centricity™

Delivering Applications and Services over Today's Network Infrastructure

Executive Summary

Network-based Business-to-Business (B2B) applications are vital to the success of virtually all businesses today. They not only deliver information, but also enable e-commerce and drive revenues.

Newly emerging application deployment models from Internet Service Providers (ISPs), Application Service Providers (ASPs), and application hosting services promise new gains in cost control and competitive advantage. Unfortunately, application performance and availability are often impacted as delivery strategies increasingly rely on public networks. Business-critical applications are now required to run over network infrastructure that is inherently unpredictable, chaotic, and often, unstable. In effect, a new "steady-state" chaos has emerged, which must somehow be managed for both enterprises and service providers to be successful.

Caught in this struggle is the diverse set of users and customers who depend on networked applications. If users, including customers and business partners, experience poor performance or cannot access applications, their business productivity is directly affected, and they will quickly look for other options.

*The solution to network chaos is not just more management tools for networks and applications. Conventional management strategies are reaching the point of diminishing returns because they can't directly address a key issue—**providing control and real-time resolution for users and applications over any network, including public networks and the Internet.***

What is needed is a system that insulates users from the chaos and provides them with consistent and reliable service even as the underlying network and application environments change. This system must be able to dynamically adapt to changes in the network and the organization, and support existing applications, without changes to either the applications or the networks.

This white paper analyzes the challenges faced by businesses and service providers and discusses how Centricity™ provides the required system solution to reliably deliver B2B applications and services to a business's customers and users.

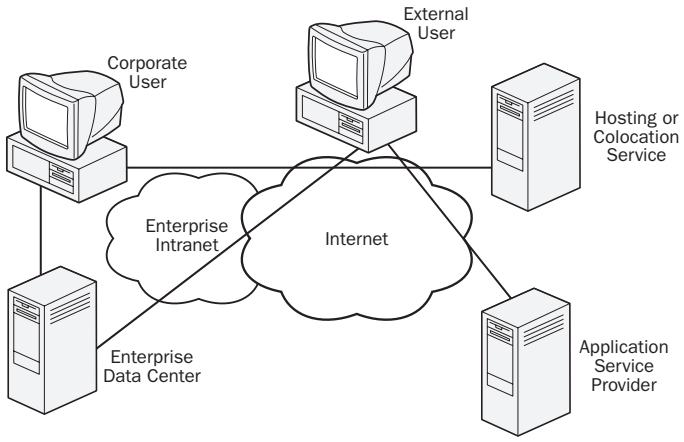

Figure 1: Business and technology managers are faced today with supporting applications over multiple networks and deployment methods.

The bottom line is that while business and technology managers are still accountable for the user's application delivery and performance, they no longer have control over the application or network

The Critical Need: Align Customer Applications with New Network Environments

Increasingly, user communities include all of the parties a business interacts with—employees, customers, and business partners. These users are often located all over the world and may number in the tens of thousands. Because of the diverse nature of these users, it isn't surprising that no single application deployment strategy works in all cases. This diversity has spawned an exploding market for application services with the promise of speeding deployment and reducing costs. Current options include traditional in-house hosting, outside application hosting services, server colocation services, and emerging classes of service providers such as application service providers (ASPs) and building local exchange carriers (BLECs).

While this flexibility of application delivery services can produce tremendous business benefits, it can also result in chaos for the business, the provider, and most importantly, the user/customer. Constantly changing and unpredictable application and network environments cause users to experience unforeseen outages and erratic performance.

Application traffic often travels over private enterprise intranets, extranets, and the Internet. For example, a corporation's employees may use a private enterprise network to access an application while customers and business partners use the Internet (Figure 1).

When applications move from the corporate data center to an outside hosting service or application service provider, the underlying network also changes. Each network and application service may have its own internal management system, but there is no end-to-end infrastructure solution.

In this environment, business and technology managers are still accountable for the application delivery and performance, yet they no longer have control over the application or network. The challenge is to provide a set of end-to-end application delivery services to ensure that employees, customers and partners will receive consistently high levels of service, regardless of where their applications are hosted or on which networks they run.

Achieving Control and Consistency: The Centricity Solution

Centricity delivers consistency by providing a unique set of application delivery services and by directly managing the user/customer experience

Centricity has developed a powerful, patent-pending system of application delivery services with two primary objectives: a) improve the customer experience by delivering consistent application services and insulating users and customers from the network and application chaos, and b) deliver the control needed to serve the business objectives as stated in policies, application and user priorities, and premium-based services.

