

A nighttime photograph of a city street with tall buildings in the background. The foreground shows a road with white lane markings and a metal guardrail. Long, colorful light trails in red, orange, and yellow curve across the lower half of the image, suggesting motion from vehicles. The buildings are lit up, with some windows glowing. The sky is dark.

coevolve™

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# Renting an optimized WAN

*How WAN Optimization as a Service can deliver a better user experience without breaking the bank*

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# Introduction

More from less. It's one of the unwritten expectations of IT management in a world where it's expected that things will continually get twice as fast, at half the cost.

The enterprise WAN is no different. With growing demands on bandwidth and simultaneous pressure to improve user experience and reduce the effects of latency for business critical applications, IT Managers have a major task at hand. Their global WAN may already include a mix of vendors, technologies, bandwidths, and geographies, making this an even complex issue to resolve.

Until recently, enterprise IT Managers had very little choice other than to buy more MPLS bandwidth (which is difficult to procure, slow to deliver and very expensive in many locations outside major cities), and/or deploy a capital intensive hardware-based optimization solution to attempt to improve the user experience.

It's a major challenge; especially when vendors offer very few promises in performance gains before actually making the investment.

There has to be a better way. And thankfully there is.

This WAN Optimization edition of Coevolve's technical whitepaper series looks at the challenges, the technologies, and methods used in recent years to improve WAN performance. In addition, it provides an overview of the new improved operating model and technologies as we transition from a world of hardware-based optimization to the 'as a Service' model.

WAN Optimization as a Service isn't a "rip-out and replace" model; instead it's an opportunity to complement your existing infrastructure investment – allowing you to optimize more sites on your network, more cost effectively.

# A Network That Keeps Costing Money

(And keeps getting more outdated)

It's been the norm in the industry for many years: deploy a new global network across the enterprise, install new networking & routing equipment, and then implement WAN optimization appliances to achieve a performance level that users will accept. Then add more bandwidth when performance is no longer acceptable.

Unfortunately, that's simply not an efficient strategy anymore. Neither is it good use of your already constrained IT budget.

For instance, in a typical global mining firm, there can be a mix of large corporate offices, international branch offices, site / project offices, multiple data centers, mine sites, exploration sites, processing plants, and shipping terminals; combined with more than ten different connectivity models of varying quality. And that's without adding in the geographical issues that cause network latency and jitter.

Making all of this work and to improve application performance is tough (and expensive), to say the least. It's where the major WAN Optimization hardware vendors like Riverbed, Silver Peak, Cisco, Juniper and Blue Coat have carved out a market estimated at \$1Bn<sup>1</sup> by enabling corporate networks to perform the way users expect them to.

But these WAN Optimization hardware vendors have a challenge in a world where the topology of the corporate WAN is rapidly changing. Following are just some of the factors affecting this older network optimization solution model:

- They're primarily designed to run on WAN infrastructure that's reliable and predictable, which poses a problem for cloud-based solutions accessed via the Internet
- They don't tend to cater well for multiple device types connecting to and using the WAN (servers, SANs, desktops, laptops, VoIP phones, smartphones and IoT devices)

- Cloud-based applications are increasingly adding performance pressure on WANs due to their low latency requirements
- They have (traditionally) high CAPEX & OPEX costs, with ongoing maintenance and monitoring required including patching and regular hardware refreshes
- They add logistical challenges in getting equipment to site, especially for highly remote requirements like offshore Oil & Gas facilities or mining sites
- They require increased technical skillset by onsite staff, adding to the cost of maintaining the network
- In some instances, smaller corporate locations requiring highly optimized WAN performance may have to go without any optimization due to the high costs and long deployment time of the traditional WAN optimization solutions

All of these factors and more are causing Enterprise IT Managers to look at newer and more efficient ways of providing the network performance they're tasked with delivering.



