Multi-Path Networking Is a Key to Maximizing Cloud Value

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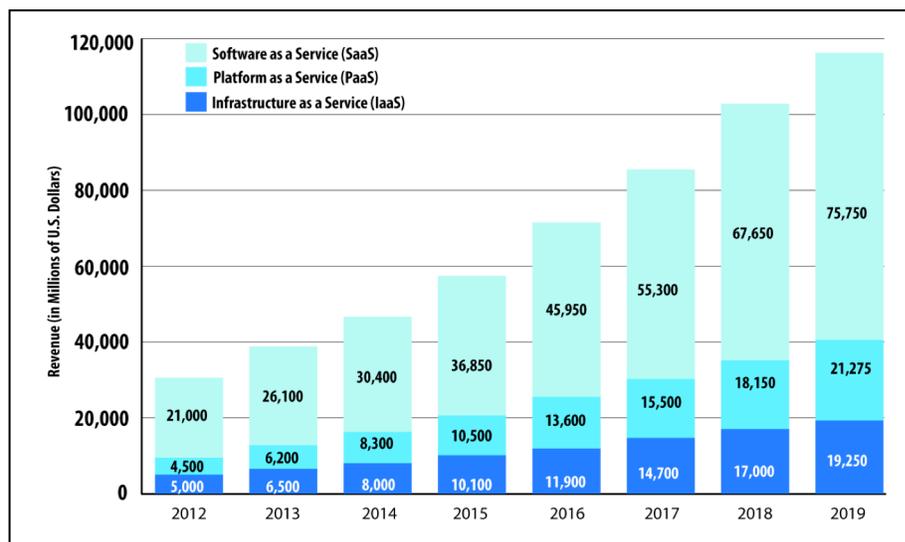Cell: 301-775-7447
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Introduction: The Cloud Era Is Here

Computing has gone through several major evolutionary steps since its introduction as a mainstream corporate resource. In the 1960s, businesses oriented their compute strategies around the mainframe. This gave way to mini-computing, which eventually ceded its role to client/server computing. Today, the industry is in the midst of another major revolution—the shift to cloud computing. The cloud is the fastest-growing part of IT today. In fact, the ZK Research 2015 Global Cloud Forecast (Exhibit 1) predicts cloud to grow at an 18% compound annual growth rate from 2014 to 2019—that's more than six times the 3% rate of growth for the rest of IT during the same period.

Each computing transition has had a profound impact on IT in multiple ways. First, the cost of processing power and storage has continued to drop by orders of magnitude. Also, the network's role has escalated in importance with each shift. In the client/server computing era, the network was a tactical resource that connected PCs to servers and offered no real competitive advantage. In the cloud era, the network becomes a strategic asset and the basis of competitive advantage.

The shift to the cloud enables organizations to become more flexible and adaptable and to take advantage of changes in the business environment. However, organizations can only be as agile as their least agile IT component—and, in most cases, that's the network. If businesses are to truly harness the power of the cloud, it's time for the network to evolve.

Exhibit 1: The Cloud Is Redefining IT

Source: ZK Research 2015 Global Cloud Forecast

Influence and insight through social media

This report outlines the limitations of legacy networks and how adding a technology called multi-path networking can greatly improve the performance of cloud applications. It also provides advice on the evaluation criteria for multi-path networking solutions.

## Section II: The Challenge with Legacy Networks

The architecture used to build most networks today has been in place for well over three decades. The traditional "hub and spoke" model (Exhibit 2) was designed for client/server environments where almost all of an organization's data and applications resided in the data center (i.e., the hub location) and were accessed by workers in branch locations (i.e., the spokes).

Internet traffic would enter the enterprise through a single ingress/egress point, typically into the data center, where it would then pass through the hub and then to the users in branch offices. This wasn't ideal because any kind of information that had to be sent back to the Internet would need to traverse that same spoke and then pass through the data center and back out the Internet connection.

Although the hub-and-spoke wide-area network (WAN) was not ideal for Internet traffic, most businesses chose this model because the majority of network traffic was client/server, and most Internet traffic was best effort in nature. Today, with the rise of cloud, the percentage of Internet traffic on the WAN has steadily increased. ZK Research estimates that 70% to 80% of traffic on enterprise networks is Internet based. Also, Internet traffic has shifted from being best effort to being mission critical, with services such as telephony services, CRM systems and other business-critical applications now being made available from the cloud. Consequently, Internet traffic can no longer be considered best effort.

Another challenge with traditional WANs is that redundant circuits were deployed in an active–passive model. This means that only one circuit can be active at any given time, so the backup link will only be made active if the primary circuit fails. Because of this, both network connections would have to be provisioned with enough capacity to handle all of an organization's network traffic.

