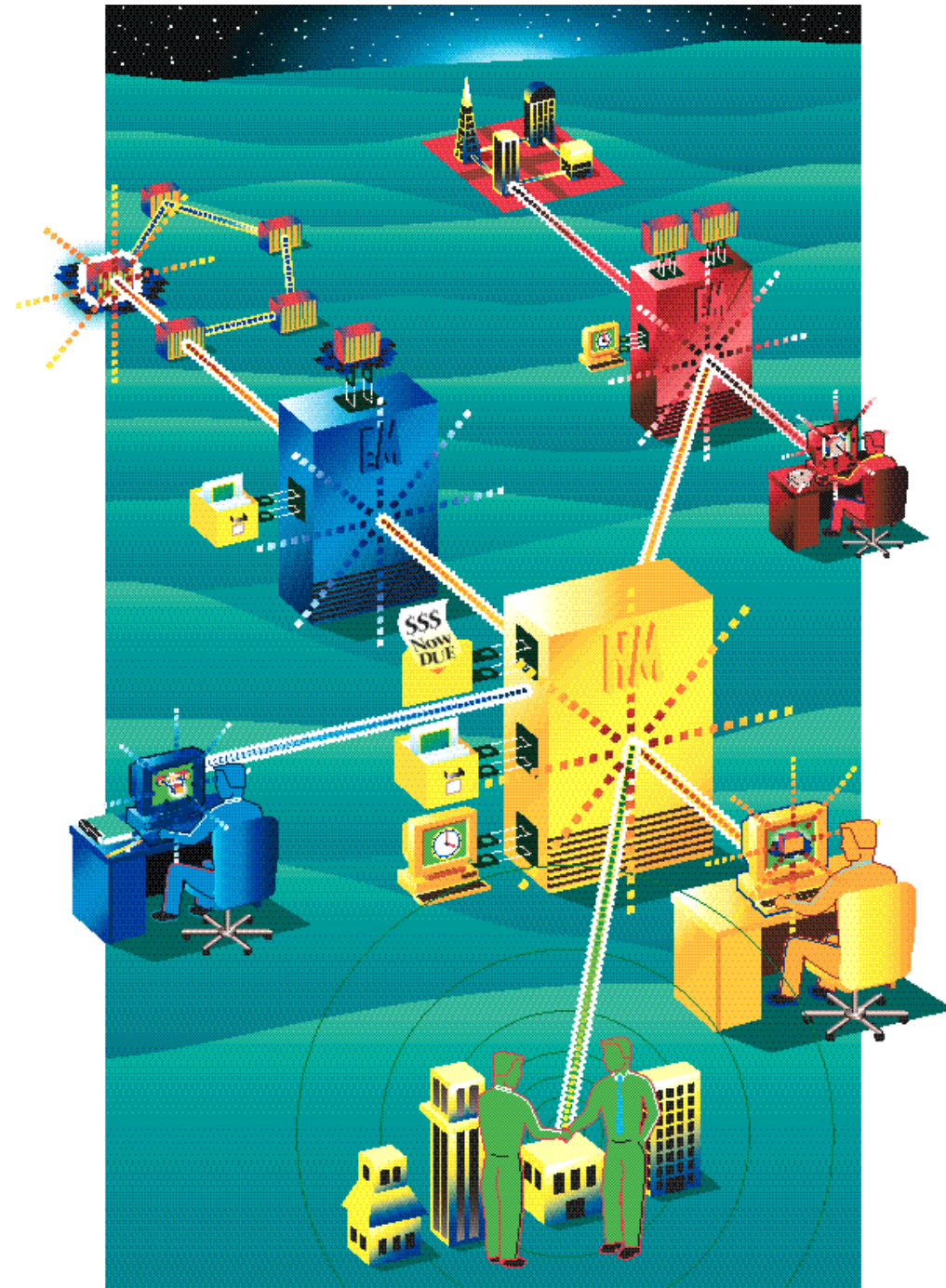


FLEXR NMS



XR-NM
XR-EM
XR-EC
XR-VX



Specifications subject to change without notice.



FUJITSU IS A WORLD LEADER IN THE MANUFACTURE OF COMPUTERS, TELECOMMUNICATIONS EQUIPMENT AND OPTOELECTRONIC COMPONENTS. COMMITMENT TO THE NEEDS OF OUR CUSTOMERS AND FIFTY YEARS OF EXPERIENCE IN TELECOMMUNICATIONS HAVE MADE US THE RIGHT CHOICE FOR INTEGRATED NETWORK SOLUTIONS.

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FLEXR Solutions For A New Millennium

Fujitsu is proud to introduce the next generation of FLEXR network management products: FLEXR Network Manager (FLEXR-NM), FLEXR Element Manager (FLEXR-EM), FLEXR Element Controller (FLEXR-EC), and FLEXR Visual Explorer (FLEXR-VX). Together, these systems provide the advanced features, security, reliability, and ease of use that Fujitsu customers have come to expect.

FLEXR-NM and FLEXR-EM share some common functions, such as security management, fault management, and log management. These functions are grouped into one internal component called Common Foundation. The modular design of the features, based on the Telecommunications Management Network (TMN) distributed architecture, contributes to the scalability and reliability of the system, as well as allowing for a rapid deployment of upgrades. It also allows for a more efficient use of resources, resulting in enhanced system performance.

TMN-based applications provide a host of benefits to the customer. The distributed, multi-tier architecture allows for:

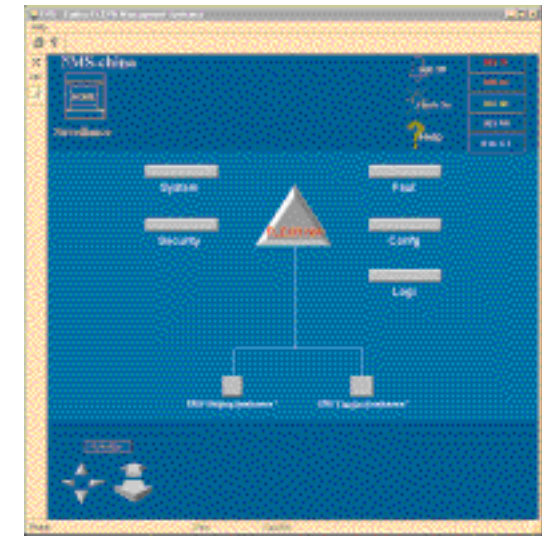
- Easier maintainability and plug-and-play upgrades without outages
- Increased scalability to accommodate network growth
- The cross-platform flexibility to manage third-party components

The FLEXR Products

FLEXR-NM, the Fujitsu network layer manager, supplies network-wide functions such as end-to-end path management, integrated topology, and network-level alarm surveillance. In conjunction with up to 20 Element Managers, FLEXR-NM provides operators with full end-to-end visibility.

FLEXR-EM, the Fujitsu element layer manager, provides access to surveillance, control, and security functions for specific managed subnetworks. Element-level alarm surveillance, network element (NE) performance, and software download are among the features supported. FLEXR-EM works seamlessly with FLEXR-NM to ensure that network data is fully synchronized between systems.

FLEXR-EC, the Fujitsu element controller, provides the familiar functionality of Fujitsu's original FLEXR craft terminal, including graphical displays of the NE shelf layout, cross-connect provisioning, a direct TLI interface to the NEs, and status displays. FLEXR-EC may be accessed either through a FLEXR-EM plug-in interface, or on a stand-alone laptop computer.