To accomplish this, Centricity has developed a software "Services Layer" between applications and the networks that carry their traffic (Figure 2). This layer, which is both application- and network-aware, provides a set of services that can detect and resolve problems, improve performance, and give customers personal guidance when problems occur.

This Services Layer provides access to a unique spectrum of application and network information. This information is used to optimize the level of service provided to customers, partners and employees. Where traditional management solutions attempt to optimize utilization of either network or application resources, Centricity uses this combined application and network awareness to provide users with the best possible individual service, balanced with business objectives and policies.

Centricity Application Delivery Services

The combination of application awareness and network awareness enables Centricity to deliver a rich set of application delivery services. These include but are not limited to:

- **Bandwidth Management–**Dynamically control network bandwidth based on business objectives and individual or group policies.
- **Policy enforcement–**Define and enforce policies, gather critical information and support customers on even the most complex networks, with a minimum of technical staff involvement.
- **Virtual Help Desk–**Gain visibility into applications, networks and transactions, and communicate in real time to all affected parties, from the system administrator to the various sets of application users.

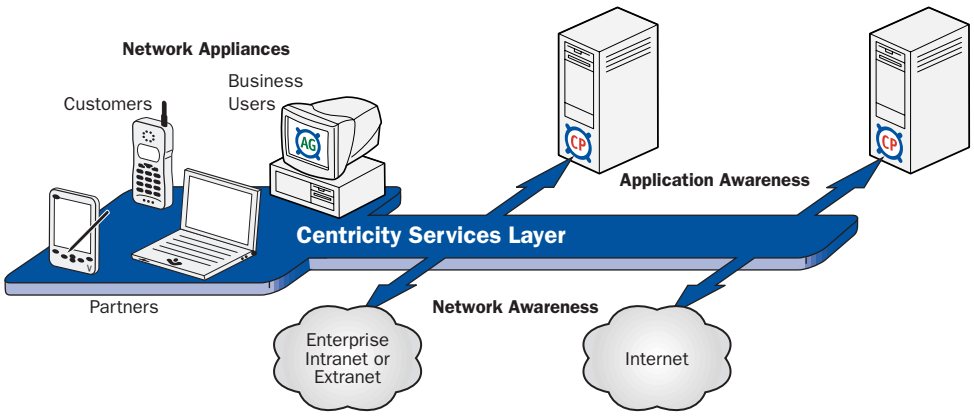

Figure 2: The Centricity "Services Layer" is both application- and network-aware to provide optimal application delivery based on business objectives and policies.

Centricity uses its combined application and network awareness to provide users with the best possible individual service, balanced with business objectives and policies.

- **Web transaction assurance**–Guarantee that complex web transactions will be completed, even in the event of a service disruption.

- **Billing and auditing services**–Capture and track detailed information about network transactions and application usage.

In addition to these application delivery services, Centricity offers an open-ended, extensible design that can serve as a platform for additional functionality such as server load balancing, caching and cache redirection, and usage-based billing for service providers. Centricity, its customers and its business partners can easily add these and other extended services for application delivery.

The Centricity System Components: Agents and Control Points

The Centricity software system is based on a scalable, decentralized framework with two key components: agents and control points. These easy to deploy components, together with their powerful messaging system, provide unparalleled control and consistency to application service delivery:

The Uniqueness of Centricity

Business IT departments and service providers can draw on countless management tools to manage their individual networks and applications. Some of these tools may employ desktop agents and claim to provide user-centric management, but they often merely monitor network performance. They do not provide a complete set of application delivery services to provide dynamic control and real-time resolution of problems before they impact the user/customer.

Most management products are point solutions designed to deal with specific network or application issues. Centricity products are not a replacement for these existing tools. In fact, they coexist with them to extend their capabilities (see Figure 5, page 9). The Centricity focus is on reducing the burden to technical support teams, while providing the control necessary in changing, unpredictable environments.

The Centricity software system provides a comprehensive set of application delivery services. This innovative system differs from conventional network and application products in three important ways:

1. It is capable of "looking through" multiple networks; each owned and managed by different organizations. This guarantees an end-to-end view of all factors that can affect a user's experience.

2. It has a user-centric design that "looks at" the network and applications from the user's desktop perspective and communicates relevant status and advisory information directly to the end user.

3. It takes immediate action to resolve problems. Instead of just reporting exceptions or poor performance to operations staff, the Centricity system works proactively to detect and avoid network, application and server problems.

The Centricity approach insulates and protects customers from the network and application chaos that can dramatically impact B2B initiatives.

