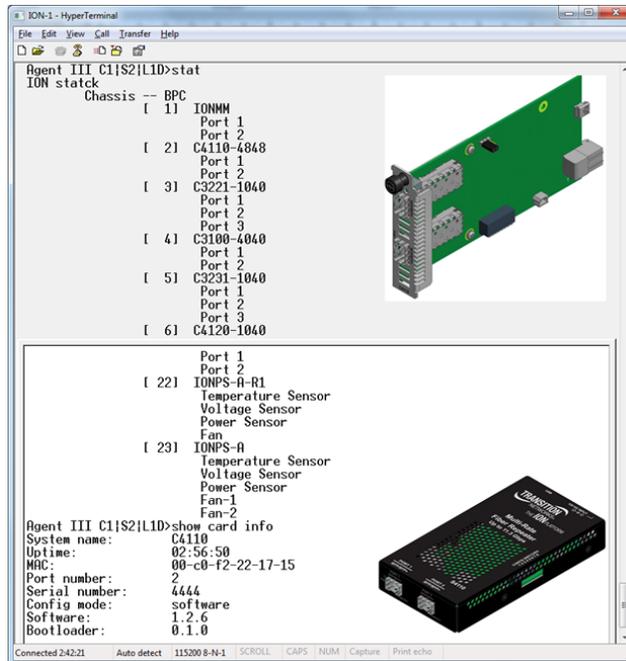# ION System x4110 Series

10 Gbps Fiber-to-Fiber Converter

Slide-in-Card and NID

Command Line Interface (CLI)

Reference Manual

33575 Rev. B

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ION System x4110 Series NID CLI Reference, 33575 Rev. B

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Revision History

Rev	Date	Description
A	03/02/15	Initial release for v 1.2.4.
B	10/17/16	Update for C4110 v1.2.6; add Vendor Specific Info to DMI; update CLI with go to slot and port (go s=12 l1p=1 and go l1p=2); update contact information.

Table of Contents

Tables

General

This manual describes the USB and Telnet command line interface (CLI) commands available for ION x4110 operation in an ION System chassis. This manual is for experienced network administrators who are responsible for configuring and maintaining the ION system.

These devices can be managed via Command Line Interface (CLI), Web interface, or Telnet. Access is through the IONMM (ION Management Module), also installed in the ION chassis. See the related *x4110 Installation Guide* or locate it on the web at http://www.transition.com, then click on Products/Product Finder to locate the manual.

For S4110 and C4110 models, product description, features, applications, manageable features and protocols, refer to the model-specific Install guide manual.

The x4110 is delivered with a default configuration. You can change the configuration via the Web interface, Focal Point 3.0, and the CLI.

The CLI offers the most comprehensive set of management features. The CLI is used during the initial setup, configuration, and troubleshooting, but can also be used for day-to-day management (device management, firmware upgrades, managing security features, etc.).

CLI commands are case sensitive. Enter the CLI commands as shown in this document.

In order to execute the CLI commands described in this manual, you must press the **Enter** key after the command has been entered.

Documentation Conventions

The conventions used within this manual for commands/input entries are described in the table below.

Table 1: Documentation Conventions

Convention	Meaning
Boldface text	Indicates the entry must be made as shown. For example: 　　**ipaddr=<**addr> In the above, only **ipaddr=** must be entered exactly as you see it, including the equal sign (=).
< >	Arrow brackets indicate a value that must be supplied by you. Do not enter the symbols < >. For example: 　　**ipaddr=<**addr> In place of <addr> you must enter a valid IP address.
[ ]	Indicates an optional keyword or parameter. For example: 　　**go** [**s=**<xx>] In the above, **go** must be entered, but **s=** does not have to be.
{ } |	Indicates that a choice must be made between the items shown in the braces. The choices are separated by the | symbol. For example: 　　**state=**{**enable** | **disable**} Enter **state=enable** or state**=disable**.
" "	Indicates that the parameter must be entered in quotes. For example: 　　**time=**<"value"> Enter **time="20100115 13:15:00"**.
>	Indicates a selection string. For example: 　　Select **File>Save**. This means to first select/click **File** then select/click **Save**.

Related Manuals

A printed documentation card is shipped with each x4110 device. Context-sensitive Help screens, as well as cursor-over-help (COH) facilities are built into the Web interface. A substantial set of technical documents, white papers, case studies, etc. are available on the Transition Networks web site at https://www.transition.com. Note that this manual provides links to third part web sites for which Transition Networks is not responsible. Other ION system and related device manuals are listed below.

- Product Documentation Postcard, 33504
- C4110 Install Guide, 33572
- S4110 Install Guide, 33573
- x4110 Web User Guide, 33574
- x4110 CLI Reference, 33575 (this manual)
- Focal Point™ 3.0 Management Application User Guide, 33293
- ION Management Module (IONMM) User Guide, 33457 and Install Guide, 33420
- SFP manuals (product specific)
- ION System NID User Guides (33432, 33457, 33472, 33493, 33494, 33495, 33496)
- Release Notes (firmware version specific)

Note: This manual may provide links to third part web sites for which Transition Networks is not responsible. Information in this document is subject to change without notice. All information was deemed accurate and complete at the time of publication. This manual documents the latest software/firmware version. While all screen examples may not display the latest version number, all of the descriptions and procedures reflect the latest software/firmware version, noted in the Revision History on page 2.

Managing Slide-In and Remote Modules via CLI Commands

Management of modules other than the IONMM can be accomplished by entering CLI commands through either the local USB serial interface or a remote Telnet session. CLI commands can operate on the device level or port level. This is indicated by the status of the command prompt's preamble.

For example:

```
AgentIII C1|S7|L1D>
```

or just:

```
C1|S1|L1D>
```

This prompt indicates that any subsequent commands entered are for the module located in chassis 1/slot1. In order to enter a command for a different device or port in the ION system, you must change the location of the command prompt. The **go** command lets you change the hierarchical location of the command prompt. Before using the command, a familiarity with the hierarchy structure in the ION system is essential.

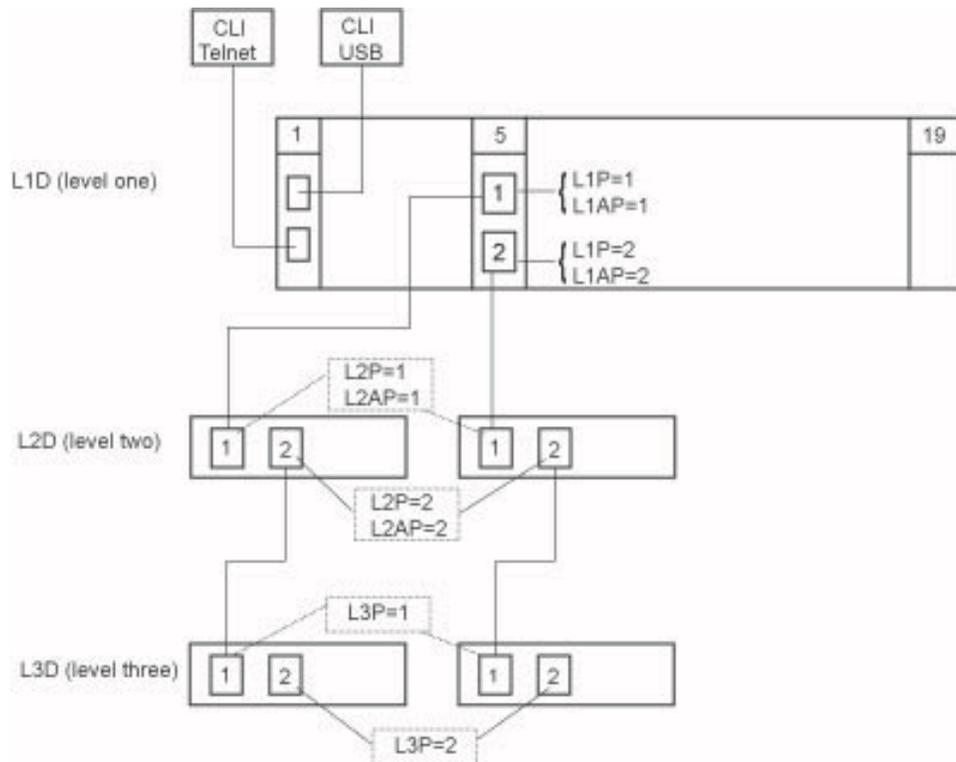A representation of the hierarchy is shown in the figure below.

Figure 1: CLI Location Hierarchy

In the above figure, there are three levels of devices:

- L1D, or level one device, refers to devices (IONMM and other chassis-resident devices) that are installed in the chassis.

- L2D, or level two device, refers to a device that is directly connected to a port in a NID in the chassis and has other devices connected to it.

- L3D, or level three device, refers to a device that is directly connected to a port in a level one device.

The ports on a device are divided into two categories: Device ports and Attachment ports.

- Device ports – These are ports on a specified device that are used as service ports for either customer or network connections, and are typically attached to routers or switches. These ports are labeled L1P=, L2P= and L3P=. The L1, L2, and L3 indicate the level of the device that the port is on. Devices attached to a port with this designation **can not** be managed by the IONMM.

- Attachment port – These are also ports on a specified device; they are labeled L1AP= and L2AP= and indicate an attachment point for another ION family device that **can** be managed by the IONMM.

Physically these are the same port. That is, L1P1 and L1AP1 are both port one on a level one device. However, it is how they are used that determines their syntax. For example, L1P1 indicates that the port is

used to connect to a service device that is not managed by the IONMM. L1AP1 indicates that the port is used to connect to a level two device that can be managed by the IONMM.

Example 1

In the CLI location hierarchy, to go to the first port (L3P1) on device L3D in the network topology shown in Figure 19, you would enter the following command from the base prompt.

    C1|S1|L1D>`go s=5 l1ap=2 l2ap=1 l3p=1`

The resulting command line prompt would be:

    C1|S5|L1AP2|L2AP1|L3P1>

Any CLI command appropriate for the port can now be entered.

Example 2

In the CLI location hierarchy, to go to device L2D in the network topology shown in Figure 5, you would enter the following command from the base prompt.

    C1|S1|L1D>`go s=5 l1ap=2 l2d=1`

The resulting command line prompt would be:

    C1|S5|L1AP1|L2D>

Any CLI command appropriate for the device can now be entered.

The following describes the procedure for using CLI commands to manage the x4110s.

1. Access the x4110 through either a USB connection or a Telnet session.

2. Use the **go** command to change the operational location to the device/port to be managed. The **go** command format is:
   `go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)`

3. Configure the x4110using the appropriate commands. For a complete list of the available commands, see the *x4110 CLI Reference Manual*.

4. To return the location to the IONMM, type **home** and press **Enter**.

Managing Standalone Modules Using CLI Commands

Management of standalone modules can be accomplished by entering CLI commands through either the local USB serial interface or a remote Telnet session. CLI commands can operate on the device level or port level. This is indicated by the status of the command prompt's preamble.

For example:

```
    AgentIII C1|S7|L1D>
```

or just:

```
    C1|S7|L1D>
```

This prompt indicates that any subsequent commands entered are for the device instead of a port. In order to enter a command for a port, you must change the location of the command prompt. The **go** command allows you to change the hierarchical location of the command prompt.

The **go** command format is:
```
go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)
```


EXAMPLE

In the CLI location hierarchy, to go to port 1 on a device, you would enter the following command from the base prompt:

```
        C1|S7|L1D>go l1p=1
```
The resulting command line prompt would be:

```
        C1|S7|L1P1>
```
Any CLI command appropriate for the port can now be entered.

Subsequently, to return to the device level, you would enter the following:

```
        C1|S7|L1P1>go l1d
```
The resulting command line prompt would be:

```
        C1|S7|L1D>
```

Reboot and Reset Command Notes

IMPORTANT

Certain CLI commands affect important stored files. Doing a reboot, restart or upgrade of the IONMM, a power restart of the chassis, or a reset to factory removes temporary files (e.g. configuration backup files, Syslog file). A Factory Reset also removes the permanent settings (e.g. configuration files, HTTPS certification file, SSH key).

These CLI commands can cause a loss of files:

- **reboot** - cold start the x4110

- **reset** - reset to factory configuration

See the specific command description for additional information.

Command Line Editing

This section describes how to enter CLI commands.

A CLI command is a series of keywords and arguments. Keywords identify a command, and arguments specify configuration parameters.

Display Similar Commands

At the command line, you can use the Tab ⇥ key or the **?** key to show available commands in a category of commands after entering a part of the command.

For example, use the Tab ⇥ key to enter part of the command (**show ether** in this example) to display all of the available commands that start with **show ether**. The commands display in a single row.

```
Agent III C1|S2|L1D>show ether
config      loopback     security     statistics tdr
Agent III C1|S2|L1D>show ether
```

Use the **?** key after a partial CLI command entry to display all of the available commands that start with **show ether**, but in a single column:

```
Agent III C1|S2|L1D>show ether
  config
  loopback
  security
  statistics
  tdr
Agent III C1|S2|L1D>show ether
```

Partial Keyword Lookup

If you terminate a partial keyword with a question mark, alternatives that match the initial letters are provided. (Remember to not leave a space between the command and question mark.)
For example "**s?**" shows all the keywords starting with the letter "**s**."

Recall Commands

To recall recently-entered commands from the command history, perform one of the optional actions below:

Ctrl-P or **Up arrow** (↑) key: Recall commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.

Ctrl-N or **Down arrow** (↓) key: Return to more recent commands in the history buffer after recalling commands with Ctrl-P or the Up arrow key. Repeat the key sequence to recall successively more recent commands.

Keystroke Commands

The table below shows the optional keystrokes available to edit command lines (*indicates HyperTerm support, ** indicates command prompt support, *** indicates both HT and command prompt support by this keystroke).

Table 2: Editing Commands

Capability	Keystroke	Purpose
Move the command line around to make changes or corrections	Ctrl-B *** or left (←) arrow key ***	Move the cursor back one character
	Ctrl-F *** or right (→) arrow key ***	Move the cursor forward one character
	Ctrl-A ***	Move the cursor to the beginning of the command line
	Ctrl-E ***	Move the cursor to the end of the command line
Recall commands from the buffer and paste them in the command line	Ctrl-Y ***	Recall the most recent entry in the buffer
	Ctrl-T **	Transpose the character to the left of the cursor with the character located at the cursor
	Ctrl-Y **	Recall the most recent entry in the buffer
Delete entries (if you make a mistake or change your mind)	Delete key *** or Backspace key ***	Erase the character to the left of the cursor
	Ctrl-D ***	Delete the character at the cursor
	Ctrl-K ***	Delete all characters from the cursor to the end of the command line
	Ctrl-U *** or Ctrl-X ***	Delete all characters from the cursor to the beginning of the command line
	Ctrl-W ***	Delete the word to the left of the cursor
	Esc D **	Delete from the cursor to the end of the word
Capitalize or lowercase words or capitalize a set of letters	Esc C *	Change case from capital to lower-case (or lower-case to capital) at the cursor
Redisplay the current command line if the switch unexpectedly sends a message to your screen	Ctrl-L *** or Ctrl-R ***	Redisplay the current command line (reverse-i-search)

System Commands

The following are basic system level commands. These commands are used to show configuration / mode, show help, reboot the system, reset the configuration, and other basic functions.

Password for Login / Access

Syntax: Password: **private**

Description: The default device CLI password. CLI entry requires a successful password entry.

Example: ```
login: ION
Password:private<cr>
Hello, this is ION command line (version 1.00).
Copyright 2009 Transition Networks.

Agent III C1|S1|L1D>
```

In order to control the NIDs via a USB interface, the command line prompt must be showing the location of the module to be managed. Use the procedure below to access the NID and login via USB connection.

1. Start the terminal emulator program (e.g., HyperTerminal).

2. When the emulator screen displays, press **Enter**. The login prompt displays. If your system uses a security protocol (e.g., RADIUS, SSH, etc.), you must enter the login and password required by that protocol.

3. Type **ION** (all upper case) and press **Enter**. The password prompt displays. If a "Login incorrect" message displays, ignore it.

4. Type your password. The default is **private** (all lower case).

5. Press **Enter**. The HyperTerminal command line prompt displays (Agent III C1|S0|L1D>).

6. Enter CLI commands to set up, configure, operate, and maintain the NID.

---

## Log Out (Quit)

*Syntax* :        **q**(uit)

*Description*:    Exit the current mode and return to the previous mode (i.e., the CLI command line prompt).

*Example* :       ```
Agent III C1|S17|L1D>q
login:
```

Note: The NID does not automatically log out upon exit or after a timeout period, which could leave it vulnerable if left unattended. Follow your organizational policy on when to log out.

