Ribbon's Network Management Solution

Portfolio

State of the Art IP and
Optical Networking

ribbon

Industry Leader In Network Management

- Unified End-to-End (E2E) management system across multiple technologies and layers.
- Comprehensive Fault, Configuration, Accounting, Performance, and Security (FCAPS) and Operations Administration and Maintenance (OAM) across all transport equipment and technologies.
- Crystal-clear control of network layers: physical, MPLS-TP/IP-MPLS data, optical/OTN , and SDH/SONET.
- Intuitive GUI for fast learning and easy operation.
- Gradual Next Generation (NG) network migration tailored to customer preferences.
- Streamlined operation, enhanced efficiency.
- Single-point Operations Support System (OSS) integration, comprehensive range of interfaces. Maximized new revenue potential while reducing OPEX, CAPEX, TCO.
- Sophisticated add-ons: Alarm Correlation and Forwarding, ASON/ WSON/ Restoration management, LightPULSE™and traffic analytics, and more.
- Data protection solution through Remote Database Replication (RDR).

Open Yourself To Endless Possibilities

Network Management Suite

Ribbon's networks are operated and maintained by a suite of intelligent element management systems, skillfully orchestrated by the LightSOFT Network Management System (NMS). Our network management suite provides powerful capabilities, easy operation, and smooth integration with any other network components. LightSOFT® functions at the network management level of the Telecommunications Management Network (TMN) scheme. A complete set of element management systems (EMSs), controlled through the LightSOFT umbrella, function at the element management level. Each EMS is tailored to a specific type of network element (NE). The EMSs may be co-located in the same platform, operated standalone, or integrated under a third-party NMS or TMN umbrella system.

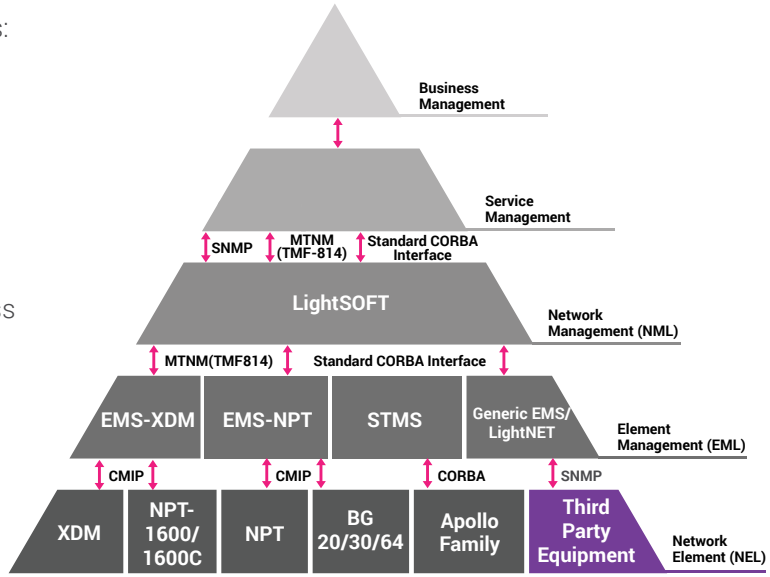
A rich selection of add-on functions such as Alarm Correlation, Alarm Forwarding, ASON/WSON/Restoration management, easy data management, Central User Administration, CNM, and RDR add value and profitability to your network management system.

Ribbon's network management suite is based on an open system philosophy, supporting Release 3.5 of the Multi-Technology Network Management (MTNM) CORBA-based interface, defined by the TeleManagement Forum (TMF, www.tmforum.org).

For maximum hardware independence, Ribbon's transport management systems can run on Solaris or Linux OS - either as bare metal installations, or on VMware virtual machines.

The Ribbon management systems product line includes:

- LightSOFT, Ribbon's powerful E2E unified transport NMS.
- EMS-NPT managing the NPT family, which provide an integrated access solution carrying voice and Ethernet over optical fiber to customer premises.
- STMS, managing the Apollo packet optical family, delivering E2E access-to-core, WDM and carrier class Ethernet services.
- Generic EMS/Muse 3rd party NMS™, managing third party equipment and enabling smooth integration with external networks.
- RDR, field-proven cost-effective redundancy mechanism for full network management backup capabilities.



