Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Airframe Dynamic Permutation parameters of a specific BS. Do not specify a value for this parameter if you want to display the Airframe Dynamic Permutation parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing Neighbour BS in each of the existing BSs if requested for all)

```
BSIDLSB                          :<value>
DownlinkPermutationBase          :<value>
UplinkPermutationBase            :<value>
```

Command Modes

Global command mode

4.8.19.5.12 Displaying Configuration Information for All Airframe Parameters

To display configuration for all Airframe parameters, run the following command:

npu# show airframe-all bs [<(1 to 16777215 StepSize 1)>]

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Airframe parameters of BS 66503, run the following command:

npu# show airframe-all bs 66053

Do not specify the BS ID if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show airframe-all bs

Command Syntax **npu# show airframe-all bs** [<(1 to 16777215 StepSize 1)>]

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display all Airframe parameters of a specific BS. Do not specify a value for this parameter if you want to display all Airframe parameters of all BSs.	Optional	N/A	1-16777215

Command Modes Global command mode

4.8.20 Managing Rate Adaptation Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Rate Adaptation parameters (refer to Section 4.8.20.1).
- Restore the default values of some or all of the Rate Adaptation parameters (refer to Section 4.8.20.2).

You can display configuration information for the Rate Adaptation parameters of a selected or all existing BSs (refer to Section 4.8.20.3).

4.8.20.1 Configuring Rate Adaptation Parameters

To configure the Rate Adaptation parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# rateadapt-general [dl-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}] [ul-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour |ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}] [mincinr-qpsk-1by2-rep6 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)>] [mincinr-qpsk-1by2 <(-20 to 30 StepSize 1)>] [mincinr-qpsk-3by4 <(-20 to 30 StepSize 1)>] [mincinr-qam16-1by2 <(-20 to 30 StepSize 0.1)>] [mincinr-qam16-3by4 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)>] [mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)>]

Command Syntax

```
npu(config-bs-66053)# [dl-basicrate {ctcQpskOneOverTwoTimesSix |
ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo |
ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo
| ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo |
ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour |
ctcQamSixtyFourFiveOverSix} ] [ul-basicrate
{ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour |
ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo |
ctcQpskThreeOverFour |ctcQamSixteenOneOverTwo |
ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo |
ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour |
ctcQamSixtyFourFiveOverSix} ] [mincinr-qpsk-1by2-rep6 <(-20 to 30
StepSize 0.1)> ] [mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize
0.1)> ] [mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)> ]
[mincinr-qpsk-1by2 <(-20 to 30 StepSize 1)> ] [mincinr-qpsk-3by4
<(-20 to 30 StepSize 1)> ] [mincinr-qam16-1by2 <(-20 to 30
StepSize 0.1)> ] [mincinr-qam16-3by4 <(-20 to 30 StepSize 0.1)> ]
[mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)> ]
[mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)> ]
[mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)> ]
[mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)> ]
```

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
dl-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}	The downlink basic rate	Optional	ctcQpskOneOverTwoTimesSix	■ ctcQpskOneOverTwoTimesSix ■ ctcQpskOneOverTwoTimesFour ■ ctcQpskOneOverTwoTimesTwo ■ ctcQpskOneOverTwo ■ ctcQpskThreeOverFour ■ ctcQamSixteenOneOverTwo ■ ctcQamSixteenThreeOverFour ■ ctcQamSixtyFourOneOverTwo ■ ctcQamSixtyFourTwoOverThree ■ ctcQamSixtyFourThreeOverFour ■ ctcQamSixtyFourFiveOverSix

	ul-basicrate {ctcQpskOneOverTwoTimesSix | ctcQpskOneOverTwoTimesFour | ctcQpskOneOverTwoTimesTwo | ctcQpskOneOverTwo | ctcQpskThreeOverFour | ctcQamSixteenOneOverTwo | ctcQamSixteenThreeOverFour | ctcQamSixtyFourOneOverTwo | ctcQamSixtyFourTwoOverThree | ctcQamSixtyFourThreeOverFour | ctcQamSixtyFourFiveOverSix}	The uplink basic rate	Optional	ctcQpskOneOverTwo	■ ctcQpskOneOverTwoTimesSix ■ ctcQpskOneOverTwoTimesFour ■ ctcQpskOneOverTwoTimesTwo ■ ctcQpskOneOverTwo ■ ctcQpskThreeOverFour ■ ctcQamSixteenOneOverTwo ■ ctcQamSixteenThreeOverFour ■ ctcQamSixtyFourOneOverTwo ■ ctcQamSixtyFourTwoOverThree ■ ctcQamSixtyFourThreeOverFour ■ ctcQamSixtyFourFiveOverSix
	mincinr-qpsk-1by2-rep6 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow QPSK 1/2 Repetition 6 Uplink transmissions. Cannot be higher than mincinr-qpsk-1by2-rep4	Optional	-20	-20 to 30 in steps of 0.1

mincinr-qpsk-1by2-rep4 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow QPSK 1/2 Repetition 4 Uplink transmissions. Must be in the range from mincinr-qpsk-1by2-rep6 to mincinr-qpsk-1by2-rep2	Optional	-20	-20 to 30 in steps of 0.1
mincinr-qpsk-1by2-rep2 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow QPSK 1/2 Repetition 2 Uplink transmissions. Must be in the range from mincinr-qpsk-1by2-rep4 to mincinr-qpsk-1by2	Optional	-20	-20 to 30 in steps of 0.1
mincinr-qpsk-1by2 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow QPSK 1/2 Uplink transmissions. Must be in the range from mincinr-qpsk-1by2-rep2 to mincinr-qpsk-3by4	Optional	-20	-20 to 30 in steps of 0.1
mincinr-qpsk-3by4 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow QPSK 3/4 Uplink transmissions. Must be in the range from mincinr-qpsk-1by2 to mincinr-qam16-1by2	Optional	-20	-20 to 30 in steps of 0.1

	mincinr-qam16-1by2 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow 16QAM 1/2 Uplink transmissions. Must be in the range from mincinr-qpsk-3by4 to mincinr-qam16-3by4	Optional	-20	-20 to 30 in steps of 0.1
	mincinr-qam16-3by4 <(-20 to 50 StepSize 1)>	The minimal CINR in dB Required to allow 16QAM 3/4 Uplink transmissions. Must be in the range from mincinr-qam16-1by2 to mincinr-qam64-1by2	Optional	-20	-20 to 30 in steps of 0.1
	mincinr-qam64-1by2 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow 64QAM 1/2 Uplink transmissions. Must be in the range from mincinr-qam16-3by4 to mincinr-qam64-2by3	Optional	-20	-20 to 30 in steps of 0.1
	mincinr-qam64-2by3 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow 64QAM 2/3 Uplink transmissions. Must be in the range from mincinr-qam64-1by2 to mincinr-qam64-3by4	Optional	-20	-20 to 30 in steps of 0.1

	mincinr-qam64-3by4 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow 64QAM 3/4 Uplink transmissions. Must be in the range from mincinr-qam64-2by3 to mincinr-qam64-5by6	Optional	-20	-20 to 30 in steps of 0.1
	mincinr-qam64-5by6 <(-20 to 30 StepSize 0.1)>	The minimal CINR in dB Required to allow 64QAM 5/6 Uplink transmissions. Cannot be lower than mincinr-qam64-3by4	Optional	-20	-20 to 30 in steps of 0.1

Command Modes bs configuration mode

IMPORTANT

When creating a new BS, at least one of the Rate Adaptation parameters must be configured explicitly (even if configured to the default value).

4.8.20.2 Restoring the Default Values of Rate Adaptation Parametes

To restore the default values of some or all of the Rate Adaptation parameters, run the following command:

npu(config-bs-66053)# no rateadapt-general [dl-basicrate] [ul-basicrate] [mincinr-qpsk-1by2-rep6] [mincinr-qpsk-1by2-rep4] [mincinr-qpsk-1by2-rep2 >] [mincinr-qpsk-1by2] [mincinr-qpsk-3by4] [mincinr-qam16-1by2] [mincinr-qam16-3by4] [mincinr-qam64-1by2] [mincinr-qam64-2by3] [mincinr-qam64-3by4] [mincinr-qam64-5by6]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the ul-basicrate parameter to the default value, run the following command:

npu(config-bs-66053)# no rateadapt-general ul-basicrate

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Rate Adaptation parameters to their default value, run the following command:

npu(config-bs-66053)# no rateadapt-general

NOTE

Refer to Section 4.8.20.1 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053)# rateadapt-general `[dl-basicrate ] [ul-basicrate ] [mincinr-qpsk-1by2-rep6 ] [mincinr-qpsk-1by2-rep4 ] [mincinr-qpsk-1by2-rep2 > ] [mincinr-qpsk-1by2 ] [mincinr-qpsk-3by4 ] [mincinr-qam16-1by2 ] [mincinr-qam16-3by4 ] [mincinr-qam64-1by2 ] [mincinr-qam64-2by3 ] [mincinr-qam64-3by4 ] [mincinr-qam64-5by6 ]`

Privilege Level

10

Command Modes

bs configuration mode

4.8.20.3 Displaying Configuration for Rate Adaptation Parameters

To display configuration information of Rate Adaptation parameters, run the following command:

npu# show rateadapt-general bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Rate Adaptation parameters of BS 66053, run the following command:

npu# show rateadapt-general bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show rateadapt-general bs

Command Syntax

npu# show rateadapt-general bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Rate Adaptation parameters of a specific BS. Do not specify a value for this parameter if you want to display Rate Adaptation parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
DownlinkBasicRate                        :<value>

UplinkBasicRate                          :<value>
MinCinrQpskCtc1/2Rep6                    :<value>
MinCINRQpskCtc1/2Rep4                    :<value>
MinCINRQpskCtc1/2Rep2                    :<value>
MinCINRQpskCtc1/2                        :<value>
MinCINRQpskCtc3/4                        :<value>
MinCINRQam16Ctc1/2                       :<value>
MinCINRQam16Ctc3/4                       :<value>
MinCINRQam64Ctc1/2                       :<value>
MinCINRQam64Ctc2/3                       :<value>
MinCINRQam64Ctc3/4                       :<value>
MinCINRQam64Ctc5/6                       :<value>
```

Command Modes Global command mode

4.8.21 Managing BS Bearer Interface Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Bearer Interface parameters (refer to Section 4.8.21.1).
- Restore the default values of some or all of the Bearer Interface parameters (refer to Section 4.8.21.2).

You can display configuration information for the Bearer Interface parameters of a selected or all existing BSs (refer to Section 4.8.21.3).

4.8.21.1 Configuring Bearer Interface Parameters

To configure the Bearer Interface Parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# bearer [ip-address <ip address>] [ip-subnetmask <ip address>] [dflt-gw <ip address>] [mtu-size <(1500 to 9000 StepSize 1)>] [linkusage-hardthrshld <(0 to100 StepSize 1)>]

Command Syntax

```
npu(config-bs-66053)# bearer [ip-address <ip address> ]
[ip-subnetmask <ip address> ] [dflt-gw <ip address> ] [mtu-size
<(1500 to 9000 StepSize 1)> ] [linkusage-hardthrshld <(0 to100
StepSize 1)> ]
```

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[ip-address <ip address>]	The IP address of the bearer interface of the BS	Mandatory when creating a new BSI	N/A	IP address

	[ip-subnetmask <ip address>]	The IP subnet mask of the bearer interface of the BS	Mandatory when creating a new BSI	N/A	Subnet mask
	[dflt-gw <ip address>]	The IP address of the default gateway of the bearer interface of the BS	Mandatory when creating a new BSI	N/A	IP address
	[mtu-size <(1500 to 9000 StepSize 1)>]	MTU size (in bytes) of the bearer interface of the BS	Optional	1500	1500 - 9000
	[linkusage-hardthrshld <(0 to 100 StepSize 1)>]	The BS backplane usage hard limit threshold, in percecents. An alarm if sent if either uplink or downlink backplane link usage exceeds the threshold.	Optional	80	0 - 100

Command Modes bs configuration mode

IMPORTANT

When creating a new BS, the Bearer Interface mandatory parameters must be configured.

4.8.21.2 Restoring the Default Values of Bearer Interface Parametes

To restore the default values of some or all of the Bearer Interface parameters, run the following command:

npu(config-bs-66053)# no bearer [mtu-size] [linkusage-hardthrshld]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the mtu-size parameter to the default value, run the following command:

npu(config-bs-66053)# no bearer mtu-size

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Bearer Interface parameters to their default value, run the following command:

npu(config-bs-66053)# no bearer

NOTE

Refer to Section 4.8.21.1 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053)# no bearer [mtu-size] [linkusage-hardthrshld]

Privilege Level

10

Command Modes

bs configuration mode

4.8.21.3 Displaying Configuration Information for Bearer Interface Parameters

To display configuration information of Bearer Interface parameters, run the following command:

npu# show bearer bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Bearer Interface parameters of BS 66053, run the following command:

npu# show bearer bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show bearer bs

Command Syntax

npu# show bearer bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Bearer Interface parameters of a specific BS. Do not specify a value for this parameter if you want to display Bearer Interface parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                          :<value>
IPAddress                        :<value>
IPsubnetMask                     :<value>
DefaultGateway                   :<value>
MTUSize                          :<value>
LinkUsageHardThreshold(%)        :<value>
```

Command Modes

Global command mode

4.8.22 Managing Authentication Relay Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Authentication parameters (refer to Section 4.8.22.1).
- Restore the default values of some or all of the Authentication non-mandatory parameters (refer to Section 4.8.22.2).

You can display configuration information for the Authentication parameters of a selected or all existing BSs (refer to Section 4.8.22.3).

4.8.22.1 Configuring Authentication Parameters

To configure the Authentication parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# auth-general [dflt-auth-ip-address <ip address>] [suspendedeapprocthrshld <(0 to 10000 StepSize 1)>] [activemsthrshld <(0 to 1024 StepSize 1)>] [maxeaproundsthrshld <(0 to 100 StepSize 1)>] [nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)>] [nonauth-pduratethrshld <(0 to 120000 StepSize 1)>]

Command Syntax

npu(config-bs-66053)# auth-general `[dflt-auth-ip-address <ip address> ] [suspendedeapprocthrshld <(0 to 10000 StepSize 1)> ] [activemsthrshld <(0 to 1024 StepSize 1)> ] [maxeaproundsthrshld <(0 to 100 StepSize 1)> ] [nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)> ] [nonauth-pduratethrshld <(0 to 120000 StepSize 1)> ]`

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[dflt-auth-ip-address <ip address>]	Identifier (IP address) of “default” authenticator ASN GW.	Mandatory when creating a new BS.	N/A	IPv4 address
[suspendedeapprocthrshld <(0 to 10000 StepSize 1)>]	Suspended EAP authentification process threshold. It is used to set an alarm.	Optional	0	0 to 10000

[activemsthrshld <(0 to 1024 StepSize 1)>]	Threshold for the number of MSs in active operation state (not Idle) served by the BS. Exceeding this threshold will set the alarm “Excessive MS number”. A value of 0 means that the alarm is disabled.	Optional	0	0 to 1024
[maxeaproundsthrshld <(0 to 100 StepSize 1)>]	Threshold for the number of EAP rounds in one direction in the same EAP session. When exceeding this threshold; alarm is set. May be used to protect the system from hazard EAP sessions with extreme number of messaging round trips. A value of "0" means the alarm is disabled. A value of 0 means that the alarm is disabled.	Optional	0	0 to 100
[nonauth-macctrlratethrshld <(0 to 120000 StepSize 1)>]	Threshold for alarm for exceeding non-authentic MAC control rate, in Kbps A value of 0 means that the alarm is disabled.	Optional	0	0 to 120000
[nonauth-pduratethrshld <(0 to 120000 StepSize 1)>]	Threshold for alarm for exceeding non-authentic PDU rate (in Kbps). A value of 0 means that the alarm is disabled.	Optional	0	0 to 120000

Command Modes

bs configuration mode

IMPORTANT

When creating a new BS, the Authentication dflt-auth-ip-address mandatory parameter must be configured.

4.8.22.2 Restoring the Default Values of Authentication Parametes

To restore the default values of some or all of the Authentication parameters, run the following command:

npu(config-bs-66053)# no auth-general [suspendedeapprocthrshld] [activemsthrshld] [maxeaproundsthrshld] [nonauth-macctrlratethrshld] [nonauth-pduratethrshld]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the activemsthrshld and maxeaproundsthrshld parameters to the default values, run the following command:

npu(config-bs-66053)# no auth-general activemsthrshld maxeaproundsthrshld

These parameters will be restored to their default values, while the other parameters will remain unchanged.

To restore all Authentication parameters to their default value, run the following command:

npu(config-bs-66053)# no auth-general

NOTE

Refer to Section 4.8.22.1 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053)# no auth-general `[suspendedeapprocthrshld ] [activemsthrshld ] [maxeaproundsthrshld ] [nonauth-macctrlratethrshld ] [nonauth-pduratethrshld ]`

Privilege Level

10

Command Modes

bs configuration mode

4.8.22.3 Displaying Configuration Information for Authentication Parameters

To display configuration information of Authentication parameters, run the following command:

npu# show auth-general bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Authentication parameters of BS 66053, run the following command:

npu# show auth-general bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show auth-general bs

Command Syntax

npu# show auth-general bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Authentication parameters of a specific BS. Do not specify a value for this parameter if you want to display Authentication parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
```

Command Modes

Global command mode

4.8.23 Managing Handover Control Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Handover Control parameters (refer to Section 4.8.23.1).
- Restore the default values of some or all of the Handover Control parameters (refer to Section 4.8.23.2).

You can display configuration information for the Handover Control parameters of a selected or all existing BSs (refer to Section 4.8.23.3).

4.8.23.1 Configuring Handover Control Parameters

To configure the Handover Control parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# hoctrl [enable-teksharing <hex-string>] [rtxtimer <(0 to 255 StepSize 1)>]

Command Syntax

npu(config-bs-66053)# hoctrl `[enable-teksharing <hex-string>] [rtxtimer <(0 to 255 StepSize 1)> ]`

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values

	enable-teksharing <hex-string>	2 hexadecimal digits that can be represented as 8 bits iIdentifying re-entry process management messages that may be omitted during the current HO attempt. The omission is due to the availability of MS service and operational context information and the MS service and operational status post-HO completion. Currently only bit 2 can be modified: A value of “ff” (bit 2 = 1) means that PKM TEK creation phase is omitted (TEK Sharing is enabled). A value of “cf (bit 2 = 0) means that the message is not omitted (TEK Sharing is disabled).	Optional	ff	■ ff ■ fb
	rtxtimer <(0 to 255 StepSize 1)>	MS Handover Retransmission Timer: After an MS transmits MOB_MSHO-REQ to initiate a handover process it shall start MS Handover Retransmission Timer and shall not transmit another MOB_MSHO-REQ until the expiration of the MS Handover Retransmission Timer.	Optional	10	0 - 255

Command Modes bs configuration mode

IMPORTANT

When creating a new BS, at least one of the Handover Control parameters must be configured explicitly (even if configured to the default value).

4.8.23.2 Restoring the Default Values of Handover Control Parametes

To restore the default values of some or all of the Handover Control parameters, run the following command:

npu(config-bs-66053)# no hoctrl [enable-teksharing] [rtxtimer]

You can restore only one parameter to the default values by specifying only that parameter. For example, to restore only the rtxtimer parameter to the default value, run the following command:

npu(config-bs-66053)# no hoctrl rtxtimer

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Handover Control parameters to their default value, run the following command:

npu(config-bs-66053)# no hoctrl

NOTE

Refer to Section 4.8.23.1 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053)# no hoctrl** `[enable-teksharing ] [rtxtimer ]`
Privilege Level	10
Command Modes	bs configuration mode

4.8.23.3 Displaying Configuration and Status Information for Handover Control Parameters

To display configuration and status information of Handover Control parameters, run the following command:

npu# show hoctrl bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Handover Control parameters of BS 66053, run the following command:

npu# show hoctrl bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show hoctrl bs

Command Syntax

npu# show hoctrl bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Handover Control parameters of a specific BS. Do not specify a value for this parameter if you want to display Handover Control parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
EnableTEKSharing                         :<value>
MSHandoverRetransmissionTimer(frames)    :<value>
SchedulingServiceSupport                 :<value>
```

Command Modes

Global command mode

In addition to the configurable parameters, the following status parameter is also displayed:

Parameter	Description	Possible Values
SchedulingServiceSupport	Scheduling Service Support. A string of two hexadecimal digits that can be presented as 8 bits where bits 5-7 are always 0. Bits 0-4 indicate whether specific services are supported, where a value of 1 means that the service is supported: UGS (0), RT-PS(1), NRT-PS(2), BE(3), ERT-PS(4). This parameter is available for populating the srvcsupport parameter in the relevant Neighbour BS General parameters tables.	A string of two hexadecimal digits.

4.8.24 Managing Bearer Traffic QoS Marking Rules

Up to 16383 Bearer Traffic QoS Marking Rules may be defined.

To configure a Bearer Traffic QoS Marking Rule:

1. Enable the BS Bearer Traffic QoS Marking Rule configuration mode for the selected Bearer Traffic QoS Marking Rule (refer to Section 4.8.24.1)
2. You can now execute any of the following tasks:
   - Configure the parameters of the Bearer Traffic QoS Marking Rule (refer to Section 4.8.24.2)
   - Restore the default values of Bearer Traffic QoS Marking Rule non-mandatory parameters (refer to Section 4.8.24.3)
   - Terminate the Bearer Traffic QoS Marking Rule configuration mode (refer to Section 4.8.24.4)

In addition, you can, at any time, display configuration information for Bearer Traffic QoS Marking Rules (refer to Section 4.8.24.6) or delete an existing Bearer Traffic QoS Marking Rule (refer to Section 4.8.24.5).

4.8.24.1 Enabling the Bearer Traffic QoS Marking Rule Configuration Mode\Creating a Bearer Traffic QoS Marking Rule

To configure the parameters of a Bearer Traffic QoS Marking Rule, first enable the BS Bearer Traffic QoS Marking Rule configuration mode for the specific Bearer Traffic QoS Marking Rule. Run the following command to enable the BS Bearer Traffic QoS Marking Rule configuration mode. You can also use this command to create a new Bearer Traffic QoS Marking Rule.

Note that for a new Bearer Traffic QoS Marking Rule this command only defines the Bearer Traffic QoS Marking Rule number, and that the Bearer Traffic QoS Marking Rule is not fully created until completing configuration of all mandatory parameters and executing the **apply** command (must be executed before exiting the Bearer Traffic QoS Marking Rule configuration mode). Also when updating an existing Bearer Traffic QoS Marking Rule, the **apply** command must be executed prior to termination the Bearer Traffic QoS Marking Rule configuration mode.

npu(config-bs-66053)# bearertrafficqos <(1 to 16383 StepSize 1)>

For example, to define a new Bearer Traffic QoS Marking Rule number 1, or to enable the configuration mode for Bearer Traffic QoS Marking Rule 1, run the following command:

npu(config-bs-66053)# bearertrafficqos 1

If you use this command to create a new Bearer Traffic QoS Marking Rule, the configuration mode for this Bearer Traffic QoS Marking Rule is automatically enabled, after which you can execute any of the following tasks:

- Configure one or more of the parameters of the Bearer Traffic QoS Marking Rule (refer to Section 4.8.24.2)
- Restore the default values of Bearer Traffic QoS Marking Rule non-mandatory parameters (refer to Section 4.8.24.3)

After executing the above tasks, you can terminate the Bearer Traffic QoS Marking Rule configuration mode (refer to Section 4.8.24.4) and return to the BS configuration mode.

Note that for properly completing the configuration of a Bearer Traffic QoS Marking Rule the **apply** command must be executed prior to exiting the Bearer Traffic QoS Marking Rule configuration mode.

Command Syntax

```
npu(config-bs-66053)# bearertrafficqos <(1 to 16383 StepSize 1)>
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`bearertrafficqos <(1 to 16383 StepSize 1)>`	The Bearer Traffic QoS Marking Rule number	Mandatory		1 - 16383

Command Modes

BS configuration mode

For example, to define Bearer Traffic QoS Marking Rule 1 for BS 66053, run the following command:

```
npu(config-bs-66053)# bearertrafficqos 1
```

NOTE

The following examples are for BS Bearer Traffic QoS Marking Rule configuration mode for bs-66053, bearer traffic qos marking rule (bearertrafficqos)-1.

4.8.24.2 Configuring Bearer Traffic QoS Marking Rule Parameters

To configure the Bearer Traffic QoS Marking Rule parameters, run the following command:

npu(config-bs-66053-bearertrafficqos-1)# mrkngrule [rule-status {Enable | Disable}] [rule-name <string (32)>] [srvcflow-datadeliverytype {uGS | bE | eRTVR | any}] [srvcflow-trafficpriority <(0 to 7 StepSize 1) | (255 to 255 StepSize 1)>] [srvcflow-mediaflowtype <string (32)>] [enable-srvcflow-mediaflowtype {TRUE | FALSE}] [outerdscp <(0 to 63 StepSize 1)>] [bp8021p <(0 to 7 StepSize 1)>]

IMPORTANT

When creating a new Bearer Traffic QoS Marking Rule Rule, the mandatory parameters must be configured.

Command Syntax

npu(config-bs-66053-bearertrafficqos-1)# mrkngrule `[rule-status {Enable | Disable}] [rule-name <string (32)>] [srvcflow-datadeliverytype {uGS | bE | eRTVR | any}] [srvcflow-trafficpriority <(0 to 7 StepSize 1) | (255 to 255 StepSize 1)>] [srvcflow-mediaflowtype <string (32)>] [enable-srvcflow-mediaflowtype {TRUE | FALSE}] [outerdscp <(0 to 63 StepSize 1)>] [bp8021p <(0 to 7 StepSize 1)>]`

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
rule-status {Enable | Disable}	The Bearer Traffic QoS Marking Rule status	Optional	Enable	■ Enable ■ Disable
rule-name <string (32)>	The Bearer Traffic QoS Marking Rule name (descriptor).	Optional	null	A string of up to 32 characters
srvcflow-datadelivery type {uGS | bE | eRTVR | any}	Service Flow Type of data delivery services.	Optional	any	■ uGS ■ bE ■ eRTVR ■ any
srvcflow-trafficpriority <(0 to 7 StepSize 1) | (255 to 255 StepSize 1)>	Service Flow Traffic Priority. A value of 255 means "ANY"	Optional	255	0-7 or 255
srvcflow-mediaflowtype <string (32)>	One of key entries into the traffic marking rules table. Media Flow Type should be defined in ASN-GW or AAA server. Only relevant if enable-srvcflow-mediaflowtype (see below) is TRUE.	Mandatory when creating a new rule (if relevant)	N/A	A string of up to 32 characters

	enable-srvcflow-mediaflowtype {TRUE | FALSE}	If TRUE, the srvcflow-mediaflowtype (see above) will be considered. when looking for a match. If FALSE it will not be considered.	Mandatory when creating a new rule		■ TRUE ■ FALSE
	outerdscp <(0 to 63 StepSize 1)>	DSCP value to be used for marking of outer IP header (IP/GRE).	Optional	0	0 - 63
	bp8021p <(0 to 7 StepSize 1)>	802.1p priority to be used for marking of traffic	Optional	0	0 - 7

Command Modes bs bearer traffic qos marking rule configuration mode

4.8.24.3 Restoring Default Values for Bearer Traffic QoS Marking Rule Configuration Parameters

After enabling the Bearer Traffic QoS Marking Rule configuration mode you can restore the default values for non-mandatory parameters.

To restore some or all of the Bearer Traffic QoS Marking Rule non-mandatory parameters to their default values, run the following command:

npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule [rule-status] [rule-name] [srvcflow-datadeliverytype [srvcflow-trafficpriority] [outerdscp] [bp8021p]

You can restore only one or several parameters to the default values by specifying only those parameters. For example, to restore only the outerdscp to the default value, run the following command:

npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule outerdscp

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Bearer Traffic QoS Marking Rule non-mandatory parameters to their default value, run the following command:

npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule

NOTE

Refer to Section 4.8.24.2 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053-bearertrafficqos-1)# no mrkngrule** `[rule-status ] [rule-name ] [srvcflow-datadeliverytype [srvcflow-trafficpriority ] [outerdscp ] [bp8021p ]`
Privilege Level	10
Command Modes	bs bearer traffic qos marking rule configuration mode

4.8.24.4 Terminating the Bearer Traffic QoS Marking Rule Configuration Mode

Run the following command to terminate the Bearer Traffic QoS Marking Rule configuration mode:

npu(config-bs-66053-bearertrafficqos-1)# exit

IMPORTANT

Do not forget to execute the apply command before terminating the BS Bearer Traffic QoS Marking Rule configuration mode:

npu(config-bs-66053-bearertrafficqos-1)# apply

Command Syntax	**npu(config-bs-66053-bearertrafficqos-1)# exit**
Privilege Level	10
Command Modes	bs bearer traffic qos marking rule configuration mode

4.8.24.5 Deleting a Bearer Traffic QoS Marking Rule

Run the following command from the BS configuration mode to delete a Bearer Traffic QoS Marking Rule:

npu(config-bs 66053)# no bearertrafficqos <(1 to 16383 StepSize 1)>

Command Syntax npu(config-bs 66053)# no bearertrafficqos <(1 to 16383 StepSize 1)>

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16383 StepSize 1)>	The Bearer Traffic QoS Marking Rule number	Mandatory	N/A	1-16383

Command Modes bs configuration mode

4.8.24.6 Displaying Configuration Information for Bearer Traffic QoS Marking Rules

To display configuration for the parameters of a specific or all Bearer Traffic QoS Marking Rules, run the following command:

npu# show bearertrafficqos bs [<(1 to 16777215 StepSize 1)> number <(1 to 16383 StepSize 1)>]

Specify the BS ID and Bearer Traffic QoS Marking Rule number if you want to display configuration for a particular Bearer Traffic QoS Marking Rule. For example, to display the parameters of Bearer Traffic QoS Marking Rule 1 in BS 66053, run the following command:

npu# show bearertrafficqos bs 66053 number 1

Do not specify these parameters if you want to view configuration information for all existing Bearer Traffic QoS Marking Rules. To display information for all Bearer Traffic QoS Marking Rules, run the following command:

npu# show bearertrafficqos bs

Command Syntax npu# show bearertrafficqos bs [<(1 to 16777215 StepSize 1)> number <(1 to 16383 StepSize 1)>]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the parameters of a specific Bearer Traffic QoS Marking Rule. Do not specify a value for this parameter if you want to display the parameters of all Bearer Traffic QoS Marking Rules.	Optional	N/A	1-16777215
number <(1 to 16383 StepSize 1)>]	The Bearer Traffic QoS Marking Rule number. To be used only if you want to display the parameters of a specific Bearer Traffic QoS Marking Rule.	Optional	N/A	1-16383

Display Format

(for each existing Service Mapping Rule if requested for all Service Mapping Rules)

```
BSIDLSB                                  :<value>
RuleNumber                               :<value>
RuleStatus                               :<value>
RuleName                                 :<value>
ServiceFlowMediaFlowType                 :<value>
ServiceFlowTrafficPriority(255meansany)  :<value>
ServiceFlowMediaFlowType                 :<value>
EnableServiceFlowMediaFlowType           :<value>
OuterDSCP                                :<value>
802.1pPriority                           :<value>
```

Command Modes

Global command mode

4.8.25 Managing Control Traffic QoS Marking Rules

To configure the Control Traffic QoS Marking Rules:

1. Enable the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.8.25.1)
2. You can now execute any of the following tasks:
   - Configure one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.8.25.2)
   - Restore the default values of parameters in one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.8.25.3)
   - Terminate the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.8.25.4)

In addition, you can, at any time, display configuration information for each of the parameters tables (refer to Section 4.8.25.5).

4.8.25.1 Enabling the Control Traffic QoS Marking Rules Configuration Mode

To configure the Control Traffic QoS Marking Rules parameters, first enable the Control Traffic QoS Marking Rules configuration mode. Run the following command to enable the Control Traffic QoS Marking Rules configuration mode.

Note that for properly completing the configuration the **apply** command must be executed prior to exiting the Control Traffic QoS Marking Rules configuration mode.

npu(config-bs-66053)# ctrltrafficqos

The configuration mode for the Control Traffic QoS Marking Rules is enabled, after which you can execute any of the following tasks:

- Configure one or more of the Control Traffic QoS Marking Rules parameters tables (refer to Section 4.8.25.2)
- Restore the default values of parameters in one or more of the parameters tables (refer to Section 4.8.25.3)

After executing the above tasks, you can terminate the Control Traffic QoS Marking Rules configuration mode (refer to Section 4.8.25.4) and return to the BS configuration mode.

Note that for properly completing the Control Traffic QoS Marking Rules configuration the **apply** command must be executed prior to exiting the Control Traffic QoS Marking Rules configuration mode.

Command Syntax	**npu(config-bs-66053)# ctrltrafficqos**
Privilege Level	10
Command Modes	bs configuration mode

4.8.25.2 Configuring Control Traffic QoS Marking Rules Parameters

After enabling the Control Traffic QoS Marking Rules configuration mode you can configure the following parameters tables:

- Internal Management (refer to Section 4.8.25.2.1)
- Intra ASN (refer to Section 4.8.25.2.2)

IMPORTANT

After completing the Control Traffic QoS Marking Rules configuration,do not forget to execute the apply command before exiting the Control Traffic QoS Marking Rules configuration mode:
npu(config-bs-66053-ctrltrafficqos)# apply

4.8.25.2.1 Configuring Internal Management Traffic QoS Marking Rules Parameters

To configure the Internal Management Traffic QoS Marking Rules, run the following command:

npu(config-bs-66053-ctrltrafficqos)# intmngmnt [dscp <(0 to 63 StepSize 1)>] [inter8021p <(0 to 7 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Internal Management Traffic QoS Marking Rules parameters must be configured explicitly (even if configured to the default value).

Command Syntax

npu(config-bs-66053-ctrltrafficqos)# intmngmnt [dscp <(0 to 63 StepSize 1)>] [inter8021p <(0 to 7 StepSize 1)>]

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
dscp <(0 to 63 StepSize 1)>	DSCP priority value to be used for marking of internal management traffic	Optional	0	0 - 63
inter8021p <(0 to 7 StepSize 1)>	802.1p priority value to be used for marking of internal management traffic	Optional	0	0 - 7

Command Modes

bs control traffic qos marking rules (ctrltrafficqos) configuration mode

4.8.25.2.2 Configuring the Intra ASN Traffic QoS Marking Rules

To configure the Intra ASN Traffic QoS Marking Rules parameters, run the following command:

npu(config-bs-66053-ctrltrafficqos)# intraasn [dscp <(0 to 63 StepSize 1)>] [intra8021p <(0 to 7 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Intra ASN Traffic QoS Marking Rules parameters must be configured explicitly (even if configured to the default value).

Command Syntax

npu(config-bs-66053-ctrltrafficqos)# intraasn [dscp <(0 to 63 StepSize 1)>] [intra8021p <(0 to 7 StepSize 1)>]

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
dscp <(0 to 63 StepSize 1)>	DSCP priority value to be used for marking of intra-ASN (R8/R6) traffic	Optional	0	0 - 63
intra8021p <(0 to 7 StepSize 1)>	802.1p priority value to be used for marking of intra-ASN (R8/R6) traffic	Optional	0	0 - 7

Command Modes

bs control traffic qos marking rules (ctrltrafficqos) configuration mode

4.8.25.3 Restoring Default Values for Control Traffic QoS Marking Rules Configuration Parameters

After enabling the Control Traffic QoS Marking Rules configuration mode you can restore the default values for parameters in the following parameters tables:

- Internal Management (refer to Section 4.8.25.3.1)
- Intra ASN (refer to Section 4.8.25.3.2)

4.8.25.3.1 Restoring the Default Values of Internal Management Traffic QoS Marking Rules Parameters

To restore one or all of the Internal Management Traffic QoS Marking Rules parameters to their default values, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intmngmnt [dscp] [inter8021p]

You can restore only one parameter to its default values by specifying only that parameter. For example, to restore only dscp to the default value, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intmngmnt dscp

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Internal Management Traffic QoS Marking Rules parameters to their default value, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intmngmnt

NOTE

Refer to Section 4.8.25.2.1 for a description and default values of these parameters.

Command Syntax

```
npu(config-bs-66053-ctrltrafficqos)# no intmngmnt [dscp ]
[inter8021p ]
```

Privilege Level

10

Command Modes

bs control traffic qos marking rules (ctrltrafficqos) configuration mode

4.8.25.3.2 Restoring the Default Values of Intra ASN Traffic QoS Marking Rules Parameters

To restore one or all of the Intra ASN Traffic QoS Marking Rules parameters to their default values, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intraasn [dscp] [intra8021p]

You can restore only one parameter to its default values by specifying only that parameter. For example, to restore only dscp to the default value, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intraasn dscp

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Intra ASN Traffic QoS Marking Rules parameters to their default value, run the following command:

npu(config-bs-66053-ctrltrafficqos)# no intraasn

NOTE

Refer to Section 4.8.25.2.2 for a description and default values of these parameters.

Command Syntax

```
npu(config-bs-66053-ctrltrafficqos)# no intraasn [dscp ]
[intra8021p ]
```

Privilege Level

10

Command Modes	bs control traffic qos marking rules (ctrltrafficqos) configuration mode

4.8.25.4 Terminating the Control Traffic QoS Marking Rules Configuration Mode

Run the following command to terminate the Control Traffic QoS Marking Rules configuration mode:

npu(config-bs-66053-ctrltrafficqos)# exit

IMPORTANT

Do not forget to execute the apply command before terminating the Control Traffic QoS Marking Rules configuration mode: **npu(config-bs-66053-ctrltrafficqos)# apply**

Command Syntax	**npu(config-bs-66053-ctrltrafficqos)# exit**
Privilege Level	10
Command Modes	bs control traffic qos marking rules (ctrltrafficqos) configuration mode

4.8.25.5 Displaying Configuration Information for Control Traffic QoS Marking Rules Parameters

You can display the current configuration information for the following parameters tables:

- Internal Management (refer to Section 4.8.25.5.1)
- Intra ASN (refer to Section 4.8.25.5.2)
- All (refer to Section 4.8.25.5.3)

4.8.25.5.1 Displaying Configuration Information for Internal Management Traffic QoS Marking Rules Parameters

To display configuration for the Internal Management Traffic QoS Marking Rules parameters, run the following command:

npu# show ctrltrafficqos-intmngmnt bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Internal Management Traffic QoS Marking Rules parameters of BS 66053, run the following command:

npu# show ctrltrafficqos-intmngmnt bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ctrltrafficqos-intmngmnt bs

Command Syntax

npu# show ctrltrafficqos-intmngmnt bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Internal Management Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display the Internal Management Traffic QoS Marking Rules parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
InternalManagementDSCP                                :<value>
InternalManagement802.1pPriority                      :<value>
```

Command Modes Global command mode

4.8.25.5.2 Displaying Configuration Information for Intra ASN Traffic QoS Marking Rules Parameters

To display configuration for the Intra ASN Traffic QoS Marking Rules parameters, run the following command:

npu# show ctrltrafficqos-intraasn bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Intra ASN Traffic QoS Marking Rules parameters of BS 66053, run the following command:

npu# show ctrltrafficqos-intraasn bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ctrltrafficqos-intraasn bs

Command Syntax **npu# show ctrltrafficqos-intraasn bs** [<(1 to 16777215 StepSize 1)

Privilege Level 1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Intra ASN Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display the Intra ASN Traffic QoS Marking Rules parameters of all BSs.	Optional	N/A	1-16777215

Display Format (for each existing BS if requested for all BSs)	`BSIDLSB :<value>`
	`IntraASNDSCP :<value>`
	`IntraASN802.1pPriority :<value>`

Command Modes	Global command mode

4.8.25.5.3 Displaying Configuration Information for All Control Traffic QoS Marking Rules Parameters

To display configuration for all Control Traffic QoS Marking Rules parameters, run the following command:

npu# show ctrltrafficqos-all bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Control Traffic QoS Marking Rules parameters of BS 66053, run the following command:

npu# show ctrltrafficqos-all bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ctrltrafficqos-all bs

Command Syntax	**npu# show ctrltrafficqos-all bs** [<(1 to 16777215 StepSize 1)
Privilege Level	1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display all Control Traffic QoS Marking Rules parameters of a specific BS. Do not specify a value for this parameter if you want to display all Control Traffic QoS Marking Rules parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                  :<value>
IntraASNDSCP                             :<value>
IntraASN802.1pPriority                   :<value>
InternalManagementDSCP                   :<value>
InternalManagement802.1pPriority         :<value>
```

Command Modes

Global command mode

4.8.26 Managing BS Management Alarm Thresholds Parameters

The Management Alarm Thresholds parameters enable configuring the alarm thresholds for control messages traffic. If the retransmission rate or the drop rate of control messages exceeds the applicable configurable threshold, an alarm will be generated.

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Management Alarm Threshold parameters (refer to Section 4.8.26.1).
- Restore the default values of some or all of the Management Alarm Threshold parameters (refer to Section 4.8.26.2).

You can display configuration for the Management Alarm Threshold parameters of a selected or all existing BSs (refer to Section 4.8.26.3).

4.8.26.1 Configuring Management Alarm Thresholds Parameters

To configure the Management Alarm Thresholds parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# mngmnt-alrmthrshld [retransmit-rate <(0 to 100 StepSize 1)>] [drop-rate <(0 to 100 StepSize 1)>]

Command Syntax

```
npu(config-bs-66053)# mngmnt-alrmthrshld [retransmit-rate <(0 to
100 StepSize 1)> ] [drop-rate <(0 to 100 StepSize 1)> ]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
retransmit-rate <(0 to 100 StepSize 1)>	Alarm Threshold for retransmission rate of control messages (in %).	Optional	30	0-100
drop-rate <(0 to 100 StepSize 1)>	Alarm Threshold for dropn rate of control messages (in %).	Optional	10	0-100

Command Modes

bs configuration mode

IMPORTANT

When creating a new BS, at least one of the Management Alarm Thresholds parameters must be configured explicitly (even if configured to the default value).

