

The background of the cover features a close-up, slightly blurred image of a fan with multiple blades. Overlaid on the center of the fan is a white target symbol consisting of three concentric circles. Four white arrows point towards the center of the target from the top, bottom, left, and right directions.

# **USER MANUAL**

## **FRM220-2000MS**

**Gigabit Ethernet OAM/IP  
Media Converter**



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**FRM220-2000MS Operation Manual**

Gigabit Ethernet OAM/IP Media Converter Card for FRM220

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This Manual supports the following models:

**FRM220-2000MS** : 1x100/1000Base-FX (SFP) + 100/1000Base-X (card)

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## **CISPR PUB.22 Class A COMPLIANCE:**

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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

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# Chapter 1 Introduction

## 1.1 Welcome

Thank you for choosing **FRM220-2000MS** Gigabit Ethernet OAM/IP Media Converter. Throughout, this OAM/IP Media Converter will be referred to as **FRM220-2000MS** or in an abbreviated form of just **2000MS**. If you would like to skip right to the installation of the converter, proceed to Chapter 2.

This manual is used to explain the hardware installation procedures and operation of **FRM220-2000MS** 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 Console and Web Based Management Chapters and Appendices to become familiar with the converter and settings. Network Administrators should read the chapters on Console, Web Based, and SNMP Management and Trouble Shooting to become familiar with the diagnostic capabilities, network settings and management strategies.

## 1.2 Product Description

**FRM220-2000MS** is an electrical to optical media converter card for Gigabit Ethernet. The card is compatible with all **FRM220** chassis options, may be used and managed standalone or inserted into the managed chassis with **NMC**. These converters support embedded stand-alone Web based management, Telnet, and SNMP over IP networks, as well as IEEE802.3ah OAM for remote in-band management. **FRM220-2000MS** also features a local console port with USB Type-C™ type connector to connect to a laptop or PC host with terminal emulation such as PuTTY or TeraTerm Pro.

**FRM220-2000MS** is an IEEE802.3ah OAM compliant copper to fiber Gigabit Ethernet solution designed to make conversion between 10/100/1000Base-TX and 100M/1000M SFP LC connector. 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 local and remotely connected **FRM220-2000MS** 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. All functions of this converter and the remotely connected converter can be configured and monitored via in-band management, including band-width control, duplex, speed, VLAN configuration and more. When deployed in a managed **FRM220** chassis with **NMC**, all configuration is done by the **NMC** and will override any other settings (local console or any standalone settings).



## 1.3 Product Features

- Auto-Cross over for MDI/MDIX at UTP port
- Auto-Negotiation or Forced Manual mode for UTP port
- Supports Dual Rate (100/1000) SFP for selectable Fast or Gigabit speed on fiber
- Supports 802.3x flow control Enable or Disable
- Supports Jumbo Frames up to 16K bytes
- Supports 16 Tag VLAN Groups
- Supports 802.1Q tagging and 802.1ad double VLAN tag (Q-in-Q)
- Egress Bandwidth control with 64Kbps granularity
- Supports 802.3ah-OAM loop back and dying gasp (remote power failure detection)
- Supports firmware upgrade via Xmodem, TFTP and Web
- Supports Digital Optical Diagnostics (DOM) for supported SFP
- Provides product information for SNMP management (stand-alone)
- Includes RMON counters (stand-alone only)
- Supports password setting for authentication (stand-alone)
- Supports Link Fault Pass Through (LFPT) Function
- Supports Auto Laser Shutdown (ALS) Function
- Supports DHCP client for automatic TCP/IP configuration (stand-alone only)

**FRM220-2000MS** SFP socket supports a wide range of MSA standard SFP modules to address any network situation.

Single-mode, Multi-mode, Multi-rate, Dual Rate (100M or 1G), Single fiber bi-directional, Coarse and Dense Wave Division Multiplexing (CWDM and DWDM) and Copper media SFPs

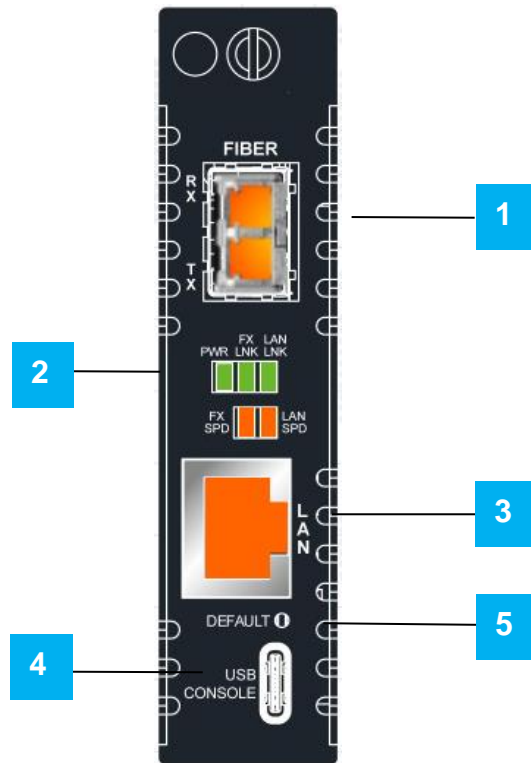
**WARNING:** Fiber optic equipment may emit laser or infrared light that could injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to an active laser light source.

## 1.4 Specifications

Model Spec.	FRM220-2000MS
Item	
<b>Optical Interface</b>	
Connector	SFP cage
Data rate	100/1000Base-X (125Mbps/1.25Gbps optical rate) Dual Rate with supported SFP
Duplex mode	Full duplex on fiber
<b>Electrical Interface</b>	
Connector	RJ-45, shielded
Data rate	auto, 10Mbps (10Base), 100Mbps (100Base), or 1000Mbps (1000Base)
Duplex mode	Full, Half, or Auto-negotiation
Cable	Cat 5e or better
Indicators	LED (PWR, FX Link, LAN Link, LAN Speed, FX Speed)
<b>Ethernet</b>	
Packet Buffer	512Kbit
Jumbo Packet Size	Up to 16KBytes
MAC Table	1024
MAC Aging	56 ~ 30037 seconds (308 seconds default)
VLAN Groups	16
Throughput Control	Egress 64Kbps ~ 1024000Kbps (nx64Kbps where n=1 to 16,000)
<b>Power</b>	
Input	CH01 Adapter Type: 12VDC or when inserted in managed FRM220 chassis
Consumption	< 3W
<b>Management</b>	
	Serial Console (via USB-C™), Telnet, HTTP (Web) and SNMP (v1) or via NMC
<b>Dimensions</b>	Card: 155 x 20.8 x 88mm (D x W x H)
<b>Weight</b>	120g
<b>Temperature</b>	Operating: 0°C~50°C   Storage: -10°C~70°C
<b>Humidity</b>	10 ~ 90% non-condensing
<b>Certifications</b>	CE, FCC, RoHS Compliant
<b>MTBF</b>	65,000 hours

## 1.5 Panel

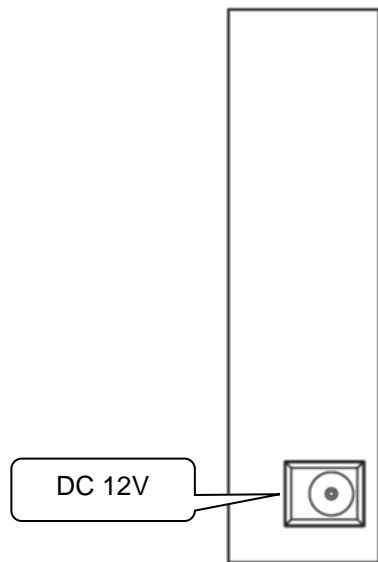
### Front Panel



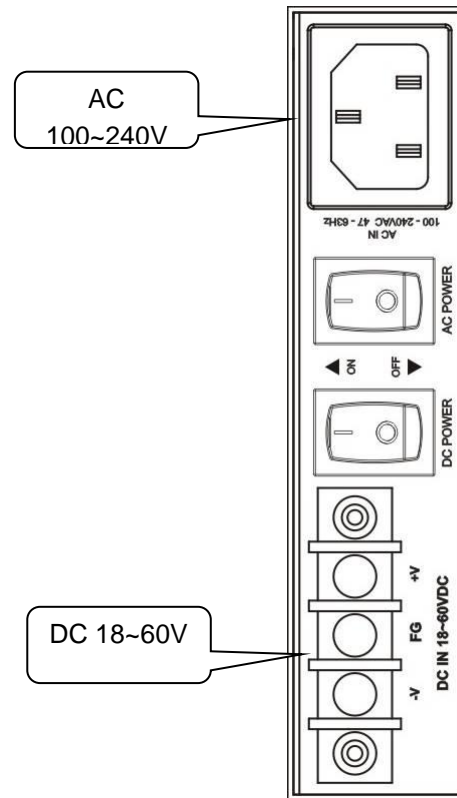
**Figure 1. FRM220-2000MS  
Front Panel**

- |                                  |                            |
|----------------------------------|----------------------------|
| <b>1</b> SFP fiber slot          | <b>2</b> LED indicators    |
| <b>3</b> RJ-45 LAN port          | <b>4</b> USB® Console port |
| <b>5</b> Reset-to-default button |                            |

## Rear Panel



**Figure 2. CH01 Adapter  
Type  
Rear Panel**



**Figure 3. CH01, Built-in  
Power  
single AC, single DC,  
dual AC, dual DC or  
AC+DC (shown) Types  
Rear Panel**

## 1.6 LED Indicators

LED	Color	Status	Definition
PWR	Green	ON	Light if power is connected and active.
		OFF	Power is not connected.
		Flash	During firmware upgrade
FX LNK	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.
LAN LNK	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	Yellow	ON	Lit when the LAN speed is 1G.
	Green	ON	Lit when the LAN speed is 100M.
		OFF	If not lit, the LAN speed of 10M is indicated.
FX Speed	Yellow	ON	Lit when the fiber speed is 1G.
	Green	ON	Lit when the fiber speed is 100M.
		OFF	There is no optical link.

## 1.7 Factory Reset Procedure

Apply power to **FRM220-2000MS**. Allow 20 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 6 seconds or until the LEDs flash very rapidly. The unit will be restored to factory default almost immediately. The defaults are:

IP=10.1.1.1

Netmask=255.255.255.0

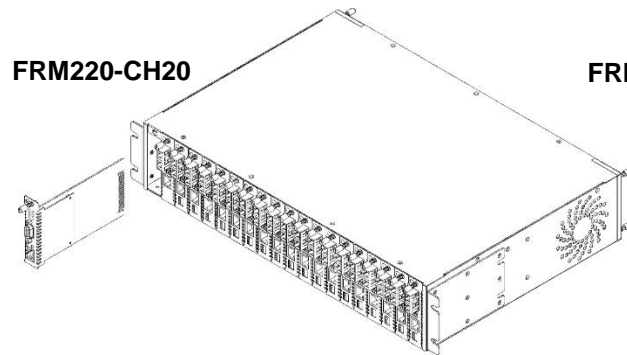
GW=10.1.1.254

'admin' password reset to none

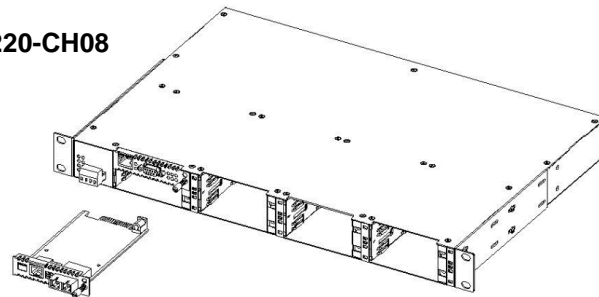
## Chapter 2 Installation

### 2.1 Chassis Options

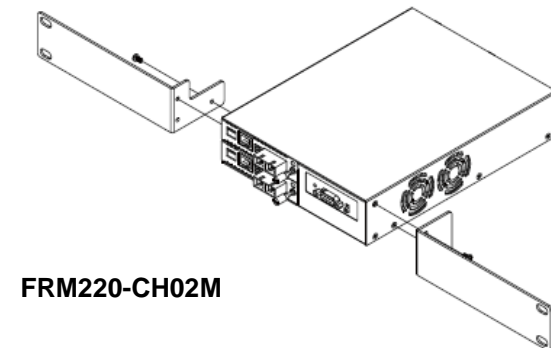
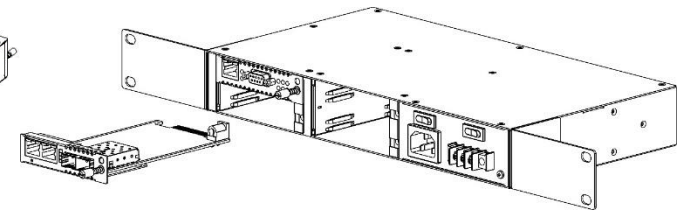
The **FRM220-2000MS** converter cards can be placed in any FRM220 series chassis, including the 20 slot CH20, 8 slot CH08 chassis, 4 slot CH04A, 2 slot CH02M, 1 slot built-in power CH01 or adapter type CH01. Chassis with built-in power are available with single AC (90-240VAC), single DC (18~75VDC). Dual AC, dual DC or AC plus DC combo for all chassis except CH01.



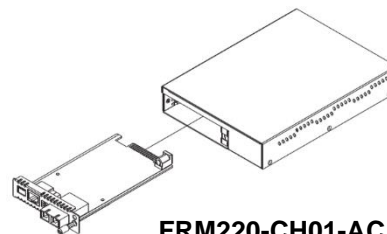
FRM220-CH08



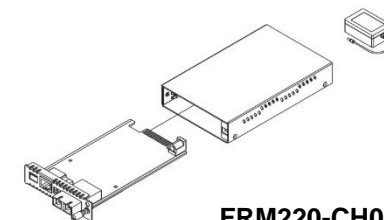
FRM220-CH04A



FRM220-CH02M



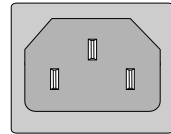
FRM220-CH01-AC



FRM220-CH01

## 2.2 Electrical Installation

With a built-in AC power chassis, AC power is supplied to the chassis through a standard IEC C14 3-prong receptacle, located on the rear of the chassis. Any national power cord with IEC C13 line plug may be used to connect AC power to the power module. With a built-in DC power chassis, DC -48V is connected to the terminal block located on the rear of the chassis, observing the proper polarity. The chassis should always be grounded through the protective earth lead of the power cable in AC installations, or via the frame ground connection for DC installations.



