

## **TranscendWare Software Delivering Policy-Based Networking**

### **Overview: Shaping the Network to Meet Business Objectives**

In the past, network managers have adapted to the increasingly heavy demands of enterprise business applications by adding bandwidth—the **speed** dimension—and by extending connectivity to remote users—the **distance** dimension. But to handle the new generation of applications characterized by ultra high bandwidth, latency sensitivity, stringent service level requirements, and any-to-any traffic flows, an entirely new dimension is now required: **policy-based networking**.

3Com TranscendWare™ software is an end-to-end, integrated approach that adds the kind of network intelligence that IT and department managers need in order to deliver sophisticated network applications and services that fully support business objectives.

TranscendWare software can improve **any** network by leveraging intelligence in these key networking areas:

- The core – High-Function Switches and routers located across the network
- The edges – Boundary Switches and hubs in wiring closets and remote sites
- The end systems – network interface cards residing in servers and desktop PCs

TranscendWare software is grouped into three functional categories: (1) Pervasive Management that distributes intelligence and instrumentation around the network; (2) Network Control for maximizing network operations while

simplifying administration; and (3) Global Policy that allows managers to align the network closely with business needs.

Specifically, TranscendWare software allows managers to:

- Administer the network as a single, end-to-end entity, rather than as a collection of discrete devices
- Implement standards-based solutions that interoperate easily in existing mixed-vendor environments
- Set up policies that establish different levels of service for diverse communities of interest and prioritize applications according to mission criticality
- Distribute intelligence pervasively across the network to provide automated monitoring, reporting, and troubleshooting capabilities
- Optimize response times for time-sensitive and bandwidth-intensive applications
- Secure data and network resources
- Establish accurate accounting and reduce the administrative costs associated with expansion and increased complexity

TranscendWare software overlays a policy dimension on the 3Com Transcend® Networking strategic framework, which focuses on scaling the performance, extending the reach, and managing the growth of networks. This policy-making power lets managers construct a highly prioritized and secure networking environment organized around the key activities of the enterprise.

TranscendWare software is not a monolithic networking approach. Rather, it comprises modules that IT management can install to solve specific problems. With a broad range of solutions already shipping today and many others scheduled for delivery in the next 18 months, TranscendWare software represents 3Com's encompassing vision for the present and future of policy-based enterprise networking.

## **A Policy Dimension to Handle Today's Network Challenges**

Until recently networks operated in a two-dimensional plane where enhancements involved either increasing bandwidth or extending connectivity to remote users. This "flat" approach has been adequate for dealing with most business applications.

But with the proliferation of multimedia, intranet Web browsers, business-priority software such as SAP, group collaboration technologies like electronic whiteboarding, and other applications demanding very high bandwidth and special handling, IT managers must do more than simply increase capacity. They must also be able to set network policies capable of achieving the service levels required by various business managers and networking constituencies.

Why is a policy-based network so important in today's new application environment? Just consider the complex issues that managers are currently facing:

- Networked applications have become increasingly diverse, making a one-size-fits-all approach to serving various business units and user communities impractical
- Many of the new applications are business-critical, calling for a guaranteed level of service
- Latency-sensitive applications need to be prioritized to run properly at peak congestion times
- The bandwidth mismatch at the LAN/WAN interface is typically a ratio in the range of 100:1, requiring policy-based traffic flow control to optimize performance/cost tradeoffs
- Any-to-any Web connections make it impossible to predict intranet traffic flows

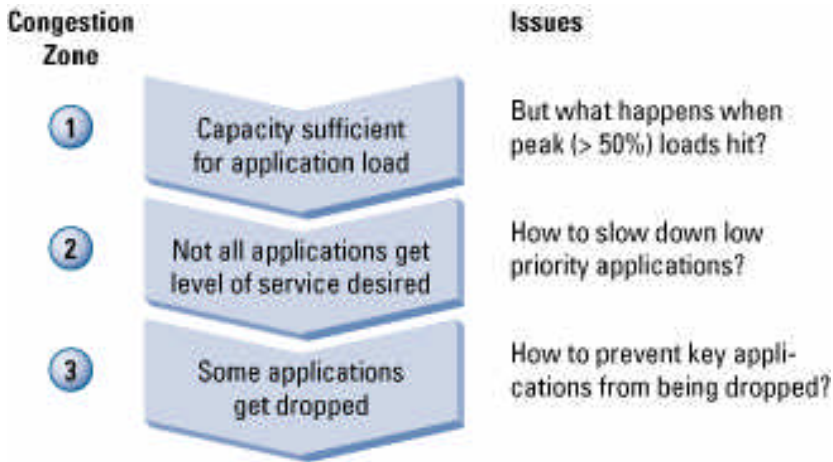
- Divergent security requirements may result in many different solutions instead of one manageable, integrated solution
- Administrative costs are rising as networks get larger and more complex, requiring greater automation and more embedded intelligence—especially at the network’s edges and end systems