4.8.26.2 Restoring the Default Values of Management Alarm Thresholds Parametes

To restore the default values of some or all of the Management Alarm Thresholds parameters, run the following command:

npu(config-bs-66053)# no mngmnt-alrmthrshld [retransmit-rate] [drop-rate]

You can restore only one parameter to the default value by specifying only that parameter. For example, to restore only the drop-rate parameter to the default value, run the following command:

npu(config-bs-66053)# no mngmnt-alrmthrshld drop-rate

This parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Management Alarm Thresholds parameters to their default value, run the following command:

npu(config-bs-66053)# no mngmnt-alrmthrshld

NOTE

Refer to Section 4.8.26.1 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053)# no mngmnt-alrmthrshld** `[retransmit-rate ] [drop-rate ]`
Privilege Level	10
Command Modes	bs configuration mode

4.8.26.3 Displaying Configuration Information for Management Alarm Thresholds Parameters

To display configuration information of Management Alarm Thresholds parameters, run the following command:

npu# show mngmnt-alrmthrshld bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Management Alarm Thresholds parameters of BS 66053, run the following command:

npu# show mngmnt-alrmthrshld bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show mngmnt-alrmthrshld bs

Command Syntax

npu# show mngmnt-alrmthrshld bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Management Alarm Thresholds parameters of a specific BS. Do not specify a value for this parameter if you want to display Management Alarm Thresholds parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
ControlMessagesRetransmissionRateThreshold(%)    :<value>
ControlMessagesDropRateThreshold(%)              :<value>
```

Command Modes

Global command mode

4.8.27 Managing ID-IP Mapping Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more ID-IP Mapping entry (refer to Section 4.8.27.1).
- Delete one or more ID-IP Mapping entries (refer to Section 4.8.27.2).

You can display configuration information for the ID-IP Mapping of a selected or all existing BSs (refer to Section 4.8.27.3).

4.8.27.1 Configuring ID-IP Mapping Entries

To configure ID-IP Mapping entries:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# idip <(1 to 16777215 StepSize 1)> [nw-node-ip <ip address>]

Command Syntax

npu(config-bs-66053)# idip <(1 to 16777215 StepSize 1)> [nw-node-ip <ip address>]

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The Next Hop (Network Node) BS ID	Mandatory	N/A	1 - 16777215
nw-node-ip <ip address>	The Next Hop (Network Node) BS IP Address	Mandatory	N/A	IP address

Command Modes

bs configuration mode

IMPORTANT

When creating a new BS, at least one ID-IP Mapping entry must be configured.

4.8.27.2 Deleting an ID-IP Mapping Entry

Run the following command from the BS configuration mode to delete an ID-IP Mapping entry:

npu(config-bs 66053)# no idip <(1 to 16777215 StepSize 1)>

Command Syntax npu(config-bs 66053)# no idip <(1 to 16777215 StepSize 1)>

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The Next Hop (Network Node) BS ID	Mandatory	N/A	1 - 16777215

Command Modes bs configuration mode

4.8.27.3 Displaying Configuration Information for ID-IP Mapping Entries

To display configuration information of ID-IP Mapping entries, run the following command:

npu# show idip bs [<(1 to 16777215 StepSize 1)> nw-node-id <(1 to 16777215 StepSize 1)>]

Specify the BS ID and Next Hop (Network Node) BS ID (nw-node-id) if you want to display information for a particular ID-IP Mapping entry. For example, to display the ID-IP Mapping of BS 66053 and Network Node 66055, run the following command:

npu# show idip bs 66053 nw-node-id 66055

Do not specify these parameters if you want to view information of ID-IP Mapping entries in all existing BSs. To display information for all BSs, run the following command:

npu# show idip bs

Command Syntax **npu# show idip bs** [<(1 to 16777215 StepSize 1)> nw-node-id <(1 to 16777215 StepSize 1)>]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to displayspecific ID-IP Mapping entry in a specific BS. Do not specify a value for this parameter if you want to display all ID-IP Mapping entries of all BSs.	Optional	N/A	1-16777215
nw-node-id <(1 to 16777215 StepSize 1)>	The Next Hop (Network Node) BS ID. Specify a value for this parameter if you want to display a specific ID-IP Mapping entry in a specific BS. Do not specify a value for this parameter if you want to display all ID-IP Mapping entries of all BSs.	Optional	N/A	1-16777215

Display Format

(for each entry if requested for all)

```
BSIDLSB                    :<value>
NetworkNodeID              :<value>
NetworkNodeIPAddress       :<value>
```

Command Modes

Global command mode

4.8.28 Managing Ranging Parameters

To configure the Ranging parameters:

1. Enable the Ranging configuration mode (refer to Section 4.8.28.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the Ranging parameters tables (refer to Section 4.8.28.2)
   - » Restore the default values of parameters in one or more of the Ranging parameters tables (refer to Section 4.8.28.3)
   - » Terminate the Ranging configuration mode (refer to Section 4.8.28.4)

In addition, you can, at any time, display configuration information for each of the parameters tables (refer to Section 4.8.28.5).

4.8.28.1 Enabling the Ranging Configuration Mode

To configure the Ranging parameters, first enable the Ranging configuration mode. Run the following command to enable the Ranging configuration mode.

Note that for properly completing the configuration the **apply** command must be executed prior to exiting the Ranging configuration mode.

npu(config-bs-66053)# ranging

The Ranging configuration mode is enabled, after which you can execute any of the following tasks:

- Configure one or more of the Ranging parameters tables (refer to Section 4.8.28.2)
- Restore the default values of parameters in one or more of the parameters tables (refer to Section 4.8.28.3)

After executing the above tasks, you can terminate the Ranging configuration mode (refer to Section 4.8.28.4) and return to the BS configuration mode.

Note that for properly completing the Ranging configuration the **apply** command must be executed prior to exiting the Ranging configuration mode.

Command Syntax	**npu(config-bs-66053)# ranging**
Privilege Level	10
Command Modes	bs configuration mode

4.8.28.2 Configuring Ranging Parameters

After enabling the Ranging configuration mode you can configure the following parameters tables:

- General (refer to Section 4.8.28.2.1)
- Bandwidth Request (refer to Section 4.8.28.2.2)
- Handover Ranging (refer to Section 4.8.28.2.3)
- Initial Ranging (refer to Section 4.8.28.2.4)
- Periodic Ranging (refer to Section 4.8.28.2.5)
- Timing Correction (refer to Section 4.8.28.2.6)

IMPORTANT

After completing the Ranging configuration,do not forget to execute the apply command before exiting the Ranging configuration mode:
npu(config-bs-66053-ranging)# apply

4.8.28.2.1 Configuring Ranging General Parameters

To configure the Ranging General parameters, run the following command:

npu(config-bs-66053-ranging)# general [start-of-rng-codes <(0 to 255 StepSize 1)>] [contbased-rsrvtimeout <(0 to 255 StepSize 1)>] [max-cellradius {one | two | four | eight | fifteen | twentyThree | thirty}]

IMPORTANT

When creating a new BS, at least one of the Ranging General parameters must be configured explicitly (even if configured to the default value).

Command Syntax

```
npu(config-bs-66053-ranging)# general [start-of-rng-codes <(0 to 255 StepSize 1)> ] [contbased-rsrvtimeout <(0 to 255 StepSize 1)> ] [max-cellradius {one | two | four | eight | fifteen | twentyThree | thirty} ]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
start-of-rng-codes <(0 to 255 StepSize 1)>	Start of Ranging Codes: The starting number S of the group of codes used for this uplink Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256.	Optional	0	0 - 255
contbased-rsrvtimeout <(0 to 255 StepSize 1)>	Contention-Based Reservation Timeout (in frames). The number of UL-MAPs to receive before contention-based reservation is attempted again for the same connection.	Optional	5	0 - 255
max-cellradius {one | two | four | eight | fifteen | twentyThree | thirty}	The Maximum Cell Radius (in km)	Optional	two	■ one ■ two ■ four ■ eight ■ fifteen ■ twentyThree ■ thirty

Command Modes bs ranging configuration mode

4.8.28.2.2 Configuring Ranging Bandwidth Request Parameters

To configure the Ranging Bandwidth Request parameters, run the following command:

npu(config-bs-66053-ranging)# bwreq [codes <(0 to 255 StepSize 1)>] [init-backoff-window-size <(0 to 15 StepSize 1)>] [final-backoff-window-size <(0 to 15 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Ranging Bandwidth Request parameters must be configured explicitly (even if configured to the default value).

Command Syntax

```
npu(config-bs-66053-ranging)# bwreq [codes <(0 to 255 StepSize 1)> ]
[init-backoff-window-size <(0 to 15 StepSize 1)> ]
[final-backoff-window-size <(0 to 15 StepSize 1)> ]
```

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
codes <(0 to 255 StepSize 1)>	Number of Bandwidth Request Codes. Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256.	Optional	14	0 - 255
init-backoff-window-size <(0 to 15 StepSize 1)>	Initial backoff window size for contention BW requests; expressed as a power of 2.	Optional	0	0 - 15

	final-backoff-window-size <(0 to 15 StepSize 1)>	Final backoff window size for contention BW requests; expressed as a power of 2. Cannot higher than or equal to bwreq init-backoff-window-size.	Optional	4	0 - 15

Command Modes

bs ranging configuration mode

4.8.28.2.3 Configuring Handover Ranging Parameters

To configure the Handover Ranging parameters, run the following command:

npu(config-bs-66053-ranging)# horng [codes <(0 to 255 StepSize 1)>] [init-backoff-window-size <(0 to 15 StepSize 1)>] [final-backoff-window-size <(0 to 15 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Handover Ranging parameters must be configured explicitly (even if configured to the default value).

Command Syntax

```
npu(config-bs-66053-ranging)# horng [codes <(0 to 255 StepSize 1)> ]
[init-backoff-window-size <(0 to 15 StepSize 1)> ]
[final-backoff-window-size <(0 to 15 StepSize 1)> ]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
codes <(0 to 255 StepSize 1)>	Number of Handover Ranging CDMA Codes. Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256.	Optional	14	0 - 255

	init-backoff-window-size <(0 to 15 StepSize 1)>	Initial backoff window size for handover ranging contention ; expressed as a power of 2.	Optional	0	0 - 15
	final-backoff-window-size <(0 to 15 StepSize 1)>	Final backoff window size for handover ranging contention; expressed as a power of 2. Cannot higher than or equal to horng init-backoff-window-size.	Optional	4	0 - 15

Command Modes bs ranging configuration mode

4.8.28.2.4 Configuring Initial Ranging Parameters

To configure the Initial Ranging parameters, run the following command:

npu(config-bs-66053-ranging)# initrng [codes <(0 to 255 StepSize 1)>] [init-backoff-window-size <(0 to 15 StepSize 1)>] [final-backoff-window-size <(0 to 15 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Initial Ranging parameters must be configured explicitly (even if configured to the default value).

Command Syntax

```
npu(config-bs-66053-ranging)# initrng [codes <(0 to 255 StepSize 1)> ]
[init-backoff-window-size <(0 to 15 StepSize 1)> ]
[final-backoff-window-size <(0 to 15 StepSize 1)> ]
```

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values

	codes <(0 to 255 StepSize 1)>	Number of Initial Ranging CDMA Codes. Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256.	Optional	14	0 - 255
	init-backoff-window-size <(0 to 15 StepSize 1)>	Initial backoff window size for initial ranging contention ; expressed as a power of 2.	Optional	0	0 - 15
	final-backoff-window-size <(0 to 15 StepSize 1)>	Final backoff window size for initial ranging contention; expressed as a power of 2. Cannot higher than or equal to initrng init-backoff-window-size.	Optional	4	0 - 15

Command Modes bs ranging configuration mode

4.8.28.2.5 Configuring Periodic Ranging Parameters

To configure the Periodic Ranging parameters, run the following command:

npu(config-bs-66053-ranging)# periodicrng [codes <(0 to 255 StepSize 1)>] [init-backoff-window-size <(0 to 15 StepSize 1)>] [final-backoff-window-size <(0 to 15 StepSize 1)>]

IMPORTANT

When creating a new BS, at least one of the Periodic Ranging parameters must be configured explicitly (even if configured to the default value).

Command Syntax **npu(config-bs-66053-ranging)# periodicrng** `[codes <(0 to 255 StepSize 1)> ] [init-backoff-window-size <(0 to 15 StepSize 1)> ] [final-backoff-window-size <(0 to 15 StepSize 1)> ]`

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
codes <(0 to 255 StepSize 1)>	Number of Periodic Ranging CDMA Codes. Note that the sum of initial ranging codes, periodic ranging codes, bandwidth request codes, handover ranging codes and start of ranging codes should be equal to or less than 256.	Optional	0	0 - 255
init-backoff-window-size <(0 to 15 StepSize 1)>	Initial backoff window size for periodic ranging contention ; expressed as a power of 2.	Optional	0	0 - 15
final-backoff-window-size <(0 to 15 StepSize 1)>	Final backoff window size for periodic ranging contention; expressed as a power of 2. Cannot higher than or equal to periodicrng init-backoff-window-size.	Optional	4	0 - 15

Command Modes

bs ranging configuration mode

4.8.28.2.6 Configuring Ranging Timing Correction Parameters

To configure the Timing Correction parameters, run the following command:

npu(config-bs-66053-ranging)# timingcorrection [thrshld-correction <(0 to 250 StepSize 0.1)>] [thrshld-rngstatus <(0 to 250 StepSize 0.1)>]

IMPORTANT

When creating a new BS, at least one of the Timing Correction parameters must be configured explicitly (even if configured to the default value).

Command Syntax

npu(config-bs-66053-ranging)# timingcorrection `[thrshld-correction <(0 to 250 StepSize 0.1)> ] [thrshld-rngstatus <(0 to 250 StepSize 0.1)> ]`

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
thrshld-correction <(0 to 250 StepSize 0.1)>	Timing correction range threshold (in microseconds) below which corrections aren't made.	Optional	1	0 - 250 in steps of 0.1
thrshld-rngstatus <(0 to 250 StepSize 0.1)>	Timing correction range threshold (in microseconds) below which the ranging status is success and above which the ranging status is continue	Optional	10	0 - 250 in steps of 0.1

Command Modes

bs ranging configuration mode

4.8.28.3 Restoring Default Values for Ranging Configuration Parameters

After enabling the Ranging configuration mode you can restore the default values for parameters in the following parameters tables:

- General (refer to Section 4.8.28.3.1)
- Bandwidth Request (refer to Section 4.8.28.3.2)
- Handover Ranging (refer to Section 4.8.28.3.3)
- Initial Ranging (refer to Section 4.8.28.3.4)
- Periodic Ranging (refer to Section 4.8.28.3.5)
- Timing Correction (refer to Section 4.8.28.3.6)

4.8.28.3.1 Restoring the Default Values of Ranging General Parameters

To restore one or all of the Ranging General parameters to their default values, run the following command:

npu(config-bs-66053-ranging)# no general [start-of-rng-codes] [contbased-rsrvtimeout] [max-cellradius]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only max-cellradius to the default value, run the following command:

npu(config-bs-66053-ranging)# no general max-cellradius

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Ranging General parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no general

NOTE

Refer to Section 4.8.28.2.1 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053-ranging)# no general** `[start-of-rng-codes ] [contbased-rsrvtimeout ] [max-cellradius ]`
Privilege Level	10
Command Modes	bs ranging configuration mode

4.8.28.3.2 Restoring the Default Values of Ranging Bandwidth Request Parameters

To restore one or all of the Ranging Bandwidth Request parameters to their default values, run the following command:

npu(config-bs-66053-ranging)# no bwreq [codes] [init-backoff-window-size] [final-backoff-window-size]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

npu(config-bs-66053-ranging)# no bwreq codes

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Ranging Bandwidth Request parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no bwreq

NOTE

Refer to Section 4.8.28.2.2 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053-ranging)# no bwreq [codes] [init-backoff-window-size] [final-backoff-window-size]

Privilege Level

10

Command Modes

bs ranging configuration mode

4.8.28.3.3 Restoring the Default Values of Handover Ranging Parameters

To restore one or all of the Handover Ranging parameters to their default values, run the following command:

npu(config-bs-66053-ranging)# no horng [codes] [init-backoff-window-size] [final-backoff-window-size]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

npu(config-bs-66053-ranging)# no horng codes

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Handover Ranging parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no horng

NOTE

Refer to Section 4.8.28.2.3 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053-ranging)# no horng [codes] [init-backoff-window-size] [final-backoff-window-size]

Privilege Level	10

Command Modes	bs ranging configuration mode

4.8.28.3.4 Restoring the Default Values of Initial Ranging Parameters

To restore one or all of the Initial Ranging parameters to their default values, run the following command:

npu(config-bs-66053-ranging)# no initrng [codes] [init-backoff-window-size] [final-backoff-window-size]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

npu(config-bs-66053-ranging)# no initrng codes

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Initial Ranging parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no initrng

NOTE

Refer to Section 4.8.28.2.4 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053-ranging)# no initrng** `[codes ] [init-backoff-window-size ] [final-backoff-window-size ]`

Privilege Level	10

Command Modes	bs ranging configuration mode

4.8.28.3.5 Restoring the Default Values of Periodic Ranging Parameters

To restore one or all of the Periodic Ranging parameters to their default values, run the following command:

npu(config-bs-66053-ranging)# no periodicrng [codes] [init-backoff-window-size] [final-backoff-window-size]

You can restore only some parameters to their default values by specifying only those parameters. For example, to restore only the codes parameter to the default value, run the following command:

npu(config-bs-66053-ranging)# no periodicrng codes

The parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Periodic Ranging parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no periodicrng

NOTE

Refer to Section 4.8.28.2.5 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-66053-ranging)# no periodicrng** `[codes ] [init-backoff-window-size ] [final-backoff-window-size ]`
Privilege Level	10
Command Modes	bs ranging configuration mode

4.8.28.3.6 Restoring the Default Values of Ranging Timing Correction Parameters

To restore one or all of the Ranging Timing Correction parameters to their default values, run the following command:

npu(config-bs-1-ranging)# no timingcorrection [thrshld-correction] [thrshld-rngstatus]

You can restore only one parameter to the default values by specifying only that parameters. For example, to restore only the thrshld-correction parameter to the default value, run the following command:

npu(config-bs-66053-ranging)# no timingcorrection thrshld-correction

The parameter will be restored to its default value, while the other parameter will remain unchanged.

To restore all Ranging Timing Correction parameters to their default value, run the following command:

npu(config-bs-66053-ranging)# no timingcorrection

NOTE

Refer to Section 4.8.28.2.6 for a description and default values of these parameters.

Command Syntax	**npu(config-bs-1-ranging)# no timingcorrection** `[thrshld-correction ] [thrshld-rngstatus ]`
Privilege Level	10
Command Modes	bs ranging configuration mode

4.8.28.4 Terminating the Ranging Configuration Mode

Run the following command to terminate the Ranging configuration mode:

npu(config-bs-66053-ranging)# exit

IMPORTANT

Do not forget to execute the apply command before terminating the CRanging configuration mode:
npu(config-bs-66053-ranging)# apply

Command Syntax	**npu(config-bs-66053-ranging)# exit**
Privilege Level	10
Command Modes	bs ranging configuration mode

4.8.28.5 Displaying Configuration Information for Ranging Parameters

You can display the current configuration information for the following parameters tables:

- General (refer to Section 4.8.28.5.1)
- Bandwidth Request (refer to Section 4.8.28.5.2)
- Handover Ranging (refer to Section 4.8.28.5.3)
- Initial Ranging (refer to Section 4.8.28.5.4)
- Periodic Ranging (refer to Section 4.8.28.5.5)
- Timing Correction (refer to Section 4.8.28.5.6)
- All (refer to Section 4.8.28.5.7)

4.8.28.5.1 Displaying Configuration Information for Ranging General Parameters

To display configuration for the Ranging General parameters, run the following command:

npu# show ranging-general bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging General parameters of BS 66053, run the following command:

npu# show ranging-general bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-general bs

Command Syntax	**npu# show ranging-general bs** [<(1 to 16777215 StepSize 1)
Privilege Level	1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Ranging General parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging General parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
StartofRangingCodes                              :<value>
Contention-BasedReservationTimeout(frames)       :<value>
MaximumCellRadius(km)                            :<value>
```

Command Modes

Global command mode

4.8.28.5.2 Displaying Configuration Information for Ranging Bandwidth Request Parameters

To display configuration for the Ranging Bandwidth Request parameters, run the following command:

npu# show ranging-bwreq bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging Bandwidth Request parameters of BS 66053, run the following command:

npu# show ranging-bwreq bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-bwreq bs

Command Syntax

npu# show ranging-bwreq bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Ranging Bandwidth Request parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging Bandwidth Request parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofBandwidthRequestCodes                    :<value>
InitialBackoffWindowSizeforBandwidthRequest      :<value>
FinalBackoffWindowSizeforBandwidthRequest        :<value>
```

Command Modes

Global command mode

4.8.28.5.3 Displaying Configuration Information for Handover Ranging Parameters

To display configuration for the Handover Ranging parameters, run the following command:

npu# show ranging-horng bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Handover Ranging parameters of BS 66053, run the following command:

npu# show ranging-horng bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-horng bs

Command Syntax

npu# show ranging-horng bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Handover Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Handover Ranging parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofHandoverRangingCodes                     :<value>
InitialBackoffWindowSizeforHandoverRanging       :<value>
FinalBackoffWindowSizeforHandoverRanging         :<value>
```

Command Modes

Global command mode

4.8.28.5.4 Displaying Configuration Information for Initial Ranging Parameters

To display configuration for the Initial Ranging parameters, run the following command:

npu# show ranging-initrng bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Initial Ranging parameters of BS 66053, run the following command:

npu# show ranging-initrng bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-initrng bs

Command Syntax

npu# show ranging-initrng bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Initial Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Initial Ranging parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofInitialRangingCodes                      :<value>
InitialBackoffWindowSizeforInitialRanging        :<value>
FinalBackoffWindowSizeforInitialRanging          :<value>
```

Command Modes

Global command mode

4.8.28.5.5 Displaying Configuration Information for Periodic Ranging Parameters

To display configuration for the Periodic Ranging parameters, run the following command:

npu# show ranging-periodicrng bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Periodic Ranging parameters of BS 66053, run the following command:

npu# show ranging-periodicrng bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-periodicrng bs

Command Syntax

npu# show ranging-periodicrng bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Periodic Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display the Periodic Ranging parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
NumberofPeriodicRangingCodes                     :<value>
InitialBackoffWindowSizeforPeriodicRanging       :<value>
FinalBackoffWindowSizeforPeriodicRanging         :<value>
```

Command Modes Global command mode

4.8.28.5.6 Displaying Configuration Information for Ranging Timing Correction Parameters

To display configuration for the Ranging Timing Correction parameters, run the following command:

npu# show ranging-timingcorrection bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display the Ranging Timing Correction parameters of BS 66053, run the following command:

npu# show ranging-timingcorrection bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-timingcorrection bs

Command Syntax **npu# show ranging-timingcorrection bs** [<(1 to 16777215 StepSize 1)

Privilege Level 1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Ranging Timing Correction parameters of a specific BS. Do not specify a value for this parameter if you want to display the Ranging Timing Correction parameters of all BSs.	Optional	N/A	1-16777215

Display Format (for each existing BS if requested for all BSs)	`BSIDLSB :<value>`
	`ThresholdforRangingTimingCorrections(microseconds):<value>`
	`ThresholdforRangingStatus(microseconds) :<value>`

Command Modes	Global command mode

4.8.28.5.7 Displaying Configuration Information for All Ranging Parameters

To display configuration for all Ranging parameters, run the following command:

npu# show ranging-all bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display configuration for a particular BS. For example, to display all Ranging parameters of BS 66053, run the following command:

npu# show ranging-all bs 66053

Do not specify this parameter if you want to view configuration information for all existing BSs. To display information for all BSs, run the following command:

npu# show ranging-all bs

Command Syntax	**npu# show ranging-all bs** [<(1 to 16777215 StepSize 1)
Privilege Level	10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display all Ranging parameters of a specific BS. Do not specify a value for this parameter if you want to display all Ranging parameters of all BSs.	Optional	N/A	1-16777215

Command Modes Global command mode

4.8.29 Managing Alarm Threshold Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the Alarm Threshold parameters (refer to Section 4.8.29.1).
- Restore the default values of some or all of the Alarm Threshold parameters (refer to Section 4.8.29.2).

You can display configuration and status information for the Alarm Threshold parameters of a selected or all existing BSs (refer to Section 4.8.29.3).

4.8.29.1 Configuring Alarm Threshold Parameters

To configure the Alarm Threshold parameters:

From the BS configuration mode, run the following command:

npu(config-bs-66053)# alrm-thrshld [dl-droppedpackets <(1 to 1000 StepSize 1)>] [unalloc-slots <(1 to 100 StepSize 1)>] [dl-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)>] [ul-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)>] [dl-subburstdrop <(0 to 100 StepSize 0.01)>] [ul-subburstdrop <(0 to 100 StepSize 0.01)>] [ul-mednoise <(-130 to 0 StepSize 1)>] [ul-99prcntnoise <(-130 to 0 StepSize 1)>]

Command Syntax

```
npu(config-bs-66053)# alrm-thrshld [dl-droppedpackets <(1 to 1000 StepSize 1)> ] [unalloc-slots <(1 to 100 StepSize 1)> ] [dl-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [ul-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)> ] [dl-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-subburstdrop <(0 to 100 StepSize 0.01)> ] [ul-mednoise <(-130 to 0 StepSize 1)> ] [ul-99prcntnoise <(-130 to 0 StepSize 1)> ]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
dl-droppedpackets <(1 to 1000 StepSize 1)>	Downlink Dropped Packets Ratio. Threshold for excessive DL dropped packets ratio - all services alarm (in promils).	Optional	1000	1 - 1000
unalloc-slots <(1 to 100 StepSize 1)>	Unallocated Slots Ratio. Alarm threshold for an excessive ratio of unallocated slots versus total number of slots (in percents), due to lack of space in map.	Optional	100	1 - 100
dl-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)>	Downlink Retransmissions. Threshold for excessive downlink retransmissions (total transmissions/total transactions) alarm. A value of -1 means the alarm is disabled.	Optional	-1	-1 or 1 to 10 in steps of 0.1
ul-retransmissions <(-1 to -1 StepSize 1) | (1 to 10 StepSize 0.1)>	Uplink Retransmissions. Threshold for excessive uplink retransmissions (total transmissions/total transactions) alarm. A value of -1 means the alarm is disabled.	Optional	-1	-1 or 1 to 10 in steps of 0.1

dl-subburstdrop <(0 to 100 StepSize 0.01)>	Downlink Sub-Burst Drop Rate. Threshold for excessive downlink HARQ sub-burst drop rate alarm (in percents).	Optional	100	0 to 100 in steps of 0.01
ul-subburstdrop <(0 to 100 StepSize 0.01)>	Uplink Sub-Burst Drop Rate. Threshold for excessive uplink HARQ sub-burst drop rate alarm (in percents).	Optional	100	0 to 100 in steps of 0.01
ul-mednoise <(-130 to 0 StepSize 1)>	Uplink Median Noise. Threshold for excessive uplink median noise alarm (in dBm).	Optional	0	-130 to 0
ul-99prcntnoise <(-130 to 0 StepSize 1)>	Uplink 99% Percentile Noise.Threshold for excessive UL 99% percentile noise alarm (in dBm).	Optional	0	-130 to 0

Command Modes bs configuration mode

IMPORTANT

When creating a new BS, at least one of the Alarm Threshold parameters must be configured explicitly (even if configured to the default value).

4.8.29.2 Restoring the Default Values of Alarm Threshold Parametes

To restore the default values of some or all of the Alarm Threshold parameters, run the following command:

npu(config-bs-66053)# no alrm-thrshld [dl-droppedpackets] [unalloc-slots] [dl-retransmissions] [ul-retransmissions] [dl-subburstdrop] [ul-subburstdrop] [ul-mednoise] [ul-99prcntnoise]

You can restore only some parameters to the default values by specifying only those parameter. For example, to restore only the dl-droppedpackets parameter to the default value, run the following command:

npu(config-bs-66053)# no alrm-thrshld dl-droppedpackets

This parameter will be restored to its default value, while the other parameters will remain unchanged.

To restore all Alarm Threshold parameters to their default value, run the following command:

npu(config-bs-66053)# no alrm-thrshld

NOTE

Refer to Section 4.8.29.1 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053)# no alrm-thrshld `[dl-droppedpackets ] [unalloc-slots ] [dl-retransmissions ] [ul-retransmissions ] [dl-subburstdrop ] [ul-subburstdrop ] [ul-mednoise ] [ul-99prcntnoise ]`

Privilege Level

10

Command Modes

bs configuration mode

4.8.29.3 Displaying Configuration Information for Alarm Threshold Parameters

To display configuration information of Alarm Threshold parameters, run the following command:

npu# show alrm-thrshld bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the Alarm Threshold parameters of BS 66053, run the following command:

npu# show alrm-thrshld bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show alrm-thrshld bs

Command Syntax

npu# show alrm-thrshld bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display Alarm Threshold parameters of a specific BS. Do not specify a value for this parameter if you want to display Alarm Threshold parameters of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                          :<value>
DownlinkDroppedPacketsRatio(promil)              :<value>
UnallocatedSlotsRatio                            :<value>
DownlinkRetransmissions(-1meansdisable)          :<value>
UplinkRetransmissions(-1meansdisable)            :<value>
DownlinkSub-BurstDropRate(%)                     :<value>
UplinkSub-BurstDropRate(%)                       :<value>
UplinkSub-BurstDropRate(%)                       :<value>
Uplink99%Noise(dBm)                              :<value>
```

Command Modes

Global command mode

4.8.30 Displaying Status Information for HARQ Maximum Retransmissions Parameter

The HARQ Maximum Retransmissions is the maximal number of retransmissions of an uplink HARQ sub-burst.

To display status information of HARQ Maximum Retransmissions parameter, run the following command:

npu# show harq bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the HARQ Maximum Retransmissions parameter of BS 66053, run the following command:

npu# show harq bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show harq bs

Command Syntax

npu# show harq bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the HARQ Maximum Retransmissions parameter of a specific BS. Do not specify a value for this parameter if you want to display the HARQ Maximum Retransmissions Pparameter of all BSs.	Optional	N/A	1-16777215

Display Format

(for each existing BS if requested for all BSs)

```
BSIDLSB                                    :<value>
MaximumRetransmissions                     :<value>
```

Command Modes	Global command mode

4.8.31 Managing BS Reserved Parameters

After enabling the BS configuration mode, you can execute the following tasks:

- Configure one or more of the BS Reserved parameters (refer to Section 4.8.31.1).
- Restore the default values of some or all of the BS Reserved parameters (refer to Section 4.8.31.2).

You can display configuration information for the BS Reserved parameters of a selected or all existing BSs (refer to Section 4.8.31.3).

4.8.31.1 Configuring BS Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 21 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the BS reserved parameters, run the following command:

npu(config-bs-66053-1)# bs-reserved [reserved-1 <string (32)>] [reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4 <string (32)>] [reserved-5 <string (32)>] [reserved-6 <string (32)>] [reserved-7 <string (32)>] [reserved-8 <string (32)>] [reserved-9 <string (32)>] [reserved-10 <string (32)>] [reserved-11 <string (32)>] [reserved-12 <string (32)>] [reserved-13 <string (32)>] [reserved-14 <string (32)>] [reserved-15 <string (32)>] [reserved-16 <string (32)>] [reserved-17 <string (32)>] [reserved-18 <string (32)>] [reserved-19 <string (32)>] [reserved-20 <string (32)>] [reserved-21 <string (32)>]

Command Syntax

```
npu (config-bs-66053)# bs-reserved [reserved-1 <string (32)> ]
[reserved-2 <string (32)> ] [reserved-3 <string (32)> ]
[reserved-4 <string (32)> ] [reserved-5 <string (32)> ]
[reserved-6 <string (32)> ] [reserved-7 <string (32)> ]
[reserved-8 <string (32)> ] [reserved-9 <string (32)> ]
[reserved-10 <string (32)> ] [reserved-11 <string (32)> ]
[reserved-12 <string (32)> ] [reserved-13 <string (32)> ]
[reserved-14 <string (32)> ] [reserved-15 <string (32)> ]
[reserved-16 <string (32)> ] [reserved-17 <string (32)> ]
[reserved-18 <string (32)> ] [reserved-19 <string (32)> ]
[reserved-20 <string (32)> ] [reserved-21 <string (32)> ]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[reserved-N<string (32)>] (N=1-21)	Reserved parameter number N	Optional	null (an empty string)	A string of 32 printable characters.

Command Modes

bs configuration mode

IMPORTANT

When creating a new BS, at least one of the BS Reserved parameters must be configured explicitly (even if configured to the default value).

4.8.31.2 Restoring the Default Values of BS Reserved Parametes

To restore the default values of some or all of the BS Reserved parameters, run the following command:

npu(config-bs-66053)# no bs-reserved [reserved-1] [reserved-2] [reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7] [reserved-8] [reserved-9] [reserved-10] [reserved-11] [reserved-12] [reserved-13] [reserved-14] [reserved-15] [reserved-16] [reserved-17] [reserved-18] [reserved-19] [reserved-20] [reserved-21]

You can restore only some parameters to the default values by specifying only those parameter. For example, to restore only the reserved-1 and reserved-2 parameters to the default values, run the following command:

npu(config-bs-66053)# no bs-reserved reserved-1 reserved-2

These parameters will be restored to the default value, while the other parameters will remain unchanged.

To restore all BS Reserved parameters to their default value, run the following command:

npu(config-bs-66053)# no bs-reserved

NOTE

Refer to Section 4.8.31.1 for a description and default values of these parameters.

Command Syntax

npu(config-bs-66053)# no bs-reserved [reserved-1] [reserved-2] [reserved-3] [reserved-4] [reserved-5] [reserved-6] [reserved-7] [reserved-8] [reserved-9] [reserved-10] [reserved-11] [reserved-12] [reserved-13] [reserved-14] [reserved-15] [reserved-16] [reserved-17] [reserved-18] [reserved-19] [reserved-20] [reserved-21]

Privilege Level

10

Command Modes

bs configuration mode

4.8.31.3 Displaying Configuration Information for BS Reserved Parameters

To display configuration information of BS Reserved parameters, run the following command:

npu# show bs-reserved bs [<(1 to 16777215 StepSize 1)

Specify the BS ID if you want to display information for a particular BS. For example, to display the BS Reserved parameters of BS 66053, run the following command:

npu# show bs-reserved bs 66053

Do not specify this parameter if you want to view information for all existing BSs. To display information for all BSs, run the following command:

npu# show bs-reserved bs

Command Syntax

npu# show bs-reserved bs [<(1 to 16777215 StepSize 1)

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Reserved parameters of a specific BS. Do not specify a value for this parameter if you want to display the Reserved parameters of all BSs.	Optional	N/A	1-16777215

Display Format (for each existing BS if requested for all BSs)	BSIDLSB	:<value>
	ReservedParameter1	:<value>
	ReservedParameter2	:<value>
	ReservedParameter3	:<value>
	ReservedParameter4	:<value>
	ReservedParameter5	:<value>
	ReservedParameter6	:<value>
	ReservedParameter7	:<value>
	ReservedParameter8	:<value>
	ReservedParameter9	:<value>
	ReservedParameter10	:<value>
	ReservedParameter11	:<value>
	ReservedParameter12	:<value>
	ReservedParameter13	:<value>
	ReservedParameter14	:<value>
	ReservedParameter15	:<value>
	ReservedParameter16	:<value>
	ReservedParameter17	:<value>
	ReservedParameter18	:<value>
	ReservedParameter19	:<value>
	ReservedParameter20	:<value>
	ReservedParameter21	:<value>

Command Modes	Global command mode

4.8.32 Managing the BS Keep-Alive Functionality

Once an MS enters the network, its context is stored in ASN entities (BS, ASN-GW). Dynamically, MS context could be transferred/updated (during HO and re-authentication) to other entities or duplicated to other entities (separation between anchor functions such as Authenticator, Data Path and Relay Data Path).

In certain cases, such as entity reset, other entities are not aware of service termination of an MS in that entity, and keep maintaining the MS context. This may result in service failure, excessive consumption of memory resources and accounting mistakes.

The keep-alive mechanism should be used to clear MS context from all network entities when it is de-attached from the BS, and de-register MS from the network when its context becomes unavailable in one of its serving function locations.

When the keep-alive mechanism is enabled the BS periodically polls other ASN-GW entities-of-interest and waits for their responses. In case of no keep-alive response, the BS shall make further actions, such as graceful de-registration of applicable MS(s) and clearing the applicable MS(s) context.

The BS builds a list of ASN-GW-of-Interest, which it must poll. The list is dynamically updated; when a new MS is attached to the BS, or MS performs CSN mobility (data-path relocation) and in its context there is an ASN-GW identifier unknown to this BS, it shall add it to the ASN-GW-of-interest list. When the last MS(s) with specific ASN-GW identifier exits the network, the BS shall remove the ASN-GW from the list. The BS shall include in the ASN-GW-of-interest list also Relay Data-path ASN-GW(s) (UL next hop IP address). This is applicable when hierarchical data-path establishment takes place during inter-ASN HO.

The BS periodically polls the ASN-GW(s) for keep-alive. The polling mechanism is independent and unrelated for every ASN-GW-of-interest the BS polls.

The keep-alive mechanism uses configurable retry timer and retries counter. Upon expiration of the retry timer, the BS resends the BS Keep-Alive request message. Upon expiration of the retries counter, the BS assumes failure of the polled ASN-GW and clears the contexts of all MS(s) served by that ASN-GW.

In addition, the BS verifies that for each polled entity that the "Last-Reset-Time" UTC value of poll N+1 is equal to the value of poll N. If the "Last-Reset-Time" UTC value of poll N+1 is higher than the value of poll N, this mean that the ASN-GW went through reset state during the interval between two consecutive polls. In this case, the BS shall de-register all MS(s) served by that specific ASN-GW and clear their contexts.

When keep-alive fails, the BS generates an alarm and log the event.

Regardless of the enable/disable status of the keep-alive mechanism in the BS, it replies to BS_Keep_Alive_Req received from ASN-GWs with BS_Keep_Alive_Rsp. that includes also its "Last-Reset-Time". It responds only if all its functions operate properly. In case one of the functions fails, the BS shall not respond to the keep-alive poll.

4.8.32.1 Configuring BS Keep-Alive Parameters

To configure one or several keep-alive parameters, run the following command:

npu(config-bs-66053)# asn-ka ([enable <enable|disable>]) **[period** <integer (10-1000)>] [**rtx-cnt** <integer (1-10)>] [**rtx-time** <integer (100-10000)>]

Command Syntax

```
npu(config-bs-66053)# asn-ka ([enable <enable|disable>]) [period <integer
(10-1000)>] [rtx-cnt <integer (1-10)>] [rtx-time <integer (100-10000)>]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[**enable** <enable|disable>]	Enable/Disable the BS keep-alive mechanism.	Optional	disable	■ enable ■ disable
[**period** <integer (10-1000)>]	The period In seconds between polling sessions. period x 1000 (value in milliseconds) cannot be lower than (rtx-cnt) x rtx-time+1).	Optional	60	10-1000
[**rtx-cnt** <integer (1-10)>]	Maximum number of retries if rtx-time has expired without getting a response.	Optional	3	1-10
[rtx-timw <integer (100-10000)>**]**	Time in milliseconds to wait for a response before initiating another polling attempt or reaching a decision that the polled entity has failed (if the maximum number of retries set by rtx-cnt has been reached).	Optional	500	100-10000

Command Modes

bs configuration mode

4.8.32.2 Displaying Configuration Information for BS Keep-Alive Parameters

To display the BS keep-alive parameters, run the following command:

npu# show asn-keep-alive bs [<(1 to 16777215 StepSize 1)

Command Syntax

npu# show asn-keep-alive bs (<(1 to 16777215 StepSize 1**)**

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	The BS ID Specify a value for this parameter if you want to display the Keep-Alive parameters of a specific BS. Do not specify a value for this parameter if you want to display the Keep-Alive parameters of all BSs.	Optional	N/A	1-16777215

Display Format

```
BSIDLSB Keep Alive Configuration
ASN-KA : <enable/disable>
Period (sec) : <value>
Retransmissions Count : <value>
Retransmission Time : <value>
```

Command Modes

Global cpmmand mode

4.9 Managing Sectors

Up to 6 Sector objects can be created and configured. The Sector's configuration includes the association of all the objects that form a sector, including BS, AU/AU-Port, ODU/ODU-Port and Antenna/Antenna Port.

This section include:

- "Configuring Sector Parameters", Section 4.9.1
- "Configuring Sector Association Entries", Section 4.9.2

4.9.1 Configuring Sector Parameters

To configure Sector Parameters:

1. Enable the Sector Parameters configuration mode for the selected Sector (refer to Section 4.9.1.1)
2. You can now execute any of the following tasks:
   - » Configure one or more of the parameters tables of the Sector (refer to Section 4.9.1.2)
   - » Restore the default values of parameters in one or more of the parameters tables of the Sector (refer to Section 4.9.1.3)
3. Terminate the Sector Parameters configuration mode (refer to Section 4.9.1.4)

In addition, you can, at any time, display configuration information for each of the parameters tables of the Sector (refer to Section 4.9.1.6) or delete an existing Sector object (refer to Section 4.9.1.5).

