



Guarantee application performance over modern networks

A look at options to evolve your enterprise VPN to a "Cloud-Ready Network"

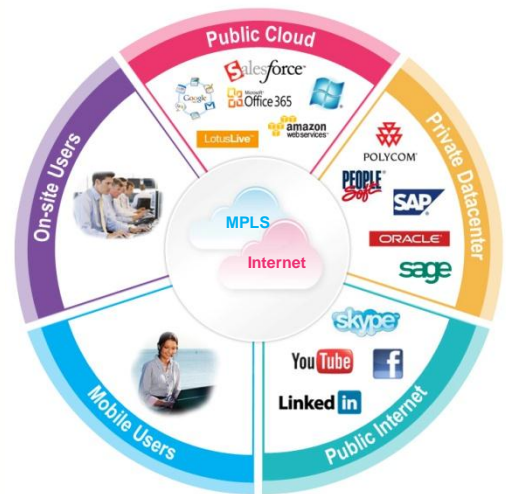
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EXECUTIVE OVERVIEW

CIOs surveyed by Gartner rank their top three business priorities in 2011 as increasing enterprise growth, attracting and retaining new customers, and reducing enterprise costs. According to the survey, “With half of CIOs moving most applications and infrastructure to the cloud, they have an opportunity to reimagine IT by asking how resources can be deployed in other ways.”¹

Internet ubiquity and increasing virtualization are changing how IT is designed and consumed – making the movement to cloud applications inevitable.

The cloud promises simplified application management, but as enterprises progressively embrace SaaS, IaaS and PaaS, networks become more diverse, complex and central to the business. Cloud computing shifts IT complexity from data centers to enterprises’ networks. Branch offices must be prepared as they become the focal point where all conventional software and cloud-based application flows converge from disparate and heterogeneous sources.



In order to overcome such complexity, enterprises must find new cost-effective ways to ensure that their global networks are “cloud-ready.” A Cloud-Ready Network is one where the promises of cloud benefits – agility and flexibility to support company growth, employee empowerment to increase productivity, and better control of IT costs – can be fulfilled.

This paper provides insight into:

- How application delivery over enterprise networks is changing;
- Why branch offices play a key role in unleashing IT initiatives;
- Considerations for enterprises to evolve their VPNs into CRNs (Cloud-Ready Networks);
- How Ipanema turns an enterprise’s VPN into a Cloud-Ready Network and provides full control and optimization of all applications over the global network, private cloud or public cloud.

¹ Mark P. McDonald, Dave Aron, “Executive Summary: Reimagining IT: The 2011 CIO Agenda,” Gartner, 1 January 2011

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About This Publication

Ipanema has created this publication as an educational resource for enterprises adopting cloud computing applications. Contents of this publication are intended to inform and educate IT and business executives about the impact of cloud applications on the enterprise VPN and how to evolve their VPN to a “Cloud-Ready Network” to fully realize all business performance benefits of cloud adoption.

1. The new IT: A collapsing frontier between private and public worlds

Cloud computing makes adopting new applications “easy.” Business units can move to an Internet-based SaaS application to minimize the apparent impact on IT (in terms of application management and deployment). Likewise, IT can leverage the cloud for PaaS and IaaS applications to offload internal management and further reduce costs. Increasingly, the cloud is becoming an inherent component of enterprise IT strategy:

- SaaS applications offer compelling alternatives to mature enterprise applications, such as collaboration or CRM;
- IT efficiency and flexibility can be simply improved by adopting cloud technologies, such as virtualization, in private data centers;
- Enterprises can further embrace cloud technology by migrating IT resources – like computing power and storage – to PaaS and IaaS services.

More and more, business applications will be sourced from everywhere – different public and private locations – and enterprise users will expect to access applications from everywhere – office or home, but also from wherever they may be at any instant.

Increasingly, the cloud is becoming an inherent component of enterprise IT strategy.

Within each enterprise, at a different degree or pace, the frontier between the private and public worlds is gradually collapsing. The times when applications could be easily classified and prioritized as “business critical” or “recreational” are over. Facebook, YouTube and other social media applications are now business tools for an increasing portion of the workforce.