Left: Live line  
Right: Neutral line  
Middle: Ground

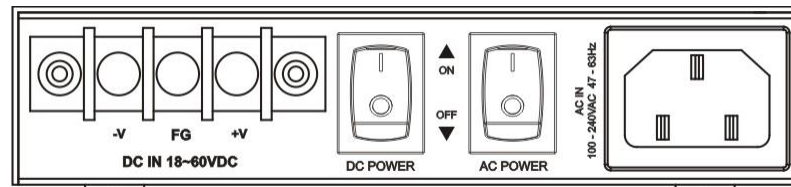


Left: -V (-48V)  
Right: +V (0V)  
Middle: Frame Ground

18~75 VDC

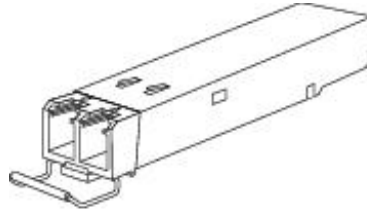
## 2.3 Power Built-in (AC + DC) Electrical Installation

The converter also has power built-in (AC + DC) type. Users can choose one of the power types for power supply source or use both power supply sources for power redundancy purpose. When AC power is used, any national power cord with IEC C13 line plug may be used to connect AC power. With a built-in DC power, DC 18~60V is connected to the terminal block located on the rear of the device. Turn on the respective AC or DC power switch to provide power supply. The device should always be grounded through the protective earth lead of the power cable in AC installations, or via the frame ground connection for DC installations.



## 2.4 Installation of SFP Modules

**CTC Union** 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.



### *2.4.1 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.

### *2.4.2 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.



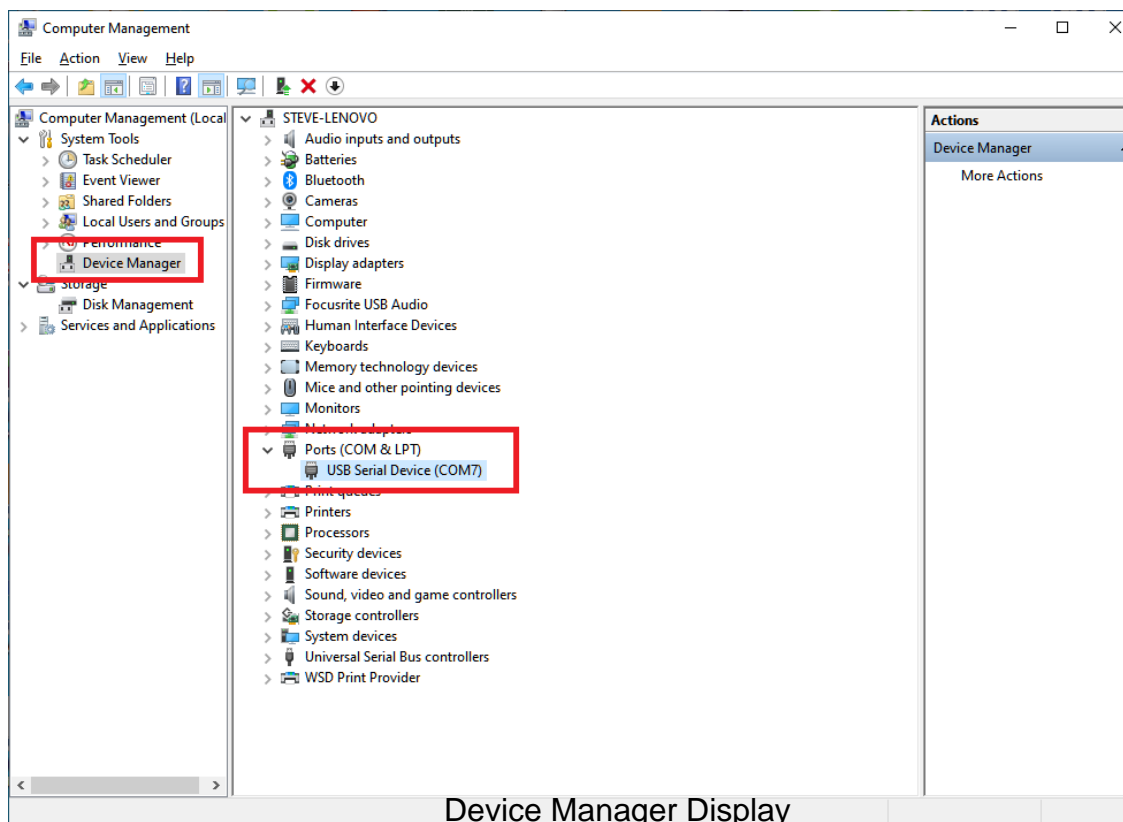
## Chapter 3 Provisioning

### 3.1 Console Provisioning

#### 3.1.1 Introduction

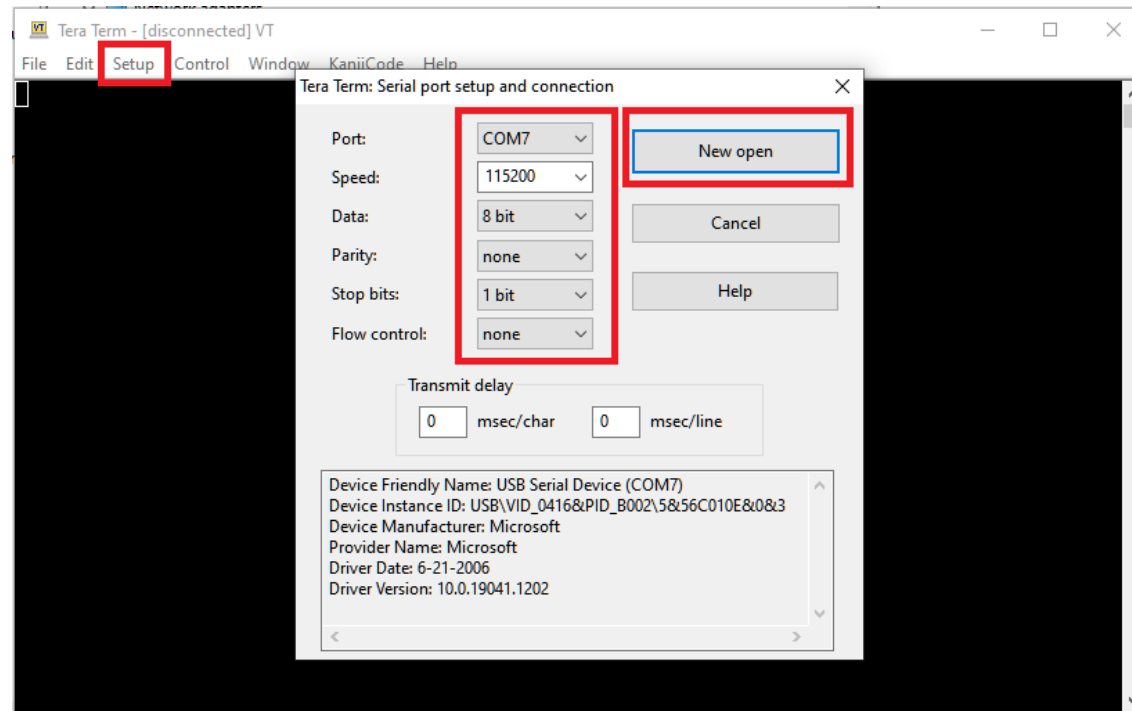
All **FRM220-2000MS** converters have a USB Type-C™ connector which may be connected to a host computer. If your host computer has a USB Type-C™ port, use a USB Type-C™ to USB Type-C™ cable to connect the **FRM220-2000MS** to the host. If the host has a regular USB Type-A™ connector (USB® v1.0, v2.0, v3.0), then use a standard USB Type-A™ to USB Type-C™ adapter cable to connect the **FRM220-2000MS** to the host computer.

When connecting to a host computer, a COM port will be added automatically. No extra drivers are required.



### 3.1.2 Terminal Operation

PuTTY and TeraTerm Pro are two of the most popular, free, terminal emulation programs available from the Internet. In the examples here, the TeraTerm Pro program will be used, under Windows 10.

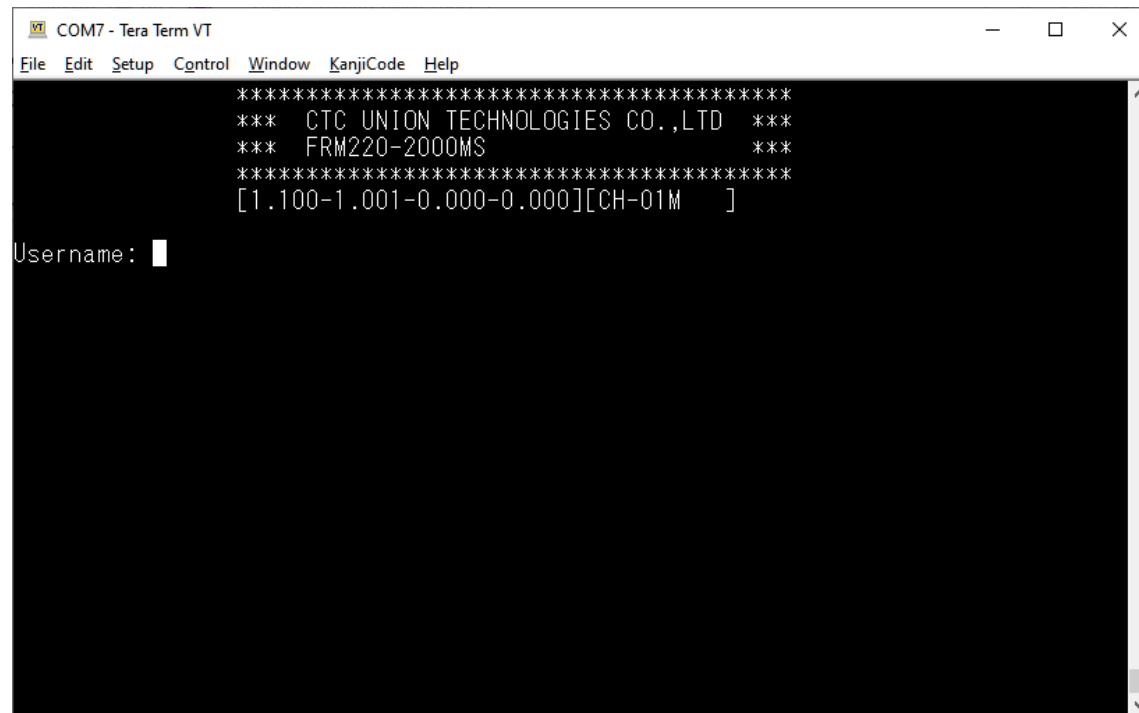


TeraTerm Pro Setup

Under the "Setup" pull-down menu, choose the "Serial port.." menu item. Remembering the COM port number from the Device Manager, set the port number (COM7 in this example). Set the Speed to 115,200, Data to 8 bits, No parity, one Stop bit and no Flow control.

Click the "New open" button.

### 3.1.3 Login



**FRM220-2000MS** Login Screen

The default username is 'admin' with no password.

### 3.1.4 Main Menu

[1.100-1.001-0.000-0.000][Standalone]

<1> System  
<2> Automatic Laser Shutdown  
<3> Ports  
<4> Link OAM  
<5> SNMP  
<6> MAC Table  
<7> VLAN  
<8> QoS  
<9> Diagnostics  
<A> Maintenance  
<P> Password Change  
<S> Save startup-config

[ESC] Logout

**<1> System:** The system menu is where settings are made for the SNMP MIB2 System Contact, System Name, System Location, plus the device IP address, the NTP settings for time server and time zone and the working mode of the device (switch or converter). The views are available for device information (MAC, time, software version) and the system log.

**<2> Automatic Laser Shutdown:** The ALS is enabled or disabled here for the Fiber port.

**<3> Ports:** All settings and views for the copper UTP and fiber SFP ports are done here.

**<4> Link OAM:** The IEEE802.3ah settings and set and viewed under this menu.

**<5> SNMP:** Enable and set management IP addresses and trap destinations along with community strings for SNMP v1 or v2c.

**<6> MAC Table:** Setup the MAC aging, static MAC addresses and view the MAC table under this menu.

**<7> VLAN:** Setup VLAN parameters and members for the Fiber and LAN ports.

**<8> QoS:** Egress bandwidth control and Broadcast Storm Policing.

**<9> Diagnostics:** IPv4 and IPv6 PING

**<A> Maintenance:** Reset, default, configuration up/download, software upgrade.

**<P> Password:** Set the console/web login password.

**<S> Save:** Copies the running-config to the startup-config so settings are available at next boot.

### 3.1.5 System

< System >

<1> Information  
<2> IP  
<3> SNMP  
<4> Time Zone  
<5> Log  
<6> Work in [Switch] Mode  
\*\* In converter mode, the CPU port will be disconnected.

[ESC] Go to previous menu. Please select an item.

**<1> Information:** Display the MAC, Date, Uptime, S/W Version, S/W Date and setup the SNMP System Contact, Name and Location.

{ System > Information }

MAC Address [00:02:AB:B6:57:5C]  
System Date [2022-03-29 T11:13:14+08:00]  
System Uptime [0d 03:32:35]  
Software Version [Ver 1.001]  
Software Date [2022-06-20 T08:22:35+08:00]  
Configuration file [running-config.txt]

<1> Contact [techsupport@ctcu.com ]  
<2> Name [FRM220-1000MS-250 ]  
<3> Location [LAB ]

**<2> IP:** Display the device MAC address, set the management VID, IPv4/IPv6 IP address(es), Netmask, Gateway or enable DHCP(6) client.

