NSG™ Pro

Converged Cable Access Platform (CCAP)

Software Guide

CableOS Release 4.0.x

Rev A

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Chapter 1
CableOS Overview

1.1 Introduction

Harmonic's NSG Pro is a Converged Cable Access Platform (CCAP) product, offering a powerful combination of ultra-dense EdgeQAM with future CMTS processing capabilities, all in a single chassis. With its CCAP-compliant high availability design, the NSG Pro allows cable operators to converge their Video and Data services onto this single powerful device, increase their operational flexibility, and realize great savings on operating expenses - reduced rack space, power consumption and cooling. As an ultra-dense universal EdgeQAM, the NSG Pro supports multiple applications and delivers thousands of QAM channels with fully-agile QAM placement.

The NSG Pro is driven by Harmonic's CableOS software, which supports a wide range of Cable applications and offers great flexibility in operating the NSG Pro. With CableOS, the NSG Pro is perfectly suited to drive convergence of multiple services onto the same edge device, in order to realize the full potential of the CCAP architecture.

Under CableOS control, the NSG Pro supports the following Cable applications:

- M-CMTS, with either static configuration or DEPI-Control provisioning
- Video on Demand (VOD). CableOS ensures smooth integration to a large variety of VOD back-office systems.
- VOD streams may be encrypted using Motorola Privacy Mode (PM) protocol.
- Switch Digital Video (SDV), with various back-office systems and provisioning protocols.
- Video broadcast modulation, either in pass-through mode or with re-multiplexing

As described in *1.2 Management Interfaces* on page 8, the NSG Pro supports several optional management interfaces, which allow users to configure, monitor and troubleshoot the device. This guide provides instructions on how to manage the NSG Pro with focus mainly on the CableOS Command Line Interface (CLI).

1.2 Management Interfaces

Harmonic offers several methods for configuring the NSG Pro devices and for monitoring their status. All management interfaces listed below connect to the NSG Pro over LAN, via its management port.

Caution: To ensure maximum network security and minimize the risk of malicious attacks, Harmonic strongly recommends that NSG devices be deployed in a secured network, without any direct internet access.

The table below lists the available management interfaces according to the management purpose for which they are designed:

Table 1–1: Management Interfaces

Interface	Purpose	Explanation
CableOS CLI	Configuration and monitoring of a single NSG Pro device	CableOS comprises commands that are organized in a hierarchical structure of submenus. You can use CableOS on any computer that communicates with NSG Pro and that has a free SSH client installed on it. By default, configuration changes that are applied via CableOS CLI are stored only in the *running config* database. See *2.5 Saving Configuration* on page 13.
MCT	Configuration of multiple NSG Pro devices.	The MCT is a spreadsheet-oriented system designed to configure multiple NSG's simultaneously. MCT is recommended for large-scale NSG deployments. Besides simultaneous configuration of large number of NSG devices, it also allows users to perform firmware upgrade for multiple devices. Configuration changes done via MCT are simultaneously saved to both *running config* and *startup config*.
3rd party SNMP monitoring	Status and Alarm Monitoring of multiple NSG Pro devices	The integrated SNMP supports an extended set of SNMP MIBs. In addition, NSG Pro may generate SNMP traps in the following SNMP versions: v1, v2c, v3.
Syslog	Monitoring of a single NSG Pro device	This is a standard network protocol for logging device messages. A Syslog server that is registered with the NSG Pro device will receive messages from the device whenever an alarm or warning is asserted or remitted.

1.3 Document Conventions

This guide uses the following conventions for command documentation:

Table 1–2: Document Conventions

Convention	Explanation
`Boldface screen font`	Commands and keywords
Italic font	Arguments that you need to provide the values
`screen output`	Console output or other text that is displayed to you on a computer screen
[element]	Indicates an optional element
{x | y | z}	Alternative, mutually exclusive, keywords
[x | y | z]	Optional alternative keywords
hyperlinked	Hyperlinked cross-references in online documents
<cr>	Press <Ctr> after typing a command
<Key>	Indicated a keyboard key

NOTE: The Note symbol calls your attention to additional information that you will benefit from heeding. It may be used to call attention to an especially important piece of information you need, or it may provide additional information that applies in only some carefully delineated circumstances.

TIP: The Tip symbol calls your attention to parenthetical information that is not necessary for performing a given procedure, but which, if followed, might make the procedure or its subsequent steps easier, smoother, or more efficient.

1.4 Related Documentation

NSG Pro SNMP Specifications Document

Chapter 2
Getting Started

2.1 Initial Configuration – Establishing Ethernet Connectivity

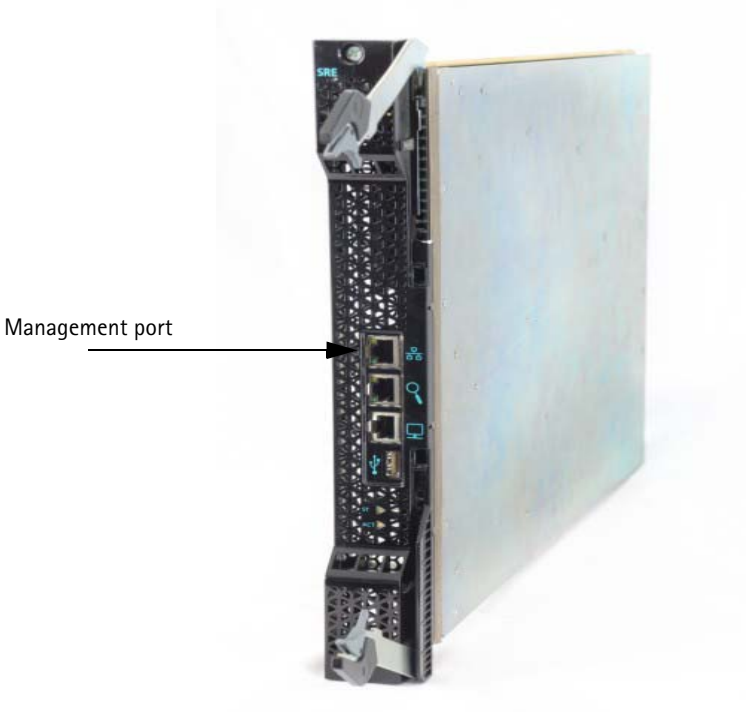
The NSG Pro is configured and controlled over a remote network connection. To operate the NSG Pro device, you must first set its management IP address. To set the NSG's IP address, follow the instructions below:

Establishing ethernet connectivity includes the following:

- Setting the network connection
- Setting the IP address of the ethernet management port

⇨ To establish Ethernet connection

1. Make that the SRE and NSI cards of the NSG Pro are mounted and secured into the chassis. See, *NSG Pro Hardware and Installation Guide*.
2. Power-up the NSG Pro, and wait until it completes the boot process.
3. Use a standard Ethernet cable to connect the Ethernet port on the SRE's front pane to the LAN port of your laptop.



4. On your laptop, configure the Network Card as follows:
   - IP address: 192.168.123.1
   - Subnet mask: 255.255.255.0
5. Open a Web browser and type the IP address of the SRE management port.- 192.168.123.45.

The following page appears:

6. To allow you to define the IP address of the management port on the I/O module, click **Edit**. By default **Edit** is enabled. Once you click **Edit**, it is disabled and **Commit** is enabled.
7. In **IP Address** enter the required IP address.
8. In **Subnet Mask**, enter the required subnet mask.
9. In **Default Gateway**, enter the required gateway.
10. Click **Commit**.
11. Wait until a message appears confirming that the action completed successfully and click OK to close it.

2.2 How to Proceed to Full Device Configuration

Once Ethernet connectivity is established, you can proceed to fully configure the NSG Pro device using one of the following:

- CableOS CLI - In this release of CableOS, use the CLI for M-CMTS configuration only.
- MCT Pro - To configure video applications, use MCT Pro only. See *MCT Pro Online Help*.

2.3 Controlling User-Access to CableOS

To enhance the security of the NSG Pro, user-access to the device is controlled by a security mechanism. The security mechanism operates in the following modes:

- Local security mechanism - supports an authorization mechanism
- Remote security mechanism - supports an Authorization, Authentication and Accounting mechanism (AAA)

2.3.1 Local Security Mechanism

Only authorized users may access the device with pre-defined rights. The security mechanism uses a local-users library, in other words a library that resides on the device. By default, the security mechanism is performed locally.

CableOS supports three built-in user-profiles: guest, config and admin. Each profile has three default accounts. You can add users and associate each user with the required profile. The following table lists the built-in profiles with default accounts and their default password and functions:

Table 2-1: Default Users

Profile	Account (username)	Password	Functions
guest	guest	nsgguest	Read only. Allows only to monitor the operation of the device.
config	config	nsgconfig	Full read-write access. Allows to configure the device and to define the password of the *config* user.
admin	admin	nsgadmin	Full read-write access, allows to configure the device. In addition: Administration of users Access to Advanced features

To enhance security, change the default passwords indicated in the above table.

2.3.2 Remote Security Mechanism

The device supports an Authorization, Authentication and Accounting mechanism (AAA). The AAA mechanism uses a remote database. The database resides on an external server, TACACS or RADIUS server. The AAA mechanism supports the following:

- Authentication - a method for authenticating users before being allowed to access the device.
- Authorization - defines the actions the user is allowed to perform.
- Accounting - a method for logging the activity of each user.

For details and instructions, see *3.2 Configuring Remote Security Mechanism* on page 23.

2.4 Accessing the CableOS CLI

The CableOS CLI allows to configure and monitor the NSG Pro device.

To access the CableOS remotely, follow the instructions below:

1. Install any SSH client on the computer, for example PuTTy.
2. Run the SSH client.
3. Select SSH (Secure Shell) protocol and port 22.
4. Enter the IP address of the required NSG device.
5. Start a session.
6. Login by entering a username and password. See *2.3 Controlling User-Access to CableOS* on page 12.

   Once the prompt appears with the required access level, CableOS Shell is running and you can start working.

2.5 Saving Configuration

You can save configuration by executing either of the following commands:

- `commit` - allows to save configuration to running. It saves the configuration to the RAM. Validation is performed and CableOS informs if commit succeeded. See example below.

  `commit` [**`and-quit`** | **`check`** | **`comment`** *text* | **`label`** *text* | **`save-running`** *file* | **`to-startup`**]

Table 2-2: Commit Command

Attribute/Value	Explanation
`commit`	Saves the configuration to running.
`and-quit`	Saves the configuration to running and quits *configure* mode.
`check`	Validates current configuration without saving.
`comment`	Associates a comment with the commit. The comment can later be seen when examining rollback files.
comment	Text
`label`	Associate a label with the commit. The label can later be seen when examining rollback files.
label	Text
`save-running`	Commit current configuration to a specific running file.
file	Name of a running file.
`to-startup`	Commit current configuration to running and startup configuration.

- `copy running configuration startup configuration` - allows to save to the start up configuration. It saves configuration to the None Volatile memory.

Example - `commit`

```
NSG CableOS(config)# cable chassis-type ds-only
NSG CableOS(config)# commit
NSG CableOS(config)# commit complete
```

Example - `copy running configuration startup configuration`

```
NSG CableOS# copy running-config startup-config
NSG CableOS#
```

2.5.1 Saving Configuration - Multiple Sessions

By default, CableOS allows multiple connections and a user may open a few sessions. If a few sessions are active, and one of the users executes the `commit` command, a notification appears for the other sessions. However, the notification does not include the commit information.

NOTE: A session may also refer to MCT connection to the device.

For example, you are connected via CableOS and at the same time, via MCT, a user is sending new configuration to the device. The following message appears:

```
System message at 2013-11-27 12:06:41...
Commit performed by admin via tcp using maapi.
```

You can monitor the commit executions using the command `show configuration commit list`. See *5.10 Monitoring Command Execution* on page 54.

NOTE: For exclusive use, see *2.8.1 Working in Exclusive Configuration* on page 17.

2.5.2 Validation mechanism

CableOS supports the following types of validations:

- Syntactic - checks while typing the command that the command is correct.
  For example, the indicated range is the allowed range:

```
NSG CableOS(config)# ntp server 1 host shalom
--------------------------------^
syntax error: "1" is out of range.
NSG CableOS(config)#
```

  It checks that the parameter is entered according to its specific type and name and that the valid elements are indicated:

```
NSG CableOS(config)# cable downstream port 5/2
NSG CableOS(config-port-5/2)# description port destrict a
----------------------------------------------^
syntax error: element does not_exist
```

- Logic - checks typically during commit the following:

The component is mounted on the device:

```
NSG CableOS(config-port-5/2)# max-carriers 39
NSG CableOS(config-port-5/2)# commit
Aborted: 'cable-cli-config cable downstream port 5/2': Failed to create port ent
ry, card 5 was not created
```

The parameter is indicated according to the application logic:

```
NSG CableOS(config-ten-gigabit-16/8)# negotiation on
NSG CableOS(config-ten-gigabit-16/8)# commit
Aborted: 'cable-cli-config interface ten-gigabit 16/8 speed' (value "10GBaseT"):
 negotiation could be enabled only for_1 gb ethernet speed
```

If you configured some parameters and did not commit them and you wish to leave the config mode, the following message appears:

Uncommitted changes found, commit them? [yes/no/cancel]

```
NSG CableOS(config)# cable downstream port 5/0
NSG CableOS(config-port-5/0)# max-carriers 40
NSG CableOS(config-port-5/0)# span-start-frequency 52000000
NSG CableOS(config-port-5/0)#
NSG CableOS(config)#
Uncommitted changes found, commit them? [yes/no/CANCEL]
```

2.6 CableOS Object Model

CableOS database resides on the SRE module of the NSG Pro device.

The configuration database is structured hierarchically, with the following main branches:

Table 2-3: CableOS Hierarchy

Node	Explanation
system	Allows to configure/monitor system parameters
card	Allows to configure/monitor linecard parameters
aaa	Allows to configure/monitor the remote security mechanism
nsg-aaa	Allows to configure/monitor the local security mechanism
network	Allows to configure/monitor network parameters and includes the following sub-nodes: ■ ip-route-table ■ default-gateway ■ management-bonding-group ■ access-list ■ local-time ■ ntp ■ snmp ■ syslog

Table 2-3: CableOS Hierarchy

Node	Explanation
interface	Allows to configure/monitor interface parameters and includes the following sub-nodes: ■ ten-gigabit ■ gigabit
cable	Allows to configure/monitor the parameters included in the following sub-nodes: ■ chassis type ■ clock ■ downstream - allows to configure/monitor RF ports and QAMs
redundancy	Allows to configure/monitor redundancy parameters and includes the following sub-nodes: ■ downstream-linecard-8-backup ■ ten-gigabit

2.7 Tips for Working with CableOS CLI

- Auto completion - If you type a partial word and press <Tab>, CableOS automatically completes it to the nearest command, or presents a list of possible completion options.
- Characters Case Sensitivity - CableOS commands, keywords, and reserved words are case-sensitive.
- Once you type at the prompt a command followed by a question mark, you will receive a list of possible completion options. For example:

```
NSG CableOS(config)# cable ?
Possible completions:
  chassis-type clock downstream linecard
```

- To terminate a session, type **`quit`** or **`logout`**. See *8.13 Logging Out* on page 74.