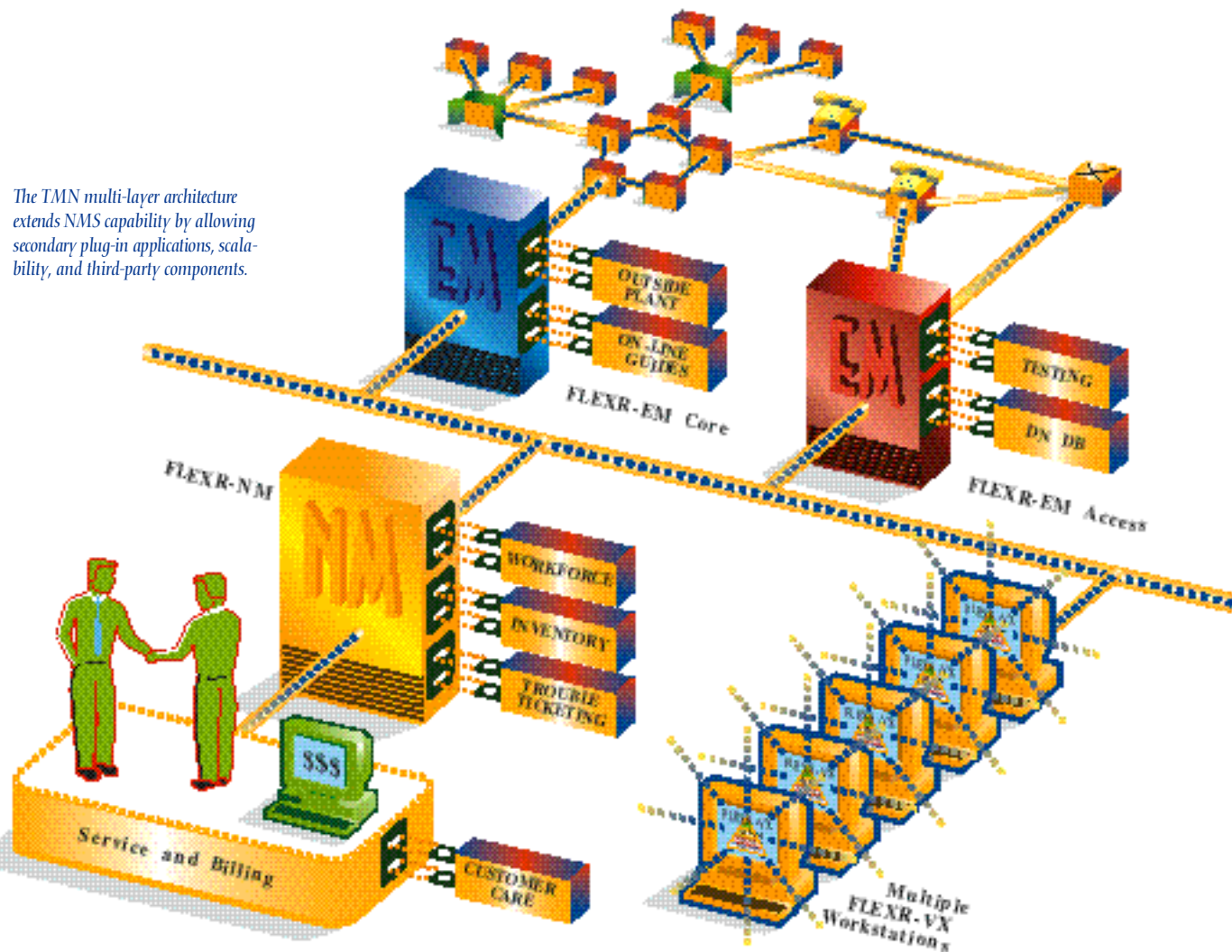


Operators can access multiple layers of NMS functionality from one easy-to-use interface.

FLEXR-VX, the Fujitsu universal user interface, provides access to all the products in the new generation of FLEXR management systems. This state-of-the-art, PC-based interface integrates functionality from all management levels in an intuitive and efficient fashion.

Why Fujitsu?

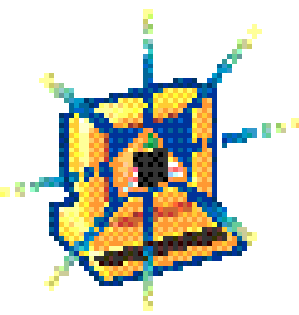
Fujitsu's world-wide research and development operations, associated with such prestigious learning institutions as Stanford University and the University of California at Berkeley, ensure that the most advanced technologies underlie Fujitsu's NMS products. Not only is Fujitsu the dominant supplier of SONET equipment in the US, it is also a major player in the SDH, WDM, switching, ATM, and Access markets around the world. With such solid technological backing, it's no wonder that Fujitsu's FLEXR family of network management solutions is the choice for the next millennium.



The TMN multi-layer architecture extends NMS capability by allowing secondary plug-in applications, scalability, and third-party components.

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Becoming Acquainted with the FLEXR-VX User Interface

The sophisticated graphics capabilities of FLEXR-VX will allow network operators to have greater control over the complex networks of the future. Some of the benefits of the universal GUI approach include:

- Lower costs, since all network functions can be accessed from one NT workstation
- Greater efficiency due to reduced training time
- Increased convenience for the network operator, since all features are available on one interface

The advanced graphics of FLEXR-VX make it easy to visualize the network. Its displays are organized into a very intuitive, hierarchical set of layers that make it easy for operators to learn

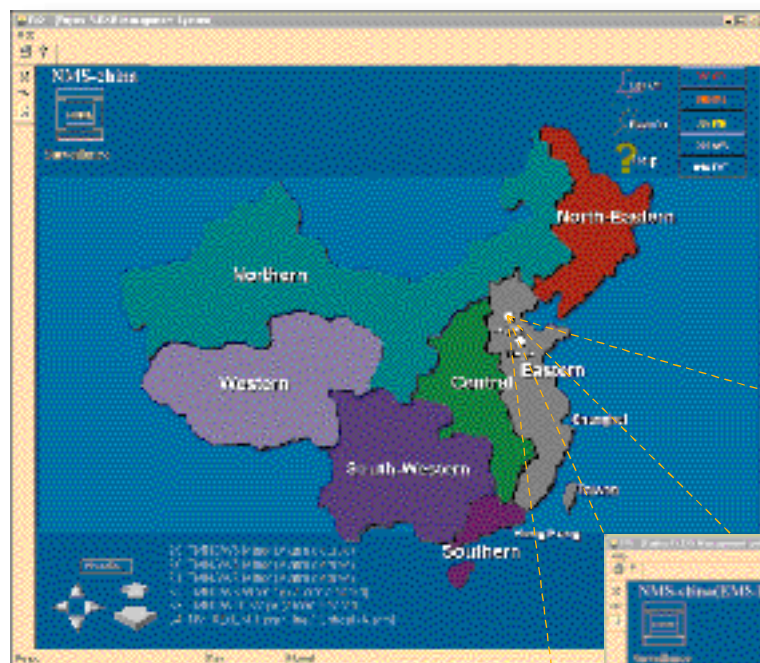
their way around the system. You can think of the FLEXR-VX interface as a series of mirrors faithfully reflecting the many views of the network.

The FLEXR-VX topology maps can be customized to the requirements of the Operations Support System (OSS). Administrators can import a background map or image, or draw their own graphics using the comprehensive FLEXR-VX editing tools.

Navigation Between Systems

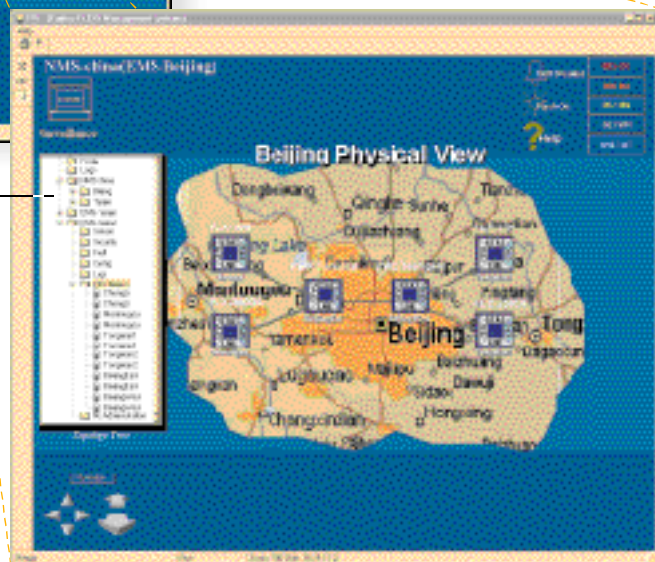
FLEXR-VX is fully integrated with the FLEXR-NM, FLEXR-EM, and FLEXR-EC products. Operators can log into FLEXR-NM and FLEXR-EM individually, or simultaneously. FLEXR-EC is embedded in the FLEXR-EM displays.

To get to FLEXR-EC, simply navigate to the FLEXR-EM topology map and zoom into a layer showing NE icons. Clicking the CFG button on the NE icon will launch the FLEXR-EC plug-in display. The FLEXR-VX interface to FLEXR-EC has the same look and feel as the original FLEXR product. This familiar interface will make network operators feel right at home!



Many operations, including link creation, path creation, alarm isolation, and network visualization may be performed using the FLEXR-VX network topology modeling system.