{ System > IP }

MAC Address [00:02:AB: B6:57:5C]  
IPv6 [FE80::202:ABFF:FEB6:575C]

<1> VLAN ID [1]  
<2> IPv4 DHCP [Disable]  
<3> IPv4 [ 10. 1. 1. 1]  
<4> Netmask [255.255.255. 0]  
<5> Gateway [ 10. 1. 1.254]  
<6> IPv6 DHCP [Disable]  
<7> IPv6 [::]

**<3> SNTP:** Activate NTP client and set up to two NTP server IP addresses.

```
<1> Active   [Disable]
<2> Server 1 [0.0.0.0]
<3> Server 2 [0.0.0.0]
```

**<4> Time Zone:** Set the hours from UTC up to 12 or -12 and set minutes if TZ doesn't not fall on the hour (such as in India).

```
{ System > Time Zone }
```

```
<1> Hours    [0]
<2> Minutes  [0]
```

**<5> Log:** View the log record of the device

```
{ System > Log }
```

ID	Time & Message
1	2022-03-29T15:08:08+08:00 SYS-BOOTING: Switch just made a cold boot.
2	2022-03-29T15:08:08+08:00 LINK-UP: Local LAN Port, changed state to up
3	2022-03-29T15:08:08+08:00 LINK-UP: Local FIBER Port, changed state to up
4	2022-03-29T15:08:11+08:00 REMOTE: FRM220-2000MS UP

**<6> Work in [Switch] Mode:** The normal mode of operation for this device is "Switch" mode. The store and forward mechanism between the LAN and FIBER ports allows for different speeds and duplexes between the two, for example 10Base or 100Base on the LAN while the FIBER speed is 1000Base. In "Converter" mode, the devices work in low latency, no store and forward, and LAN and FIBER must match speed and duplex. In addition, in "Converter" mode, Telnet, Web, SNMP are disabled, the IEEE802.3ah OAM is disabled and there is no in-band management of any remote device.

```
-----
<0> Converter    <1> Switch    <ESC> Exit
```

### 3.1.6 Automatic Laser Shutdown

Automatic Laser Shutdown (ALS) is a technique used to automatically shut down the output power of the transmitter in case of fiber break, according to ITU-T G.664. If a fiber is cut, the receiver will detect a Loss Of Signal (LOS). The ALS agent will turn off the transmitter. The receiver at the far end will then detect an LOS and its ALS agent will turn off the transmitter. In this way the entire fiber will go dark. The protocol will also occasionally turn on the laser briefly, monitoring a link for recovery. This on/off period is configurable.

```
{ Automatic Laser Shutdown }
```

```
<1> Mode          [Disable]
<2> Period ON     [1.0 sec]
<3> Period OFF    [3.0 sec]
```

**<1> Mode:** Select to enable or disable ALS.

**<2> Period ON:** Set the period, in seconds (1~5), that turns the laser on to attempt a link recovery. Default is 1 second.

**<3> Period OFF:** Sets how long, in seconds (1~5), the laser remains off after a failed recovery attempt. Default is 3 seconds.

### 3.1.7 Ports

The LAN and FIBER port settings for speed, duplex, flow control (802.3x), Link Fault Pass Through (LFPT) and Jumbo Frames (16KB) support. In addition, the SFP and ports statistics can be viewed by selecting the appropriate menu item.

```
{ Ports }
```

```
Link Speed
LAN  [ Up ][1Gfdx]
FIBER [ Up ][1Gfdx]

<1> Fiber Speed      [Auto]
<2> Fiber Flow Control [Disable]
<3> LAN Speed        [Auto]
<4> LAN Flow Control [Disable]
<5> LFPT              [Disable]
<6> Jumbo Frame      [Disable]
<7> SFP Status
<8> Detailed Statistics
```

**<1> Fiber Speed:** Sets up the Fiber port speed or sets in auto-detect mode. (fdx= full duplex) The SFP must support the selected speed.

```
-----
<0> Disable      <4> 100fdx    <5> 1Gfdx    <6> Auto    <ESC> Exit
```

**<2> Fiber Flow Control:** Enables or disables the 802.3x Ethernet flow control for the port.

-----  
<0> Disable      <1> Enable      <ESC> Exit

**<3> LAN Speed:** Sets up the LAN port speed and duplex or sets in auto-negotiation mode. (hdx= half duplex, fdx= full duplex)

-----  
<0> Disable      <1> 10hdx      <2> 10fdx      <3> 100hdx  
<4> 100fdx      <5> 1Gfdx      <6> Auto      <ESC> Exit

**<4> LAN Flow Control:** Enables or disables the 802.3x Ethernet flow control for the port.

-----  
<0> Disable      <1> Enable      <ESC> Exit

**<5> LFTP:** Link Fault Pass-Through causes loss of link on one side of a media converter to be passed through to the other side, so that upstream equipment can see fault conditions that would otherwise be hidden by the media converters. LFTP, when enabled, will pass the link fault both ways, i.e., from LAN to FIBER and from FIBER to LAN.

-----  
<0> Disable      <1> Enable      <ESC> Exit

**<6> Jumbo Frame:** This device can enable support for jumbo frames (>1518) to support up to 16Kbytes Ethernet frames.

-----  
<0> Disable      <1> Enable      <ESC> Exit

**<7> SFP Status:** Displays the DDOM of the installed SFP module.

```
Vendor Name   [OEM           ]
Vendor PN     [GLC-BX-20U    ]
Vendor SN     [1807100006     ]
Fiber Type    [Single mode]
Wave Length   [1550 nm]
Wave Length(2) [0000 nm]
Link Length   [20 Km]
TX Power      [-5.52 dBm]
RX Power      [-3.60 dBm]
Rx Sensitivity [0 dBm]
Tx Bias       [24.7060 mA]
Supply Voltage [3.4240 V]
Temperature   [54.00 degree C]
```



**<8> Detailed Statistics:** Choose the port, LAN (1) or FIBER (2) and use the "greater than, less than" (>, <) keys to show next or previous pages of statistics.

{ Port > LAN Statistics }

RX Packets:	39494	TX Packets:	17
RX Octets:	6166496	TX Octets:	1232
RX Unicast:	76	TX Unicast:	2
RX Multicast:	26620	TX Multicast:	2
RX Broadcast:	12798	TX Broadcast:	13
RX Pause:	0	TX Pause:	0

[1] LAN

[2] FIBER

[ ] Previous Page

[>] Next Page

[C] Clear

[SPACE] Renew

[ESC] Go to previous menu

RX 64:	14034	TX 64:	13
RX 65-127:	8470	TX 65-127:	3
RX 128-255:	12314	TX 128-255:	1
RX 256-511:	3436	TX 256-511:	0
RX 512-1023:	1657	TX 512-1023:	0
RX 1024-1518:	16	TX 1024-1518:	0
RX 1519- :	0	TX 1519- :	34474
RX Drops:	0	TX Drops:	0
RX CRC/Alignment:	0	TX Late/Exc. Coll:	0
RX Undersize:	0		
RX Oversize:	0		
RX Fragments:	0		
RX Jabbers:	0		
RX Symbol:	0		

### 3.1.8 Link OAM

This media converter supports standard IEEE802.3ah OAMPDU such as discovery, loopback and dying gasp. Additionally, organizational specific OAMPDU are used to create layer 2 in-band management between a local and a remote converter, either another **FRM220-2000MS**, **FMC-2000MS** or legacy **FRM220/FMC-1000MS**.

{ Link-OAM }

- <1> Port Settings
- <2> Port Statistics
- <3> Port Status
- <4> Remote Device (FMC-2000MS)

[ESC] Go to previous menu. Please select an item.

**<1> Port Settings:** Brings up the sub-menu for OAM port settings.

	LAN	FIBER
	-----	-----
OAM Enabled	<1> [ ]	<5> [V]
OAM Mode	<2> [Passive]	<6> [Active ]
Loopback Support	<3> [ ]	<7> [V]
Loopback Operation	<4> Trigger	<8> Trigger

<1> toggles LAN OAM enabled/disabled

<2> toggles LAN OAM mode passive/active

<3> toggles LAN port support for OAM loopback enabled/disabled

<4> triggers the LAN loopback operation

-----  
<Y> Loopback Operation    <ESC> Exit

<5> toggles Fiber OAM enabled/disabled

<6> toggles Fiber OAM mode passive/active

<7> toggles Fiber port support for OAM loopback enabled/disabled

<8> triggers the Fiber loopback operation

-----  
<Y> Loopback Operation    <ESC> Exit

**<2> Port Statistics:** List the OAM port statistics for Fiber and LAN ports.

```
{ Link-OAM > FIBER Statistics }
```

Rx Loopback Control	[	1]	Tx Loopback Control	[	1]
Rx Link Fault PDUs	[	0]	Tx Link Fault PDUs	[	3]
Rx Dying Gasp	[	0]	Tx Dying Gasp	[	0]
Rx Critical Event PDUs	[	0]	Tx Critical Event PDUs	[	0]

[1] LAN      [2] FIBER

**<3> Port Status:** Displays the status of LAN or Fiber port.

```
{ Link-OAM > FIBER Status }
```

Discovery State      [Send Any]  
Peer MAC Address     [00:02:AB:A0:B8:0E]

	Local	Peer
Mode	[Active    ]	[Passive    ]
Unidirectional Operation Support	[Disabled   ]	[Disabled   ]
Remote Loopback Support	[Enabled    ]	[Enabled    ]
Link Monitoring Support	[Disabled   ]	[Disabled   ]
MIB Retrieval Support	[Disabled   ]	[Disabled   ]
MTU Size	[        1518]	[        1518]
Multiplexer State	[Forwarding]	[Forwarding]
Parser State	[Forwarding]	[Forwarding]
Organizational Unique Identification	[00-02-AB   ]	[00-02-AB   ]
PDU Revision	[           1]	[           1]

[1] LAN      [2] FIBER

**<4> Remote Device (FRM220-2000MS):** This menu item allows entering configuration of the remote OAM fiber connected converter. If the remote converter is not seen, make sure that OAM is enabled on both converters and make sure the local converter is in 'active' mode. The factory default has the converters in 'passive' mode. OAM cannot link unless at least one device is in 'active' mode.

```
{ Link-OAM > Remote Device > FRM220-2000MS }
```

```
Ver [1.000-1.001-0.000-0.000]
```

```
MAC [00:02:AB:A0:B8:0E      ]
```

```
<1> System IP           <5> OAM
<2> Automatic Laser Shutdown <6> VLAN
<3> Port Configuration  <7> QoS
<4> SFP
```

```
[ESC] Go to previous menu. Please select an item.
```

All settings for the remote are performed exactly the same as those of the local converter described here.

### 3.1.9 SNMP

The SNMP settings are divided into two groups, one for Manager Configuration and one for Trap Configuration.

```
{ SNMP }
```

```
<1> Community [192.168.0.114 ][private      ][read-write]
<2> Community [192.168.0.114 ][public      ][read-only ]
<3> Community [                ][           ][read-only ]
<4> Community [                ][           ][read-only ]
```

```
<5> Trap Community [192.168.0.114 ][public      ]
<6> Trap Community [                ][           ]
<7> Trap Community [                ][           ]
<8> Trap Community [                ][           ]
```

Up to 4 management IPs can be configured, their community string defined, and their access defined as read-only or read-write. A read-only manager is only able to perform 'get' commands. All 'set' commands are reserved for a manager given read-write control.

Traps are unsolicited messages issued by this SNMP agent, that typically indicate some alarm condition has occurred. Up to 4 Trap receivers (managers that receive the traps) are configured here and include the manager's IP address and an authentication community string.

### 3.1.10 MAC Table

This device has features to modify the MAC table aging time as well as being able to create static MAC entries in the MAC table.

```
{ MAC Table }
```

```
<1> Aging Time
<2> MAC Table Configuration
<3> MAC Address Table
```

```
[ESC] Go to previous menu. Please select an item.
```

**<1> Aging Time:** Automatic aging may be disabled (default is enabled) and the aging time changed (56~30037sec.) from the default 308sec.  
Note: The aging seconds must be a multiple of "7". A keyin will automatically fall to the closest multiple.

```
{ MAC Table > Aging }
```

```
<1> Automatic Aging [Enable]
<2> Aging Time      [308 sec]
```

**<2> MAC Table Configuration:** Up to 16 static MAC entries can be added to the table in this device.

```
{ MAC Table > Static Configuration }
```

```
<0> Delete Static Entry
<1> Add New Static Entry
```

Item	Ports	MAC
1	LAN	00:E0:4C:36:1A:8C
2		
3		
4		
5		
6		

```
[ ] Previous Page    [>] Next Page    [ESC] Go to previous menu
```

**<3> MAC Address Table:** This device has a 1024 MAC table and all MACs may be displayed through this menu item. Once the table is full, a packet with a new MAC will pass unfiltered. A new MAC will not be added until an address has timed out and is removed from the table. Only then could a new MAC be added. This is usually not a problem since either the fiber or the TP of the media converter is connected to a switch which typically can support a much larger MAC table.

{ MAC Table > MAC Address Table }

<1> Start from item [1] with [10] entries per page

Item	Type	MAC	Ports
-----	-----	-----	-----
1	Static	00:02:AB:95:21:CE	CPU
2	Dynamic	00:02:AB:A0:B8:0E	FIBER
3	Dynamic	00:0C:29:39:1D:E4	LAN
4	Dynamic	00:0C:29:4F:2C:F0	LAN
5	Dynamic	00:0C:29:55:6C:48	FIBER
6	Dynamic	00:0C:29:82:AC:2E	LAN
7	Dynamic	00:0C:29:8F:4B:67	FIBER
8	Dynamic	00:0C:29:E5:47:5C	FIBER
9	Dynamic	00:0D:48:39:85:43	LAN
10	Dynamic	00:0F:3A:A0:4D:89	LAN

Use the > "greater than" and < "less than" character keys to browse multiple pages.

