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Run by Code

The Next Generation
'Cloud-Ready' Wide Area Network

Contents

Introduction

A standard MPLS WAN just won't do it anymore.

Private MPLS-based networks have been the mainstay of corporate connectivity for the best part of 10 years, but this old design is no longer suitable for today's dynamic requirements. The ever-increasing demand for internet-delivered services and communications has stretched the MPLS model to breaking point.

For forward-thinking enterprises to take advantage of efficiency gains from cloud technologies, there simply has to be a better way.

And thankfully there is. Software Defined Networking (SDN) has exploded into the data center arena over the past few years with its ability to dynamically handle traffic flows. However, the technology's greatest impact is proving to be in the Enterprise WAN.

With several key vendors pushing their own agendas on how SDN could be most effectively implemented, it's a difficult and somewhat risky proposition for IT decision makers to 'throw out the entire network' and start again with a new model.

This edition of the Coevolve Technical White Paper Series looks at the challenges, the opportunities, and the options moving forward for enterprises that wish to get more out of their existing WAN without impacting the stability of their environment.

The MPLS WAN (Circa. 'Yesterday')

It's an unfortunate fact that today's MPLS WAN consisting of fixed carrier tails, interconnects, expensive routers and highly complex switching is struggling with the onslaught of changing traffic profiles.

With the meteoric rise of cloud-based applications and cost effective Infrastructure as a Service (IaaS), the fixed MPLS network of yesterday just isn't suited to the internet demands of tomorrow.

More and more traffic is now internet-based, with productivity tools such as Microsoft Office 365® and Google Docs® as well as compute & storage from Amazon AWS® and Microsoft Azure® requiring faster and more efficient internet connectivity, the traditional MPLS WAN needs a rethink' to cater to this change.

According to ACG Research;

> *"Analyses show that over 50% of the world's application workloads are running in a cloud-based environment of one type or another today (private, hybrid or public), and in five years' time that number is projected to exceed 75%."* [1]

The issue lies in the basic structure of MPLS networks.

MPLS is designed to connect multiple, fixed bandwidth carrier links together via a complex switching arrangement to allow for static traffic flows between centrally hosted infrastructure and branch / remote offices. This works well in high-bandwidth, branch-to-branch links but becomes ineffective in dealing with bottlenecks that occur at smaller sites.

With the vast majority of enterprise traffic up until recent times being file, print and telephony, the MPLS network was quite predictable from a capacity management point of view.

From a budgeting perspective, it was also relatively risk-free to sign a 36 month term (or longer) for a 'safe' amount of bandwidth to most sites, despite the poor ROI. It simply was the best available way to connect static resources with geographically displaced offices. The enterprise paid for predictability.

Enter the growth in Internet-based services and all of a sudden, this model seems like it's from the 90s. This type of capacity-constrained static network is simply no longer viable.

What Needs to Change in the WAN?

Enterprise MPLS WANs have served us well up until this point however there are several limitations to their future effectiveness when the effects of Internet delivered applications and resources are considered.

The following are what could be termed the 'Top Three' limitations of traditional MPLS networks:

High Cost

The capital expenditure costs of designing and deploying a global enterprise WAN are truly enormous, yet this investment usually has a lifespan of three years in most cases. Adding to that the MPLS circuits themselves can sometimes run into hundreds of dollars per Mbps, which adds greatly to the total cost of ownership (TCO).

Further unforeseen costs come into play when enterprises are forced into costly network upgrades (and the associated carrier contract penalties) due to higher bandwidth demands from Internet traffic. Often these upgrades are prohibitively expensive, meaning you have to make incremental increases which tend to be ineffective, all the while adding to the costs of maintaining & supporting the network.