- Integration and Service options for effective technical support and assistance throughout all stages of network planning, design, and operation.

LightSOFT®

Leading End-to-End Multilayer Network Management

LightSOFT is a single NMS that simultaneously provisions, monitors, and controls many network layers with multiple transmission technologies. LightSOFT provides a holistic solution for your network management challenges: simple, smart, scalable, and centralized. Its intuitive front-end GUI is backed up by sophisticated server engines. Its on-demand service provisioning and pinpoint bandwidth allocation dramatically reduce the equipment and operating costs usually incurred by multiple management systems.

LightSOFT helps you realize the full potential of your Ethernet/MPLS, optical, and SDH/SONET networks through integrated data-aware netwide management. One integrated management system gives you full control of all your NEs, regardless of manufacturer, offering a complete view of the network at a glance.

A single user-friendly interface combines configuration, maintenance, and performance management tools with fault handling, E2E trail definition, and failsafe database backups for uninterrupted reliable network operation. LightSOFT offers best-of-breed FCAPS management tools. TMN-compliant, LightSOFT reduces OPEX, minimizes downtime, and ensures your network is always performing at its best.

Basic Level 1 Package

LightSOFT Level 1 supports multilayer management of physical, Ethernet/MPLS, optical, and SDH/SONET layers with multiple topology views. By facilitating evolution from one technology to another, LightSOFT eliminates the need to replace the management system or integrate new management systems into the existing one. The result – significant cost savings, as well as reduced implementation time and risks when new technologies are introduced to the network.

Controlling such a wide range of technologies from a single application allows LightSOFT to implement features that link and correlate information from different layers, providing customers with a significant advantage. For example, users can quickly identify the relationship between NEs by easily navigating between an Ethernet service, the MPLS tunnel it uses, and the underlying optical equipment. Network Operations Center (NOC) operators can easily visualize physical and logical network topologies, enabling quick troubleshooting and problem resolution, even in complex networks.

The Level 1 package comprises the following features:

- Access to physical and EMS topology layers, providing graphical topology visualization of all physical Network Elements (NEs) and Element Management Systems (EMSs) managed by LightSOFT.
- Access to Ethernet/MPLS data technology layer, providing graphical topology visualization and point-and-click management of Wavelength Division Multiplexing (WDM) equipment and Optical Transport Network (OTN) trails.
- Access to optical technology layer, providing graphical topology visualization and point-and-click management of Wavelength Division Multiplexing (WDM equipment and Optical Transport Network (OTN) trails.
- Access to SDH/SONET technology layer, providing graphical topology visualization and point-and-click management of SDH/SONET equipment and trails.

- Current Performance Monitoring direct from the trails, services, and tunnel lists, providing performance analysis tools for optical and SDH/SONET trails. Data is measured by counters, monitoring various parameters that affect QoS in 15-minute or 24-hour intervals.

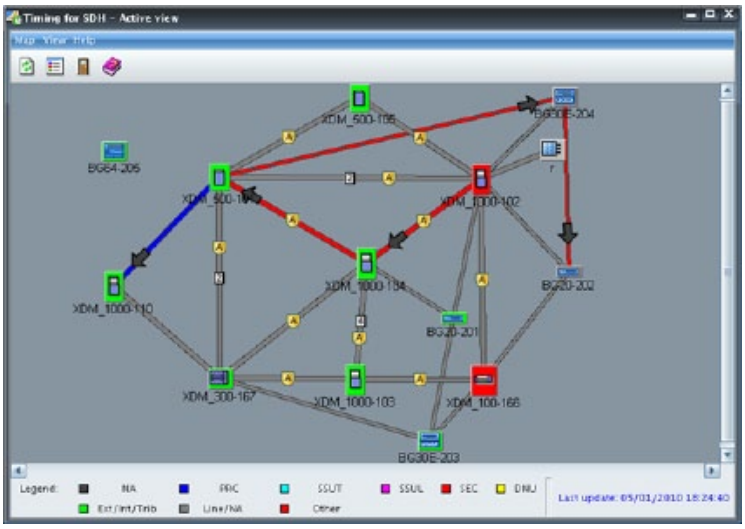
Basic Pathfinder automatic provisioning, providing advanced trail management functions that allow creation, deletion, and modification of Ethernet services, MPLS tunnels, and optical and SDH/SONET trails. LightSOFT automatically selects optimal E2E primary and protection paths across complex topologies via its advanced Pathfinder algorithm, based on the minimum hops criterion.