- **Agents** monitor activity, manage bandwidth, and take action when exception conditions occur.

- **Control Points** act as message brokers to share user service intelligence.

Centricity agents are lightweight software components that are deployed on clients to monitor, record, analyze, and act upon application or network activity. The Centricity software agents have a unique vantage point for monitoring and managing both the network traffic and applications status.

Centricity agents can:

- Forward system status and activity information to control points that aggregate the information and share it with other agents throughout the network. This enables agents to make more intelligent decisions based on global information and keep customers and support staff advised of overall system status.

- Resolve many problems before a user even becomes aware of them. For example, if a primary server fails, an agent can redirect requests to a backup server and report the workaround to the help desk or to technical operations staff.

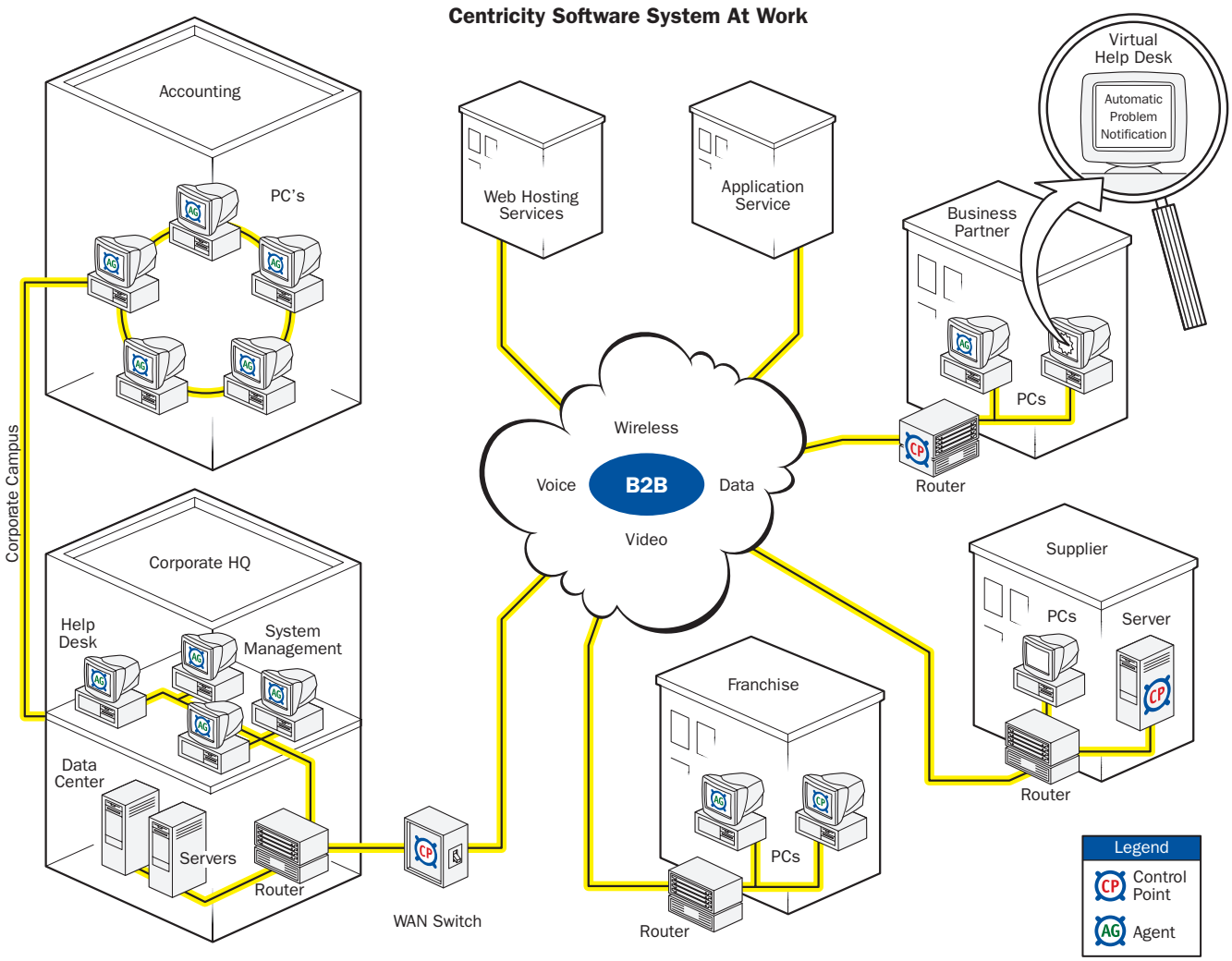

Figure 3: The Centricity system provides service providers and businesses the control and dynamic problem resolution needed to deliver high levels of application service. Agents reside on client systems, while Control Points run on a client PC, network server or network device.