Inefficiency

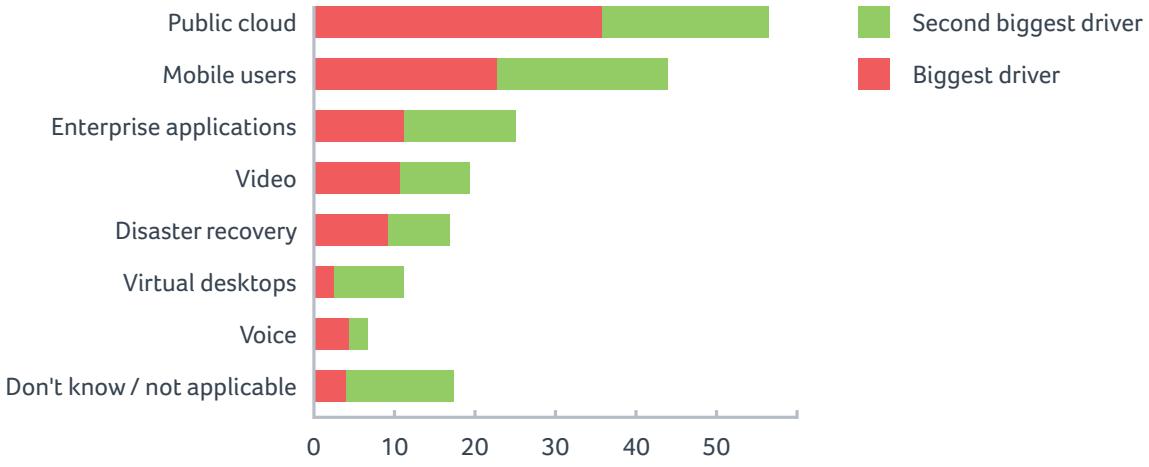
With the near exponential growth of Internet traffic to deliver services in the enterprise, problems arise when much of that traffic needs to traverse an MPLS network. Unfortunately, most enterprise networks aren't designed route Internet-based traffic in the most efficient way. That's because MPLS networks generally are designed around traffic going to central gateways before being routed onwards, rather than incorporating the fastest way possible – *which may not be via the gateway at all.*

Lack of Agility

As covered above, changes to a fixed MPLS network can be costly. However it's not just cost that's the issue. MPLS networks usually are highly complex and require months of careful planning and analysis to design, so when changes are required due to unforeseen traffic increases, whole parts of the network can suddenly require infrastructure upgrades that need to be done quickly with little time for proper analysis.

The other challenge is that most carriers can't change bandwidth components at a moment's notice, sometimes requiring more than 60 days to effect a change. And worse still, it can be an equally long time period to order new switching and routing equipment to handle the increased traffic loads.

Figure 1: Biggest drivers of enterprise Internet traffic



SOURCE: IDC[2]

How SDN Is Changing the WAN Landscape

Software Defined Networking (SDN) caused a dramatic shift in how networking was done within the data centre, allowing for more dynamic traffic flows, greater visibility and better control.

By now implementing these technologies into the WAN, the positive impacts for Enterprise are immense when it comes to dealing with the inefficiencies of MPLS in an internet-centric world.

It essentially breathes 'new life' into the static world of the enterprise WAN. David Hughes, CEO of Silver Peak put it this way;

> *"The idea of SD-WAN is to rethink with a clean sheet of paper how you would build a branch. And if you start from scratch, you don't need a lot of the functionality that's out there. You can go with a very thin branch architecture."* [3]

Software-Defined WANs (SD-WANs) have the ability to dynamically scale, directing traffic via the most efficient path based on traffic type by making control decisions a separate thing to packet handling.

This new way of looking at the network allows for enterprise network managers to make better use of the connectivity technologies available at each site. All too often the MPLS tail is the only tail delivered into a branch or remote office but that doesn't necessarily mean it's the best.

