



BreezeMAX[®] Extreme 5000 – Centralized Provisioning



Technical Note

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1 Scope

This document provides general guidelines to the centralized provisioning scheme of BreezeMAX PRO 5000 CPEs using an AAA RADIUS server, and BreezeMAX Extreme 5000 BTSs operating under centralized provisioning. In the example detailed here, a Radiator AAA server is used.

NOTE

"Centralized Provisioning" means that authentication is performed versus an AAA RADIUS server (central entity) and that the authentication is based on USER NAME and PASSWORD that are configured on the SU. This is in contrast to "Local Provisioning" under which authentication is performed on the BTS, and is based on the CPE-MAC address (wireless port MAC address).

This document should be used as a supplement to the system manual.

Not all the configurable parameters are mentioned in this document.

2 Site Description

A basic site configuration is illustrated in Figure 1.



Figure 1: Basic Setup

The minimum required equipment comprises a Base Transceiver Station (BTS), a PRO 5000 Customer Premises Equipment (CPE), a server running Radiator radius server and a router capable of serving as the Default Gateway and DHCP server. The network structure can be modified according to the available equipment, without restraining the generality of this document (i.e. the radius server can be used also as the Default Gateway and the DHCP server).

3 Configuring the BTS – via Monitor

The first step in building the setup is to commission the BTS. This step involves configuring a management connection to the BTS, radio settings (the wireless connection to the CPE) and available service management.

3.1 Configuring the Management Connection

 Connect a PC with an IP address from the 1.1.1.0/24 subnet to the Ethernet port of the IDU (or directly to the Ethernet port of the BTS, if the unit has a DC power supply) and telnet to 1.1.1.23. The Monitor telnet application opens. The default admin password is "admin" (see Figure 2). The default BTS IP is 1.1.1.23.



Figure 2: Main Menu

 Select 1.BTS > 4.Configuration > 3.Connectivity > 2.Update and fill in all the necessary information (management IP, Subnet, Default Gateway and VLAN – if applicable).



Figure 3: Configure Connectivity

3. Verify the connection settings by selecting 1. Show (see Figure 4). Incorrect configuration may result in connectivity loss.

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BTS-Configuration-Connectivity-Show	
Current IP Address	1.2.3.4
Configured IP Address	1.2.3.4
Current Subnet Mask	255.255.255.0
Configured Subnet Mask	255.255.255.0
Current Default Gateway	1.2.3.1
Configured Default Gateway	1.2.3.1
Current VLAN ID	1234
Configured VLAN ID	1234
Current VLAN Priority	7
Configured VLAN Priority	7
>	

Figure 4: Verifying Connection Settings

 After confirming the configured values are accurate, reboot the unit by selecting 1.BTS > 5.Unit Control > 2.Reset BTS > Confirm Reset and telnet again using those values.



Figure 5: Rebooting the Unit

3.2 Configuring the Radio Parameters

 From the main menu select 1.BTS > 4.Configuration. It is not mandatory to set the parameters in the General Parameters menu.



NOTE

When using AlvariSTAR or AlvariCRAFT, make sure the BTS Number (1.General Parameters > 2.Update > 1.BTS Number) is different for each unit commissioned.

 For centralized provisioning, select 1.BTS > 4.Configuration > 2.BTS Working Mode > 2.Update >1 (1 - Embedded Distributed ASN-GW Centralized Authentication). In the Monitor application use the TAB key to see the available options.



Figure 6: Configuring the Working Mode

3. Navigate back to the BTS > Configuration menu. Configuring the Authorized Managers is not mandatory.



NOTE

If default values are changed, only the NMS stations explicitly added will be able to access the unit using SNMP.

4. Select 1.BTS > 4.Configuration > 5.Radio > 2.Update menu. It is mandatory to set the Operator ID and Service Zone ID options with non default values. The Operation mode menu parameters (options depend on HW type and applied licenses), Band Name menu parameters and the DFS menu parameters (if applicable) must be the same as the parameters set on the CPE unit. The DFS specific parameters (CAC, Detection threshold etc) are the ones specified by the Regulatory Authority for the chosen Frequency Band and they cannot be changed.



Figure 7: Radio Channel Parameters

- 5. Navigate back to the main menu and then select 3.Sector > 2.Select >1 (Sector1) 2.Configuration > 1.General Parameters.
- 6. Select 2.Update and set the mandatory parameters (Sector Heading, Bandwidth, Frequency and Tx Power), and the optional descriptive parameters (Sector Name and Sector Location). When selecting the Tx Power consider local regulation, and the saturation threshold (-16dBm) of the CPE. Exceeding the saturation threshold could damage the unit.



NOTE

For ease of installation, remembering the selected frequency value can be helpful in narrowing the search band when configuring the PRO 5000 unit.

The DFS options should be set according to local regulation and are not the object of this document.

7. Return to the main menu. The options in the BS menu should be set, but the process is straightforward and leaving the default values will not affect the scenario presented in this document.

