LANTRONIX®

ION C4110-4848
10 Gbps Fiber-to-Fiber Converter

Install Guide

Part Number 33572

Revision D August 2023

Intellectual Property

Warranty

For details on the Lantronix warranty policy, go to http://www.lantronix.com/support/warranty.

Contacts

Lantronix Corporate Headquarters
48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995
Technical Support
Online: https://www.lantronix.com/technical-support/
Sales Offices
For a current list of our domestic and international sales offices, go to www.lantronix.com/about/contact.

Disclaimer

Revision History

Rev	Date	Description of Changes
A	3/2/15	Initial release for v 1.2.4.
B	9/12/16	Update for C4110 v1.2.6; add Vendor Specific Info to DMI; add C4110 support in Focal Point; update driver installation and contact information.
C	6/30/17	Remove Loopback and update LPT description.
D	8/22/23	Initial Lantronix re-brand.

Contents

Introduction

Lantronix two-port C4110 series 10 Gbps Fiber-to-Fiber Converter is designed to install in an ION chassis. The ION x4110 is a 10 Gbps fiber-to-fiber port converter with two SFP+ slots that performs full 3R (re-amplify, re-shape, and re-timing) signal regeneration. It can be used all alone or it can be connected to another x4110, providing fiber-to-fiber conversion in the following user networks:

- 10G LAN, 10G WAN
- 10G Fiber Channel
- SONET OC192
- 10G OTN (G.709)

The C4110 can be used in telecom and enterprise applications where 10 Gbps links require fiber extension or where 10 Gbps links require an interface between two different types of fiber. The C4110 performs a wide variety of protocol transparent service; it supports virtually any protocol from 1 Gbps to 11.5 Gbps:

- 10G LAN (10.3125 Gbps) / WAN (9.95 Gbps)
- SONET OC-192/SDH STM-64 at 9.95 Gbps
- 10G Fiber Channel at 10.52 Gbps
- 1/2/4/8 Gbps Fiber channel
- OTU2 at 10.709 Gbps
- OTU1e at 11.05 Gbps
- OTU1f at 11.27 Gbps
- OTU2e at 11.09 Gbps
- OTU2f at 11.32 Gbps
- SONET OC-48/SDH STM-16 at 2.40 Gbps
- Legacy 1G Ethernet at 1.25 Gbps
- Any other rate in the range of 1 - 11.5 Gbps

Models

The C4110 is an ION chassis slide-in-card (SIC). The S4110 is an ION Stand-alone device.

The S4110 is used as a stand-alone device or as a remote device when linked back to a managed chassis card.

The C4110 SIC card can be managed by ION Web or ION CLI. The S4110 can not be remotely managed.

Manageable C4110 features are available when used in an ION Platform chassis along with an ION Management Module (IONMM). The x4110 is delivered with a default configuration. You can change the configuration via the ION Web interface and the ION CLI.

Model	Fiber Connections	Rates
C4110-4848	SFP/SFP+	1-11.5 Gbps
S4110-4848	SFP/SFP+	1-11.5 Gbps

Note that the C4110 (ION Chassis Card) can be upgraded from the IONMM. The S4110 (Standalone model) can not be upgraded from the IONMM.

Accessories (ordered separately)

Model	Description
SFP Modules	SFP and SFP+ modules supported. See the Lantronix SFP webpage.

Features

- DMI (Diagnostic Monitoring Interface)
- For use in ION Chassis
- Manageable when installed in a managed ION Chassis
- Supports various physical media types
- Fiber repeater, performs 3R signal regeneration
- No packet size limitation

Document Overview

The purpose of this manual is to provide the information needed to install the C4110 to the point of operation. Note that there is a separate install guide for the S4110.

Related Manuals and Online Help

A printed documentation card is shipped with each x4110 device. For Lantronix Documentation, Firmware, App Notes, etc. go to https://www.lantronix.com/technical-support/. For SFP manuals see Lantronix SFP webpage. Note that this manual provides links to third party web sites for which Lantronix is not responsible. Other ION system and related device manuals are listed below.

1. Product Documentation Postcard, 33504
2. ION C4110 Install Guide, 33572 (this manual)
3. ION S4110 Install Guide, 33573
4. ION x4110 Web User Guide, 33574
5. ION x4110 CLI Reference, 33575
6. ION Management Module (IONMM) Install Guide, 33420 and User Guide, 33457
7. Release Notes (firmware version specific)

Note: 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 Record of Revisions on page 2. Note: Some Documentation may have Transition Networks named or pictured. Transition Networks was acquired by Lantronix in August 2021.

Application Examples

The figures below show switch-to-switch and switch-to-server appliaction examples.
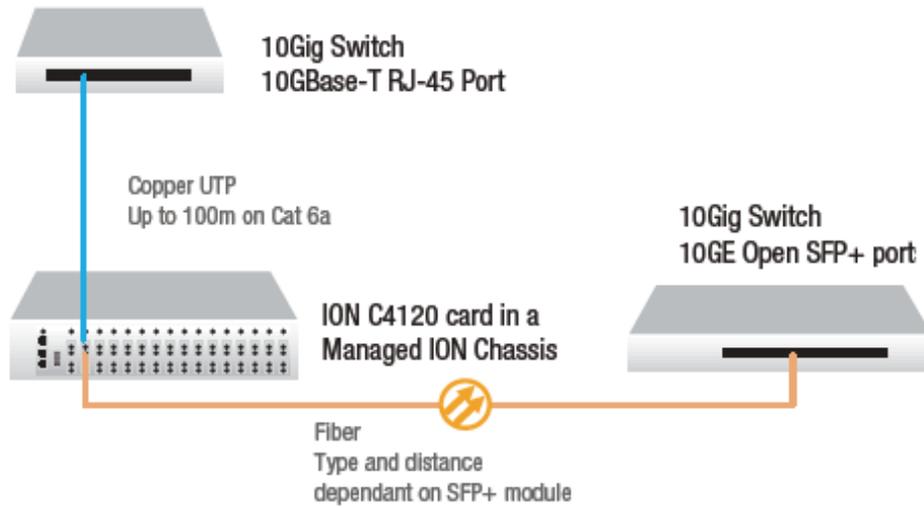
Figure 1: 10Gig Switch to Switch
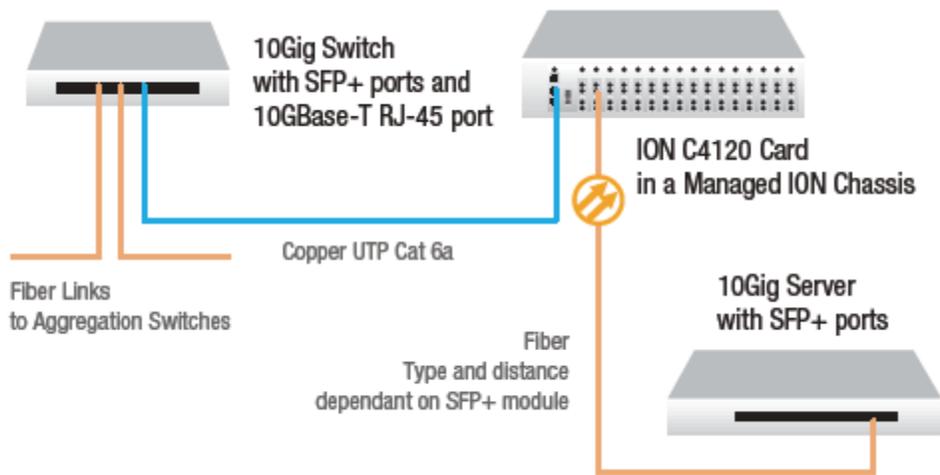
Figure 2: 10Gig Switch to Server

