USER MANUAL

FTH4-1000M(S)
FTH4-100M

**Managed Gigabit & Fast Ethernet
OAM/IP Media Converter with Cable Tray**

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FTH4-1000M(S)
FTH4-100M   Operation Manual

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This Manual supports the following models:
   FTH4-1000M: 1x100/1000Base-FX + 1x10/100/1000Base-TX
   FTH4-1000MS: 1x100/1000Base-FX (SFP) + 1x10/100/1000Base-TX
   FTH4-100M: 1x100Base-FX + 1x10/100Base-TX

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CISPR PUB.22 Class A COMPLIANCE:

This device complies with EMC directive of the European Community and meets or exceeds the following technical standard. EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment. This device complies with CISPR Class A.

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Marking by the symbol CE indicates compliance of this equipment to the EMC and LVD directives of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards: EN 55022:2006, Class A, EN55024:1998+A1:2001+A2:2003, and EN60950-1:2001

Table of Contents

Chapter 1 Introduction

1.1 Welcome

Thank you for choosing **FTH4-1000MS & FTH4-100M** Managed Gigabit & Fast Ethernet OAM/IP Media Converter with cable tray. Throughout this document, the two different models of this family will be referred to as **FTH4-1000M & FTH4-100M** (FTH4-1000MS will also be stated when necessary). If you would like to skip right to the installation of the media converter, proceed to Chapter 2.

This manual is used to explain the hardware installation procedures and operation of **FTH4-1000M & FTH4-100M**, and present its capabilities and specifications. This manual is divided into 3 chapters, the Introduction, Installation, and Provisioning Chapters.

Installers should carefully read the Chapters 1 & 2, Introduction and Installation. The divisions in that manual are intended for use by personnel to answer questions in general areas. Planners and potential purchasers may read the Introduction to determine the suitability of the product to its intended use; Operating Personnel would use the Web Based Management Chapters and Appendices to become familiar with the settings. Network Administrators should read the chapters on Web Based Management and Trouble Shooting to become familiar with the diagnostic capabilities, network settings and management strategies.

1.2 Product Description

FTH4-1000M & FTH4-100M are managed electrical to optical media converters with cable tray for Gigabit & Fast Ethernet. There are two models for FTH4-1000MS series, one with fixed optical transceiver (FTH4-1000M) and one supporting pluggable SFP transceiver (FTH4-1000MS). These converters support embedded stand-alone Web based management over IP networks as well as IEEE802.3ah OAM for remote in-band management.

FTH4-1000M & FTH4-100M are IEEE802.3ah OAM compliant copper to fiber Gigabit & Fast Ethernet solution housed in wall mountable enclosure. These converters have a built-in cable tray that allows users to enclose excessive fiber within the converter. When deployed as a stand-alone solution, this media converter incorporates an easy to use Web user interface for operation, administration and maintenance of both locally and remotely connected **FTH4-1000M & FTH4-100M** converters. By offering 802.3ah OAM compliance, this converter can be linked to any 802.3ah compliant fiber switch and support loop back and dying gasp functions.

1.3 Product Features

- Auto-Cross over for MDI/MDIX at UTP port
- Auto-Negotiation or Forced Manual mode for UTP port
- Supports SFP for selectable Fast or Gigabit speed on fiber (for FTH4-1000MS only)
- Supports 802.3X flow control Enable or Disable
- Supports Jumbo Frames up to 9600 bytes
- Supports 16 Tag VLAN Groups
- Supports 802.1Q tagging
- Ingress/Egress Bandwidth control with 64K granularity
- Supports 802.3ah-OAM loop back and dying gasp (remote power failure detection)
- Supports firmware upgrade via Web
- Supports Digital Diagnostics (DOM) for supported SFP
- Includes RMON counters
- Supports password setting for authentication
- Supports Link Fault Pass Through (LFP) Function
- Supports Auto Laser Shutdown (ALS) Function
- With built-in fiber cable tray

FTH4-1000MS SFP socket supports a wide range of standard SFP modules to address any network situation.

WARNING: Fiber optic equipment may emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to an active laser light source.

1.4 Specifications

Model Item	FTH4-1000M(S)	FTH4-100M
Optical Interface		
Connector	Duplex SC, ST, FC (FTH4-1000M) or SFP cage (FTH4-1000MS)	Duplex SC, ST, FC
Data rate	100/1000Base-X	100Base-FX
Duplex mode	Full duplex on fiber	Full duplex on fiber
Electrical Interface		
Connector	RJ-45, shielded	RJ-45, shielded
Data rate	auto, 10Mbps (10Base), 100Mbps (100Base), or 1000Mbps (1000Base)	auto, 10Mbps (10Base) or 100Mbps (100Base)
Duplex mode	Full or Half (Auto)	Full or Half (Auto)
Cable	Cat 5e or better	Cat 5e or better
Indications	Power, Fiber Link, Fiber Speed, LAN Link, LAN Speed	Power, Fiber Link, LAN Link, LAN Speed
Power		
Output Voltage	12VDC	
Consumption	< 4W	< 4W
Dimensions	220 x 140 x 27mm (D x W x H)	220 x 140 x 27mm (D x W x H)
Weight	720g	720g
Temperature	0°C~60°C (Operating), -10°C~70°C (Storage)	0°C~60°C (Operating), -10°C~70°C (Storage)
Humidity	10 ~ 90% non-condensing	10 ~ 90% non-condensing
Certifications	CE, FCC, RoHS Compliant	CE, FCC, RoHS Compliant
MTBF	65000 hrs	65000 hrs

1.5 Management Features

Once configured for TCP/IP access, these units support a Web Smart GUI for intuitive setting via point & click.

