WHITE PAPER

Cloud-ready networks - WAN Governance for cloud computing

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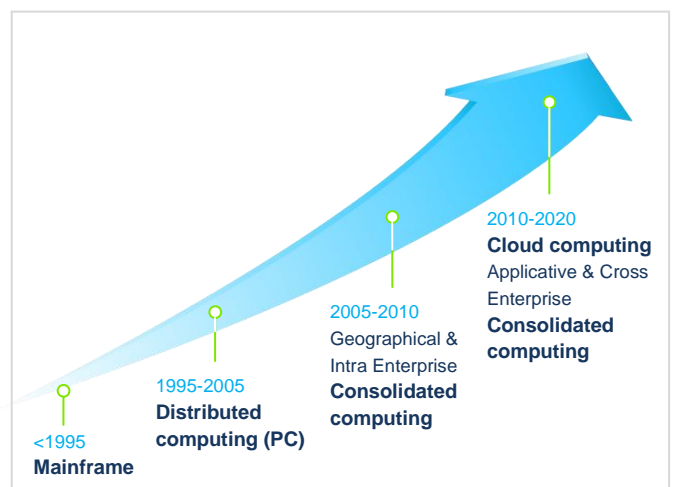Technologies

Beyond the Network...

EXECUTIVE SUMMARY

Cloud-ready networks - WAN Governance for cloud computing

Cloud computing simplifies enterprise application delivery with resource flexibility, investment-less OPEX models, and no need for specialized in-house support resources.

In the view of Zeus Kerravala, Senior Vice President at Yankee Group, "*cloud computing has a very profound impact on the Wide Area Network. When we move to cloud computing, the WAN actually becomes in many ways the backplane of virtual, cloud-based data centers.*" [1]

The WAN's traffic matrix becomes much more complicated with cloud computing: Internet and MPLS must jointly deliver applications to users, while performance and reliability remain absolute necessities for an efficient business. As the core of this application delivery infrastructure, the WAN must be viewed as a crucial business resource requiring full attention from IT managers. WAN usage must be understood. WAN performance must be controlled, optimized and continually aligned with business goals. WAN costs, including bandwidth and deployment of new applications, must be controlled.

2010-2020
Cloud computing
Applicative & Cross Enterprise
Consolidated computing

2005-2010
Geographical & Intra Enterprise
Consolidated computing

1995-2005
Distributed computing (PC)

<1995
Mainframe

WAN Governance, a method of IT management developed by Ipanema Technologies, enables enterprises to manage their WANs as "cloud-ready networks" - able to understand, control and optimize traffic between branch offices and public and private data centers, with capabilities to automatically adapt to new traffic patterns.

Ipanema provides the only all-in-one solution able to control global networks and deliver WAN Governance. Ipanema's Autonomic Networking System (ANS™) automatically understands application traffic and performance, controls each user's application flow according to need, optimizes response times and dynamically selects the best route for applications across hybrid networks. Multi-tenant by design, ANS scales to the largest enterprise network and the installed base of the world's leading telecom operators.

Powered by ANS, WAN Governance from Ipanema enables any large organization to gain full control and optimization of all applications over its global network, including evolutions to private and public cloud computing. With WAN Governance, applications delivery and performance adapt to ongoing infrastructure transformations, so enterprises can **perform today while taking control of tomorrow.**

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[1] Zeus Kerravala, "How does cloud computing affect WAN bandwidth?," SearchEnterpriseWAN.com, July 22, 2010

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INDUSTRY VIEW

"Worldwide cloud services revenue is forecast to reach $68.3 billion in 2010, a 16.6 percent increase from 2009 revenue of $58.6 billion. The industry is poised for strong growth through 2014, when worldwide cloud services revenue is projected to reach $148.8 billion."

Gartner, Inc.[2]

"Because of the consolidation and virtualization of servers, the deployment of private cloud computing results in additional application traffic transiting the WAN. In an analogous fashion, a key component of public cloud computing is that IT organizations will access IT resources such as applications and storage from one or more third parties. Hence, as IT organizations increase their adoption of both private and public cloud computing solutions, the wide area network will be involved in an increasing percentage of instances when users access applications and storage."