A policy-based network helps IT avoid the service brownouts and “meltdowns” that can occur when diverse applications simultaneously contend for a high level of service. If demand exceeds capacity regularly or at peak times, managers can use policies to give higher priority to certain applications based on their importance to the organization, and to make sure mission-critical applications aren’t preempted by less urgent applications. Furthermore, managers can use policies to ensure that particular applications get the services they must have to run properly.

For example, a video training application requires high-bandwidth, low-delay treatment on the network. So does a voice-over-IP application, which is not as bandwidth intensive as video but is still sensitive to latency. However, both these applications may not be as important to the enterprise as may be a certain computer-aided design (CAD) application at a critical part of the product development cycle. It might therefore be a matter of policy for the enterprise to give the CAD application first priority in its network application hierarchy, at least for the duration of the critical development period.

Figure 1 indicates how a Zone 1 of sufficient capacity can degenerate into a Zone 3 of potential downtime as network loads and traffic flows increase. The objective is to structure the network in such a way that key applications

don't experience delays or get dropped entirely as they contend with less critical applications for bandwidth.



Most networks experience all zones as application load and flows shift.

**Figure 1. Capacity Versus Application Demand**

By implementing a policy-based network in cost-effective increments on their existing equipment, managers can ensure that the network responds to all the requirements of the communities of interest within the organization—from performance and uptime to security and virtual LAN (VLAN) membership—while also keeping expenses in line.

### **Beyond Single-Policy Networking**

Current two-dimensional networks are essentially single-policy networks. That is, they employ a one-size-fits-all service rather than an adaptable policy-based infrastructure.

To illustrate this point, think of the network as an airline with a very efficient standby shuttle system. Two-dimensional networks handle traffic on an as-available basis. But to meet the demands of newer applications, networks need more classes of service, analogous to the airline seating classes shown in Figure 2.

Classes	Examples of applications
Standby	E-mail, information publishing, text indexing and searching
Coach Class	Order entry, procurement, electronic commerce, customer interaction
Business Class	One-way audio/visual, electronic whiteboarding, security
First Class	Two-way audio/visual, real-time monitoring, high security

**Figure 2. Classes of Service Using an Airline Model**

Thus, a mission-critical order entry system might be given an intermediate coach class priority, while a two-way video application demanding very high bandwidth and low latency could receive a first class priority. A number of these classes of service might be required to fully support all the different network applications, with the exact hierarchy determined in consultation with the enterprise's business managers.

To operate at peak efficiency, a multipolicy network also requires a "travel agent" and a "control tower." The travel agent function deals with application needs, and can ensure that users have access to the network according to the policy level assigned to them. The control tower function is a central point of management that sets policies and reacts to traffic conditions reported by pervasive intelligence distributed throughout the network.

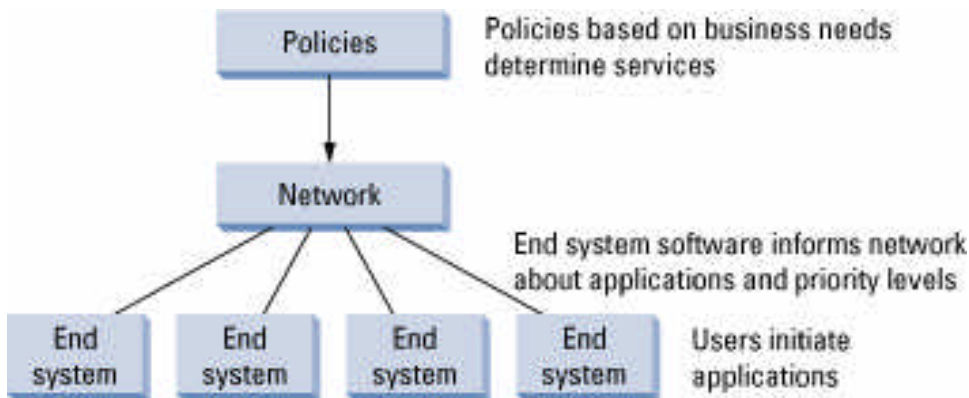
### **How to Achieve a Fully Intelligent System**

A fully intelligent, policy-based networking scheme requires that managers give the peripheries of the network an active role, but not a controlling one.