# WAN Under Pressure

## Management Study Key Findings

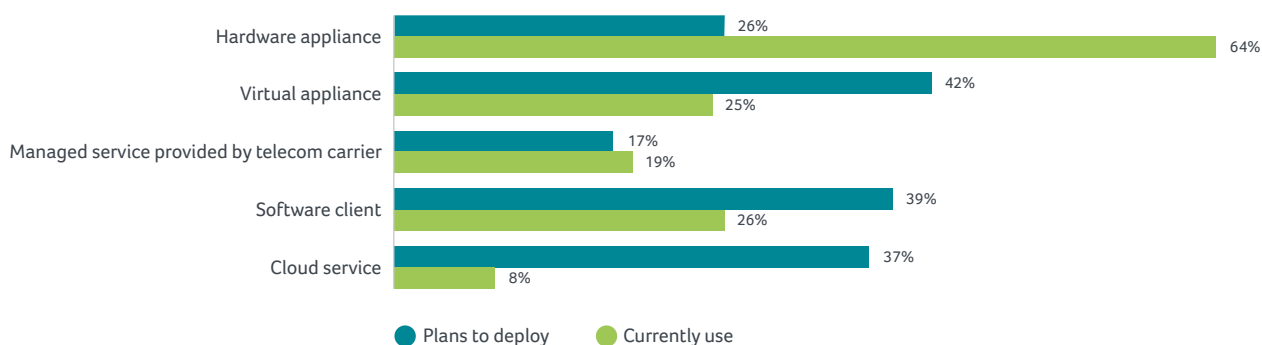
Trac Research's *2013 WAN Management Spectrum Study*<sup>2</sup> reported the findings from more than 400 user organizations regarding their view on the corporate WAN:

- 22% of traffic currently being transferred over their private WAN will be moved to public Internet in the next year.
- Despite having WAN Optimization technology in place on the network, organisations are not optimizing 54% of their remote locations.
- Two times more organizations reported to be looking at WAN Optimization as a software or cloud service when compared to hardware solutions.
- In the past twelve months, the amount of data transferred over enterprise WANs increased by 151%.
- 56% of organizations were said to be replacing their WAN Optimization solution due to existing solutions not scaling to the levels promised.
- On average, organizations deploying WAN Management technologies experienced 2.7x better WAN bandwidth.

This study clearly shows that there are changes going on in the way many enterprises are currently managing their WAN performance.

But what's really telling is the action that enterprises are taking. In the below table, it's clear that virtual optimization is well and truly a trend that's taken hold.

**Figure 1:** Deployment methods for WAN Management



SOURCE: Trac Research 2013 WAN Management Spectrum Study<sup>2</sup>

# The WAN Is Changing Into A New Type Of Network

Cloud and to a lesser extent, Mobility, is transforming the way networks are utilized, by adding an extra layer of complexity: the Internet.

Until recently, traditional carrier based WANs were used to access data center or head-office based application infrastructure, and secondarily for centralized Internet access. But with the enormous growth in cloud-based technologies taking over everything from file server to SAN to applications and compute, Local Internet links are becoming more relevant at every site on the network.

Therein lies the challenge: technology change. File server traffic (for instance), would traditionally be carried via the MPLS network connection from a remote office to the head office or data center. This traffic is usually well optimized if you have the hardware based WAN optimization devices at each site.

However, with so many business functions now being cloud based (outside the network perimeter) rather than sitting inside the network, the challenge of latency, chatty applications, and protocols inefficiencies is amplified. For example, TCP or Transmission Control Protocol maintains a continuous connection and expects regular acknowledgements from the receiver as well as requesting retransmission of any lost packets until all packets are sent to the receiver.

This adds significantly to the time it takes for a file to traverse a network, especially when high latency and jitter on large network segments can cause 'dropped' packets (and the resulting partial or complete retransmission of them).

No wonder that a sales manager accessing Salesforce.com® at a remote office wants a direct connection over the Internet to the application, and not via a central data centre a few thousand miles away (which is then dragged across a sluggish MPLS WAN as well).

Today's complex global WANs and cloud-based critical applications simply aren't suited to handle the suboptimal links and protocols, nor are the hardware WOCs (WAN Optimization Controllers) employed to solve the problem.

*"...many TCP protocol stacks are highly inefficient when it comes to managing retransmissions. In fact, some stacks may have to retransmit the whole congestion window if a single packet is lost. They also tend to back off exponentially (i.e., reduce congestion windows and increase retransmission timers) in the face of network congestion—a behavior that is detected by TCP as packet loss.*

*However, if congestion is managed within the network infrastructure by a system that sees all traffic on a given WAN connection, then much greater and more efficient throughput is possible—and aggressive back-off is not required. A much better solution to the TCP fairness problem is to allow individual hosts to consume as much bandwidth as they need, so long as all other hosts receive adequate service when they need it. This can be accomplished by implementing a single congestion window, shared by all hosts, that is managed within the network itself.*

*The result is a system in which hosts get the bandwidth they need in periods of light competition, as well as when competition is more intense. This single window method delivers consistently higher utilization and greater overall throughput than aggressive back-off. Hosts each see a clean, fast network that never loses packets, and cumulative traffic demands are matched to the overall buffering capability of the network. As a result, IT managers experience optimally utilized networks, under the broadest range of network latency and loss conditions."*

F5 Networks Whitepaper: Myths of Bandwidth Optimization<sup>3</sup>



Even by increasing the bandwidth (a common solution for troublesome sites), the application performance won't fully benefit from the increased bandwidth unless the Round Trip Time (RTT) is simultaneously reduced. Unfortunately in a 'long distance WAN' type of world, latency is something that simply can't be eliminated.