4.9.1.1 Enabling the Sector Parameters Configuration Mode\Creating a Sector Object

To configure the parameters of a Sector, first enable the Sector Parameters configuration mode for the specific Sector. Run the following command to enable the Sector Parameters configuration mode for an existing Sector object:

npu (config)# sector-params <(1 to 6 StepSize 1)>

To create a new Sector object, the mandatory heading and width parameters must be specified. Run the following command to create a new Sector object and enable the parameters configuration mode for this ODU:

npu (config)# sector-params <(1 to 6 StepSize 1)> [**heading** <(0 to 359 StepSize 1)> **width** <(0 to 359 StepSize 1)>]

A new Sector object is created with default values for all parameters except to the mandatory heading and width parameters.

IMPORTANT

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

For example, to create Sector 1 object and enable the parameters configuration mode for this Sector, where the heading is 180 and width is 90, run the following command:

npu (config)# sector-params 1 heading 180 width 90

After enabling the Sector Parameters configuration mode for a Sector you can execute any of the following tasks:

- Configure one or more of the parameters tables of the Sector (refer to Section 4.9.1.2)
- Restore the default values of non-mandatory parameters in one or more of the parameters tables of the Sector (refer to Section 4.9.1.3)

After executing the above tasks, you can terminate the Sector Parameters configuration mode (refer to Section 4.9.1.4) and return to the global configuration mode.

Command Syntax	**npu (config)# sector-params** <(1 to 6 StepSize 1)> [heading <(0 to 359 StepSize 1)> width <(0 to 359 StepSize 1)>]
Privilege Level	10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 6 StepSize 1)>	The Sector ID	Mandatory	N/A	1-6
heading <(0 to 359 StepSize 1)>	The sector heading (The center angle of the sector), in degrees.	Mandatory when creating a new Sector	N/A	0 - 359
width <(0 to 359 StepSize 1)>	The planned sector coverage, in degrees.	Mandatory when creating a new Sector	N/A	0 - 359

Command Modes

Global configuration mode

NOTE

The following examples are for sector-1 parameters configuration mode.

4.9.1.2 Configuring Sector Parameters

After enabling the Sector Parameters configuration mode you can configure the following parameters tables:

- Sector Definition (refer to Section 4.9.1.2.1)
- Sector Reserved (refer to Section 4.9.1.2.2)

4.9.1.2.1 Configuring Sector Definition Parameters

The Sector Definition table enables configuring the main properties of the Sector.

To configure the Sector Definition parameters, run the following command:

npu(config-sector-params-1)# sector-definition [sector-name <string (32)>] [heading <(0 to 359 StepSize 1)>] [width <(0 to 359 StepSize 1)>]

IMPORTANT

An error may occur if you provide an invalid value for any of these parameters. Refer the syntax description for more information about the appropriate values and format for configuring these parameters.

Command Syntax

npu(config-sector-params-1)# sector-definition [sector-name <string (32)>] [heading <(0 to 359 StepSize 1)>] [width <(0 to 359 StepSize 1)>]

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
sector-name <string (32)>	The sector name (description). Must be unique in the site (shelf).	Optional	null (empty string)	A string of up to 32 characters
heading <(0 to 359 StepSize 1)>	The sector heading (The center angle of the sector), in degrees. The heading of an associated Sector cannot be changed.	Optional	Configured previously	0 - 359
width <(0 to 359 StepSize 1)>	The planned sector coverage, in degrees.	Optional	Configured previously	0 - 359

Command Modes

sector-params configuration mode

4.9.1.2.2 Configuring Sector Reserved Parameters

As the name implies, the reserved parameters table enables configuring up to 4 parameters that are reserved for possible future use. In the current release none of the reserved parameters is being used.

To configure the Sector Reserved parameters, run the following command:

npu(config-sector-params-1)# sector-reserved [reserved-1 <string (32)>] [reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4 <string (32)>].

Command Syntax

npu (config-sector-params-1)# sector-reserved [reserved-1 <string (32)>] [reserved-2 <string (32)>] [reserved-3 <string (32)>] [reserved-4 <string (32)>]

Privilege Level 10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[reserved-N <string (32)>] (N=1-4)	Reserved parameter number N	Optional	null (an empty string)	A string of 32 printable characters.

Command Modes sector-params configuration mode

4.9.1.3 Restoring Default Values for Sector Configuration Parameters

After enabling the Sector Parameters configuration mode you can restore the default values for parameters in the following parameters tables:

- Sector Definition (refer to Section 4.9.1.3.1)
- Sector Reserved (refer to Section 4.9.1.3.2)

4.9.1.3.1 Restoring the Default Values of Sector Definition Parameters

To restore the non-mandatory sector-name parameter to the default value, run the following command:

npu(config-sector-params-1)# no sector-definition [sector-name]

Since there is only one non-mandatory parameters, you can use any one of the following two commands to restore the sector-name to its default value:

npu(config-sector-params-1)# no sector-definition

or:

npu(config-sector-params-1)# no sector-definition sector-name

NOTE

Refer to Section 4.9.1.2.1 for a description and default values of this parameter.

Command Syntax	**npu(config-sector-params-1)# no sector-definition** [sector-name]
Privilege Level	10
Command Modes	sector-params configuration mode

4.9.1.3.2 Restoring the Default Values of Sector Reserved Parameters

To restore Sector Reserved parameters to their default value, run the following command:

npu(config-sector-params-1)# no sector-reserved [reserved-1] [reserved-2] [reserved-3] [reserved-4]

You can restore only selected parameters to their default value by specifying only those parameter. For example, to restore only the reserved-1 parameter to its default values, run the following command:

npu(config-sector-params-1)# no sector-reserved reserved-1

This parameter will be restored to the default value, while the other parameters will remain unchanged.

To restore all parameters to their default value, run the following command:

npu(config-sector-params-1)# no sector-reserved

NOTE

Refer to Section 4.9.1.2.2 for a description and default values of these parameters.

Command Syntax	**npu(config-sector-params-1)# no sector-reserved** [reserved-1] [reserved-2] [reserved-3] [reserved-4]
Privilege Level	10
Command Modes	sector-params configuration mode

4.9.1.4 Terminating the Sector Parameters Configuration Mode

Run the following command to terminate the Sector Parameters configuration mode:

npu(config-sector-params-1)# exit

Command Syntax	**npu(config-sector-params-1)# exit**
Privilege Level	10
Command Modes	sector-params configuration mode

4.9.1.5 Deleting a Sector Object

Run the following command to delete a Sector object:

npu(config)# no sector-params <(1 to 6 StepSize 1)>

IMPORTANT

An associated Sector (specified in a Sector Association) cannot be deleted.

Command Syntax	**npu(config)# no sector-params** <(1 to 6 StepSize 1)>
Privilege Level	10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 6 StepSize 1)>	The Sector ID	Mandatory	N/A	1-6

Command Modes	Global configuration mode

4.9.1.6 Displaying Configuration Information for Sector Parameters

You can display the current configuration and (where applicable) additional status information for the following parameters tables:

- Sector Definition (refer to Section 4.9.1.6.1)
- Sector Reserved (refer to Section 4.9.1.6.2)

4.9.1.6.1 Displaying Configuration Information for Sector Definition Parameters

To display configuration information for the Sector Definition parameters of a specific or all Sector objects, run the following command:

npu# show sector-definition [sector-id <(1 to 6 StepSize 1)>]

Specify the Sector ID (1-6) if you want to display configuration information for a particular Sector. Do not specify a value for this parameter if you want to view configuration information for all existing Sector objects.

Command Syntax

npu# show sector-definition [sector-id <(1 to 6 StepSize 1)>]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
sector-id <(1 to 6 StepSize 1)>	The Sector ID Specify a value for this parameter if you want to display the Sector Definition parameters of a specific Sector. Do not specify a value for this parameter if you want to display the parameters of all Sectors.	Optional	N/A	1-6

Display Format (for each existing ODU object if requested for all ODUs)

```
SectorID                                :<value>
SectorName                              :<value>
SectorHeading(degrees)                  :<value>
SectorWidth(degrees)                    :<value>
```

Command Modes Global command mode

4.9.1.6.2 Displaying Configuration Information for Sector Reserved Parameters

To display configuration information for the reserved parameters of a specific or all Sector objects, run the following command:

npu# show sector-reserved [sector-id <(1 to 6 StepSize 1)>]

Specify the Sector ID (1-6) if you want to display configuration for a particular Sector. Do not specify a value for this parameter if you want to view configuration for all existing Sector objects.

Command Syntax npu# show sector-reserved [sector-id <(1 to 6 StepSize 1)>]

Privilege Level 1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 6 StepSize 1)>	The Sector ID. Specify a value for this parameter if you want to display the reserved parameters of a specific Sector. Do not specify a value for this parameter if you want to display the reserved parameters of all Sectors.	Optional	N/A	1-6

Display Format (for each existing ODU object if requested for all ODUs)	SectorID	:<value>
	ReservedParameter1	:<value>
	ReservedParameter2	:<value>
	ReservedParameter3	:<value>
	ReservedParameter4	:<value>

Command Modes	Global command mode

4.9.2 Configuring Sector Association Entries

The Sector Association entry defines all the components that together form a Sector. Because of the unique functionality of Sector Association entries, they can only be created: An existing Sector Association entry cannot be modified (to modify an entry, it must first be deleted and then created again with the modified values). For details on creating a new Sector Association entry, refer to Section 4.9.2.1.

You can, at any time, display configuration information for each or all of the Sector Association entries (refer to Section 4.9.2.3) or delete an existing Sector Association entry (refer to Section 4.9.2.2).

4.9.2.1 Creating a Sector Association Entry

A Sector Association entry is identified by the BS ID, AU Slot ID and AU Port Number.

To create a new Sector Association entry, all the entry's parameters must be specified. Run the following command to create a new Sector Association entry:

npu (config)# sector-assoc <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)> sector-id <(1 to 6 StepSize 1)> odu-no <(1 to 28 StepSize 1)> antenna-no <(1 to 28 StepSize 1)> odu-port-no <1 to 4 StepSize 1> antenna-port-no <1 to 8 StepSize 1>

A new Sector Association entry is created with the specified values. For example, to create a Sector Association entry identified by BS ID 66053, AU Slot No. 2 and AU Port No. and with association to Sector ID 3, ODU No. 4, Antenna No. 5, ODU Port No. 1 and Antenna Port No. 1, run the following command:

npu (config)# sector-assoc 66053 2 1 sector-id 3 odu-no 4 antenna-no 5 odu-port-no 1 antenna-port-no 1

Command Syntax

npu (config)# sector-assoc <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)> sector-id <(1 to 6 StepSize 1)> odu-no <(1 to 28 StepSize 1)> antenna-no <(1 to 28 StepSize 1)> odu-port-no <1 to 4 StepSize 1> antenna-port-no <1 to 8 StepSize 1>

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	BS ID (bs-id-lsb)	Mandatory	N/A	1-16777215
<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>	AU Slot ID	Mandatory	N/A	1-4, 7-9
<(1 to 4 StepSize 1)>	AU Port Number	Mandatory	N/A	1-4
sector-id <(1 to 6 StepSize 1)>	Sector ID	Mandatory	N/A	1-6
odu-no <(1 to 28 StepSize 1)>	ODU Number	Mandatory	N/A	1-28
antenna-no <(1 to 28 StepSize 1)>	Antenna Number	Mandatory	N/A	1-28
odu-port-no <1 to 4 StepSize 1>	ODU Port Number	Mandatory	N/A	1-4
antenna-port-no <1 to 8 StepSize 1>	Antenna Port Number	Mandatory	N/A	1-4

Command Modes

Global configuration mode

Creation of a new Sector Association entry will succeed only if all the following conditions are met:

- The specified BS object exists and is properly configured (see also Section 4.8):
  - » All mandatory parameters have been configured properly.

- The configured frequency is within the valid range defined by the required ODU type in the specified ODU object and the bandwidth parameter.
- The Operator ID is the same as Operator ID configured for previously associated BSs.
- In all tables that includes only non-mandatory parameters at least one parameter has been configured.
- Wherever needed, the apply command has been executed.

- The specified AU object exists (see Section 4.5).
- The specified ODU object exists (the mandatory parameters required-type and txpower for port 1 have been configured). The configured txpower is within the valid range for the required ODU type (see Section 4.6).
- The Antenna object exists (the mandatory heading parameter has been configured). The specified Antenna Port No. is within the range defined by the no-of-ports parameter (see Section 4.7).
- The Sector object exists (mandatory parameters have been configured). The defined sector-name is unique in the site (shelf).
- An ODU Port (combination of ODU No. and ODU Port No.) cannot appear in more than one entry.
- An AU Port (combination of AU Slot No. and AU Port No.) cannot appear in more than one entry.
- An Antenna Port (combination of Antenna No. and Antenna Port No.) cannot appear in more than one entry.
- A specific Antenna can only be associated with a single Sector.
- In the current release, a specific BS can only be associated with a single AU, and vice versa (If BS 66053 is associated with AU 1, BS 66053 cannot be associated with another AU, and AU 1 cannot be associated with another BS).

4.9.2.2 Deleting a Sector Association Entry

Run the following command to delete a Sector Association entry:

npu (config)# no sector-assoc <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)>

Command Syntax

npu (config)# no sector-assoc <(1 to 16777215 StepSize 1)> <(1 to 4 StepSize 1) | (7 to 9 StepSize 1)> <(1 to 4 StepSize 1)>

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<(1 to 16777215 StepSize 1)>	BS ID (bs-id-lsb)	Mandatory	N/A	1-16777215
<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>	AU Slot ID	Mandatory	N/A	1-4, 7-9
<(1 to 4 StepSize 1)>	AU Port Number	Mandatory	N/A	1-4

Command Modes

Global configuration mode

Note that if all Sector Association entries with a particular BS are deleted (meaning the BS is no longer in use), this BS should be removed from all relevant Neighbour BS lists of other BSs.

4.9.2.3 Displaying Configuration Information for Sector Association Entries

To display configuration information of a specific or all Sector Association entries, run the following command:

npu# show sector-assoc [bs-id-lsb <(1 to 16777215 StepSize 1)> au-slot-no <(1 to 4StepSize 1) | (7 to 9 StepSize 1)> au-port-no <(1 to 4 StepSize 1)>]

Specify the BS ID (bs-id-lsb), AU Slot No. (au-slot-no) and AU Port number (au-port-no) if you want to display configuration information for a particular Sector Association entry. Do not specify values for these parameters if you want to view configuration information for all existing Sector Association entries.

Command Syntax

npu# show sector-assoc [bs-id-lsb <(1 to 16777215 StepSize 1)> au-slot-no <(1 to 4StepSize 1) | (7 to 9 StepSize 1)> au-port-no <(1 to 4 StepSize 1)>]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<bs-id-lsb (1 to 16777215 StepSize 1)>	BS ID Specify only if you want to display configuration of a particular Sector Association entry.	Optional	N/A	1-16777215
<(1 to 4 StepSize 1) | (7 to 9 StepSize 1)>	AU Slot ID Specify only if you want to display configuration of a particular Sector Association entry.	Optional	N/A	1-4, 7-9
<(1 to 4 StepSize 1)>	AU Port Number Specify only if you want to display configuration of a particular Sector Association entry.	Optionaly	N/A	1-4

Display Format

(for each existing ODU Port if requested for all ODU Ports)

```
BSIDLSB                    :<value>
AUSlotNo.                  :<value>
AUPortNo.                  :<value>
SectorID                   :<value>
ODUNo.                     :<value>
ODUPortNo.                 :<value>
AntennaNo.                 :<value>
AntennaPortNo.             :<value>
```

Command Modes

Global command mode

4.10 Monitoring Performance of Hardware and Software Components

This section describes the procedures for:

- "Monitoring Hardware Components" on page 778
- "Monitoring Software Components" on page 784
- "Displaying Statistics for Physical and IP Interfaces" on page 815
- "Displaying System Files" on page 819

4.10.1 Monitoring Hardware Components

You can use the CLI to monitor performance of the following hardware components with respect to:

- "Displaying the Current Status of Shelf Components" on page 778
- "Displaying Utilization of CPU and Memory Resources for the NPU" on page 779
- "Displaying Packets Discarded Via Rate Limiting" on page 780
- "Displaying Location Information for the 4Motion Shelf" on page 782
- "Displaying the Unique Identifier for the 4Motion Shelf" on page 783

4.10.1.1 Displaying the Current Status of Shelf Components

You can view the current status of the following shelf components:

- NPU
- PSU
- PIU
- AVU or (specific fan)

To view the current status of all shelf components, run the following command:

npu# show shelf status [{**NPU** [<slot id>] | **PSU** [<slot id (1-4)>] |**PIU** [<slot id (1-2)>] | **AVU** | **Fan** [<fan_num (1-10)>]}]

NOTE

Refer Figure 4-1 for more information about the slot IDs assigned to each shelf component.

For example, run the following command to view the status of the PSU, slot# 4:

npu# show shelf status PSU 4

To view the status of all the shelf components, run the following command:

npu# show shelf status

Command Syntax

npu# show shelf status [{**NPU** [<slot id>] | **PSU** [<slot id (1-4)>] |**PIU** [<slot id (1-2)>] | **AVU** | **Fan** [<fan_num (1-10)>]}]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[{NPU [<slot id>] | PSU [<slot id (1-4)>] |PIU [<slot id (1-2)>] | AVU | Fan [<fan_num (1-10)>]}	Indicates the shelf components for which you want to display the current status. Do not specify any component to view the status of all components.	Optional	N/A	■ NPU ■ PSU ■ PIU ■ AVU ■ Fan<(1-10>

4.10.1.2 Displaying Utilization of CPU and Memory Resources for the NPU

To display the utilization of CPU and memory resources for the NPU, run the following command:

npu# show resource usage

After you run this command, the current CPU and memory usage is displayed.

NOTE

For more information about setting thresholds for CPU and memory usage, refer to "Displaying CPU and Memory Utilization Limits for the NPU" on page 183.

Command Syntax

```
npu# show resource usage
```

Privilege Level

1

Display Format

```
Resource    Usage[in %]
CPU           <value>
Memory        7<value>
```

Command Modes

Global command mode

4.10.1.3 Displaying Packets Discarded Via Rate Limiting

To retrieve the number of packets discarded because of rate limiting for a specific or all applications (pre-defined, user-defined or all), run the following command:

```
npu# show rate-limit counters {ftp | telnet | tftp | ssh | icmp |
snmp | R4-R6 | igmp | eap | arp | all-others | <user-defined-app> |
all}
```

NOTE

For more information about configuring rate limiting, refer to "Configuring the Rate Limiting for the NPU" on page 184.

Command Syntax

```
npu# show rate-limit counters {ftp | telnet | tftp | ssh | icmp | snmp |
R4-R6 | igmp | eap | arp | all-others | <user-defined-app> | all}
```

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`{ftp | telnet | tftp | ssh | icmp | snmp | R4-R6 | igmp | eap | arp | all-others | <user-defined-app> | all}`	Indicates the application for which packets discarded by rate limiting are to be displayed.	Optional	N/A	■ ftp ■ telnet ■ tftp ■ ssh ■ icmp ■ snmp ■ R4-R6 ■ igmp ■ eap ■ arp ■ all-others: Refers to all other applications that may send packets to the CPU, and are not in the list of pre-defined or user-defined applications. ■ <user defined> ■ all: Refers to all applications that may attempt to send packets to the CPU.

Display Format

```
RATELIMIT COUNTERS: Pre-defined applications
-------------------------------------------
Application     Packets discarded
 <Application>    <Number of Packets Discarded>
<Application>    <Number of Packets Discarded> SSH
<Application>     <Number of Packets Discarded> SNMP
RATELIMIT COUNTERS: User-defined applications
--------------------------------------------
Application    Packets discarded
<Application>   <Number of Packets Discarded>
```

Command Modes

Global command mode

4.10.1.4 Displaying Location Information for the 4Motion Shelf

To display location information for the shelf, run the following command:

npu# show site [{Name |Address | RackLocation | ContactPerson | AsnName |Region | ProductType |ShelfHwVersion}]

Specify the shelf parameter for which you want to view the related details. For example, if you want to display information about the rack location, run the following command:

npu# show site RackLocation

If you want to view information about for all shelf parameters, run the following command:

npu# show site

Command Syntax

npu# show site [{Name |Address | RackLocation | ContactPerson | AsnName |Region | ProductType |ShelfHwVersion}]

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`[{Name |Address | RackLocation | ContactPerson |AsnName |Region | ProductType |ShelfHwVersion}]`	Indicates the shelf parameter for which informationis to be displayed. If you do not enter any value for this parameter, information for all the shelf parameters is displayed.	Optional	N/A	■ Name ■ Address ■ RackLocation ■ ContactPerson ■ AsnName ■ Region ■ ProductType ■ ShelfHwVersion

Display Format

```
Site:
Name            : <Name>
Address          : <Address>
Rack Location       : <Location>
Contact Person      : <Name>
ASN Name         : <value>
Region          : <value>
Product Type       : <value>
Shelf HW Version     : <value>
```

Command Modes

Global command mode

4.10.1.5 Displaying the Unique Identifier for the 4Motion Shelf

To display the unique identifier assigned to the 4Motion shelf, run the following command:

```
npu# show site identifier
```

NOTE

An error may occur if you have not configured a unique identifier for the 4Motion shelf.

Command Syntax	**`npu# show site identifier`**
Privilege Level	1
Display Format	`Site Id : <Device ID>`
Command Modes	Global command mode

4.10.2 Monitoring Software Components

IMPORTANT

The software components listed in this section are available only if you are operating the NPU in the ASN-GW mode. Skip this section if you are operating the NPU in the transparent mode.

This section describes the following procedures for monitoring the following software components:

- "Managing Statistics for the IGMP Functionality" on page 785
- "Managing statistics for the MIP-FA functionality" on page 786
- "Managing Statistics for the PMIP Client Functionality" on page 789
- "Managing Statistics for the Authenticator Functionality" on page 791
- "Managing Statistics for the Data Path Function" on page 796
- "Managing Statistics for the Context Function" on page 801
- "Managing Statistics for the MS State Change Functionality" on page 803
- "Managing Statistics for RADIUS" on page 806

- “Managing Statistics for the DHCP Server” on page 808
- “Managing Statistics for the DHCP Proxy” on page 810
- “Managing Statistics for the DHCP Relay” on page 812
- “Managing Statistics for the SFA Functionality” on page 814

4.10.2.1 Managing Statistics for the IGMP Functionality

IMPORTANT

The IGMP functionality is not supported in the current release.

This section describes the commands to be used for:

- “Displaying Statistics for the IGMP Functionality” on page 785
- “Resetting Statistics for the IGMP Functionality” on page 786

4.10.2.1.1 Displaying Statistics for the IGMP Functionality

You can display statistics counters that provide information about the IGMP queries received and transmitted. The following table lists the statistics counters for the IGMP functionality:

Table 4-31: Statistics Counters for the IGMP Functionality

Statistics Counter	Indicates the number of...
`igmpQueryRx`	IGMP queries received by the NPU.
`igmpReportRx`	IGMP reports received by the NPU.
`igmpReportTx`	IGMP reports transmitted by the NPU.
`igmpErrQueryRx`	IGMP erroneous queries received by the NPU.
`igmpErrReportRx`	IGMP erroneous reports received by the NPU.
`igmpMcastGroups`	Active IGMP multicast groups.
`igmpInvalidEvent`	invalid events that have occurred because of receipt of IGMP messages.

Run the following command to display statistics for the IGMP functionality:

```
npu# show igmp statistics
```

After you run this command, the statistics for the IGMP functionality are displayed.

Command Syntax	**npu# show igmp statistics**
Privilege Level	1
Display Format	IGMP Statistics: igmpQueryRx = <value> igmpReportRx = <value> igmpReportTx = <value> igmpErrQueryRx = <value> igmpErrReportRx = <value> igmpMcastGroups = <value> igmpInvalidEvent = <value>
Command Modes	Global command mode

4.10.2.1.2 Resetting Statistics for the IGMP Functionality

Run the following command to reset statistics for the IGMP functionality:

npu# clear igmp statistics

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.2 Managing statistics for the MIP-FA functionality

IMPORTANT

The MIP-FA functionality is not supported in the current release.

This section describes the commands to be used for:

- "Displaying Statistics for the MIP-FA Functionality" on page 787
- "Resetting Statistics for the MIP-FA Functionality" on page 789

4.10.2.2.1 Displaying Statistics for the MIP-FA Functionality

You can display statistics counters that provide information about the requests and responses, and the number of active and failed IP address allocations by the MIP-FA functionality. The following table lists the statistics counters for the MIP-FA functionality:

Table 4-32: Statistics Counters for the MIP-FA Functionality

Statistics Counter	Indicates the number of...
`mipNumCmipMS`	MSs for which the NPU is serving as the FA.
`mipRRQRx`	MIP registration requests received by the MIP-FA (NPU).
`mipRRPRx`	MIP registration responses received by the MIP-FA (NPU).
`mipRRQTx`	MIP registration requests transmitted by the MIP-FA (NPU). This does not include retransmissions.
`mipRRPTx`	MIP registration responses transmitted by the MIP-FA (NPU). This does not include retransmissions.
`mipRRQErr`	Erroneous MIP registration requests received by the MIP-FA (NPU).
`mipRRPErr`	Erroneous MIP registration responses received by the MIP-FA (NPU).
`mipAgentAdvTx`	MIP agent advertisements transmitted by the MIP-FA (NPU). This does not include retransmissions.
`mipAgentSolRx`	MIP agent solicitation messages transmitted by the MIP-FA (NPU). This does not include retransmissions.
`mipMsLifetimeExp`	MSs for which the NPU is serving as the MIP-FA and the MS lifetime has expired.
`mipIpAllocFailed`	IP address allocation failures that have occurred (for MSs for which the NPU is serving as the MIP-FA).

Table 4-32: Statistics Counters for the MIP-FA Functionality

Statistics Counter	Indicates the number of...
`mipIpDeallocFailed`	IP address deallocation failures that have occurred (for MSs for which the NPU is serving as the MIP-FA).
`mipInvalidEvent`	Invalid events that have occurred because of receipt of messages by MIP-FA (NPU).

Run the following command to display statistics for the MIP-FA functionality:

`npu# show mip-fa statistics`

After you run this command, the statistics for the MIP-FA functionality are displayed.

Command Syntax

`npu# show mip-fa statistics`

Privilege Level

1

Display Format

```
MIP-FA Statistics :
mipNumCmipMS = <value>
mipRRQRx = <value>
mipRRPRx = <value>
mipRRQTx = <value>
mipRRPTx = <value>
mipRRQErr = <value>
mipRRPErr = <value>
mipAgentAdvTx = <value>
mipAgentSolRx = <value>
mipMsLifetimeExp = <value>
 = <value>
mipIpDeallocFailed = <value>
mipInvalidEvent = <value>
```

Command Modes	Global command mode

4.10.2.2.2 Resetting Statistics for the MIP-FA Functionality

Run the following command to reset statistics for the MIP-FA functionality

```
npu# clear mip-fa statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.3 Managing Statistics for the PMIP Client Functionality

IMPORTANT

The PMIP client functionality is not supported in the current release.

This section describes the commands to be used for:

- “Displaying Statistics for the PMIP Client Functionality” on page 789
- “Resetting Statistics for the PMIP Client Functionality” on page 791

4.10.2.3.1 Displaying Statistics for the PMIP Client Functionality

You can display statistics counters that provide information about the requests and responses, and the number of active and failed IP address allocations by the PMIP client functionality. The following table lists the statistics counters for the PMIP client functionality:

Table 4-33: Statistics Counters for the PMIP Client Functionality

Statistics Counter	Indicates the number of...
`mipNumPmipMS`	MSs for which the NPU is serving as the PMIP client.
`mipRRPRx`	MIP registration responses received by the PMIP client (NPU).
`mipRRQTx`	MIP registration requests transmitted by the PMIP client (NPU). This does not include retransmissions.

Table 4-33: Statistics Counters for the PMIP Client Functionality

Statistics Counter	Indicates the number of...
mipRRQRtx	MIP registration requests retransmitted by the PMIP client (NPU).
mipRRPErr	Erroneous MIP registration responses received by the PMIP client (NPU).
mipMsSoftLifetimeExp	Number of times the soft lifetime timer has expired.
mipIpAllocFailed	Failed IP address allocations by by the PMIP client (NPU).
mipIpDeallocFailed	Failed IP address deallocations by by the PMIP client (NPU).
mipFaMigFailed	FA migration failures.
mipInvalidEvent	Invalid events that occurred because of receipt of MIP messages by the PMIP client (NPU).

Run the following command to display statistics for the PMIP client functionality:

```
npu# show mip-client statistics
```

After you run this command, the statistics for the PMIP client functionality are displayed.

Command Syntax	`npu# show mip-client statistics`
Privilege Level	1

Display Format

```
PMIP-Client Statistics :
mipNumPmipMS = <value>
mipRRPRx = <value>
mipRRQTx = <value>
mipRRQRtx = <value>
mipRRPErr = <value>
mipMsSoftLifetimeExp = <value>
mipIpAllocFailed = <value>
mipIpDeallocFailed = <value>
mipFaMigFailed = <value>
mipInvalidEvent = <value>
```

Command Modes Global command mode

4.10.2.3.2 Resetting Statistics for the PMIP Client Functionality

Run the following command to reset statistics for the PMIP client functionality:

```
npu# clear pmip-client statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.4 Managing Statistics for the Authenticator Functionality

This section describes the commands to be used for:

- "Displaying Statistics for the Authenticator Functionality" on page 791
- "Resetting Statistics for the Authenticator Functionality" on page 796

4.10.2.4.1 Displaying Statistics for the Authenticator Functionality

You can display statistics counters that provide information about the EAP messages, and successful and failed authentications handled by the Authenticator functionality. The following table lists the statistics counters for the Authenticator functionality:

Table 4-34: Statistics Counters for the Authenticator Functionality

Statistics Counter	Indicates the number of...
eapIdReqTx	EAP ID requests transmitted by the Authenticator functionality (NPU). This does not include the number of retransmissions.
eapIdReqRtx	EAP ID requests retransmitted by the Authenticator functionality (NPU).
eapIdRspRx	EAP ID responses received by the Authenticator functionality (NPU).
eapIdRspDrop	EAP ID responses dropped by the Authenticator functionality (NPU).
eapTransferTx	EAP transfers transmitted by the Authenticator functionality (NPU). This does not include the number of retransmissions.
eapTransferRtx	EAP transfers retransmitted by the Authenticator functionality (NPU).
eapTransferRx	EAP transfers received by the Authenticator functionality (NPU).
eapTransferDrop	EAP transfers dropped by the Authenticator functionality (NPU).
eapStartRx	EAP start messages received by the Authenticator functionality (NPU).
eapStartDrop	EAP start messages dropped by the Authenticator functionality (NPU).
eapCounterIdReqExp	Failed EAP ID request retries.
eapCounterTransferExp	Failed EAP ID request retries.
eapRndOver	EAP transfer rounds that have exceeded the threshold for the maximum number of permitted EAP rounds.
eapAuthSuccess	MSs that are successfully authenticated.
eapAuthFailure	MSs for which authentication has failed.
eapAuthAttempts	Authentication attempts processed by the Authenticator functionality (NPU).
eapReauthSuccess	Successful reauthentications.
eapReauthFailure	Failed MS reauthentications.

Table 4-34: Statistics Counters for the Authenticator Functionality

Statistics Counter	Indicates the number of...
eapReauthAttempts	Reauthentication attempts processed by the Authenticator functionality (NPU).
eapInvalidNai	Invalid NAIs received by the Authenticator functionality (NPU).
eapInvalidNaiLen	Times an NAI with an invalid length is received by the Authenticator functionality (NPU) in the EAP response ID message.
eapInvalidNaiRealm	Times an NAI with an invalid realm is received by the Authenticator functionality (NPU) in the EAP response ID message.
eapInvalidNaiPseudoId	Times an NAI with an invalid psuedo ID is received by the Authenticator functionality in the EAP response ID message.
eapNaiMismatchAuthMode	Times an NAI with an invalid authentication mode is received by the Authenticator functionality in an EAP response ID message.
authUnauthMS	Unauthnticated MSs.
arpEapTransferTx	EAP transfers transmitted by the Authenticator functionality (NPU).
arpEapTransferRx	EAP transfers received by the Authenticator functionality (NPU).
arpEapTransferDrop	EAP transfers dropped by the Authenticator functionality (NPU).
arpEapStartRx	EAP start messages received by the Authenticator functionality (NPU).
arpEapStartDrop	EAP start messages dropped by the Authenticator functionality (NPU).

Run the following command to display statistics for the Authenticator functionality:

```
npu# show authenticator statistics
```

After you run this command, the statistics for the Authenticator functionality are displayed.

Command Syntax	`npu# show authenticator statistics`
Privilege Level	1

Display Format

```
Authenticator Function Statistics :
eapIdReqTx = <value>
eapIdReqRtx = <value>
eapIdRspRx = <value>
eapIdRspDrop = <value>
eapTransferTx = <value>
eapTransferRtx = <value>
eapTransferRx = <value>
eapTransferDrop = <value>
eapStartRx = <value>
eapStartDrop = <value>
eapCounterIdReqExp = <value>
eapCounterTransferExp = <value>
eapRndOver = <value>
eapAuthSuccess = <value>
eapAuthFailure = <value>
eapAuthAttempts = <value>
eapReauthSuccess = <value>
eapReauthFailure = <value>
eapReauthAttempts = <value>
eapInvalidNai = <value>
eapInvalidNaiLen = <value>
eapInvalidNaiRealm = <value>
eapInvalidNaiPseudoId = <value>
eapNaiMismatchAuthMode = <value>
authUnauthMS = <value>
arpEapTransferTx = <value>
arpEapTransferRx = <value>
arpEapTransferDrop = <value>
arpEapStartRx = <value>
arpEapStartDrop = <value>
```

Command Modes	Global command mode

4.10.2.4.2 Resetting Statistics for the Authenticator Functionality

Run the following command to reset statistics for the Authenticator functionality:

```
npu# clear authenticator statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.5 Managing Statistics for the Data Path Function

This section describes the commands to be used for:

- "Displaying Statistics for the Data Path Function" on page 796
- "Resetting Data Path Statistics" on page 801

4.10.2.5.1 Displaying Statistics for the Data Path Function

You can display statistics counters that provide information about the data path registration, pre-registration and de-registration requests and responses handled by the data path function. The following table lists the statistics counters for the data path function:

Table 4-35: Statistics Counters for the Data Path Function

Statistics Counter	Indicates the number of...
dpPathRegReqRx	Path registration requests received by the data path function (NPU).
dpPathRegReqTx	Path registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathRegReqRtx	Path registration requests retransmitted by the data path function (NPU).
dpPathRegReqDrop	Path registration requests dropped by the data path function (NPU).
dpPathRegRprtRx	Path registration reports received by the data path function (NPU).

Table 4-35: Statistics Counters for the Data Path Function

Statistics Counter	Indicates the number of...
dpPathRegRprtTx	Path registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathRegRprtRtx	Path registration reports retransmitted by the data path function (NPU).
dpPathRegRprtDrop	Path registration reports dropped by the data path function (NPU).
dpPathRegRprtAckRx	Path registration reports for which the data path function (NPU) has received an ACK.
dpPathRegRprtAckTx	Path registration reports for which the data path function (NPU) has trasnmitted an ACK.
dpPathRegRprtAckDrop	Path registration reports for which the data path function (NPU) has dropped an ACK.
dpPathPreRegReqRx	Path pre-registration requests received by the data path function (NPU).
dpPathPreRegReqTx	Path pre-registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathPreRegReqRtx	Path pre-registration requests retransmitted by the data path function (NPU).
dpPathPreRegReqDrop	Path pre-registration requests dropped by the data path function (NPU).
dpPathPreRegRprtRx	Path pre-registration reports received by the data path function (NPU).
dpPathPreRegRprtTx	Path pre-registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathPreRegRprtRtx	Path pre-registration reports retransmitted by the data path function (NPU).
dpPathPreRegRprtDrop	Path pre-registration reports dropped by the data path function (NPU).

Table 4-35: Statistics Counters for the Data Path Function

Statistics Counter	Indicates the number of...
dpPathPreRegRprtAckRx	Path pre-registration reports for which the data path function (NPU) has received an ACK.
dpPathPreRegRprtAckTx	Path pre-registration reports for which the data path function (NPU) has transmitted an ACK.
dpPathPreRegRprtAckDrop	Path pre-registration reports for which the data path function (NPU) has dropped an ACK.
dpPathDeregReqRx	Path de-registration requests received by the data path function (NPU).
dpPathDeregReqTx	Path de-registration requests transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathDeregReqRtx	Path de-registration requests retransmitted by the data path function (NPU).
dpPathDeregReqDrop	Path de-registration requests dropped by the data path function (NPU).
dpPathDeregRprtRx	Path de-registration reports received by the data path function (NPU).
dpPathDeregRprtTx	Path de-registration reports transmitted by the data path function (NPU). This does not include the number of retransmissions.
dpPathDeregRprtRtx	Path de-registration reports retransmitted by the data path function (NPU).
dpPathDeregRprtDrop	Path de-registration reports transmitted by the data path function (NPU).
dpPathDeregRprtAckRx	Path de-registration reports for which the data path function (NPU) has received an ACK.
dpPathDeregRprtAckTx	Path de-registration reports for which the data path function (NPU) has transmitted an ACK.

Table 4-35: Statistics Counters for the Data Path Function

Statistics Counter	Indicates the number of...
dpPathDeregRprtAckDrop	Path de-registration reports for which the data path function (NPU) has dropped an ACK.
dpActiveSF	Active service flows.
dpActiveGRESessions	Active GRE sessions.

Run the following command to display statistics for the data path function:

```
npu# show datapath statistics
```

After you run this command, the statistics for the data path function are displayed.

Command Syntax	`npu# show datapath statistics`
Privilege Level	1

Display Format

Data Path Function Statistics :

dpPathRegReqRx = <value>

dpPathRegReqTx = <value>

dpPathRegReqRtx = <value>

dpPathRegReqDrop = <value>

dpPathRegRprtRx = <value>

dpPathRegRprtTx = <value>

dpPathRegRprtRtx = <value>

dpPathRegRprtDrop = <value>

dpPathRegRprtAckRx = <value>

dpPathRegRprtAckTx = <value>

dpPathRegRprtAckDrop = <value>

dpPathPreRegReqRx = <value>

dpPathPreRegReqTx = <value>

dpPathPreRegReqRtx = <value>

dpPathPreRegReqDrop = <value>

dpPathPreRegRprtRx = <value>

dpPathPreRegRprtTx = <value>

dpPathPreRegRprtRtx = <value>

dpPathPreRegRprtDrop = <value>

dpPathPreRegRprtAckRx = <value>

dpPathPreRegRprtAckTx = <value>

dpPathPreRegRprtAckDrop = <value>

dpPathDeregReqRx = <value>

dpPathDeregReqTx = <value>

dpPathDeregReqRtx = <value>

dpPathDeregReqDrop = <value>

dpPathDeregRprtRx = <value>

dpPathDeregRprtTx = <value>

dpPathDeregRprtRtx = <value>

dpPathDeregRprtDrop = <value>

dpPathDeregRprtAckRx = <value>

dpPathDeregRprtAckTx = <value>

dpPathDeregRprtAckDrop = <value>

dpActiveSF = <value>

dpActiveGRESessions = <value>

Command Modes	Global command mode

4.10.2.5.2 Resetting Data Path Statistics

Run the following command to reset statistics for the data path functionality:

```
npu# clear datapath statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.6 Managing Statistics for the Context Function

This section describes the commands to be used for:

- "Displaying Statistics for the Context Function" on page 801
- "Resetting Statistics for the Context Function" on page 803

4.10.2.6.1 Displaying Statistics for the Context Function

You can display statistics counters that provide information about the requests and reports transmitted and received by the Context function. The following table lists the statistics counters for the Context function:

Table 4-36: Statistics Counters for the Context Function

Statistics Counter	Indicates the number of...
`ctxtfnCtxtReqTx`	Context requests transmitted by the Context function (NPU). This does not include retransmissions.

Table 4-36: Statistics Counters for the Context Function

Statistics Counter	Indicates the number of...
ctxtfnCtxtReqRtx	Context requests retransmitted by the Context function (NPU).
ctxtfnCtxtReqRx	Context requests received by the Context function (NPU).
ctxtfnCtxtReqDrop	Context requests dropped by the Context function (NPU).
ctxtfnCtxtRprtTx	Context reports transmitted by the Context function (NPU). This does not include retransmission.
ctxtfnCtxtRprtRtx	Context reports retransmitted by the Context function (NPU).
ctxtfnCtxtRprtRx	Context reports received by the Context function (NPU).
ctxtfnCtxtRprtDrop	Context reports dropped by the Context function (NPU).
ctxtfnCtxtRprtAckTx	Context reports transmitted by the Context function (NPU).
ctxtfnCtxtRprtAckRx	Context report ACK messages received by the Context function (NPU).
ctxtfnCtxtRprtAckDrop	Context report ACK messages dropped by the Context function (NPU).
ctxtfnPkmv2Failure	PKMv2 handshake failures that have occurred.

Run the following command to display statistics for the context function.

npu# show contextfn statistics

After you run this command, the statistics for the context function are displayed.