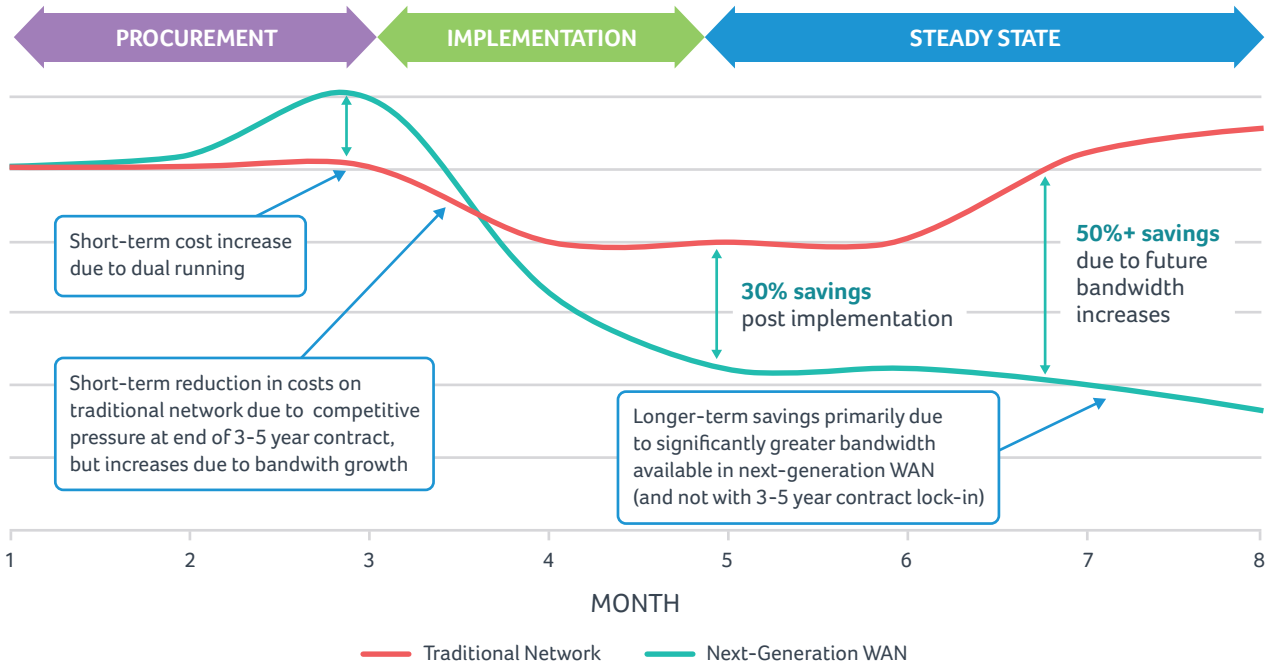
Gigaom Research states in its 2014 report - SDN Meets The Real World Part Two: SDN Rewrites The WAN Manual;

> *"The provisioning of a WAN link, managed from a central point and using an SDN approach, could be as simple and economical as the price of a regular broadband connection.*

The combination of WAN performance, with broadband price and implementation time could create a revolution for the WAN in the same way that SDN has done for the data center." [4]

Being able to utilize cheaper, faster Internet bandwidth tails for some of the traffic requirements spreads the load and improves overall site efficiency at far less than the cost of an otherwise incremental increase in MPLS speed.

Figure 2: Next-Generation WAN Cost Savings



SOURCE: Coevolve[5]

It also changes the switching infrastructure at the site, by moving the 'smarts' to high-powered (and relatively cheap) servers, rather than expensive and inflexible switches.

Mr Jim O'Reilly of TechTarget put it this way:

"A good analogy is building a model. You can start with a block of wood and chop away until the model is finished, or you can use Lego™. The Lego™ version is faster to build and it can be quickly altered. This is the traditional fixed structure switch versus the SDN approach." [6]

Making an immediate shift to SD-WAN isn't a simple thing to do of course.

The challenge will be in working out how to integrate the indisputable benefits of SD-WAN technology into an existing, fixed-infrastructure network.

The Next Generation WAN

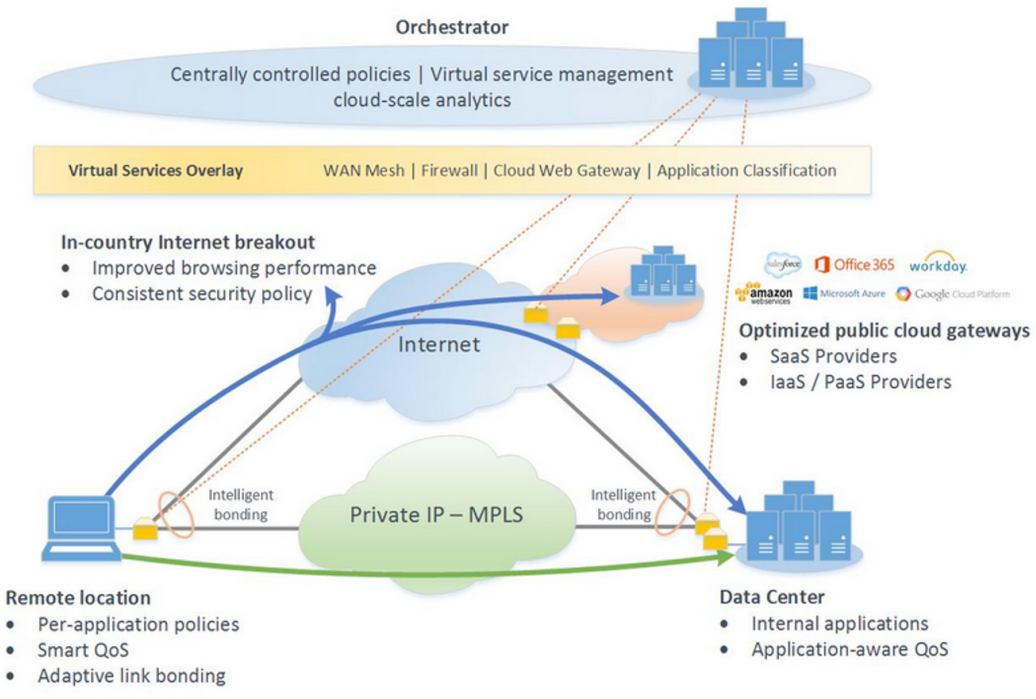
The evolution of SD-WAN in the enterprise can be termed the Next Generation WAN as it creates a fundamental shift-change in how network is designed, delivered and managed.

