



## INSTALLATION AND OPERATION MANUAL

# CNGEUMC4+2(TX,RX)/M

## 10/100/1000 MBPS UNIDIRECTIONAL MEDIA CONVERTER

**This manual serves the following ComNet Model Numbers:**

CNGEUMC4+2TX/M

CNGEUMC4+2RX/M

The ComNet CNGEUMC4+2(TX,RX)/M unidirectional media converter with Link Guardian limits network traffic to one way communication between source and destination networks preventing cybersecurity attacks from a non-secured entry point in the network from reaching a secured part of the network. The CNGEUMC4+2(TX,RX)/M provides four 10/100/1000Base-T(X) copper ports and two 1000base-FX SFP ports.

The unidirectional media converter also features Port Guardian which provides additional cybersecurity protection by enabling physical port lockout in the event that an existing cable is disconnected and prevents a potential network incursion using common spoofing techniques.

Also included is the ComNet exclusive functionality for easy field deployments including DIP Switch based operation of RSFP (redundant SFP) for creating redundant fiber connections and MUX Features for port isolation preventing network video flooding of multicast traffic.

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## Regulatory Compliance Statement

Product(s) associated with this publication complies/comply with all applicable regulations. Please refer to the Technical Specifications section for more details.

## Warranty

ComNet warrants that all ComNet products are free from defects in material and workmanship for a specified warranty period from the invoice date for the life of the installation. ComNet will repair or replace products found by ComNet to be defective within this warranty period, with shipment expenses apportioned by ComNet and the distributor. This warranty does not cover product modifications or repairs done by persons other than ComNet-approved personnel, and this warranty does not apply to ComNet products that are misused, abused, improperly installed, or damaged by accidents.

Please refer to the Technical Specifications section for the actual warranty period(s) of the product(s) associated with this publication.

## Disclaimer

Information in this publication is intended to be accurate. ComNet shall not be responsible for its use or infringements on third-parties as a result of its use. There may occasionally be unintentional errors on this publication. ComNet reserves the right to revise the contents of this publication without notice.

## Safety Indications

- » The equipment can only be accessed by trained ComNet service personnel.
- » This equipment should be installed in secured location.

# Overview

## Introduction

The CNGEUMC4+2(TX,RX)/M Unidirectional Media Converter Contains many features The media converter will work under a wide variety of temperature, dirty and humid conditions. Some advanced features are configurable using DIP media converters on the device.

## Software Features

- » Web-based GUI and USB Console CLI configuration
- » Enable/disable ports
- » Jumbo Frame support (10240 MTU)
- » Static MAC lock (per port)
- » Field firmware upgrade capable
- » Port Guardian physical port lockout feature

## Hardware Features

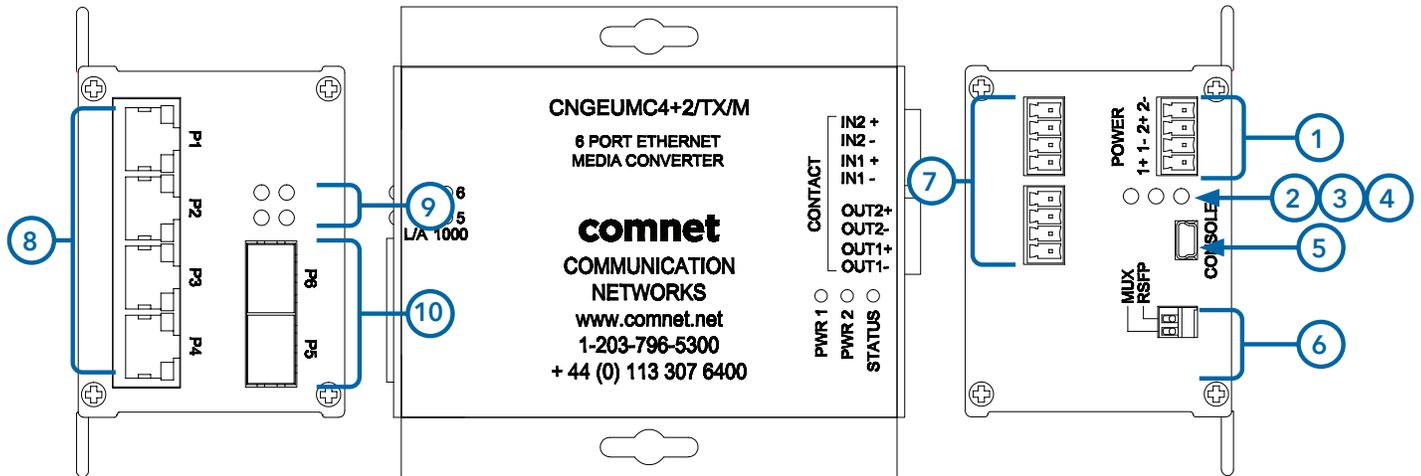
- » 2 × DIP media converters for quick feature selection
- » 2 × Redundant DC power inputs
- » Operating Temperature: -40 - 75°C
- » Storage Temperature: -40 - 85°C
- » Operating Humidity: 5% - 95%, non-condensing
- » 4 × 10/100/1000Base-TX Gigabit Ethernet port
- » 2 × 1000Base-X SFP
- » 2 × Dry Contact Inputs
- » 2 × Form A Relays
- » USB Console Port
- » Dimensions: 4.1 × 3.7 × 2.2 in (10.4 × 9.4 × 5.6 cm)

## Hardware Overview

### Side Panels

The following table describes the ports that are on the sides of the CNGEUMC4+2[POE][HO]/M.

