CMR-8500

DVB IP Encapsulator

Installation and Operation Manual

Part Number MN-CMR8500
Revision 2
June 30, 2009

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

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Customer Support

Contact the Comtech EF Data Customer Support Department for:
- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached at:

Comtech EF Data
Attention: Customer Support Department
2114 West 7th Street
Tempe, Arizona 85281 USA

480.333.2433 or 480.333.4357 (Customer Support Desk)
480.282.2850 (After Hours Support)
480.333.2161 FAX

To return a Comtech EF Data product (in-warranty and out-of-warranty) for repair or replacement:

- **Contact** the Comtech EF Data Customer Support Department. Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.
- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.
- **Pack** the product in its original shipping carton/packaging to ensure that the product is not damaged during shipping.
- **Ship** the product back to Comtech EF Data. (Shipping charges should be prepaid.)

For Online Customer Support:

An RMA number request can be requested electronically by contacting the Customer Support Department through the online support page at **www.comtechefdata.com/support.asp**:

- **Click** on "Return Material Authorization" for detailed instructions on our return procedures.
- **Click** on the "RMA Request Form" hyperlink, then fill out the form completely before sending.
- **Send e-mail** to the Customer Support Department at **cdmipsupport@comtechefdata.com**.

For information regarding this product's warranty policy, refer to the Warranty Policy, p. xi.

About this Manual

This manual provides installation and operation information, functional capabilities, and performance specifications for the Comtech EF Data (CEFD) CMR-8500 DVB IP Encapsulator. The manual additionally provides information on how to connect the CMR-8500 to other data transport equipment.

This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the CEFD CMR-8500 DVB IP Encapsulator.

Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual are appreciated. To submit comments, please e-mail the Comtech EF Data Technical Publications Department at **techpub@comtechefdata.com**.

Conventions and References

Cautions and Warnings

IMPORTANT or NOTE indicates a statement that is associated with the task being performed or information critical for proper equipment function.

CAUTION indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
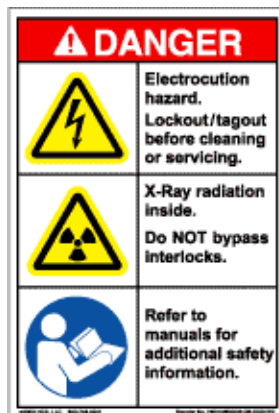
Examples of Multi-Hazard Formats

Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing non-Metric to Metric conversions.

Recommended Standard Designations

Recommended Standard (RS) Designations are interchangeable with the designation of the Electronic Industries Association (EIA).

Trademarks

Windows is a trademark of the Microsoft Corporation.

Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged. Comtech EF Data neither endorses nor otherwise sponsors any such production or services referred herein.

Electromagnetic Compatibility (EMC) Compliance

This is a Class B product. In a domestic environment, it may cause radio interference that requires the user to take adequate protection measures.

Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commision (FCC) rules, and EN55022 Class A requirements. (*pending*)

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

EN61000 Compliance

This equipment meets the EMC/immunity characteristics for the limits and methods of measurement for information technology equipment as per EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5 and EN61000-4-11. (*pending*)

This equipment meets the EMC/immunity characteristics for the limits and methods of measurement of mains harmonics & flicker for information technology equipment as per CE EN61000-3-2 and EN61000-3-3. (*pending*)

Safety Compliance

EN60950 Compliance

Applicable testing is routinely performed as a condition of manufacturing on all units to ensure compliance with safety requirements of EN60950. This equipment meets the Safety of Information Technology Equipment specification as defined in EN60950. (*pending*)

Low Voltage Directive (LVD)

The following information is applicable for the European Low Voltage Directive (EN60950):

<HAR>	Type of power cord required for use in the European Community.
⚠	**CAUTION:** Double-pole/Neutral Fusing **ACHTUNG:** Zweipolige bzw. Neutralleiter-Sicherung

International Symbols:

Symbol	Definition		Symbol	Definition
∼	Alternating Current		⏚	Protective Earth / Safety Ground
⎓	Fuse		⏚	Chassis Ground

> **NOTE**
>
> **For additional symbols, refer to Cautions and Warnings *listed earlier in this Preface.***

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a period of two years from the date of shipment. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original two year warranty or a 90 day extended warranty, whichever is longer.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Chapter 1. INTRODUCTION

Figure 1-1. DVB IP Encapsulator – Front Panel

1.1 Introduction

The Comtech EF Data (CEFD) DVB IP Encapsulator (IPE) provides the highest packet processing performance on the market today.

The CMR-8500 encapsulates Ethernet/IP Unicast or Multicast packets, as specified by DVB Multiprotocol Encapsulation (MPE) recommendation (documented in ETSI EN 301 192) and formats the sections into MPEG-2 transport frames for transmission over an Asynchronous Serial Interface (ASI) link or Gigabit Ethernet (GE) interface over Code of Practice 3 (CoP3) as outlined by the ProMPEG specification.

The CMR-8500 DVB IP Encapsulator is available in the following configurations:

- Standalone unit
- 1:1 Redundant system

1.2 Standard Features

Based on an embedded architecture, the CMR-8500 provides the following features:

- High Reliability – supports 1:1 redundancy
- Support for Multicast and Unicast IP datagrams
- MPE Section Packing and Non-Section Packing on a route-by-route basis
- Support for all valid PIDs in 8192 range
- 80,000 Routes and one default route
- QoS on a route-by-route basis (min/max bandwidth)
- MPEG-2 188/204-byte operation
- Aggregate throughput of 155 Mbps with 1,500-byte IP packets
- Maximum configurable egress rate 155 Mbps

- Program Specific Information (PSI) - PAT/PMT support
- IGMP for Multicast Route Announcements
- Configurable Telnet, FTP, and HTTP ports for security
- Color LEDs for status monitoring and rapid fault isolation
  - Support for 802.1Q VLAN Tags
  - Management (monitor, control and configuration):
    - Web Interface
    - FTP and TFTP for remote field software/firmware upgrade
    - SNMP V2 (Private and MIB II) Support
  - Multicast Zones
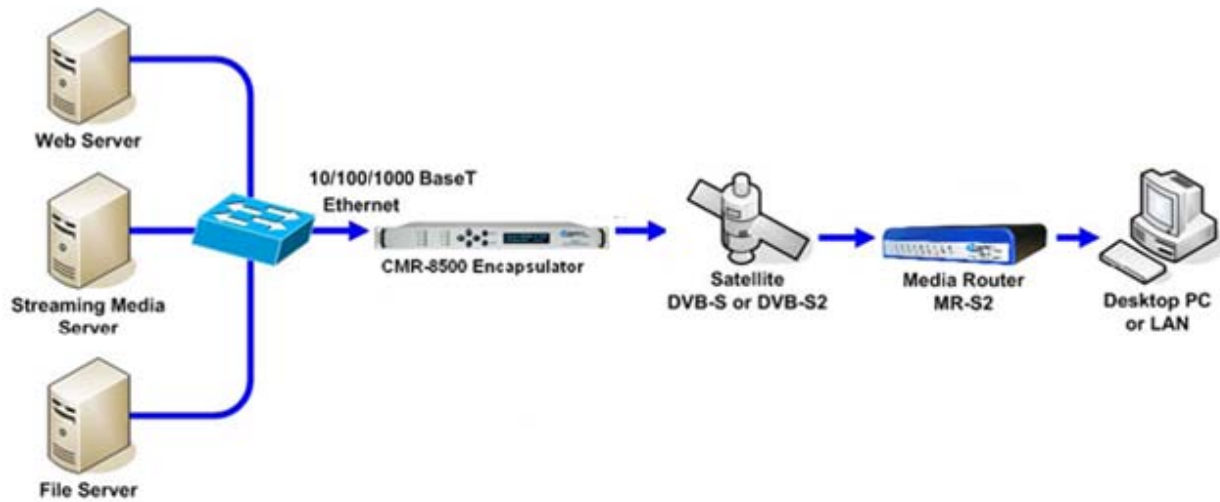
Figure 1-2. CMR-8500 DVB IP Encapsulator

1.3 Redundancy

Figure 1-3. CMR-8500 Redundant System

The CMR-8500 supports a 1:1 redundant configuration, providing for automatic failover in the event of a failure of the primary encapsulator. For networks with high availability demands, the redundant system provides a cost effective solution.

Note: The CMR-8500 supports CoP3 (Gigabit Ethernet) redundancy only. ASI redundancy is not currently supported.

1.3.1   Configuration

Redundancy is accomplished through the CMR-8500 by communication over the management Ethernet interface and the redundancy (via the CA-0000316 connection) interfaces. One unit is designated as the primary unit, while the other is designated as the backup unit. Redundancy configuration is done using the web interface on both units. Please refer to section 4.2.4.3 for instructions on configuring redundancy in detail.

Note: Whenever changes are made to the configuration through the web interface, the user must click on the "Submit" button for the page for the changes to take effect. In order for the changes to be saved upon a reboot of the system, the user must click on the "Save" tab on the upper right of the web interface.

Permanent changes to the configuration require two steps, first click "Submit", then click on "Save".

1.3.2   Operation

The design of the CMR-8500's redundant system ensures high reliability and low probability of a single point of failure. In the unlikely event of a failure with the primary encapsulator, the system will switch over to the backup unit.

The status of an IPE is indicated by the REDUN LED. When configured in a redundant system:

- **Solid green** LED indicates that the unit is in primary mode and operational
- **Flashing green** LED indicates that the unit is in backup mode

1.4   Performance

The CMR-8500 provides the following performance characteristics:

Item	Value	Interfaces
Maximum Packets per Seconds (Minimum Packet Size 64 Bytes)	150,000 packets per second (pps)	GE to GE or GE to ASI
Maximum Bits Per Second (Maximum Packet Size 1,518 Bytes)	155 Mbps (188 byte mode)	GE to GE or GE to ASI
Egress Clock Accuracy	Better than +/- 1 Kbps (KHz)	-
Latency	Less than 10 ms	-

1.5   Specifications

The table below outlines the technical specifications for the CMR-8500 standalone unit. For detailed connector pin assignment information, please refer to **Chapter 3 – Interface Pinouts**.

Parameter		Specification		
Physical	Dimensions	11.375" L x 17" W x 1.75" H (28.89 x 43.18 x 4.45 cm)		
	Weight	6 lbs (2.7 kg)		
	Power	50-60 Hz / 100-220VAC auto-sensing AC Input		
	ASI Copper Output (2)	BNC (75Ω)		
	ASI Copper Input (2)	BNC (75Ω)		
	REF Ext/Int	BNC (75Ω)		
	Ethernet (10/100/1000BaseT) GE-1 and GE-2 port	RJ-45		
	Ethernet (10/100BaseT) Management port	RJ-45		
	Terminal	RJ-12		
	Aux	RJ-12		
	LEDs	LED	Color	Description
		STATUS	Green/Red	Red indicates error status, green indicates status ok
		ASI IN 1	Green	Solid when ASI input to this port is connected
		ASI IN 2	Green	Solid when ASI input to this port is connected
		REDUN	Green	Redundancy indicator. Solid green unit is redundant online and flashing green is redundant offline (backup)
		FE ACT	Amber	Flashes when there is Ethernet activity on this port

Parameter		Specification		
		GE1 ACT	Amber	Flashes when there is Ethernet activity on this port
		GE2 ACT	Amber	Flashes when there is Ethernet activity on this port
		MGT	Amber	Solid when management connection (web or Telnet or FTP)
Electrical	Power/Input Consumption	100-220VAC auto-sensing AC Input		
	ASI (Copper)	EN50083-9		
	Ethernet (10/100/1000BaseT)	IEEE802.3ab		
	Ethernet (10/100BaseT)	IEEE 802.3u		
	Console	RS-232		
	Aux	RS-232		
Environmental	Temperature			
	Operating	32° to 122° Fahrenheit (0° to 50° Celsius)		
	Storage (non-operating)	-68° to 158° Fahrenheit (-20° to 70° Celsius)		
	Humidity			
	Operating	10% to 90% Non-condensing		
	Storage (non-operating)	Relative humidity to 95% with temperature ≤ 95° Fahrenheit (35° Celsius)		
	Altitude			
	Operating	Up to 10,000 feet (3,048 m) above sea level		
	Storage (non-operating)	Survival up to 50,000 feet (15240 m) above sea level for up to 15 hours		

1.6　　　　　Terminology

Acronym	Definition
ASI	Asynchronous Serial Interface
ATSC	Advanced Television Systems Committee
BNC	Bayonet Nut Connector
CEFD	Comtech EF Data Corporation
CIDR	Classless Inter-Domain Routing
CMR	Comtech Media Router
CoP3	Code of Practice 3
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
DTE	Data Terminal Equipment
DVB	Digital Video Broadcasting
EN	Norme European (European Standard)
ETSI	European Telecommunications Standards Institute
FAST	Fully Accessible System Topology
FE	Fast Ethernet
FPGA	Field Programmable Gate Array
FTP	File Transfer Protocol
GigE	Gigabit Ethernet
GE	Gigabit Ethernet
GUI	Graphical User Interface
HTML	HyperText Markup Language
HTTP	HyperText Transport Protocol
IANA	Internet Assigned Number Authority
ICMP	Internet Control Message Protocol
IEC	International Electro- technical Commission
IEEE	Institute for Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPE	IP Encapsulator
IRD	Integrated Receiver Decoder
LAN	Local Area Network
LED	Light Emitting Diode

Acronym	Definition
LLC_SNAP	Logical Link Control – Sub-Network Access Protocol
MAC	Media Access Control
Mbps	Mega bits per second
MENCAP	Micro Encapsulator
MGT	Master Guide Table
MIB	Management Information Base
MGT	Management
MPE	Multiprotocol Encapsulation
MPEG	Moving Pictures Experts Group
MPEG2	Moving Pictures Experts Group Layer 2
NIC	Network Interface Card
NIT	Network Information Table
ODI	Opportunistic Data Insertion
OID	Object Identifier
OS	Operating System
PAT	Program Association Table
PID	Program Identifier
PMT	Program Map Table
PSI	Program Specific Information
QoS	Quality of Service
REF	Reference
RMA	Return Materials Authorization
RSW	Redundancy Switch
SI	Service Information
SM	Subnet Mask
SMPTE	Society of Motion Picture & Television Engineers
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TS	Transport Stream
UDP	User Datagram Protocol
VCT	Virtual Channel Table
VLAN	Virtual Local Area Network

Chapter 2. INSTALLATION & INITIAL CONFIGURATION

2.1 Major Assembly

The table below lists the components provided with the unit. If any listed item is missing, please contact Comtech EF Data Customer Support.

Quantity	Description
1	CMR-8500 DVB IP Encapsulator
1	IEC AC Power Cord
1	CA-TERMINAL cable
1	Quick Start Reference
1	CA-0000316 Redundancy cable

2.2 Unpacking

Retain the shipping container and packing material for possible reshipment.

Perform a receiving inspection as follows:
- **Inspect** the shipping container for damage. If there is damage to the shipping, container, notify the carrier.
- **Check** to determine that all parts, materials and documentation have been shipped with the IPE.
- **Inspect** the IPE for possible physical damage.
- **Test** the IPE for proper operation.
- **Contact** Comtech EF Data Customer Support if the shipment is:
  - Incomplete
  - Physically damaged
  - Inoperable

2.3 Installation

The CMR-8500 is designed for ease of installation and configuration. Once the unit has been removed from the packing container, please follow these instructions:

Step	Procedure		
1	Place the unit into a rack with free airflow, where the LEDs can be clearly observed and with unrestricted access to the rear panel of the unit.		
2 IMPORTANT	Do NOT connect the ASI cable until the unit has been completely configured.		
3	Connect the IEC 320 AC power cable to the power connection on the back of the unit.		
4	Connect AC power (via the IEC 320 power cord) between a standard wall outlet and the CMR-8500.		
5	Upon startup, the LEDs on the front panel illuminate as follows:		
	Color	Label	Description
	Green/Red	STATUS	Red indicates error status, green indicates status ok
	Green	ASI IN 1	Solid when ASI input on this port (*future*)
	Green	ASI IN 2	Solid when ASI input on this port (*future*)
	Green	REDUN	Redundancy indicator. Solid green unit is redundant online and flashing green is redundant offline (backup)
	Amber	FE ACT	Flashes when activity on the management interface
	Amber	GE1 ACT	Flashes when activity on the GigE-1 interface
	Amber	GE2 ACT	Flashes when activity on the GigE-2 interface
	Amber	MGT	Solid when management connection (FTP, web or Telnet activity)
6	Connect the FE interface to the Ethernet switch to allow the CMR-8500 to be managed via a web browser on a PC.		

2.4   Initial Configuration

The initial configuration requires using the front panel to set up the IP parameters on the FE MGT (management IP port). Once the IP parameters have been configured, connect the CMR-8500's FE port to the management network, and use the web interface to complete the configuration.

To configure the IP parameters using the front panel:

Step	Procedure
1	Use the keypad to navigate the Vacuum Fluorescent Display (VFD) menu display
2	Select the **Config** menu option
3	Select the **Ethernet** menu option for the FE MGT port
4	Select the **IP Address** option and enter the IP address (in dotted decimal format)
5	Select **Mask** and enter the subnet mask (in dotted decimal format)
6	Select **Gateway** and enter the IP address of the default gateway
7	Connect an Ethernet cable to the port labeled **FE MGT** and your network Ethernet switch

After completing the preceding steps, the unit is configured for management IP operation. Please use the web interface to complete configuration of the unit. Additional configuration and management is best performed using the web interface (refer to Chapter 4, Device Management Via User Interfaces). Use of the front panel is described in Chapter 4 as well.

2.5   Redundancy Configuration

Redundancy management with the CMR-8500 is accomplished through the Fast Ethernet (FE) interface and the Redundancy (REDUNDANT) interface. The FE interface carries the configuration data between the primary and backup units, and the REDUNDANT interface carries the status of the units to the redundant partner. To utilize redundancy, both CMR-8500s (primary and backup) must have the following connections:

- FE connections cabled to a common Ethernet switch
- REDUNDANT connections must be connected via Comtech EF Data part number CA-0000316

Setup of both units is the same as instructed in Section 2.4, Initial Configuration, plus setting up the redundancy information on the Redundancy Tab of each unit. The required information is the IP address of each interface on the other unit. Please refer to Chapter 4, Section 4.2.4.3 for more on redundancy configuration.

The connection between the REDUNDANT interface via CA-0000316 provides the following unit status:

- Primary Unit (Mode of operation and state of unit - including the status of the GE interfaces)
- Backup Unit (Mode of operation and state of unit - including the status of the GE interfaces)

If the REDUNDANT ports become disconnected, both units will transition to online status until the condition is cleared.

Whenever changes are made to the configuration using the web interface:

Click the "**Submit**" button for the changes to take effect.

To save the changes upon a reboot of the system, click the "**Save**" tab on the upper right of the web interface window.

Permanent changes to the configuration require two steps: first, click "**Submit**", then click "**Save**".
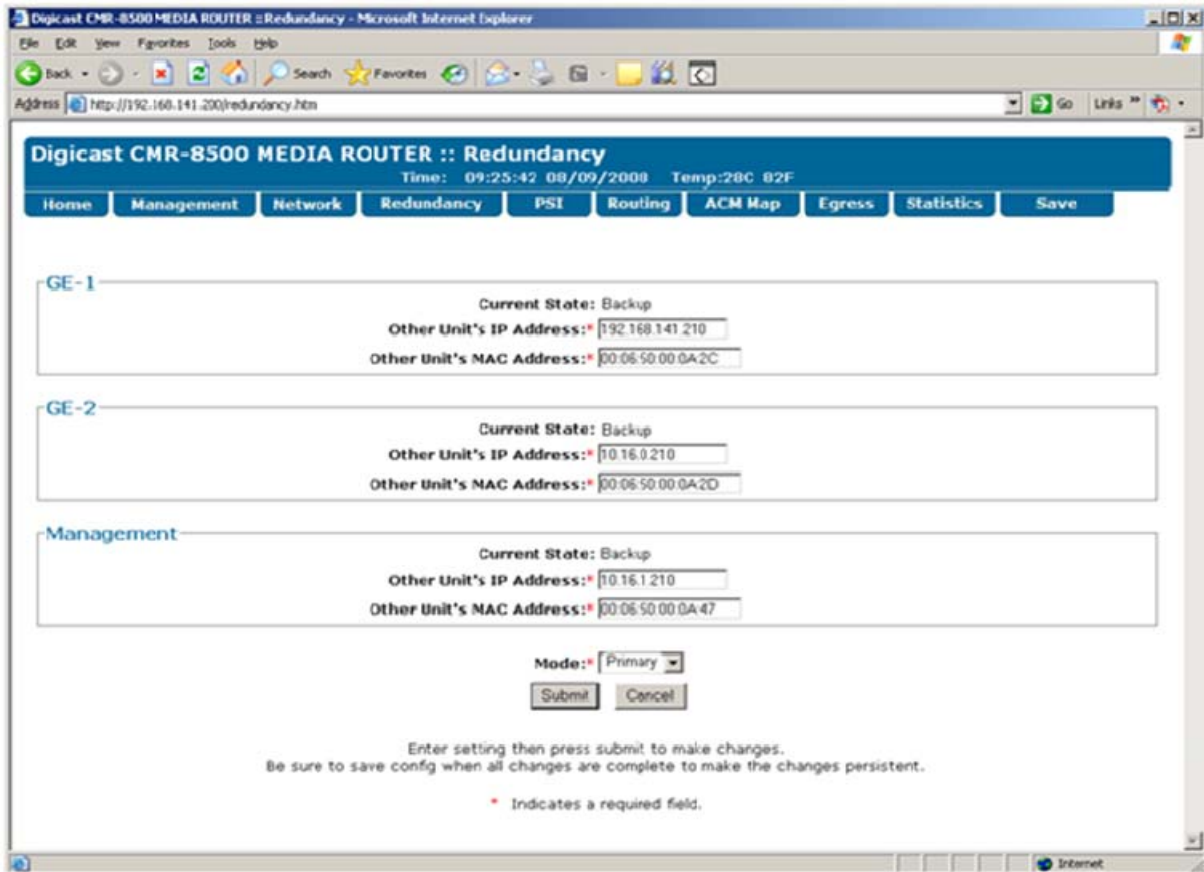
Figure 2-1. CMR-8500 Web Interface Redundancy Tab

Chapter 3. INTERFACE PINOUTS

3.1   Pinout Overview

The rear panel interface (Figure 3-1) provides all necessary external connections between the CMR-8500 and other equipment.