- XML Trails/Services/Tunnels import/export interface, allowing export in batch format and offline editing in any text editor. These edited items can then be imported back into the system.
- Enhanced alarm functionality, including convenient user notes linked to specific notifications, counters, and filters that can be configured and saved per user, and alarm columns in the trail lists.
- Licensing for three concurrent users including configurator privileges, plus licensing to manage two EMSs.

Enhanced Level 2 Package

LightSOFT's Level 2 package enables advanced network management, including all Level 1 package features as well as the following additional tools and enhancements:

- Resource Domain Partitioning (RDP), allowing service providers (SPs) to partition their network according to logistical, technological, and organizational needs. Partitioning can make large nationwide networks simpler to manage and network operation more efficient. For example, an SP can assign regional NOC access rights to equipment residing in their regions only, while allowing a national NOC access all equipment. Fine granularity access privileges are provided, including assignment of rights to perform specific operations on specific resources within an NE.
- Customer Network Management (CNM), enabling SPs to lease network resources to customers and allowing the customer to self-manage those resources. The sophisticated scheme allows both the customer and the SP to perform alarm management, troubleshooting, and maintenance operations on the resources. For service provisioning purposes, the resources are exclusively reserved for the designated customer only, so that services intended for other customers cannot be provisioned on those resources. For example, a Carrier of Carriers can lease out portions of the network to other carriers, who in turn can autonomously and safely provision and monitor services using LightSOFT.
- Enhanced provisioning features that support advanced Pathfinder criteria, allowing SPs to fine-tune the automatic provisioning algorithm according to cost, utilization, and distance parameters. This advanced capability enables a network engineer to program the intelligent Pathfinder algorithm to handle the special network cases that often exist in today's complex multi-technology networks.



- Three dedicated maps, including:
  - **Availability Map** - showing the amount of resources available for each link at various rates, with customizable ranges and colors. This is an invaluable tool for network traffic planning.
  - **Timing Map** - enabling visualization and monitoring of the network's timing topology using a convenient color-coding scheme.
  - **Control Map** - showing the management channels in the network (DCC/GCC/OSC) and gateway NEs.
- Nested groups, allowing users to create groups of NEs within any physical or logical topology view. NE groups can be nested within other groups, thereby condensing the size of the topology display. The user can easily zoom in or out of a group. This greatly simplifies management of large networks, allowing for easy visualization of a network comprising thousands of NEs from a single screen.
- Enhanced maintenance features, enabling remote trail-oriented maintenance operations directly from LightSOFT, such as path protection switching, Remote Detection Indication (RDI), and loopback.

Expansion Packages*

LightSOFT Level 1 and Level 2 packages include licensing for three concurrent users and management of two EMSs. EMS licenses are expanded in increments of one. User licenses are expanded in increments of either one or ten for greater flexibility, for up to 150 concurrent users (V9 and above).

Web clients are licensed separately.