Port	Description
10/100/1000Base-T(X) RJ-45 Ethernet ports	4 × 10/100/1000Base-TX RJ-45 fast Ethernet ports support auto-negotiation. Default Settings: Speed: auto Duplex: auto Flow control: disable
SFP Ports	2 × 1000Base-X SFP
USB Console	Use the included mini USB cable to manage the device.



CNGEUMC4+2TX/M

1. Power Connections
2. LED for PWR1
3. LED for PWR2
4. LED for STATUS
5. Console Mini USB
6. Configuration DIP switches
7. Contact Closure terminal block
8. RJ-45 Ethernet Ports 1-4
9. Link/Activity LEDs for SFP Ports 5 and 6
10. SFP Ports 5 and 6

## Indicating LEDs

LED	Color	Status	Description
PWR1	Green	On	DC Power Input 1 Good
		Off	No power detected
PWR2	Green	On	DC Power Input 2 Good
		Off	No power detected
STATUS	Green	On	Initialization passed
	Red	On	Failed
<b>10/100/1000Base-T(X) Ethernet ports</b>			
LNK/ACT	Green	On	Port link up
		Blinking	Data transmitting
Gigabit LED	Amber	On	Port speed is 1000 Mbps (Gigabit)
<b>SFP</b>			
LNK/ACT	Green	On	Port link up.
		Blinking	Data transmitted.

# Cables

## Ethernet Cables

The CNGEUMC4+2(TX,RX)/M unidirectional media converters have standard Ethernet ports. According to the link type, the media converters use CAT 3, 4, 5, & 5e UTP cables to connect to any other network device (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

*Cable Types and Specifications*

Cable	Type	Max. Length	Connector
10BASE-T	Cat. 3, 5, 5e, 6 100Ω	UTP 100 m (328 ft)	RJ-45
100BASE-TX	Cat. 5, 5e, 6 100Ω UTP	UTP 100 m (328 ft)	RJ-45
1000BASE-TX	Cat. 5, 5e, 6 100Ω UTP	UTP 100 m (328 ft)	RJ-45

## 10/100/1000BASE-T(X) Pin Assignments

With 100BASE-T(X)/10BASE-T cable, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data.

*10/100 Base-T RJ-45 Pin Assignments*

Pin Number	Assignment
1	TD+
2	TD-
3	RD+
4	Not used
5	Not used
6	RD-
7	Not used
8	Not used

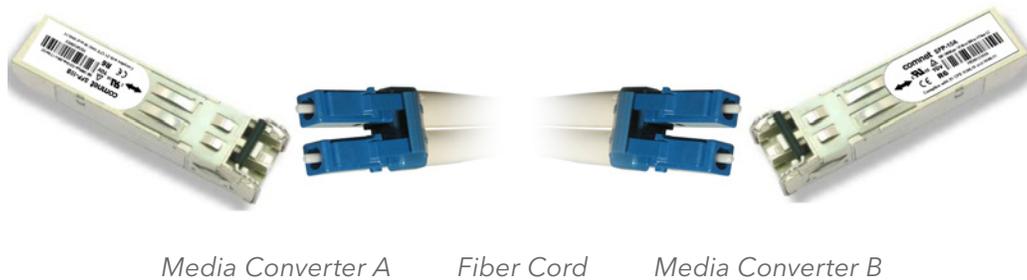
**Note:** "+" and "-" signs represent the polarity of the wires that make up each wire pair.

1000 Base-T RJ-45 Pin Assignments

Pin Number	Assignment
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

**SFP Transceivers**

The media converter has fiber optic ports that utilize SFP connectors. ComNet offers a wide selection of SFP modules that offer different fiber type, connector type and distances. Please remember that the TX port of unit A should be connected to the RX port of unit B.



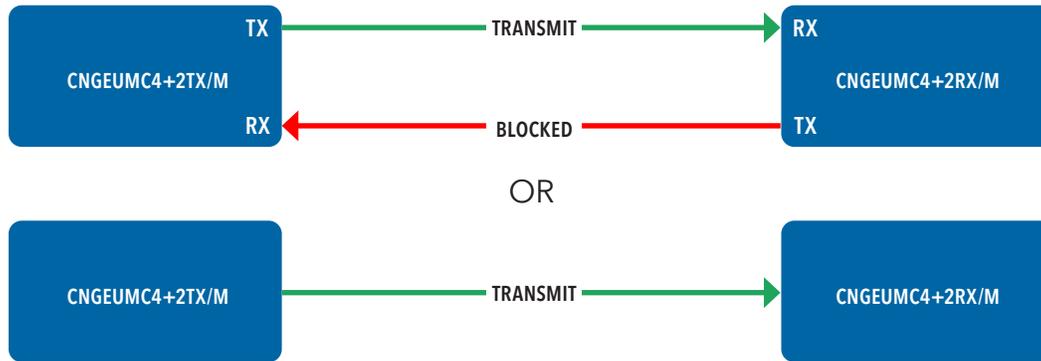
**Console Cable**

Each CNGEUMC4+2(TX,RX)/M unidirectional media converter can have the initial network settings configured by the management console port. You can connect them to a PC with USB Ports using the supplied USB to USB Mini B male plug cable.