Only an intelligent end system can tell the network which application is coming, and what provisions must be made to

accommodate it. And end systems are also excellent points for monitoring network traffic.

Figure 3 shows how such a policy-based network works. IT managers, working in concert with business managers, set policy based on what users and their applications need. These policies serve as a basis for network operation. Intelligence at the end systems tells the network when applications are initiated and what priority they should be given, according to policies pre-set by IT management.

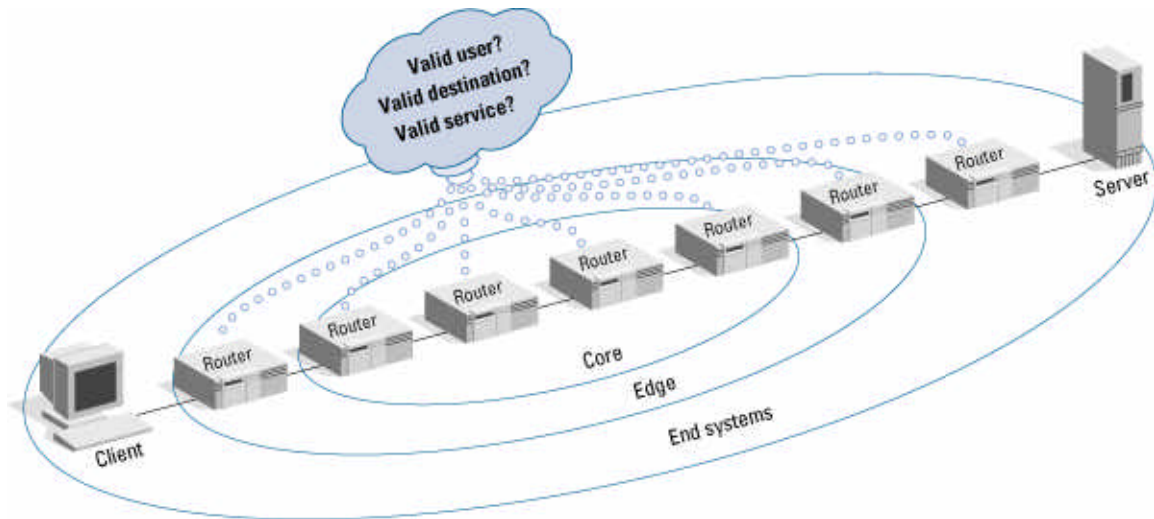


**Figure 3. The Basics of a Policy-Based Network**

Contrast this simple way of doing things with the complexity involved when all the network intelligence is concentrated in routers and other devices at the network's core. Without information from the end systems, the core devices are forced to use a lot of their processing power to "guess" the nature of the traffic by looking at source addresses, destination addresses, and service types.

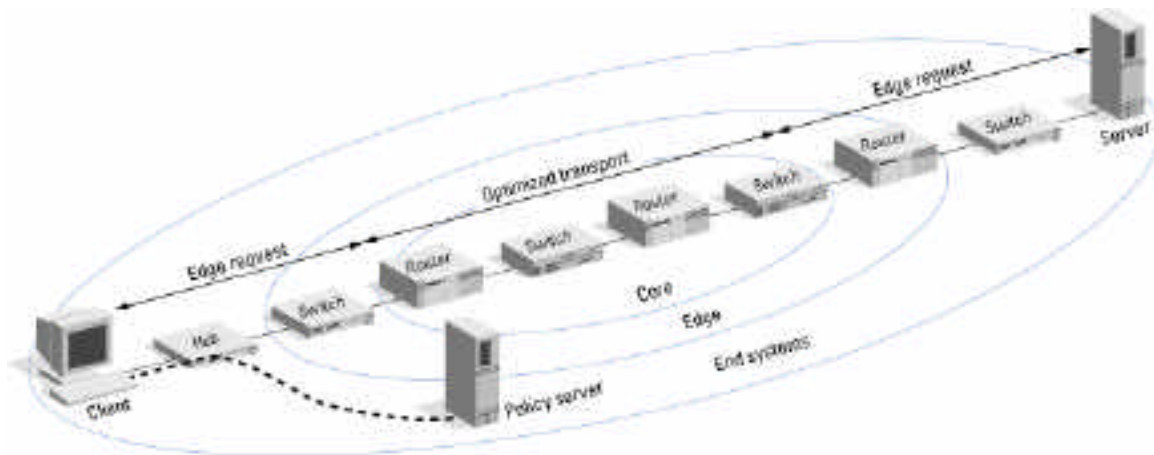
As Figure 4 points out, this core-only intelligence creates latency as the core devices examine the traffic one packet at a time to determine key information about the transmission. Core-only intelligence is also resource-intensive, making it costly to set up and administer. And acting without end