1.6 Panel

1.6.1 Top & Front panel
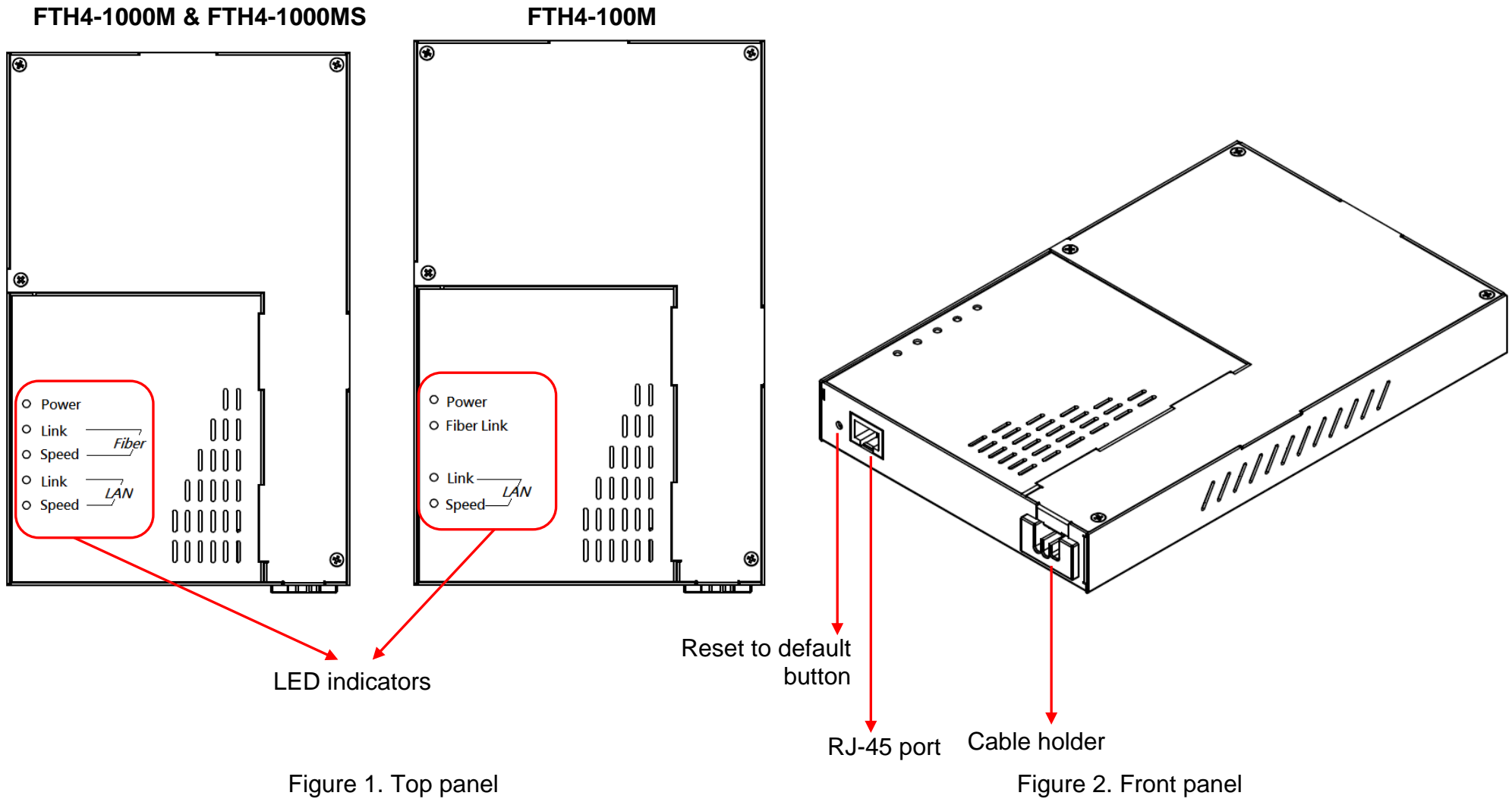
FTH4-1000M & FTH4-1000MS

FTH4-100M

Power
Link
Speed — Fiber
Link
Speed — LAN

Power
Fiber Link
Link
Speed — LAN

LED indicators

Figure 1. Top panel

Reset to default button

RJ-45 port   Cable holder

Figure 2. Front panel

1.6.2 Wall Mounting Holes & Inside the Media Converter

Wall mounting holes
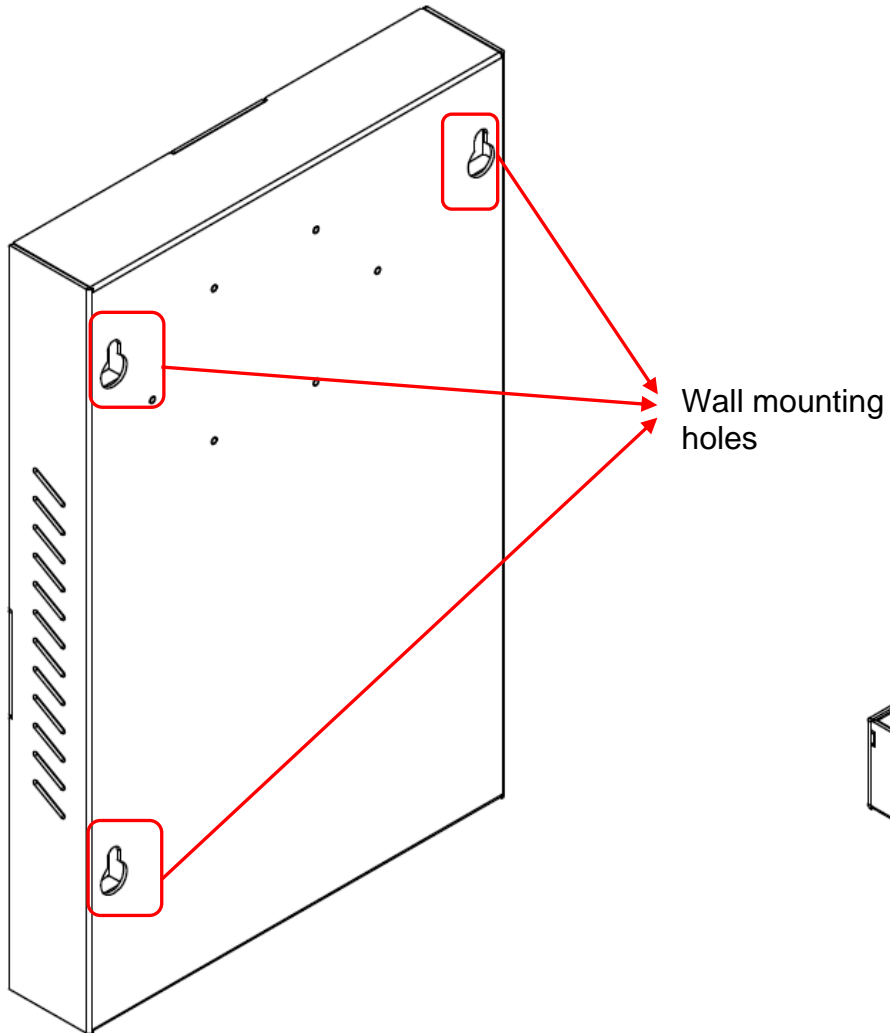
Power DC jack

Fiber optic port

Cable tray management

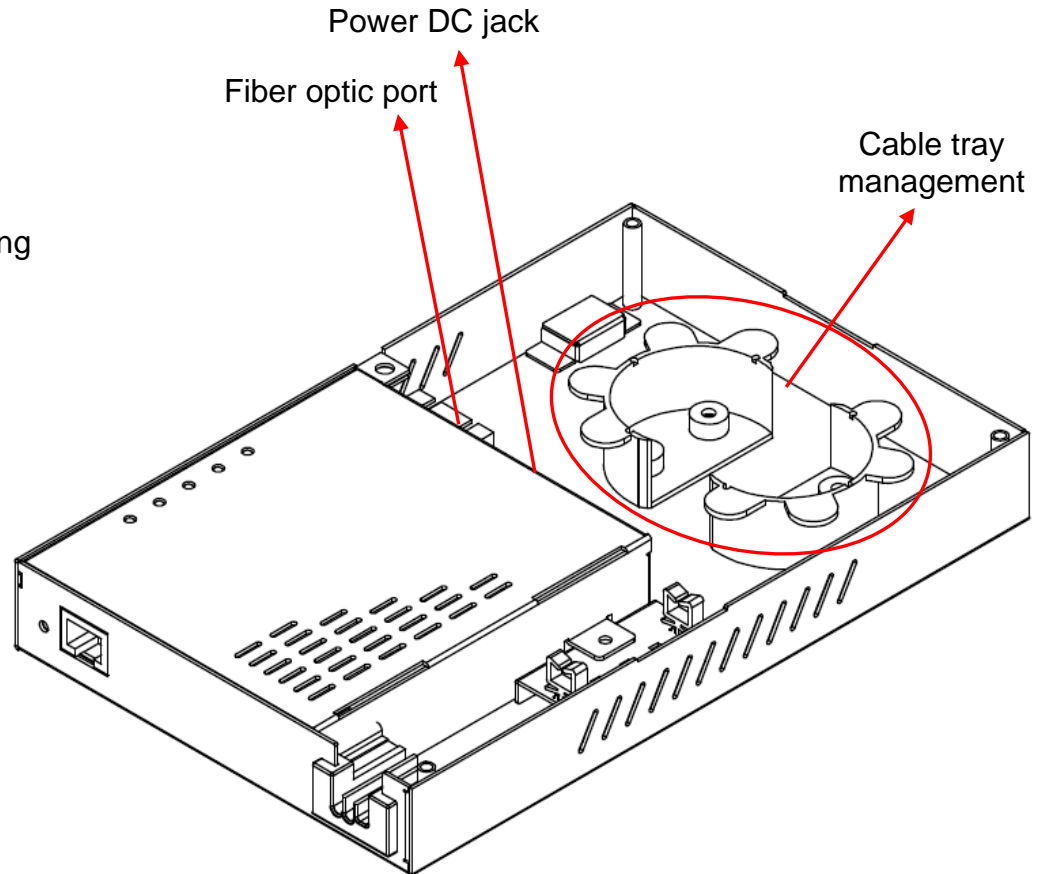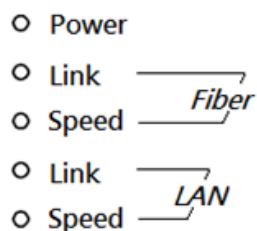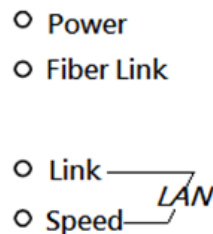Figure 3. Wall mounting holes

Figure 4. Inside the media converter

1.7 LED Indicators

FTH4-1000M & FTH4-100M have LEDs on the front face that report the condition of power, Fiber link & Speed, LAN link & Speed.