Jim Metzler, Vice President, Ashton, Metzler & Associates [3]

"To properly take advantage of what cloud computing can provide, IT organizations need to take a hard look at their internal governance processes and adapt them as necessary. Those organizations that do not have the structure and disciplines in place to effectively leverage new technologies will always be behind the curve in delivering value and at a competitive disadvantage. Cloud computing not only raises the bar on how strategy and governance intersect it also requires centralized control to ensure that a coherent strategy is followed and risks are minimized."

Bruce Marches, CIO, Right Fit Technologies [4]

"Developing an effective and flexible WAN strategy doesn't end with selecting the right optimization solution and putting it in place across your network. The next step is to plan for the future… The first, fast, and relatively cheap thing to try here (assuming the current network equipment allows) is setting up class-of-service (CoS) and quality of service (QoS) features to prioritize real-time traffic over other classes and to push the most forgiving things, like email, into a below-normal priority class."

John Burke, Principal Research Analyst, Nemertes Research [5]

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[2] Press Release, "Gartner Says Worldwide Cloud Services Market to Surpass $68 Billion in 2010," Gartner, Inc., June 22, 2010

[3] Jim Metzler and Stephen Taylor, "Cloud networking," Wide Area Networking Alert, NetworkWorld, February 1, 2010

[4] Bruce Maches, "The Impact of Cloud Computing on Internal IT Governance," HPC in the Cloud, January 25, 2010

[5] John Burke, "WAN optimization lifecycle: Planning, executing and maintain," SearchEnterprise.com, September 10, 2009

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About this publication

Ipanema has created this publication primarily as an educational resource for senior executives and IT managers involved in IT Governance and responsible for aligning IT with their organization's business performance goals. Contents of this publication are intended to inform and educate about issues surrounding cloud computing, its impact on enterprise WANs and solutions provided by WAN Governance enabled by Autonomic Networking.

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1. Enterprises are on their way to the cloud

Recent software progress like server and desktop virtualization combined with increased computing power has created a new way to organize IT data centers that host application servers. Large, shared IT infrastructures are now feasible, leading to new service-oriented business models that deliver Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Cloud computing is progressively complementing the traditional data center that consolidates the enterprise's critical business applications.

Historically speaking, the first cloud-based applications are on the Web and we all use them as SaaS applications: for example, yellow pages, Google Maps, Yahoo! Finance, YouTube, Facebook, etc. Yet today the border between applications for personal use and business use is vanishing for example, is LinkedIn a personal or business application? In addition, many employees are using the same computer - or smartphone for both business and personal use. Modern life, Internet ubiquity and mobile terminals all converge into personal and business activities.

Source: IEEE Internet Computing, October 2010

On the other hand, private data centers will not disappear that fast in many enterprises, however appealing cloud offerings can be. Some data is so confidential that enterprises won't accept the idea of storage in a shared data center without their own management control. Some business-critical applications have been fine-tuned for years and support such important processes that modifying their implementation and delivery model would create more problems than clouds may solve.

The public cloud offers infrastructure (Amazon Elastic Compute Cloud - EC2) and platforms (Windows Azure) as well as a growing number of applications (Google Apps, Office 365, LotusLive, Salesforce.com, etc.) that will be used by enterprises in the same way that they use electricity and water: pay per use, no upfront investment, short-term commitment and short-notice provisioning.