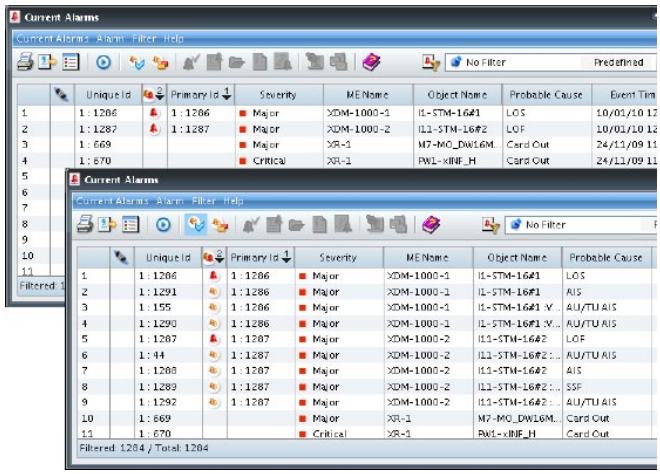
Add-Ons

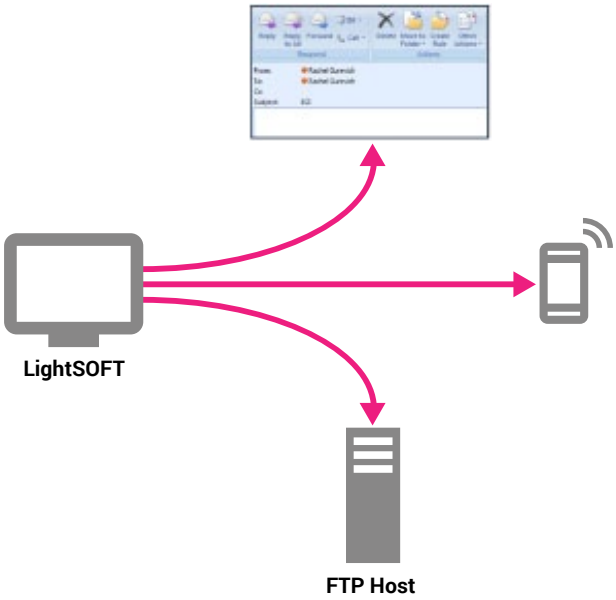
In addition to the Level 1 and 2 packages, the LightSOFT portfolio includes a suite of valuable add-ons that further enhance LightSOFT with additional interfaces and functionality. These add-ons can be added to Level 1 or Level 2 packages.

Alarm Correlation

Alarm Correlation, currently supported for the optical and SDH/SONET layers, automatically identifies the root cause of a fault, eliminating the need to sift through the avalanche of alarms often triggered by a root alarm.

LightSOFT can be configured to display only primary alarms in the Current Alarms window, enabling the NOC operator to focus on the root cause of the fault without the difficult and time-consuming task of analyzing and sorting through the secondary alarms as well, thereby improving efficiency, speeding up response time, and providing significant OPEX savings. The figure depicts an example of how the number of displayed alarms can be reduced using alarm correlation.





Alarm Forwarder

The Alarm Forwarder provides alarm notification by Short Messaging Service (SMS) and email to technicians' and managers' mobile phones, PDAs, and email accounts. This feature is especially useful for service providers that prefer to close their Network Operation Centers (NOCs) after business hours, for significant OPEX savings.

Network operators have full control of alarm notification formats, either individually or as a statistical summary, according to configurable alarm count thresholds. By enabling separate thresholds to be maintained for SMS and email channels, LightSOFT allows service providers to streamline alarm notifications according to their needs.

The Alarm Forwarder can also export current alarms to remote FTP servers, providing a seamless interface with external fault monitoring systems, using an ASCII format compatible with many legacy alarm management systems. Alarm data are automatically exported via FTP to multiple target host systems.

Traffic Analytics

The Traffic Analytics feature enables operators to analyze the potential impact of equipment failure on trails and services. Any combination of NEs, cards, ports, links, SRLGs (group of links sharing the same duct) may be selected for this analysis. The results provide a convenient method for mapping services that are vulnerable to equipment failure and optimize the network by adding new HW only where it is most needed. They also provide easy assessment of the impact of equipment failure on services in the network and are very useful when preparing embedded upgrades. Furthermore, Traffic Analytics enable visualization of the impact of network growth on the Availability Map, via a convenient growth slide rule.

LightPULSE for ONCP/OTDR

LightPULSE for ONCP enables viewing and analyzing Optimized Network Communications Protocol (ONCP) optical parameters and PM values for OCH and OMS trails, optical links, NEs, and ports of Apollo NEs in a modern web-based GUI. The data is presented in either text or chart format. LightPULSE delivers intelligent, proactive use of data to help operators maintain healthy optical networks for maximized SLAs and minimized costs.

LightPULSE for OTDR enables activation of OTDR tests on specific Apollo cards for immediate localization of fiber cuts. This saves OPEX by sending the technician directly to the affected site.

