If you’re fortunate, you’ve managed to survive the global economic meltdown of a lifetime with your career and company intact. So savor that briefly but be aware the stakes are likely to be even higher for IT management professionals and their staffs going forward.

That’s because the after-effects will include relentless downward pressure on costs, with the most intense scrutiny ever on each budget line item and each expenditure. Meantime, if you work in one of the many industries hit hard by financial turmoil, investment in many new technology platforms may be stifled for the foreseeable future.

At least that’s the case for technology investments that can’t deliver a rock-solid return on investment (ROI) in a very short timeframe. The ideal scenario is to achieve ROI quickly by either increasing revenues, reducing operating expenses or letting companies avoid new spending in order to pass muster.

Experts say a technology category, that could be broadly classified as bandwidth and IT resource management, delivers ROI in precisely these areas. The category includes Wide Area Network (WAN) optimization.

This technology allows users to manipulate WAN traffic for increased efficiency, throughput and response times. It also offers the prospect of saving money, which often makes its business case a no-brainer. Fortunately, a slew of vendors offer products in this area.

**Fast ROI**

WAN optimization products seek to speed applications by eliminating redundant transmissions, compressing and prioritizing data, streamlining chatty protocols and more. That improves the utilization of bandwidth and halts network congestion.

“Payback time, just in hard costs, can be very rapid” with these technologies, says Eric Siegel, senior analyst with the Burton Group, a consulting firm. There are softer, or less tangible, benefits as well, experts say.

“If it takes hours to ship a file back and forth between offices, maybe they won’t bother, and they’ll lose a bid or a project as a result,” Siegel adds. “But with technologies such as WAN optimization, people can and will continue to reach out to the best person in the company, even if they’re on the other side of the world.”

Even with economic and budget pressures at an unprecedented level, employees have grown so connected in recent years that their usage of network and other IT resources will continue to increase sharply. This is even if their company’s spending on technology stays flat or even declines.

**Growing Network Demands**

One factor for greater network importance is the practice of companies opening lots of branch offices — justified as a tangible way to achieve proximity to their customers. With each new office comes more IT infrastructure, including bandwidth that has to be deployed, paid for and managed in support of all the new applications running over the network.

“Bandwidth is a constant concern for our customers,” says Mark Urban, senior director of product marketing for Blue Coat Systems Inc., a vendor of WAN optimization products. “It’s inexhaustible,” he says. “Demand keeps climbing due to the sheer number of applications that companies have in use.”

For example, software manufacturers are increasingly creating applications that utilize the resilient nature of IP. Network convergence, virtualization, physical security and business continuity are all increasing network importance. And everyone assumes a high level of service availability for these applications.
Now it’ll be up to IT to figure out how to better manage that proliferation of applications and data. And this will likely be without the option of throwing more bandwidth at the problem.

“From enterprise customers and the government sector too, there’s a clear desire to get more out of existing WAN connections,” says Abhinav Bisarya, product marketing manager at Juniper Networks, whose products perform WAN optimization. “That monthly recurring bill is part of their operational expenditures, and they’d like to bring it down.”

**Managing For Efficiency**

Getting the highest possible utilization out of existing IT resources — servers, bandwidth, storage, CPU cycles — has been a long-standing goal of IT organizations and corporate financial managers. As we move through 2009, many IT organizations will have no alternative to doing more with the resources in place.

That’s precisely where WAN optimization delivers so much value. WAN optimization — generally delivered in the form of an appliance that sits at endpoints on a network — performs four key functions, regardless of what vendor’s product is being used:

- **Data compression.** This involves squeezing down data before it reaches the WAN, carrying it with this reduced footprint over the WAN and then decompressing it at the receiving end of the network. Using less bandwidth for a particular application means there’s more available for other apps.

- **Caching.** WAN optimizers cache — or store in high-speed, readily accessed memory banks — frequently transmitted data and determine what has been updated since the last transmission. That way, they are able to transmit only changes that have occurred since the last transmission, rather than entire files on a repetitive basis, eliminating the use of bandwidth for data that is no different than the last time it was transmitted.

- **Optimization of Transmission Control Protocol (TCP) or other protocols.** This includes taking redundant, protocol-specific chatter — think of handshaking or pinging to establish connections or confirm status — that would be traversing a WAN and eliminating it.

- **Quality of service.** These are algorithms to prioritize applications and the amount of bandwidth available to them based on their value to the organization.

“When you combine all four functions together, that really allows you to use your WAN connections a lot more efficiently,” says Sven Rasmussen, LAN/WAN specialist at CDW. “A T1 line is still going to be 1.5Mbps, but you’re able to use it a lot more efficiently, to get a lot more data through.”

**Applications Proliferate**

Companies that supply WAN optimization products say a slew of applications are driving the need for their products. The increase in traffic being carried over corporate networks has been documented ad infinitum. Less frequently analyzed has been the sharp increase in traffic that Blue Coat’s Urban labels “recreational.” That includes music downloads from iTunes and employees watching YouTube and other video sites during “downtime” at work or at home.

Another trend is the consolidation of IT infrastructure into large data centers. These data centers are designed to centralize as many applications as possible on a unified hardware and telecommunications infrastructure.

