THE
Network Monitor™
A PUBLICATION OF NETWORKING ISSUES

Vol. 6 No. 1

The Return of The Network Monitor

by Paul H. Mauritz

With this edition of The Network Monitor, Netcordia re-launches a tradition that began with the first edition of The Network Monitor published in March 1997 by Chesapeake Computer Consultants, Inc. (CCCI).

The very first edition of The Network Monitor consisted of 4 pages covering topics such as "What is Network Management" and a "Consultant Profile of Terry Slattery".

The Network Monitor was published quarterly until Mentor Technologies (the final name for CCCI) ceased operations. Terry Slattery (founder and President of CCCI) purchased the rights to The Network Monitor, and has brought it back to life in this edition.

We hope you will find the same blend of interesting articles, technical tips (this time focused on Network Analysis and Management) and informative insight into the use of the Periscope Network Analysis Appliance in each quarterly edition. We will use The Network Monitor to share technical tips on how to use Periscope, to provide insights into the network management space, and to inform our readers about innovative customers and partners who are maximizing the value of their investment in Netcordia and our Periscope product.

Each edition of The Network Monitor will include a Partner Profile (In this edition, we highlight Blackwood Associates, the first Manufacturers Representative to sell the Periscope product line), and a customer profile (For this first edition, we highlight the Johns Hopkins Bloomberg School of Public Health).

As the editor of The Network Monitor, I hope you will find the new editions as informative and insightful as the past versions. I would welcome feedback on The Network Monitor and contributions to future editions. N M

Introducing Netcordia

by Paul H. Mauritz

Netcordia was formed in July 2000 with the goal of understanding the challenges faced by today's companies, and developing solutions to enhance the management of the IT infrastructure. Netcordia was founded by Terry Slattery, a pioneer in the network architecture, design and management arenas. Terry previously founded Chesapeake Computer Consultants, Inc., a nationally recognized Cisco Systems training and consulting partner.

Terry started Netcordia to develop solutions that differed from the existing network management products in three distinct areas.

- Netcordia products provide a systems-level view of the network infrastructure. A systems-level view of the network takes raw data from network devices and applies experiential rules and industry best practices through an analysis engine to provide insight into the overall network as opposed to a network element specific (router/switch) view of the network.
- The second founding principal is to provide

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Knowing Your Network (part 1)

by Terry Slattery

Knowing your network is the basis for a smoothly operating network. You have to know what devices are on it, how they are interconnected, how they are configured, and how well they are operating. Let's take a look at some specific things that are critical. I'm going to refer to Periscope's presentation of the items in this article.

Network Health Scorecard

I've always wanted to know the overall health of my network. The ideal display would be a metric or some graphic that showed me the network's health over the last 30 days. A display like that would show me whether the network is improving or not. The problem is that a modern network is composed of a large number of components and interacting systems. It would be easy to take the number of routers and switches and create a metric that shows me the percentage that are not having any major problems. But that doesn't take into account network-wide systems such as routing protocol stability or VLAN stability.

At Netcordia, we invented a way to measure overall network health. Our approach is to measure the number of exceptions or issues we detected in the network's configuration and operation. The result is the Network Scorecard™ (see Figure 1). We start with a network that has a perfect score and subtract points as issues are identified. The result is the Network Scorecard™. Periscope calculates the health of a variety of functional areas so it is easy to see the part of the network that needs the most work. The scores from the functional areas are then combined to produce an overall network health score. Graphing the overall score for the prior 30 days tells us a lot about how our network is doing over time. We look for an improving score during periods of at least seven days.