### 3.1.11 VLAN

A virtual LAN (VLAN) is any broadcast domain that is partitioned and isolated in a computer network at the data link layer (OSI layer 2). This device supports C-Port (802.1Q with EtherType 0x8100) and S-Port (802.1ad or QinQ with EtherType 0x88A8 or user defined) configurations, with both ingress and egress filtering and allowed VLAN lists, with up to 16 individual VLAN ID groups.

{ VLAN }

<1> Configuration

<2> Membership

## <1> Configuration: Setup the VLAN configurations for the Fiber and the LAN port.

```
{ VLAN > Configuration }
```

```
<0> Ethertype for Custom S-ports [88A8]
{ FIBER }
<1> Port VLAN          [          1]
<2> Port Type          [C-Port      ]
<3> Ingress Acceptance [Tagged and Untagged]
<4> Egress Tagging     [Untag Port VLAN ]
<5> Allowed VLANs     [1            ]

{ LAN }
<6> Port VLAN          [          1]
<7> Port Type          [C-Port      ]
<8> Ingress Acceptance [Tagged and Untagged]
<9> Egress Tagging     [Untag Port VLAN ]
<A> Allowed VLANs     [1            ]
```

<1,6> *Port VLAN*: For Fiber and/or LAN port, sets the VID for the port. VID 1 is the "default VID". A VID from 2~4095 will set the 'access' VID for that port.

<2,7> *Port Type*: The C-Port type is a standard 802.1Q, single, inner tag where the "C" refers to 'customer' in MEF (Metro Ethernet Forum) terminology. The S-Port type, where "S" refers to 'service provider', is the outer tag for 802.1ad or QinQ, which is added to an Ethernet frame which already has a 802.1Q tag.

<3,8> *Ingress Acceptance*: This is an acceptance filter that is applied to packets coming into the LAN or Fiber port. Three settings are supported here, all packets tagged and untagged, only tagged packets or only untagged packets. Packets that do not match the acceptance filter are dropped.

<4,9> *Egress Tagging*: How packets leave the LAN or Fiber port are affected by this setting:

*Untag the port VID*. All packets which match the port VLAN VID will be untagged on egress

*Tag All*. All packets with tags will keep their tag and any untagged packets will be tagged with the Port VLAN VID.

*Untag All*. Tags are removed from all packets which egress this port.

<5,A> *Allowed VLANs*: In this field, all VIDs which will be allowed can be specifically addressed here. Individual VIDs entered are separated by commas, while ranges of VIDs are separated by dashes. (ex. 1, 10-24). Up to 16 VIDs are supported.

## <2> Membership: Display the VLAN membership for the LAN and Fiber ports.

```
VLAN  Interface
----  -
1      LAN, Fiber
```

### 3.1.12 QoS

The Quality of Service (QoS), in this device, refers to the egress bandwidth control and the broadcast storm protection.

{ QoS }

<1> Bandwidth Control

<2> Storm Policing

**<1> Bandwidth Control:** Provides egress rate limiting for both the LAN and Fiber ports.

{ QoS > Bandwidth }

[Egress]

<1> FIBER Port Rate Limit [Disable]

<2> LAN Port Rate Limit [Disable]

**<1> Egress FIBER Port Rate Limit:** The outgoing rate limit, in Kbps, can be set on the Fiber port. The rate is set with a granularity of 64Kbps, from 1 (64Kbps) to 16000 (1024000Kbps). Packets will be held at the defined outgoing rate.

**<2> Egress LAN Port Rate Limit:** The outgoing rate limit, in Kbps, can be set on the LAN port. The rate is set with a granularity of 64Kbps, from 1 (64Kbps) to 16000 (1024000Kbps). Packets will be held at the defined outgoing rate.

[ESC] Go to previous menu. Please select an item.

-----  
0: Disable, else: Rate = keyin value x 64k pbs

Rate:

Set the rate limit to zero (0) to disable limiting.



**<2> Storm Policing:** To prevent ARP, ICMP, broadcast, and multicast packets impacting the performance of CPU, this device can drop those ARP, ICMP, broadcast and multicast frames in a specific period. This storm prevention may be enabled separately for ARP, ICMP, broadcast and multicast packets. Storm threshold, in packets per 100ms, can be individually set (0~255) for ARP and ICMP with a single setting shared for both broadcast and multicast packets.

```
{ QoS > Storm }
```

```
ARP          <1> [Enable ]    <5> Threshold [100] in 100 ms
ICMP         <2> [Enable ]    <6> Threshold [ 50] in 100 ms
Multicast    <3> [Enable ]    <7> Threshold [ 40] in 100 ms
Broadcast    <4> [Enable ]    < > See "Multicast Threshold"
```

### 3.1.13 Diagnostics

This device supports "Ping" diagnostics for both IPv4 and IPv6.

```
{ Diagnostics }
```

```
<1> Ping
<2> Ping6
```

### 3.1.14 Maintenance

```
{ Maintenance }
```

```
<1> Restart Device
<2> Factory Default
<3> Auto Provision
<4> Software
<5> Configuration
```

**<1> Restart Device:** Use this option to perform a cold reboot. Confirmation is required. The device will block traffic for about 15 seconds. The startup-config is loaded into memory (running-config).

**<2> Factory Default:** Use this option to return the device to factory defaults, either completely or to just keep the current IP address setting. Confirmation is required. This action will only default the running-config, so remember to save to startup-config. This must be done manually.

```
-----
<1>  Factory Default    <2> Factory Default (Keep IP)
<ESC> Exit
```

**<3> Auto Provision:** This device supports auto provisioning using DHCP Option 66, 67 and 254. Setup of DHCP server is beyond the scope of this user manual.

```
{ Maintenance > Auto Provision }
```

```
Software          [Up to Date]
Configuration     [Up to Date]
DHCPv4 Client IP  [Not ready]
```

```
<1> Auto Provision Mode    [Disable]
<2> Vendor Class Identifier [FRM220-2000MS]
```

**<4> Software:** Use this menu to perform software upgrade or to swap back to a previous software version.

```
{ Maintenance > Software }
```

Active Image	Image	FRM220-2000MS-v1.001.mfi
	Version	1.001
	Date	2022-06-20 T08:22:35+08:00
Alternate Image	Image	FRM220-2000MS-v1.000.mfi
	Version	1.000
	Date	2022-02-24 T17:33:43+08:00

```
<1> Upgrade via TFTP
<2> Upgrade via X-Modem
<3> Swap
```

**<1> Upgrade via TFTP:** TFTP upgrade method requires a TFTP server, accessible on the network by the FRM220-2000MS, and with an image file on the TFTP server.

```
-----
Syntax : <host> <file_name>, Example: 10.1.1.1 update.mfi
```

**<2> Upgrade via XModem:** This upgrade/recovery procedure is performed through the local console port and requires a terminal emulation program, such as TeraTerm Pro, which supports transferring via serial using the XModem protocol. Once confirmed, the image will be erased and the device will listen and wait for the XModem file transfer, after which the flash is written.

**<3> Swap:** The device has the ability to swap the "Active" image with the "Alternate" image. Whenever the software is upgraded, whether by Web posting, TFTP or serial XModem, the "Active" image will become the new "Alternate" image, while the new software will become the new "Active" image. Swapping allows falling back to the previous software version. Confirmation is required.

**<5> Configuration:** The final member of the Maintenance group is the configuration management.

{ Maintenance > Configuration }

- <1> Save startup-config
- <2> Download
- <3> Upload

**<1> Save startup-config:** This device, when cold booted, will copy the "startup-config" into memory as the "running-config" and then run all operations from this running configuration in memory. Any changes made via Web or console are done immediately to the "running-config". To save those changes from the running configuration so they are available at the next cold boot, they must be "copied" to the "startup-config". Put very simply, this is the "save" operation when finished with final configuration. **Note: Failure to do this action will result in a loss of all configuration changes since the last cold boot.**

**<2> Download:** This device supports configuration backup by downloading (a pure text format file) either the startup or running configuration to a TFTP server. Via the Web-based management, this download is supported in the browser from HTTP.

-----  
Syntax : <host> <file\_name> {startup | running }  
Example: 10.1.1.10 config.txt startup  
Download:

**<3> Upload:** This device supports configuration upload (restore) by transfer (a pure text format file) either the startup or running configuration text file from a TFTP server. Via the Web-based management, this upload is supported in the browser from HTTP POST.

-----  
Syntax : <host> <file\_name> {startup | running }  
Example: 10.1.1.10 config.txt startup  
Upload:

## 3.2 Web Provisioning

### 3.2.1 Introduction

To make Networking devices easier to configure, many devices can now be configured via a Web GUI, which should be familiar to all Internet users.

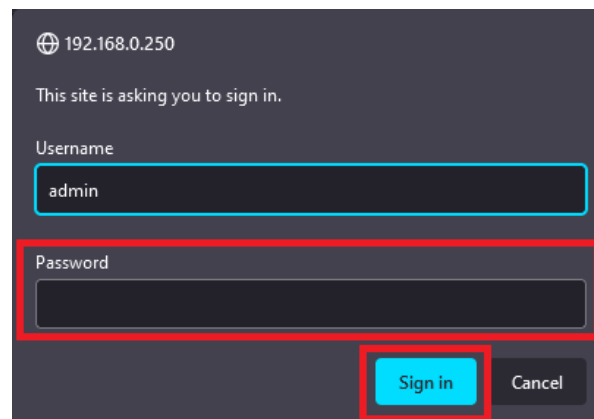
The web page is accessed by the Default IP Address of the device from a Web Browser such as Chrome, Edge or Firefox in the following way:

http://10.1.1.1/ (Assuming the Default IP Address is 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. The IP address can be changed through the console port interface and serial terminal. See Chapter 3, section 3.1 Please refer to Chapter 1, section 1.7 for the factory reset procedure via default push-button. If the IP address has not been set for your network, either previously or via serial console, 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.

### 3.2.2 Web Login Page

Access the device via a web browser. The default username is 'admin' with no password. Enter the password, if required and click "Sign in".



The image shows a web browser's security warning dialog for the IP address 192.168.0.250. The dialog has a dark background. At the top, it says "192.168.0.250" with a globe icon. Below that, it says "This site is asking you to sign in." There are two input fields: "Username" with the text "admin" and "Password" which is empty. A red rectangle highlights the "Password" field and the "Sign in" button. The "Sign in" button is blue with white text, and the "Cancel" button is grey with white text.

### 3.2.3 Web Main Page

CTC<sup>®</sup> union

FRM220-2000MS  
GigaBit Ethernet Switch

Auto-refresh ☐ Refresh

Port State Overview

2000MS

FIBER

RX TX

FX LAN  
PWR LNK LNK

FX LAN  
SPD SPD

LAN

DEFAULT

USB  
CONSOLE

← Save Logout

The first page will present the user with the Function Menu in the Left-hand frame and the Ports State Overview in the main frame.

### 3.2.4 System

#### Configuration

System Configuration	
System Contact	techsupport@ctcu.com
System Name	FRM220-2000MS-250
System Location	9F-Lab
<input type="button" value="Save"/> <input type="button" value="Reset"/>	

These three fields provide the information necessary for SNMP standard MIB2.

#### Information

System Information	
System	
Contact	techsupport@ctcu.com
Name	FRM220-2000MS-250
Location	9F-Lab
Hardware	
MAC Address	00:02:AB:B6:57:5C
Time	
System Date	2022-03-29 T13:39:27+08:00
System Uptime	0d 00:59:38
Hardware	
Hardware Version	Ver 1.100
Software	
Software Version	Ver 1.001
Software Date	2022-03-24 T11:28:16+08:00
Configuration	
Configuration File	running-config.txt

The information displayed here gives specific System fields, the hardware MAC address of this device, the current system time (as set from a Network Time Server), the system "uptime" since last cold boot, the software version and date code, and finally the current configuration file (Default-Config.txt is the factory default, or running-config).

### 3.2.5 IP

#### Configuration

**IP Configuration**

VLAN	
VLAN ID	1

IPv4	
IPv4 DHCP	Disable ▾
Address	192.168.0.250
Netmask	255.255.255.0
Gateway	192.168.0.10

IPv6	
IPv6 DHCP	Disable ▾
IPv6	::

Save Reset

This device supports setting a management VID as well as both static or dynamic IPv4 and IPv6 IP addresses, subnet mask and default gateway. When DHCP is enabled, this device will look for a DHCP server and dynamically receive an IP address from the DHCP server's available pool of IP addresses.

#### Status

IP Interfaces		
Interface	Type	Address
VLAN1	LINK	00:02:AB:95:21:CE
VLAN1	IPv4	192.168.0.250
VLAN1	IPv6	FE80::202:ABFF:FE95:21CE

Provides a quick look at the current IP Status.

3.2.6 *SNTP*

NTP Configuration

Mode	Enable
Server 1	192.168.0.254
Server 2	192.168.0.253

Save

Reset

Enables the NTP client function with a primary and backup Network Time Protocol Server.

3.2.7 *Time*

Time Zone Configuration

Time Zone Configuration	
Hours	8
Minutes	0

Save

Reset

Configures the Time Zone by entering the hours and minutes offset from UTC (Universal Time Coordinates).

3.2.8 *Log Information*

System Log Information

Auto-refresh ☐

Start from ID  with  entries per page.

Apply

ID	Time	Message
1	2022-03-29T12:39:56+08:00	SYS-BOOTING: Switch just made a cold boot.
2	2022-03-29T12:39:56+08:00	LINK-UP: Local LAN Port, changed state to up



## Detailed

Detailed System Log Information

Refresh |<< << >> >>|

ID

2

Message

Time

2022-03-29T12:39:56+08:00

Message

LINK-UP: Local LAN Port, changed state to up

Browse the log ID by ID using First (|<<), Previous (<<), Next (>>) and Last (>>|) buttons.