So how do you solve this? By using cloud based technology to optimize your network, instead of hardware.

More sites. Faster deployment. Less cost.

# Hardware vs. Cloud Optimization

There's no disputing the importance of the over-arching optimization layer in an enterprise WAN.

Despite the issues of buying, shipping, configuring, implementing, managing and then eventually upgrading hardware-based WAN Optimization equipment, these solutions still do the job well in simple network environments. The problem for global enterprises is that networks aren't simple anymore.

There is however an alternative.

Cloud-based WAN Optimization or '*WAN Optimization as a Service*' is set to fill the void that's currently under serviced by the traditional solution vendors. Companies like Aryaka, Glue Networks, and Pertino as well as some of the bigger players like Cisco are providing solutions that are designed around cloud's interaction with the WAN.












One of the biggest benefits of cloud based WAN optimization is the reduction in bandwidth costs that they bring to the enterprise. By delivering more traffic via relatively cheap but optimized internet connections rather than expensive MPLS connections, huge monthly cost savings can be gained, which brings near immediate ROI.

Even in a developed market such as North America, MPLS connections could cost well into the many *hundreds of dollars per month per Mbps*, as opposed to an Internet links costing around \$20 per Mbps per month (and sometimes even less).

But their immediate benefits are not just cost savings, it is also the speed of deployment. For example, Coevolve's WAN Optimization as a Service based on technology from Aryaka Networks can provide WAN Optimization solutions that can be deployed and activated in a matter of minutes using your existing internet connection, without replacing existing equipment, and most importantly, without CAPEX.

The benefits of incorporating dynamic cloud-based optimization in your network infrastructure are many, as illustrated by this infographic from Aryaka:

**Figure 2:** WAN Optimization as a Service

24x7x365 Support		Reporting	Visibility	SLAs
Application Acceleration (Proxies)			100X ↑	  
Last Mile Acceleration (optional ANAP)				
Bandwidth Scaling (Compression & dedup)			20-50X ↑	  
TCP Optimization			2-10X ↑	  
QoS and Security				 
Global Network				
Reliability	Redundancy	High-Availability	Security	Elasticity

SOURCE: Aryaka Whitepaper - The New WAN, Simplified: Optimization for On-premise and Cloud Applications<sup>4</sup>

# WAN Optimization

Now Available, On Demand

Cloud based WAN Optimization as a Service completely transforms how enterprise IT managers can tune their global networks to get the best results.

Kurt Marko from *InformationWeek Network Computing* explains in simple terms how Cloud is changing WANs in two important ways:

*“The first change amounts to a software-as-a-service approach to network administration, whereby management consoles and device configuration screens sit in a cloud service, are accessed via browsers, and use web APIs to push changes to remote network equipment. This approach, described as cloud-enabled networks, was pioneered by wireless LAN vendors trying to streamline the configuration and administration of thousands of distributed access points, but it’s also applied to branch office routers, VPN gateways, and other security appliances.*

*The second change entails delivering private network services over a public utility. Though cloud services inherently rely on the Internet, they’re obviously not all public services. Companies have tunneled private traffic over the Internet using VPNs for years. Much as Salesforce and Workday use the cloud to deliver dedicated instances of enterprise applications, companies such as Aryaka and Pertino now deliver network-as-a-service offerings. The backbone of those offerings is the Internet, not private point-to-point or MPLS circuits, but with capabilities similar to conventional private WANs”.*

Kurt Marko, *InformationWeek Network Computing*<sup>5</sup>

As Kurt points out, the dynamism of cloud based service offerings (massive leverage, low cost, fast deployment, almost limitless growth) are transforming how enterprise WANs are optimized to take advantage of new and existing cloud technologies.

Unlike hardware optimization solutions that require months of planning, large upfront CAPEX, and ongoing support & maintenance, cloud based optimization solutions can literally be setup in minutes by a junior engineer.

Coevolve's cloud based WAN Optimization as a Service works by short-circuiting the long MPLS paths that business applications encounter on the traditional global WANs. This is done by utilizing low cost internet connections in each location to connect to a globally distributed PoPs, by which the traffic can then traverse a highly optimized global core infrastructure to get to its destination regardless if the destination is an application hosted by a cloud service provider or a private application hosted within your enterprise.