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```
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Main
1 - BTS
2 - ASN GW
3 - Sector
4 - BS
5 - Radio Channel
6 - Antenna
7 - GPS
8 - MS
X - Exit
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Sector
_____
1 - Show Summary
2 - Select
>2
Sector-Select
Select Sector Id
                                    : 1
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Sector-1
1 - Show
2 - Configuration
>2
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Sector-1-Configuration
_____
1 - General Parameters
2 - DFS / DCS
3 - Spectrum Analyzer
```

Figure 8: Sector Configuration

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BreezeMAX Extreme / BTS 1.2.3.4 SW Version 1.5.1.72 Sector-1-Configuration-General Param	neters
1 - Show 2 - Update >2	
Sector-1-Configuration-General Parar	meters-Update
Sector Name	: Sector 1
Sector Location	: pelab
Sector Heading (degrees)	: 60
Select frequency range	: 8
7 - [5477.500;5600] - Tx po 8 - [5475;5600] - Tx power 10 - [5600;5650] - Tx power 11 - [5600;5650] - Tx power 13 - [5650;5722.500] - Tx power 14 - [5650;5720] - Tx power	over [0;10] dBm, for 5.000 MHz bandwidth(s) [0;13] dBm, for 10.000 MHz bandwidth(s) [0;10] dBm, for 5.000 MHz bandwidth(s) [0;13] dBm, for 10.000 MHz bandwidth(s) over [0;10] dBm, for 5.000 MHz bandwidth(s) [0;13] dBm, for 10.000 MHz bandwidth(s)
Select frequency range	: 8
Bandwidth	: 5
Enter: 5 - 10.000 MHz.	
Bandwidth	: 5
Frequency (MHz)	: 5590
TX Power (dBm)	: 13
Enter a transmission power in the ra	ange: $[0;13]$ [dBm].
TX Power (dBm)	: 13
Reboot the BTS for the changes to ta	ake effect

Figure 9: Sector General Parameters Configuration

8. From the main menu select 5.Radio Chanel > 2.Select > 1 > 2.Update > Admin Status: 1 (Enable).



Figure 10: Configuring Radio Channel Admin Status

Return to the main menu and then select 6.Antenna > 2.Select > 1
 >2.Update and set all the required options.

```
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Antenna-Antenna ID 1
_____
1 - Show
2 - Update
>2
Antenna-Antenna ID 1-Update
_____
Antenna Gain (dBi)
                                 : 14
Beam Width (degrees)
                                 : 90
Antenna Polarization
Enter:
1 - Vertical
2 - Horizontal
3 - Dual Slant
4 - Omni
Antenna Polarization
Antenna Type
Enter
1 - Integral
Antenna Type
                                 : 1
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
Antenna-Antenna ID 1
_____
1 - Show
 - Update
2
```

Figure 11: Configuring Antenna Parameters

Make sure the antenna parameters, correspond to the parameters actually used (integral/external, polarization etc). In addition, the antenna gain should be set so that the actual Tx power measured at the end does not to exceed the saturation threshold of the CPE.

10. Return to the main menu and select 7.GPS > 2.Configuration > 1.Chain Parameters > 2.Update.