Clear the Screen

Syntax: **cls**

Description: Clears the screen and returns to the location of the IONMM card.

Go Back to IONMM

Syntax: **home**

Description: Sets the command prompt back to the location of the IONMM card.

Example: If the IONMM card is in chassis 1/slot 1 (c=1 s=1) and the command prompt was at c=1 s=17 l1d and then you entered the following command:

```
Agent III C1|S17|L1D>home
```

the new command line prompt would be:

```
Agent III C1|S1|L1D>
```

Go to Another Location

Syntax: go [c=<0-16>] [s=<0-32>] [l1ap=<1-15>] [l2ap=<1-15>] (l1p=<1-5>|l2p=<1-15>|l3p=<1-15>|l1d|l2d|l3d)

Description: Sets the location (device or port) where subsequent commands are destined for. This
information will appear on the command prompt line as the location where the command
will be executed.

where:

c   = Chassis number (1–16) of the chassis where the card/port is located.

s   = Slot number (1–32) of the slot in the chassis where the card/port is located.
Note: if the chassis parameter (c=) is specified you must specify a slot number.

l1ap = Port number (1–16) on a level 1 device that is used to attach to a level 1 device.

[l2ap = Port number (1–16) on a level 2 device that is used to attach to a level 2
device.

zz   = mandatory; specifies the port or device where subsequent commands are destined
for. Valid choice are:

l1d – indicates the level 1 device to which subsequent commands are destined.

l1p=<port#> – port number (1–16) on a level 1 device.

l2d – indicates the level 2 device.

l2p=<port#> – port number (1–16) on a level 2 device.

l3d – indicates the level 3 device.

l3p=<port#> – port number (1–16) on a level 3device.

Usage: `go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)`

Example 1:   The following command would cause all subsequent commands to be executed for the
device in slot 5 of chassis 1.

```
C1|S1|L1D>go s=5 l1d
```

The new command prompt would be:

```
C1|S5|L1D>
```

Example 2:   The following would cause all subsequent commands to be executed for port 2 on
the device in slot 5.

```
C1|S5|L1D>go l1p=2
```

The new command prompt would be:

```
C1|S5|L1P2>
```

Example 3:   The following would cause all subsequent commands to be executed for a remote
device connected to port 2 of a chassis-resident module in slot 5.

```
C1|S5|L1D>go l1ap=2 l2d
```

The new command prompt would be:

```
C1|S5|L1AP2|L2D>
```

Help (?)

Syntax: **?**

Description: Display help for CLI commands by typing a question mark (**?**). Typing a **?** at the
command line prompt displays a list of base commands (show, set, etc.).
To display a list of the options for a particular command or parameter, type the
command/parameter then a space and then **?**.

Examples:
The following will display a list of all base commands.

```
C1|S2|L1D>?
```

While the following will display a list of all the entries for the **set** commands that start with the letter "l".

```
C1|S15|L1P1>set l ?
  l2cp
  loam
  lpt
```

The following displays a list of all the entries for the **set lpt** commands:

```
C1|S15|L1P1>set lpt ?
  monitor-port
  state
```

The following displays a list of the valid values for the **set lpt state** command:

```
C1|S15|L1P1>set lpt state ?
  disable
  enable
  notSupported
C1|S15|L1P1>
```

By typing a ? after each parameter in a command string you can see what the options are, either for what
the next parameter is or for what options must be specified following an equal sign.

List

Syntax: **list**

Description: Display all available command line commands.

Example (partial list):

```
Agent III C1|S0|L1D>list
add acl condition type=(srcmacaddr|ipv4addr|ipv4addrrange|ipv4network|tcpport|
tcpportrange|udpport|udpportrange|icmp) srcdst=(src|dst) oper=(equal|notequal)
value=VAL
add acl rule position=(head|tail) table=(raw|filter|nat|mangle) chain=(prerout
ing|input|forward|output|postrouting) policy=(accept|drop|trap) [traprate=TRAPRATE]
[condition=CONDLIST]
add fwddb mac=MAC [conn-port=PORT] [priority=PRIO] [type=(static|staticNRL|staticPA)]
add ip6tables acl condition type=(srcmacaddr|ipv6addr|ipv6network|tcpport|tcpp
ortrange|udpport|udpportrange|icmp) srcdst=(src|dst) oper=(equal|notequal) value=VAL
:              :         :           :            :          :
show usb-port state
show vlan-db config
start ether tdr test
start https certificate
stat
tftp get iptype=(ipv4|ipv6|dns) ipaddr=ADDR remotefile=RFILE [localfile=LFILE]
tftp put iptype=(ipv4|ipv6|dns) ipaddr=ADDR localfile=LFILE [remotefile=RFILE]
tftp upgrade iptype=(ipv4|ipv6|dns) ipaddr=ADDR remotefile=RFILE
update firmware-db file=FILENAME
upgrade module
Agent III C1|S17|L1D>
```

Process Snapshot

Syntax: ps

Description: Displays a snapshot of the current memory processes. For example:

```
    1 root        312 S   init
    2 root            SWN [ksoftirqd/0]
    3 root            SW  [watchdog/0]
    4 root            SW< [events/0]
    5 root            SW< [khelper]
    6 root            SW< [kthread]
   37 root            SW< [kblockd/0]
   40 root            SW< [khubd]
   53 root            SW  [pdflush]
   54 root            SW  [pdflush]
   55 root            SW< [kswapd0]
   56 root            SW< [aio/0]
  651 root            SW  [mtdblockd]
  681 root            SW< [spi_gpio.0]
  695 root            SWN [jffs2_gcd_mtd4]
  700 root            SWN [jffs2_gcd_mtd7]
  701 root            SWN [jffs2_gcd_mtd8]
::::::::::::::::
  782 root        356 S   radiuscd 0
  803 root        284 S   sntpcd
  821 root        564 S   lighttpd -f /etc/lighttpd.conf
  830 root        176 S   telnetd -p 17800
  834 root        176 S   telnetd -l /usr/local/bin/a3cli
  837 root       2668 S   subagent
  838 root       2668 S   subagent
  839 root       2668 S   subagent
  842 root       2668 S   subagent
  843 root       2668 S   subagent
  844 root       2668 S   subagent
  847 root       2668 S   subagent
  848 root       2668 S   subagent
  853 root        276 S   syslogd -m 0 -L -O /var/log/sys.log -l 6 -s 200 -b 1
  854 root        268 S N monitor /usr/local/bin/taskmonitor.conf /agent3/conf/
  858 root        224 S   init
  861 root       2668 S   subagent
  868 root        460 S   tacplus
 2277 root       2520 S   /usr/local/bin/a3cli --
 5862 root        304 S   sh -c ps
 5863 root        284 R   ps
Agent III C1|S2|L1D>
```

Show Current Directory

Syntax: **pwd**

Description: Displays the current directory.

Example:
```
Agent III C1|S17|L1D>pwd
/
Agent III C1|S17|L1D>
```

Change Modes (Quit)

Syntax :   **quit**

Description: Exit the current mode and return to the previous mode (i.e., the CLI command line prompt). Note that the x4110 does not automatically log out upon exit or after a timeout period, which could leave it vulnerable if left unattended. Follow your organizational policy on when to log out.

Example:
```
Agent III C1|S17|L1D>quit
login:
```

Reboot

Syntax: **reboot**

Description: Performs a reboot ("Cold start the system") of the device in the command line prompt. After a x4110 reboot via CLI while connected via USB port, you must disconnect and then reconnect USB cable for the console to become accessible again.

Example:
```
Agent III C1|S17|L1D>reboot
Warning: this command will restart system, connection will be lost and
please login again!
Agent III C1|S17|L1D>
```

⚠ **Warning:** doing a reboot or restart of the x4110 may cause some configuration backup files to be lost and the USB or Telnet session to drop. Doing a reboot, restart or upgrade of the IONMM, a power restart of the chassis, or a reset to factory removes temporary files (e.g. configuration backup files, Syslog file). A Factory Reset also removes the permanent settings (e.g. configuration files, HTTPS certification file, SSH key).

Reboot Procedure

At times you may have to reboot (restart) the ION system. This operation can be accomplished by either the CLI or Web method.

Note: this operation can take several minutes. The amount of time for the reboot to complete depends on the ION system configuration. When the reboot is finished, some devices (usually remote devices) will show the error condition of a "red box" around items like IP address, Trap Manager IP addresses, and/or DNS Entries. The 'red box' condition occurs while the devices are resetting; this condition can continue several minutes after the reboot.

After a x4110 reboot via CLI while connected via USB port, you must disconnect and then reconnect USB cable for the console to become accessible again.

1. Access the x4110 through either a USB connection or a Telnet session.

2. At the command prompt type: **reboot** and press **Enter**. A warning displays: *this command will restart system, connection will be lost and please login again!* The ION system reboots the x4110. If this operation is performed on a standalone module, the connection / session is terminated.

3. To reestablish the connection / session, wait about one minute, and then:

   - For a USB connection

     a) Select **Call>Disconnect**.

     b) Select **File>Exit**.

     c) Disconnect then reconnect one end of the USB cable.

     d) Start a USB session.

   - For a Telnet session

     a) Press **Enter**.

     b) Start a Telnet session.

Example:
```
Agent III C1|S2|L1D>reboot
Warning: this command will restart system, connection will be lost and please login
    again!
Agent III C1|S2|L1D>
```

Reset Factory Configuration

Syntax: **reset factory**

Description: Resets a card to its factory default configuration.

Example:
```
Agent III C1|S17|L1D>reset factory
Warning: this command will restart the specified card, connection will
be lost!
Agent III C1|S17|L1D>
```

⚠️ **Warning:** doing a x4110 reset to factory restarts the device and drops the Telnet or HyperTerminal connection. Doing a reset to factory removes temporary files (e.g. configuration backup files, Syslog file) and also removes the permanent settings (e.g. configuration files, HTTPS certification file, SSH key).

Resetting Defaults Procedure

1. Access the x4110 through either a USB connection or a Telnet session.

2. At the command prompt type: **reset factory**.

3. Press **Enter**. The following displays:

```
Agent III C1|S2|L1P2>reset factory
Error: this command should be executed on a device!
Agent III C1|S2|L1P2>go l1d
Agent III C1|S0|L1D>reset factory
Error: Fail to get SIC configure mode!
Agent III C1|S0|L1D>
```

All configuration parameters will be reset to their factory values.

Note: Your USB and/or Telnet session will be disconnected.

4. Set the IP configuration.

Reset Device Uptime

Syntax: **reset uptime**

Description: Resets the x4110 Up Time counter to zero, and immediately begins to increment.

Example:
```
Agent III C1|S17|L1D>reset uptime
Agent III C1|S17|L1D>
```

Use the **show card info** command to display the current system uptime.

Note: the reset uptime command is not available for the Power Supply modules.

Reset Device Uptime Procedure

1. Access the x4110 through either a USB connection or a Telnet session.

2. At the command prompt type: **reset uptime** and press **Enter**. The System Up Time field resets to zero, and immediately begins to increment.

   For example:
```
Agent III C1|S17|L1D>reset uptime
Agent III C1|S17|L1D>
```

Show Card Information

Syntax: **show card info**

Description: Displays the system information for the IONMM or slide-in module. The system
               information can be alphabetic, numeric or a combination.

Example: (C4110 in slot 2):

```
Agent III C1|S2|L1D>show card info
System name:        C4110
Uptime:             00:17:26
MAC:                00-c0-f2-22-17-15
Port number:        2
Serial number:      4444
Config mode:        software
Software:           1.2.6
Bootloader:         0.1.0
Hardware:           1.0.0
Agent III C1|S2|L1D>
```

Show Card Type

Syntax: **show cardtype**

Description: Displays the device's card type (model number).

Example: (C4110 in slot 2):

```
Agent III C1|S1|L1D>show cardtype
Card type:                   IONMM
Agent III C1|S1|L1D>go c=1 s=2 l1d
Agent III C1|S2|L1D>show cardtype
Card type:                   C4110-4848
Agent III C1|S2|L1D>
```

Show Chassis Information

Syntax: **stat**

Description: Displays information about all slide-in modules installed in the chassis and all standalone
                modules connected to the slide-in modules (remotes), and their ports.

Example:
```
Agent III C1|S1|L1D>stat
ION statck
       Chassis -- BPC
              [  1]  IONMM
                      Port 1
                      Port 2
              [  2]  C4110-4848
                      Port 1
                      Port 2
              [  3]  C3221-1040
                      Port 1
                      Port 2
                      Port 3
              [  4]  C3100-4040
                      Port 1
                      Port 2
               [  6]  C4120-1040
                      Port 1
                      Port 2
              [ 22]  IONPS-A-R1
                      Temperature Sensor
                      Voltage Sensor
                      Power Sensor
                      Fan
           Agent III C1|S1|L1D>
```

Show Slot Information

Syntax: **show slot info**

Description: Displays information about the ION chassis backplane, slide-in modules installed in the chassis, and related status. This command is only valid on an IONMM.

Example: Display the current slot information.

```
Agent III C1|S2|L1D>show slot info
Error: This command is only valid on an IONMM!
Agent III C1|S2|L1D>home
Agent III C1|S1|L1D>show slot info
Chassis BPC information:

Serial number:     101829
Model name:        IONBPC-219
Software:          1.2.1
Hardware:          1.0.0
Bootloader:        0.1.0


Slot information:
slot      slot status          description                              power status
-------------------------------------------------------------------------------------
1         occupied             ION Management Module AGENT                   on
2         occupied             ION Media Conversion Module C4110-4848        on
3         empty                                                             on
4         empty                                                             on
5         occupied             ION Media Conversion Module C4120-1040        on
6         empty                                                             on
7         occupied             ION Media Conversion Module C2210-1013
8         empty                                                             on
9         empty                                                             on
10        empty                                                             on
11        empty                                                             on
12        empty                                                             on
13        empty                                                             on
14        empty                                                             on
15        empty                                                             on
16        empty                                                             on
17        empty                                                             on
18        empty                                                             on
19        empty                                                             on
Agent III C1|S1|L1D>
```

Set Circuit ID

Syntax: **set circuit-ID**=<xx>

Description: Lets you define an ASCII text string up to 63 bytes and override the default Circuit ID, which is *vlan-module-port* in binary format, for a device and/or device ports. Use the **show circuit-ID** command to display the Circuit ID information for a device or port.

Example:
```
Agent III C1|S17|L1P1>set circuit XX/YYYY/000000/111/CC/SEG
Agent III C1|S17|L1P1>show circuit-ID
Circuit-ID:        XX/YYYY/000000/111/CC/SEG
Agent III C1|S17|L1P1>
```

Note: the dash ("**-**") is required, and the letters "ID" must be upper-case. The x4110 supports the Circuit ID, a company-specific identifier assigned by the user to identify the converter and individual ports in any manner the user chooses. In the ION system, the Circuit ID port identifier is based on the agent-local identifier of the circuit (defined in RFC 3046), detected by the agent and associated with a particular port.

Show Circuit ID

Syntax: **show circuit-ID**

Description: Displays the current Circuit ID for the device or port. Use the **show circuit-ID** command to display the current Circuit ID information defined for a device or port.

Example:
```
Agent III C1|S17|L1P1>set circuit XX/YYYY/000000/111/CC/SEG
Agent III C1|S17|L1P1>show circuit-ID
Circuit-ID:        XX/YYYY/000000/111/CC/SEG
Agent III C1|S17|L1P1>
```

Note: the dash ("**-**") is required, and the letters "ID" must be upper-case (in capital letters).

Circuit ID Config Procedure

1. Access the x4110 through either a USB connection or a Telnet session.

2. At the device's command prompt type: **set circuit-ID=**<xx> <u>where</u>:

    xx = the Circuit ID to be used for this device or port.

3. Press **Enter**.

4. Verify the Circuit ID setting. Type **show circuit-ID** and press **Enter**. Note that the dash ("-") is required, and the letters "ID" must be upper-case. The Circuit ID information displays. For example:

```
C1|S16|L1D>set circuit XX/YYYY/000000/111/CC/SEG
C1|S16|L1D>show circuit-ID
Circuit-ID:        XX/YYYY/000000/111/CC/SEG
C1|S16|L1D>
```

5. At the each of the device port's command prompts, enter the Circuit ID as in step 2 and 3.

6. At the each of the device port's command prompts, verify the Circuit ID setting as in step 4.
    For example:

```
C1|S16|L1D>go l1p=1
C1|S16|L1P1>set circuit-ID=xx/yyyy/000000/111/cc/seg
C1|S16|L1P1>show circuit-ID
Circuit-ID:        xx/yyyy/000000/111/cc/seg
C1|S16|L1P1>
C1|S16|L1P1>go l1p=2
C1|S16|L1P2>set circuit XX/YYYY/000000/111/CC/SEG
C1|S16|L1P2>show circuit-ID
Circuit-ID:        XX/YYYY/000000/111/CC/SEG
C1|S16|L1P2>
```

Set Device Description

Syntax: **set device description**=<xx>

Description: Lets you configure an ASCII text string up to 63 bytes and override the default
                 information, which is *vlan-module-port* in binary format.