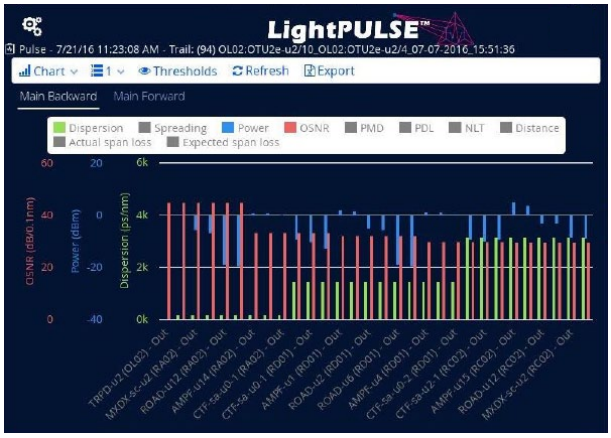
Easy Data Management

The Easy Data Management package in the LightSOFT GUI includes several powerful tools that facilitate fast and cost-efficient provisioning of data services in the network. The package includes:

- Automatic provisioning of underlying tunnels for services
- Automatic provisioning of bypass (protection) tunnels for selected objects
- Enhanced FRR protection scheme configuration
- Automatic full mesh multi-tunnel creation between selected nodes
- Tools for copying service parameters from one service endpoint to another.

Central User Administration

LightSOFT offers a centralized user administration functionality that is especially useful for large enterprises. Complex organizations often incorporate multiple controlled-access systems that require secure logins. Centralized user administration systems such as Lightweight Directory Access Protocol (LDAP) and Remote Authentication Dial-In User Service (RADIUS), greatly simplify these tasks. LDAP and RADIUS are popular protocols for accessing online directory services. They enable remote access servers to communicate with a central server to authenticate users and authorize their access to the system, instead of using the LightSOFT server directly to add/remove users and configure authorization levels. LightSOFT supports multiple working configuration options, including the use of a backup server and fallback to local authorization, as needed.



ASON/WSON/Restoration
LightSOFT supports a number of sophisticated protection schemes, which can greatly enhance a network's resiliency and survivability. These include:

- ASON (automatically switched optical network) as supported by the Apollo product lines
- WSON (wavelength switched optical network) as supported by the Apollo product line
- Restoration, a GMPLS-like protection scheme for bidirectional data tunnels, managed and administered by LightSOFT, which automatically reroutes main tunnels that have been switched to their protection routes, to keep them in a permanent state of protection.

The LightSOFT GUI clearly displays these schemes on screen and provides a variety of monitoring tools for the various protection states, as well as configuration of the relevant protection parameters. LightSOFT also enables smooth migration to any of these protection schemes for existing network circuits. These protection schemes enable service providers to support trail resiliency while dedicating less bandwidth than traditional methods. In this way, availability is improved because the network can tolerate multiple failures while retaining the ability to reroute services, without complex replanning exercises and service calls.

Topology on Demand Client
This is a special mode for customers with large networks, designed to shorten login time for their operators. When configured in this way, LightSoft will not initially load the entire topology, loading instead specific layers/NEs/links requested by the user. Initial login time is thus shortened to a few minutes and many man-hours of lost productivity spent by users waiting for LightSoft to load are eliminated.

Once the operator is logged in and working in ToD mode, he can 'grow' the initial topology by requesting to load links related to an NE, rings in which a link participates, all the NEs participating in a tunnel/trail/service (L2 and L3), or NEs associated with a specific alarm.

One-Time Password
When this option is configured, LightSoft works in two-factor authentication mode and users are required to enter a time-based numeric password generated by their personal smart phone, in addition to their user name and password. Ideal for network operators requiring additional security in their NOCs.

MTNM-CORBA Northbound Interface
LightSOFT's Northbound CORBA interface provides a rich integration technology between LightSOFT and higher level OSS and umbrella management systems. The CORBA interface fully supports TeleManagement Forum's TMF-814 MTNM 3.5 standard, providing increased operating efficiency through automation and integration of OSS, network management, and element management systems. It also enables multi-vendor interoperability.

MTNM interfaces provide support for connection and equipment provisioning, fault management, maintenance, and performance monitoring operations for all EMSs managed by LightSOFT. Features may vary, depending on the EMS. MTNM interface licensing is flexible, with options for up to five interfaces available in increments of one.

SNMP Alarm Gateway
LightSOFT's SNMP alarm gateway provides a highly efficient interface, allowing rapid integration between LightSOFT and any external alarm management system.

SQL Interface
LightSOFT's SQL interface offers a direct interface to LightSOFT's database, providing read-only access to NMS databases for queries by external customer applications. Data includes equipment inventory, various NE attributes, full topology, and trail and customer information. In addition, extensive documentation of the interface is provided for customers and third-party vendors.