Business applications must be accessible all the time in a unified manner, with stable performance and availability from everywhere in the enterprise (headquarters, main sites, branch offices), from home offices and on the road (hotels, airports, etc.) for mobile workforces.
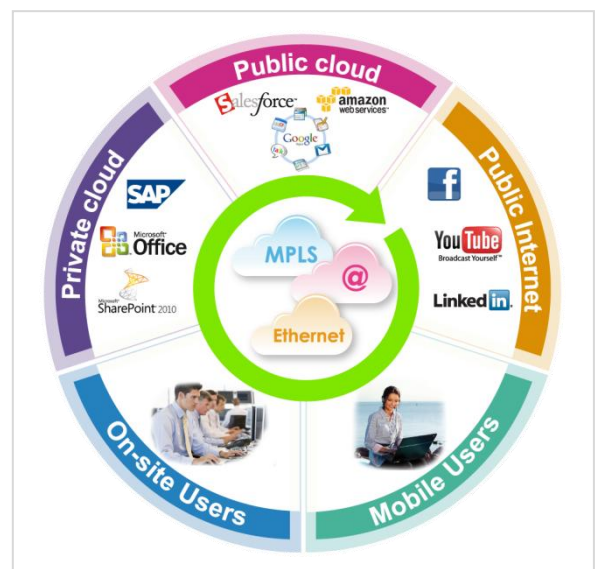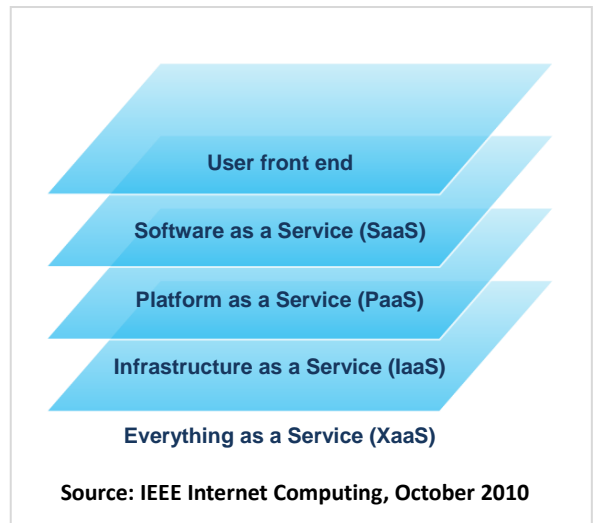
2. Yet enterprises must perform during this transformation

Transition to cloud architectures will take years and business must go on. While under this long term transformation, enterprises must get optimal workforce productivity in a cost effective and flexible way with:

- Guaranteed application performance
- Total business continuity
- Business process agility
- IT cost savings

Moreover, not all applications will be ready to move to the cloud. For example, peer-to-peer applications like telepresence or voice imply direct two-way traffic within the enterprise. Although controllers and gateways could be installed in the cloud, voice and video flows circulate between branch offices, making the traffic mesh even more complicated.

3. WAN challenges are increasing

The new cloud architecture increases the network's role in reliable application delivery to users, wherever they work. Not only must the network be always on, it must perform appropriately in many different and changing situations.

In "Applications delivery: Starting over again" featured in *NetworkWorld*, Jim Metzler, widely recognized as an authority on both network technology and business applications, says: "*IT organizations are facing a new generation of challenges. For example, some of the traditional application delivery challenges have morphed. Surprisingly, ensuring acceptable VoIP quality over the WAN is still a very important challenge today. That challenge, however, has morphed into the broader challenge of ensuring the quality of other real time applications.*" [6]

More examples of new challenges appearing include:

Application-centric consolidation: Data center consolidation implemented in recent years consisted of gathering all application servers in a central location - usually in one or two data centers for a large enterprise. This is now complemented by an "application-centric" consolidation, where enterprises will use applications that are delivered from external locations they do not control. The SaaS model exacerbates this trend with a shared data center for each application.

Branch offices becoming traffic hubs: A branch office that was a "spoke" in the network with the data center as the "hub" will itself be transformed into a traffic hub. With cloud computing, employees will access to geographically dispersed data centers according to the applications they use from private data centers, public data centers and SaaS data centers. Moreover, collaborative applications like voice and telepresence introduce traffic between sites. This creates a complex and dynamic traffic meshes that must be taken into account by cloud-ready networks.

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[6] Jim Metzler and Stephen Taylor, "Application delivery: Starting over again," Wide Area Networking Alert, NetworkWorld, August 9, 2010

Blurring network usage: Things used to be reasonably simple: VPN = business usage, Internet = recreational usage. With cloud computing, this paradigm no longer exists. The Internet serves both business and recreational applications. Moreover, the nature of an application is less clear than ever: Facebook and Twitter are recreational applications for most users, while they can also be business applications for marketing departments. So the new paradigm is becoming VPN = Internet = all types of applications. To make things even more complex, increasing Internet usage for recreational applications can cannibalize business resources. The ability to understand and control the nature of applications that run over the network is a key feature for cloud-ready networks.

