NSG™ Pro
Converged Cable Access Platform (CCAP)

Software Guide
CableOS Release 4.0.x
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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**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Purpose</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CableOS CLI</td>
<td>Configuration and monitoring of a single NSG Pro device</td>
<td>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 <em>running config</em> database. See 2.5 Saving Configuration on page 13.</td>
</tr>
<tr>
<td>MCT</td>
<td>Configuration of multiple NSG Pro devices.</td>
<td>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 <em>running config</em> and <em>startup config</em>.</td>
</tr>
<tr>
<td>3rd party SNMP monitoring</td>
<td>Status and Alarm Monitoring of multiple NSG Pro devices</td>
<td>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.</td>
</tr>
<tr>
<td>Syslog</td>
<td>Monitoring of a single NSG Pro device</td>
<td>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.</td>
</tr>
</tbody>
</table>
1.3 Document Conventions

This guide uses the following conventions for command documentation:

Table 1–2: Document Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boldface screen font</strong></td>
<td>Commands and keywords</td>
</tr>
<tr>
<td><em>Italic font</em></td>
<td>Arguments that you need to provide the values</td>
</tr>
<tr>
<td><strong>Screen output</strong></td>
<td>Console output or other text that is displayed to you on a computer screen</td>
</tr>
<tr>
<td>[element]</td>
<td>Indicates an optional element</td>
</tr>
<tr>
<td>{x</td>
<td>y</td>
</tr>
<tr>
<td>[x</td>
<td>y</td>
</tr>
<tr>
<td><em>hyperlinked</em></td>
<td>Hyperlinked cross-references in online documents</td>
</tr>
<tr>
<td>&lt;cr&gt;</td>
<td>Press &lt;Ctr&gt; after typing a command</td>
</tr>
<tr>
<td>&lt;Key&gt;</td>
<td>Indicated a keyboard key</td>
</tr>
</tbody>
</table>

**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 sure 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

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

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

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

- `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 destruct 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 entry, card 5 was not created
```

The parameter is indicated according to the application logic:

```
NSG CableOS(config-tan-gigabit-16/8) # negotiation on
NSG CableOS(config-tan-gigabit-16/8) # commit
Aborted: 'cable-cli-config interface tan-gigabit 16/8 speed' (value '1GBaseT'): negotiation could be enabled only for 100GBaseT 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 520000000
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

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

<table>
<thead>
<tr>
<th>Key Function</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backspace</td>
<td>Deletes characters backwards</td>
</tr>
</tbody>
</table>
| ?            | 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 |
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`.

### 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.

```bash
# config exclusive
```

**Example** - `config exclusive`

NSG CableOS # config exclusive

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:
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:

```
<table>
<thead>
<tr>
<th>SLOT</th>
<th>CARD TYPE</th>
<th>MODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dic-6</td>
</tr>
<tr>
<td>6</td>
<td>src</td>
<td>-</td>
<td>SRL card</td>
</tr>
<tr>
<td>8</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dic-8</td>
</tr>
<tr>
<td>13</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dic-13</td>
</tr>
<tr>
<td>16</td>
<td>nsi</td>
<td>-</td>
<td>N5I card</td>
</tr>
</tbody>
</table>
```

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">
```

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
2.9.2 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

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

2.9.2.2 Example - Filter Include

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

#show inventory | include nsi
2.9.2.3 Example - Filter Select

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

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

<table>
<thead>
<tr>
<th>SLOT</th>
<th>NAME</th>
<th>CARD</th>
<th>ACTUAL</th>
<th>CARD</th>
<th>TYPE</th>
<th>STATE</th>
<th>NUMBER</th>
<th>PART</th>
</tr>
</thead>
<tbody>
<tr>
<td>a0</td>
<td>FanO</td>
<td>Fan</td>
<td>fail</td>
<td>unknown</td>
<td>unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a0</td>
<td>Fan1</td>
<td>Fan</td>
<td>fail</td>
<td>unknown</td>
<td>unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.9.2.4 Example - Filter Begin

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

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

```
10 2013-09-25T22:16:37+00:00 critical R2Switch 0 RF Switch Card Missing 1.3.6.1.4.1.1563.1.2.0.273
11 2013-09-25T22:16:37+00:00 critical R2Switch 4 RF Switch Card Missing 1.3.6.1.4.1.1563.1.2.0.273
12 2013-09-25T22:16:37+00:00 critical R2Switch 5 RF Switch Card Missing 1.3.6.1.4.1.1563.1.2.0.273
13 2013-09-25T22:16:37+00:00 critical Platform Fan 0 Failure 1.3.6.1.4.1.1563.1.2.0.11
14 2013-09-25T22:16:37+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:

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

```
```
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 <configuration 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

<table>
<thead>
<tr>
<th>SNo.</th>
<th>User</th>
<th>Client</th>
<th>Time Stamp</th>
<th>Label/ID</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>admin</td>
<td>cli</td>
<td>2013-05-13 10:24:35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>root</td>
<td>cli</td>
<td>2013-05-13 06:30:33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>root</td>
<td>cli</td>
<td>2013-05-13 06:27:15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>root</td>
<td>cli</td>
<td>2013-05-13 06:23:59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>admin</td>
<td>maapi</td>
<td>2013-05-13 06:12:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>admin</td>
<td>maapi</td>
<td>2013-04-24 03:33:57</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>PORT</th>
<th>DEVIDE</th>
<th>DESCRIPTION</th>
<th>MAC ADDRESS</th>
<th>PHY ADDRESS</th>
<th>LNK DESCRIPT</th>
<th>RIC STATE</th>
<th>FY</th>
<th>SPP</th>
<th>SPEED</th>
<th>RX OCTETS</th>
<th>RX PACKETS</th>
<th>RX DUETS</th>
<th>TX OCTETS</th>
<th>TX PACKETS</th>
<th>TX DUETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/0/0</td>
<td>False</td>
<td>00:12:40:0000:00:00</td>
<td>12.01.10.00 40:11.10</td>
<td>55510000</td>
<td>490104</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/0/0</td>
<td>True</td>
<td>00:12:40:0000:00:00</td>
<td>12.01.10.00 40:11.10</td>
<td>55510000</td>
<td>490104</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 RADIUS - 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

table 3-1: Configuring External Server

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

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.