## Unidirectional Data Transmission

The CNGEUMC4+2 unidirectional media converter will only communicate in Transmitter (CNGEUMC4+2TX/M) to Receiver (CNGEUMC4+2RX/M) pairs over fiber uplinks. Data on the source device (TX) will transmit over fiber to the destination device(RX) but data will not transmit from destination to source devices.



## DIP Switches

The CNGEUMC4+2(TX,RX)/M unidirectional media converters feature DIP switch based operation of MUX and RSFP.

The DIP Switches are located on the back of the units and are numbered from left to right when viewing the side of the media converter with the backplate on the bottom and the power connections on the left. If "Web Management Enabled" is selected in management software under Systems settings, the DIP Switch settings on the media converter will be overridden by any settings made in the browser interface.

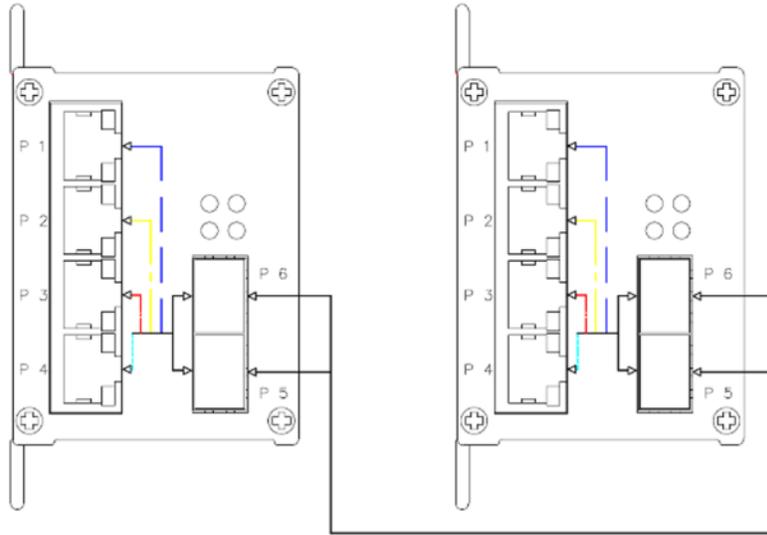
DIP Switch Position	Description
1	MUX
2	RSFP

Dip Switch Feature Summary

<b>MUX (switch 1)</b>	<b>Resulting Mode</b>	<b>Comment</b>
Off	No Port Isolation	All Ports Communicating
On	MUX Enabled	Ports 1-4 are isolated and only transmit out the fiber ports

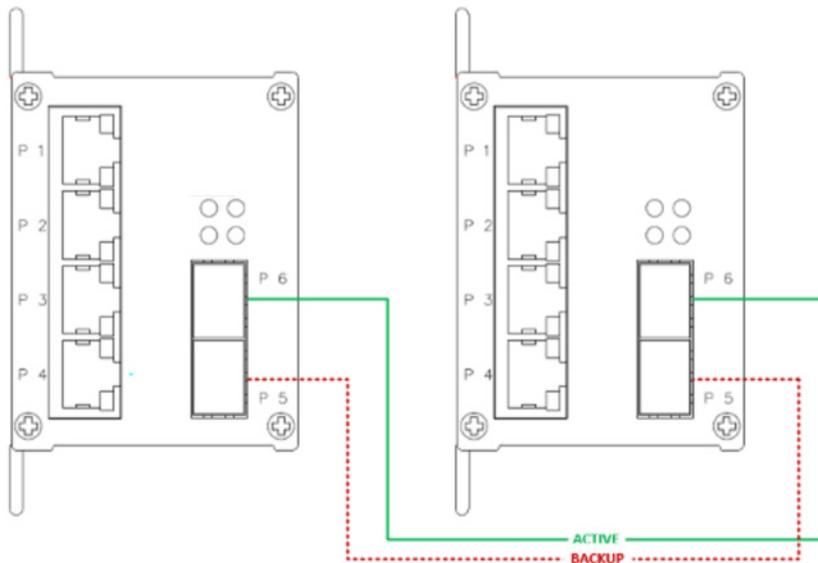
<b>RSFP (switch 2)</b>	<b>Resulting Mode</b>	<b>Comment</b>
Off	Fiber Ports are independent	All Ports Communicating
On	Fiber Ports 5 and 6 are Trunked	Port 6 is primary, Port 5 is failover

**MUX Enabled (DIP switch 1 in ON Position)**



**RSFP Enabled (DIP switch 2 in On Position)**

With RSFP (Switch 2) Enabled, the fiber ports will trunk and port 6 will be primary. Port 5 will be failover.



## Graphical User Interface

This section provides instruction on accessing the HTML Web Site on the Media Converter.

### Web Based Configuration

An embedded HTML Web Site resides in the flash memory on the CPU Board.

It contains HTML code that allows you to view and toggle settings on the Media Converter through a standard web browser.

### Preparing for GUI Access

The default values are below:

IP Address: 192.168.10.1

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.254

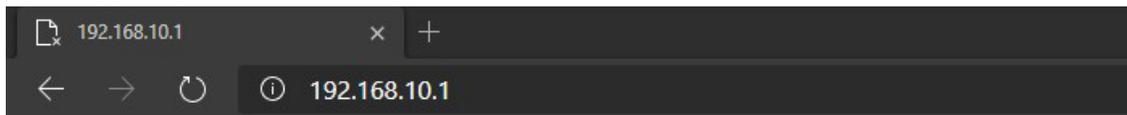
Username: admin

Password: admin

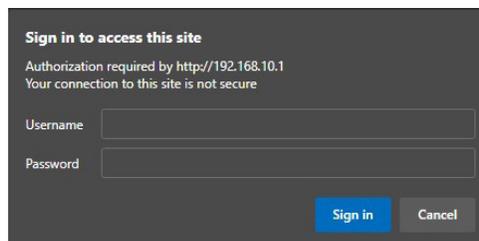
### GUI Login

With a PC on the same subnet as the Media Converter, do the following to access the GUI.