Continuing Internet growth: By 2015 more than 15 billion devices will be connected to the Internet. Every day more than 15 petabytes of new information is being generated, and the rate doubles every 18 months[7]. The Internet is everywhere - at the office, at home and in our pocket (smartphone). The vanishing borders between business and personal usage combined with richer content (high-resolution images and videos) are rapidly absorbing business bandwidth. A cloud-ready network must be able to differentiate usage types and control network resources appropriately.

Hybrid networks: The Internet offers large, relatively inexpensive bandwidth access to any location worldwide. While its level of end-to-end quality may vary, it has now reached a point that makes it a valid option for business-critical usage. High quality, value-priced MPLS combined with Internet bandwidth is very appealing to many large global enterprises as a solution to cope with exponential traffic growth and to control IT budget. There is a strong need to get the best of both worlds in an easy and efficient manner.

Flexibility: Enterprises need IT to run fluidly and enable business agility. Yearly plans are more of a challenge because the ability to rapidly adapt to changing demands is a key IT requirement. It is now possible to rent CPU and disk space for a few hours from a web portal. A new application can be deployed almost instantly. The orchestration of all these changes requires a versatile network that must be able to adapt easily and fast to these unplanned changes, delivering the appropriate performance for the new usage while preserving the performance of existing business applications.

Costs control: The main business drivers for cloud computing are flexibility, simplifying IT alignment with enterprise goals and controlling IT costs. Most of the financial impact will be indirect, with direct savings depending on a company's size and IT consumption. Of course, cost savings will occur only if cloud computing can deliver the right application performance and availability to all users. With exponential usage inflation, properly managing network consumption and cost will be significant to controlling the overall IT budget.

4. WAN Governance: the route to cloud ready networks

Effective WAN Governance enables organizations to overcome challenges to achieve critical business goals. Using WAN Governance, organizations have proven to be able to manage their business networks at much higher levels of performance with lower costs and to dynamically align their IT performance with ever-changing needs.

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[7] Gartner, Inc.

Within IT governance, WAN Governance is a unique way of approaching the management of a WAN from the viewpoint of enterprise performance.

- The purpose of WAN Governance is to align IT with business goals at the network level, making applications and data more effectively and easily available throughout the large global enterprise.

- It organizes and manages resources to execute synchronized IT and WAN strategies. Providing full control of applications over the network, WAN Governance maximizes the enterprise's productivity and minimizes TCO.
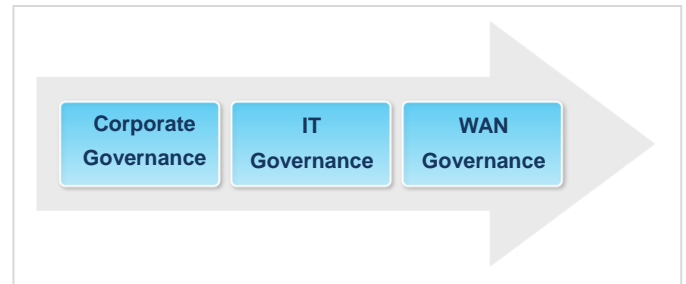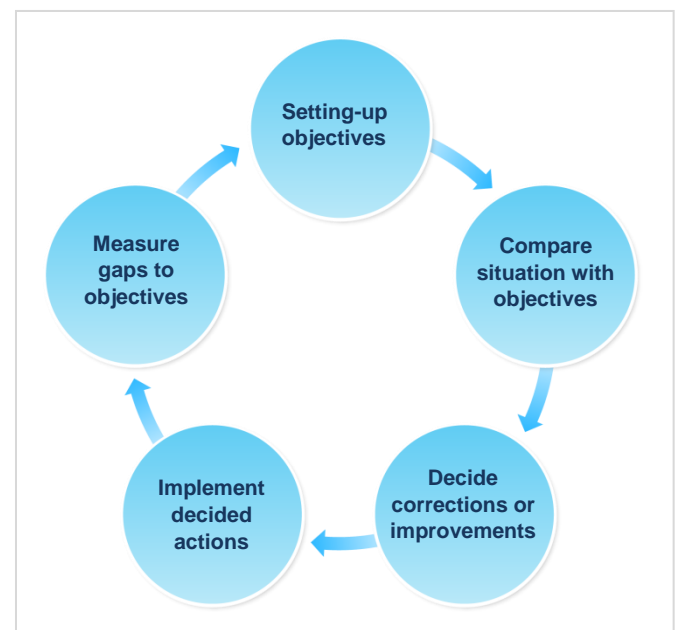
WAN Governance enables IT to:

- Understand the nature of application traffic
- Control and optimize this traffic
- Manage application performance
- Improve user Quality of Experience
- Simplify network operations
- Control network costs and leverage savings

Since the overall purpose is to fine-tune the WAN in a dynamic environment, WAN Governance is implemented as a closed-loop system where network managers can:

- Define performance goals
- Audit performance and assess situations in comparison with goals
- Identify and decide on needed corrections or improvements
- Implement corrections and enhancements
- Measure performance after corrections and enhancements to compare with goals

5. Autonomic Networking enables automated WAN Governance

Traffic across an enterprise network is in perpetual transformation over different time periods:

- Year: M&A activity and strategic evolution of IT infrastructure
- Quarter: roll-out of new business applications and regular traffic growth
- Month: workforce set-up, seasonality (such as for retailers), monthly financial consolidation
- Day: peak traffic during office working hours, nightly back-ups, antivirus updates, etc.
- Hour: morning email synchronization, mid-day internet news checking, e-learning…

- Second: immediate people activity (calls, transactions and emails), meshed flows and variations in network performance
- Micro-second: real-time competition between highly sensitive flows (voice, telepresence, trading) and elastic bandwidth-hungry traffic (file transfer, emails, anti-virus updates, etc.)

While WAN Governance is a closed-loop system, it requires regular maintenance in order to remain aligned. It is clearly impossible to adapt to the rapid variations of WAN traffic with a manual approach, like legacy policy-based solutions with millions of rules that would have to be tuned every second. Only an algorithmic approach can dynamically support optimal WAN alignment.

Ipanema's Autonomic Networking System (ANS^{TM}) fully automates implementation of WAN Governance for the most complex cloud environment and with scalability up to the largest enterprise network.

Autonomic: Pionnering the principles of autonomic networking, Ipanema has built a carrier-class and rock-solid system able to understand and control in real-time the most complex traffic patterns. Self-learning, self-managing and self-healing, ANS automatically discovers end-to-end network capacity, any-to-any traffic mesh patterns and any combination of application traffic. Distributed and cooperative algorithms, coupled to unique fine grain traffic control technics, allows ANS to control individually each application flow according to the dynamic user's behavior in order to guarantee quality of experience for business critical applications while maximizing the global network capacity and performance. ANS main characteristics include:

- **Objective based management**, providing a simple and high-level mean for the IT managers to set-up performance objectives and decide what really matters to the enterprise's IT and business.
- **Dynamic "sense and respond"** technology that adapts to any traffic situation and network topology and providing automatic, intelligent control and optimization of application sessions.
- **Cooperation between appliances** providing full traffic management, global optimization of the network resources and allowing global control with physical deployments needed at only 10-20% of enterprise locations.