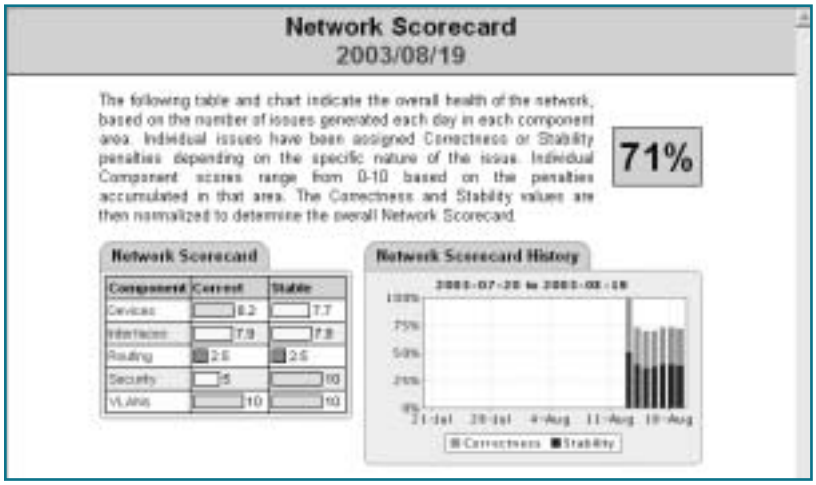


Figure 1

VLAN Configuration and Stability

Stable VLANS are critical to a smoothly operating network. Manually tracking VLAN membership, topology, and ports quickly becomes impossible as a network grows. There are also problems with auto negotiation of speed and duplex on 10/100Mbps Ethernet ports.

Larger potential problems loomed when I started thinking about the stability of the Spanning Tree Protocol (STP). I regularly hear about the old, small switch that is installed in a VLAN and suddenly the VLAN isn't stable. With the default priority, the small switch may become the root of the spanning tree. In a large STP domain, the slower CPU of the small switch can be overloaded, causing timeouts in the root's STP advertisements. A spanning tree topology change occurs as the root changes between the small switch and a more powerful core switch. Connectivity via the VLAN suffers during each topology change.

We designed Periscope to

(continued on page 7)

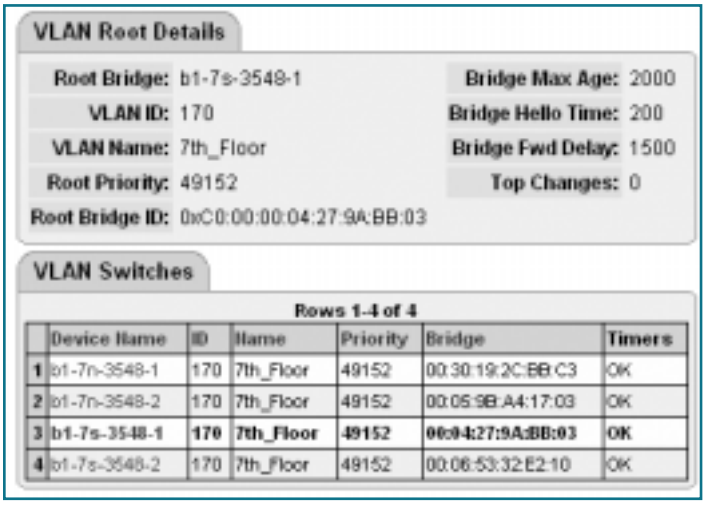


Figure 2

Netcordia Launches Periscope™ Network Analysis Appliance

by Paul H. Mauritz

At Netcordia, we take great pains to understand the challenges facing the existing network management market, to evaluate the strengths and weaknesses of the available products and to fill the gap in the network management market. Periscope™ is the result of this effort. Netcordia,

"We have stumbled into a memory leak on our 3508 switches in the past few days and Periscope was the first to see it."

a provider of appliance based network analysis products, has announced the first revenue ship of the Periscope Network Analysis Appliance. While other network management products perform real time monitoring of networks, event correlation of fault information and display of network maps, none of the existing products performs analysis of the network to determine the overall health of the network infrastructure. Periscope offers a cost competitive solution for analyzing today's complex networks.

The Periscope Network Analysis Appliance is a standalone system that gives the Network Manager an Expert System for Network Analysis. Periscope: Gathers pertinent data through multiple data collection engines to gain knowledge of the network topology, architecture and layout; Analyzes gathered data using best practices and industry norms to create system level information about network operation and stability; Coalesces and presents information to make it easy to view network issues and take action on those issues in a prioritized approach (see Figure 3).

The Periscope family incorporates three major objectives in all products: 1. Have a system-level view of the network; 2. Be easy to configure and use; and 3. Produce useful information. According to Kevin Stone, network manager for the Johns Hopkins Bloomberg School of Public Health, "I have a dozen different tools that tell me things but nothing that puts it all together in the summaries that Periscope does. We have stumbled into a memory leak on our 3508 switches in the past few days and Periscope was the first to see it. 99.1% memory utilization is not a good thing."

