

Enabling Productivity Through Application Acceleration

2006 Application Acceleration Challenge



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Productivity Improved with Acceleration?

Productivity for people is often measured in terms of how many jobs or processes can be done in a certain period of time (per day, per week, etc.).

Another way to express that kind of metric is how long it takes to perform a job or process. Many of the tools that IT supports – user applications – are designed to make that job or process easier and faster to do.

When applications are slowed down, the time it takes to perform a job or process increases (and conversely, when the application is accelerated, the time it takes decreases).

When applications are slowed, productivity decreases.

When applications are accelerated, productivity increases.

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Two Response Time Focus Areas

In the search for application performance, there are two reasons why application slow downs occur ...

- Congestion
 - Local area networks with huge amounts of bandwidth dump their traffic into very limited wide area networks.
 - When too much traffic from the LAN comes, the network must slow things down and start queuing (which also slows things down).
- Latency
 - Most client-server applications are designed on local area networks, with next to no latency. In this environment, it is easy to create interactions that are very chatty.
 - This chattiness takes a huge toll on response time performance when the application goes over the wide area network.

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Two Proven Techniques to Combat Congestion

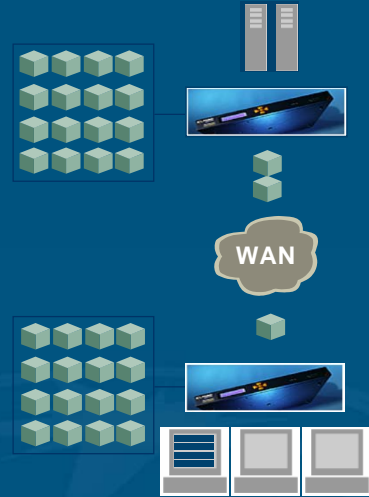
- > If the problem is that there is not enough bandwidth, then why not simply add more bandwidth?
 - That is exactly what **COMPRESSION** does, but usually much more affordably than increasing the link size.
 - With more bandwidth available, there is less congestion.
- > However, simply adding more bandwidth does not always ensure that business critical applications get the bandwidth they need.
 - **QoS** is required for the network to treat business critical applications more importantly than not-as-critical applications.
 - The application mix will not usually stay constant when you multiply available bandwidth – not-as-critical applications are often more aggressive than business critical applications.

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Compass Compression

- > Patented algorithms
- > Byte-level caching
- > Packet header reduction
- > Adaptive packet compression
- > Fully transparent



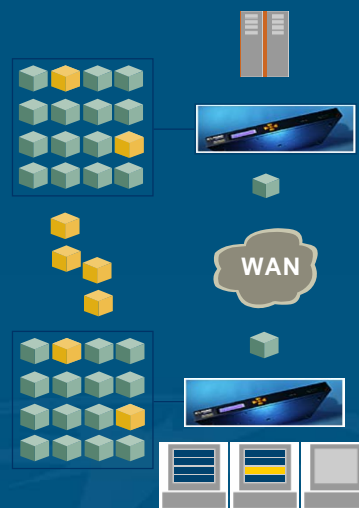
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Compass Compression

- > When data repeats, content is delivered from the edge
 - True data reduction on the WAN
- > The multiplicative "bandwidth effect"

Reduced data sent as flags between Accelerators ... the flags point to strings of data in the dictionaries

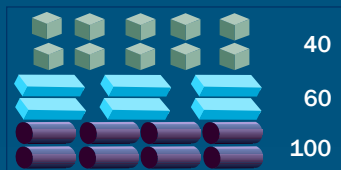


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QoS - How It Works

- > Traffic is categorized into application classes
- > Bytes and packets are tallied
- > Shaping policies govern the flow of traffic
- > Prioritize and control apps
 - Guaranteed, min/max bandwidth for key applications
 - Control/block rogue applications
 - Seamless integration with other optimization services



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Mitigate Latency

Congestion is only an issue some of the time, but latency on the wide area network is always an issue. The problem is that we not able to reduce latency any more than we are able to increase the speed of light.

Rather than trying to *eliminate* latency, the smart strategy is to *mitigate latency*.

- A one time hit of latency is probably not a big problem – it is the additive effect of many roundtrips that make latency a problem.
- Mitigating latency is about reducing the number of costly roundtrips over the WAN.

Reducing the number of roundtrips requires a deep understanding of how applications flow, often necessitating different techniques for different applications. Reducing the number of roundtrips transparently, without requiring any changes to the applications themselves, is a necessity in any modern and complex enterprise network.