1. Access the x4110 through either a USB connection or a Telnet session.

2. At the device's command prompt type: **set device description=**<xx> <u>where</u>:

    xx = the Device Description to be used for this device or port.

3. Press **Enter**.

4. Verify the Device Description setting. Type **show device description** and press **Enter**. Note that the
    dash ("-") is required, and the letters "ID" must be upper-case. The Device Description information
    displays.

Example:

```
Agent III C1|S17|L1D>set device description
  CIRCUIT
Agent III C1|S17|L1D>set device description D-CIRCUIT
Agent III C1|S17|L1D>show device description
Device description: D-CIRCUIT
Agent III C1|S17|L1D>
```

Show Device Description

Syntax: **show device description**

Description: Displays the currently-configure ASCII text string up to 63 bytes and override the default
                 information, which is *vlan-module-port* in binary format.

Example:

```
Agent III C1|S17|L1D>set device description
  CIRCUIT
Agent III C1|S17|L1D>set device description D-CIRCUIT
Agent III C1|S17|L1D>show device description
Device description: D-CIRCUIT
Agent III C1|S17|L1D>
```

Data Rate Timing Commands

The C4110 can be used in applications where links supporting data rates from 1Gig to 10Gig require fiber extension or where 10Gig links require an interface between two fiber networks. It performs 3R (re-amplify, re-shape, re-time) signal regeneration. The S4110 is protocol 'agnostic', supporting a wide variety of protocols in a network; from 1 to 11.5Gbps, including 10G LAN, 10G WAN, 10G Fiber Channel, SONET OC192, 10G OTN (G.709), 1/2/4/8 Gig Fiber Channel, 1 Gig Ethernet, or Sonet OC-48. The fiber length and type is defined by the SFP+ module inserted.

The OC (Optical Carrier) specifies the speed of fiber optic networks conforming to the SONET standard. The speeds for common OC levels include OC-1 = 51.85 Mbps, OC-3 = 155.52 Mbps, OC-12 = 622.08 Mbps, OC-24 = 1.244 Gbps, OC-48 = 2.488 Gbps, OC-192 = 9.952 Gbps, and OC-255 = 13.21 Gbps.

Set Optical Data Rate Timing

Syntax: **set dataRateTiming** *ratexxxx* (case sensitive)

Description: Configure the x4110 data rate timing. The settings are **set dataRateTiming** =

rate10GE   = 10GE = 10 gigabit Ethernet (10GbE or 10 GigE) (factory default).
rate10GFC   = 10GFC = 10GbE Fibre Channel.
rate10GFCFEC = 10GFC + FEC = 10GbE Fibre Channel with Forward Error Correction.
rate1GE   = 1GE = 1 gigabit Ethernet.
rate1GFC   = 1GFC = 1GbE Fibre Channel.
rate2_5GE   = 2.5G = 2.5 gigabit Ethernet.
rate2GFC   = 2GFC = 2G Fiber Channel with 2.125 gigabaud Line rate and 400 MBps throughput (at full duplex).
rate4GFC   = 4GFC = 4G Fiber Channel with 4.25 gigabaud Line rate and 800 MBps throughput (at full duplex).
rate8GFC   = 8GFC = 8G Fiber Channel with 8.5 gigabaud Line rate and 1,600 MBps throughput (at full duplex).
rateOC192   = WAN/OC-192 = OC-192 network line with transmission speeds up to 9953.28 Mbit/s.
rateOC192FEC = WAN/OC-192+FEC = OC-192 network line with transmission speeds up to 9953.28 Mbit/s with Forward Error Correction.
rateOC48   = Sonet OC-48 network line with transmission speeds to 2488.32 Mbit/s.

Example: Show the available data rates and set the rate to 10GE:

```
Agent III C1|S2|L1D>set dataRateTiming ?
  rate10GE
  rate10GFC
  rate10GFCFEC
  rate1GE
  rate1GFC
  rate2GFC
  rate2_5GE
  rate4GFC
  rate8GFC
  rateOC192
  rateOC192FEC
  rateOC48
Agent III C1|S4|L1D>set dataRateTiming rate10GE
Agent III C1|S4|L1D>
```

Show Data Rate Timing

Syntax: **show dataRateTiming**

Description: Display the current x4110 data rate timing setting. The settings are described above.

Example: Show the data rate set in the command example above.

```
Agent III C1|S4|L1D>show dataRateTiming
Data Rate Timing/Retiming: rate10GE
Agent III C1|S4|L1D>
```

Messages:

Error: this command should be executed on a device!
Error: System is busy, please retry this command later!
Error: Software version of this card is too old, please upgrade it!
Error: Data Rate Timing is not supported on this card!
The data rate timing limit is not supported on C4110 card!
Error: Invalid data rate timing!
Error: Set data rate timing failed!
Error: Cannot set data rate timing on this card!
Error: Get dataRateTiming status no such object.

The CLI displays "Unknown Line Rate Mode" until a data retiming rate has been saved.

DMI Commands

The following commands are used for Diagnostic Monitoring Interface (DMI) operations.

Note: These commands can only be entered for a fiber port that supports DMI. Not all x4110 models or SFP models support DMI. The SFP models that support DMI have a "D" at the end of the model number. If you enter a DMI command on a x4110 model that does not support DMI, the message "*The DMI feature is not supported on current port*." displays.

Show DMI Configuration

Syntax: **show dmi info**

Description: Displays the configuration of the Diagnostic Monitoring Interface (DMI) for a port.

Example 1   Display the current DMI configuration for port 1.

```
Agent III C1|S2|L1P1>show dmi info
Diagnostic monitoring interface information:
--------------------------------------------------------------------
DMI connector type:                 LC
DMI indentifier:                    DWDM-SFP/SFP+
DMI Nominal bit rate:               1300*Mbps
DMI 9/125u Singlemode Fiber (k):    80*km
DMI 9/125u Singlemode Fiber (m):    25500*m
DMI 50/125u Multimode Fiber (m):    N/A
DMI 62.5/125u Multimode Fiber (m):  N/A
Copper(m):                          N/A
DMI fiber interface wavelength:     1550*nm
DMI temperature:                    28.1*C
DMI temperature:                    82.6*F
DMI temperature alarm:              normal
DMI transmit bias current:          39292*uA
DMI transmit bais alarm:            normal
DMI Transmit power:                 1686*uW
DMI Transmit power:                  2.269*dBM
DMI Transmit power alarm:           normal
DMI Receive power:                  0*uW
DMI Receive power alarm:            lowAlarm
DMI Vendor name:                    Transition
DMI Vendor Part Number:             TN-DWDM-SFP-5012
DMI Vendor serial number:           TWDW34Z001
DMI Vendor revision:                2.0
DMI Vendor date code:               2016-07-30
DMI Vendor Transceiver type:        SFP 1000BASE-X
DMI Vendor OUI:                     00-C0-F2
DMI Receive power intrusion threshold: 10*uW
Agent III C1|S2|L1P1>
```

Example 2   Display the current DMI configuration for port 2.

```
Agent III C1|S2|L1P1>go l1p=2
Agent III C1|S2|L1P2>show dmi info
Diagnostic monitoring interface information:
-------------------------------------------------------------------
DMI connector type:                 LC
DMI indentifier:                    SFP/SFP+/SFP28
DMI Nominal bit rate:               10500*Mbps
DMI 9/125u Singlemode Fiber (k):    10*km
DMI 9/125u Singlemode Fiber (m):    10000*m
DMI 50/125u Multimode Fiber (m):    N/A
DMI 62.5/125u Multimode Fiber (m):  N/A
Copper(m):                          N/A
DMI fiber interface wavelength:     1310*nm
DMI temperature:                    44.4*C
DMI temperature:                    111.9*F
DMI temperature alarm:              normal
DMI transmit bias current:          36416*uA
DMI transmit bais alarm:            normal
DMI Transmit power:                 564*uW
DMI Transmit power:                 -2.487*dBM
DMI Transmit power alarm:           normal
DMI Receive power:                  28*uW
DMI Receive power:                  -15.528*dBM
DMI Receive power alarm:            lowWarn
DMI Vendor name:                    Transition
DMI Vendor Part Number:             TN-10GSFP-LR1
DMI Vendor serial number:           8800022
DMI Vendor revision:                0001
DMI Vendor date code:               2011-08-09
DMI Vendor Transceiver type:        SFP 10G
DMI Vendor OUI:                     00-C0-F2
DMI Receive power intrusion threshold:  0*uW
Agent III C1|S2|L1P2>
```

For More Information on topics such as Fiber Optics Power Measurements, Fiber and Cable Loss, OTDRs, Bandwidth, Reflectance/Optical Return Loss, and Fiber Optic Cleaning Procedures see The Fiber Optic Association - Tech Topic in the FOA Guide to Optics and Premises Cabling on the FOA website at http://www.thefoa.org/tech/FAQS/FAQ-TEST.HTM#bw.

Set DMI Receive Power Preset Level

Syntax:　　　**set dmi rx–power–preset–level=**<xx>

Description:　Defines the lowAlarm threshold for RxPowerAlarm. If a non-zero value (in microwatts) is specified, the module will stop passing traffic when the receive power drops below the new threshold. This feature is sometimes referred to as Intrusion Detection, since tapping into a fiber to intercept traffic leads to a reduction in receive power.

Sets the Diagnostic Monitoring Interface (DMI) receive preset power level.

where:　**xx** = Pwr-val: A preset level for Rx Power on the Fiber port (0-65535).

Example:　　Set the level to 110 and show the resulting DMI information:

```
Agent III C1|S2|L1P1>set dmi rx-power-preset-level=110
Agent III C1|S2|L1P1>show dmi info
Diagnostic monitoring interface information:
---------------------------------------------------------------------
DMI connector type:                      LC
DMI indentifier:                         DWDM-SFP/SFP+
DMI Nominal bit rate:                    1300*Mbps
DMI 9/125u Singlemode Fiber (k):         80*km
DMI 9/125u Singlemode Fiber (m):         25500*m
DMI 50/125u Multimode Fiber (m):         N/A
DMI 62.5/125u Multimode Fiber (m):       N/A
Copper(m):                               N/A
DMI fiber interface wavelength:          1550*nm
DMI temperature:                         26.7*C
DMI temperature:                         80.1*F
DMI temperature alarm:                   normal
DMI transmit bias current:               38984*uA
DMI transmit bais alarm:                 normal
DMI Transmit power:                      1686*uW
DMI Transmit power:                       2.269*dBM
DMI Transmit power alarm:                normal
DMI Receive power:                       0*uW
DMI Receive power alarm:                 lowAlarm
DMI Vendor name:                         Transition
DMI Vendor Part Number:                  TN-DWDM-SFP-5012
DMI Vendor serial number:                TWDW34Z001
DMI Vendor revision:                     2.0
DMI Vendor date code:                    2016-07-30
DMI Vendor Transceiver type:             SFP 1000BASE-X
DMI Vendor OUI:                          00-C0-F2
DMI Receive power intrusion threshold:  110*uW
Agent III C1|S2|L1P1>
```

Messages: *Error: No DMI support on this port!*
Error: This card is in hardware mode and no setting allowed!

DMI Config Procedure

The DMI (Diagnostic Maintenance Interface) function displays x4110 diagnostic / maintenance information such as fiber interface characteristics, diagnostic monitoring parameters, and supported fiber media lengths. **Note**: Transition Networks SFPs that support DMI have a "-D" at the end of the model number. DMI can be configured in the x4110 via the CLI as follows.

1. Access the x4110 through either a USB connection or a Telnet session.

2. Set the Diagnostic Monitoring Interface receive preset power level. Type: **set dmi rx-power-preset-level**=xx where xx is a preset level for Rx Power on the Fiber port, in the range of 0-65535.

3. Press **Enter**. For example: **set dmi rx-power-preset-level=10**.

4. Display the DMI information. Type: **show dmi info** and press **Enter**. For example:

```
Agent III C1|S5|L1P2>set dmi rx-power-preset-level 2
Agent III C1|S5|L1P2>show dmi info
Diagnostic monitoring interface information:
----------------------------------------------------------------------
DMI connector type:                 LC
DMI indentifier:                    DWDM-SFP/SFP+
DMI Nominal bit rate:               1300*Mbps
DMI 9/125u Singlemode Fiber (k):    80*km
DMI 9/125u Singlemode Fiber (m):    25500*m
DMI 50/125u Multimode Fiber (m):    N/A
DMI 62.5/125u Multimode Fiber (m):  N/A
Copper(m):                          N/A
DMI fiber interface wavelength:     1550*nm
DMI temperature:                    30.0*C
DMI temperature:                    86.0*F
DMI temperature alarm:              normal
DMI transmit bias current:          39292*uA
DMI transmit bais alarm:            normal
DMI Transmit power:                 1692*uW
DMI Transmit power:                  2.284*dBM
DMI Transmit power alarm:           normal
DMI Receive power:                  0*uW
DMI Receive power alarm:            lowAlarm
DMI Vendor name:                    Transition
DMI Vendor Part Number:             TN-DWDM-SFP-5012
DMI Vendor serial number:           TWDW34Z001
DMI Vendor revision:                2.0
DMI Vendor date code:               2016-07-30
DMI Vendor Transceiver type:        SFP 1000BASE-X
DMI Vendor OUI:                     00-C0-F2
DMI Receive power intrusion threshold: 2*uW
Agent III C1|S5|L1P2>
```

DMI Parameters

The DMI tab parameters are described in the table below.

Table 3: DMI Parameters

Parameter	Description
Interface Characteristics	
DMI connector type	The external optical or electrical cable connector provided as the interface. For example: LC, SC, Dual BNC coax connectors, DB9 for RS232 and RS485, 6 Pos Terminal Block for RS485, RJ-11, unshielded twisted pair, SC fiber, 1550nm 40km, SC fiber, 1 x 9, 125km Gigiabit , ST Single-Fiber 155Mbps, 6-pin RS-485 Terminal Block, DIN 6-Pin for RS232, LC Multimode Fiber, SFP cage, 5 Pos Terminal Block for RS485, Single-Fiber Multimode, SC Multimode (long haul), LC Singlemode (long haul), XFP slot, or SFP+ slot.
DMI identifier	Specifies the physical DMI device ID from the standard; for example: SFP/SFP+/SFP28, SG, Optical pigtail, MPO 1x12 (Multifiber Parallel Optic) , MPO 2x16, Module/connector soldered to motherboard , SFP, 300-pin XBI , XENPAK, XFP, XFF, XFP-E, XPAK, X2, DWDM-SFP/SFP+, QSFP, QSFP+, CXP, Shielded Mini Multilane HD 4X or 8X, QSFP28, CXP2, CDFP (Style 1/Style 2), Shielded Mini Multilane HD 4X or 8X Fanout Cable, CDFP (Style 3), microQSFP, QSFP-DD Double Density 8X Pluggable Transceiver, HSSDC II, Copper Pigtail, RJ45 (Registered Jack), No separable connector, or MXC 2x16.
DMI Nominal bit rate	Bitrate in units of 100Mbps (for example: 10500, or 10.G Gbps) (measured rate).
DMI 9/125u Singlemode Fiber (km)	Specifies the link length that is supported by the transceiver while operating in single mode (SM) fiber. The unit of measure is kilometers (km). For example, 8Km.
DMI 9/125u Singlemode Fiber (m)	Specifies the link length that is supported by the transceiver while operating in single mode (SM) fiber. The unit of measure is meters (m). For example, 80m.
DMI 50/125u Multimode Fiber (m)	Specifies the link length that is supported by the transceiver while operating in 50 micron Multimode (MM) fiber. The value is in meters.
DMI 62.5/125u Multimode Fiber (m)	Specifies the link length that is supported by the transceiver while operating in 62.5 micron Multimode (MM) fiber. The value is in meters.
Copper (m)	Specifies the link length that is supported by the transceiver while operating in copper cable. The value is in meters.
DMI fiber interface wavelength	The Nominal transmitter output wavelength at room temperature (measured wavelength). The unit of measure is nanometers (for example: 1550 nm or 850 nm).
DMI temperature	Measured temperature of fiber transceiver in tenths of degrees C (Celsius). For example: 30.1˚C.
DMI temperature	Measured Temperature of fiber transceiver in tenths of degrees F (Fahrenheit). For example: 86.2 ˚F.
DMI temperature alarm	Alarm status for temperature of fiber transceiver. An *ionDMITemperatureEvt* event is sent when there is a warning or alarm on DMI temperature. Normal -1, Not Supported - 2, Low Warn - 3, High Warn - 4,