Figure 3-1. CMR-8500 Connection Interfaces

3.2   AUX / TERM
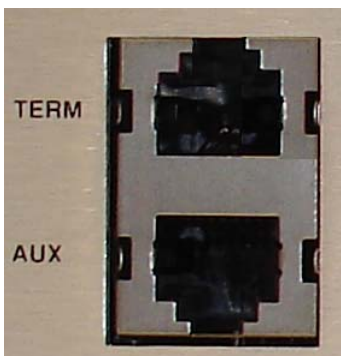
TERM

Pin	Definition
1	GND
2	TXD
3	RXD
4	GND
5	N/C
6	N/C

AUX

Pin	Definition
1	GND
2	TXD
3	RXD
4	GND
5	N/C
6	N/C

3.3   GE1

Pin	Name	Definition
1	BI_DA+	Bi-directional pair A +
2	BI_DA-	Bi-directional pair A -
3	BI_DB+	Bi-directional pair B +
4	BI_DC+	Bi-directional pair C +
5	BI_DC-	Bi-directional pair C -
6	BI_DB-	Bi-directional pair B -
7	BI_DD+	Bi-directional pair D +
8	BI_DD-	Bi-directional pair D -

3.4 GE2

Pin	Name	Definition
1	BI_DA+	Bi-directional pair A +
2	BI_DA-	Bi-directional pair A -
3	BI_DB+	Bi-directional pair B +
4	BI_DC+	Bi-directional pair C +
5	BI_DC-	Bi-directional pair C -
6	BI_DB-	Bi-directional pair B -
7	BI_DD+	Bi-directional pair D +
8	BI_DD-	Bi-directional pair D -

3.5 FE

Pin	Definition
1	TXD+
2	TXD-
3	RXD+
4	N/C
5	N/C
6	RXD-
7	N/C
8	N/C

3.6 ASI IN 1 (*future*)

Pin	Definition
Center	8B/10B 270 Mbps
Outer Ring	GND

3.7   ASI OUT 1

Pin	Definition
Center	8B/10B 270 Mbps
Outer Ring	GND

3.8   ASI IN 2 (*future*)

Pin	Definition
Center	8B/10B 270 Mbps
Outer Ring	GND

3.9   ASI OUT 2

Pin	Definition
Center	8B/10B 270 Mbps
Outer Ring	GND

3.10   **EXT / INT REF** (*future*)

Pin	Definition
Center	TTL Input
Outer Ring	GND

3.11   REDUNDANT

Pin	Definition
6	Tx -
7	Rx -
13	Tx +
14	Rx +
1	AGND
9	DGND

Chapter 4. DEVICE MANAGEMENT VIA USER INTERFACES

4.1　Introduction

Management of the CMR-8500 is simple and intuitive. There are a variety of ways to configure and manage the CMR-8500:

- Front panel interface
- Web Interface via a LAN-based Desktop Browser
- Terminal Interface via direct connection to a PC's asynchronous port
- Telnet Interface via a LAN
- TFTP for remote upgrades
- FTP for remote upgrades
- SNMP Private MIB and MIB II (future)

4.2　Front Panel Interface

The Front Panel Interface provides the capability to perform basic setup and configuration of the CMR-8500 encapsulator. The Front Panel consists of:

- LED status indicators
- Keypad for menu navigation
- Vacuum Fluorescent Display (VFD) menu display

4.2.1   LED Status Lights

LED	Color	Description
STATUS	Green/Red	Red indicates error status, green indicates status ok
ASI IN 1 (*future*)	Green	Solid when ASI input to this port is connected
ASI IN 2 (*future*)	Green	Solid when ASI input to this port is connected
REDUN	Green	Redundancy indicator. Solid green unit is redundant online and flashing green is redundant offline (backup). LED is OFF when in standalone mode.
FE ACT	Amber	Flashes when there is Ethernet activity on this port
GE1 ACT	Amber	Flashes when there is Ethernet activity on this port
GE2 ACT	Amber	Flashes when there is Ethernet activity on this port
MGT	Amber	Solid when management connection (FTP or web or Telnet)

4.2.2   Keypad

Use the keypad to navigate and set the menu options on the VFD display.
Left / Right arrow keys navigate menu options
Up / Down arrow keys change option values
Enter key selects menu option / changes
Clear key rejects changes / goes back one menu option

4.2.3   VFD Menu Display

The Menu for the Front Panel allows for easy navigation in setting up and configuring the basic functionality of the CMR-8500 encapsulator.
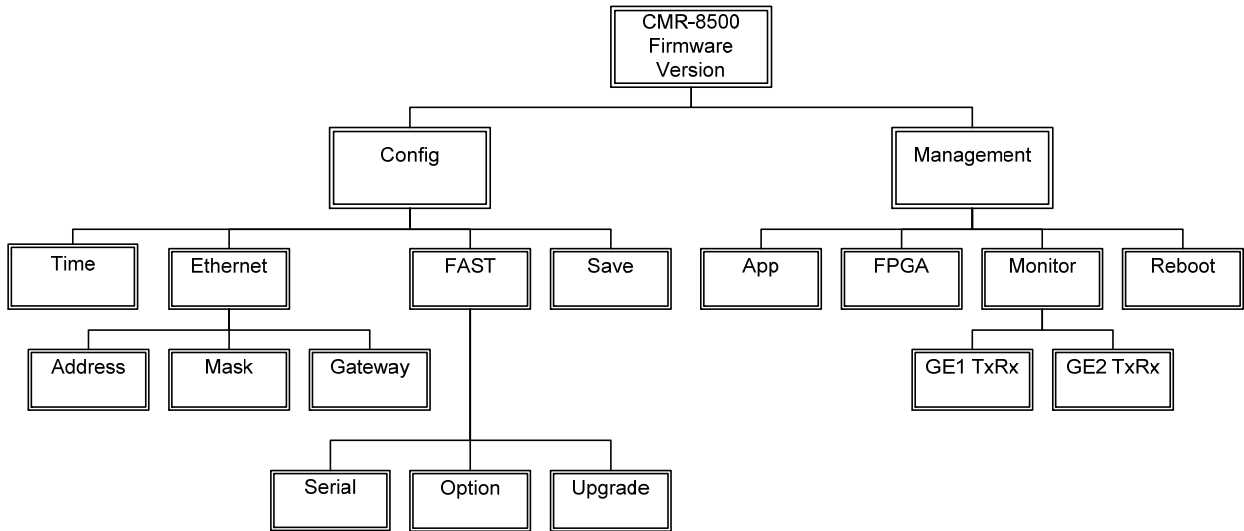
Figure 4-1. CMR-8500 Menu Hierarchy

Note: Whenever changes are made to the configuration through the Front Panel interface, the user must select the "Save" menu option for the changes to take effect.

The top level displays the model number (CMR-8500) of the unit as well as the firmware version.

The top level menu options for the front panel interface are:

- Config – Allows initial configuration and setup of the Ethernet network interface.
- Management – Displays version information, current throughput information, and reboot option.

4.2.3.1 Config Menu Options

The Front Panel Config Menu enables the user to configure the following settings:

- Date and Time
- Ethernet for the management interface
- FAST code settings
- Save option

4.2.3.1.1 Date and Time

Use the keypad to navigate and edit the date and time settings. Press the ENTER key to accept the changes made.

4.2.3.1.2 Ethernet

Ethernet has the following configurable parameters:

- **IP Address** - The IP Address assigned to the CMR-8500's LAN interface. The IP Address is entered in dotted decimal format.
- **Mask** - The subnet mask to assign for this network. The subnet mask is entered in dotted decimal format.
- **Default Gateway** - The Default Gateway assigned to the CMR-8500's LAN interface. The Default Gateway is entered in dotted decimal format and must be within the subnet of the IP Address assigned

to the LAN interface. The Default Gateway is the address of a local router to which all non-local
subnet traffic will be directed.

4.2.3.1.3   FAST

The CMR-8500 supports the Comtech EF Data FAST (Fully Accessible System Topology) code, which is
the capability to upgrade your CMR-8500 by entering a number unique to your CMR-8500 unit by its
serial number.

Comtech EF Data's FAST system permits the purchase and installation of options through special
authorization codes, entered remotely or through the front panel.

FAST allows immediate implementation of different options through the user interface keypad. All FAST
options are available through the basic platform unit. To add additional features to the CMR-8500, please
contact your Comtech EF Data sales representative.

The menu options for FAST are:

- **Serial Number** - Displays the serial number of the unit. FAST code options are unique for each unit
  by the unit's serial number. When requesting an update, or entering a FAST code on a unit, the FAST
  code upgrade will only be applicable to the serial number that it was generated for.
- **Option** - Use the **Up/Down** arrow keys to view the currently installed options on the CMR-8500.
- **Upgrade** - The CMR-8500 can be configured with multiple interface and performance options, and
  with the FAST code capability, a unit can be upgraded after it has been deployed and in use without
  being returned to the factory or replaced.

4.2.3.2　Management Menu Options

The front panel Management Menu allows the user to perform the following:

- App – View firmware application version
- FPGA – View FPGA version
- Monitor – View transmit and receive statistics for either GE interface.

4.2.3.2.1　Application

Displays the version of the firmware currently running on the CMR-8500.

4.2.3.2.2　FPGA
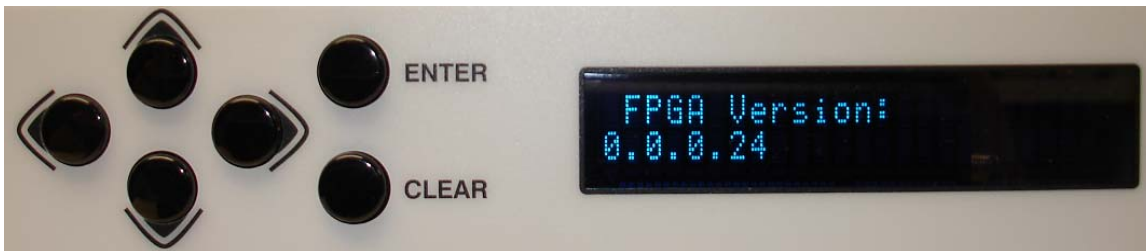
The FPGA selection displays the version of the FPGA currently running on the CMR-8500.

4.2.3.2.3　Monitor

The Monitor selection displays the current throughput in bits-per-second (bps) and packets-per-second (pps). This can be selected for either Ethernet port, for receive or transmit.

4.2.3.2.4   Reboot

Select the Enter button to reboot the CMR-8500, or Cancel to exit to go back to the Management menu level.

4.2.4   Web Interface

The Web Interface, operating under standard Hypertext Transport Protocol (HTTP), is used to communicate with and command the CMR-8500 via a Hypertext Markup Language (HTML) based Graphical User Interface (GUI).

To use the Web Interface, a LAN connection must exist between a PC with a browser and the CMR-8500.

The CMR-8500 requires the user to be authenticated via login before the configuration can be viewed or modified. The default user name is **comtech** and the default password is **comtech**.

After a period of inactivity (user defined), the user will be logged out automatically. Log in again to reestablish connectivity.

After following the initial configuration procedure (see Chapter 2) to establish a valid IP Address, Subnet Mask and Default Gateway for the CMR-8500, activate a browser on the PC's desktop.

Enter the IP address for the CMR-8500 into the URL field as shown in the figure below.

If the port number has been modified from the standard 80 via the Terminal Interface, then the port number must be appended with a colon to the IP address.

A successful connection between the PC and the CMR-8500 results in the display of the Login page shown below.
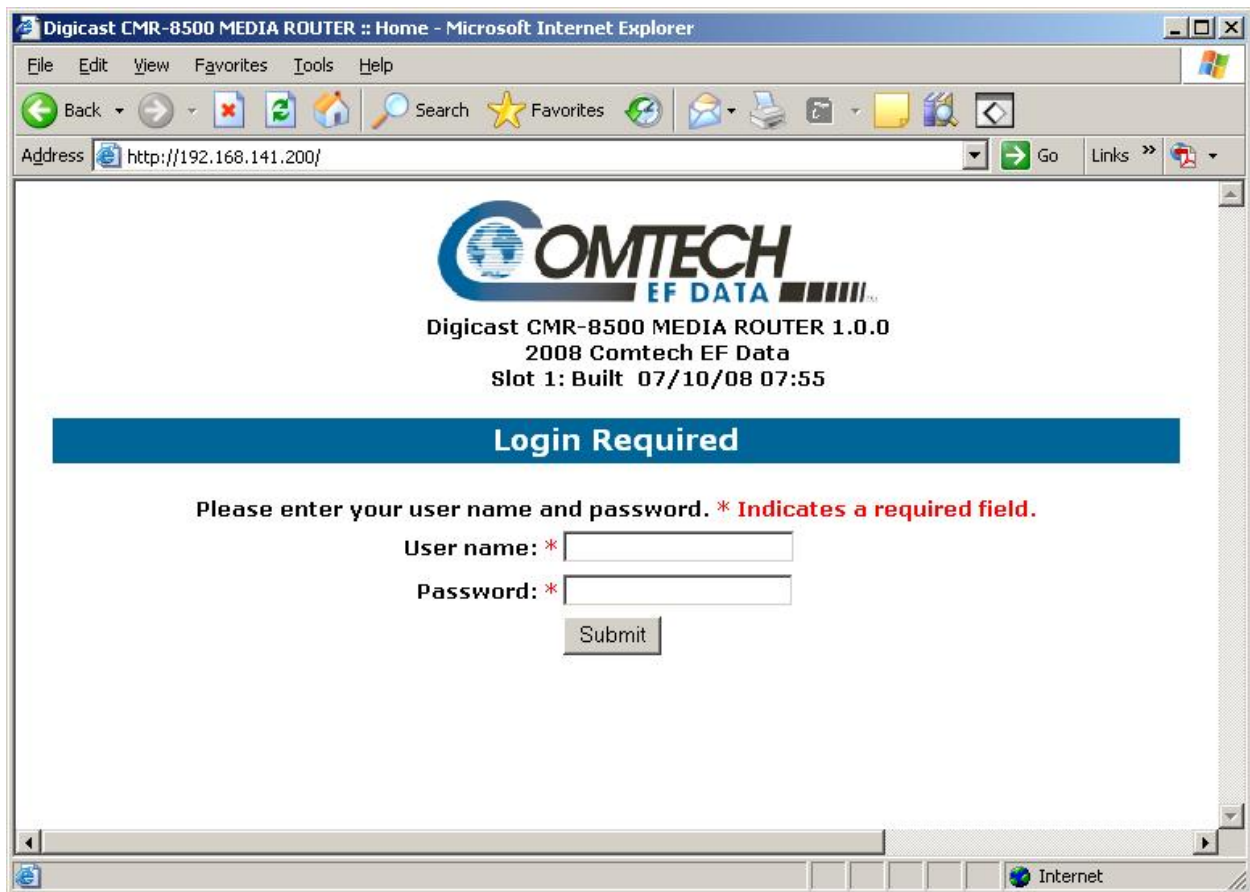
Figure 4-2. CMR-8500 Web Interface Login Page

The Login Page is the entry point to the CMR-8500 menu system via a browser.

The Home Page displays after a successful login authentication:
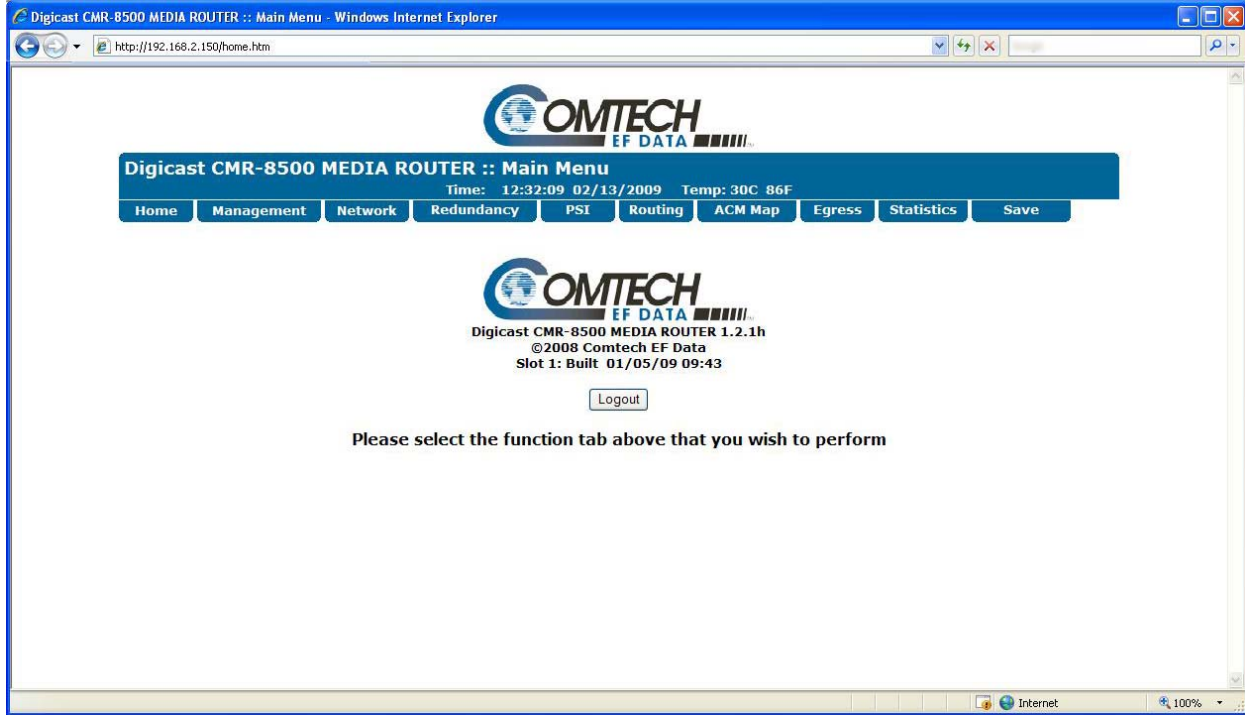
Figure 4-3. CMR-8500 Web Interface Home Page

Whenever changes are made to the configuration using the web interface:

Click the "Submit" button for the changes to take effect.

To save the changes upon a reboot of the system, click the "Save" tab on the upper right of the web interface window.

Permanent changes to the configuration require two steps: first, click "Submit", then click "Save".

4.2.4.1   Management Tab

The Management contains a sub-tab level for access to configuring the CMR-8500. These configurable tabs are:

- Main – Contains the identification, security, and basic setup configuration settings.
- Syslog – Enables Syslog and configuration.
- FAST – Displays the available features controlled by FAST codes.
- Firmware – Displays the current version of firmware running, and the ability to update firmware via TFTP or FTP.
- Auto Logout – Enables auto logout feature.
- Port – Enable configuring of ports for access (FTP, HTTP, and Telnet).
- Timers – Configuration of timers for encapsulation processes.

4.2.4.1.1　Management: Main
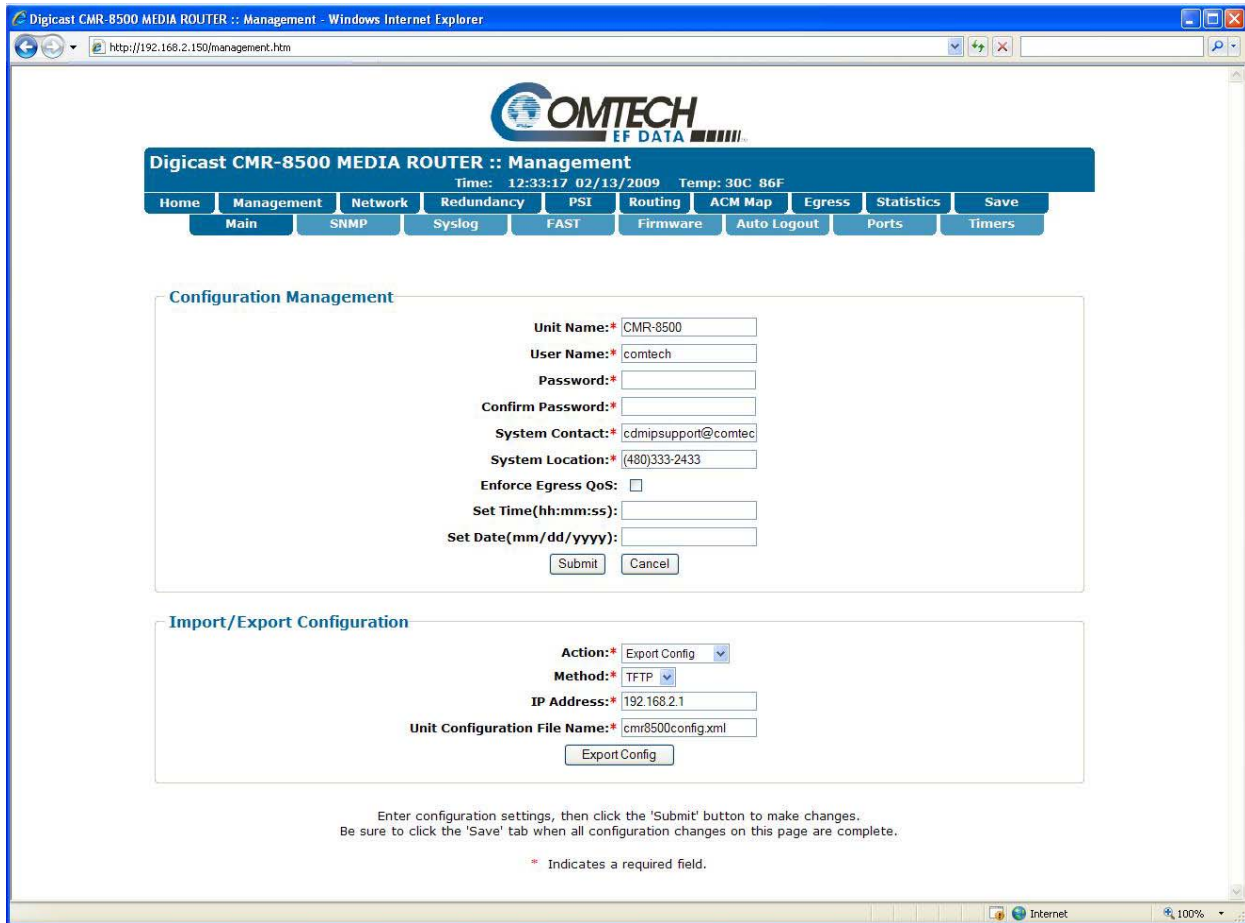
Figure 4-4. CMR-8500 Web Interface Management: Main Tab

The Main tab has the following configurable parameters:

- **Unit Name:** The name of this CMR-8500.
- **Unit Location:** The location of where the unit is installed.
- **User Name:** The CMR-8500's User Name is user configurable and is used for connecting to the unit via IP management services and terminal services. The default user name is **comtech.**
- **Password:** The Password is used for authenticating a user when connecting via IP management services. The default password is **comtech.**
- **System Contact:** Enter the contact information of the system administrator for support.
- **System Location:** Enter the physical location where the unit has been installed.
- **Enable Telnet:** Use the checkbox to Enable or Disable Telnet access on the CMR-8500.
- **Enforce Egress QoS:** Enables bandwidth management feature on the CMR-8500.
- **Set Time:** Set the time on the CMR-8500. The system time is displayed on the header of each web page.
- **Set Date:** Set the date on the CMR-8500. The system date is displayed on the header of each web page.