Network Scenarios

The C4110 provides up to 10Gig fiber-to-fiber port repeating and performs 3R (re-amplify, reshape) signal regeneration. The figures below show how x4110 devices can be used in pairs (scenarios A,B,C below) or used as single repeater in a customer network (scenarios D & E below); It can also interconnect with an x4110-1048 (scenario F).
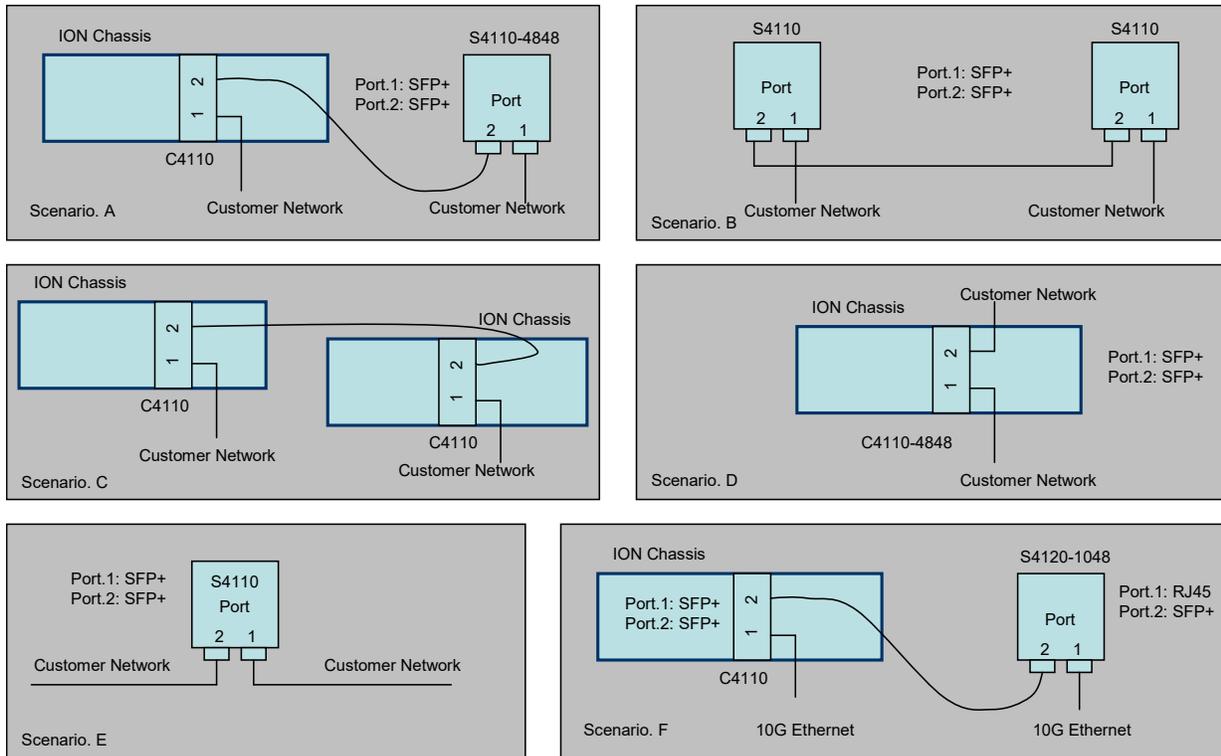
Figure 3: Network Scenarios

Pre-Installation

Safety

Before installing the C4110, read the "Electrical Safety Warnings" on page 34 of this manual and ensure that the requirements noted are met. During installation and maintenance, avoid direct exposure to laser beams. Specifically, do not look into laser ports. Ensure that each SFP/SFP+ port at which laser beams are (or will be) present is occupied by an SFP/SFP+ that is locked in position. See the related SFP/SFP+ manual for details. See "Electrical Safety Warnings" on page 34 for Electrical Safety Warnings translated into multiple languages.

Unpacking

1. Carefully unpack all C4110 contents.

2. Verify receipt of all C4110 components; see "Ship Kit Contents" below.

3. Place the C4110 and related materials in the desired install location.

4. Save the C4110 shipping carton and packing materials for future use.

Ship Kit Contents

The C4110 is shipped with some standard and some optional components. Make sure you have received the following standard items:

- One C4110 device
- One printed Product Documentation postcard

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when handling the C4110. Failure to observe this caution could result in damage or failure of the C4110.

DIP Switch (SW1) and Jumper (J9)

The C4110 has a field-configurable DIP Switch (SW1) and Jumper (J9) as shown below.
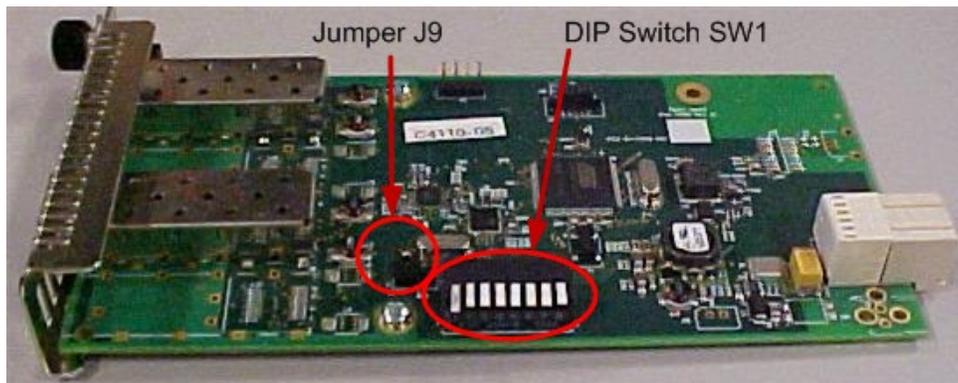
Figure 4. Jumper J9 and DIP Switch SW1

Hardware/Software Mode Jumper (J9)

The hardware/software 3-pin header, J9, is located on the circuit board (labeled **S** and **H**). Use a small needle-nose pliers to set the jumper.

S - Software   In this position, the mode of the C4110 is determined by the most-recently saved software settings. This is the default setting.

H - Hardware   In this position, the mode of the C4110 is determined by the 8-position DIP switch (hardware) settings.
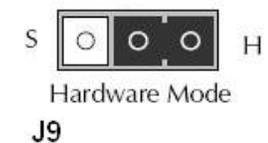
Note: you must change the J9 setting to **H** (Hardware mode) to be able to use the DIP Switch settings (see below).

Use the CLI command "***show card info***" to show the current Config mode setting (*hardware* or *software*).

From the web GUI, navigate to the ION Stack > Chassis > C4110 menu path and check the MAIN tab's System Configuration section > Configuration Mode field setting (i.e., *hardware* or *software*).

DIP Switch SW1 (Function Settings in Hardware Mode)

The 8-position DIP switch labeled SW1 is on the bottom edge of the C4110 PCB. The factory default setting is SW1 – 4 in the Down position (all Down). SW5 - 8 settings are not used ('do not care').

Note 1: you must change the J9 setting to 'Hardware' mode to be able to use the DIP Switch settings (see above). Remove the DIP switch protective tape covering the switches. Use a small, flat-blade screwdriver (or similar tool) to set the switches to site requirements.
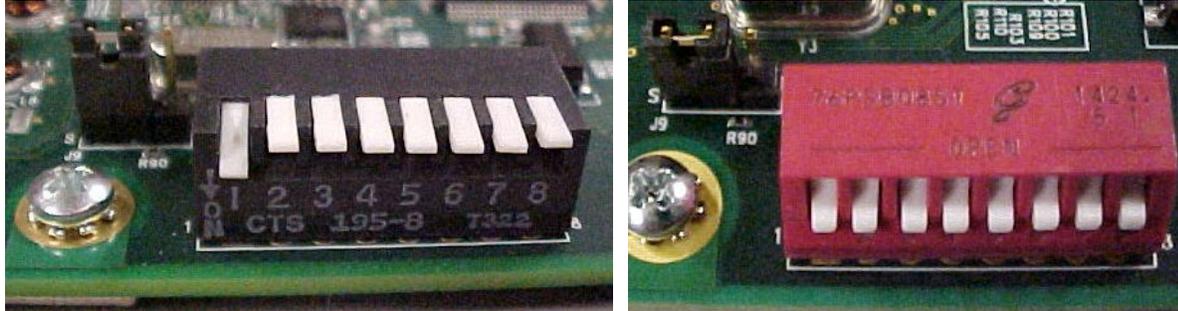
Note 2: Component labeling may vary; the figure above left shows SW 1 in the position labeled '**ON**' (**Down**), and SW 2-8 are shown in the 'Off' or 'Up' position. The figure above right shows all 8 switches in the Closed (down) position (opposite from the position labeled "OPEN).