1. Launch your Web Browser.
2. Type HTTP:// and the IP address of the Media Converter, press enter.



3. The login screen appears.
4. Enter username and password, Default is "admin" for both.



5. Select Sign in or Enter, then the main interface of the web-based GUI appears.

Main Interface

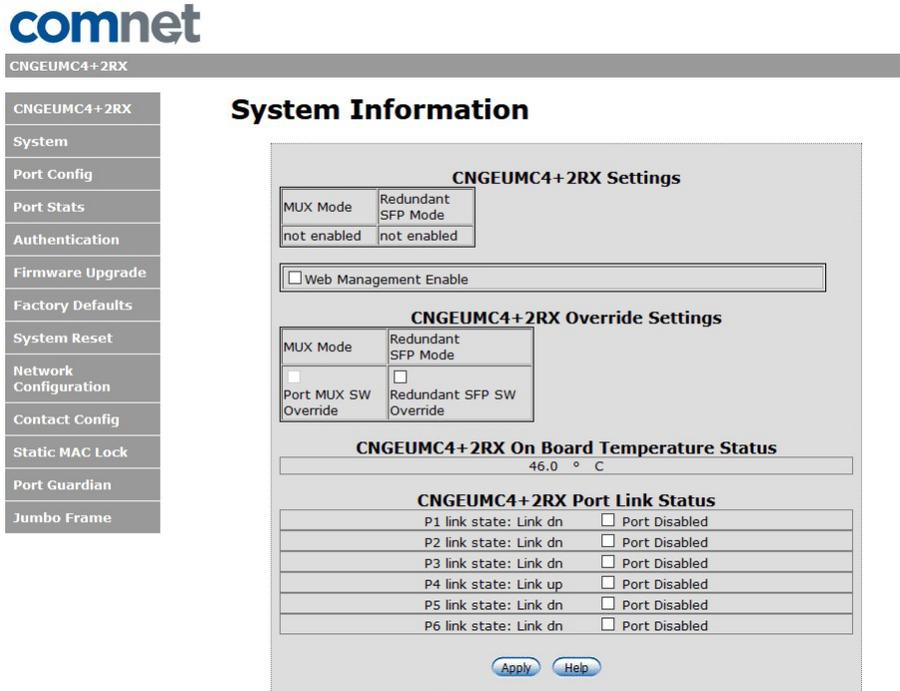


CNGEUMC4+2RX	
CNGEUMC4+2RX	<h3>Comnet CNGEUMC4+2RX</h3> <p><b>Build Version:</b> 1.0.1  <b>Build Date:</b> Oct 27 2020 11:26:34</p> <p>This website is used for management and status of the CNGEUMC4+2RX device</p> <p>All pages include a help page that describes page options</p> <p>The apply button on each page will save the displayed configuration in persistent storage to maintain the configuration between power cycles</p> <p>The USB port CLI is also available to configure the network options, the terminal settings are 115K baud 8,N,1 no flow control</p> <p><b>To avoid resubmitting configuration, please do not refresh the page. Instead, use the side navigation menu to reload the page.</b></p>
System	
Port Config	
Port Stats	
Authentication	
Firmware Upgrade	
Factory Defaults	
System Reset	
Network Configuration	
Contact Config	
Static MAC Lock	
Port Guardian	
Jumbo Frame	

Main interface

# System Information

The media converter system information is provided here.



System Information interface

Label	Description
Settings	Summary MUX and Redundant SFP Mode States
Web Management Enable	Override of the DIP Switch Settings
Override Settings	With Web MGMT Enabled, these options will override MUX and RSFP
Temperature Status	Device internal board temperature reading
Port Link Status	Link status and port disable

# Port Configuration

The Port Configuration page shows you current link state and settings.

By default, the Media Converter ports are set to auto negotiation, the user may force negotiation so they can select port speed, duplex, and flow control.



CNGEUMC4+2RX

**Port Configuration**

Port	Negotiation	Speed	Duplex	Flow Control
Port1	Auto	100	full	enable

**With forced half duplex mode, flow control ON is recommended**

Please perform a System Reset after applying any changes.

**Port Status**

Port	Link State	Negotiation	Speed	duplex	flow control
1	Link dn	-	-	-	-
2	Link dn	-	-	-	-
3	Link dn	-	-	-	-
4	Link up	Auto	100mbs	Full	Auto
5	Link dn	-	-	-	-
6	Link dn	-	-	-	-

# Port Statistics

Port Statistics displays packet counts per port. Refresh the screen to update statistics.



CNGEUMC4+2RX

**Port Statistics**

**CNGEUMC4+2RX Port Statistics**

Port MIB	Port1	Port2	Port3	Port4	Port5	Port6
Egress Stats						
OutOctets						
OutUnicast						
OutBroadcast						
OutMulticast						
Collisions						
OutFCSErr						
Ingress Stats						
InGoodOctets						
InBadOctets						
InMulticast						
InBroadcast						
InUnicast						
InRxErr						
InFCSErr						

Clear All Port Counters

# Authentication

The Authentication page allows you to change the username and password. All updates apply to both the GUI Webpage and Command Line Access.