EMS-NPT

EMS-NPT is an advanced EMS that manages the NPT family. It has a cutting-edge architecture that supports multiple operating systems and thousands of NEs for integrated management, either standalone or with LightSOFT. It consists of a GUI client and a server application.

EMS-NPT can run under the Solaris, Linux or Windows operating systems, including a Windows-based PC for very small networks.

Basic Package*

The basic EMS-NPT package consists of 30 tokens for managing up to 30 NEs, as well as all relevant 3rd party licenses that the EMS deploys.

Expansion Package*

Operators may choose Right To Use (RTU) licensing, defined as a percentage of the total price of the managed network, expanding as needed by natural network growth. Alternatively, expansion packages are available for specific numbers of additional tokens.

Add-Ons

In addition to the basic and expansion packages, valuable card/port add-on options enhance the EMS-NPT with additional interfaces and functionality. These add-ons can be added to the basic or expansion packages. Operators may add licensing in increments of one (1 license per card), for:

- Additional MPLS cards
- BG-20 ADM capabilities (SAM4 cards)
- PTP1588v2 and/or FE ports
- MacSEC 1G/10G Ports
- Allows Zero Touch Installation (ZTI) Remote Installation per number of NEs
- Enables 200G line ports
- IP/MPLS or L3VPN capabilities per NPT NE
- Various matrix capacity licenses which allow a pay-as-you-grow model.

Northbound MTNM interfaces can also be added, with options for up to five interfaces available in increments of one.

* Operates according to a simple pay-as-you-grow token expansion system, guaranteeing full support of additional network elements as the network builds out

STMS

The ShadeTree Management System (STMS) is the enhanced EMS for the Apollo family. The distributed, object-oriented modular architecture is naturally able to scale with a growing system while ensuring smooth integration into existing network management systems. STMS provides FCAPS management tools as well as powerful Optical cross-connect capabilities, inter- and intra-site fiber connectivity, and plug-and-play support for rapid deployment. As part of ECI's network management suite, STMS integrates naturally with LightSOFT, but for smaller scale networks can also be deployed in standalone mode on either Solaris or Linux OS. STMS enables LightSOFT to create end-to-end optical trails, creates the fiber connectivity across the network and across management platforms, gathers ONCP data from the Apollo Network elements, and reports the network's health to LightSOFT. STMS allows pre-configuration of the Apollo family according to the LightPlan planning tool design, even before the deployment of the network elements in the field. Once deployed, STMS validates and reports any mismatch between planned and deployed configuration. STMS provides service consistency, synchronizing service definitions throughout the network. Its transaction processing technology eliminates misconfigured or partially configured services by updating multiple service elements in a single transaction. STMS gathers, processes, and stores statistical information that is collected by the Apollo family for complete and accurate accounting, billing, and SLA management.

Basic Package*

The basic package includes a standalone STMS software license for Solaris operating systems with licensing for a varied number of Apollo NEs, depending on the models selected. For details, please contact your Ribbon sales representative.

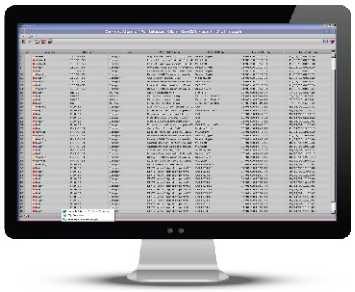
Expansion Package*

Operators may choose Right To Use (RTU) licensing, defined as a percentage of the total price of the managed network, expanding as needed by natural network growth. Alternatively, expansion packages are available for specific numbers of additional tokens.

Add-Ons

- Northbound MTNM interface, enabling smooth integration with an NMS or OSS. Integration features include GCT, alarms, and topology data.
- ASON/WSON port tokens, enabling ASON/WSON on the ports.
- Alien spectrum tokens with 12.5Ghz increments.
- 1G-40G client tokens, enabling ports on muxponder cards.
- 100G Client Tokens, enabling ports on muxponder cards.
- Encryption port tokens.
- TM400 line port tokens, enabling TM400 in 400G mode.
- TM400 client port tokens, enabling additional TM400 client ports.
- MPLS port tokens, enabling MPLS-TP on AoC10_L2 cards.
- TM800/TM1200 line port tokens, allowing the line to work with DCI (Data-Center Interconnect), Metro, and Long-Haul, and ZR transceivers
- 9914/32 Matrix capacity tokens, which unlock capacity for line cards in use.
- 9914/32 Port capacity tokens, for opening ports on the line cards.
- 99xx Enable packet tokens, allowing packet capabilities for the 99xx family of products.
- OPT9901x 100G line port token, enabling the 100G line port
- 400G Client token, enabling ports on muxponder cards

* Operates according to a simple pay-as-you-grow token expansion system, guaranteeing full support of additional network elements as the network builds out



Generic EMS

Ribbon is aware of the need for customers to have complete management of all NEs, regardless of each one's specific functionality. Guided by our open standards approach, Ribbon offers the Generic EMS to facilitate this strategy, providing a valuable solution to the entire customer base.