Parameter	Description
	Low Alarm - 6 High Alarm - 7
DMI transmit bias current	Measured transmit bias current on local fiber interface, in uA (microamperes). For example, 5936 uA (microamps).
DMI transmit bias alarm	Alarm status for transmit bias current on local fiber interface. Normal -1, Not Supported - 2, Low Warn - 3, High Warn - 4, Low Alarm - 6 High Alarm - 7
DMI Transmit power	Measured transmit power on local fiber measured in microwatts.For example, 240 uW (microwatts).
DMI Transmit power	Transmit power on local fiber measured in dBM (decibels relative to one milliwatt) which defines signal strength. For example: -2.291 dBM.
DMI Transmit power alarm	Alarm status for transmit power on local fiber. Normal -1, Not Supported - 2, Low Warn - 3, High Warn - 4, Low Alarm - 6 High Alarm - 7
DMI Receive power	Receive power (measured power measurement) on local fiber measured in micro-watts (for example: 11 uW).
DMI Receive power alarm	Alarm status for receive power on local fiber: Normal -1, Not Supported - 2, Low Warn - 3, High Warn - 4, Low Alarm - 6 High Alarm - 7
DMI Vendor name	A 16 character field that contains ASCII characters. The full name of the corporation, a commonly accepted abbreviation of the name of the corporation, the SCSI company code for the corporation, or the stock exchange code for the corporation. For example: Transition or other.
DMI Vendor Part Number	A 16-byte field that contains ASCII characters, defining the vendor part number or product name. A value of all zeroes in the 16-byte field indicates that the vendor PN is unspecified. For example, TN-SFP-LX1, TN-SFP-BXD, TN-SFP-OC3M, TN-SFP-OC3S, TN-10GSFP-SR or similar. For the TN-DWDM-SFP-xxxx, the xxxx indicates the center wavelength (e.g., for a TN-DWDM-SFP-5012, the 5012 indicates 1550.12 nm center wavelength laser support).
DMI Vendor serial number	A 16 character field that contains ASCII characters, defining the vendor's serial number for the transceiver. A value of all zeroes in the 16-byte field indicates that the vendor SN is unspecified. For example: TWDW34Z001, 8800022, 102201102, or similar.
DMI Vendor revision	A 4-byte field that contains ASCII characters, defining the vendor product revision number. A value of all zeroes in the 4-byte field indicates that the vendor revision is unspecified. For example e.g., 2.0.

Parameter	Description
DMI Vendor date code	An 8-byte field that contains the Vendor's date code in ASCII characters: 84-85 ASCII code, two low order digits of year. (00 = 2000). 86-87 ASCII code, digits of month (01 = Jan through 12 = Dec) 88-89 ASCII code, day of month (01-31) 90-91 ASCII code, vendor specific lot code, may be blank. For example 2016-07-30.
DMI Vendor SFP type	The SFP transceiver type. For example: None, Not Supported, SFP 100FX, SFP 1000BASE-T, SFP 1000BASE-CX, SFP 1000BASE-SX, SFP 1000BASE-LX, SFP 1000BASE-X, SFP 2G5, SFP 5G, or SFP 10G.
DMI Vendor OUI	The vendor Organizationally Unique Identifier field (Vendor OUI) is a 3-byte field that contains the IEEE Company Identifier for the vendor (e.g., 00-C0-F2). A value of all zeroes in the 3-byte field indicates that the Vendor OUI is unspecified.
DMI Receive power intrusion threshold	A preset level for Rx Power on the Fiber port. If the DMI read value falls below the preset value, an intrusion is detected, and a trap is generated (0-10). The message displays: *ALARM: Receive power is below specified threshold. Fiber trap intrusion may be in progress*. See below for alarm recovery.

DMI Messages:

Message: *% Parameter value is out of range.*
% Unknown command.
Meaning: There was an error in one or more CLI command parameters. .
Recovery: Verify the command parameters an re-enter the CLI command. .

Message: *Error: No DMI support on this port!*
The DMI feature is not supported on current port.
Meaning: C4110 port 2 DMI is not shown if there is no SFP in port 1. Without an SFP in port 1, the port 2 DMI will display "The DMI feature is not supported on the current port.". When an SFP is inserted into port 1, the port 2 DMI displays as expected.
Recovery: Insert an SFP in Port 1 and click the **Refresh** button.

Message: Error: Get DMI Vendor name no such object.
Error: Get DMI Vendor Part Number no such object.
Error: Get DMI Vendor serial number no such object.
Error: Get DMI Vendor revision no such object.
Error: Get DMI Vendor date code no such object.
Error: Get DMI Vendor SFP type no such object.
Error: Get DMI Vendor OUI no such object.
Recovery:
1. Verify the command parameters and re-enter the CLI command.
2. Verify the SFP is supported.
3. Verify that DMI is supported.

Ethernet Port Commands

The following commands are used for Ethernet port operations. The functions of some of the Ethernet port commands below depend on the type of port or SFP.

Note: These commands can only be entered at the port level - when the last part of the command line prompt indicates the location is a port (e.g., L1P1>).

Show Ethernet Port Configuration

Syntax: **show ether config**

Description: Displays the Ethernet port configurations on a slide-in module. Different ports capabilities vary, so the display content will vary according to the model and port type.

Example 1:   A Port 1 example is shown below.

```
Agent III C1|S2|L1P1>show ether config
Port-14848
SM port:
--------------------------------------------------------------------------
Speed:                      10G
Duplex:                     full

Agent III C1|S2|L1P1>
```

Example 2:   A Port 2 example is shown below.

```
Agent III C1|S2|L1P1>go l1p=2
Agent III C1|S2|L1P2>show ether config
Port-24848
MM port:
-----------------------------------------------------------------------------------
-
Speed:                      100M
Duplex:                     full
Agent III C1|S2|L1P2>
```

Use this procedure to define the port's Ethernet transmission speed and Duplex mode to be used on the Ethernet port. The defaults are 10 Mbps and Full Duplex. **Note**: This command is only applicable on a copper port. **Note**: Auto Cross and Auto negotiation are only shown for the copper port.

1. Access the x4110 through either a USB connection or a Telnet session.

2. Check the configuration settings. Type: **show ether config** and press **Enter**. The Ethernet configuration displays. The example above shows port 1 first and then port 2.

Recording Model Information and System Information

After performing the troubleshooting procedures, and before calling or emailing Technical Support, please record as much information as possible in order to help the Transition Networks Technical Support Specialist.

1. Select the x4110 **MAIN** tab. (From the CLI, use the commands needed to gather the information requested below. This could include commands such as **stat**, **show card info**, **show slot info**, **show ether config**, or others as request by the TN Support Specialist.

2. Record the **Model Information** for your system.

    Serial Number: _____   Model: _____

    Software Revision: _____   Hardware Revision: _____

    Bootloader Revision: _____

3. Record the **System Configuration** information for your system.

    System Uptime: _____   Configuration Mode: _____

    Number of Ports: _____   MAC Address: _____

    Device Description: _____   Data Rate Retiming: _____

4. Provide additional Model and System information to your Technical Support Specialist. See
    the"Basic ION System Troubleshooting" section.

    Your Transition Networks service contract number: _____

    A description of the failure: _____

    _____

    _____

    LED status description: _____

    A description of any action(s) already taken to resolve the problem (e.g., changing switch mode,
    rebooting, etc.): _____

    _____

    _____

    The serial and revision numbers of all involved Transition Networks products in the network:
    _____

    _____

    A description of your network environment (layout, cable type, etc.): _____

    _____

    _____

    Network load and frame size at the time of trouble (if known): _____

    The device history (i.e., have you returned the device before, is this a recurring problem, etc.):
    _____

    _____

    Any previous Return Material Authorization (RMA) numbers: _____

Technical Support

Contact Us

Technical Support: Technical support is available 24-hours a day

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International: 00-1-952-941-7600

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Web: https://www.transition.com

Firmware: Keep your products up to date by downloading the latest firmware. You must log in or create an account to download firmware. For further assistance contact us at +1.952.358.3601, 1.800.260.1312, or at techsupport@transition.com.

Appendix A: CLI Messages and Recovery

The following messages may display during CLI operations.

Ambiguous command

A. This message indicates either a) the input for one of the parameters is incorrect, or b) a hyphen is missing between two parts of the command.

1. Verify the CLI command syntax.

2. Retry the operation.

B. You typed part of a valid CLI command and pressed **Enter** before completing the command syntax. For example, if you type

```
C1|S7|L1D>add v
```

and then press the **Enter** key, the message "*% Ambiguous command.*" displays.

1. Type the part of the command that failed (**add v** in the example above), type a question mark (**?**), and the press **Enter**. The valid commands that start with the part of the command you initially entered are displayed.

2. Verify the CLI command syntax.

3. Retry the operation.

C. The system was unable to resolve the desired command based on the portion of the command entered. For example, you entered the following: `C1|S7|L1D>set dot1`

1. Verify the command syntax.

2. Retry the CLI command syntax. See Appendix A.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Cannot get link pass through information on this card

This message indicates that a link pass through (LPT) CLI command was entered for an IONMM. CLI commands for LPT operations are only valid for slide-in modules other than the IONMM.

1. Use the **go** command to change from the IONMM to the specific slide-in module. The **go** command format is:
    go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)

2. Retry the operation. For a complete list of the available commands, see the ION System CLI Reference Manual, 33473.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

This message indicates that a port level command was entered for the IONMM but the command is only valid for the other types of slide-in modules.

1. Use the **go** command to change location of where the command operates. The **go** command format is:
    go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Cannot get port security on this port!

This message indicates that a port level command was entered for the IONMM but the command is only valid for the other types of slide-in modules.

1. Use the **go** command to change location of where the command operates. The **go** command format is:
    go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)

2. Retry the operation. For a complete list of the available commands, see the ION System CLI Reference Manual, 33473.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Command incomplete

This message indicates that not all of the required fields were entered for the CLI command.

1. Verify the command syntax.

2. Retry the operation. For a complete list of the available commands, see the ION System CLI Reference Manual, 33473.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Could not open connection to the host on port 23. Connection failed.

This message indicates that the Telnet server and client are configured for different ports. For Telnet operations the default port is 23.

1. Ensure that the Telnet port is set to 23 for both the server and the client. This will require someone with administrative rights in order to make a change.

2. Add the port number to the Telnet command. For example:

   Telnet <ipaddr> <port#>

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error: this command should be executed on a device

This message indicates that the CLI command was entered for a port and it is only applicable for a device.

1. Use the **go** command to change location of where the command operates. The **go** command format is:
   go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error: this command should be executed on a port

This message indicates that the CLI command was entered for a card and it is only applicable for a port.

1. Use the **go** command to change location of where the command operates. The **go** command format is:
   `go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)`

2. Retry the operation.

3. For a complete list of the available commands, see Appendix A.

4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Fail to get MAC address!

This message indicates that communications to the module can not be established.

1. Verify that the correct hierarchy has been specified in the command (see "Managing Slide-In and Remote Modules Using CLI Commands").

2. For all modules (slide-in and remote) check the following:

   • module is properly seated/connected
   • module is powered up

3. Wait 60 seconds, then retry the operation.

4. Cycle power for the module in question. **Note:** for slide-in modules pull the module out so it is no longer connected to the backplane, then slide the module back in, ensuring that it is firmly seated.

5. Retry the operation.

6. If the problem persists, contact Technical Support. See Contact Us on page 41.

Fail to get port type!

This message indicates that a port level command was entered for the IONMM but the command is only valid for the other types of slide-in modules.

1. Use the **go** command to change location of where the command operates.

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Incomplete location command!

This message indicates that one or more parameters for the **go** command are missing. The go command was entered to set location parameters, but the module, slot and/or port value(s) were no included in the command string.

The go command can operate on a local or remote card/port, and you must give the last parameter to specify the target is a port or device. For example, the input go c=1 s=14 does not include the port parameter, so the CLI module displays "Incomplete location parameters".

1. Verify the command syntax.

2. Re-enter the **go** command and be sure to include all of the location parameters:

    ```
    go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)
    ```

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Invalid location parameters, cannot find the physical entity!

This message indicates that the system can not detect the presence of the device or port specified in the **go** command.

1. Verify that the correct hierarchy has been specified in the command (see "Managing Slide-In and Remote Modules Using CLI Commands").

2. For all modules (slide-in and remote) check the following:
    *   module is properly seated/connected
    *   module is powered up

3. Wait 60 seconds then retry the operation.

4. Cycle power for the module in question. **Note:** for slide-in modules pull the module out so it is no longer connected to the backplane, then slide the module back in, ensuring that it is firmly seated.

5. Retry the operation.

6. If the problem persists, contact Technical Support. See Contact Us on page 41.

Invalid user!

This message indicates that the specified user is not valid.

1. Verify the user.

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Login incorrect

This message indicates that either the login or password entered while trying to establish a USB or Telnet connection is incorrect.

1. Verify the login/password.

   Note: the login and password are case sensitive. The default login is **ION** and the default password is **private**.

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

No DMI support on this port!

This message indicates that you entered a DMI command for a port that does not support DMI.

1. Verify that the port supports DMI. For Transition Networks x4110s and SFPs, the model number has a "-D" at the end.

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

There is no matched command

This message indicates that there is no such command available on this system.

1. Verify the command syntax.

2. Retry the operation.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Unable to open xx. Please check your port settings.

This message indicates that HyperTerminal no longer recognizes which COM port to use for its connection.

1. Check that the USB cable is connected to the management station and the IONMM.

2. Check that the COM port is listed for the device manager on the management station (PC).

   a) On the desktop, right-click on **My Computer**.

   b) Select **Manage**.

   c) Click **Device Manager**.

   d) In the right panel, expand the list for **COM & LPT**.

3. Is the COM port in the list?

Yes	No
Continue with step 4.	Restart the management station.

4. In the HyperTerminal window, select **File>Properties**.

5. Check that the correct port is listed in the **Connect using** field.

6. Restart the management station.

7. Reboot the IONMM.

8. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error, you should first give full location parameters

The location value is incomplete; it is missing the module, slot and/or port value(s). This message can display when a device-level command is entered (e.g., **show lpt config**).

When you change a bigger container, the value of smaller object is cleared. For example, originally the operated object is Chassis=1, slot=4, L1AP=1 L2AP=2 L3D, and then when the command chassis 3 is entered. This automatically sets the value of module, slot and port to 0.

If the value of module, slot and port are not set in later commands, and then you run a device-level command (e.g., **show lpt config**), this error message displays.

Enter the **go** command and be sure to include all of the location parameters.

```
go [c=CHASSIS] [s=SLOT] [l1ap=L0APORT] [l2ap=L1APORT] (l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)
```

System is initializing...

CLI is receiving continuous error message "*system is initializing...*"
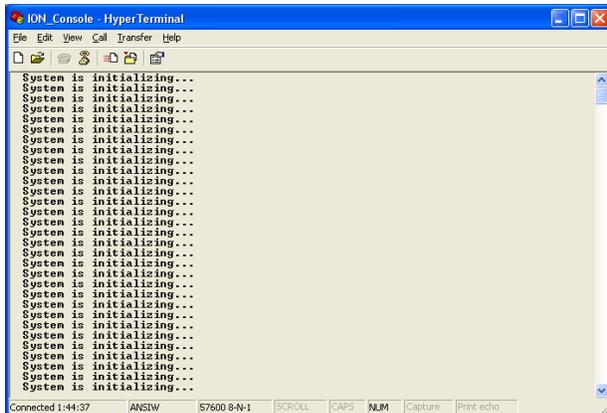
1. Wait for a few minutes for the message to clear.

2. Cycle power to the IONMM.

3. Retry the operation.

4. If the problem persists, contact Technical Support. See Contact Us on page 40.

Start HTTPS certificate failed.

1. Verify the HTTPS parameters (HTTPS is enabled, the certificate type is defined, certificate file defined, private key file defined, password defined).

2. Verify that the HTTPS server is operational.

3. Retry the operation (i.e., type **start https certificate** and press **Enter**).

4. If the problem persists, contact Technical Support. See Contact Us on page 41.

This command is only available on <x323x> card!

The command you entered is not supported on the card from which it was entered (e.g., you entered **set soam ma**, **set soam meg**, or **set soam mep** from a x4110 card, which does not support SOAM).