As the share of Internet traffic from social networking and cloud computing continues to grow across enterprise WANs, hybrid networks utilizing both MPLS and Internet bandwidth are a logical and cost-effective network design strategy. While enterprises have been controlling Internet access from branch offices centrally, many are now

considering direct local access from inside each branch or in-MPLS Internet breakouts.

2. Cloud computing shifts the complexity of application delivery to the WAN and to the branch offices

The cloud is about delivering applications anytime, anywhere and on any device. This shifts the complexity of application delivery from central data centers to the enterprise network and to branch offices where users decide about traffic composition and loads.

Application delivery in branch offices becomes increasingly diverse as traffic flows from traditional enterprise private data centers mix with flows coming from the Internet (SaaS, IaaS and data centers hosting applications). Combined with the increasing use of voice, video and telepresence for branch-to-branch communications, the cloud turns branch offices from traffic spokes to focal points of enterprise communications. The days when all users’ traffic comes from a central hub are over – the branches are now the hubs.

Moreover, the overall traffic mix is increasingly dynamic. In the past, it was easy to find patterns in user behavior. A network manager could see a peak in email traffic in the morning as users arrived in the office and a peak in Internet traffic at lunchtime. Repetitive business tasks such as financial consolidation appeared at specific times during the month or the quarter.

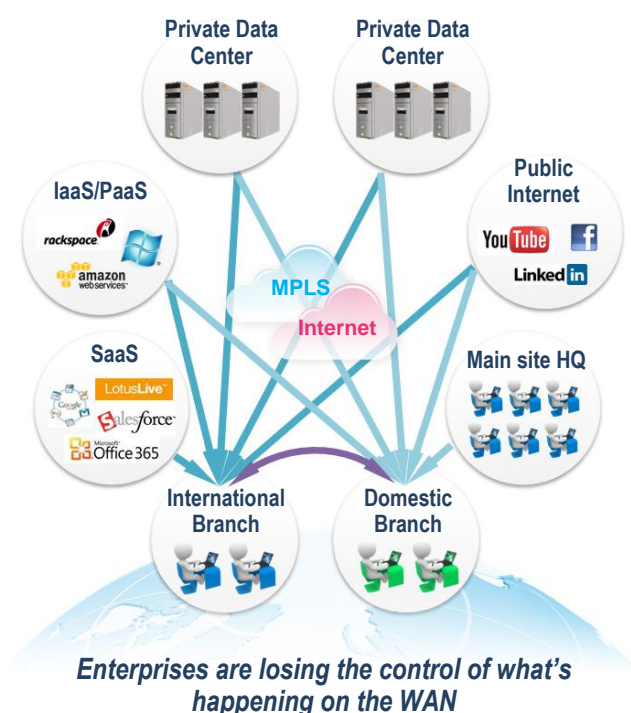
The days when all users’ traffic goes to a central hub are over—the branches are now the hubs.

Traffic patterns today are much less discernible: email, collaboration applications and the Internet are all business tools that are used in a highly dynamic manner throughout the day. The cloud is about elasticity, so it should come as no surprise that application traffic patterns are also becoming more elastic.

The changes in traffic patterns are even worsened as it’s nearly impossible for an IT organization to police Internet applications that cross the frontier between business and recreational worlds. Shut down Facebook, Twitter or LinkedIn and the enterprise misses opportunities to promote its

brand, products, events, and industry views via social media. The competition between applications that are clearly business critical – such as ERP, CRM, and collaboration – and applications that are less critical is increasing dramatically.

IT and network managers are losing their capabilities to control what’s happening on their global network. The use of diverse application resources and their diverse consumption schemes require new tools for the enterprise to reclaim control.



3. The evolution of VPNs to Cloud-Ready Networks

The architecture of VPNs has not evolved for more than 10 years. With social networking and cloud computing, neither VPN architecture nor its management tools can be effective. As enterprises progressively embrace the cloud and in order to guarantee the performance of their business critical applications, they need to have a careful look at the design of their WAN and at the technologies they use to manage their application traffic across it.

WAN design considerations: Internet breakouts

According to their situation, enterprises may look at local Internet access to their branch locations or

in the network itself. Going through a central gateway to access the Internet is perfect for control and security but it adds delay and bandwidth constraints to communications, a typical cause of application performance issues.