While serving as a translator, the Generic EMS receives SNMP traps or events from the 3rd party EMS or NE and converts them to the MTNM protocol. It receives commands from the NMS and delivers them to the 3rd party EMS or NE. It can also be customized to serve as a platform for specific project requirements. The Generic EMS provides an easy Do-It-Yourself, zero-code option to map element interfaces and traps.

Generic EMS offers a cost-effective management solution, enabling customers to have an integral view of their network with minimal integration efforts and affordable licensing cost. Generic EMS capabilities can benefit:

- Network operators that want to cut their OPEX and simplify network management integration with newly introduced NEs.
- Network operators that want to use LightSOFT as a 'Light OSS' and will use Generic EMS as the collection point from all their 3rd party equipment.
- Network operators that want quick and simple integration with existing SNMP-based equipment while leveraging the advantages of LightSOFT.

Basic Package*

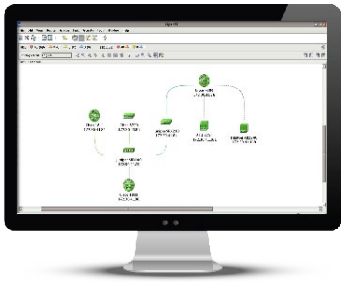
The basic package supports management of up to 20 third-party platforms from the same family and one northbound MTNM interface for smooth integration with an NMS or OSS.

Expansion Package*

- Expansion packages provide licensing for additional NEs.
- Options include adding licenses for additional NEs (in increments of 20 NEs).
- NE-type license is needed per each unique new type of NE which is managed.

* Operates according to a simple pay-as-you-grow token expansion system, guaranteeing full support of additional network elements as the network builds out

Muse™ 3rd Party NMS (LightNET)



Muse 3rd party NMS is an advanced multivendor management system, that provides a software-based platform for managing multivendor network infrastructure. It is especially suitable for network-wide discovery and display of L2/L3 SNMP-based equipment, such as switches, routers, and firewalls. This gives a clear view of the network's physical and logical inventory. Muse 3rd party NMS's model-based, vendor-agnostic approach simplifies network management, especially in the complex context of modern telecom networks.

Integrating new devices into the network is an intuitive process based on models, with no need for complex coding skills. Operators working from a predefined set of models and templates, can easily create, edit, and manage new network elements. New devices and vendors can be integrated, on-boarded, and made ready for use within a matter of days.

Muse 3rd party NMS cross-vendor real-time discovery capabilities, include:

- Physical and logical resources (NE, services)
- Topology (based on IS-IS, OSPF, and LDP protocols)

Operators can create, modify, delete, and assure services through an intuitive point-and-click interface, along with complete rollback options. Service validation and assurance mechanisms make it simple to check your service configuration periodically. Fault management is handled using standard SNMP MIBs, with the added capability to change alarm severity and descriptions. Network operators can implement quick and simple integration with existing SNMP-based equipment, leveraging LightSOFT as a 'Light OSS', and Muse 3rd party NMS serving as the collection point from all 3rd-party equipment.

Basic Package*

The basic package supports installation Muse 3rd party NMS (installed over VMware).

Expansion Package*

- Expansion packages provide licensing for additional NEs.
- Licensing for Service provisioning.
- Licensing for a REST interface towards a higher-level OSS.
- An NE-type license is needed for each unique new type of NE that is managed.

* Operates according to a simple pay-as-you-grow token expansion system, guaranteeing full support of additional network elements as the network builds out

Security Package

The Solaris-based OS Security Package takes security to a level exceeding the options provided in the application layer of the LightSOFT NMS and element-specific management systems (EMSs).