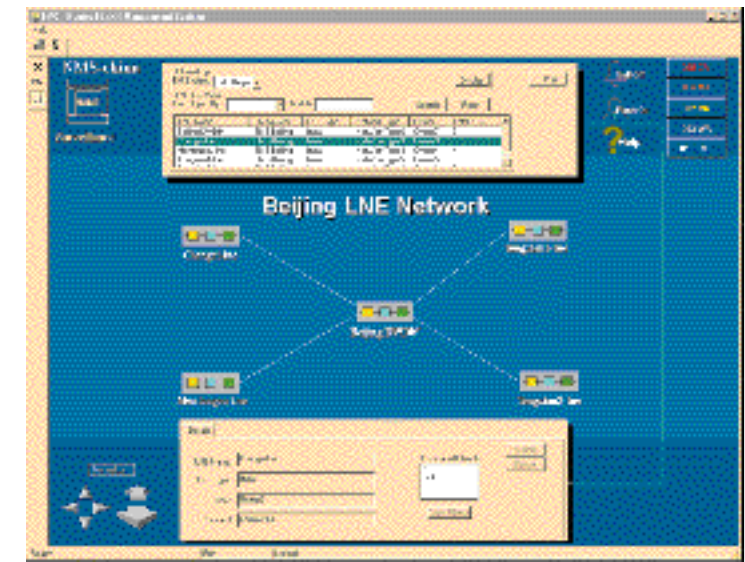
The Topology Tree View gives you access to any display in FLEXR-VX.



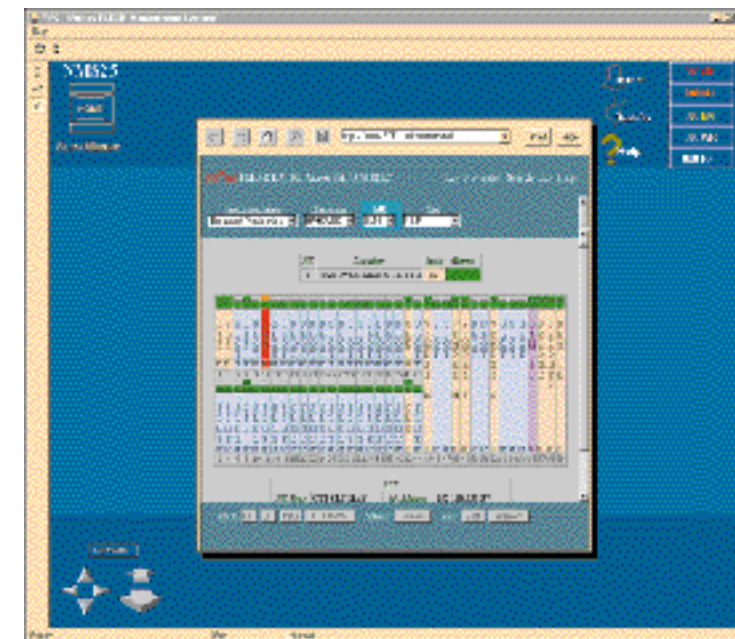
Accessing Functions and Reports

You can access most network functions in either a split-screen display, which appears at the top and the bottom of the topology map area, or in a single-screen display.

Reports are given in both a list and a detail view; clicking on an item in a list will automatically cause the detail view to show the corresponding information.



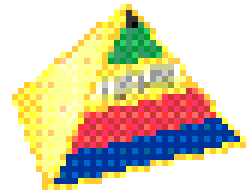
The split-screen reporting function lets you view the network between the two displays as you perform NMS tasks.



You can access web-based tools or information from within FLEXR-VX.

The Web Browser

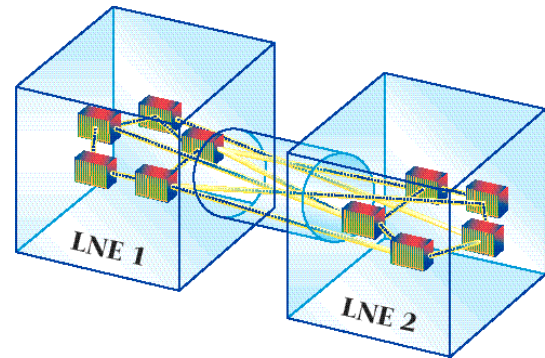
FLEXR-VX features an embedded Web Browser, which allows you to access third-party web-based management or information systems without changing computers or applications. A simple click on the appropriate icon will call up the desired screen.



FLEXR-NM Functions

FLEXR-NM allows operators to manage the complete network by merging individual FLEXR-EM subnetwork views into a composite logical network, which is used to support operator functions. FLEXR-NM also supports open interfaces to upper Service or Business Management applications.

FLEXR-NM integrates data from FLEXR-EM systems, allowing the operator to access all network resources with a single click. For example, you can view alarms from multiple FLEXR-EM systems on a single report, or on the FLEXR-NM topology map. In addition, FLEXR-NM allows end-to-end path management across subnetworks, even if they are located on different FLEXR-EM systems. A FLEXR-NM system can allow you to manage up to 10,000 NEs from a single terminal!



The Logical Network Element

A logical network element (LNE) is a subnetwork of NEs which are connected by high-speed links. The LNE subnetwork concept will forever revolutionize the way you see the network: by abstracting the NE functionality in this fashion, you can run generic paths across different types of networks, without needing domain-specific knowledge about each piece of NE hardware. This makes path-building easy!

Security Management

FLEXR-NM provides full security management functionality, including password-protected user accounts, user profiles, and security alarm filters. You can set expiration dates for operator passwords and enable terminal lockouts to thwart break-in attempts. All NMS messages are encrypted for added security.

FLEXR-NM Topology: Building your Graphical Network View

The powerful FLEXR-VX graphic tools make building topology maps easy. LNEs can be grouped together however you like: by customer, by network type, by location, or by any other criteria you choose. You can import background images or draw your own group icons.

You can also place graphical LNE icons on the map by accessing the Inventory Tree View, which shows all of the LNEs available to FLEXR-NM. Logical links, which represent all of the physical links between two LNEs, will appear automatically.

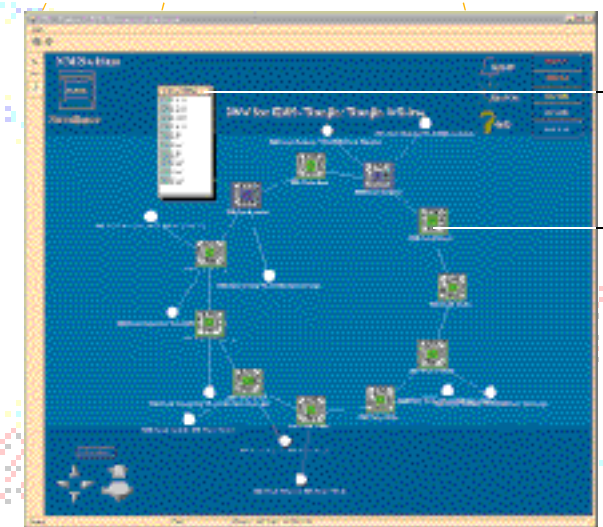
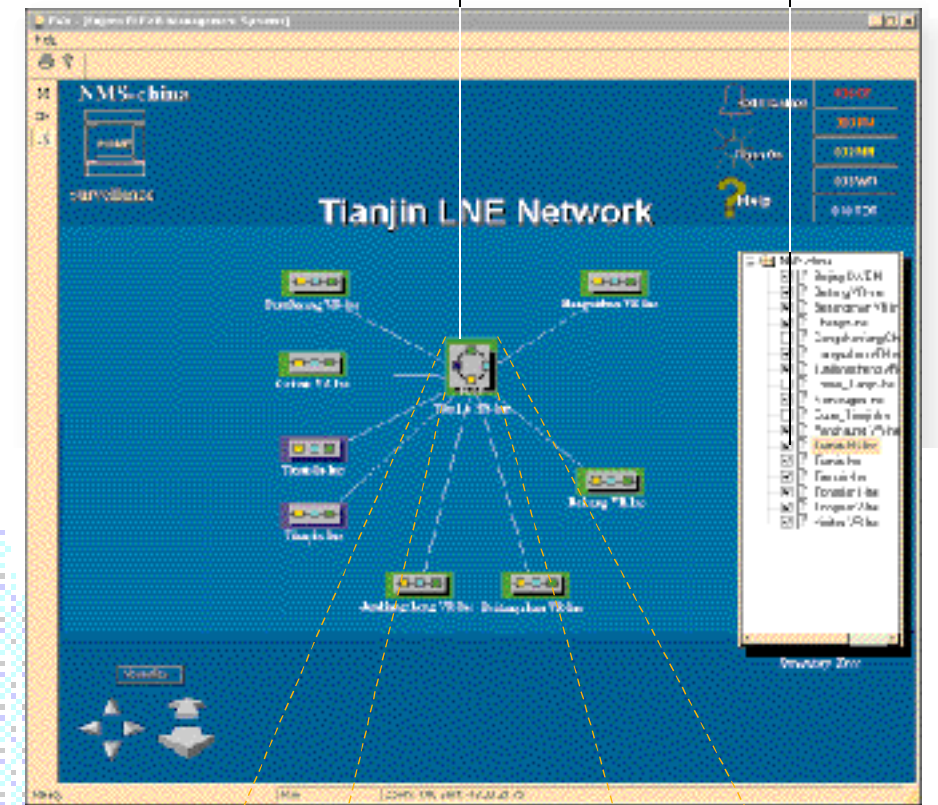
Communication with FLEXR-EM

FLEXR-NM communicates with the Element Managers using *management channels* over the TCP/IP network. FLEXR-NM provides an easy-to-use Channel Display, where you can add, modify, and delete channels between FLEXR-NM and FLEXR-EM. Once a channel has been added, you can activate and deactivate it with the touch of a button.