○ Power	○ Power
○ Link —— Fiber	○ Fiber Link
○ Speed ——	
○ Link —— LAN	○ Link —— LAN
○ Speed ——	○ Speed ——

FTH4-1000M LED Indicators   **FTH4-100M LED Indicators**

LED	Color	Status	Definition
Power	Green	ON	Light if power is connected.
	OFF		Power is not connected.
Fiber Link (FTH4-100M)	Green	ON steadily	Light when the fiber port has an optical link but no link activity.
		Flashing	Flash when there is data traffic.
	OFF		There is no optical link.
Fiber Link (FTH4-1000MS)	Green	ON steadily	Light when the fiber port has an optical link but no link activity.
		Flashing	Flash when there is data traffic.
	OFF		There is no optical link.
Fiber Speed (FTH4-1000MS)	Green	ON	Light when the Fiber speed is 100M.
	Amber	ON	Light when the Fiber speed is 1000M.
	OFF		There is no optical link.
LAN LINK	Green	ON steadily	Light when the LAN port has a link but no link activity.
		Flashing	Flash when there is Ethernet traffic.
	OFF		There is no LAN port link.
LAN Speed	Green	ON	Light when the LAN speed is 100M.
	Amber	ON	Light when the LAN speed is 1000M. (for FTH4-1000MS only)
	OFF		If not lit, the LAN speed of 10M is indicated.

1.8 Reset to Default Button

The "Reset to Default" button is located next to RJ-45 UTP port. It is used to recover lost password or to return TCP/IP settings to factory default values. Use a pencil or blue-point pen and then press the button for 6 seconds then release to reset the device to the factory default settings. DO NOT POWER OFF. Allow the device to again fully reboot.

Default values:
Login Username: admin
Password: admin
IP: 10.1.1.1
Netmask: 255.255.255.0
Gateway: 0.0.0.0

Chapter 2 Installation

2.1 Cable Tray Management

FTH4-1000M & FTH4-100M have built-in cable tray that is used to organize excessive fiber in order. The installation of fiber cable in the cable tray is simple and straightforward. The following pictures describe the fiber installation step by step.
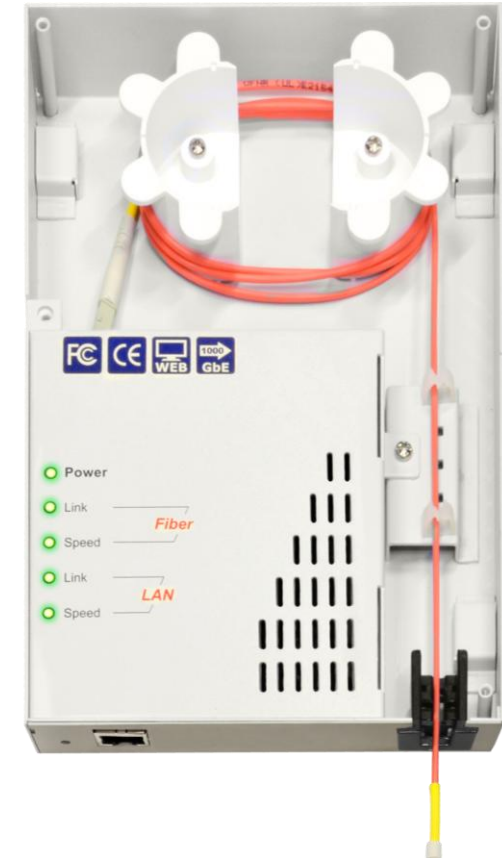
Step 1. Use the screwdriver to remove screws fixed on the top panel.
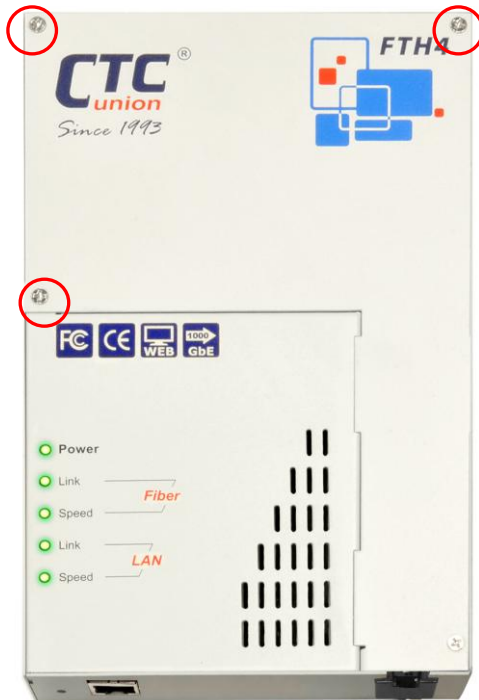
Step 2. Remove the top panel.

Step 3. Connect one end of the fiber connector to the fiber optic port and t hen organize excessive fiber in the cable tray.

2.2 Wall mounting

FTH4-1000M & FTH4-100M can not only be placed on the flat desk but also be mounted on the wall. The media converter provides three wall mounting holes at the bottom panel that allows users to hang it vertically or horizontally depending on the actual wall mounting needs. The wall mounting installation methods are simple and straightforward. Follow the steps below to hang the media converter on the wall.

Firstly, fix two or three screws (screws are not provided) on the wall. The distance between screws varies depending on the vertical or horizontal direction of the media converter. Once the screws are fixed on the wall, hang the media converter on those screws securely.
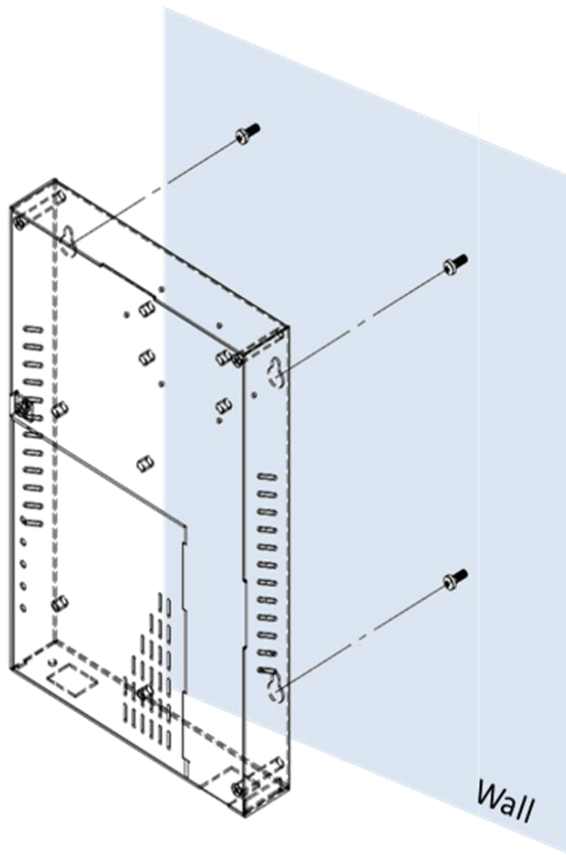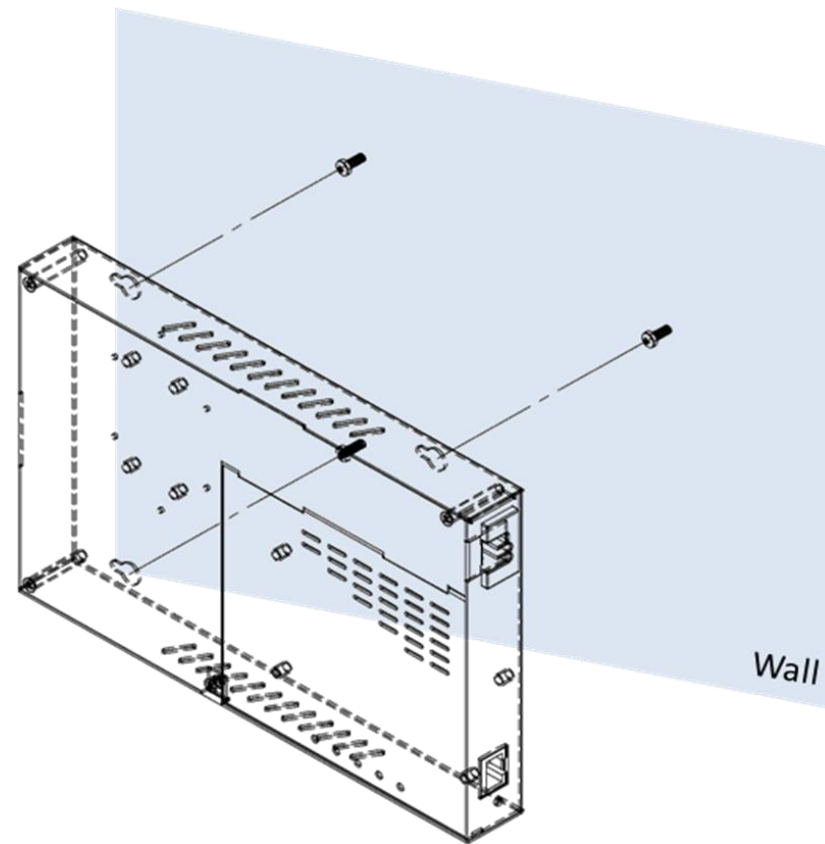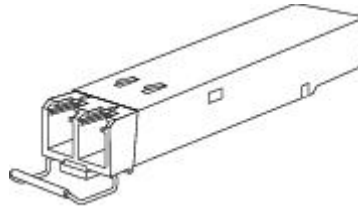