\texttt{aaa authentication login login \{local | none | radius | tacacs\}}

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>login</td>
<td>Select one of the following options:</td>
</tr>
<tr>
<td></td>
<td>- local - AAA functionality is performed locally</td>
</tr>
<tr>
<td></td>
<td>- none - No AAA functionality is configured</td>
</tr>
<tr>
<td></td>
<td>- radius - AAA functionality is performed via RADIUS server</td>
</tr>
<tr>
<td></td>
<td>- tacacs - AAA functionality is performed via TACACS server</td>
</tr>
</tbody>
</table>

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:

\texttt{aaa authentication login login radius local}

3.2.4 Configuring Passwords for Local Users

\texttt{aaa authentication users username password password}

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>users</td>
<td>Local users</td>
</tr>
<tr>
<td>users</td>
<td>Select one of the following options:</td>
</tr>
<tr>
<td></td>
<td>- admin</td>
</tr>
<tr>
<td></td>
<td>- config</td>
</tr>
<tr>
<td></td>
<td>- guest</td>
</tr>
<tr>
<td></td>
<td>See \textit{2.3.1 Local Security Mechanism} on page 12</td>
</tr>
<tr>
<td>password</td>
<td>String</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cmd</strong></td>
<td>For every command an authorization is performed on the selected server.</td>
</tr>
<tr>
<td><strong>server</strong></td>
<td>Select one of the following options:</td>
</tr>
<tr>
<td></td>
<td>- local - AAA functionality is performed locally</td>
</tr>
<tr>
<td></td>
<td>- none - No AA functionality is configured</td>
</tr>
<tr>
<td></td>
<td>- radius - AAA functionality is performed via RADIUS server</td>
</tr>
<tr>
<td></td>
<td>- tacacs - Default. AAA functionality is performed via TACACS server</td>
</tr>
</tbody>
</table>

**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:

```plaintext
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

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

Example

NSG CableOS(config)# system contact 1-800-MPEGTWO description 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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ds-only</td>
<td>Downstream only. Currently only ds-only is supported Default option.</td>
</tr>
</tbody>
</table>
Table 3-6: Configuring System Type

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>two-way</td>
<td>Downstream and upstream</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPv4 address</td>
<td>ipv4 - IP address is as follows: 0.0.0.0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ntp</td>
<td>Synchronize device time with UTC.</td>
</tr>
<tr>
<td>server id</td>
<td>Enter the required server ID By default server ID is 0</td>
</tr>
<tr>
<td>ip</td>
<td>hostname</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>local-time</td>
<td>Allows to manually set device time according either of the following: GMT daylight saving time</td>
</tr>
<tr>
<td>offset</td>
<td>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)</td>
</tr>
<tr>
<td>offset</td>
<td>Enter in minutes the required offset relative to GMT time Integer between -720 to 720 Default: 0</td>
</tr>
<tr>
<td>daylight-saving</td>
<td>Optional.</td>
</tr>
<tr>
<td>daylight-saving</td>
<td>on</td>
</tr>
<tr>
<td>region</td>
<td>If daylight-saving is on, set the required region.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute=Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>snmp</td>
<td>Optional</td>
</tr>
<tr>
<td>community</td>
<td>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.</td>
</tr>
<tr>
<td>community</td>
<td>String 1 to 32 chars. Default: public.</td>
</tr>
<tr>
<td>shutdown</td>
<td>no shutdown - to enable the SNMP server</td>
</tr>
<tr>
<td>notification-receiver</td>
<td>Destination and type of trap.</td>
</tr>
<tr>
<td>server-id</td>
<td>Integer between 1 to 19, or a range.</td>
</tr>
<tr>
<td>ip</td>
<td>the IP Address of the computer to which you wish to forward all SNMP traps from the NSG.</td>
</tr>
</tbody>
</table>
| 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

```plaintext
syslog [shutdown shutdown] server server-id {host host-ip}
```

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

**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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>interface gigabit</strong></td>
<td>Management port</td>
</tr>
<tr>
<td>ethernet-port-index</td>
<td>16/ 20 or 16/21 Currently only NSI 16 is supported.</td>
</tr>
<tr>
<td>description</td>
<td>Optional. A sort description to identify the port.</td>
</tr>
<tr>
<td>shutdown</td>
<td>Not supported for 16/20 Supported for 16/21</td>
</tr>
</tbody>
</table>
| 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**

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>group-id</em></td>
<td>integer. Currently only 0 is a possible value. Default: 0</td>
</tr>
<tr>
<td><em>interface-id</em></td>
<td>Integer slot/ port</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>**interface ten-</td>
<td>12 x 10 GbE input ports</td>
</tr>
<tr>
<td>gigabit**</td>
<td></td>
</tr>
<tr>
<td><em>ten-gigabit-port-index</em></td>
<td>Integer in the following pattern: card/port. Range 16/0 to 16/11. Currently only NSI card16 is supported</td>
</tr>
<tr>
<td><em>description</em></td>
<td>Optional. A sort description to identify the port. Default: 10GbE interface</td>
</tr>
<tr>
<td><em>negotiation</em></td>
<td>{off</td>
</tr>
<tr>
<td><em>refresh-interval</em></td>
<td>Define, in msec, how often to send a Ping request.</td>
</tr>
<tr>
<td><em>refresh-interval</em></td>
<td>Integer between 1000 to 6000 Default: 5000</td>
</tr>
<tr>
<td><em>route-refresh</em></td>
<td>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.</td>
</tr>
<tr>
<td><em>route-refresh</em></td>
<td>{off</td>
</tr>
<tr>
<td><em>shutdown</em></td>
<td>Optional. To enable type no shutdown</td>
</tr>
</tbody>
</table>
Table 3–14: Configuring 10 GbE Input Ports

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| *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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| *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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>cable clock prefer</em></td>
<td>Optional. Applies to Auto revert mode only.</td>
</tr>
</tbody>
</table>
Table 3–16: Preferred DTI Port

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Integer card/port, where: Card 16 or 17, Port: 30 or 31, Default: 16/30</td>
</tr>
</tbody>
</table>

**cable clock redundancy** *(auto | auto-revert | manual)*

Table 3–17: DTI Redundancy

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cable_clock_redundancy</td>
<td>Optional</td>
</tr>
<tr>
<td>auto</td>
<td>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 &quot;active&quot; 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.</td>
</tr>
<tr>
<td>auto-revert</td>
<td>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.</td>
</tr>
<tr>
<td>manual</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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 [description] [operation-mode]
```

