CHAPTER 2

Customer Challenges

This chapter summarizes the challenges that enterprises face when delivering applications across corporate wide-area networks (WANs).

The WAN is the connective fabric that holds a distributed organization together. Because the WAN has bandwidth restrictions and latency issues, however, application performance suffers without WAN and application optimization. With optimization, IT organizations can substantially improve application delivery to ensure secure, cost effective, and acceptable application performance to meet business needs.

2.1 Consolidating Data Centers and Server Infrastructure

Enterprise servers and applications continue to be consolidated and centralized. For example, previously it was common for remote sites to have their own file and various application servers. The cost of maintaining servers remotely is high and new regulations and compliances such as Sarbanes Oxley (SOX) and Health Insurance Portability and Accountability Act (HIPAA) push costs even higher and drive server consolidation in the data center. IT organizations face new challenges of providing LAN-like response times across the corporate WAN even as data and processing become more centralized.

2.2 Globalization

The workforce is increasingly located outside of headquarters. These remote users demand the same quality of experience when using applications and services that their headquarters colleagues enjoy connected to a server over a LAN. Remote access should not result in lower productivity due to slower response time. IT organizations face constant challenges to achieve the same response time and "always-on" services for remote users. A survival strategy is also needed so that remote locations can function alone in the event of resource failures.

2.3 Improving Business Continuity and Disaster Recovery Processes

An enterprise's ability to failover seamlessly from one data center to another and the ability to back up data in all remote locations is essential. This requires moving massive amount of data across a WAN in real time. At the same time, enterprises want to reduce the costs of data backup and disaster recovery. Even worse, if a scheduled backup operation spills over into regular working hours, remote users may find that their application response times become unacceptable.

2.4 Delay-Sensitive Applications

Real-time applications, such as Voice over Internet Protocol (VoIP) and interactive video, have strict requirements on transport delay, jitter, packet loss and bandwidth availability. Therefore, it is essential to prioritize different traffic types to minimize congestion risk in the end-to-end service path in order to deliver high quality voice or video, as well as provide preferential treatment to business-critical applications.

2.5 Badly Behaved Applications on the WAN

Too many businesses deploy new applications without completely understanding how the applications will work in a complex, distributed network. Many business applications are developed without considering requirements relevant to performance in a real network (for example, WAN latency and limited bandwidth).

Even worse, many application architectures, which are designed for use over a LAN, do not provide efficient performance across corporate WANs. Unfortunately, LAN protocols are “chatty.” For example, an especially bad variant of “chatty” occurs when applications break messages into small data blocks. The application works in a serial manner: an acknowledgement is required for each data block before the next one can be sent. This can require many round trips to send just one message, causing significant application delay. Much of the delay comes from time on the wire. In this example, latency degrades application performance and limits application throughput. Adding bandwidth does not solve such performance issues. For example, Microsoft Exchange and Common Internet File System (CIFS), Network File System (NFS), and many web-based applications have latency issues. In fact, these applications show increasing response times the further they are deployed from the data center.

Although many applications can be altered to accommodate latency and bandwidth restrictions, modifying applications is not always viable. For example, shrink-wrapped applications usually cannot be modified. In such cases, a solution outside the applications is needed. Deploying WAN optimization and application acceleration tools in the network addresses latency and performance problems, but do not require any changes to the applications.

2.6 Webified Applications

Computing is changing. We are now in the early stages of implementing “webified” applications. These new application environments demand a new type of network that can support the unique requirements of Web-based application technologies.

For example, Web-enabled applications require many more connections between the client and server. New acceleration technologies must deal with the increased number of connections to achieve better application performance. Moving HTTP and XML enables developers to include more objects, such as graphics, that increase the amount of transferred data. Migrating applications to Service Oriented Architecture (SOA) radically changes network demands. Web applications are usually worse with respect to bandwidth requirements as they have to render the screen. For example, a branch user using the SAP client will only get requested data. However, a user using SAP over the Web must receive formatting and graphical data.

2.7 Delivering Rich Content and Rolling out New Services

Large organizations struggle to ensure that employees have the latest content, whether it is training collateral, compliance documentation, email, or video. IT organizations are constantly challenged to deliver more services, such as large file transfers (e.g., medical imaging and computer-aided design (CAD) files), VoIP, and streaming video. Such applications contribute to high bandwidth growth. However, IT organizations are also expected to simultaneously reduce operational expenses (OpEx). In practice, cost bandwidth costs still represent a significant portion of recurring OpEx for many organizations. Therefore, IT organizations want to exploit WAN optimization technologies to extend constrained bandwidth resources and avoid costly bandwidth upgrades.

2.8 The Network Must Truly Support the Business

IT organizations are constantly challenged to deploy new applications to drive user productivity and gain competitive advantage. There is a direct correlation between the application environment and the network solutions required. Network architectures often need to be transformed to meet new business requirements. The Cisco “network as a platform” approach allows businesses to use the network to gain significant benefits for diverse sets of applications and infrastructure architectures. By leveraging the Cisco “network as a platform” approach, we can empower our customers to rapidly roll out new applications and services across their organizations, allowing them to maintain business competitiveness.