The package operates on the operating system of deployed servers and provides a full suite of options to fortify their security. The OS Security Package can intuitively control the services and access the OS, preventing unauthorized access to sensitive customer data, protecting the system from hackers and intruders, minimizing the risk of normal system functionality being damaged by malicious or unintentional actions, preventing the system from being used as a platform for hackers or hostile attacks on customer networks and computing facilities.

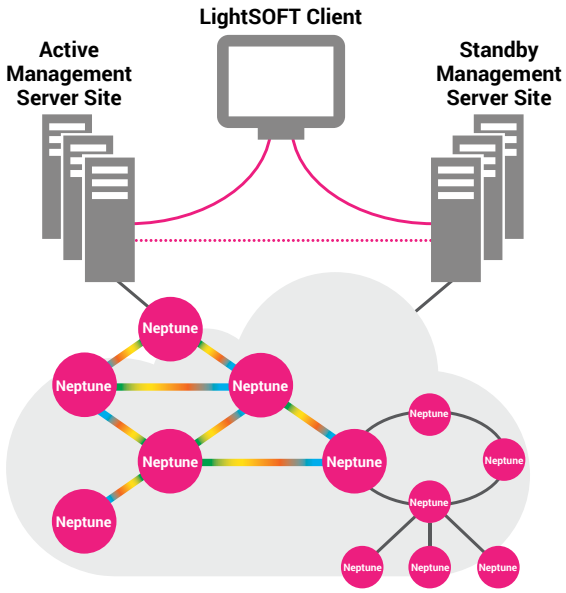
Two levels of security packages are available:

- **Level One** - for compulsory security rules, implemented at the OS installation stage.
- **Level Two** - for security hardening actions, set according to customer demand during system configuration.

Remote Database Replication (RDR)

ECI's management portfolio includes RDR, a field-proven cost-effective redundancy mechanism that provides full network management backup capabilities for Disaster Recovery Plans (DRPs). System continuity is assured. RDR is flexible and can be configured in a wide variety of topologies. It provides optimal protection consistent with geographic infrastructure distribution, security needs, and available budget for standby mirror hardware. RDR can be used for:

- Data protection
- Disk protection
- Host protection (primary and mirror sites connected via LAN)
- Site protection (primary and mirror sites connected via long distance link)



Working with duplicate management hardware, one station serves as the active site (primary server) and the other as the standby site (backup server and mirror). One standby site can back up multiple stations (1:N). RDR performs periodic remote data backups (replication) between primary stations and the backup server. Backup data can subsequently be restored (synchronized) on a mirror station. For enhanced efficiency, a system of incremental backups at three different levels is included.

Failure in the active site leads to a quick switchover to the standby site and resumed network management. The intelligent database signature feature updates standby sites with all NE configuration data changed since the last replication. When the primary server is restored, a replication from the standby site preserves changes made while the primary server was down. A client workstation can be connected over the same LAN to both the active and standby sites, so a client session can always be initiated on the station presently managing the network.

OSS Interface Table

All applications support OSS integration at various levels, including alarms, performance monitoring (PM), OAM, provisioning, and inventory management.

Ribbon management packages have been integrated smoothly with Tier 1 vendors around the world. Contact Ribbon's Software Business Manager for additional pricing details of OSS integration support and annual warranties.

Additional interface options are available depending on customer requirements.

Additional development and integration support may be necessary.

Interface	Description	EMS-NPT	Generic EMS	STMS	LightSOFT	LightINSIGHT	Muse 3rd party NMS (LightNET)
MTNM	Complete CORBA MTNM interface to OSS (TMF standard)	√*	√*	√*	√*		
SNMP	Alarm forwarding with sort, filter, and NE inventory capabilities				√*		
DB queries	Enables database queries				√*		√*
XML	XML trails, tunnels, and services for NMS XML XCs for EMS-MPT, EMS-APT, and STMS	√		√	√		
ASCII file	PM files at EMS level Alarm forwarding at NMS level	√		√	√		
CSV/XLS	PM and inventory					√	
REST	Generic integration interface						√*

* Add-on option package with additional development and integration support required.

Contact Us Contact us to learn more about Ribbon solutions.

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. We maintain a keen focus on our commitments to Environmental, Social and Governance (ESG) matters, offering an annual Sustainability Report to our stakeholders. To learn more about Ribbon visit rbbn.com.