1. Verify the command entered is the one you want.

2. Verify that the device for the command entered can support the function of the command.

3. Retry the operation.

4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error: this command should be executed on a port!

1. Verify the command entered is the one you want.

2. Change to the desired port; enter the **go** command with all of the location parameters (chassis / slot / port).

3. Retry the operation from the port (i.e., type **show fwd portlist** and press **Enter**).

Unknown command!

The command you entered is not supported, or you entered the wrong command format / syntax.

1. Verify the CLI command syntax.

2. Retry the operation.

3. For a complete list of the available commands, see Appendix A.

4. If the problem persists, contact Technical Support. See Contact Us on page 41.

There is no matched command.

The command you entered is not supported, or you entered the wrong command format / syntax.

1. Verify the CLI command syntax.

2. Retry the operation.

3. For a complete list of the available commands, see Appendix A.

4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error location parameter number!

The go command you entered had an invalid or missing parameter.

1. Enter the **go** command with all of the location parameters (chassis / slot / port) in the format:

   `go [c=CHASSIS] [s=SLOT] [l1ap=PORT] [l2ap=PORT](l1p=PORT|l2p=PORT|l3p=PORT|l1d|l2d|l3d)`

Fail to set link pass through state!

You tried to set the LPT state to an unacceptable state. For example, you typed:

   `C1|S3|L1D>`**`set lpt state=enable`**

1. Verify the CLI command syntax.

2. Check the **set lpt monitor-port** and **set selective lpt state** command settings.

3. Enter the **show lpt config** command and in the Link Pass Through configuration, check if the Link pass through state is set to **notSupported** or if the **Remote fault detect state** is set to **notSupported**.

   If either is set to **notSupported**, change the setting to enable (e.g., type **set rfd state enable** and press **Enter**).

4. Retry the operation.

5. If the problem persists, contact Technical Support. See Contact Us on page 41.

TFTP transfer failed!

The attempted firmware upgrade via the **tftp upgrade** command was unsuccessful.

1. Verify the CLI command syntax.

2. Verify the firmware version.

3. Be sure the TFTP server is configured and running.

4. Check that the remotefile is in the proper location (e.g., the file *x323x.bin.0.5.4* is at *C:\TFTP-Root*).

5. Retry the operation. See the **tftp upgrade** command.

6. If the problem persists, contact Technical Support. See Contact Us on page 41.

Fail to transfer the file!
tftp get: set address type failed.
tftp put failed.

The file transfer attempt failed. The command you entered to do a tftp file transfer was unsuccessful (e.g., tftp get or tftp put or tftp transfer). For example:

```
C1|S4|L1D>tftp get iptype ipv4 ipaddr 192.168.1.30 remotefile xxxx
tftp get: set address type failed.
C1|S4|L1D>tftp put iptype ipv4 ipaddr 192.168.1.30 localfile xxxx
tftp put failed.
C1|S4|L1D>tftp upgrade iptype ipv4 ipaddr 192.168.1.30 remotefile xxxx
tftp get: set address type failed.
```

1. Check the command syntax. See IONMM User Guide manual.
2. Make sure the TFTP server is configured and running.
3. Verify the filename to be transferred, its location, and the IP address of the TFTP server.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

The attempted show dot1bridge aging-time command failed to complete.

1. Verify the **dot1bridge aging-time** command syntax. See the IONMM User Guide manual.

2. Retry the operation. See the **dot1bridge aging-time** command

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Redundancy is not supported on this card!

The attempt to set or show fiber redundancy failed. For example, you entered the command: **show redundancy info**, but the device does not support fiber redundancy.

1. Verify that the card you entered the command on supports this function (must have at least 2 fiber ports) .
2. Retry the operation on a card that supports this function.
3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Invalid user!
Fail to set SSH server state!

You entered the command **show ssh public-key user admin**, but the x4110 does not support SSH.

1. Use the go command to switch to a device that supports SSH.
2. If the problem persists, contact Technical Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

Upgrade is only supported on IONMM card!
You entered a firmware *upgrade* or firmware *update* command from a device other than the IONMM. For example:

```
C1|S3|L1D>show firmware upgrade result
C1|S3|L1D>show firmware-db update result
C1|S3|L1D>show upgrade firmware file
C1|S3|L1D>update firmware-db file cert
C1|S3|L1D>upgrade module
```

1. Make sure of the command you want to enter. See the IONMM User Guide manual.
2. Use the **home** command to go to the IONMM device.
3. Re-enter the firmware upgrade command from the IONMM.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

DMI is only supported on FIBER port!

You entered the command **show dmi info** on a card that does not support it. For example:

```
C1|S7|L1P1>show dmi info
DMI is only supported on FIBER port!
```

1. Verify if the card supports DMI.
2. Use the **go** command to switch to a different card port supporting Fiber.
3. Verify the command entry. See "DMI Commands" section above.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Cannot clear loopback counters on this card!
Cannot set administrate state on this port!
Cannot set advertisement capability on this port!
Cannot set autocross on this card!
Cannot set auto negotiation state on this port!
Cannot set Ethernet port speed for this card!
Cannot set Ether port duplex mode on this card!
Cannot set far end fault on this card!
Cannot set filter unknown dest unicast frames on this port!
Cannot set pause on this port!
Cannot set source address lock action on this port!

Cannot set USB port state on this card!
Cannot get port security configuration on this port!
Cannot show forwarding port list on this card!
Cannot show USB port state on this card!
Cannot show port QoS configuration in this card!
Cannot set tag type for priority in this card!
Cannot set default priority in this card!
Cannot set IEEE tag for priority in this card!
Cannot get VLAN database configuration on this card!

Cannot get LOAM configuration on this port!

Cannot set remote fault detect state on this card!

Cannot set service vid for tag on this card!
Fail to set management VLAN id!
Fail to set management VLAN state!
Cannot set bandwidth alloc type on this card!
Cannot set ingress and egress rate on this card!
Cannot show system information on this card!
Cannot set ingress and egress rate on this card!
IP management is not supported on this card!
Link OAM is not supported on this card!
No tdm loopback supported on this card!
No Time-domain reflectometer support on this card!
Syslog is not supported on this card!
TAOS status setting is not supported on this card!
TNDP is not supported on this card!

You entered a command for a function not supported on the card. For example:

```
C1|S7|L1P1>clear ether all counters
Cannot clear loopback counters on this card!
C1|S7|L1P1>show qos config
Cannot show port QoS configuration in this card!

C1|S7|L1P1>show qos priority remapping
Cannot show port QoS priority remapping in this card!
```

1. Verify if the card supports the desired function.
2. Use the **go** command to switch to a different card port supporting loopback.
3. Verify the command entry.

Cannot set slot power on this card!

You entered a set slot power= command on a device that does not support it. For example:

```
C1|S16|L1P1>set slot 16 power on
Cannot set slot power on this card!
```

1. Verify this is the command you want.
2. Verify the command parameter; make sure you are not trying to power up a slot that already has power.
3. Use the **go** command to switch to the slot you want.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error: this command should be executed on a power sensor or fan!

You entered a set sensor command on a device that does not support it. For example:

```
C1|S16|L1P1>set sensor stid 1 notif true
Error: this command should be executed on a power sensor or fan!
```

1. Verify this is the command you want.
2. Use the **stat** command to show the chassis configuration. For example:
   ```
   [ 22]  IONPS-A
    Temperature Sensor
    Volatage Sensor
    Power Sensor
    Fan-1
    Fan-2
   ```
3. Use the **go** command to switch to the power sensor or fan.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Invalid forward port list!
You entered an invalid parameter in response to a prompt (e.g., for a module number for firmware up-grade). For example:

```
C1|S7|L1D>upgrade module
Available modules:
index    module                                         loc
------------------------------------------------------------------------
1        ION219                                         c=1 s=0 l1d
2        C3230-1040                                     c=1 s=3 l1d
3        C3230-1040                                     c=1 s=5 l1d
4        S3230-1040                                     c=1 s=5 l1ap=2 l2d
5        IONMM                                          c=1 s=7 l1d
6        C3231-1040                                     c=1 s=10 l1d
7        C2220-1014                                     c=1 s=16 l1d
8        C3220-1040                                     c=1 s=18 l1d
9        IONPS-A                                        c=1 s=22 l1d

Choose the module you want to upgrade: (eg. 1,3,16; at most 8 modules
to upgrade, press 'q' to exit upgrade)
show card info

Invalid forward port list!
```

1. Re-enter the command, wait for the prompt, and then enter a response in the correct syntax.

2. See the related command / function section of this manual.

3. If the problem persists, contact Technical Support. See Contact Us on page 41.

L2CP is not supported on this card!
You tried to perform an L2CP function but the device does not support L2CP.
1. Make sure this is the command / function that you wanted.
2. Use the **go** command to switch to a device that supports L2CP.
3. Try entering another command.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Can not set speed on this port!
You entered the CLI command to define the x4110 port's operating speed, but the command failed.
For example:

```
C1|S5|L1P2>set ether speed 100M
Can not set speed on this port!
C1|S5|L1P2>
```

1. Verify the x4110 supports this speed.
2. Verify the command syntax.
3. Re-enter the **set ether speed=** command with a speed supported by the card.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Cannot remove vlan on this card!
You entered a command to delete one or all VLANs from the x4110, but the action cannot be performed.
For example:

```
C1|S7|L1D>remove vlan all
Cannot remove vlan on this card!
C1|S7|L1D>remove vlan vid=3
Cannot remove vlan on this card!
C1|S7|L1D>
```

1. Make sure this is the function that you want.
2. Use the **go** command to switch to a x4110 that supports the VLAN database.
3. Use the **add vlan-db** command to add a VLAN VID if needed.
4. If the problem persists, contact Technical Support. See Contact Us on page 41.

Cannot remove forward database rows on this card!
You entered a command to delete a VLAN forward database VID (forward database row) from the
x4110, but the action cannot be performed. For example:

```
C1|S7|L1D>remove vlan-db vid 3
Cannot remove forward database rows on this card!
C1|S7|L1D>
```

1. Make sure this is the function that you want.
2. Use the **go** command to switch to a NID that supports the VLAN FDB.
3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error symbol period window low is out of range, its range is 125000000 - 268435455!
Error frame period window is out of range, its range is 174762 - 104057560!
Error frame period threshold is out of range, its range is 0 - 268435455!
Error frame window is out of range, its range is 10 - 600!
Error frame threshold is out of range, its range is 0 - 268435455!
Error frame seconds summary window is out of range, its range is 100 - 9000!
Error frame seconds summary threshold is out of range, its range is 0 - 268435455!

A parameter entered in the "Event Configuration" has exceeded the range limitation.

1. Enter a parameter within the valid range displayed.
2. If the problem persists, contact Technical Support. See Contact Us on page 41.

ERROR: Current user is not authorized to do this operation!
% There is no matched command.

You tried to enter a CLI command but the entry failed.
An Admin user has full rights to read/write all configurations through Web/CLI. An Admin user can create new users and delete any users other than itself and ION.
A Read-Write user can read/write all configurations except for Upgrade and Backup/Restore via the Web or CLI. A read-write user can also change its own login password. When a read-write user logs in via the Web, the "UPGRADE" tab and the "BACKUP/RESTORE" tab are disabled. When a read-write user logs in via the CLI, all set commands except for upgrade and backup/restore can be executed.
A Read-Only user can read all configurations except for Upgrade and Backup/Restore though the Web/CLI.
1. Try another command on the x4110.
2. Check with the Admin if the command should be supported.
3. If the problem persists, contact Technical Support. See Contact Us on page 41.

Error: **This card is in hardware mode and no setting allowed!**

You tried to enter a CLI command with the x4110 in Hardware mode.

1. Change the x4110 to Software mode. See the x4110 Install Guide manual for information.

TFTP Server Messages

Messages like the ones below may display during TFTP Server operation, depending on the TFTP Server package that you use.
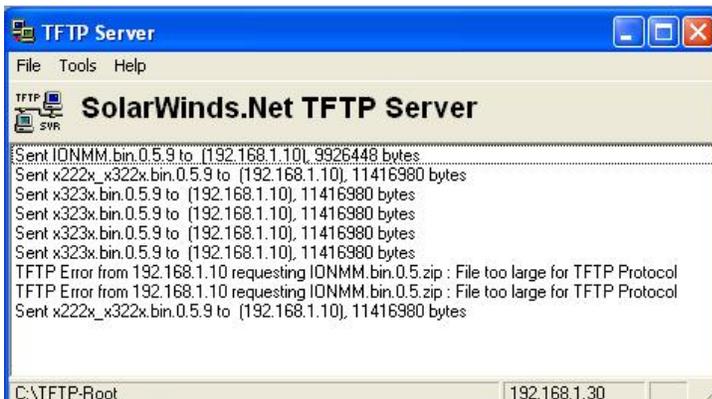
Message: *File does not exist*

Meaning: A TFTP Server error - the TFTP Server Address that you specified does not contain the Firmware File Name specified.
Recovery: 1) Verify the TFTP server's correct file location (e.g., local disk at *C:\TFTP-Root*). 2) Make sure of the filename / extension. 3) Check the TFTP Server's online helps for suggestions.

Message: *File too large for TFTP Protocol*

Meaning: A TFTP Server error - you tried to upload a file e.g., (IONMM.bin.0.5 – 50Mb) but the TFTP server failed. The file you tried to upload via the TFTP server exceeded the file size capability.
Recovery: 1) Check if some extra files ended up in the zip folder – some repeated – 6 FW files total.
2) Remove some of the files from the zip folder and try the upload again. 3) Send the remaining files in a separate file. 4) Check the TFTP Server's online helps for suggestions.

Appendix D: Linux Commands

ION supports certain standard Linux file system commands such as **cat**, **cd**, **ls**, **more**, **pwd**, and **rm**. These commands are restricted to the user directories; internal Linux file systems are not accessible.

The ION standard Linux file system commands are based on BSD 4; refer to the related documentation for more information.

cat *Command*

Command: cat

Description: Show the content of the FILES. Concatenate files and print on the standard output.

Example: `C1|S7|L1D>cat  [OPTION]`

Options: Refer to the BSD 4 documentation for options and Interactive commands for the **more** command.

cd *Command*

Command: cd

Description: Change to another directory.

Example:

Options: Refer to the BSD 4 documentation for options and Interactive commands for the **more** command.

ls *Command*

Command: ls

Description: Unix and Unix-like operating systems maintain the concept of a current working directory, (i.e., where you are currently positioned in the hierarchy of directories).

When invoked without any arguments, **ls** lists the files in the current working directory. This command is restricted to the IONMM user directories; internal Linux file systems are not accessible.

The IONMM card stores all configuration backup files, HTTPS certification file, SSH key file, and Syslog file. For example, the HTTPS certificate is stored in *'/agent3/conf/lighttpd'* . For SSH, the host keys (RSA and DSA) are stored in *'/agent3/conf/dropbear'*. For the SSH user key, there is a 'root' user and the user key for 'root' is stored in *'/root/.ssh'*.

Example:
```
C1|S7|L1D>ls
    agent3
    app
    bin
    dev
    etc
    lib
    linuxrc
    mnt
    proc
    root
    sbin
    sys
    tftpboot
    tmp
    usr
    var
    www
C1|S7|L1D>
```

Options:
Without options, **ls** displays files in a bare format. This bare format however makes it difficult to establish the type, permissions, and size of the files. The most common options to reveal this information or change the list of files are:

-l long format, displaying Unix file types, permissions, number of hard links, owner, group, size, date, and filename

-F appends a character revealing the nature of a file, for example, * for an executable, or / for a directory. Regular files have no suffix.

-a lists all files in the given directory, including those whose names start with "." (which are hidden files in Unix). By default, these files are excluded from the list.

-R recursively lists subdirectories. The command ls -R / would therefore list all files.

-d shows information about a symbolic link or directory, rather than about the link's target or listing the contents of a directory.

-t sort the list of files by modification time.

-h print sizes in human readable format. (e.g., 1K, 234M, 2G, etc.)

Example:

```
C1|S3|L1D>ls etc
    TZ
    VERSION
    dropbear
    factory
    fstab
    group
    gshadow
    host.conf
    hostname
    hosts
    init.d
    inittab
    lighttpd
    lighttpd.conf
    motd
    openssl
    passwd
    profile
    protocols
    radius
    rcS.d
    resolv.conf
    rpc
    script
    services
    shadow
    snmpd.conf
    sysconfig
    terminfo
C1|S3|L1D>
```

Refer to the BSD 4 documentation for additional options and Interactive commands for the **more** command.

more *Command*

Command: more

Description: A filter for paging through text one screenful at a time.