4.2.4.1.2   SNMP

- SNMP R/W Community - ready write community string for using the private MIB
- SNMP R/O Community - read only community string for using the private MIB
- SNMP Server IP Address - the address of the SNMP Trap Server where SNMP traps are sent

4.2.4.1.3   Management: Syslog

Figure 4-5. CMR-8500 Web Interface Management: Syslog Tab

Syslog is a standard for forwarding log messages in an IP network, assisting in system management. Below are the configurable parameters found on the Syslog Tab:

- **Enable:** Enable or disable Syslog messaging on the CMR-8500.
- **IP Address:** The IP address of the Syslog server for the CMR-8500 to send log messages.
- **Port:** The port of the Syslog server. The default port is 514.

4.2.4.1.4   Management: FAST

The CMR-8500 supports the Comtech EF Data FAST code, which is the capability to upgrade the factory set options on the CMR-8500 by entering a number unique to your CMR-8500 unit by its serial number.
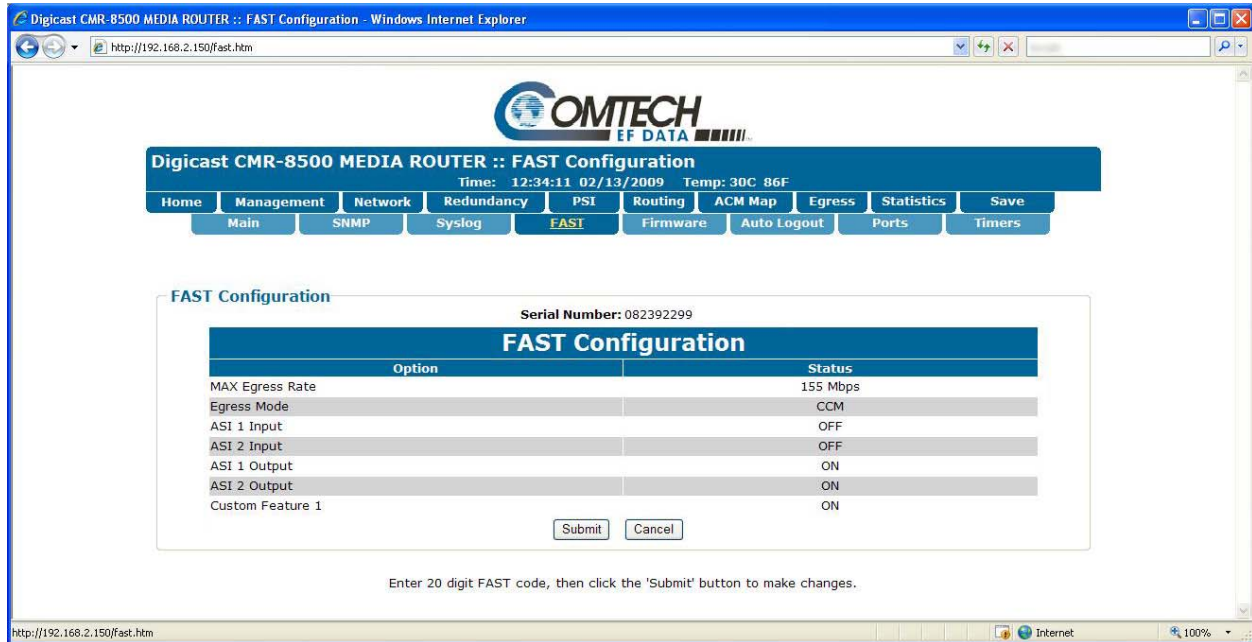
Figure 4-6. CMR-8500 Web Interface Management: FAST Tab

Comtech EF Data's FAST (Fully Accessible System Topology) system permits the purchase and installation of options through special authorization codes, entered through the front panel. FAST allows immediate implementation of different options through the user interface keypad. All FAST options are available through the basic platform unit.

The parameters on the FAST tab are:

Serial Number (view only)

Displays the serial number of the unit. FAST code options are unique for each unit by the unit's serial number. When requesting an update, or entering a FAST code on a unit, the FAST code upgrade will only be applicable to the serial number that it was generated from.

Upgrade Code

The CMR-8500 can be configured with multiple options for functionality, and with the FAST code capability, a unit can be upgraded after it has been deployed and in use without being returned to the factory or replaced. The code entered is a hexadecimal string that modifies (i.e., add) the feature set on the product via the front panel. To add additional features to the CMR-8500, please contact your Comtech EF Data sales representative.

View FAST Codes

Displays the enabled/disabled feature set of the CMR-8500.

4.2.4.1.4.1   Management: FAST: Configuration

Figure 4-7. FAST Configuration Options Display

4.2.4.1.5   Management: Firmware
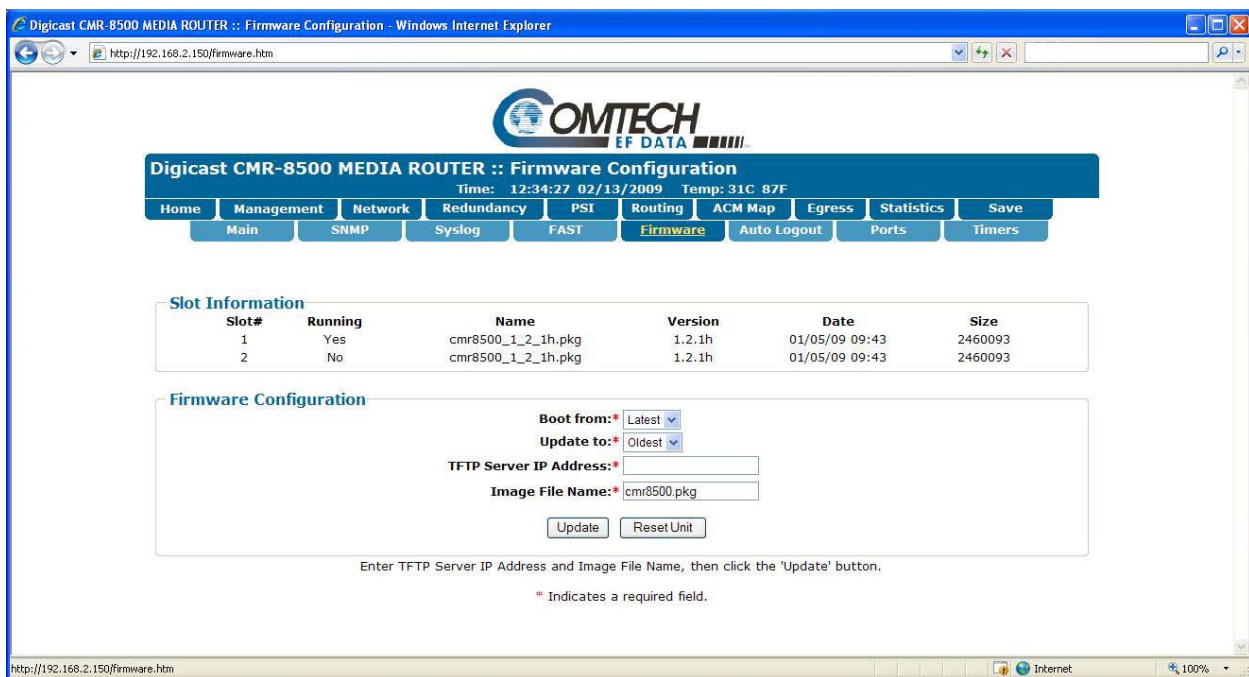
Figure 4-8. CMR-8500 Web Interface Management: Firmware Tab

The CMR-8500 stores two version of firmware, of which only one version can be running at any time. The Firmware tab on the CMR-8500 lists what version is loaded into each of the two slots, as well as which version is currently loaded and running.

The configurable parameters for the Firmware Tab are:

- **Boot From:** The user can select which slot (subsequently which firmware version) for the CMR-8500 to boot from on the next restart of the system. The available options are Slot 1, Slot 2, or Newest.

- **Update To:** User configurable option allows selecting which slot gets the next firmware update. The available options are Slot 1, Slot 2, or Oldest.
- **TFTP Server IP Address:** The IP address of the Server running the TFTP server program, where the CMR-8500 update package file resides.
- **Image File Name:** The name of the package file, residing on the TFTP server, to update the CMR-8500 with.

Also on this tab is the "Reset Unit" button, which reboots the CMR-8500 when selected. The updating of firmware on the CMR-8500 will always require a reboot of the system for the changes to take effect.

4.2.4.1.6   Management: Auto Logout
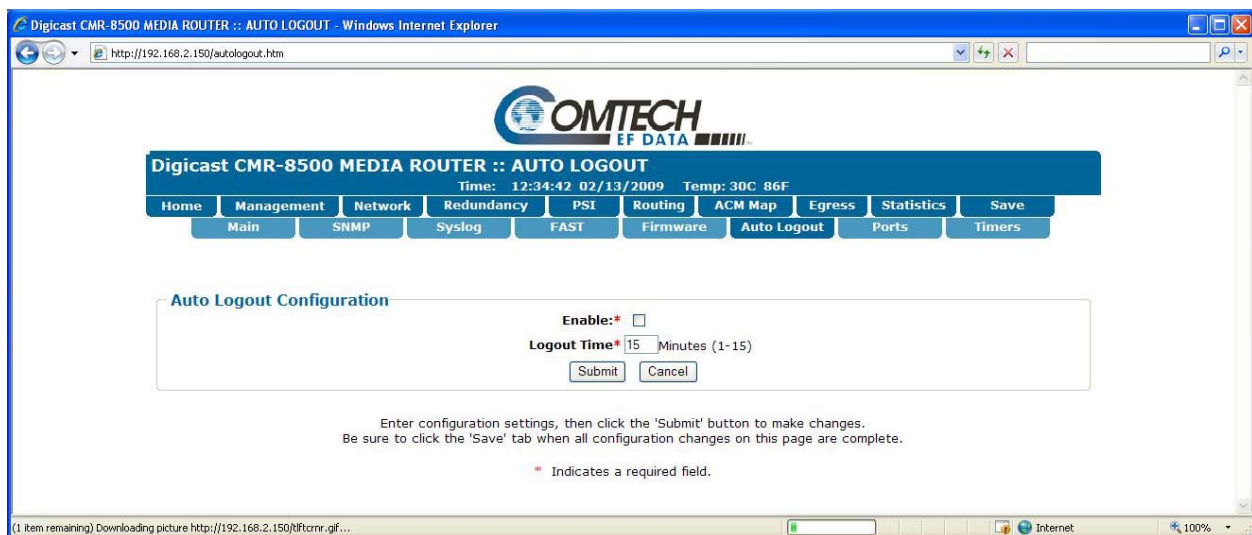
CMR-8500 web interface Management: Auto Logout tab

The Auto Logout Tab adds a layer of security when managing the CMR-8500 via the web interface. This tab allows enabling auto logout and setting a time parameter, so the web interface requires a valid login name and password after a set number of minutes.

The configurable parameters for this page are:

- **Enable:** Enables or disables the auto logout feature. When disabled, the user is not automatically logged out.
- **Logout Time:** The number of minutes for the interface to wait after inactivity to require a user log back on with a valid user name and password. The range is from one (1) to fifteen (15) minutes.

4.2.4.1.7   Management: Port
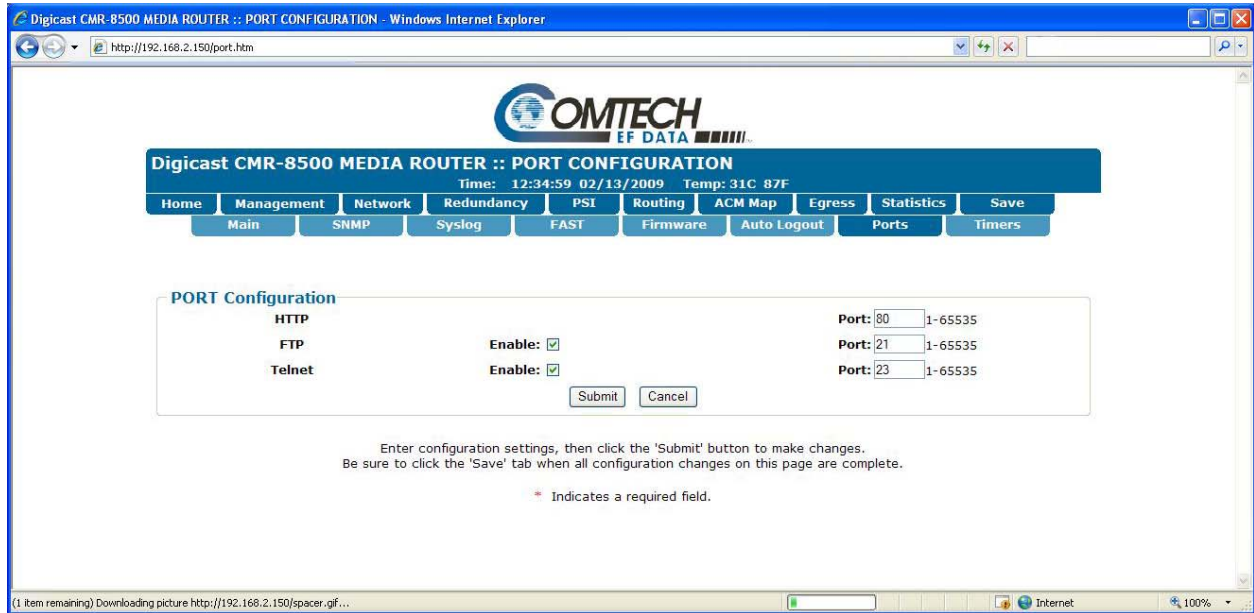
Figure 4-9. CMR-8500 Web Interface Management: Ports Tab

The CMR-8500 comes with the default port settings for HTTP, FTP, and Telnet, but these can be overridden.

The configurable parameters for the Port Configuration Tab are:

- **HTTP Port:** The port for HTTP access to the CMR-8500. The default is port 80.
- **FTP Port:** The port for FTP access to the CMR-8500. The default port is 21.
- **Telnet Port:** The port for Telnet access to the CMR-8500. The default port is 23.

IMPORTANT

None of the ports may be the same. Each port must be set to a unique value.

4.2.4.1.8   Management: Timers

Figure 4-10. CMR-8500 Web Interface Management: Timers Tab

The Timers Tab allows for configuring certain timers for performance in the CMR-8500. Note that typically increasing the Timer setting increases bandwidth efficiency and latency, while reducing the Timer setting lowers bandwidth efficiency and latency.

The Configurable parameters for the Timers Tab are:

- **Global Section Packing Timer:** When section packing is enabled, this setting determines how much time is allocated to hold MPEG2 frames to ensure filling an MPEG frame before transmitting the frame.

4.2.4.2   Network

The Network Tab has a sub-level for configuring the three network interfaces on the CMR-8500. Of the three interfaces, one is Fast Ethernet (FE) and is used as the management interface to the CMR-8500. The other two interfaces are Gigabit (GE) and are the data transport interfaces.

4.2.4.2.1   Network: Mgt (Management Interface)
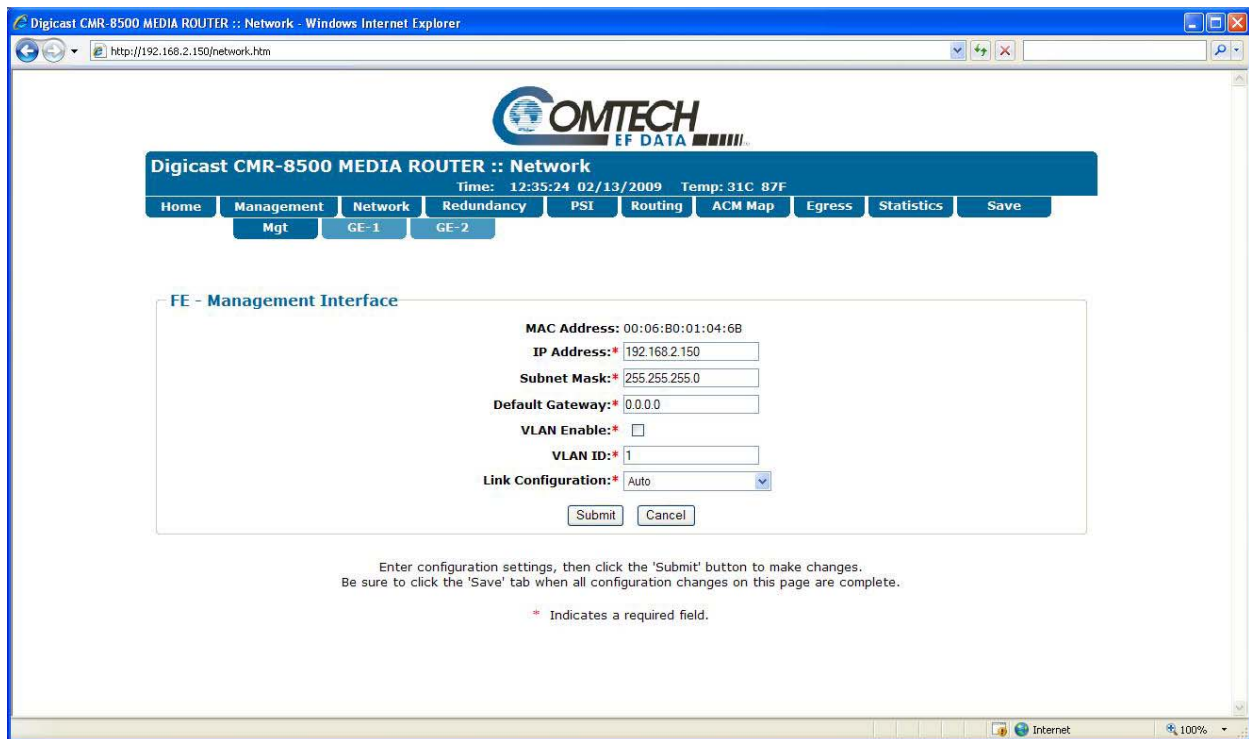
Figure 4-11. CMR-8500 Web Interface Network: Mgt Tab

The configurable parameters for the Mgt Tab are:

- **IP Address:** The IP address assigned to the CMR-8500 for management. The IP address is entered in dotted decimal format.
- **Subnet Mask:** The subnet mask assigned to the CMR-8500's management interface. The subnet mask is entered in dotted decimal format and is typically 255.255.255.0 for a C-Class mask, 255.255.0.0 for a B-Class mask, or 255.0.0.0 for an A-Class mask.
- **Default Gateway:** The Default Gateway assigned to the CMR-8500's management interface. The Default Gateway is entered in dotted decimal format and must be within the subnet of the IP Address assigned to the LAN interface. The Default Gateway is the address of a local router to which all non-local subnet traffic will be directed.
- **VLAN Enable:** Enable VLAN capability for this interface.
- **VLAN ID:** The ID of the VLAN (if enabled).
- **Link Configuration:** Speed and duplex setting for the Management Interface. The valid selections for this interface are:
    - Auto (Preferred)

- 100-BaseT/Full Duplex
- 100-BaseT/Half Duplex
- 10-BaseT/Full Duplex
- 10-BaseT/Half Duplex