This change is expected to greatly gather speed in 2015 as indicated by Nemertes Research;

> *"We are going to see a sharp increase in the number and importance of branch offices that are being connected up just over the Internet... rather than with a private WAN connection," analyst John Burke said.*[7]

The goal of NGN is to deliver a cloud-ready enterprise grade WAN, using low-cost Internet-based infrastructure (where available) and moving reliance away from just MPLS tails.

Figure 3: Conceptual Next-Generation Network Solution



SOURCE: Coevolve[8]

Using optimized internet tails, branches and remote offices can avoid the often inefficient routes to the cloud that their MPLS network provides and instead get an 'express route' directly to the application or productivity tool in question.

By implementing a smarter set of controls into the network like this, it in effect brings the user experience of 'speed' up to the level that cloud applications were intended for.

Overall, the result is reduced risk (secondary / multiple path options) and improved performance for better productivity.

The Leaders In The Field (So Far)

The following vendors are the most prominent in this new emerging market today, with most of them featuring cloud-based delivery. Here's the leaders so far and a their key offerings / proposition:

- **Aryaka** – Network as a Service
- **Cisco** – IWAN (Cisco Intelligent WAN)
- **CloudGenix** – ION™ cloud-based control & delivery
- **Glue Networks** – Gluware 2.0, Network-Aware SD-WAN Orchestration Platform
- **Nuage Networks** – Virtualized Services Platform
- **Silver Peak** – Unity, intelligent WAN fabric unifying cloud & enterprise network
- **VeloCloud** – Cloud-Delivered SD-WAN
- **Viptela** – Secure Extensible Network (SEN)

At this time it is very difficult to pick a winner from this group as each have their strengths and weaknesses however Glue Networks, Nuage Networks, Cisco and VeloCloud appear to be leading the charge so far.

In particular, VeloCloud's solution can potentially leverage Cisco's popular ISR routers allowing it to accommodate far more customers given Cisco's lead in the networking hardware space.

> *"Software-defined technologies are enabling enterprises to align themselves with the new era of mobile and cloud computing," said Zeus Kerravala, founder and principal analyst of ZK Research. "The Cisco Intelligent WAN (IWAN) solution with the VeloCloud SD-WAN creates a powerful combination for users to achieve an improved quality of experience."* [9]

Ultimately the choice of SD-WAN 'smarts' to provide an next-generation enterprise WAN is going to come down to the best performance and feature-set, against the implementation (and ongoing) costs.

Working with an experienced SD-WAN consultancy can help to narrow down the ideal options from the hype.

Next-Generation WAN: The Next Steps

Despite what some SD-WAN vendors may tell you, the next-generation WAN model doesn't have to be implemented all at once to gain the benefits offered. Nor would signing a 5-year deal be a wise decision at this time.

SD-WAN technologies can be configured initially in 'test-bed' remote sites, with a laser focus on the ones that have extraordinarily high MPLS costs yet have available access to cheaper Internet tails.

Remote or regional sites of this type can route Internet based traffic more efficiently via the cheaper ISP tail(s), freeing up the more expensive MPLS bandwidth for 'on-net' network traffic.

Overall, **there are four (4) key steps in evaluating and implementing the next-generation WAN** in the enterprise:

1. **Set the goals for the project and get internal stakeholders on board**
   Look at the in-house capabilities of existing staff. Are there any who can lead a potential implementation project? Also, take some time to shortlist potential NGN implementation vendors with the right level of expertise, and identify candidate locations for a pilot or proof of concept.

