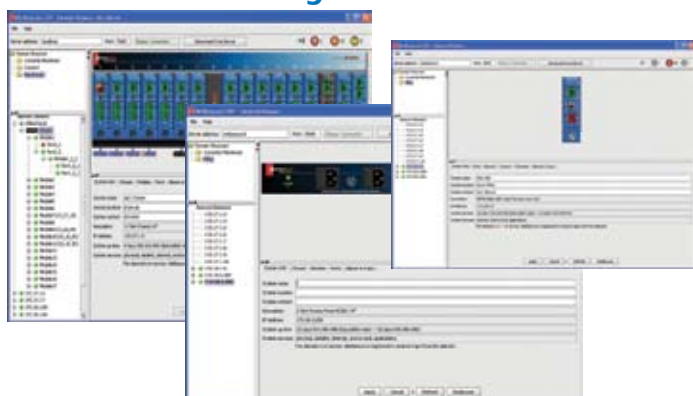


NetBeacon® ESP

Element Management System

Ethernet Service Provisioning



NetBeacon® ESP Element Management System (EMS) by Telco Systems is a comprehensive and extensible element manager that provides a scalable, secure and reliable hierarchical system for managing large-scale deployment of Metrobility® devices.

Extensible Element Management

NetBeacon ESP provides a user friendly, graphical point-and-click interface to provision, monitor and manage the Metrobility chassis-based and remotely managed products. NetBeacon ESP supports hundreds of Metrobility chassis across a geographically dispersed network.

Authorized users can manage each Metrobility device from any designated NetBeacon ESP management station to provision services, monitor performance, and respond to alarms.

To meet the stringent demands of network administrators, NetBeacon ESP supports the FCAPS (fault, configuration, accounting, performance, and security) attributes for network management.

Fault Management

NetBeacon ESP notifies administrators of network problems using traps and alarms based on detected faults as well as changes in configuration and operational status. Color-coded and audible alarms ensure that problems do not go unnoticed and that administrators can respond proactively to potential problems to minimize downtime.

Test features such as remote loopback, link loss carry forward, and far end fault can be enabled through NetBeacon ESP.

NetBeacon ESP also enables proactive management by identifying degrading power supplies and optical transceivers by reporting on power and voltage levels, optical power and temperature.

Configuration Management

NetBeacon ESP discovers Metrobility elements within the defined network, initiates an automatic update of the NetBeacon ESP framework when new hardware is detected, automatically updates

the inventory database, and initiates monitoring activities for each element. These processes speed network provisioning and enable faster service turn-up.

Accounting Management

NetBeacon ESP tracks usage for each service based on switched Ethernet or MPLS/VPLS. A comprehensive report is available based on the performance measurement data.

Performance Management

NetBeacon ESP provides administrators the ability to identify bottlenecks and potential problems. Patent-pending Logical Services Loopback (LSL) and standards-compliant embedded test head functions which are available on designated products support end-to-end service level agreement verification.

Security

Using a choice of three authentication modes — including RADIUS — administrators can control access to resources. Further, NetBeacon ESP offers network administrators the ability to fine tune user permissions based on existing company authorization policies. These policies allow finely grained access to any network element resource. Administrators can assign geographically independent permissions by element and by function.

Network Management System Integration

NetBeacon ESP supports industry-standard interfaces to communicate management statistics, control functions, and alert network administrators to alarm and event conditions. Standard and Metrobility-specific MIBs provide extensive real-time information on OAM, interface, and switched Ethernet services. ■

Product Highlights

- ❖ FCAPS Model
- ❖ Service Provisioning
- ❖ End-to-End Service Assurance
- ❖ MEF-Defined Services Support
- ❖ Secure Access
 - RADIUS support for authenticated and authorized management access
 - SSL and Shared Key
- ❖ Communication Protocols
 - SNMP v1, v2c, v3
 - COBRA
 - XML
 - FTP, TFTP, Telnet
 - DHCP
- ❖ Performance Statistics
 - Interface
 - RMON
 - TCP, IP, UDP, ARP