system intelligence, the core devices can't prioritize applications in accordance with business-oriented policies.



**Figure 4. The Old Model: Core-Only Intelligence**

But with the intelligent system model, core devices can provide the information necessary to recognize and prioritize applications immediately. No “guessing” means faster response time for business-critical applications. And priorities can be set with the aid of a policy server controlled centrally. Figure 5 depicts how this intelligent system approach takes the guesswork out of handling traffic.



**Figure 5. A New Model: The Intelligent System**



In sum, what IT management needs in order to establish a policy-based network is an architecture that distributes intelligence to the peripheries as well as the core, with everything under the firm control of the central IT staff.

## **The TranscendWare Advantage**

TranscendWare software works in an integrated fashion at the core, at the edges, and in the end systems to create an application-aware, application-adapting enterprise network environment. The software is grouped into three functional categories: Pervasive Management, Network Control, and Global Policy.

**TranscendWare Pervasive Management** uses embedded management software in the core, edges, and end systems to implement policies, provide control, and monitor traffic. It allows managers to identify and troubleshoot problems quickly, scale intelligence to meet specific requirements, and implement Service Level Agreements (SLAs) with communities of interest within the organization

**TranscendWare Network Control** maximizes network performance, simplifies and automates administrative tasks, manages traffic, and combines services. It lets managers minimize response time from one end of the network to the other for all applications, decrease administration time, reduce service costs, and enhance traffic control to alleviate congestion.

**TranscendWare Global Policy** enables IT management to set policies for applications and network operations, and makes it possible for the network to act on those policies. In effect, Global Policy gives managers a powerful, intuitive way to shape the network to meet business objectives. Simplified Class of Service prioritization avoids the effort required for real-time manual settings, and integrated

security provides protection for individual groups and applications, as well as for the network as a whole.

The result is a fully instrumented network environment that can adapt to changing conditions while at the same time containing administrative costs.

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### **TranscendWare Software: Basic Principles**

- Make the network faster and simpler to control by deploying end-to-end intelligence
- Reduce the time and cost of manual effort by automating application and network-specific policies that support business needs
- Use end systems to communicate application priorities and other policy-based information to the network
- Collect information pervasively to provide management metrics concerning network devices and applications
- Support industry standards to foster interoperability and ease of migration in multivendor networks

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TranscendWare software is already supported in the full range of 3Com products, allowing 3Com customers to leverage their existing investment. Because it is standards-based, TranscendWare intelligence operates in mixed-vendor environments without requiring massive upgrades or complex reconfigurations.

### **Building End-to-End Intelligence**

Policy-based networking demands that end systems no longer remain passive elements in the network. DynamicAccess™ technology is the TranscendWare software residing in each end system's network interface card (NIC).

Nearly all the 40 million 3Com NICs installed worldwide since 1992 can be upgraded to DynamicAccess functionality. Starting in March 1997, 500,000 NICs a month will ship with AutoUpdate capabilities that allow automatic upgrades over the network.

DynamicAccess software allows the network to:

- Know what application has been initiated by the client
- Set the priority of the application
- Accelerate response time with technologies such as 3Com Fast IP
- Track network usage with intelligent agents such as 3Com dRMON (distributed RMON)
- Upgrade NICs automatically to new software release levels

DynamicAccess software will let the end system download policy information from a policy server and implement those policies as applications are launched. For example, the software can apply an application priority flag to packets before they enter the network.

To speed overall network performance, DynamicAccess software will also be able to signal another end system to establish a shortcut around routers for the purpose of creating the fastest route across the network. This shortcut is a switched connection using Fast IP. Furthermore the dRMON capability, 3Com's distributed implementation of the RMON (Remote Monitoring) and RMON2 industry standards, allows DynamicAccess software to track network traffic at the end system and report the information for comprehensive management.