The following table lists the keys supported by CableOS and describes their function:

Table 2-4: Keyboard Keys

Key Function	Explanation
Backspace	Deletes characters backwards
?	Displays the following: a list of options to choose from with a short explanation.
<Ctrl> A	Moves to the beginning of the line
<Ctrl> E	Moves to the end of the line
Up	Moves to the previous logged command line
Down	Moves to the next logged command line
Left	Moves the insertion point one character to the left
Right	Moves the insertion point one character to the right

Table 2-4: Keyboard Keys

Key Function	Explanation
<Ctrl> C	Aborts the current line and current mode
<Ctrl > D	Aborts the current mode and in Operational mode, ends the session.
<Ctrl> K	Deletes all characters to the right of the insertion point
<Ctrl> U	Deletes the character to the left of the insertion point
Tab	auto completion
Q	Ends the current command and ends a session

2.8 Understanding Command Modes

You can work in either of the following modes:

- Operational - This is the initial mode after successful login to CableOS CLI. It is primarily used for viewing the status of the device, and for monitoring and troubleshooting the device operation. See *Monitoring and Troubleshooting* on page 34
  In the operational mode, you can also execute the following commands:
  - Action - See *Action Commands* on page 64.
  - File - See *File Commands* on page 70.
- Configuration - This mode allows you to configure the device. You can initiate this mode by entering the `config` command in operational mode. The changes take effect once a successful commit command is entered.
  To exit the configuration mode, type **`exit`** or press <Ctrl > D.

  `# config`

  Example:

  ```
  NSG CableOS # config
  NSG CableOS(config)#
  ```

  See *Configuring Chassis Parameters* on page 23

2.8.1 Working in Exclusive Configuration

CableOS supports multiple connections and a user may open a few sessions. The `config exclusive` command allows a single user to apply changes to the device. Only one user can enter into exclusive Configuration Mode.

`# config exclusive`

Example – `config exclusive`

```
NSG CableOS # config exlusive
Entering configuration mode exclusive
Warning: uncommitted changes will be discarded on exit
NSG CableOS(config)#
```

If another user is attempting to enter this mode the following appears:

```
NSG CableOS# config exclusive
Error: configuration database locked by:root ssh (cli from
10.40.22.20) on since 2013-03-14 07:03:22 exclusive
Aborted: configuration locked
```

2.9 Filtering and Manipulating Output of show Commands

Typically the `show` commands present data. You can arrange the data by doing the following:

- Setting presentation style
- Filtering the results

2.9.1 Presenting Results

- Standard style
- Table
- XML

2.9.1.1 Example – Standard Style

The command is as follows:

```
#show running-config chassis nsi 0 ten-gb-ethernet-port
```

Result in Cisco style:

```
aaa authentication users user admin
 uid        0
 gid        9000
 password   $1$aa$A7eI7Yc8Ved6vGJbv/xOw.
 ssh_keydir /home/admin
 homedir    /home/admin
!
```

2.9.1.2 Example – Table Style

The command is as follows:

```
show running-config card |tab
```

Result in a table style

```
NSG CableOS# show running-config card |tab
SLOT                          OPERATION
NUMBER  CARD TYPE             MODE       DESCRIPTION
-------------------------------------------------------
3       downstream-linecard   40b        dlc-8
6       sre                   -          SRE card
8       downstream-linecard   40b        dlc-8
13      downstream-linecard   40b        dlc-13
16      nsi                   -          NSI card
```

2.9.1.3 Example – XML Style

The command is as follows:

```
show inventory |display xml
```

Result in a XML style

```
<config xmlns="http://tail-f.com/ns/config/1.0">
```

```
  <cable-cli-monitoring xmlns="http://www.harmonicinc.com/cable-cli-monitoring">
  <inventory>
    <slot-name>6</slot-name>
    <description>SRE card</description>
    <cfg-card-type>sre</cfg-card-type>
    <actual-card-type>sre</actual-card-type>
    <state>ok</state>
    <serial-number>331250009</serial-number>
    <part-number>10 221-0023027-01F</part-number>
  </inventory>
```

2.9.2 Filtering Results

Filter - you can filter the information according to parameters or values. The filter is preceded by the | - an output modifier. The available filters are:

- exclude
- include
- select
- begin
- until
  <command> | <filter name>

  For example,
  `#show inventory | select state fail`

2.9.2.1 Example – Filter Exclude

In the following example, NSI is excluded of the inventory:

```
#show inventory | exclude nsi
```

:

```
                    CFG    ACTUAL
SLOT                CARD   CARD            SERIAL
NAME   DESCRIPTION  TYPE   TYPE    STATE   NUMBER      PART NUMBER
-------------------------------------------------------------------------
6      SRE card     sre    sre     ok      331250009   10 221-0023027-01F
ps0    ps0          psu    psu     out     unknown     unknown
ps1    ps1          psu    psu     out     unknown     unknown
ps2    ps2          psu    psu     out     unknown     unknown
ps3    ps3          psu    psu     out     unknown     unknown
fan0   fan0         fan    fan     fail    unknown     unknown
fan1   fan1         fan    fan     fail    unknown     unknown
pic0   pic0         pic    pic     out     unknown     unknown
pic1   pic1         pic    pic     out     unknown     unknown
pic2   pic2         pic    pic     out     unknown     unknown
pic3   pic3         pic    pic     out     unknown     unknown
pic4   pic4         pic    pic     out     unknown     unknown
pic5   pic5         pic    pic     out     unknown     unknown
```

2.9.2.2 Example – Filter Include

In the following example, NSI is included in the inventory:

```
#show inventory | include nsi
```

```
16    NSI card     nsi   nsi     ok     unknown    unknown
NSG CableOS#
```

2.9.2.3 Example – Filter Select

In the following example only inventory parameters with *state fail* are displayed:

```
#show inventory | select state fail
```

```
                    CFG   ACTUAL
SLOT                CARD  CARD            SERIAL   PART
NAME  DESCRIPTION   TYPE  TYPE    STATE   NUMBER   NUMBER
-------------------------------------------------------------
fan0  fan0          fan   fan     fail    unknown  unknown
fan1  fan1          fan   fan     fail    unknown  unknown
```

2.9.2.4 Example – Filter Begin

Displays inventory items from the first instance of the indicated number, in this case number 10:

```
#show alarm | begin 10
```

```
10    2013-08-25T22:16:37+00:00  critical  RfSwitch 3      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
11    2013-08-25T22:16:37+00:00  critical  RfSwitch 4      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
12    2013-08-25T22:16:38+00:00  critical  RfSwitch 5      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
13    2013-08-25T22:16:35+00:00  critical  Platform        Fan 0 Failure           1.3.6.1.4.1.1563.1.2.0.11
14    2013-08-25T22:16:35+00:00  critical  Platform        Fan 1 Failure           1.3.6.1.4.1.1563.1.2.0.12
```

2.9.2.5 Example – Filter Until

Displays inventory items until the first instance of the indicated number, in this case number 10:

```
#show inventory | until 10
```

.

```
ALARM
INDEX  ASSERT TIME                SEVERITY  SOURCE MODULE   ALARM DESCRIPTION       SNMP OID
-------------------------------------------------------------------------------------------------------------
1      2013-08-25T22:16:35+00:00  critical  Power-Supply-0  Power Supply Missing    1.3.6.1.4.1.1563.1.2.0.19
2      2013-08-25T22:16:35+00:00  critical  Power-Supply-1  Power Supply Missing    1.3.6.1.4.1.1563.1.2.0.19
3      2013-08-25T22:16:35+00:00  critical  Power-Supply-2  Power Supply Missing    1.3.6.1.4.1.1563.1.2.0.19
4      2013-08-25T22:16:35+00:00  critical  Power-Supply-3  Power Supply Missing    1.3.6.1.4.1.1563.1.2.0.19
5      2013-08-25T22:16:36+00:00  critical  RfSwitch 1      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
6      2013-08-25T22:16:36+00:00  critical  RfSwitch 2      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
7      2013-08-25T22:16:35+00:00  critical  MgmtPort-0      ETH1 Port Link Down     1.3.6.1.4.1.1563.1.2.0.76
8      2013-08-25T22:16:35+00:00  critical  RfSwitch 0      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
9      2013-08-25T22:16:36+00:00  critical  IOBoard         IO Board Voltage Error  1.3.6.1.4.1.1563.1.2.0.281
10     2013-08-25T22:16:37+00:00  critical  RfSwitch 3      Rf Switch Card Missing  1.3.6.1.4.1.1563.1.2.0.273
```

2.10 Additional Commands

2.10.1 Working with Ranges

When you can indicate a range in a command, indicate a range as follows:

<number>-<number>

Example

```
NSG CableOS(config)# cable downstream port 5/0-5/5
NSG CableOS(config-port-5/0-5/5)# max-carriers 40
NSG CableOS(config-port-5/0-5/5)# commit
NSG CableOS(config)# commit complete
```

2.10.2 Rollback

The `rollback` command allows you to select a command and to delete the configuration committed by the command. The command is available in `config` mode only.

While in config mode, do the following:

1. To create a list of all commit actions, type: `show configuration commit list`
2. To locate the required command, type: `rollback configuration <configuraion id>`
3. Type `commit`

Example – `rollback configuration`

In case you committed a configuration change and you wish to delete it.

```
NSG CableOS(config)# show configuration commit list
SNo. User       Client      Time Stamp          Label/ID    Comment
~~~~ ~~~~       ~~~~~~      ~~~~~~~~~~          ~~~~~~~~    ~~~~~~~
0    admin      cli         2013-05-13 10:24:35
1    root       cli         2013-05-13 06:30:33
2    root       cli         2013-05-13 06:27:15
3    root       cli         2013-05-13 06:23:59
4    root       cli         2013-05-13 06:22:55
5    admin      maapi       2013-05-13 06:12:00
6    admin      maapi       2013-04-24 03:33:57
NSG CableOS(config)# rollback configuration 0
NSG CableOS(config)# commit
Commit complete
```

2.10.3 Repeat

The `repeat` command is available in operational mode only. It allows you to view current information from the device and to indicate how often you wish CableOS to read information from the device. Add the repeat command to any show command and then you can monitor online the required device parameter. For example, to monitor the GbE ports and to refresh data every 5 seconds, type the following command:

```
show interfaces | repeat 5
```

A table appears with the data. This table is updated every five seconds. The following picture shows the data during 15 seconds:

PORT INDEX	DESCRIPTION	SHUTDOWN	MAC ADDRESS	IP ADDRESS	LINK STATUS	REDUNDANCY STATE	SFP	SPEED	RX OCTETS	RX PACKETS	RX BCAST PACKETS	RX BITRATE	RX ERROR PACKETS	TX OCTETS	TX PACKETS	TX BCAST PACKETS	TX BITRATE	TX ERROR PACKETS
16/20	-	false	00:20:a3:22:f4:8c	10.40.22.132	up	none	eth0	-	55581993	459906	0	0	0	811323	5206	0	0	0
16/21	-	true	00:20:a3:22:f4:8d	10.20.4.55	down	none	eth1	-	0	0	0	0	0	0	0	0	0	0

PORT INDEX	DESCRIPTION	SHUTDOWN	MAC ADDRESS	IP ADDRESS	LINK STATUS	REDUNDANCY STATE	SFP	SPEED	RX OCTETS	RX PACKETS	RX BCAST PACKETS	RX BITRATE	RX ERROR PACKETS	TX OCTETS	TX PACKETS	TX BCAST PACKETS	TX BITRATE	TX ERROR PACKETS
16/20	-	false	00:20:a3:22:f4:8c	10.40.22.132	up	none	eth0	-	55586759	459957	0	0	0	819619	5219	0	0	0
16/21	-	true	00:20:a3:22:f4:8d	10.20.4.55	down	none	eth1	-	0	0	0	0	0	0	0	0	0	0

PORT INDEX	DESCRIPTION	SHUTDOWN	MAC ADDRESS	IP ADDRESS	LINK STATUS	REDUNDANCY STATE	SFP	SPEED	RX OCTETS	RX PACKETS	RX BCAST PACKETS	RX BITRATE	RX ERROR PACKETS	TX OCTETS	TX PACKETS	TX BCAST PACKETS	TX BITRATE	TX ERROR PACKETS
16/20	-	false	00:20:a3:22:f4:8c	10.40.22.132	up	none	eth0	-	55605011	460119	0	0	0	840327	5251	0	0	0
16/21	-	true	00:20:a3:22:f4:8d	10.20.4.55	down	none	eth1	-	0	0	0	0	0	0	0	0	0	0

To abort the command press <Ctrl> + c

2.10.4 Alias

Alias is a pseudonym you attach to a command. It is possible to define aliases that accept parameters. You can create alias commands only in configure mode.

While in config mode, do the following:

1. Type, `# alias <alias name>(parameter)s <cr>`
2. Enter the command of the alias as follows: `# "<expansion>"(parameter)`
3. Type, `commit`

Example - `alias`

The following example shows how to create an alias for the command `show entities (a)"`

```
NSG CableOS# config

Entering configuration mode terminal

NSG CableOS(config)# alias inve(a)

Value for "expansion" (<string>): show $(a)

NSG CableOS(config-alias-inve(a))# commit

Commit complter
```

To view the defined aliases, type:

```
show running-config alias
```

Chapter 3
Configuring Chassis Parameters

3.1 Chassis Configuration Overview

To configure the chassis, switch to config mode. See *2.10 Additional Commands* on page 21. The following chapter guide you on how to configure the system:

3.2 Configuring Remote Security Mechanism on page 23

3.2 Configuring Remote Security Mechanism

The following section describes the available commands and parameters for TACACS and RADIUS configuration. See also *2.7 Tips for Working with CableOS CLI* on page 16.

3.2.1 Prerequisites for External AAA

To enable the RADIUS/TACACS AAA security mechanism, the following should apply:

- NSG Pro should have a connection to the remote RADIUS/TACACS server
- Login to the NSG Pro device as *admin* user and configure the following:
  - Server parameters - see *3.2.2 Configuring External Server* on page 23.
  - Authentication parameters- see *3.2.3 Configuring Authentication Parameters* on page 25
  - Authorization parameters- see *3.2.5 Configuring Authorization Parameters* on page 25

When working with an external server, you can configure a fallback to local AAA mechanism in case external failed:

See *3.2.3.1 Configuring Fallback for Remote AAA* on page 25

See *3.2.5.1 Configuring Fallback for Authorization* on page 26

3.2.2 Configuring External Server

To configure the RADIUS/TACACS server, configure the following parameters:

NOTE: RADIUS server is currently for authentication only.

- Server ID - You can configure up to three remote servers.
- auth-port - the port number over which the remote server communicates with the device. Default ports are: For RADIOUS - port 1812, for TACACS port 49.
- Host - the host name or IP address of the RADIUS/TACACS server.
- Key - enter a confidential string that is shared between the device and the RADIUS server.
- clear key - for debugging purposes only. By default it is set to false, to decipher the key.
- retransmit-attempts - Enter the number of attempts to connect to the server
- timeout - Enter in seconds, the time allowed to elapse between an NSG request and a response from the RADIUS/TACACS server

tacacs-server | **radius-server** *id* [**accounting-port** *port*] **auth-port** *port* **host** *ip address/name* **key** *key* **retransmit-attempts** *retransmit-attempts* **timeout** *timeout*

Table 3-1: Configuring External Server

Attribute/Value	Explanation
tacacs-server | radius-server	External server is either TACACS or RADIUS.
id	Integer between 1 to 3. You can configure up to three external services.
accounting-port	Applies to RADIUS only
port	An integer between 0 to 65535.
auth-port	The port number over which the remote server communicates with the device
port	Integer between 0 to 65535. Default values: ■ TACACS server - port 49 ■ RADIUS server - port 1812
host	The port number over which the remote server communicates with the device
ip address/name	The IP address of the RADIUS/TACACS server/host name
key	A confidential string that is shared between the device and the server
key	String. Enter the confidential string
retransmit-attempt	Number of attempts to connect to the server
retransmit-attempt	Integer Default value: 1
timeout	Time allowed to elapse between an NSG request and a response from the RADIUS/TACACS server
timeout	The time, in seconds, allowed to elapse between an NSG Pro request and a response from the RADIUS server. Integer between 1 to 60 Default value: 3 seconds

```
Example
NSG CableOS(config)# radius server 1
NSG CableOS(config-radius-server-1) # aut-port 1812
NSG CableOS(config-radius-server-1) # host 10.40.22.49
NSG CableOS(config-radius-server-1) # key testing
NSG CableOS(config-radius-server-1) # retransmit-attempts 1
NSG CableOS(config-radius-server-1) # timeout 3
NSG CableOS(config-radius-server-1) # commit
commit complete
```

3.2.3 Configuring Authentication Parameters

Configure AAA authentication login and server name as explained below.

`aaa authentication login` *login* {`local` | `none` | `radius` | `tacacs`}

Table 3-2: Configuring Authentication Login

Attribute/Value	Explanation
login	Select one of the following options: ■ `local` - AAA functionality is performed locally ■ `none` - No AAA functionality is configured ■ `radius` - AAA functionality is performed via RADIUS server ■ `tacacs` - AAA functionality is performed via TACACS server

Example

```
NSG CableOS(config)# # aaa authentication login tacacs
NSG CableOS(config) # commit
commit complete
```

3.2.3.1 Configuring Fallback for Remote AAA

If authentication via TACACS/RADIUS is rejected or fails, the fallback is local, as the following example shows:

`aaa authentication login` *login* `radius local`

3.2.4 Configuring Passwords for Local Users

`aaa authentication users` *username* **password** *password*

Table 3-3: Configuring Users' Password

Attribute/Value	Explanation
`users`	Local users
users	Select one of the following options: ■ `admin` ■ `config` ■ `guest` See *2.3.1 Local Security Mechanism* on page 12
password	String

Example

```
NSG CableOS(config)# # aaa authentication users user admin
NSG CableOS(config-user-admin) # password te23ing
NSG CableOS(config) # commit
commit complete
```

3.2.5 Configuring Authorization Parameters

Configure authorization cmd and server name as follows:

aaa authorization cmd *server* {local | none | radius | tacacs}

Table 3-4: Configuring Authorization

Attribute/Value	Explanation
cmd	For every command an authorization is performed on the selected server.
server	Select one of the following options: ■ local - AAA functionality is performed locally ■ none - No AA functionality is configured ■ radius - AAA functionality is performed via RADIUS server ■ tacacs - Default. AAA functionality is performed via TACACS server

Example

```
NSG CableOS(config)# # aaa authorization cmd tacacs
NSG CableOS(config) # commit
commit complete
```

NOTE: Accounting is currently not configurable.

3.2.5.1 Configuring Fallback for Authorization

If authorization via TACACS/RADIUS is rejected or fails, the fallback is local, as the following example shows:

aaa authorization cmd *server* radius local

3.3 System Parameters

You can configure the following parameters:

- contact
- description
- hostname
- IP
- location

system type - see *3.4 Configuring System Type* on page 27.

3.3.1 Configuring System Parameters

`system` [**`contact`** *contact* |**`description`** *description* |**`hostname`** *hostname* |**`ip`** *ip* **`location`** *location*]

Table 3-5: Configuration of System Parameters

Attribute/Value	Explanation
contact	Contact information to Harmonic support. String. Default: [1-800-MPEGTWO]
description	A short description to identify the device String
hostname	The name of the device.
ip	The IP address of the management port of the device
location	The geographical location of the device String Default: Sunnyvale CA.

Example

```
NSG CableOS(config)# system contact 1-800-MPEGTWO descripton site_a
hostname april ip 10.40.22.132 location ca
```

3.4 Configuring System Type

You can configure the following:

Chassis type - whether downstream only or two way. Currently only DS is supported.

`cable chassis-type` {`ds-only` | `two-way`}

Table 3-6: Configuring System Type

Attribute/Value	Explanation
`ds-only`	Downstream only. Currently only `ds-only` is supported Default option.

Table 3-6: Configuring System Type

Attribute/Value	Explanation
`two-way`	Downstream and upstream

Example

```
NSG CableOS(config)# cable chassis-type ds-only
NSG CableOS(config)# commit
NSG CableOS(config)# commit complete
```

3.5 Configuring Gateway Parameters

`default-gateway` *IPv4 address*

Table 3-7: Configuring Gateway Parameters

Attribute/Value	Explanation
IPv4 address	ipv4 - IP address is as follows: 0.0.0.0

3.6 Configuring Device Time

Set the device time according to either of the following options:

- Automatically - Synchronize the NSG Pro time with the Universal Time Coordination (UTC) by connecting to an NTP (Network Time Protocol) server. If you enable this option, you cannot set the time of the unit manually.
- Manually - Use this option when NTP server is not available.

3.6.1 Setting Device Time according to NTP

`ntp server` *server id* **`host`** *ip* | *hostname*

Table 3-8: Configuring NTP Server

Attribute/Value	Explanation
`ntp`	Synchronize device time with UTC.
server id	Enter the required server ID By default server ID is 0
ip | *hostname*	IP - String in the pattern of an IP address. Enter the IP address o the NTP server Hostname - String. A name of the host computer

3.6.1.1 Enables/Shuts down NTP Server

no ntp shutdown - enables the NTP service

ntp shutdown- shuts down the NTP service

```
NSG CableOS(config)# no ntp shutdown <cr> enabled

NSG CableOS(config)# ntp shutdown <cr>
```

3.6.2 Setting Device Time Manually

To manually set device time, do either of the following:

Set local time offset -

Or,

Select Enable Daylight Saving - The Time Offset is disabled and you can select the required region. The daylight saving time is automatically defined according to the selected region.

local-time {offset *offset* | **daylight-saving** *daylight-saving* {**region** *region*}}

Table 3-9: Setting Device Time

Attribute/Value	Explanation
local-time	Allows to manually set device time according either of the following: GMT daylight saving time
offset	Optional. Allows to set the required local time offset to match between the time of the device, UTC time, and the Greenwich Mean Time (GMT)
offset	Enter in minutes the required offset relative to GMT time Integer between -720 to 720 Default: 0
daylight-saving	Optional.
daylight-saving	on | off
region	If *daylight-saving* is on, set the required region.

Example – Configuring Device Time According to GMT

```
NSG CableOS(config)# local-time offset 42
NSG CableOS(config)# commit
NSG CableOS(config)# commit complete
```

Example – Configuring Daylight Saving

```
NSG CableOS(config)# local-time daylight-saving on region Europe/
Lisbon
NSG CableOS(config)# commit
NSG CableOS(config)# commit complete
```

3.7 Configuring SNMP and Syslog Parameters

NSG Pro is capable of reporting its status via SNMP (Simple Network Management Protocol) to a third-party SNMP-based network management systems.

NSG Pro status is reported to the SNMP manager in the following ways:

SNMP Traps - notifications that the NSG device initiates and sends to the SNMP manager to indicate the assertion or remittance of an alarm or warning. SNMP Traps are sent only to SNMP managers that are registered with the NSG Pro.

Alarms status queries - the SNMP manager may query the NSG for its current alarms status. The NSG reports this information using standard and custom SNMP MIBs.

Configuration and Traffic queries - the SNMP manager may query the NSG for various configuration parameters, as well as various traffic counters that indicate the rate of traffic that is flowing through the NSG's interfaces.

In addition, NSG Pro supports Syslog - a standard-based method for centralized logging of device messages. A Syslog server that is registered with the NSG Pro device will receive messages from the device whenever an alarm or warning is asserted or remitted.

`snmp [community` *community*`]` **`shutdown`** *shutdown* **`notification-receiver`** {*server-id ip* [*notification-type*]}

Table 3-10: Configuring SNMP

Attribute/Value	Explanation
snmp	Optional
community	Optional. Enter the required value for the Get community. It is the name of the community having Read access to the network elements. The elements will respond to this community Get commands.
community	String 1 to 32 chars. Default: *public*.
shutdown	no shutdown - to enable the SNMP server
`notification-receiver`	Destination and type of trap.
server-id	Integer between 1 to 19, or a range.
ip	the IP Address of the computer to which you wish to forward all SNMP traps from the NSG.
notification-type	Optional. The SNMP version as follows: ■ snmpv1-trap ■ snmpv2c-inform ■ snmpv2c-trap - default value

Example - Configuring SNMP

```
NSG CableOS(config)# snmp community public
NSG CableOS(config)# snmp notification-receiver 15
NSG CableOS(config-notification-receiver-15) ip address 10.40.22.4
NSG CableOS(config-notification-receiver-15) notification-type
snmpv2c-trap
NSG CableOS(config-notification-receiver-15)commit
Commit complete
```

Example - Shutting Down SNMP

```
NSG CableOS(config)# snmp shutdown
```

3.7.1 Configuring Syslog

syslog [**shutdown** *shutdown*] **server** *server-id* {**host** *host-ip*}

Table 3-11: Configuring Syslog

Attribute/Value	Explanation
syslog	Optional
shutdown	no shutdown - to enable the SNMP server This is a global command that applies to all Syslog servers.
server-id	Integer between 1 to 19, or a range.
host-ip	IP address of the Syslog server that logs the NSG events.

Example – Configuring Syslog

```
NSG CableOS(config)# syslog server 5
NSG CableOS(config-server-5)# host 10.40.22.67
NSG CableOS(config-server-5)# commit
Commit complete
```

Example – Shutting Down Syslog

```
NSG CableOS(config)# syslog shutdown
```

3.8 Configuring the Device Cards

The device is furnished with the following cards:

- NSI module - 2 x NSI modules, labeled NSI 16 - 17, currently only 16 is supported.
- SRE LCs - 2 x SRE LCs, labeled SRE 6 to 7, currently only 6 is supported.
- Slots - 14 x slots, labeled slot 0 - 13, where:
  - 0 - 5 - DLC or Upstream Line Card (ULC)
  - 8 - 13 - Downstream Line Card (DLC)
  - 6 - 7 SRE, currently only slot 6 is supported

3.9 Configuring NSI

Currently you can configure only NSI 16. You may configure the following ports:

- Management port, see *3.9.1 Configuring Management Ports* on page 31
- 10GbE ports, see *3.12 Configuring DTI Ports* on page 34
- DTI ports, see *3.12 Configuring DTI Ports* on page 34

3.9.1 Configuring Management Ports

Each NSI module is furnished with two ethernet ports. The Ethernet ports allow connection to separate networks. The Ethernet ports are labeled ETH20 and ETH21. ETH20 is a management port and ETH1 is usually used for CAS. The ports are indicated as follows x/y where:
x = NSI module number 16 or 17. Currently only NSI 16 is supported
y = Ethernet port number - 20 or 21

You can also configure the management ports to work in a bonding group. See

interface gigabit *ethernet-port-index* [**description** *description*] [**shutdown** *shutdown*] [**speed** *speed*] [**duplex** *duplex*] [**negotiation** *neg*] [**ip-address** *ip*] [**netmask** *netmask*]

Table 3-12: Configuring Management Port

Attribute/Value	Explanation
interface gigabit	Management port
ethernet-port-index	16/ 20 or 16/21 Currently only NSI 16 is supported.
description	Optional. A sort description to identify the port.
shutdown	Not supported for 16/20 Supported for 16/21
speed	Sets the speed of the port. Select one of the following: `{10GbaseT |10baseT | 100baseT |1000baseT}` Default: 1000baseT
duplex	Sets the physical configuration of the physical layer (PHY): `{full | half}`
negotiation	A handshake protocol used in Ethernet links. It must be selected if the other end of the Ethernet link also uses auto Negotiation. Selecting this protocol while communicating with a device that does not use it, causes communication problems.
negotiation	`{off |on}` Default: on
ip	The IP address of the management port
Netmask	Netmask IP address Default: 255.255.255.255

Example

```
NSG CableOS(config)# interface gigabit 16/20
NSG CableOS(config-gigabit-16/20)# description management
NSG CableOS(config-gigabit-16/20)# duplex full
NSG CableOS(config-gigabit-16/20)# ip address 10.40.23.120
NSG CableOS(config-gigabit-16/20)# negotiation on
NSG CableOS(config-gigabit-16/20)# netmask 255.255.255.0
NSG CableOS(config-gigabit-16/20)# shutdown no shutdown
NSG CableOS(config-gigabit-16/20)# apeed 1000baseT
NSG CableOS(config-gigabit-16/20)# commit
```

3.10 Configuring Bonding-Group Mode

`management-bonding-group` *group-id* **`interface`** *interface-id*

Table 3-13: Bonding-Group Mode

Attribute/Value	Explanation
group-id	integer. Currently only 0 is a possible value. Default: 0
interface-id	Integer *slot/ port*

Example - Bonding-Group

