

SERVICE-EMBEDDED NETWORK MANAGEMENT

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Introduction

Enterprise network executives face several challenges in successfully migrating to advanced IP services. They must connect large, distributed organizations with optimized bandwidth to facilitate application performance. They must lower the number of circuits they support while dramatically reducing latency. They must respond to pressure to implement a voice over IP (VoIP) solution to add functionality and lower telecommunications costs, without any perceptible impact on the quality of the enterprise's voice capabilities. They must train and retain IT staff, often with insufficient budgets. Finally, they must find a cost-effective way to manage their new network.

The choices facing the network executive today tend to fall into two solutions: 1) build a management solution, or 2) outsource this work to a third party. When you think about this, you really have one solution with a choice of who will do the work. This is essentially two sides to the same coin, with the coin being an overlay network solution. As an overlay solution, there are common challenges to this approach that network executives encounter. This paper will explore the problems inherent in an overlay management approach and describe a new approach that allows for the management of the wide-area network to be not only offered as a service, but actually embedded in the network itself, resulting in several incremental benefits to the enterprise.

Current Solution: Overlay Management For Impartiality And Control

IT departments have a tendency to tackle network jobs themselves, thinking that the network management is really just an extension of their existing responsibilities. Many IT groups further believe that keeping the management "in-house" will minimize the budgetary impact. Typically, this "do-it-yourself" approach tends to become more difficult as the myriad of attendant tasks required to run an enterprise network create distractions, the costs of adding new capabilities stresses budgets, and the integration work involved in adding new sites or supporting a corporate merger become overwhelming.

On the other hand, outsourcing the overlay management network to a third party can reduce the work on the IT staff; but at a cost in terms of dollars and

network management control. Overlay solutions are not cheap, nor are they something you can just buy once and then stop paying for. There is an ongoing maintenance component for the continued support, along with the potential costs of added (future) capabilities. More importantly, however, is the risk of not having control over your network. Depending on the approach taken, you could find yourself turning your network management over to a vendor and hoping they give your network the same priority your staff would.

Often overlooked in this debate over outsourcing vs. in-sourcing are the greater costs inherent in an overlay network approach. First, there is the latency added by collecting the session header information needed to assess network traffic performance. Some overlay management solutions use “agents” or “probes” to capture this information. However, some application performance must be diverted to these agents so that the information can be captured and analyzed, adding latency to the network traffic. Some “customer premise” routers have the ability to capture this information as the traffic is flowing through the device, but this data capture simply increases the processing time of these routers, thereby adding latency to the process. Regardless of the approach to data collection, there is a “latency tax” that is paid with an overlay solution.

Second, there are the costs of adding new locations to the network, and the headaches of integrating this new location into the overlay management solution. Some companies have found that this is where they begin to migrate from a “do it yourself” approach to an outsourced alternative. While all networks must be managed, few network executives get kudos from the senior team for this effort, and in fact often hear only the criticism when some aspect of the network performance is not delivered as promised.

Third, adding an additional (management) application to the network increases traffic that is competing with other network traffic. Since the server where the network traffic statistics are stored and analyzed is somewhere in the enterprise network, accessing that information simply puts additional strain on the corporate network. This “bandwidth tax” can be as much as 20% of available bandwidth, thereby reducing the bandwidth available for other applications.

Fourth, there are the time and resources involved in implementing an overlay management network. A typical solution for a medium-sized enterprise network takes four to six months to deploy, and a larger enterprise network could take six to twelve months to complete.

Finally, there is the cost of servers, maintenance and other fees that the enterprise must cover to store and maintain the data. While some of these expenses, such as the cost of the server, might be avoided the end result is significant upfront and ongoing expenditures required to maintain an overlay WAN management solution.

The Embedded Service Approach

A new alternative to this overlay solution is a service model that captures the session header information inside the provider edge network, eliminating the need for hardware or software on the enterprise side. This innovative approach involves leveraging deep packet processing enabled through the service packet mirroring feature. This mirroring feature allows the service provider to capture ALL session header information for network traffic on a given circuit—not a five minute traffic “sample”—and store that information on servers placed in a secure location inside the service provider’s network.

Although the traffic is mirrored and recorded on the provider edge of the network, the service actually records the session header information when the traffic enters and leaves the customer edge of the network—at the demarcation point. The detailed session header information then is available within seconds of when the traffic has traversed the WAN. This gives the enterprise an immediate reading of its WAN traffic.

Important point: only the *session header* information is recorded. The actual content being sent across the circuit remains secure inside the corporate network.

The deep packet processing is an essential, but not sufficient, part of the service-embedded approach. The session header information is stored on secure servers inside the provider network, with customers having access only to their

own network statistics. However, the service provider must build a web-based tool to allow the enterprise network administrator access to this information for viewing and reporting.

Indeed, because ALL session header information is captured, the tool should be robust enough to present granular and dynamic network performance analysis and reporting capabilities. The tool must also allow network administrators to do “network traffic forensics,” to study application performance in several ways, including by application type, IP address, port address, protocol and QoS level. Finally, the tool should allow the administrator to set key thresholds on specific network traffic metrics to quickly assess potential problem areas, and then allow the user to send various levels of alerts to designated personnel when those thresholds are reached or exceeded.

The Advantages of Service-Embedded Network Management

There are several advantages to the service-embedded network management approach. First, all session header information is mirrored inside the provider edge router as the application is taking its normal path through the network. Because the application is not re-directed, or “touched,” in any way, there is no impact on the network traffic, and therefore no impact on latency.

Second, because the session header information is mirrored and recorded at the provider-edge ingress and egress points, the service is always available at anytime without any equipment or integration effort required. There is no waiting four to six months—or longer—to begin getting meaningful network statistics and reports. The service is simply “turned on” and the session header traffic is recorded for viewing at anytime.

Third, because the service is offered on a circuit-by-circuit basis, the network management is extremely easy to scale. The network administrator can implement this service at any and all of the locations at any time. New location are simply turned on and automatically integrated into the service for immediate viewing.

Fourth, the service is embedded in the provider's network, so there is no tying up the enterprise's bandwidth or equipment to view the results. The network administrator can view network performance securely and conveniently from anywhere Internet access is available. This eliminates the "bandwidth tax" on the enterprise, freeing up critical bandwidth for higher priority uses.

Finally, the costs for an embedded management service are substantially lower than those for an overlay solution. There are no hardware, software or integration costs, and no maintenance fees to pay. The service can be offered for a low monthly rate, thereby allowing the enterprise to redirect its capital while also reducing its operating costs.

Conclusion

Enterprise network administrators face several challenges as they adopt advanced IP services. One key challenge is to get accurate, granular information on the corporate traffic traversing the WAN. Building or outsourcing an overlay solution addresses some of the problems, but often creates others challenges for the enterprise. Advanced provider-edge routers allow service providers to mirror and store critical network traffic statistics for immediate analysis, viewing and reporting. The results are improved application and WAN performance, and a lower total cost of network ownership.