Netcordia was founded by Terry Slattery, the second Cisco Certified Internetwork Expert (CCIE) certified and the first outside of Cisco Systems, to develop a special purpose analysis product that provided the same level of analysis that a CCIE would provide. Periscope offers our customers the availability of a CCIE level network expert contained in an easy to use network appliance at an affordable price. With Periscope, customers are able to view all of the vital components of their network infrastructure via a web browser in one place, and with a single screen, determine the overall health of their network. When the network health is acceptable, customers can go about their daily routine. If the network health is unacceptable, the customer is able to utilize Periscope to determine the root cause of the unhealthy network.

Periscope fills the gap in the network management market by providing an analysis engine that continuously audits the network and analyzes the data to produce meaningful results and determine network health. Our customers are finding Periscope to be an invaluable tool in the ongoing challenge to understand what is happening to their networks, analyze the symptoms evident on their networks and report on the findings. N M

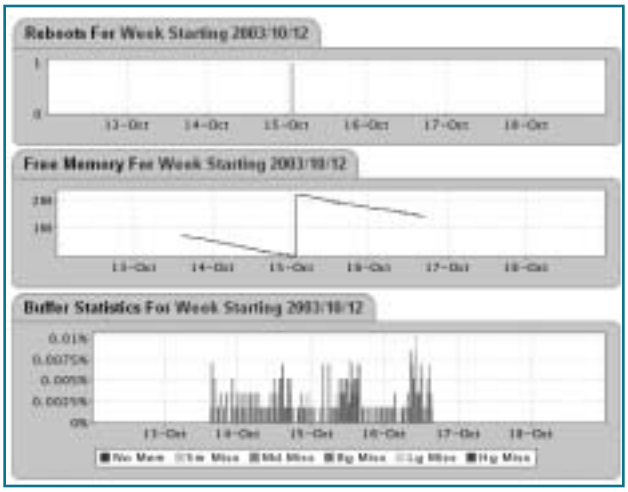


Figure 3. Memory Exhaustion and reboot on a 2912 switch

Customer Spotlight

Johns Hopkins University, Bloomberg School of Public Health

by Paul H. Mauritz

As a leading international authority on public health, the Johns Hopkins Bloomberg School of Public Health (JHSPH) is dedicated to protecting health and saving lives. To ensure that the mission of the School of Public Health is met, a significant amount of time and energy is spent supporting, managing and modernizing the Information Technology (IT) infrastructure that supports the school.

Just keeping up with the every day changes in the IT infrastructure keeps a team of five IT professionals working more than full time. To aid them in their efforts, the IT staff has developed, purchased and integrated a set of tools which aid in their daily challenges. One of the tools the school has purchased is the Periscope™ Network Analysis Appliance. Periscope offers the IT support team a network analysis tool that is a stand alone, and which provides the high level analysis of the network infrastructure that typically requires the time and attention of a high end network professional.

A typical day in the lives of the IT support team at JHSPH entails the support of desktop devices ranging from Windows PCs to Macintosh PCs to Linux servers to the full range of servers that support the mission of the school. All of these systems are connected via a network that provides connectivity and protection to the students, faculty and administration of the JHSPH.

Even without the challenges presented by the various worms that have attacked the network in recent weeks, the complexity of the JHSPH network keeps the support team hopping as they track down network problems, standardize the network infrastructure and continue to improve the quality of service provided to their customers.

Kevin Stone, a Senior Network Administrator on the IT team supporting the JHSPH infrastructure, has evaluated and utilized numerous tools to aid in the ongoing support of the JHSPH network. "Of all of the tools I have evaluated, Periscope provides the most useful information in a single place – I can tell how the network is doing by looking at one screen." said Stone. "We can begin our day by looking at the Network Health Report produced by Periscope, and know what kind of day we'll have based on the overall health of our network." This level of analysis and reporting is available from Periscope after 24 hours of operation on a network.

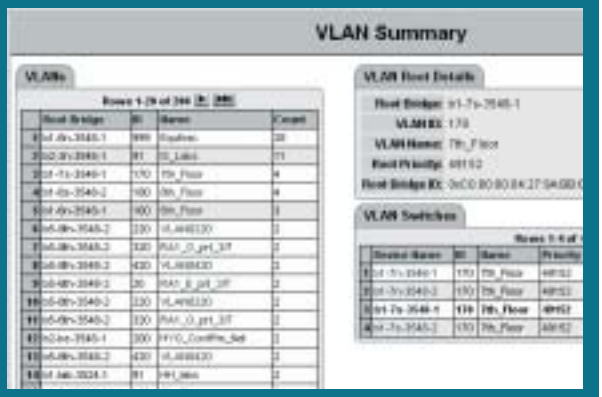
"Of all of the tools I have evaluated, Periscope provides the most useful information in a single place"

Every day, the Bloomberg School of Public Health works to keep millions around the world safe from illness and injury by pioneering new research, deploying its knowledge and expertise in the field, and educating tomorrow's scientists and practitioners in the global defense of human life. The JHSPH IT team provides a well managed IT infrastructure that makes that mission possible. N M

tech tip

VLAN Root

What switch is the root bridge?