```
NSG CableOS(config)# management-bonding-group 0
NSG CableOS(config-management-bonding-group-0)# interface 16/20
```

3.11 Configuring GbE Ports

Gbe ports are indicated as follows x/y where:
x = NSI module number
y = Ethernet port number

`interface ten-gigabit` *ten-gigabit-port-index* | *range* **`[description`** *description*] [**`ip-address`** *ip*] `negotiation` [**`negotiation`** *neg*] [**`refresh-interval`** *interval*] [**`route-refresh`** *refresh*] [**`shutdown`** *shutdown*] [**`speed`** *speed*]

Table 3-14: Configuring 10 GbE Input Ports

Attribute/Value	Explanation
`interface ten-gigabit`	12 x 10 GbE input ports
ten-gigabit-port-index	Integer in the following pattern: *card/port*. Range 16/0 to 16/11. Currently only NSI card16 is supported
description	Optional. A sort description to identify the port. Default: 10GbE interface
negotiation	`{off |on}` Default: on
`refresh-interval`	Define, in msec, how often to send a Ping request.
refresh-interval	Integer between 1000 to 6000 Default: 5000
`route-refresh`	Route Refresh - When enabled, the NSG routinely sends gratuitous ARP messages to the switch. Messages are sent approximately once per 5 seconds, thus preventing expiration of the route.
route-refresh	`{off |on}` Default: on
shutdown	Optional. To enable type `no shutdown`

Table 3-14: Configuring 10 GbE Input Ports

Attribute/Value	Explanation
speed	Sets the speed of the port. Select one of the following: `{10GBaseT | 1000baseT}` Default: 10GBaseT

Example

```
NSG CableOS(config)# interface ten-gigabit 16/1
NSG CableOS(config-ten-gigabit 16/1)# description 10GbE interface
NSG CableOS(config-ten-gigabit 16/1)# ip address 172.30.32.2
NSG CableOS(config-ten-gigabit 16/1)# negotiation on
NSG CableOS(config-ten-gigabit 16/1)# refresh-interval 5000
NSG CableOS(config-ten-gigabit 16/1)# route-refresh on
NSG CableOS(config-ten-gigabit 16/1)# shutdown
NSG CableOS(config-ten-gigabit 16/1)# speed 10GBaseT
```

3.12 Configuring DTI Ports

Each NSI module is furnished with two DTI ports. DTI ports are labeled port 30 and 31 and by default are enabled.

Once you configure any of the `cable clock` options, the real-time clock of the NSG Pro device is enslaved to the DTI server that feeds the selected DTI port. To get out of this mode and let the clock of the NSG device run freely, you should use the command `no cable clock`.

You can configure the following parameters of the DTI ports

- port - determines which is the active port through which the NSG should receive the signal of the DTI server
- prefer - to define the preferred port in case of auto revert
- redundancy - to select the redundancy mode of the DTI port

`cable clock port` *port-id*

Table 3-15: Enslaving DTI Port

Attribute/Value	Explanation
port-id	Integer card/port, where: Card 16 or 17 Port: 30 or 31 Default: 16/30

`cable clock prefer` *port-id*

Table 3-16: Preferred DTI Port

Attribute/Value	Explanation
`cable clock prefer`	Optional. Applies to Auto revert mode only.

Table 3-16: Preferred DTI Port

Attribute/Value	Explanation
port-id	Integer card/port, where: Card 16 or 17 Port: 30 or 31 Default: 16/30

`cable clock redundancy` {*auto* | *auto-revert* | *manual*}

Table 3-17: DTI Redundancy

Attribute/Value	Explanation
`cable clock redundancy`	Optional
auto	Selecting the active port is completely automatic, without any intervention and without any preference of a specific port. If the active port fails, the standby port is activated and assumes the role of "active" as long as it is in normal state. If the latter fails, ports will be switched again. This switching can continue any number of times, without any preference of a specific port.
auto-revert	The selected port (as defined in Selected Port) is always preferred over the other port. In case that the selected port fails, the standby port is automatically activated. Once the selected port is fixed, the NSG automatically switches back to the selected port.
manual	You need to select the DTI port upon port failure. No switch or activation of ports is performed regardless of the status of the DTI port.

Example

```
NSG CableOS(config)# cable clock 16/30
NSG CableOS(config-port-16/30)# commit
Commit complete
PNSG CableOS(config)# cable clock prefer 16/30
NSG CableOS(config-port-16/30)# commit
Commit complete
NSG CableOS(config)# cable clock redundancy auto-revert
NSG CableOS(config-port-16/30)# commit
Commit complete
```

To allow the clock of the NSG device to run freely, type:

`no cable clock`

3.13 Configuring LCs

You can configure the various cards of the device. For each card, you can configure the following:

- card-type - indicate whether DLC, ULC, SRE or NSI
- description - enter a short description to easily identify the card
- operation-mode - for DLC - 40b

card *card-id* **card-type** *card-type* [**description** *description*] [**operation-mode** *operation-mode*]

Table 3-18: Configuring LCs

Attribute/Value	Explanation
card	The LC is numbered according to its slot number
card-id	Integer between 0 to 13: 0 - 5 DLCs, 8 - 13 DLC/ULC 6 - 7 SREs 16 -17 NSI Note: You may configure LCs in slots 0 - 5 and 8 - 13 only. You can only monitor LCs in slots 6 - 7 and 16 - 17.
card-type	Select the card type
card-type	{downstream-linecard | nsi | sre | upstream-linecard}
description	Optional.
description	A short description to identify the card
operation-mode	Optional, applies to DLCs and ULCs only. Currently only ITU-T Annex B is supported with 40 QAM-RF channels.
operation-mode	Default: 40b - 40 QAM-RF channels in Annex b.

Example

```
NSG CableOS(config)# card 5
NSG CableOS(config-card-5)# card-type downstream-linecard
PNSG CableOS(config-card-5)# description downsteram
NSG CableOS(config-card-5)# operation mode
NSG CableOS(config-card-5)# commit
Commit complete
```

3.14 Configuring a Port of a DLC

cable downstream port *port-id* [**compensation-gain** *compensation-gain*] [**description** *description*] [**max-carriers** *max-carrier*] [**power-per-qam** *power-per-qam*] [**rf-shutdown** *rf-shutdown*] [**slope-compensation** *slope-compensation*] [**span-start-frequency** *span-start-frequency*]

Table 3-19: DLC Port Configuration

Attribute/Value	Explanation
port-id	Range or Integer in the following pattern: slot/port, where slot - 0 - 5 or 8 - 13 port - 0 -5
compensation-gain	Optional enabled if *slope compensation* is on. To yield the best frequency flatness at the end of the cable, enter a value where the cable attenuation provides pre-emphasis to high frequencies.
compensation-gain	Integer between 0 to 20
description	Optional.
description	A short description to identify the port
max-carriers	Optional. The number of QAM-RFs per port.
max-carriers	An integer between 0 to 56. Default: 40
optimized-acp	Optional. If ACP is applied, # QAMs per Port, is disabled. The device automatically balances the RF gain chain according to the number of currently active QAMs. However, if you mute a channel, while Optimized ACP is enabled, a momentary disruption to video on other channels may ensue. By default, Optimized ACP is disabled.
optimized-acp	Default: disabled. True false To enable type: `no acp optimization`
power-per-qam	Decimal number between 34 to 52. Default: 42
rf-shutdown	To enable type: `no rf-shutdown` Default: disabled
slope-compensation	Once it is enabled, you can configure the compensation gain.
slope-compensation	{off | on} Default: off

Table 3-19: DLC Port Configuration

Attribute/Value	Explanation
span-start-frequency	Sets the span window, along the spectrum. Once you define the frequency range, all QAM Channel frequencies are aligned with the span window. For example: If the span start is 228 MHz, the QAM frequencies are: 231, 237, 243MHz. If you change the Span Start by 1KHz, 228.001MHz, all QAM frequencies change respectively, 231.001, 237.001 etc'
span-start-frequency	Integer between 50000000 to 996000000 Default: 228000000

Example

```
NSG CableOS(config)# cable downstream port 5/0
NSG CableOS(config-port-5/0)# description port 5/0
NSG CableOS(config-port-5/0)# max-carriers 40
NSG CableOS(config-port-5/0)# optimized-acp no optimized-acp
NSG CableOS(config-port-5/0)# rf-shutdown no rf-shutdown
NSG CableOS(config-port-5/0)# slope compensation
NSG CableOS(config-port-5/0)# span-start-frequency 52000000
NSG CableOS(config--port-5/0)# commit
Commit complete
```

3.15 Configuring RF-Profile

You can create an RF profile and apply it across the QAMs of the line card.

cable downstream rf-profile *rf-profile-name* **annex** *annex* **constellation** *constellation* [**description** *description*] **interleaver-depth-option1** *interleaver-depth-option1* **interleaver-depth-option2** *interleaver-depth-option2* [**symbol-rate** *symbol-rate*]

Table 3-20: Configuring RF Profile

Attribute/Value	Explanation
rf-profile-name	String. Enter a name for the RF profile.
annex	Enter the required ITU-T Annex.
annex	a | b. By default it is b and currently only Annex B is supported. ITU-T Annex B - This is the mode used in North-American countries. Utilizes bandwidth of 6 MHz per QAM-RF channel. ITU-T Annex A - This mode is used mainly in European and Asian countries. Utilizes bandwidth of 8 MHz per QAM-RF channel.
constellation	The Constellation is the type of Quadrature Amplitude Modulation (QAM) used. QAM constellation affects Data Rate and Symbol Rate, and must be set according to HFC network properties.

Table 3-20: Configuring RF Profile

Attribute/Value	Explanation
constellation	`qam64 | qam256` The default is qam256. Valid values are: Annex A/C: 16, 32, 64, 128, 256 Annex B: 64, 256
description	Optional.
description	Enter a description to identify this RF profile
`interleaver-depth-option1`	An advanced QAM configuration parameter.
interleaver-depth-option1	`fecI8J16 | fecI12J17 | fecI16J8 | fecI32J4 | fecI64J2 | fecI128J1 | fecI128J2 | fecI128J3 | fecI128J4 | fecI128J5 | fecI128J6 | fecI128J7 | fecI128J8 | other` Select the required values according to the following: For Annex-A/C, use 12-17. For Annex-B, Interleaver value depends on the constellation in use. Constellation 64: 128-1, constellation 256: 128-4, 128-1
`interleaver-depth-option2`	An advanced QAM configuration parameter.
interleaver-depth-option2	`fecI8J16 | fecI12J17 | fecI16J8 | fecI32J4 | fecI64J2 | fecI128J1 | fecI128J2 | fecI128J3 | fecI128J4 | fecI128J5 | fecI128J6 | fecI128J7 | fecI128J8 | other` Select the required values according to the following: For Annex-A/C, use 12-17. For Annex-B, Interleaver value depends on the constellation in use. Constellation 64: 128-1, constellation 256: 128-4, 128-1
`symbol- rate`	The rate of QAM symbols that are encoded and transmitted per second
symbol- rate	The default is 5.360537 Annex-B - (Read-only), symbol rate is fixed per constellation.

Example

```
NSG CableOS(config)# cable downstream rf-profile 50
NSG CableOS(config-rf-profile-50) annex b constellation qam256
description rf-profile 50 interleaver-depth-option1 fecI128J1
interleaver-depth-option2 fecI128J2 [symbol-rate symbol-rate]
NSG CableOS(config-rf-profile-50)# commint
Commint complete
```

3.16 Configuring QAMs of a DLC

To configure the QAM-RF channel, use the following command. During this configuration, you define the QAM mode, also known as QAM manager, and the interleaver according to the options defined in the RF-profile configuration. See *3.15 Configuring RF-Profile* on page 38.

cable downstream qam *qam-id* **cw-mode** *cw-mode* [**description** *description*] **frequency** *frequency* [**interleaver-depth-option** {option1 | option2}] [**mode** {*depi-dynamic* | *depi-static*}] **rf-profile** *profile* [**ripple-attenuation** *ripple-attenuation*] **tsid** *tsid* [**dti-sync** *dti-sync*] [**offset** *offset*]

Table 3-21: Configuring a Downstream QAM

Attribute/Value	Explanation
qam-id	Range or integer - x/y/z, where x - slot number 0-5 or 8-13 y - port number 0-5 z - qam number 0-55
`cw-mode`	Optional. Select for testing purposes only. Enabled only when the QAM channel is active.
cw-mode	{on | off} Default: Off
`description`	Optimal. A short description to identify the QAM.
description	A String.
`frequency`	The center RF frequency (Hz) of this transport stream. You can locate the QAM channel anywhere along the Span window allocated for the QAM
frequency	Integer
`interleaver-depth-option`	Optimal. An advanced QAM configuration parameter. For Annex-A/C, use 12-17. For Annex-B, Interleaver value depends on the constellation in use. Constellation 64: 128-1, constellation 256: 128-4, 128-1
interleaver-depth-option	{option1 | option2} Default: option1 Note: Interleaver options are defined in rf-profile. See *Table 3-20 on page 38*.
`mode`	Optional. The QAM mode, also known as QAM manager.
depi-dynamic	The device is controlled by the CMTS device using the Downstream External PHY Interface (DEPI). This interface enables the CMTS device to control the NSG device, and provides the CMTS with a control path for setting up, maintaining, and tearing down sessions.
depi-static	Default option. The QAM-RFs deliver M-CMTS data and are controlled by the CMTS. To configure the m-cmts static session see *3.16.1 Configuring M-CMTS Static Sessions* on page 42.
docsis	For future use

Table 3-21: Configuring a Downstream QAM

Attribute/Value	Explanation
ermi	For future use
isa-video	For future use
linear-video	For future use
`profile`	Defines the RF profile.
profile	String option# - enter the required profile as defined in *3.15 Configuring RF-Profile* on page 38.
`shutdown`	Default: QAM is off
shutdown	To enable type: `no shutdown`
`ripple-attenuation`	Optional. Flattens the residual frequency ripple/tilt.
ripple-attenuation	Decimal between 0-2 dB with steps of 0.1dB
`spectral-inversion`	An advanced QAM parameter
spectral-inversion	on |off Default: off
tsid	Indicated the TS ID that carries the QAM
`offset`	Optional. The CMTS core router automatically inserts DOCSIS sync packets into the primary DS QAM channels. To ensure the accuracy of the DOCSIS sync packets, the EdgeQAM re-stamps them. Depending on RF network topology, it may be required to fine-tune the sync messages that flow over the various QAM channels of the EdgeQAM. The fine-tuning ensures consistent timing of CMs across all cable interfaces of the system. The sync offset units are ticks of the CMTS 10.24 MHz clock, where 1 tick=97.6 nano-sec. The typical allowed offset difference between modems is +/- 6 ticks. To define the sync compensation value, measure the average Cable Modem (CM) timing offset difference (you can view the timing offset values via the CMTS core console) and calculate the desired compensation value for the QAMs of the port. Typically, the compensation value of adjacent QAMs in the port is identical for each QAM in the port.
offset	Integer. Default: 0
`dti-sync`	Synchronizes between the NSG and the DTI clock. When On is selected, t*he EdgeQAM re-stamps the DTI sync packets.*
dti-sync	`{off | on}` Default: off

Example