Command Syntax	**npu# show contextfn statistics**
Privilege Level	1

Display Format

```
Context Function Statistics :
ctxtfnCtxtReqTx = <value>
ctxtfnCtxtReqRtx = <value>
ctxtfnCtxtReqRx = <value>
ctxtfnCtxtReqDrop = <value>
ctxtfnCtxtRprtTx = <value>
ctxtfnCtxtRprtRtx = <value>
ctxtfnCtxtRprtRx = <value>
ctxtfnCtxtRprtDrop = <value>
ctxtfnCtxtRprtAckTx = <value>
ctxtfnCtxtRprtAckRx = <value>
ctxtfnCtxtRprtAckDrop = <value>
ctxtfnPkmv2Failure = <value>
```

Command Modes

Global command mode

4.10.2.6.2 Resetting Statistics for the Context Function

Run the following command to reset statistics for the context function:

```
npu# clear contextfn statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.7 Managing Statistics for the MS State Change Functionality

This section describes the commands to be used for:

- "Displaying Statistics for the MS State Change Functionality" on page 803
- "Resetting Statistics for the MS State Change Functionality" on page 806

4.10.2.7.1 Displaying Statistics for the MS State Change Functionality

You can display statistics counters that provide information about the requests and responses transmitted and received by the MS state change functionality. The following table lists the statistics counters for the MS state change functionality:

Table 4-37: Statistics Counters for the MS State Change Functionality

Statistics Counter	Indicates the number of...
`msscfnMsscReqTx`	MS state change requests transmitted by the MS state change functionality (NPU). This does not include retransmissions.
`msscfnMsscReqRtx`	MS state change requests retransmitted by the MS state change functionality (NPU).
`msscfnMsscReqRx`	MS state change requests received by the MS state change functionality (NPU).
`msscfnMsscReqDrop`	MS state change requests dropped by the MS state change functionality (NPU).
`msscfnMsscRspTx`	MS state change responses transmitted by the MS state change functionality (NPU). This does not include retransmissions.
`msscfnMsscRspRtx`	MS state change responses retransmitted by the MS state change functionality (NPU).
`msscfnMsscRspRx`	MS state change responses received by the MS state change functionality (NPU).
`msscfnMsscRspDrop`	MS state change responses dropped by the MS state change functionality (NPU).
`msscfnMsscRspAckTx`	MS state change response ACK messages transmitted by the MS state change functionality (NPU).
`msscfnMsscRspAckRx`	MS state change response ACK messages received by the MS state change functionality (NPU).
`msscfnMsscRspAckDrop`	MS state change response ACK messages dropped by the MS state change functionality (NPU).
`msscfnMsUnsuppSecCap`	MS network entry failures because of unsupported security capabilities.

Table 4-37: Statistics Counters for the MS State Change Functionality

Statistics Counter	Indicates the number of...
`msscfnMsSecCapMismatch`	MS network entry failures because of unsupported security capability mismatch.

Run the following command to display statistics for the MS state change functionality.

`npu# show msscfn statistics`

After you run this command, the statistics for the MS state change functionality are displayed.

Command Syntax

`npu# show msscfn statistics`

Privilege Level

1

Display Format

```
MS State Change Function Statistics :
msscfnMsscReqTx = <value>
msscfnMsscReqRtx = <value>
msscfnMsscReqRx = <value>
msscfnMsscReqDrop = <value>
msscfnMsscRspTx = <value>
msscfnMsscRspRtx = <value>
msscfnMsscRspRx = <value>
msscfnMsscRspDrop = <value>
msscfnMsscRspAckTx = <value>
msscfnMsscRspAckRx = <value>
msscfnMsscRspAckDrop = <value>
msscfnMsUnsuppSecCap = <value>
msscfnMsSecCapMismatch = <value>
```

Command Modes

Global command mode

4.10.2.7.2 Resetting Statistics for the MS State Change Functionality

Run the following command to reset statistics for the MS state change functionality:

```
npu# clear msscfn statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 15.

4.10.2.8 Managing Statistics for RADIUS

This section describes the commands to be used for:

- "Displaying Statistics for RADIUS" on page 806
- "Resetting Statistics for RADIUS" on page 808

4.10.2.8.1 Displaying Statistics for RADIUS

You can display statistics counters that provide information about the access, postpaid, and prepaid accounting requests and responses processed by the RADIUS function. The following table lists the statistics counters for the RADIUS function:

Table 4-38: Statistics Counters for RADIUS

Statistics Counter	Indicates the number of...
`msscfnMsscReqTx`	MS state change requests transmitted by the MS state change functionality (NPU). This does not include retransmissions.
`msscfnMsscReqRtx`	MS state change requests retransmitted by the MS state change functionality (NPU).
`msscfnMsscReqRx`	MS state change requests received by the MS state change functionality (NPU).
`msscfnMsscReqDrop`	MS state change requests dropped by the MS state change functionality (NPU).

Table 4-38: Statistics Counters for RADIUS

Statistics Counter	Indicates the number of...
`msscfnMsscRspTx`	MS state change responses transmitted by the MS state change functionality (NPU). This does not include retransmissions.
`msscfnMsscRspRtx`	MS state change responses retransmitted by the MS state change functionality (NPU).
`msscfnMsscRspRx`	MS state change responses received by the MS state change functionality (NPU).
`msscfnMsscRspDrop`	MS state change responses dropped by the MS state change functionality (NPU).
`msscfnMsscRspAckTx`	MS state change response ACK messages transmitted by the MS state change functionality (NPU).
`msscfnMsscRspAckRx`	MS state change response ACK messages received by the MS state change functionality (NPU).
`msscfnMsscRspAckDrop`	MS state change response ACK messages dropped by the MS state change functionality (NPU).
`msscfnMsUnsuppSecCap`	MS network entry failures because of unsupported security capabilities.
`msscfnMsSecCapMismatch`	MS network entry failures because of unsupported security capability mismatch.

Run the following command to display statistics for RADIUS.

`npu# show radius statistics`

After you run this command, the statistics for RADIUS are displayed.

Command Syntax	**`npu# show radius statistics`**
Privilege Level	1

Display Format	`Radius Statistics :`
	`radAccessReqTx = <value>`
	`radAccessReqRtx = <value>`
	`radAccessChallengeRx = <value>`
	`radAccessAcceptRx = <value>`
	`radAccessRejectRx = <value>`
	`radAccessChallengeDrop = <value>`
	`radAccessAcceptDrop = <value>`
	`radAccessRejectDrop = <value>`
	`radTimerAccessReqExp = <value>`
	`radCounterAccessReqExp = <value>`
	`radInvalidEvent = <value>`
	`radMsProfileChange = <value>`
	`radEapMismatch = <value>`

Command Modes	Global command mode

4.10.2.8.2 Resetting Statistics for RADIUS

Run the following command to reset RADIUS statistics:

```
npu# clear radius statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 10.

4.10.2.9 Managing Statistics for the DHCP Server

This section describes the commands to be used for:

- "Displaying Statistics for the DHCP Server" on page 809
- "Resetting DHCP Server Statistics" on page 810

4.10.2.9.1 Displaying Statistics for the DHCP Server

You can display statistics counters that provide information about the requests and responses processed by the DHCP server. The following table lists the statistics counters for the DHCP server:

Table 4-39: Statistics Counters for DHCP Server

Statistics Counter	Indicates the number of...
`dhcpDiscoverRx`	DHCP discover messages received by the DHCP server (NPU).
`dhcpRequestRx`	DHCP request messages received by the DHCP server (NPU).
`dhcpDiscoverDrop`	DHCP discover messages dropped by the DHCP server (NPU).
`dhcpRequestDrop`	DHCP request messages dropped by the DHCP server (NPU).
`dhcpReleaseRx`	DHCP release messages received by the DHCP server (NPU).
`dhcpReleaseDrop`	DHCP release messages dropped by the DHCP server (NPU).
`dhcpLeaseTimerExp`	DHCP lease timer expiries the DHCP server (NPU).
`dhcpInvalidEvent`	Invalid events that occurred because of DHCP messages received by the DHCP server (NPU).

Run the following command to display statistics for the DCHP server.

```
npu# show dhcp-server statistics
```

After you run this command, the statistics for the DHCP server are displayed.

Command Syntax	`npu# show dhcp-server statistics`
Privilege Level	1

Display Format

```
DHCP Server Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpReleaseRx = <value>
dhcpReleaseDrop = <value>
dhcpLeaseTimerExp = <value>
dhcpInvalidEvent = <value>
```

Command Modes

Global command mode

4.10.2.9.2 Resetting DHCP Server Statistics

Run the following command to reset statistics for the DHCP server:

```
npu# clear dhcp-server statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 10.

4.10.2.10 Managing Statistics for the DHCP Proxy

This section describes the commands to be used for:

- "Displaying Statistics for the DHCP Proxy" on page 810
- "Resetting Statistics for the DHCP Proxy" on page 812

4.10.2.10.1 Displaying Statistics for the DHCP Proxy

You can display statistics counters for the DHCP proxy. The following table lists the statistics counters for the DHCP proxy:

Table 4-40: Statistics Counters for the DHCP Proxy

Statistics Counter	Indicates the number of...
dhcpDiscoverRx	DHCP discover messages received by the DHCP proxy.

Table 4-40: Statistics Counters for the DHCP Proxy

Statistics Counter	Indicates the number of...
dhcpDiscoverDrop	DHCP discover messages dropped by the DHCP proxy.
dhcpRequestRx	DHCP requests received by the DHCP proxy.
dhcpRequestDrop	DHCP requests dropped by the DHCP proxy.
dhcpLeaseTimerExp	DHCP lease timer expiries handled by the DHCP proxy.
dhcpInvalidEvent	Invalid events that have occurred because of DHCP messages received by the DHCP proxy.

Run the following command to display statistics for the DCHP proxy.

```
npu# show dhcp-proxy statistics
```

After you run this command, the statistics for the DHCP proxy are displayed.

Command Syntax

```
npu# show dhcp-proxy statistics
```

Privilege Level

1

Display Format

```
DHCP Proxy Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpReleaseRx = <value>
dhcpReleaseDrop = <value>
dhcpLeaseTimerExp = <value>
dhcpInvalidEvent = <value>
```

Command Modes

Global command mode

4.10.2.10.2 Resetting Statistics for the DHCP Proxy

Run the following command to reset statistics for the DHCP proxy:

```
npu# clear dhcp-proxy statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 10.

4.10.2.11 Managing Statistics for the DHCP Relay

This section describes the commands to be used for:

- "Displaying Statistics for the DHCP Relay" on page 812
- "Resetting Statistics for the DHCP Relay" on page 814

4.10.2.11.1 Displaying Statistics for the DHCP Relay

You can display statistics counters for the DHCP relay. The following table lists the statistics counters for the DHCP relay:

Table 4-41: Statistics Counters for the DHCP Relay

Statistics Counter	Indicates the number of...
`dhcpDiscoverRx`	DHCP discover messages received by the DHCP relay.
`dhcpDiscoverDrop`	DHCP discover messages dropped by the DHCP relay.
`dhcpOfferRx`	DHCP offer messages received by the DHCP relay.
`dhcpOfferDrop`	DHCP offer messages dropped by the DHCP relay.
`dhcpRequestRx`	DHCP requests received by the DHCP relay.
`dhcpRequestDrop`	DHCP requests dropped by the DHCP relay.
`dhcpAckRx`	DHCP ACK messages received by the DHCP relay.
`dhcpAckDrop`	DHCP ACK messages dropped received by the DHCP relay.

Table 4-41: Statistics Counters for the DHCP Relay

Statistics Counter	Indicates the number of...
dhcpNakRx	DHCP NACK messages received by the DHCP relay.
dhcpNakDrop	DHCP NACK messages dropped by the DHCP relay.
dhcpIpAllocFailed	Failed IP address allocations handled by the DHCP relay.
dhcpInvalidEvent	Invalid events that occurred because of messages received by the DHCP relay.

Run the following command to display statistics for the DCHP relay.

```
npu# show dhcp-relay statistics
```

After you run this command, the statistics for the DHCP relay are displayed.

Command Syntax

```
npu# show dhcp-relay statistics
```

Privilege Level

1

Display Format

```
DHCP Relay Statistics :
dhcpDiscoverRx = <value>
dhcpDiscoverDrop = <value>
dhcpOfferRx = <value>
dhcpOfferDrop = <value>
dhcpRequestRx = <value>
dhcpRequestDrop = <value>
dhcpAckRx = <value>
dhcpAckDrop = <value>
dhcpNakRx = <value>
dhcpNakDrop = <value>
dhcpIpAllocFailed = <value>
dhcpInvalidEvent = <value
```

Command Modes	Global command mode

4.10.2.11.2 Resetting Statistics for the DHCP Relay

Run the following command to reset statistics for the DHCP relay:

```
npu# clear dhcp-relay statistics
```

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 10.

4.10.2.12 Managing Statistics for the SFA Functionality

You can display statistics counters for the DHCP relay. This section describes the commands to be used for:

- “Displaying Statistics for the SFA Functionality” on page 814
- “Resetting Statistics for the SFA Functionality” on page 815

4.10.2.12.1 Displaying Statistics for the SFA Functionality

The following table lists the statistics counters for the SFA functionality:

Table 4-42: Statistics Counters for the SFA Functionality

Statistics Counter	Indicates the number of Times...
`sfaQosMappingFail`	QoS mapping has failed.
`sfaSfDescMissing`	Service flow description is missing.
`sfaDfltLpApplied`	Default local profile is applied.
`sfaRejMsMissingProf`	MSs are rejected rejected because of a missing service profile.
`sfaLocalServProfApplied`	Local service profile is applied.

Run the following command to display statistics for the SFA functionality.

```
npu# show sfa statistics
```

After you run this command, the statistics for the SFA functionality are displayed.

Command Syntax	**npu# show sfa statistics**
Privilege Level	1
Display Format	SFA Statistics : sfaQosMappingFail = <value> sfaSfDescMissing = <value> sfaDfltLpApplied = <value> sfaRejMsMissingProf = <value> sfaLocalServProfApplied = <value>
Command Modes	Global command mode

4.10.2.12.2 Resetting Statistics for the SFA Functionality

Run the following command to reset statistics for the SFA functionality:

npu# clear sfa statistics

After you run this command, the statistics counter is reset to 0.

NOTE

The privilege level of this command is 10.

4.10.3 Displaying Statistics for Physical and IP Interfaces

The following table lists the statistics counters for the physical interfaces:

Table 4-43: Statistics Counters for the Physical Interfaces

Statistics Counter	Indicates the number of...
rxUnicast Packets	Unicast packets received by the AU.
rxMulticast Packets	Multicast packets received by the AU.
rxBroadcast Packets	Broadcast packets received by the AU.
rxDiscarded Packets	Discarded packets received by the AU.

Table 4-43: Statistics Counters for the Physical Interfaces

Statistics Counter	Indicates the number of...
rxError Packets	Erroneous packets received by the AU.
rxUnknown Packets	Unknown packets received by the AU.
txBytes	Bytes transmitted by the AU.
txUnicast Packets	Unicast packets transmitted by the AU.
txBroadcast Packets	Broadcast packets transmitted by the AU.
txMulticast Packets	Multicast packets transmitted by the AU.
txDiscarded Packets	Discarded packets transmitted by the AU.
txError Packets	Erroneous packets transmitted by the AU.

The following table lists the statistics counters for the physical and IP interfaces:

Table 4-44: Statistics Counters for the IP Interfaces

Statistics Counter	Indicates the number of...
rxBytes	Bytes received by an IP interface.
rxUnicast Packets	Unicast packets received by an IP interface.
rxDiscarded Packets	Discarded packets received by an IP interface.
rxError Packets	Error packets received by an IPinterface.
txBytes	Bytes transmitted by an IP interface.
txUnicast Packets	Unicast packets transmitted by an IP interface.

Run the following command to display the statistics for physical and IP interfaces:

```
npu# show interfaces [{[<interface-type> <interface-id>] |
internal-mgmt | external-mgmt | bearer | local-mgmt}] counters
```

The following table lists parameters to be used with respect to the type of interface:

Table 4-45: Parameters for Displaying Statistics for All Physical, IP, and Virtual Interfaces

Interface	Parameters	Example

Physical Interfaces	**Fast Ethernet:**
	`<interface-type>`
	`<interface-id>`
		`npu# show interfaces fastethernet 0/1 counters`
		`npu# show interfaces fastethernet 0/2 counters`
		`npu# show interfaces fastethernet 0/3 counters`
		`npu# show interfaces fastethernet 0/4 counters`
		`npu# show interfaces fastethernet 0/5 counters`
		`npu# show interfaces fastethernet 0/6 counters`
		`npu# show interfaces fastethernet 0/7 counters`
		`npu# show interfaces fastethernet 0/8 counters`

	Gigabit Ethernet
	`<interface-type>`
	`<interface-id>`
		`npu# show interfaces gigabitethernet 0/9 counters`
		`npu# show interfaces gigabitethernet 0/10 counters`

IP Interfaces	`internal-mgmt`	`npu# show interfaces internal-mgmt counters`
	`external-mgmt`	`npu# show interfaces external-mgmt counters`
	`bearer`	`npu# show interfaces bearer counters`
	`local-mgmt`	`npu# show interfaces local-mgmt counters`

IMPORTANT

An error may occur if:

- The interface type or interface ID you have specified is incorrect. Refer the syntax description for more information about the appropriate values for configuring these parameters.
- The IP interface does not exist for the configured connectivity and boot mode.

Command Syntax

```
npu# show interfaces [{[<interface-type> <interface-id>] | internal-mgmt | external-mgmt | bearer | local-mgmt}] counters
```

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`[{[<interface-type> <interface-id>] | internal-mgmt | external-mgmt | bearer | local-mgmt}] counters`	Indicates the type of interface (physical or IP) for which statistics are to be displayed. Do not specify any value for this parameter if you want to display statistics for all physical and IP interfaces.	Optional	N/A	Refer Table 4-45

Display Format (Fast Ethernet/Gigabit Ethernet)

```
Port                        = <value>
rxUnicast Packets           = <value>
rxMulticast Packets         = <value>
rxBroadcast Packets         = <value>
rxDiscarded Packets         = <value>
rxError Packets             = <value>
rxUnknown Packets           = <value>
txBytes                     = <value>
txUnicast Packets           = <value>
txBroadcast Packets         = <value>
txMulticast Packets         = <value>
txDiscarded Packets         = <value>
txError Packets             = <value>
```

Display Format (IP Interfaces)	`Port = <IP Interface Name>`
	`rxBytes = <value>`
	`rxUnicast Packets = <value>`
	`rxDiscarded Packets = <value>`
	`rxError Packets = <value>`
	`txBytes = <value>`
	`txUnicast Packets = <value>`

Command Modes	Global command mode

4.10.4 Displaying System Files

The following system files reside in the TFTP boot directory of the NPU:

- Performance data files: Contain performance counters for system modules. (For more information about the modules for which you can configure collection and storage of performance data, refer Section 4.3.12. These files are available in the path, /tftpboot/management/performance.
- System log: Contain log and trace messages. (For more information about configuring logging and tracing, refer Section 4.11.1 and Section 4.3.11. These files are available in the path, /tftpboot/management/system_log.
- Active alarms: Contain a list of currently active alarms. These files are residing in the path, /tftpboot/management/fault.
- User history files: Contain information about the commands/tasks executed by the user. These files are available in the path, /tftpboot/management/user_log.

To display a list of performance data, system log, active alarms, or user history files, run the following command:

`npu# show saved {Performance | Active-alarm | Log | User-history} files [recent <1-65535>]`

For example, if you want to view the 30 most recently saved log files, residing in the TFTP boot directory of the NPU, run the following command:

`npu# show saved Log files recent 30`

Command Syntax

```
npu# show saved {Performance | Active-alarm | Log | User-history}
files [recent <1-65535>]
```

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`Performance|Active-alarm|Log|User-history`	Indicates the type of system files that are to be displayed:	Mandatory	N/A	■ Performance ■ Active-alarm ■ Log ■ User-history
`[recent <1-65535>]`	Indicates the number of files to be displayed. The most recently saved files are displayed. If you do not specify a value for this parameter, all the files of a particular type are displayed.	Optional	N/A	1-65355

Command Modes

Global command mode

4.11 Troubleshooting

4.11.1 Configuring Tracing

The system can generate traces to be used for tracing the execution sequence of a module and determining the actual cause of an erroneous condition. Traces are recorded for events that occur with respect to the following system modules:

- System startup procedures: Refers to all procedures/events that occur during system startup.
- NPU/AU upgrade procedures: Refers to all the procedures executed while upgrading the NPU/AU.
- Fault management procedures: Refers to internal processes that are executed for monitoring erroneous conditions or fault conditions.
- System performance procedures: Refers to internal processes that are executed for monitoring system performance.
- Shelf management procedures: Refers to internal processes that are executed for monitoring the health and temperature of all hardware components (other than the NPU) such as the AU, PIU and PSU.
- WiMAX signaling protocols: Refers to all the protocols that implement the ASN-GW functionality.
- User interface: Refers to the command line or remote management interface used for executing all user-initiated events such as system shut down or reset.
- AU Manager: Refers to all internal processes used for fault, configuration, and performance management for AU.

The system stores a maximum of 1000 trace and log messages, after which the oldest messages are overwritten. First configure system-level tracing, and then configure tracing separately for each module. This section describes the commands to be used for:

- "Managing System-level Tracing" on page 822
- "Configuring Module-level Tracing" on page 825

4.11.1.1 Managing System-level Tracing

System-level tracing refers all the procedures to be executed for managing tracing for the entire system. To manage system-level tracing:

- Enable/disable logging for the entire system and specify the destination (file or console) where traces are to be maintained.
- Make periodic backups of trace files

You can, at any time, view the current destination to where traces are maintained. After you have enabled/disabled system-level logging and specified the destination for storing log messages, you can configure logging separately for each module.

This section describes the commands to be used for:

- "Enabling System-level Tracing" on page 822
- "Disabling System-level Tracing" on page 823
- "Displaying the Current Status of Trace Destinations" on page 824

4.11.1.1.1 Enabling System-level Tracing

You can enable traces for all modules across the system and specify the destination where traces should be written. The destination can be either a file stored on the local system or console. To view whether tracing to file or console is enabled or disabled, refer Section 4.11.1.1.3.

NOTE

By default, system-level tracing to file is disabled. If you enable tracing to file, traces are written to the same file that contains log messages. This file is not maintained after system reset. It is recommended that you periodically make a backup of this file on the NPU flash. For details, refer to Section 4.3.11.1.5.

To enable system-level tracing, run the following command:

```
npu(config)# trace destination {file|console}
```

The system maintains a maximum of 1000 trace and log messages, after which the oldest messages are overwritten.

NOTE

After you have enabled system-level tracing, you can configure the types of traces (brief or detailed) to be generated for each module. By default, module-level tracing is disabled. To configure tracing for each module, refer to Section 4.11.1.2.

IMPORTANT

An error may occur if:

- Tracing is already enabled for the requested destination (file or console).
- An internal error has occurred.

Command Syntax

```
npu(config)# trace destination {file|console}
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
{file|console}	Indicates whether tracing to a file or console is to be enabled for the entire system.	Mandatory	N/A	■ **file**: Indicates that system-level traces are to be written to a file. ■ **console**: Indicates that the system-level traces are to be written to a console.

Command Modes

Global configuration mode

4.11.1.1.2 Disabling System-level Tracing

To disable tracing at the system-level, run the following command:

```
npu(config)# no trace destination {file|console}
```

IMPORTANT

An error may occur if:

- Tracing is already disabled for the requested destination (file or console).
- An internal error has occurred.

Command Syntax

```
npu(config)# no trace destination {file|console}
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
{file|console}	Indicates whether tracing to file or console is to be disabled for the entire system.	Mandatory	N/A	■ **file**: Indicates that tracing to file is to be disabled. ■ **console**: Indicates that tracing to console is to be disabled.

Command Modes

Global configuration mode

4.11.1.1.3 Displaying the Current Status of Trace Destinations

To view the current status of trace destinations, that is, whether the system is enabled/disabled for tracing to file or console, run the following command:

```
npu(config)# show trace destination
```

IMPORTANT

This command may not be successfully executed if an internal error occurs while processing the result.

Command Syntax

```
npu(config)# show trace destination
```

Privilege Level

1

Display Format

```
Tracefile(<file name>)  :  Enabled/Disabled
Console(<console>)    :  Enabled/Disabled
```

Command Modes

Global command mode

4.11.1.2 Configuring Module-level Tracing

After configuring module-level tracing, you can specify whether brief or detailed traces should be recorded for the following modules:

- System startup procedures
- NPU/AU upgrade procedures
- Fault management procedures
- System performance procedures
- Shelf Management procedures
- WiMAX signaling protocols
- User interface
- AU Management procedures

You can also disable tracing for a particular module. This section describes the commands to be used for:

- "Configuring Trace Levels" on page 826
- "Disabling Module-level Tracing" on page 827
- "Displaying Trace Levels" on page 828

NOTE

By default, module-level tracing is disabled.

4.11.1.2.1 Configuring Trace Levels

To specify the trace level (brief or detailed) for each module, run the following command:

```
npu(config)# trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AU
Mgr}] {Brief|Detailed}
```

The parameters in this command correspond to the system modules/procedures listed in the following table:

Table 4-46: Modules for which Tracing can be Enabled

Parameter	Refers to...
StartupMgr	System startup procedures
SWDownload	Software upgrade procedures
FaultMgr	Fault management procedures
ShelfMgr	Shelf management procedures
SIGASN	WiMAX signaling protocols
UserIF	User-initiated procedures
AUMgr	Internal processes used for managing AU
PerfMgr	Performance management procedures

Specify the module name if you want to configure the trace level separately for this module. If you do not specify the name of the module, the trace level that you configure in this command is applied to all modules.

For example, run the following command if you want logs to be created for WiMAX signaling protocols when the trace level configured to Detailed:

```
npu(config)# trace level SIGASN Detailed
```

Command Syntax

```
npu(config)# trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
{Brief|Detailed}
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]`	Indicates the name of the module for which the trace level is to be configured. If you do not specify any value for this parameter, the same trace level is applied to all modules. For more information about these parameters, refer Table 4-46.	Optional	N/A	■ StartupMgr ■ SWDownload ■ FaultMgr ■ PerfMgr ■ ShelfMgr ■ SIGASN ■ UserIF ■ AUMgr
`{Brief|Detailed}`	Indicates the trace level to be applied for a particular or all modules.	Mandatory	N/A	■ Brief ■ Detailed

Command Modes

Global configuration mode

4.11.1.2.2 Disabling Module-level Tracing

To disable tracing for one or all modules, run the following command:

```
npu(config)# no trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Specify the module if you want to disable tracing for that module. If you do not specify the name of the module, tracing is disabled for all modules.

For example, run the following command if you want to disable tracing for WiMAX signaling protocols:

```
npu(config)# no trace level SIGASN
```

Command Syntax

```
npu(config)# no trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Privilege Level

10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]	Indicates the name of the module for which tracing is to be disabled. If you do not specify any value for this parameter, tracing is disabled for all functionalities. For more information about these parameters, refer Table 4-46.	Optional	N/A	■ StartupMgr ■ SWDownload ■ FaultMgr ■ PerfMgr ■ ShelfMgr ■ SIGASN ■ UserIF ■ AUMgr\

Command Modes

Global configuration mode

4.11.1.2.3 Displaying Trace Levels

To view the trace levels configured for one or more modules, run the following command:

```
npu(config)# show trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Specify the module for which you want to view the configured trace level. If you do not specify the name of the module, the trace levels configured for all modules is displayed.

Command Syntax

```
npu(config)# show trace level
[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]
```

Privilege Level

1

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`[{StartupMgr|SWDownload|FaultMgr|PerfMgr|ShelfMgr|SIGASN|UserIF|AUMgr}]`	Indicates the name of the module for which you want to display the configured trace levels. If you do not specify any value for this parameter, the trace levels for all modules are displayed. For more information about these parameters, refer Table 4-46.	Optional	N/A	■ StartupMgr ■ SWDownload ■ FaultMgr ■ PerfMgr ■ ShelfMgr ■ SIGASN ■ UserIF ■ AUMgr

Display Format

```
Module Name     :   Trace level
<module name>    :   <Trace Level>
```

Command Modes

Global command mode

4.11.2 Configuring Port Monitoring

The port monitoring feature enables you to mirror all incoming and outgoing traffic on an interface to another interface. You can configure one interface as the destination interface to which traffic from multiple interfaces can be mirrored. This section describes the commands to be executed for enabling/disabling port monitoring for source and destination interfaces or displaying configuration information for a particular interface.

To enable port monitoring, you are required to configure:

- Source interfaces: Refers to the FastEthernet or GigabitEthernet interface for which incoming, outgoing or both types of traffic is to be monitored. You can configure port monitoring for one or more source interfaces.

- Destination interface: Refers to the interface where the packets are sent for analysis.

- Direction of the traffic that is to be monitored

The following table lists the interfaces that can be mirrored, and the port numbers mapping to these interfaces:

Table 4-47: Interface to Ethernet Port Mapping

Ethernet Port	Interface Type	Interface ID
AU1	Fast Ethernet	0/1
AU2	Fast Ethernet	0/2
AU3	Fast Ethernet	0/3
AU4	Fast Ethernet	0/4
AU5	Fast Ethernet	0/5
AU6	Fast Ethernet	0/6
AU7	Fast Ethernet	0/7
MGMT	Fast Ethernet	0/8
CASCD	Gigabit Ethernet	0/9

This section describes the commands to be used for:

- “Enabling the Port Monitoring Session” on page 830

- “Disabling a Port Monitoring Session” on page 833

- “Displaying Configuration Information for Source and Destination Interfaces” on page 834

4.11.2.1 Enabling the Port Monitoring Session

The port monitoring session refers to the association of a destination interface with one or more source interfaces. You can monitor incoming, outgoing or both types of traffic that is mirrored from the source interface to the destination interface.

NOTE

For the current release, only one monitor session can be set up. This means that only one destination can be configured for one or more source interfaces.

Run the following command to enable port monitoring for a source or destination interface:

```
npu(config)# monitor session { destination interface
<interface-type > <interface-id> | source interface
<interface-type> <interface-id> [{ rx | tx | both }] }
```

For example, to configure the Gigabit Ethernet 0/9 interface as the destination interface, you can run the following command:

```
monitor session destination interface gigabitethernet 0/9
```

You can now run the following commands to mirror incoming traffic for the source interfaces, Fast Ethernet 0/1 and Fast Ethernet 0/3:

```
npu(config)# monitor session source interface fastethernet 0/1 rx
```

```
npu(config)# monitor session source interface fastethernet 0/3 rx
```

All incoming and outgoing traffic for the 0/1 and 0/3 interfaces will be mirrored to the 0/9 interface.

IMPORTANT

An error may occur if:

- The interface ID of the source or destination port you have specified is invalid. Refer Table 4-47 for the interface ID corresponding to each interface type.
- The port specified as the source interface is already specified as the destination interface for another port or vice versa.

Command Syntax	**npu(config)# monitor session** { **destination interface <interface-type > <interface-id>** | **source interface** <interface-type> <interface-id> [{ **rx** | **tx** | **both** }] }
Privilege Level	10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`{destination interface <interface-type > <interface-id> | source interface <interface-type> <interface-id> }`	Indicates whether port monitoring is to be enabled for a source or destination interface. Specify the interface type and interface ID for the interface to be configured.	Mandatory	N/A	Interface type: ■ fastethernet ■ gigabitetherne Interface ID: ■ 0/1 (for Fast Ethernet AU 1 port) ■ 0/2 (for Fast Ethernet AU 2 port) ■ 0/3 (for Fast Ethernet AU 3 port) ■ 0/4 (for Fast Ethernet AU 4 port) ■ 0/5 (for Fast Ethernet AU 5 port) ■ 0/6 (for Fast Ethernet AU 6 port) ■ 0/7 (for Fast Ethernet AU 7 port) ■ 0/8 (for Fast Ethernet MGMT port) ■ 0/9 (for Gigabit Ethernet CSCD port)
`{ rx | tx | both }`	Indicates whether the incoming, outgoing or both types of traffic is to be mirrored for the source interface.	Optional	Both	■ rx ■ tx ■ both

Command Modes

Global configuration mode

4.11.2.2 Disabling a Port Monitoring Session

You can disable a port monitoring session for a source or destinations interface for which port monitoring is enabled. Run the following command to disable port monitoring for a source or destination interface:

```
npu(config)# no monitor session [{source interface <interface-type>
<interface-id> |destination interface <interface-type > <
interface-id >}]
```

IMPORTANT

An error may occur if:

- The interface ID of the source or destination port you have specified is invalid. Refer Table 4-47 for the interface ID corresponding to each interface type.
- Port monitoring is not enabled for the source or destination interface for which you are trying to disable port monitoring.

Command Syntax	`npu(config)# no monitor session [{source interface <interface-type> <interface-id> |destination interface <interface-type > < interface-id >}]`
Privilege Level	10

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
`[{source interface <interface-type> <interface-id> |destination interface <interface-type > < interface-id >}]`	Indicates whether port monitoring is to be disabled for a source or destination interface. Specify the interface type and interface ID for the interface to be configured.	Mandatory	N/A	Interface type: ■ fastethernet ■ gigabitetherne Interface ID: ■ 0/1 (for Fast Ethernet) ■ 0/2 (for Fast Ethernet) ■ 0/3 (for Fast Ethernet) ■ 0/4 (for Fast Ethernet) ■ 0/5 (for Fast Ethernet) ■ 0/6 (for Fast Ethernet) ■ 0/7 (for Fast Ethernet) ■ 0/8 (for Fast Ethernet) ■ 0/9 (for Gigabit Ethernet)

Command Modes Global configuration mode

4.11.2.3 Displaying Configuration Information for Source and Destination Interfaces

To display configuration information for port monitoring, that is, the source and destination interfaces for which this feature is enabled, run the following command:

npu# show port-monitoring

Command Syntax

npu# show port-monitoring

Privilege Level

1

Display Format

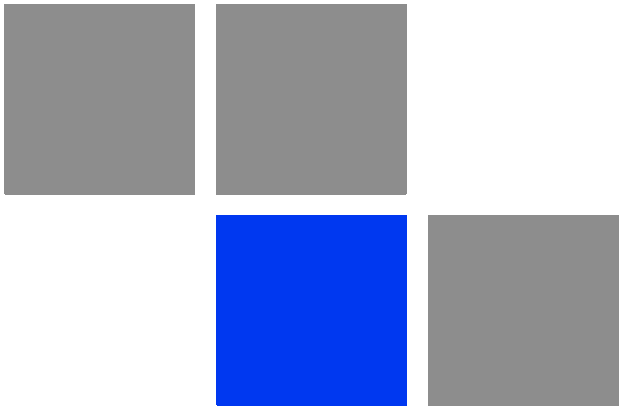
Port Monitoring: enabled

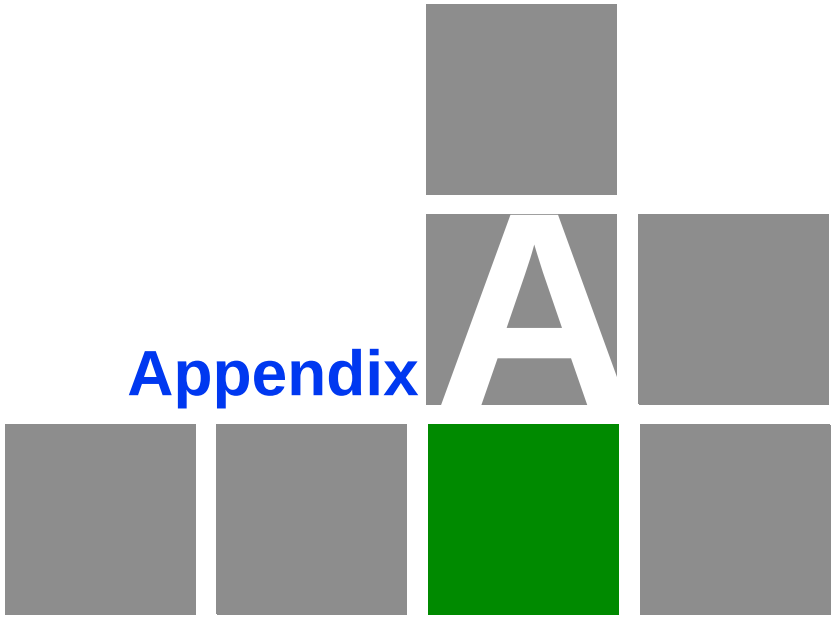
Monitor Port: Gi0/9

Port	Ingress-Monitoring	Egress-Monitoring
Fa0/1	<status>	<status>
Fa0/2	<status>	<status>
Fa0/3	<status>	<status>
Fa0/4	<status>	<status>
Fa0/5	<status>	<status>
Fa0/6	<status>	<status>
Fa0/7	<status>	<status>
Fa0/8	<status>	<status>
Gi0/9	<status>	<status>

Command Modes

Global configuration mode





Appendix A

Antenna Configurations

In this Appendix:

- “Introduction” on page 838
- “Antenna Configurations” on page 839
- “Antenna Down-Tilt Guidelines” on page 842

A.1 Introduction

The 4Motion Access Units implement four transmit/receive channels and are hardware-capable of supporting adaptive beam-forming and MIMO Matrix B technologies in all possible configurations (only MIMO Matrix B, only beam-forming, both beam-forming and MIMO Matrix B in different zones, and combined beam-forming and MIMO Matrix B). The operation mode is selected via software, giving the maximal flexibility to select the appropriate mode for each scenario and for each user.

The following sections explain the proposed antenna configurations that support the different available diversity scenarios and are prepared for supporting beam-forming and MIMO Matrix B techniques that are not available in the current release.

A.2 Antenna Configurations

A.2.1 Second Order Diversity Configurations

For this scenario, it is proposed to use one of the following configurations:

A.2.1.1 Two-Element Wide Slant (/----10λ----\)

This configuration consists of two dual-slant antennas separated by at least 10 wavelengths, when only one antenna element of each is connected, with different polarizations.

This configuration is ready for upgrade to a four-element wide dual-slant array as described in section Section A.2.2.1 by connecting the additional two elements.

This configuration is suitable for supporting future MIMO Matrix B techniques.

A.2.1.2 Two-Element Dual-Slant (X)

This configuration consists of a single dual-slant antenna. This configuration is suitable for supporting future MIMO Matrix B techniques.

A.2.2 Fourth Order Diversity Configurations

For this scenario, the following configuration is proposed:

A.2.2.1 Four-Element Wide Dual-Slant (X--10λ--X)

This configuration consists of two dual-slant antennas separated by at least 10 wavelengths. This configuration is suitable for supporting future MIMO Matrix B techniques.

A.2.3 Beam-Forming/MIMO Configurations

This section provides guidelines for future antenna diversity configurations supporting beam-forming/MIMO Matrix B techniques (not available in current release).

In the receive direction, it is always recommended to use four receive branches. In the transmit direction, it is recommended to use two transmit branches for MIMO Matrix B configurations, and four transmit branches for beam-forming and beam-forming plus MIMO Matrix B configurations.

A.2.3.1 Four-Element Wide Double Dual-Slant (//--10λ--\\)

This configuration consists of two pairs of dual-slant antennas separated by at least 10 wavelengths, when only one antenna element of each is connected, with

different polarizations in each side. This configuration is suitable for combined beam-forming plus MIMO Matrix B operation. This configuration also provides second order diversity.

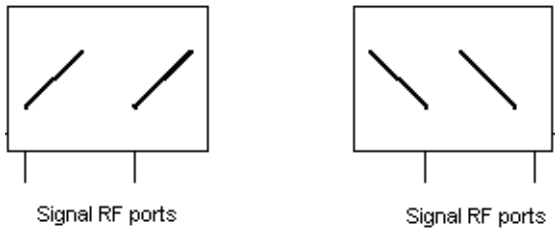


Figure A-1: Four-Element Wide Double Dual-Slant

A.2.3.2 Narrow Double Dual-Slant Array (XX)

A closely spaced dual-slant pair also allows for MIMO Matrix B operation combined with beam-forming, providing second order diversity as well.

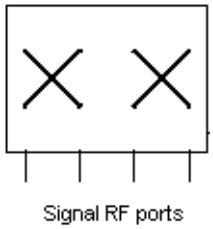


Figure A-2: Narrow Double Dual-Slant Array

A.2.3.3 Wide Double Dual-Slant Array (X--10λ--X)

A widely spaced dual-slant pair allows for MIMO Matrix B operation combined with beam-forming, providing at the same time fourth order diversity. The beam-forming gain in this configuration is lower than in the configurations previously described.

Figure A-3: Wide Double Dual-Slant Array

The 4Motion solution can accommodate a wide spectrum of antenna arrays besides the ones described above.

A.3 Antenna Down-Tilt Guidelines

Antennas may support mechanical down tilt (MDT), electrical down tilt (EDT) and remote electrical tilt (RET). Typical adjustment ranges for MDT and EDT are 0 to -10 degrees.

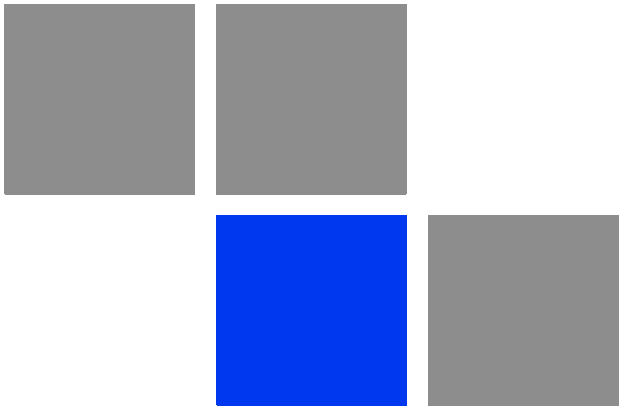
As a ground rule it is recommended to minimize the usage of MDT, preferring EDT instead.

The degree of tilt to be used is highly dependant on sector configuration and specific environment considerations and conditions. It also depends on network rollout stage - in the initial stage, when not many sites are deployed in a specific area, a certain tilt is be applied to maximize the coverage footprint of the existing sites, and at a later stage, when more sites are built, the degree of tilt per sector may be increased to control the inter-site interference.

Table A-1 shows typical numbers provided only as a reference for initial site deployment.

Table A-1: Typical EDT Values

Environment	EDT (degrees)
Dense urban	6
Urban	6
Suburban	4
Rural	2



Appendix B

Software Upgrade

In This Appendix:

- "Before You Start" on page 845
- "Upgrading the NPU" on page 846
- "Upgrading the AU" on page 853

B.1 Before You Start

To load new NPU/AU software files to the unit's flash memory, you are required to execute a simple loading procedure using a TFTP application.

Before performing the upgrade procedure, ensure that you have the most recent instructions, and that the correct software files are available on your computer.

The NPU flash stores two software files that can be used for NPU upgrade, and three software files to be used for AU software upgrade. When you download a new software file to the NPU flash, the oldest file is overwritten with the newly downloaded file.

NOTE

To view the current NPU software files, refer to “Displaying the Operational, Shadow, and Running Versions” on page 850.

To view the current AU software files, refer to “Displaying the Shadow, Running, and Operational Versions” on page 860. To delete an existing AU file, refer to “Displaying Images Residing in the AU Flash” on page 865.

B.2 Upgrading the NPU

To upgrade the NPU, first configure the TFTP server that you want to use for the software version download, and then download the image to the NPU flash. You can then reboot the NPU with the downloaded image. After you have tested and verified that the NPU is functioning properly with the shadow image, you can make the shadow image as the operational image.

NOTE

The operational image is the default image used for rebooting the NPU after system reset. The shadow image is the downloaded image that you can use to boot up the NPU. However, the next time the system is reset, it is the operational image that is used to boot up the NPU.

B.2.1 Executing the Upgrade Procedure

To execute the upgrade procedure:

- "Step 1: Configuring the TFTP Server"
- "Step 2: Triggering Software Download"
- "Step 3: Resetting and Booting the NPU Using the Shadow Image"
- "Step 4: Making the Shadow Version Operational"

B.2.1.1 Step 1: Configuring the TFTP Server

To initiate the NPU software upgrade procedure, start with configuring the TFTP server to be used for the software version download.

To configure the TFTP server, run the following command:

```
npu(config)# software version server <server ip>
```

IMPORTANT

An error may occur if you execute this command when another software download is already in progress.

Command Syntax

npu(config)# software version server *<server ip>*

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<server ip>	Denotes the IP address of the TFTP server to be used for the software version download.	Mandatory	N/A	Valid IP address

Command Modes

Global configuration mode

NOTE

After you have configured the TFTP server, you can, at any time, view the TFTP server configuration information. For more details, refer to "Displaying the TFTP Configuration Information" on page 851.

B.2.1.2 Step 2: Triggering Software Download

After the TFTP server is configured, run the following command to trigger the download of the shadow image to be used for software upgrade:

npu(config)# load to shadow <shadow image name>

After you execute this command, the shadow image is downloaded to the NPU flash, and the shadow image that is currently residing in the flash is overwritten.

IMPORTANT

An error may occur if you execute this command when:

- Another software download is already in progress.
- The shadow image to be downloaded is already residing in the NPU flash as the shadow or operational image.
- The TFTP server is not configured. For more information about configuring the TFTP server, refer to "Step 1: Configuring the TFTP Server" on page 846.
- The name of the shadow image to be downloaded is incorrect or the format of the file name is incorrect. Because the file to be downloaded is a compressed file, always be suffix the file name with **.tgz**.
- The NPU is running with the shadow image.

Command Syntax

```
npu(config)# load to shadow <shadow image name>
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<shadow image name>	Denotes the name of the shadow image that is to be downloaded to the NPU flash. The name of this file should always be suffixed with **.tgz**.	Mandatory	N/A	<Valid shadow image name>.tgz

Command Modes

Global configuration mode

NOTE

After you have triggered the download procedure, you can at any time, obtain information about the download status. For more details, refer to "Displaying the Download Status Information" on page 851.