```
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
GPS-Configuration-Chain Parameters
_____
1 - Show
2 - Update
>2
GPS-Configuration-Chain Parameters-Update
Chain Number
                               : 123
                               : 0
GPS Type
Enter O - None, 1 - Trimble. Default value is 1 - Trimble
GPS Type
                               : 0
Reboot the BTS for the changes to take effect
Hold Over Passed Timeout (min)
                               : 30
Stop Tx After Hold Over Timeout
                               : +00:00
Time Zone Offset From UTC
Daylight Saving
BreezeMAX Extreme / BTS 1.2.3.4
SW Version 1.5.1.72
GPS-Configuration-Chain Parameters
______
 - Show
1
   Update
```

Figure 12: Configuring GPS

If the setup is carried out in laboratory conditions (no GPS satellites available) make sure the GPS type is set to 0 (None) otherwise the radio channel will not go UP. If satellites are detected, the system needs at least four of them in order to start and at least two in order for the BTS to be synchronized.

NOTE

The GPS chain must be different from the default value.

3.3 Configuring Services

The mechanism of selecting flows of data and offer quality of service (QoS) according to predefined criteria is realized through the "Services". In order to offer maximum flexibility and modularity, the services are broken in several interlaced modules.

To configure "Services" select 2.ASN GW > 2.Services. Because some modules depend on other modules in order to create a Service, start from the bottom of the list (6.Forwarding Rule) and work your way up to the top (2.Service Profile). For example, in order to define a Service Interface, a Forwarding Rule must be created first. In order to delete a Service, start from the top down (one cannot delete a module unless all the dependencies on that module are deleted). A synthetic list of all the necessary modules to be configured is presented in Figure 14.



NOTE

After rebooting the unit in order to change the BTS working mode, a new menu appears under 2.ASN GW: 1.AAA. In addition, the "Add" option under 1.MSs Services disappears. This will be discussed further in Section 5 Provisioning the CPE.



Figure 13: Services Menu

3.3.1 Forwarding Rules

Forwarding Rules refers to Multicast and Broadcast traffic and how it should be treated by the ASN. To create a Forwarding Rule, from the main menu select 2.ASN GW > 1.Services >6.Forwarding Rules > 4.Add. A configuration model is presented below (see Figure 15).

ASN GW-Services-Forwarding Rules-fr	_ip_cs_mng-Update
Forwarding Rule Name	: fr_ip_cs_mng
Enter a string of 1 to 32 printable	characters
Forwarding Rule Name	: fr_ip_cs_mng
Relay Mode	: 2
Enter 1 - Enable, 2 - Disable	
Relay Mode	: 2
Unknown Packet Forwarding Mode	: 2
Enter 1 - Forward, 2 - Discard	
Unknown Packet Forwarding Mode	: 2
OoS Type	: 3
Enter 1 $-$ BE, 3 $-$ NRT	
Oos Tune	. 3
CD CD	• 1
or Enter a decimal number in the range	• ±
children a decimal humber in the range	
	: 1
CIR (Kbps)	: 256
Enter a decimal number in the range	32 to 54000
CIR (kbps)	: 256
MIR (kbps)	: 512
Enter a decimal number in the range	32 to 54000
MIR (kbps)	: 512
Transaction succeeded	

Figure 14: Forwarding Rule Creation

3.3.2 Service Interfaces

The Service Interfaces menu deals with the transition between the network side of the service (the backbone link) and the wireless side. This is where the VLAN (for the network side) and Convergence Sublayer type (for the wireless side) are defined. In order to configure a Service Interface at least one Forwarding Rule must be preconfigured. An example of Service Interface configuration is available in the Figure 16. From the Service (2.ASN GW > 2.Services) menu select 5.Service Interfaces > 4.Add and fill in the requested information.

ASN GW-Services-Service Interfaces-s	:i_ip_cs_mng-Update
Service Interface Name	: si_ip_cs_mng
Enter a string of 1 to 32 printable	characters
Service Interface Name	: si_ip_cs_mng
Forwarding Rule Name	: fr_ip_cs_mng
Enter a string of 1 to 32 printable	characters
Forwarding Rule Name	: fr_ip_cs_mng
CS Type	: 2
Enter 1 - Ethernet CS, 2 - IP CS. De	efault value is 2 - IP CS.
CS Type	: 2
Inner DSCP Marking	: 2
Enter 1 - Enable, 2 - Disable	
Inner DSCP Marking	: 2
VLAN Interfaces	: 1
Enter 1 - Enable, 2 - Disable. Defau	ult value is 1 - Enable.
VLAN Interfaces	: 1
Interface VLAN (1Q)	: 200
Enter a decimal number in the range	1 to 4094. Empty or 4096 input means Untagged
Interface VLAN (1Q)	: 200
Interface Priority (1P)	: 1
Enter a decimal number in the range	0 to 7.
Interface Priority (1P)	: 1
Transaction succeeded	

Figure 15: Service Interface Creation

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3.3.3 Service Group

A Service Group defines the DHCP mode to be used for acquiring IP address configurations for the CPE, and for other devices behind the CPE. To create a Service Group, from the Services menu select 4.Service Groups > 4.Add. A configuration model is presented below (see Figure 17).



Figure 16: Service Group Creation

Starting with release 1.5, an internal DHCP server can be used and Relay functionalities are enabled. The DHCP Relay and Forward capabilities imply complex settings on network and DHCP side and they are not the object of this document.

In order to setup an internal DHCP server select DHCP type 5 (server) and fill in the desired values. A configuration model is presented in the figure below (Figure 17).

ASN GW-Services-Service Groups-sg srv-Update						
	======					
Service Group Name :	sg_srv					
Dhcp Type :						
Enter 1 - None, 2 - Relay With Option	82, 3 - Forward With Option 82, 4 - Transp					
arent, 5 - Server						
Dhcp Type :	5					
Nomadic Mode :	2					
DHCP Pool IP Address :	10.1.80.0					
Dhcp Pool Subnet Mask :	255.255.255.0					
DHCP IP Address :	10.1.80.5					
DHCP Pool Dns Ip Address 1 :	10.1.30.1					
DHCP Pool Dns Ip Address 2 :	0.0.0.0					
DHCP Lease time :	3600					
CPE Management Server :	http://ACSIP:8080/dps/TR069					
Enter a string of up to 100 printable	characters					
CPE Management Server :	http://ACSIP:8080/dps/TR069					
AAA Attribute 31 :	1					
AAA Attribute 32 :	1					
Default Gateway :	10.1.80.1					
VLAN ID :	4096					
In order to apply the settings, all MSs using this Service Group may be deregist						
ered.						
Are you sure you want to continue? [Y/N] y						
Transaction succeeded						

Figure 17: Service Group – Internal DHCP Server

DHCP Pool IP represents the subnet pool for the DHCP Clients, DHCP IP Address is the Server's IP (the IP of the subinterface in the served subnet), the CPE Management Server is the ACS server address, the Default GW is the Default GW address sent in the DHCP Offer and the VLAN ID is the VLAN of the Service Interface used for the clients.

3.3.4 Multiple Service Flows

Multiple Service Flows is where the ASN behavior regarding data flows belonging to certain Service Groups is defined. In order to create a Multiple Service Flow (MSF) at least one Service Group should be already defined.

- To create an MSF, from the Services menu select 3.Multiple Service Flows > 4.Add.
- 2. After the new MSF is created, navigate to 2.Select from list or 3.Select by name option to select the newly created MSF. The Service Rules menu allows a new Service Rule to be created for the selected MSF. The rules apply to the Service Interface defined in the menu. After the Service Rule is created, a Classifiers menu becomes available under the newly created Service Rule.

The Classifiers are used to classify the Downlink and Uplink streams of each defined service flow. The next figures show a configuration model for each of the previously discussed parameters.

Figure 18: MSF Creation

ASN GW-Services-Multiple Service Flows-msf_ip_cs_mng-Service Rules-Service Interface Name : si_ip_cs_mng Enter a string of 1 to 32 printable characters Service Interface Name : si_ip_cs_mng Transaction succeeded

Figure 19: Service Rule Creation

ASN GW-Services-Multiple Service Flo	០ឃ	3-ma	sf_ip_cs_mng-Service Rules-1-Classifiers-
	===	====	
Uplink Classifier Type		1	
Enter O - Any, 1 - DSCP.			
Uplink Classifier Type		1	
Uplink Classifier Parameter 1		6	
Enter a decimal number in the range	Ο	to	63
Uplink Classifier Parameter 1		6	
Uplink Classifier Parameter 2		6	
Enter a decimal number in the range	Ο	to	63
Uplink Classifier Parameter 2		6	
Downlink Classifier Type		1	
Enter O - Any, 1 - DSCP.			
Downlink Classifier Type		1	
Downlink Classifier Parameter 1		6	
Enter a decimal number in the range	Ο	to	63
Downlink Classifier Parameter 1		6	
Downlink Classifier Parameter 2		6	
Enter a decimal number in the range	0	to	63
Downlink Classifier Parameter 2		6	
Transaction succeeded			

Figure 20: Classifiers Creation

3.3.5 Service Profile

The Service Profile Menu (2.Service Profiles > 4.Add from the services menu) enables QoS treatment for defined service flows. The current software version supports five types of service profiles (1 - Data, 2 - VoIP, 3 -Management, 4 - PPPoE, 6 - Reliable Video).

1. In order to create a QoS profile a Service Profile must be first created.



Figure 21: Service Profile Creation

- 2. After the profile is created, navigate to 2.Select from list or 3.Select by name to select the profile.
- Select 4.QoS Profiles > 4.Add to add a new QoS profile. A configuration model is presented below (see Figure 23).