```
NSG CableOS(config)# cable downstream qam 2/0/0 cw-mode off
description qam 2/0/0 frequency 400000000 [interleaver-depth-option
option1 mode depi-dynamic rf-profile option1 ripple-attenuation 0
tsid 10 dti-sync off offset 0
NSG CableOS(config-rf-profile-50)# commint
Commint complete
```

3.16.1 Configuring M-CMTS Static Sessions

To configure M-CMTS static sessions, use the command:

`cable downstream qam` *qam-id* **`mode depi-static mcmts-session`** *depi-remote-id dest-ip*

Table 3-22: Configuring M-CMTS Static Sessions

Attribute/Value	Explanation
`mcmts-session`	Optional. Applies to QAM mode depi-static only.
depi-remote-ip	L2TP Session ID
dest-ip	The input GbE port over which the sessions flows into the device.

3.17 LC Redundancy

The RF module redundancy protects the network from a faulty QAM-RF module. The RF module redundancy allows an intra-chassis redundancy switch that does not require an additional backup device. You may define the RF module in slot eight as the redundancy module for any faulty RF module, or for a specific RF module. As a result, the redundancy switch takes place among the QAM-RF modules and not between a primary and backup devices.

For the RF module redundancy to take place, the QAM-RF module in slot eight only is not configured and is reserved for redundancy purposes. Once you enable LC redundancy, upon failure, line card 8 obtains the configuration of the faulty line card and starts operating as the faulty line card.

NOTE: To enable LC redundancy, slot 8 should be occupied.

Preferred LC - To allow minimum failover time, the backup module is pre-configured to have the same QAM & RF settings as the Preferred module. All QAM & RF configuration of the preferred module is copied upon configuring it as the preferred module to the backup module. Changes to the QAM & RF configuration of the preferred module are also applied to the backup blade while the latter is not occupied.

`redundancy downstream-linecard-8-backup enable`

redundancy downstream-linecard-8-backup member-linecard *card-id*

Table 3-23: Configuring LC Redundancy with Preferred LC

Attribute/Value	Explanation
card-id	Integer between: 0 to 5, 9 to 13

1. Type, **redundancy downstream-linecard-8-backup enable**
2. Type, **redundancy downstream-linecard-8-backup member-linecard** *card-id*
3. Type, commit

Example

```
NSG CableOS# redundancy downstream-linecard-8-backup enable
NSG CableOS# redundancy downstream-linecard-8-backup member-linecard
5
NSG CableOS# commit
Commit complete
```

3.18 Input GbE Port Redundancy

NSG Pro supports 1:1 redundancy mode for its GbE input ports.

1:1 port redundancy - define for each primary port a backup port. You may enable Same IP option to ensure the highest level of protection against various network failures. You may also enable Same MAC address. In this case, the backup port is disabled and the IP address of the port changes to the IP address of the primary port as well as the MAC address. When the primary port fails, the backup port is enabled, using the same IP address and MAC address of the failed port.

In general, the following guidelines apply for the port redundancy feature:

- To configure port redundancy, port should be enabled.
- A primary port cannot serve as a backup port.
- Configuring port redundancy, blocks the port configuration except for IP address in case you enable Same IP Address.
- Verify that the capacity of the backup port matches or exceeds the actual capacity of the primary port.
- Alarm configuration:
  - By default both Link Down and No Input Traffic alarms trigger port redundancy.
  - The alarm configuration of the primary port and backup port is the same.
  - You can configure the alarms of a primary port only.
  - When selecting a backup Port, the alarm configuration of the primary port also applies to the backup port.
  - Any changes to the alarm configuration immediately applies to the backup port and to all primary ports it backs up.
- Upon redundancy switch, automatically the configured backup port is activated. If the backup port fails, a redundancy switch is performed to return to the Primary. If the primary port is still faulty, the redundancy mechanism, re-checks the last active port for a

momentary failure. If it is still faulty, the redundancy switch reverts to the primary and keeps checking in increased intervals the configured backup port, until detecting an active port.

redundancy ten-gigabit primary port *port-id* **backup-port** *backup-port* [**same-ip** *same-ip*] [**same-mac** {*on* | *off*}] [**link-down-trigger** *link-down-trigger*] [**no-input-traffic-trigger** *no-input-traffic-trigger*]

Table 3-24: Input GbE Port Redundancy

Attribute/Value	Explanation
port-id	Integer in the following pattern: *card/port*. Range 16/0 to 16/11. Currently only NSI card16 is supported
backup-port	Integer in the following pattern: *card/port*. Range 16/0 to 16/11. Currently only NSI card16 is supported
same-ip	Optional. The backup port assumes the IP address of the primary port.
same-ip	{on | off} Default: off
same-mac	Optional. The backup port assumes the MAC address of the primary port.
same-mac	{on | off} Default: off
link-down-trigger	Optional.
link-down-trigger	{on | off} Default: on
no-input-traffic-trigger	Optional.
no-input-traffic-trigger	{on | off} Default: on

Example

```
NSG CableOS(config)# redundancy ten-gigabit primary port 16/0
NSG CableOS(config-primary-port-16/0)# backup-port 16/6
NSG CableOS(config-primary-port-16/0)# same-ip on
NSG CableOS(config-primary-port-16/0)# same-mac on
NSG CableOS(config-primary-port-16/0)# # commit
Commit complete
```

Chapter 4
Configuring Applications

4.1 Applications Overview

NSG Pro operates in the following applications:

- M-CMTS - The system serves as a CMTS processing unit. To manage the device use CableOS. See *4.2 Configuring NSG Pro in M-CMTS Deployment* on page 45.

For the following applications, use the MCT to manage the device.

- VOD Application - The system serves as a highly integrated digital video gateway, capable of multiplexing on-demand content streamed over an IP network.
- Broadcast Applications- The system serves as a digital video gateway that broadcasts remuxed services.
- SDV Application - The device streams out SDV sessions provisioned by ISA.
- CAS - This version supports Privacy Mode scrambling only.

4.2 Configuring NSG Pro in M-CMTS Deployment

Preparation of the NSG Pro to work in M-CMTS deployment includes the following configuration stages:

Table 4-1: M-CMTS Configuration Stages

Procedure	Required Card/ Module	Reference
Defining Management IP	NSI module	*4.2.1 Configuring Management Ports* on page 46
Enabling DTI ports		*4.2.2 Configuring DTI Ports* on page 46
Configuring GbE input ports: ■ IP configuration ■ General configuration ■ Port redundancy		*4.2.3 Configuring GbE Ports* on page 46
RF configuration ■ Num of QAMs per port ■ Amplitude ■ Constellation, interleaver etc. ■ RF ON/OFF ■ Redundancy	DLCs	See *4.2.4 Configuring an LC as a DLC* on page 46
Configuring L2TP sessions		See *4.2.5 Configuring M-CMTS Sessions* on page 47

4.2.1 Configuring Management Ports

Ethernet ports are indicated as follows x.y where:
x = NSI module number
y = Ethernet port number

interface gigabit *ethernet-port-index* [**description** *description*] [**shutdown** *shutdown*] [**speed** *speed*] [**duplex** *duplex*] [**negotiation** *neg*] [**ip-address** *ip*] [**netmask** *netmask*]

For parameter explanation, see *Table 3-12 on page 32*.

Example

```
NSG CableOS(config)# interface gigabit 16/20
NSG CableOS(config-gigabit-16/20)# description management
NSG CableOS(config-gigabit-16/20)# duplex full
NSG CableOS(config-gigabit-16/20)# ip address 10.40.23.120
NSG CableOS(config-gigabit-16/20)# negotiation on
NSG CableOS(config-gigabit-16/20)# netmask 255.255.255.0
NSG CableOS(config-gigabit-16/20)# shutdown no shutdown
NSG CableOS(config-gigabit-16/20)# apeed 1000baseT
NSG CableOS(config-gigabit-16/20)# commit
```

4.2.2 Configuring DTI Ports

For parameter details, see *Table 3-15 on page 34*, *Table 3-16 on page 34* and *Table 3-17 on page 35*.

cable clock port *port-id*

cable clock prefer *port-id*

cable clock redundancy {*auto* | *auto-revert* | *manual*}

See *Example* on page 35.

4.2.3 Configuring GbE Ports

For parameter details, *4.2.3 Configuring GbE Ports* on page 46.

interface ten-gigabit *ten-gigabit-port-index* | *range* **[description** *description*] [**ip-address** *ip*] negotiation [**negotiation** *neg*] [**refresh-interval** *interval*] [**route-refresh** *refresh*] [**shutdown** *shutdown*] [**speed** *speed*]

4.2.4 Configuring an LC as a DLC

Configuring an LC as a DLC

Configuring an RF port of a DLC

Configuring an RF profile

Configuring a QAM-RF

card *card-id* **card-type** *card-type* [**description** *description*] [**operation-mode** *operation-mode*]

For parameter details, see *Table 3-18* on page 36

4.2.4.1 Configuring DLC RF port

cable downstream port *port-id* [**compensation-gain** *compensation-gain*] [**description** *description*] [**max-carriers** *max-carrier*] [**power-per-qam** *power-per-qam*] [**rf-shutdown** *rf-shutdown*] [**slope-compensation** *slope-compensation*] [**span-start-frequency** *span-start-frequency*]

For parameter details, see *Table 3-19* on page 37

4.2.4.2 Configuring an RF Profile

cable downstream rf-profile *index num* **annex** *annex* **constellation** *constellation* [**description** *description*] **interleaver-depth-option1** *interleaver-depth-option1* **interleaver-depth-option2** *interleaver-depth-option2* [**symbol-rate** *symbol-rate*]

For parameter details, see *Table 3-20* on page 38.

4.2.4.3 Configuring a QAM-RF

cable downstream qam *qam-id* **cw-mode** *cw-mode* [**description** *description*] **frequency** *frequency* [**interleaver-depth-option** {option1 | option2}] [**mode** {*depi-dynamic* | *depi-static*}] **rf-profile** *profile* [**ripple-attenuation** *ripple-attenuation*] **tsid** *tsid* [**dti-sync** *dti-sync*] [**offset** *offset*]

For parameter details, see *Table 3-21* on page 40.

4.2.5 Configuring M-CMTS Sessions

cable downstream qam *qam-id* **mode depi-static mcmts-session** *depi-remote-id dest-ip*

For parameter details, see *Table 3-22* on page 42.

4.2.5.1 Example

```
NSG CableOS# show depi static |tab
          DEPI
          REMOTE              DTI   DEPI
QAM ID    ID      FREQUENCY   SYNC  OFFSET  DEPI IP       BANDWIDTH
-------------------------------------------------------------------
13/1/0    50200   231000000   true  0       10.50.14.100  0.63
```

4.3 Monitoring M-CMTS Configuration and Sessions

4.3.1 Viewing M-CMTS Input Ports

show interface

4.3.2 Viewing M-CMTS Sessions Output Ports

show depi static

show depi tunnel

Chapter 5
Monitoring and Troubleshooting

5.1 Overview

You can monitor the device components and the in-flowing and out-flowing streams.

5.2 Monitoring Alarms

You can monitor the alarms by using the command `show alarm`.

To view alarm history, see *show logs* on page 48

`show alarm`

INDEX	ASSERT TIME	SEVERITY	SOURCE MODULE	ALARM DESCRIPTION	SNMP OID
1	2013-08-25T22:16:35+00:00	critical	Power-Supply-0	Power Supply Missing	1.3.6.1.4.1.1563.1.2.0.19
2	2013-08-25T22:16:35+00:00	critical	Power-Supply-1	Power Supply Missing	1.3.6.1.4.1.1563.1.2.0.19
3	2013-08-25T22:16:35+00:00	critical	Power-Supply-2	Power Supply Missing	1.3.6.1.4.1.1563.1.2.0.19
4	2013-08-25T22:16:35+00:00	critical	Power-Supply-3	Power Supply Missing	1.3.6.1.4.1.1563.1.2.0.19
5	2013-08-25T22:16:36+00:00	critical	RfSwitch 1	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
6	2013-08-25T22:16:36+00:00	critical	RfSwitch 2	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
7	2013-08-25T22:16:35+00:00	critical	MgmtPort-0	ETH1 Port Link Down	1.3.6.1.4.1.1563.1.2.0.76
8	2013-08-25T22:16:35+00:00	critical	RfSwitch 0	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
9	2013-08-25T22:16:36+00:00	critical	IOBoard	IO Board Voltage Error	1.3.6.1.4.1.1563.1.2.0.281
10	2013-08-25T22:16:37+00:00	critical	RfSwitch 3	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
11	2013-08-25T22:16:37+00:00	critical	RfSwitch 4	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
12	2013-08-25T22:16:38+00:00	critical	RfSwitch 5	Rf Switch Card Missing	1.3.6.1.4.1.1563.1.2.0.273
13	2013-08-25T22:16:35+00:00	critical	Platform	Fan 0 Failure	1.3.6.1.4.1.1563.1.2.0.11
14	2013-08-25T22:16:35+00:00	critical	Platform	Fan 1 Failure	1.3.6.1.4.1.1563.1.2.0.12

The table lists the alarms as follows:

NSG Alarms Index - a sequential number of the alarm listed in the table

Assert Time - the time the alarm was raised

Severity - whether an alarm, severity 6, or a warning, severity 4.

Source Module - the module that raised the alarm

Alarm Description - describes the fault that invoked the alarm.

SNMP OID - the object ID in the SNMP trap

`show logs`

Shows alarm history since the device is up and running. When the file is too large it is updated to show the most recent alarms

```
05/12/2013 21:42:05 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 21:42:04 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
05/12/2013 21:41:08 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 21:41:07 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
05/12/2013 21:40:39 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 21:40:38 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
05/12/2013 20:18:39 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 20:18:38 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
05/12/2013 20:18:09 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 20:18:08 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
05/12/2013 20:10:53 MainBoard          Nearing High Temperature (ARBEL_I2C_TEMP 1.3.6.1.4.1.1563.1.2.0.29      on
05/12/2013 20:10:52 MainBoard          Nearing High Temperature                 1.3.6.1.4.1.1563.1.2.0.29      off
```

The table lists the alarm history as follows:

Assert Time - the time the alarm was raised

Source Module - the module that raised the alarm

Alarm Description - describes the fault that invoked the alarm.

SNMP OID - the object ID in the SNMP trap

Alarm status - indicates whether remitted

See *6.2 Clearing Alarm History* on page 64.

5.3 Monitoring Device Modules

`show inventory`

You can monitor the device entities, that is HW modules such as slots, LCs, power supply units, fans, PICs. However, CableOS monitors only active LCs.