Centricity focuses on eliminating the burden on technical support teams, while providing the control necessary in changing, unpredictable environments

- Deliver relevant information directly to users, customers and help desk personnel in real time, when appropriate (Figure 3). For example, users can be notified when applications become unavailable or when a user's network connection is dropped.

Centricity agents are available for Microsoft Windows 95/98, Windows NT, and Windows 2000 operating systems. The agents are designed to work with all applications that communicate via the standard Microsoft Winsock programming interface. No changes are required to existing applications. Centricity is currently developing agents for additional platforms, such as Web browsers, wireless handheld devices, and network appliances.

Agents can be installed and distributed from centralized servers, virtually eliminating desktop administration. Depending on the features selected, these lightweight agents typically require less than 200 KBytes of memory.

Control points (CPs) are information brokers that manage and distribute the information gathered by Centricity agents. The messaging protocol used between agents and CPs is based on XML and is designed to minimize network traffic.

The collective knowledge obtained from agents is used to proactively notify all users when any agent detects an exception condition. For example, when one agent detects that an application is no longer running on a server, it notifies the CP, which shares the information with the other agents in its domain. Agents can then redirect customer requests to other servers. The CP can also take other action on the information such as sending a notification to a designated management platform.

Centricity Service Example: Bandwidth Management for Quality of Service (QoS)
Although local area network bandwidth is increasing at unprecedented rates, WAN (Wide Area Network) resources often become congested when bandwidth-hungry applications compete for resources. Bandwidth contention problems occur when non-critical or background activities (such as file transfers and Web surfing) interfere with business-critical applications (order processing, customer service, financial transactions, etc.).

Centricity services offer bandwidth management and control based on business policies. Centricity agents have a built-in "effective priority" algorithm that allocates end-to-end bandwidth based on user, application type, URL, or network server address. Mission-critical applications are supplied with assured amounts of bandwidth, while lower priority applications receive best effort service. Working together with the agents, the Centricity Control Points make dynamic bandwidth allocation decisions based on changes in network activity. These bandwidth allocation policies are then distributed to the agents for policy enforcement.

In addition to this built-in bandwidth management capability, Centricity agents will also be able to use the Microsoft Windows 2000 Generic QoS (GQoS) programming interface. This allows Centricity to take advantage of the industry-standard RSVP and DiffServ bandwidth management that is built into many network switches and routers. No application modifications are required to take advantage of any of these bandwidth management capabilities. This is a key benefit because few applications are natively enabled to use the GQoS programming interface.

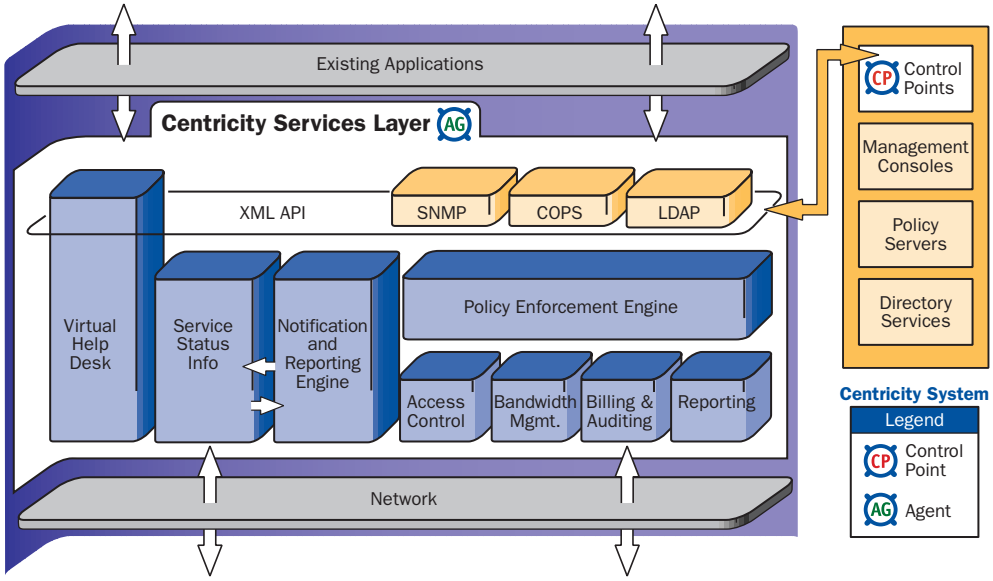

Figure 4: Inside the Services Layer. With our patent-pending architecture, Centricity provides a rich and expandable set of application delivery services from bandwidth management to billing and auditing. The Centricity architecture works with existing systems such as directory servers and systems managers to provide real-time dynamic enforcement based on business policy, application priority or premium paid service.