```
ASN GW-Services-Service Profiles-sp1-QoS Profiles-Add
UpLink QoS Type
Enter 1 - BE, 3 - NRT, 5 - ERT
UpLink QoS Type
UpLink CP
Enter a decimal number in the range 1 to 2
UpLink CP
                               : 1000
UpLink CIR (kbps)
                                : 5000
UpLink MIR (kbps)
DownLink QoS Type
Enter 1 - BE, 3 - NRT, 5 - ERT
DownLink QoS Type
DownLink CP
Enter a decimal number in the range 1 to 2
DownLink CP
                               : 2
DownLink CIR (kbps)
                               : 1000
DownLink MIR (kbps)
                               : 5000
Transaction succeeded
```

Figure 22: Configuring a QoS Profile

If needed, other services can be created using the same pattern.

3.3.6 Default Services

Starting with release 1.5 the BTS can be provisioned with Default Services. This method is recommended for quick setups for trials or where complex network settings are not available.

There is one provisioning scenario available: ETH CS Management and Data. ETH CS Data is using a Service Interface with VLAN ID 1234 (the BTS Management should be configured on the same 1234 VLAN).

In order to use Default Services, they have to be first created. Go to 2. ASN GW -> 1. Services -> 7. MSs Default Services and select option 2. Create Default Services.



Figure 23: Default Services

After the services are created (a list of successful transactions should be displayed), you can check them by browsing each category (Forwarding Rules, Service Interfaces etc) – you can identify them by the naming convention: **[[ServiceName]]**.

4 Configuring the CPE – via the WEB

Configuring the Customer Premises Equipment (CPE) from the web browser implies having direct access to the device.

- The default IP address of the CPE is 192.168.254.251. Therefore, first assign an IP of the same class to the managing computer (192.168.254.250 is the default TFTP server for the CPE, so if other operation are considered this would be the preferred choice of an IP).
- 2. After the IP is configured on the management machine, open a browser window and go to <u>http://192.168.254.251</u>. The default login password is "installer".



Figure 24: CPE Default Screen

3. From the main menu select Radio > Frequency Scanning and select an appropriate start and end frequency for the scanning and also the scanning main step and bandwidth.



Figure 25: Configuring Scanning Parameters

4. Click Apply and make sure that the scanning table list is updated. If the range is correctly chosen, after few minutes the Best BS scanning table should also be populated (see Figure 26).

	Scannii	ng Table				
	Full Scanni	ing table list				
Rx Frequency	/(KHz)		Bandwidtł	n		
547000	0		10MHz			
547250	0		10MHz			
547500	5475000			10MHz		
547750	5477500		10MHz			
548000	0		10MHz			
Best	t BS Scanning tab	le list				
BS ID	Rx Frequency (KHz)	SNR(dB)	RSSI(dBm)	Bandwidth		
13.13.13.16.236.1	5475000	25.49	-79.32	10MHz		
	Update Sc	anning Table				

Figure 26: Scanning Table

The same information is also available in the BST/AU menu.

Selected BST/AU ID 0.0.0.0.0.0 Selected Rx Frequency 0 Selected Best BS RSSI(dBm) Ο Selected Best BS SNR(dB) 0 Selected BW 0 Best BST/AU Table Rx Frequency (KHz) BS ID SNR(dB) RSSI(dBm) Bandwidth 13.13.13.16.236.1 5475000 25.81 -79.32 10MHz BST/AU and Preferred BST/AU Parameters BST/AU ID 0 .0 . 0 .0 . 0 .0 BST/AU ID Mask 0 ,0 . 0 .0 , 0 .0

Selected BST/AU Parameters

Figure 27: BST/AU Menu

5. In the Registration menu, select Registration submenu. Fill in the user name and password (also retype the password) and check the "EAP TTLS" radio button. Reset the unit whenever requested to.



Figure 28: Registration Menu

6. Click "Show all".



Figure 29: Identifying the CPE MAC

NOTE

The printed MAC Address (as shown in Figure 29) is the MAC used for the Ethernet link of the CPE. The MAC address used on air (the one seen by the BTS) is hexadecimal incremented by 1 (in the above example the air MAC would be 00:12:CF:C8:DE:A5).

5 **Provisioning the CPE**

The process of configuring the BTS for centralized provisioning is handled by the AAA server (release 1.5 supports FreeRadius in addition to release 1.2).

 Before configuring the radius server to handle the provisioning requests, the user must specify the way in which the BTS is to reach it. Select 2.ASN GW > 1AAA > 2.Configuration.