```
SLOT                                                                SERIAL
NAME  DESCRIPTION  CFG CARD TYPE        ACTUAL CARD TYPE     STATE  NUMBER     PART NUMBER
-----------------------------------------------------------------------------------------------
1     -            -                    -                    ok     123456789  02 240-0023069-04
3     dlc-8        downstream-linecard  downstream-linecard  ok     331251007  240-0023069
4     -            -                    -                    ok     unknown    unknown
5     -            -                    -                    ok     123456789  1234567890123456789
6     SRE card     sre                  sre                  ok     331310102  12 221-0023027-01F
8     dlc-8        downstream-linecard  downstream-linecard  ok     unknown    unknown
9     -            -                    -                    ok     unknown    unknown
10    -            -                    -                    ok     unknown    unknown
11    -            -                    -                    ok     unknown    unknown
12    -            -                    -                    ok     331241002  01 240-0023069-01F
13    dlc-13       downstream-linecard  downstream-linecard  ok     unknown    unknown
16    NSI card     nsi                  nsi                  ok     331311056  03 221-0023050-01
ps0   ps0          psu                  psu                  ok     222222222  111111111
ps1   ps1          psu                  psu                  fail   222222222  111111111
ps2   ps2          psu                  psu                  ok     222222222  111111111
ps3   ps3          psu                  psu                  fail   222222222  111111111
fan0  fan0         fan                  fan                  ok     unknown    unknown
fan1  fan1         fan                  fan                  ok     unknown    unknown
pic0  pic0         pic                  pic                  out    unknown    unknown
pic1  pic1         pic                  pic                  alarm  unknown    unknown
pic2  pic2         pic                  pic                  out    unknown    unknown
pic3  pic3         pic                  pic                  out    unknown    unknown
pic4  pic4         pic                  pic                  out    unknown    unknown
pic5  pic5         pic                  pic                  alarm  unknown    unknown
```

For each entity you can view the following:

Table 5-1: Entity Attributes

Parameter	Explanation
Slot Name	The number of the slot or module
Description	Indicates the module/LC type
CFG Card Type	The expected module type
Actual Card Type	The actual card type that is mounted in the slot
State	Whether active or not
Serial Number	The serial number of the mounted module
Part Number	The part number of the mounted module
Module name	The name of the module

5.4 Monitoring Device Interfaces

You can monitor the following device interfaces.

- Management ports - You can monitor management ports for the parameters listed in *Table 5-2 on page 51*
- 10 GbE ports - You can monitor 10 GbE ports for the parameters listed in *Table 5-2 on page 51*

`show interface`

Or

`show interface nsi`

```
PORT                RF        MAX   QAMS
ID    DESCRIPTION   SHUTDOWN  QAMS  ON    STATE  BITRATE
---------------------------------------------------------
13/1  myport        false     40    1     -      0.0

                      IF
QAM ID  DESCRIPTION   OUTPUT  FREQUENCY  MODE         STATE  SPEED  BITRATE
---------------------------------------------------------------------------
13/1/0  myqam         on      231000000  depi-static  -      -      -

                                                                                          RX                RX                          TX                TX
PORT                               MAC      IP       LINK    REDUNDANCY       SPEED  RX      RX       BCAST    RX       ERROR    TX      TX       BCAST    TX       ERROR
INDEX  DESCRIPTION  SHUTDOWN  ADDRESS  ADDRESS  STATUS  STATE        SFP  GB/S   OCTETS  PACKETS  PACKETS  BITRATE  PACKETS  OCTETS  PACKETS  PACKETS  BITRATE  PACKETS
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------
16/8                false     -        -        -       -            -    -      -       -        -        -        -        -       -        -        -        -
16/20  -            false     -        -        -       -            -    -      -       -        -        -        -        -       -        -        -        -
16/21  -            true      -        -        -       -            -    -      -       -        -        -        -        -       -        -        -        -
```

`show ip interface`

This command allows you to monitor Ethernet port information with focus on the IP parameters:

```
PORT                                        LINK    REDUNDANCY
INDEX  DESCRIPTION  IP ADDRESS    SHUTDOWN  STATUS  STATE       MAC ADDRESS
-------------------------------------------------------------------------------------
16/8                10.50.14.100  false     up      none        00:20:a3:23:0d:08
16/20  -            10.40.23.211  false     up      none        00:20:a3:23:0d:0c
16/21  -            10.20.4.55    true      down    none        00:10:18:00:00:00
```

Table 5-2: 10 GbE Ports and Management Ports

Parameter	Explanation
Port Index	The port number <card/port>
Description	A short description of the module
Shutdown	false - port is active true - port is inactive
MAC Address	The port MAC address
IP Address	The IP address of the port
Link Status	Up Down
Redundancy State	none, primary, backup-active
SFP	SFP: <Vendor name>
Speed GB/S	1 GbE 10 GbE
RX Octets	The total number of valid octet units transmitted by the active port
RX Packets	The number of legal packets transmitted by the active port.
RX Bcast Packets	The number of broadcast output packets.
RX Bitrate	The current output bitrate of the port.
RX Error Packets	The number of errors in the input traffic.
TX Octets	Applies only to Ethernet ports. The total number of valid octet units received by the active port.
TX Packets	The number of legal packets received by the active port.
TX Bcast Packets	The number of broadcast input packets.
TX Bitrate	The current input bitrate of the port.
TX Error Packets	The number of errors in the output traffic.

5.5 Monitor DTI Parameters

You can view DTI server, client and port parameters.

Table 5-3: DTI Port Parameters

Parameter	Explanation
Port number	DTI port number.
Port Status	Indicates whether active.
Signal Detected	Indicates whether a DTI signal is detected.
CRC Error Count	The number of cyclic redundancy check (CRC) errors.
Frame Error	Indicates the Frame Error Rate as follows: Below 2%, 2% to 5%, or Over 5%.
Cable Advance	Indicates whether cable advance is valid. A valid, i.e. Stable, Cable Advance value is essential in order for the client to lock to the server.

show cable-clock

```
NSG CableOS# show cable-clock |tab
cable-clock server server-status warm-up
cable-clock server root-server-clock-type ITU-type-1
cable-clock server root-server-source internal
cable-clock server server-type root
cable-clock server client-performance-stable true
cable-clock server client-cable-advance-valid true
cable-clock client client-status free-run
cable-clock client client-clock-type ITU-type-1
cable-clock client client-firmware-version 0
cable-clock client client-dti-version n/a
cable-clock client client-timestamp 764742923
cable-clock client client-phase-correction 0
cable-clock client client-normal-time 0
cable-clock client client-holdover-time 0
cable-clock client client-transition-t3-count 0
cable-clock client client-transition-t4-count 0
cable-clock client client-transition-t6-count 0
cable-clock client client-transition-t7-count 0
cable-clock client client-port-switch-count 0
cable-clock client client-integral-frequency-term 0
cable-clock client client-efc-value 0
                            CRC    FRAME
PORT    PORT      SIGNAL    ERROR  ERROR  CABLE
NUMBER  STATUS    DETECTED  COUNT  RATE   ADVANCE
-------------------------------------------------
16/30   inactive  false     84     100    0
16/31   inactive  false     220    100    0
```

5.6 Monitoring System Information

show system

This command allows to obtain the following information:

- Management port IP
- Alarm count
- Warning count

- System uptime
- Total input bitrate
- Total output bitrate

```
NSG CableOS# show system |tab
system management-ip N/A
system alarm-count   19
system warning-count 0
system uptime        2839
system total-input-bitrate 776
system total-output-bitrate 15543
```

5.7 Monitoring CableOS

show cli

You can monitor general parameters of CableOS The following table lists some of the parameters to view:

Table 5-4: CableOS Parameters

Parameter	Explanation
history	The number of commands to track backwards.
idle-timeout	The time a CableOS session stays active without any activity.
Paginate	Indicates whether to display a large amount of data in sections.
Prompt	The current prompt.
show default	Indicates whether to display default values.

```
NSG CableOS# show cli
autowizard            false
complete-on-space     false
display-level         99999999
history               100
idle-timeout          1800
ignore-leading-space  false
output-file           terminal
paginate              true
prompt1               NSG CableOS\M#
prompt2               NSG CableOS(\m)#
screen-length         62
screen-width          208
service prompt config true
show-defaults         false
terminal              xterm
timestamp             disable
```

5.8 Show Device Clock

show clock

You can view the device time and whether connected to an NTP server. If yes, the command displays NTP parameters

```
NSG CableOS# show clock |tab
clock date "11:42:49 08-27-2013"
clock shutdown true
SERVER                    SERVER
ID      HOST              STATUS    STRATUM
-----------------------------------------
0       192.114.62.250    INACTIVE  -
```

5.9 Show Device Time

show date-and-time

You can view the device time

```
NSG CableOS# show date-and-time
Current time: 11:57:11 08-27-2013
```

5.10 Monitoring Command Execution

show configuration commit list

You may monitor command execution. The command output shows whether the system was configured via MCT or CableOS:

maapi - via MCT

CLI - via CableOS

```
NSG CableOS# show configuration commit list
SNo. User       Client      Time Stamp          Label/ID    Comment
~~~~ ~~~~       ~~~~~~      ~~~~~~~~~~          ~~~~~~~~    ~~~~~~~
0    admin      cli         2013-08-27 11:29:11
1    admin      cli         2013-08-27 11:28:28
2    admin      maapi       2013-08-27 07:33:16
3    admin      maapi       2013-08-25 12:22:28
4    admin      maapi       2013-08-25 12:18:09
5    admin      maapi       2013-08-25 12:11:14
6    admin      maapi       2013-08-25 11:22:21
7    admin      maapi       2013-08-25 11:21:14
8    admin      maapi       2013-08-25 11:09:40
9    admin      cli         2013-08-22 11:31:55
10   admin      maapi       2013-08-22 07:46:11
11   admin      maapi       2013-08-22 06:29:24
12   admin      cli         2013-08-21 11:15:14
13   admin      maapi       2013-08-21 11:14:09
14   admin      cli         2013-08-21 11:10:23
15   admin      cli         2013-08-21 10:51:51
16   admin      cli         2013-08-21 10:50:35
17   admin      cli         2013-08-21 10:48:32
18   admin      cli         2013-08-21 10:48:23
19   admin      cli         2013-08-21 10:45:36
20   admin      cli         2013-08-21 10:41:59
```

5.11 Monitoring Static DEPI Sessions

`show depi static`

This command allows to view DEPI sessions created via CableOS only. You may view the following parameters:

Table 5-5: Static DEPI Sessions

Parameter	Explanation
QAM ID	The QAM ID card/port/qam
DEPI Remote ID	The number of the DEPI session
Frequency	The configured frequency of the session
DTI Sync	Indicates whether active or not: True - active False - inactive
DEPI Offset	Indicates the offset configured value.
DEPI IP	The IP of the input port over which the session flows into the system
Bandwidth	Indicates the current output bitrate

```
          DEPI
          REMOTE            DTI   DEPI
QAM ID    ID      FREQUENCY  SYNC  OFFSET  DEPI IP       BANDWIDTH
-----------------------------------------------------------------------
13/1/0    50200   231000000  true  0       10.50.14.100  0.62
```

5.12 Monitoring Dynamic DEPI Sessions

`show depi tunnel`

This command allows to view dynamic DEPI sessions created by the CMTS core. You may view the following parameters:

Table 5-6: Dynamic DEPI Sessions

Parameter	Explanation
Tunnel ID	The tunnel ID
Core Device Address	The IP address of the CMTS core.
Edge Device Address	The IP address of the EdgeQAM device
Session ID	The ID of the session
TS ID	The ID of the TS
QAM ID	The QAM ID card/port/qam
DPR Type	Indicates whether Primary or Secondary
State	Indicates the current state: ■ Established ■ Allocated

```
                CORE DEVICE  EDGE DEVICE                                DPR
TUNNEL ID       ADDRESS      ADDRESS      SESSION ID  TSID  QAM ID    TYPE     STATE
-----------------------------------------------------------------------------------------
1039674223      1.1.1.1      1.1.1.2      1252002311  3701  13/0/4    primary  established
                                          1252006705  3713  13/0/16   primary  established
                                          1252019544  3708  13/0/11   primary  established
                                          1252019778  3704  13/0/7    primary  established
                                          1252020446  3703  13/0/6    primary  established
                                          1252023488  3717  13/0/20   primary  established
                                          1252024417  3715  13/0/18   primary  established
                                          1252026563  3707  13/0/10   primary  established
                                          1252027591  3700  13/0/3    primary  established
                                          1252030348  3720  13/0/23   primary  established
                                          1252036797  3702  13/0/5    primary  established
                                          1252042566  3712  13/0/15   primary  established
                                          1252042770  3714  13/0/17   primary  established
                                          1252044105  3719  13/0/22   primary  established
                                          1252044217  3711  13/0/14   primary  established
                                          1252049122  3710  13/0/13   primary  established
                                          1252049505  3698  13/0/1    primary  established
                                          1252053013  3709  13/0/12   primary  established
                                          1252053384  3697  13/0/0    primary  established
                                          1252053847  3716  13/0/19   primary  established
                                          1252056496  3706  13/0/9    primary  established
                                          1252059873  3705  13/0/8    primary  established
                                          1252061744  3699  13/0/2    primary  established
                                          1252065154  3718  13/0/21   primary  established
1376609585      10.80.10.10  10.80.10.11  1252002297  2031  8/0/14    primary  established
                                          1252004510  2035  8/0/18    primary  established
                                          1252005924  2018  8/0/1     primary  established
```

5.13 CableOS Command History

`show history`

This command allows to view the commands that were executed in CableOS with the following parameters:

Table 5-7: show history

Parameter	Explanation
Time	hh:mm:ss
Command	The executed CableOS command

```
NSG CableOS# show history
11:20:35 -- show ip interface |tab
11:25:50 -- show system |tab
11:33:18 -- show cli
11:42:49 -- show clock |tab
11:47:18 -- show confd-state
11:50:25 -- show configuration
11:50:35 -- show configuration
11:50:50 -- show configuration commit
11:51:10 -- show configuration list
11:51:33 -- show configuration commit list
11:57:11 -- show date-and-time
12:02:26 -- show depi static |tab
12:03:23 -- show depi tunnel |tab
12:09:51 -- show history
```

5.14 Show Redundancy Switches

`show redundancy linecard`

The command allows to view the exact time redundancy switches took place.

