

# Hosted-Application Performance Hinges on Network Performance

Hosted cloud applications present both challenges and new business opportunities. Communication service providers (CSPs) are under constant pressure to reduce costs, maximize profits, guarantee quality of service, increase customer satisfaction, and support new and real-time applications—all while balancing ever-increasing bandwidth demands. CSPs play a critical role interconnecting users to applications and data. Downstream, their customers may include enterprises and small businesses, while upstream, customers include over the top (OTT) and cloud service providers.

However, today's application delivery chain is somewhat decoupled. The wide-area delivery network has little to no visibility into the transactions traversing it, yet its performance is critical to the end-user experience. Slight changes in network performance may have significant consequences to application performance. CSPs typically provide only basic-level service level agreements (SLAs) to upstream and downstream customers that are based on data delivery, not application performance.

The adoption of applications and technologies such as video, VoIP, and virtual desktop infrastructure (VDI), as well as different flavors of unified communication (UC) technologies, are increasing the complexity of wide area network (WAN) traffic and are posing new challenges for managing WAN performance. Multiple WAN

technologies may be involved; customers may reside in large enterprise locations or small offices/remote offices, while others rely on mobile devices to access their applications and data. This non-heterogeneous nature of application delivery further complicates the ability to monitor application performance or to offer any application for SLAs.



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## The WAN Plays a Critical Role in Application Delivery

The impact of poor network performance on overall application performance can be significant. Packet loss can occur for many reasons, including network congestion, protection events such as route reconvergence, and network misconfigurations. Furthermore, most WANs are oversubscribed and leverage statistical-gain techniques to maximize the use of available capacity. As data traffic is bursty and unpredictable in nature, the wide area switches will begin to selectively discard traffic when network congestion occurs. The percentage of packets discarded may be low, perhaps 1 to 2 percent, but the impact on application performance can be dramatic.

While this is acceptable to some applications which do not require real-time interactive performance, many critical applications such as those necessary for data-center virtualization and hosting are intolerant to packet loss. This often results in drastic application decreases in throughput as network packet loss increases, and is further compounded by a significant increase in latency. Within the network, identifying the location and sources of unexpected latency, as well as the associated implications to specific applications, is paramount to be able to offer meaningful SLAs for cloud-delivered services. The effect of packet loss and application latency for applications using TCP/IP is shown in the chart.

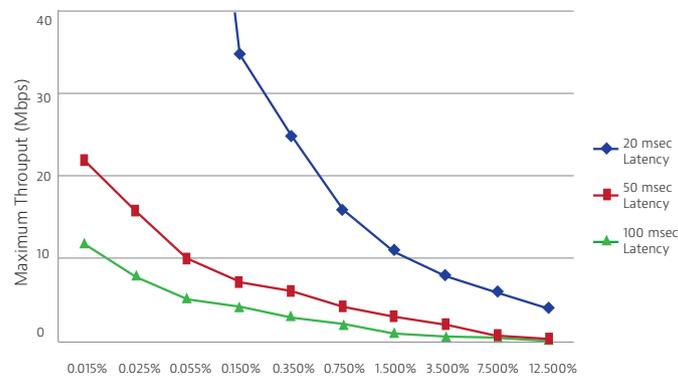


Figure 1. Relationship of TCP throughput to network packet loss

## The Situation Today

When it comes to having full visibility into network traffic, it is no longer sufficient just to monitor bandwidth consumption per protocol (for example, HTTP and SSL) to understand how much bandwidth is being consumed by each application. For example, not all HTTP traffic has the same level of business priority or bandwidth requirements and should not be treated as a homogeneous category. Without having a sufficient level of application-level visibility, it is difficult for organizations to ensure that their available network resources are being used in a way that provides the most value to their businesses. Today, network operators have no simple way to measure user-application response times in order to understand and manage user experiences. An increasing number of network devices provide embedded traffic classification and monitoring capabilities, however often with performance and affordability impacts.