B.2.1.3 Step 3: Resetting and Booting the NPU Using the Shadow Image

After the shadow image is downloaded to the NPU flash, run the following command to reboot the NPU with the downloaded shadow image:

```
npu(config)# reboot from shadow [<shadow image name>]
```

In the above command, you can specify the shadow image name that is to be used for NPU reboot. If you do not specify a value for the `shadow image name` parameter, the shadow image that was last downloaded is used for rebooting the NPU.

Command Syntax

```
npu(config)# reboot from shadow [<shadow image name>]
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
`<shadow image name>`	Denotes the name of the shadow image that is to be used for rebooting the NPU. If you do not specify a value for this parameter, the last downloaded shadow image is used for rebooting the NPU.	Optional	N/A	Valid shadow image name

Command Modes

Global configuration mode

B.2.1.4 Step 4: Making the Shadow Version Operational

After you reset the NPU with the shadow image, and ensure that the NPU is functioning correctly with the shadow image, you can make the shadow version as the operational version. The next time you reset the system, the shadow image that you make operational is used for rebooting the NPU.

To make the shadow version as the operational version, run the following command.

```
npu(config)# switchover npu
```

After you run this command, the operational image is swapped with the shadow image. The next time you reset the NPU, the system boots up with the swapped image.

IMPORTANT

If you reset the NPU before running this command, the NPU boots up with the image that is currently the operational image.

IMPORTANT

An error may occur if you run this command when the NPU is not running with the shadow image.

Command Syntax

```
npu(config)# switchover npu
```

Command Modes

Global configuration mode

B.2.2 Displaying the Operational, Shadow, and Running Versions

You can, at any time (during or after the software download procedure), run the following command to view the operational, shadow, and running versions of the NPU software:

```
npu# show software version npu
```

NOTE

The operational version is the default software version that is used for rebooting the NPU after system reset.

The shadow version is the downloaded software version that you can use to boot up the NPU. However, it is the operational software version that is used to boot up the NPU after the next system reset.

The running version is the software version (can be either the operational or shadow version) that is currently running on the system.

Command Syntax

```
npu# show software version npu
```

Display Format

```
Mananged Object  : NPU
Operational Version : <Operational Version>
Shadow Version      : <Shadow Version>
Running Version     : <Shadow Version>
```

Command Modes

Global command mode

B.2.3 Displaying the TFTP Configuration Information

You can, at any time (during or after the download procedure), run the following command to view the configuration information about the TFTP server that is used for the NPU software upgrade:

```
npu# show software version server
```

IMPORTANT

An error may occur if configuration information is requested for a TFTP server that is not configured. For more information about configuring the TFTP server to be used for software download, refer to "Step 1: Configuring the TFTP Server" on page 846.

Command Syntax

```
npu# show software version server
```

Display Format

```
Software version server <Server IP Address>
```

Command Modes

Global command mode

B.2.4 Displaying the Download Status Information

After initiating software download, you can, at any time, view the download progress for the NPU image. The progress of the image download procedure can be in any of the following stages:

- Downloading
- Decompressing
- Validating
- Copying
- Writing to flash
- Download complete

An error may occur while:

- Downloading the software image from the TFTP server
- Decompressing the downloaded file
- Validating the downloaded file
- Copying of the software image to the NPU flash

Run the following command to view the download status:

npu# show download status npu

After you run the above command, the TFTP server address, image name and version, download status, and the number of bytes that have been downloaded, are displayed.

IMPORTANT

An error may occur if you execute this command when no download procedure is in progress.

Command Syntax

npu# show download status npu

Display Format

```
Mananged Object            :  NPU
Image Name                 :  <Downloaded Image Name>
Software version server    :  <IP Address of TFTP Server>
Download Status            :  <Download Status>
Download Bytes             :  <Bytes Downloaded>
```

Command Modes

Global command mode

B.3 Upgrading the AU

To upgrade the AU software, first configure the TFTP server that you want to use for software version download, and then download the image to the NPU flash. You can store up to three images to be used for AU upgrade. You are required to create a mapping between the AU slot and the image residing in the NPU flash. Each time the AU is reset or if you are inserting/re-inserting the AU card in the AU slot for, the AU boots up using the AU-to-image mapping that you specify.

You can specify separate AU-to-image mappings for each AU slot. In addition, you are required to create a mapping that is to be used as the default mapping. This default mapping is used for boot up all AU slots for which a mapping does not exist. After you have created the mapping, download the mapped image from the NPU flash to the AU flash (for the AU slot for which the mapping is created). You can then reboot the AU using the downloaded image.

If the image that you have used to reboot the AU is not the image currently mapped to this AU slot, the AU-to-image mapping for that AU slot is updated with this image (provided you have not deleted this image from the NPU flash before rebooting the AU).

IMPORTANT

Before inserting an AU card, ensure that an AU-to-image mapping exists, which is to be used for booting the AU. If you insert the AU card when there is no existing mapping, the AU is immediately shut down. For more information about creating a (default) AU-to-image mapping, refer "Step 3: Creating the AU-to-Image Mapping" on page 856.

After you create the AU-to-image mapping, execute the following command (for details refer Section B.3.1.5).

```
npu(config)# reboot au [<au slot-id>] shadow [<shadow image name>]
```

After you execute this comamnd, the AU boots up with the mapped image.

B.3.1 Procedure for Upgrading the AU

To execute the AU upgrade procedure:

- "Step 1: Configuring the TFTP Server" on page 854
- "Step 2: Downloading the AU Image to the NPU Flash" on page 855
- "Step 3: Creating the AU-to-Image Mapping" on page 856

- "Step 4: Downloading the Image to the AU Flash" on page 857
- "Step 5: Resetting and Rebooting the AU with the Shadow Image" on page 858

IMPORTANT

If you are inserting/re-inserting the AU card, you are required to execute this procedure before inserting and powering up the AU card. If an error occurs while booting up of the AU, it is reset upto three times, after which it is completely shut down.

B.3.1.1 Step 1: Configuring the TFTP Server

To create an AU-to-image mapping, you need to first configure the TFTP server to be used for downloading the image to the NPU flash.

IMPORTANT

The same TFTP server is used for downloading the software image to be used for upgrading the NPU/AU. For detailed information about the configuring the TFTP server, refer Section B.2.1.1.

Run the following command to configure the TFTP server to be used for software version download.

```
npu(config)# software version server <server ip>
```

IMPORTANT

An error may occur if you execute this command when another software download is already in progress.

Command Syntax

```
npu(config)# software version server <server ip>
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<server ip>	Denotes the IP address of the TFTP server to be used for the software version download.	Mandatory	N/A	Valid IP address

Command Modes

Global configuration mode

B.3.1.2 Step 2: Downloading the AU Image to the NPU Flash

After the TFTP server is configured, run the following command to download the AU image (to be used for software upgrade) to the NPU flash:

```
npu(config)# Download AU image <AU image name>
```

IMPORTANT

The NPU flash can store a maximum of three AU images. If you download a new AU image to the NPU flash, the oldest image (that is not used for any mapping) is overwritten. To delete an AU image that is used for mapping, you must first delete the AU-to-image mapping. For details, refer to "Deleting the AU-to-Image Mapping" on page 863. It is recommended that you frequently delete AU images that are no longer required, from the NPU flash. For details, refer to "Displaying Images Residing in the AU Flash" on page 865.

After you execute this command, the AU image is downloaded to the NPU flash.

IMPORTANT

An error may occur if you execute this command when:

- Another software download is already in progress.
- The AU image to be downloaded is already residing in the NPU flash.
- The TFTP server is not configured. For more information about configuring the TFTP server, refer to "Step 1: Configuring the TFTP Server" on page 854.
- The shadow image name that you have specified does not exist.
- All the AU images residing in the NPU flash are mapped to an AU slot. Any image that is mapped to an AU slot cannot be deleted or overwritten.

Command Syntax

```
npu(config)# Download AU image <AU image name>
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Values
<AU image name>	Denotes the name of the AU image that is to be downloaded from the TFTP server to the NPU flash.	Mandatory	N/A	Valid image name

Command Modes	Global configuration mode

B.3.1.3 Step 3: Creating the AU-to-Image Mapping

After you have downloaded the AU image to the NPU flash, you can map this image to a specific AU slot. You can also use this image to create the default AU-to-image mapping.

IMPORTANT

If you are inserting/re-inserting the AU card, run this command before inserting and powering up the AU card.

To create an AU slot ID-to-image mapping, run the following command:

```
npu# map au {<au slot-id|default>} <image name>
```

Specify the slot ID if you want to map the image to a specific AU slot. Specify **default** if you want to use this as the default mapping for all AU cards for which a mapping does not exist.

IMPORTANT

Always create a default AU-to-image mapping to be used for booting one or more AU cards, before inserting/re-inserting the AU card.

An error may occur if you map the AU to an image that is not residing in the AU flash.

Command Syntax	`npu# map au {<au slot-id|default>} <image name>`

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
<*au slot-id*|**default**>	Indicates the AU to which the image is to be mapped.	Mandatory	N/A	■ 1, 2, 3, 4, 7, 8, 9 (valid slot ID) ■ default: if you want to create a default AU-to-image mapping that can be used by all AUs for which a mapping does not exist.
<image name>	Denotes the name of the image to be mapped to the AU slot.	Mandatory	N/A	Valid image name

Command Modes

Global configuration mode

B.3.1.4 Step 4: Downloading the Image to the AU Flash

The AU flash can store two AU images: shadow and operational. The operational image is the image that is currently mapped to the AU slot, and is used for booting the AU when the AU is reset. The shadow image is the image that is downloaded from the NPU flash.

After you have created the AU-to-image mapping for a particular AU slot, download the image from the NPU flash to the AU flash. To download the image to the AU flash, run the following command.

```
npu(config)# load to au [<au slot-id>] shadow <shadow image name>
```

IMPORTANT

An error may occur if:

- The AU image is not present in the NPU flash
- You execute this command immediately after inserting the AU card, and it is still registering itself with the 4Motion system.
- An AU image is currently being downloaded to the AU flash.
- The AU software image version is incompatible with the AU hardware.

Command Syntax

```
npu(config)# load to au [<au slot-id>] shadow <shadow image name>
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
`[<au slot-id>]`	Indicates the slot ID of the AU to which the image is to be downloaded from the NPU flash.	Optional	N/A	1, 2, 3, 4, 7, 8, 9 (Valid slot ID)
shadow `<shadow image name>`	Denotes the name of the shadow image to be downloaded from the NPU to the AU flash.	Optional	N/A	Valid image name

Command Modes

Global configuration mode

B.3.1.5 Step 5: Resetting and Rebooting the AU with the Shadow Image

After you have downloaded the image to the AU flash, you can run the following command to reset the system and boot the AU with the shadow image. After you run the following command, the shadow image is used to boot the AU after it is reset.

If the AU is successfully rebooted with the shadow image, then this image becomes the operational image for AU. If an error occurs in booting up the AU with the shadow image, the AU boots up with the operational image instead.

However, the AU is immediately shut down after it boots up with the operational image.

npu(config)# reboot au [<au slot-id>] **shadow** [<shadow image name>]

Specify the image name that you have used for creating the mapping in, “Step 3: Creating the AU-to-Image Mapping” on page 856. If you define another image name in this command, the AU-to-image mapping is updated with this image (provided this image is also residing in the NPU flash). Specify the slot ID if you want to reboot a specific AU slot with this image. If you want to reboot all the AU slots with this image, do not specify any slot ID. In addition, the mappings for all AUs are updated with this image.

After you run this command, the software version that is used to reboot the AU is the operational version. This version will be used for rebooting after the next AU reset.

IMPORTANT

An error may occur if:

- The AU image is not present in the NPU flash.
- You execute this command immediately after inserting the AU card, and it is still registering itself with the 4Motion system.
- The software image version is incompatible with the hardware.
- Rebooting the AU with the shadow image has failed. (The AU boots up with the operational image, and then initiates self-shut down.

IMPORTANT

Do not delete this image from the NPU flash because this image is used to boot up the AU the next timeit is reset . If you delete this image from the NPU flash, the default AU-to-image mapping will be used to reboot the AU.

Command Syntax **npu(config)# reboot au** [<au slot-id>] **shadow** <shadow image name>

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
`[<au slot-id>]`	Denotes the slot ID of the AU to be rebooted with the image residing in the AU flash. If you do not specify a value for this parameter, the image is used to reboot all AUs.	Optional	N/A	1, 2, 3 4, 7, 8, 9
`<shadow image name>`	Denotes the name of the AU image to be used for rebooting the AU. If you do not specify the name of the shadow image, the AU reboots with the shadow image residing in the AU flash.	Mandatory	N/A	Valid shadow image name

Command Modes

Global configuration mode

B.3.2 Displaying the Shadow, Running, and Operational Versions

You can, at any time (during or after the software download procedure), run the following command to view the shadow, running, and operational versions used for the AU:

```
npu# show software version au [<au slot-id>]
```

Specify the AU slot ID, if you want to view the software version for a specific AU slot. Do not specify the AU slot ID if you want to view the software versions used for all AU slots.

NOTE

The operational version is the default software version that is used for rebooting the AU after AU reset.

The shadow version is the downloaded software version that you can use to boot the AU. However, the next time the system is reset, it is the operational software version that is used to boot the NPU.

The running version is the software version (is either the operational or shadow version) that is currently running on the system.

Command Syntax

```
npu# show software version au [<au slot-id>]
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
[<au slot-id>]	Indicates the AU slot ID for which information about the shadow, operational, and running images is to be displayed. If you do not specify a value for this parameter, information about the shadow, operational, and running images for all AUs is displayed.	Optional	N/A	1 , 2 3, 4, 7, 8, 9

Command Modes

Global configuration mode

Display Format

```
Mananged Object     :  AU
AU Slot-ID          :  <au slot-d>
Operational Version :  <oper_ver>
Shadow Version      :  <shaow_ver>
Running Version     : <running_ver>
```

B.3.3 Displaying the Download Status Information

After initiating software download, you can, at any time, view the download progress for the AU image to the NPU flash. The progress of image download can be in any of the following stages:

- Downloading
- Validating
- Copying

- Writing to flash
- Download complete

An error may occur while:

- Downloading the software image from the TFTP server
- Validating the downloaded file
- Copying of the software image to the NPU flash

Run the following command to view the download status of the AU image to NPU flash:

npu# show software download status au

IMPORTANT

An error may occur if you execute this command when no download procedure is in progress.

Command Syntax

npu# show software download status au

Display Format

```
Mananged Object          : AU
Image Name               : <Downloaded Image Name>
Software version server  : <Server IP address>
Download Status          : <Download Status>
Download Bytes           : <Download bytes>
```

Command Modes

Global configuration mode

B.3.4 Displaying the AU-to-Image Mapping

You can run the following command to view the AU-to-image mapping for a particular AU slot:

npu# show au [{<au slot-id|**default**>}] **mapping**

Specify the AU slot ID to display the AU-to-image mapping for a specific AU slot. If you want to view the default AU-to-image mapping, specify **default**. If you do not specify the slot ID or default, all the AU-to-image mappings are displayed.

Command Syntax

```
npu# show au [{<au slot-id|default>}] mapping
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
<au slot-id|default>	Indicates the AU for which the AU slot to image mapping is to be displayed. If you do not specify a value for this parameter, all the AU-to-image mappings are displayed.	Mandatory	N/A	■ 1, 2, 3, 4, 7, 8, 9 (Valid slot ID) ■ default: if you want to display the default AU-to-image mapping

Command Modes

Global configuration mode

Display Format

```
 AU slot id   Software image
<AU slot-id>  <Image Name>
```

B.3.5 Deleting the AU-to-Image Mapping

Run the following command to delete an existing AU-to-image mapping:

```
npu# delete au <au slot-id> mapping
```

Specify the AU slot ID for which you want to delete the existing mapping. After you delete this mapping, the AU boots up using the default AU-to-image mapping after the next AU reset.

Command Syntax

```
npu# delete au <au slot-id> mapping
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
`<au slot-id>`	Denotes the slot ID of the AU for which the AU slot to image mapping is to be deleted.	Mandatory	N/A	Valid slot ID

Command Modes

Global command mode

B.3.6 Deleting AU Images from the NPU Flash

The NPU flash can store a maximum of three AU images. When you download a new AU image to the NPU flash, the oldest image (that is not mapped to any AU) is overwritten. It is recommended that you frequently delete AU images that are no longer required in the NPU flash.

NOTE

You cannot delete any image that is already mapped to a particular AU. To delete an image, you are required to first delete the corresponding mapping, and then delete the image from the NPU flash. For more information about deleting an AU-to-image mapping, refer to "Deleting the AU-to-Image Mapping" on page 863.

To delete an AU image from the NPU flash, run the following command:

```
npu# erase au image <au image name>
```

NOTE

An error may occur if:

- The image to be deleted is not residing in the NPU flash
- The image is mapped to a particular AU slot.

Command Syntax

```
npu# erase au image <au image name>
```

Syntax Description

Parameter	Description	Presence	Default Value	Possible Value
`<au image name>`	Denotes the name of the AU image that is to be deleted from the NPU flash.	Mandatory	N/A	Valid image name

Command Modes Global command mode

B.3.7 Displaying Images Residing in the AU Flash

To display the images residing in the AU flash, run the following command:

```
npu# show au image repository
```

Command Syntax

```
npu# show au image repository
```

Command Modes Global command mode

Appendix C

Configuration Example

4Motion® Configuration Via AlvariSTAR™

Quick Start Guide

Software Version 2.5
December 2008
DN1031

Date	Document Name	Document Number
30.12.2008	4Motion Configuration Using AlvariSTAR	DN1031
Written By: Carmit Partoush **Title:** Product Expert NMS	**No. of pages:** 43 **Rev: A**	

Rev.	Date	Name	Notes
A	30.12.2008	Carmit Partoush	

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1 Scope

The purpose of this document is to guide you through the elementary configuration steps that must be carried out to manage a 4Motion release 2.5 site via the AlvariSTAR EMS system and to establish a first link with the BTS.

Please note: this document describes a specific configuration with specific IP addresses and specific values. The purpose of this example is to demonstrate site configuration with air link and CPE management support.

The CPE Management configuration refers to Star-ACS supporting CPEs with TR69 only. The CPE described in this example is BreezeMAX PRO CPE and BreezeMAX Si CPE with the Rosedale 2 chipset supporting TR69.

Please use the following configuration description as a reference only and change all parameters values, IP addresses, operator and BS IDs according to the required parameters in the field.

Configuration description:

The configuration described in this document is as follows:

- One site with one AU, one ODU, one Antenna, one BS, one Site Sector
- VLAN Service Type is used in this example. For a description of IP-in-IP Service Type, see Annex A.
- Radio configuration: band 2.5 GHz with 10 MHz bandwidth and central frequency 2600.

Software supported

This document supports 4Motion Release 2.5 with the following internal versions:

- NPU: 2_5_12_2
- AU: 2_5_0_32
- AlvariSTAR infrastructure 4.0.0.87 with 4Motion Device Driver 2.5.1.57.

2 Pre-Configuration Requirements

The following must be configured before using AlvariSTAR.

1. Access the CLI from local terminal

   To access the CLI via the MON connector, use the following parameter values:

Table 1: CLI Parameters

Parameter	Value
Bit per second	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	Xon/Xoff

NOTE

The default login ID and password are:
Login ID: root
Password: admin123

2. Show Software Versions

   Before you start ensure that you have the correct software files available on the NPU card.

   - Show NPU versions

     npu# show software version npu

   - Show au versions

     npu# sh au image repository

3. Make the shadow version operational.

   This operation is performed only when that correct NPU version is located at the NPU's shadow

   npu(config)# switchover npu

   On the AU:
   npu(config)# load to au [<au slot-id>] shadow <shadow image name>

4. Clear the current NPU configuration

   Before you start, it is recommended to clean any existing configuration.

NOTE

All existing configuration will be deleted, including AU mapping and SW versions.

npu# restore-factory-default

The restore-factory-default command automatically performs NPU reset.

5. If you performed Software Upgrade, you must upload the Vendor Configuration File. You can do this via AlvariSTAR (see Annex B).

3 4Motion Configuration

3.1 Configuration Via the CLI

The following should be configured via the CLI

3.1.1 Site ID Configuration

Site Identifier is a mandatory parameter and is used as the site's unique ID on the net.

Valid values – any integer

```
npu# c t

npu(config)# site identifier 246

npu(config)# exit

npu# wr

      Configurations saved successfully
```

3.1.2 External Management IP Address Configuration

External Management IP address must be configured in order to have management configuration between the NPU and AlvariSTAR.

```
npu# c t

npu(config)# interface external-mgnt

npu(config-if)# shutdown

npu(config-if)# ip address 10.0.22.246 255.255.255.0

npu(config-if)# no shutdown

npu(config-if)# exit

npu(config)# exit

npu#

npu# wr

      Configurations saved successfully
```

3.1.3 SNMP Communities

The SNMP communities are essential for managing the device.

```
npu# c t

npu(config)# snmp-mgr ReadCommunity public ReadWriteCommunity
private

npu(config)# exit

npu# wr

      Configurations saved successfully
```

3.1.4 Access List Definition

Create a standard Access List (ACL) (number 1) and enable the ACL configuration mode. This ACL allows unlimited access to the AU. This policy can be changed later via the AlvariSTAR configuration screens.

```
npu# c t

npu(config)# ip access-list standard 1

npu(config-std-nacl)# permit any any

npu(config-std-nacl)# exit

npu(config)# exit

npu# wr

      Configurations saved successfully
```

3.1.4.1 Virtual Interfaces

Enable the NPU and AU virtual interfaces configuration mode and attach the above ACL to the NPU and AU virtual interfaces.

```
npu# c t

npu(config)# interface all-au

npu(config-acl)# ip access-group 1

npu(config-acl)# exit

npu(config)# exit

npu# wr

      Configurations saved successfully
```

3.1.5 Default Route Configuration

This part is applicable only if the AlvariSTAR server is not on the same subnet as the External Management interface of the BTS. In this case you must add a default route or specific route to the AlvariStar server network.

(10.0.22.29 is an example for the IP address of the default route.)

npu# c t

npu(config)# ip route 0.0.0.0 0.0.0.0 10.0.22.29 (default gateway ip address next hop)

npu(config)# exit

```
npu# wr

      Configurations saved successfully
```

3.1.6 Creating the AU-to-Image Mapping

Map AU software version to a specific AU slot. You can also use this image to create the default AU-to-image mapping.

```
npu# c t

npu(config)# map au default AU_2_0_9_3 (AU version name)

