The Challenge
Where once there were servers spread far and wide across the enterprise, now there are fewer, typically cloistered in well-managed and closely-watched datacenters. The benefits in cost and risk reduction are real. Unfortunately, the amount of data they host and serve are not reducing – quite the opposite. Where there were once dozens or hundreds of different pathways for server-to-server communication sharing this load, now all the traffic goes over just a couple of strained datacenter to datacenter connections. Large pipes are expensive and erode consolidation savings, but are minor costs compared to the risk of applications failing due to inadequate connectivity. Moreover, there are good reasons to believe this problem will get worse, not better.

Traffic between datacenters, and from datacenters to large regional offices, is growing dramatically. Four factors are colliding to drive up bandwidth usage and reduce application performance:

Data Archival for Compliance
- 58% of companies have deployed or are actively deploying email archival; 53% are doing the same with user files stored on local hard drives according to an October 2006 Forrester study. All of this data has to be moved, updated, archived and retrieved in narrow backup windows, straining WAN links.

Server Consolidation
- For security and cost reduction, servers have left branch and regional offices and moved to the core. Not only must users travel farther for their applications, but fewer servers also mean more bandwidth intensive hot-hot active clusters between locations for redundancy.

Expanding Disaster Recovery and Business Continuity SLAs
- The stunning realization of previously marginal technology and strategic risks drives a renewed interest in the enterprise’s ability to withstand and restore service in the event of an incident. The result is more data being replicated to more locations in ever smaller backup windows.

Voice over IP
- 32% of the Global 2000 are deploying VoIP technology, and another 29% say it is a critical initiative for 2006. Unlike other time-insensitive applications such as email, VoIP is bandwidth intensive and subject to significant performance problems without proper WAN management.

Growing File Sizes
- Some enterprises such as graphic design, engineering and entertainment, have been coping with huge files for years. For others, growing adoption of rich media, video and e-document retention means ever-increasing numbers of ever larger files. All those files must be copied, accessed and backed-up, usually over WAN links. As many enterprises are discovering, adding more bandwidth or quality-of-service lines like MPLS alone will not solve the problem. Beyond a few Mbps, throughput and performance does not scale linearly with bandwidth, as latency, protocol issues and physical limitations of the transport come into play. To continue meeting SLA mandates under ever greater pressure, administrators need a new approach to managing and optimizing their networking investments.

The Solution
WAN links between datacenters have complex traffic patterns that require sophisticated solutions. This must include an ability to recognize traffic as a user-application pairing, allocating the appropriate resources for each need. Further, it must also provide technologies to dramatically improve the responsiveness and bandwidth profile for critical applications.

The first step towards enhanced WAN performance is to understand and control the traffic, allocating bandwidth to traffic that has the highest business priority. The more dependant an organization becomes on real-time applications like video and VoIP, the greater the demand for a policy-driven, application-fluent bandwidth management system. Specifically:

Optimize and Manage your Datacenter to Datacenter Traffic with Blue Coat MACH5 Technology
Through a combination of server consolidation and organic data growth, traffic between datacenters is growing at an accelerating rate. Worse, protocol limitations and tiered bandwidth pricing translate into steep cost increases as throughput expands. To get the backups and database synchronizations completed on time, while maintaining availability for VoIP and Internet backhaul, enterprises rely on WAN optimization from Blue Coat. Using Blue Coat MACH5 technology, companies can compress, prioritize and optimize their datacenter to datacenter traffic.
User- and Application-aware Bandwidth Management

-> Priorities change throughout the day and vary by user, application and context. The solution must be able to understand the difference between a user-initiated file copy and one started by the backup daemon – even if they are on the same computer. Further, to leverage their investment in directory services, organizations must be able to set bandwidth allocations not just by authenticated user, but by their location and group memberships in LDAP repositories like Active Directory.

Content awareness in addition to bandwidth management

-> Removing, or at least throttling, unnecessary network traffic first requires an understanding the content, not just the protocol. Content filtering is not only a compliance mandate, but a useful tool in bandwidth management as well.

The second step is a complete suite of acceleration solutions that approach application delivery in a variety of ways, as any individual technology cannot solve the diverse challenges presented by datacenter backhaul. Specifically:

Byte Caching for differential backups

-> Although each organization has idiosyncratic data streams that are highly repetitive, generic compression alone is only effective in finding the most obvious redundancy. Byte caching builds a library specific to your data patterns and takes them off the wire, dramatically improving performance, especially for backups that are already differential-only.

Object caching and pre-positioning

-> Why copy files more than once? Object caching, especially in conjunction with pre-positioning, can serve files locally without the management burden of an overlay file network.

Protocol-specific optimizations

-> Much of the business critical traffic on WANs – database log shipping, backup, collaboration – under the hood still rely on protocols such as CIFS. These protocols were not designed for WANs, and even low latency links cause significant performance degradation. By optimizing these protocols, much of the latency associated with these applications can be eliminated. TCP optimizations further reduce latency, but the application protocols make a more significant impact.

Compression

-> For further removal of redundant data, additional inline compression is necessary, especially on the first copy before caching improvements begin in earnest.