Figure 5. Wall mounting (vertical)

Figure 6. Wall mounting (horizontal)

2.3 Installation of SFP Modules (for FTH4-1000MS only)

We supplied SFP modules are of the Bale Clasp type. The bale clasp pluggable module has a bale clasp that secures the module into the SFP cage and has a handle to aid in removing the module.

Bale Clasp type SFP

2.3.1 Inserting a Bale Clasp SFP Module into the Cage

Step 1 Close the bale clasp upward before inserting the pluggable module.
Step 2 Line up the SFP module with the port, and slide it into the cage. Seat it. Attach fiber cable.

2.3.2 Removing a Bale Clasp SFP Module

Step 1 Remove fiber cable. Open the bale clasp on the SFP module. Press the clasp downward with your index finger.
Step 2 Grasp the SFP module between your thumb and index finger and carefully remove it from the SFP cage.

Follow all ESD precautions when handling SFP modules.

Chapter 3 Web Based Provisioning

3.1 Introduction

In an effort to make Networking devices easier to configure, many devices can now be configured via a Web Page, which should be familiar to all Internet users.

The webpage is accessed by the Default IP Address of the device from a Web Browser such as Internet Explorer or Firefox in the following way:
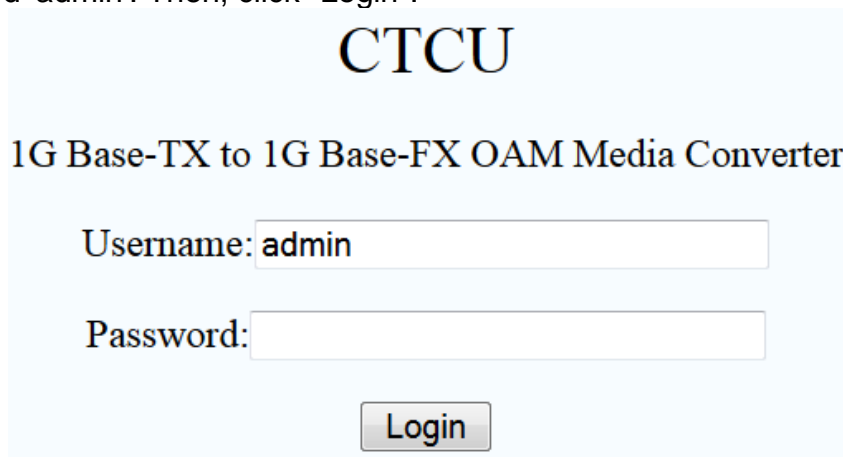
http://10.1.1.1/ (Assuming the device has Default IP Address of 10.1.1.1)

Before accessing this device by web browser, the IP address must be known or it must be reset or changed to be used on the desired network. Please refer to Chapter 1, section 1.8 for the factory reset procedure. For initial configuration, you must set your PC to the default IP subnet and access this device that way. Then you can change the IP address through the web interface.

3.2 Web Login Page

Access the device via a web browser.
Enter the username 'admin' and password 'admin'. Then, click "Login".

3.3 Web Main Page

When you successfully access the device, the first page you will see look like the one provided below. In this manual, we 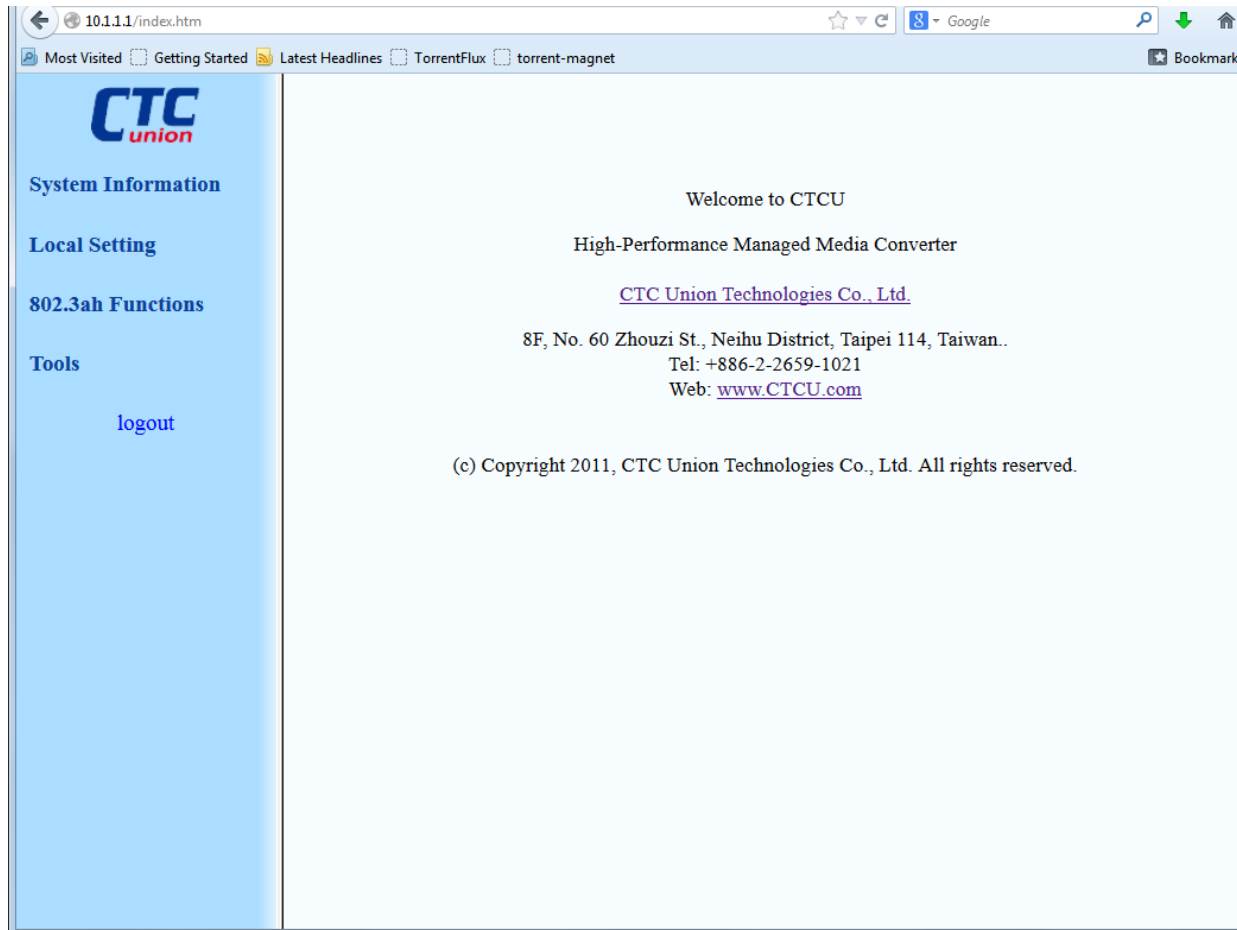use **Gigabit media converter's** (FTH4-1000M) Web configuration page as example. If you use Fast Ethernet media converter, some pages may vary.