You can also create channel filters, which control which types of alarms are passed from a selected FLEXR-EM to FLEXR-NM.

Clicking an LNE icon will take you to a topology display showing the NEs and links inside the selected LNE.

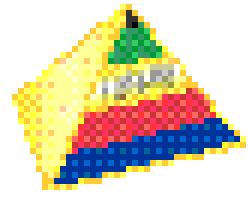
Clicking the checkbox next to an LNE in the tree view will cause a corresponding LNE icon to appear in the center of the display.



You can click the AID button to access a list of ports.

Clicking the PHY button will take you to a FLEXR-EM topology display, showing the physical context of the NE.

The FLEXR-NM logical-topology views help you manage your network.



FLEXR-NM Fault Management

FLEXR-NM fault management integrates and displays all of the alarm, event, and system messages forwarded by the FLEXR-EM systems.

FLEXR-NM supports alarm latching, which is a mechanism that requires a manual clear for each alarm. When latching is turned off, alarms are automatically transferred to the Historical Alarm Log when network clear messages are received.

Alarm message filtering can screen out messages you do not want to receive. For example, channel filters screen out alarms at the NM-EM interface level. In addition, individual operators can create personal alarm filters, while security alarm filters may be applied by administrative users to control which alarms are seen by each operator.

The alarm list is the primary surveillance tool.

Alarms are shown as flashing colors on the graphical topology maps.

The alarm bell feature is configurable.

The colored-coded event counters show alarm totals for each level of severity.

LNEs that have alarms flash in the Inventory Tree View.

You can click on a flashing map name to go directly to that display.

The scrolling display lists alarm information as it is received.

Severity	Name	Time	Area	Source	Destination	Priority
Critical	2748-30-11:00:00	NE	Event02	EM	Event02	Event02
Critical	2748-30-11:00:00	LINE	Event02	EM	Event02	Event02
Warning	2748-30-11:00:00	IFP	Event02	EM	Event02	Event02

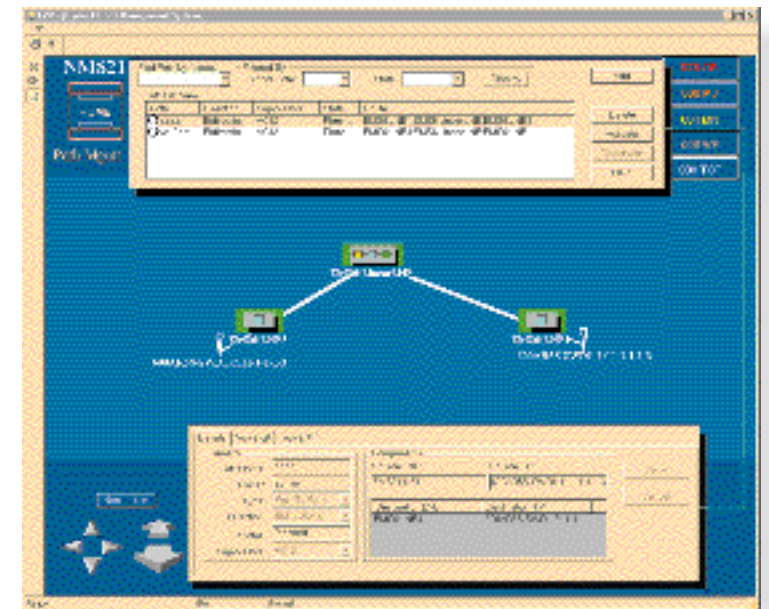
Fault information is shown in a wide variety of real-time displays, so that you can use the alarm display mechanism you are the most comfortable with.

Path Management

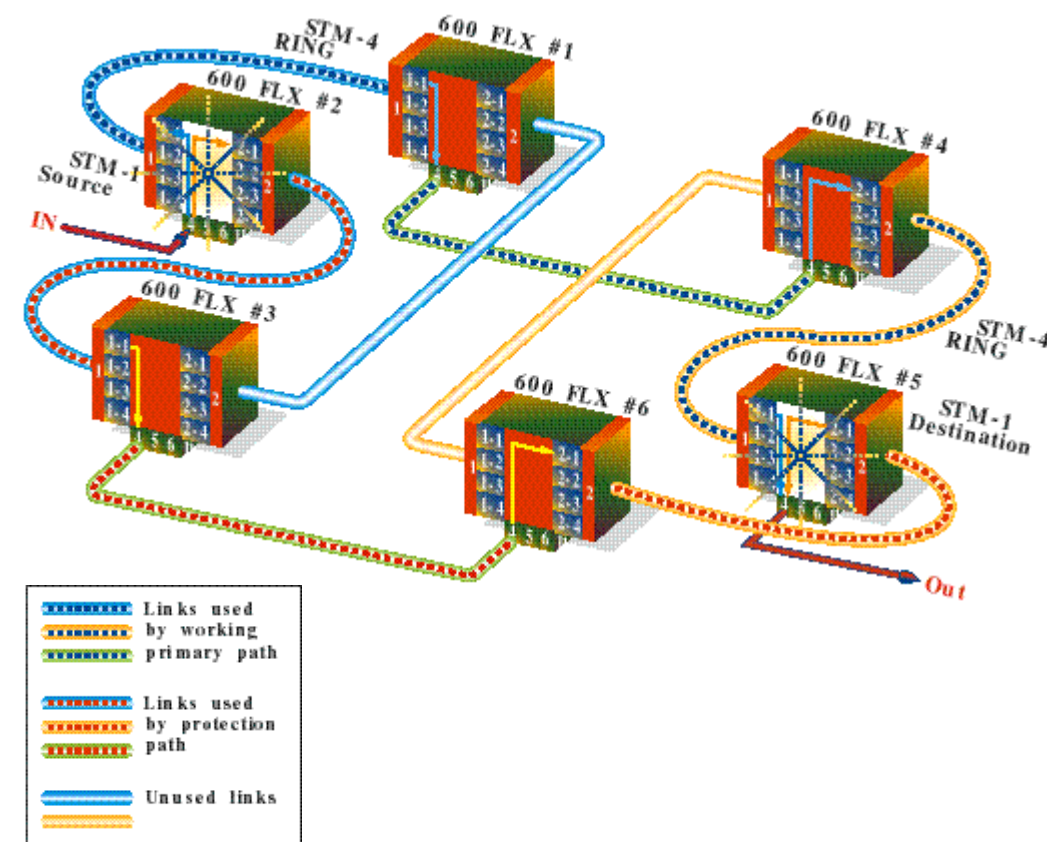
Since the FLEXR-NM network is partitioned into LNEs, path-building is amazingly swift and easy.

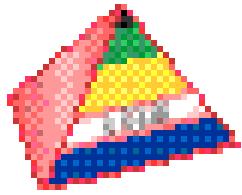
First, you specify some basic path information, such as path name, direction, and signal rate. Next, you pick your endpoints.

After you submit this information to FLEXR-NM, you'll see a list of possible routes which satisfy the criteria you chose. Select one, verify that space is available by simply clicking on a button, and presto! The path is created. FLEXR-NM will automatically coordinate all connectivity assignments between Element Managers.



After the path has been created, it will be displayed on the network topology map.





FLEXR-EM Functions

FLEXR-EM allows you to manage the physical network of NEs and links, as well as create the logical network information used by FLEXR-NM.

FLEXR-EM provides direct support for NE functions, such as fault processing, provisioning, software download, and performance data collection.