4.2.4.2.2   Network: GE1
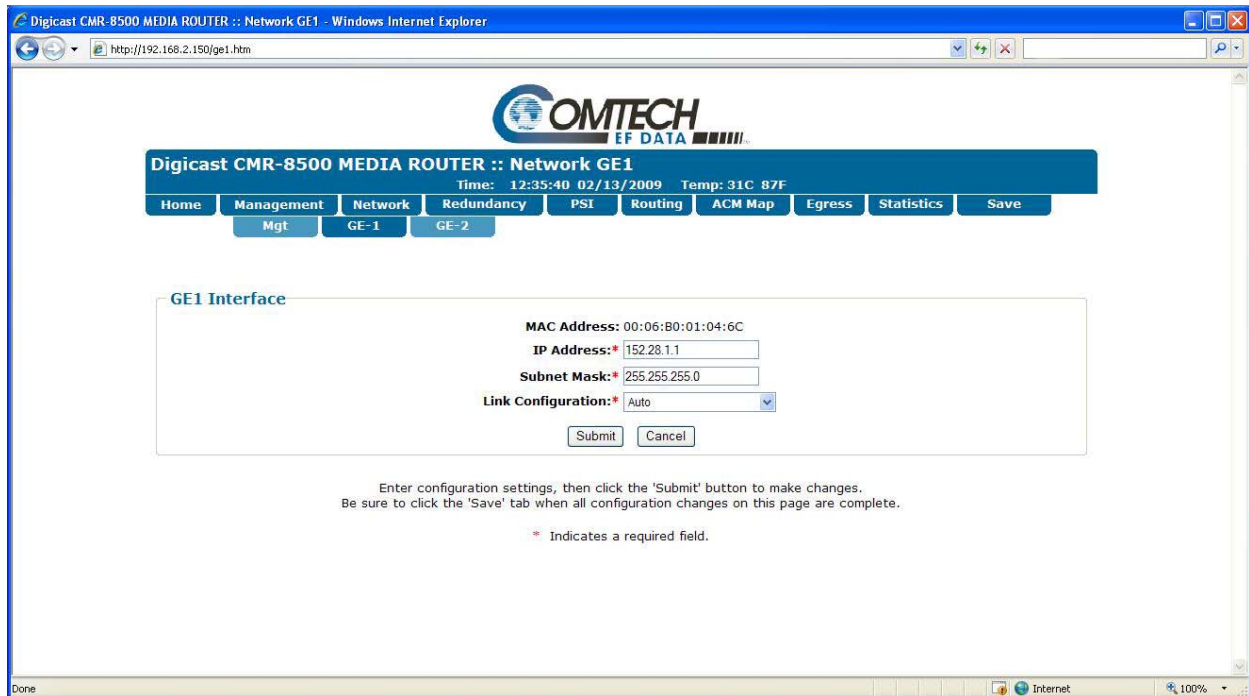
Figure 4-12. CMR-8500 Web Interface Network: GE-1 Tab

The configurable parameters for the GE-1 tab are:

- **IP Address:** The IP address assigned to the CMR-8500 for the GE-1 interface. The IP address is entered in dotted decimal format.
- **Subnet Mask:** The subnet mask assigned to the CMR-8500's GE-1 interface. The subnet mask is entered in dotted decimal format and is typically 255.255.255.0 for a C-Class mask, 255.255.0.0 for a B-Class mask, or 255.0.0.0 for an A-Class mask.
- **Link Configuration:** Speed and duplex setting for the GE-1 Interface. The valid selections for this interface are:
  - Auto (Preferred)
  - 1000-BaseT/Full Duplex
  - 100-BaseT/Full Duplex
  - 100-BaseT/Half Duplex
  - 10-BaseT/Full Duplex
  - 10-BaseT/Half Duplex
 - Disabled
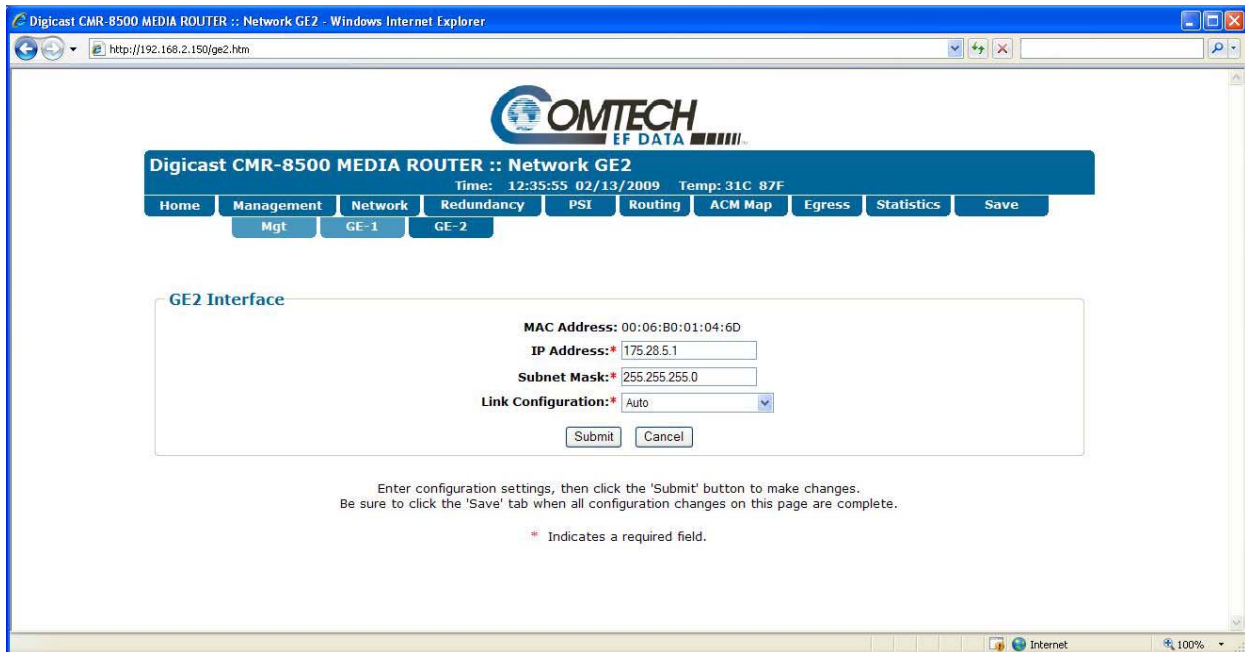
4.2.4.2.3   Network: GE2

Figure 4-13. CMR-8500 Web Interface Network: GE-2 Tab

The configurable parameters for the GE-2 Tab are:

- **IP Address:** The IP address assigned to the CMR-8500 for the GE-2 interface. The IP address is entered in dotted decimal format.
- **Subnet Mask:** The subnet mask assigned to the CMR-8500's GE-2 interface. The subnet mask is entered in dotted decimal format and is typically 255.255.255.0 for a C-Class mask, 255.255.0.0 for a B-Class mask, or 255.0.0.0 for an A-Class mask.
- **Link Configuration:** Speed and duplex setting for the GE-2 Interface. The valid selections for this interface are:
  - Auto (Preferred)
  - 1000-BaseT/Full Duplex
  - 100-BaseT/Full Duplex
 - 100-BaseT/Half Duplex
  - 10-BaseT/Full Duplex
  - 10-BaseT/Half Duplex
  - Disabled

4.2.4.3   Redundancy

Note: Only CoP3 GE/GE redundancy is supported!

IMPORTANT

4.2.4.3.1   Cop3 (Gigabit Ethernet)
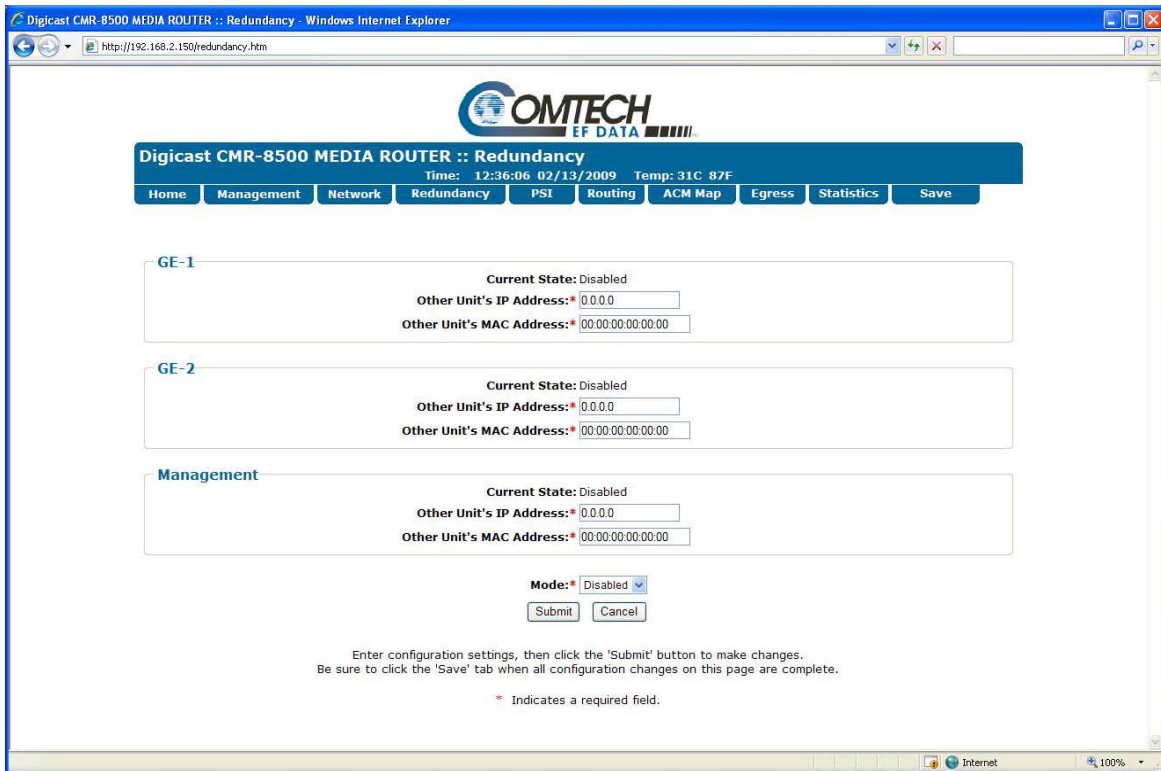
Figure 4-14. CMR-8500 Web Interface Redundancy Tab

Redundancy is enabled when two CMR-8500 units are configured as redundant units and able to communicate via Ethernet connection (Management (FE) Interface). To use redundancy, connect a DB-15 to DB-15 cable (CA-0000316) between the primary and secondary CMR-8500 redundancy ports.

The configurable parameters for the Redundancy Tab are:

- GE-1 Interface:
    - Other Unit's IP Address: The IP address of the GE-1 interface on the other CMR-8500 used in this redundant pairing.
    - Other Unit's MAC address: The MAC address of the GE-1 interface on the other CMR-8500 used in this redundant pairing.
- GE-2 Interface:
    - Other Unit's IP Address: The IP address of the GE-2 interface on the other CMR-8500 used in this redundant pairing.

- Other Unit's MAC address: The MAC address of the GE-2 interface on the other CMR-8500 used in this redundant pairing.
- Management Interface:
  - Other Unit's IP Address: The IP address of the Management (FE) interface on the other CMR-8500 used in this redundant pairing.
  - Other Unit's MAC address: The MAC address of the Management (FE) interface on the other CMR-8500 used in this redundant pairing.
- Mode: The redundant mode of this CMR-8500. Valid selections are:
  - Disabled: This unit is not part of a redundant system (stand alone).
  - Primary: This unit is the primary encapsulator in a redundant system.
  - Back Up: This unit is the backup encapsulator in a redundant system.

Note: Do not set both units to the same mode, as unpredictable behavior may occur.

IMPORTANT

4.2.4.3.2   ASI Redundancy

The CMR-8500 does not currently support ASI redundancy (*future feature*).

4.2.4.4   PSI (Program Specific Information)
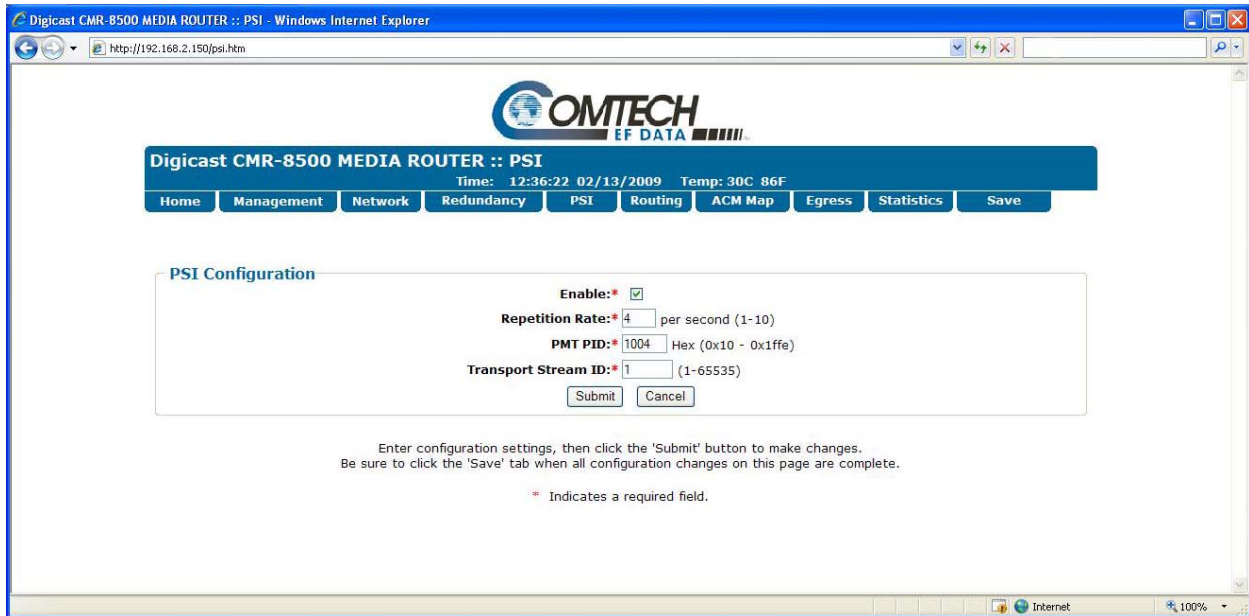
Figure 4-15. CMR-8500 Web Interface PSI Tab

The CMR-8500 provides support for the MPEG-2 PSI. PSI provides the Program Association Table (PAT) and Program Map Table (PMT).

The PAT resides on PID 0x0000 and the CMR-8500 allows the user to define the following PID for the PMT:

- The PMT announces the PID assigned to each valid route for up to 1,000 routes.
- The stream type for a PID assigned to a route will be announced as "DSM-CC" (stream type 0x08).
- In the PAT, each program number will be assigned the corresponding route number.

The PSI Configuration Tab has the following configurable parameters:

- **Enable:** The "Enable" PSI Boolean allows the user to enable or disable the PSI information. Most multiplexers will require the PSI information to be present to identify the input programs.
- **Rate:** The rate in tenths of a second the PSI tables (PAT/PMT) will be transmitted to the network. For example, 4 is a rate of 250ms.
- **PMT PID Base:** The first PID number that will be used to announce the available programs to the network.
- **Transport Stream ID:** The transport stream ID provides the identification of this TS from any other multiplex in the network.

4.2.4.5   Routing
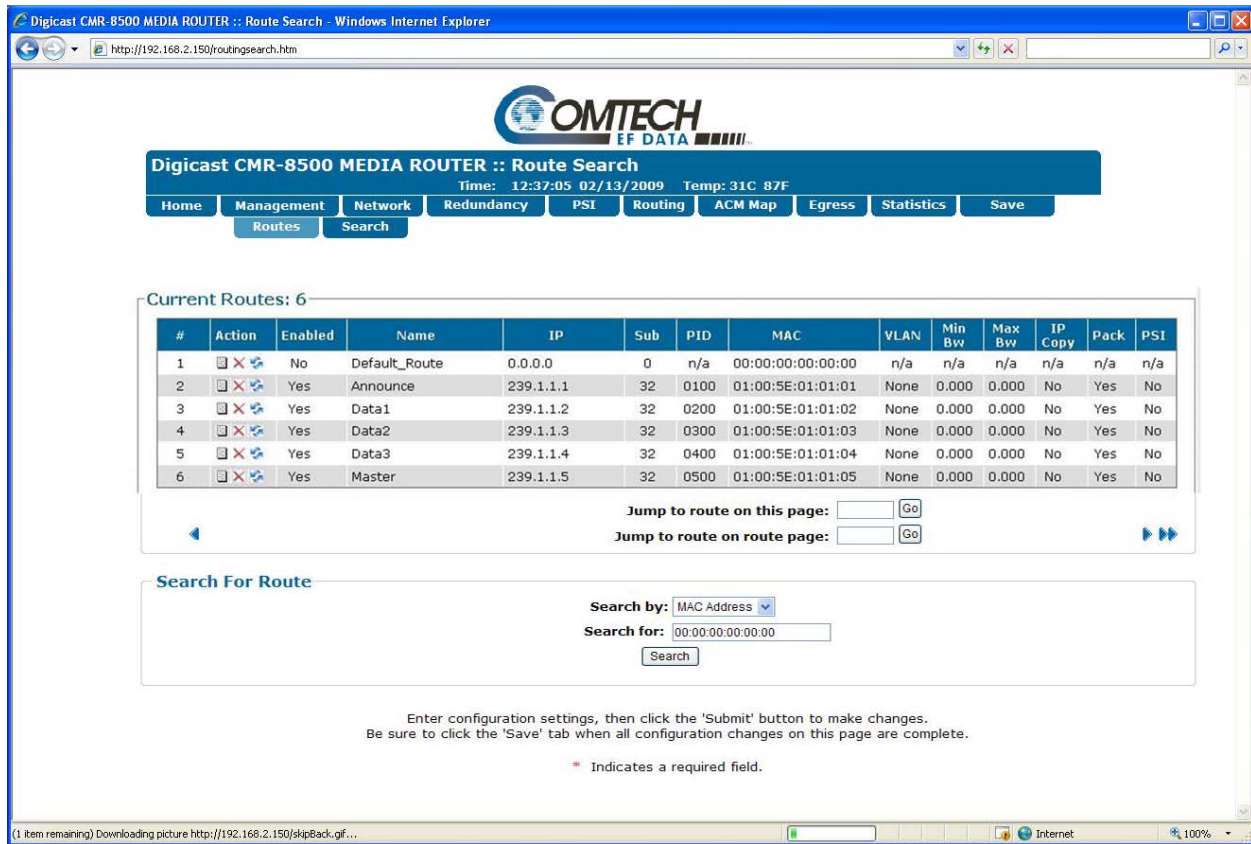
Figure 4-16. CMR-8500 Web Interface Route Tab

The CMR-8500 can support up to 80,000 Multicast and/or Unicast routes: 80,000 unique routes and 1 default route (if enabled). The Route Tab can display up to 16 routes per page, and navigation through the routes can be accomplished by using the arrows at the bottom of the route listing.

Arrow	Function
▶	Forward 10 routes
▶▶	Forward 100 routes
◀	Back 10 routes
◀◀	Back 100 routes

On the Route Page, a user can:

Icon or Button	Function
Add New Route	Add a new route
	Edit an existing route
	Delete a route
	Enable / Disable a route
Jump to route #: [ ] Go	Navigate the route table using the "Jump to route #" feature
	Navigate the route table using the navigation arrows
MAC Address: 00:00:00:00:00:00 SearchMac	Search for a route by the assigned MAC address

4.2.4.5.1   Default Route

The first route listed is the *Default_Route*. This route, when enabled, will route all IP traffic not already defined in another route. The Default Route can be thought of as *a catch-all* route.

Note: Any IP traffic on the subnet not explicitly defined will flow out this route, so care must be used when enabling this route!

4.2.4.5.2   Routing: Adding a Route
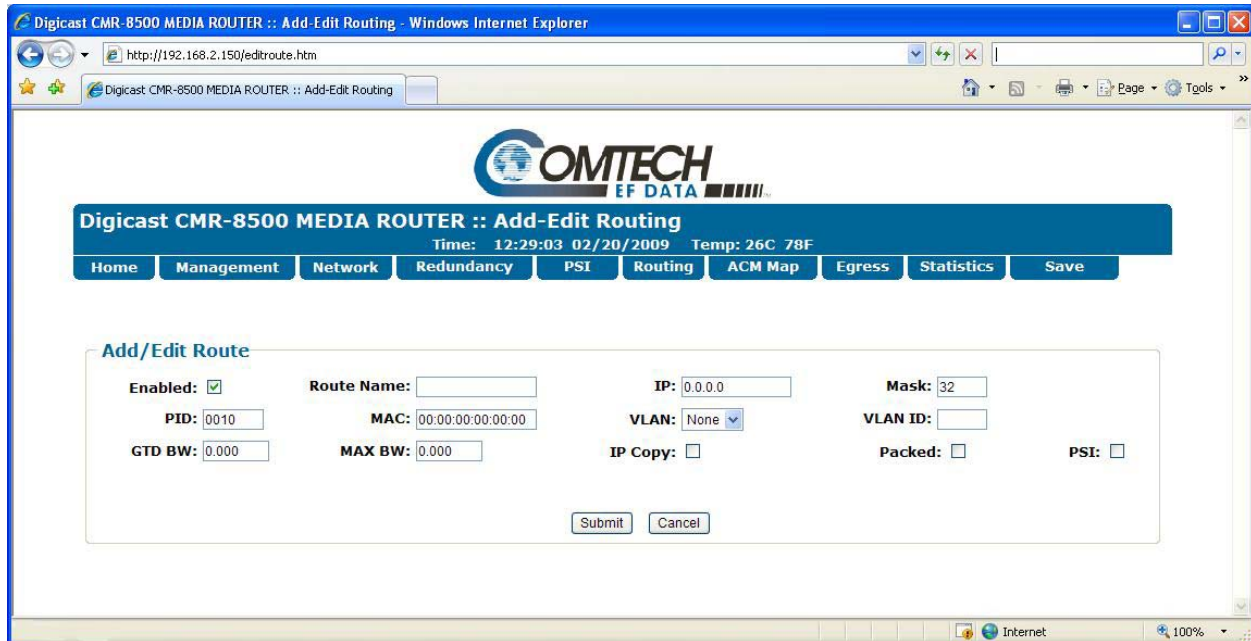
Figure 4-17. CMR-8500 Web Interface Add Route

The configurable parameters on the Add Route Page are:

- **Enabled:** Enable or Disable the route.
- **Route Name:** The name assigned to a given route.
- **IP:** The IP address assigned to a given route. A unicast route will fall within the range 0.0.0.0 to 223.255.255.255 (excluding broadcast or reserved IP addresses), and a multicast route will fall within the range of 224.0.0.0 to 239.255.255.255.
- **Mask:** The subnet mask defines the range of IP addresses that will be supported by a particular route.