3.4 System Information

3.4.1 Network Information

The information displayed on this page gives specific device, network information, and port status for the local FTH4-1000MS and for any remote that is accessible via IEEE802.3ah OAM in-band management.

Local Device Information

MAC Address	00:02:ab:0d:a8:67
Software Version	1.040
IP Address	10.1.1.1
Gateway	10.1.1.254
Subnet Mask	255.255.255.0
Description	FTH4-1000MS

Remote Device Information

MAC Address	00:02:ab:0d:a8:60
Software Version	1.040
IP Address	10.1.1.1
Gateway	10.1.1.254
Subnet Mask	255.255.255.0
Description	FTH4-1000MS

Local Port Status

Ports	TP	FX
Link Status	Up	Up
Speed	1000M	1000M
Duplex mode	Full	Full
Flow control	Enable	Enable
Auto negotiation	Auto	Auto

Remote Port Status

Ports	TP	FX
Link Status	Down	Up
Speed	10M	1000M
Duplex mode	Half	Full
Flow control	Enable	Enable
Auto negotiation	Auto	Auto

3.4.2 DD Information

The DD or DDOM information is read from the MSA compliant SFP module and can be displayed via the web user interface.

Local DD Information

Vendor Name0	CTC UNION
Vendor Part Number	SFS-7020-WA-DDI
Fiber Type	Single Mode
TX Wave Length	1310 nm
RX Wave Length	1550 nm
Link Length	0020 Km
Tx Power	-06 dBm
Rx Power	-05 dBm
Rx Sensitivity	-35 dBm
Temperature	035 C

Remote DD Information

Vendor Name0	CTC UNION
Vendor Part Number	SFS-7020-WB-DDI
Fiber Type	Single Mode
TX Wave Length	1550 nm
RX Wave Length	1310 nm
Link Length	0020 Km
Tx Power	-06 dBm
Rx Power	-05 dBm
Rx Sensitivity	-35 dBm
Temperature	025 C

3.5 Local Settings

The following is a listing of the local settings that can be performed via the web interface for the Gigabit & Fast Ethernet media converter. We will go through the settings here, one by one, in detail.

Local Setting
- IP Configuration
- Password Setting
- Converter
- Configuration
- Port Configuration
- MIB Counter
- VLAN

3.5.1 IP Configuration

Use this screen to set the TCP/IP configuration for the local unit. Note, that if you change the IP address you could lose remote management for this device. Remember to save settings under the "Tools" menu.

IP Configuration

DHCP Client	Disable ∨
IP Address	10.1.1.1
Subnet Mask	255.255.255.0
Gateway	10.1.1.254
Description	FTH4-1000MS

Apply

The above shows the factory default TCP/IP settings for Gigabit & Fast Ethernet media converters. The "Description" field varies depending on the device you use.

DHCP Client, when enabled, will allow the device to automatically get the IP configuration settings from the network's Dynamic Host Configuration Protocol server. When setting this device with static IP, make sure this is disabled (disabled is the default).

IP Address is the dotted/decimal format for the IPv4 address to remotely manage this device.

The **Subnet Mask** defines the type of subnet the device will be on. The proper subnet setting will be defined by the network administrator.

The **Gateway** is the default path for any packets NOT belonging to the local subnet. This IP address is the address of the router on your network. It is also entered as a dotted/decimal IPv4 format address. If the device will only be managed on the local subnet, setting a gateway address is optional.

After applying settings, do not forget to save the configuration under the 'Tools' menu so that the settings are permanent.

3.5.2 Password Setting

This function is used to modify the default password for the device. The password is required so that only authorized users have access to the management of the device.

Password Setting

Login Name	admin
Old Password	
New Password	
Confirm	

Key in the current password and type in the new password twice, then click the "Apply" button.

After applying settings, do not forget to save the configuration under the 'Tools' menu so that the settings are permanent.

3.5.3 Converter Configuration

The Converter configuration menu includes special features of Gigabit & Fast Ethernet media converter.

All of these special functions will be explained on the following two pages. Select the proper radio buttons and then click the "Apply" button. Remember to save settings under the "Tools" menu.

The remote **Management** functions of the converter can be disabled. Once disabled and saved, regardless of the 802.3ah OAM settings, the remote management feature is disabled. When management is enabled, the remote management feature will be available.

This converter is capable of supporting **Jumbo Frames** (9k byte packets) when this option is enabled. Note that in order to support jumbo frames, the TP speed and duplex must match the FX. Jumbo Frames are not typically used on a normal network, since most devices are not able to handle them and they would be truncated. Most PCs, servers, switches, DSL and WiFi do not support jumbo frames. Jumbo frames can only work on a pure Jumbo frame network, which currently only exists in data centers for server-to-server or server-to-storage connections and on some education back bone networks. Jumbo frames will always be considered to be illegal, non-standard Ethernet packets, according to IEEE802.3. In most cases, the call for jumbo frame support is just marketing hype.

Link Loss Carry Forward or Link Fault Pass through (**LFP**) allows a link condition to be passed from fiber to TP or from TP to fiber. This function is disabled by default.

Auto Laser Shutdown (ALS) is an optical safety mechanism which will shutoff laser transmission if the transceiver experiences a loss of receive signal. This function is disabled by default.

Forward CRC Frame option is disabled by default. The normal behavior of a switch is to read the entire Ethernet frame (store), calculate the checksum and compare to the FCS in the packet. If the checksum matches, the packet is transmitted (& forwarded). If the checksum does not match, the switch considers the packet to have CRC error and drops it. If this option is enabled, the packet with CRC error will still be forwarded instead of being dropped.

The option **Forward Pause Frame** allows pause frame forwarding to occur when enabled. Pause frames are special broadcast frames defined in IEEE802.3X. Normally pause frames are used by the switch to throttle packets through a bottle neck rather than drop excess packets (for example, if **1000M** data stream is exiting a lower speed 100M port). Normally, the pause frames are not forwarded between interfaces in the switch. In many cases, pause frames are considered problematic. Therefore, their forwarding is disabled by default in this converter.

Management Packet High Priority is a function which is enabled by default. Unless VLAN is enabled, this function is meaningless. The packet priority is included as 3 bit priority in the VLAN tag. Management packets will be assigned the highest priority so that even in the presence of high traffic throughput, this converter can still be easily managed.

Broadcast Storm is a condition where either a loop exists on the network or an Ethernet transceiver is bad and exhibiting jabber. In addition there are the deliberate attempts to bring a network down through virus and denial of service routines. When enabled, the **Broadcast Storm Filter** will recognize and block the forwarding of these broadcasts.

Multicast storms happen when application participants request retransmits of information they have missed in the multicast stream. There are many applications, like video streaming, IP based punch clocks, IP based surveillance trackers and camera, that come with multicast or some broadcast based protocol turned on by default. The **Multicast Storm Filter** can be enabled to filter these unwanted effects.

The **Unknown DA Unicast Storm Filter** can be used to filter the Unicast broadcasts whose objective is to cause deny-of-service. Some Trojans and virus start scanning multicast IP ranges causing excess broadcasts and reducing network performance.

3.5.4 Port Configuration

This screen is for the configuration of the electrical Ethernet port (TP) and the optical port (FX).

Port Configuration

Port	Link	Port Active	Mode	Flow Control	Ingress Rate Limit (bps)		Egress Rate Limit (bps)	
TP	Down	Enable ▾	Auto Speed ▾	Enable ▾	Not Limit ▾	0 * 64k	Not Limit ▾	0 * 64k
FX	1000F	Enable ▾	Auto Speed ▾	Enable ▾	Not Limit ▾	0 * 64k	Not Limit ▾	0 * 64k

Apply Refresh

Both the TP and FX **Port Active** are enabled by default. If a port is disabled, all transmission through this port will be stopped. The device's LAN or Fiber Link LED will be extinguished if the port is made inactive. However, any connected device will still detect an Ethernet link.