With such consolidation comes an explosion in bandwidth requirements for these mega-facilities. If the network “pipes” into those facilities aren’t architected — and optimized — correctly, performance and reliability can be severely degraded.

“I T consolidation is a huge play right now,” says Apurva Dave, director of product marketing at Riverbed Technology Inc., maker of the Steelhead WAN optimization appliances. “Having applications run at acceptable speeds means you can be more efficient about the footprint of that application. You no longer need to deploy servers in five regional hubs; instead you can deploy them in one location and make them accessible worldwide.”
Blue Coat’s Urban agrees, adding, “Companies are moving storage and files from branch offices to the data center.”

Large-scale consolidation can only work, experts agree, if end users can be guaranteed the application performance they need to be as productive as possible in their jobs. And bandwidth management platforms are critical to allowing them to do that.

Another application that’s growing in usage and bandwidth consumption is IP telephony or Voice over IP. The technology ties a corporate phone system directly into the data network and enables integrated voice-data applications without the cost of dedicated voice lines. Unfortunately, that doesn’t really mean that VoIP voice becomes free.

The voice component of VoIP applications can be a bandwidth hog. It can sap available resources, including bandwidth that had been available for mission-critical applications carrying purely data.

Voice requires a high level of quality and can’t be squeezed down to a level that the quality of the transmission is unintelligible. In addition, it can’t be delayed or slowed down in favor of other applications; otherwise the information being communicated by voice gets out of sync.

A final application that increasingly comes into play is disaster recovery and business continuity. WAN optimizers ensure no single WAN connection or server is a single point of failure.

They’re built to redirect traffic to systems that are up and running if one goes down. “If you lose one link, you can actually still continue to work. It ensures productivity is maintained and downtime doesn’t occur,” says Yaron Bielous, vice president, product management for Radware, whose products perform WAN optimization and application acceleration.

**Containing Costs, Reining In Sprawl**

Recreational traffic and VoIP introduce similar problems — huge files or chunks of data going over the network and sucking bandwidth away from core business applications. WAN optimization vendors have a common approach to controlling that problem and ensuring those voracious applications don’t overtake the network.

Namely, their systems support optimization and management functions that let IT managers assign priorities to traffic, define the quality of service that must be available to each application, and even limit bandwidth available to certain applications when that’s appropriate.

Using Blue Coat’s PacketShaper appliance as an example, Urban says it can be configured so that only 10 percent of total bandwidth — or whatever ratio IT managers deem appropriate — is available to recreational traffic when capacity constraints or thresholds come into play. Similarly, quality of service can ensure real-time traffic isn’t degraded due to latency in the network.

Vendors such as F5 Networks focus on application delivery and response time to ensure end users are getting the response time that their applications require. That’s about more than just removing load from servers; instead, it’s optimizing what servers are able to focus on and do.

“It’s not just distributing the load but doing things like Secure Sockets Layer (SSL) offload so servers can serve the application and offload processing intensive things like encryption,” says Mike Krasnow, product marketing manager at F5 Networks, which makes the BIG-IP Controller.

Offloading SSL, a widely used encryption protocol, relieves a server of the processing burden of encryption and/or decrypting traffic sent via SSL. This frees a network server to focus on running the core functions of an application.

“We really want to make sure each server is getting the load it can handle rather than just spreading load around without really looking at how the app is performing,” Krasnow explains. “What matters is whether the app is being delivered and not whether you’re sending packets to a server.”
Compression isn’t glamorous technology. It’s been around for years in various capacities. However, it’s core to the value that WAN optimization products bring to the table.

Radware’s AppDirector product, for example, compresses HyperText Transfer Protocol (HTTP) objects such as GIF and JPEG images, explains Bielous. “You want to reduce traffic that goes from the client browser to headquarters.”

Juniper’s Bisarya adds that carriers will at times suggest customers increase their bandwidth when they begin to face constraints. But he says technologies such as compression can wring more use from the bandwidth in place and, perhaps, avoid additional bandwidth expenditures.

**What Comes Next**

Looking to the future, market experts expect a convergence regarding products that perform management and optimization of bandwidth to be more tightly incorporated into security and other core infrastructure products.

“In a couple years this technology is going to be more integrated into management and security”, says Burton Group’s Siegel. “And more a part of a whole application delivery model.”

As that plays out, customers are likely to benefit from approaches like that in use by Juniper Networks. The firm’s common hardware strategy means components such as hard drives are usable across all products in their portfolio.

That’s just the sort of economical thinking that shows vendors are working aggressively to provide products, platform integration and new functionality. This should help IT managers ride out this downturn while continuing to deliver robust and efficient network infrastructure.

**WAN Optimization Products Offer Network Plusses**

Increasing numbers of applications on the network may cause slowdowns resulting in decreased productivity and customer-service degradation. WAN optimization technology offers a solution and brings a number of important business benefits to IT organizations:

- Improves employee productivity and business agility by accelerating revenue-generating applications
- Reduces WAN bandwidth expenses
- Decreases branch-office infrastructure costs by enabling server, backup, application and storage resources to be centralized into the data center
- Improves disaster recovery operations via remote data backups and replication
- Boosts network performance without the need to acquire additional hardware

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