**Example**

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

**Table 3-18: Configuring LCs**

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>card</td>
<td>The LC is numbered according to its slot number</td>
</tr>
<tr>
<td>card-id</td>
<td>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.</td>
</tr>
<tr>
<td>card-type</td>
<td>Select the card type</td>
</tr>
<tr>
<td>card-type</td>
<td>(downstream-linecard</td>
</tr>
<tr>
<td>description</td>
<td>Optional.</td>
</tr>
<tr>
<td>description</td>
<td>A short description to identify the card</td>
</tr>
<tr>
<td>operation-mode</td>
<td>Optional, applies to DLCs and ULCs only. Currently only ITU-T Annex B is supported with 40 QAM-RF channels.</td>
</tr>
<tr>
<td>operation-mode</td>
<td>Default: 40b - 40 QAM-RF channels in Annex b.</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>port-id</td>
<td>Range or Integer in the following pattern: slot/port, where slot - 0 - 5 or 8 - 13 port - 0 - 5</td>
</tr>
<tr>
<td>compensation-gain</td>
<td>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.</td>
</tr>
<tr>
<td>compensation-gain</td>
<td>Integer between 0 to 20</td>
</tr>
<tr>
<td>description</td>
<td>Optional.</td>
</tr>
<tr>
<td>description</td>
<td>A short description to identify the port</td>
</tr>
<tr>
<td>max-carriers</td>
<td>Optional. The number of QAM-RFs per port.</td>
</tr>
<tr>
<td>max-carriers</td>
<td>An integer between 0 to 56. Default: 40</td>
</tr>
<tr>
<td>optimized-acp</td>
<td>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.</td>
</tr>
<tr>
<td>optimized-acp</td>
<td>Default: disabled. True false To enable type: no acp optimization</td>
</tr>
<tr>
<td>power-per-qam</td>
<td>Decimal number between 34 to 52. Default: 42</td>
</tr>
<tr>
<td>rf-shutdown</td>
<td>To enable type: no rf-shutdown Default: disabled</td>
</tr>
<tr>
<td>slope-compensation</td>
<td>Once it is enabled, you can configure the compensation gain.</td>
</tr>
<tr>
<td>slope-compensation</td>
<td>(off</td>
</tr>
</tbody>
</table>
Chapter 3 Configuring Chassis Parameters

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>rf-profile-name</td>
<td>String. Enter a name for the RF profile.</td>
</tr>
<tr>
<td>annex</td>
<td>Enter the required ITU-T Annex.</td>
</tr>
<tr>
<td>annex</td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>ITU-T Annex B - This is the mode used in North-American countries. Utilizes bandwidth of 6 MHz per QAM-RF channel.</td>
</tr>
<tr>
<td></td>
<td>ITU-T Annex A - This mode is used mainly in European and Asian countries. Utilizes bandwidth of 8 MHz per QAM-RF channel.</td>
</tr>
<tr>
<td>constellation</td>
<td>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.</td>
</tr>
</tbody>
</table>
Table 3-20: Configuring RF Profile

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 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.                                   |
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.                                   |
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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>qam-id</td>
<td>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</td>
</tr>
<tr>
<td>cw-mode</td>
<td>Optional. Select for testing purposes only. Enabled only when the QAM channel is active.</td>
</tr>
<tr>
<td>cw-mode</td>
<td>(on</td>
</tr>
<tr>
<td>description</td>
<td>Optimal. A short description to identify the QAM.</td>
</tr>
<tr>
<td>description</td>
<td>A String.</td>
</tr>
<tr>
<td>frequency</td>
<td>The center RF frequency (Hz) of this transport stream. You can locate the QAM channel anywhere along the Span window allocated for the QAM</td>
</tr>
<tr>
<td>frequency</td>
<td>Integer</td>
</tr>
<tr>
<td>interleaver-depth-option</td>
<td>(option1</td>
</tr>
<tr>
<td>mode</td>
<td>Optional. The QAM mode, also known as QAM manager.</td>
</tr>
<tr>
<td>depi-dynamic</td>
<td>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.</td>
</tr>
<tr>
<td>depi-static</td>
<td>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.</td>
</tr>
<tr>
<td>docsis</td>
<td>For future use</td>
</tr>
</tbody>
</table>
### Configuring Chassis Parameters

**Chapter 3 Configuring Chassis Parameters**

**Configuring QAMs of a DLC**

For future use

For future use

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 0.1 dB

**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, the EdgeQAM re-stamps the DTI sync packets.

**dti-sync**

{off | on}

Default: off

---

**Table 3-21: Configuring a Downstream QAM**

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ermi</td>
<td>For future use</td>
</tr>
<tr>
<td>isa-video</td>
<td>For future use</td>
</tr>
<tr>
<td>linear-video</td>
<td>For future use</td>
</tr>
<tr>
<td><strong>profile</strong></td>
<td>Defines the RF profile.</td>
</tr>
<tr>
<td><strong>profile</strong></td>
<td>String option# - enter the required profile as defined in 3.15 Configuring RF-Profile on page 38.</td>
</tr>
<tr>
<td><strong>shutdown</strong></td>
<td>Default: QAM is off</td>
</tr>
<tr>
<td><strong>shutdown</strong></td>
<td>To enable type: no shutdown</td>
</tr>
<tr>
<td><strong>ripple-attenuation</strong></td>
<td>Optional. Flattens the residual frequency ripple/tilt.</td>
</tr>
<tr>
<td><strong>ripple-attenuation</strong></td>
<td>Decimal between 0-2 dB with steps of 0.1 dB</td>
</tr>
<tr>
<td><strong>spectral-inversion</strong></td>
<td>An advanced QAM parameter</td>
</tr>
<tr>
<td><strong>spectral-inversion</strong></td>
<td>on</td>
</tr>
<tr>
<td><strong>tsid</strong></td>
<td>Indicated the TS ID that carries the QAM</td>
</tr>
<tr>
<td><strong>offset</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>offset</strong></td>
<td>Integer.</td>
</tr>
<tr>
<td><strong>offset</strong></td>
<td>Default: 0</td>
</tr>
<tr>
<td><strong>dti-sync</strong></td>
<td>Synchronizes between the NSG and the DTI clock. When On is selected, the EdgeQAM re-stamps the DTI sync packets.</td>
</tr>
<tr>
<td><strong>dti-sync</strong></td>
<td>{off</td>
</tr>
<tr>
<td><strong>dti-sync</strong></td>
<td>Default: off</td>
</tr>
</tbody>
</table>
Chapter 3 Configuring Chassis Parameters

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>mcmts-session</td>
<td>Optional. Applies to QAM mode depi-static only.</td>
</tr>
<tr>
<td>depi-remote-ip</td>
<td>L2TP Session ID</td>
</tr>
<tr>
<td>dest-ip</td>
<td>The input GbE port over which the sessions flows into the device.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>card-id</td>
<td>Integer between: 0 to 5, 9 to 13</td>
</tr>
</tbody>
</table>