1	2	3	4	Data Rate
Down	Down	Down	Down	10GE = 10 gigabit Ethernet (also 10GbE or 10 GigE). This is the factory default setting.
Up	Down	Down	Down	10GFC + FEC = 10GbE Fibre Channel with Forward Error Correction).
Down	Up	Down	Down	10GFC = 10GbE Fibre Channel.
Up	Up	Down	Down	WAN/OC-192+FEC = OC-192 network line with transmission speeds up to 9953.28 Mbit/s with Forward Error Correction).
Down	Down	Up	Down	WAN/OC-192 = OC-192 network line with transmission speeds up to 9953.28 Mbit/s.
Up	Down	Up	Down	8GFC = 8G Fiber Channel with 8.5 gigabaud Line rate and 1,600 MBps Throughput (at full duplex).
Down	Up	Up	Down	4GFC = 4G Fiber Channel with 4.25 gigabaud Line rate and 800 MBps Throughput (at full duplex).
Up	Up	Up	Down	2GFC = 2G Fiber Channel with 2.125 gigabaud Line rate and 400 MBps Throughput (at full duplex).
Down	Down	Down	Up	1GFC = 1GbE Fibre Channel.
Up	Down	Down	Up	2.5GE = 2.5 gigabit Ethernet.
Down	Up	Down	Up	1GE = 1 gigabit Ethernet.
Up	Up	Down	Up	OC-48 = network line with transmission speeds of up to 2488.32 Mbit/s.
Down	Down	Up	Up	Reserved (Default).
Up	Down	Up	Up	Reserved (Default).
Down	Up	Up	Up	Reserved (Default).
Up	Up	Up	Up	Reserved (Default).

Installation and Setup

General

This section describes how to install the C4110 and the procedures to access and initially set it up via either a local serial interface (USB) or a remote Ethernet connection (Telnet session or Web interface).

Install the C4110 in the ION Chassis

The C4110 is a slide-in module that can only be installed in a Lantronix ION chassis (ION106-x or ION219-x).

The following describes how to install the C4110 in the ION chassis.

⚠️ **Caution**: Failure to wear a grounding device and observe electrostatic discharge precautions when installing the C4110 could result in damage or failure of the module.
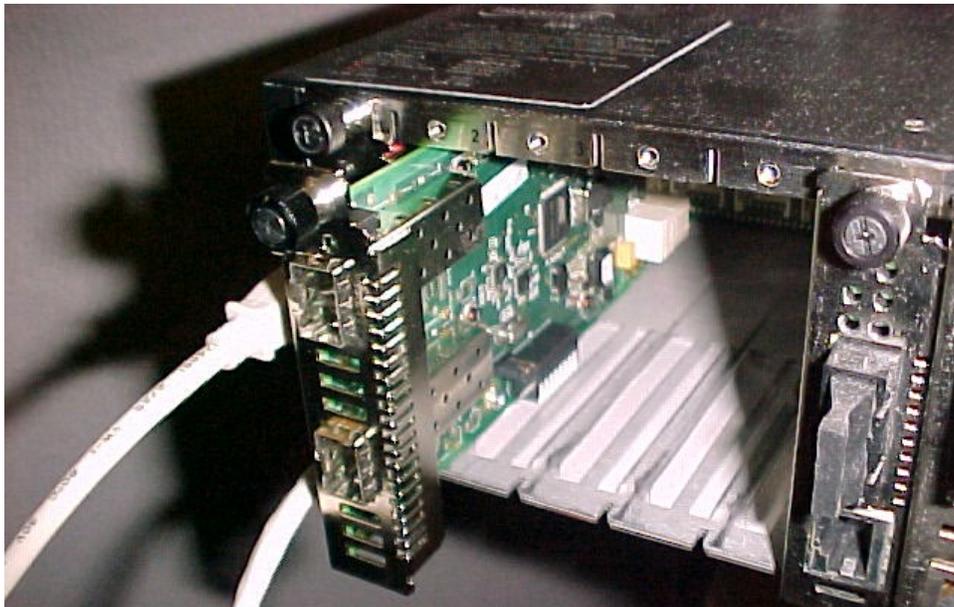
Figure 5: Chassis Installation

IMPORTANT

The C4110 slide-in cards are "hot swappable" devices, and can be installed with chassis power on.

1. Locate an empty slot in the ION System chassis. If necessary, remove a chassis slot cover from the ION Chassis (*keep the slot cover and screw*).

2. Grasp the edges of the C4110 by its front panel, align the card with the upper and lower slot guides, and carefully insert the C4110 into the slot.

3. Firmly seat the C4110 against the chassis back panel.

4. Push in and rotate clockwise the panel fastener screw to secure the C4110 to the chassis (Figure 5).

5. Note that the card's Power LED lights. See Accessing the C4110 on page 17.

Port Locations

The C4110 has two ports. The locations of PORT1 and PORT 2 (SFP/SFP+) are shown below.
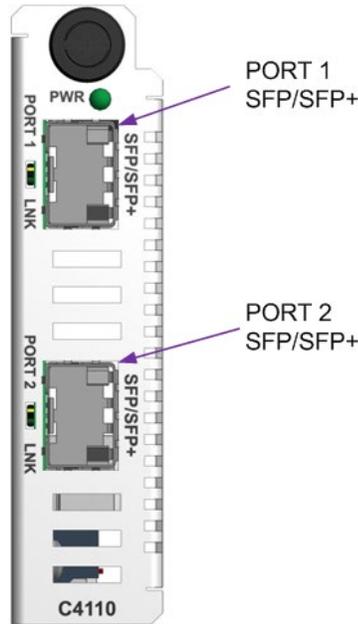
Figure 6: Port Locations

Installing SFP/SFP+ Devices

The C4110 lets you install SFP/SFP+ devices of choice to make a fiber connection. The C4110 has two SFP/SFP+ ports.
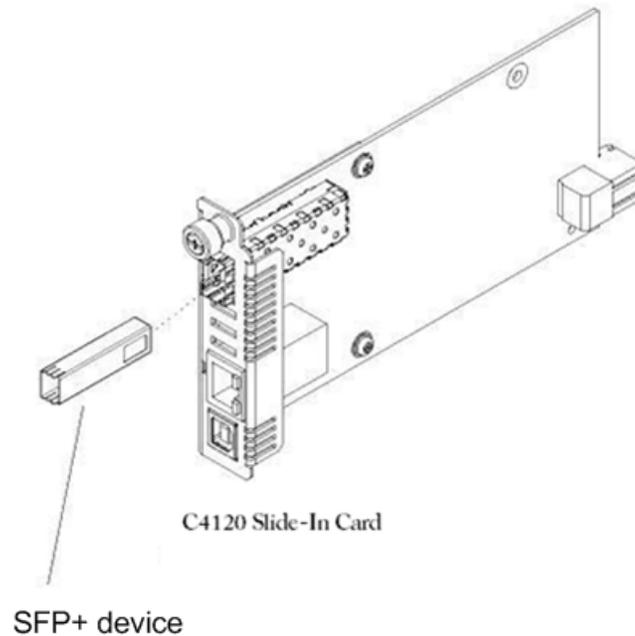
Figure 7: SFP/SFP+ Installation

Note: The S4100 is an "any rate to same rate" device, meaning the two SFPs used must both support the same data rate. However, two SFPs can support different types of fiber and different transmission distances.

SFP/SFP+ Optical Transceivers

Lantronix SFP and SFP+ devices are small form factor, hot-pluggable transceivers which allow for a single piece of network equipment to be connected to a multitude of interfaces, protocols, and transmission media via the SFP/SFP+ port. All of Transition's SFPs and SFP+ devices are compliant with the Multi-Sourcing Agreement (MSA) ensuring interoperability with all other MSA compliant networking devices. The SFP/SFP+ module used defines the fiber length and type that can be used. Identical SFP/SFP+ modules must be used at each end for a given port. (One port in LAN mode with the other port in WAN mode is not a valid scenario.) Note that SFP+ power is Level II - 1.5W (1.5W is the maximum per MSA).