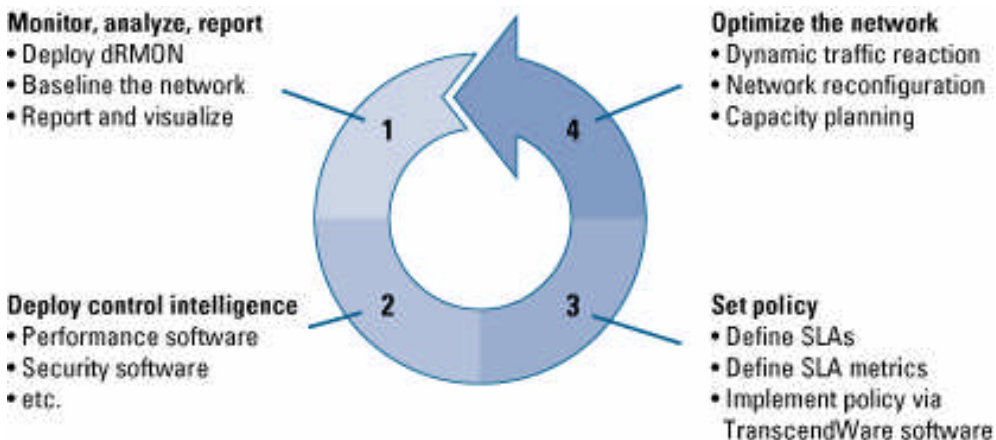
In building an intelligent system, IT management first deploys DynamicAccess software at the end systems for maximum performance and management benefits. Policies are communicated to the end system via a policy server containing a policy table that covers all the networked applications and

users. The user names are automatically populated from one existing domain name server and other sources. IT management registers legitimate applications in the table and sets network priority policies for applications and users based on business needs.

When the user boots the end system, the policy table is automatically downloaded. Then, when the user initiates an application, all the packets associated with that application are assigned priority flags before they are transmitted. When the packets reach a congested spot on the network, the prioritizing device doesn't have to do any traffic guesswork. Instead, it quickly scans the packet flags and forwards the packets in priority order.

### TranscendWare Implementation: An Iterative Approach

Implementing TranscendWare software is an iterative process, with the order of the steps varying according to the unique requirements of each network. The sequence described below and shown in Figure 6 describes implementation for a typical network environment. Since TranscendWare intelligence is scalable, managers can deploy it in increments as needed in specific locations around the network.



**Figure 6. TranscendWare Implementation Steps**

**Step 1. Monitor, analyze, and report.** This step starts with deploying RMON/RMON2 (including 3Com dRMON and SmartAgent® intelligence) across the network. The information obtained from these agents may then be used to visualize and report current network activity and to create baseline values.

3Com Traffix™ Manager application running on a UNIX management station is well suited to handling the complex task of collecting and integrating data from multiple sources in order to visualize usage and identify how application traffic is behaving on the network. For example, managers can investigate slow response times of SNA traffic across the WAN by using an RMON2 probe and Transcend Traffix Manager to view end-to-end application flows for each source/destination pair of end systems.

**Step 2. Deploy control intelligence.** Once the intelligence gathering components are in place, IT management can decide which networking issues are most critical and then deploy various types of intelligence to address those issues. Potential issues include response time and performance, resource access privileges and security, automation of manual administrative tasks, and address management.

For instance, the manager might choose to address the slow response times for SNA traffic by reserving router bandwidth using Bandwidth Reservation (bandwidth grooming), and giving high-priority traffic additional bandwidth with Bandwidth-on-Demand (bandwidth aggregation). Re-measuring the traffic tells the manager whether or not the solution has been successful.

**Step 3. Set policies.** At this point, IT management can set policies concerning response time and uptime targets, application priorities, Quality of Service (QoS), security

access, Internet/intranet access, and other key criteria in consultation with enterprise business and department managers. Service Level Agreements (SLAs) formalize these policies with reference to metrics and accountability, allowing IT to manage the network according to SLA targets.

After the policies are deployed on a policy server, TranscendWare intelligence has the ability to both carry them out and report on how well they are working. As an example, IT could have a remote site report actual versus target values with regard to response time and security measures on a monthly basis.