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]
```

### Table 3-24: Input GbE Port Redundancy

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>port-id</code></td>
<td>Integer in the following pattern: <code>card/port</code>. Range 16/0 to 16/11. Currently only NSI card16 is supported.</td>
</tr>
<tr>
<td><code>backup-port</code></td>
<td>Integer in the following pattern: <code>card/port</code>. Range 16/0 to 16/11. Currently only NSI card16 is supported.</td>
</tr>
<tr>
<td><code>same-ip</code></td>
<td>Optional. The backup port assumes the IP address of the primary port.</td>
</tr>
</tbody>
</table>
| `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
```
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**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Required Card/Module</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining Management IP</td>
<td>NSI module</td>
<td>4.2.1 Configuring Management Ports on page 46</td>
</tr>
<tr>
<td>Enabling DTI ports</td>
<td></td>
<td>4.2.2 Configuring DTI Ports on page 46</td>
</tr>
<tr>
<td>Configuring GbE input ports:</td>
<td></td>
<td>4.2.3 Configuring GbE Ports on page 46</td>
</tr>
<tr>
<td> IP configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td> General configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td> Port redundancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF configuration</td>
<td>DLCs</td>
<td>See 4.2.4 Configuring an LC as a DLC on page 46</td>
</tr>
<tr>
<td> Num of QAMs per port</td>
<td></td>
<td></td>
</tr>
<tr>
<td> Amplitude</td>
<td></td>
<td></td>
</tr>
<tr>
<td> Constellation, interleaver etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td> RF ON/OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td> Redundancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configuring L2TP sessions</td>
<td></td>
<td>See 4.2.5 Configuring M-CMTS Sessions on page 47</td>
</tr>
</tbody>
</table>
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)# speed 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 range] [description description] [ip-address ip] [negotiation negotiation] [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
Chapter 4 Configuring Applications Monitoring M-CMTS Configuration and Sessions

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

<table>
<thead>
<tr>
<th>QAM ID</th>
<th>ID</th>
<th>FREQUENCY</th>
<th>DTI SYNC</th>
<th>OFFSET</th>
<th>DEPI</th>
<th>DEPI IP</th>
<th>BANDWIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/1/0</td>
<td>50200</td>
<td>231000000</td>
<td>true</td>
<td>0</td>
<td></td>
<td></td>
<td>10.50.14.100</td>
</tr>
</tbody>
</table>

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
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
```

<table>
<thead>
<tr>
<th>INDEX</th>
<th>ASSERT TIME</th>
<th>SEVERITY</th>
<th>SOURCE MODULE</th>
<th>ALARM DESCRIPTION</th>
<th>SNMP OID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Power-Supply:0</td>
<td>Power Supply Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.10</td>
</tr>
<tr>
<td>2</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Power-Supply:1</td>
<td>Power Supply Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.10</td>
</tr>
<tr>
<td>3</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Power-Supply:2</td>
<td>Power Supply Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.10</td>
</tr>
<tr>
<td>4</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Power-Supply:3</td>
<td>Power Supply Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.10</td>
</tr>
<tr>
<td>5</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:1</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.273</td>
</tr>
<tr>
<td>6</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:2</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.273</td>
</tr>
<tr>
<td>7</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>rentPort:0</td>
<td>ETH Port Link Down</td>
<td>1.3.6.1.4.1.1863.1.2.0.76</td>
</tr>
<tr>
<td>8</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:0</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.273</td>
</tr>
<tr>
<td>9</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>REBoard:0</td>
<td>IO Board Voltage Error</td>
<td>1.3.6.1.4.1.1863.1.2.0.201</td>
</tr>
<tr>
<td>10</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:3</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.279</td>
</tr>
<tr>
<td>11</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:4</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.279</td>
</tr>
<tr>
<td>12</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>SSWITCH:5</td>
<td>RF Switch Card Missing</td>
<td>1.3.6.1.4.1.1863.1.2.0.279</td>
</tr>
<tr>
<td>13</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Platform:0</td>
<td>Fan 0 Failure</td>
<td>1.3.6.1.4.1.1863.1.2.0.11</td>
</tr>
<tr>
<td>14</td>
<td>2013-08-25T2:16:35+00:00</td>
<td>critical</td>
<td>Platform:0</td>
<td>Fan 1 Failure</td>
<td>1.3.6.1.4.1.1863.1.2.0.12</td>
</tr>
</tbody>
</table>

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.
The table lists the alarm history as follows:

<table>
<thead>
<tr>
<th>Assert Time</th>
<th>Source Module</th>
<th>Alarm Description</th>
<th>SNMP OID</th>
<th>Alarm Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/12/2013 21:42:05 MainBoard</td>
<td>Nearing High Temperature (ARREL_IEC_TEMP)</td>
<td>1.3.6.1.4.1.1563.1.2.0.29</td>
<td>on</td>
<td></td>
</tr>
<tr>
<td>05/12/2013 21:42:04 MainBoard</td>
<td>Nearing High Temperature</td>
<td>1.3.6.1.4.1.1563.1.2.0.29</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>05/12/2013 21:42:04 MainBoard</td>
<td>Nearing High Temperature (ARREL_IEC_TEMP)</td>
<td>1.3.6.1.4.1.1563.1.2.0.29</td>
<td>on</td>
<td></td>
</tr>
<tr>
<td>05/12/2013 21:42:04 MainBoard</td>
<td>Nearing High Temperature</td>
<td>1.3.6.1.4.1.1563.1.2.0.29</td>
<td>off</td>
<td></td>
</tr>
</tbody>
</table>

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.
For each entity you can view the following:

Table 5-1: Entity Attributes

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

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

show ip interface

This command allows you to monitor Ethernet port information with focus on the IP parameters:
Table 5-2: 10 GbE Ports and Management Ports

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

You can view DTI server, client and port parameters.

**Table 5-3: DTI Port Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port number</td>
<td>DTI port number.</td>
</tr>
<tr>
<td>Port Status</td>
<td>Indicates whether active.</td>
</tr>
<tr>
<td>Signal Detected</td>
<td>Indicates whether a DTI signal is detected.</td>
</tr>
<tr>
<td>CRC Error Count</td>
<td>The number of cyclic redundancy check (CRC) errors.</td>
</tr>
<tr>
<td>Frame Error</td>
<td>Indicates the Frame Error Rate as follows: Below 2%, 2% to 5%, or Over 5%.</td>
</tr>
<tr>
<td>Cable Advance</td>
<td>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.</td>
</tr>
</tbody>
</table>

**show cable-clock**