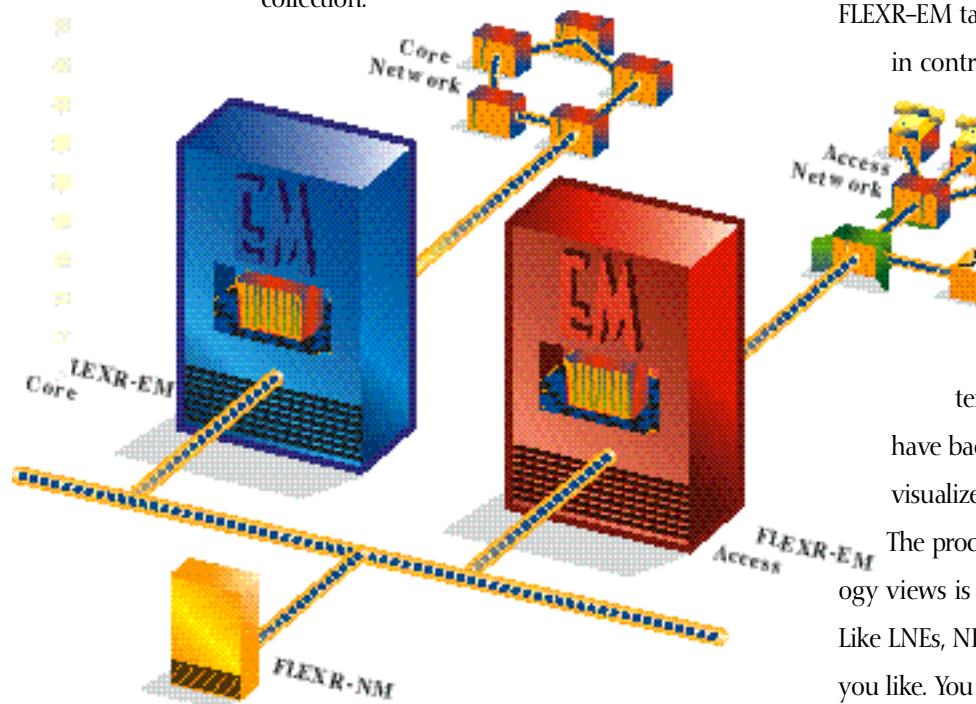
protected user accounts, user profiles, and security alarm filters. All messages between management systems are encrypted, and as in FLEXR-NM, security violations are logged.

A Physical View of the Network

FLEXR-EM takes a physical view of the network, in contrast to FLEXR-NM's logical view. The FLEXR-EM network topology focuses on the actual NEs and fiber-optic links that are the backbone of the network.

Topology views are organized in terms of geographic location, and often have background maps to help the operator visualize the physical network context.

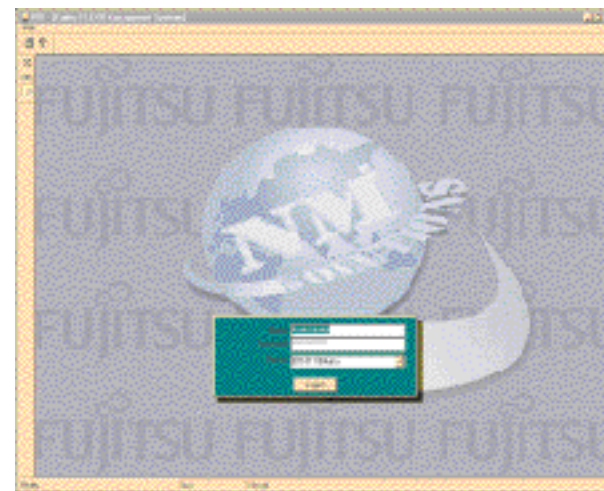
The process of building the FLEXR-EM topology views is very similar to that of FLEXR-NM. Like LNEs, NEs can be grouped together however you like. You can import images or background pictures, or draw your own group icons using the FLEXR-VX editing tools.



This information may then be relayed across an open, standards-based interface to FLEXR-NM or another upper management system. Data synchronization between FLEXR-EM and the upper system is performed automatically.

Security Management

Each FLEXR-EM system comes with its own set of powerful and comprehensive security features, including password-



You must have a valid user account and password before you can access FLEXR-EM.



Clicking the checkbox next to an NE in the tree view will cause a corresponding NE icon to appear in the center of the display.

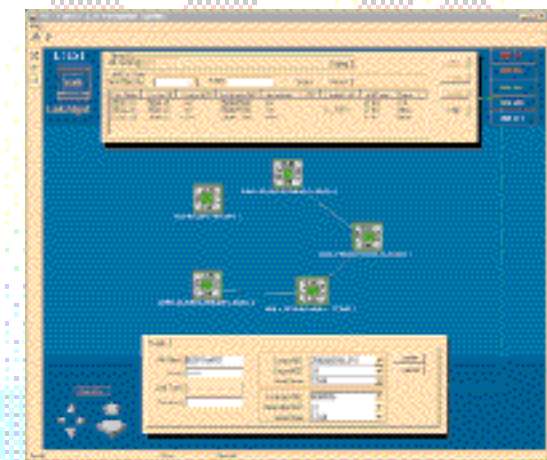
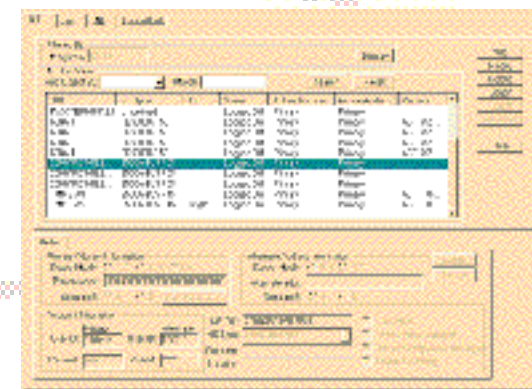
The FLEXR-EM network topology maps are a powerful visualization tool.

To place NE icons on the map, simply click on NE names from the Inventory Tree View, which shows all of the NEs managed by FLEXR-EM. Links between the mapped NEs will appear automatically.

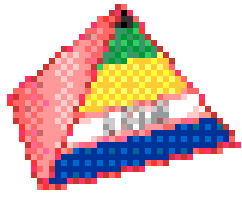
Adding a link between two NEs is simple: just specify the link name, signal type, and source/destination port. The new link will automatically be displayed on the appropriate FLEXR-EM topology map.

Managing NEs, Links, and LNEs

FLEXR-EM supplies NE management functions, such as adding, modifying, deleting, logging on, and logging off of NEs. For specific NE configuration tasks, it invokes the FLEXR-EC plug-in.



The FLEXR-EM LNE management functions are similar to the NE and link functions. You can add, modify and delete LNEs, or you can view the NEs and links inside an LNE. The logical links between LNEs are computed automatically. Once entered, the logical network information is automatically transferred to the FLEXR-NM system.



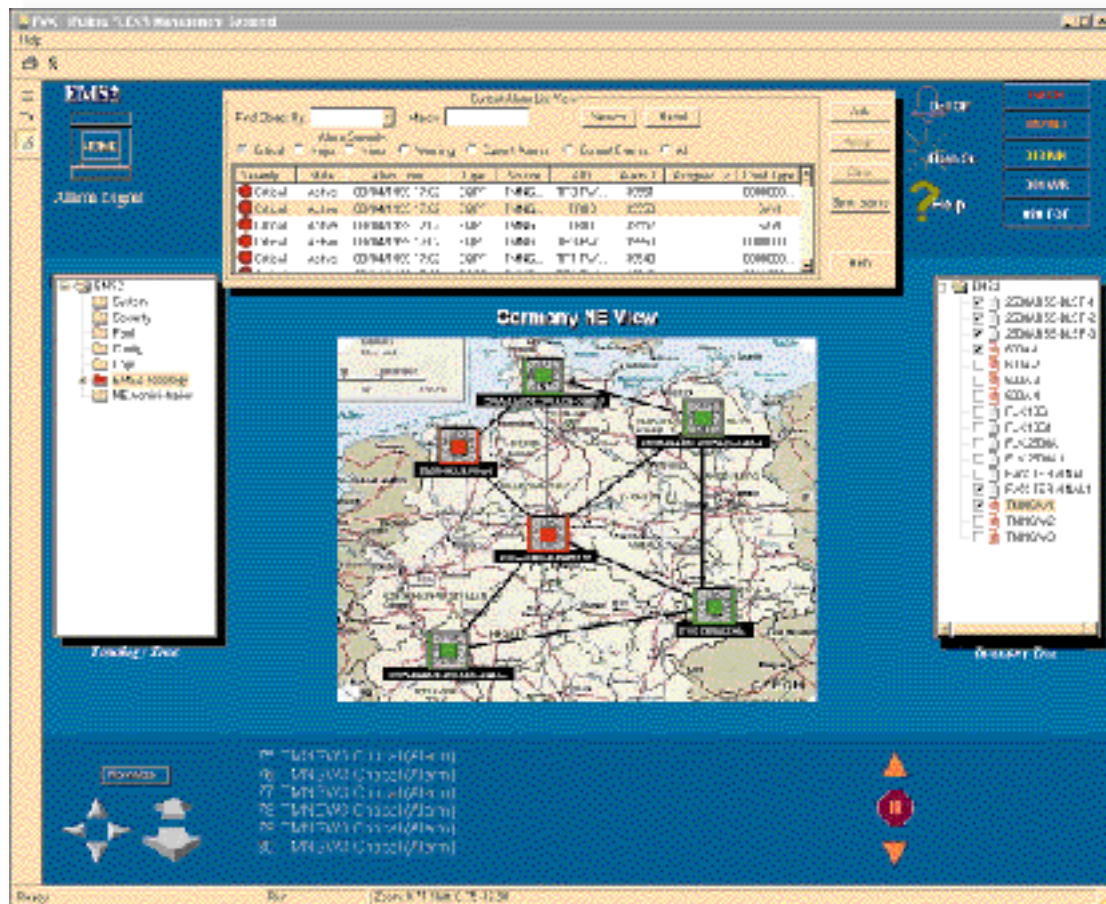
FLEX-EM Fault Management

The FLEX-EM fault management features are the same as in FLEX-NM, since alarms are managed by the Common Foundation component, which both systems share. Thus, operators don't have to spend time learning how to manage a different set of alarm features for each system.