To install an SFP/SFP+ device in the C4110:

1. Position the SFP/SFP+ device at either installation slot, with the label facing up.
2. Carefully slide the SFP/SFP+ device into the slot, aligning it with the internal installation guides.
3. Ensure that the SFP/SFP+ device is firmly seated against the internal mating connector.
4. Connect the fiber cable to the fiber port connector of the SFP/SFP+ device.

See the Lantronix SFP webpage for the latest SFP information.

Cabling

The C4110 can be used in telecom and enterprise applications where 1Gig to 10Gig links require fiber extension or where 1Gig to 10Gig links require an interface between two fiber networks. It performs 3R (re-amplify, re-shape, and re-time) signal regeneration. The C4110 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)
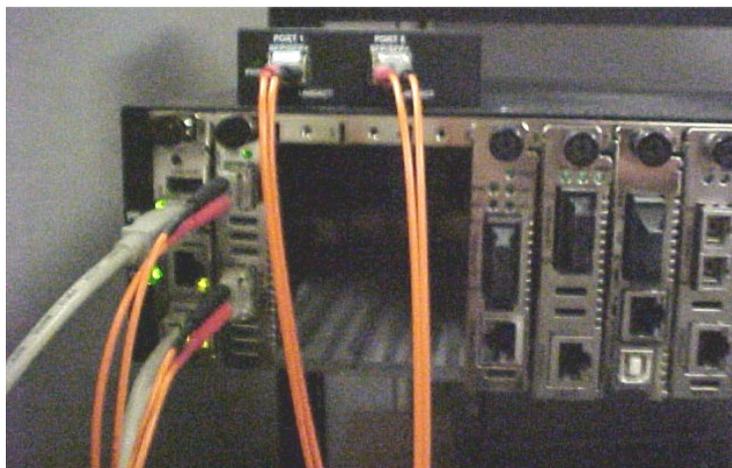
Figure 8: C4110-to-S4110 Connection

The figure above shows cabling a C4110 to an S4110. The procedure is provided below.

Install Fiber Cable

Port 1 and 2: Fiber Ports

1. Locate a fiber cable with male, two-stranded TX to RX connectors installed at both ends. See "Cable Specifications" on page 28 for details.

2. Connect the fiber cable to the 10GE SFP+ fiber port (Port 2 labeled **10GE SFP+**) on the C4110 as described:

   - Connect the male TX cable connector to the female TX connector.
   - Connect the male RX cable connector to the female RX connector.

3. Connect the fiber cables to the 10GE fiber port on the other device (*another media converter, hub, S4110, etc.*) as described:

   - Connect the male TX cable connector to the female RX connector.
   - Connect the male RX cable connector to the female TX connector.
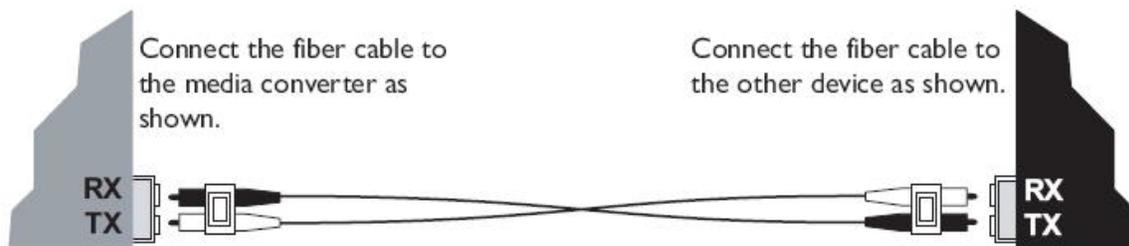
Figure 9: SFP+ Installation

IONMM Installation

For IONMM Management Module installation information, see the *IONMM Install Guide*, 33420.
For IONMM operation see the *ION Management Module (IONMM) User Guide*, 33457.

Operation

Power and Fiber Status LEDs

The status LEDs (labeled **PWR** and **LINK SFP+**) are located next to the fiber port (Port 2). Use the status LEDs to monitor C4110 operation in the network.

LED Label	Meaning	Operation
PWR	Power	Green ON for power applied to board.
PORT 1 LINK	SDF Fiber Status 1	On = Fiber Signal Detected. Off = Fiber Signal Not Detected.
PORT 2 LINK	SDF Fiber Status 2	On = Fiber Signal Detected. Off = Fiber Signal Not Detected.
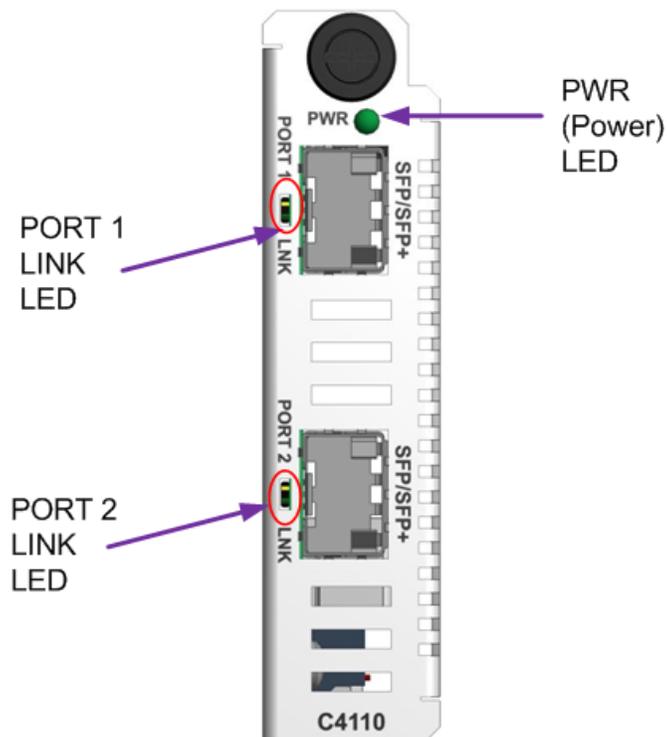
Figure 10: Power and Fiber Status LEDs

Establishing Link

The Link LEDs on end devices (10Gig switches) do not light until an end-to-end link is established, as shown in Figure 8 below. If you only connect one port on the x4110 to an end device, the link LED on the media converter will not light with most SFPs, and you will not see link on the end device. While this may kind of look like a Link Pass Through Event, the C4110 does not support LPT. After both links are connected, the Link LEDs will light on the end devices.

10Gig switches link when RS-to-RS layers can communicate. They need to see RS-to-RS to establish link. The RS (Reconciliation Sub-layer) works at OSI layer 4, the Transport layer. Lantronix media converters do not link at the RS Layer; therefore the LEDs at the end device will not light. So with the C4110, you must make all connections before the port status LEDs light.
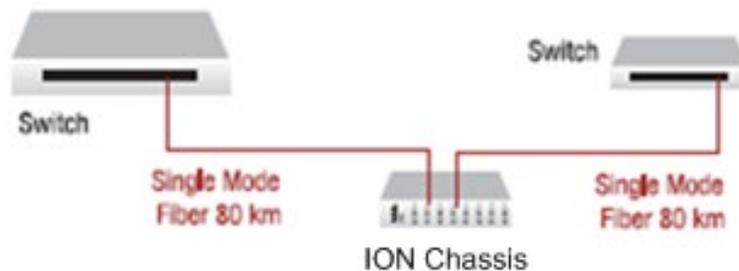
Figure 8: Establishing Link

Accessing the C4110

The C4110 can be accessed through an Ethernet network connection on the IONMM installed in the ION chassis along with the C4110. The network connection can be done via a Telnet session or a Web graphical user interface (GUI).

Installing the USB Driver (Windows XP)

IMPORTANT

The following driver installation instructions are for the *Windows XP* operating system only. Installing the USB driver using another operating system is similar, but not necessarily identical to the following procedure.

To install the USB driver on a computer running *Windows XP*, do the following.

1. Extract the driver from the C4110 Product page and place it in an accessible folder on the local drive of the PC. You must log in or create an account to download firmware.