```
BreezeMAX-Extreme / BTS 10.1.200.5
SW Version 1.2.1.4
ASN GW
_____
1 - AAA
2 - Services
   MAC Access Lists
>1
BreezeMAX-Extreme / BTS 10.1.200.5
SW Version 1.2.1.4
ASN GW-AAA
_____
1 - Show Summary
2 - Configuration
>2
BreezeMAX-Extreme / BTS 10.1.200.5
SW Version 1.2.1.4
ASN GW-AAA-Configuration
1 - AAA Client
2 - Authentication Servers
   Accounting Servers
```

Figure 30: AAA Configuration Menu

The default values for the 1.AAA Client are shown in Figure 30. If the default parameters are not suitable for your setup, they can be changed by selecting the "2. Update" option.

BreezeMAX-Extreme / BTS 10.1.200.5 SW Version 1.2.1.4 ASN GW-AAA-Configuration-AAA Client		
1 - Show		
2 - Update		
>1		
ASN GW-AAA-Configuration-AAA Client-	Sł	10W
	==	
Retry Interval (sec)	:	5
Maximum Number of Retries	:	3
Keep Alive Timeout (sec)	:	60
>		

Figure 31: Default AAA Client Configuration

Point to the intended AAA server. Select 2.Authentication Server > 3.Add and fill in the information as shown in Figure 31.

BreezeMAX-Extreme / BTS 10.1.200.5 SW Version 1.2.1.4
ASN GW-AAA-Configuration-Authentication Servers
1 - Show Summary
2 - Select
3 - Add
>3
ASN GW-AAA-Configuration-Authentication Servers-Add
Server IP Address : 10.1.200.3
Server Alias : alva
Shared Secret : *******
Re-enter Shared Secret : *******
UDP Port Number : 1812

Figure 32: Authentication Server Designation

Select an accounting server by navigating to 3.Accounting Servers > 3.Add and fill in the required information.

```
BreezeMAX-Extreme / BTS 10.1.200.5
SW Version 1.2.1.4
ASN GW-AAA-Configuration
1 - AAA Client
2 - Authentication Servers
3 - Accounting Servers
BreezeMAX-Extreme / BTS 10.1.200.5
SW Version 1.2.1.4
ASN GW-AAA-Configuration-Accounting Servers
_____
1 - Show Summary
2 - Select
3 - Add
ASN GW-AAA-Configuration-Accounting Servers-Add
Server IP Address
                                : 10.1.200.2
Server Alias
                               : alva
                               : *******
Shared Secret
Re-enter Shared Secret
UDP Port Number
                                : 1813
```

Figure 33: Accounting Server Designation

4. Verify if the appointed radius server is up and running by selecting "1.Show Summary". This is correlated with the AAA Client setting previously discussed.



Figure 34: Authentication Server Status

5.1 Radiator

Access the Radiator server and edit the significant configuration file.

1. The first file to edit is "/opt/Radiator/config/include/Clients.inc".

The declaration format for the file is:

```
<Client <BTS_IP>>
```

Secret <secret> DupInterval 0 NasType unknown

</Client>

<BTS_IP> is the BTS IP, and <secret> is the chosen secret (the one set in the previous paragraph).

2. Next, edit the "/opt/Radiator/etc/wimax_users" file.

The Declaration format for this file is:

```
<user>@<realm> Password=<user_password>
Reply-Message="<custom reply message>",
Session-Timeout=2000,
Filter-
Id="SP=sp_ip_cs_mng:MSF=msf_ip_cs_mng;SP=sp_eth_cs_data:M
SF=msf_eth_cs_data;"
```

<user>@<realm> is the user set on the CPE under the Registration TAB.

<user_password> is the Registration password

sp_ip_cs_mng, msf_ip_cs_mng, sp_eth_cs_data and msf_eth_cs_data are the services defined for the BTS.

5.2 Freeradius

1. Access the Radiator server and edit the significant configuration file.

The first file to edit is "/usr/local/etc/raddb/Clients.conf".

The declaration format for the file is:

```
client <BTS_IP> {
    secret = <secret>
    shortname = justaname
}
```

<BTS_IP> is the BTS IP, and <secret> is the chosen secret (the one set in the previous paragraph).

2. Next, edit the "//usr/local/etc/raddb/ users" file.

The Declaration format for this file is:

<user>@<realm> Cleartext-Password := "<user_password>"

Termination-Action = RADIUS-Request

<user>@<realm> is the user set on the CPE under the Registration TAB.

<user_password> is the Registration password

sp_ip_cs_mng, msf_ip_cs_mng, sp_eth_cs_data and msf_eth_cs_data are the services defined for the BTS (the Default Services created can be used also).

3. After successfully adding all the desired services, to verify that the CPE is up and running, from the BTS main menu select 8.MS > 1.Show Summary.

BreezeMAX-Extreme / BTS 10.1.200.5	
SW Version 1.2.1.4	
ns	
==	
1 - Show Summary	
2 - Show Summary By BS	
3 - Show Concise Summary	
4 - Show Concise Summary By BS	
5 - Select By MAC	
>1	
MS-Show Summary	
=============	
MS MAC Address	: 00-12-cf-c8-de-f9
MS IP Address	: 10.1.200.52
BS ID	: 1
Operational Status	: In Service
Total Number Of MSs	: 1
Total Number Of MSs Connected to BS	1: 1
Total Number Of MSs Connected to BS	2: 0
>	

Figure 35: CPE Status Checking

6 Configuring the BTS – via AlvariCRAFT

All the above configurations can also be carried out via a Graphic User Interface (GUI) using AlvariCRAFT. Launch AlvariCRAFT for the selected BTS. (For information on installing and using AlvariCRAFT see the AlvariCRAFT user manual). Make sure that the BTS is manageable from AlvariCRAFT. The state of the BST must be Up.

BTS1PE on 10.1.200.5 -	- Configuring Equipment	- 🗆 X
BreezeMAX Extreme	BreezeMAX Extreme	
BTS		
🕀 🗀 ASN-GW		
Gector		
⊕ - 22 BS		
Radio Channel		
Antenna		
	Refresh	Apply
Done.		

Figure 36: AlvariCRAFT Default Screen

The general connectivity options (as discussed in section 3.1) can be configured using the various tabs of the BTS menu.

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III BTS1PE on 10.1.200.5 - C	Configuring Equipment			- 🗆 X
BreezeMAX Extreme	BTS			
⊕-	General Management Connectivity	Properties Radio Frequency B	and File Authorized Managers	Unit Control
🕀 🗀 Radio Channel				
🕀 🧀 Antenna	General			
-D GPS	Operator Name	sadis	Service Zone Name	PE Zone
L_D MS	Current		Configured	
	Operator ID	13.13.13	Operator ID	13.13.13
	Service Zone ID	135	Service Zone ID	135
	Band Name	5.4GHz Universal	Band Name	5.4GHz Universal
	ATPC			
:	ATPC Mode	Open Loop		
:	DL/UL Ratio			
	Current		Configured	
	DL/UL Ratio	DL = 60% : UL = 40% ✓	DL/UL Ratio	DL = 60% : UL = 40%
	Supported Frequency Band			
	Name	5.4GHz Universal	Start Frequency (MHz)	5470.000
	Applicable Bandwidth (MHz)	5.0,10.0	Stop Frequency (MHz)	5900.000
	DFS Type	None		
	Operation Mode			
	Current		Configured	
	Single Sector Single BS with D	Diversity	Single Sector Single BS wit	h Diversity
	Single Sector Single BS no Div	versity	Single Sector Single BS no	Diversity