FLEX-EM can manage all of the alarm, event, and system messages forwarded by the NEs. As in FLEX-NM, FLEX-EM may be configured to enable alarm latching, which is a mechanism that requires a manual clear for each alarm. Alarm acknowledgment, assignment, and clearing are synchronized between FLEX-EM and FLEX-NM.



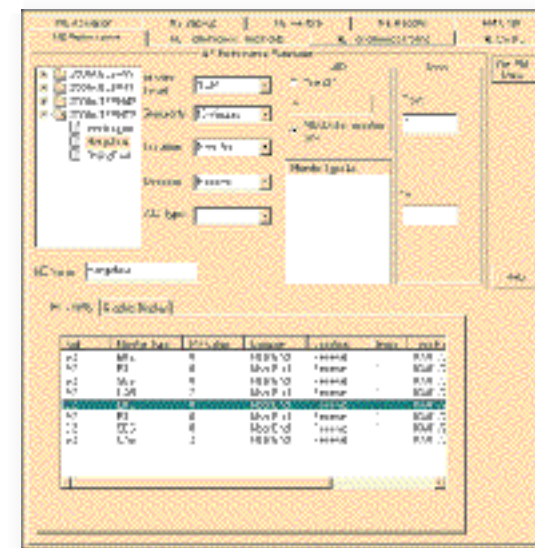
Security filters may be defined by administrative users to restrict the alarms that are seen by each operator. In addition, individual users can create personal alarm filters to screen out messages they do not want to receive.



The FLEX-EM fault management displays are the same as in FLEX-NM.

NE Performance Management

FLEX-EM can retrieve, store, display, and measure transmission quality data. This information can be retrieved on-demand, or automatically once per day. You can view the information in a text report, or you can switch to a full-color graphical display.



You can retrieve detailed performance reports from any NE.

Performance monitoring is optional: you can specify which NEs are polled and which types of performance data should be retrieved from each NE.

Performance polling commands may be specified on a per-NE basis; the group of commands will then be sent to the target NEs once per day by FLEX-EM.



The NE reporting function lets you view five different types of reports from one display.

NE Software Download

FLEX-EM features fully automated NE software download and activation. You can copy software generics to as many as 100 NEs in one session, as well as schedule validation and activation of the new software. FLEX-EM also provides comprehensive NE Backup, NE Restore, and NE Reporting functions. The interface for these features is efficiently organized and easy-to-use.



FLEXR-EC: The FLEXR NE Configuration Tool

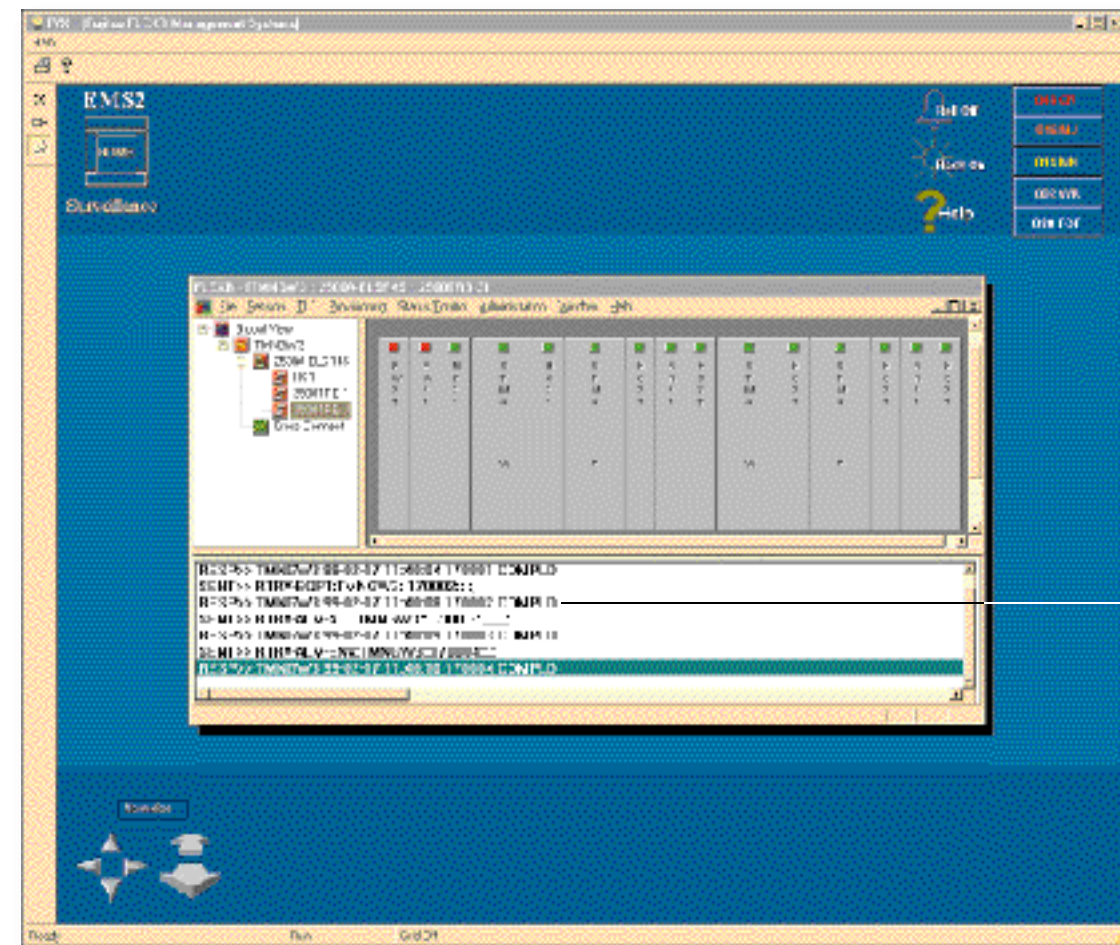
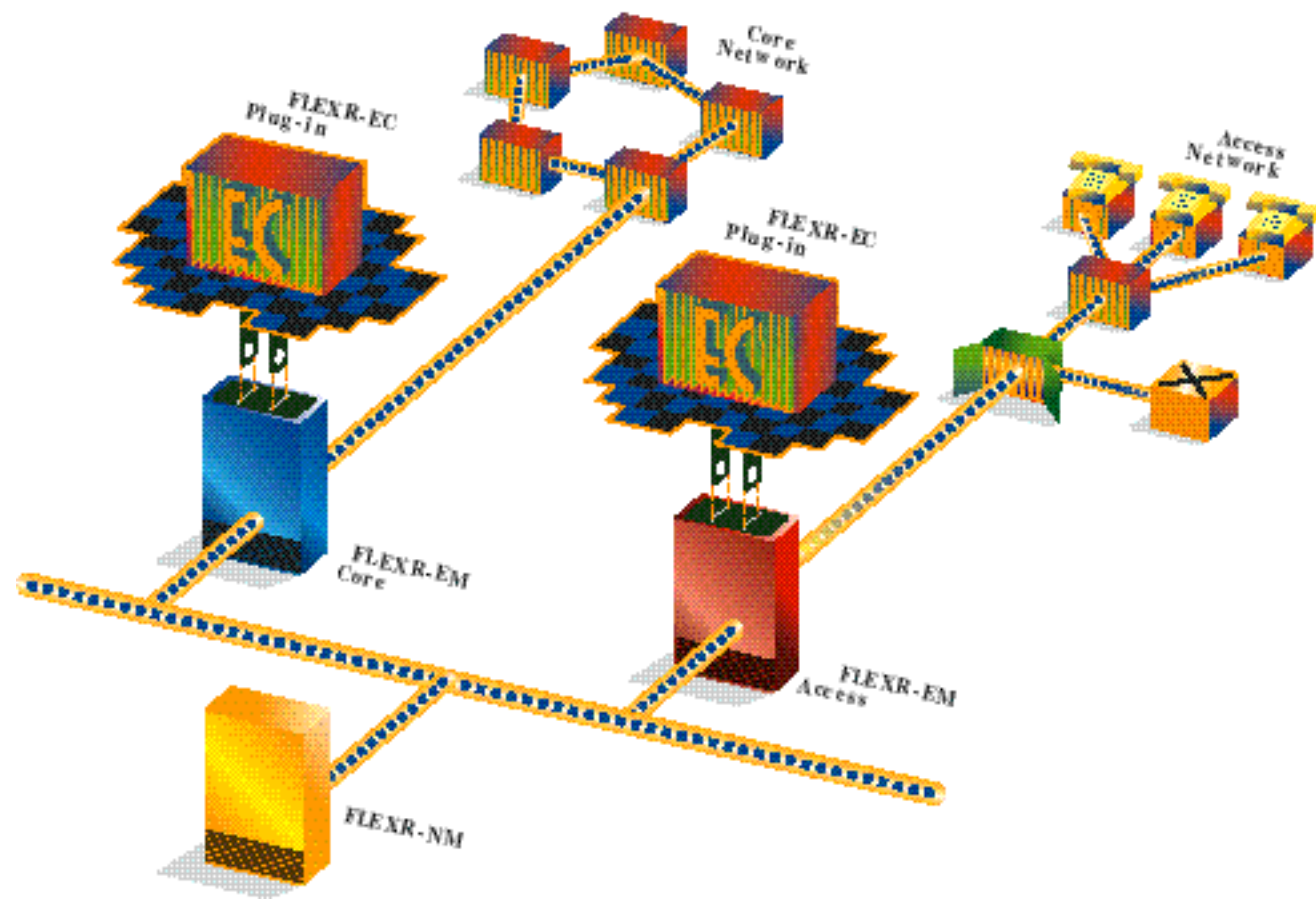
FLEXR-EC functions as a plug-in to the FLEXR-EM system. There is one FLEXR-EC for each NE type, allowing you to install the EC plug-ins in a modular fashion as your network expands to include new hardware.