**comnet**

CNGEUMC4+2RX

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## Authentication Username and Password Configuration

Username and password apply to both the CLI and Webpage login

**System Location:**   
**System Contact:**   
**Admin Username:**   
**Admin Password:**

## Upgrade Firmware

Enable Image Upgrade allows you to update the firmware of the Media Converter. The firmware is upgraded using a bootloader provided by ComNet. The Enable Image Upgrade button must be enabled before the bootloader will connect to the Media Converter. RSFP is not available during the firmware update process so please observe the network topology before upgrading.

**comnet**

CNGEUMC4+2RX

CNGEUMC4+2RX

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### Firmware Image Upgrade

The image upload will re-initialize the CNGEUMC4+2RX to the version listed in the hex file supplied by Comnet. This page will cause the device to reset, the webpage will stop responding and the device will be ready for image upload. **DO NOT POWER CYCLE THE DEVICE DURING THIS OPERATION** Before proceeding, make sure you have the Comnet provided UBL application and Comnet supplied firmware upgrade image. Use the windows UBL PC application to connect to the device and follow the directions in the user manual for using the application. Record the IP address of the device, the PC application will use that same IP address.

**After applying a new firmware version, it is recommended that a Factory Default Reset is performed to ensure that all new or adjusted settings take effect. Please note that performing a Factory Default reset will erase all the devices settings except for the IP address.**

Enable Image Upgrade

Apply

Details on how to use the upgrade bootloader is available in the Firmware Upgrade section.

After applying a new firmware version, it's recommended that a factory default reset is performed to ensure that all the new or adjusted settings take effect. Please note that performing a factory reset will erase all the device settings except for the IP address.

**Warning Do not enable the firmware update process unless you have a firmware file available and are ready to upgrade the unit. Once this process is started it cannot be cancelled and if a new firmware is not uploaded to the unit it will be necessary to return the unit to the factory for re-programming.**

# Factory Defaults Reset

The factory default Reset feature restores the device to the original factory default values except for the network configuration settings.



CNGEUMC4+2RX

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## Factory Defaults Reset

The Factory Defaults Reset will re-initialize the defaults as shipped from the factory with the exception of the Network settings. The factory default administrative password is shown in the product literature.

A Factory Defaults Reset is required following a firmware upgrade

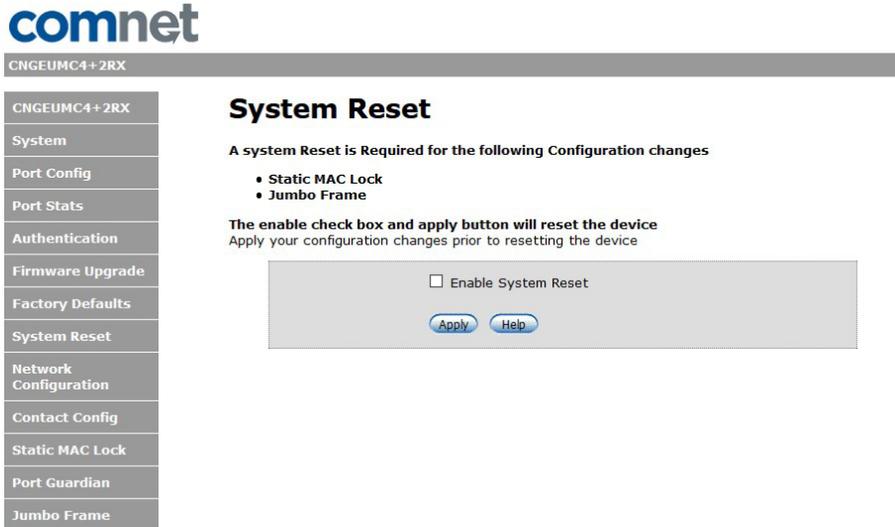
Enable Factory Default Reset

[Apply](#)

# System Reset

A System Reset is required for configuration of Jumbo Frames and the Static MAC Lock.

System reset is a soft reboot, system can take up to 15 seconds to fully power cycle.



*System Reset interface*

# Network Interface Configuration



CNGEUMC4+2RX

- CNGEUMC4+2RX
- System
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## Interface Configuration

This page allows for changing the network configuration settings.

**CAUTION:** Incorrect settings may cause the board to lose network connectivity. Recovery options will be provided on the next page.

Enter the new settings for the network interface below:

Please perform a System Reset after applying any Network Interface changes.

