As today's complex packet data networks grow, and voice and data networks start to converge, network traffic management becomes more important and more complex. In the packet environment, including IP and ATM technologies, network congestion and events can impact service levels. With more than 25 years of experience as designers and producers of network management systems globally, Lucent Technologies has played the leading vendor role in defining and implementing performance management solutions. Today we continue to define the features and technologies that shape the future of network performance management. As the network migrates from the traditional single-service networks (e.g., circuit-switched hierarchical networks) to ubiquitous converged packet networks, Lucent extends its expertise in network management through VitalNet™ and VitalEvent™ software.

The first step towards a total solution of avoiding network congestion is to monitor and manage packet traffic in real time. It's the only way to handle unanticipated packet volumes across multiple service layers (data and voice) and maintain quality of service (QoS) during unusual network events.

Network Performance Management Needs

Figure 1 shows the key constituents involved in most of the phases and cycles of managing a network. The diagram highlights the dichotomy between the strategic managers (executives and service level managers) responsible for establishing the objectives for network performance, and the tacticians (capacity planners and engineers) who are responsible for achieving those goals.

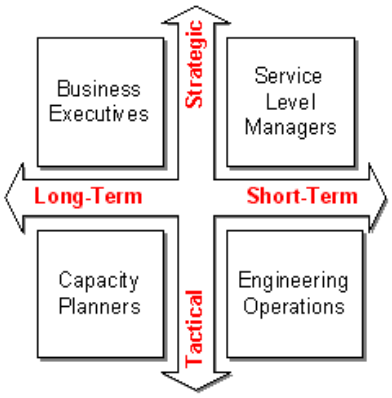

Figure 1. Network Management Stakeholders

Each of these stakeholders requires different levels of network performance information to assess the impact of the network on their particular area. For instance, executives and business managers demand high-level summaries of network performance (current, recent, and historical), so they can see the impact of the network on their applications and ultimately their business operations. Capacity planners seek insight into how recent past performance can predict future and recurring usage so they can intelligently provide and anticipate sufficient network bandwidth to support demands while minimizing capital expenditures. Network engineers seek detailed, granular performance data to resolve current and recent network performance issues. Service level managers need to monitor key current and recent SLA metrics to ensure that the network is providing the service to the customer compliant with the SLAs. The needs of each of these groups are summarized in Table 1.

Table 1. Performance Data Needs of Network Managers

Function/ Attributes	*Business Executives*	*Capacity Planners*	*Service Level Managers*	*Engineering*	*Operations*
Objectives for Network Management:	Ensure network is meeting business goals	Intelligently plan and anticipate capacity needs	Ensure compliance with SLAs	Minimize downtime and facilitate changes	Maximize current network throughput
Measured On:	Bottom line	Network expenditures and the ability-minimize the impact of change	Service provider performance	Mean-time-to-repair problems	Current network event resolution
Planning Horizon:	3-12+ months	3-12 months	1-6 months	1 day to 1 month	Real time to 1 day
Reporting Needs:	High-level overviews	Long-term trending	Weekly and monthly performance	Detailed performance reporting	Event analysis and response
Report Granularity:	Months	Months	Months, weeks	Days, hours	Days, hours, minutes
Key Network Metrics:	Availability and downtime; total costs	Projected utilization; usage	Carrier costs; availability	Congestion; error statistics	Congestion; QoS, throughput, real-time optimization
Challenges:	How to manage the network while improving the bottom line	Balance expenditures against business needs	Balancing network resources and offered services	Simplifying fault detection, isolation, and resolution	Optimize real-time revenue potential, prevent network/ service degradation during abnormal network incidents

Clearly, satisfying each of these groups requires a diverse set of tools that provide visibility into the packet network infrastructure to monitor and measure actual performance throughout the network. Furthermore, the granularity of data required varies significantly, ranging from days for executive reports to real-time for network optimization and incidence reports. After all, if performance can't be measured, it is difficult (if not impossible) to optimize or improve that performance. Only by monitoring the entire network infrastructure is it possible to make informed decisions about real-time optimization, upgrades, maintenance, budgeting, and a variety of other improvements. The true power of network management is in the data, and this is unleashed through the synergistic and functionally complementary capabilities offered by VitalEvent and VitalNet.

Performance Management Solution for Network Management

VitalNet from Navis iOperations, the Network Operations Software or NOS division of Lucent Technologies, is a member of the Navis iAssure product family specifically designed for network and performance management applications. VitalNet provides a personal information portal that integrates network, application, and user performance data into a single "business performance management" solution that lets users see how well their business and IT objectives are being met.

By extending the scope of the product from the enterprise networks to carrier networks, VitalNet delivers a powerful performance monitoring and reporting solution that helps improve network performance and reduce maintenance and support costs. By continuously gathering and aggregating performance statistics from the routers, switches, and access devices that comprise the network infrastructure, VitalNet helps users identify current and prospective performance problems across the packet network, ensuring optimal long-term performance and efficient capital investment in network resources.