All-in-One: ANS provides all the tightly coupled functions to deliver fully automated control of cloud traffic over the WAN:

- **Application Visibility**, providing full understanding of application usage and performance over the global network.
- **QoS & Control**, dynamically adjusting flow behavior and network resources to application traffic demand.
- **WAN Optimization**, accelerating applications response time and offering additional virtual bandwidth to the network.
- **Dynamic WAN Selection** for multi-networked branch offices, automatically selecting the best network according to actual performance and application traffic characteristics.
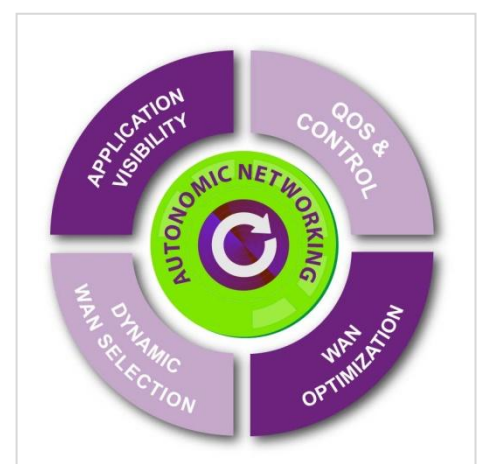

Multi-tenant service platform: Cloud-ready networks are too complex and too critical to be managed from a bottom-up perspective. IT and network teams have no more time to manually fine-tune and troubleshoot equipments spread across the enterprise, gather local information and unsuccessfully attempt to consolidate high level KPIs. Cloud computing is about streamlining application delivery: it has to be the same for managing traffic over the network. SALSA is the fully integrated

central management platform that has been designed to address this challenge. It scales from the smallest organization up to the largest multinational enterprise and provides:

- **Global management interface** that allows enterprises to define their high level performance objectives in a top-down approach and to automatically orchestrate the entire ANS system according to these objectives.

- **Consolidated reporting** to built high-value KPIs about application performance and usage across the global network and propose them from a user friendly web portal.

- **Multi-tenant platform** with scalability up to tens of millions of users, hundreds of thousands of sites and tens of thousands of networks, SALSA is capable of supporting the largest telecom service provider customer base.

6. Implementing WAN Governance with ANS in a cloud environment
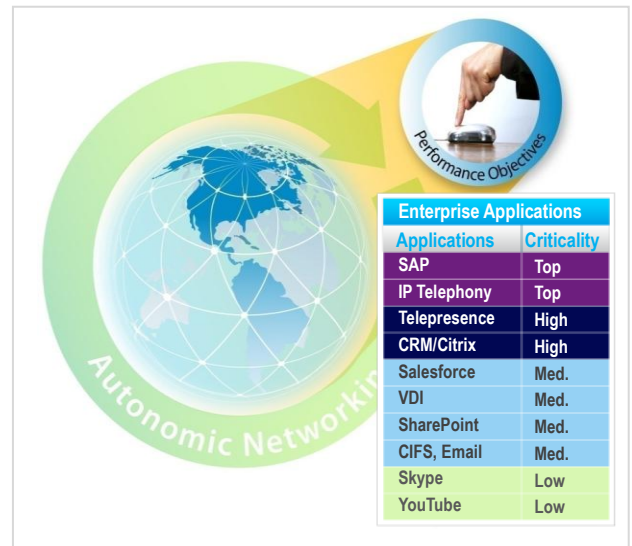
WAN Governance requires central control and ANS affordably delivers this global network control. Unlike WAN optimization technologies that require a physical appliance at each network location for local policy enforcement, ANS uses physical devices at only a few strategic sites, such as data centers and network locations with host servers, for global policy enforcement. These site components constantly interact collaboratively to dynamically match network capacity with application demand. They ensure that pre-defined global application performance objectives are always reached over the entire network. Mobile agents, virtual appliances and tele-appliances, all fully and seamlessly integrated into ANS architecture, complete the ANS deployment scheme, providing full control over the large global enterprise network.