Typical SLAs focus only on the physical layer to the networking layer (Layers 1 to 3). Basic performance monitoring reported includes latency, packet-delivery ratios, and errored seconds. However, distributed applications require distributed data-capture strategies in order to be able to isolate issues. Today's solutions usually require appliances to capture and monitor network traffic, including specific applications. Extending this visibility to all different locations, however, is complex and costly. In a network operations center, a typical large appliance such as a network recorder, capable of capturing data at 10 G by monitoring critical links, may be the viable strategy. However, this strategy does not scale as the WAN extends to enterprise campus locations and small offices, or branch offices where the cost to deploy and sustain a hardware appliance becomes prohibitive. Obtaining a true measure of user experience requires in-line monitoring at client and server end points as well as throughout the dynamic WAN.

An effective solution requires the ability to look beyond packet headers and deep into the content within the applications. For instance, the growing mobile-user presence and the increased complexity of network environments means that users typically pick up IP addresses dynamically. For this reason, a user could have several IP addresses during a single work period. This evolution of the network makes it nearly impossible to monitor, secure, and manage solely by an IP address. Unless a simple, pervasive, and cost-effective deep-packet-inspection capability is available, it will be difficult to monitor exactly what traffic may be traversing networks.

## New Business Opportunities for CSPs

Providing enhanced WAN traffic visibility creates opportunities for service providers to offer advanced SLA-based solutions that process data collected and make it more actionable for their own use as well as their customer's. Many enterprises lack the capital budget to deploy a robust WAN monitoring product, while others lack the in-house expertise to get the most out of the technology. In these situations, an enterprise can improve network visibility and its response to network issues by outsourcing WAN monitoring and management.

By outsourcing WAN monitoring and management to a trusted third party, an enterprise can eliminate the hardware maintenance and support staff costs associated with having on-premises technology. The managed service provider can also take advantage of economies of scale to use the most sophisticated WAN monitoring and management products on the market and employ people with the expertise to assess more effectively the data collected. This skill set qualifies a carrier to resolve any trouble spots, accurately forecast future capacity requirements and identify possible denial-of-service attacks before they wreak havoc. These services can also be bundled in with transport and other managed services. Small- and medium-sized businesses with fewer IT personnel are an ideal target market for outsourced WAN performance management services.

To deliver these types of services, network operators need to have visibility into how their network capacity is being used, how applications on the network are performing, and where the bottlenecks for optimal performance are. They need to be able to make educated decisions about how to improve network and application performance.

## Value to Both Upstream Customers and the Network Operator

Industry studies show that an extra 0.5 second delay in generating search results would worsen the user experience and, in effect, reduce traffic to its website by 20 percent. Clearly, there is untapped potential for operators to improve the quality of the end-user experience on behalf of content providers through proactive and real-time monitoring, while quickly resolving any issues that lead to business impacts for their customers.

From a cost-containment perspective, operators may use increased intelligence about utilization on their network to better plan capital investments as well as develop new business models with OTT providers. Knowing exactly how the network is being used could allow the operator to create advanced SLAs improving the content delivery for upstream OTT partners, while enriching the user experience.

## Requirements for New Solutions

A network-wide monitoring solution, extending to remote branch offices, can provide access to key performance information for CSPs to provide advanced SLAs to their upstream (OTT, cloud provider) and downstream (enterprise, small business) customers. This information may include:

- Measurement and analysis application performance for all transactions
- Comparisons of response times against intelligent baselines and thresholds
- Identification of abnormal latencies in the network
- Isolation of the problem to a specific link or application server, or the application itself
- Delivery of alerts on any performance deterioration

Offering these types of advanced connectivity services lets network operators and cloud operators attract a greater number of more lucrative customers by differentiating their services through value-added SLAs and, in turn, increase new, recurring revenue opportunities.

Solutions like Viavi Solutions™ PacketPortal™ provide a scalable to approach to pervasive monitoring, management, and troubleshooting. PacketPortal's architecture decouples data collection from management, aggregation, and analysis. This innovative approach allows a highly scalable, distributed, cost-effective method to embedding visibility throughout the network, reducing the cost, footprint, and complexity of capturing rich intelligence about the network, the content, and the customer experience.



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