Example: `C1|S7|L1D>more [OPTION]`

Options: Refer to the BSD 4 documentation for options and Interactive commands for the **more** command.

pwd *Command*

Command: pwd

Description: Show current directory.

Example:

```
C1|S7|L1D>pwd
/
C1|S7|L1D>
```

Options: Refer to the BSD 4 documentation for options and Interactive commands for the **pwd** command.

Glossary

This section describes many of the terms and mnemonics used in this manual. Note that the use of or description of a term does not in any way imply support of that feature or of any related function(s).

10 gigabit Ethernet

(10GE or 10GbE or 10 GigE) refers to various technologies for transmitting Ethernet frames at a rate of 10 gigabits per second (10 billion bits per second), first defined by the IEEE 802.3ae-2002 standard. Like previous versions of Ethernet, 10GbE supports both copper and fiber cabling. However, due to its higher bandwidth requirements, higher-grade copper cables are required: category 6a or Class F/Category 7 cables for links up to 100m. Unlike previous Ethernet standards, 10 gigabit Ethernet only defines full duplex point-to-point links which are generally connected by network switches. Half duplex operation does not exist in 10GbE.

The 10 gigabit Ethernet standard encompasses a number of different physical layer (PHY) standards. A networking device may support different PHY types through pluggable PHY modules, such as those based on SFP+. Over time, market forces will determine the most popular 10GE PHY types. At the time that the 10 gigabit Ethernet standard was developed, interest in 10GbE as a wide area network (WAN) transport led to the introduction of a WAN PHY for 10GbE. The WAN PHY encapsulates Ethernet packets in SONET OC-192c frames and operates at a slightly slower data-rate (9.95328 Gbps) than the local area network (LAN) PHY. Both share the same physical medium-dependent sublayers so can use the same optics. The WAN PHY can support maximum link distances up to 80 km depending on the fiber standard employed.

10GBASE-KX4

Operates over four backplane lanes and uses the same physical layer coding (defined in IEEE 802.3 Clause 48) as 10GBASE-CX4.

10GBASE-KR

Operates over a single backplane lane and uses the same physical layer coding (defined in IEEE 802.3 Clause 49) as 10GBASE-LR/ER/SR.

10GBASE-T

10GBASE-T, or IEEE 802.3an-2006, is a standard released in 2006 to provide 10 Gbit/s connections over unshielded or shielded twisted pair cables, over distances up to 100 meters (330 ft). Although category 6a is required to reach the full 100 meters (330 ft), category 5e is good for up to 45 meters (148 ft) and category 6 will reach 55 meters (180 ft).[22] 10GBASE-T cable infrastructure can also be used for 1000BASE-T allowing a gradual upgrade from 1000BASE-T using autonegotiation to select which speed to use. 10GBASE-T has latency in the range 2 to 4 microseconds compared to 1 to 12 microseconds on 1000BASE-T. As of 2010 10GBASE-T silicon is available from several manufacturers with claimed power dissipation of 3-4 W at structure widths of 40 nm. With 28 nm in development, power will continue to decline.

10GBASE-T uses the IEC 60603-7 8P8C (commonly known as RJ45) connectors already widely used with Ethernet. Transmission characteristics are now specified to 500 MHz. To reach this frequency Category 6A or better balanced twisted pair cables specified in ISO/IEC 11801 amendment 2 or ANSI/TIA-568-C.2 are needed to carry 10GBASE-T up to distances of 100 m. Category 6 cables can carry 10GBASE-T for shorter distances when qualified according to the guidelines in ISO TR 24750 or TIA-155-A.

10GBASE-SR

10GBASE-SR ("short range") is a port type for multi-mode fiber and uses 850 nm lasers. Its Physical Coding Sublayer 64b/66b PCS is defined in IEEE 802.3 Clause 49 and its Physical Medium Dependent PMD in Clause 52. It delivers serialized data at a line rate of 10.3125 Gbit/s.

Over obsolete FDDI-grade 62.5 micrometers multimode fiber cabling it has a maximum range of 26 meters. Over 62.5 micrometers OM1 it has a range of 33 meters; over 50 micrometers OM2 a range of 82 meters; over OM3 300 meters and over OM4 400 meters. OM3 and OM4 are the preferred choices for structured optical cabling within buildings. MMF has the advantage over SMF of having lower cost connectors because of its wider core.

There is a non-standard lower cost, lower power variant sometimes referred to as 10GBASE-SRL (10GBASE-SR lite). This is inter-operable with 10GBASE-SR but only has a reach of 100 meters.

10GBASE-LR

10GBASE-LR ("long reach") is a port type for single-mode fiber and uses 1310 nm lasers. Its Physical Coding Sublayer 64b/66b PCS is defined in IEEE 802.3 Clause 49 and its Physical Medium Dependent PMD in Clause 52. It delivers serialized data at a line rate of 10.3125 Gbit/s.

10GBASE-LR has a specified reach of 10 kilometers (6.2 mi), but 10GBASE-LR optical modules can often manage distances of up to 25 kilometers (16 mi) with no data loss.

10GBASE-LRM

10GBASE-LRM, (Long Reach Multimode) originally specified in IEEE 802.3aq is a port type for multimode fiber and uses 1310 nm lasers. Its Physical Coding Sublayer 64b/66b PCS is defined in IEEE 802.3 Clause 49 and its Physical Medium Dependent PMD in Clause 68. It delivers serialized data at a line rate of 10.3125 Gbit/s.

10GBASE-LRM supports distances up to 220 meters (720 ft) on FDDI-grade multimode fiber and the same 220m maximum reach on OM1, OM2 and OM3 fiber types. 10GBASE-LRM reach is not quite as far as the older 10GBASE-LX4 standard.

To ensure that specifications are met over FDDI-grade, OM1 and OM2 fibers, the transmitter should be coupled through a mode conditioning patch cord. No mode conditioning patch cord is required for applications over OM3 or OM4.

Some 10GBASE-LRM transceivers also support distances up to 300 meters (980 ft) on standard single-mode fiber (SMF, G.652), however this is not part of the IEEE or MSA specification. 10GBASE-LRM uses electronic dispersion compensation (EDC) for receive equalization.

10GBASE-LRM has been a failure in the market.

10GBASE-ER

10GBASE-ER ("extended reach") is a port type for single-mode fiber and uses 1550 nm lasers. Its Physical Coding Sublayer 64b/66b PCS is defined in IEEE 802.3 Clause 49 and its Physical Medium Dependent PMD in Clause 52. It delivers serialized data at a line rate of 10.3125 Gbit/s.

The 10GBASE-ER transmitter is implemented with an externally modulated laser (EML).

10GBASE-ER has a reach of 40 kilometers (25 mi) over engineered links and 30 km over standard links.

10GBASE-ZR

Several manufacturers have introduced 80 km (50 mi) range ER pluggable interfaces under the name 10GBASE-ZR. This 80 km PHY is not specified within the IEEE 802.3ae standard and manufacturers have created their own specifications based upon the 80 km PHY described in the OC-192/STM-64 SDH/SONET specifications. The 802.3 standard will not be amended to cover the ZR PHY.

802.3 Standards for 10GbE

The IEEE 802.3 working group has published several standards relating to 10GbE. These included: 802.3ae-2002 (fiber -SR, -LR, -ER and -LX4 PMDs), 802.3ak-2004 (-CX4 copper twin-ax InfiniBand type cable), 802.3an-2006 (10GBASE-T copper twisted pair), 802.3ap-2007 (copper backplane -KR and -KX4 PMDs) and 802.3aq-2006 (fiber -LRM PMD with enhanced equalization). The 802.3ae-2002 and 802.3ak-2004 amendments were consolidated into the IEEE 802.3-2005 standard. IEEE 802.3-2005 and the other amendments were consolidated into IEEE Std 802.3-2008.

100BASE-FX

100BASE-FX is a version of Fast Ethernet over optical fiber. It uses a 1300 nm near-infrared (NIR) light wavelength transmitted via two strands of optical fiber, one for receive (RX) and the other for transmit (TX). Maximum length is 400 meters (1,310 ft) for half-duplex connections (to ensure collisions are detected), 2 kilometers (6,600 ft) for full-duplex over multimode optical fiber, or 10,000 meters (32,808 feet) for full-duplex single mode optical fiber. 100BASE-FX uses the same 4B5B encoding and NRZI line code that 100BASE-TX does. 100BASE-FX should use SC, ST, or MIC connectors, with SC being the preferred option. 100BASE-FX is not compatible with 10BASE-FL, the 10 MBit/s version over optical fiber.

1000BASE-X

Refers to gigabit Ethernet transmission over fiber, where options include 1000BASE-CX, 1000BASE-LX, and 1000BASE-SX, 1000BASE-LX10, 1000BASE-BX10 or the non-standard -ZX implementations.

802.1

The IEEE standard for port-based Network Access Control. IEEE 802.1 is a working group of the IEEE 802 project of the IEEE Standards Association. It's concerns include 802 LAN/MAN architecture, internetworking among 802 LANs, MANs and other wide area networks, 802 Link Security, 802 overall network management, and those protocol layers above the MAC and LLC layers.

802.1ad

IEEE 802.1ad (Provider Bridges) is an amendment to IEEE standard IEEE 802.1Q-1998 (aka QinQ or Stacked VLANs), intended to develop an architecture and bridge protocols to provide separate instances of the MAC services to multiple independent users of a Bridged LAN in a manner that does not require cooperation among the users, and requires a minimum of cooperation between the users and the provider of the MAC service.

802.1ah

IEEE 802.1ah-2008 is a set of architecture and protocols for routing of a customer network over a provider network, allowing interconnection of multiple Provider Bridge Networks without losing each customer's individually defined VLANs. The final standard was approved by the IEEE in June 2008.

802.1p

The IEEE standard for QoS packet classification.

802.1p Prioritization

The ability to send traffic to various prioritization queues based on the 802.1q VLAN Tag priority field. (AKA, CoS. Standard: IEEE 802.1p.)

802.1q

IEEE 802.1Q, or VLAN Tagging, is a networking standard allowing multiple bridged networks to transparently share the same physical network link without leakage of information between networks. IEEE 802.1Q (aka, dot1q) is commonly refers to the encapsulation protocol used to implement this mechanism over Ethernet networks. IEEE 802.1Q defines the meaning of a VLAN with respect to the specific conceptual model for bridging at the MAC layer and to the IEEE 802.1D spanning tree protocol.

ACL

(Access Control List) A set of data that informs a computer's operating system which permissions, or access rights, that each user or group has to a specific system object, such as a directory or file. Each object has a unique security attribute that identifies which users have access to it, and the ACL is a list of each object and user access privileges such as read, write or execute.

ALR

(Automatic Link Restoration) After a link failure condition has been corrected, the device will automatically re-establish the link in all network conditions using the ALR feature.

ARP

(Address Resolution Protocol) A protocol for mapping an IP address to a physical machine address that is recognized in the local network

Auto-Negotiation

With Auto-Negotiation in place, Ethernet can determine the common set of options supported between a pair of "link partners." Twisted-pair link partners can use Auto-Negotiation to figure out the highest speed that they each support as well as automatically setting full-duplex operation if both ends support that mode. (AKA, N-WAY Protocol. Standard: IEEE 802.3u.)

Auto MDI / MDIX

Auto MDI/MDIX automatically detects the MDI or MDIX setting on a connecting device in order to obtain a link. This means installers can use either a straight through or crossover cable and when connecting to any device, the feature is pretty self explanatory.

Auto-provisioning

A process that enables centralized management for multiple end user devices. It uses DHCP option 60, 66 and 67 to provide centralized firmware and configuration management. The feature provides mass firmware upgrade capability as well as booting-up full end device configuration without any manual intervention.

Backplane Ethernet

Backplane - also known by its task force name 802.3ap - is used in backplane applications such as blade servers and routers/switches with upgradable line cards. 802.3ap implementations are required to operate in an environment comprising up to 1 meter (39 in) of copper printed circuit board with two connectors. The standard defines two port types for 10 Gbit/s (10GBASE-KX4 and 10GBASE-KR) and a 1 Gbit/s port type (1000BASE-KX). It also defines an optional layer for FEC, a backplane autonegotiation protocol and link training for 10GBASE-KR where the receiver can set a three tap transmit equalizer. The autonegotiation protocol selects between 1000BASE-KX, 10GBASE-KX4, 10GBASE-KR or 40GBASE-KR4 operation. 40GBASE-KR4 is defined in 802.3ba. New backplane designs use 10GBASE-KR rather than 10GBASE-KX4.

BPC

(Back Plane Controller) the ION system component that provides communication between the SIC cards and the IONMM. The BPC is an active device with a microprocessor and management software used to interconnect IONMM and SIC cards via the Ethernet management plane. The BPC has knowledge of the cards that are present in the system, and is responsible for managing the Ethernet switch that interconnects all the chassis slots.

BPDU

(Bridge Protocol Data Unit) Data messages that are exchanged across the switches within an extended LAN that uses a spanning tree protocol topology. BPDU packets contain information on ports, addresses, priorities and costs and ensure that the data ends up where it was intended to go. See also "STP".

Bridge

A device that connects one local area network (LAN) to another LAN.

Cat 6 (Category 6) Cable

Category 6 cable, commonly referred to as Cat 6, is a standardized cable for Gigabit Ethernet and other network physical layers that is backward compatible with the Category 5/5e and Category 3 cable standards. Compared to Cat 5 and Cat 5e, Cat 6 provides more stringent specifications for crosstalk and system noise. The Cat 6 cable standard provides performance of up to 250 MHz and is suitable for 10BASE-T, 100BASE-TX (Fast Ethernet), 1000BASE-T/1000BASE-TX (Gigabit Ethernet) and 10GBASE-T (10-Gigabit Ethernet). Category 6 cable has a reduced maximum length when used for 10GBASE-T.
Like most earlier twisted-pair cable, Category 6 cable contains four twisted wire pairs. Attenuation, near end crosstalk (NEXT), and PSNEXT (power sum NEXT) in Cat 6 cable and connectors are all much lower than Cat 5 or Cat 5e, which uses 24 AWG wire. The increase in performance with Cat 6 comes mainly from increased (22 AWG) wire size. Because the conductor sizes are generally the same, Cat 6 jacks may also be used with Cat 5e cable.
Category 6 cable can be identified by the printing on the side of the cable sheath. Cat 6 patch cables are normally terminated in 8P8C modular connectors. If Cat 6 rated patch cables, jacks, and connectors are not used with Cat 6 wiring, overall performance is degraded to that of the cable or connector.
Connectors use either T568A or T568B pin assignments; although performance is comparable provided both ends of a cable are the same, T568B is a deprecated standard in the US and no longer supported by TIA.

Category 6a Cable (Augmented Category 6)

Category 6a cable, or Augmented Category 6, is characterized to 500 MHz and has improved alien crosstalk characteristics, allowing 10GBASE-T to be run for the same distance as previous protocols.
The latest standard from the TIA for enhanced performance standards for twisted pair cable systems was defined in February 2008 in ANSI/TIA/EIA-568-B.2-10. Category 6a is defined at frequencies up to 500 MHz—twice that of Cat. 6.
Category 6a performs at improved specifications, in particular in the area of alien crosstalk, as compared to Cat 6 UTP (unshielded twisted pair), which exhibited high alien noise in high frequencies.
The global cabling standard ISO/IEC 11801 has been extended by the addition of amendment 2, which defines new specifications for Cat 6A components and Class EA permanent links. These new global Cat 6A/Class EA specifications require a new generation of connecting hardware, which offer superior performance compared to existing products based on the American TIA standard.
Note the performance difference between ISO/IEC and EIA/TIA component specifications for the NEXT transmission parameter. At a frequency of 500 MHz, an ISO/IEC Cat 6A connector performs 3 dB better than a Cat 6A connector that conforms with the EIA/TIA specification. The 3 dB represents a 100% increase of near-end crosstalk noise reduction when measured in absolute magnitudes.
When used for 10GBASE-T, Cat 6 cable's maximum length is 55 meters (180 ft) in a favorable alien crosstalk environment, but only 37 meters (121 ft) in a hostile alien crosstalk environment, such as when

many cables are bundled together. However, because the effects of alien crosstalk environments on cables are difficult to determine prior to installation, it is highly recommended that all Cat 6 cables being used for 10GBASE-T are electrically tested once installed. With its improved specifications, Cat6 A does not have this limitation and can run 10GBASE-T at 100 meters (330 ft) without electronic testing.

CE

A mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA). The CE marking certifies that a product has met EU consumer safety, health or environmental requirements.