Tracking the root bridge within each VLAN is important for increasing the stability of the VLAN. The root bridge in each VLAN should be the switch that's connected to a router that's providing subnet connectivity for the VLAN.

The root switch can be found by issuing the CLI command 'show spanning-tree' on the switches within each VLAN. The root switch will report 'We are the root of the spanning tree' while non-root switches will report 'Current root has priority 32768, address 0002.b9fc.b700'. The address is the MAC address of the root switch. Using the CLI to find the switch with that MAC address is tedious.

Periscope correlates the VLAN data to identify the root of each VLAN by its name or IP address. The Results/Network/VLAN Summary identifies the VLAN by number and name. (You should use a different name for each unique VLAN. Reusing the VLAN number is acceptable.) The root bridge is identified for the VLAN. The list of switches in the VLAN can be viewed by clicking on the VLAN name.

Partner Spotlight

Blackwood Associates and Periscope

by Paul H. Mauritz

Netcordia is developing Sales channels through relationships with successful Manufacturers Representatives and Resellers.

A Manufacturers' Representative is a sales agent who represents our products, and sells them directly to end users. When a Manufacturers Representative sells product on behalf of Netcordia, we ship the product to the end user and provide all support directly to the end user.

A Reseller has a similar relationship with Netcordia, except that the Reseller holds their own inventory for shipping to the end user, and the Reseller provides first level support directly to the end user.

Our first Manufacturers Representative, Blackwood Associates, Inc. (BAI) has signed an agreement with Netcordia to represent our Periscope™ Network Analysis Appliance to customers throughout the Mid-Atlantic region. In addition to direct sales, BAI will recruit, train and support other Manufacturers Representatives to sell the Netcordia product line.

Since 1977, BAI has been working closely with leaders in the IT community in both the government and commercial sectors to provide them with solutions and equipment to better manage their networks. BAI's specialty is to provide tools and solutions that will help their customers' networks run more efficiently. From Protocol LAN/WAN Analyzers and Authentication, to Network Management Systems and Network Synchronization, BAI helps to bring cost saving alternatives to customers.

The relationship with Netcordia and BAI is based on a mutual understanding of the needs of the network space, with a specific focus on network management, and the product offerings within the space.

BAI makes its clients aware of the appropriate technologies in the network management space, and has helped their customers make their networks more efficient in terms of predicting and responding to problems, while providing information to help them make cost efficient decisions and changes required in their networks. With Periscope, BAI is able to offer their customers an analysis tool that views the entire network as a whole; that is easy to use; and, that provides useful information. The Periscope Network Analysis Appliance is the proactive, network analysis product that provides significant return on investment to BAI customers.

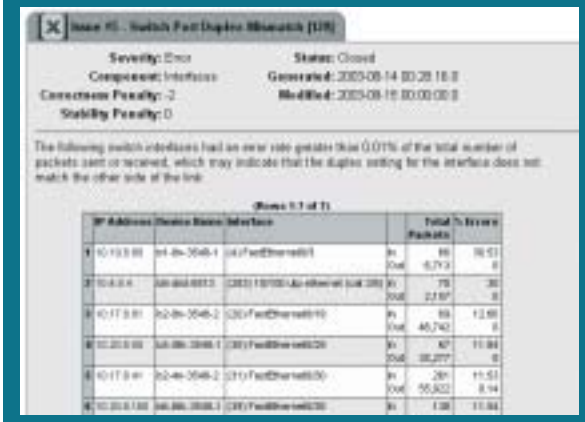
Blackwood Associates represents our Periscope™ Network Analysis Appliance to customers throughout the Mid-Atlantic region.

For over 26 years, BAI has earned the respect of both manufacturers and customers in the Information Technology field, as one of the most innovative Manufacturers Representatives in the country. Netcordia is pleased to have BAI as a Manufacturers Representative for the Periscope product line.