### 3.2.9 Auto Laser Shutdown

Auto Laser Shutdown Configuration

Port	Mode	Period (0.1 Sec)	
		ON	OFF
Fiber	Disable ▾	10	30

Save

Reset

Automatic Laser Shutdown (ALS) is a technique used to automatically shut down the output power of the transmitter in case of fiber break, according to ITU-T G.664. If a fiber is cut, the receiver will detect a Loss Of Signal (LOS). The ALS agent will turn off the transmitter. The receiver at the far end will then detect an LOS and its ALS agent will turn off the transmitter. In this way the entire fiber will go dark. The protocol will also occasionally turn on the laser briefly, monitoring a link for recovery. This on/off period is configurable.

**Mode:** Select to enable or disable ALS.

**Period ON:** Set the period, in seconds (1.0~5.0), that turns the laser on to attempt a link recovery. Default is 1 second.

**Period OFF:** Sets how long, in seconds (1.0~5.0), the laser remains off after a failed recovery attempt. Default is 3 seconds.

### 3.2.10 Ports

#### Configuration

**Port Configuration**

Port	Link	Speed		Flow Control
		Current	Configured	Enable
LAN		1Gfdx	Auto	<input checked="" type="checkbox"/>
Fiber		1Gfdx	Auto	<input checked="" type="checkbox"/>

Link Loss Pass Through

Enable

Jumbo Frame

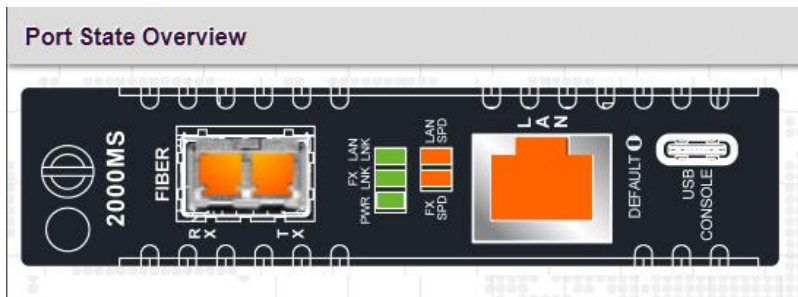
Enable

Save

Reset

Set the configured link speed/duplex or Auto for the LAN and Fiber port. Enable or disable flow control (802.3x) by checkbox. Use pull-downs to enable/disable

#### State Overview



This is a graphical view of the real-time state of the ports and the LEDs. The orange FX SPD and LAN SPD indicate gigabit links.

## SFP Status

SFP Status	
Item	Information
Vendor Name	OEM
Vendor PN	GLC-BX-20U
Vendor SN	1807100006
Fiber Type	Single mode
Wave Length	1550 nm
Wave Length(2)	0000 nm
Link Length	20 Km
Tx Power	-5.52 dBm
Rx Power	-4.20 dBm
Rx Sensitivity	0 dBm
Tx Bias	24.7060 mA
Supply Voltage	3.4162 V
Temperature	53.00 degree C

For an SFP module which supports DDOM, all details of the SFP will be shown. Note that Wave Length(2) is a special field only filled when a CTC Union branded BiDi SFP is inserted. The Wave Length will indicate the Tx lambda while Wave Length(2) indicates the Rx lambda.

## Detailed Statistics

Detailed Port Statistics				LAN Port	auto-refresh	Refresh	Clear
Receive Total		Transmit Total					
Rx Packets	87197	Tx Packets	19968				
Rx Octets	23519823	Tx Octets	4440503				
Rx Unicast	30208	Tx Unicast	28487				
Rx Multicast	84312	Tx Multicast	7				
Rx Broadcast	54921	Tx Broadcast	8				
Rx Pause	0	Tx Pause	0				
Receive Size Counters		Transmit Size Counters					
Rx 64 Bytes	62778	Tx 64 Bytes	7856				
Rx 65-127 Bytes	50338	Tx 65-127 Bytes	18102				
Rx 128-255 Bytes	45079	Tx 128-255 Bytes	204				
Rx 256-511 Bytes	4619	Tx 256-511 Bytes	53				
Rx 512-1023 Bytes	6395	Tx 512-1023 Bytes	182				
Rx 1024-1518 Bytes	268374247	Tx 1024-1518 Bytes	2105				
Rx 1519- Bytes	268374015	Tx 1519- Bytes	0				
Receive Error Counters		Transmit Error Counters					
Rx Drops	0	Tx Drops	0				
Rx CRC/Alignment	0	Tx Late/Exc. Coll.	0				
Rx Undersize	0						
Rx Oversize	268374015						
Rx Fragments	0						
Rx Jabber	0						
Rx Symbol	0						

### 3.2.11 Link OAM

#### Port Settings

**Link OAM Port Configuration**

Port	OAM Enabled	OAM Mode	Loopback Support	Loopback Operation
LAN	<input type="checkbox"/>	Passive ▼	<input type="checkbox"/>	<input type="checkbox"/>
Fiber	<input checked="" type="checkbox"/>	Active ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Save Reset

This media converter supports standard IEEE802.3ah OAMPDU such as discovery, loopback and dying gasp. Additionally, organizational specific OAMPDU are used to create layer 2 in-band management between a local and a remote converter, either another FRM220-2000MS or a legacy FRM220/FMC-1000MS.

#### Port Statistics

**Detailed Link OAM Statistics for Fiber Port** Fiber Port ▼ Auto-refresh ☐ Refresh Clear

Receive Total		Transmit Total	
Rx Loopback Control	0	Tx Loopback Control	0
Rx Link Fault PDUs	0	Tx Link Fault PDUs	2
Rx Dying Gasp	0	Tx Dying Gasp	0
Rx Critical Event PDUs	0	Tx Critical Event PDUs	0

List the OAM port statistics for LAN and Fiber ports.

## Port Status

Detailed Link OAM Status for Fiber Port				Fiber Port ▾	Auto-refresh
Discovery State		Send Any			
Peer MAC Address		00:02:AB:A0:B8:0E			
Local		Peer			
Mode	Active	Mode	Passive		
Unidirectional Operation Support	Disabled	Unidirectional Operation Support	Disabled		
Remote Loopback Support	Enabled	Remote Loopback Support	Enabled		
Link Monitoring Support	Disabled	Link Monitoring Support	Disabled		
MIB Retrieval Support	Disabled	MIB Retrieval Support	Disabled		
MTU Size	1518	MTU Size	1518		
Multiplexer State	Forwarding	Multiplexer State	Forwarding		
Parser State	Forwarding	Parser State	Forwarding		
Organizational Unique Identification	00-02-AB	Organizational Unique Identification	00-02-AB		
PDU Revision	1	PDU Revision	1		

Displays the status of LAN or Fiber port.



### 3.2.12 Remote Device

**OAM Remote Device**Ref

Type	Version	MAC
FRM220-2000MS	1.001	00:02:AB:14:4F:D5

System IP ALS Port SFP OAM VLANs QoS

**Port Configuration**

Port	Link	Speed		Flow Control
		Current	Configured	Enable
Fiber		1Gfdx	Auto	<input type="checkbox"/>
LAN		Down	Auto	<input type="checkbox"/>

Link Loss Pass Through

Disable

Jumbo Frame

Enable

**Port Statistics Overview**

Port	Packets		Bytes		Errors		Drops	
	Received	Transmitted	Received	Transmitted	Received	Transmitted	Received	Transmitted
Fiber	24704	680465	2431893	105856	6106	0	0	0
LAN	0	0	0	0	0	0	0	0

Save Reset Clear counter Device reset Device load defaults Save startup-config

This web page allows entering configuration of the remote OAM connected converter. If the fiber connected remote converter is not seen, make sure that OAM is enabled on both converters and make sure the local converter is in 'active' mode. The factory default has the converters in 'passive' mode. OAM cannot link unless at least one device is in 'active' mode. From the menu items in the vertical bar, all settings for the remote can be done. This example is showing the settings under the "Port" menu.

### 3.2.13 SNMP

SNMP or Simple Networking Management Protocol is a standard protocol for centralized management. Up to 4 management IPs can be configured in the **FRM220-2000MS**, their community string defined, and their access defined as read-only or read-write. A read-only manager is only able to perform 'get' commands. All 'set' commands are reserved for a manager given read-write control.

Traps are unsolicited messages issued by this SNMP agent, that typically indicate some alarm condition has occurred. Up to 4 Trap receivers (managers that receive the traps) are configured here and include the manager's IP address and an authentication community string.

The screenshot displays two configuration sections: 'SNMP System Configuration' and 'SNMP Trap Configuration'. The first section contains a table with two entries for community strings 'public' and 'private', both pointing to the source IP 192.168.0.114. The 'public' entry is set to 'Read-Only' and the 'private' entry is set to 'Read-Write'. Below this table is an 'Add New Static Entry' button. The second section, 'SNMP Trap Configuration', contains a table with one entry for the trap community 'public' pointing to the destination address 192.168.0.114. It also features an 'Add New Static Entry' button. At the bottom of the interface are 'Save' and 'Reset' buttons.

Delete	Community	Source IP	Access
<input type="checkbox"/>	public	192.168.0.114	<input checked="" type="radio"/> Read-Only <input type="radio"/> Read-Write
<input type="checkbox"/>	private	192.168.0.114	<input type="radio"/> Read-Only <input checked="" type="radio"/> Read-Write

Add New Static Entry

Delete	Trap Community	Trap Destination Address
<input type="checkbox"/>	public	192.168.0.114

Add New Static Entry

Save Reset

Example of a single manager (192.168.0.114) with both RO and RW privileges, and also as a trap receiver with string 'public'.

### 3.2.14 Security -User Password

**Edit User**

User Settings	
User Name	admin
Password	
Password (again)	

Save Reset

Create a password if none exists or change the password here, then click the 'Save' button.

### 3.2.15 MAC Table Configuration

**MAC Address Table Configuration**

**Aging Configuration**

Disable Automatic Aging ☐

Aging Time 308 seconds  
Must be a multiple of 7.

**Static MAC Table Configuration**

Delete	MAC Address	Port Members	
		LAN	Fiber

Add New Static Entry

Save Reset

Enable or disable MAC learning and set the aging time here. Supports 56 ~ 30037 seconds, in multiples of 7. Static MAC addresses (up to 16) may be added through the "Add New Static Entry" button. Click "Save" before leaving this page.



### 3.2.16 MAC Table Display

MAC Address Table				
Display	Both Types	entries.		
Type	MAC Address	Port Members		
		CPU	LAN	Fiber
Static	00:02:AB:95:21:CE	✓		
Dynamic	00:02:AB:A0:B8:0E			✓
Dynamic	00:02:AB:D8:80:00		✓	
Dynamic	00:0C:29:39:1D:E4		✓	
Dynamic	00:0C:29:4F:2C:F0		✓	
Dynamic	00:0C:29:55:6C:48		✓	
Dynamic	00:0C:29:82:AC:2E		✓	
Dynamic	00:0D:48:39:85:43		✓	
Dynamic	00:0F:3A:A0:4D:89		✓	
Dynamic	00:17:C8:62:7F:ED		✓	
Dynamic	00:17:C8:62:80:E5		✓	
Dynamic	00:19:99:B4:EF:DE		✓	
Dynamic	00:19:D2:04:F4:D6		✓	
Dynamic	00:1B:21:7E:E4:48		✓	
Dynamic	00:1B:21:7F:1C:24		✓	
Dynamic	00:1B:21:87:46:08		✓	
Dynamic	00:22:15:17:67:F5		✓	
Dynamic	00:26:18:6C:F5:74		✓	
Dynamic	00:26:18:82:A6:38		✓	
Dynamic	00:40:01:30:49:E2		✓	
Dynamic	00:40:01:30:64:6E		✓	
Dynamic	00:40:01:30:84:EC		✓	
Dynamic	00:40:01:31:2D:86		✓	
Dynamic	00:40:01:32:38:3B		✓	
Dynamic	00:40:01:32:AA:81		✓	
Dynamic	00:40:01:43:17:BF		✓	
Dynamic	00:50:56:98:0F:A1		✓	
Dynamic	00:50:56:98:2C:05		✓	
Dynamic	00:50:56:98:77:5D		✓	
Dynamic	00:50:56:98:A5:61		✓	

← Select 'Static', 'Dynamic', or both

### 3.2.17 VLAN Configuration

Global VLAN Configuration

Ethertype for Custom S-ports

88A8

← S-Port default is 0x88A8, but may be user defined

Port VLAN Configuration

Port	Port VLAN	Port Type	Ingress Acceptance	Egress Tagging	Allowed VLANs
Fiber	1	C-Port ▾	Tagged and Untagged ▾	Untag Port VLAN ▾	1
LAN	1	C-Port ▾	Tagged and Untagged ▾	Untag Port VLAN ▾	1

Save

Reset

A virtual LAN (VLAN) is any broadcast domain that is partitioned and isolated in a computer network at the data link layer (OSI layer 2). This device supports C-Port (802.1Q with EtherType 0x8100) and S-Port (802.1ad or QinQ with EtherType 0x88A8 or user defined) configurations, with both ingress and egress filtering and allowed VLAN lists, with up to 16 individual VLAN ID groups.

**Port VLAN:** For Fiber and/or LAN port, sets the VID for the port. VID 1 is the "default VID". A VID from 2~4095 will set the 'access' VID for that port.

**Port Type:** The C-Port type is a standard 802.1Q, single, inner tag where the "C" refers to 'customer' in MEF (Metro Ethernet Forum) terminology. The S-Port type, where "S" refers to 'service provider', is the outer tag for 802.1ad or QinQ, which is added to an Ethernet frame which already has a 802.1Q tag.

**Ingress Acceptance:** This is an acceptance filter that is applied to packets coming into the Fiber or LAN port. Three settings are supported here, all packets tagged and untagged, only tagged packets or only untagged packets. Packets that do not match the acceptance filter are dropped.

**Egress Tagging:** How packets leave the LAN or Fiber port are affected by this setting:

**Untag the port VID.** All packets which match the port VLAN VID will be untagged on egress

**Tag All.** All packets with tags will keep their tag and any untagged packets will be tagged with the Port VLAN VID.

**Untag All.** Tags are removed from all packets which egress this port.

**Allowed VLANs:** In this field, all VIDs which will be allowed can be specifically addressed here. Individual VIDs entered are separated by commas, while ranges of VIDs are separated by dashes. (ex. 1, 10-24). Up to 16 VIDs are supported.