```plaintext
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 7567935933
cable-clock client client-phase-correction 0
cable-clock client client-normale-time 0
cable-clock client client-holdover-time 0
cable-clock client client-transition-t1-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-cfo-value 0
cable-clock frame frame-status 0
cable-clock frame frame-tx-status 0
cable-clock frame frame-delay 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
  N/A
system management-ip
  19
system alarm-count
system warning-count
system uptime
system total-input-bitrate
system total-output-bitrate
```

### 5.7 Monitoring CableOS

```
show cli
```

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

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

```
NSG CableOS# show cli
  False
complete-on-space
  False
display-level
  100
  idle-timeout
  1800
ignore-leading-space
  False
output-file
  terminal
paginate
  True
prompt1
  NSG CableOS
prompt2
  NSG CableOS
screen-length
  64
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
### 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>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>QAM ID</td>
<td>The QAM ID card/port/qam</td>
</tr>
<tr>
<td>DEPI Remote ID</td>
<td>The number of the DEPI session</td>
</tr>
<tr>
<td>Frequency</td>
<td>The configured frequency of the session</td>
</tr>
<tr>
<td>DTI Sync</td>
<td>Indicates whether active or not:</td>
</tr>
<tr>
<td></td>
<td>True - active</td>
</tr>
<tr>
<td></td>
<td>False - inactive</td>
</tr>
<tr>
<td>DEPI Offset</td>
<td>Indicates the offset configured value.</td>
</tr>
<tr>
<td>DEPI IP</td>
<td>The IP of the input port over which the session flows into the system</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>Indicates the current output bitrate</td>
</tr>
</tbody>
</table>

#### Table 5-5: Static DEPI Sessions

<table>
<thead>
<tr>
<th>No.</th>
<th>User</th>
<th>QAM</th>
<th>Time Stamp</th>
<th>Label</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-27</td>
<td>11:29:11</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-27</td>
<td>11:28:28</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>07:53:16</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>10:23:08</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>12:16:09</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>12:11:14</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>11:22:21</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>11:21:14</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-25</td>
<td>11:09:40</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-22</td>
<td>11:51:55</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-22</td>
<td>07:46:11</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-22</td>
<td>06:29:24</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>11:15:14</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>admin</td>
<td>maspi</td>
<td>2013-08-21</td>
<td>11:14:09</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>11:10:23</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:51:31</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:50:55</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:48:52</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:46:23</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:45:36</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>admin</td>
<td>cli</td>
<td>2013-08-21</td>
<td>10:41:59</td>
<td></td>
</tr>
</tbody>
</table>
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

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

<table>
<thead>
<tr>
<th>TUNNEL ID</th>
<th>CORE DEVICE ADDRESS</th>
<th>EDGE DEVICE ADDRESS</th>
<th>SESSION ID</th>
<th>TSTD</th>
<th>QAM ID</th>
<th>DPR TYPE</th>
<th>STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1039674223</td>
<td>1.1.1.1</td>
<td>1.1.1.2</td>
<td>1252002111</td>
<td>3701</td>
<td>13/0/4</td>
<td>primary</td>
<td>established</td>
</tr>
<tr>
<td>1252016705</td>
<td>3713</td>
<td>13/0/16</td>
<td>primary</td>
<td>established</td>
<td>3704</td>
<td>13/0/7</td>
<td>primary</td>
</tr>
<tr>
<td>1252015944</td>
<td>3709</td>
<td>13/0/11</td>
<td>primary</td>
<td>established</td>
<td>3715</td>
<td>13/0/18</td>
<td>primary</td>
</tr>
<tr>
<td>1252014778</td>
<td>3703</td>
<td>13/0/5</td>
<td>primary</td>
<td>established</td>
<td>3717</td>
<td>13/0/20</td>
<td>primary</td>
</tr>
<tr>
<td>1252014468</td>
<td>3717</td>
<td>13/0/20</td>
<td>primary</td>
<td>established</td>
<td>3707</td>
<td>13/0/10</td>
<td>primary</td>
</tr>
<tr>
<td>1252016563</td>
<td>3700</td>
<td>13/0/3</td>
<td>primary</td>
<td>established</td>
<td>3720</td>
<td>13/0/23</td>
<td>primary</td>
</tr>
<tr>
<td>1252015702</td>
<td>3722</td>
<td>13/0/22</td>
<td>primary</td>
<td>established</td>
<td>3712</td>
<td>13/0/15</td>
<td>primary</td>
</tr>
<tr>
<td>1252014566</td>
<td>3714</td>
<td>13/0/17</td>
<td>primary</td>
<td>established</td>
<td>3719</td>
<td>13/0/22</td>
<td>primary</td>
</tr>
<tr>
<td>1252014217</td>
<td>3711</td>
<td>13/0/14</td>
<td>primary</td>
<td>established</td>
<td>3710</td>
<td>13/0/13</td>
<td>primary</td>
</tr>
<tr>
<td>1252014912</td>
<td>3710</td>
<td>13/0/13</td>
<td>primary</td>
<td>established</td>
<td>3710</td>
<td>13/0/13</td>
<td>primary</td>
</tr>
<tr>
<td>1252015905</td>
<td>3709</td>
<td>13/0/12</td>
<td>primary</td>
<td>established</td>
<td>3709</td>
<td>13/0/13</td>
<td>primary</td>
</tr>
<tr>
<td>1252015384</td>
<td>3707</td>
<td>13/0/6</td>
<td>primary</td>
<td>established</td>
<td>3715</td>
<td>13/0/19</td>
<td>primary</td>
</tr>
<tr>
<td>1252015387</td>
<td>3715</td>
<td>13/0/9</td>
<td>primary</td>
<td>established</td>
<td>3705</td>
<td>13/0/8</td>
<td>primary</td>
</tr>
<tr>
<td>1252014906</td>
<td>3705</td>
<td>13/0/8</td>
<td>primary</td>
<td>established</td>
<td>3720</td>
<td>13/0/2</td>
<td>primary</td>
</tr>
<tr>
<td>1252014794</td>
<td>3720</td>
<td>13/0/2</td>
<td>primary</td>
<td>established</td>
<td>3719</td>
<td>13/0/21</td>
<td>primary</td>
</tr>
</tbody>
</table>

117746005585 10.30.10.10 10.30.10.11 | 1252002507 2631 8/0/14 | primary established | 1252004510 2635 8/0/16 | primary established |
1252003024 2638 8/0/1 | primary established |
5.13 **CableOS Command History**

```markdown
show history
```