2. Connect the C4110 to the USB port on the PC.

    Note: for slide-in modules installed in an ION Chassis, the USB connection will be made to the ION Management Module (IONMM) if one is installed in the ION chassis.

    The *Welcome to the Found New Hardware Wizard* window displays.

3. Select **No, not this time**.

4. Click **Next**.

    The installation options window displays.

5. Select **Install from a list or specific location (Advanced)**.

6. Click **Next**.

    The driver search installation options window displays.

7. Click **Browse**.

8. Locate and select the USB driver downloaded in step 1 above.

9. Click **Next**. Driver installation begins.

10. When the finished installing screen displays, click **Finish**. The USB driver installation is complete. You must now configure access the C4110 via an Ethernet network.

Installing the USB Driver (Windows 8)

IMPORTANT

The following driver installation instructions are for the *Windows 8* operating system only. Installing the USB driver using another operating system is similar, but not necessarily identical to this procedure.

To install the USB driver on a computer with the *Windows 8* operating system, do the following.

1. Extract the driver from the C4110 Product page and place it in an accessible folder on the local drive of the PC.

2. Connect the IONMM to the USB port on the PC.

3. Press the Windows key and type "startup". Choose "Change advanced startup options".
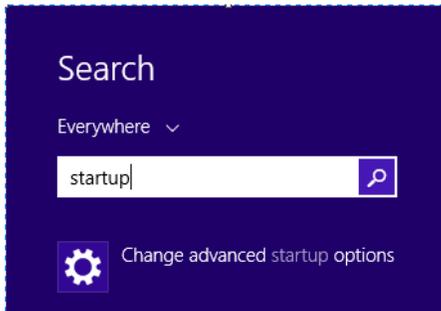
4. On the right side click on the "Restart now" button under Advanced startup.
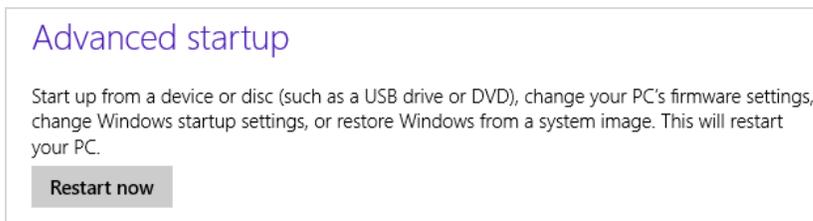
5. Your PC will reboot and display the "Choose an Option" screen; choose "Troubleshoot".

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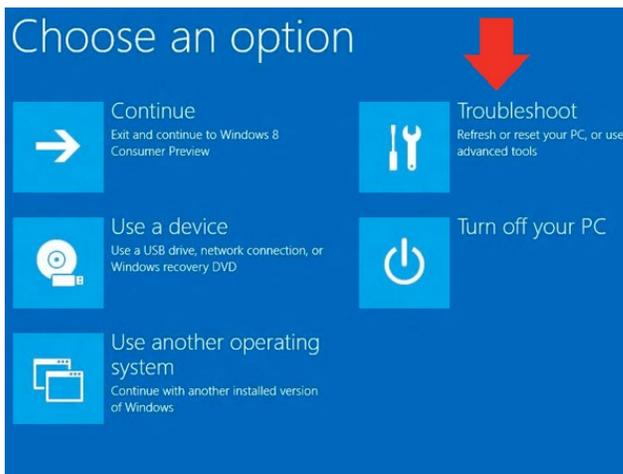
6.   At the Troubleshoot screen choose "Advanced options".
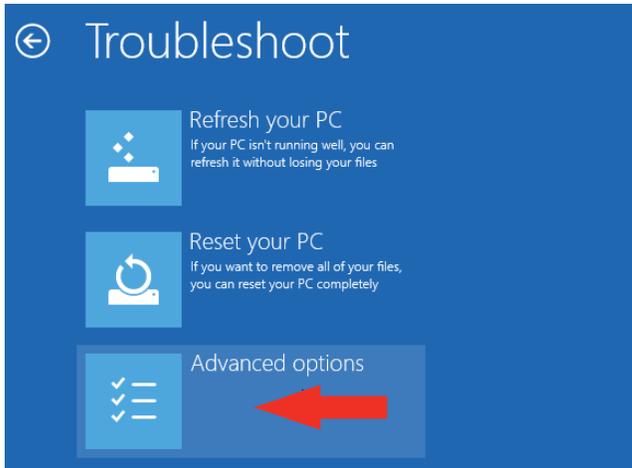
7.   In the Advanced options screen choose "Startup Settings".
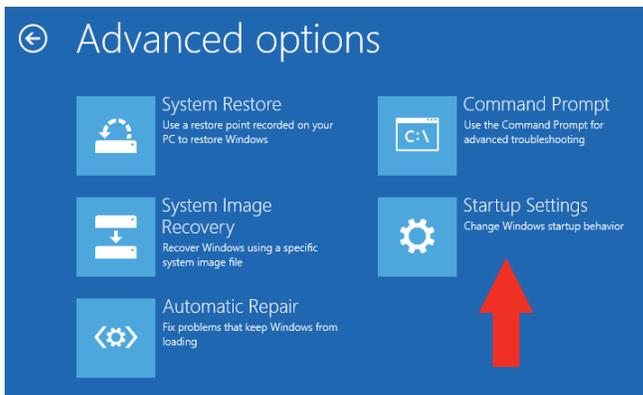
8.   A list of Windows Startu Settings displays; click the "Restart" button. Your PC will reboot.
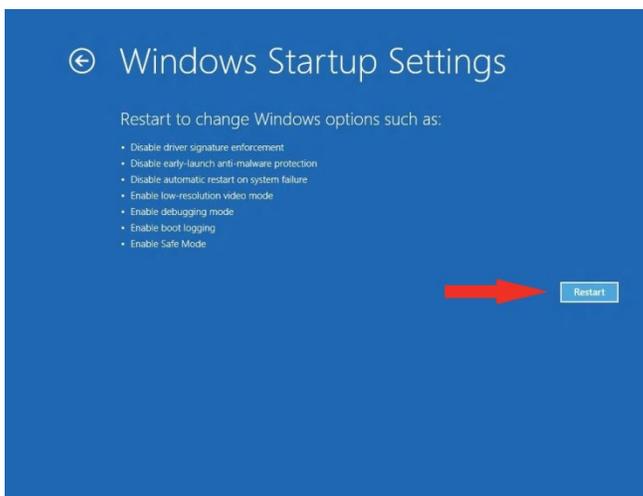
9.   Your PC will boot into a Startup Settings screen. Select "7) Disable driver signature enforcement".
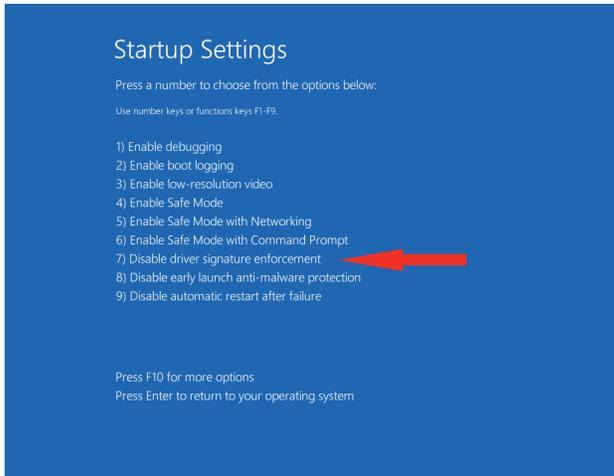
10.   Your PC will reboot one more time and will not load normally.
11.   Plug the USB into the PC and IONMM card and have the USB driver saved locally to the PC.
12.   The install will fail again; right click on "My computer" and click "Manage" to get to "Device Manager".
13.   In Device Manager, expand "Ports (COM& LPT)" to view your connection with an error on the driver.
14.   Right click on the driver and choose "Update driver software".
15.   You will get a pop up with two options; choose "Browse my PC for driver".
16.   Point to the folder location where you have the driver installed and click "install".
17.   You will receive another Windows Security pop up; choose "Install this driver software anyway".