	<			
				Metresh Apply
Done.				

Figure 37: BTS Menu

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The radio parameters (as discussed in section 3.2) can be configured using SECTOR, BS, RADIO CHANNEL, ANTENNA and GPS screens and their various tabs. The process is straight forward and the parameters are the same as those discussed for the "Monitor" application (see the following figures).

III BTS1PE on 10.1.200.5 -	Configuring Equipment				- 🗆 ×
BreezeMAX Extreme BTS Sn-GW	Sector ID 1				
Sector ID 1 Sector ID 1 B5 B5 B5 B5 B5	General Sector ID 1 Sector Location peLab]	Sector Name Sector Heading (deg)	sector1 60	~
Radio Channel 1 Radio Channel 2 Antenna	Current		Configured		_
Antenna 1 Antenna 2	Bandwidth (MHz) 10 Frequency (MHz) 5475. TX Power (dPm) 16.00	.000	Bandwidth (MHz) Frequency (MHz)	10 ¥ 5475.000	
—_] GPS —_] MS	BTS Supported Frequency Band	·	TX Power (dbiii)	15.00	
	Name 5.4GH Start Frequency (MHz) 5470.	000	Stop Frequency (MHz)	5900.000	
	Applicable Bandwidth (MHz) 5.0,10 Allowed Tx Power From (dBm) 00.00)	Frequency Resolution (KHz) Allowed Tx Power To (dBm)	2500,5000 21.00	
	Radio Operation Mode Single Single Diversi	Sector Single BS with			
	Associated Antenna				
	Antenna Index Antenna 1 14 2 14	a Gain (dBi) Beam Wid 60 60	rn (degrees) Antenna Polarizati Dual Slant Dual Slant	on Antenna Type External External	_
	Associated BSs & Radio Channels BS Index BS ID	BS Name	Radio Channel Fre BS Bandwid	th (MHz) Radio Channel ID	×
Done.	🌯 💿			efre	esh 🖌 Apply

Figure 38: Sector ID Menu

I BTS1PE on 10.1.200.5 -	Configuring Equi	pment					-	□ ×
BreezeMAX Extreme	S 1							
😑 🗁 Sector	General MAC	Properties	;					^
Sector ID 1		u						
BS 1	MAC							
😑 🗁 Radio Channel	Current				Configured			
- Radio Channel 1	Cell Number		12		Cell Number		12 🗘	
Radio Channel 2	Segment Nu	mber	1		Segment Number		1 🗘	
😑 🗁 Antenna	Cell Radius (m)	40000		Cell Radius (m)	40000	~	
Antenna 1	Map Repetit	ion	1		Map Repetition	1	~	
	Compressed	Мар	Uplink + Downli	nk		L		
└─ ` MS								
	Preamble In	dex	44					
	•							
	Multi Rate				Configured			
	Uplink Multi	Rate			Configurou			
	Uplink Multi I	Rate Mode	Enable	 Disable 	Uplink Multi Rate Mode	Enable	 Disable 	
	Uplink Basic	Rate	QPSK-CTC-1/2		Uplink Basic Rate	QP5K-CTC-1/2	~	-
	Uplink Fade	Margin (dB)	2		Uplink Fade Margin (dB)		2 🗘	
	Downlink Mu	lti Rate						
	Downlink Mu	lti Rate Mode	Enable	 Disable 	Downlink Multi Rate Mode	Enable	 Disable 	
	Downlink Ba	sic Rate	QP5K-CTC-1/2		Downlink Basic Rate	QPSK-CTC-1/2	~	
	Downlink Fa	de Margin (dB)	2		Downlink Fade Margin (dB)		2 🗘	
	PHY General							
	Current				Configured			
	🗞 📀						🔗 <u>R</u> efresh 🛛 🖌 🖉	1. pply
Done.								

Figure 39: BS Menu

I BTS1PE on 10.1.200.5 -	Configuring Equipment	_ 🗆 🗧
BreezeMAX Extreme BTS Grant ASN-GW	GPS	
	Chain Configuration Current GPS Type None Configured GPS Type	None V
	Chain Number 11 GPS Daylight Saving C	
Radio Channel	Hold Over Passed Timeout (min) 30 Stop Date C	00.00
Antenna	Time Zone Offset From UTC +00:00 Advance Hour Factor	+00:00
Antenna 2	Current Configured	Distribution
MS	External 1 PPS Clock Disable External 1 PPS Clock External 1 PPS Clock External 10 MHz Clock External 10 MHz Clock	Disable V
	Clock Mode Master Clock Mode M	Master
	GPS Info Number Of Rx Satellites 0 Latitude 0	000.000
	Local Date And Time 06:35:24 23/01/1991 Longitude C Signal Processor SW Version Unknown Altitude C	000.000
	Navigation Processor SW Version Unknown	
	GPS Status	
	BS Tx Hold Over T/O Hold Over GPS Com 2 Sat & more 4 Sat & more E: OK None OK OK	Ext 10MHz Ext 1PPS OK
		🚱 <u>R</u> efresh 🖌 🖌 Apply
Done.		

Figure 40: GPS Menu

I BTS1PE on 10.1.200.5 -	Configuring Equipment		- 🗆 X
BreezeMAX Extreme	Radio Channel 1		
Car Sector			
e- 🗁 BS	General		
└─ □ BS 1	Radio Channel Number	1	
😑 🗁 Radio Channel	Admin status	Enable 🗸	