**Step 4. Optimize the network.** The last step in the implementation process is to optimize the network to address the issues identified in Step 2. TranscendWare software's automatic prioritization capabilities may be used to adjust applications to temporary network fluctuations. If necessary, TranscendWare monitoring and reporting can also be employed to re-allocate existing resources and to identify places where new capacity is needed. Network optimization is accomplished in keeping with the policies set in Step 3.

### **3Com TranscendWare Solutions**

Below are brief descriptions of just some of the products and technologies that comprise TranscendWare management intelligence. 3Com will continue to expand the portfolio of TranscendWare solutions in response to new networking issues as they arise. Solutions marked by an asterisk(\*) will be available in the future.

- **ATM Multiservices Access.** The new 3Com AccessBuilder® 9000 ATM Multiservices Access family allows networks of any size to consolidate voice, data, and video traffic with local Asynchronous Transfer Mode (ATM) traffic for cost-

effective transport over ATM WAN services. The platform's high-performance distributed architecture optimizes expensive WAN bandwidth and provides a scalable migration path to higher speeds. Advanced traffic management reduces latency and ensures that each application receives the bandwidth it needs.

- **AutoCast VLANs.** This is the 3Com standards-based solution for minimizing multicast traffic duplication on the network. The AutoCast VLAN feature in 3Com High-Function Switches supports the use of multimedia and other IP multicast-based applications in switched networks by limiting the flooding of multicast packets only to those ports with attached users who have actually requested membership in the multicast group. Users who don't request membership aren't burdened with unwanted traffic.
- **Bandwidth-on-Demand (bandwidth aggregation).** This solution dynamically manages the aggregate size of a serial WAN bundle based on the traffic and underlying serial link resources, taking advantage of Multilink PPP and the router's dial pooling features.
- **Bandwidth Reservation (bandwidth grooming).** This solution provides improved service for interactive, transaction-oriented, and latency-sensitive network applications by statically configuring a minimum percentage of bandwidth for each protocol that operates on a WAN link. In this way, heavy-usage applications such as file transfer and e-mail can share link capacity with light-usage applications such as SNA, providing guaranteed response time and other Quality of Service (QoS) benefits. 3Com NETBuilder II® routers have built-in "grooming" features that set up and tear down dial-up connections to increase bandwidth during peak periods, compress traffic to conserve bandwidth, automatically select the most economical WAN

service, and prioritize bandwidth usage according to management policies.

- **dRMON**. The industry's most comprehensive data collection solution, dRMON is a cooperative technology built on the RMON and RMON2 standards that spreads the data collection workload across multiple devices (switches, hubs, routers, NICs, and probes) to minimize administrative costs. dRMON provides full-time monitoring of traffic, segments, and devices in both switched and shared environments. (See [Transcend dRMON Edge Monitor](#) and [Transcend PC Link SmartAgent](#).)
  
- **DynamicAccess Technology**. 3Com DynamicAccess technology is a set of software modules that transform 3Com NICs into active network components and distributes intelligence to end systems across the network. DynamicAccess features include:
  - **Application-Based Class of Service\*** – an innovative technique for recognizing traffic by application at the end system and marking packets with appropriate priority flags. This enables switches to easily recognize high-priority packets and adjust Class of Service levels according to application type. Priorities can be defined today using 3Com PACE™ technology priority bits, and, in the future, using IEEE802.1p flags.
  - **AutoUpdate\*** – client agents and server software that will allow centralized installation and updating of end system software. For installations without sophisticated desktop management software, AutoUpdate offers a low-cost, efficient way to mass-upgrade end systems with new DynamicAccess features.
  - **Desktop dRMON** – the NIC-embedded version of 3Com dRMON (see [dRMON](#)) for RMON collection at the end system. Desktop dRMON works with hubs and switches to deliver a full RMON capability.



- **Fast IP\*** – a “shortcut” technology that provides the performance of switching with the control of routing (see Fast IP).
- **Multicast Control\*** – a low-cost way to achieve control of multicast (point-to-multipoint) traffic by allowing NICs to dynamically communicate with switches to set multicast filters.
- **Fast IP\***. This technology, which operates over any type of backbone, will dramatically improve network performance by preserving the LAN router’s role in filtering initial session requests between clients and servers, while switching packet forwarding to faster LAN switches when practical. With Fast IP, the intra-subnet communication starts out using the normal, controlled Layer 3 path, preserving desired broadcast domain containment and firewall safeguards across the network. If both end systems support Fast IP and an end-to-end Layer 2 path is discovered, the desktop-to-server communication automatically moves over to the faster, low-latency Layer 2 path. If no Layer 2 path is discovered, communication continues over the original Layer 3 path. Because Fast IP is initiated from the desktop or server using TranscendWare DynamicAccess technology, it makes policy implementation easier and eliminates the guesswork involved in competing IP switching solutions. In addition, Fast IP helps keep the switches in the wiring closet simple and less costly.
- **Firewall Management**. Software in 3Com enterprise AccessBuilder systems allows managers to precisely define and control network access policies and permissions. This graphical software is fully interoperable with 3Com NETBuilder® router firewall implementation and builds on the other security capabilities offered by AccessBuilder systems.