Table 5-8: Show Redundancy Linecard Parameters

Parameter	Explanation
Time	yyyy-mm-ddThh:mm:ss+GMT
LC Switchover	From LC # to LC #

```
                              LINECARD
TIME                          SWITCHOVER
----------------------------------------
2013-08-27T11:34:13+00:00  13 --> 8
```

5.15 Show Running Configuration

To view the running configuration of various system elements, use the following commands:

show running-config aaa

Table 5-9: show running-config aaa

parameter	Explanation
Name	The username
UID	Shows the user ID
GID	Shows the group ID
Password	Shows the password. The password is encrypted.
SSH KEYDIR	Shows the key directory
HomeDIR	Shows the working directory of the user

```
NSG CableOS# show running-config aaa|tab
NAME    UID  GID   PASSWORD                        SSH KEYDIR    HOMEDIR
--------------------------------------------------------------------------
admin   0    9000  $1$aa$A7eI7Yc8Ved6vGJbv/xOw.  /home/admin   /home/admin
config  0    9000  $1$aa$jZceDuFEjFp2jDeS/se8Q/  /home/config  /home/config
guest   0    9000  $1$aa$E9uAGQE8.Nq8cUyn6CsKz1  /home/guest   /home/guest
```

show running-config alias

Shows all defined aliases

show running-config cable

Shows system type and DTI parameters: configure redundancy, preferred port and configured ports.

```
NSG CableOS# show running-config cable |tab
cable chassis-type ds-only
cable clock redundancy auto
cable clock prefer 16/30
PORT
ID
-------
16/30
16/31
```

show running-config card

Shows the active cards with the slot number, card type, operation mode and card description.

```
NSG CableOS# show running-config card |tab
SLOT                          OPERATION
NUMBER  CARD TYPE             MODE       DESCRIPTION
-----------------------------------------------------
3       downstream-linecard   40b        dlc-8
6       sre                   -          SRE card
8       downstream-linecard   40b        dlc-8
13      downstream-linecard   40b        dlc-13
16      nsi                   -          NSI card
```

show running-config default-gateway

Shows the default gateway IP address

```
NSG CableOS# show running-config default-gateway
default-gateway 10.40.23.1
```

show running-config interface

Shows the GbE input port configuration: port number, description, whether enabled, speed, IP address, Netmask route refresh and refresh interval.

```
NSG CableOS# show running-config interface |tab
TEN
GIGABIT
PORT                                                                                  ROUTE    REFRESH
INDEX    DESCRIPTION      SHUTDOWN  SPEED      NEGOTIATION  IP ADDRESS    NETMASK        REFRESH  INTERVAL
-------------------------------------------------------------------------------------------------------------
16/0     10GbE interface  false     1000baseT  off          10.50.10.100  255.255.255.0  off      -
16/1     10GbE interface  false     1000baseT  off          10.50.12.100  255.255.255.0  off      -
16/2     10GbE interface  false     1000baseT  off          10.30.4.103   255.255.255.0  off      -
16/3     10GbE interface  false     1000baseT  off          10.30.4.104   255.255.255.0  off      -
16/4     10GbE interface  false     10GBaseT   off          10.30.4.105   255.255.255.0  off      -
16/5     10GbE interface  false     10GBaseT   off          10.30.4.106   255.255.255.0  off      -
16/6     10GbE interface  false     10GBaseT   off          10.30.4.107   255.255.255.0  off      -
16/7     10GbE interface  false     10GBaseT   off          10.30.4.108   255.255.255.0  off      -
16/8     10GbE interface  false     10GBaseT   off          10.30.4.109   255.255.255.0  off      -
16/9     10GbE interface  false     10GBaseT   off          10.30.4.110   255.255.255.0  off      -
16/10    10GbE interface  false     10GBaseT   off          10.30.4.111   255.255.255.0  off      -
16/11    10GbE interface  false     10GBaseT   off          10.30.4.112   255.255.255.0  off      -

ETHERNET
PORT
INDEX     SHUTDOWN  IP ADDRESS   NETMASK
-----------------------------------------------
16/20     false     10.30.4.100  255.255.255.0
16/21     true      10.30.4.101  255.255.255.0
```

show running-config ip-route-table

Shows the routing table for GbE/Eth port.

show running-config local-time

Shows local time configuration

```
NSG CableOS# show running-config local-time
local-time offset 60
local-time daylight-saving off
```

show running-config management-bonding-group

Shows bonding group configuration

```
NSG CableOS# show running-config management-bonding-group | tab
GROUP  INTERFACE
ID     ID
-----------------
0      16/20
       16/21
```

show running-config ntp

Shows the NTP configuration

```
NSG CableOS# show running-config ntp | tab
no ntp shutdown
SERVER
ID      HOST
---------------------
0       10.20.30.40
```

show running-config radius-server

Shows the configuration of the RADIUS server

show running-config tacacs-server

Shows the configuration of the TACACS server

show running-config snmp

Shows the configuration of the SNMP system

```
NSG CableOS# show running-config snmp | tab
no snmp shutdown
snmp community public
RECEIVER  NOTIFICATION
ID        TYPE          IP ADDRESS
-------------------------------------
0         snmpv1-trap   10.30.22.22
```

show running-config syslog

Shows the configuration of the syslog server

```
NSG CableOS# show running-config syslog | tab
no syslog shutdown
SERVER
ID      HOST IP
----------------------
0       10.10.10.10
```

show running-config system

Shows the contact information of the system

```
NSG CableOS# show running-config system
system location "Sunnyvale CA."
system contact 1-888-MPEGTWO
system hostname NSG-PRO
system ip 10.40.23.211
```

5.16 Show Startup Configuration

To view the startup configuration of various system elements, use the following commands:

show startup-config aaa

See *Table 5-9 on page 58*.

show startup-config alias

Shows all defined aliases

show startup-config cable

Shows system type and DTI parameters: configure redundancy, preferred port and configured ports.

show startup-config card

Shows the active cards with the slot number, card type, operation mode and card description.

show startup-config default-gateway

Shows the default gateway IP address

show startup-config interface

Shows the GbE input port configuration: port number, description, whether enabled, speed, IP address, Netmask route refresh and refresh interval

```
NSG CableOS# show running-config interface |tab
TEN
GIGABIT
PORT                                                                                                    ROUTE    REFRESH
INDEX    DESCRIPTION      SHUTDOWN  SPEED      NEGOTIATION  IP ADDRESS    NETMASK        REFRESH  INTERVAL
-----------------------------------------------------------------------------------------------------------------------
16/0     10GbE interface  false     1000baseT  off          10.50.10.100  255.255.255.0  off      -
16/1     10GbE interface  false     1000baseT  off          10.50.12.100  255.255.255.0  off      -
16/2     10GbE interface  false     1000baseT  off          10.30.4.103   255.255.255.0  off      -
16/3     10GbE interface  false     1000baseT  off          10.30.4.104   255.255.255.0  off      -
16/4     10GbE interface  false     10GBaseT   off          10.30.4.105   255.255.255.0  off      -
16/5     10GbE interface  false     10GBaseT   off          10.30.4.106   255.255.255.0  off      -
16/6     10GbE interface  false     10GBaseT   off          10.30.4.107   255.255.255.0  off      -
16/7     10GbE interface  false     10GBaseT   off          10.30.4.108   255.255.255.0  off      -
16/8     10GbE interface  false     10GBaseT   off          10.30.4.109   255.255.255.0  off      -
16/9     10GbE interface  false     10GBaseT   off          10.30.4.110   255.255.255.0  off      -
16/10    10GbE interface  false     10GBaseT   off          10.30.4.111   255.255.255.0  off      -
16/11    10GbE interface  false     10GBaseT   off          10.30.4.112   255.255.255.0  off      -

ETHERNET
PORT
INDEX     SHUTDOWN  IP ADDRESS   NETMASK
-----------------------------------------------
16/20     false     10.30.4.100  255.255.255.0
16/21     true      10.30.4.101  255.255.255.0
```

show startup-config ip-route-table

Shows the routing table for GbE/Eth port.

show startup-config local-time

Shows local time configuration

```
NSG CableOS# show running-config local-time
local-time offset 60
local-time daylight-saving off
```

show startup-config management-bonding-group

Shows bonding group configuration

`show startup-config ntp`

Shows the NTP configuration

`show startup-config radius-server`

Shows the configuration of the RADIUS server

`show startup-config tacacs-server`

Shows the configuration of the TACACS server

`show startup-config snmp`

Shows the configuration of the SNMP system

`show startup-config syslog`

Shows the configuration of the syslog server

`show startup-config system`

Shows the contact information of the system

5.17 Tech Support

Allows to view all system information. Shows logs, alarms, versions of HW and FM configuration and monitoring information. For debug and analysis of R&D.

`show tech-support`

5.18 Show Versions

Allows to view the firmware version installed on the various system components.

`show versions`

Table 5-10: Show Versions

Parameter	Explanation
Device current time	System current time
Device Uptime	System uptime
NSG Pro	Released version installed
SRE	Per each SRE: ■ Firmware version ■ LLC version
NSI	Per each NSI: ■ ST version
DLC	ST version per each DLC

Table 5-10: Show Versions

Parameter	Explanation
Processor	Per each processor: ■ ID ■ Vendor ID ■ Model name ■ Cache size ■ CPU cores

Chapter 6
Action Commands

6.1 Overview

This chapter describes commands that execute a process. The process does not use or affect the data model.

hard-reset - see *6.3 Hard Reset* on page 64

soft-reset - see *6.4 LC Soft-Reset* on page 65

ping - *6.6 Ping* on page 65

reboot - *6.7 Rebooting the Device* on page 66

restore-factory-setting - see *6.5 Restoring Factory Settings* on page 65

Firmware-installation - see *6.9 Upgrading the Firmware* on page 67

Interface details - see *6.10 Interface Details* on page 68

Manual redundancy switch - see *6.8 Manual Redundancy Switch* on page 66

TCP packets - see *6.12 Monitoring TCP Packets* on page 69

Working with TFTP server - see *6.13 Working with TFTP* on page 69

6.2 Clearing Alarm History

clear-logs

This command allows to clear the alarm history. See *show alarm history* on page 35.

Example

```
NSG CableOS# clear-logs
<cr>
```

6.3 Hard Reset

This command allows to disconnect the voltage for the LCs.

cable linecard reset *slot-id*

Table 6-1: Hard Reset Command

Attribute/Value	Explanation
slot-id	integer 0-5, 8-13

1. Type, `cable linecard reset` *slot-id*
2. Type `Yes` or `No`
   Once you type `Yes`, command is executed.

Example

```
NSG CableOS# cable linecard reset 0
Are you sure? [yes, no] yes
Commit complete
```

6.4 LC Soft-Reset

This command allows to re-load the FPGA firmware.

cable linecard soft-reset *slot-id*

Table 6-2: LC Soft Reset Command

Attribute/Value	Explanation
slot-id	integer 0-5, 8-13

1. Type, `cable linecard soft-reset` *slot-id*
2. Type `Yes` or `No`
   Once you type `Yes`, command is executed.

Example

```
NSG CableOS# command soft-rese slote-id 9
Are you sure? [yes, no] yes
commit complete
```

6.5 Restoring Factory Settings

The factory-default command allows to reset device configuration to factory defaults.

restore-factory-settings

1. Type, `restor-factory-settings`
2. Type `Yes` or `No`
   Once you type `Yes`, command is executed.

Example

```
NSG CableOS# command factory-settings
Are you sure? [yes, no] yes
commit complete
```

6.6 Ping

The ping command allows to ping and check connectivity between the device and another platform.

ping *Hostname or IP address of host to check connectivity to*

Example

```
NSG CableOS# command ping <Hostname or IP address>
PING 10.40.22.135 (10.40.22.135) 56(84) bytes of data.
64 bytes from 10.40.22.135: icmp req=1 ttl=64 time=0.067 ms
64 bytes from 10.40.22.135: icmp req=1 ttl=64 time=0.062 ms
64 bytes from 10.40.22.135: icmp req=1 ttl=64 time=0.062 ms
64 bytes from 10.40.22.135: icmp req=1 ttl=64 time=0.069 ms
```

To abort the ping, press <Ctrl C>.

6.7 Rebooting the Device

The reboot command allows to reboot the device

reboot

1. Type, `reboot`
2. Type `Yes` or `No`
   Once you type `Yes`, command is executed.

Example

```
NSG CableOS# command reboot
Are you sure? [yes, no] n
Aborted: by user
NSG CableOS#
```

6.8 Manual Redundancy Switch

Allows to manually switch from primary to backup and vice versa. The command applies to linecard and input ports.

switchover [linecard *card-id* **| ten-gigabit** *port-id* **] from** *[card-id | port-id]*

Table 6-3: Manual Redundancy Parameters

Attribute/Value	Explanation
linecard	Linecard redundancy switch
card-id	Integer between: 0 to 5, 9 to 13
ten-gigabit	Input port redundancy switch
port-id	Integer in the following pattern: *card/port*. Range 16/0 to 16/11. Currently only NSI card16 is supported
from	Switch is always from the primary port. In case you wish to revert from backup to primary, indicate the primary and it automatically switches to the backup port, or to the last active linecard.
card-id	The primary linecard
port-id	The primary port

Example

```
NSG CableOS# switchover ten-gigabit from 16/8
Are you sure? [yes,no] yes
```

```
NSG CableOS# show interface nsi | tab
                                                                  RX        RX            TX        TX
PORT                                LINK  REDUNDANCY      SPEED       RX    BCAST  RX    ERROR  TX    TX    BCAST  TX    ERROR
INDEX DESCRIPTION SHUTDOWN MAC ADDRESS    IP ADDRESS  STATUS STATE     SFP   GB/S  RX OCTETS  PACKETS  PACKETS BITRATE PACKETS OCTETS  PACKETS PACKETS BITRATE PACKETS
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
16/0        false   00:20:a3:22:f4:80 7.7.7.7    down  none      SFP: 10  0     0     0     0     0    498   14    2     0     0
16/8        true    00:20:a3:22:f4:88 10.30.4.109 down  backup-active SFP: 10  0     0     0     0     0    0     0     0     0     0
16/20 -     false   00:20:a3:22:f4:8c 10.40.22.132 up   none      eth0  -   1902493270 25814284 0     0     0     4084674 32526 0     0     0
16/21 -     false   00:20:a3:22:f4:8d 10.20.4.55  down  non       eth1  -   0     0     0     0     0     0     0     0     0     0
```

The backup port of port 16/8 is active.

```
NSG CableOS# switchover ten-gigabit from 16/8
Are you sure? [yes,no] yes
NSG CableOS# show interface nsi | tab
```

```
NSG CableOS# show interface nsi | tab
                                                                  RX        RX            TX        TX
PORT                                LINK  REDUNDANCY      SPEED       RX    BCAST  RX    ERROR  TX    TX    BCAST  TX    ERROR
INDEX DESCRIPTION SHUTDOWN MAC ADDRESS    IP ADDRESS  STATUS STATE     SFP   GB/S  RX OCTETS  PACKETS  PACKETS BITRATE PACKETS OCTETS  PACKETS PACKETS BITRATE PACKETS
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
16/0        false   00:20:a3:22:f4:80 7.7.7.7    down  none      SFP: 10  0     0     0     0     0    498   14    2     0     0
16/8        true    00:20:a3:22:f4:88 10.30.4.109 down  primary   SFP: 10  0     0     0     0     0    0     0     0     0     0
16/20 -     false   00:20:a3:22:f4:8c 10.40.22.132 up   none      eth0  -   1902506140 25814414 0     0     0     4093098 32578 0     0     0
16/21 -     false   00:20:a3:22:f4:8d 10.20.4.55  down  none     eth1  -   0     0     0     0     0     0     0     0     0     0
```

6.9 Upgrading the Firmware

This command allows to upgrade the device firmware.