IMPORTANT   *IP routes may NOT overlap.*

The following demonstrates how the subnet mask defines the IP address range – the CMR-8500 uses Classless Inter-Domain Routing (CIDR) notation for setting the subnet mask:

- 255.255.255.255 is 32 bits (used for an explicit route for a single IP address)
- 255.255.255.0 is 24 bits (used for a C-Class Mask)
- 255.255.0.0 is 16 bits (used for a B-Class Mask)
- 255.0.0.0 is 8 bits (used for an A-Class Mask)

- **PID:** The Program Identifier (PID) assigned to a particular route. PIDs do not have to be unique and may be assigned to one or more routes.
- **MAC:** The MAC address assigned to a given route. For Unicast, this is typically the MAC address of the satellite receiver card at the remote location to which the data is being sent. For Multicast, the MAC address is generated for the route when the route is created.
- **VLAN:** VLAN support options:
  - **None:** No VLAN traffic will be passed. Only traffic without a VLAN tag will be passed.
  - **All:** All traffic received with VLAN tags will be passed and all non-VLAN traffic will be blocked.
- **VLAN ID:** ID must match the VLAN ID field. If the VLAN ID is set, only traffic on the configured VLAN ID will be passed.
- **VLAN ID:** A valid VLAN ID for the desired route. The valid ranges of the VLAN ID are 0 to 4095.
- **GTD BW:** The Guaranteed Bandwidth offered to a given route. The route will be guaranteed a minimum of this amount of bandwidth on the CMR-8500. This will only function if the "Enforce Egress QoS" option on the Management:Main tab is enabled.
- **MAX BW:** The maximum bandwidth allowed for a given route. Any traffic that exceeds the maximum bandwidth for this route will be silently discarded. Valid only if "Enforce Egress QoS" option on the Management:Main tab is enabled.
- **IP COPY:** Enables IP Copy for this route. If disables, then the route is handled as a standard IP route via the assigned IP address, subnet mask, and configured MAC address. Refer to Addendum B for details.
- **PACKED:** Enables section packing for this route. Section packing adds efficiency to the transport, but adds latency.
- **PSI:** Allows the user to select whether the route is present or not present in the PSI table. The PSI must be enabled for the route to be included in the PSI table.

The CMR-8500 supports up to 1,000 routes contained within the PSI table.

4.2.4.6   Egress
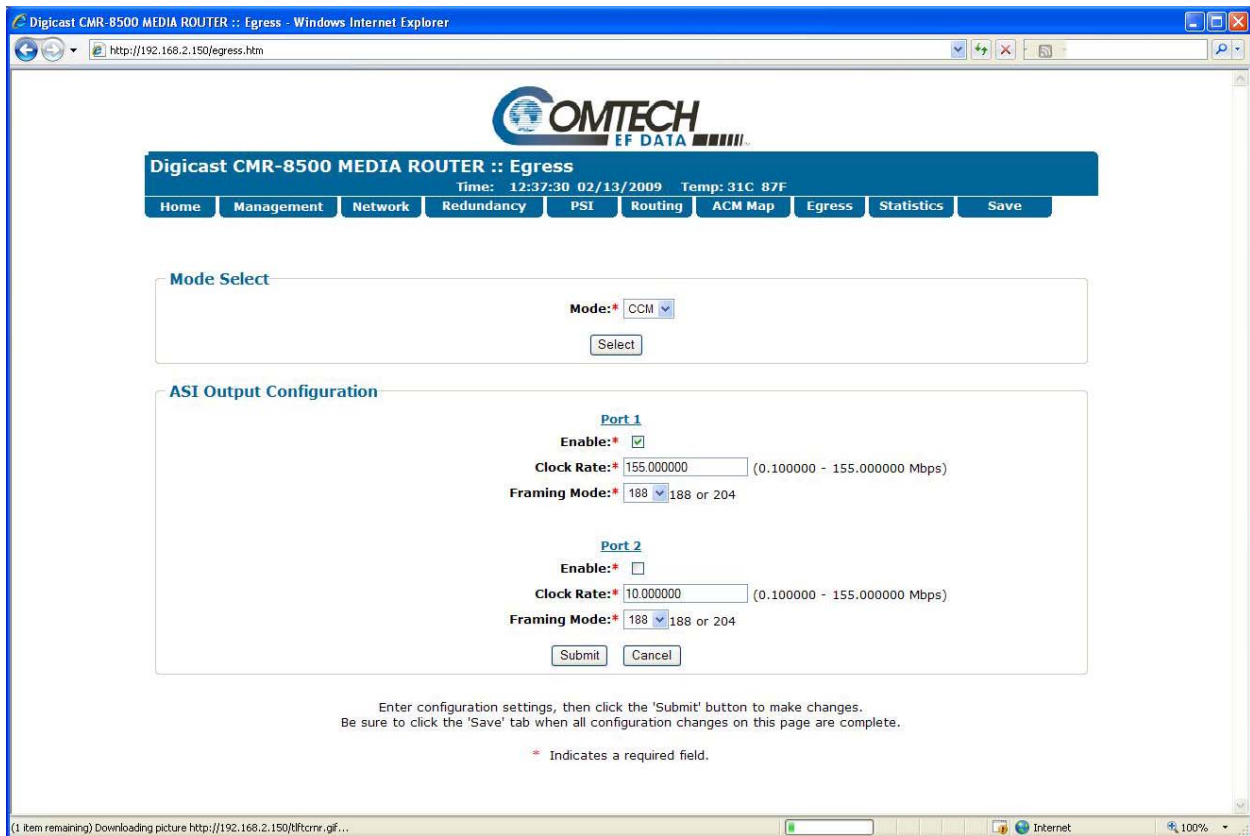
Figure 4-18. CMR-8500 Web Interface Egress Tab

The configurable parameters for the Egress Tab are:

- **Enable:** Enables / Disables the selected port. Note that only one (1) egress port may be enabled at a time.
- **Clock Rate:** The CMR-8500 supports egress clock rates from 100 Kbps to 190 Mbps (188-Byte mode only) in steps of 1 bps (accuracy better than +/- 1 Kbps).
- **Framing Mode:** The CMR-8500 supports both 188-Byte and 204-Byte framing mode. When selecting 204 Byte framing mode, the 16 Bytes of the MPEG-2 packets are padded with zeros (0x00).

4.2.4.7   Statistics
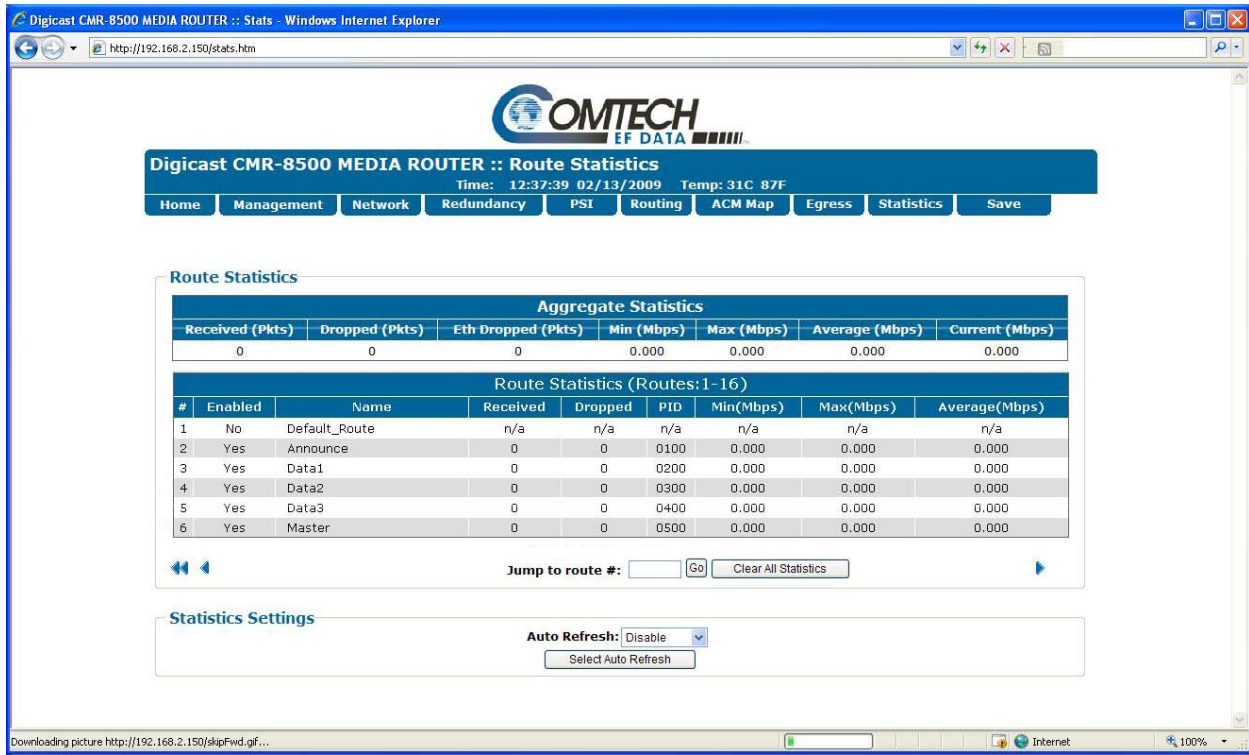
Figure 4-19. CMR-8500 Web Interface Statistics Tab

The Statistics Tab displays the aggregate statistics (all enabled routes combined) of the CMR-8500 as well as the statistics for each individual route that is defined.

Navigation through the route statistics is similar to what is found on the Route Tab.

The user can also use the "Jump to Route #" for a quick traversal if the CMR-8500 has a substantial number of routes defined.

The route statistics can be reset by using the "Clear All Statistics" button.

The Statistics Tab can be monitored and auto-refresh by enabling the "Auto-Refresh" setting. When Auto-Refresh is enabled, the browser will be updated with updated statistics every time that the screen is refreshed.

Arrow	Function
▶	Forward 10 routes
▶▶	Forward 100 routes
◀	Back 10 routes
◀◀	Back 100 routes

IMPORTANT

Note that traffic statistics displayed on the web interface may be different than the traffic statistics displayed on the front panel, depending on whether section packing is enabled and the packet size of the traffic. Statistics are the rate of the resulting egress rate of MPEG2 frames flowing over the egress transport stream.

4.2.4.8   Save
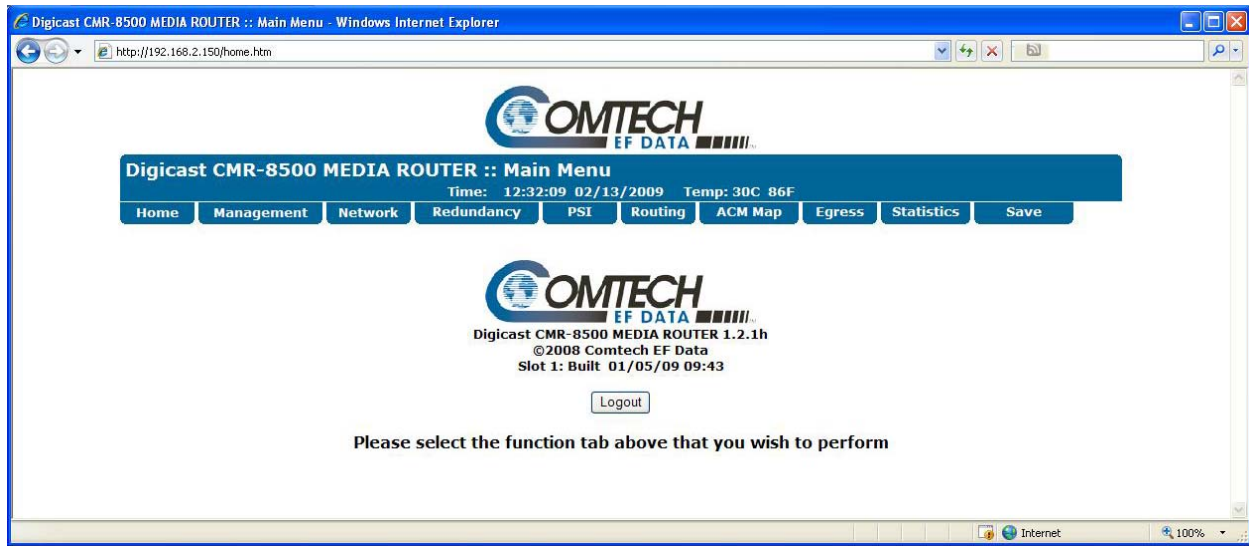
Figure 4-20. CMR-8500 Web Interface Save Tab

Whenever changes are made to the configuration through the Web interface, the user must click on the
"**Submit**" button for the page for the changes to take effect. In order for the changes to be saved upon a
reboot of the system, the user must click on the "**Save**" tab on the upper right of the web interface.

> **Permanent changes to the CMR-8500's configuration require two steps:**
>
> **Click "Submit" on the Web Page where the changes were made.**
>
> **IMPORTANT**   **Click "Save" (upper right tab).**

4.2.5 Terminal Interface

The Terminal Interface provides a textual configuration dialog for configuring some of the basic settings.
It is recommended that the web interface be utilized for all configurations made to the CMR-8500. This
method of configuration can be used for initial configuration of the unit; i.e., configuring the network
parameters for the unit but *not* for normal operation. The Web (HTTP) Interface is recommended for
operational management.

The Terminal Interface allows can only be used while a serial connection is present between the CMR-
8500 and a PC. The screens shown in this section are displayed via a serial connection to a Windows PC.
The screens, menu options, and functionality are the same whether connected via a serial connection or by
a network connection via Telnet.

The user must authenticate (login) before being able to access the application. After a period of inactivity,
the user's session will time out, and must log in again to resume.
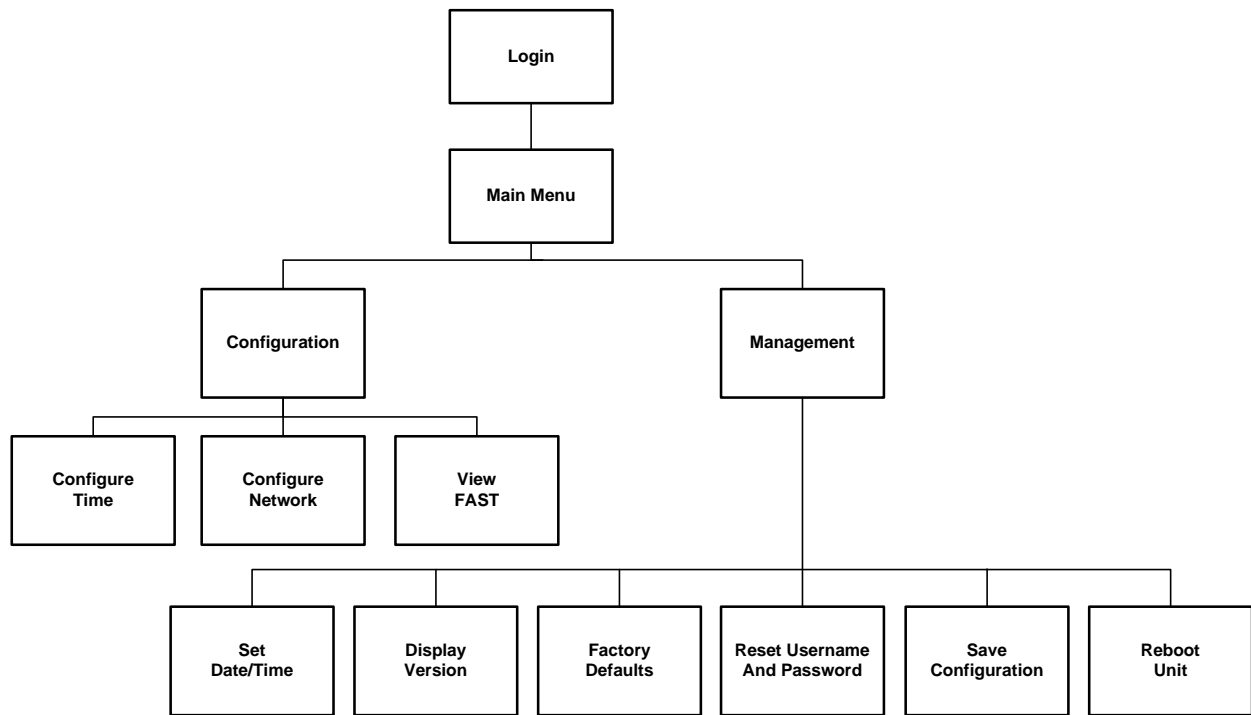
Figure 4-21. Terminal Interface Menu Structure

4.2.5.1 Login
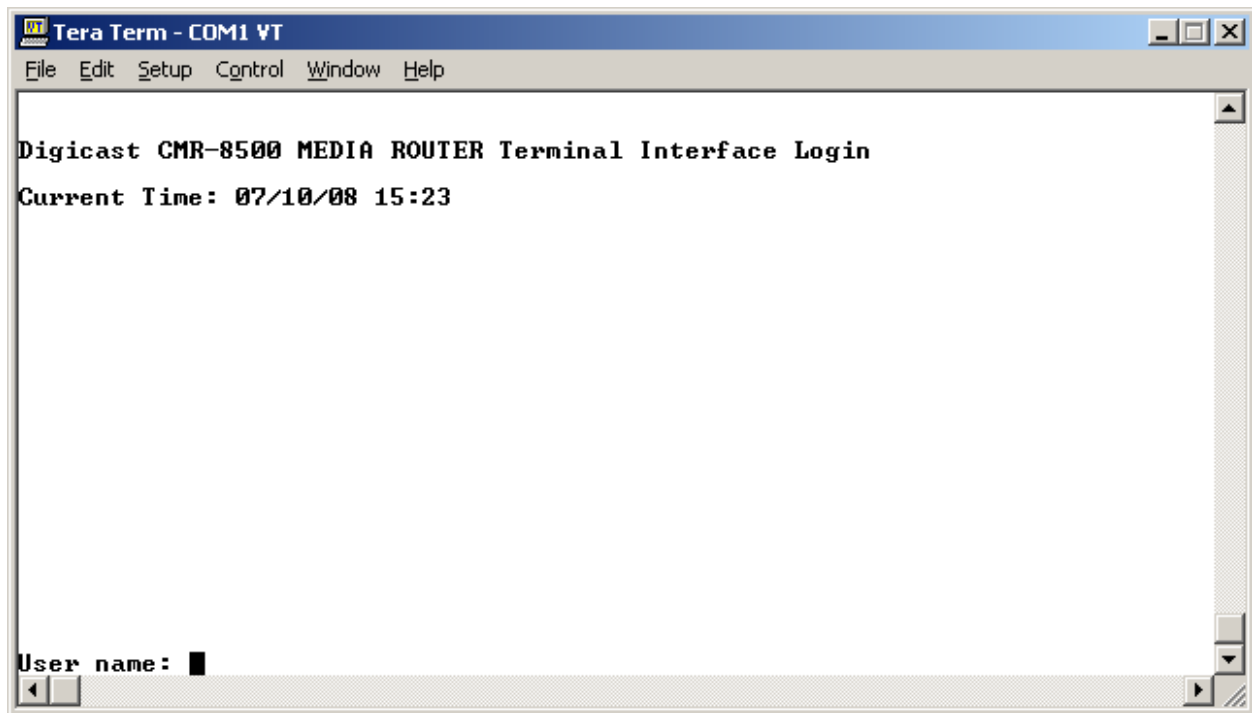
Figure 4-22. CMR-8500 Terminal Interface Login Screen

The login prompt is displayed upon entry via Telnet or a serial connection. The default user name is "*comtech*", and the default password is "*comtech*" (case sensitive).