The Centricity approach protects customers from the network and application chaos that can impact e-business initiatives

Control points can be installed on any Windows platform (including Windows 95/98, Windows NT, and Windows 2000). They do not require dedicated servers. Future implementations will support other server platforms, such as Sun Solaris and Linux. Embedded versions for routers, firewalls, and other devices are planned.

Figure 3 shows Centricity Control Points and agents as deployed throughout an organization and beyond.

Centricity Technology Architecture

The Centricity software system is designed to operate as a cooperative system that integrates well with existing network management tools. The agents are responsible for reporting information to the control points and for enforcing policy at each desktop. The control points are responsible for collecting feedback from the agents and then proactively working to manage bandwidth, as well as setting new policies and distributing them to the agents.

Within each agent is the Centricity Services Layer (Figure 4). It provides the interfaces between the applications, the network layers and external information sources. While the Services Layer is both network- and application-aware, it does not depend on any particular networking products or applications. The Services Layer works with any application over any TCP/IP network—with no changes to existing applications, network, devices or the client TCP/IP stack.

As a system, the Centricity software is also designed to be extensible, and can be integrated with various existing management consoles, policy servers or directory services.

Centricity and Existing Tools/Environments

One of the most important features of the Centricity product is that it fits into any existing application or network environment without requiring changes to the infrastructure or the applications. The system is designed to easily work with and enhance existing management tools, while its extensible architecture allows Centricity to coexist with both current and emerging B2B infrastructures and standards.

Centricity Service Example: Virtual Help Desk
One of the most powerful features of the Centricity system is the ability to communicate network and application status information directly to end users/customers. This creates a personal "virtual help desk" for each end-user that can eliminate many of the routine calls made to conventional help desks.

Centricity can send information directly to the end-user desktop, or can take actions that are transparent to the end users, such as sending notices to an existing management console, email address or support staff pager. In addition, Centricity, its customers, and its business partners can easily "snap-in" new desktop functionality as required. Some examples of services that can be delivered by the Virtual Help Desk include:

- User notification of network and application status information
- User notification of planned outages
- Customer news services
- Utilization and billing information
- Generation of reports on network and application activity

There are two key benefits to this new help desk approach:

- *Scalability.* Conventional help desks do not scale to handle the sudden increases in customer activity that can occur. An increase in the number of active users results in a proportional increase in help desk calls. Centricity can handle much of the routine activity automatically and free up the help desk to focus on the more complex problems.
- *Proactivity.* One of the major problems with the conventional help desk approach is that the burden of determining that a problem exists and then placing a call to the help desk is placed squarely on the shoulders of the customer. Unfortunately, users generally don't call the help desk until they are already confused or frustrated. This delays problem resolution and wastes time. With distributed e-business applications, some customers will become so frustrated that they will never call the help desk. They may take matters into their own hands, or worse, take their business elsewhere. Centricity's proactive approach provides users with immediate information that reduces confusion, frustration, delays, and unnecessary calls to the help desk.

Information provided by the Virtual Help Desk can include:

- An explanation of what's going on
- An estimate of when the problem will be resolved
- Suggested actions for the user to take
- Assurance that the help desk has been notified of the problem

The Virtual Help Desk also makes it easy to control what users see. Some may need detailed technical descriptions of problems while others need only a simple, plain English notification of what's going on. Centricity provides a basic set of announcements that can be used as-is or modified to meet specific requirements, including translated into other languages for international applications.

While the Centricity solution doesn't eliminate the need for conventional help desks, it can greatly reduce the number of help desk calls while providing customers with faster service and a better experience.