18.   The driver will install correctly and you will no longer see the error on the connection in Device Manager.
19.   You will now be able to connect via USB to the device and log in. On a stand-alone device, be sure to set it to "Remote" so you can remotely manage the device.

Access via an Ethernet Network

The C4110 can be managed remotely through the Ethernet network via either a Telnet session or the Web interface. Before this is possible, you must set up the IP configuration for the C4110.

IMPORTANT

It is recommended that you initially set up the IP configuration through the serial interface (USB connection). See "Accessing the C4110" on page 17.

Otherwise, in order to communicate with the C4110 across the network for the first time, you must change the network settings (IP address, subnet mask and default gateway address) of your PC to coincide with the defaults of the C4110 (see "Defaults" on page 27). Make note of the original settings for the PC as you will need to reset them after setting the IP configuration for the C4110.

Starting a Telnet Session

The C4110 can be controlled from a remote management station via a Telnet session over an Ethernet connection. The C4110 is controlled and configured through CLI commands. Use the following procedure to connect to and access the C4110 via a Telnet session.

1. Click **Start**.

2. Select **All Programs > Accessories**.

3. Click **Command Prompt**. The command prompt window displays.
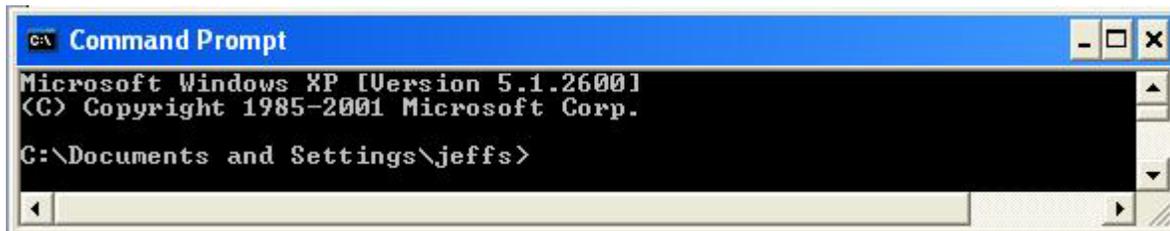
4. At the command line type: **telnet** <xx> where:

   xx = IP address of the C4110 (e.g., 192.168.1.10)

5. Press **Enter**. The login prompt displays.

Note: If your systems uses a security protocol (e.g., RADIUS, SSH, etc.), enter the login and password required by that protocol.

6. Type your login (the default is **ION**). **Note:** the login is case sensitive.

7. Press **Enter**. The password prompt displays.

8. Type your password (the default is **private**). **Note:** the password is case sensitive.

9. Press **Enter**. The command line prompt displays.
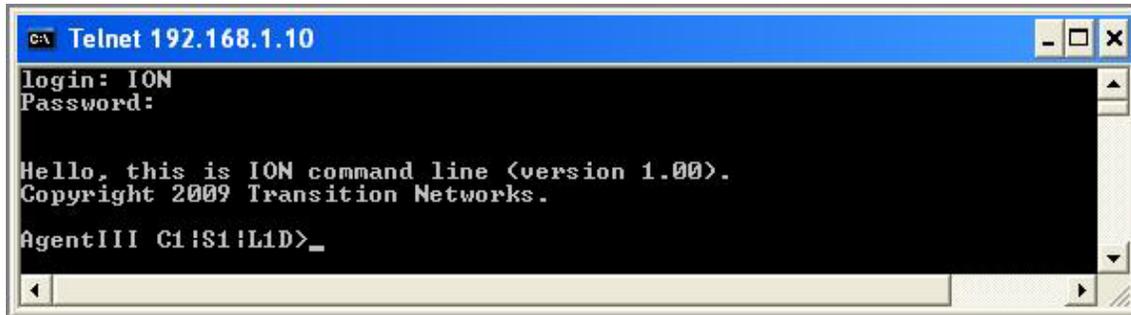
10. Enter a **go** command to change the location for the command prompt. The **go** command format is:
    go [c=<0-16>] [s=<0-32>] [l1ap=<1-15>] [l2ap=<1-15>] (l1p=<1-5>|l2p=<1-15>|l3p=<1-15>|l1d|l2d|l3d)

11. Enter commands to set up the various configurations for the C4110. For web GUI configuration, see the *x4110 Web User Guide*. For CLI command descriptions see the *x4110 CLI Reference* manual.

Note: If required by your organization's security policies and procedures, use the CLI command **set community write=<xx>** to change the default password. See the x4110 *CLI Reference* manual.

Terminating a Telnet Session

To terminate the Telnet session:

1. Type **q**(uit).

2. Press the **Enter** key.

Web Browsers Supported

The ION system supports the latest vresion of most popular web browsers (e.g., Firefox (Mozilla Firefox), Internet Explorer, Google Chrome, Opera).

Starting the Web Interface

The C4110 can be controlled and configured from a remote management station via a Web graphical user interface (GUI) over an Ethernet connection. Information is entered into fields on the various screens of the interface. **Note:** fields that have a grey background can not be modified.

A Web session can be used to connect to and set up the C4110.

IMPORTANT

- Do not use the browser's back button to navigate the screens. This causes the connection to drop.
- Do not use the keyboard's back space key in grayed out fields. This causes the connection to drop.
- For DHCP operations, a DHCP server must be on the network and available.

To sign in to the C4110 via the Web:

1. Open a web browser.

2. In the address (URL) block, type the IP address of the IONMM (the default address is 192.168.1.10).

3. Click **Go** or press **Enter**. The ION System sign in screen displays.

Note: If your systems uses a security protocol (e.g., RADIUS, SSH, etc.), you must enter the login and password required by that protocol.

1. Type the System name (the default is **ION**). **Note:** the System name is case sensitive - all upper case.

2. Type the password (the default is **private**). **Note:** the password is case sensitive - all lower case.

---

3. Click **Sign in** or press **Enter**. The opening screen displays.
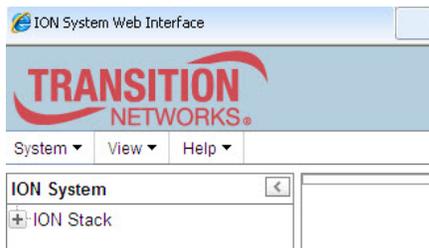
4. Click the plus sign [**+**] next to **ION Stack**. This unfolds "ION Stack" node in the left tree view and will refresh device status.

5. Click the plus sign [**+**] next to **Chassis** to unfold the chassis devices.
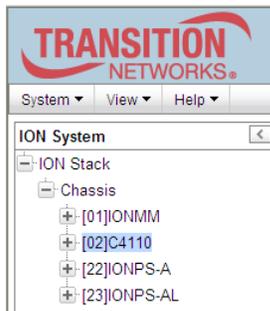
6. Select the appropriate C4110-4848 device. The **MAIN** screen displays for the selected C4110.
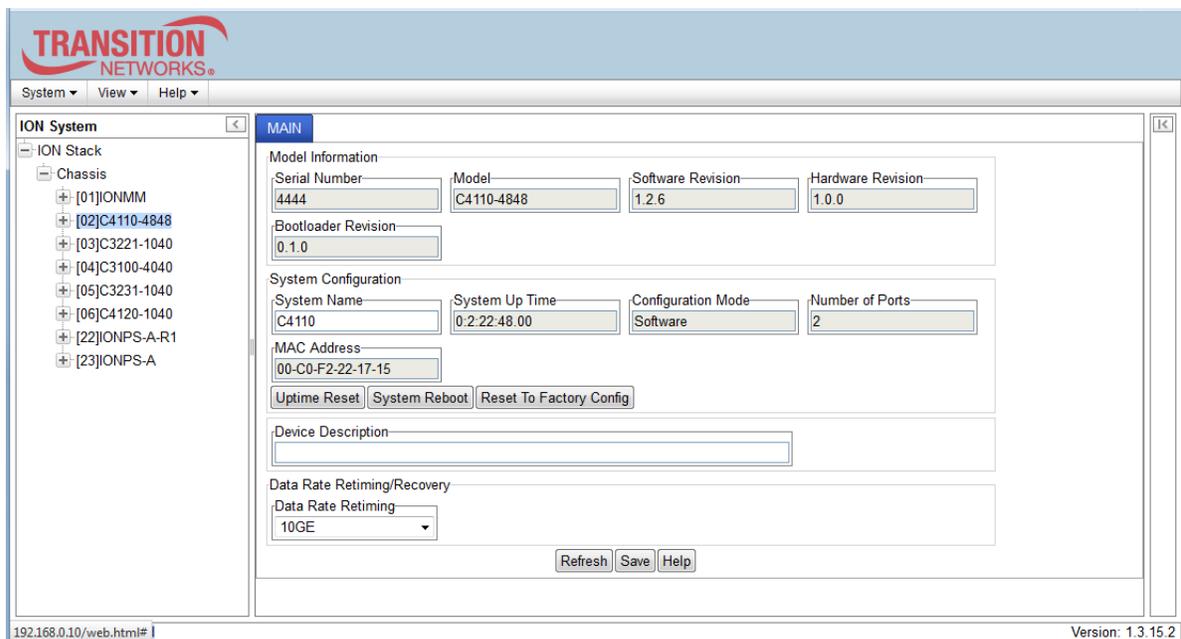
7. You can use the various fields to configure the device and ports. For web GUI configuration, see the *x4110 Web User Guide*.