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

Table 5-7: show history

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>hh:mm:ss</td>
</tr>
<tr>
<td>Command</td>
<td>The executed CableOS command</td>
</tr>
</tbody>
</table>

NSG CableOS# show history
11:20:33 -- show ip interface |tab
11:20:33 -- show system |tab
11:20:33 -- show cli
11:20:33 -- show clock |tab
11:20:33 -- show confd-state
11:20:33 -- show configuration
11:20:33 -- show configuration commit
11:20:33 -- show configuration list
11:20:33 -- show configuration commit list
11:20:33 -- show date-and-time
12:02:26 -- show depl static |tab
12:02:26 -- show depl tunnel |tab
12:02:26 -- show history

5.14 **Show Redundancy Switches**

```markdown
show redundancy linecard
```

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

Table 5-8: Show Redundancy Linecard Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>yyyy-mm-ddThh:mm:ss+GMT</td>
</tr>
<tr>
<td>LC Switchover</td>
<td>From LC # to LC #</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>LINECARD</th>
<th>SWITCHOVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-08-27T11:34:13+00:00</td>
<td>13</td>
<td>--&gt; 8</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The username</td>
</tr>
<tr>
<td>UID</td>
<td>Shows the user ID</td>
</tr>
<tr>
<td>GID</td>
<td>Shows the group ID</td>
</tr>
<tr>
<td>Password</td>
<td>Shows the password. The password is encrypted.</td>
</tr>
<tr>
<td>SSH KEYDIR</td>
<td>Shows the key directory</td>
</tr>
<tr>
<td>HomeDIR</td>
<td>Shows the working directory of the user</td>
</tr>
</tbody>
</table>

```
NSG CableOS# show running-config aaa
NAME     UID    GID    PASSWORD                       SSH_KEYDIR     HOMEDIR
admin    0      9000   \$1f4a$2f17e1f70c5e60dc5d3b5//x0w/ /home/admin   /home/admin
config   0      9000   \$1f4a$2f17e1f70c5e60dc5d3b5//x0w/ /home/config   /home/config
guest    0      9000   \$1f4a$2f17e1f70c5e60dc5d3b5//x0w/ /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
 cable chassis-type dx-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

<table>
<thead>
<tr>
<th>SLOT NUMBER</th>
<th>CARD TYPE</th>
<th>OPERATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dlc-8</td>
</tr>
<tr>
<td>5</td>
<td>src</td>
<td>-</td>
<td>SRE card</td>
</tr>
<tr>
<td>8</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dlc-8</td>
</tr>
<tr>
<td>13</td>
<td>downstream-linecard</td>
<td>40b</td>
<td>dlc-13</td>
</tr>
<tr>
<td>16</td>
<td>nsi</td>
<td>-</td>
<td>NSI card</td>
</tr>
</tbody>
</table>
```

**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

| PORT INDEX | DESCRIPTION SHUTDOWN SPEED NEGOTIATION IP ADDRESS NETMASK ROUTE REFRESH REFRESH INTERVAL |
|------------|-----------------------|----------------|-------------------------|-----------------|-----------------|-----------------|------------------|
| 16/0       | 10GB interface false 100BaseT off 10.50.10.10 255.255.255.0 off -                  |
| 16/1       | 10GB interface false 100BaseT off 10.50.10.10 255.255.255.0 off -                  |
| 16/2       | 10GB interface false 100BaseT off 10.30.3.100 255.255.255.0 off -                 |
| 16/3       | 10GB interface false 100BaseT off 10.30.3.104 255.255.255.0 off -                 |
| 16/4       | 10GB interface false 100BaseT off 10.30.3.105 255.255.255.0 off -                 |
| 16/5       | 10GB interface false 100BaseT off 10.30.3.106 255.255.255.0 off -                 |
| 16/6       | 10GB interface false 100BaseT off 10.30.3.107 255.255.255.0 off -                 |
| 16/7       | 10GB interface false 100BaseT off 10.30.3.109 255.255.255.0 off -                 |
| 16/8       | 10GB interface false 100BaseT off 10.30.3.110 255.255.255.0 off -                 |
| 16/9       | 10GB interface false 100BaseT off 10.30.3.111 255.255.255.0 off -                 |
| 16/10      | 10GB interface false 100BaseT off 10.30.3.112 255.255.255.0 off -                 |
| 16/11      | 10GB interface false 100BaseT off 10.30.3.113 255.255.255.0 off -                 |

<table>
<thead>
<tr>
<th>PORT INDEX</th>
<th>SHUTDOWN IP ADDRESS NETMASK</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/20</td>
<td>false 10.30.4.100 255.255.255.0</td>
</tr>
<tr>
<td>16/21</td>
<td>true 10.30.4.101 255.255.255.0</td>
</tr>
</tbody>
</table>
```

**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 cff
```

**show running-config management-bonding-group**
Chapter 5 Monitoring and Troubleshooting

Show Running Configuration

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 1-006-MFESTMO
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

<table>
<thead>
<tr>
<th>PORT</th>
<th>INDEX</th>
<th>DESCRIPTION</th>
<th>SHUTDOWN</th>
<th>SPEED</th>
<th>NEGOTIATION</th>
<th>IP ADDRESS</th>
<th>NETMASK</th>
<th>ROUTE</th>
<th>REFRESH</th>
<th>INTERVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/0</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.50.10.100</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/1</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.50.12.100</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/2</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.101</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/3</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.104</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/4</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.105</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/5</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.106</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/6</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.107</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/7</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.108</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/8</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.109</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/9</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.110</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/10</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.111</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16/14</td>
<td>10GBE interface</td>
<td>false</td>
<td>100BaseT</td>
<td>off</td>
<td>10.30.4.112</td>
<td>255.255.255.0</td>
<td>off</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

```
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 cff
```

```
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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device current time</td>
<td>System current time</td>
</tr>
<tr>
<td>Device Uptime</td>
<td>System uptime</td>
</tr>
<tr>
<td>NSG Pro</td>
<td>Released version installed</td>
</tr>
<tr>
<td>SRE</td>
<td>Per each SRE:</td>
</tr>
<tr>
<td></td>
<td>■ Firmware version</td>
</tr>
<tr>
<td></td>
<td>■ LLC version</td>
</tr>
<tr>
<td>NSI</td>
<td>Per each NSI:</td>
</tr>
<tr>
<td></td>
<td>■ ST version</td>
</tr>
<tr>
<td>DLC</td>
<td>ST version per each DLC</td>
</tr>
</tbody>
</table>
### Table 5–10: Show Versions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Per each processor:</td>
</tr>
<tr>
<td></td>
<td>• ID</td>
</tr>
<tr>
<td></td>
<td>• Vendor ID</td>
</tr>
<tr>
<td></td>
<td>• Model name</td>
</tr>
<tr>
<td></td>
<td>• Cache size</td>
</tr>
<tr>
<td></td>
<td>• CPU cores</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot-id</td>
<td>integer 0-5, 8-13</td>
</tr>
</tbody>
</table>

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

Example
Chapter 6 Action Commands

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>slot-id</td>
<td>integer 0-5, 8-13</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>linecard</td>
<td>Linecard redundancy switch</td>
</tr>
<tr>
<td><code>card-id</code></td>
<td>Integer between: 0 to 5, 9 to 13</td>
</tr>
<tr>
<td><code>ten-gigabit</code></td>
<td>Input port redundancy switch</td>
</tr>
<tr>
<td><code>port-id</code></td>
<td>Integer in the following pattern: card/port. Range 16/0 to 16/11. Currently only NSI card16 is supported</td>
</tr>
<tr>
<td><code>from</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>card-id</code></td>
<td>The primary linecard</td>
</tr>
<tr>
<td><code>port-id</code></td>
<td>The primary port</td>
</tr>
</tbody>
</table>

**Example**