Distributed Registry-based Architecture

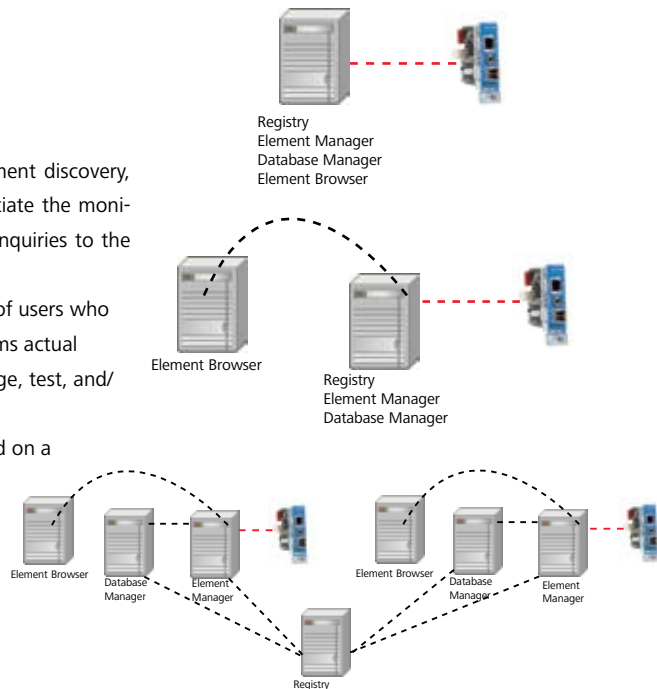
NetBeacon ESP consists of four components:

- Registry
- Database Manager
- Element Manager
- Element Browser

As the "gatekeeper" for NetBeacon ESP, the registry is responsible for element discovery, tells the element manager what database to use to define the element and initiate the monitoring of the element. The registry also authenticates the user and directs all inquiries to the appropriate element manager.

A network administrator enters a list of network elements along with a list of users who will have access to those elements into the Registry. An Element Manager performs actual monitoring of Network Elements. Using the Element Browser, the user can manage, test, and/or monitor the network elements.

All components can be located on a single server, or they may be distributed on a management server and several workstations creating a true hierarchical system approach to element management that is highly scalable and fault tolerant.



EMS Functions

Operator-Friendly GUI Interface

Network status is viewed easily through a Java-based graphical user interface that emulates the appearance and functions of each device and provides managers with an "at-a-glance" look at network element status. An Element Browser graphically shows all link connections, environmental conditions, and port activity and status at a glance. Elements may be identified by their IP address or DNS name.

The Domain structure identifies a group of network elements by their logical associations with each other. A detailed list of elements within the domain is available in the Network Elements panel.

Information is easily accessible in the main window of the NetBeacon ESP Element Browser. Double-clicking a module or a port launches a separate window for another layer of detail.

Domain Structure

Network Elements

Chassis View

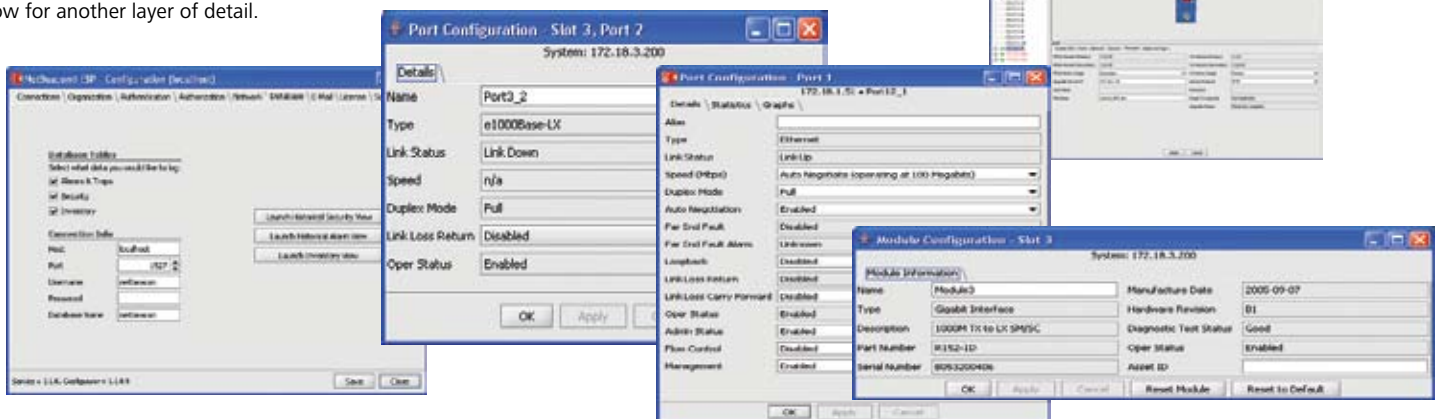
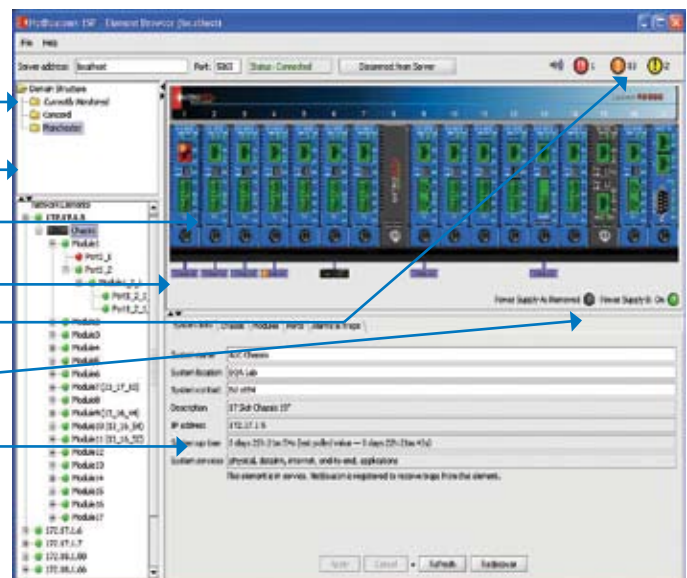
Remote