Learn more about Blackwood Associates at www.blackwoodassociates.com. NM

tech tip

Port Duplex Mismatch



Port duplex mismatch problems are a real pain! If the switch port and attached computer are not configured correctly, the duplex mode could wind up being incompatible. The connection seems to work fine at low traffic levels, particularly for ping packets. But as the traffic level grows, the errors increase, affecting network throughput. Unless you monitor the errors on every switch port, you may not be aware of the problem.

Periscope identifies switch ports reporting more than 0.01% errors on either input or output. At an average packet size of 100 to 1500 bytes, this is equivalent to a bit error rate (BER) of roughly 10E-7 to 10E-8. A good LAN interface should have a BER of less than 10E-10, or one bit out of every 10 billion bits. On a 100Mbps link, that's one error for every 100 seconds of full-speed operation. It ís a good idea to work through the list of switch ports reporting high error rates and check for duplex mismatches or cabling problems. Your network operation will be substantially better as a result.

Network Management Review

by Terry Slattery

Where are we today?

Network management is a relatively new field, having started in the mid-1980s as networks began to grow. Being less than 20 years old means that we're still learning a lot about it.

Today's technology is primarily focused on device and interface monitoring. There are also event log filtering systems that identify significant events and provide alerts to network staff. Examples of these systems are HP Open View, What's Up Gold, and Cricket/MRTG. Each system has significantly different costs, complexity, and results. HP Open View is for larger networks, requires significant training and configuration, and can do a variety of things albeit at a potentially significant cost. What's Up Gold is simple, inexpensive, and reports on basic interface performance, log file monitoring, alerting, and device availability. Cricket/MRTG is a free network performance graphing package that is typically used to display interface utilization and error data.

Network Management Requirements

The primary component of successful network management is the definition and use of a network policy. "What!? Aren't my network monitoring systems enough?" No, they aren't. Without a network policy, you don't have a defined network structure, operating procedures, or a network growth plan, all of which makes managing your network easier. For example, what is your policy and procedure for handling a computer virus? If you invent a process for each virus attack, you're not learning from past events so that you handle future ones more efficiently. Another example is handling the failure of a major router, switch, or subnet. Do you have access to the necessary spares and connectivity to quickly repair the network? What is your policy regarding people who attach laptops to your corporate network, potentially allowing a virus or worm past your internet firewalls?

Other components of successful network management are more obvious. The FCAPS (Fault, Configuration, Accounting, Performance, Security) model — see Table below — is useful to make sure you've covered all your bases. Fault management and performance management collects real-time and historical data for troubleshooting, trend analysis, and to identify failure-prone devices or links. Configuration management tracks changes so you can quickly detect whether a problem was due to human error - the most frequent cause of network outages. Accounting management tracks who is using the network so that important business functions are not overwhelmed by non-business uses like file downloads and web browsing. Finally, security management helps you make sure that the network doesn't fail when the latest virus or worm strikes.

Network management is a prime candidate for the move to appliances, as long as configuration and maintenance are kept simple.

What's Coming in Network Management

The networking industry is beginning to accept the use of appliances to perform specific functions other than routing and switching. Network management is a prime candidate for the move to appliances, as long as configu-

FCAPS Model

Fault Management	Configuration Management	Accounting Management	Performance Management	Security Management
alarm handling	system turn-up	track service usage	data collection	control access
trouble detection	network provisioning	bill for services	report generation	enable functions
trouble correction	autodiscovery		data analysis	access logs
test and acceptance	back up and restore			
network recovery	database handling			

ration and maintenance are kept simple. A simple-to-use system should not sacrifice functionality. What should these new systems provide?

Analysis - Detect network problems by correlation and analysis of the collected data. For example, is OSPF on a router recalculating the SPF tree too often, indicating a routing stability problem? Other analysis can be done to identify important network subsystems such as mapping subnets to VLANs and showing VLAN topology. The analysis should show whether the network's stability and efficiency is improving.

Reporting - Reporting "I'm ok" events overloads the network staff with additional data that's often ignored. A better approach is to summerize the overall operation and stability of the network in reports suitable for use by both network administrators and corporate management (e.g., the CIO). In addition, reports for the network staff should clearly identify actions to be taken that will improve the stability and correctness of the network.