Empowering branches with local Internet breakouts removes any extra delay and lowers constraints on the public cloud flows, but security and control needs to be handled in a distributed fashion.

Cloud-based security services and the use of centrally managed devices can mitigate the increased complexity of security management. Cloud security gateways are also viable complements to local or network-based Internet breakouts.

WAN design considerations: Hybrid networks

Why use stable but relatively expensive MPLS bandwidth to carry all WAN traffic when less expensive Internet bandwidth can easily absorb growing capacity requirements? Instead, why not combine MPLS and Internet more effectively? A hybrid MPLS + Internet network makes a lot of sense for most companies and many are taking steps to a hybrid network infrastructure. Internet bandwidth was once considered only for backups of MPLS lines. It’s now time to use both links at the same time and get the best of both worlds.

MPLS service providers are well aware of this new trend and they are taking steps to deliver the benefits of hybrid networks through their managed services portfolio. Some are in the process of integrating pure hybrid networks within their offerings and some already offer an alternative by implementing managed Internet gateways in multiple locations with their MPLS service as a compromise to minimize management complexity.

Traffic management considerations: Quality of Service (QoS)

Traditional Quality of Service (QoS) mechanisms like MPLS Classes of Service (CoS) are static, labor-intensive and an insufficient approach to QoS & Control. They do not precisely address the requirements of application performance for MPLS and are even more difficult to apply to SaaS performance:

- **Based on invalid assumptions using IP addresses and port numbers:** Many applications use HTTP port 80, including SAP, SharePoint, Facebook, Skype, etc. Some can be business-critical but most are not. With standard MPLS implementations, all are assigned the same priority level.
- **Ignore the “any-to-any” nature of traffic:** Today’s WANs support multiple data centers, Internet gateways, branch-to-branch networking, etc. CoS apply on a local basis only and fail to manage the any-to-any nature of application traffic where multiple sources of traffic compete for resources at the branch office.
- **Cannot match real-time and granular application demands:** While applications and users have a very dynamic behavior, CoS can only offer to statically group several applications and users in a few classes with predefined priority characteristics.

Enterprises should consider next generation QoS and control mechanisms that overcome all of the limitations above. They need to look at technology that provides the necessary application awareness and dynamicity – technology that provides total control wherever their data centers and Internet gateways are located, and whatever the nature of the underlying network, including hybrid networks.

Traffic management considerations: WAN Optimization

WAN Optimization is a technology that enterprises should consider as they design their Cloud-Ready Network. However, they should understand what their exact requirements are.

WAN Optimization Controllers (WOCs) are traditionally focused on addressing high-delay, low-bandwidth and expensive access lines, concentrating their feature set on demanding

Enterprises should consider next generation QoS mechanisms that overcome the limitations of MPLS Classes of Service.

compression and protocol acceleration. Their price points prevent building a good business case for high-speed, low-budget branch office sites. That’s

why WOCs are typically deployed in only 5% to 20% of locations.

Enterprises should consider full WOCs only on sites where a ROI is made possible through bandwidth savings or when protocol acceleration is mandatory. In other sites they should consider solutions that focus on delivering advanced QoS & Control features which are now available on the market at a disruptive price point.

For example, nano|engines from Ipanema provide an optimized feature set that perfectly fits the broadband needs of the modern branch office. Features include:

- Application-aware, per-connection control and QoS for public and private application flows, guaranteeing a good and stable Quality of Experience (QoE) for each user;
- End-to-end visibility of application performance of each flow with comprehensive KPIs and quality scores;
- Dynamic selection among up to three networks for optimized path control of multi-attached branches, local Internet breakouts and hybrid networks.

The nano|engines fit particularly well in sectors like retail, finance and hospitality, where slow response times to access customer data or delays in processing an order can lead to customer dissatisfaction and poor business performance. The nano|engines’ ability to guarantee application performance prevents brownouts and protects the business.

Ipanema’s nano|engines provide an optimized feature set that perfectly fits the broadband needs of the modern branch office.