- **IP Firewalls.** 3Com provides NCSA-certified firewall security in NETBuilder routers to ensure data and resource protection for intranets and remote office LANs. This firewall capability also offers traffic simulation for verifying firewall configurations. In addition, the software can be used to audit or log Internet/intranet usage.
- **Multicast Filtering.** This technique, which includes AutoCast VLANs (see AutoCast VLANs), conserves bandwidth for multicast traffic by having the network do packet replication only to designated recipients. This improves performance for high-bandwidth applications such as video feeds.
- **Quality of Service Monitoring\*.** TranscendWare software will provide Quality of Service (QoS) monitoring and reporting across networks, servers, and applications to help IT managers fulfill SLAs with their internal customers. This capability delivers consolidated historical and real-time information that is matched with QoS policies stored in memory. The results are presented as a series of user-configurable management reports.
- **Secured VLANs.** 3Com Transcend VLANs can be defined by port, MAC-layer address, protocol, or IP address to delimit subnet groups and thus prevent unauthorized access to particular groups. Advanced software available in the future will allow managers to set access to services based on VLAN membership with great precision (for example: by user, time of day, and application type).
- **Transcend AccessWatch.** AccessWatch is a Web-based management application that provides easy and secure Web access to management information for 3Com AccessBuilder

remote access products. A broad range of capabilities in the application include accounting and reporting functions as well as QoS, remote access usage, and capacity utilization analysis.

- **Transcend dRMON Edge Monitor System.** The newest element in 3Com dRMON capability, the dRMON Edge Monitor System uses dRMON and PC Link SmartAgent software residing on each end station's NIC, together with the Edge Monitor itself, to provide full RMON coverage in switched and Fast Ethernet environments. Data collection, filtering, and polling features provided by this system reduce administrator workload and lower cost of ownership.
- **Transcend Enterprise Manager.** This 3Com application delivers integrated, consistent, end-to-end management of 3Com network systems from a single console. Optimized for popular UNIX and Windows management platforms, Transcend Enterprise Manager provides automated RMON alarm management that includes Autocalibration of alarm thresholds and enhanced Action-on-Event features for proactive management. Device views offer at-a-glance device status, while simple point-and-click operation provides access to in-depth configuration and statistics. Transcend Enterprise Manager offers a wealth of tools for visualizing and administering the network at both the logical and physical levels, including VLAN, LAN Emulation (LANE), ATM, device, and file browser/Explorer Model management.
- **Transcend PC Link SmartAgent.** Working in conjunction with other Transcend applications, SmartAgent intelligent agents reach beyond hubs to monitor and control the network activities of every PC in an Ethernet or Token Ring LAN. SmartAgent software is based on the Simple Network Management Protocol (SNMP) standard for easy integration with standards-based platforms.

- **Traffix Manager.** Traffix Manager is the industry's first RMON2 standards-based network management system. It works seamlessly with **Transcend LANsentry**<sup>®</sup> software, **Transcend Enterprise Monitor** and **SuperStack**<sup>™</sup> **II Enterprise Monitor** probes, and other RMON, RMON2, and dRMON intelligence-gathering solutions to provide a range of network operation information—from application-level monitoring to segment-oriented data to enterprise-level information, including complete multiprotocol analysis. A well-organized, flexible user interface lets managers organize network views by location, subnet, functional group, VLAN, and other attributes. Graphing and charting features make it easy to select and view real-time or historical data based on numerous criteria. In addition, managers can select and merge sets to create powerful correlations for what-if analyses.
- **Transcend ATM VLAN Manager.** This graphical VLAN management platform lets managers view virtual as well as physical connectivity systems at multiple levels for both ATM and non-ATM devices. Transcend ATM VLAN Manager also supports automated VLAN configuration. The result is consolidated management of virtual and emulated LANs.

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