### 3.2.18 VLAN Membership and Port Status

This is a display only of all VIDs and their port membership.

VLAN Membership Status		
VLAN ID	Port Members	
	LAN	Fiber
1	✓	✓

This is a display only overview of VLAN port status.

VLAN Port Status				
Port	Port Type	Frame Type	Port VLAN ID	Tx Tag
Fiber	C-Port	All	1	Untag Port VLAN
LAN	C-Port	All	1	Untag Port VLAN

### 3.2.19 QoS Bandwidth Control

Egress Rate Limit				
Port	Enable	Rate		
Fiber	<input type="checkbox"/>	0	x 64k bps =	Unlimited
LAN	<input type="checkbox"/>	0	x 64k bps =	Unlimited

Save Reset

The outgoing rate limits, in Kbps, can be set on the LAN and/or Fiber ports. The rate is set with a granularity of 64Kbps, from 1 (64Kbps) to 16000 (1024000Kbps). Packets which exceed the outgoing rate will be dropped. Better bandwidth control (without packet loss) can be achieved if the link is using flow control (802.3x).

### 3.2.20 Storm Policing

Frame Type	Enable	Threshold	Period
ARP	<input type="checkbox"/>	0	100ms
ICMP	<input type="checkbox"/>	0	100ms
Multicast	<input type="checkbox"/>	0	100ms
Broadcast	<input type="checkbox"/>		

To prevent ARP, ICMP, broadcast, and multicast packets impacting the performance of CPU, this device can drop those ARP, ICMP, broadcast and multicast frames in a specific period. This storm prevention may be enabled separately for ARP, ICMP, broadcast and multicast packets. Storm threshold, in packets per 100ms, can be individually set (0~255) for ARP and ICMP with a single setting shared for both broadcast and multicast packets.

### 3.2.21 Diagnostics

This device supports "Ping" diagnostics for both IPv4 and IPv6.

#### ICMP Ping

IP Address

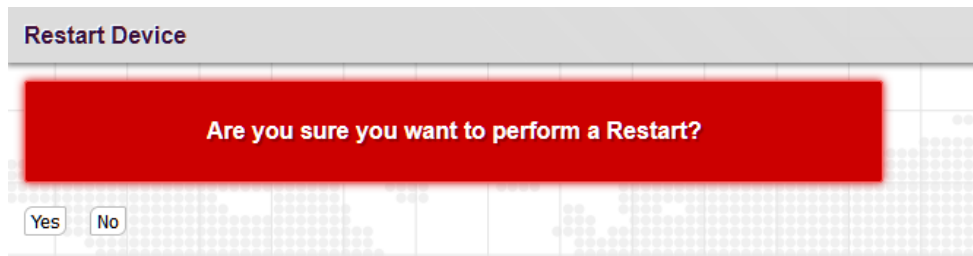
#### ICMP Ping

64 bytes from 192.168.0.254: time=1ms  
64 bytes from 192.168.0.254: time=1ms  
64 bytes from 192.168.0.254: time=1ms  
64 bytes from 192.168.0.254: time=1ms  
Sent 4 packets, received 4 OK, 0 bad.

### 3.2.22 Maintenance

Nine menu items under this item provide restart, factory default, software upgrade, and configuration management.

#### 3.2.22.1 Restart Device



Restart Device

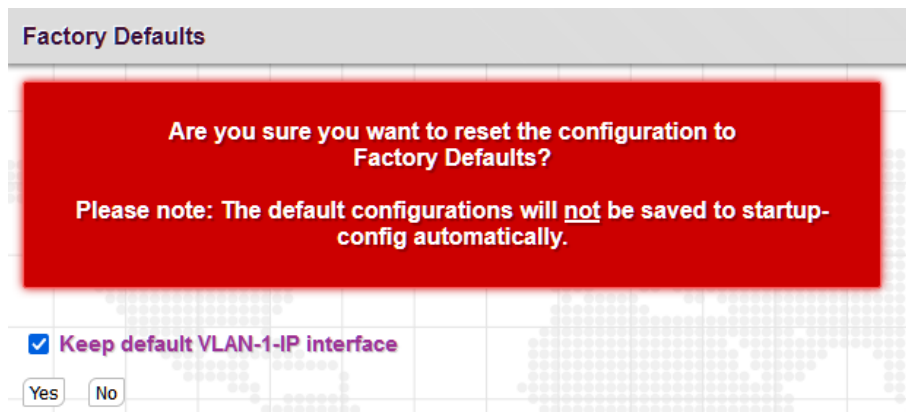
Are you sure you want to perform a Restart?

Yes No

Use this option to perform a cold reboot. Confirmation is required. The device will block traffic for about 15 seconds until fully booted.

#### 3.2.22.2 Factory Default

Use this option to return the device to factory defaults, either completely or to just keep the current IP address setting. Confirmation is required. Note: This action will only default the running-config, so remember to save to startup-config. This must be done manually.



Factory Defaults

Are you sure you want to reset the configuration to Factory Defaults?

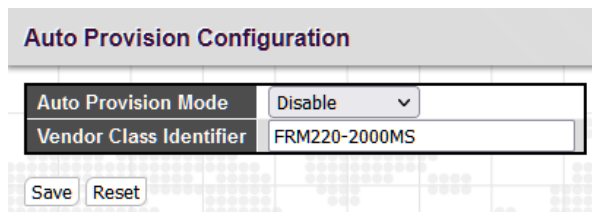
Please note: The default configurations will not be saved to startup-config automatically.

☒ Keep default VLAN-1-IP interface

Yes No

### 3.2.22.3 Auto Provisioning

This device supports auto provisioning using DHCP Option 66, 67 and 254. Setup of DHCP server is beyond the scope of this user manual.



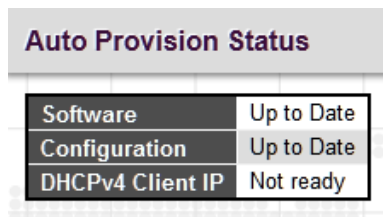
The interface shows a configuration window titled "Auto Provision Configuration". It contains two fields: "Auto Provision Mode" with a dropdown menu set to "Disable", and "Vendor Class Identifier" with a text input field containing "FRM220-2000MS". Below these fields are two buttons: "Save" and "Reset".

Auto Provision Configuration	
Auto Provision Mode	Disable
Vendor Class Identifier	FRM220-2000MS

Save Reset

### 3.2.22.4 Auto Provision Status

Displays the status of auto provisioning.



The interface shows a status window titled "Auto Provision Status". It contains a table with three rows: "Software" (Up to Date), "Configuration" (Up to Date), and "DHCPv4 Client IP" (Not ready).

Auto Provision Status	
Software	Up to Date
Configuration	Up to Date
DHCPv4 Client IP	Not ready

### 3.2.22.5 Software Upload

Use this item to perform software upgrade. Click 'Browse' to locate the upgrade image file, then click 'Upload' to start the upgrade process.

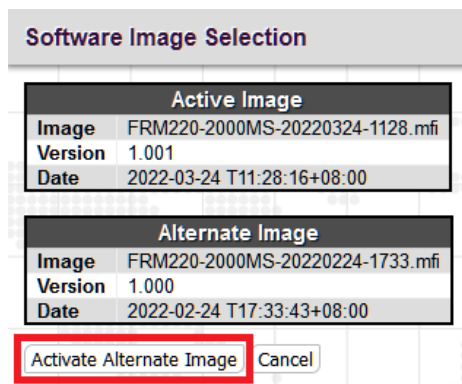


The interface shows a window titled "Firmware Upload". It contains a "Browse..." button, a text field displaying "No file selected.", and an "Upload" button.

Browse... No file selected. Upload

### 3.2.22.6 Software Image Select

The device has the ability to swap the "Active" image with the "Alternate" image. Whenever the software is upgraded, whether by Web posting, TFTP or serial X-Modem, the "Active" image will become the new "Alternate" image, while the new software will become the new "Active" image. Swapping allows falling back to the previous software version. Confirmation is required.



Software Image Selection

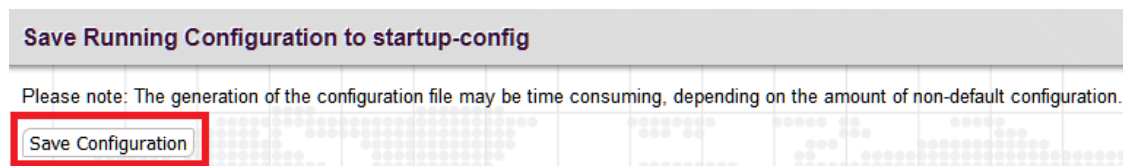
Active Image	
Image	FRM220-2000MS-20220324-1128.mfi
Version	1.001
Date	2022-03-24 T11:28:16+08:00

Alternate Image	
Image	FRM220-2000MS-20220224-1733.mfi
Version	1.000
Date	2022-02-24 T17:33:43+08:00

Activate Alternate Image Cancel

### 3.2.22.7 Configuration Save Startup-Config

This device, when cold booted, will copy the "startup-config" into memory as the "running-config" and then run all operations from this running configuration in memory. Any changes made via Web or console are done immediately to the "running-config". To save those changes from the running configuration so they are available at the next cold boot, they must be "copied" to the "startup-config". Put very simply, this is the "save" operation when finished with final configuration. **Note: Failure to do this action will result in a loss of all configuration changes since the last cold boot.**



Save Running Configuration to startup-config

Please note: The generation of the configuration file may be time consuming, depending on the amount of non-default configuration.

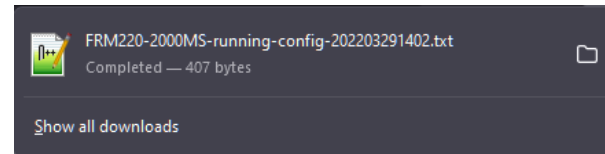
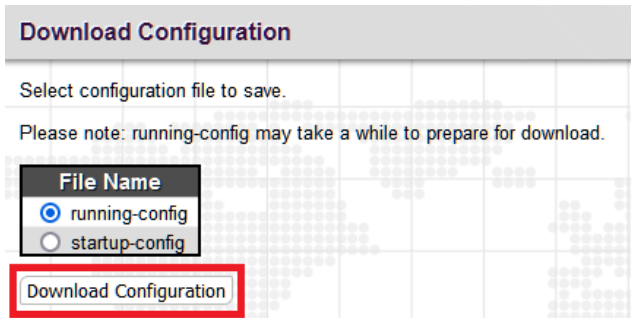
Save Configuration

Alternately, this function can be performed at any time from the main header, by clicking the 'floppy' icon.



### 3.2.22.8 Configuration Download

This device supports configuration backup by downloading (a pure text format file) either the startup or running configuration to a local file through the browser from HTTP.



Partial example of the contents of downloaded file.

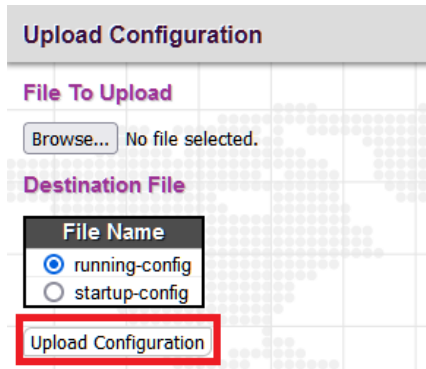
```
hostname FRM220-2000MS.250
username admin password encrypted ys7FoSrVZvE4wBRihyUdQ==24
!
sntp
sntp server 1 ip-address 192.168.0.254
sntp server 2 ip-address 192.168.0.253
!
!
qos wrr 1 127 127 127 127 127 127 127

!
clock timezone 8 0
lfpt
no jumbo
snmp-server contact techsupport@ctcu.com
snmp-server location 9FLab
snmp-server community 1 ip 192.168.0.114 public read-only
snmp-server community 2 ip 192.168.0.114 private read-write
snmp-server host 1
  host 192.168.0.114 traps
version v1 public
```



### 3.2.22.9 Configuration Upload

This device supports configuration upload (restore) by transfer (a pure text format file) either the startup or running configuration text file from a local browser client using HTTP POST.



### 3.2.23 Logout

Logging out will ensure that the management session with **FRM220-2000MS** 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 **FRM220-2000MS** again.



Click the “Exit Door” icon to completely log out. Click the “Cancel” button to return to configuration of **FRM220-2000MS**.

## 3.3 Troubleshooting

### 3.3.1 *Factory Default.*

Apply power to **FRM220-2000MS** and allow 15-20 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 6 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 password is reset to [blank].

Additionally, any VLAN, 1Q or Q in Q will be disabled. All ports will be enabled, UTP ports set for auto-negotiation and no bandwidth limiting on any port.

Note: The default settings have been restored to the running-config, not to the startup-config. To have the device later boot up to default, the running-config must be copied to the startup-config.

### 3.3.2 *LED Observations*

#### 3.3.2.1 Power On

At initial power on, PWR LED will be lit.

Error conditions :

If all LEDs immediately light and never turn off, or if no LED ever lights, then the card is possibly defective. Be sure to double check power source and try either another **FRM220-2000MS** in the same chassis or try the card in a different chassis or with a different power adapter.

### 3.3.2.2 UTP Link Test.

Following a complete power and boot up (about 15 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. If there are no link indications for a live connection to LAN, check if LFTP is enabled in the configuration. **When LFTP is enabled, there must be both live Fiber and LAN connection.**

### 3.3.2.3 Fiber Link Test

Following a complete power and boot up (about 15 seconds) the converter will be active. For **FRM220-2000MS**, 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. If there are no link indications for a live connection to Fiber, check if LFTP is enabled in the configuration. **When LFTP is enabled, there must be both live Fiber and LAN connection**

**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.**

## 3.3.3 Operation Checks

### 3.3.3.1 Converter Check

A very easy way to ensure a pair of **FRM220-2000MS** 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 **FRM220-2000MS** pair is operational.