The UTP port **Mode** supports auto-**negotiation** per IEEE802.3u as well as manual forced mode setting of **Speed** and **Duplex** (Half/Full). In 802.3u, speed can be auto detected, however the Duplex mode MUST be negotiated. When an 802.3u compliant device is configured in auto negotiation mode, failure to negotiate Duplex (for example, if connected to legacy equipment or to equipment configured in forced mode) will result in the Auto device assuming a Half-Duplex operating mode. Do not connect forced Full mode Ethernet ports to an auto device as this will result in a Duplex-Mismatch.

The Gigabit Media Converter's FX port will be able to auto detect speed (100M/1000M for Gigabit media converter; 100M for Fast Ethernet media converter) although there is no standard for fiber speed and duplex negotiation. Therefore, it is important that at least one device on the fiber link be manually configured for speed. In the example here, the device is manually configured for fiber speed of 100M.

Ethernet **Flow Control** (IEEE802.3X) is a mechanism for temporarily stopping the transmission of data on Ethernet family computer networks. It can work in conjunction with rate limiting to avoid dropped packets from TCP. Flow control should also be used with care and with full knowledge of its effect when used to pause traffic coming from a switch.

The **rate limiting** is adjustable for both ingress (packets received into the TP or FX port) and egress (packets transmitted from the TP or FX port) in granularity of 64k. By default, rate limiting is disabled. Once enabled, the rate limit can be set in nx64k rates where n=1 to 16000. Entering an "n" value of zero (0) will again disable the rate limiting.

3.5.5 MIB Counters

MIB Counters

(The following counter means the port received number)

Port	TP	FX	CPU
Total Bytes	2733581	110332	420652
Total Pkts	20993	886	3471
Total Error Pkts	0	0	0
Unicast Pkts	2648	867	3435
Multicast Pkts	6329	0	0
Broadcast Pkts	12016	19	36
64	5950	450	668
65-127	8522	0	2271
128-255	4754	436	445
256-511	1142	0	6
512-1023	621	0	4
1024-1518	4	0	77
Undersize Pkts	0	0	0
Oversize Pkts	0	0	0
Fragments	0	0	0
CRC Errors	0	0	0
Jabbers	0	0	0
Drop Events	0	0	11
Pause Frames	0	0	0

Clear   Refresh

The counters have an accumulation of received bytes and packets for each port (UTP, Fiber and Management). The distribution of those packets is further delineated into packet types (Unicast, Multicast, Broadcast) and packet sizes. Also counted are illegal packets and dropped events. This display can be refreshed or the counters cleared by clicking the appropriate buttons.

3.5.6 VLAN

3.5.6.1 VLAN Group

802.1Q VLAN Group

VLAN Mode Disable

VLAN Group	VID	Member		
		TP	FX	CPU
0	1	☑	☑	☑
1	1	☑	☑	☑
2	1	☑	☑	☑
3	1	☑	☑	☑
4	1	☑	☑	☑
5	1	☑	☑	☑
6	1	☑	☑	☑
7	1	☑	☑	☑
8	1	☑	☑	☑
9	1	☑	☑	☑
10	1	☑	☑	☑
11	1	☑	☑	☑
12	1	☑	☑	☑
13	1	☑	☑	☑
14	1	☑	☑	☑
15	1	☑	☑	☑

By default, this device is VLAN unaware, making it completely transparent to VLAN tags. In most application, this device only acts as a media converter and therefore the device should be transparent. This device does support up to 16 VLAN groups. By using the check boxes for each port, the ingress access to different VIDs can be controlled here for TP, FX and management.

3.5.6.2 VLAN Per Port Configuration

802.1Q VLAN Per Port Setting

Port	Egress Link Type	Port VLAN Entry
TP	Dont Touch Tag	0
FX	Dont Touch Tag	0
CPU	Dont Touch Tag	0

Replace Tag
Remove Tag
Add Tag
Dont Touch Tag

Within the Gigabit & Fast Ethernet media converter, there are actually three different ports, the external copper and fiber ports, plus the internal CPU port (management). The VLAN Per Port Setting page deals with how frames exit (egress) the copper, fiber and CPU (management). These are the **Frame Egress Type**. The following operations may be performed to the outgoing frames: **<1>: Replace Tag** The switch will remove VLAN tags from packets then add new tags to them. The inserted tag is defined in "Port VLAN Entry". **<2>: Remove Tag** The switch will remove VLAN tags from packets, if they are tagged. The switch will not modify packets received without tags **<3>: Add Tag** The switch will add VLAN tags to packets, if they are not tagged when these packets are output on this port. The switch will not add tags to packets already tagged. The inserted tag is defined in "Port VLAN Entry". **<4>: Don't Touch Tag** Do not insert or remove VLAN tags to/from packet which is output on this port.

3.5.7 Management VLAN Setting

This function is independent of any other VLAN group or per port settings. The settings here provide a very quick method to configure how access to management is controlled.

Management VLAN Setting

Utp Port Access Control	○ Disable	○ Enable	○ Drop
Fiber Port Access Control	○ Disable	○ Enable	○ Drop
Management VID	1	(1~4094)	
	Apply		

There are three control 'states' defined as follows:

Disable: This means that the "access control" is not enabled. When set to disable, management is allowed in the respective port. By default, both the TP and FX ports allow full management using untagged packets.

Enable: The access control for the effected port is now enabled. Only packets tagged with the assigned "Management VID" are allowed for management of the Gigabit & Fast Ethernet media converter.

Drop: No management is allowed from this port connection. If, for example, the TP port is set for 'Drop', then there will be no way to manage this device when connected to the UTP port. The management is effectively blocked on that port. This dropped setting might be used in an application where only management arriving from the FX port is desired and all management from TP is blocked.

   Caution: The "Apply" button is immediate and persistent. An incorrect setting here could result in 'loss of management' when applying that setting. For example, if you are managing the device via the UTP connection, select 'Drop' for the UTP port and then click 'Apply', management will be immediately lost. In fact, the device will no longer reply to 'ping' at its IP address. Simply rebooting the device will not be enough to recover. To regain management control, either access management from the fiber side, or reset the device to factory default and start over again.

3.6 Remote Settings

When 802.3ah is active in both the local and remote unit (with fiber connection), the in-band management provides an embedded channel to control and configure the remote by using OAM (layer 2) Ethernet packets. The same settings available to the local unit are available under the **Remote Setting** menu, with the exception of password setting.

Remote Setting
IP Configuration
Converter
Configuration
Port Configuration
VLAN

3.7 802.3ah OAM Functions

This converter supports IEEE 802.3ah, an OAM protocol that operates at Ethernet Layer 2 (Data Link layer). OAM provides mechanisms to monitor link operation / health and to improve fault isolation. OAM only works point-to-point over the fiber link. In addition to standard 802.3ah functions like loop back and dying gasp, **this converter** also implements OAM to provide complete provisioning of the remote fiber connected converter, without using Layer 3 IP protocol. By using OAM, we can remotely manage another fiber connected converter, without IP addressing. From this menu we can also perform some basic diagnostics, such as loop back test.

802.3ah Functions
802.3ah
Configuration
Loopback Test
802.3ah Status

3.7.1 802.3ah Configuration

802.3ah OAM Configuration

802.3ah Function	○ Disable	◉ Enable
802.3ah Mode	○ Passive	◉ Active
Link Events	○ Disable	◉ Enable
Remote Loopback	○ Disable	◉ Enable
Unidirection Support	◉ Disable	○ Enable
Errfrm_Win(second)	2	(1~60)
Errfrm_Thr	1	(1~2^32)
Errfrmprd_Win	148800	(1~2^32)
Errfrmprd_Thr	5	(1~2^32)
Errfrmsec_Win(second)	10	(10~900)
Errfrmsec_Thr	5	(1~65535)
	Apply	

To use the OAM functions, the **802.3ah Function** setting must be enabled. It is not enabled by default. The **802.3ah mode** is used to configure an OAM pair. In a pair, one unit must be 'active', while the other must be 'passive'. We typically place the remote converter (CPE) in 'passive' mode and make the local converter 'active'. 'Passive' is the default setting when 802.3ah function is enabled.

The 802.3ah function supports Event Notification with user-defined Alarm Thresholds for alarm reporting. This allows the service provider to monitor alarm thresholds to verify the given SLA (Service Level Agreement) of the line. These alarms are reported in the form of "Error Events" when the errors in a given "Window" size reach a pre-defined threshold. Use the radio button to enable or disable **link events**.

