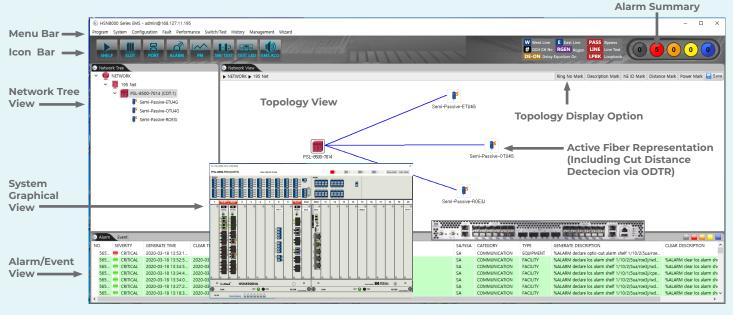# HFR NETWORKS

flexiHaul HiEMS Element Management System

HiEMS for flexiHaul HSN8000 Series & M-Series TSN Switch Solutions

flexiHaul HiEMS Element Management System: HSN8800NA

Carrier-Class EMS Enables Simplified Operations

HFR Networks' flexiHaul HiEMS Element Management System offers full visibility and operational control into remotely deployed RAN transport and Ethernet access equipment. Easy to install and operate, HFR Networks' HiEMS greatly simplifies network operations. Pre-integrated with HFR Networks' solutions, this highly scalable, carrier-class software solution runs on commercial off-the-shelf hardware or in a cloud instance. This ensures operators can quickly install new services while also maintaining higher performance in order to exceed their customers' service level agreements (SLAs). Highly intuitive, the flexiHaul HiEMS helps optimize operations across a range of xHaul and Ethernet access service use cases, including mobile fronthaul/backhaul applications and converged Carrier Ethernet offerings.

Detailed Visibility and Robust Features

HFR Networks' HiEMS supports DWDM and SmartOptics T2DOC integration with the flexiHaul HSN8000 and M-Series TSN product lines, including full OAM&P in instances when Smart Tunables are deployed as third party optics. This allows for advanced troubleshooting functions, such as remote loopbacks with BERT capabilities. Expanding control to include HFR's OTDR, enables operators to gain detailed visibility into the health of their fiber infrastructure. This is incredibly valuable during troubleshooting since it provides information, such as cut distances for truck dispatches. Utilizing integrated testing tools with full network visibility, the flexiHaul HiEMS will expedite service turn-ups while limiting costly truck rolls to remote locations. With an universal look and feel between

the network operations center (NOC) and field, the same software package can be deployed as a craft interface tool (CIT) for field operations or on a client server basis for large-scale deployments. The flexiHaul HiEMS is the primary graphical interface for all HFR Networks' products and delivers a single comprehensive view of transport applications across Layers 1, 2, and 3 service deployments.

Flexible Deployment Options

HFR Networks' HiEMS is designed to operate either stand alone or integrated with other management platforms. It supports seamless integration with the latest NETCONF/YANG models and traditional SNMP collectors and monitoring solutions.

Features:

- Fault Management
- Configuration Management
- Accounting & Administration
- Performance Monitoring
- Security
- System Inventory and Topology
- Resiliency and Backup/Restore

flexiHaul Products Supported:

- HSN8000 Series: HSN8500NA, HSN8300NA, HSN8100NA, and HSN7200NA
- Packet M-Series TSN Switch
- Smart Tunable Optics

H i E M S

Supported Software

Server O/S	RedHat Enterprise Linux 8.x
Server Database	MySQL Enterprise
Client O/S	Microsoft Windows 10 Recommended (Available for Windows 7 Above)
CIT O/S	Microsoft Windows 10 Recommended (Available for Windows 7 Above)
JAVA	Version 1.8

Client Hardware: Recommended Specification

CPU	Intel Core i5 or Higher (or Similar AMD Processor)
Main Memory	8GB or Above
Hard Disk	512GB or Above
Video	Full HD (1920 x1080) Resolution or Higher
Other	Mouse

Server Hardware / VM Recommended Specification

CPU	Intel Xeon 2.4GHz (Octal Core) or Higher
Main Memory	ECC 16GB (DDR3) or Above
Hard Disk	3 TB or Above
Video	UXGA (1600 x 1200)
Network Interface Card	1 Gbps (1 EA)
Other	Printer, Mouse
Operational Client	Max. 50 of Concurrent Connection
Operational Node	HSN8000 Series: Max. 2048 Nodes M-Series: Max. 1024 Nodes

General

User Levels	Admin, Operator, Monitor
Remote Access	SSH, SFTP
Permit Port from Firewall	SSH 22, SNMP Trap 162 (UDP), HTTPS 443
Time Sync Mode	Server Type: EMS or NTP

System:
- System Configuration Backup/Restore
- Software Download: Auto Software Download
- System Network
- System Restart/Initialize

Configurations:
- Topology, System, Slot, Port, SFP Wavelength Configuration

Threshold Functions:
- PWM, TEMP, BIAS, BIP, CV, FCS, and FEC

Views/Status:
- Topology
- Network Tree
- Network
- Server Status: CPU, Memory, and Hard Disk
- System Graphical
- Alarm/Event
- NE Node: By Group or TID
- Link State: Normal, LOS, DEACT

Performance Data:
- CPE, CV, FCS, WDM, BIP, FEC, TEMP, and BIAS

History Views:
- Event
- Alarm Statistics
- Operation Log
- Performance

Security:
- Screen Lock (Noted in Minutes)
- Last Used (Noted in Days)
- Invalid Password
- IP Guard

Wizards Supported:
- Port Peer to Peer Information
- Total Port Activation
- Total Port Configuration
- End-to-End Port Configuration
- Total Module Inventory Retrieve
- Total Active Alarm Retrieve
- Total Alarm Severity Set
- Line Status Lookup Switching
- Facilities Information
- Total PM Threshold Set
- Total Alarm Threshold Set
- Total SFP Wavelength Set
- Total SNMP Set
- Total SOAK Interval Set

Switch/Test Delay Status:
- Loopback Test
- Line Test
- LED Test
- OTDR OSC Monitoring
- OTDR Port Configuration
- OTDR Line Monitoring
- Optical Switch Configuration

Optional Functions:
- MySQL Database Replication Setup
- Database Backup/Restore