FLEXR-EC provides complete network element configuration functionality, and integrates direct network element control into the FLEXR-EM system. This modular architecture provides a stable and maintainable management environment, which can easily be upgraded without an outage.

The Familiar FLEXR Interface

FLEXR-EC's functionality is almost identical to that of the original FLEXR product. In addition, FLEXR-VX provides a FLEXR-EC plug-in interface that has the same look and feel as the original FLEXR.

You can access the FLEXR-EC plug-in interface from the FLEXR-EM topology map displays. Simply navigate to a topology map layer which shows NE icons, and click the CFG button on a selected NE. The specific FLEXR-EC plug-in interface for that NE will appear, giving you access to a host of provisioning and monitoring functions.



The FLEXR-EC displays have the same look and feel as the original FLEXR product.

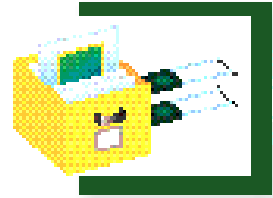
The FLEXR-EC plug-in interface supports a TLI Mode, which allows you to send direct TLI messages to an NE.

FLEXR-EC Functions

Multiple graphical displays are provided by the FLEXR-EC plug-in interface, including a graphical card display and a graphical shelf display. For selected NEs, a graphical LED display is provided as well.

Alarms are mapped to the affected card or shelf, and are displayed in colors according to their severity.

FLEXR-EC allows you to perform NE provisioning and status control operations. For selected NE types, you can create cross-connects using simple point and click graphics.



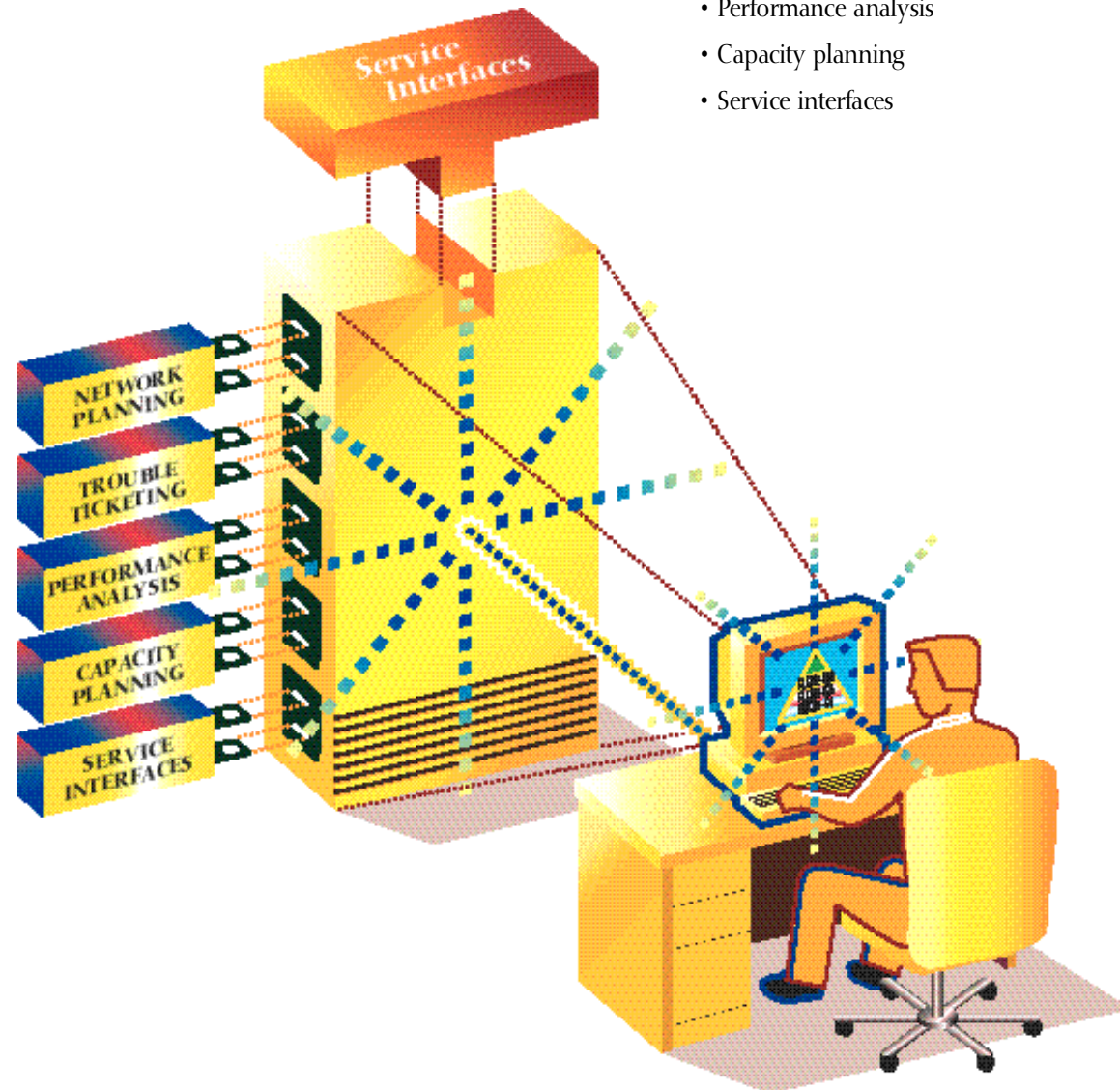
Application Plug-ins

In the past, users intending to upgrade their system with new software to support new applications or network element types were forced to take their systems off-line to add the software. As a consequence, network operators lost visibility to their network during upgrades. Because the FLEXR-NM and FLEXR-EM systems are based on CORBA (Common Object Request Broker Architecture) and on managed object technology, new plug-in applications can be added without affecting service or visibility to the network.

In addition, customers can develop their own plug-in applications to use with FLEXR-NM and FLEXR-EM. These plug-ins can take the form of additional modular network functions, or they can be complete supplementary management applications. The open interfaces of FLEXR-NM and FLEXR-EM promote true NMS optimization.