Definitions:
* Error Symbol Period (error symbols per second): The number of symbol errors that occurred during a specified period exceeded a threshold. These errors are coding symbol errors.
* Error Frame (error frames per second): The number of frame errors detected during a specified period exceeded a threshold.

* Error Frame Period (error frames per n frames): The number of frame errors within the last n frames has exceeded a threshold.
* Error Frame Seconds Summary (error seconds per m seconds): The number of error seconds (1-second intervals with at least one frame error) within the last m seconds has exceeded a threshold.

It is recommended that the Alarm Threshold settings not be adjusted by the novice end user. Threshold settings are specifically for the 802.3ah fault events, which should be defined and set by the service provider.

If "Link Events" are disabled, these threshold settings are all ignored.

Here are the meanings of the settings in the GUI.
Errfrm_Win = Error Frame Event Window: This window of time can be adjusted from 1 to 60 seconds, with the default window being 2 seconds. This is the "Window" used to gather error frames.
Errfrm_thr = Error Frame Event Threshold: This threshold count can be set from 1 up to 2×10^{32}. This count in conjunction with the time frame window will determine if the Error Frame event is reported via OAM.
Errfrmprd_Win = Error Frame Period Event Window: This window can be set from 1 up to 2×10^{32}, with 148800 being the default.
Errfrmprd_Thr = Error Frame Period Event Threshold: This threshold count can be set from 1 up to 2×10^{32}. This count in conjunction with the frame window will determine if the Error Frame Period event is reported via OAM.
Errfrmsec_Win = Error Frame Seconds Summary events Window: This window of time can be adjusted from 10 to 900 seconds, with the default window being 10 seconds. This is the "Window" used to gather error frame seconds.
Errfrmsec_Thr = Error Frame Seconds Summary Threshold: This threshold count can be set from 5 up to 2×10^{16}. This count in conjunction with the frame seconds window will determine if the Error Frame Seconds Summary event is reported via OAM.

In order to do **Remote Loop Back** test, this option must be enabled in both converters. By default it is enabled.

802.3ah Status

Discovery Status	ACTIVE_SEND_LOCAL
Fiber Port Status	NORM FWD
	refresh

The normal status when OAM is working is shown above. If OAM is not passing due to fiber disconnect, Discovery Status will be Fault. If OAM is not enabled, this status window will not even be shown.

The unidirectional support indicates whether or not the device supports the transmission of OAMPDUs on links that operate in unidirectional mode. Use the radio button to enable **Unidirection Support** if it is capable of sending OAMPDUs when the receive path is non-operational.

3.7.2 Loop Back Test

802.3ah Loop Back Test

Send Packet Number	1	(1~255)
Packet Length(Not include CRC)	60	(60~1514)

The loop back test is a non-intrusive test which uses OAM packets and will not affect normal transmissions. The number of OAM frames used (the number of times the loop back is done) is set by the **Send Packet Number**. The default is 1 packet.

The **Packet Length (Not including CRC)** controls the packet size of the OAM frames used for loop back testing. The default is 60 bytes. The CRC of Ethernet packets uses 4 bytes. Valid Ethernet packets range in size from 64 bytes to 1518 bytes. VLAN tag adds another 4 bytes for a maximum size of 1522 bytes. Any frame size larger than this is technically called a jumbo frame and is not IEEE802.3 compliant.

The **Loop Back Test Start** is accomplished by clicking the "Apply" button.

802.3ah Loop Back Test

Send Packet Number	100	(1~255)
Packet Length(Not include CRC)	1514	(60~1514)

Apply

Loop Back Test Result

Result	Pass
TX Counter	100
RX Counter	100
RX Error Counter	0

802.3ah is a slow protocol with a maximum throughput of 10 packets per second. The test above takes about 10 seconds for 100 packets.

3.7.3 802.3ah Status

802.3ah Status Information

Global Config

Function Enable	ENABLED
Fiber Port State	NORM FWD
Local DTE MAC	00-02-AB-11-22-44
Remote DTE MAC	00-02-AB-11-22-23

Flags Field

	Local	Remote
Remote Stable	TRUE	TRUE
Remote Evaluating	FALSE	FALSE
Local Stable	TRUE	TRUE
Local Evaluating	FALSE	FALSE
Critical Event	FALSE	FALSE
Dying Gasp	FALSE	FALSE
Link Fault	FALSE	FALSE

Discovery Information

Discovery State	SEND_ANY
Local PDU	ANY
Local Satisfied	TRUE
Remote State Valid	TRUE
Local Lost Link Timer Done	FALSE
Local Link Status	TRUE

The **Global Config** fields display the state of OAM, if OAM is enabled. We can also see the MAC addresses of the local and remote units in the OAM manageable pair. The **Flags Field** list the results of individual events based on the results of OAM protocol data units (OAMPDUs). Lastly, when two OAM devices start negotiation, there is **Discovery Information** passed between them. The results are shown here.

Information TLV

	Local	Remote
State Mux	FWD	FWD
State Par	FWD	FWD
Revision	0x2	0x2
Variable	TRUE	TRUE
Link Events	TRUE	TRUE
Loopback	TRUE	TRUE
Unidir	FALSE	FALSE
Mode	ACTIVE	PASSIVE

Most information carried by OAMPDU is encoded using type-length-value (TLV) format. The first octet (or byte) of the OAMPDU indicates the type. This type is used to let the OAM client know how to decode the bytes containing the information. The next octet carries the length of the information. This display has **TLV information** for both the local and remote OAM units.

Link Event Notification Status

	Local	Remote
Frm Errtal	0	0
Frm Evetal	0	0
Frmprd Errtal	0	0
Frmprd Evetal	0	0
Frmsec Errtal	0	0
Frmsec Evetal	0	0

Ethernet OAM also defines a set of standard event conditions that Ethernet links should monitor in normal operation, and if detected, should be signaled to a peer entity. The **Link Event Notification Status** conditions reflect a degraded, but not yet inoperable, Ethernet connection. These conditions include threshold-crossing alarms on the frequency of symbol errors and frame errors.

Remote Dying Gasp	
Remote Dying Gasp Count:	0

One of the most critical problems in an access network for carriers is differentiating between a simple power failure at the customer premise and an equipment or facility failure. Dying gasp provides this information by having a station indicate to the network that it is having a power failure.
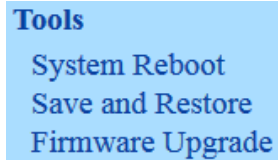
If remote management is lost, we simply need to check the **Remote Dying Gasp Count** register to see if it has been incremented.

Remote Dying Gasp	
Remote Dying Gasp Count:	1

3.8 Tools

The **Tools** menu includes the **System Reboot**, **Save and Restore** settings and **Firmware Upgrade** functions.

Tools
System Reboot
Save and Restore
Firmware Upgrade

3.8.1 System Reboot

When the converter is rebooted, all counters and registers are cleared and the converter starts fresh. If OAM is enabled, the discovery process will start. After selecting the System Reboot menu item, a confirmation dialogue box will pop up. Click "OK" to reboot the converter or click "Cancel" to leave without rebooting. The converter requires about 20~25 seconds to fully reboot.

Do you want to restart the Converter?

OK   Cancel
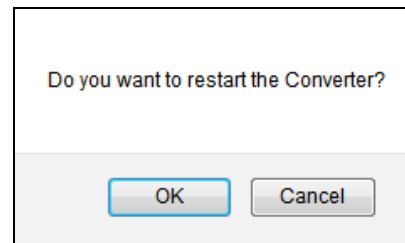
3.8.2 Save and Restore

After performing configuration of the converter, the settings must be saved. Click the "**Save To Flash**" button to save settings. If you wish to abandon all settings and return to the previous settings before doing configuration, click the "**Load From Flash**" button.
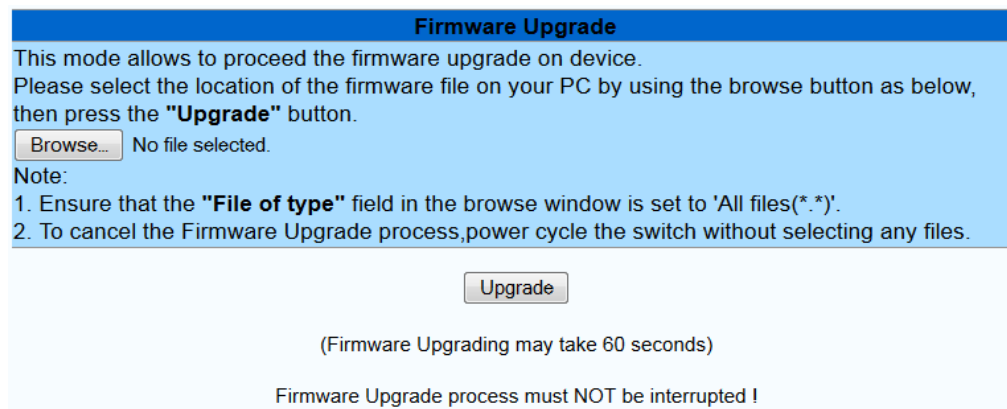
To restore all settings to factory default, click the "**Reset To Factory**" button. The IP address will also be reset, so you might lose management contact with the converter. So, be careful.