```
NSG CableOS# switchover ten-gigabit from 16/8
Are you sure? [yes, no] yes
```
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>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>transfer-method</td>
<td>The transfer protocol</td>
</tr>
<tr>
<td>transfer-method TFTP only</td>
<td></td>
</tr>
<tr>
<td>version-file-name</td>
<td>The firmware file</td>
</tr>
<tr>
<td>file</td>
<td>File name is as follows:</td>
</tr>
<tr>
<td></td>
<td>NSGPRO-x.x.x.x.iso</td>
</tr>
<tr>
<td>host</td>
<td>The TFTP server</td>
</tr>
<tr>
<td>file</td>
<td>The IP address of the TFTP server</td>
</tr>
<tr>
<td>finalize-mode</td>
<td>Upgrade finalizing stage</td>
</tr>
<tr>
<td>manual - reboot manually</td>
<td>using the command:</td>
</tr>
<tr>
<td>automatic - the device</td>
<td>reboots with the new installed firmware</td>
</tr>
<tr>
<td>final-mode automatic -</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The backup port of port 16/8 is active.
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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| `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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>hostname</code></td>
<td>The IP address or name of the TFTP server</td>
</tr>
</tbody>
</table>
| `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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>file name</td>
<td>The name of the file you wish to copy</td>
</tr>
<tr>
<td>destination</td>
<td>The directory to copy to the file</td>
</tr>
</tbody>
</table>

Example
NSG CableOS# file copy
<cr>

7.4 File Move

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

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>file name</td>
<td>The name of the file you wish to move</td>
</tr>
<tr>
<td>destination</td>
<td>The directory to move to the file</td>
</tr>
</tbody>
</table>

Example

NSG CableOS# file copy
<cr>

### 7.5 Create a Directory

Allows to create a directory in the working directory.

```
file create directory name
```

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>file name</td>
<td>The new directory</td>
</tr>
</tbody>
</table>

Example

NSG CableOS# file create test
<cr>

### 7.6 Rename a File

Allows to rename a file.

