White Paper

Monitoring Application Performance from an End-User Perspective

The sole reason for an enterprise network is to deliver applications to end users. Traditional network management focuses on devices and links, not the end user experience. Some network management platforms attempt to address this through a central polling approach, which can be ineffective in today's modern networks. Fluke Networks' new NetAlly Application Advisor adds the end user experience to traditional network management with a method designed for today's networks.

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FLUKE networks

Why Network Management Isn't Enough

Today, nearly every network of any size has some sort of system for monitoring its performance. These Network Management systems have been around for many years and are critical to the network support team's efforts to deliver reliable services. A wide variety of choices are available, ranging from freeware to systems that can cost millions of dollars. Some systems are provided by equipment vendors, while others are vendor-independent.

In general, all of these systems monitor the status and performance of key devices and links on the network. Examples of the types of measurements tracked include:

- Key interface utilization
- Device CPU and memory utilization
- Protocol mix on key links
- Device settings
- Device availability
- Status of processes on servers

But users don't complain that "the interface has too much utilization" or that "the router's memory is low". They say, "the network is slow", because response time is what they care about. The problem is that this sort of network management doesn't measure time at all. All these measurements don't really provide you an understanding of what end users are seeing any more than studying each individual tree can tell you about the size and shape of the forest.

Approaches for Monitoring End User Experience

The folks who provide network management solutions are aware of these issues and have attempted to add application performance to their solutions. A typical approach is shown in figure 1.

In this example, you want to know the response time the user is seeing from the server, which is indicated by the red arrow. The central poller of the network management system attempts to determine this response time by making two measurements as shown by the green arrows. The first is a measurement of network response between the poller and the user and is typically a PING. The second is a measurement of application response between the poller and the application server and can be a "real" server query such as opening a port. If the poller is located near the server or the user, the sum of these measurements approximates the response time the user would be seeing.

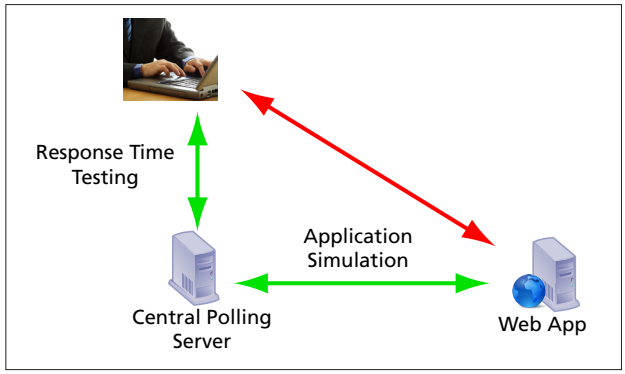

Figure 1. Central polling approaches attempt to measure customer response time (red) by combining application response and network performance measurements (green)

Issues with Modern Networks

Unfortunately, the approach based on a central poller runs into three significant problems when applied to modern, real world networks.

First, many users are not located in the same location as the central poller. Application performance measurements would be valid for users in the same site as the poller, but you have no idea what remote users are seeing.

Second, response time tests from the central poller to the remote sites will be inaccurate. That's because modern networks have a collection of devices that treat different types of traffic differently, such as firewalls and traffic shapers. So the ping test could see a very different response than real network traffic – or not get through at all. QoS settings on the network may limit the bandwidth available for some types of traffic and not others. Traffic coded as "high priority", such as VoIP, will be treated differently than business apps, which will be treated differently than less important traffic. As a result, the pings used for response time testing will experience very different performance from real application traffic.

Third, much of the traffic in a modern MPLS network does not travel through a single point on the network at all. Some enterprises have multiple distributed data centers. After the calls are set up, VoIP traffic travels between the callers. Many customers are outsourcing key applications to application service providers such as Salesforce.com. A centralized polling solution in this situation is completely blind to what these end users are experiencing.

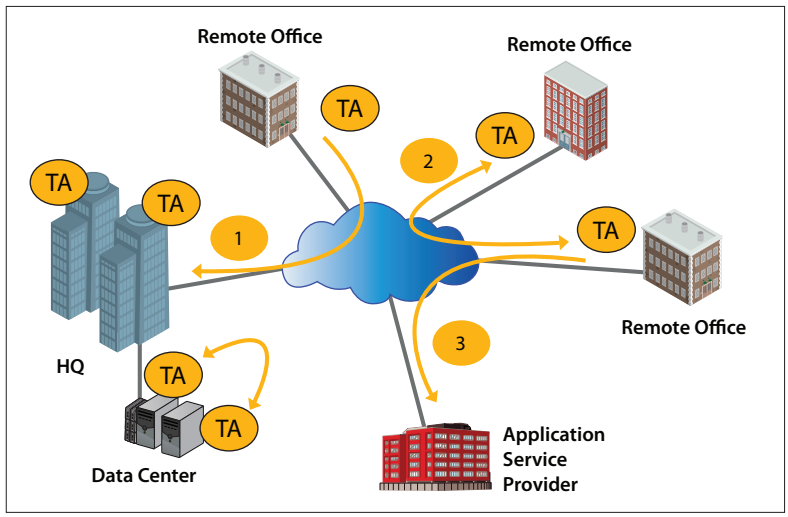

Figure 2: Traffic Agents (TA) test from (1) remote sites to the HQ/data center data center; (2) remote site to remote site; (3) remote site to external resources;

The NetAlly Application Advisor Approach

Fluke Networks' NetAlly Application Advisor provides a simple, effective way to measure application performance by measuring the performance of actual application transactions. It adds the user experience to the device centric view provided by network management.

With Application Advisor, Traffic Agents are placed where the users are and run the applications the users run.