3.8.3 Firmware Upgrade

If functions are added or if factory default settings are changed, the firmware in the converter will require upgrading. The only method to do upgrade for this converter is through the local Web (HTTP) user interface. The firmware image is uploaded from the browser (Post), it is checked for integrity, the flash is erased and then the flash is written with the new image.

DO NOT LET ANY POWER INTERRUPTION OCCUR DURING THE UPGRADE PROCEDURE.

> **Firmware Upgrade**
>
> This mode allows to proceed the firmware upgrade on device.
> Please select the location of the firmware file on your PC by using the browse button as below, then press the **"Upgrade"** button.
>
> [Browse…] No file selected.
>
> Note:
> 1. Ensure that the **"File of type"** field in the browse window is set to 'All files(*.*)'.
> 2. To cancel the Firmware Upgrade process,power cycle the switch without selecting any files.
>
> [Upgrade]
>
> (Firmware Upgrading may take 60 seconds)
>
> Firmware Upgrade process must NOT be interrupted !

The "Upload success!" indicates the image was transferred OK. **Do not do anything for the next 60 seconds!!!!**.

> Upload success!
> please wait a few seconds and visit the main page again!
> Click here to visit the web site.

After 60 seconds, you may click the link to re-login to the web interface. Login as usual.

3.9 Logout

Logging out will ensure that the management session with the device is terminated. This is especially important if you are using a public computer to manage the device. Once logged out, a password must be entered to access the device again.
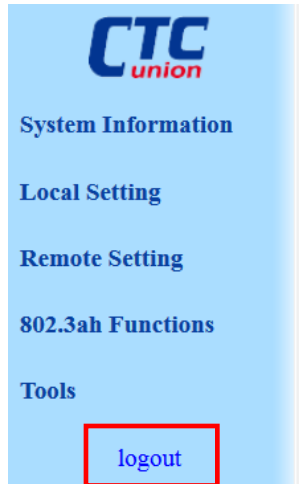
Click the "OK" button to completely log out. Click the "Cancel" button to return to configuration of the device.
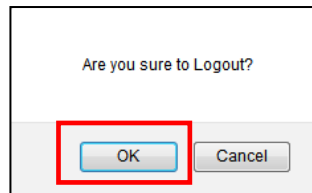
3.10 Troubleshooting

3.10.1 Factory Default

Apply power to the device and allow 25-30 seconds to fully boot. Using a pencil or ball-point pen, press the 'DEFAULT' recessed push-button switch (located on the face plate) and hold for 10 seconds or more then release. **DO NOT POWER OFF**; Allow the unit to again fully reboot (about 25 seconds). The factory default TCP/IP settings are:

    IP=10.1.1.1
    netmask=255.255.255.0
    GW=10.1.1.254

The username and password are both reset to 'admin'.

Additionally, any VLAN, 1Q or bandwidth control will be disabled. All ports will be enabled, UTP ports set for auto-negotiation.

3.10.2 Reset

The reset function is a hardware reboot. Using a pencil or ball-point pen, press the 'DEFAULT' recessed push-button switch and hold for 3 seconds (no more than 4 seconds) and release. The unit will reboot using the previous saved configuration.

3.10.3 LED Observations

3.10.3.1 Power On

At initial power on, PWR LED will not be lit. If active LAN is connected to the TP port, that Link and Speed LED will be lit. After 25 seconds the CPU has fully booted, PWR LED will be lit.

Error conditions:

If all LEDs immediately light and never turn off, or if no LED ever lights, then the unit is possibly defective. Be sure to double check power source.

3.10.3.2 UTP Link Test

Following a complete power and boot up (about 25 seconds) the converter will be active and LAN port will display LAN LNK state when connected to a live Ethernet circuit. The LAN SPD LED will be green when connected to Fast Ethernet (100M) and yellow when connected to Gigabit Ethernet (1000M). When connected to 10Base-T the LAN SPD LED will be off.

3.10.3.3 Fiber Link Test

Following a complete power and boot up (about 25 seconds) the converter will be active. For **FTH4-1000MS**, place a known good SFP module into Fiber Port cage. Use a simplex patch cable (single fiber strand, LC to LC), route the SFP Tx back to the Rx optical connection. The FX LNK LED should light. For **FTH4-1000M & FTH4-100M**, use a simplex patch cable (single fiber strand, SC to SC, ST to ST or FC to FC), route the Tx back to the Rx optical connection. The FX LNK LED should light.
Caution: When performing a physical loop back on any fiber port, DO NOT connect the LAN port to a live Ethernet network. Doing so could create a broadcast storm.
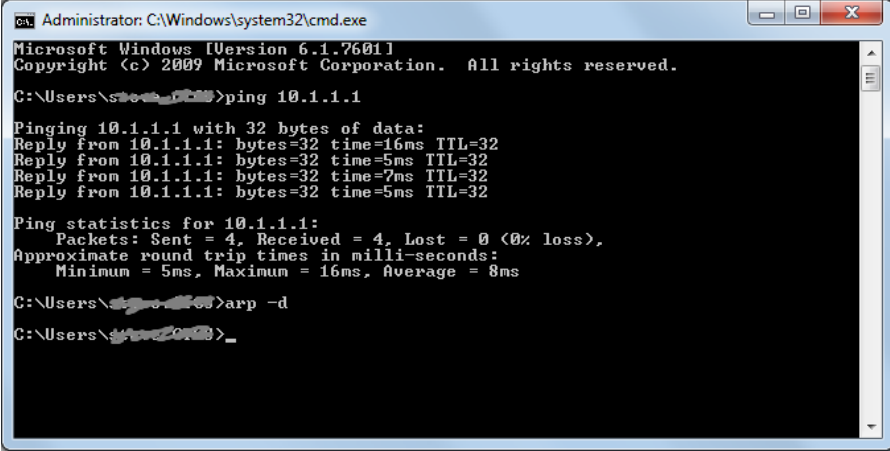
3.10.4 Operation Checks

3.10.4.1 Converter Check

A very easy way to ensure a pair of **FTH4-1000M or FTH4-100M** is passing traffic, is to place them between two PCs. Connect PC1 to LAN of one converter and PC2 to LAN of the other converter. When the two PCs can ping each other, it indicates **FTH4-1000M or FTH4-100M** pair is operational.

3.10.4.2 Ping Test

With the device reset to factory default, connect a PC and configure the PC to the 10.1.1.0 network (10.1.1.100 recommended). Use a PC to ping the device at its factory default IP address of 10.1.1.1. With a direct connection to PC, there should be no time outs and ping latency should be less than 1 millisecond. If you switch to another device, be sure to clear the PC ARP table. Every device has the same default IP address, but every unit has a different MAC address. To clear the PC's MAC table, open a command window and execute the command 'arp – d'. In addition, if you disconnect the PC from any LAN connection and then re-connect, the ARP table should also be cleared.

3.10.4.3 Web Access Test

With the device reset to factory default, connect a PC and configure the PC to the 10.1.1.0 network (10.1.1.100 recommended). Use a PC to connect to the device at its factory default IP address of 10.1.1.1 using a web browser (Internet Explorer, Firefox, Chrome, etc.). The local web page login page should display. Use 'admin/admin' to login; the local main page should be displayed in the browser.

If the ping test can pass and the login page can be displayed but login fails, we recommend that cookies be deleted. You may either delete all cookies for your browser or only the individual cookie created for the IP address of the device.

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