**MAC Address:** 00:22:3b:ff:ff:ff

**Host Name:**

Enable DHCP

**IP Address:**

**Gateway:**

**Subnet Mask:**

**Primary DNS:**

**Secondary DNS:**

Label	Description
Host Name	Assign a name to the device
Enable DHCP	When DHCP Client function is enabled, the Media Converter will be assigned an IP Address from the network DHCP Server. The default IP will be replaced by the DHCP Address assigned to it.
IP Address	IP address of the media converter.
Gateway	Gateway Address for network traffic.
Subnet Mask	Subnet mask for the device.
Primary DNS	Assign the primary DNS IP address if needed
Secondary DNS	Backup DNS if needed

# Contact Configuration



CNGEUMC4+2RX

**Contact Configuration**

CNGEUMC4+2RX Contact Configuration

Output 1 Contact	Output 2 Contact
<input type="checkbox"/> PS1 Fault	<input type="checkbox"/> PS1 Fault
<input type="checkbox"/> PS2 Fault	<input type="checkbox"/> PS2 Fault
<input type="checkbox"/> Port 1 loss	<input type="checkbox"/> Port 1 loss
<input type="checkbox"/> Port 2 loss	<input type="checkbox"/> Port 2 loss
<input type="checkbox"/> Port 3 loss	<input type="checkbox"/> Port 3 loss
<input type="checkbox"/> Port 4 loss	<input type="checkbox"/> Port 4 loss
<input type="checkbox"/> Port 5 loss	<input type="checkbox"/> Port 5 loss
<input type="checkbox"/> Port 6 loss	<input type="checkbox"/> Port 6 loss

CNGEUMC4+2RX Contact Override

Contact 1 Manual Override	Contact 2 Manual Override
<input type="checkbox"/> Con 1 ovrd	<input type="checkbox"/> Con 2 ovrd
<input checked="" type="checkbox"/> Con 1 closed	<input checked="" type="checkbox"/> Con 2 closed

CNGEUMC4+2RX Contact Status

Input Contact 1: Contact not Active
Input Contact 2: Contact not Active
Output Contact 1: Contact Closed
Output Contact 2: Contact Closed

Apply Help

Label	Description
Output Contact	The faults that trigger the output contacts are fully configurable by selecting the source(s) to monitor
Contact Override	The contacts may also be forced to be an opened or closed state, the state box checked will close the contact when override is selected
Contact Status	The input and output contact states are displayed

# Static MAC Lock



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### Static MAC Lock

This page allows for assigning static MAC addresses to a specific participating port. Changes to the MAC lock must be applied to save in the startup configuration and **a reboot is required for changes to take effect. This feature is not compatible with RSTP.**

Enable Static MAC Lock
 

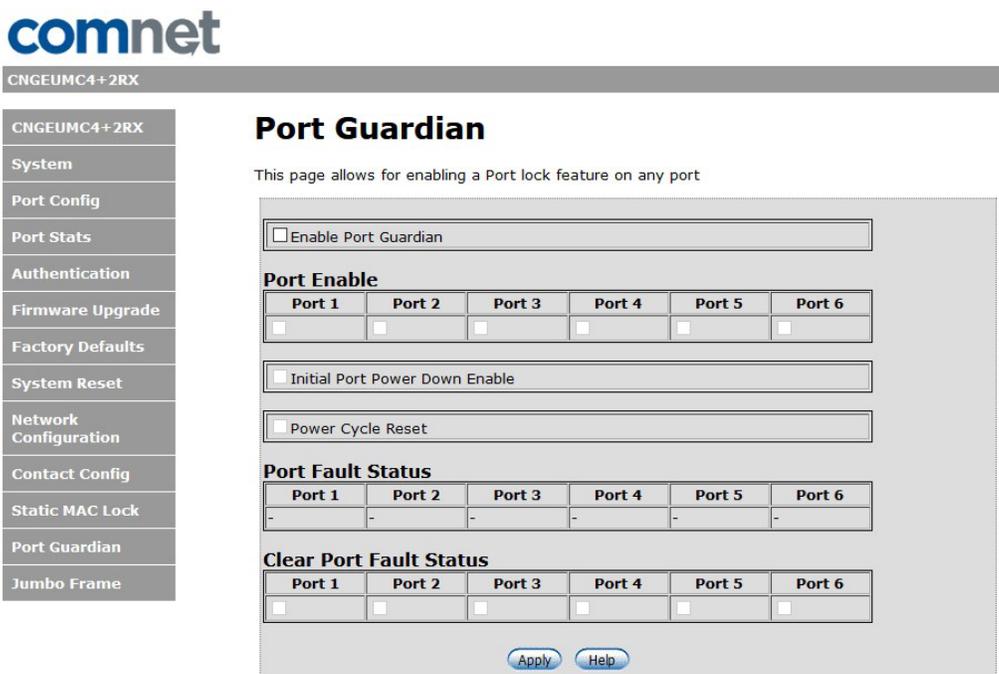
Static MAC Addr.	Port 1	Port 2	Port 3	Port 4	Delete
00:00:00:00:00:00	<input type="checkbox"/>				
00:00:00:00:00:00	<input type="checkbox"/>				
00:00:00:00:00:00	<input type="checkbox"/>				
00:00:00:00:00:00	<input type="checkbox"/>				

Label	Description
Enable Static MAC Lock	Enables Static MAC Locking
Static MAC Address	MAC Address of the device that is allowed to forward and receive traffic. Packets will be dropped for MAC addresses not listed in the table
Port Number	Ports to be included in the locked list

## Port Guardian

The Port Guardian feature provides a high security managed port lock out mode and when enabled will power down the port as soon as a link loss status is detected when a cable is disconnected. This provides high security against network attack by an intruder who accesses the edge device and disconnects it to then try and connect their own intrusion device (laptop, network sniffer etc.).

To reset a port from a lock out state the network administrator can issue an SNMP reset or can reset a port by using the CLI via the USB serial port. In PoE models a reset can also be initiated by using one of the contact inputs.