Traffic management considerations: WAN Path Controllers

Managing traffic among several network accesses can be a very frustrating job. Traditional approaches like Policy-Based Routing (PBR) are so challenging in practice that their operational complexity and poor performance nullify the benefits of a hybrid network. In a September 2011 report, Gartner analysts Bjarne Munch and Neil

Rickard shared their key findings from research into the state of hybrid network design and their recommendations to enterprises. In their view, “Shortcomings in hybrid IP WAN design have frustrated enterprises seeking a better way to combine multiple connections to different networks. Now, WPCs [WAN Path Controllers] can simplify the process of managing traffic across multiple links, allowing WAN configuration for each site at optimal price/performance.”²

While PBR is designed to balance packets across multiple networks, it introduces a number of major drawbacks:

- **Operational complexity:** PBR requires per-router configuration and specific engineering skills that increase the cost of operations;
- **Static rules:** Applications are routed based on static policies without taking into account end-to-end loads or link quality;
- **Poor application classification:** port-level classification is unable to provide the necessary intelligence that is necessary to separate critical from less critical applications (e.g. HTTP port 80).

To address these issues, Enterprise deploying hybrid networks should consider replacing PBR by a new feature category called WAN Path Controller (WPC) that overcomes the limitations of legacy PBR.

4. Ipanema ANS: The intelligent layer for Cloud-Ready Networks

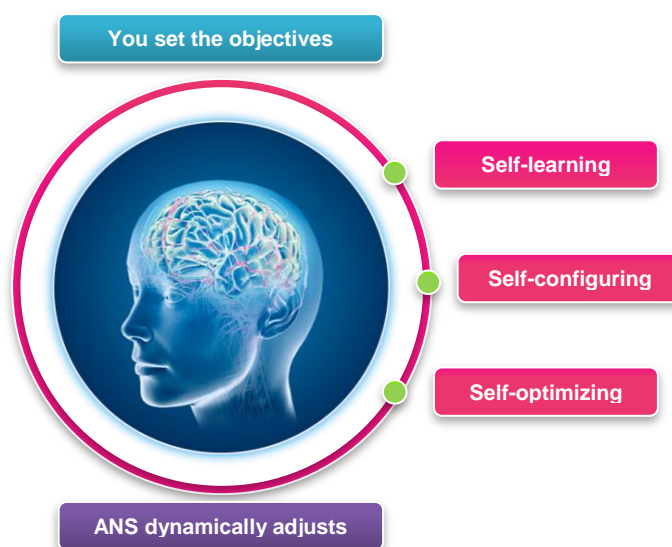
Ipanema’s Autonomic Networking System™ (ANS™) covers all the requirements to transform a VPN into a Cloud-Ready Network. ANS combines WOCs, WPCs, advanced QoS & Control and Application Visibility features in an all-in-one solution with the flexibility to manage the multiple WAN design options enterprises have to build their Cloud-Ready Network.

ANS provides the intelligence and automation for the most complex cloud environment with

² Bjarne Munch and Neil Rickard, “WAN Path Controllers Add Flexibility and Efficiency to Hybrid Networks,” Gartner, 1 September 2011

scalability to support the largest enterprise networks. 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;
- Controls each application connection individually according to Application Performance Objectives and end-user behavior;
- Guarantees users Quality of Experience



(QoE) for business critical applications;

- Maximizes the global network capacity and its delivered performance.