### 3.3.3.2 Ping Test

With **FRM220-2000MS** 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 **FRM220-2000MS** 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 FRM220-2000MS, be sure to clear the PC ARP table. Every **FRM220-2000MS** 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 as administrator 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.

### 3.3.3.3 Web Access Test

With **FRM220-2000MS** 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 **FRM220-2000MS** 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 and no password' 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 **FRM220-2000MS** which is 10.1.1.1 by default.

## Appendix

### MIB Description

Label	OID	Access	Description
ctcAutoProvisioningStatusGlobalsDHCPv4Bound	.1.3.6.1.4.1.4756.189.10.145.1.3.1.3	ReadOnly	Indicates DHCPv4 IP address is bound or not.
ctcAutoProvisioningStatusGlobalsConfigurationUpToDate	.1.3.6.1.4.1.4756.189.10.145.1.3.1.2	ReadOnly	Indicates the configuration is up to date or not.
ctcAutoProvisioningStatusGlobalsSoftwareUpToDate	.1.3.6.1.4.1.4756.189.10.145.1.3.1.1	ReadOnly	Indicates the software is up to date or not.
ctcAutoProvisioningConfigGlobalsVendorClassIdentifier	.1.3.6.1.4.1.4756.189.10.145.1.2.1.2	ReadWrite	Configure the DHCP option 60 vendor class identifier. The allowed string length is 0 to 63 and the allowed content is the ASCII characters from 32 to 126. This value is not necessary in the DHCP server. However once this vendor class identifier is specified the device must have the same vendor class identifier so as to accept Auto-provisioning values.
ctcAutoProvisioningConfigGlobalsMode	.1.3.6.1.4.1.4756.189.10.145.1.2.1.1	ReadWrite	Indicates the auto provision mode operation. Possible modes are: Enabled: Enable auto provision mode operation. Disabled: Disable auto provision mode operation.
ctcIpStatusInterfacesAddress	.1.3.6.1.4.1.4756.189.10.102.1.3.2.1.1.4	ReadWrite	The current address of the interface (of the given type).
ctcIpConfigInterfacesIpv6Ipv6Address	.1.3.6.1.4.1.4756.189.10.102.1.2.2.4.4	ReadWrite	Static configured IPv6 address.
ctcIpConfigInterfacesIpv6EnableDhcpClient	.1.3.6.1.4.1.4756.189.10.102.1.2.2.4.3	ReadWrite	Enable IPv6 DHCP client.
ctcIpConfigInterfacesIpv4Gateway	.1.3.6.1.4.1.4756.189.10.102.1.2.2.3.6	ReadWrite	Gateway.
ctcIpConfigInterfacesIpv4PrefixSize	.1.3.6.1.4.1.4756.189.10.102.1.2.2.3.5	ReadWrite	Prefix size of the network.
ctcIpConfigInterfacesIpv4Ipv4Address	.1.3.6.1.4.1.4756.189.10.102.1.2.2.3.4	ReadWrite	IPv4 address.
ctcIpConfigInterfacesIpv4EnableDhcpClient	.1.3.6.1.4.1.4756.189.10.102.1.2.2.3.3	ReadWrite	Enable IPv4 DHCP client. Note: the DHCP client can only be enabled if there is no conflict in the values of: ipv4Address prefixSize and dhcpClientFallbackTimeout.

ctclcfgControlCopyConfigConfigFileUrl	.1.3.6.1.4.1.4756.189.10.101.1.4.2.3	ReadWrite	The location of configuration files to upload or download. It is a specific character string that constitutes a reference to a resource. Syntax: <protocol>://<host>/<file_name> For example tftp://10.10.10.10/config.txt. A valid file name is a text string drawn from alphabet (A-Za-z) digits (0-9) dot (.) hyphen (-) underscore (_). The maximum length is 31 and hyphen must not be first character. The file name content that only contains . is not allowed.
ctclcfgControlCopyConfigSourceConfigType	.1.3.6.1.4.1.4756.189.10.101.1.4.2.2	ReadWrite	Source configuration type. none(0) means no configuration file. copyRunningStartup(1) indicates that the running configuration will be copied to the startup configuration. copyStartupRunning(2) indicates that the startup configuration will be copied to the running configuration. uploadRunning(3) indicates that the running configuration will be uploaded. uploadstartup(4) indicates that the startup configuration will be uploaded. uploadRunning(5) indicates that the running configuration will be downloaded. uploadstartup(6) indicates that the startup configuration will be downloaded.
ctclcfgControlCopyConfigCopy	.1.3.6.1.4.1.4756.189.10.101.1.4.2.1	ReadWrite	Action to do copy or not. true is to do the copy operation. false is to do nothing
ctclcfgControlGlobalsReloadDefault	.1.3.6.1.4.1.4756.189.10.101.1.4.1.1	ReadWrite	Reset system to default. none(0) is to do nothing. default(1) is to reset the whole system to default. defaultKeepIp(2) is to reset system to default but keep IP address of VLAN 1.

ctcLcfgStatusConfigUploadFilename	.1.3.6.1.4.1.4756.189.10.101.1.3.4.1	ReadOnly	Indicates the last uploading running-config filename the configuration file can upload from TFTP or HTTP by manually or upload from TFTP HTTP or FTP by Auto-provision.
ctcLcfgStatusCopyConfigStatus	.1.3.6.1.4.1.4756.189.10.101.1.3.3.1	ReadOnly	The status indicates the status of current copy operation. none(0) means no copy operation. success(1) means copy operation is successful. inProgress(2) means current copy operation is in progress. errOtherInProcessing(3) means copy operation is failed due to other in processing. errNoSuchFile(4) means copy operation is failed due to file not existing. errSameSrcDst(5) means copy operation is failed due to the source and destination are the same. errPermissionDenied(6) means copy operation is failed due to the destination is not permitted to modify. errLoadSrc(7) means copy operation is failed due to the error to load source file. errSaveDst(8) means copy operation is failed due to the error to save or commit destination.
ctcDaylightSavingConfigGlobalsTimeZoneOffset	.1.3.6.1.4.1.4756.189.10.97.1.2.1.2	ReadWrite	To set the system time zone with respect to UTC in minutes.
ctcLinkOAMStatusRevision	.1.3.6.1.4.1.4756.189.10.79.30.1.59	ReadOnly	PDU Revision.
ctcLinkOAMStatusOUI	.1.3.6.1.4.1.4756.189.10.79.30.1.58	ReadOnly	Organizational Unique Identification.
ctcLinkOAMStatusParser	.1.3.6.1.4.1.4756.189.10.79.30.1.57	ReadOnly	Parser State.
ctcLinkOAMStatusMultiplexer	.1.3.6.1.4.1.4756.189.10.79.30.1.56	ReadOnly	Multiplexer State.
ctcLinkOAMStatusMTUSize	.1.3.6.1.4.1.4756.189.10.79.30.1.55	ReadOnly	MTU Size.
ctcLinkOAMStatusMIBRetrieval	.1.3.6.1.4.1.4756.189.10.79.30.1.54	ReadOnly	MIB Retrieval Support.
ctcLinkOAMStatusLinkMonitoring	.1.3.6.1.4.1.4756.189.10.79.30.1.53	ReadOnly	Link Monitoring Support.
ctcLinkOAMStatusLoopback	.1.3.6.1.4.1.4756.189.10.79.30.1.52	ReadOnly	Remote Loopback Support.
ctcLinkOAMStatusUnidirectional	.1.3.6.1.4.1.4756.189.10.79.30.1.51	ReadOnly	Unidirectional Operation Support.
ctcLinkOAMStatusMode	.1.3.6.1.4.1.4756.189.10.79.30.1.50	ReadOnly	OAM Mode.
ctcLinkOAMStatusInfoMac	.1.3.6.1.4.1.4756.189.10.79.10.1.40	ReadOnly	Peer MAC Address.
ctcLinkOAMStatusInfoDiscovery	.1.3.6.1.4.1.4756.189.10.79.10.1.30	ReadOnly	OAM Discovery State.

ctcLinkOAMStatisticsCriticalEvent	.1.3.6.1.4.1.4756.189.10.79.10.1.60	ReadOnly	The number of received and transmitted OAM Critical Event packets.
ctcLinkOAMStatisticsDyingGasp	.1.3.6.1.4.1.4756.189.10.79.10.1.50	ReadOnly	The number of received and transmitted OAM Dying Gasp packets.
ctcLinkOAMStatisticsLinkFault	.1.3.6.1.4.1.4756.189.10.79.10.1.40	ReadOnly	The number of received and transmitted OAM Link Fault packets.
ctcLinkOAMStatisticsLoopback	.1.3.6.1.4.1.4756.189.10.79.10.1.30	ReadOnly	The number of received and transmitted OAM Loopback packets.
ctcLinkOAMConfigMibClr	.1.3.6.1.4.1.4756.189.10.79.1.1.60	ReadWrite	Clear Link-OAM Statistics.
ctcLinkOAMConfigLBTrigger	.1.3.6.1.4.1.4756.189.10.79.1.1.50	ReadWrite	Local device OAM remote loopback trigger.
ctcLinkOAMConfigLB	.1.3.6.1.4.1.4756.189.10.79.1.1.40	ReadWrite	Local device OAM remote loopback configuration.
ctcLinkOAMConfigMode	.1.3.6.1.4.1.4756.189.10.79.1.1.30	ReadWrite	Local device OAM in-band management mode.
ctcLinkOAMConfigEn	.1.3.6.1.4.1.4756.189.10.79.1.1.20	ReadWrite	Local device OAM in-band management active.
ctcSntpConfigServerAddress	.1.3.6.1.4.1.4756.189.10.57.1.2.2.1.2	ReadWrite	Internet address of a SNTP server.
ctcSntpConfigGlobalsMode	.1.3.6.1.4.1.4756.189.10.57.1.2.1.1	ReadWrite	Global config mode of SNTP. true is to enable SNTP function in the system and false is to disable it.
ctcSyslogControlHistoryClear	.1.3.6.1.4.1.4756.189.10.37.1.4.1	ReadWrite	Clear syslog history by setting to true.
ctcSyslogStatusHistoryMsgText	.1.3.6.1.4.1.4756.189.10.37.1.3.1.1.5	ReadOnly	The detailed context of the system log message.
ctcSyslogStatusHistoryMsgTimeStamp	.1.3.6.1.4.1.4756.189.10.37.1.3.1.1.4	ReadOnly	The value of sysUpTime when this message was generated.
ctcSnmpConfigTrapReceiverTableRowEditorAction	.1.3.6.1.4.1.4756.189.10.36.1.2.21.100	ReadWrite	Action
ctcSnmpConfigTrapReceiverAction	.1.3.6.1.4.1.4756.189.10.36.1.2.10.1.100	ReadWrite	Action
ctcSnmpConfigCommunityTableRowEditorAction	.1.3.6.1.4.1.4756.189.10.36.1.2.3.100	ReadWrite	Action
ctcSnmpConfigCommunityTableRowEditorAccess	.1.3.6.1.4.1.4756.189.10.36.1.2.3.4	ReadWrite	SNMP accrss: 0: Read-Only 1: Read-Write
ctcSnmpConfigCommunityAction	.1.3.6.1.4.1.4756.189.10.36.1.2.2.1.100	ReadWrite	Action
ctcSnmpConfigCommunityAccess	.1.3.6.1.4.1.4756.189.10.36.1.2.2.1.4	ReadWrite	SNMP accrss: 0: Read-Only 1: Read-Write



ctcFirmwareControllImageUploadUrl	.1.3.6.1.4.1.4756.189.10.28.1.4.2.3	ReadWrite	The location of image to upload. It is a specific character string that constitutes a reference to a resource. Syntax: <protocol>://<host>/<file_name> For example tftp://10.10.10.10/new_image.mfi. A valid file name is a text string drawn from alphabet (A-Za-z) digits (0-9) dot (.) hyphen (-) under score (_). The maximum length is 32 and hyphen must not be first character. The file name content that only contains . is not allowed.
ctcFirmwareControllImageUploadDoUpload	.1.3.6.1.4.1.4756.189.10.28.1.4.2.1	ReadWrite	Action to do upload image or not. true is to do the upload operation. false is to do nothing. The upload operation may need longer time to upload the image so the SNMP timeout time needs to be modified accordingly.
ctcFirmwareControlGlobalsSwapFirmware	.1.3.6.1.4.1.4756.189.10.28.1.4.1.1	ReadWrite	Swap firmware between active (primary) and alternative (backup). true is to swap the firmware. false is to do nothing.
ctcFirmwareStatusImageUploadStatus	.1.3.6.1.4.1.4756.189.10.28.1.3.2.1	ReadOnly	The status indicates the status of current upload operation. It is updated automatically. Modifying this flag does not take any effect. none(0) means no upload operation. success(1) means upload operation is successful. inProgress(2) means current upload operation is in progress. errInvalidIp(3) means upload operation is failed due to invalid IP address. errTftpFailed(4) means upload operation is failed due to failed TFTP operation. errBusy(5) means upload operation is failed due to other upload in processing. errMemoryInsufficient(6) means upload operation is failed due to memory insufficient.