Prioritization - Classify problems into several categories, depending on the severity of the problem. This way, the staff can focus on the most important items first. It's easy to automatically determine what's important in any network, based on utilization or location within the network.

Systems level view - The network is a system comprised of many components. Instead of reporting on the individual components, provide a system-level view. For example, is your routing protocol stable? How are your routing and VLAN topologies integrated?

Easy to use - Most importantly, the system must be easy to use. Many a network management system has been purchased, installed, and configured, only to become shelf-ware. A good system will require little additional training. It should communicate in terms the network staff already recognizes. It should perform mundane tasks itself instead of requiring network staff input.

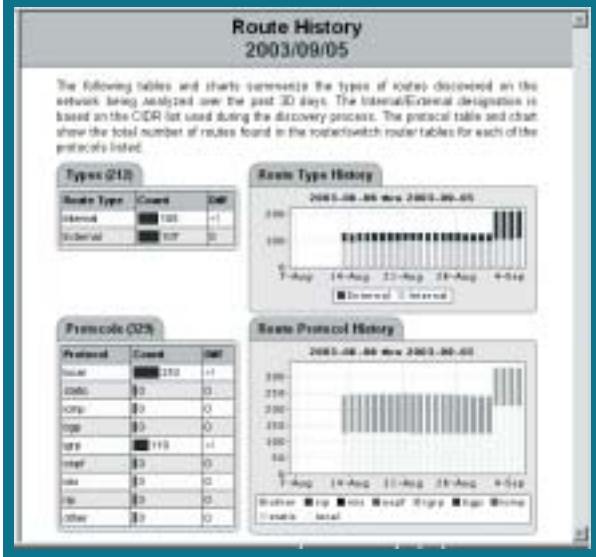
Summary

Network management is going to see significant changes in the next few years as appliances become more prevalent. Networks will continue to become more complex as new technology like wireless and voice become more integrated. Netcordia will be playing a role in making network management simpler and more useful as our Periscope family of network analysis appliances expands. N M

tech tip

Routing Protocols

What routing protocols are being used?



You're doing a routing protocol migration and need to know when all the instances of the old protocol have been replaced by the new protocol. How do you check all the routers in your network to track the progress of the migration? A manual process is slow and error-prone.

Periscope collects routing tables from all routers and identifies the routing protocols in use on each router. The bars in the **Route History** chart shows the number of routers using each protocol on every day for the past 30 days. Tracking the progress of a routing protocol migration just became a lot easier!

Knowing Your Network (continued from page 2)

provide visibility into both of the above problems. The root bridge is clearly identified within the VLAN (see Figure 2, page 2). All the switches that are members of the VLAN are shown, along with their priority and MAC address. It becomes easier to identify improperly selected root bridges and to set the priority of the core switches so that the problem is unlikely to occur. The number of STP topology changes is tracked and if it occurs too many times, Periscope creates an issue to bring to the attention of the network staff. Individual switch ports are also monitored and a separate issue is generated when a potential duplex mismatch is detected. These two items have the potential for helping make many VLANs more stable and efficient. N M

Introducing Netcordia

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useful information. Useful information is that which has been processed through a knowledge base (through the analysis engine) and reasonable assumptions and assertions have been made about the information. The information is then presented at a high level, and in a concise, easy to understand format. Additional information to better understand the root cause of any underlying issues is also available.

•Finally, Netcordia solutions must be easy to use. A network management tool that requires training, maintenance and regular updates is one that seldom gets used. Netcordia products are designed to be used by a wide range of corporate staff from a high level network engineer, and a level one technical support individual, as well as by non-technical management.

Netcordia's Periscope™ Network Analysis Appliance follows the three guiding principals of:
1) providing a system level view, 2) producing useful information, and 3) being easy to use. It affords the user a high level analysis of the overall health and well being of their network infrastructure.

As Netcordia moves through additional product development cycles, the company will focus on analyzing additional layers of technology. Application layers of focus include port scanning, Voice over IP, Security, Wireless and MPLS.

Headquartered in Annapolis, Maryland, Netcordia offers products through Resellers, Manufacturing Representatives and Consultants to medium to large enterprises throughout North America. **NM**

Don't miss out!

We hope you enjoy this free quarterly publication and encourage you to visit us online to ensure you receive the next issue. Please visit us at www.netcordia.com to sign up.

The Network Monitor is published quarterly by Netcordia.

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