```
file rename name new name
```

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>file name</td>
<td>The original file name</td>
</tr>
<tr>
<td>new name</td>
<td>The new name</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>filename</td>
<td>Indicate the configuration file</td>
</tr>
<tr>
<td>element</td>
<td>Optional. Indicate the specific element its configuration you wish to compare</td>
</tr>
</tbody>
</table>

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, 10:27, 0 users, load average: 0.10, 0.06, 0.12
Tasks: 63 total, 1 running, 72 sleeping, 0 stopped, 3 zombie
%Cpu(s): 3.0 us, 0.3 sy, 0.0 ni, 96.8 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem: 6200116 total, 2140316 used, 6059800 free, 44040 buffers
KiB Swap: 0 total, 0 used, 0 free, 139944 cached

<table>
<thead>
<tr>
<th>PID</th>
<th>USER</th>
<th>PRI</th>
<th>NI</th>
<th>VIRT</th>
<th>RES</th>
<th>SHR</th>
<th>S</th>
<th>%CPU</th>
<th>%MEM</th>
<th>TIME+</th>
<th>COMMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>3358</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>2494m</td>
<td>1.87</td>
<td>948s</td>
<td>S</td>
<td>5.6</td>
<td>22.6</td>
<td>3882219</td>
<td>kmsg.bin</td>
</tr>
<tr>
<td>21</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.3</td>
<td>0.0</td>
<td>30:15.89</td>
<td>kworker/1:1</td>
</tr>
<tr>
<td>1</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>2200</td>
<td>732</td>
<td>620</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:14.96</td>
<td>init</td>
</tr>
<tr>
<td>2</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:00.15</td>
<td>kthreadd</td>
</tr>
<tr>
<td>3</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:24.27</td>
<td>ksoftirqd/0</td>
</tr>
<tr>
<td>6</td>
<td>root</td>
<td>rt</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:00.44</td>
<td>migration/0</td>
</tr>
<tr>
<td>7</td>
<td>root</td>
<td>rt</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:18.29</td>
<td>watchdog/0</td>
</tr>
<tr>
<td>8</td>
<td>root</td>
<td>rt</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:00.35</td>
<td>migration/1</td>
</tr>
<tr>
<td>10</td>
<td>root</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:01.01</td>
<td>ksoftirqd/1</td>
</tr>
<tr>
<td>12</td>
<td>root</td>
<td>rt</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:03.79</td>
<td>watchdog/1</td>
</tr>
<tr>
<td>13</td>
<td>root</td>
<td>0</td>
<td>-20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:00.00</td>
<td>cpuset</td>
</tr>
<tr>
<td>14</td>
<td>root</td>
<td>0</td>
<td>-20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>S</td>
<td>0.0</td>
<td>0.0</td>
<td>0:00.00</td>
<td>khelper</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>logout</td>
<td>Allows to terminate the session.</td>
</tr>
</tbody>
</table>
### Terminating a Session

**quit exit**

In Operational mode, allows to quit the current session.

### Terminating Configuration Mode

**exit**

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

### To Negate a Command

**no**

Allows to negate a command.

### 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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>message</td>
<td>The message should be a single word or a few words separated by a hyphen.</td>
</tr>
</tbody>
</table>

Example

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
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

<table>
<thead>
<tr>
<th>Attribute/Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>size</code></td>
<td>Integer between 0 to 1000.</td>
</tr>
</tbody>
</table>
# 9.1 Configuration Command Reference

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>aaa authorization cmd</code></td>
<td>page 25</td>
</tr>
<tr>
<td><code>aaa authentication login</code></td>
<td>page 25</td>
</tr>
<tr>
<td><code>aaa authentication users</code></td>
<td>page 25</td>
</tr>
<tr>
<td><code>alias</code></td>
<td>page 22</td>
</tr>
<tr>
<td><code>cable chassis-type</code></td>
<td>page 27</td>
</tr>
<tr>
<td><code>cable clock</code></td>
<td>page 34</td>
</tr>
<tr>
<td><code>card</code></td>
<td>page 36</td>
</tr>
<tr>
<td><code>cable downstream port</code></td>
<td>page 37</td>
</tr>
<tr>
<td><code>cable downstream qam</code></td>
<td>page 40 page 42</td>
</tr>
<tr>
<td><code>cable downstream rf-profile</code></td>
<td>page 38</td>
</tr>
<tr>
<td><code>commit</code></td>
<td>page 13</td>
</tr>
<tr>
<td><code>config exclusive</code></td>
<td>page 17</td>
</tr>
<tr>
<td><code>default-gateway</code></td>
<td>page 28</td>
</tr>
<tr>
<td><code>interface gigabit</code></td>
<td>page 33</td>
</tr>
<tr>
<td><code>interface ten-gigabit</code></td>
<td>page 33</td>
</tr>
<tr>
<td><code>local-time</code></td>
<td>page 29</td>
</tr>
<tr>
<td><code>management-bonding-group</code></td>
<td>page 33</td>
</tr>
<tr>
<td><code>ntp</code></td>
<td>page 28</td>
</tr>
<tr>
<td><code>radius-server</code></td>
<td>page 23</td>
</tr>
<tr>
<td><code>redundancy</code></td>
<td>page 42</td>
</tr>
<tr>
<td><code>rollback</code></td>
<td>page 21</td>
</tr>
</tbody>
</table>
Table 9-1: Configuration Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>snmp</td>
<td>page 29</td>
</tr>
<tr>
<td>syslog</td>
<td>page 31</td>
</tr>
<tr>
<td>system</td>
<td>page 27</td>
</tr>
</tbody>
</table>

Tacacs-server

T

Table 9-2: Show Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>show</td>
<td>page 18</td>
</tr>
<tr>
<td>show-defaults</td>
<td>page 76</td>
</tr>
<tr>
<td>show alarm</td>
<td>page 48</td>
</tr>
<tr>
<td>show arp</td>
<td>page 73</td>
</tr>
<tr>
<td>show cable-clock</td>
<td>page 52</td>
</tr>
<tr>
<td>show cli</td>
<td>page 53</td>
</tr>
<tr>
<td>show clock</td>
<td>page 54</td>
</tr>
<tr>
<td>show configuration commit list</td>
<td>page 54</td>
</tr>
<tr>
<td>show date-and-time</td>
<td>page 54</td>
</tr>
<tr>
<td>show depi static</td>
<td>page 55</td>
</tr>
<tr>
<td>show depi tunnel</td>
<td>page 56</td>
</tr>
<tr>
<td>show history</td>
<td>page 57</td>
</tr>
<tr>
<td>show interface</td>
<td>page 50</td>
</tr>
<tr>
<td>show ip interface</td>
<td>page 50</td>
</tr>
<tr>
<td>show inventory</td>
<td>page 49</td>
</tr>
<tr>
<td>show logs</td>
<td>page 48</td>
</tr>
<tr>
<td>show redundancy linecard</td>
<td>page 57</td>
</tr>
<tr>
<td>show running-config</td>
<td>page 58</td>
</tr>
<tr>
<td>show startup-config</td>
<td>page 61</td>
</tr>
<tr>
<td>show system</td>
<td>page 52</td>
</tr>
<tr>
<td>show tech-support</td>
<td>page 62</td>
</tr>
<tr>
<td>show versions</td>
<td>page 62</td>
</tr>
</tbody>
</table>
## 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>
<thead>
<tr>
<th>Command</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A autowizard</td>
<td>page 72</td>
</tr>
<tr>
<td>C cable</td>
<td>page 64</td>
</tr>
<tr>
<td>clear-logs</td>
<td>page 64</td>
</tr>
<tr>
<td>compare</td>
<td>page 72</td>
</tr>
<tr>
<td>config</td>
<td>page 17</td>
</tr>
<tr>
<td>copy</td>
<td>page 13</td>
</tr>
<tr>
<td>H help</td>
<td>page 72</td>
</tr>
<tr>
<td>history</td>
<td>page 76</td>
</tr>
<tr>
<td>F file</td>
<td>page 70</td>
</tr>
<tr>
<td>I id</td>
<td>page 74</td>
</tr>
<tr>
<td>idle-timeout</td>
<td>page 74</td>
</tr>
<tr>
<td>ifconfig</td>
<td>page 68</td>
</tr>
<tr>
<td>L logout</td>
<td>page 74</td>
</tr>
<tr>
<td>N no</td>
<td>page 75</td>
</tr>
<tr>
<td>P ping</td>
<td>page 65</td>
</tr>
<tr>
<td>Q quit</td>
<td>page 75</td>
</tr>
<tr>
<td>R repeat</td>
<td>page 21</td>
</tr>
<tr>
<td>rollback</td>
<td>page 21</td>
</tr>
<tr>
<td>reboot</td>
<td>page 66</td>
</tr>
<tr>
<td>restore-factory-settings</td>
<td>page 65</td>
</tr>
<tr>
<td>S send</td>
<td>page 75</td>
</tr>
<tr>
<td>set-clock</td>
<td>page 68</td>
</tr>
<tr>
<td>source</td>
<td>page 73</td>
</tr>
<tr>
<td>sw-upgrade</td>
<td>page 67</td>
</tr>
<tr>
<td>sw-upgrade-finalize-and-reboot</td>
<td>page 67</td>
</tr>
<tr>
<td>switchover</td>
<td>page 66</td>
</tr>
</tbody>
</table>
## Table 9-3: Operational Command Reference

<table>
<thead>
<tr>
<th>Command</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>T tcpdump</td>
<td>page 69</td>
</tr>
<tr>
<td>tftp</td>
<td>page 69</td>
</tr>
<tr>
<td>timestamp</td>
<td>page 73</td>
</tr>
<tr>
<td>top</td>
<td>page 73</td>
</tr>
<tr>
<td>traceroute</td>
<td>page 74</td>
</tr>
<tr>
<td>W who</td>
<td>page 74</td>
</tr>
</tbody>
</table>