npu(config)# exit

npu# wr

     Configurations saved successfully
```

IMPORTANT

If you are inserting/re-inserting the AU card, run this command before inserting and powering up the AU card.

3.2 Configuration Via AlvariSTAR

From this part on, use AlvariSTAR to configure the system.

In each BS Managed Object (MO) window, it is mandatory to **Apply** the screen configuration even if you use the default parameters.

3.2.1 L1\L2 Connectivity

Select Connectivity > L1/L2 Connectivity > Site Connectivity from the navigation tree.

If the system uses in-band mode, Click **Apply** to accept the default values.

When working in in-band mode, the administrative status of the backhaul port must always be up, otherwise you will lose connection with BTS.

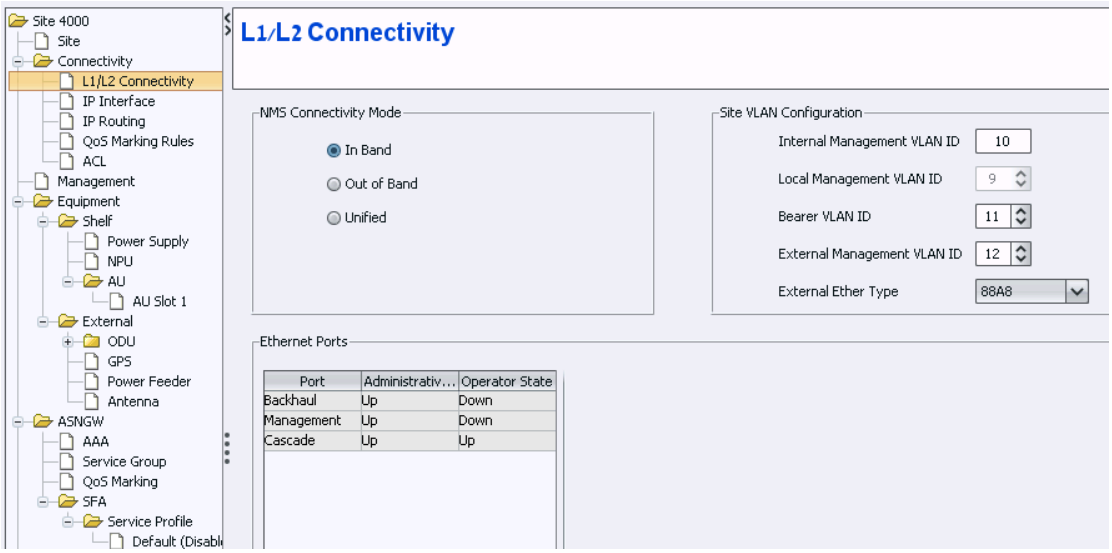


Figure 1: L1\L2 Connectivity

Table 2: L1\L2 Connectivity

Category	Parameter Name	Value	Notes
NMS connectivity mode		In band	MGMT and data are connected through the same port and separated by VLAN
Site VLAN configuration	Bearer VLAN ID	11	Default VLAN
Site VLAN configuration	External management VLAN ID	12	Default VLAN
Ethernet ports (backhaul)	Administrative port state	Up	

3.2.1.1 Connectivity Diagram (In-band)

The following diagram describes the In-band connectivity mode, where VLAN is used to differentiate between the bearer and NMS IP domains on the DATA port. The bearer VLAN is used for the bearer IP domain and the external-management VLAN is used for NMS IP domain. The MGMT port is used for Local Management IP interface.

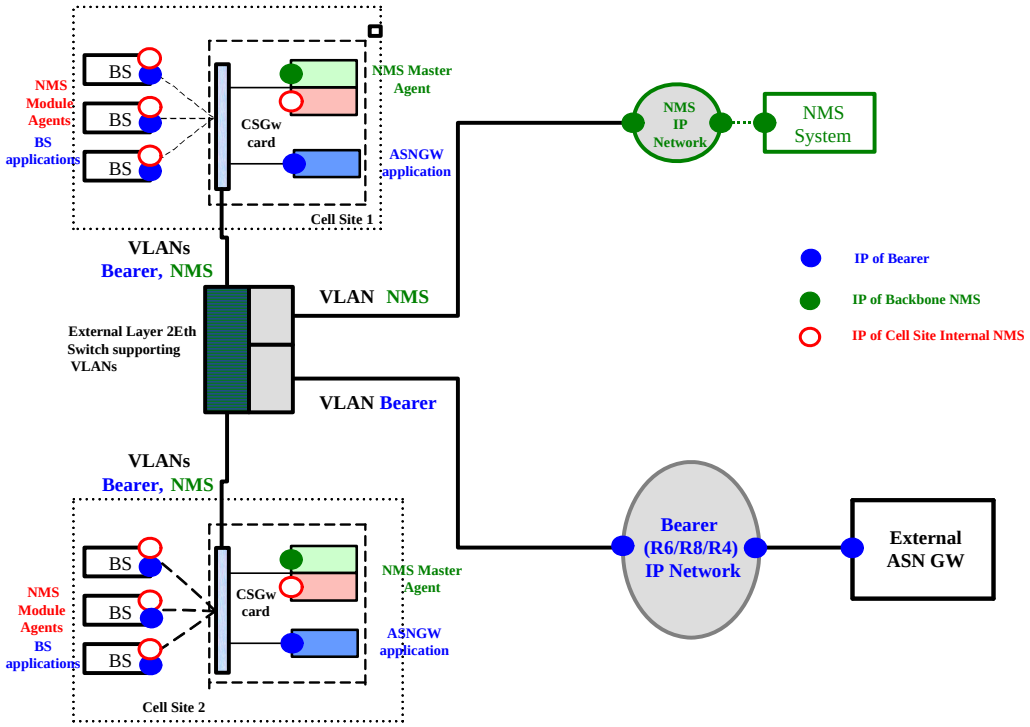


Figure 2: In-band Connectivity Mode Diagram

3.2.2 IP Interfaces Settings

Select Connectivity > IP Interface from the navigation tree.

The list contains the three available IP interfaces. The external management interface was already configured in Section 3.1.2.

Bearer IP interface should be properly configured.

3.2.2.1 Interface Configuration

Changing the bearer or the management interfaces depend by the network setup. To modify the IPs or any other values do the following:

1. Change the administrative status to Down.
2. Click on the **Apply** button.
3. Change the IP and/or any other value except for VLAN ID.
4. Click on the **Apply** button.
5. Change the administrative status back to UP.
6. Click on the **Apply** button to accept the changes.

Table 3: IP Interfaces

Parameter Name	Value
Administrative status	Up
IP Address	External Management- 192.168.1.1 Bearer- 172.16.0.1 Local Management- 172.31.0.1
IP Subnet Mask	255.255.255.0
MTU size	1500
VLAN ID	External Management -Vlan ID- 12 Bearer- Vlan ID -11 Local Management- Vlan ID-9

3.2.3 IP Routing

1. Select Connectivity > IP routing from the navigation tree.
2. The Default Route was already configured from the CLI (see Section 3.1.5)
3. If another route is needed for the specific network setup, configure it now.

3.2.4 Management

Select Management from the navigation tree.

Add an SNMP Trap Manager as follows:

1. From the SNMP Trap Manager, click on the **Add Manager** button and define all parameters as in Table 4.
2. Click on the **Apply** button to accept the changes.

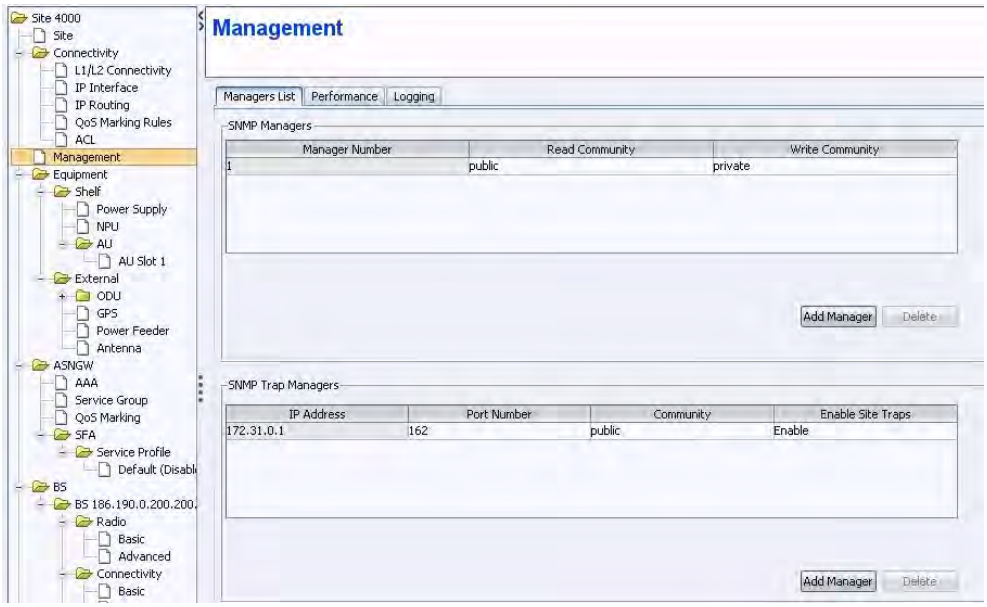


Figure 3: Management

Table 4: IP Interfaces

Parameter Name	Value
IP Address	External Management IP address should be configure
Port Number	162 (default port number)
Community	Public
Enable Site Traps	Enable

3.2.5 AU

1. Select Equipment > Shelf > AU from the navigation tree.
2. Right-click on the AU icon and click **Create**.
3. AU number – select a slot number.
4. Follow Table 5 for the AU configuration.
5. Click on the **Apply** button to accept the changes.

A new AU will be added to the navigation tree according to the slot number (e.g. AU Slot 1). This new screen allows the AU configuration.

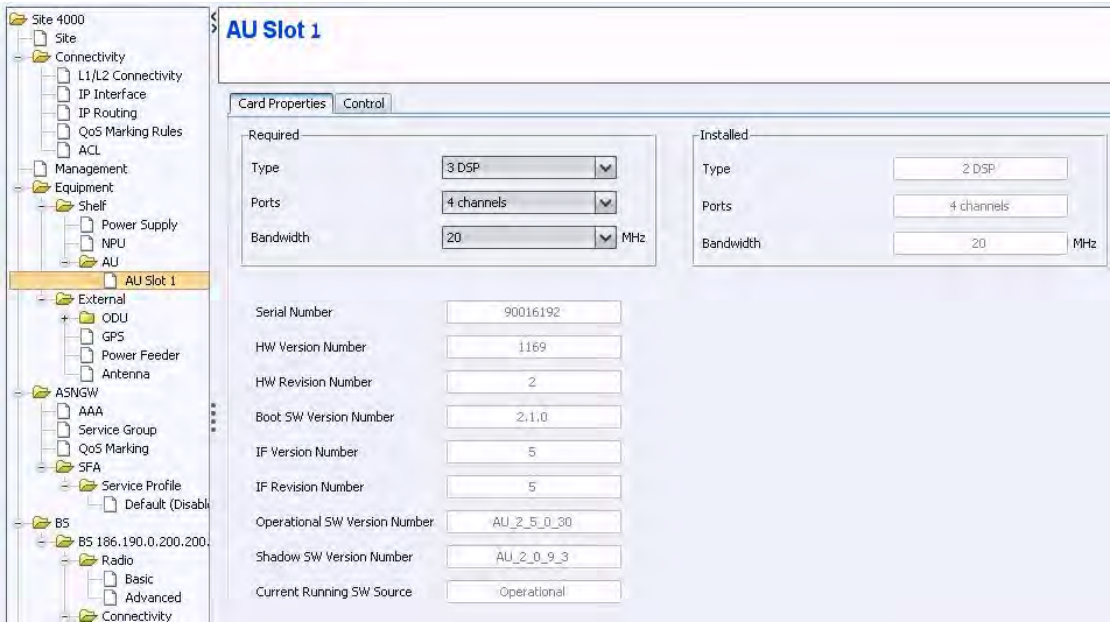


Figure 4: AU

Table 5: AU Configuration

Parameter name	Value	Notes
Type	3 DSP	Typically used. Note that AU may support also 4DSP
Ports	4 Channels	Default for 4Motion AU cards
Bandwidth	20	
AU number		According to the physical slot

3.2.6 ODU

1. Select Equipment > External > ODU from the navigation tree.
2. Right-click on the ODU icon and click **Create** – a new ODU ID will open (see Figure 5).
3. Select the ODU type According to the ODU installed.
4. Select the ODU number.
5. Click **Apply** to accept the changes.

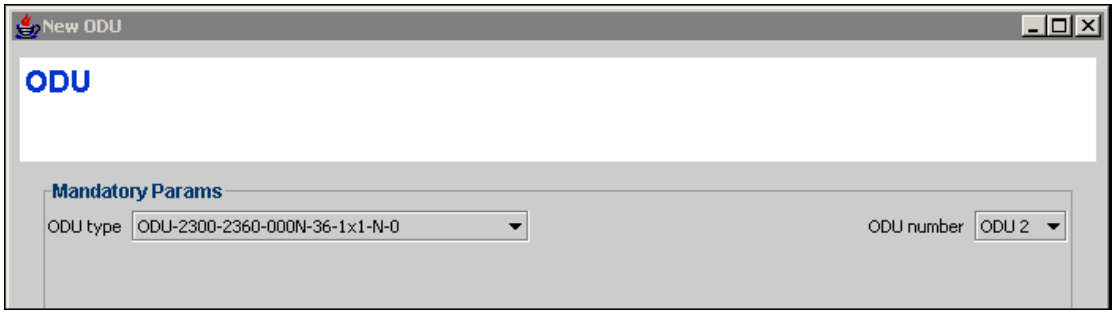


Figure 5: New ODU

A new ODU is added to the navigation tree according to the ODU number (e.g. ODU 2). This new screen allows ODU configuration.

6. On the ODU configuration screen, click **Apply** to accept the default values.

IMPORTANT

You must click **Apply** on the ODU configuration screen to complete the ODU creation even if no change was made to the screen.

To verify that the ODU was added successfully, verify that the HPA Card value is Not Installed (see Figure 6).

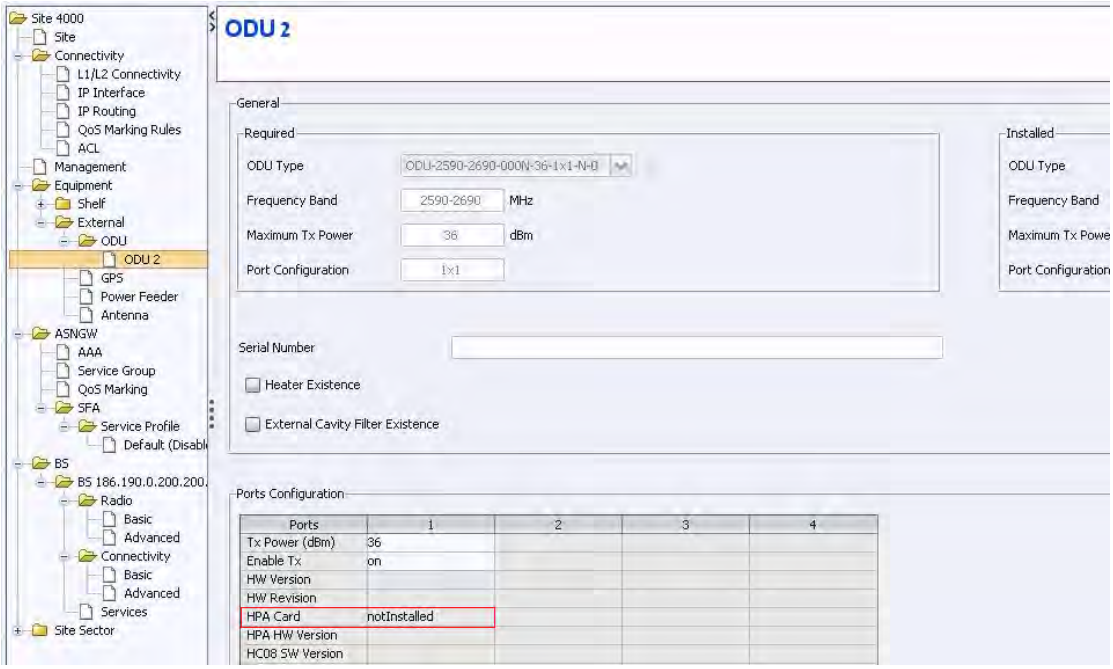


Figure 6: ODU

3.2.7 GPS

1. Select Equipment > External > GPS from the navigation tree.
2. Configure the GPS type according the setup. The available option is Trimble. If no GPS is used, select None.
3. Click **Apply** to accept the changes.

IMPORTANT

Any change in this screen requires NPU reset. You can restart the NPU after the entire configuration is complete.

3.2.8 Antenna

This section describes the parameters needed in order to configure the antennas settings.

NOTE

The default values presented in this document are used only to provide the minimal requirements for establishing a connection. The numbers serve only as an example and should be adjusted in order to receive best radio performance.

1. Select Equipment > External > Antenna from the navigation tree.
2. Click **ADD** to create a new antenna settings.
3. Configure the required parameters described in Figure 7.
4. Repeat the antenna configuration for each of the connected antennas.
5. Click on the **Apply** button to accept the changes.

IMPORTANT

Port Number and Heading are mandatory parameters.

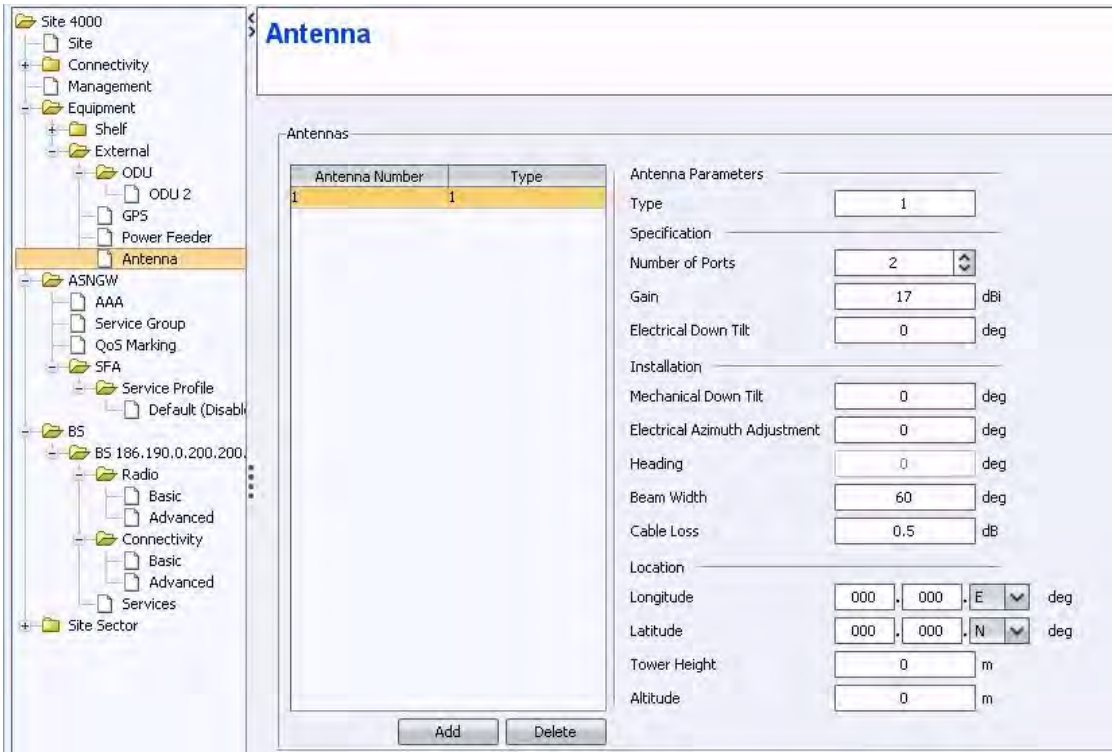


Figure 7: Antenna

3.2.9 AAA Configuration

This configuration will create an AAA association for system authentication and provisioning (the R3 interface).

1. Select ASNGW > AAA from the navigation tree.
2. Configure the parameters as described in Table 6.
3. Click **Apply** to accept the changes.

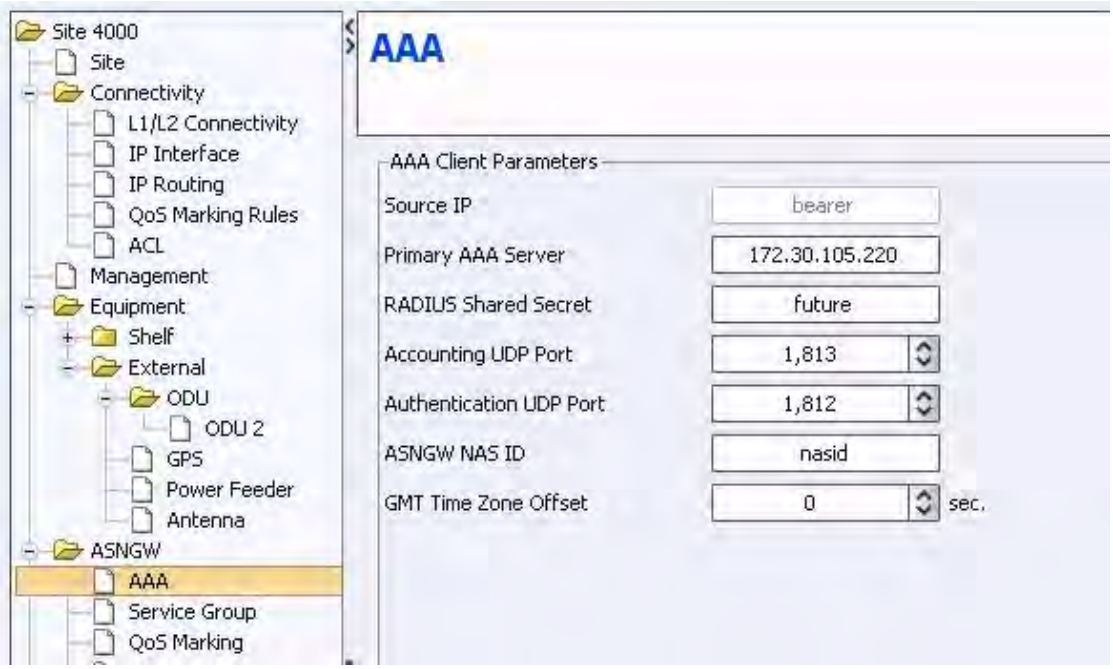


Figure 8: AAA

Table 6: AAA Client Parameters

Parameter Name	Value	Notes
Source IP interface	bearer	Read only
Primary AAA server	172.30.105.220	AAA server IP address
Radius shared secret	future	string - Shared secret between AAA and ASN
Accounting UDP port	1813	Default Port no
Authentication UPD port	1812	Default Port no
ASNGW NAS ID	nasid	String - NAS ID
GMT time zone offset	0	Number of seconds

3.2.10 Service Group

This section describes the configuration of service interfaces and service groups.

3.2.10.1 Service Interface

1. Select ASNGW > Service Group > Service Interfaces from the navigation tree.
2. Two service interfaces must be defined: one for Data and one for management. Add service interfaces; define the service using Figure 9, Figure 10 and Table 7.
3. Click **Apply** to accept the changes.

For an example of IP-IP and Service group-IP configuration, refer to Annex A.

NOTE

All configuration referring to Management is relevant only when working with StarACS.

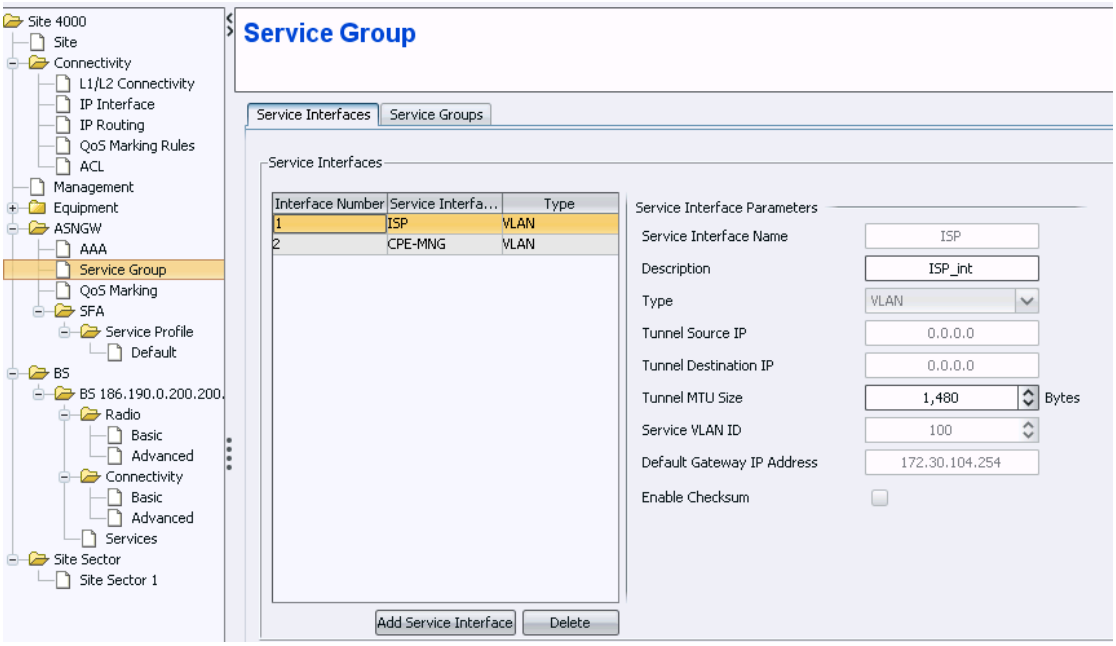


Figure 9: Service Interfaces - Data

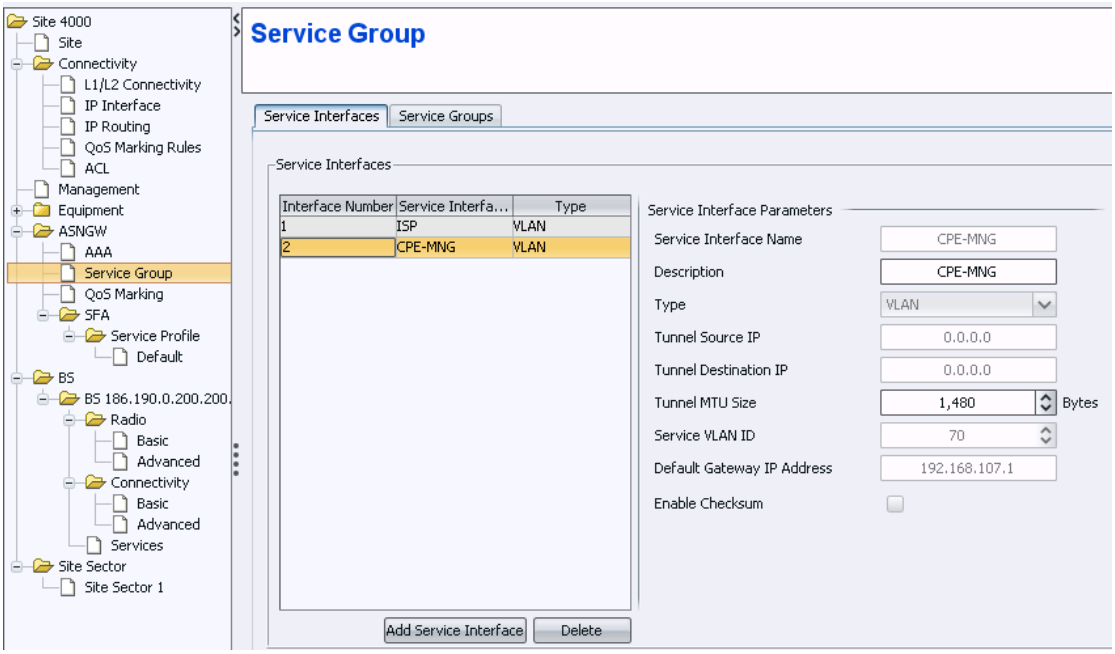


Figure 10: Service Interfaces - Management

Table 7: Service Interface

Parameter Name	Value – for Data	Value – for Management
service interface Name	ISP	CPE_MNG
Description	ISP_int	CPE_MNG
type	VLAN	VLAN
Tunnel MTU size	1480	1480
Service VLAN ID	100	70
Default gateway IP address	172.30.104.254	192.168.107.1

3.2.10.2 Service Group

1. Select ASNGW > Service Group > Service Groups from the navigation tree.
2. Create two service groups: one associated with the Data service interface and the other with the management interface. Add service groups and follow Figure 11 to Figure 14 and Table 8.
3. Click **Apply** to accept the changes.

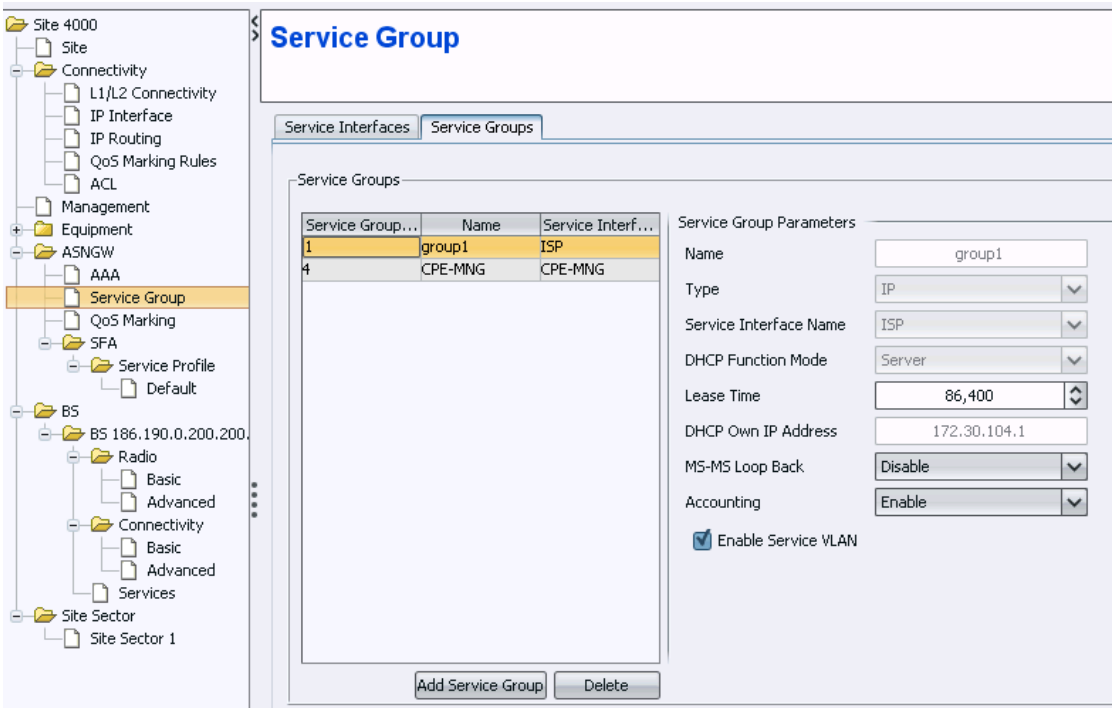


Figure 11: Service Group Parameters - Data

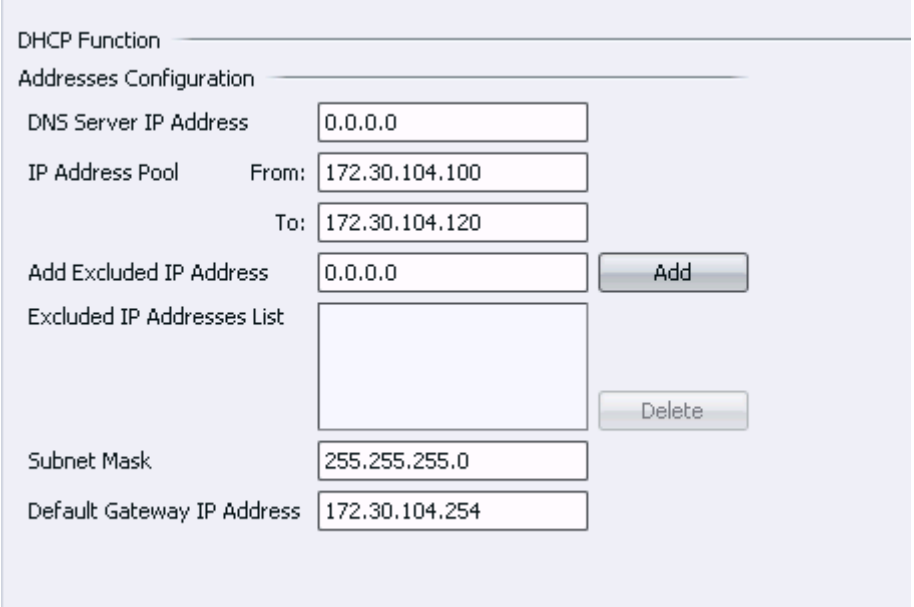


Figure 12: DHCP Function - Data

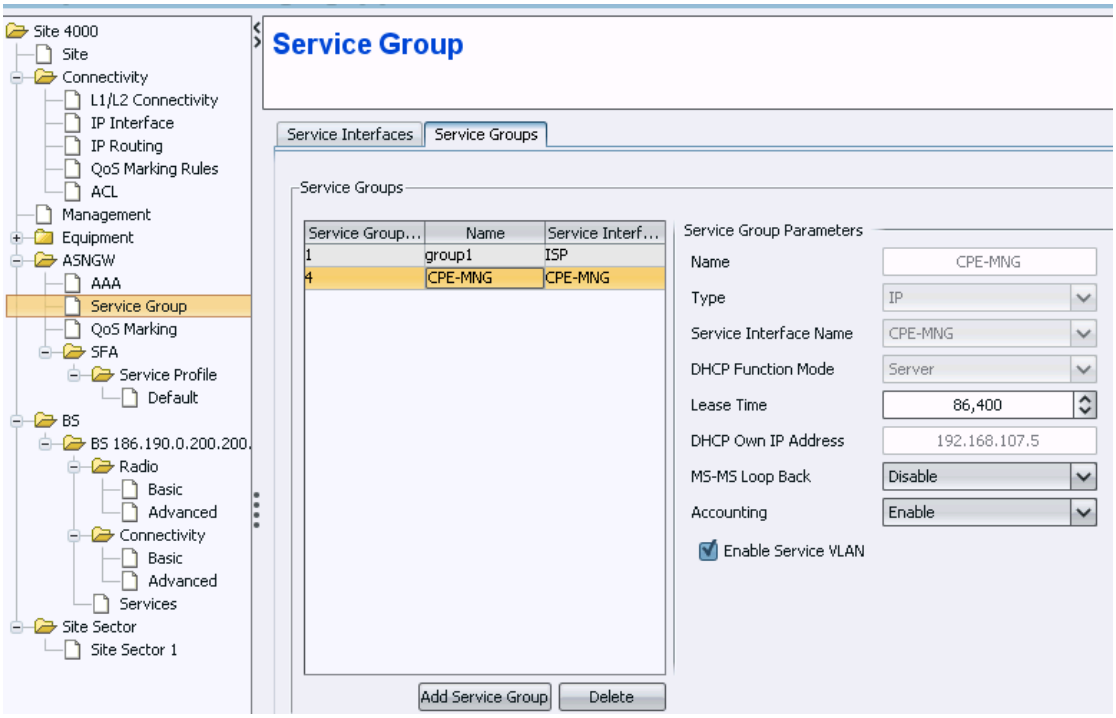


Figure 13: Service Group Parameters - Management

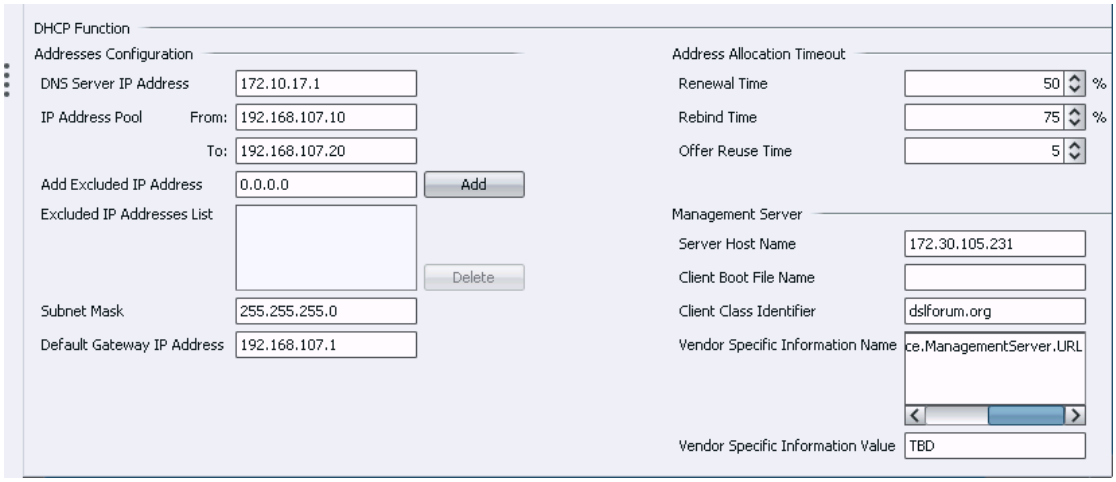


Figure 14: DHCP Function & Management Server - Management

Table 8: Service Group Parameters

Parameter Name	Value – for Data	Value – for Management
Service group parameters		
Name	Group1	CPE-MNG
Type	IP	IP
Service Interface Name	ISP	CPE-MNG
DHCP function Mode	Server	server
Lease Time	86,400	86400

Parameter Name	Value – for Data	Value – for Management
DHCP Own IP Address	172.30.104.1	192.168.107.5
Enable server VLAN	V	V
DHCP Function		
DNS Server IP Address	0.0.0.0	172.10.17.1
IP address poll from	172.30.104.100	192.168.107.10
IP address poll to	172.30.104.120	192.168.107.20
Subnet mask	255.255.255.0	255.255.255.0
Default gateway IP address	172.30.104.254	192.168.107.1
Management server		
Server host name		172.30.105.231- Star-ACS IP address
Client class identifier		Dslforum.org
Vendor specific information name		Fill

NOTE

Dslforum.org is use only for RD2.

3.2.11 QoS Marking Rules

This configuration will create a QoS marking rule for the internal and the external interfaces. For quick installation you can work with the default configuration as describe in Figure 15 and Figure 16.

1. Select ASNGW > QoS Marking from the navigation tree.
2. Click **Apply.**

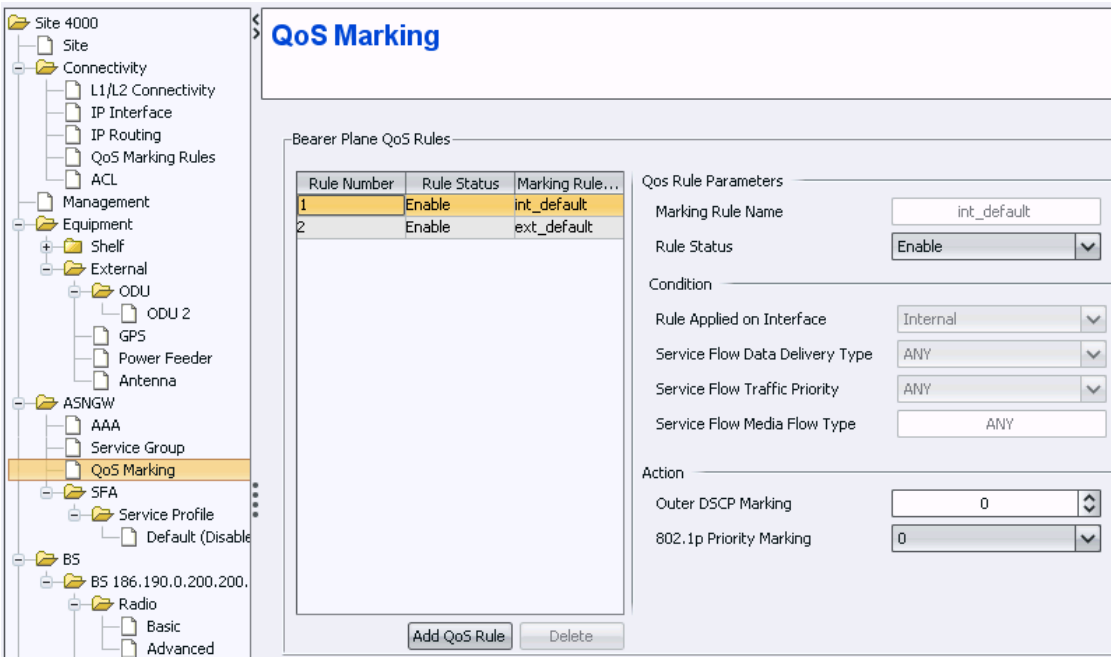


Figure 15: QoS - Internal Rule

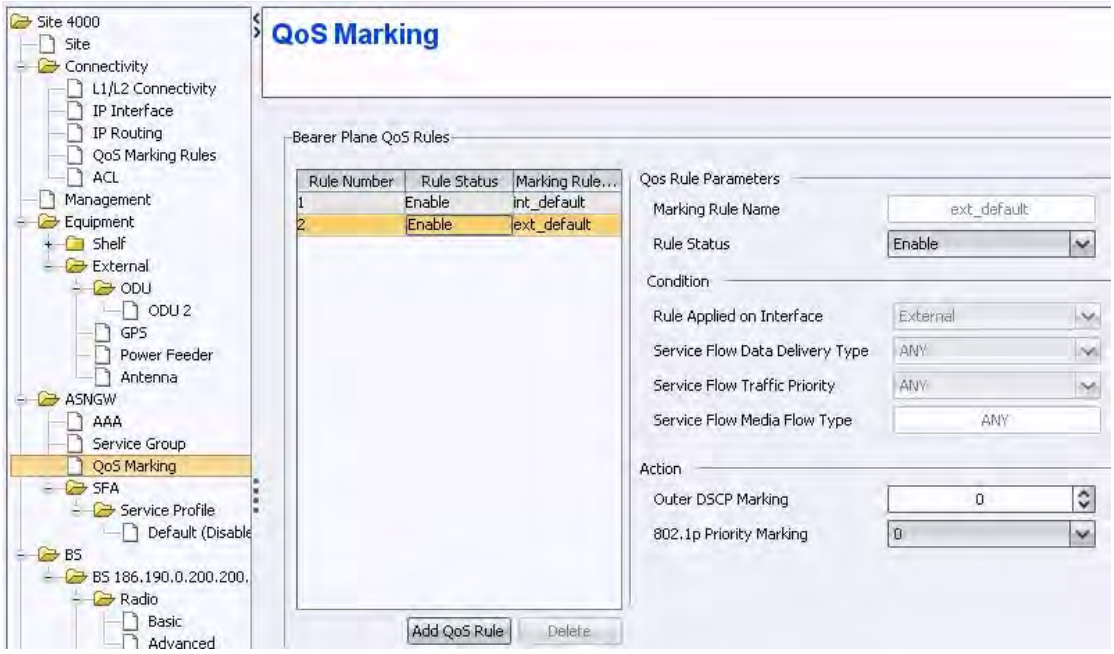


Figure 16: QoS- External Rule

3.2.12 SFA

1. Select SFA from the navigation tree.
2. In the classification rules tab, add two classifications rules: DSCP and DSCP6. Follow Figure 17 and Figure 18.
3. In the Layer 3 section, Enable IP TOS.
4. Define IP TOS according to Table 9.

NOTE

DSCP6 is relevant only when using CPE R2.

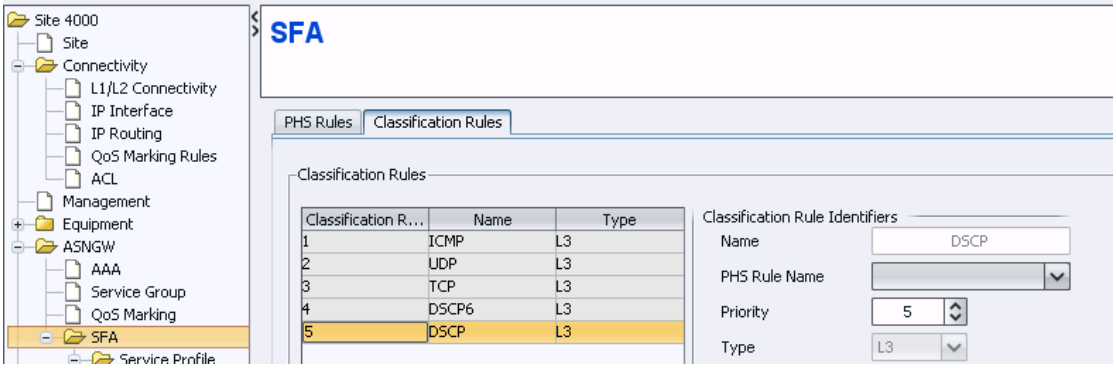


Figure 17: SFA - DSCP

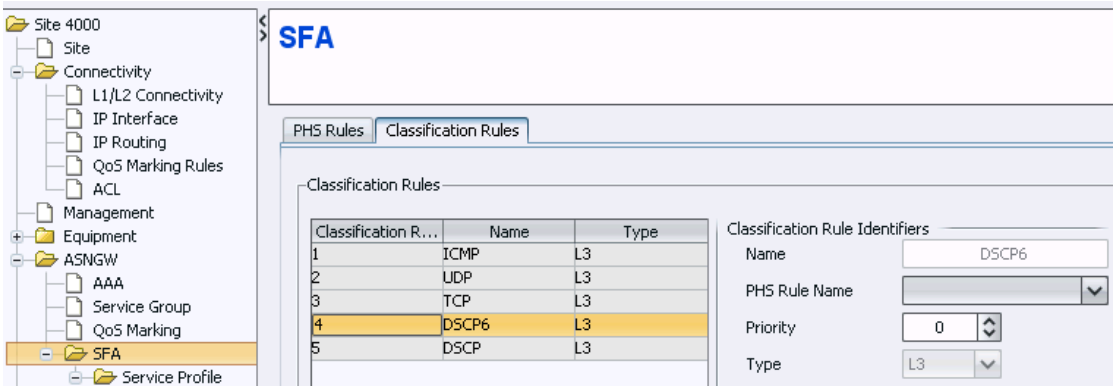


Figure 18: SFA – DSCP6

Table 9: TOS Parameters

Classification Rule Name	TOS Range	TOS Mask
DSCP	From 0 to 1	63
DSCP6	From 6 to 7	0

3.2.13 Service Profile

1. Select SFA > Service Profile from the navigation tree.

   A Default service profile already exists. Use the default profile or create a new profile.

IMPORTANT

A Default service profile is used only in the Unauthenticated mode. If this mode is not used, you need to configure a new service profile according to configuration in AAA server.

2. Bind classifier rules with 1 flow according to Table 10.

3. Change the profile status to Enable.
4. Click **Apply** to accept the changes.

To create a new service profile:

1. Right-click on the service profile icon and click Create.
2. Define service profile name. A new service profile is created.
3. Click **Apply** to accept the changes.

   This newly created Service Profile will be 'empty', without a Service Flow.
4. Add a new service flow and follow Table 10.

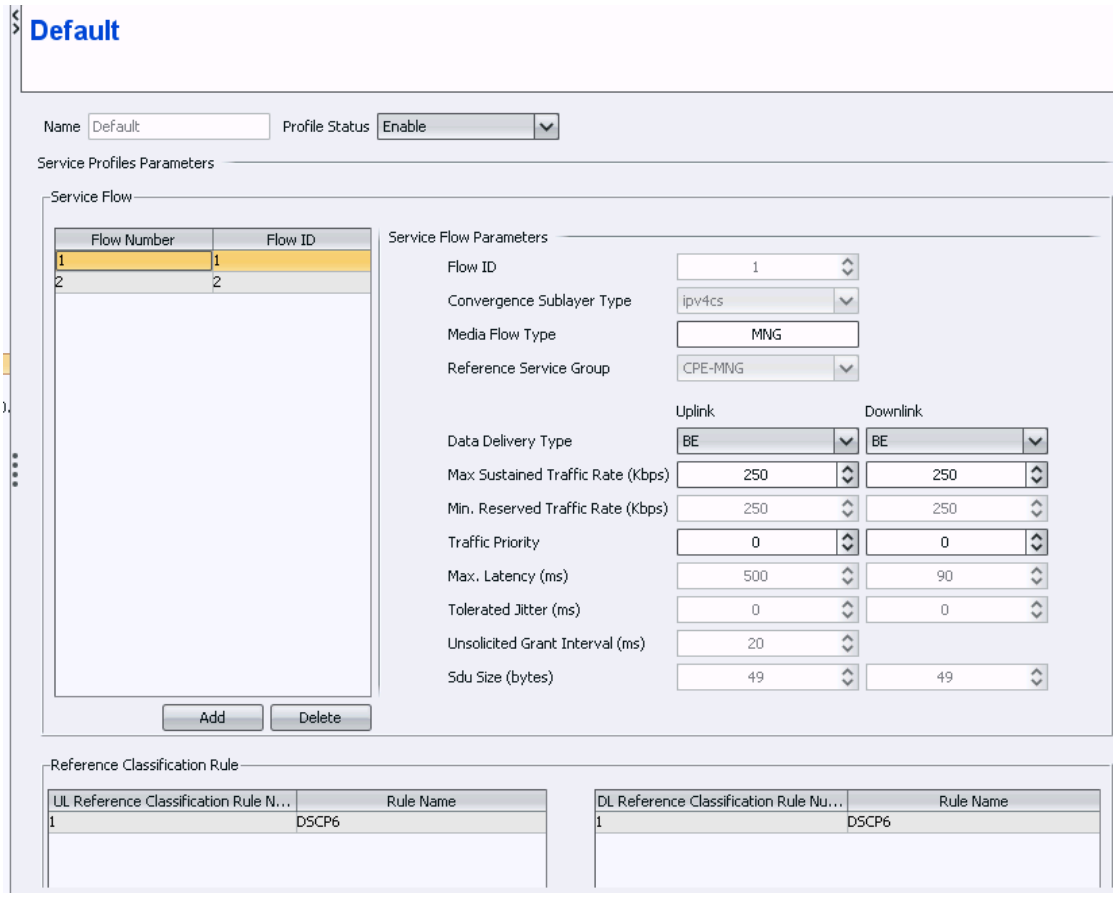


Figure 19: Service Profile – Management

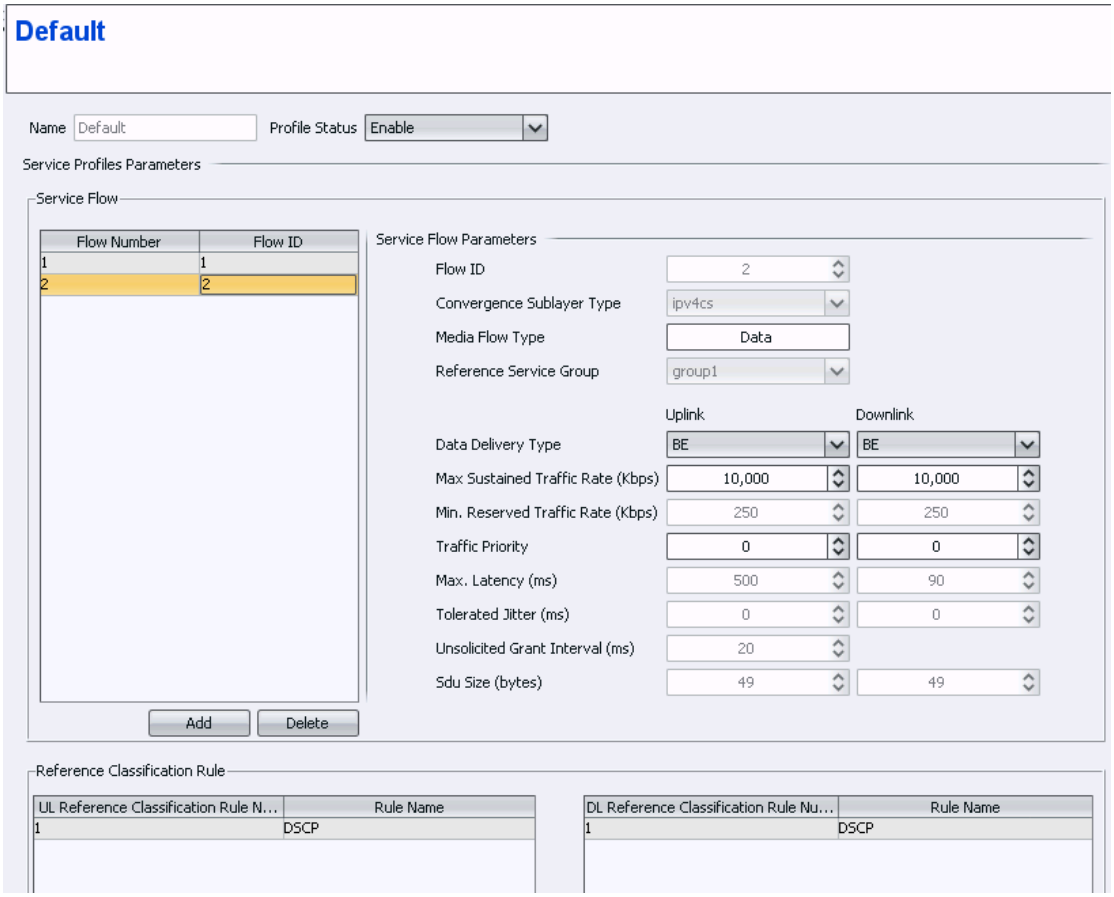


Figure 20: Service Profile – Data

Table 10: Service Profile

Parameter Name	Value – for Data	Value – for Management
Service flow parameters		
Flow ID	2	1
Media flow type	Data	MNG
Reference service group	Group1	CPE-MNG
Data delivery type	Uplink: BE Downlink: BE	Uplink: BE Downlink: BE
Max sustained traffic rate (kbps)	Uplink: 512 Downlink: 512	Uplink: 250 Downlink: 250
traffic priority	Uplink: 0 Downlink: 0	Uplink: 0 Downlink: 0
Reference Classifier Rule		
UL	DSCP	DSCP6

Parameter Name	Value – for Data	Value – for Management
DL	DSCP	DSCP6

3.2.14 BS

1. In the navigation tree, right click on BS and click Create.
2. Define the following:
   - BS LSB- This value should be unique in the network. For example, 1.2.3 (Driven from the value 01.02.03 (HEX) which is 66051 (DEC)
   - Operator ID- populated with the last operator ID in the DB. Should be the same for all BSs of a specific operator.
3. Click **Apply** to accept the changes.

3.2.14.1 BS Radio Configuration

3.2.14.1.1 Basic

Select BS > BS ID > Radio > Basic from the navigation tree.

3.2.14.1.1.1 General

Configure the parameters according to Table 11.

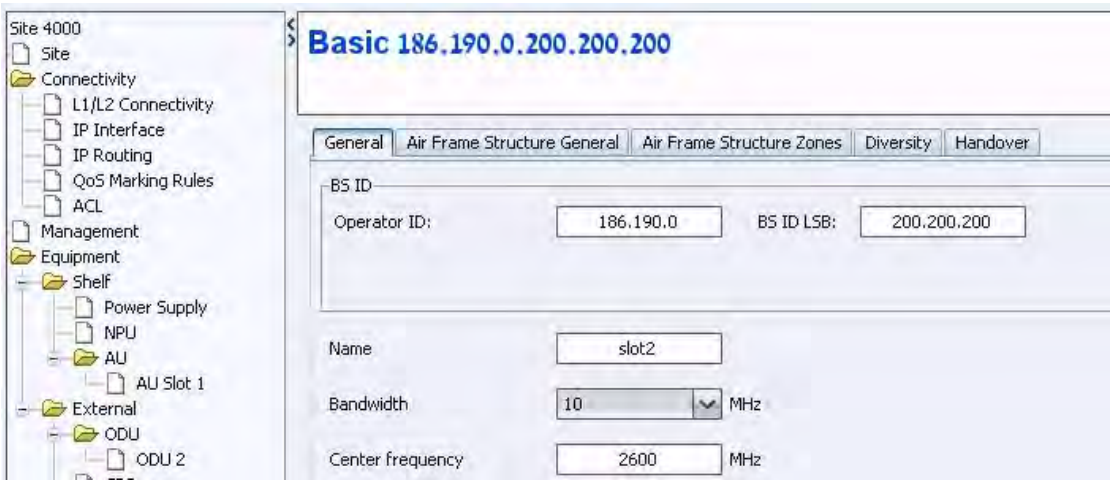


Figure 21: RC General

Table 11: RC General

Parameter Name	Value
Name	Slot2
Bandwidth	10 MHz

Parameter Name	Value
Central frequency	2600.0

3.2.14.1.1.2 Air Frame Structure General

Configure the parameters according to Table 12.

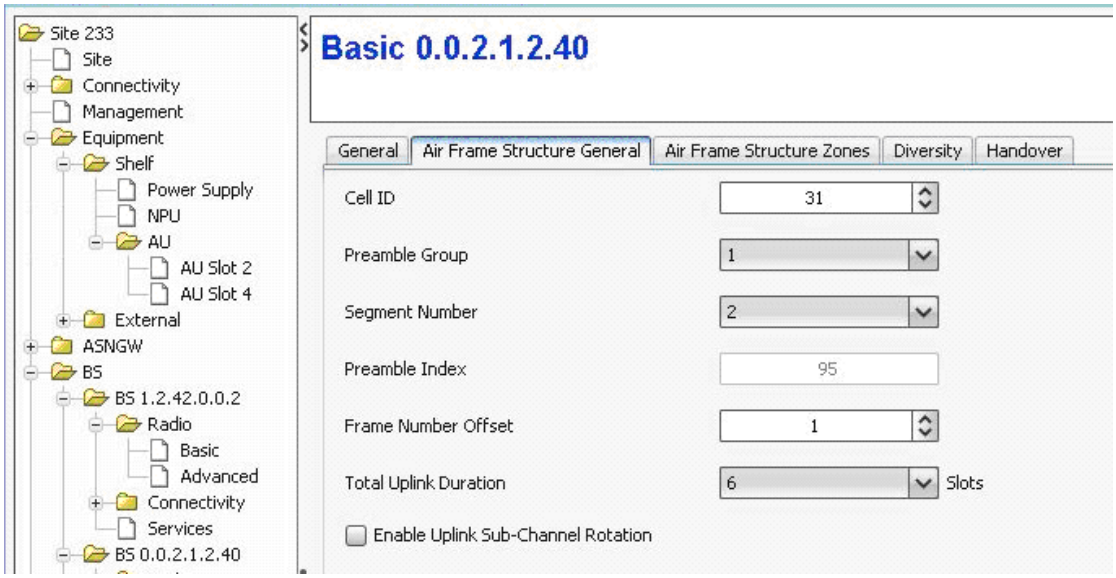


Figure 22: RC AFSG

NOTE

Preamble Index formula: segment X 32 + Cell ID
Segment- available values: 0-2
Cell ID- available values: 0-31
Please notice that if the value of Preamble Index = 0, It means that this AU is down.

Table 12: RC AFSG

Parameter Name	Value
Cell ID	31
Preamble group	1
Segment number	2
Preamble index	2*32+31 = 95
Frame number offset	0
Total uplink duration	6

3.2.14.1.1.3 Air Frame Structure Zone

Configure the parameters from Table 13. The following parameters are for 10 MHz bandwidth.

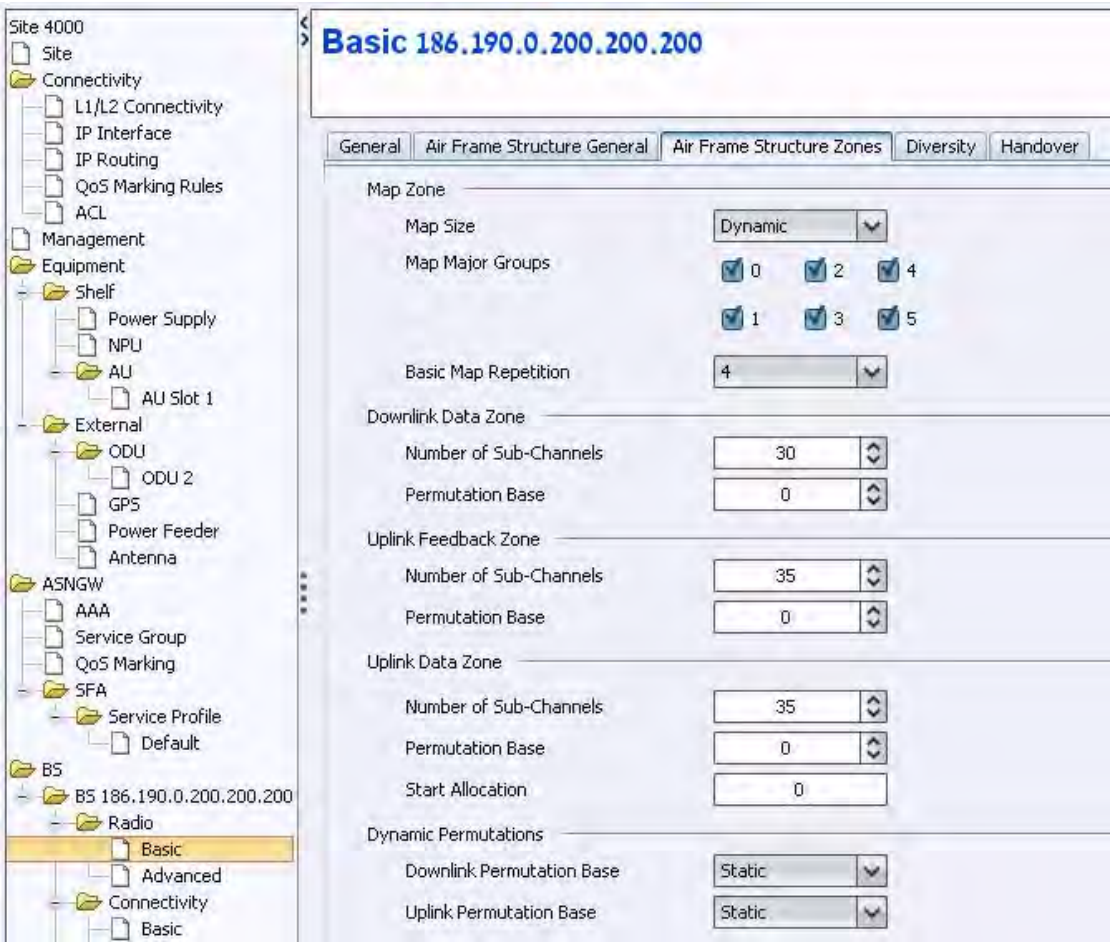


Figure 23: RC AFSZ

Table 13: RC AFSZ

Category	Parameter Name	Value
Map Zone	Map size	Dynamic
	Map major groups	mark ALL (0-5)
	Basic Map repetition	4
Downlink data zone	Num of sub channels	30
	Permutation base	0
Uplink Feedback zone	Num of sub channels	35
	Permutation base	0
Uplink Data Zone	Num of sub channels	35

Category	Parameter Name	Value
	Permutation base	0
	Start allocation	0
Dynamic permutation	Downlink Permutation base	Static
	Uplink Permutation base	Static

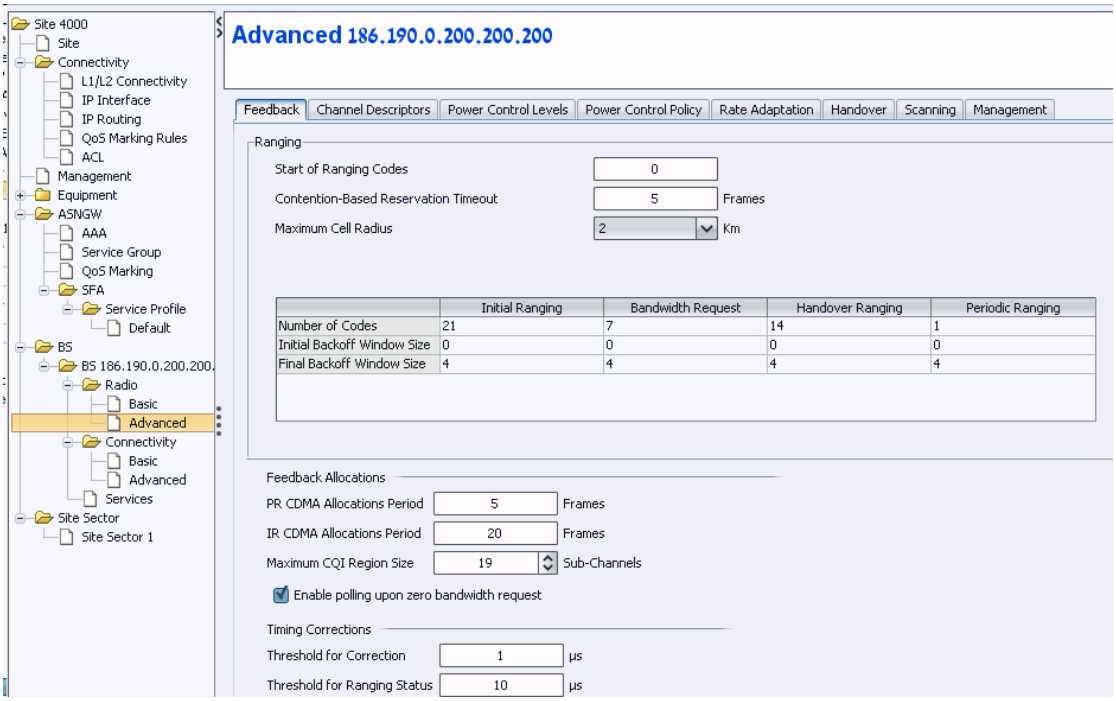
3.2.14.1.1.4 Diversity

Use none at this point, it is not mandatory for first link.

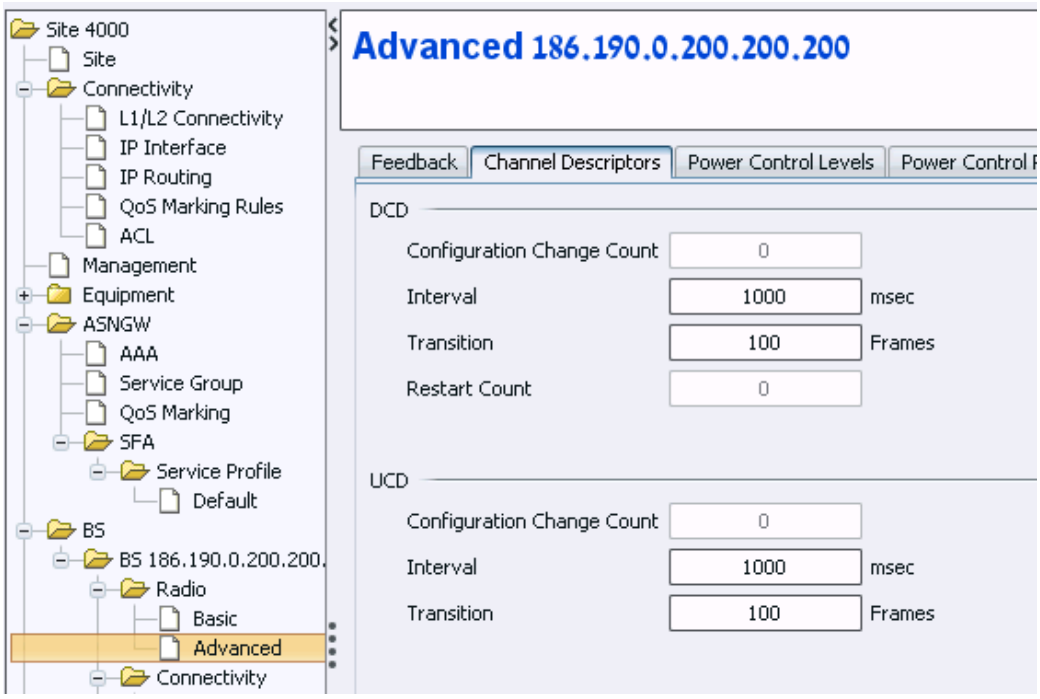
3.2.14.1.2 Advanced

1. Select BS > BS ID > Radio > Advance from the navigation tree.
2. Configure the parameters according to the screen captures below.
3. After making all the required changes, click **Apply** to accept the changes.

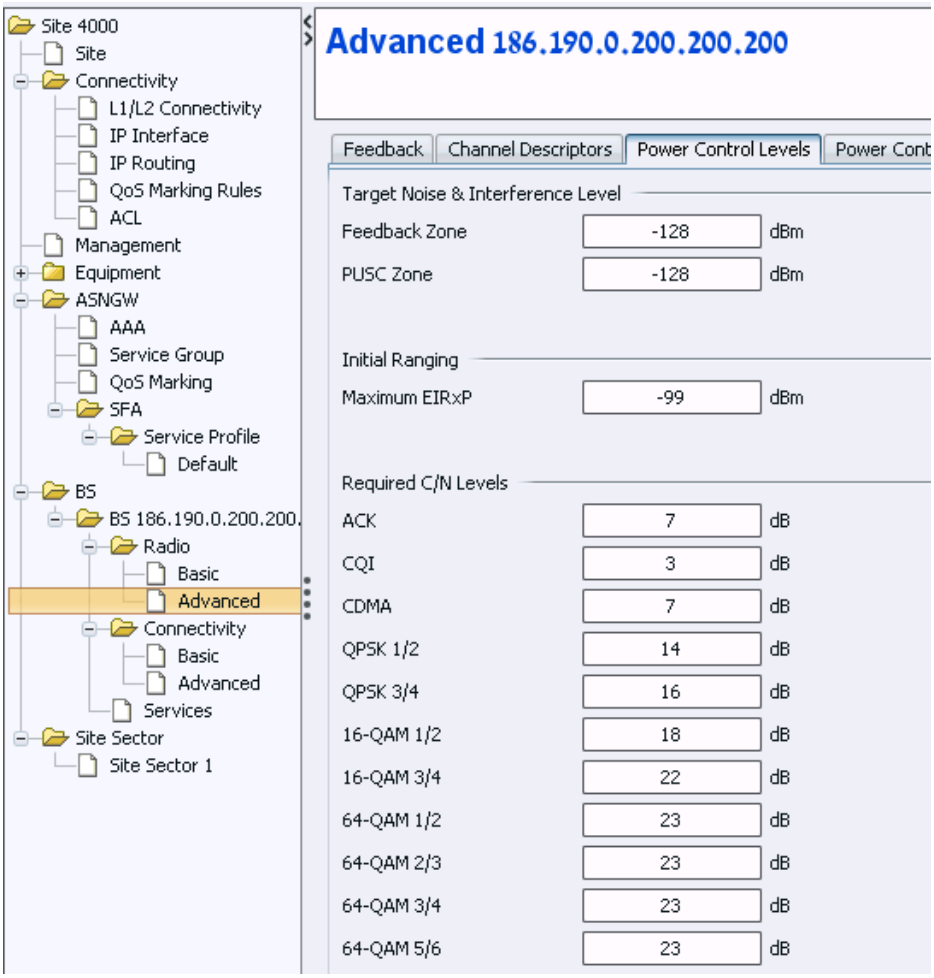
3.2.14.1.2.1 Feedback



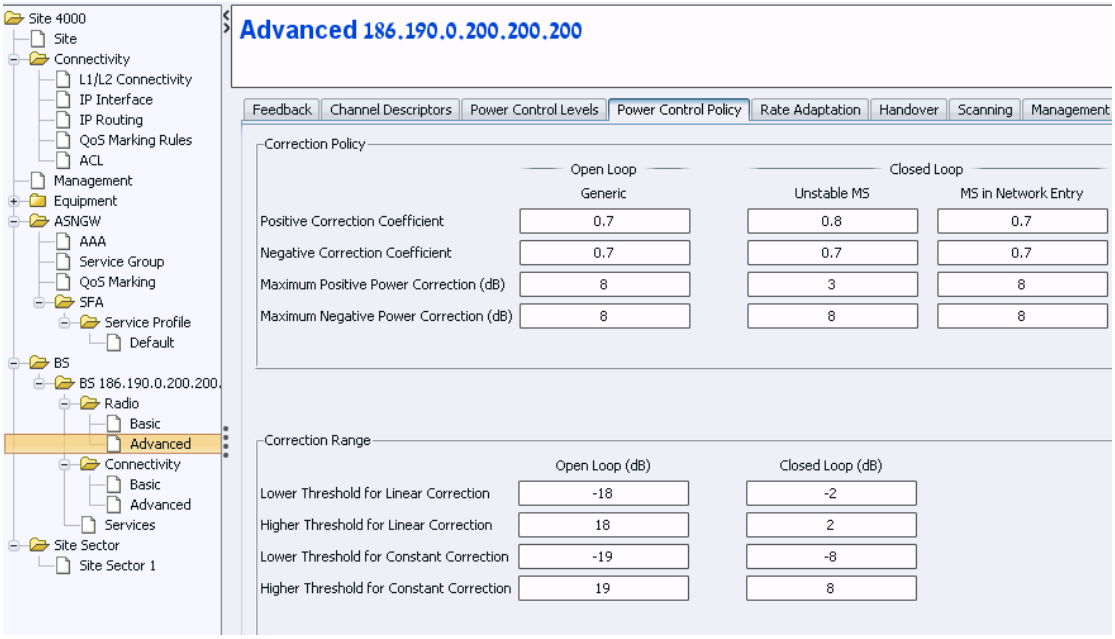
3.2.14.1.2.2 Channel Description



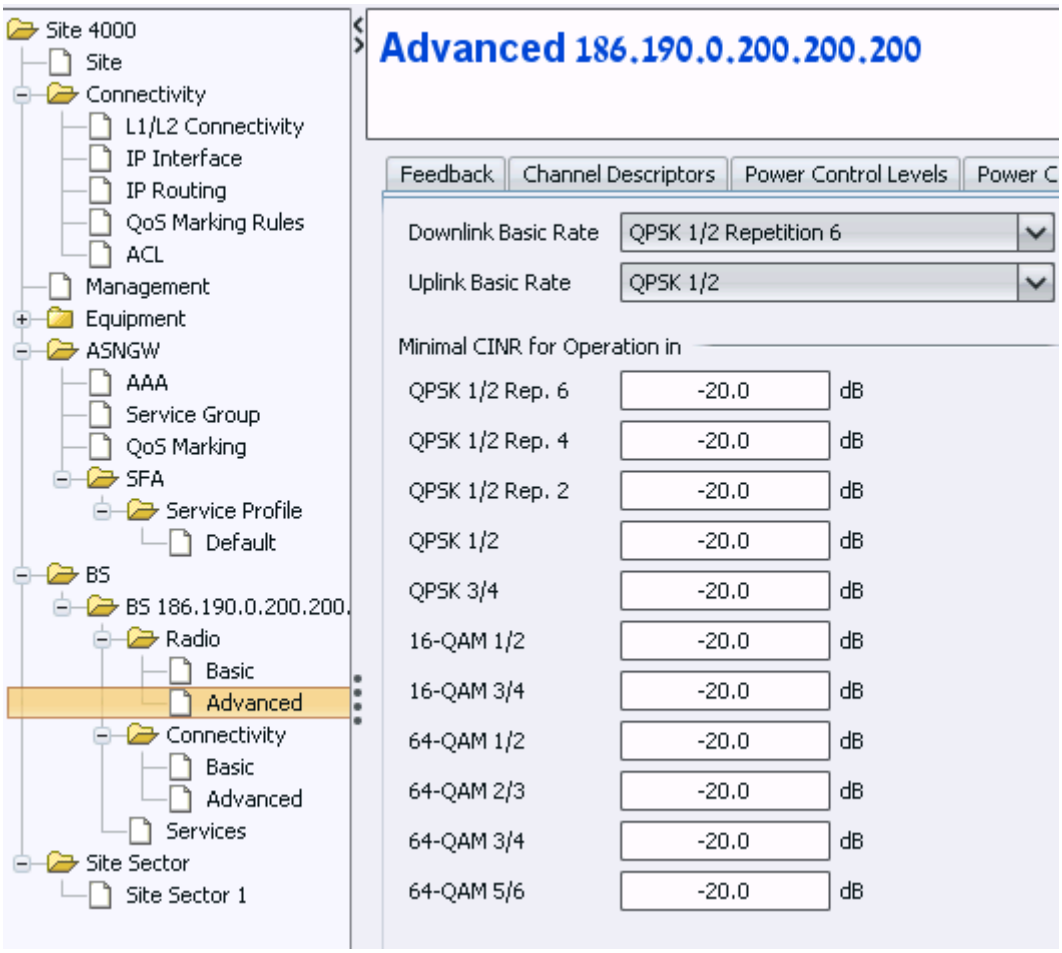
3.2.14.1.2.3 Power Control Levels



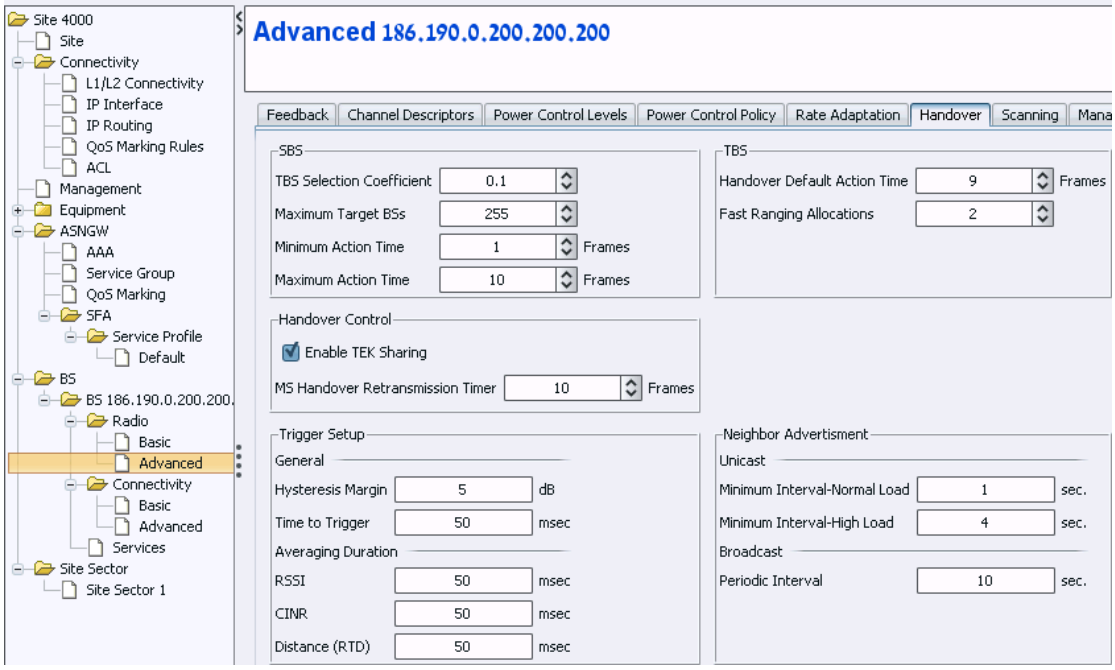
3.2.14.1.2.4 Power Control Policy



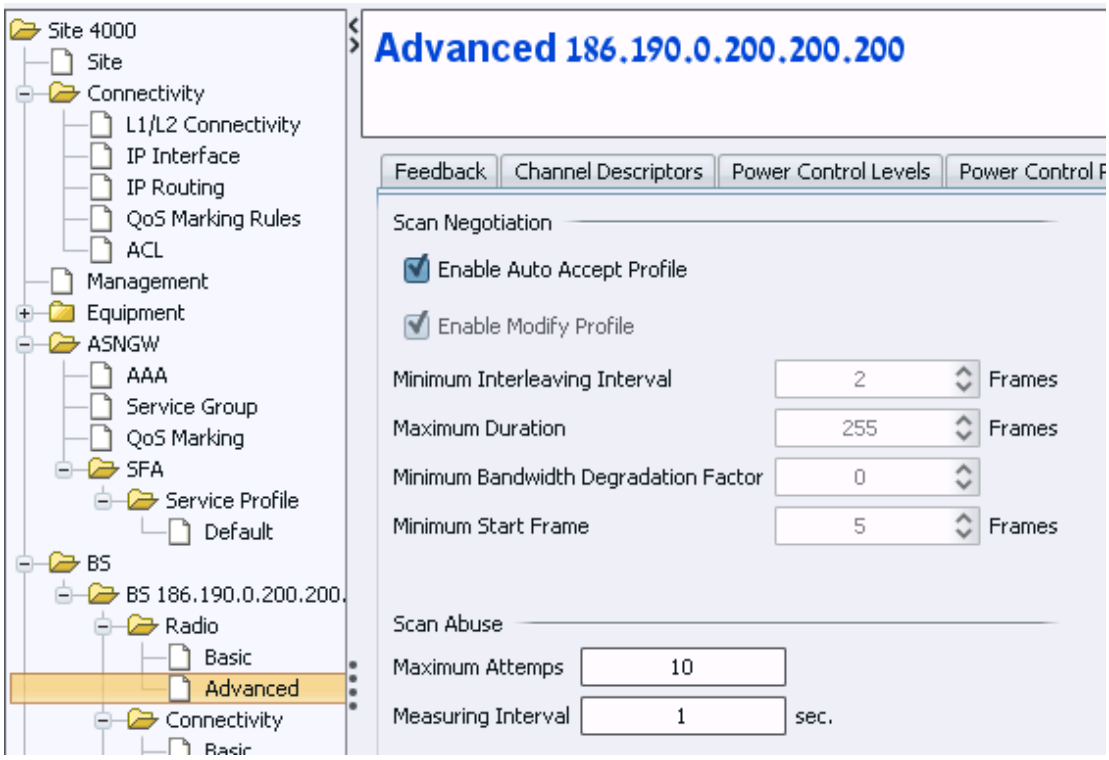
3.2.14.1.2.5 Rate Adaptation



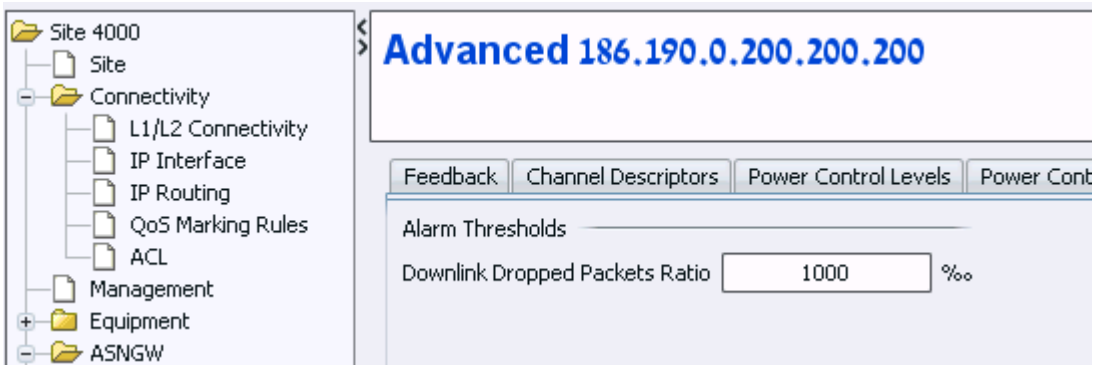
3.2.14.1.2.6 Handover



3.2.14.1.2.7 Scanning



3.2.14.1.2.8 Management



3.2.14.2 Connectivity

3.2.14.2.1 Basic

Select BS > BS ID > Connectivity > Basic from the navigation tree.

3.2.14.2.1.1 Bearer

1. Configure the bearer parameters according to Table 14.
2. Click **Apply** to accept the changes.

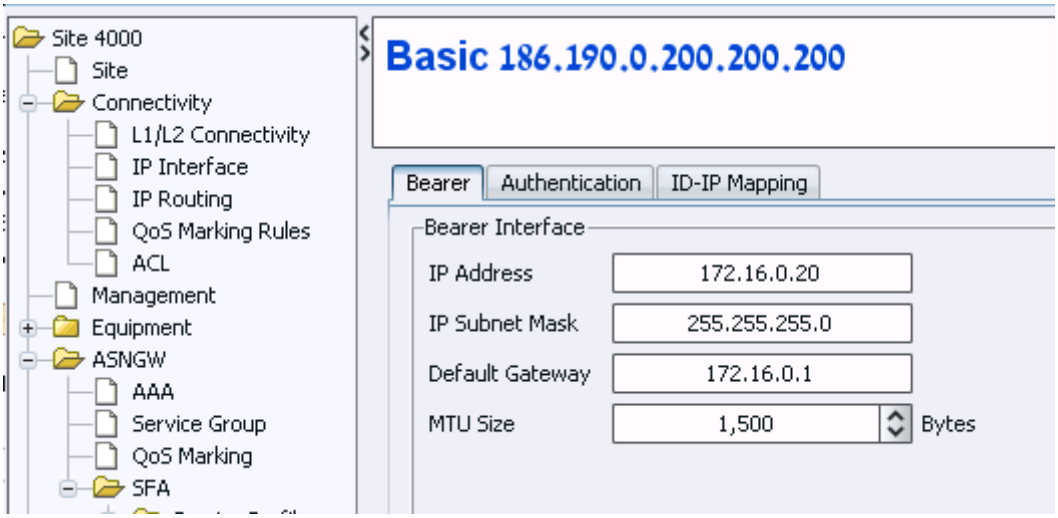


Figure 24: Bearer

Table 14: Bearer

Category	Parameter Name	Value
Bearer Connectivity	IP Address	172.16.0.20
Bearer Connectivity	IP sub mask	255.255.255.0
Bearer Connectivity	Default gateway	172.16.0.1
Bearer Connectivity	MTU size	1500

3.2.14.2.1.2 Authentication

1. Configure the authentication parameters according to Table 18.
2. Click **Apply** to accept the changes.

NOTE

Active MSs counts the number of connected MSs. Therefore, increase the threshold value, otherwise an alarm will be generated for exceeded number of MSs as soon as an MS connects.

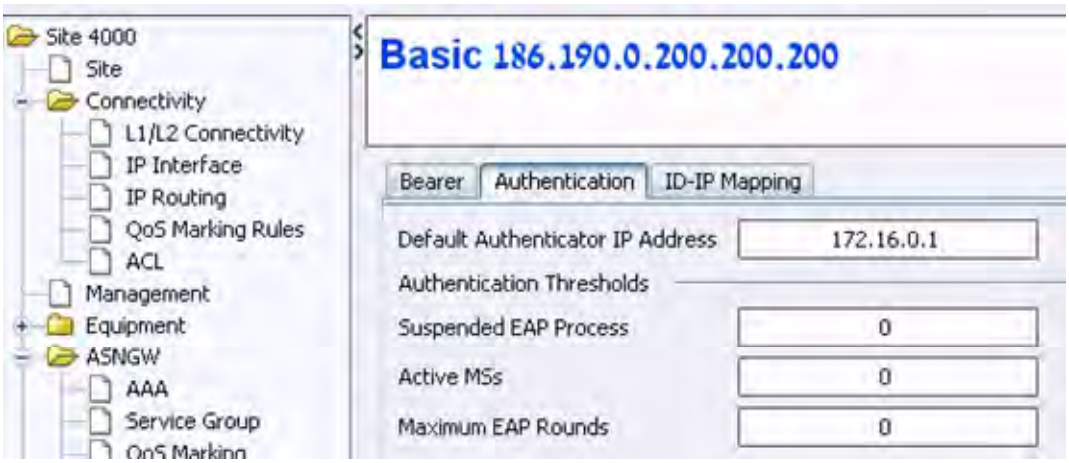


Figure 25: Authentication

Table 15: Authentication

Category	Parameter Name	Value
Default Authenticator IP	Default Authenticator IP	172.16.0.1
	Active MSs	Number of MSs that will connect this BS

3.2.14.2.2 Advanced

1. Select BS > BS ID > Connectivity > Advanced from the navigation tree.
2. Define one rule according to Figure 26.
3. Click **Apply** to accept all changes.

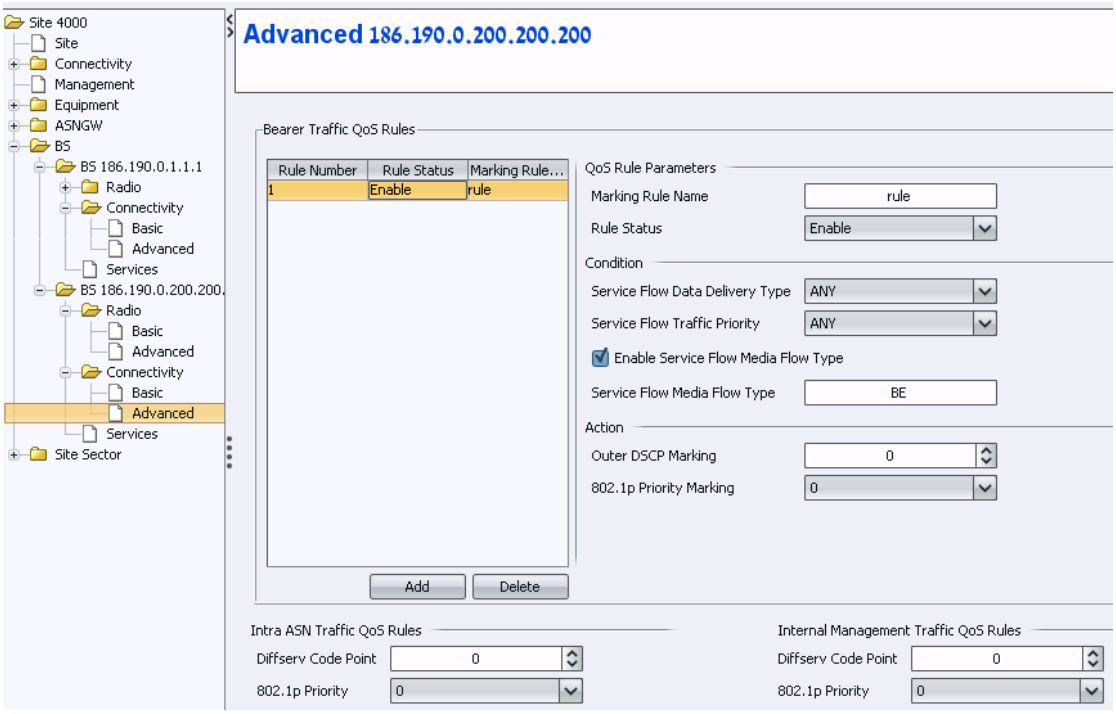


Figure 26: Connectivity - Advanced

3.2.15 Site Sector

1. In the navigation tree, right-click on Site Sector and create new site sector.
2. Select the site sector number.
3. Click **Apply** to accept the change. A new Site Sector is created.
4. In the new site sector window, define the parameters according to Figure 27.
5. Click **Apply** to accept the changes.

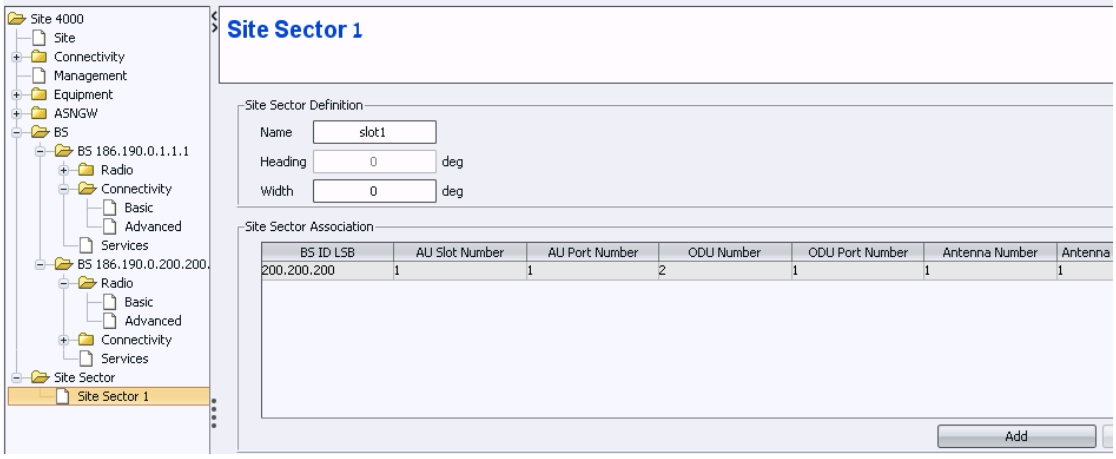


Figure 27: Site Sector

3.3 Apply All Changes

For all the changes to take effect, you need to restart the NPU via AlvariSTAR.

NOTE

The NPU restart must be performed only via AlvariSTAR, otherwise the last changes will not be saved.

Annex A. CPEs Support

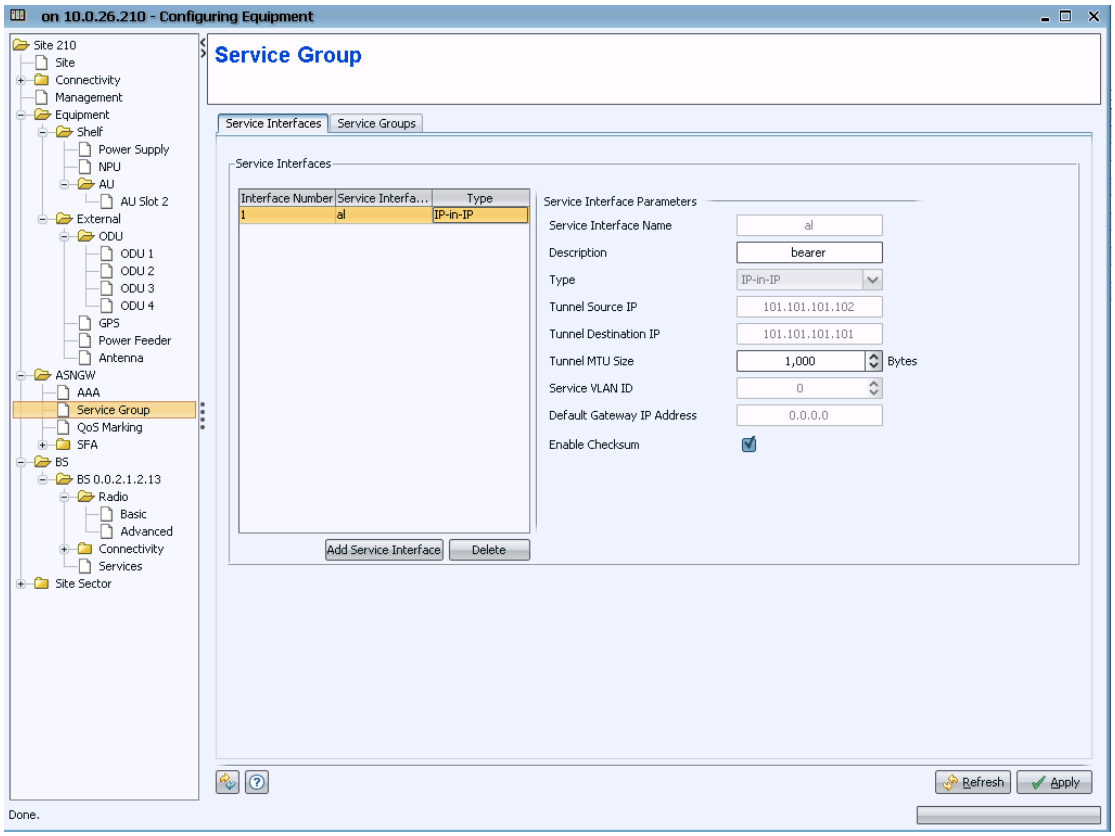
This example describes the following:

1. configuration of SI, SG, SP, SF for all other CPEs (not R2)
2. Working with IP mode (thus far, VLAN mode was described)

A.1. Service Interface

Service interface configuration

Type IP-in IP is used



A.2. service Group

IMPORTANT

It is important to verify that the 'Vendor Class Identifier' parameter is configured according to the value of Option 60 located in the DHCP-discover message sent by the CPE.

For WCM and RGW 'Vendor Class Identifier'= MSFT 5.0

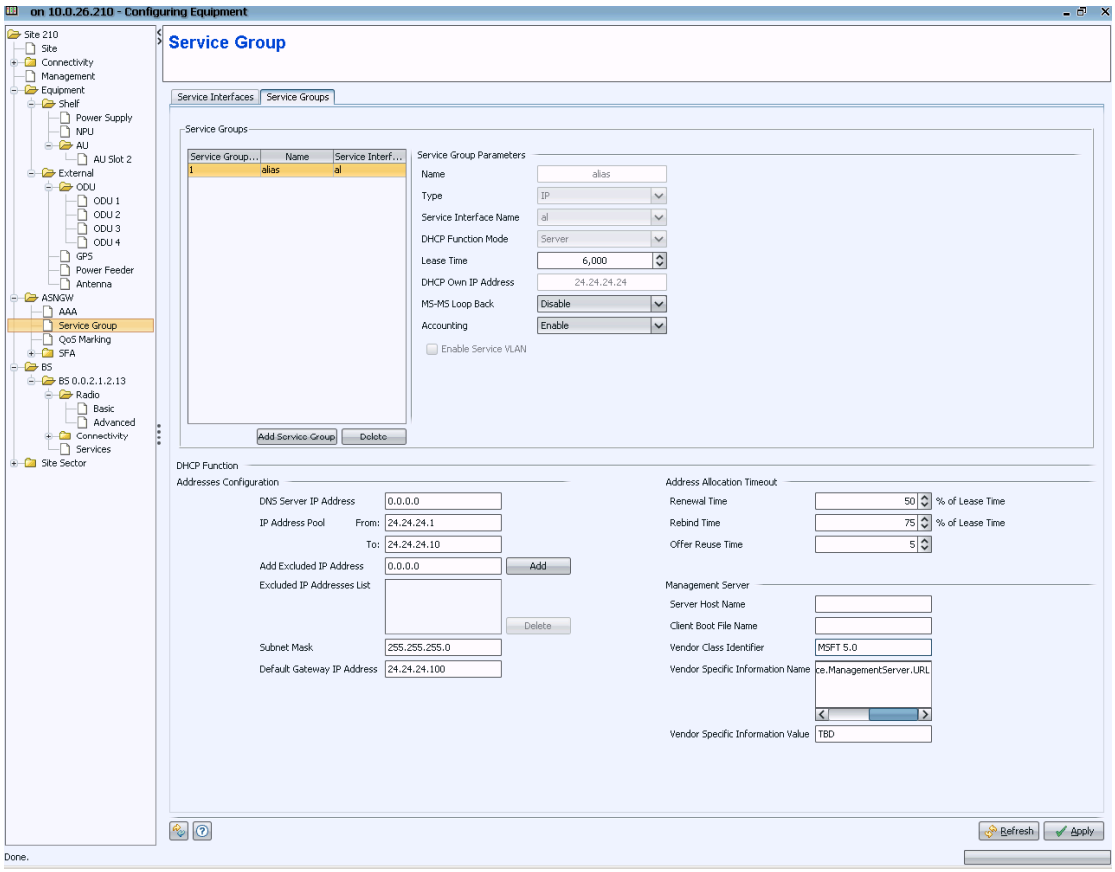


Figure 28: Service Group

A.3. SFA- Classification Rules

Configure three classifier rules with the IP protocol value as describe in the following table:

Classifier Name	IP Protocol Value
TCP	6
UDP	17
ICMP	1

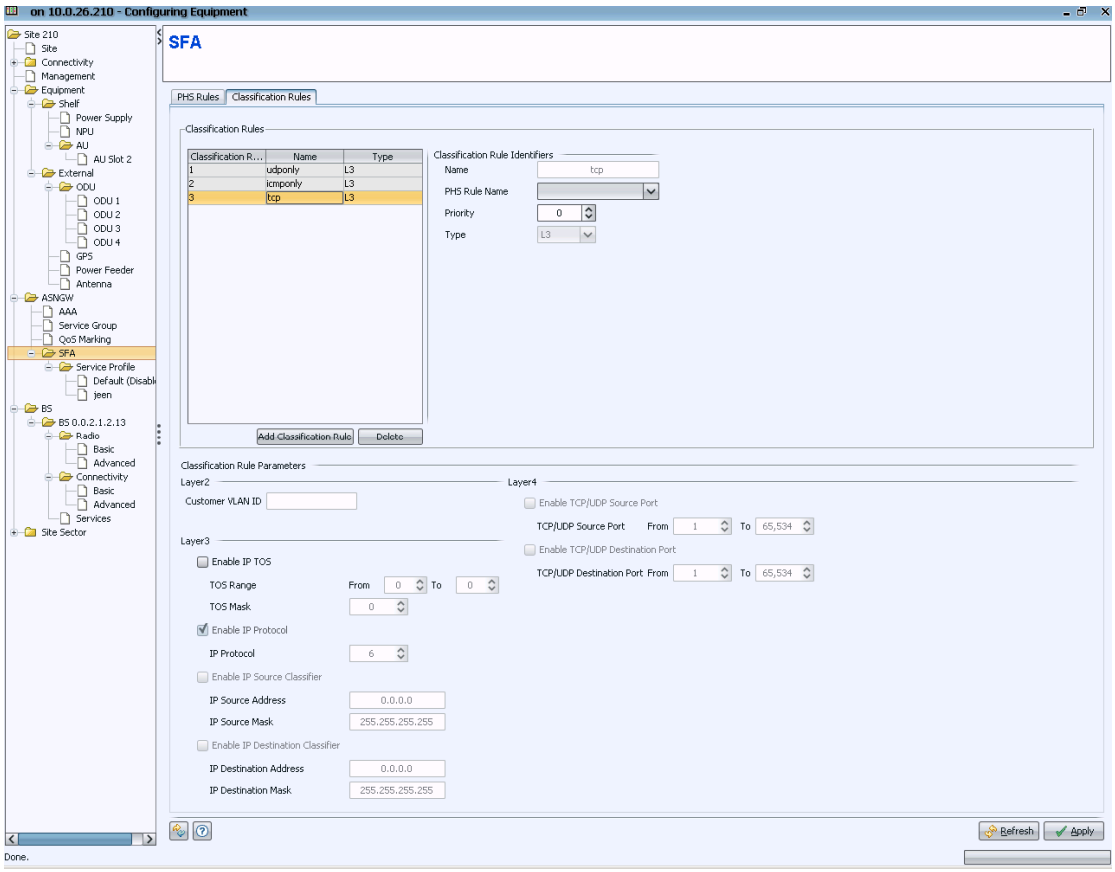
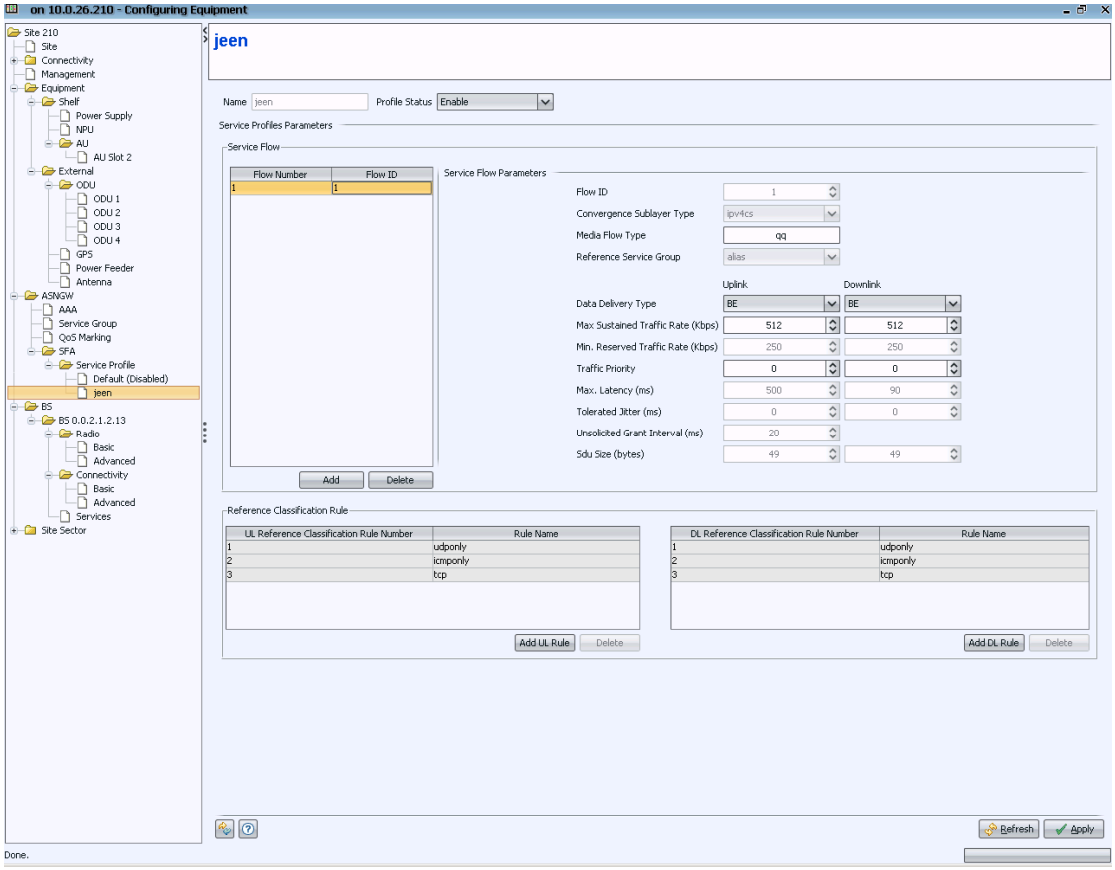


Figure 29: SFA

A.4. Service

Create a new service profile with the following flow:

1. One service flow with the service group describe in A.2.
2. Define three classifiers for downlink and three for uplink as described in A.3.

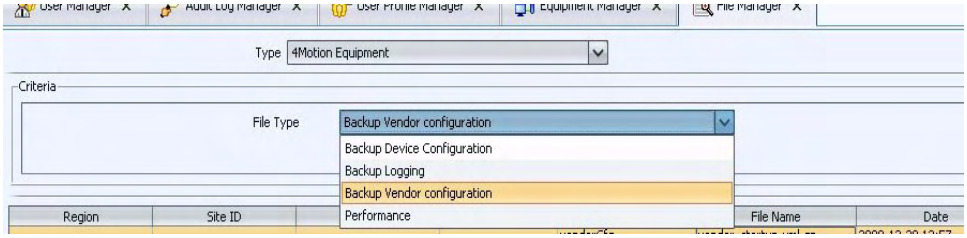

on 10.0.26.210 - Configuring Equipment
Site 210
Site
Connectivity
Management
Equipment
Shelf
Power Supply
NPU
AU
AU Slot 2
External
ODU
ODU 1
ODU 2
ODU 3
ODU 4
GPS
Power Feeder
Antenna
ASNGW
AAA
Service Group
QoS Marking
SFA
Service Profile
Default (Disabled)
jeen
BS
BS 0.0.2.1.2.13
Radio
Basic
Advanced
Connectivity
Basic
Advanced
Services
Site Sector
jeen
Name jeen
Profile Status Enable
Service Profiles Parameters
Service Flow
Flow Number
Flow ID
1
1
Add
Delete
Service Flow Parameters
Flow ID 1
Convergence Sublayer Type ipv4cs
Media Flow Type qq
Reference Service Group alias
Uplink
Downlink
Data Delivery Type BE BE
Max Sustained Traffic Rate (Kbps) 512 512
Min. Reserved Traffic Rate (Kbps) 250 250
Traffic Priority 0 0
Max. Latency (ms) 500 90
