

# xHaul Element Management System

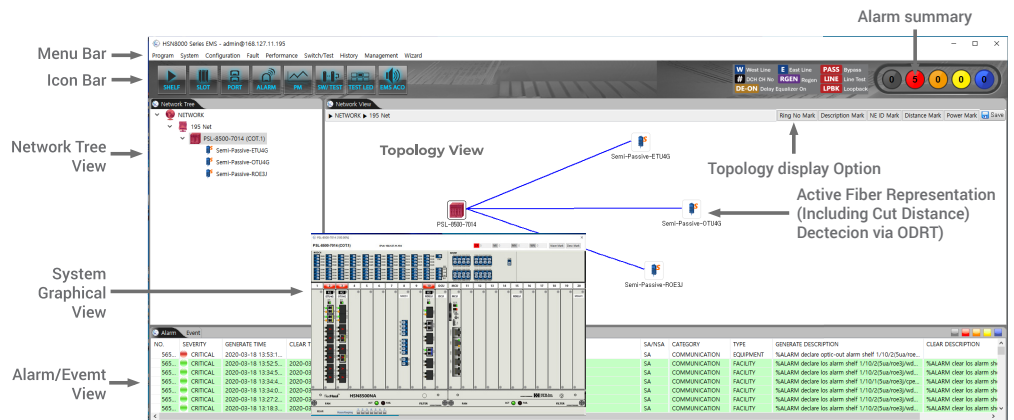
## Carrier-Class EMS Enables Simplified Operations

Ribbon's xHaul Element Management System (EMS) offers full visibility and operational control into remotely deployed RAN transport and Ethernet access equipment. Easy to install and operate, Ribbon's FH-EMS greatly simplifies network operations. Pre-integrated with Ribbon's 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 FH-EMS 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

Ribbon's FH-EMS supports DWDM and SmartOptics T2DOC integration with the NPT-800FH 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 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 FH-EMS 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 FH-EMS is the primary graphical interface for new solutions, such as the NPT-800FH TSN Transport Switch. The FH-EMS delivers a single pane of glass for xHaul applications across Layers 1, 2, and 3 service deployments.

## EMS for xHaul C-RAN & NPT-800FH TSN Switch Solutions



FH Element Management System

## Flexible Deployment Options

Ribbon's FH-EMS 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.

## Flexible Deployment Options

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

## Flexible Deployment Options

- Passive Optical Products
- Packet NPT-800FH TSN Switch
- Smart Tunable Optics

## Supported Software

- |                   |   |
|-------------------|---|
| • Server O/S      | RedHat Enterprise Linux 7.x   |
| • Server Database | MySQL Enterprise  |
| • Client O/S      | Microsoft Windows 10 Recommended<br>(Available for Windows 7 Above) |
| • CIT O/S         | Microsoft Windows 10 Recommended<br>(Available for Windows 7 Above) |
| • JAVA            | Version 1.8   |

## Client Hardware: Minimum Specification

- |                          |                                  |
|--------------------------|----------------------------------|
| • CPU                    | Intel Xeon 2.4GHz (Octal Core)   |
| • Main Memory            | ECC 8G (DDR3)                    |
| • Hard Disk              | 2.1 TB                           |
| • Video                  | SXGA (1280 X 1024) or Above      |
| • Network Interface Card | 1 Gbps (1 EA)                    |
| • Other                  | Printer, Mouse                   |
| • Operational Client     | Max. 50 of Concurrent Connection |
| • Operational Node       | Max. 2048 Nodes                  |

## General

- |                             |  |
|-----------------------------|--|
| • User Levels               | Admin, Operator, Monitor               |
| • emote 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

## Configurations:

- 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 (COT Only)

## 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

Contact us to find out how our IP and Optical Solutions can help your business grow 

## About Ribbon

Ribbon Communications (Nasdaq: RBBN) delivers communications software, IP and optical networking solutions to service providers, enterprises and critical infrastructure sectors globally. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge software-centric solutions, cloud-native offers, leading-edge security and analytics tools, along with IP and optical networking solutions for 5G. To learn more about Ribbon visit [rbbn.com](http://rbbn.com).