VitalEvent extends the iAssure system solution in carrier telephony networks, to provide the same world-class performance management of emerging ubiquitous packet networks. By measuring and monitoring real-time performance in both the core and access portions of the packet network, network managers using VitalEvent can optimize efficiency while providing consistent quality of service. Additionally, network managers who are providing voice services over data packet networks can use VitalEvent along with other iAssure applications, such as VitalAnalysis and VitalHelp. Such a solution can provide a complete merged end-to-end view of network performance at the element, network, and service layers, covering multiple equipment vendors and technologies (i.e., circuit-switched, IP, ATM, and others).

VitalEvent operates in real time to provide network operators with current views of packet network performance. VitalEvent also gives managers the ability to proactively detect and manage performance events, such as network congestion, before these events affect customers.

Thus, through synergistic use of VitalNet and VitalEvent, the performance management needs of the carrier stakeholders are met as follows:

- Business Executives: The software concisely presents how the network is affecting key applications.
- Capacity Planners: It identifies critical PVC / link upgrades before applications are impacted.
- Service Level Managers: It verifies that the network is delivering per committed customer SLAs.
- Engineers: It provides in-depth details to rapidly isolate and resolve problems.
- Network Operators: It provides real time, up-to-date views of packet network performance and enables managers to proactively detect and manage performance events, such as network congestion, before these events affect customers.

Synergistic Use of VitalNet and VitalEvent

The following table illustrates the relevance of each of these two complementary network management systems from the user's perspective. As described earlier each system has its strength in the domain it is designed for, namely the long-term planning/monitoring with VitalNet and real-time, network-wide analysis/monitoring with VitalEvent.

Table 2. VitalNet and VitalEvent Product Summaries

	VitalNet	VitalEvent
Focus	VitalNet is a performance monitoring application that provides network performance reports to all levels of management and detailed performance statistics for diagnosis and planning. Focusing on data element-level alerting and long-term engineering, on data network elements and computing resources, to address long-term changes in overall traffic load for data element networks.	VitalEvent is an extension and application of the unique iAssure real-time congestion management solutions for service provider packet (data) networks. VitalEvent is targeted at network operations center (NOC) users, whose responsibility is to monitor and maintain the overall network and service quality. VitalEvent provides the OSS platform, built upon data collectors such as VitalNet, providing a traffic management application that allows network operators to proactively monitor network performance and respond quickly to performance events in order to improve the QoS delivered to end customers.
Main Users	• Executives • IT managers • Capacity planners • Network engineers responsible for longer-term NE provisioning and engineering solutions to chronic traffic performance problems	• Network operations engineers responsible for the real-time optimization of the currently available network capacity, utilizing currently available network capacity and maximizing QoS, in reaction to traffic performance anomalies
Key Customer Needs Addressed	• Supports diverse data networks and network devices at a node and interface level • Auto-discovery of network components • Trend analysis on a component or cluster of component views • Provides executive reporting, capacity planning, SLA verification, baselining and troubleshooting • Flexible set of personalized as well as out-of-the-box reports • Network-based heat charts that can immediately identify hot spots	• Supports diverse converged networks and network devices, with an end-to-end network-wide view. • Auto-discovery of network components • Interactive real-time display of network congestion and other unusual network events that require immediate analysis and resolution. • Combined with other iAssure products, provides a total traffic management solution for voice and other latency sensitive services delivered over converged network domains

	VitalNet	VitalEvent
Value to Customers	• Improves network availability and performance through long-term provisioning and engineering of network elements • Facilitates service level management • Reduces and optimizes network costs • Enables capacity and budget planning • Provides on-line diagnostics and troubleshooting • Facilitates new network/application rollout	• Improves network availability and performance through the real-time application of congestion management techniques, maintaining overall maximum network capacity and QoS, until anomalies have subsided or longer-term engineering solutions can be implemented • Provides insight about performance that is not directly available from raw performance measurements • Improves/protects QoS in real time. • Helps capture new revenues by supporting delivery of differentiated services. • Helps reduce loss of customers • Provides protection of essential services • Helps you support key customers

Summary

VitalNet and VitalEvent complement each other in providing full range of network management capabilities for carrier-grade data networks. While VitalNet accommodates the near- to long-term needs of network operators and managers, VitalEvent provides the critical operational support needed in real time. Network performance monitoring provides the visibility necessary to optimize network bandwidth and manage the infrastructure while allowing network managers and planners to optimize their network resources, ultimately supporting the mission-critical applications that run the business.

By providing a critical window in the network infrastructure, these two products when deployed together improve the availability of mission-critical network resources and applications while lowering the total cost of ownership.

For additional information about our software products, please contact a Lucent Technologies Sales Representative. You can also visit the website at www.vital.lucent.com or call 888-467-8342 in the U.S.; or 650-318-1020 outside the U.S.

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