Tolerated Jitter (ms) 0 0
Unsolicited Grant Interval (ms) 20
Sdu Size (bytes) 49 49
Reference Classification Rule
UL Reference Classification Rule Number
Rule Name
1 udponly
2 icmponly
3 tcp
Add UL Rule
Delete
DL Reference Classification Rule Number
Rule Name
1 udponly
2 icmponly
3 tcp
Add DL Rule
Delete
Refresh
Apply
Done.

Annex B. Uploading the Vendor Configuration File

Uploading vendor configuration file is mandatory after every software upgrade.

To upload the vendor configuration file:

1. Take the vendor_startup.xml file and generate a .gz file (zip file) from it.
2. From the navigation tree, select File Manager and import vendor_startup.xml.gz file, by clicking Import > Select File > Import.
3. In the File Manager, select File Type 'Backup Vendor Configuration' and click on the **Retrieve** button.



The vendor_startup.xml.gz file will is displayed.

4. Click on the file.
5. Click on the **Restore** button at the right. The Restore Configuration window is displayed.
6. In the Restore Configuration window, click on **Add**.
7. Select your site and click **Select**.
8. Click on **Run**. The downloading process begins.
9. When the process completed message is displayed, close the window.

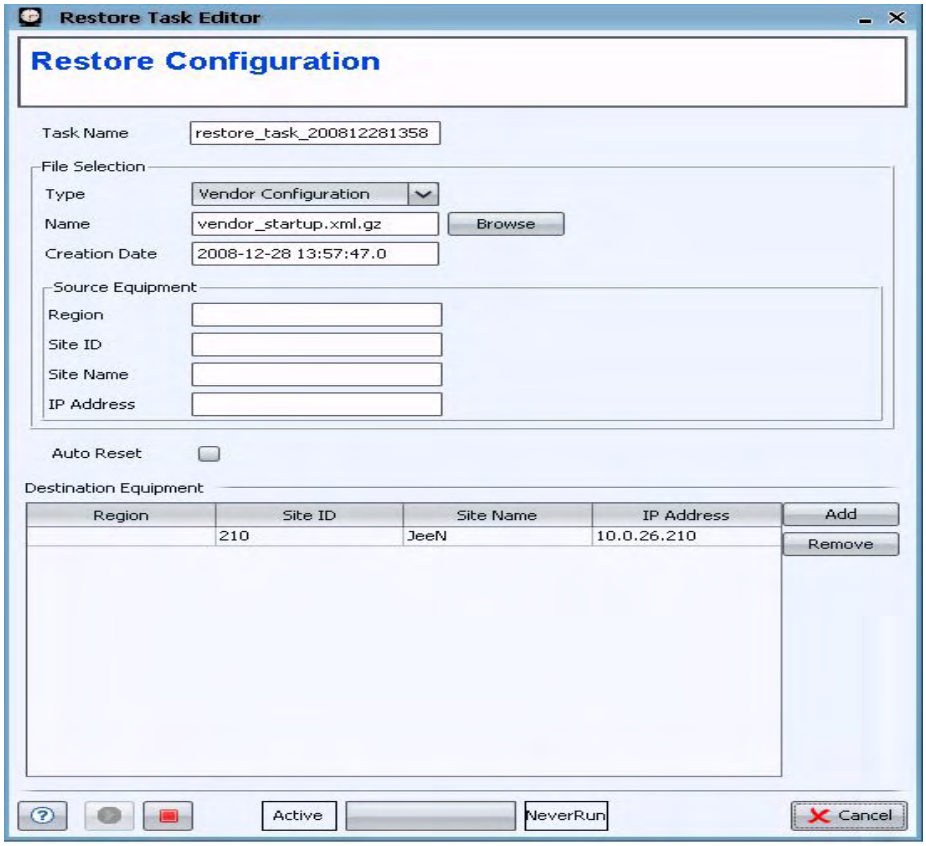
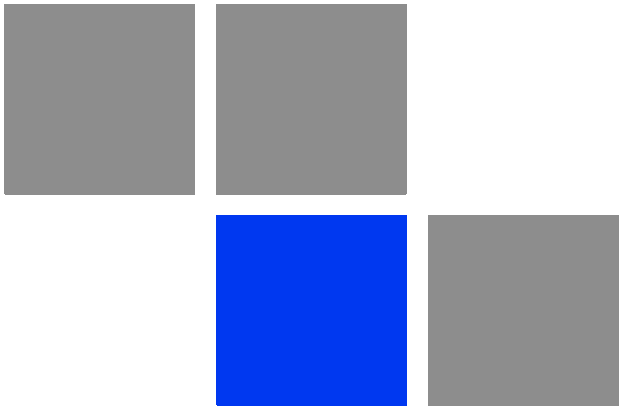


Figure 30: Restore Configuration

10. Perform NPU reset. The NPU will start up with the configured vendor parameters (including asnif and csnif).



Glossary

10Base-T	An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (i.e. Cat 3 or better, Cat 5 in most networks) with data rate of 10 Mbps. (10 for 10Mbps, Base for baseband, T for twisted pair). 10Base-T implementation uses star topology.
100Base-T	An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (i.e. Cat 5 or better), with data rate of 100 Mbps. 100Base-T implementation uses star topology. 100Base-T is also known as Fast Ethernet.
1000Base-T	An Ethernet cabling standard where data is transmitted in baseband spectrum of a twisted pair cable (Cat 5E or better), with data rate of 1000 Mbps. 1000Base-T implementation uses star topology. 1000Base-T is also known as Gigabit Ethernet.
3G	Third generation wireless service, designed to provide high data speeds, always-on data access, and greater voice capacity..
AAA	Authentication, Authorization, and Accounting (pronounced "triple a."). A system (or several systems) that controls what resources users have access to, and keeps track of the activity of users over the network.
AAS	Adaptive Antenna System, also called Advanced Antenna System, is a technology to enable the network operators to increase the wireless network capacity. In addition, adaptive antenna systems offer the potential of increased spectrum efficiency, extended range of coverage and higher rate of frequency reuse. Adaptive antenna systems consist of multiple antenna elements at the transmitting and/or receiving side of the communication link, whose signals are processed adaptively in order to exploit the spatial dimension of the mobile radio channel. Depending on whether the processing is performed at the transmitter, receiver, or both ends of the communication link, the adaptive antenna technique is defined as multiple-input single-output (MISO), single-input multiple-output (SIMO), or multiple-input multiple-output (MIMO).
ACL	Access Control List. A filtering mechanism used by many access IP routers that controls which traffic may be received or transmitted on an interface or port.
AISG	Antenna Interface Standards Group. The objective of the group is to facilitate the introduction of base station antennas with remotely adjustable tilt by agreeing open standards for the associated data transmission system.
ANSI	American National Standards Institute. A voluntary organization composed of corporate, government, and other members that coordinates standards-related activities, approves U.S. national standards, and develops positions for the United States in international standards organizations.
ARP	Address Resolution Protocol. Internet protocol used to map an IP address to a MAC address. Defined in RFC 826.
ARQ	Automatic Repeat reQuest. A communication technique in which the receiving device detects errors and requests retransmissions.
ASCII	American Standard Code for Information Interchange. A code for representing English characters as numbers, with each letter assigned a number from 0 to 127.

ASN	Access Service Network. An ASN is defined as a complete set of network functions needed to provide radio access to a WiMAX subscriber. An ASN is comprised of network elements such as one or more Base Stations (BS) and one or more ASN gateways (ASN-GW). An ASN may be shared by more than one Connectivity Service Network (CSN).
ASN-GW	Access Service Network Gateway. The ASN-GW is a network entity that acts as a gateway between the ASN and CSN. The ASN functions hosted in an ASN-GW may be viewed as consisting of two groups - the decision point (DP) that provides control functionality and enforcement point (EP) that provides bearer transport.
ASP	Application Service Provider. A third-party entity that manages and distributes software-based services and solutions to customers across a wide area network from a central data center.
AU	Access Unit
AVU	Air Ventilation Unit
AWG	An electronics industry acronym for American Wire Gauge. AWG is a measure of the thickness of copper, aluminum and other wiring.
AWGN	Additive White Gaussian Noise. Also known as WGN. Constant spectral energy at all frequencies with a probability histogram that follows a Gaussian bell shaped curve.
BE	Best Effort. Service supporting applications with no strict rate or delay requirements.
BS	Base Station. The WiMAX BS is an entity that implements the WiMAX MAC and PHY in compliance with the IEEE 802.16e standard. A BS operates on one frequency assignment, and incorporates scheduler functions for uplink and downlink resources.
BTS	Base Transceiver Station. A wireless network element that provides the radio interface of the network. The BTS comprises the radio transmission and reception devices, and also manages the signal processing related to the air interface.
BW	Bandwidth
BWA	Broadband Wireless Access
CALEA	The Communications Assistance for Law Enforcement Act is a United States wiretapping law passed in 1994. In its own words, the purpose of CALEA is: To amend title 18, United States Code, to make clear a telecommunications carrier's duty to cooperate in the interception of communications for Law Enforcement purposes, and for other purposes. CALEA was intended to preserve the ability of law enforcement agencies to conduct electronic surveillance by requiring that telecommunications carriers and manufacturers of telecommunications equipment modify and design their equipment, facilities, and services to ensure that they have the necessary surveillance capabilities.

CDMA	Code Division Multiple Access is a second generation (2G) cellular technology defined by Qualcomm in IS-95 and IS-2000. A coding scheme, used as a modulation technique, in which multiple channels are independently coded for transmission over a single wideband channel. In some communication systems, CDMA is used as an access method that permits carriers from different stations to use the same transmission equipment by using a wider bandwidth than the individual carriers. On reception, each carrier can be distinguished from the others by means of a specific modulation code, thereby allowing for the reception of signals that were originally overlapping in frequency and time. Thus, several transmissions can occur simultaneously within the same bandwidth, with the mutual interference reduced by the degree of orthogonality of the unique codes used in each transmission.
CE	The CE-marking is a European Union regulatory community sign. It symbolizes the compliance of the product with all essential requirements relating to safety, public health, consumer protection.
CINR	Carrier-to-Interference plus Noise Ratio (expressed in dB)
CIR	Committed Information Rate. The rate (in bits per second) at which a network guarantees to transfer information under normal conditions, averaged over a minimum increment of time.
CLI	Command Line Interface. A user interface that accepts typed commands to instruct the managed device on the task to perform.
cPCI	Compact Peripheral Component Interface. a standard for computer backplane architecture and peripheral integration, defined and developed by the peripheral component interconnect (PCI) industrial computers manufacturers group (PICMG). Designed to provide rugged, high-density systems.
CPU	Central Processing Unit.
CQI	Channel Quality Information
CS	Convergence Sublayer. Particular protocols that are responsible for gathering and formatting higher layer information so it can be processed by the lower layers.
CSMA/CD	Carrier Sense Multiple Access with Collision Detection. Media-access mechanisms wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all colliding devices. This collision subsequently delays retransmissions from those devices for some random length of time. Ethernet and IEEE 802.3 use CSMA/CD access.
CSN	Connectivity Service Network. A CSN is defined as a set of network functions that provide IP connectivity services to WiMAX subscribers and all the IP core network functions. A CSN is comprised of network elements such as routers, proxy/servers, user databases, and inter-working gateway devices.
CTC	Convolutional Turbo Code is a type of turbo codes with some of the convolutional schemes used. For its high-performance error correction nature, CTC is the iterative decoding scheme of choice as evidenced by their wide adoption in standards bodies.
DCD	Downlink Channel Descriptor.

DHCP	Dynamic Host Configuration Protocol. A protocol for dynamically assigning IP addresses from a pre-defined list to nodes on a network. Using DHCP to manage IP addresses simplifies client configuration and efficiently utilizes IP addresses.
DL	Down Link
DSCP	Differentiated Service Code Point, AKA DiffServ: An alternate use for the ToS byte in IP packets. Six bits of this byte are being reallocated for use as the DSCP field where each DSCP specifies a particular per-hop behavior that is applied to the packet.
DNS	Domain Naming System. A system that stores information about hostnames and domain names. DNS provides an IP address for each hostname, and lists the e-mail exchange servers accepting e-mail addresses for each domain.
DoS	Denial of Service
DSL	Digital Subscriber Line. A technology that exploits unused frequencies on copper telephone lines to transmit traffic typically at multi-megabit speeds. DSL can allow voice and high-speed data to be sent simultaneously over the same line. Because the service is 'always available,' end-users don't need to dial in or wait for call set-up.
EAP	Extensible Authentication Protocol, A protocol used between a user station and an authenticator or authentication server. It acts as a transport for authentication methods or types. It, in turn may be encapsulated in other protocols, such as 802.1x and RADIUS. EAP is defined by RFC 2284.
EDT	Electrical Down-Tilt
EIRP	Equavalent Isotropic Radiated Power. The apparent power transmitted towards the receiver, if it is assumed that the signal is radiated equally in all directions. The EIRP is equal to the power (in dBm) at the antenna port, plus the power gained from the directivity of the antenna (in dBi).
EMC	Electro-Magnetic Compatibility. The capability of equipment or systems to be used in their intended environment within designed efficiency levels without causing or receiving degradation due to unintentional EMI (Electro Magnetic Interference). EMC generally encompasses all of the electromagnetic disciplines.
EMS	Element Management System. An element management system (EMS) manages one or more of a specific type of telecommunications network element (NE). Typically, the EMS manages the functions and capabilities within each NE but does not manage the traffic between different NEs in the network.
EN	Abbreviation for "European Norm".
ERT-VR	Extended Real-Time Variable Rate. Service supporting real-time applications with variable bit rates that require guaranteed data rate, delay and low jitter, such as voice.
ETS	European Telecommunications Standard

ETSI	European Telecommunications Standards Institute. A non-profit organization producing voluntary telecommunications standards used throughout Europe, some of which have been adopted by the EC as the technical base for Directives or Regulations.
FA	Foreign Agent. A mobility agent on the foreign network that can assist the mobile node in receiving datagrams delivered to the care-of address. (The foreign network is the network to which the mobile node is attached when it is not attached to its home network, and on which the care-of-address is reachable from the rest of the Internet). See also HA (Home Agent).
FCC	Federal Communications Commission. A U.S. government agency that supervises, licenses, and controls electronic and electromagnetic transmission standards.
FEC	Forward Error Correction. A method of communicating data that can corrects errors in transmission on the receiving end. Prior to transmission, the data is put through a predetermined algorithm that adds extra bits specifically for error correction to any character or code block. If the transmission is received in error, the correction bits are used to check and repair the data.
FFT	Fast Fourier Transform. An algorithm for converting data from the time domain to the frequency domain; often used in signal processing.
FTP	File Transfer Protocol. A protocol for exchanging files over the Internet. FTP uses the Internet's TCP/IP protocols to enable data transfer.
GMT	Greenwich Mean Time. On January 1, 1972, GMT was replaced as the international time reference by Coordinated Universal Time (UTC), maintained by an ensemble of atomic clocks around the world.
GPS	Global Positioning System. A system that uses satellites, receivers and software to allow users to determine their precise geographic position.
GRE	General Routing Encapsulation. A method or technique of adding an IP standard header and trailer to a message that does not follow IP protocols. The encapsulated message is sent over a public network while received messages are stripped of the wrapper and processed. This permits non-standard data and totally encrypted messages to use the Internet. The technology is an important element in Virtual Private Network (VPN) offerings.
HA	Home Agent. A node on the home network (the network at which the mobile node seems reachable, to the rest of the Internet, by virtue of its assigned IP address) that effectively causes the mobile node to be reachable at its home address even when the mobile node is not attached to its home network.
HARQ	Hybrid Automatic Repeat reQuest (Hybrid ARQ) is a sheme wherein information blocks are encoded for partial error correction at receiver and additional, uncorrected errors are retransmitted.
HO	Hand-Over.
HP	Abbreviation for "Horizontal Pitch" or standard width measurement which defines the width for plug-in modules in the 19” construction system. One HP equals 5.08 mm.

IANA	Internet Assigned Numbers Authority. A regulatory group that maintains all assigned and registered Internet numbers, such as IP and multicast addresses.
ICMP	Internet Control Message Protocol is a protocol designed to allow hosts to send error and control messages to other network devices. Basically ICMP provides communication between the Internet Protocol (IP) software on network devices. The short ICMP messages use IP packets and are usually processed by the IP software, rather than presented to the user at the application level.
IEC	The International Electro-Technical Commission. an international organization that writes standards for safety for electrical and other equipment. Many IEC standards were adopted from the German VDE, which was the main historical standards-writing body in Europe. One goal of the IEC is to harmonize differing standards between European countries to facilitate free trade. The U.S. Underwriters Laboratories (UL) and the Canadian CSA are members of the IEC.
IEEE	Institute of Electrical and Electronics Engineers. IEEE (pronounced I-triple-E) is an organization composed of engineers, scientists, and students. The IEEE is best known for developing standards for the computer and electronics industry. In particular, the IEEE 802 standards for local-area networks are widely followed.
IEEE 802.16	Also known as WIMAX. A group of broadband wireless communications standards for metropolitan area networks (MANs) developed by a working group of the IEEE.
IEEE 802.16e	802.16e, also known as 802.16-2005, is an IEEE standard addressing mobility of wireless broadband (WiMax). IEEE 802.16e is sometimes called Mobile WiMAX, after the WiMAX forum for interoperability. 802.16e, based on an existing WiMAX standard 802.16a, adds WiMAX mobility in the 2-to-6 GHz-licensed bands. 802.16e allows for fixed wireless and mobile Non Line of Sight (NLOS) applications primarily by enhancing the OFDMA (Orthogonal Frequency Division Multiple Access).
IEEE 802.1p	A QoS method - A three-bit value that can be placed inside an 802.1Q frame tag.
IEEE 802.1q	The IEEE 802.1q standard defines the operation of VLAN Bridges that permit the definition, operation and administration of Virtual LAN topologies within a Bridged LAN infrastructure. The 802.1q specification establishes a standard method for inserting VLAN membership information into Ethernet frames. A tag field containing VLAN (and/or 802.1p priority) information can be inserted into an Ethernet frame, carrying VLAN membership information.
IEEE 802.3	A Local Area Network protocol suite commonly known as Ethernet. Ethernet uses Carrier Sense Multiple Access bus with Collision Detection CSMA/CD. This method allows users to share the network cable. However, only one station can use the cable at a time. A variety of physical medium dependent protocols are supported.
IF	Intermediate Frequency. Radio communications systems modulate a carrier frequency with a baseband signal in order to achieve radio transmission. In many cases, the carrier is not modulated directly. Instead, a lower IF signal is modulated and processed. At a later circuit stage, the IF signal is converted up to the transmission frequency band.