Some examples of potential plug-in applications include:

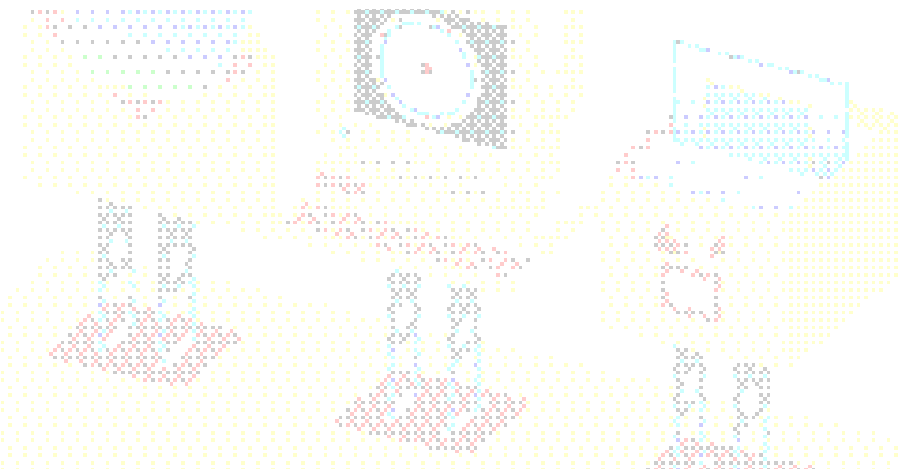
- Network planning
- Trouble ticketing
- Performance analysis
- Capacity planning
- Service interfaces

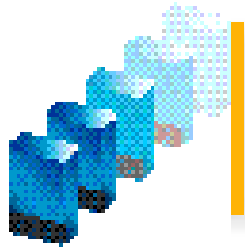


Key Applications of the New Fujitsu NMS

The Distributed NMS

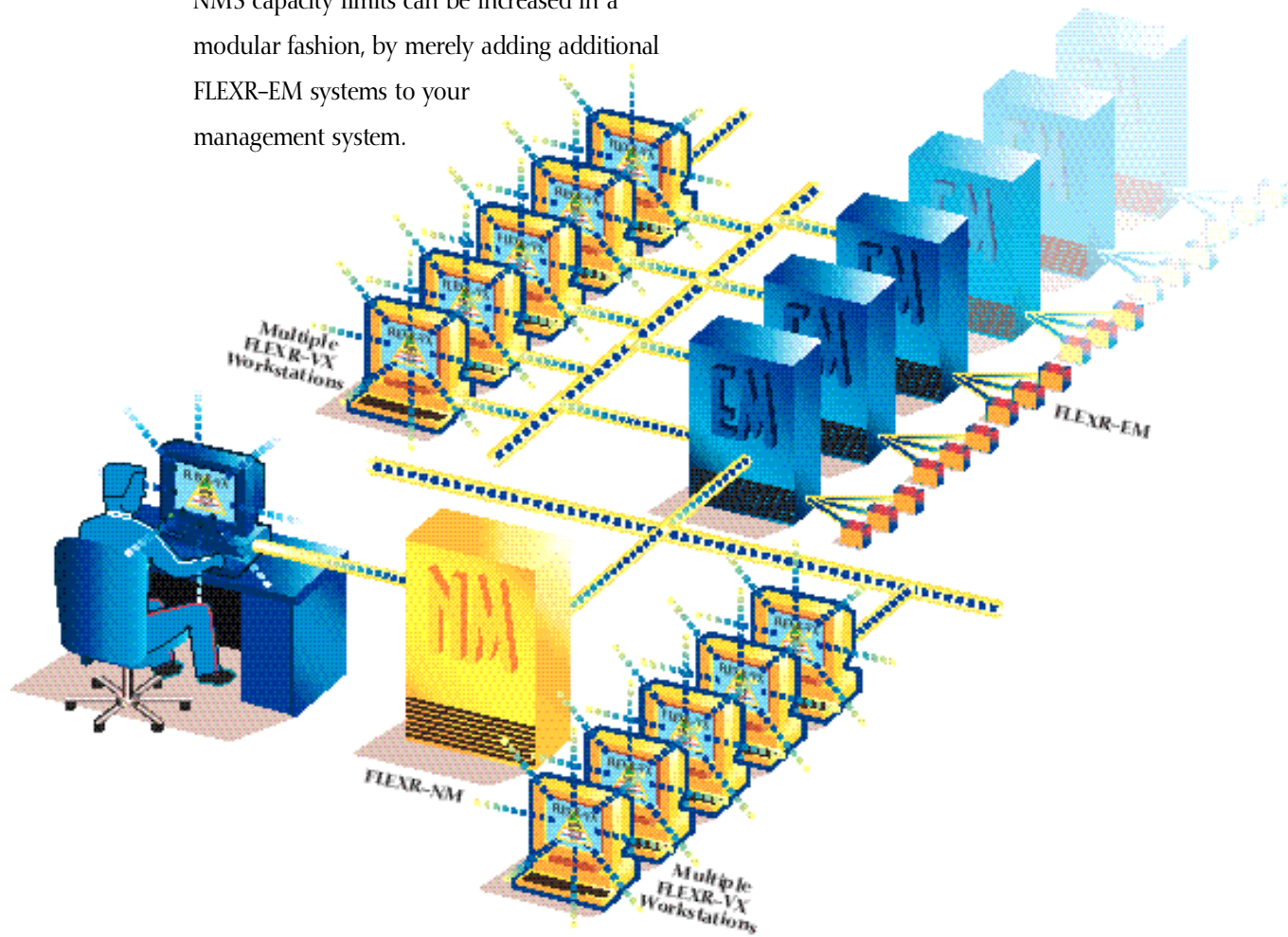
The new Fujitsu TMN-based NMS is distributed, creating a functional partitioning of the management system features. The next-generation FLEXR products function seamlessly to act as one system.





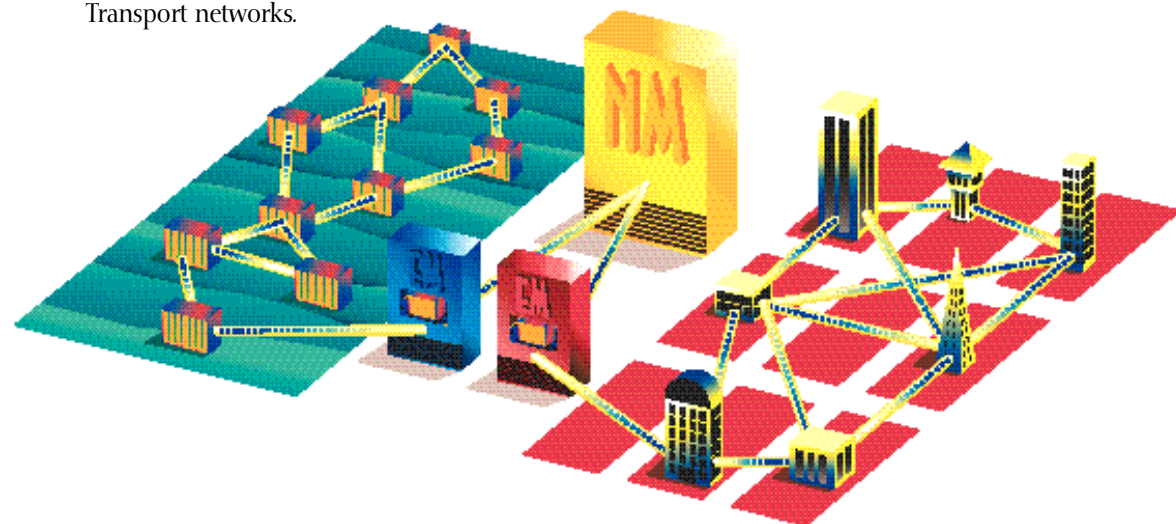
System Extensibility

NMS capacity limits can be increased in a modular fashion, by merely adding additional FLEXR-EM systems to your management system.



Technical Integration

FLEXR-NM can manage multiple technologies at the same time, including Core, Access, and Transport networks.



Fujitsu: The Right Choice for the Next Millennium

The networks of the next millennium will be larger and change faster than ever before. You'll need the right solutions to help you manage the ever-increasing complexity of the networks of the future.

Fujitsu's FLEXR-NM, FLEXR-EM, FLEXR-EC, and FLEXR-VX suite of products are the keys to your network management success. The new Fujitsu NMS is based on the TMN precepts of distributed architecture, which give you scalability and maintainability. The system's modularity enables you to upgrade your network and add new services for your customers without outages. In addition, automated resource load-balancing increases overall system performance.

The universal user interface concept of FLEXR-VX lets you seamlessly navigate from one management system to another without having to move to a different machine or load program. FLEXR-VX is easy-to-use, con sophisticated, and intuitive. Its superior features are a technological breakthrough; work topology visualization.

Fujitsu Supplies The Features You Need

- Distributed architecture in a TMN-based system
 - Sophisticated network topology modeling
 - High-performance fault management
 - End-to-end path and service management
 - Network element, link, and logical network element management
 - NE provisioning, status control, and cross-connect features
 - NE performance and software download
- Plus additional features, such as security management, event logs, backup/restore functions, and more!

The Choice is Clear

The new Fujitsu FLEXR NMS, compose FLEXR-NM, FLEXR-EM, FLEXR-EC, and F provides the right tools for your netwo next century. The advanced features an TMN-based architecture are a breakthr in the networking industry. Fujitsu's FLEXR family of network management solutions gives you the right scalable, state-of-the-art products to maxi- mize your network's potential.