4.2.5.2   Main Menu
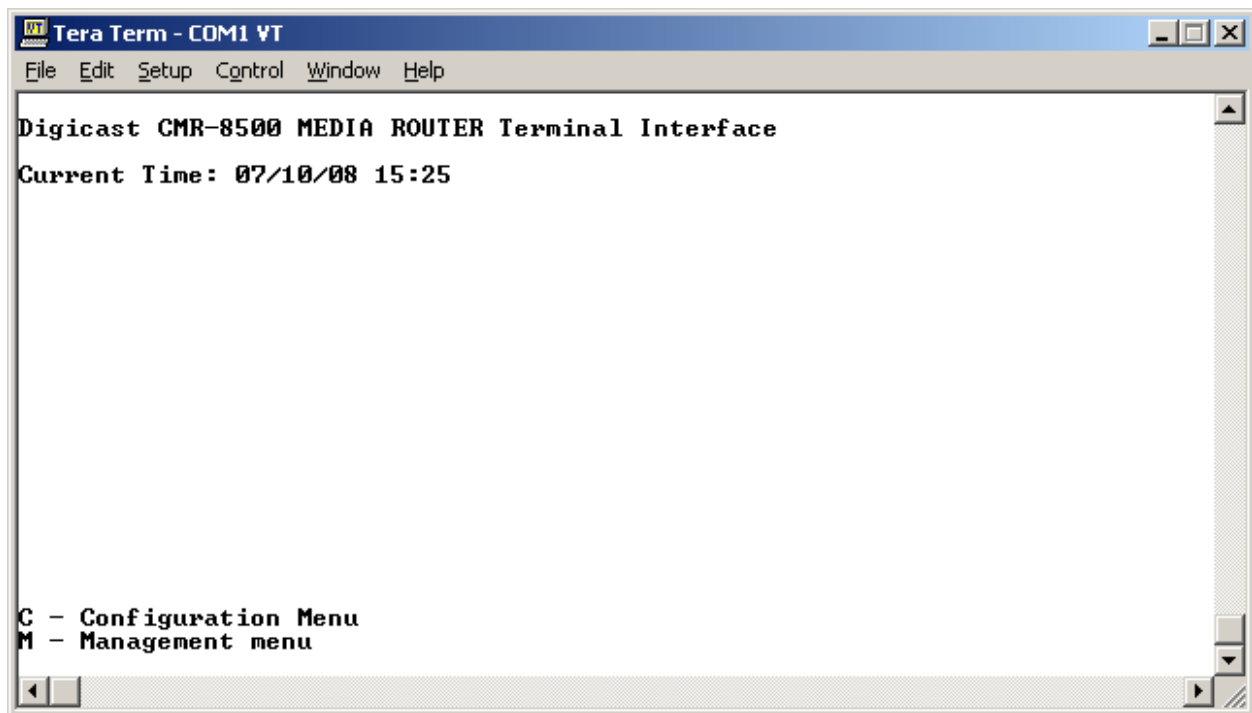
Figure 4-23. CMR-8500 Terminal Interface Main Menu

The Main Menu of the Terminal Interface provides two options:
- C – Configuration Menu
- M – Management Menu

4.2.5.3   Configuration Menu
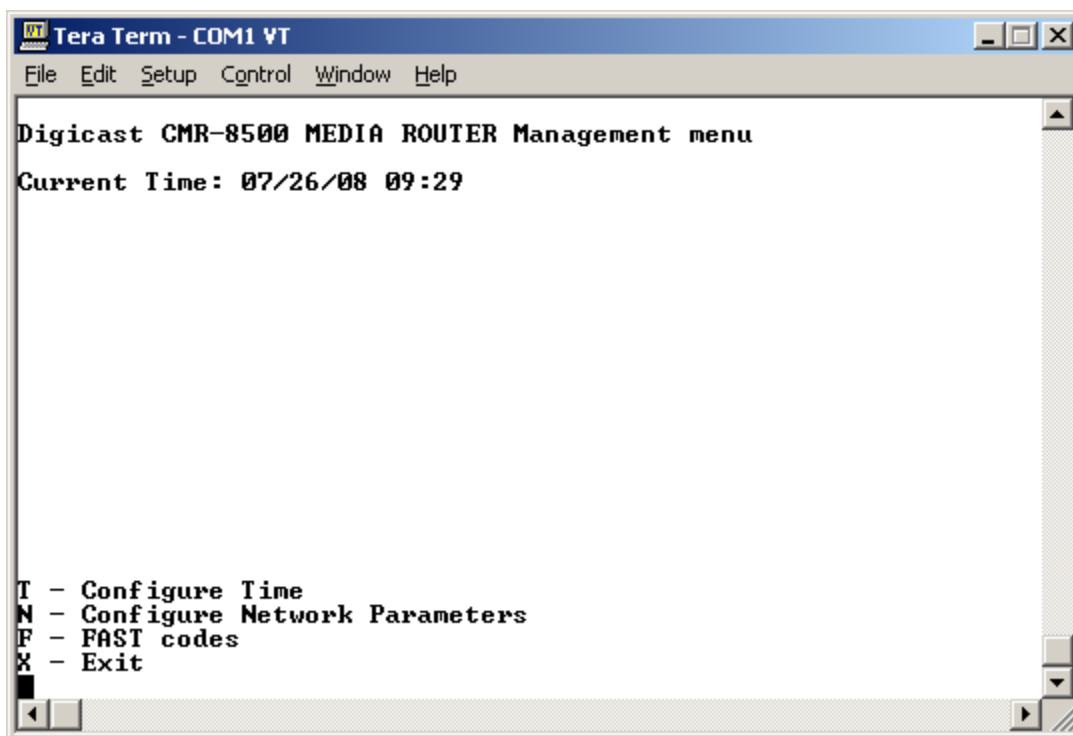
Figure 4-24. CMR-8500 Terminal Interface Configuration Menu

The Configuration Menu provides the following options:

- T – Configure Time
- N – Configure Network Parameters
- F – FAST Codes
- X – Exit

4.2.5.4   Configuration: Configure Time
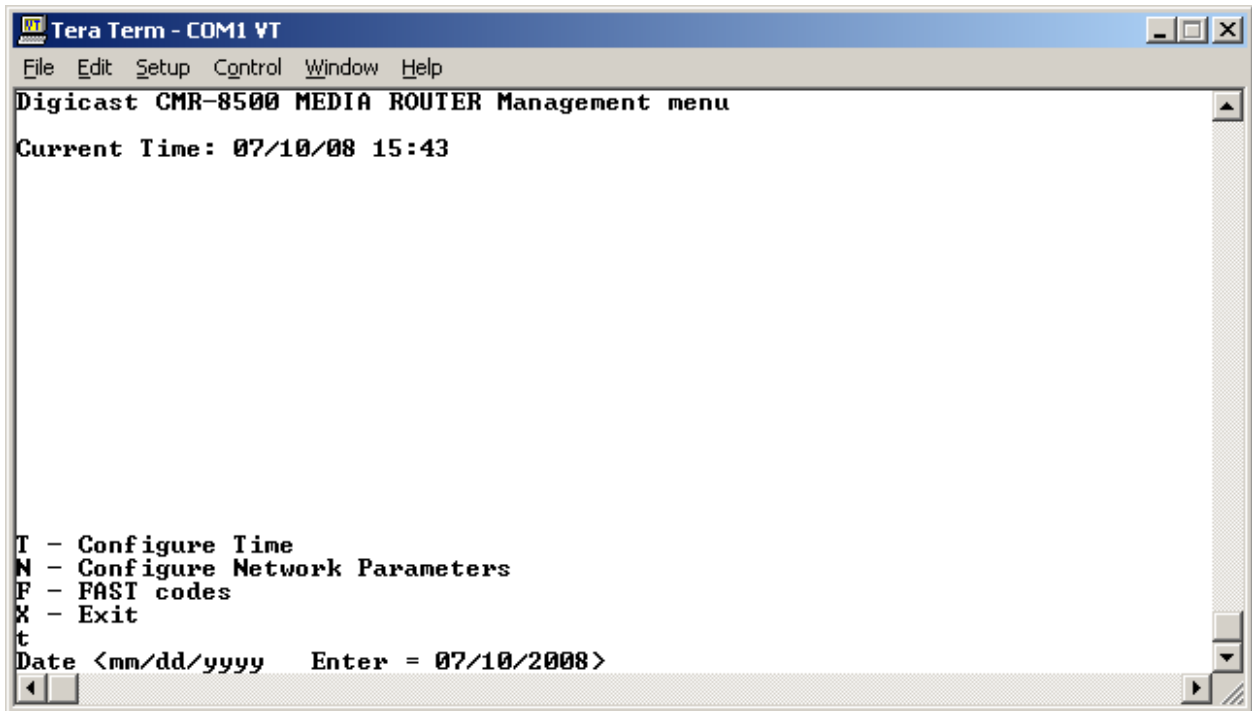
Figure 4-25. CMR-8500 Terminal Interface Configure Time Screen

To configure the date and time, when prompted, enter the date in mm/dd/yyyy format and time in hh:mm:ss format.

4.2.5.5   Configuration: Configure Network

```
Tera Term - COM1 VT                                                    _ □ ×
File  Edit  Setup  Control  Window  Help

Digicast CMR-8500 MEDIA ROUTER Network Management menu

Current Time: 07/10/08 15:43






1 - Configure GigE1 Interface
2 - Configure GigE2 Interface
M - Configure Management Interface
G - Configure Default Gateway
T - Enable/Disable Telnet
P - Set Web/FTP/Telnet Ports
S - Save Configuration
X - Exit
```
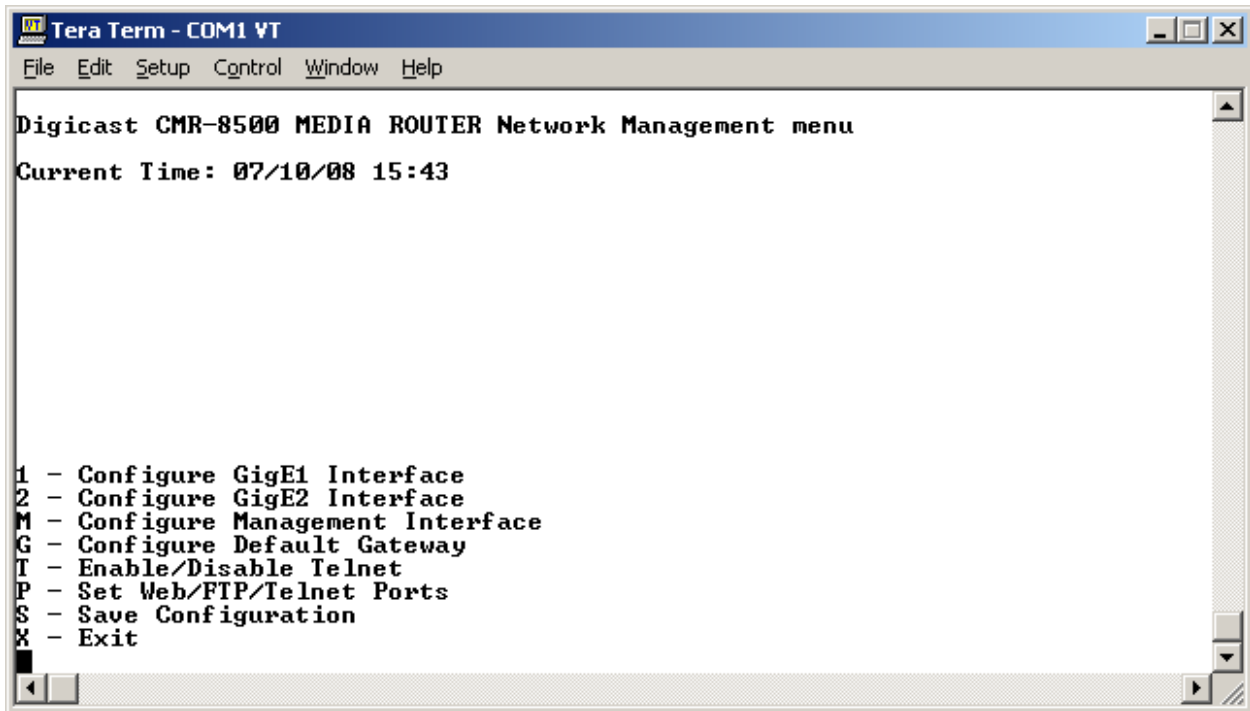
Figure 4-26. CMR-8500 Terminal Interface Configure Network Menu

The Network Management Menu provides the following selections:

1 – Configure GigE1 Interface - Prompts for the IP address and subnet mask for the GigE1 interface.

2 – Configure GigE2 Interface - Prompts for the IP address and subnet mask for the GigE2 interface.

M – Configure Management Interface - Prompts for the IP address, subnet mask, and VLAN Support for the Management interface.

G – Configure Default Gateway - Enter the Default Gateway for this unit. This should be for the Management interface.

T – Enable/Disable Telnet – Enables or disables Telnet access to the CMR-8500.

P – Set Web/FTP/Telnet Ports - Allows changes to the default port settings for web, Telnet, and FTP access to the CMR-8500.

S – Save Configuration - Saves changes made permanently. If changes are made but NOT saved, then changes will be lost upon the next reset of the CMR-8500.

X – Exit - Exit this menu and return to previous menu.

4.2.5.6   Configuration: FAST Codes
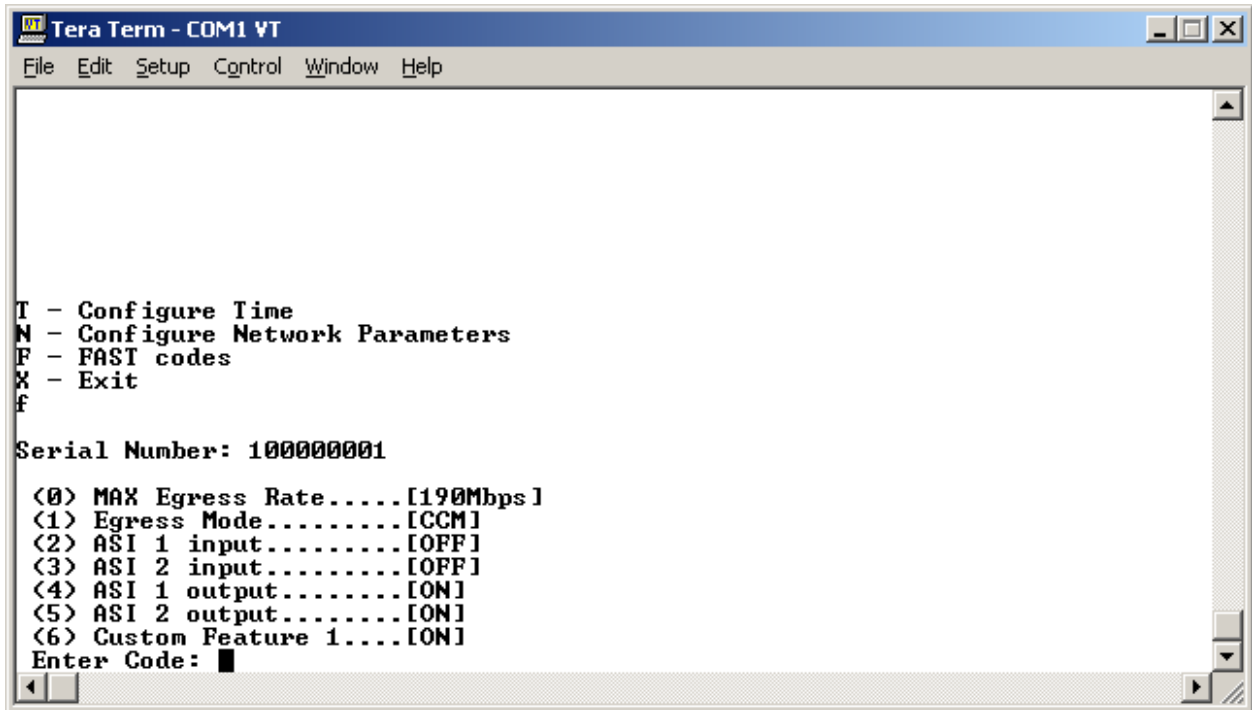
Figure 4-27. CMR-8500 Terminal Interface Configure FAST Screen

The FAST Code menu selection displays the serial number of the CMR-8500, the currently installed features and options. Please refer to Section 4.2.3.1.3 for more information concerning Comtech EF Data's FAST code options.

4.2.5.7　Management Menu
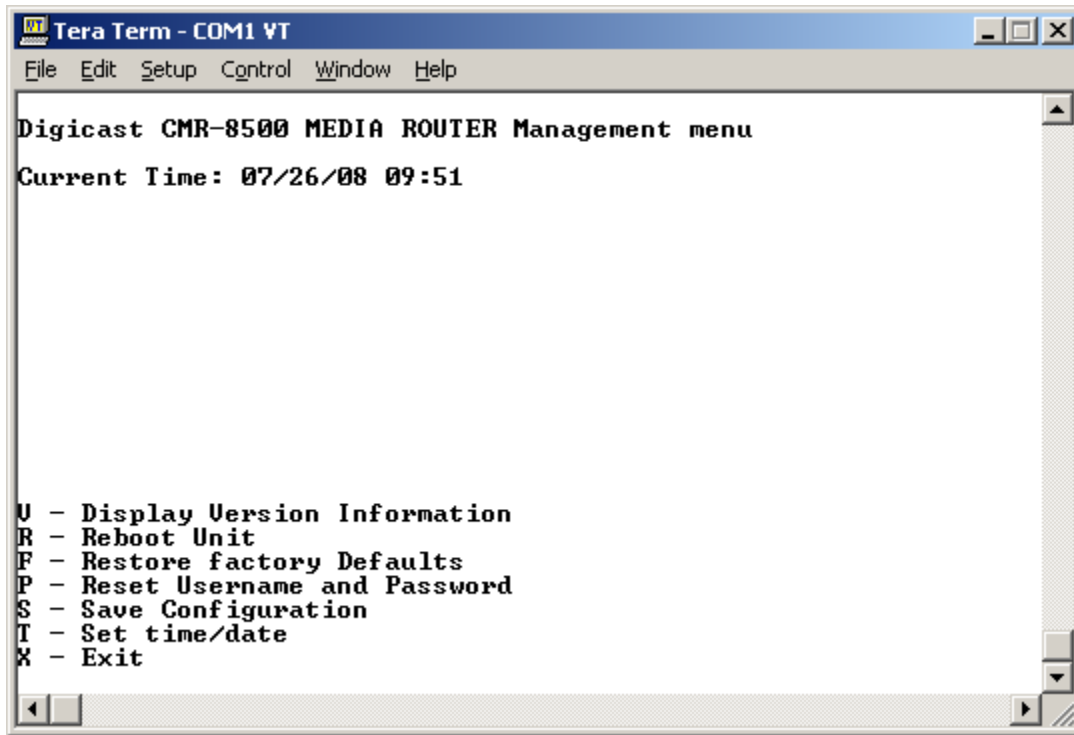
Figure 4-28. CMR-8500 Terminal Interface Management Menu

The Management Menu provides the following menu options:

V – Display Version Information - The CMR-8500 has two bootable slots. This selection displays the firmware version of each slot, and indicates which slot the CMR-8500 is currently running.

R – Reboot Unit - Resets the CMR-8500.

F – Restore Factory Defaults - Allows restoration of most configurable settings back to the factory defaults. The Management Network Interface settings will not be changed.

P – Reset Username and Password - Resets the Username and Password to the factory defaults. The factory default username is **comtech** and the factory default password is **comtech**.

S – Save Configuration - Saves changes made permanently. If changes are made but NOT saved, then changes will be lost upon the next reset of the CMR-8500.

T – Set Time/Date – Prompts to configure the date and time, enter the date in mm/dd/yyyy format and time in hh:mm:ss format.

X – Exit - Exit this menu and return to previous menu.

4.2.6 Telnet Interface

Telnet provides a textual interface over a LAN. Most PCs have the capability to use Telnet. Navigate the menus in the same manner as when using the Terminal Interface. With specific exceptions as noted in the Terminal Interface section, the menus available via Telnet and Serial interfaces are identical.

> **The "Enable Telnet" option on the Management:Main tab must be enabled before the user can log into the CMR-8500 with Telnet.**

To use Telnet on a Microsoft Windows® product, click [Run...], then [Start]. The Run dialog box opens:
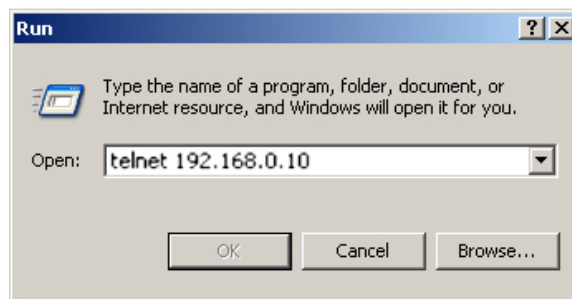
In the **Open:** text window, enter "**telnet xxx.xxx.xxx.xxx**," where **xxx.xxx.xxx.xxx** is the IP address of the CMR-8500. If the port number has been modified from the **standard 23** via the Terminal Interface, then the port number must be appended with a colon to the IP address.

Click **OK** to continue to the login prompt. At the login prompt, enter the user name and password to gain access to the telnet interface.

> **The default username is "comtech" and the default password is "comtech", both of which are case sensitive.**

4.2.7   Trivial File Transfer Protocol (TFTP)

The CMR-8500 supports changes to the resident software and firmware by means of the Trivial File Transfer Protocol (TFTP). This enables changes to be made remotely via the LAN interface. It is recommended to use Solarwinds TFTP server application (available at http://support.solarwinds.net/updates/SelectProgramFree.cfm).

To modify the software and/or firmware, use the following procedures:

Configure the server as follows:
a)   **File → Configuration →** Select the '**TFTP Root Directory**'. Set up the location of the CMR-8500 files.
b)   **File → Configuration →** Select the '**Security**' tab and make sure '**Transmit and Receive**' are selected.
c)   Save configuration.

The server is now configured for the file transfer process.

	Because the CMR-8500 requires a reboot during the upgrade process, it is recommended that this upgrade procedure be performed during scheduled network down time.
IMPORTANT	**Do NOT remove power from the unit during the download process.**

To update the firmware on the CMR-8500 via the web interface:

Step	Procedure
1	Start up Solarwinds TFTP server – Ensure configuration as described previously.
2	Ensure that the code provided by CEFD is located in the TFTP Root directory.
3	Open a web browser and connect to the CMR-8500.
4	Select the Management Tab.
5	Select the Firmware Tab.
6	Verify that the "Update To" selection is correct (Slot 1, Slot 2, or Oldest).
7	Enter the IP address of the TFTP server.
8	Type in the name of the update package file located in the TFTP directory on the server.
9	Wait several minutes, then click on the displayed web page until the message, "Complete" is shown.
10	Verify that the "Boot From" selection is correct (Slot 1, Slot 2, or Latest).
11	Reboot the CMR-8500 using the "Reset Unit" button on the Firmware page.

4.2.8   File Transfer Protocol (FTP)

The CMR-8500 also supports changes to the resident software and firmware by means of the File Transfer Protocol (TFTP). The difference in the way the CMR-8500 handles updates between FTP and TFTP is the file is pushed (via the FTP put command) to the CMR-8500.

IMPORTANT

Because the CMR-8500 requires a reboot during the upgrade process, it is recommended that this upgrade procedure be performed during scheduled network down time.

Do NOT remove power from the unit during the download process.

To update the CMR-8500 via FTP (using a Windows PC):

IMPORTANT

The CMR-8500 FTP server process does not support several FTP client software programs. When updating a CMR-8500 via FTP from a Windows PC, use the FTP commands from a command prompt (DOS window) only.

Step	Procedure
1	Verify that the "Update To" selection on the Firmware Page is correct (Slot 1, Slot 2, or Oldest).
2	Verify that the "Boot From" selection on the Firmware Page is correct (Slot 1, Slot 2, or Latest).
3	Verify that the update package file is on the PC, or on a network drive accessible from the PC.
4	Open a command prompt (Select "Start", then "run", then type in cmd).
5	Open an FTP session to the CMR-8500. Example: "*ftp 192.168.1.10* "
6	Set the transfer to binary mode, i.e., issue the "*bin*" command
7	Use the FTP "*put*" command to transfer the file. Example: "*put cmr-8500-2_0_0.pkg*"
8	After the file has transferred successfully, close the FTP session using the "*bye*" command.
9	Once the update has completed, a reboot of the unit is required.