Radio Channel 1	Operational Status	Up	
Radio Channel 2			
Antenna	Associated Sector Information		
Antenna 1	Sector ID	1	
	Sector Name	sector1	
	Bandwidth (MHz)	10	
	TX Power (dBm)	16.00	
	Frequency (MHz)	5475.000	
	Associated BS Information		
	BS Index	1	
	DO INGON	*	
	0100	13,13,13,10,230,1	
	BS Name	PE1BTS	
	Bandwidth (MHz)	10	
	R ()		🔗 <u>R</u> efresh 🛛 🖌 Apply
Done.			

Figure 41: Radio Channel Menu

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The AAA configuration is carried out by selecting ASN GW >AAA >Radius Client menu.

III BTS1PE on 10.1.200.5 -	Configuring Equipment					-	□ ×
BreezeMAX Extreme	S Radius Client						
e- 🗁 ASN-GW							
E 🗁 Services							^
MS Service Tables MS Service Profiles Multiple Service Flo Service Groups	General Parameters Retry Interval (s) Max Number Of Retries						
Service Interfaces Service Interfaces	Keep Alive T/O (s)		60	0 🗘			
- Corwarding Rules	Authentication Servers						_
Radius Client	Authentication Server Sh	ared Secret Kev					
HAC Lists Sector	Retype Authentication Se	rver Shared Secret Key					
- Sector ID 1							
e 🗁 BS	No 1	Server IP Address 10.1.200.2	tripla	UDP Port 1812	Management Port Adopt None	Oper Status	
- BS 1	-						
e-🗁 Radio Channel					Update	Add Delete	
Radio Channel 1							
Radio Channel 2	Accounting Servers						_
- Antenna	Accounting Server Share	Secret Key					
Antenna 1	Accounting Server Shares						
Antenna 2	Retype Accounting Serve	r Shared Secret Key					
		Community and design	Comment Man	LIDD D-ut	Manager Britshall	On an Chaban	
	1	10.1.200.2	berver Allas	1813	Yes	Uper Status	
	-						
					Update	Add Delete	>
<	🌯 💿					🔗 <u>R</u> efresh 🛛 🖌 <u>A</u>	pply
Done.							

Figure 42: Radius Client Menu

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To create a service select ASN GW >Services menu.

I BTS1PE on 10.1.200.5 -	Configuring Equipment	_ 🗆 X
BreezeMAX Extreme	Multiple Service Flow	
BTS		
e- 🗁 ASN-GW		
- 🗁 Services	Multiple Service Flow	~
- MS Service Tables		
- Service Profiles	Name	
- Multiple Service Flo	msfm General	
- Service Groups	mstd general MEE Name met in se me	
- Service Interfaces	ms/_et_cs_data	
Forwarding Rules	Service Group Name gsg V	
e- 🗁 AAA	Service Operation Mode Bridge 🗸	
Radius Client		
- 🖂 MAC Lists		
e- 🗁 Sector	Add Delete	
Sector ID 1		
e-🗁 BS	Rules & Classifiers	
BS 1	MSF Name Service Rule Service Inte MSF Name Service Rule No Classifier No	
😑 🗁 Radio Channel	msf_jp_cs_mng 1 si_jp_cs_mng 1 1 1	
- Radio Channel 1		
Radio Channel 2		
😑 🗁 Antenna		
- Antenna 1		
Antenna 2		
GPS	u	
└── <u></u>] MS	Classifier Type DSCP 🗸	
	Classifier Start/Stop Value 6 6 6	
	Classifier Type	
	Classifier Start/Stop Value 6 0 6	
	Add Delete	\sim
< >	le resh	Apply
Done.		

Figure 43: MSF Menu

III BTS1PE on 10.1.200.5 - Configuring Equipm	ient		- 🗆 X
BreezeMAX Extreme	files		
	inco		
e 🗁 ASN-GW			
Services Service Profile			^
MS Service Tables			
Service Profiles Name	Туре		
Multiple Service Flo	Management	General	
Service Groups Spd Spd Spin cs mpd	Data	Service Profile Name Service Profile Type HARO Repetition	
Service Interfaces sp_eth_cs_data	Data	sp. in. cs. mpg. Management M. 4	
Forwarding Rules			
Radius Client			
⊕- □ MAC Lists			
Sector			
Sector ID 1	Add Delete		
QoS Profile			_
Badio Channel 1		1	
Radio Channel 1 Service Profile Na Service Profile Na Service Profile Na	ne QoS Prohile No		
		OoS Profile	
Antenna 2		QoS Type Committed Priority MIR (Kbps) CIR (Kbps)	
		UL nRT 🗸 1 🗸 512 256	
MS MS		DL nRT V 1 V 512 256	
	Add Delete]	~
		efresh	🖌 Apply
Done.			

Figure 44: SP Menu

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The rules described in section 3.3 still apply for creating the services. Modules should be configured bottom up: from Forwarding Rules to Service Profiles, and deleted top down. After creating objects under each menu, double click on them to expand, if needed.