ANS Implementation
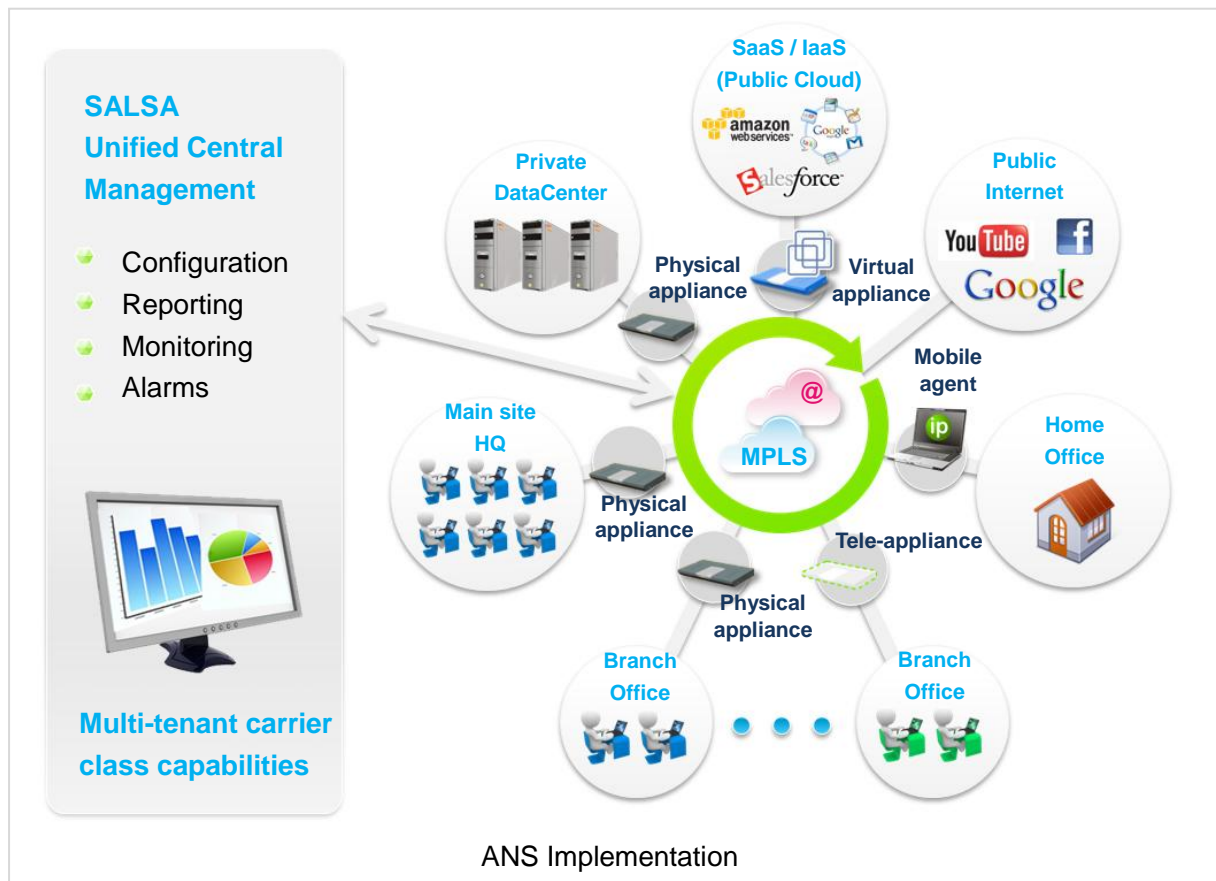
The central management platform (SALSA) is the one and only point to manage the entire system, whatever its size and configuration. Two key sets of information are exchanged here between the IT manager and the system:

■ **Application performance objectives** that define the business priorities (e.g. salesforce.com is more critical for the business than Amazon.com, despite both are available over the Internet) and the level of experience to be guaranteed to users - whenever they need it, from wherever they use it.

A survey of Ipanema ANS customers (representing over 100,000 sites) shows an average of 15 to 20 application performance objectives per enterprise, all extremely stable. The administrative workload is amazingly low, even for a 1,000+ site enterprise with hundreds of thousands of employees.

Enterprise Applications	
Applications	**Criticality**
SAP	Top
IP Telephony	Top
Telepresence	High
CRM/Citrix	High
Salesforce	Med.
VDI	Med.
SharePoint	Med.
CIFS, Email	Med.
Skype	Low
YouTube	Low

■ **KPIs and high-level metrics** like AQS (Application Quality Score) and MOS (Mean Opinion Score) compare objectives with the performance actually achieved, including explanations of results that are significantly better or worse than expected. This information provides IT managers with the visibility and reporting to clearly understand application delivery across the enterprise's clouds and allow them to make rational decisions to lower cost and increase business efficiency.