4.2.9   Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) allows an SNMP Manager such as OpenView or Castle Rock to be used to remotely manage the CMR-8500 in an automated fashion.

The CMR-8500 supports SNMP versions 1 and 2 (SNMPv1 and SNMPv2). Two types of Management Information Bases (MIBs) are supported: **MIB II** and **private MIB**.

MIB II is the default MIB that is used to gather generic information about the unit, such as system 'up' time, packets sent or received on an interface, etc. **MIB II** is designed for only read access, not write access. To read and write configuration parameters over SNMP requires a **private MIB**. The **private MIB** allows parameters to be set on the Web, Terminal, or Telnet interfaces.

The elements Object Identifiers (OIDs) of the MIB will be listed in the appendix of a revised version of this manual. CEFD has been assigned an SNMP designator by the IEEE, which will be found in all elements of the CMR-8500's MIB.

The assigned designator for CEFD (enterprise OID) is 1.3.6.4.1.18723.

The CMR-8500 supports configurable community strings for added security. **As a security precaution, passwords cannot be remotely queried over SNMP.**

For SNMP access from a remote network via the public Internet, a VPN connection to the CMR-8500 will need to be established using third-party VPN client/server access.

The default community strings for the SNMP R/W community is **private** and the R/O community is **public**.

4.2.9.1   Multiple Variable Bindings

Three OIDs allow routes to be created, edited, and deleted via a single SNMP command. The procedures to use these OIDs are as follows:

Addition (Create):

- To add a route to the CMR-8500, the SNMP manager issues a "**create**" on the main route table. An index of 1 is assigned.

The route index will be one greater than the number of entries already in the table. This operation creates the default row as indicated below:

- An "**add row"** is performed on the index provided. The row is created with all default values.
- Each element is populated using the normal sets to each field in the row, until the entire route has been filled in.
- Once complete, the "**commit**" is issued that commits the route for use.

Look-up (Search):

- A "**set"** is performed by setting one of the three search criteria [IP | MAC | RouteName]. Only one variable may be set to perform the search. The value returned will be the actual route index that may be reviewed, modified or deleted.

When the search results in a single route, the index will always be 1. If more than one matches, then the searched-for route could have an index in this table between 1 and X, where Z is the number of matching routes.

Note that the changes are made directly on the search table with no need to go to the full route table.

Deletion:

- Using the look-up as described above, the route index may be obtained and then deleted, if desired.

Appendix A. SOFTWARE UPGRADE

A.1   Introduction

The CMR-8500 supports changes to the resident software and firmware by two methods:

- Trivial File Transfer Protocol (TFTP)
- File Transfer Protocol (FTP)

Using TFTP, the transfer is initiated from the CMR-8500 using the unit's web interface, and connecting to a remote TFTP server. If FTP is to be used, the transfer is initiated remotely and an FTP session is created between the CMR-8500 and the remote device (typically a PC).

The CMR-8500 supports two banks of firmware. The user has the capability to select which bank of firmware to boot from, as well as which bank to update.

A.2   Software Upgrade via TFTP, Using the CMR-8500 Web Interface

If TFTP is to be used for software upgrades, it is recommended to use Solarwinds$^{©}$ TFTP server application (available at http://support.solarwinds.net/updates/SelectProgramFree.cfm).

To modify the software and/or firmware, use the following procedures:

Configure the server as follows:
a) **File → Configuration →** Select the '**TFTP Root Directory**'. Set up the location of the CMR-8500 files.

b) **File → Configuration →** Select the '**Security**' tab and make sure '**Transmit and Receive**' are selected.

c) Save configuration.

The server is now configured for the file transfer process.

IMPORTANT

Because the CMR-8500 requires a reboot during the upgrade process, it is recommended that this upgrade procedure be performed during scheduled network down time.

Do NOT remove power from the unit during the download process.

To update the CMR-8500 via TFTP:

Step	Procedure
1	Open the web interface to the CMR-8500, and access the Management-> Firmware tab.
2	Verify that the "Boot From" selection is correct. This is the bank of firmware that the CMR-8500 will boot from on the next reset of the unit.
3	Verify that the "Update To" selection is correct. This is the bank of firmware to be updated the next time that an update package is sent via TFTP or FTP to the CMR-8500.
4	Enter the TFTP server IP Address. This should be a server running a TFTP Server process, and where the CMR-8500 update package file is located.
5	Enter the "Image File Name". This is the name of the update file, which should be located on the TFTP server.
6	Click on the "Update" button. The software update will now transfer to the CMR-8500, and the update process will begin.
7	When the update has successfully been installed, a message, "Complete" will be displayed.
8	Once the unit has been successfully upgraded, click on the "Reset Unit" button to reboot the CMR-8500.
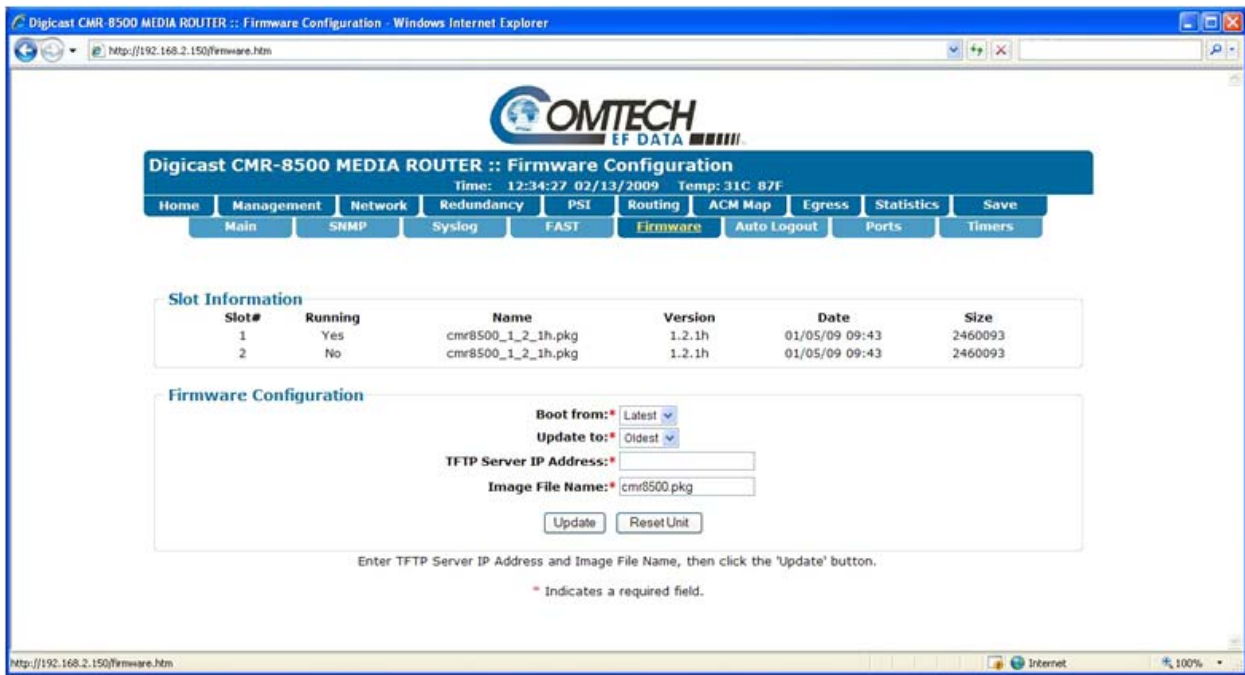
Figure A-1**. CMR-8500 Firmware Update Web Page**

A.3   Software Upgrade via FTP

Using FTP to upgrade the CMR-8500, the user initiates an FTP session remotely and sends the update file to the CMR-8500 using FTP commands.

The CMR-8500 also supports changes to the resident software and firmware by means of the File Transfer Protocol (TFTP). The difference in the way the CMR-8500 handles updates between FTP and TFTP is this: With TFTP, the CMR-8500 requests the file from a TFTP server. With an update via FTP, the file is pushed (via the FTP put command) to the CMR-8500.

Because the CMR-8500 requires a reboot during the upgrade process, it is recommended that this upgrade procedure be performed during scheduled network down time.

Do NOT remove power from the unit during the download process.

To update the CMR-8500 via FTP (using a Windows PC):

The CMR-8500 FTP server process does not support several FTP client software programs. When updating a CMR-8500 via FTP from a Windows PC, use the FTP commands from a command prompt (DOS window) only.

Step	Procedure
1	Verify that the "Update To" selection on the Firmware Page is correct (Slot 1, Slot 2, or Oldest).
2	Verify that the "Boot From" selection on the Firmware Page is correct (Slot 1, Slot 2, or Latest).
3	Verify that the update package file is on the PC, or on a network drive accessible from the PC.
4	Open a command prompt (Select "Start", then "run", then type in cmd).
5	Open an FTP session to the CMR-8500. Example: "*ftp 192.168.1.10* "
6	Set the transfer to binary mode, i.e., issue the "*bin*" command
7	Use the FTP "*put*" command to transfer the file. Example: "*put cmr-8500-2_0_0.pkg*"
8	After the file has transferred successfully, close the FTP session using the "*bye*" command.
9	Once the update has completed, a reboot of the unit is required.

Appendix B. IP Routing Support

B.1   Introduction

Offering state-of-the-art encapsulation based on the DVB Specification for Data Broadcasting (EN 301 192), the CMR-8500 provides the following configuration features:

- IP Encapsulation per Multi-Protocol Encapsulation (EN 301 192)
- Unicast Routing
- Multicast Routing
- Section Packing and Non-Section Packing
- 80,000 Configurable Routes
- 1 Default Route
- Multicast Zones
- IP Copy
- 802.1q VLAN

B.2   Route Configuration

Both Unicast and Multicast IP datagrams are encapsulated per the Multi-Protocol Encapsulation specification. Routing of datagrams is accomplished by configuration of the ME Route Table, described in the following section.

B.2.1 Unicast Routing

Unicast routing provides point-to-point delivery of IP datagrams. Routes for Unicast IP packets are configured according to the following:

- **IP Addresses**, which fall into three classes, namely: A (0.0.0.0 to 127.255.255.255), B (128.0.0.0 to 191.255.255.255) and C (192.0.0.0 to 223.255.255.255).
- **Medium Access Control (MAC) Addresses,** which identify the destination device (next-hop) to which the packets are sent. The least-significant bit of the first byte of the six-byte MAC address is a '0'. For example, 0x00 11 22 33 44 55 is a Unicast address.

Unicast is supported by the CMR-8500 as it would be in any routed network. A route is created and a subnet mask is assigned to the route.

The CMR-8500 uses Classless Inter-Domain Routing (CIDR) notation in which a 'slash' followed by a decimal number is used to represent the number of bits for the mask, e.g. /32 is 255.255.255.255 and /24 is 255.255.255.0.

As stated previously, part of the route configuration is a MAC address that is assigned for delivery of the packet when it is encapsulated into MPE. The MAC address typically identifies the remote receiver (physical device); e.g. satellite terminal, DTV terminal, or cable receiver.

B.2.2 Multicast Routing

Multicast routing provides point-to-multipoint delivery of IP datagrams. Routes for multicast IP packets are configured according to the following:

- **IP Addresses**, which fall into class D (224.0.0.0 to 239.255.255.255)
- **Medium Access Control (MAC) Addresses,** which identify the frames as multicast. The least-significant bit of the first byte of the six-byte MAC address is a '1'. For example, 0x01 00 5E 00 00 01 is a multicast address.
- **Broadcast frames** are identified by the MAC Address, 0x FF FF FF FF FF FF.

Multicast IP addresses are related to multicast MAC addresses as follows:

- The lower 23 bits of the IP address are mapped into the lower 23 bits of the MAC address.

Figure B-1. Multicast Mapping (IP to MAC)

Several examples of the relationship are:

- Received IP: 239.1.1.10 = MAC: 0x01 00 5E 01 01 0A
- Received IP: 224.10.10.10 = MAC: 0x01 00 5E 0A 0A 0A
- Received IP: 228.63.10.10 = MAC: 0x01 00 5E 3F 0A 0A

Note that the upper 5 bits of the multicast IP address are ignored in the MAC so that 32 Multicast group IP addresses map to a single MAC address. This implies further filtering is required at the end device.

B.3   802.1Q VLAN Support

802.1Q VLAN support allows the encapsulator to route traffic based on the VLAN tags. The configuration of the VLAN tag is done on the Advanced Routing page on the terminal interface and is also available on the web interface. VLAN tags are supported when LLC_SNAP Ethernet frames are being used. Normal

Ethernet frames utilize IEEE 802.3 framing with a maximum frame size of 1,518 bytes; however, LLC_SNAP frames contain four extra bytes (on the frame header) that may be used for VLAN tags, so the Ethernet frame size is up to 1,522 bytes. The VLAN tag allows the CMR-8500 to route packets based on the presence of a route that matches the VLAN tag. The VLAN tag is 12 bits in length and valid values from 0 to 4095 are accepted.

B.4   Section Packing

Section packing is a technique to provide better utilization of the MPEG-2 Transport Stream (TS) packet structure. When section packing is not used, each TS packet (containing the MPE section) can carry no more than a single section. This often results in wasted payload capacity when the sections are less than 184 bytes. The section packing feature allows more than a single MPE section to be carried by an MPEG-2 TS packet, thereby minimizing wasted payload capacity. In the case of a large MPE section that spans multiple MPEG-2 packets, the ending of an MPE section may occur in the middle of an MPEG-2 packet. In this instance, with section packing, a new MPE section begins immediately after the first MPE section has finished without any 'fill' (wasted) bytes having to be inserted before the start of the next MPEG-2 packet.

The CMR-8500 provides an option to set how much time is allocated to hold packets to ensure filling an MPEG frame before transmitting the frame.
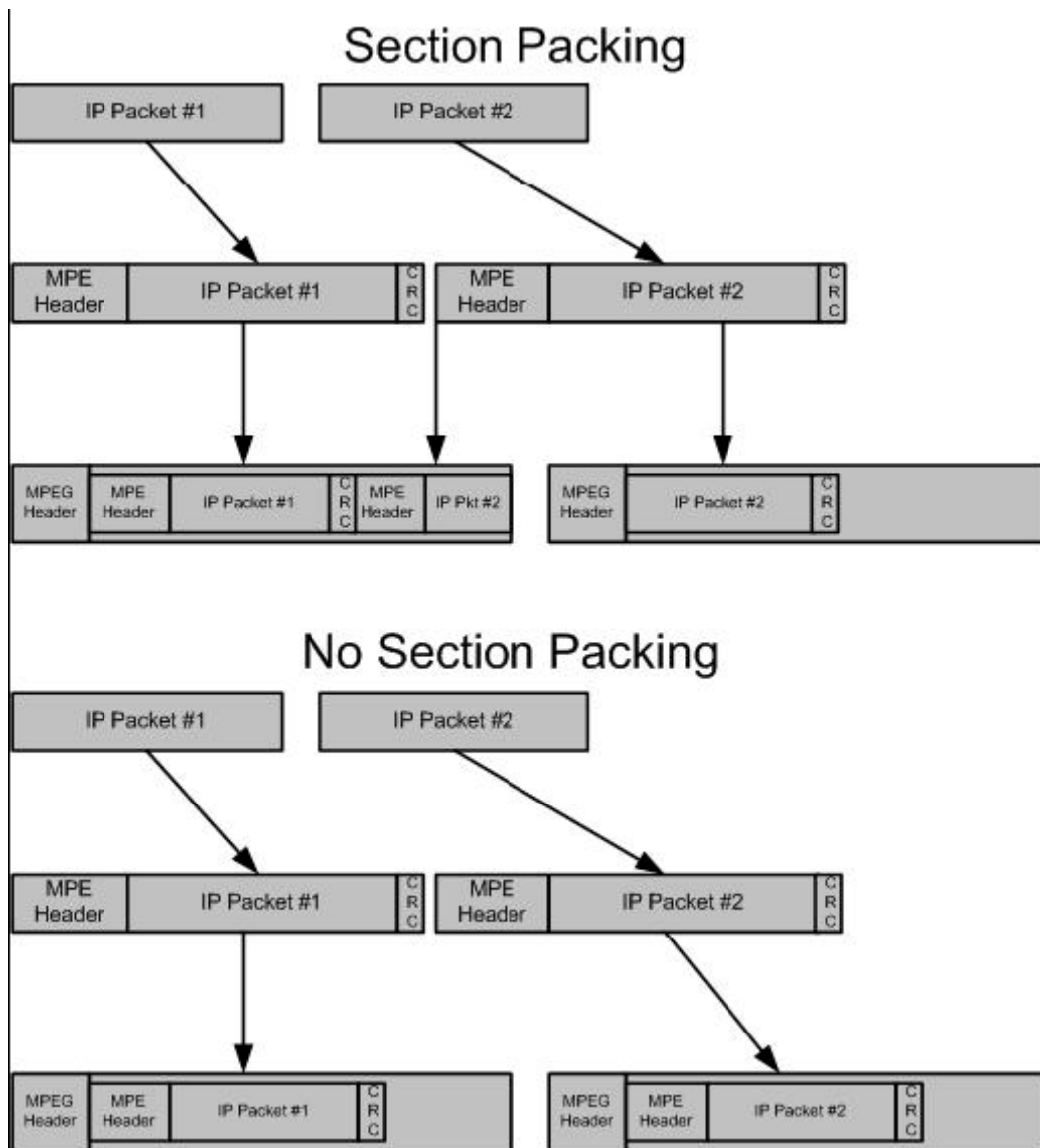
Figure B-2. Section Packing

B.5   80,000 Routes

The CMR-8500 is capable of providing up to 80,000 unique IP routes. Each IP route can be configured as Unicast or Multicast. Additional routes may be supported by using the Multicast Zones feature described in the next section.

Routes can be assigned to PIDs in the range 0x0010 to 0x1FFE (this excludes the reserved PIDs as defined in ISO 13818-1).

B.6   Multicast Zones

The Multicast Zones feature allows the user to more efficiently configure the Encapsulator when supporting multicasting. Using the IP subnetting techniques of Unicast routing, Multicast Zones allows a single IP address to be specified on a route and a subnet mask is assigned to the route. The CMR-8500 uses Classless Inter-Domain Routing (CIDR) notation in which a 'slash' followed by a decimal number is used to represent the number of bits for the mask; e.g. /32 is 255.255.255.255 and /24 is 255.255.255.0.

The subnet mask defines how many multicast IP addresses are allowed to be mapped to a single route. Care must be taken when using the multicast zone feature since IP traffic present within the multicast zone will be routed over the network. An example of multicast zone is as follows:

- Multicast Route = 239.0.10.1
- Multicast Zone Mask = 255.255.255.252
- Multicast groups mapped to the 239.0.10.1 route:
    - 239.0.10.0
    - 239.0.10.1
    - 239.0.10.2
    - 239.0.10.3

B.7   IP Copy

IP Copy is another technique for more efficiently mapping incoming IP packets to Encapsulator routes by means of a defined rule associated with a given route. Typically, IP Copy is used for Unicast traffic. The rules instruct the CMR-8500 how to assign the MAC addresses, used in the encapsulation process, based on the incoming IP address of the packets. The rules appear as follows:

- IP Copy Range = 10.10.10.X
- Mask = 255.255.255.0

The rule states the last byte of the IP address "X" becomes the last byte of the destined MAC address:

- MAC Address = 0x00 50 C2 25 00 00 – 0x00 50 C2 25 00 FF

The IP Copy rules provide automatic MAC address assignment based on the incoming IP address. Therefore, a single route running IP Copy can support multiple remotes. In this example, the rule will support up to 1,024 remotes on a single route.

IP Copy Example:

Incoming IP Address – 10.10.10.5 assigned MAC Address – 0x00 50 C2 25 00 05

Incoming IP Address – 10.10.10.100 assigned MAC Address – 0x00 50 C2 25 00 64

B.8   Quality of Service (QoS)

Each route defined can be configured to provide a determined bandwidth. Note that all QoS rates are for the MPEG transport stream and are based on MPEG payloads. Therefore, IP data rates may be slightly less due to the transport overhead of the MPEG and MPE. Additionally, running section packing will provide more IP data throughput, but consumes an equal amount of usage over the MPEG transport stream. The bandwidth attributes that may be set are as follows:

- **Minimum:** The guaranteed amount of bandwidth the CMR-8500 will provide for this route. The total number of routes with guaranteed bandwidth must always be less than the rate of the egress port.
- **Maximum:** The maximum amount of bandwidth a route will be allowed to have. Once the traffic for this route exceeds this level, packets will be silently discarded to ensure that the maximum is not exceeded
- **No Setting:** If neither the Guaranteed nor the Maximum values are set, the route will be allowed to use as much bandwidth as possible and possibly attempt to exceed the egress bandwidth, which will result in lost data. Conversely, if there is not guaranteed bandwidth for the route, another route may utilize all available bandwidth.