Note: If required, use the **set community** CLI command to change the default password according to your organization's security policies and procedures.

Terminating the Web Interface

To sign out from the Web interface, in the upper left corner of the ION System Web Interface:
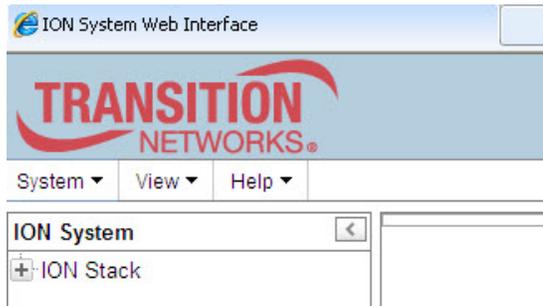
1. Click the **System** dropdown.

2. Click **Sign out**.
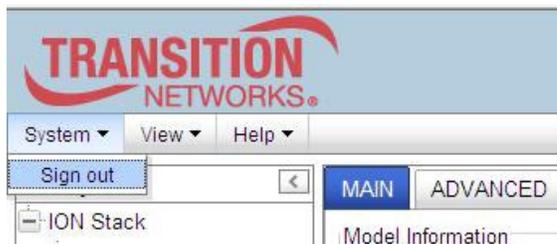
The ION sign- in screen displays.

Note: The C4110 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 sign out from the ION System via the Web Interface

Product Features

The Digital Monitoring Interface (DMI) feature is described below.

Digital Monitoring Interface (DMI)

The Diagnostic Monitoring Interface (DMI) feature allows diagnosing problems within the network. The DMI function displays C4110 diagnostic / maintenance information such as 10Gbps fiber interface characteristics, diagnostic monitoring parameters, and supported fiber media lengths. All DMI events will trigger notification. Intrusion detection, based on Rx Power level, is available for triggering any drop in the Rx power.

Within each function, the DMI device will send a trap whenever a high or low warning event or high or low alarm event occurs (for a total of 16 traps). If both the local and remote NIDs are DMI models, the DMI device will indicate whether the trap event is from a local or remote device.

C4110 Diagnostic Monitoring Interface information includes:

DMI connector type: e.g., *LC*   DMI temperature alarm: *normal*
DMI ID: e.g., *SFP*   DMI transmit bias current: *6240*uA*
DMI Nominal bit rate: e.g., *10500*Mbps*   DMI transmit bais alarm: *normal*
DMI 9/125u Singlemode Fiber (m): *N/A*   DMI Transmit power: *589*uW*
DMI 50/125u Multimode Fiber (m): *80*m*   DMI Transmit power: *-2.299*dBM*
DMI 62.5/125u Multimode Fiber (m): *3*10m*   DMI Transmit power alarm: *normal*
Copper(m): *N/A*   DMI Receive power: *573*uW*
DMI fiber interface wavelength: *850*nm*   DMI Receive power: *-2.418*dBM*
DMI temperature: *42.0*C*   DMI Receive power alarm: *normal*
DMI temperature: *107.6*F*   DMI Receive power intrusion threshold: *0*uW*

Vendor Specific Information (Vendor Name, Vendor Part Number, Serial Number, Revision, MFG Date Code, Transceiver Type, and Vendor OUI) is available with firmware v 1.2.6 and above.

Technical Specifications

Standards:	IEEE802.3ae / ITU.G.709 / SFF8431
Data Rate	10 Gbps
Dimensions	Width: 0.86" [21.85 mm]
	Depth: 6.5" [165 mm]
	Height: 3.4" [86.36 mm]
Power Source	12VDC from ION backplane
Power Consumption	4.2W (350mA @12V)
Environment	See ION chassis specifications
Operating Temperature	0 to 50 degrees C
Storage Temperature	-40 to 85 degrees C
Altitude	0-10,000 feet
Operating Humidity	5% to 95% (non-condensing)
Shipping Weight	1 lb. (0.45 Kg.)
MTBF	Greater than 250,000 hours (MIL-HDBK-217F)
	Greater than 687,000 hours (Bellcore)
Regulatory Compliance for:	
Emission	FCC Class A; EN55022 Class A
Immunity	EN55024
Safety Compliance	CE Mark
Warranty:	Lifetime

The information in this user's guide is subject to change. For the latest information, see the online user's guide at https://www.lantronix.com/products/c4110-4848/#product-resources.

WARNING: Visible and invisible laser radiation when open. DO NOT stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Defaults

After you configure the C4110 and insert it into ION chassis, it will start up and run automatically using its defaults. The C4110 initialization default values are shown below.

Parameter	Default Value	Property
Configuration Mode	Software (SW) mode	Read only
Device Description	(blank)	Read & Write
Data Rate Retiming	10GE	Read & Write
Fiber Port		
Link Status	Down	Read only

You can change the default configuration via the ION Web GUI or the ION CLI (Command Line Interface).

Cable Specifications

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

Fiber port: SFP+, both Class-I and Class-II, 10.3125Gbps.

Cable Types

The cabling specifications are provided for reference and troubleshooting purposes.

Fiber (10GbE) Cabling

The two general types of fiber optic cables are SMF (single-mode fiber) and MMF (multi-mode fiber).

SMF has an optical core of approximately 9 µm (microns), and has lower modal dispersion than MMF, and can support distances of at least 10 Km and as high as 80-100 Km (Kilometers) or more, depending on transmission speed, transceivers, etc..

MMF has an optical core of either 50 µm or 62.5 µm, and it supports distances up to 600 meters, depending on transmission speeds and transceivers.

Fiber Cable Descriptions

Standard	Cable Type	Core Diameter	IEEE Standard Distance	Wavelength
OM1	Multi-mode (MMF)	62.5/125 µm	33 meters (SR)	850 / 1300 nm
OM2	Multi-mode (MMF)	50/125 µm	82 meters (SR)	850 / 1300 nm
OM3	Multi-mode (MMF)	50/125 µm	300 meters (SR)	850 / 1300 nm
OM4	Multi-mode (MMF)	50/125 µm	550 meters (SR)	850 / 1300 nm
OS1	Single mode (SMF)	9 µm	up to 10,000m	1310 / 1550 nm

OS1 SMF optics are used for distances up to 10,000m (6.2 miles) with standard transceivers and can work at longer distances with special transceivers and switching infrastructure.

The C4110 supports:

10GBase-SR: The most common type of fiber-optic 10GbE cable that supports an SFP+ connector with an optical transceiver rated for 10Gb transmission speed (also known as "short reach" fiber-optic cables).

10GBase-LR: The the "long reach" fiber optic cables that support single-mode fiber optic cables and connectors. Provides serialized data at a line rate of 10.3125 Gbit/s.10GBASE-LR has a specified reach of 10 kilometres (6.2 mi), but 10GBASE-LR optical modules can often manage distances of up to 25 kilometres (16 mi) with no data loss.