Support for SSL-encrypted traffic

-> SOA web service applications, outsourced software-as-service websites and user HTTPS browsing on average account for over 30% of WAN traffic. Any solution that doesn’t open, manage and accelerate these isn’t delivering some of the most enterprise critical applications. As Service Oriented Architecture becomes more and more of a business reality, applications communication between operations centers is set to grow; unified web portals for customers, partners and internal employees are already aggregating data from around the enterprise. For compliance, privacy and security, these web services are usually encrypted with SSL. Any solution that doesn’t open, manage and accelerate these isn’t poised to deliver the next generation of web-enabled SOA application.

Bulk File Copy: Be it engineering files, video or 3D graphics files, inventory control spreadsheets or just marketing documents, user and system-initiated individual or batch file copies are a large part of the corporate WAN. However, the protocols commonly used are notorious under-performers – even on Quality of Service guaranteed MPLS links. MACH5 will optimize these chatty protocols, while bandwidth management ensures sufficient room on the link for the copies to complete. If they are even copied at all; the combination of byte caching and object caching means that only the changed parts of files need cross the wire. For bulk transfers a 10x increase in performance is common.

Inter-site Email Backhaul using SMTP and IMAP: Passing files over email is standard business practice; those attachments can generate a tremendous amount of traffic. Blue Coat MACH5 recognizes these as file transfers and can optimize and cache even over email protocols. Further, email traffic isn’t real-time, and can be compressed and de-prioritized to make room for time-sensitive protocols like VoIP. For email backhaul, a 5x increase in performance is common.

Differential Backup applications, such as Double-Take, SnapMirror, EMC and BackupExec: These applications keep track of file changes, and only pass changes between locations. However, they too can be dramatically compressed using byte caching technology, and are subject to the same bandwidth contention issues of any
other application if a traffic control solution like MACH5 is not in place. Using bandwidth management, Blue Coat appliances can ensure time on the wire for backups, and optimize TCP connections to ensure backups finish in the allotted window. For most backup applications, a 10x performance increase is common for incremental backups, and up to 45x for full recovery.

Database Replication using native SQL replication: Oracle replication and Microsoft DTS use complex SQL statements to automate data transfer. Byte caching and compression removes the inherent redundancy of this data, while our user-aware bandwidth management can separate database use from database backup and allocate bandwidth accordingly. Further TCP enhancements are also possible for a consistent – and consistently fast – data stream. For most SQL automated transfers, a 3x performance increase is common.

Why Blue Coat MACH5?

Enterprises shouldn’t have to make compromises when optimizing their datacenter connectivity, and they shouldn’t have to deploy multiple boxes to achieve their application objectives. Blue Coat MACH5 technology brings together all the available WAN optimization features together in a single appliance. Now you don’t have to trade-off robust bandwidth management for byte caching and protocol optimization. Nor do you need to put box after box inline for your most critical traffic.

Blue Coat SG Appliances uniquely meet the entire solution criteria – and provides integrated security and policy controls – through a combination of:

- Policy driven Bandwidth Management, capable of making decision based on any combination of users, user group, location, application, content, source, destination and time of day.
- Byte Caching to create a custom library of repetitive patterns in your traffic, and keep that data off the wire for faster service and lower bandwidth utilization.
- Object Caching that keeps the most used files off the wire by serving them locally.
- Protocol Optimization to remove the scalability and distance challenges associated with high bandwidth lines and legacy protocols.
- Compression to remove the most obvious redundancies from your WAN.
- Complete Layer 3 and Layer 4 transparent tunnels, to seamlessly integrate into your existing network management and monitoring infrastructure.

- Optional encryption of the data portion of the tunnel between datacenters, providing privacy without sacrificing network transparency.

Blue Coat appliances with MACH5 technology accelerate and secure your business critical applications, in a single box, without the worry of bolting on security after the fact.

Return on Investment

Calculating value in IT investments is often a challenge. When analysts say that WAN optimization has a payback period of 6 months , they generally cite two types of ROI that can be quantified, bandwidth avoidance and business process enablement.

The return on bandwidth avoidance is a very straightforward calculation. In many parts of the world, there are significant tiers of throughput pricing; costs do not grow linearly with additional bandwidth, and are often significantly greater for high-end connections. Worse, even as higher operating costs outpace the bandwidth added, the performance returns on a bigger WAN pipe are decreasing thanks to latency and protocol inefficiencies. If organizations can expand backup, video and VoIP activities without adding more bandwidth expense, the savings is computed as:

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\text{Net Savings from Optimization} = \text{Cost of Next Largest Pipe} - \text{Cost of Current Pipe} \times \text{Planning Horizon in Months}
\]

This is a conservative figure; it doesn’t require testing the WAN optimization to see exactly how much bandwidth savings you’ll receive and comparing that to the cost per megabyte paid today. Such a survey often leads to even larger savings estimates.

Another metric is application enablement. VoIP implementation stalled? New ERP system not working across the country the way it did across the lab bench? How much is it worth for the backups to complete each night? Often each application team in isolation makes assumptions about how much more time they need on the wire, and when they combine quickly realize there isn’t enough to go around. WAN optimization from Blue Coat solves this problem. The value of that solution can be directly tied the cost of letting individual applications, and the business imperatives they deliver, fail to perform. Often the cost of a Blue Coat solution is not only less than the cost of additional bandwidth, but a fraction of the price of failure for business critical applications.

Blue Coat appliances with MACH5 technology accelerate and secure your business critical applications, in a single box, without the worry of bolting on security after the fact. For more information on Blue Coat solutions please visit www.bluecoat.com or contact us at 1.866.30.BCOAT.

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