Lightweight software Traffic Agents are deployed throughout the network at different sites, on multiple VLANs, and servers (including multiple virtual servers, as desired) - anywhere end-to-end performance needs to be measured. Traffic Agents can be directed to measure in all the ways that a modern network is designed:

- From the remote sites to the Data Center (or multiple data centers) to measure application performance
- From one Agent to another to measure site-to-site performance on MPLS networks or for applications such as VoIP
- From the Agent to devices outside your network to measure application performance of application service providers

NetAlly Application Advisor's approach solves the three problems noted above with centralized polling approaches. First, since traffic agents can easily be deployed at remote sites closer to the end user, their traffic travels the same links as the end users'. Second, since they send real traffic, such as DNS queries, FTP, RADIUS, HTTP, and VoIP, their traffic will be handled in the same fashion as the end users'. Third, real application traffic can be set up to travel between remote sites or from remote users to remote services, even if they are outside your network.

By getting closer to the end user and closer to the application, NetAlly Application Advisor delivers an accurate assessment of how real applications are performing for real users.

Measuring the End User Experience

NetAlly Application Advisor directly measures what really what matters to end users – response time for key applications such as:

- Network services, such as DNS, DHCP, or RADIUS
- Email services
- Response time of key web servers, including your own website
- Any back-end database application that can be accessed through web server
- Any application that can be tested by opening a port
- User defined applications (UDP, TCP, multicasting)

Name	Result
CRM Web Server	✓
DHCP Client Registration	X
DNS Server	X
Oracle Database	✓
Oracle Web Server	✓
POP3 Server	✓
SMTP Server	✓
Salesforce.com	✓
Server Port Connectivity	✓
Sharepoint	✓
VPN Server Connectivity (CN)	✓
VPN Server Connectivity (US)	✓
VoIP Performance	✓

Figure 3

Limits may be set on response times and then a simple pass/fail screen can show if these limits are being exceeded or not (see figure 3). If the limit is exceeded (or there is no response), and email alert or SNMP trap can be generated.

Analysis tools allow you to plot the performance of an application over time and compare it between sites (see figure 4). You can also track availability as part of these tests.

NetAlly Application Advisor also measures a second key metric end users care about – quality of VoIP connections. Calls can be placed between agents on a regular basis and then scored for quality using a mean opinion score (MOS) measurement. Limits may be placed on key metrics (MOS, loss, delay, etc.) and reported in the summary pass/fail screen.

By measuring what matters to the end user, NetAlly Application Advisor adds the critical end user experience view to the device-centric view provided by network management. Further, it offers a more accurate assessment by being closer to the end user and closer to the real applications on your network.

Contact Fluke Networks: Phone **800-283-5853** (US/Canada) or **425-446-4519** (other locations).
Email: info@flukenetworks.com.

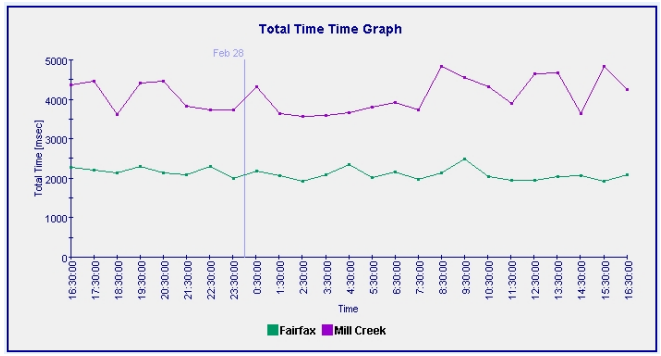

Figure 4 Plot of hourly web asset download time from two traffic agents.

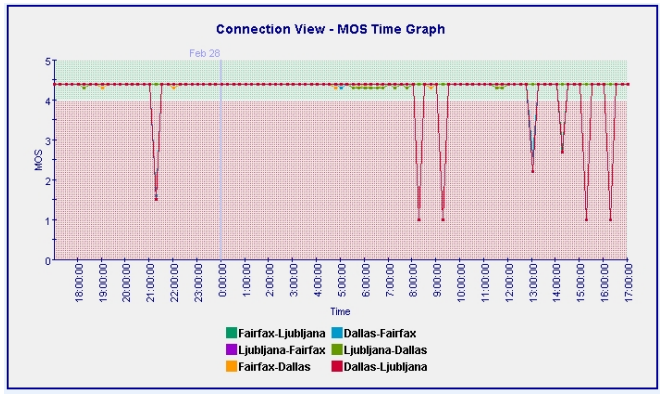

Figure 5 Display of MOS score for multiple sites over time.

OptiView Management Suite (OMS): The complete picture for monitoring, analysis and troubleshooting

OMS provides the breadth of visibility and depth of analysis for a complete picture of network and application performance. It's the only solution that combines proactive monitoring with in-depth "on-the-wire" analysis and portability to see problems up close - anywhere on the network.

Unlike other Network Management Systems, OMS shows you:

- Overall network health: key devices and applications for performance, not just availability
- End-user perspective: measure performance to and from users, critical links, virtual environments and remote sites
- Problems up close: portability allows you to see problems anywhere in the network -- whether wired or wireless
- On-the-wire packet analysis: visibility of packet-level details to quickly troubleshoot application behavior and response time issues

OMS can be used as a holistic management suite or part of your IT organization's toolset, to help reduce complexity and improve productivity in your team's daily workflow of monitoring, analysis and troubleshooting.

For more information, visit www.flukenetworks.com/oms

NETWORKSUPERVISION

Fluke Networks
P.O. Box 777, Everett, WA USA 98206-0777

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