Center Wavelength

In a laser, the nominal value central operating wavelength. It is the wavelength defined by a peak mode measurement where the effective optical power resides. Center Wavelength (CWL) is the midpoint between the wavelengths where transmittance is 50% of the specified minimum transmission, referred to as the Full Width at Half Maximum (FWHM).

Circuit ID

A company-specific identifier assigned to a data or voice network between two locations. This circuit is then leased to a customer by that ID. If a subscriber has a problem with the circuit, the subscriber contacts the telecommunications provider to provide this circuit id for action on the designated circuit. Several Circuit ID formats exist (Telephone Number Format, Serial Number Format, Carrier Facility Format and Message Trunk Format). Telecom Circuit ID formats (LEC circuit IDs) provide service codes for DSL, HDSL, ADSL, Digital data, SST Network Trunk, Switched Access, E1, Switched Access, Basic Data and Voice, LAN, SONET, Ethernet, Video, Voice, Digital Transmission, and others.

CLI

(Command-Line Interface) A mechanism for interacting with a computer operating system or software by typing commands to perform specific tasks. The CLI allows users to set up switch configurations by using simple command phrases through a console / telnet session.

Community

Two levels of ION system access privileges are password protected:
Read access (Read ONLY) - a Community Name with a particular set of privileges to monitor the network without the right to change any of its configuration.
Read/Write (Read <u>and</u> make changes) - a Community Name with an extended set of privileges to monitor the network as well as actively change any of its configuration.

CSA

(Canadian Standards Association) A not-for-profit membership-based association serving business, industry, government and consumers in Canada and the global marketplace.

CWDM

Prior to the relatively recent ITU standardization of the term, one common meaning for coarse WDM meant two (or possibly more) signals multiplexed onto a single fiber, where one signal was in the 1550 nm band, and the other in the 1310 nm band.
In 2002 the ITU standardized a channel spacing grid for use with CWDM (ITU-T G.694.2), using the wavelengths from 1270 nm through 1610 nm with a channel spacing of 20 nm. (G.694.2 was revised in 2003 to shift the actual channel centers by 1 nm, so that strictly speaking the center wavelengths are 1271 to 1611 nm).
A recent development related to CWDM is the creation of GBIC and small form factor pluggable (SFP) transceivers utilizing standardized CWDM wavelengths. GBIC and SFP optics allow for something very close to a seamless upgrade in legacy systems that support SFP interfaces. See also WDM, DWDM, and Wavelength-Division Multiplexing.

dBm

(DeciBels below 1 Milliwatt) A measurement of power loss in decibels using 1 milliwatt as the reference point. A signal received at 1 milliwatt yields 0 dBm. A signal at .1 milliwatt is a loss of 10 dBm.

DCE

(Data Circuit-terminating Equipment) A device that sits between the data terminal equipment (DTE) and a data transmission circuit. Also called data communications equipment and data carrier equipment.

Discovery

Discovery allows a Service OAM-capable device to learn sufficient information (e.g. MAC addresses etc.) regarding other SOAM capable NIDs so that OAM frames can be exchanged with those discovered devices. With EVCs, discovery allows SOAM capable NIDs to learn about other Service OAM capable devices that support the same EVCs. These devices are expected to be at the edges of the OAM domain in which the discovery is carried out. See "LLDP" and "TNDP" for discovery mechanisms. Discovery occurs when a SOAM-capable NID learns sufficient information (e.g. MAC addresses etc.) regarding other SOAM capable NIDs to exchange OAM frames with those discovered NIDs.

DMI

(Diagnostic Monitoring Interface) Adds parametric monitoring to SFP devices.

DMM / DMR

(Delay Measurement Message / Delay Measurement Response) DMM/DMR is used to measure single-ended (aka, two-way) Frame Delay (FD) and Frame Delay Variation (FDV, aka, Jitter).

DNS

(Domain Name System) An internet service that translates domain names into IP addresses. DNS allows you to use friendly names, such as www.transition.com, to easily locate computers and other resources on a TCP/IP-based network

Dr. Watson

Dr. Watson for Windows is a program error debugger. The information obtained and logged by Dr. Watson is used by technical support groups to diagnose a program error for a computer running Windows. A text file (Drwtsn32.log) is created whenever an error is detected, and can be delivered to support personnel by the method they prefer. There is an option to create a crash dump file, which is a binary file that a programmer can load into a debugger.

DTE

(Data Terminal Equipment) The RS-232C interface that a computer uses to exchange data with a modem or other serial device. An end instrument that converts user information into signals or reconverts received signals (e.g., a terminal).

DWDM

Dense wavelength division multiplexing (DWDM) refers originally to optical signals multiplexed within the 1550 nm band so as to leverage the capabilities (and cost) of erbium doped fiber amplifiers (EDFAs), which are effective for wavelengths between approximately 1525–1565 nm (C band), or 1570–1610 nm (L band). See also WDM, CWDM, and Wavelength-Division Multiplexing.

Dynamic IP addressing

"Dynamic" means moving or changing. A dynamic IP address is an address that is used for the current session only; when the session is terminated, the IP address is returned to the list of available addresses. If a network uses dynamic addressing, it means that when a network interface asks to join the network, it is randomly allocated an IP address from a pool of available addresses within that network. Thus, under dynamic addressing, a computer may possess over time (e.g. across reboots) a variety of different IP addresses. Dynamic addressing is often used in scenarios where end-user computers are intermittently connected to the network.
The DHCP protocol provides a means to dynamically allocate IP addresses to computers on a network. A system administrator assigns a range of IP addresses to a DHCP server, and each client computer on the LAN has its TCP/IP software configured to request an IP address from the DHCP server, which can grant the request. The request and grant process uses a lease concept with a controllable time period.

EEA

(European Economic Area) Established on 1 January 1994 following an agreement between member states of the European Free Trade Association, the European Community, and all member states of the European Union (EU). It allows these EFTA countries to participate in the European single market without joining the EU.

ESD

(Electrostatic Discharge) A sudden and momentary electric current that flows between two objects.

Event log

Records events such as port link down, configuration changes, etc. in a database.

FC

Fibre Channel is a high-speed network technology (common rates of 2-, 4-, 8- and 16-Gbps) often used to connect computer data storage. Fibre Channel is standardized in the T11 Technical Committee of IN-CITS (the International Committee for Information Technology Standards) an ANSI standards committee.
Note: When FC technology was developed, it supported only optical cabling (fiber). Copper cable support was later added, so the development committee kept the same name but changed to the British spelling 'fibre' for the standard. The American English spelling 'fiber' refers only to optical cabling, so a network using 'fibre' can be implemented either with copper or optical cabling.

The FC protocol has a range of speeds based on a various underlying transport media. Native FC speed variants include:

Media	Line-rate (GBps)	Throughput (full duplex; Mbps)*	Availability
1GFC	1.0625	200	1997
2GFC	2.125	400	2001
4GFC	4.25	800	2004
8GFC	8.5	1,600	2005
10GFC	10.52	2,550	2008

Fibre Channel does not follow OSI Layer modeling, but is similarly split into five layers (FC0 - FC4):

FC4: Protocol-mapping layer, in which application protocols, such as SCSI or IP, are encapsulated into a PDU for delivery to FC2.

FC3: Common services layer, a thin layer that could eventually implement functions like encryption or RAID redundancy algorithms.

FDX

(Full Duplex) Communication in both directions simultaneously.

FEC

Forward Error Correction- a technique used for controlling errors in data transmission over unreliable or noisy communication channels. The central idea is the sender encodes his message in a redundant way by using an error-correcting code (ECC). IETF RFC 5052 describes how to use Forward Error Correction (FEC) codes to efficiently provide and/or augment reliability for bulk data transfer over IP multicast.

Firmware

Computer programs and data stored in hardware - typically in read-only memory (ROM) or programmable read-only memory (PROM) - such that the programs and data cannot be dynamically written or modified during execution of the programs.
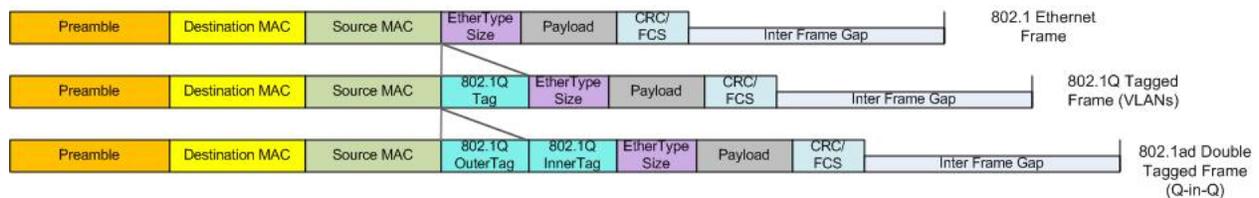
Frame

A unit of data that is transmitted between network points on an Ethernet network. An Ethernet frame has explicit minimum and maximum lengths and a set of required data that must appear within it. Each frame on an IEEE 802 LAN MAC conveys a protocol data unit (PDU) between MAC Service users. There are three types of frame; untagged, VLAN-tagged, and priority-tagged.

Frame Format

In Ethernet, a frame is a way of arranging sections of data for transfer over a computer network. The frame is a key element of an Ethernet system. A typical Ethernet frame is made up of three elements: a pair of addresses, the data itself, and an error checking field.
Frame Formats for 802.1, 802.1Q and 802.1ad are illustrated below.

Frame Loss Ratio

Frame loss ratio is the number of service frames not delivered divided by the total number of service frames during time interval T, where the number of service frames not delivered is the difference between the number of service frames arriving at the ingress ETH flow point and the number of service frames delivered at the egress ETH flow point in a point-to-point ETH connection.

Frame Delay

Frame delay is the round-trip delay for a frame, defined as the time elapsed from the start of transmission of the first bit of the frame by a source node until the reception of the last bit of the loopbacked frame by the same source node, when the loopback is performed at the frame's destination node.

FTP

(File Transfer Protocol) A standard network protocol used to exchange and manipulate files over a TCP/IP based network, such as the Internet. See also TFTP.

G.709/Y.1331

ITU-T Recommendation ITU-T G.709/Y.1331 defines the requirements for the optical transport module of order n (OTM-n) signals of the optical transport network, in terms of: the optical transport hierarchy (OTH), the functionality of the overhead in support of multi-wavelength optical networks, frame structures, bit rates, and formats for mapping client signals.
The interfaces defined in this Recommendation can be applied at user-to-network interfaces (UNI) and network node interfaces (NNI) of the optical transport network.
This Recommendation defines "ODUk.ts" as "an increment of bandwidth which when multiplied by a number of tributary slots gives the recommended size of an ODUflex (GFP) optimized to occupy a given number of tributary slots of a higher order OPUk."
The Optical Transport Hierarchy (OTH) is a new transport technology for the Optical Transport Network (OTN) developed by the ITU. It is based on the network architecture defined in ITU G.872 "Architecture for the OTN". G.872 defines an architecture that is composed of the Optical Channel (OCh), Optical Mul-tiplex Section (OMS) and Optical Transmission Section (OTS). It then describes the functionality needed to make OTN work.
OTN offers these advantages compared to SONET/SDH: stronger Forward Error Correction (FEC), more Levels of Tandem Connection Monitoring (TCM), transparent transport of Client Signals, and switching Scalability.
See http://www.itu.int/rec/T-REC-G.709-201202-I/en for more information on G.709 : Interfaces for the optical transport network.

GBIC

(Gigabit Interface Converter) A transceiver that converts serial electrical signals to serial optical signals and vice versa. In networking, a GBIC is used to interface a fiber optic system with an Ethernet system, such as Fibre Channel and Gigabit Ethernet.

Gbps

(Gigabits Per Second) Data transfer speeds as measured in gigabits.

GUI

(Graphical User Interface) A type of user interface item that allows people to interact with programs in more ways than typing. A GUI offers graphical icons, and visual indicators, as opposed to text-based in-

terfaces, typed command labels or text navigation to fully represent the information and actions available to a user. The actions are usually performed through direct manipulation of the graphical elements.

HSCP

(High-Security Console Password)

HTML

(HyperText Markup Language) The predominant markup language for web pages. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists etc as well as for links, quotes, and other items.

HTTPS

(Hypertext Transfer Protocol Secure) A combination of the Hypertext Transfer Protocol with the TLS or SSH protocol to provide encryption and secure identification of the server.

IEC

(International Electrotechnical Commission) The world's leading organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

IEEE

(Institute of Electrical and Electronics Engineers) An international non-profit, professional organization for the advancement of technology related to electricity.

IP

(Internet Protocol) One of the core protocols of the Internet Protocol Suite. IP is one of the two original components of the suite (the other being TCP), so the entire suite is commonly referred to as TCP/IP. IP is the method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it from all other computers on the Internet.

IPC

(Interprocess Communications) The exchange of data between one program and another either within the same computer or over a network. It implies a protocol that guarantees a response to a request.

ITU

ITU is the leading United Nations agency for information and communication technology issues, and the global focal point for governments and the private sector in developing networks and services. For nearly 145 years, ITU has coordinated the shared global use of the radio spectrum, worked to improve telecommunication infrastructure in the developing world, and established worldwide standards that foster seamless interconnection of a vast range of communications systems. See http://www.itu.int/net/about/itu-t.aspx.

Jumbo Frame

Jumbo frames are frames larger than the standard Ethernet frame size, which is 1518 bytes (1522 if VLAN-tagged). Though this is not a standard, more vendors are adding support for jumbo frames. An initiative to increase the maximum size of the MAC Client Data field from 1500-bytes to 9000-bytes. The initiative was not adopted by the IEEE 802.3 Working Group, but it was endorsed by a number of other companies. Larger frames would provide a more efficient use of the network bandwidth while reducing the number of frames that have to be processed. The Jumbo Frame proposal restricts the use of Jumbo Frames to full-duplex Ethernet links, and defines a "link negotiation" protocol that allows a station to determine if the station on the other end of the segment is capable of supporting Jumbo Frames.

Kbps

(Kilobits Per Second) Data transfer speeds as measured in kilobits.

LAN

(Local Area Network) A group of computers and associated devices that share a common communications line or wireless link. Typically, connected devices share the resources of a single processor or server within a small geographic area (for example, within an office building).

LED

(Light Emitting Diode) An electronic light source.

LRM

Long Reach Multimode. See "10GBASE-LRM".

MAC

(Media Access Control) An address that is a unique value associated with a network adapter. MAC addresses are also known as hardware addresses or physical addresses. They uniquely identify an adapter on a LAN.

MAU

(Media Attachment Unit) In an Ethernet LAN, a device that interconnects the attachment unit interface port on an attached host computer to the Ethernet network medium (such as Unshielded Twisted Pair or coaxial cable). The MAU provides the services that correspond to the physical layer of the Open Systems Interconnection (OSI) reference model. A MAU can be built into the computer workstation or other device or it can be a separate device

Mbps

(Megabits per second) Data transfer speed measured in thousands of bits per second.

Media converter

Media converters transparently connect one type of media, or cabling, to another – typically copper to fiber. By bridging the gap between legacy copper infrastructures and fiber growth, media converters provide an economical way to extend the distance of an existing network, extend the life of non-fiber based equipment, or extend the distance between two like devices.
Transition Networks' brand of media converters makes conversion between disparate media types possible; while helping companies leverage their existing network infrastructure. These media conversion technologies are offered across a broad spectrum of networking protocols including Ethernet, Fast Ethernet, Gigabit, T1/E1, DS3, ATM, RS232/485, video, Power-over-Ethernet, and many more.

MSA

(Multi-Source Agreement) Common product specifications for pluggable fiber optic transceivers. Multi-Source Agreements. enhanced Small Form-factor Pluggable transceiver. To support different 10GbE physical layer standards, many interfaces consist of a standard socket into which different PHY modules may be plugged. Physical layer modules are not specified in an official standards body but by multi-source agreements (MSAs) that can be negotiated more quickly. Relevant MSAs for 10GbE include XENPAK (and related X2 and XPAK), XFP and SFP+. When choosing a PHY module, a designer considers cost, reach, media type, power consumption, and size (form factor). A single point-to-point link can have different MSA pluggable formats on either end (e.g. XPAK and SFP+) as long as the 10GbE optical or copper interface (e.g. 10GBASE-SR) inside the pluggable is identical. See also "SFP+".

MT-RJ

(Mechanical Transfer-Registered Jack) A small form-factor fiber optic connector which resembles the RJ-45 connector used in Ethernet networks.