Elements View

Trap/Alarm Indicator

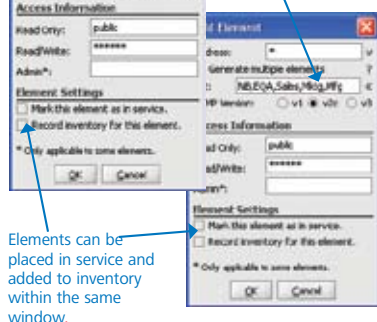
Power Supply Status

Detailed information
organized by tabs



Service Provisioning

An Element Manager discovers network elements based on a defined IP address or DNS name provided by the network administrator. The administrator also enters the user names and access permission to each of the elements being managed, creates and manages domains, groups and users, authentication and permissions, and trap notifications.



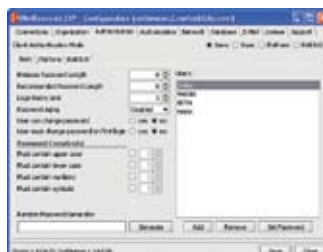
Once discovered, the element can be added to inventory including part number, serial number, date placed in service, firmware version (if applicable), etc. The administrator configures SNMP settings and places the element in service. Once activated, connectivity is verified and all alarms and events are automatically monitored and logged.

Secure Access

NetBeacon ESP supports three types of log-in security modes: Basic, Platform, and RADIUS.

- **BASIC:** When configured for basic log-in, NetBeacon ESP processes the file of user names and passwords that the administrator specifies.
- **PLATFORM:** When configured for Platform login authorization, NetBeacon ESP processes the user account(s) on the underlying platform (i.e., Windows XP).
- **RADIUS:** When configured as a RADIUS client, the user name and password must be entered to log on to the NetBeacon ESP Configurator or Element Browser.

Individual users can be given read or write permission to various resources within each network element, i.e. ports, EVCs, tunnels. They may also be denied access to certain resources of an element. Permissions may be applied to an individual user or to an entire group of users by element and by function regardless of physical location. Users in one location, for example, may view, but not change, configuration and status of an element installed in another location. A color-coded label indicates the user's access privilege.



End-to-End Service Assurance and Performance Monitoring

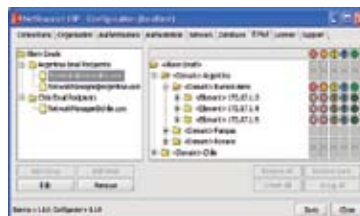
Utilizing sophisticated management software like NetBeacon ESP to monitor Metrobility network elements, network managers can remotely troubleshoot point-to-point transmission failures, ensuring end-to-end service assurance.



Fault isolation is based on events and traps which create alarms. The NetBeacon ESP Element Browser provides both audible and visual alarm indicators. Three distinct sounds representing different levels of alarms audibly notify a network administrator that a problem has occurred. Flashing alarm icons on the chassis image and flashing red text in the Domain Structure and Network Elements panels visually alert the administrator to an alarm.

NetBeacon ESP provides numerous trap and alarms, including notification of configuration and status changes, or problems with a power supply, chassis, module, or port.

NetBeacon ESP reports three types of alarm severities: minor, major, and critical. Locations of alarms are visible in the Element Browser from the individual port to the domain level. Audible alarms, also based on severity, ensure that managers can identify and respond quickly.



All traps and alarms for all monitored elements that are in service are reported. However, the information may be filtered by alarm severity, domain, element, resolution, or acknowledgement. Alarm filtering also enables the network administrator to

assign different aspects of the service assurance tasks to different technicians.

Equipment Quality

NetBeacon ESP monitors not only individual links, but also the overall health of the chassis itself. For example, alarm conditions are sent for loss of AC or DC power, temperature rising out of operating specification, and DC power rising or falling out of operating specification. These notifications alert network operations personnel to degrading environmental conditions before it affects customer service.

NetBeacon ESP provides an option to view historical information regarding the alarms by running an SQL query. The query may be customized to include only one type of alarm, alarms assigned to an individual, or alarms associated with a particular network element.