2. **Identify the specific use cases in your environment**
   This is where identifying the applications and sites that have the biggest performance issues becomes the priority, as well as looking at how the overall network could benefit from this technology over the next 12-24 months.

3. **Prepare for transition**
   Creating both a strategy and a roadmap is best done with the assistance of an experienced SD-WAN consultancy firm so that the best results are gained without causing expensive detours. Choosing the right firm with experience in multi-vendor, multi-carrier global network installations can eliminate any unwanted surprises and ensure your options remain open to accommodate further enhancements.

4. **Make it happen**
   Implementation can either be all at once or over a period of time (depending on the strategy & roadmap chosen) but the thing to keep in mind is the high fluidity of the technology at this time. Signing long-term contracts would not be advisable given the rate of change underway.

1. GETTING STARTED	2. UNDERSTAND WHERE THE TECHNOLOGY FITS	3. PREPARE FOR TRANSITION	4. IMPLEMENTATION
i. Identify an internal project sponsor to help drive outcomes	i. Identify applications, locations and user groups experiencing performance issues	i. Update business case with revised assumptions	i. This is not a traditional procurement approach
ii. Identify industry peers that have experience with the technology	ii. Review the priority of the internal and cloud-based application portfolio	ii. Develop detailed technical design	ii. Do not look to enter into long term (5 year) agreements – 24-36 months maximum
iii. Identify high-level goals (TCO savings, application performance improvements)	iii. Review existing supplier contracts to understand timeline flexibility	iii. Create and implementation roadmap aligned to the understanding developed in initial assessments	iii. Simplifying the operational approach will enable the IT team to keep an eye on the horizon and work to deliver business value rather than struggle with operational challenges
iv. Identify non-core, risk free elements of the environment to trial the technology (back-up links a great place to start)	iv. Review capex investments – determine end of life for existing WAN Op, firewalls, routers etc.	iv. Create a strategy document for the technology team and business to jointly understand	iv. A phased migration will allow the adoption of the new solution to be aligned with existing contract end dates
v. Determine expectations and steps for a trial or POC	v. Update network architecture documentation for clear understanding.	v. Develop communication plan for regional / local IT and other stakeholders	

SD-WAN is still in its relative infancy however some implementations have proven to create substantial results in both freed-up MPLS bandwidth and greater usability of cloud based applications.

It certainly seems like it's an easy approach to take for significant ROI and a better user experience. But when you consider the underlying components, the SD-WAN concept only goes so far in providing a total solution.

Deploying a next-generation WAN in practice means going outside the relative 'safety' of a single carrier MPLS network and instead integrating ISPs and other transport providers to deliver the optimum result. This means that effective vendor management is critical to ensure the right components of the new network (both cloud based orchestration platforms and internet access circuits) are procured and delivered correctly in each location.

Specialist advice, preferably from a firm with global experience and oversight of the entire SD-WAN market can help address this challenge and deliver a successful outcome.

Conclusion

The Next Generation WAN incorporating SD-WAN as the overarching design strategy is expected to become the norm over the next 3 to 5 years as MPLS networks struggle to evolve in a cloud-centric world.

The cloud *(and the level of reliance on it)* is not slowing down anytime soon.

Without a step-change in the way that global enterprise networks are procured, implemented and configured, the MPLS network will undoubtedly be the 'slowdown' that enterprise clients are otherwise trying to be avoid.

This trend is part of an increasing commoditization of infrastructure in IT; the real value is now in the software that can potentially run on a wide variety of generic hardware and telecommunications circuits. Traditional telecom procurement processes focused on identifying carriers with highly engineered core networks and the lowest possible latency between each point - software-based technologies like SD-WAN allow for much greater variance in the performance of an individual underlying component.

The enterprise has the most to gain from this change - if it has taken the necessary steps to prepare.

Please also see our earlier White Paper

Meet Face to Face – *Teamwork without borders: Pervasive Video solutions*

http://www.coevolve.com/download-white-paper-meet-face-to-face

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About Coevolve

Coevolve is the go-to partner for enterprises wishing to adopt Next Generation Networks that enable Cloud, Agile IT and rapidly changing business requirements.

We have the experience to be the bridge between legacy technologies and vendors and a wide range of new disruptive products, to deliver an end-to-end service for our clients globally.

If you would like a more in-depth discussion about how your enterprise can gain new efficiencies and reduce total cost of ownership by 50% or more through next-generation WAN technologies, then contact the Coevolve team today.

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