Key characteristics

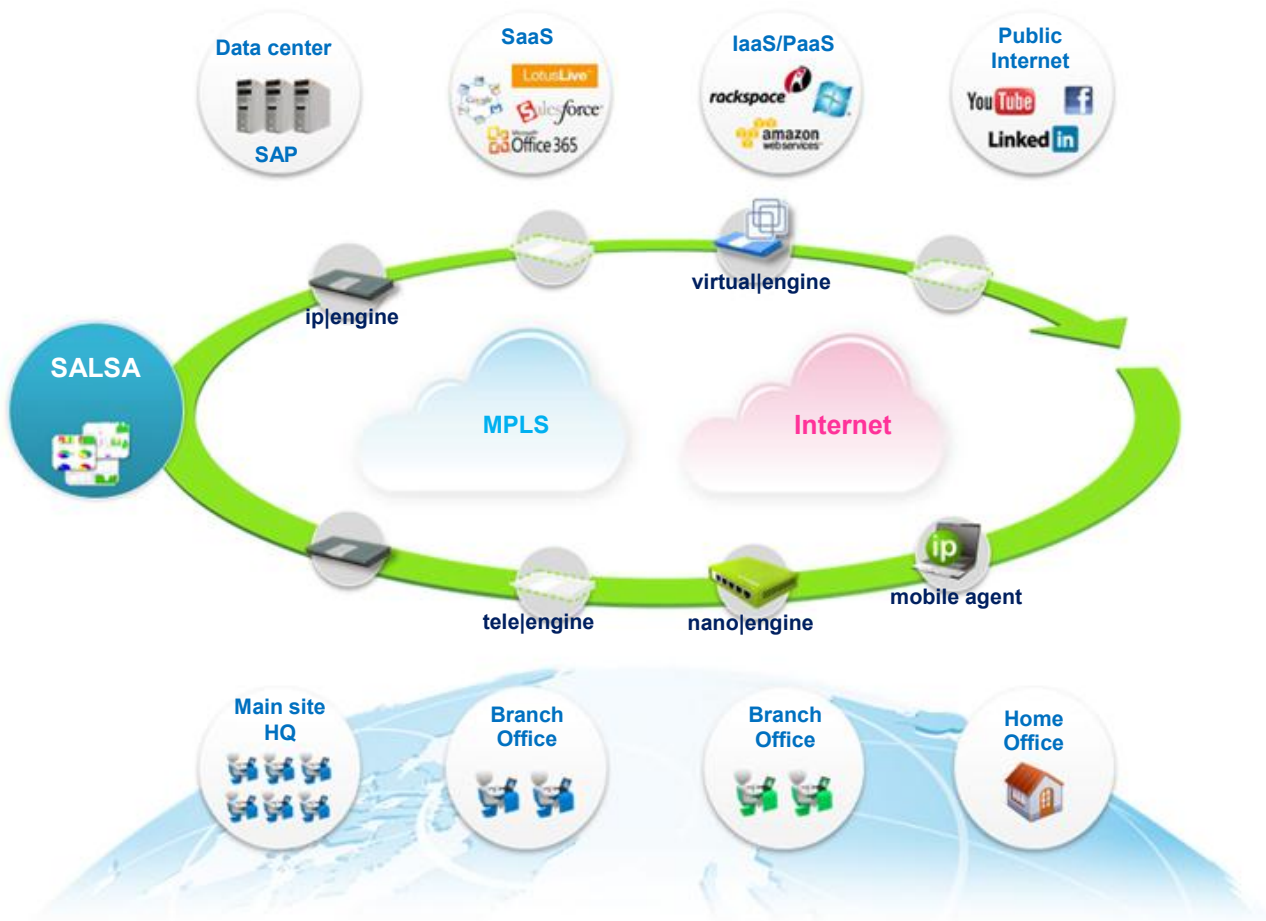
- **Objective-based management**, providing a simple and high-level method for IT managers to set-up Application Performance Objectives according to what matters to the business.
- **Dynamic “sense and respond” technology** that adapts to any traffic situation and network topology for automatic, intelligent control and optimization of every application connection;
- **Cooperative ip|engines and nano|engines** providing full traffic management, global optimization of the network resources, and global network control;
- **Tele|engines** that allow control of enterprise traffic in branch offices from the datacenters

without installing local technologies at the edge;

- **Mobile agents** for home office and mobile workers;

- **Global management platform (SALSA)** to define the Application Performance Objectives and monitor applications' usage and performance with consolidated reporting across the whole network.

Using ANS, enterprises moving to the cloud can guarantee the user experience while reducing bandwidth requirements by a factor of three.



Ipanema's Autonomic Networking System (ANS) provides the intelligence and automation to turn VPNs into cloud-ready networks

WAN Governance: Managing from a Business Perspective

Cloud adoption adds exponential complexity to network management. Cloud applications bring many of the same issues as other IT projects, but the performance impact is magnified because of its reliance on the WAN. This becomes evident in a company's first cloud project. WAN Governance, which aligns the network with business objectives, enables the enterprise to control this complexity and network impact.