Line Quality

RMON Group 1 statistics show usage based on traffic size and type. RMON data may also be viewed as a graph.



OAM statistics include the number of OAMPDUs transmitted and received as well as the number of frames dropped by the OAM multiplexer. The OAMPDU types include information, unique and duplicate event notifications, loopback controls PDUs, variable requests and responses, organization specific PDUs, and unsupported codes.

Technicians can enable remote diagnostics such as remote loopbacks, link loss carry forward and link loss returns, to determine source and type of problem.

Database Manager

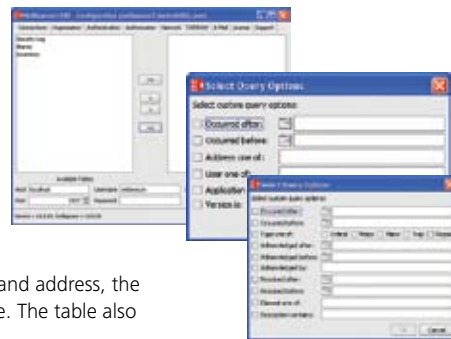
NetBeacon ESP provides three types of database tables:

- **Alarms & Traps:** The Alarms & Traps table is a record of all SNMP trap notifications, correlated traps, and events. This database logs the date and time the event occurred and its severity. If the alarm was acknowledged, it includes the date and time it was acknowledged, along with the user who acknowledged it. If the alarm was resolved, the date and time of resolution is included. The DNS name or IP address of the element where the event occurred and a description of the alarm are also included in the database.

- **Security:** This database table logs the date and time of each user connection and disconnection, the user's name and address, the application to which the user connected, and the version of the user's software. The table also includes the number of login failures that occurred, if any.



- **Inventory:** This table contains the date and time when the information was first recorded, the serial number and model of the element, the date the element was manufactured, its location, type, description, name, and additional element-specific information. The table also includes whether or not an element is in service.



System Requirements

For optimal operation, the hardware should satisfy the recommended requirements.

NetBeacon Component	Minimum Hardware Requirements	Recommended Hardware Requirements	Supported Operating System
Full (all components on a single platform)	3 GHz processor, 1 GB RAM, 80 GB disk, 1024x768 screen resolution	3+ GHz processor, 1+ GB RAM, 80+ GB disk, 1024x768 screen resolution	Windows XP Professional Windows 2003 Server Redhat LINUX
Registry	2 GHz processor, 512 MB RAM, 60 GB disk	3 GHz processor, 1 GB RAM, 80 GB disk	Windows XP Professional Windows 2003 Server Redhat LINUX
Element Manager	2 GHz processor, 512 MB RAM, 60 GB disk	3 GHz processor, 1 GB RAM, 80 GB disk	Windows XP Professional Windows 2003 Server Redhat LINUX
Database Manager	2 GHz processor, 512 MB RAM, 60 GB disk	3 GHz processor, 1 GB RAM, 80 GB disk	Windows XP Professional Windows 2003 Server Redhat LINUX
Element Browser	2 GHz processor, 512 MB RAM, 60 GB disk Monitor to support 1024x768 screen resolution	2 GHz processor, 512 MB RAM, 60 GB disk Monitor to support 1024x768 screen resolution	Windows XP Professional Windows 2003 Server Redhat LINUX

Compliance

NetBeacon ESP supports the following:

ARP	RMON Group 1
DHCP	RMON High Capacity
FTP	Networks
ICMP	SNMP v1, v2c, and v3
IP	TCP
Internet Standard	Telnet
Subnetting Procedure	TFTP
MIB-II	UDP
RADIUS	



Ordering Information

NetBeacon ESP Element Manager

Part Number	Description
Network Management	
NBESP-99	Management Software for Windows XP Professional and NetBeacon ESP software license for 99 network elements
NBESP-249	Management Software for Windows XP Professional and NetBeacon ESP software license for 249 network elements
NBESP-UNLIMITED	Management Software for Windows XP Professional and NetBeacon ESP software license for unlimited network elements
NetBeacon ESP Upgrade to Software License	
NBESP-99UP 249	NetBeacon ESP software license upgrade from 99 to 249 network elements
NBESP-99UP UNL	NetBeacon ESP software license upgrade from 99 to unlimited network elements
NBESP-249UP UNL	NetBeacon ESP software license upgrade from 249 to unlimited network elements
Annual Software Maintenance	
NBMAINT-ESP	NetBeacon ESP annual maintenance agreement for software

Features and Benefits

- ❖ Distributed registry-based architecture
- ❖ Headless server architecture for scalability
- ❖ Software download capability
- ❖ Operator-friendly GUI interface
- ❖ Audible and visual alarm identification
- ❖ Automatic element discovery
- ❖ Logical and physical network topologies