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Application Acceleration

- > The WAN is a huge source of **latency**
- > **Latency limits** application performance
- > Compared to the LAN, each time traffic makes a round trip over the WAN, response time increases because of WAN latency
- > Also, this is **not just one round trip** per transaction, but often hundreds or even thousands of round trips per transaction
- > The delay adds up quickly to **poor user experience**

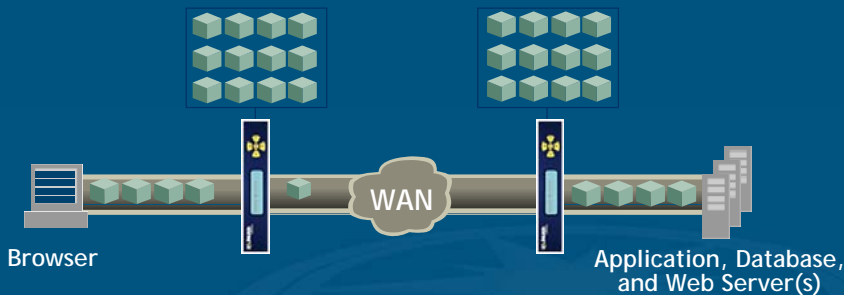


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Application Acceleration

- > Application Acceleration – the Accelerators – **changes that poor user experience**
- > Compass **mitigates latency and packet loss** through caching and traffic reduction technologies
- > Accelerates HTTP, HTTPS, DNS and FTP



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The Inefficiencies of TCP

3-way handshake

- Round-trip #1 and #2

TCP slow start

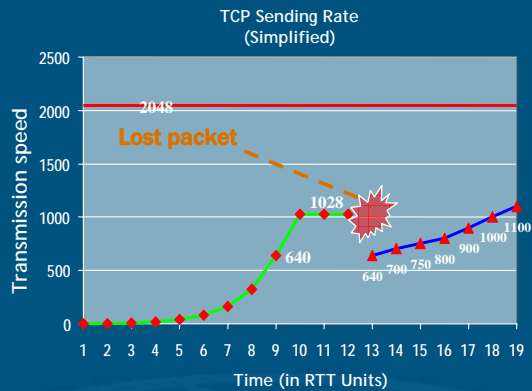
- Transmission speed picks up slowly

Window size issue

- Typical TCP stacks can go up to 64k window size
- This limits top speed in this case to 1Mbps

Congestion Avoidance

- When loss occurs, reduce rate by ~50%
- Shift to conservative speed increase



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The Efficiencies of SCPS TCP Acceleration