**Figure 3:** WAN Optimization as a Service



SOURCE: Coevolve<sup>6</sup>

By designing the network in this manner, the ability to burst can also become readily available to handle the ever changing application workflows of the enterprise, avoiding the headaches of fixed hardware & bandwidth that traditionally plagues global WANs.

These solutions also provide a highly detailed view of the entire network's performance, because the solution can be cost-effectively implemented in every site, rather than only the commercially justifiable sites.

This doesn't mean that your current investment in a hardware WAN Optimization strategy is wasted. On the contrary, it can be integrated into a wider, smarter, overall solution whilst it's still functional and providing value. The investment already made in these appliances can be leveraged while applying similar optimization functionality to more locations on the network; this will allow the lifespan of these existing appliances to be maintained, and in some cases extended. Full testing will be required to identify the appropriate solution for the full global environment, incorporating the optimum solution for each location type.

Ciaran Roche, Coevolve's CTO notes:

*Legacy WAN technologies do not meet the cost and flexibility demands of businesses today, but it takes technical and operational excellence to make the Internet enterprise-ready. We are providing that technology and deep expertise on an 'as-a-service' basis at a fraction of the CAPEX and much lower ongoing operational cost. The next few years will usher in many game changing technologies as more network components are virtualized, but enterprise IT teams need trusted partners to ramp up the use of these disruptive technologies. This is Coevolve's mission.*



# Conclusion

Will my Wide Area Network (WAN) still be relevant in the near future?

Of course. WANs will have their place for the foreseeable future in a global enterprise. What will change though is the underlying connectivity and is how and what they interact with.

Cloud technologies have transformed how business services such as storage, compute, and applications are procured and delivered to the enterprise. Given that these services are mostly internet based, it's expected that increased demand will be placed on the Internet connections at each individual WAN site, rather than on the expensive MPLS network carrying traffic for your centralized applications.

With lower costs, faster & more agile deployments, and better overall performance –Cloud based *WAN Optimization as a Services* will play a very critical role in delivering the performance for your distributed business critical applications.

It's important to look at the full picture. Working with a partner that understands the end to end solution, and understands the dependencies between each of the component parts can make a major difference to the end user experience. A service such as cloud-based WAN Optimization as a Service can bring real benefits to locations previously out of reach for appliance-based solutions, but it's critical to look at the underlying ISP infrastructure, peering, and performance to get the most out of it. Coevolve is helping its global clients get the most out of their networks by adopting this holistic approach.

For an in-depth discussion on how you can optimize more of your WAN, contact Coevolve by visiting our website at [coevolve.com](http://coevolve.com)

## Please also see our earlier White Paper

***Looking Beyond Utilization*** – Gaining Visibility and Control with Application Performance Management

<http://www.coevolve.com/download-white-paper-looking-beyond-utilization>



## REFERENCES

- <sup>1</sup> Markets & Markets: Network Management – Worldwide Market Forecasts and Analysis:  
<http://www.marketsandmarkets.com/requestsample.asp?id=1041>
- <sup>2</sup> Trac Research 2013 WAN Management Spectrum Study  
<http://trac-research.com/reports/2013WANSpectrum-ipt.pdf>
- <sup>3</sup> F5 Networks Whitepaper: Myths of Bandwidth Optimization  
<https://www.f5.com/pdf/white-papers/bandwidth-myth-wp.pdf>
- <sup>4</sup> Aryaka Whitepaper - The New WAN, Simplified: Optimization for On-premise and Cloud Applications  
<http://info.aryaka.com/rs/aryaka/images/Aryaka-The-New-WAN-Simplified-WP.pdf>
- <sup>5</sup> Network Computing. WAN & The Cloud: Let The Transformation Begin.  
<http://www.networkcomputing.com/networking/wan-and-the-cloud-let-the-transformation-begin/d/d-id/1112822>
- <sup>6</sup> Coevolve – WAN Optimization as a Service  
<http://www.coevolve.com/services/managed-services/wan-optimization-as-a-service>

# About Coevolve

Coevolve provides a range of consulting and managed services across the entire network life cycle for multinational enterprises. Coevolve's mission is to deliver measurable improvement in the technical, operational and commercial performance of these complex networks.

Many new "as a service" offerings are driving an unprecedented need to change outdated network designs. Constantly changing traffic patterns mean achieving application performance visibility across the network is now essential. Coevolve helps enterprises face these challenges, bringing new levels of flexibility and agility into the network infrastructure arena, and always with the objective of achieving improved application performance for end users.

**coevolve**<sup>™</sup> AGILE NETWORKS FOR  
GLOBAL APPLICATIONS

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