Appendix C. CMR-8500 Private MIB Elements

C.1   Main

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.1.1.0	dniUnitInfoUnitName	read-write	Name of unit
.1.3.6.1.4.1.18723.8500.1.2.0	dniUnitInfoUserName	read-write	Management User Name
.1.3.6.1.4.1.18723.8500.1.3.0	dniUnitInfoPassword	read-write	Management Password
.1.3.6.1.4.1.18723.8500.1.4.0	dniUnitInfoConfirmPassword	read-write	Management Password Confirm
.1.3.6.1.4.1.18723.8500.1.5.0	dniUnitInfoSystemContact	read-write	System Contact
.1.3.6.1.4.1.18723.8500.1.6.0	dniUnitInfoSystemLocation	read-write	System Location
.1.3.6.1.4.1.18723.8500.1.7.0	dniUnitInfoEnableTelnet	read-write	Enable use of Telnet
.1.3.6.1.4.1.18723.8500.1.8.0	dniUnitInfoEnforceEgressQoS	read-write	Enforce Egress QoS Rules on Unit (Global)
.1.3.6.1.4.1.18723.8500.1.9.0	dniUnitInfoMgmtTime	read-write	Unit Time
.1.3.6.1.4.1.18723.8500.1.10.0	dniUnitInfoMgmtDate	read-write	Unit Date
.1.3.6.1.4.1.18723.8500.1.11.0	dniUnitInfoTemperature	read-write	Unit Temperature
.1.3.6.1.4.1.18723.8500.1.12.0	dniConfigurationSaveStatus	read-write	Save Configuration

C.2   SNMP

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.2.1.0	dniSNMPServerIPAddress	read-write	IP Address of the Trap Server

C.3   SYSLOG

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.3.1.0	dniSyslogEnable	read-write	Enable System Log
.1.3.6.1.4.1.18723.8500.3.2.0	dniSyslogServerIPAddress	read-write	IP Address of System Logger
.1.3.6.1.4.1.18723.8500.3.3.0	dniSyslogPort	read-write	Port of System Logger

C.4   Firmware

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.5.2.0	firmwareBootFromSlot	read-write	Boot from Slot
.1.3.6.1.4.1.18723.8500.5.3.0	firmwareUpdateToSlot	read-write	Update to Slot
.1.3.6.1.4.1.18723.8500.5.4.0	firmwareResetUnit	read-write	Reset the Unit
.1.3.6.1.4.1.18723.8500.5.1.1.1	slotNumber	read-only	Slot Number
.1.3.6.1.4.1.18723.8500.5.1.1.2	isRunning	read-only	Slot Number Running (Actively)
.1.3.6.1.4.1.18723.8500.5.1.1.3	packageFileName	read-only	Package File Name (Firmware Package)
.1.3.6.1.4.1.18723.8500.5.1.1.4	packageFileVersion	read-only	Package File Version (Package Version)
.1.3.6.1.4.1.18723.8500.5.1.1.5	packageFileBuildDte	read-only	Package File Build Date
.1.3.6.1.4.1.18723.8500.5.1.1.6	packageFileByteSize	read-only	Package File Size (in Bytes)

C.5   Auto Logout

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.6.1.0	dniAutoLogoutEnable	read-write	Auto logout enable
.1.3.6.1.4.1.18723.8500.6.2.0	dniAutoLogoutTime	read-write	Auto logout time (only valid if auto logout is enabled)

C.6   PORTS

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.7.1.0	dniHTTPPort	read-write	HTTP Port Number
.1.3.6.1.4.1.18723.8500.7.2.0	dniFTPPort	read-write	FTP Port Number
.1.3.6.1.4.1.18723.8500.7.3.0	dniTelnetPort	read-write	Telnet Port Number
.1.3.6.1.4.1.18723.8500.7.4.0	dniACMControllerPort	read-write	ACM Controller Port Number
.1.3.6.1.4.1.18723.8500.7.5.0	dniACMControllerEnable	read-write	ACM Controller Enable
.1.3.6.1.4.1.18723.8500.7.6.0	dniFTPEnable	read-write	FTP Enable

C.7   Timers

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.8.1.0	dniGlobalPackingTimer	read-write	Global Packing Timer (Global MPEG 2 Section Packing Timer)
.1.3.6.1.4.1.18723.8500.8.2.0	dniGlobalModcodHoldTimer	read-write	Global MODCOD Timer (Global MODCOD Packing Timer for ACM)

C.8   Network

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.9.1.1.1	interfaceNumber	read-only	Interface Number
.1.3.6.1.4.1.18723.8500.9.1.1.2	interfaceName	read-only	Interface Name
.1.3.6.1.4.1.18723.8500.9.1.1.3	interfaceMAC	read-only	Interface MAC Address
.1.3.6.1.4.1.18723.8500.9.1.1.4	interfaceIPAddress	read-write	Interface IP Address
.1.3.6.1.4.1.18723.8500.9.1.1.5	interfaceSubnetMask	read-write	Interface Subnet Mask
.1.3.6.1.4.1.18723.8500.9.1.1.6	interfaceDefaultGateway	read-write	Interface Default Gateway
.1.3.6.1.4.1.18723.8500.9.1.1.7	interfaceVLANEnable	read-write	Interface VLAN Enable
.1.3.6.1.4.1.18723.8500.9.1.1.8	interfaceVLANID	read-write	Interface VLAN ID (Only valid if VLAN is enabled)
.1.3.6.1.4.1.18723.8500.9.1.1.9	interfaceLinkConfiguration	read-write	Interface link configuration

C.9   Redundancy

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.10.1.0	redundancyMode	read-write	Redundancy Mode
.1.3.6.1.4.1.18723.8500.10.2.0	redundancyState	read-only	Redundancy State
.1.3.6.1.4.1.18723.8500.10.3.1.1	redundantIntefaceNumber	read-only	Redundancy Interface Number
.1.3.6.1.4.1.18723.8500.10.3.1.2	redundantIntefaceName	read-only	Redundancy Interface Name
.1.3.6.1.4.1.18723.8500.10.3.1.3	redundantIntefaceIPAddress	read-write	Redundancy Interface IP Address
.1.3.6.1.4.1.18723.8500.10.3.1.4	redundantIntefaceMAC	read-write	Redundancy Interface MAC Address

C.10   PSI

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.11.1.0	dniPSIEnable	read-write	PSI Enable
.1.3.6.1.4.1.18723.8500.11.2.0	dniPSIRate	read-write	PSI Rate (Only valid if PSI is enabled)
.1.3.6.1.4.1.18723.8500.11.3.0	dniPSIPMTPID	read-write	PSI PMT PID (Base PID for the PMT)
.1.3.6.1.4.1.18723.8500.11.4.0	dniTransportStreamID	read-write	PSI Transport Stream ID

C.11   Routing

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.12.1.0	iprouteAddCommit	read-write	IP Route Add Commit
.1.3.6.1.4.1.18723.8500.12.2.1.1	iprouteIndex	read-only	IP Route Index
.1.3.6.1.4.1.18723.8500.12.2.1.2	iprouteName	read-write	IP Route Name
.1.3.6.1.4.1.18723.8500.12.2.1.3	iprouteIPAddress	read-write	IP Route IP Address
.1.3.6.1.4.1.18723.8500.12.2.1.4	iproutePrefixLength	read-write	IP Route Prefix Length (Subnet)
.1.3.6.1.4.1.18723.8500.12.2.1.5	iproutePID	read-write	IP Route PID
.1.3.6.1.4.1.18723.8500.12.2.1.6	iprouteMODCOD	read-only	IP MODCOD (for ACM Mode only)
.1.3.6.1.4.1.18723.8500.12.2.1.7	iproutePilots	read-only	IP Route Pilots (for ACM Mode only)
.1.3.6.1.4.1.18723.8500.12.2.1.8	iprouteFrame	read-only	IP Route Frames (for ACM Mode Only)
.1.3.6.1.4.1.18723.8500.12.2.1.9	iprouteMACAddress	read-write	IP Route MAC Address
.1.3.6.1.4.1.18723.8500.12.2.1.10	iprouteVLANID	read-write	IP VLAN ID
.1.3.6.1.4.1.18723.8500.12.2.1.11	iprouteMaxBandwidth	read-write	IP Route Max Bandwidth (only valid if enforce QoS is enabled)
.1.3.6.1.4.1.18723.8500.12.2.1.12	iprouteGuaranteedBandwidth	read-write	IP Guaranteed Bandwidth (only valid if enforce QoS is enabled)
.1.3.6.1.4.1.18723.8500.12.2.1.13	iprouteIPCopy	read-write	IP Route IP Copy
.1.3.6.1.4.1.18723.8500.12.2.1.14	iprouteSectionPacked	read-write	IP Route Section Packing Enabled
.1.3.6.1.4.1.18723.8500.12.2.1.15	iproutePSI	read-write	IP Route PSI Enabled
.1.3.6.1.4.1.18723.8500.12.2.1.16	iprouteEnabled	read-write	IP Route Enabled
.1.3.6.1.4.1.18723.8500.12.2.1.17	iprouteDelete	read-write	IP Route Delete
.1.3.6.1.4.1.18723.8500.12.2.1.18	iprouteOperation	read-write	IP Route Operation

C.12   Routing Search

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.13.1.0	iprouteSearchByMAC	read-write	IP Route Search by MAC Address
.1.3.6.1.4.1.18723.8500.13.2.0	iprouteSearchByIP	read-write	IP Route Search by IP Address
.1.3.6.1.4.1.18723.8500.13.3.0	iprouteSearchByName	read-write	IP Route Search by Name
.1.3.6.1.4.1.18723.8500.13.4.1.1	iprouteSearchIndex	read-only	IP Route Search by Index
.1.3.6.1.4.1.18723.8500.13.4.1.2	iprouteSearchName	read-write	IP Route Search Name
.1.3.6.1.4.1.18723.8500.13.4.1.3	iprouteSearchIPAddress	read-write	IP Route Search by IP Address
.1.3.6.1.4.1.18723.8500.13.4.1.4	iprouteSearchPrefixLength	read-write	IP Route Search by IP Prefix Length (Subnet)
.1.3.6.1.4.1.18723.8500.13.4.1.5	iprouteSearchPID	read-write	IP Route Search by IP PID
.1.3.6.1.4.1.18723.8500.13.4.1.6	iprouteSearchMODCOD	read-only	IP Route Search by MODCOD
.1.3.6.1.4.1.18723.8500.13.4.1.7	iprouteSearchPilots	read-only	IP Route Search by Pilots
.1.3.6.1.4.1.18723.8500.13.4.1.8	iprouteSearchFrame	read-only	IP Route Search by Frame Size
.1.3.6.1.4.1.18723.8500.13.4.1.9	iprouteSearchMACAddress	read-write	IP Route Search by MAC Address
.1.3.6.1.4.1.18723.8500.13.4.1.10	iprouteSearchVLANID	read-write	IP Route Search by VLAN ID
.1.3.6.1.4.1.18723.8500.13.4.1.11	iprouteSearchMaxBandwidth	read-write	IP Route Search by Max Bandwidth
.1.3.6.1.4.1.18723.8500.13.4.1.12	iprouteSearchGuaranteedBandwidth	read-write	IP Route Search by Guaranteed Bandwidth
.1.3.6.1.4.1.18723.8500.13.4.1.13	iprouteSearchIPCopy	read-write	IP Route Search by IP Copy
.1.3.6.1.4.1.18723.8500.13.4.1.14	iprouteSearchSectionPacked	read-write	IP Route Search by Section Packed
.1.3.6.1.4.1.18723.8500.13.4.1.15	iprouteSearchPSI	read-write	IP Route Search by PSI
.1.3.6.1.4.1.18723.8500.13.4.1.16	iprouteSearchEnabled	read-write	IP Route Search by Enabled
.1.3.6.1.4.1.18723.8500.13.4.1.17	iprouteSearchDelete	read-write	IP Route Searched by Delete

C.13 ACM Map

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.14.1.0	acmmapAddCommit	read-write	ACM Map Commit
.1.3.6.1.4.1.18723.8500.14.2.1.1	acmmapIndex	read-only	ACM Map Index
.1.3.6.1.4.1.18723.8500.14.2.1.2	acmmapPID	read-write	ACM Map PID
.1.3.6.1.4.1.18723.8500.14.2.1.3	acmmapModulation	read-write	ACM Map Modulation Type
.1.3.6.1.4.1.18723.8500.14.2.1.4	acmmapFrame	read-write	ACM Map Frame Type
.1.3.6.1.4.1.18723.8500.14.2.1.5	acmmapFEC	read-write	ACM Map FEC Type
.1.3.6.1.4.1.18723.8500.14.2.1.6	acmmapPilots	read-write	ACM Map Pilots
.1.3.6.1.4.1.18723.8500.14.2.1.7	acmmapCommitted	read-only	ACM Map Committed
.1.3.6.1.4.1.18723.8500.14.2.1.8	acmmapDelete	read-write	ACM Map Delete

C.14 Egress

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.15.1.0	egressMode	read-write	Egress Mode
.1.3.6.1.4.1.18723.8500.15.2.1.1	asiPortIndex	read-only	ASI Port Index
.1.3.6.1.4.1.18723.8500.15.2.1.2	asiPortEnable	read-write	ASI Port Enable
.1.3.6.1.4.1.18723.8500.15.2.1.3	asiPortClockRate	read-write	ASI Port Clock Rate
.1.3.6.1.4.1.18723.8500.15.2.1.4	asiPortFramingMode	read-write	ASI Port Framing Mode
.1.3.6.1.4.1.18723.8500.15.3.1.1	cop3Index	read-only	CoP 3 Index
.1.3.6.1.4.1.18723.8500.15.3.1.2	cop3Mode	read-write	CoP 3 Mode
.1.3.6.1.4.1.18723.8500.15.3.1.3	cop3Destination	read-write	CoP 3 Destination
.1.3.6.1.4.1.18723.8500.15.3.1.4	cop3IPAddress	read-write	CoP 3 IP Address
.1.3.6.1.4.1.18723.8500.15.3.1.5	cop3MACAddress	read-write	CoP 3 MAC Address
.1.3.6.1.4.1.18723.8500.15.3.1.6	cop3Port	read-write	CoP 3 Port
.1.3.6.1.4.1.18723.8500.15.3.1.7	cop3TTL	read-write	CoP 3 Time-to-Live

C.15   Statistics

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.16.1.1.1	aggRouteStatsIndex	read-only	Aggregate Route Statistics Index
.1.3.6.1.4.1.18723.8500.16.1.1.2	aggRouteStatsPacketsReceived	read-only	Aggregate Route Statistics Packets Received
.1.3.6.1.4.1.18723.8500.16.1.1.3	aggRouteStatsPacketsDropped	read-only	Aggregate Route Statistics Packets Dropped
.1.3.6.1.4.1.18723.8500.16.1.1.4	aggRouteStatsEthPacketsDropped	read-only	Aggregate Route Statistics Ethernet Packets Dropped
.1.3.6.1.4.1.18723.8500.16.1.1.5	aggRouteStatsMinMbps	read-only	Aggregate Route Statistics Minimum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.1.1.6	aggRouteStatsMaxMbps	read-only	Aggregate Route Statistics Maximum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.1.1.7	aggRouteStatsAvgMbps	read-only	Aggregate Route Statistics Average Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.1.1.8	aggRouteStatsCurrentMbps	read-only	Aggregate Route Statistics Current Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.2.1.1	routeStatsIndex	read-only	Route Statistics Index
.1.3.6.1.4.1.18723.8500.16.2.1.2	routeStatsEnabled	read-only	Route Statistics Enabled
.1.3.6.1.4.1.18723.8500.16.2.1.3	routeStatsName	read-only	Route Statistics Name
.1.3.6.1.4.1.18723.8500.16.2.1.4	routeStatsPacketsReceived	read-only	Route Statistics Packets Received
.1.3.6.1.4.1.18723.8500.16.2.1.5	routeStatsPacketsDropped	read-only	Route Statistics Dropped
.1.3.6.1.4.1.18723.8500.16.2.1.6	routeStatsPID	read-only	Route Statistics PID
.1.3.6.1.4.1.18723.8500.16.2.1.7	routeStatsMinMbps	read-only	Route Statistics Minimum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.2.1.8	routeStatsMaxMbps	read-only	Route Statistics Maximum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.2.1.9	routeStatsAvgMbps	read-only	Route Statistics Average Rate (Mbps)
.1.3.6.1.4.1.18723.8500.16.3.0	routeStatsClearAllStat	read-write	Route Statistics Clear All Statistics

C.16   MODCOD Statistics

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.17.3.0			
.1.3.6.1.4.1.18723.8500.17.1.1.1	aggMODCODStatsIndex	read-only	Aggregate MODCOD Statistics Index
.1.3.6.1.4.1.18723.8500.17.1.1.2	aggMODCODStatsBytesTX	read-only	Aggregate MODCOD Statistics Bytes Transmitted
.1.3.6.1.4.1.18723.8500.17.1.1.3	aggMODCODStatsMinMbps	read-only	Aggregate MODCOD Statistics Minimum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.1.1.4	aggMODCODStatsMaxMbps	read-only	Aggregate MODCOD Statistics Maximum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.1.1.5	aggMODCODStatsAvgMbps	read-only	Aggregate MODCOD Statistics Average Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.1.1.6	aggMODCODStatsCurrentMbps	read-only	Aggregate MODCOD Statistics Current Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.2.1.1	mODCODIndex	read-only	MODCOD Index
.1.3.6.1.4.1.18723.8500.17.2.1.2	mODCODModulation	read-only	MODCOD Modulation Type
.1.3.6.1.4.1.18723.8500.17.2.1.3	mODCODFEC	read-only	MODCOD FEC Type
.1.3.6.1.4.1.18723.8500.17.2.1.4	mODCODFrame	read-only	MODCOD Frame Type
.1.3.6.1.4.1.18723.8500.17.2.1.5	mODCODPilots	read-only	MODCOD Pilots
.1.3.6.1.4.1.18723.8500.17.2.1.6	mODCODPID	read-only	MODCOD PID
.1.3.6.1.4.1.18723.8500.17.2.1.7	mODCODStatsBytesTX	read-only	MODCOD Statistics Bytes Transmitted
.1.3.6.1.4.1.18723.8500.17.2.1.8	mODCODStatsMinMbps	read-only	MODCOD Statistics Minimum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.2.1.9	mODCODStatsMaxMbps	read-only	MODCOD Statistics Maximum Rate (Mbps)
.1.3.6.1.4.1.18723.8500.17.2.1.10	mODCODStatsAvgMbps	read-only	MODCOD Statistics Average Rate (Mbps)

C.17   Edit Route

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.18.1.0	oldRouteIPAddress	read-write	Multiple Variable Binding Old Route IP Address
.1.3.6.1.4.1.18723.8500.18.2.0	oldRoutePrefixLength	read-write	Multiple Variable Binding Old Route Prefix Length (Subnet)
.1.3.6.1.4.1.18723.8500.18.3.0	oldRouteVLANID	read-write	Multiple Variable Binding Old Route VLAN ID
.1.3.6.1.4.1.18723.8500.18.4.0	newRouteName	read-write	Multiple Variable Binding New Route Name
.1.3.6.1.4.1.18723.8500.18.5.0	newRouteIPAddress	read-write	Multiple Variable Binding New Route IP Address
.1.3.6.1.4.1.18723.8500.18.6.0	newRoutePrefixLength	read-write	Multiple Variable Binding New Route Prefix Length (Subnet)
.1.3.6.1.4.1.18723.8500.18.7.0	newRoutePID	read-write	Multiple Variable Binding New Route PID
.1.3.6.1.4.1.18723.8500.18.8.0	newRouteMACAddress	read-write	Multiple Variable Binding New Route MAC Address
.1.3.6.1.4.1.18723.8500.18.9.0	newRouteVLANID	read-write	Multiple Variable Binding New Route VLAN ID
.1.3.6.1.4.1.18723.8500.18.10.0	newRouteMaxBandwidth	read-write	Multiple Variable Binding New Route Maximum Bandwidth (Valid if Enforce QoS Rules are Enabled)
.1.3.6.1.4.1.18723.8500.18.11.0	newRouteGuaranteedBandwidth	read-write	Multiple Variable Binding New Route Guaranteed Bandwidth (Valid if Enforce QoS Rules are Enabled)
.1.3.6.1.4.1.18723.8500.18.12.0	newRouteIPCopy	read-write	Multiple Variable Binding New Route IP Copy
.1.3.6.1.4.1.18723.8500.18.13.0	newRouteSectionPacked	read-write	Multiple Variable Binding New Route Section Packing
.1.3.6.1.4.1.18723.8500.18.14.0	newRoutePSI	read-write	Multiple Variable Binding New Route PSI
.1.3.6.1.4.1.18723.8500.18.15.0	newRouteEnabled	read-write	Multiple Variable Binding New Route Enabled
.1.3.6.1.4.1.18723.8500.18.16.0	editComplete	read-write	Multiple Variable Binding Edit of Route is Complete

C.18   SNMP Traps

OID	Name	Access	Description
.1.3.6.1.4.1.18723.8500.100.0.1	dniMR8500SoftwareReset	Trap	CMR-8500 has been Software Reset
.1.3.6.1.4.1.18723.8500.100.0.2	dniMR8500AlarmDroppingPackets	Trap	CMR-8500 is in Alarm due to packets dropping
.1.3.6.1.4.1.18723.8500.100.0.3	dniMR8500AlarmClearedPackets	Trap	CMR-8500 has cleared an Alarm
.1.3.6.1.4.1.18723.8500.100.0.4	dniMR8500RedundancyPrimaryIsPrimary	Trap	CMR-8500 Redundancy Primary is Primary
.1.3.6.1.4.1.18723.8500.100.0.5	dniMR8500RedundancyPrimaryIsBackup	Trap	CMR-8500 Redundancy Primary is Backup
.1.3.6.1.4.1.18723.8500.100.0.6	dniMR8500RedundancyBackupIsPrimary	Trap	CMR-8500 Redundancy Backup is Primary
.1.3.6.1.4.1.18723.8500.100.0.7	dniMR8500RedundancyBackupIsBackup	Trap	CMR-8500 Redundancy Backup is Backup
.1.3.6.1.6.3.1.1.5.1	dniMR8500ColdStart	Trap	CMR-8500 Cold Start
.1.3.6.1.6.3.1.1.5.2	dniMR8500WarmStart	Trap	CMR-8500 Warm Start
.1.3.6.1.6.3.1.1.5.3	dniMR8500LinkDown	Trap	CMR-8500 Link Down
.1.3.6.1.6.3.1.1.5.4	dniMR8500LinkUp	Trap	CMR-8500 Link Up
.1.3.6.1.6.3.1.1.5.5	dniMR8500AuthFail	Trap	CMR-8500 Authentication Fail

METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^{5}	6.336×10^{4}	5.280×10^{3}	1.760×10^{3}	—	1.609×10^{3}	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Unit	° Fahrenheit	° Centigrade
32° Fahrenheit	—	0 (water freezes)
212° Fahrenheit	—	100 (water boils)
-459.6° Fahrenheit	—	273.1 (absolute 0)

Formulas
C = (F - 32) * 0.555
F = (C * 1.8) + 32

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoir.	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^{3}	35.27	32.15	2.205	2.679	—