Multicast

One of the four forms of IP addressing, each with its own unique properties, a multicast address is associated with a group of interested receivers. Per RFC 3171, addresses 224.0.0.0 through 239.255.255.255, the former Class D addresses, are designated as multicast addresses in IPv4. The sender sends a single datagram (from the sender's unicast address) to the multicast address, and the intermediary routers take care of making copies and sending them to all receivers that have registered their interest in data from that sender. See also Unicast.

NIC

(Network Interface Card or Network Interface Controller) A computer hardware component designed to allow computers to communicate over a computer network. It is both an OSI layer 1 (physical layer) and layer 2 (data link layer) device, as it provides physical access to a networking medium and provides a low-level addressing system through the use of MAC addresses. It allows users to connect to each other either by using wireless communications or cables.

NID

(Network Interface Device) A device that serves as the demarcation point between the carrier's local loop and the customer's premises wiring. In telecommunications, a NID is a device that serves as the demarcation point between the carrier's local loop and the customer's premises wiring. In fiber-to-the-premises systems, the signal is transmitted to the customer premises using fiber optic technologies.
In general terms, a NID may also be called a Network Interface Unit (NIU), Telephone Network Interface (TNI), Slide-in-card (SIC), or a slide-in-module. See also "Media Converter".

OC

Optical Carrier, used to specify the speed of fiber optic networks conforming to the SONET standard. The speeds for common OC levels include OC-1 = 51.85 Mbps, OC-3 = 155.52 Mbps, OC-12 = 622.08 Mbps, OC-24 = 1.244 Gbps, OC-48 = 2.488 Gbps, OC-192 = 9.952 Gbps, and OC-255 = 13.21 Gbps.

OC-192

(OC-192 / STM-64 / 10G SONET) OC-192 is a network line with transmission speeds of up to 9953.28 Mbit/s (payload = 9510.912 Mbit/s (9.510912 Gbit/s); overhead = 442.368 Mbit/s). A standardized variant of 10 Gigabit Ethernet (10GbE), called WAN PHY, is designed to inter-operate with OC-192 transport equipment while the common version of 10GbE is called LAN PHY (which is not compatible with OC-192 transport equipment in its native form). The naming is a bit misleading since both LAN PHY and WAN PHY can be used on a wide area network.

ODU Bit Rate Tolerance

The ODU bit-rate tolerance is ±20 ppm.

ODU Types and Bit Rates

ODU type   ODU nominal bit rate
ODU0   1 244 160 kbit/s
ODU1   239/238 × 2 488 320 kbit/s
ODU2   239/237 × 9 953 280 kbit/s
ODU3   239/236 × 39 813 120 kbit/s
ODU4   239/227 × 99 532 800 kbit/s

OID

(Object Identifier) Known as a "object identifier" or "MIB variable" in the network management protocol, an OID is a number assigned to devices in a network for identification purposes. Each branch of the MIB Tree has a number and a name, and the complete path from the top of the tree down to the point of inter-est forms the name of that point. A name created in this way is known as an Object ID or OID.
In SNMP, an Object Identifier points to a particular parameter in the SNMP agent.

OSI

(Open Systems Interconnection) A standard description or reference model for how messages should be transmitted between any two points in a telecommunication network. Its purpose is to guide product im-plementors so that their products will consistently work with other products. The reference model defines seven layers of functions that take place at each end of a communication.

OTU Bit Rate Tolerance

The OTU bit-rate tolerance is ±20 ppm.

OTU Types and Bit Rates

OTU type   OTU nominal bit rate
OTU1   255/238 × 2 488 320 kbit/s
OTU2   255/237 × 9 953 280 kbit/s
OTU3   255/236 × 39 813 120 kbit/s
OTU4   255/227 × 99 532 800 kbit/s

OTH

(Optical Transport Hierarchy): see "G.709/Y.1331" above.See also "OTN" below.

OTN

(Optical Transport Network): the Optical Transport Hierarchy (OTH) is a new transport technology for the Optical Transport Network (OTN) developed by the ITU. OTH is based on the network architecture de-fined in ITU G.872 "Architecture for the Optical Transport Network (OTN)".
G.872 defines an architecture that is composed of the Optical Channel (OCh), Optical Multiplex Section (OMS) and Optical Transmission Section (OTS). G.872then describes the functionality that needed to make OTN work. Compared to SONET/SDH, using OTN offers advantages (stronger Forward Error Cor-rection, more levels of TCM, transparent transport of Client signals, switching scalability) and disad-vantages (requires new hardware and management system).

OTU Type   OTU Bit Rate (Nominal)
OTU1   255/238 x 2 488 320 kbit/s
OTU2   255/237 x 9 953 280 kbit/s

OTU3   255/236 x 39 813 120 kbit/s

The OTU bit rate tolerance is ±20 ppm for OTU1, OTU2, and OTU3. The nominal OTUk rates are approx-imately 2 666 057.143 kbit/s (OTU1), 10 709 225.316 kbit/s (OTU2) and 43 018 413.559 kbit/s (OTU3). See http://www.itu.int/rec/T-REC-G.709/ for more information. See also "G.709/Y.1331" above.

OUI

(Organizationally Unique Identifier) the Ethernet Vendor Address component. Ethernet hardware ad-dresses are 48 bits, expressed as 12 hexadecimal digits (0-9, plus A-F, capitalized). These 12 hex digits consist of the first/left 6 digits (which should match the vendor of the Ethernet interface within the station) and the last/right 6 digits, which specify the interface serial number for that interface vendor. These high-order 3 octets (6 hex digits) are called the Organizationally Unique Identifier or OUI.

RJ-45

The standard connector utilized on 4-pair (8-wire) UTP (Unshielded Twisted Pair) cable. The RJ-45 con-nector is the standard connector for Ethernet, T1, and modern digital telephone systems.

RS-232

(Recommended Standard 232) A standard for serial binary data signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

SFP

(Small Form-Factor Pluggable) A compact, hot-pluggable transceiver used in telecommunication and data communications applications. It interfaces a network device mother board (for a switch, router, media converter or similar device) to a fiber optic or copper networking cable. The SFP transceiver is specified by a multi-source agreement (MSA) between competing manufacturers. The SFP was designed after the GBIC interface, and allows greater port density (number of transceivers per inch along the edge of a mother board) than the GBIC, thus SFP is also known as "mini-GBIC". Optical SFP transceivers support digital diagnostics monitoring (DDM) functions according to the industry-standard SFF-8472. This feature lets you monitor real-time parameters of the SFP, such as optical output power, optical input power, tem-perature, laser bias current, and transceiver supply voltage. AKA, Digital Optical Monitoring (DOM), DMI (Diagnostic Monitoring Interface), or DMM (Diagnostic Maintenance Monitoring).

SFP+
enhanced Small Form-factor Pluggable transceiver. To support different 10GbE physical layer standards, many interfaces consist of a standard socket into which different PHY modules may be plugged. Physical layer modules are not specified in an official standards body but by multi-source agreements (MSAs) that can be negotiated more quickly. Relevant MSAs for 10GbE include XENPAK (and related X2 and XPAK), XFP and SFP+. When choosing a PHY module, a designer considers cost, reach, media type, power consumption, and size (form factor). A single point-to-point link can have different MSA pluggable formats on either end (e.g. XPAK and SFP+) as long as the 10GbE optical or copper interface (e.g. 10GBASE-SR) inside the pluggable is identical. See also "MSA".
The newest module standard is the enhanced small form-factor pluggable transceiver, generally called SFP+. Based on the small form-factor pluggable transceiver (SFP) and developed by the ANSI T11 fibre channel group, it is smaller still and lower power than XFP. SFP+ has become the most popular socket on 10GE systems. SFP+ modules do only optical to electrical conversion, no clock and data recovery, put-ting a higher burden on the host's channel equalization. SFP+ modules share a common physical form factor with legacy SFP modules, allowing higher port density than XFP and the re-use of existing designs for 24 or 48 ports in a 19" rack width blade.
SFP+ modules can further be grouped into two types of host interfaces: linear or limiting. Limiting mod-ules are preferred except when using old fiber infrastructure which requires the use of the linear interface provided by 10GBASE-LRM modules.

SGMII

(Serial Gigabit Media Independent Interface) A standard Gigabit Ethernet interface used to connect an Ethernet MAC-block to a PHY. To carry frame data and link rate information between a 10/100/1000 PHY and an Ethernet MAC, SGMII uses a different pair for data signals and for clocking signals, with both being present in each direction (i.e., TX and RX). The x4110 has SGMII support for use with 10/100/1000BASE-T copper SFPs. The x4110 uses the **set ether phymode=SGMII** CLI command to select SGMII mode.

SLA

(Service Level Agreement) In general terms, a part of a service contract where the level of service is formally defined in terms of a contracted delivery time or performance. In Metro Ethernet, the contract between the Subscriber and Service Provider specifying the agreed to service level commitments and related business agreements.

SONET

(Synchronous Optical Networking) SONET and SDH are standardized multiplexing protocols that transfer multiple digital bit streams over optical fiber. SONET and SDH, which are essentially the same, were originally designed to transport circuit mode communications (e.g., DS1, DS3) from a variety of sources. Both protocols are widely used today: SONET in the United States and Canada, and SDH in the rest of the world.

STID

(Sensor Transaction Identifier) The STID is used for power supply / sensor / IONDCR configuration via the **set sensor stid** command to define notification, relation, severity, and value parameters. The **show power config** command displays the power supply sensors information. The STID is shown in the Web interface at the **Power Supply** tab > **Temp**, **Volt**, **Power**, and **Fan** sub-tabs.

STP

(Shielded Twisted Pair) A special kind of copper telephone wiring used in some business installations. An outer covering or shield is added to the ordinary twisted pair telephone wires; the shield functions as a ground.

TCP

(Transmission Control Protocol) One of the core protocols of the Internet Protocol Suite. TCP is one of the two original components of the suite (the other being Internet Protocol, or IP), so the entire suite is commonly referred to as TCP/IP. Whereas IP handles lower-level transmissions from computer to computer as a message makes its way across the Internet, TCP operates at a higher level, concerned only with the two end systems, for example a Web browser and a Web server. In particular, TCP provides reliable, ordered delivery of a stream of bytes from a program on one computer to another program on another computer.

TCP/IP

(Transmission Control Protocol/Internet Protocol) The basic communication language or protocol of the Internet and/or a private network (either an intranet or an extranet).
TCP/IP is a two-layer program. The higher layer, Transmission Control Protocol (TCP), manages the assembling of a message or file into smaller packets that are transmitted over the Internet and received by a TCP layer that reassembles the packets into the original message. The lower layer, Internet Protocol (IP), handles the address part of each packet so that it gets to the right destination.

Telnet

A user command and an underlying TCP/IP protocol for accessing remote computers. Through Telnet, an administrator or another user can access someone else's computer remotely. Telnet is a terminal emulation program for TCP/IP networks that runs on your computer and connects your PC to a switch management. (Standard: RFC 854.)

TFTP

(Trivial File Transfer Protocol) A file transfer protocol, with the functionality of a very basic form of File Transfer Protocol (FTP). Due to its simple design, TFTP can be implemented using a very small amount of memory. Because it uses UDP rather than TCP for transport, TFTP is typically used to transfer firmware upgrades to network equipment.

TFTP Download / Upload

The ability to load firmware, configuration files, etc. through a TFTP server. (AKA, TFTP. Standard: RFC 1350.)

TFTP Root Directory

The location on the console device (PC) where files are placed when received, and where files to be transmitted should be placed (e.g., *C:\TFTP-Root*).

TFTP Server

An application that uses the TFTP file transfer protocol to read and write files from/to a remote server. In TFTP, a transfer begins with a request to read or write a file, which also serves to request a connection. If the server grants the request, the connection is opened and the file is sent in fixed length blocks of 512 bytes. Each data packet contains one block of data, and must be acknowledged by an acknowledgment packet before the next packet can be sent. Examples of available packages include Open TFTP Server, Tftpd32, WinAgents TFTP Server for Windows, SolarWinds free TFTP Server, TFTP Server 1.6 for Linux, and TftpServer 3.3.1, a TFTP server enhancement to the standard Mac OSX distribution.

Throughput

The maximum rate at which no frame is dropped. This is typically measured under test conditions.

TNDP

(TN Topology Discovery Protocol) the Transition Networks implementation of LLDP. When set to Enabled, the device entering this command/setting will no longer be discovered by the IONMM if it is remotely managed through this port. See also "LLDP" and the "set tndp" and "show tndp" CLI commands. See also "Discovery".

Trap

In SNMP, a trap is a type of PDU used to report an alert or other asynchronous event about a managed subsystem. Also, a place in a program for handling unexpected or unallowable conditions - for example, by sending an error message to a log or to a program user. If a return code from another program was being checked by a calling program, a return code value that was unexpected and unplanned for could cause a branch to a trap that recorded the situation, and take other appropriate action.
An ION system trap is a one-way notification (e.g., from the IONMM to the NMS) that alerts the administrator about instances of MIB-defined asynchronous events on the managed device. It is the only operation that is initiated by the IONMM rather than the NMS. For a management system to understand a trap sent to it by the IONMM, the NMS must know what the object identifier (OID) defines. Therefore, it must have the MIB for that trap loaded. This provides the correct OID information so that the NMS can understand the traps sent to it.

UDP

(User Datagram Protocol) A connectionless protocol that, like TCP, runs on top of IP networks. Unlike TCP/IP, UDP/IP provides very few error recovery services, offering instead a direct way to send and receive datagrams over an IP network. It's used primarily for broadcasting messages over a network.

Unicast

One of the four forms of IP addressing, each with its own unique properties. The most common concept of an IP address is in unicast addressing, available in both IPv4 and IPv6. It normally refers to a single sender or a single receiver, and can be used for both sending and receiving. Usually, a unicast address is associated with a single device or host, but it is not a one-to-one correspondence. Some individual PCs have several distinct unicast addresses, each for its own distinct purpose. Sending the same data to multiple unicast addresses requires the sender to send all the data many times over, once for each recipient. See also "Multicast".

USB

(Universal Serial Bus) A plug-and-play interface between a computer and add-on devices, such as media players, keyboards, telephones, digital cameras, scanners, flash drives, joysticks and printers.

UTC

(Coordinated Universal Time) A time standard based on International Atomic Time (TAI) with leap seconds added at irregular intervals to compensate for the Earth's slowing rotation. Leap seconds are used to allow UTC to closely track UT1, which is mean solar time at the Royal Observatory, Greenwich.

UTP

(Unshielded Twisted Pair) The most common form of twisted pair wiring, because it is less expensive and easier to work with than STP (Shielded Twisted Pair). UTP is used in Ethernet 10Base-T and 100Base-T networks, as well as in home and office telephone wiring. The twist in UTP helps to reduce crosstalk interference between wire pairs.

VAC

Volts AC (alternating current, as opposed to DC – direct current).

Varbind

In SNMP, a Sequence of two fields, an Object ID and the value for/from that Object ID. Varbinds is short for Variable bindings. It's the variable number of values that are included in an SNMP packet.
Each varbind is made of an OID, type, and value.

VCP

(Virtual Com Port) A driver that allows a USB device to appear as an additional COM port. The USB device can be accessed by an application in the same manner as a regular COM port.

VDC

Volts DC (direct current, as opposed to AC – alternating current).

Wavelength-Division Multiplexing (WDM, DWDM and CWDM)

WDM, DWDM and CWDM are based on the same concept of using multiple wavelengths of light on a single fiber, but differ in the spacing of the wavelengths, number of channels, and the ability to amplify the multiplexed signals in the optical space. See also CWDM, DWDM, and WDM.

WDM

In fiber-optic communications, wavelength-division multiplexing (WDM) is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e., colors) of laser light. This technique enables bidirectional communications over one strand of fiber, as well as multiplication of capacity. WDM systems are divided into different wavelength patterns, coarse (CWDM) and dense (DWDM). See also CWDM, DWDM, and Wavelength-Division Multiplexing.

Web-based Management

Allows users to manage the switch through a web browser. (AKA, Web GUI, Web interface, Web IF.)

Write View

A view name (up to 64 characters) for each SNMP group that defines the list of object identifiers (OIDs) that are able to be created or modified by users of the group.

XAUI

XAUI is a standard for extending the XGMII (10 Gigabit Media Independent Interface) between the MAC and PHY layer of 10 Gigabit Ethernet (10GbE). XAUI is pronounced "zowie", a concatenation of the Roman numeral X, meaning ten, and the initials of "Attachment Unit Interface". The XGMII Extender, which is composed of an XGXS at the MAC end, an XGXS at the PHY end and a XAUI between them, is to extend the operational distance of the XGMII and to reduce the number of interface signals. Applications include extending the physical separation possible between MAC and PHY components in a 10 Gigabit Ethernet system distributed across a circuit board.

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