`sw-upgrade transfer-method` *transfer-method* **version-file-name** *file* **host** *host* **finalize-mode** *finalize mode*

Table 6-4: Upgrading Firmware Parameters

Attribute/Value	Explanation
transfer-method	The transfer protocol
transfer-method	TFTP only
version-file-name	The firmware file
file	File name is as follows: NSGPRO-x.x.x.xx-x.iso
host	The TFTP server
file	The IP address of the TFTP server
finalize-mode	Upgrade finalizing stage
finalize-mode	▪ manual - reboot manually using the command: `sw-upgrade-finalize-and-reboot` ▪ automatic - the device reboots with the new installed firmware

Example

```
NSG CableOS# sw-upgrade transfer-method tftp version-file-name
NSGPRO-4.1.0.27-1.iso dest-host 10.40.2.20 finalization-mode manual
*********************************************************************
**************
* WARNING: trying to download upgrade file using no authentication
protocol tftp. *
* This operation might take few minutes depends on your network
connection speed. *
*********************************************************************
**************
Recieved: 8988 [KBytes]NSG CableOS#
```

6.10 Interface Details

Shows interface details.

`ifconfig`

Example

```
NSG CableOS# ifconfig
blade0    Link encap:Ethernet  HWaddr 00:20:a3:22:f4:8f
          inet addr:126.0.0.254  Bcast:126.0.0.255  Mask:255.255.255.0
          inet6 addr: fe80::220:a3ff:fe22:f48f/64 Scope:Link
          UP BROADCAST RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:3 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:16

blade1    Link encap:Ethernet  HWaddr 00:20:a3:22:f4:8f
          inet addr:126.0.0.254  Bcast:126.0.0.255  Mask:255.255.255.0
          inet6 addr: fe80::220:a3ff:fe22:f48f/64 Scope:Link
          UP BROADCAST RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:3 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:17
```

6.11 Configuring Device Time

Allows to configure device time and date.

`set-clock` *HH:MM:SS mm-dd-yyyy*

Example

```
NSG CableOS# set-clock 22:11:45 12-04-2013
Are you sure [yes | no]
```

To view device time, see *page 54*

6.12 Monitoring TCP Packets

Based on the Linux tcpdump command. Allows to debug TCP packets

`tcpdump start interface` *interface name*

Table 6-5: TCP Packet Parameters

Attribute/Value	Explanation
interface name	Indicate the specific interface: ■ Eth o, or ■ All

To stop, type **`tcpdump stop`**

6.13 Working with TFTP

Allows to send or obtain files using the TFTP protocol.

`tftp hostname` *ip* | *name* **`get`** | **`put`** *filename*

Table 6-6: TFTP Parameters

Attribute/Value	Explanation
hostname	The IP address or name of the TFTP server
get | **put**	Get - to obtain a file via TFTP Put - to send a file via TFTP
filename	Indicate the required file

Example

```
NSG CableOS# tftp host 10.40.2.20 get file test
mode set to octet
Connected to 10.40.2.20 (10.40.2.20), port 69
getting from 10.40.2.20:test to test [octet]
Received 4 bytes in 0.2 seconds [131 bit/s]
```

Chapter 7
File Commands

7.1 Overview

The file commands allows you manipulate files in the working directory of CableOS. The available action commands are as follows:

File show - *7.2 File Show* on page 70

File copy - *7.3 File Copy* on page 70

Create a directory - *7.5 Create a Directory* on page 71

Rename a file - *7.6 Rename a File* on page 71

List of file - *7.7 List of File* on page 71

7.2 File Show

To view a file in the working directory, use the following command

`file show` *file name*

Example

```
NSG CableOS# show file
```

7.3 File Copy

Allows to copy a file to a different folder in the working directory.

`file copy` *file name* **`directory`** *destination*

Attribute/Value	Explanation
file name	The name of the file you wish to copy
destination	The directory to copy to the file

Example

```
NSG CableOS# file copy
<cr>
```

7.4 File Move

Moves a file a file or directory in the working directory.

`file move` *file name* **`directory`** *destination*

Attribute/Value	Explanation
file name	The name of the file you wish to move
destination	The directory to move to the file

Example

```
NSG CableOS# file copy
<cr>
```

7.5 Create a Directory

Allows to create a directory in the working directory.

`file create` *directory name*

Attribute/Value	Explanation
file name	The new directory

Example

```
NSG CableOS# file create test
<cr>
```

7.6 Rename a File

Allows to rename a file.

`file rename` *name new name*

Attribute/Value	Explanation
file name	The original file name
new name	The new name

Example

```
NSG CableOS# file rename .test test_test
```

7.7 List of File

Allows to list all files in the directory.

`file list`

Example

```
NSG CableOS# file list
.bash_logout
.bashrc
.profile
```

Chapter 8
Operational Commands

8.1 Overview

⇨ The operational commands are all the commands that are executed in the Operational mode and are not `show` commands.

8.2 Help

`help`

Displays a short description about the command.

Example

```
NSG CableOS# help show
Help for command: show
    Show running system information
```

8.3 Syntax Validation

`autowizard enable | disable`

Automatically queries for mandatory elements.

8.4 Comparing Files

`compare file` *file name [element]*

`compare startup` *file name [element*

Allows to compare running configuration file to another configuration file.

Table 8-1: Compare Files Parameters

Attribute/Value	Explanation
filename	Indicate the configuration file
element	Optional. Indicate the specific element its configuration you wish to compare

Example

In the example the running configuration is compared with file gigabit.cfg. The element with the different configuration is marked with +

```
NSG CableOS# compare file gigabit.cfg interface gigabit
 interface gigabit 16/20
  no shutdown
  ip-address 10.40.22.132
  netmask    255.255.255.0
!
```

```
interface gigabit 16/21
  no shutdown
interface gigabit 16/21
- ip-address 10.20.4.55
+ ip-address 10.20.4.56
  netmask    255.255.255.0
!
```

8.5 Show ARP Messages

`show arp`

Allows to show arp messages.

8.6 Writing Commands to a File

`source` *file name*

Based on the Linux source command. Allows to write commands of operational mode to a file. When required you can run the commands in the file.

8.7 Monitoring CPU Usage

`top`

Based on the Linux top command. Allows to view a list of processes that consume most of the CPU.

Example

```
top - 07:16:28 up 19 days, 18:27,  0 users,  load average: 0.10, 0.08, 0.12
Tasks:  83 total,   1 running,  79 sleeping,   0 stopped,   3 zombie
%Cpu(s):  3.0 us,  0.3 sy,  0.0 ni, 96.6 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
KiB Mem:   8200116 total,  2148316 used,  6051800 free,    49040 buffers
KiB Swap:        0 total,        0 used,        0 free,   153944 cached

  PID USER      PR  NI  VIRT  RES  SHR S  %CPU %MEM    TIME+  COMMAND
 3358 root      20   0 2494m 1.8g 9468 S   8.6 22.6   2552:19 Hnsg.bin
   21 root      20   0     0    0    0 S   0.3  0.0  30:15.89 kworker/1:1
    1 root      20   0  2280  732  628 S   0.0  0.0   0:14.96 init
    2 root      20   0     0    0    0 S   0.0  0.0   0:00.15 kthreadd
    3 root      20   0     0    0    0 S   0.0  0.0   0:24.27 ksoftirqd/0
    6 root      rt   0     0    0    0 S   0.0  0.0   0:00.44 migration/0
    7 root      rt   0     0    0    0 S   0.0  0.0   1:48.29 watchdog/0
    8 root      rt   0     0    0    0 S   0.0  0.0   0:00.63 migration/1
   10 root      20   0     0    0    0 S   0.0  0.0   0:01.01 ksoftirqd/1
   12 root      rt   0     0    0    0 S   0.0  0.0   0:03.79 watchdog/1
   13 root       0 -20     0    0    0 S   0.0  0.0   0:00.00 cpuset
   14 root       0 -20     0    0    0 S   0.0  0.0   0:00.00 khelper
```

8.8 Timestamp

`timestamp enable| disable`

Allows to disable/enable a timestamp after a command has been executed. The timestamp is displayed by default in the time-zone UTC+-00:00.

Example

```
NSG CableOS# timestamp enable
NSG CableOS# config
Sun Dec  22 07:22:08.741 UTC
Entering configuration mode terminal
```

8.9 Monitoring Packets Route

traceroute

Based on the Linux traceroute command. Allows to trace the routes of the packets.

8.10 Logged User

who

Allows to find out the current logged in user.

Example

```
NSG CableOS# who
Session User      Context      From         Proto Date       Mode
*23     admin     cli          10.40.4.19   ssh   07:21:34   operational
 14     admin     cli          10.40.101.13 ssh   2013-12-02 config-terminal
 12     cmts-core depi-control 127.0.0.1    tcp   2013-12-02 operational
```

8.11 User ID

id

Shows the ID of the logged in user.

Example

```
hermon-sre# id
user = admin(0), gid=9000, groups=nsgadmin, gids=1000
```

8.12 Configuring CableOS Idle Timeout

idle-timeout

Allows to set inactivity time in seconds for closing the CableOS sessions.

Example

```
hermon-sre# idle-timeout 1800
```

8.13 Logging Out

logout [session *session number* | **user** *user*]

Allows to logout and to terminate the session for other users.

Table 8-2: Logging Out Parameters

Attribute/Value	Explanation
logout	Allows to terminate the session.

Table 8-2: Logging Out Parameters

Attribute/Value	Explanation
session	Optional. Type if you wish to terminate the session
session	Type the session number. Session number appears once you type `logout session ?`
user	Optional. Type if you wish to logout a user
session	Type the user name. Current users appear once you type `logout user ?`

Example

Your session is indicated by the * sign.

```
NSG CableOS# logout session ?
Possible completions:
  12   cmts-core@127.0.0.1 depi-control 2013-12-02
  32   admin@10.40.4.19 cli 11:22:26 (*)
NSG CableOS# logout session 12
```

8.14 Terminating a Session

`quit exit`

In Operational mode, allows to quit the current session.

8.15 Terminating Configuration Mode

`exit`

In Configuration mode, allows to exit this mode. If in Operational mode, terminates the session.

8.16 To Negate a Command

`no`

Allows to negate a command.

8.17 Sending Messages

`send` [*logged user* | *all*] **`message`**

Allows to send messages to a specific logged in user or to all currently logged in users.

Table 8-3: Send Message Parameters

Attribute/Value	Explanation
message	The message should be a single word or a few words separated by a hyphen.

Example

```
NSG CableOS# NSG CableOS# send admin reboot-soon

Message from admin@hermon-sre at 2013-12-22 11:36:12...reboot-soon
```

8.18 Show Default Values

`show-defaults` {*true* | *false*}

Shows default values.

Example

The following example shows the presentation of input port 16/20 once `show-defaults` is true. Since netmask has default value, CableOS presents it:

```
NSG CableOS# show-defaults true
NSG CableOS# show running-config interface gigabit
interface gigabit 16/20
no shutdown
ip-address 10.40.22.132
netmask    255.255.255.0    ! 255.255.255.0
!
interface gigabit 16/21
no shutdown
ip-address 10.20.4.56
netmask    255.255.255.0    ! 255.255.255.0
!
```

8.19 Setting the Size of the History Log

`history` *size*

Sets the size of the log for the `show history` command. See *5.13 CableOS Command History* on page 57.

Table 8-4: History Parameters

Attribute/Value	Explanation
size	Integer between 0 to 1000.

Chapter 9
Command Reference

9.1 Configuration Command Reference

The following table lists in an alphabetical order all commands that are executed in config mode.

Table 9-1: Configuration Command Reference

	Command	Details
A	`aaa authorization cmd`	page 25
	`aaa authentication login`	page 25
	`aaa authentication users`	page 25
	`alias`	page 22
C	`cable chassis-type`	page 27
	`cable clock`	page 34
	`card`	page 36
	`cable downstream port`	page 37
	`cable downstream qam`	page 40 page 42
	`cable downstream rf-profile`	page 38
	`commit`	page 13
	`config exclusive`	page 17
D	`default-gateway`	page 28
I	`interface gigabit`	page 33
	`interface ten-gigabit`	page 33
L	`local-time`	page 29
M	`management-bonding-group`	page 33
N	**ntp**	page 28
R	`radius-server`	page 23
	`redundancy`	page 42
	rollback	page 21

Table 9-1: Configuration Command Reference

	Command	Details
S	`snmp`	page 29
	`syslog`	page 31
	`system`	page 27
T	`tacacs-server`	page 23

9.2 Show Command Reference

The following table lists in an alphabetical order all commands that are `show` commands.

Table 9-2: Show Command Reference

Command	Details
`show`	page 18
`show-defaults`	page 76
`show alarm`	page 48
`show arp`	page 73
`show cable-clock`	page 52
`show cli`	page 53
`show clock`	page 54
`show configuration commit list`	page 54
`show date-and-time`	page 54
`show depi static`	page 55
`show depi tunnel`	page 56
`show history`	page 57
`show interface`	page 50
`show ip interface`	page 50
`show inventory`	page 49
`show logs`	page 48
`show redundancy linecard`	page 57
`show running-config`	page 58
`show startup-config`	page 61
`show system`	page 52
`show tech-support`	page 62
`show versions`	page 62

9.3 Operational Command Reference

The following table lists in an alphabetical order all commands that are executed in operational mode and are not `show` commands.

Table 9-3: Operational Command Reference

	Command	Details
A	**autowizard**	page 72
C	**cable**	page 64
	clear-logs	page 64
	compare	page 72
	config	page 17
	copy	page 13
H	**help**	page 72
	history	page 76
F	**file**	page 70
I	**id**	page 74
	idle-timeout	page 74
	ifconfig	page 68
L	**logout**	page 74
N	**no**	page 75
P	**ping**	page 65
Q	**quit**	page 75
R	**repeat**	page 21
	rollback	page 21
	reboot	page 66
	restore-factory-settings	page 65
S	**send**	page 75
	set-clock	page 68
	source	page 73
	sw-upgrade	page 67
	sw-upgrade-finalize-and-reboot	page 67
	switchover	page 66

Table 9-3: Operational Command Reference

	Command	Details
T	`tcpdump`	*page 69*
	`tftp`	*page 69*
	`timestamp`	*page 73*
	`top`	*page 73*
	`traceroute`	*page 74*
W	`who`	*page 74*

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