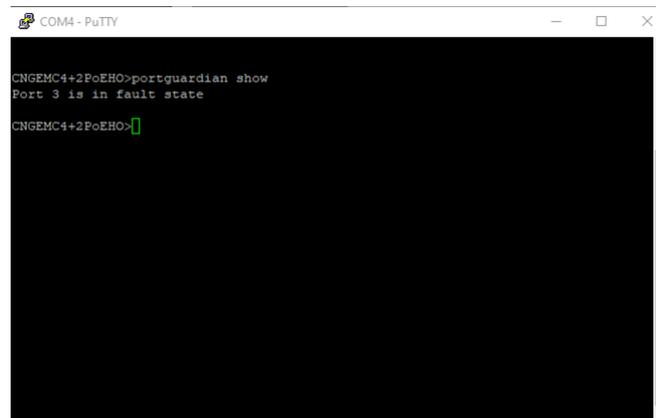


Label	Description
Enable	Enable the Port Guardian feature
Port Enable	Enable the Port Guardian feature on each port
Initial Port Power Down	If enabled, then any ports which are enabled for Port Guardian will be put into lock out state in the event of a power cycle. These ports would then need to be re-enabled by the administrator after a power cycle event.
Power Cycle Reset	If enabled, any ports which were in lock out state will be re-enabled after a power cycle
Port Fault Status	Displays the current port state. A "faulted" message indicates the port is disabled by Port Guardian
Clear Port Fault Status	Check and apply to clear a port faulted on a port

## Port Guardian - CLI Reset

The Port Guardian feature can be cleared from the USB serial port connection on the unit through the CLI and also the port status can be displayed to show any ports that are in lock out state.

To access the Port Guardian CLI commands, connect to the CLI using the procedure described in the Command Line Interface Management section on page 48 and then use the commands described below.

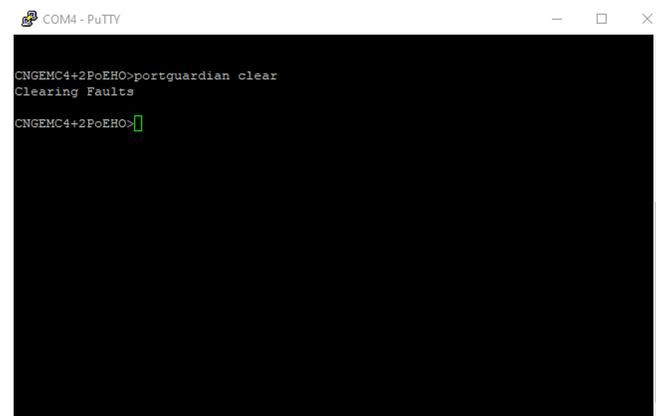


```

COM4 - PuTTY
CNGEMC4+2PoEHO>portguardian show
Port 3 is in fault state
CNGEMC4+2PoEHO>

```

Command	Description
<i>portguardian show</i>	Will display any ports that are currently in port lockout fault state.



```

COM4 - PuTTY
CNGEMC4+2PoEHO>portguardian clear
Clearing Faults
CNGEMC4+2PoEHO>

```

Command	Description
<i>portguardian clear</i>	Will clear any ports that were previously in port lockout fault state.

# Jumbo Frame Port Configuration

Select port frame size (MTU). 10240 is the default for the device. To disable jumbo frame support, select "Not Enabled" on the appropriate port. That will default the MTU size to 1522.



CNGEUMC4+2RX

---

CNGEUMC4+2RX

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Static MAC Lock

Port Guardian

Jumbo Frame

## Jumbo Frame Port Configuration

Port1	Port2	Port3	Port4	Port5	Port6
10240 MTU ▾					

**The MTU size when not enabled is 1522, RFC 1191**

Apply
Help

Please perform a System Reset after applying any Jumbo Frame changes.

# Command Line Interface Management

## How to access the Command Line Interface (CLI)

CLI access is provided by connecting a USB cable from a PC to the Media Converter.

The PC should recognize the device and assign a COM Port to the device. Please refer to your PC documentation to determine which COM port was assigned to the media converter.

CLI Serial Settings (115200 Baud, 8, non, 1, none)

To connect to CLI, you will use a terminal emulator application that can communicate using serial protocol. The following example will use Tera Term.

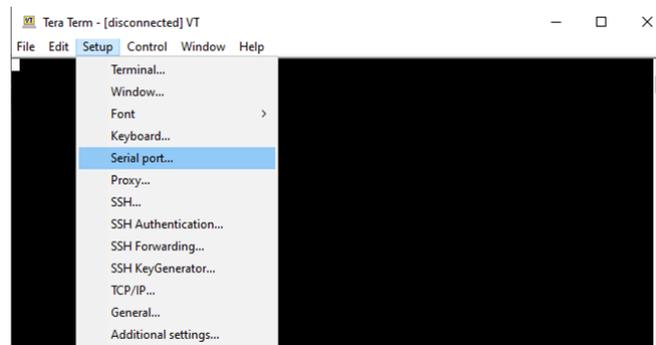
<https://ttssh2.osdn.jp/index.html.en>

Step 1. Download and install Tera Term.

Step 2. Connect PC to Media Converter, verify that a COM port was assigned to the device.

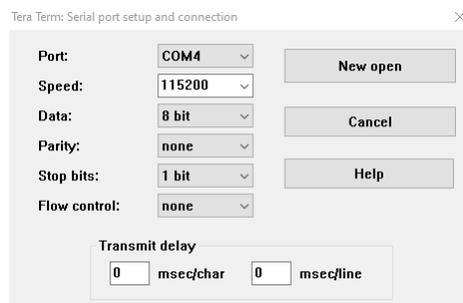
Step 3. Start Tera Term.