No 3-way handshake

- No overhead

TCP fast start

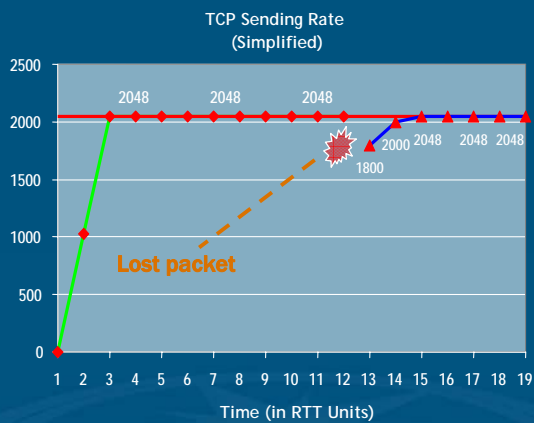
- Full speed from 1st packet

Huge window size

- Default is 512 KB
- Virtually no speed limit

Smarter Congestion Avoidance

- Speed slightly reduced
- Quickly resumes normal speed

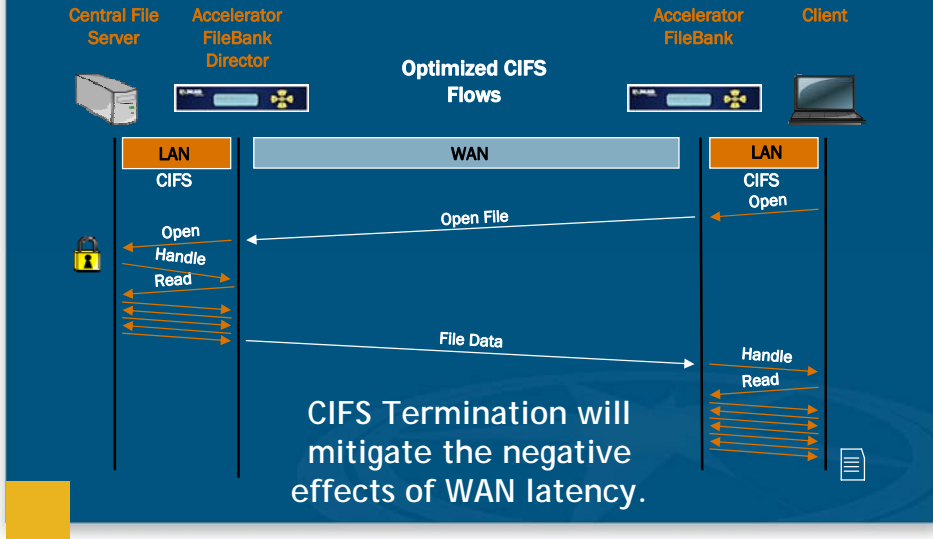


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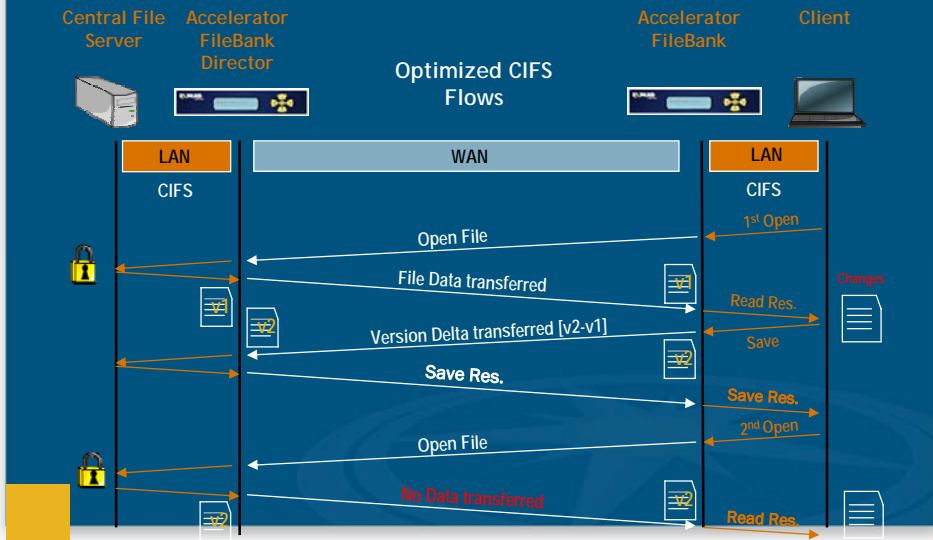
Local CIFS Termination



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Version-based WAFS Optimization



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REAL Results - Putting It All Together

In today's complex enterprise networks, single point solutions rarely get the job done – with change as the rule and not the exception, only a complete solution will really meet the needs of the business.

For example, how useful is a WAFS solution that won't work when large FTP sessions are taking place? You need QoS to guarantee that your optimized traffic is always available.

The other side of this is performance – rather than the lone technique of a point solution, the Compass multi-service platform brings several technologies together to provide a multiplicative effect on response time improvement.

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Combined Performance

Moving a 3 MB Word file over a 256 Kbps link with 200 millisecond delay.
Un-optimized performance is 122 seconds.

	First Pass	Second Pass
Compass Compression Alone	> 49 seconds (149% faster)	> 27 seconds (352% faster)
Compass Compression and TCP Acceleration	> 28 seconds (336% faster)	> 9.6 seconds (1,171% faster)
Compass Compression, TCP Acceleration, and FTP Acceleration	> 27 seconds (352% faster)	> 0.2 seconds (60,900% faster)

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Application Acceleration Checklist

- > Compression and QoS for congestion
 - Need application visibility before you can effectively apply QoS
- > Application and Protocol Acceleration for latency
 - TCP acceleration alone (Protocol Acceleration) misses the higher level opportunity for ultimate performance (see the Combined Performance)
- > Transparency is the way to simplify operation
 - Solutions should be able to fully function and be compliant in all environments (i.e., MPLS, SMB signatures, etc.)
- > Part of being a complete solution is reducing the total cost of ownership
 - Central management and reporting is key
 - Multi-box solutions in the branch (i.e., one box for WAN Optimization and one box for WAFS) is an expensive solution

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Don't Leave Your Remote Users Out on a Limb?



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