10GBase-ER: The "extended reach" port type for single-mode fiber that 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.

10GBase-ZR: An 80 km (50 mile) range ER pluggable interface, the 80 km PHY is not specified within the IEEE 802.3ae standard, and manufacturers have created their own specifications based on the 80 km PHY described in the OC-192/STM-64 SDH/SONET specifications.

Note: the interface standard used is defined by the fiber module used and is transparent to the x4110. All other standards are limiting mode (EDC disabled).

Note: the C4110 does not support 10GBase-LX4, 10GBase-CX4, or 10GBase-LRM.

Optical Transport Network (OTN)

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 defined 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.872 then describes the functionality that needed to make OTN work.

Compared to SONET/SDH, using OTN offers advantages (stronger Forward Error Correction, more levels of TCM, transparent transport of Client signals, switching scalability) and disadvantages (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 approximately 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.

Fibre Channel (FC)

FC (Fibre Channel) is a high-speed network technology (common rates of 2-, 4-, 8- and 10-Gbps) often used to connect computer data storage. Fibre Channel is standardized in the T11 Technical Committee of INCITS (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.

SONET (Synchronous Optical Transport Network)

Synchronous **O**ptical **Net**work, a standard for connecting fiber-optic transmission systems. SONET was proposed by Bellcore in the middle 1980s and is now an ANSI standard.

SONET defines interface standards at the physical layer of the OSI seven-layer model. The standard defines a hierarchy of interface rates that allow data streams at different rates to be multiplexed. SONET establishes Optical Carrier (OC) levels from 51.8 Mbps (OC-1) to 9.95 Gbps (OC-192). The international equivalent of SONET, standardized by the ITU, is called SDH.

SONET and Synchronous Digital Hierarchy (SDH) are standardized protocols that transfer multiple digital bit streams synchronously over optical fiber using lasers or highly coherent light from light-emitting diodes (LEDs). At low transmission rates data can also be transferred via an electrical interface. The method was developed to replace the Plesiochronous Digital Hierarchy (PDH) system for transporting large amounts of telephone calls and data traffic over the same fiber without synchronization problems. SONET generic criteria are detailed in Telcordia Technologies Generic Requirements document GR-253-CORE.
Both SDH and SONET are widely used today: SONET in the United States and Canada, and SDH in the rest of the world. Although the SONET standards were developed before SDH, it is considered a variation of SDH because of SDH's greater worldwide market share. SONET and SDH often use different terms to describe identical features or functions. This can cause confusion and exaggerate their differences. With a few exceptions, SDH can be thought of as a superset of SONET.

Messages

Message: *Setting values failed (snmp operation error, possible reasons: invalid data, error data sequence, etc)*
Meaning: The selected parameter setting was not recognized.
Recovery: Click the Refresh button to clear the error message.

Message: *The DMI feature is not supported on current port.*
Meaning: Either the port or the SFP does not support DMI, or an SFP is not currently installed in Port 1.
Recovery: Either insert an SFP/SFP+ in Port 1, or change to Port 1, or change SFPs to a type that supports DMI. See notes above for SFP DMI support.

Troubleshooting

If a problem or exception occurs, the C4110 will send related Trap message to the Trap Server to report this event.

1.   Is the **PWR** (power) LED lit?

        NO

        • Is the C4110 inserted properly into the ION chassis?
        • Is the power cord properly installed in the ION chassis and in the grounded AC outlet?
        • Does the grounded AC outlet provide power?
        • Contact Tech Support.

        YES

        • Proceed to step 2.

2.   Is the **LINK** LED lit?

        NO

        • Check that the SFP+ device is supported and properly connected. See "Installing SFP/SFP+ Devices" on page 12.
        • Check the fiber cables for proper connection to the SFPs.
        • Verify that the cable specs are met. See "Cable Specifications" on page 28.
        • Contact Tech Support.

        YES

        • Proceed to step 3.

3.   Is the CLI accessible?

        NO

        • Check the Install process. See "Installation and Setup" on page 11.
        • Check the cabling. See "Install Fiber Cable" on page 14.
        • Contact Tech Support.

        YES

        • Proceed to step 4.

4.   Is the web GUI accessible?

        NO

        • Check the Install process. See "Installation and Setup" on page 11.

        • Check the cabling. See "Cable Specifications" on page 28.

        YES

5.   Does the "*Getting card version failed*" display indicating that the C4110 card is not discovered by the ION chassis.

        • Make sure the HW / SW mode is set correctly. See "DIP Switch (SW1) and Jumper (J9)" on page 9.

6.   Does the Data Rate Retiming setting match the SFP SFP+ device being used?

        No

        • Change the Data Rate Retiming setting or change the type of SFP/SFP+ device so they match. See "Installing SFP/SFP+ Devices" on page 12.

        Yes

        • Contact Tech Support.

Compliance Information

Declaration of Conformity

Manufacture's Name: Lantronics, Inc.

Manufacture's Address: 48 Discovery, Suite 250, Irvine, California 92618 USA

Declares that the products:
C4110, S4110

Conforms to the following Product Regulations:
FCC Part 15 Class A, EN 55032:2012, EN 55024:2010
Directive 2014/30/EU, Directive 2015/863/EU
Low-Voltage Directive 2014/35/EU
IEC /EN 60950-1:2006+A2:2013
2011/65/EU EN 50581:2012

With the technical construction on file at the above address, this product carries the CE Mark

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Place: Irvine, California

Date: August 18, 2023

Signature: Eric Bass

Full Name: Eric Bass

Position: Vice President of Engineering

FCC Regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.
Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la lass A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fäll ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées.

In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Lantronix will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.
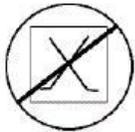
CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EGMitgliedstaaten verstösst gegen die jeweligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer

Electrical Safety Warnings

Electrical Safety
IMPORTANT: This equipment must be installed in accordance with safety precautions.

Elektrische Sicherheit
WICHTIG: Für die Installation dieses Gerätes ist die Einhaltung von Sicherheitsvorkehrungen erforderlich.

Elektrisk sikkerhed
VIGTIGT: Dette udstyr skal 34nstallers I overensstemmelse med sikkerhedsadvarslerne.

Elektrische veiligheid
BELANGRIJK: Dit apparaat moet in overeenstemming met de veiligheidsvoorschriften worden geïnstalleerd.

Sécurité électrique
IMPORTANT : Cet équipement doit être utilisé conformément aux instructions de sécurité.

Sähköturvallisuus
TÄRKEÄÄ : Tämä laite on asennettava turvaohjeiden mukaisesti.

Sicurezza elettrica
IMPORTANTE: questa apparecchiatura deve essere installata rispettando le norme di sicurezza.

Elektrisk sikkerhet
VIKTIG: Dette utstyret skal 34nstallers I samsvar med sikkerhetsregler.

Segurança eléctrica
IMPORTANTE: Este equipamento tem que ser instalado segundo as medidas de precaução de segurança.

Seguridad eléctrica
IMPORTANTE: La instalación de este equipo deberá llevarse a cabo cumpliendo con las precauciones de seguridad.

Elsäkerhet
OBS! Alla nödvändiga försiktighetsåtgärder måste vidtas när denna utrustning används

Safety Instructions for Rack Mount Installations

The instructions below (or similar) are intended for rackmount installation environments:

1. Elevated Operating Ambient: if installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may exceed room ambient. Install the equipment in an environment compatible with the maximum ambient temperature (Tma) specified.

2. Reduced Air Flow: install the equipment in a rack so that the amount of air flow required for safe operation is not compromised.

3. Mechanical Loading: Mount the equipment in the rack so that a hazardous condition does not occur due to uneven mechanical loading (weight distribution/rack balance).

4. Circuit Overloading: give consideration to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Consider all equipment nameplate ratings when addressing this concern.

5. Reliable Earthing: maintain reliable earthing of rack-mounted equipment; pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

LANTRONIX®

Lantronix Corporate Headquarters
48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support
Online: https://www.lantronix.com/technical-support/

Sales Offices
For a current list of our domestic and international sales offices, go to the Lantronix web site at
www.lantronix.com/about/contact.