While Centricity doesn't eliminate the need for conventional help desks, it can greatly reduce the number of help desk calls while providing customers with faster service and a better experience

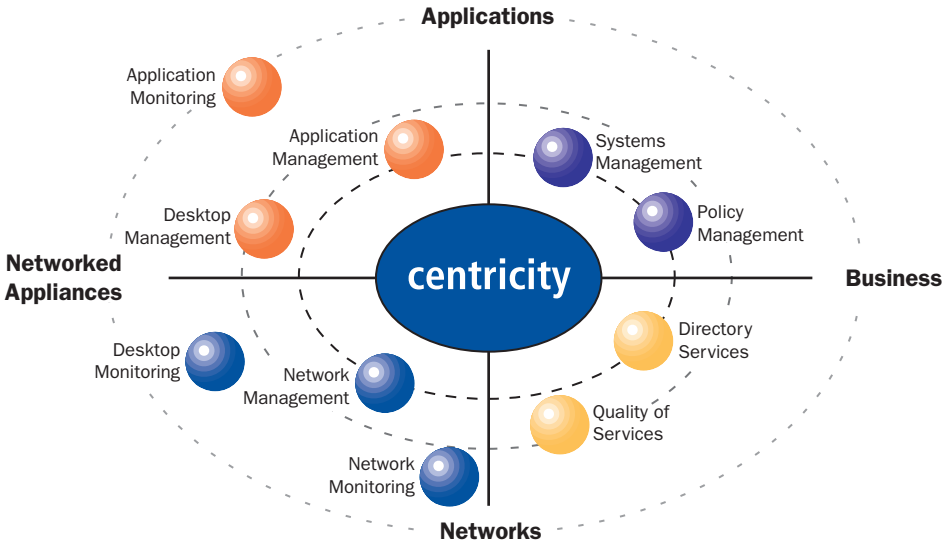

Figure 5: The Centricity solution works with existing standards, networks, management tools and applications to provide control and consistency to application delivery.

Existing network applications require no modifications and no rewriting because the Centricity agents work with the standard Microsoft Winsock programming interface. Even legacy applications can take advantage of emerging technology standards such as RSVP and DiffServ.

Centricity Control Points include an open XML-based API (Application Programming Interface) that can be used to interface with almost any existing management system or application. These APIs allow Centricity, its business partners, and its customers to add new functionality and services that may be required in the future.

Many organizations have deployed network, application, and system management products. By using standard APIs, the Centricity system can provide critical user-level information directly to these existing management tools and consoles. While these products continue to manage network devices and applications, Centricity focuses on the element that they do not address—application delivery services.

Support for Emerging Industry Standards

Many network devices now have built-in bandwidth management features such as 802.1p prioritization, DiffServ, and RSVP bandwidth reservation. Centricity leverages the capabilities of these technologies by marking packets with prioritization information and initiating RSVP bandwidth reservation requests on behalf of Windows applications. In addition, Centricity provides its own "effective prioritization" mechanism that provides end-to-end bandwidth management over any network, even when routers and switches are not QoS-enabled.

Centricity will also take advantage of the industry-standard LDAP (Lightweight Directory Access Protocol) products, such as Microsoft Active Directory and Novell NDS that are now being deployed. Centricity will use LDAP to obtain policy information from these directories and it will implement COPS (Common Open Policy Server) interfaces to the emerging policy management systems.

Finally, the Centricity solution is ideally suited to monitoring traffic and managing bandwidth in networks that employ encryption, such as IPSec, to secure information. A key element of many QoS products is packet classification based on application information, often URLs. When clients and servers encrypt application data, routers and switches can no longer classify and prioritize data based on application content. Centricity agents reside on clients, and therefore can classify traffic before it is encrypted. Because encryption is so important in e-business applications running over extranets, Centricity has a clear advantage over network-based classification schemes.

Summary

Business and technology managers have traditionally relied on network and systems management products to provide enterprise users with adequate access to business-critical applications. This reactive approach to a managed infrastructure can have a positive effect on end user service levels, but simply isn't adequate for today's B2B environment. Today's users are not just a captive audience of employees, but are also customers and business partners.

This dynamic, ever-changing and chaotic world requires not just more management, but a system for better application delivery. Centricity delivers a broad set of application delivery services that includes:

- Dynamic bandwidth allocation to optimize end-to-end network performance based on application and user priority
- Automatic workarounds for many common problems
- Direct interaction with users to resolve problems and reduce the frustration of not knowing what is happening
- Capture of transaction-level statistics for billing, auditing and pay for use services

The Centricity solution is highly scalable, and works with existing products and infrastructure. Because of its client-side architecture, it is the only solution that meets the most important B2B objective: customer satisfaction.

For more information about Centricity products and solutions, visit our Web site at www.centricitysoftware.com

Centricity, Inc.
4900 SW Meadows Road, Suite 400
Lake Oswego, OR 97035
tel 503.675.2703
fax 503.675.2796

3/00