			<p>errInvalidImage(7) means upload operation is failed due to invalid image. errWriteFlash(8) means upload operation is failed due to failed writing flash.</p> <p>errSameImageExisted(9) means upload operation is failed because the upload image is the same as the one in flash.</p> <p>errUnknownImage(10) means upload operation is failed because the type of upload image is unknown.</p> <p>errFlashImageNotFound(11) means upload operation is failed because the location in flash to upload the image is not found.</p> <p>errFlashEntryNotFound(12) means upload operation is failed because the corresponding entry in flash to upload the image is not found.</p> <p>errCrc(13) means upload operation is failed due to incorrect CRC in the upload image.</p> <p>errImageSize(14) means upload operation is failed due to invalid image size. errEraseFlash(15) means upload operation is failed due to failed erasing flash.</p> <p>errIncorrectImageVersion(16) means upload operation is failed due to incorrect version of the upload image. errDownloadUrl(17) means upload operation is failed due to fail to download image from URL. errInvalidUrl(18) means upload operation is failed due to invalid URL. errInvalidFilename(19) means upload operation is failed due to invalid filename of the upload image. errInvalidPath(20) means upload operation is failed due to invalid path of the upload image.</p>
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ctcFirmwareStatusImageBuiltDate	.1.3.6.1.4.1.4756.189.10.28.1.3.1.1.5	ReadOnly	The built date when the image is built.
ctcFirmwareStatusImageVersion	.1.3.6.1.4.1.4756.189.10.28.1.3.1.1.4	ReadOnly	Image version.
ctcFirmwareStatusImageType	.1.3.6.1.4.1.4756.189.10.28.1.3.1.1.2	ReadOnly	Image type of the status. bootloader(0) is for boot loader. activeFirmware(1) is for active (primary) firmware. alternativeFirmware(2) is for alternative (backup) firmware.
ctcSysutilControlRebootType	.1.3.6.1.4.1.4756.189.10.24.1.4.1.2	ReadWrite	Type of reboot. noReboot(0) does not reboot. coldReboot(1) is to do cold reboot.
ctcSysutilStatusBoardInfoBoardSerial	.1.3.6.1.4.1.4756.189.10.24.1.3.5.3	ReadOnly	Serial number
ctcSysutilStatusBoardInfoBoardMacAddress	.1.3.6.1.4.1.4756.189.10.24.1.3.5.1	ReadOnly	Board Mac Address
ctcSysutilStatusSystemUptimeSystemUptime	.1.3.6.1.4.1.4756.189.10.24.1.3.4.1	ReadOnly	The time since the DUT is Up.
ctcSysutilConfigSystemTimeSystemCurTimeFormat	.1.3.6.1.4.1.4756.189.10.24.1.2.2.2	ReadOnly	Format for setting up current system time
ctcSysutilConfigSystemTimeSystemCurTime	.1.3.6.1.4.1.4756.189.10.24.1.2.2.1	ReadWrite	Current system time
ctcSysutilConfigSystemInfoLocation	.1.3.6.1.4.1.4756.189.10.24.1.2.1.3	ReadWrite	Location.
ctcSysutilConfigSystemInfoContact	.1.3.6.1.4.1.4756.189.10.24.1.2.1.2	ReadWrite	Contact name.
ctcSysutilConfigSystemInfoHostname	.1.3.6.1.4.1.4756.189.10.24.1.2.1.1	ReadWrite	Hostname
ctcVlanConfigInterfacesVlans	.1.3.6.1.4.1.4756.189.10.23.1.2.2.1.1.23	ReadWrite	Ports can control which VLANs are allowed to become members.
ctcVlanConfigInterfacesEgressTagging	.1.3.6.1.4.1.4756.189.10.23.1.2.2.1.1.14	ReadWrite	Controls tagging of frames on egress. tagThis(1) is not allowed.
ctcVlanConfigInterfacesIngressAcceptance	.1.3.6.1.4.1.4756.189.10.23.1.2.2.1.1.13	ReadWrite	Controls whether frames are accepted on ingress depending on VLAN tag in frame.
ctcVlanConfigInterfacesPortType	.1.3.6.1.4.1.4756.189.10.23.1.2.2.1.1.11	ReadWrite	0: Disable 1~4095: S-Tag
ctcVlanConfigInterfacesNativeVlan	.1.3.6.1.4.1.4756.189.10.23.1.2.2.1.1.10	ReadWrite	The port VLAN ID the port will be assigned.
ctcVlanConfigGlobalsMainCustomSPortEtherType	.1.3.6.1.4.1.4756.189.10.23.1.2.1.1.1	ReadWrite	TPID (EtherType) for ports marked as Custom-S tag aware.
ctcQosConfigInterfaceEgressLimitRate	.1.3.6.1.4.1.4756.189.10.14.1.2.2.6.1.3	ReadWrite	Rate limit bandwidth = value x 64k pbs.
ctcQosConfigInterfaceEgressLimitEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.2.6.1.2	ReadWrite	If true the port egress limit is enabled.
ctcQosConfigInterfaceIngressLimitFrameRate	.1.3.6.1.4.1.4756.189.10.14.1.2.2.4.1.3	ReadWrite	Rate limit bandwidth = value x 64k pbs.
ctcQosConfigInterfaceIngressLimitEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.2.4.1.2	ReadWrite	If true the port ingress limit is enabled.
ctcQosConfigGlobalsStormPolicersBroadcastThreshold	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.8	ReadWrite	Storm control threshold storm counter clear period is 100ms
ctcQosConfigGlobalsStormPolicersBroadcastEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.7	ReadWrite	If true the storm policer is enabled.

ctcQosConfigGlobalsStormPolicersMulticastThreshold	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.6	ReadWrite	Storm control threshold storm counter clear period is 100ms
ctcQosConfigGlobalsStormPolicersMulticastEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.5	ReadWrite	If true the storm policer is enabled.
ctcQosConfigGlobalsStormPolicersICMPThreshold	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.4	ReadWrite	Storm control threshold storm counter clear period is 100ms
ctcQosConfigGlobalsStormPolicersICMPEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.3	ReadWrite	If true the storm policer is enabled.
ctcQosConfigGlobalsStormPolicersARPThreshold	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.2	ReadWrite	Storm control threshold storm counter clear period is 100ms
ctcQosConfigGlobalsStormPolicersARPEnable	.1.3.6.1.4.1.4756.189.10.14.1.2.1.1.1	ReadWrite	If true the storm policer is enabled.
ctcMacStatusFdbCopyToCpu	.1.3.6.1.4.1.4756.189.10.12.1.3.1.1.5	ReadOnly	Copy this frame to the CPU (True) or not (False)
ctcMacStatusFdbDynamic	.1.3.6.1.4.1.4756.189.10.12.1.3.1.1.4	ReadOnly	The entry is dynamically learned (True) or statically added (False)
ctcMacStatusFdbPortList	.1.3.6.1.4.1.4756.189.10.12.1.3.1.1.3	ReadOnly	List of destination ports for which frames with this DMAC is forwarded to.
ctcMacConfigFdbTableRowEditorAction	.1.3.6.1.4.1.4756.189.10.12.1.2.3.100	ReadWrite	Action
ctcMacConfigFdbTableRowEditorPortList	.1.3.6.1.4.1.4756.189.10.12.1.2.3.3	ReadWrite	List of destination ports for which frames with this DMAC is forwarded to.
ctcMacConfigFdbTableRowEditorMacAddress	.1.3.6.1.4.1.4756.189.10.12.1.2.3.2	ReadWrite	The destination MAC address which this entry applies.
ctcMacConfigFdbAction	.1.3.6.1.4.1.4756.189.10.12.1.2.2.1.100	ReadWrite	Action
ctcMacConfigFdbPortList	.1.3.6.1.4.1.4756.189.10.12.1.2.2.1.3	ReadWrite	List of destination ports for which frames with this DMAC is forwarded to.
ctcMacConfigFdbGlobalAgeTime	.1.3.6.1.4.1.4756.189.10.12.1.2.1.1	ReadWrite	Mac address aging time in the FDB.
ctcPortStatisticsTxCollisionPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.36	ReadOnly	Shows the number of frames detected later than 512 bit-times into the transmission.
ctcPortStatisticsTxDropPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.35	ReadOnly	Shows the number of frames discarded due to egress congestion.
ctcPortStatisticsTx1519PktsToMax	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.34	ReadOnly	The number of transmitted frames with size larger than 1518 bytes.
ctcPortStatisticsTx1024to1518Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.33	ReadOnly	The number of transmitted frames with size within 1024 to 1518 bytes.
ctcPortStatisticsTx512to1023Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.32	ReadOnly	The number of transmitted frames with size within 512 to 1023 bytes.
ctcPortStatisticsTx256to511Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.31	ReadOnly	The number of transmitted frames with size within 256 to 511 bytes.

ctcPortStatisticsTx128to255Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.30	ReadOnly	The number of transmitted frames with size within 128 to 255 bytes.
ctcPortStatisticsTx65to127Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.29	ReadOnly	The number of transmitted frames with size within 65 to 127 bytes.
ctcPortStatisticsTx64Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.28	ReadOnly	The number of 64 bytes frames transmitted.
ctcPortStatisticsTxPauseFrames	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.27	ReadOnly	The number of pause frames transmitted.
ctcPortStatisticsTxBroadcastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.26	ReadOnly	Shows the number of transmitted (good and bad) broadcast packets.
ctcPortStatisticsTxMulticastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.25	ReadOnly	Shows the number of transmitted (good and bad) multicast packets.
ctcPortStatisticsTxUnicastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.24	ReadOnly	Shows the number of transmitted (good and bad) unicast packets.
ctcPortStatisticsTxOctets	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.23	ReadOnly	Shows the number of transmitted (good and bad) bytes. Includes FCS but excludes framing bits.
ctcPortStatisticsTxPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.22	ReadOnly	Shows the number of transmitted (good and bad) packets.
ctcPortStatisticsRxSymbolPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.21	ReadOnly	The number of received frames with a symbol error.
ctcPortStatisticsRxJabbersPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.20	ReadOnly	The number of long frames (frames that are longer than the configured maximum frame length for this interface) received with invalid CRC.
ctcPortStatisticsRxFragmentsPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.19	ReadOnly	Shows the number of short frames (frames that are smaller than 64 bytes) received with invalid CRC.
ctcPortStatisticsRxOversizePkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.18	ReadOnly	Shows the number of long frames received with valid CRC.
ctcPortStatisticsRxUndersizePkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.17	ReadOnly	Shows the number of short frames (frames that are smaller than 64 bytes) received with valid CRC.
ctcPortStatisticsRxCrcError	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.16	ReadOnly	Shows the number of frames received with CRC or alignment errors.
ctcPortStatisticsRxDropPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.15	ReadOnly	Shows the number of frames discarded due to ingress congestion.
ctcPortStatisticsRx1519PktsToMax	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.14	ReadOnly	The number of received frames with size larger than 1518 bytes.
ctcPortStatisticsRx1024to1518Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.13	ReadOnly	The number of received frames with size within 1024 to 1518 bytes.

ctcPortStatisticsRx512to1023Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.12	ReadOnly	The number of received frames with size within 512 to 1023 bytes.
ctcPortStatisticsRx256to511Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.11	ReadOnly	The number of received frames with size within 256 to 511 bytes.
ctcPortStatisticsRx128to255Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.10	ReadOnly	The number of received frames with size within 128 to 255 bytes.
ctcPortStatisticsRx65to127Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.9	ReadOnly	The number of received frames with size within 65 to 127 bytes.
ctcPortStatisticsRx64Pkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.8	ReadOnly	The number of 64 bytes frames received.
ctcPortStatisticsRxPauseFrames	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.7	ReadOnly	The number of pause frames received.
ctcPortStatisticsRxBroadcastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.6	ReadOnly	Shows the number of received (good and bad) broadcast packets.
ctcPortStatisticsRxMulticastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.5	ReadOnly	Shows the number of received (good and bad) multicast packets.
ctcPortStatisticsRxUnicastPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.4	ReadOnly	Shows the number of received (good and bad) unicast packets.
ctcPortStatisticsRxOctets	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.3	ReadOnly	Shows the number of received (good and bad) bytes. Includes FCS but excludes framing bits.
ctcPortStatisticsRxPkts	.1.3.6.1.4.1.4756.189.10.11.1.5.1.1.2	ReadOnly	Shows the number of received (good and bad) packets.
ctcPortControlStatisticsClearStatisticsClear	.1.3.6.1.4.1.4756.189.10.11.1.4.1.1.2	ReadWrite	Set to TRUE to clear the statistics of an interface.
ctcPortStatusInformationSFPVendorSN	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.10	ReadOnly	Shows the SFP vendor Serial Number.
ctcPortStatusInformationSFPVendorRev	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.9	ReadOnly	Shows the SFP vendor Revision.
ctcPortStatusInformationSFPVendorPN	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.8	ReadOnly	Shows the SFP vendor Product Number.
ctcPortStatusInformationSFPVendorName	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.7	ReadOnly	Shows the SFP vendor name.
ctcPortStatusInformationSpeed	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.5	ReadOnly	Shows the current interface speed.
ctcPortStatusInformationFiber	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.4	ReadOnly	Shows whether interface is a fiber link (fiber SFP or cu SFP).
ctcPortStatusInformationFdx	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.3	ReadOnly	Shows whether interface is running in full duplex.
ctcPortStatusInformationLink	.1.3.6.1.4.1.4756.189.10.11.1.3.1.1.2	ReadOnly	Shows whether interface has link.
ctcPortJumbo	.1.3.6.1.4.1.4756.189.10.11.1.2.4	ReadWrite	If true the Jumbo Packet is supported.
ctcPortLFP	.1.3.6.1.4.1.4756.189.10.11.1.2.3	ReadWrite	Link Loss Pass Through.
ctcPortAlsPowerOffPeriod	.1.3.6.1.4.1.4756.189.10.11.1.2.2.1.4	ReadWrite	The period is Tx laser power turn OFF. The allowed range is 10 to 50 in tenths of seconds default period is 30 in tenths of seconds (3 second).

ctcPortAlsPowerOnPeriod	.1.3.6.1.4.1.4756.189.10.11.1.2.2.1.3	ReadWrite	The period is Tx laser power turn OFF. The allowed range is 10 to 50 in tenths of seconds default period is 30 in tenths of seconds (3 second).
ctcPortAlsEnabled	.1.3.6.1.4.1.4756.189.10.11.1.2.2.1.2	ReadWrite	Enable/Disable the laser power of transceiver module shutdown automatically.
ctcPortConfigFC	.1.3.6.1.4.1.4756.189.10.11.1.2.1.1.6	ReadWrite	Controls the port flow control mode.
ctcPortConfigSpeed	.1.3.6.1.4.1.4756.189.10.11.1.2.1.1.3	ReadWrite	Controls the port speed and duplex.
ctcPortConfigShutdown	.1.3.6.1.4.1.4756.189.10.11.1.2.1.1.2	ReadWrite	Controls whether interface is shutdown or powered up. Set to TRUE in order to power down the interface.





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