WAN Governance reinforces existing IT Governance policies by providing a holistic approach to global network visibility and control of application performance – versus conventional network management solutions operating as independent silos. WAN Governance ensures business continuity as cloud applications are adopted. Through its use of Application Performance Objectives, it helps guarantee that the network's capabilities match enterprise requirements for agility, flexibility and growth.

All-in-one solution

ANS tightly couples the following WAN management functionality into an all-in-one solution to make networks cloud-ready with fully automated control:

- **Application Visibility**, providing full understanding of the usage and performance of applications over the global network;
- **QoS & Control**, dynamically adjusting traffic flows and network resources to usage demands in accordance with Application Performance Objectives;
- **WAN Optimization**, accelerating applications' response times and offering additional virtual bandwidth to the network;
- **Dynamic WAN Selection** for multi-networked offices, automatically selecting the best network path for each application connection according to actual performance and traffic characteristics.

ANS automates many tasks that network managers typically perform manually today, allowing real-time performance views of every application and dynamic adjustments to each application flow.

ANS supports any enterprise's network strategy and stage of cloud adoption

ANS can be deployed by any enterprise, even the largest, to exploit the value of private and public applications without risk, regardless of network strategy or stage of cloud adoption:

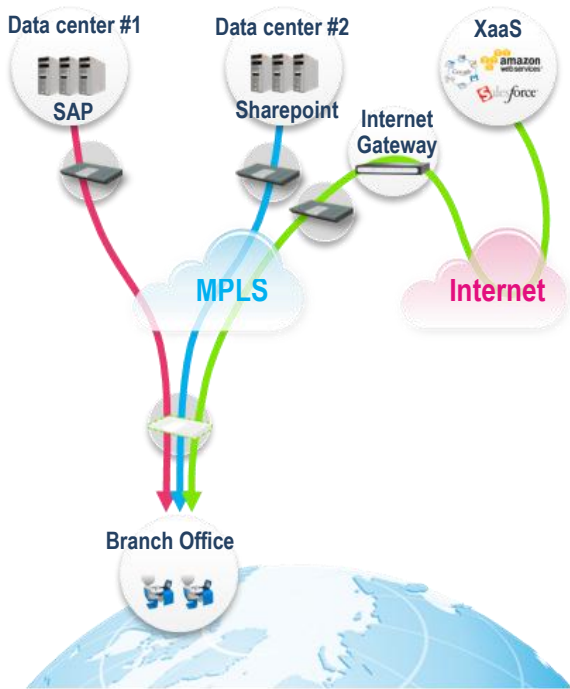
- A company with traditional MPLS VPN may want to adopt a single cloud application without change in its architecture. ANS can make the network cloud-ready by providing full application flow control while leveraging the existing MPLS architecture.
- A company that wants to move to hybrid MPLS + Internet architecture would want to take full advantage of the Internet as a business network. ANS can optimize the hybrid network efficiency, minimize costs and maximize the usage of all the available bandwidth.

Deploying ANS over VPNs	In case of hybrid network
<p>Improve users' quality of experience and IT operations</p> <ul style="list-style-type: none"> ■ Guarantee performance of cloud applications to the branch; ■ Ensure cloud applications do not impact the performance of other business-critical applications; ■ Prove cloud applications are performing as expected and do not impact other business-critical applications; ■ Postpone upgrades and minimize network costs; ■ Automate numerous network management tasks and accelerate problem identification. 	<p>Maximize MPLS + Internet efficiency</p> <ul style="list-style-type: none"> ■ Take full advantage of the Internet as a business network; ■ Maximize usage of cost effective Internet with high-quality MPLS; ■ Simplify hybrid network management; ■ Improve business continuity.