IGMP	Internet Group Membership Protocol) is protocol used by IP hosts to report their host group memberships to any immediately neighboring multicast routers. The use of IP multicasting in TCP/IP networks is defined as a TCP/IP standard in RFC 1112. In addition to defining address and host extensions for how IP hosts support multicasting, this RFC also defines the IGMP version 1. Version 2 of IGMP is defined in RFC 2236. Both versions of IGMP provide a protocol to exchange and update information about host membership in specific multicast groups.
IP	Internet Protocol. The standard that defines how data is transmitted over the Internet. IP bundles data, including e-mail, faxes, voice calls and messages, and other types, into "packets", in order to transmit it over public and private networks.
IPv4	Internet Protocol version 4 is still the most commonly used Internet Protocol (IP) version, initially deployed in 1983. IPv4 addresses are 32-bit numbers often expressed as 4 octets in "dotted decimal" notation (for example, 192.0.32.67). IPv6 is the newer version of the Internet Protocol (deployment began in 1999) that offers many improvements over IPv4, such as 128-bit IP addresses, and will eventualy completely replace IPv4.
ISP	Internet Service Provider. A company that provides access to the Internet.
KEK	Key Encryption Key. Key that encrypts or decrypts other key for transmission or storage.
LED	Light Emitting Diode.
MAC	Media Access Control. The lower of the two sub-layers of the data link layer defined by the IEEE. The MAC sub-layer handles access to shared media, such as whether token passing or contention will be used.
MAC Address	Standardized data link layer address that is required for every port or device that connects to a LAN. Other devices in the network use these addresses to locate specific ports in the network and to create and update routing tables and data structures. MAC addresses are 6bytes long and are controlled by the IEEE.
MDT	Mechanical Down-Tilt
MIB	Management Information Base. A database of objects that can be monitored by a network management system. SNMP uses standardized MIB formats that allow any SNMP tools to monitor any device defined by a MIB.
MIMO	Multiple Input, Multiple Output. A technique for faster wireless communication. MIMO allows for the use of multiple transmitter and receiver antennas to increase throughput and range.
MIP	Mobile IP. A protocol used to provide IP mobility to IPv4-based nodes, defined in RFC-2002.
MIR	Maximum Information Rate. Specifies the maximum rate of information that can be available to a user. The MIR is used by the traffic policing mechanism to prevent users from sending excess traffic to the network.

MTU	Maximum Transmission Unit. This is the greatest amount of data that can be transferred in one physical frame on the network. If a packet that has a smaller MTU than the packet's frame length is sent, fragmentation will occur. For TCP MTU can range from 68 to 1500 bytes. Larger MTUs provide for lower overhead (fewer headers).
MS	Mobile Station. The equipment used by the end user to access the WiMAX network.
NAI	Network Address Identifier. Used to create a new unique subscriber identifier, when a subscriber enters the network without a user name.
NAP	Network Access Provider. A NAP is a business entity that provides WiMAX radio access infrastructure to one or more Network Service Providers (NSPs). An NAP implements this infrastructure using one or more ASNs.
NAS	Network Access Server. A Network Access Server operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS server(s(, and then acting on the response.
NMS	Network Management System. A system responsible for managing at least part of a network. An NMS is generally a reasonably powerful and well-equipped computer, such as an engineering workstation. NMSs communicate with agents to help keep track of network statistics and resources.
NOC	Network Operations Center. The physical space from which a typically large telecommunications network is managed, monitored and supervised.
NPU	Network Processing Unit
NRT-VR	Non Real Time - Variable Rate. Service supporting non-real-time applications with variable bit rates that require guaranteed data rate and are delay-tolerant such as file transfers
NSP	Network Service Provider. An NSP is a business entity that provides IP connectivity and WiMAX services to WiMAX subscribers compliant with the established service level agreement. The NSP concept is an extension of the Internet service provider (ISP) concept, providing network services beyond Internet access. To provide these services, an NSP establishes contractual agreements with one or more NAPs. An NSP may also establish roaming agreements with other NSPs and contractual agreements with third-party application providers (e.g. ASP, ISP) for the delivery of WiMAX services to subscribers. From a WiMAX subscriber standpoint, an NSP may be classified as a home or visited NSP.
NWG	Network Working Group. The WiMAX Forum's Network Working Group (NWG) is responsible for developing the end-to-end network requirements, architecture, and protocols for WiMAX, using IEEE 802.16e-2005 as the air interface.
OA&M	Operation, Administration & Maintenance. Provides the facilities and the personnel required to manage a network.
OCXO	Oven-Controlled crystal oscillator often used in navigation system clocks, frequency standards, MTI radars, wireless base stations, telecom timing modules and precision test equipment.
ODU	Outdoor Unit

OFDM	Orthogonal Frequency Division Multiplexing: A method for multiplexing signals, which divides the available bandwidth into a series of frequencies known as tones. Orthogonal tones do not interfere with each other when the peak of one tone corresponds with the null. The rapid switching, frequency-hopping technique is intended to allow more robust data service.
OFDMA	Orthogonal Frequency Division Multiple Access. It's a logical extension of OFDM and a modulation/multiple access technique. OFDMA divides a signal into sub-channels (i.e. groups of carriers), with each sub-channel (or several sub-channels) being allocated to a different subscriber.
OOB	Out-Of-Band. Out-of-band management is a method wherein management information exchanged between the network element and its associated management application is carried on a separate communications path from the user data that is coming to/from the network element. Conversely, in-band (IB) management is management data that is carried across the same interface as user data.
OSPF	Open Shortest Path First. A link-state IGP (Interior gateway protocol) that makes routing decisions based on the shortest-path-first (SPF) algorithm (also referred to as the Dijkstra algorithm).
OSS	Operations Support Systems. A system that processes telecommunications information supporting various management functions, such as billing, customer care, network management, inventory control, maintenance, trouble ticket reporting, surveillance and service provisioning; not considered a network element or part of the network itself.
PDA	Personal Digital Assistant. A handheld computing device.
PDU	Protocol Data Unit. The concept of a PDU is used in the OSI reference model. From the perspective of a protocol layer, a PDU consists of information from the layer above plus the protocol information appended to the data by that layer. . For example, a frame is a PDU of the Data Link Layer, and a packet is a PDU of the Network Layer.
PEP	Policy Enforcement Point is an entity in a policy-based system where decisions are enacted.
PER	Packet Error Rate. In a digital transmission, PER is the percentage of packets with errors divided by the total number of packets that have been transmitted, received or processed over a given time period.
PHS	Payload Header Suppression. PHS is a technique used to mask redundant cell, frame, or packet header information when one or more of the same type of higher layer data PDU's are transported as the payload of an 802.16 MAC PDU.
PHY	PHYsical Layer. The physical, or lowest, layer of the OSI Network Model. In a wireless network, the PHY defines parameters such as data rates, modulation method, signaling parameters, transmitter/receiver synchronization, etc. Within an actual radio implementation, the PHY corresponds to the radio front end and baseband signal processing sections.

PICMG	The PCI Industrial Computers Manufacturer's Group is a consortium of over 450 industrial computer product vendors. PICMG's charter is to develop specifications for PCI-based systems and boards for use in industrial computing applications. PICMG 2.x series is a specification for PCI-based equipment that combines the power of low cost PCI silicon and software with the rugged Eurocard packaging.
PIM	Protocol Independent Multicast. A protocol-independent multicast routing protocol. PIM sparse mode routes to multicast groups that might span wide-area and interdomain internets. PIM dense mode is a flood-and-prune protocol.
PIU	Power Interface Unit
PKM	Privacy Key Management. The key management protocol used in 802.16 to obtain the needed authorization to use the media. PKM protocol operates in two phases: AK (Authorization Key) phase, and TEK (Traffic Encryption Keys). AK represents the secret key used to obtain TEK in the exchanges between MS and BS in subsequent phases.
PSU	Power Supply Unit
PUSC	Partial Usage of Sub-Channels
QAM	Quadrature Amplitude Modulation. A technique used in wireless applications to double the available bandwidth by combining two amplitude-modulated signals. The two combined signals differ in phase by 90 degrees; this technique doubles the bandwidth by combining the two signals at the source before transmission, transmitting digital data at a rate of 4 bits per signal change.
QoS	Quality of Service. Measure of performance for a transmission system that reflects its transmission quality and service availability.
QPSK	Quadrature Phase Shift Keying. A data transfer technique used in coaxial cable networks that sends data using modulating signals. Four different phases represent data, with each signal's information determined by the signal before it. For example, if a phase stays the same from one signal to the other, the information has not changed.
RADIUS	Remote Authentication Dial-In User Service, an authentication and accounting system used by many Internet Service Providers (ISPs). When you connect to the system you must enter your username and password. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access to the system.
RET	Remote Electrical Tilt
RF	Radio frequency. An AC signal of high enough frequency to be used for wireless communications.
RFC	Request For Comments. The name of the result and the process for creating a standard on the Internet. New standards are proposed and published on the Internet, as a Request For Comments. The proposal is reviewed by the Internet Engineering Task Force.
RoHS	Restriction of the use of certain Hazardous Substances in electrical and electronic equipment, reference EC Directive 2002/95/EC of 27 January 2003.

RS-232	A serial interface published by the EIA (Electronic Industries Association) for asynchronous data communication over distances up to a few hundred feet. Characterized by a single-ended (not differential) physical layer, it uses one signal wire for transmission, another for reception, and a common wire (ground), plus some timing and control signals.
RS-422	RS-422 is a serial interface standard in which data is sent in a differential pair (two wires, or twisted pair cable), which allows greater distances and higher data rates than non-differential serial schemes such as RS-232.
RSSI	Received Signal Strength Indicator. A signal or circuit that indicates the strength of the incoming (received) signal in a receiver.
R&TTE	Radio & Telecommunications Terminal Equipment. The R&TTE Directive 1999/5/EC governs the marketing and use of R&TTE equipment. With the exception of a few categories of equipment, the Directive covers all equipment, which uses the radio frequency spectrum. It also covers all terminal equipment attached to public telecommunication networks.
RTC	Real Time Clock.
RTD	Round Trip Delay.
RTP	Real Time Protocol. An Internet protocol for transmitting real-time data such as audio and video. RTP itself does not guarantee real-time delivery of data, but it does provide mechanisms for the sending and receiving applications to support streaming data. Typically, RTP runs on top of the UDP protocol, although the specification is general enough to support other transport protocols.
RT-VR	Real Time - Variable Rate. Service supporting real-time applications with variable bit rates that require guaranteed data rate and delay such as streaming video.
Rx	Receive
SBS	Serving Base Station
SDU	Service Data Unit. A set of data that is sent by a user of services of a given layer, and is transmitted to a peer service user semantically unchanged. The SDU is the data that a certain layer will pass to the layer below.
SFA	Service Flow Authorization.
SFM	The Service Flow Manager (SFM) located in the BS is responsible for the creation, admission, activation, modification, and deletion of IEEE 802.16e-2005 service flows. It consists of an Admission Control (AC) function, data path function and the associated local resource information. AC decides whether a new service flow can be admitted to the system.

SNMP	Simple Network Management Protocol. A network management protocol that provides a means to monitor and control network devices, and to manage configurations, statistics collection, performance, and security. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.
SSH	Secure Shell is a protocol for secure remote login and other secure network services over an insecure network.
TBS	Target Base Station
TCP	Transmission Control Protocol. Connection-oriented transport layer protocol that provides reliable full-duplex data transmission. TCP is the part of the TCP/IP suite of protocols that is responsible for forming data connections between nodes that are reliable, as opposed to IP, which is connectionless and unreliable.
TCXO	Temperature-Compensated crystal oscillator often used for frequency control in tactical radios, telecom timing modules (Stratum 3 Type), wireless systems, and reference oscillators.
TDD	Time Division Duplex is a duplexing technique dividing a radio channel in time to allow downlink operation during part of the frame period and uplink operation in the remainder of the frame period.
TEK	Traffic Encryption Key - a symmetric key that is used to encrypt/decrypt messages.
TFTP	Trivial File Transfer Protocol. Simplified version of FTP that allows files to be transferred from one computer to another over a network, usually without the use of client authentication.
ToS	Type of service. The method of handling traffic using information extracted from the fields in the ToS byte to differentiate packet flows.
Tx	Transmit
TUV	TÜV is a safety-testing laboratory with headquarters in Germany. TÜV can test products for compliance with IEC or VDE requirements. Products that have the TÜV insignia have been tested by TÜV for compliance with applicable standards for sale in the European market.
U	Abbreviation for "Unit" or standard height measurement which defines the vertical height for plug-in modules in the 19” construction system. One U equals 44.5 mm.
UCD	Uplink Channel Descriptor.
UDP	User Datagram Protocol. Connectionless transport layer protocol in the TCP/IP protocol stack. UDP is a simple protocol that exchanges datagrams without acknowledgments or guaranteed delivery, requiring that error processing and retransmission be handled by other protocols. UDP is defined in RFC 768.
UGS	Unsolicited Grant Service. Service supporting real-time applications generating fixed-rate data such as voice over IP without silence suppression.

UL	1. Abbreviation for “Underwriters’ Laboratory”. The UL is an independent organization which conducts safety tests and product certifications. 2. Up Link
UTC	Coordinated Universal Time. The reference for the official time used by all countries in the world, maintained by an ensemble of atomic clocks around the world, and it is independent from the time zones. The modern implementation of Greenwich Mean Time.
VLAN	Virtual Local Area Network. A group of devices on one or more LANs that are configured with the same VLAN ID so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Used also to create separation between different user groups.
VoIP	Voice over Internet Protocol. Provides an advanced digital communications network that bypasses the traditional public switched telephone system and uses the Internet to transmit voice communication. VoIP enables people to use the Internet as the transmission medium for telephone calls by sending voice data in packets using IP rather than by traditional circuit switched transmissions of the PSTN.
WCS	Wireless Communications Service is defined by the Federal Communications Commission as radio communications that may provide fixed, mobile, radio location, or satellite communication services to individuals and businesses within their assigned spectrum block and geographical area. The WCS is in the 2.3 GHz band from 2,305 to 2,320 MHz and 2,345 to 2,360 MHz..
WEEE	Waste Electronic and Electrical Equipment. The purpose of Directive 2002/96/EC on waste electrical and electronic equipment (WEEE) is, as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.
Wi-Fi	Wi-Fi (short for wireless fidelity and pronounced 'why-fye') is a term for certain types of wireless local area network that use specifications in the IEEE 802.11 family. The term Wi-Fi was created by an organization called the Wi-Fi Alliance, which oversees tests that certify product interoperability.
WiMAX	WiMAX is an acronym that stands for Worldwide Interoperability for Microwave Access. WiMAX is a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL. WiMAX provides fixed, nomadic, portable, and mobile wireless broadband connectivity without the need for direct line-of-sight to a base station.
XML	Extensible Markup Language. Language used for defining a set of markers, called tags, that define the function and hierarchical relationships of the parts of a document or data set. It is a flexible way to create common information formats and share both the format and the data, most commonly on the web. It generally similar to HTML and helps share information in a consistent way. XML is "extensible" because, unlike HTML, the markup symbols are unlimited and self-defining.