Step 4. Configure Serial Settings by Selecting Setup -> Serial



Step 5. Configure the following Settings.

**Note:** Select the appropriate COM port for your device.



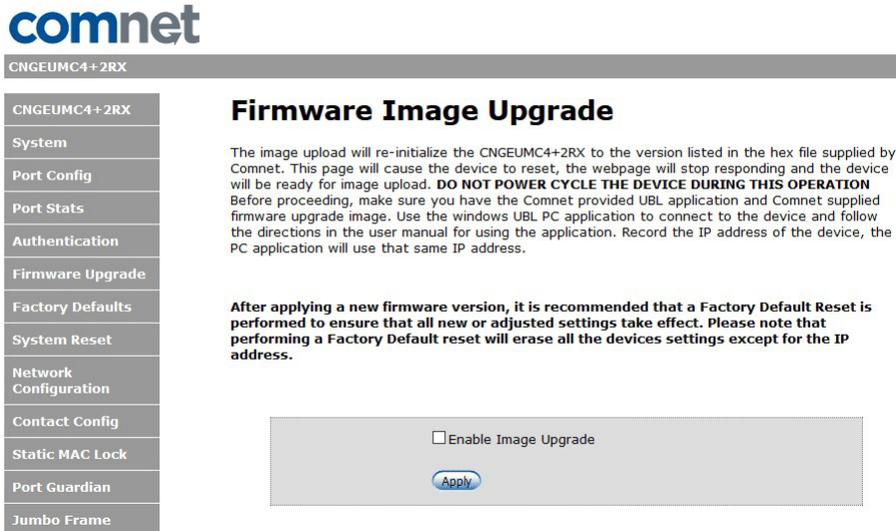
Step 6. Hit enter to initiate the connection and receive the Username prompt. After a successful login, you will be presented with a CLI prompt. Here is a list of some helpful commands:

Command	Description
netinfo	Displays the IP Address of the device
help	Displays a list of available command
setip	Update the IP Address on the device Format: setip <interface> <IP Address> <Subnet Mask> Example format: "setip eth0 10.10.10.10 255.255.255.0"

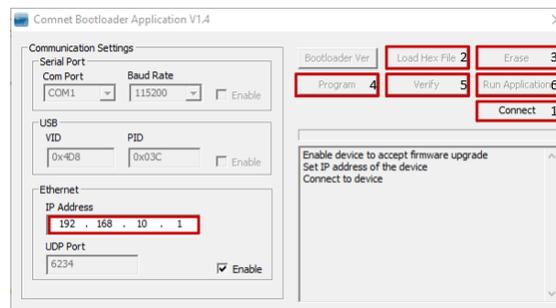
## Firmware Upgrade Procedure

The steps for upgrading the unit with the push bootloader are as follows:

1. Bring up the web server and select the Firmware Upgrade tap. Check the "Enable Image Upgrade box.



2. Start the bootloader and verify the IP address listed is the same as your device. Update if needed.



Once IP Address is correct, click on connect (step 1) then follow the next steps:

- Click Load Hex File (2)
- Click Erase (3)
- Click Program (4)
- Click Verify (5)
- Click Run Application (6)

**Warning:** Do not enable the firmware update process unless you have a firmware file available and are ready to upgrade the unit. Once the process is started, it cannot be cancelled and if a new firmware is not uploaded to the unit it will be necessary to return the unit to the factory for re-programming.

## Technical Specifications

### Interface

SFP	2 × 1000Base-X SFP
RJ-45 Ports	2 × 10/100/1000Base-T(X), Auto MDI/MDIX
LED Indicators	Per Unit: Power x 2 (Green) RJ-45 Per Port: Link/Activity (Green/Blinking), 1000 Mbps Indicator (Amber) SFP Per Port: Link/Activity (Green/Blinking)

### Power Requirements

Input Voltage	Dual 9 - 36 VDC or 24 VAC
Current Draw	1A
Reverse Polarity	Polarity Protection Present on terminal block

### Environmental

Operating Temperature	-40 to +75 °C
Storage Temperature	-40 to +85 °C
Operating Humidity	5% to 95%, non-condensing

### Mechanical

Dimension	4.1 × 3.7 × 2.2 in (10.4 × 9.4 × 5.6 cm)
Casing	Aluminum

### Regulatory Approvals

EMC	EN50130-4:2011 EN55024:2010 EN55022:2010
EMS	EN 55022:2010 Radiated Emissions EN 55022:2010 Conducted Emissions EN 61000-3-2-2006+A2:2009 Harmonic Current Emissions EN 61000-3-3:2013 Voltage Fluctuations EN 61000-4-2:2009 ESD EN 61000-4-3:2006 + A2:2010 Radiated Electromagnetic Field Immunity EN 61000-4-4:2012 EFT EN 61000-4-5:2006 Surge Immunity EN 61000-4-8:2010 Magnetic Field Immunity EN 61000-4-11:2004 Voltage Dips and Fluctuations EN 50130-4:2011 Mains Supply Variations
Safety	EN 60950-1 SELV
Warranty	Lifetime

# MECHANICAL INSTALLATION INSTRUCTIONS

## ComNet Customer Service

Customer Care is ComNet Technology's global service center, where our professional staff is ready to answer your questions at any time.

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