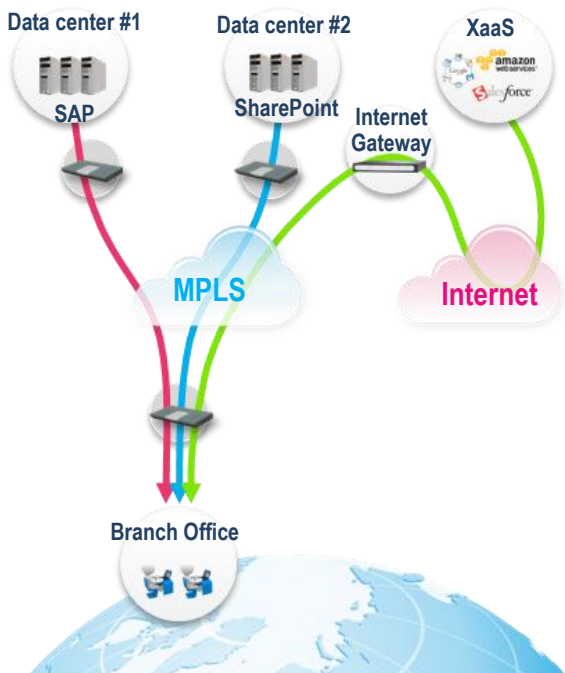
Benefits of making enterprise networks cloud-ready with Ipanema ANS

Example ANS deployment options

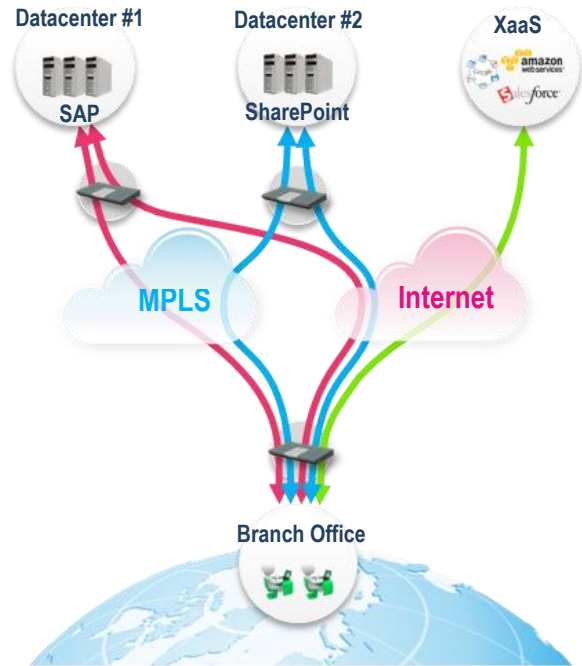
The following figures illustrate the main types of Cloud-Ready Networks and the relevant ANS deployment options.



An MPLS Cloud Ready Network with central Internet gateways and appliances only in key locations



An MPLS Cloud Ready Network with in-MPLS Internet gateways and appliances in branches



A unified hybrid MPLS + Internet Cloud Ready Network

5. Realizing cloud computing promises

As inevitable as the tides, cloud computing is the wave of today, shifting the complexity of application delivery from data centers to the WAN. Applications types and sources become diverse. Traffic grows substantially and – once managed exclusively from a central hub – has now to be managed by branches themselves.

Ipanema ANS™ turns enterprise WANs into Cloud-Ready Networks by adding a layer of intelligence that enterprises leverage to:

- Provide the same elasticity to their network as the cloud applications it supports;
- Ensure business continuity during and after cloud adoption;
- Discover, understand and communicate clear KPIs about application performance;
- Control and optimize public and private applications over complex global networks;
- Guarantee applications performance for all users, wherever they are located;
- Optimize cost and performance across hybrid MPLS + Internet networks;
- Institute WAN Governance to manage application performance from a business perspective.

Related reading

Ipanema, “Moving to Office 365, Google Apps, Salesforce or any SaaS? Here’s what it means for your WAN,” May 2011

Dr. Jim Metzler, “The 2011 Application & Service Delivery Handbook”, August 2011

Ipanema, “Cloud-ready networks - WAN Governance for cloud computing,” November 2010

Gartner, “Magic Quadrant for WAN Optimization Controllers”, December 2010

Gartner, “WAN Path Controllers Add Flexibility and Efficiency to Hybrid Networks” September 2011

WAN Governance blog,
www.wan-governance.com

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 hybrid networks. It dynamically adapts to whatever is happening in the traffic 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 Service Providers and large enterprises. With solutions used extensively by many of the world's largest telecom providers and enterprises across business and public sectors, Ipanema controls and optimizes over 100,000 sites among 1,000+ customers.

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