7. Benefits of WAN Governance with ANS in a cloud environment

Implemented through ANS, WAN Governance gives enterprises full control and optimization of all applications over their global network - private cloud, public cloud or both. This automatic alignment of the WAN to the company's business priorities provides:

Application visibility: ANS provides the enterprise with full visibility of application traffic over its network(s). Its powerful DPI (Deep Packet Inspection) is able to distinguish all business applications, peer-to-peer and recreational traffic.

Performance visibility: Performance across the clouds is understood for each application and each site. It is possible to breakdown the cloud impact on the WAN from both the client side and the data center. Powerful consolidation patterns allow this global view, while deep dives into technical details enable support teams to troubleshoot problems quickly.

Guaranteed application performance: The dynamic nature of ANS coupled with per-flow Quality of Service (QoS) and Control allows the system to adapt to every situation, including the most complex like full-mesh traffic and combinations of data and real-time applications. Efficient WAN optimization improves application response times and creates large additional virtual bandwidth. Objective driven, ANS enables enterprises to easily define their priorities and ensure optimal availability and performance of business-critical applications.

Hybrid Network Unification: Dynamic WAN Selection fully combined with Control and WAN Optimization enables enterprises to deploy their applications across several WANs, for example, combining high-quality

and value-priced MPLS with large and low-cost Internet. Getting the best of both worlds, they can reach datacenters over all clouds and sustain usage inflation while reducing bandwidth cost.

Operation flexibility: The built-in dynamics of ANS and its objective-driven management model provide the ideal platform to automatically handle the evolution of network traffic and IT architecture. Short and medium-term actions are automatically taken to protect business application performance. No more in a hurry, IT managers can concentrate on planning, SLA management and understanding how their IT should align with business objectives.

Cost control and reduction: WAN Governance has demonstrated a considerable impact on IT expenses, such as less workload to manage, troubleshooting performance problems over clouds, and improving workforce efficiency. Expenses can be allocated among business units and costs per department, encouraging accountability for how the network is used. Network costs are also reduced by improving network efficiency, suppressing redundant data patterns and delaying bandwidth upgrades by several years. Dependence on the Internet as a business network (alone, or in combination with a carrier-grade MPLS VPN) is another significant source of savings.

Tangible results: WAN Governance is currently used over very large organizations, both domestic and international. It applies to all industry and service sectors where it proves every day tangible results for millions of users: full understanding of the traffic and performance, guaranteed quality of experience, improved response time, low TCO and of course reduction of IT and network expenses.

Get full visibility over your global network

- Ensure performance SLAs for all critical applications for **99,9%** of the time
- Reduce problem identification and time-to-repair by **80%**
- Understand **100%** of your applications in the global network

Deliver business applications over clouds

- Improve response time up to **20x**
- Reduce document download times from 5 minutes down to **15** seconds
- Zero business application brownout during Olympic games

Cost optimize your WAN

- Delay bandwidth upgrades by **24** months
- Save **70%** per transferred Gbyte
- Reduce TCO by **80%** compared to pure WAN Optimization solutions

8. With WAN Governance, perform today and take control of tomorrow

Enterprise's IT is transitioning to cloud computing. The demands of understanding, prioritizing and efficiently managing WAN traffic to deploy cloud solutions while ensuring business continuity and the performance of all business-critical applications are exceeding conventional, policy-based management and WAN optimization techniques. WAN Governance with ANS overcomes these challenges by enabling cloud-ready networks with automated capabilities to control and optimize traffic and dynamically adapt to whatever happens on the WAN.

Powered by ANS, WAN Governance gives you full control and optimization of all applications over the global network, private cloud, public cloud or both.

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ABOUT IPANEMA TECHNOLOGIES

The Ipanema System enables any large enterprise to have full control and optimization of their global networks; private cloud, public cloud or both. It unifies performance across disparate networks. It dynamically adapts to whatever is happening in these networks and guarantees constant control of critical applications. It is the only system with a central management and reporting platform that scales to the levels required by Telcos and large enterprises.

For more information www.ipanematech.com

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