Exhibit 2: The "Hub and Spoke" WAN Is Optimized for Internet Traffic
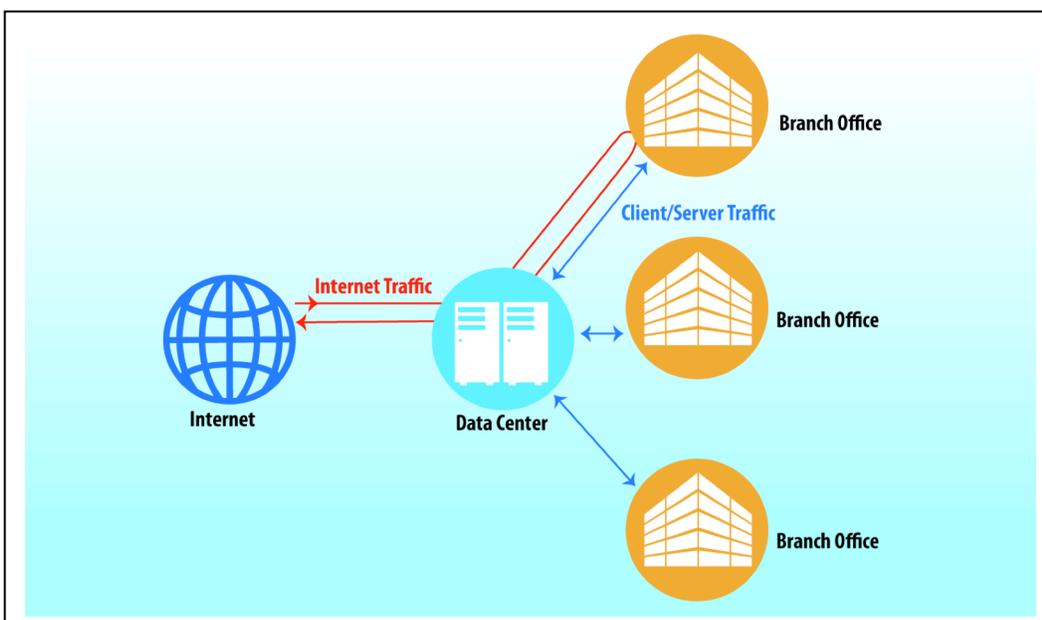
Source: ZK Research, 2015

Also, most business networks use costly private IP network services such as Multiprotocol Label Switching (MPLS). Despite the high cost, MPLS has become the de facto standard for enterprise networks because service providers offer service-level agreements (SLAs) guaranteeing network performance and it is generally more secure than Internet services. However, although MPLS service is ideal for traditional client/server applications, it is not optimized for cloud services.

Lastly, private WAN circuits often have long lead times—typically 90 days, but sometimes as long as six months. This can be highly detrimental to an organization looking to begin operations in a new branch location because no business services will be available until the remote location can connect to the corporate WAN.

Legacy networks are expensive to run, inflexible and lack the agility to leverage the cloud. Organizations can no longer afford to stay with a traditional wide-area network, as the cost of not changing is missed business opportunities.

It's time for organizations to rethink their network strategies and find a way to leverage the ubiquity and cost benefits of the Internet. Multi-path technology can enable businesses to make the shift from high-cost, MPLS-based service to a network built on the Internet.

Section III: Multi-Path Technology Can Deliver Business-Grade Cloud Performance

Historically, businesses have had to choose between two suboptimal options when building a WAN. One choice is to buy network services that are highly reliable but come with a high price tag. Alternatively, businesses that choose low-cost network services such as DSL or cable Internet are forced to deal with reliability issues.

The balancing act between cost and performance is the most significant challenge for businesses when designing a WAN. When comparing a low-cost Internet connection to a high-cost MPLS service, there is no question that a single Internet connection cannot meet the security and performance characteristics of MPLS. What if there were a way to leverage multiple Internet connections and save a significant amount of money but still get performance equivalent to or better than MPLS? That would certainly be the best of both worlds, and that is what multi-path networking can deliver.

Multi-path technology enables businesses to leverage multiple network connections. This can be a mix of Internet and private network services or all Internet services if the business chooses. By using multi-path technology, businesses can set up policies to route traffic down multiple network connections. The policies can be driven by application type, performance, cost, IT needs or any other criteria the business might deem important.

Exhibit 3 presents two different scenarios. The first diagram illustrates an organization that has deployed a hybrid WAN where business-critical traffic is sent down the MPLS connection and all other traffic is routed over the Internet connection. The second diagram shows a business network built on multiple Internet connections. A dynamic multi-path solution can continuously monitor the network and send traffic down the best-performing link.

Multi-path technology brings a level of agility to the WAN that it has never been able to achieve before. This is a critical step in the network's evolution to become "cloud ready." In a hub-and-spoke network, cloud traffic would come from the Internet into the data center and then up the spoke to a branch office. Each of these hops adds unnecessary latency to the flow of traffic, meaning that software-as-a-service (SaaS) applications perform suboptimally. When the Internet was used for best-effort traffic, this was acceptable but not ideal. Now that the cloud is being used for applications that require high-performance networks—such as voice, video, desktop virtualization and data replication—it's crucial that the network be optimized for the cloud first.

In addition to having a network that is built for the cloud computing era, businesses that deploy multi-path solutions will realize these benefits as well:

- **Less reliance on expensive MPLS networks and lower costs:** Multi-path networking enables organizations to eliminate the need for MPLS. Conservative enterprises that want to migrate away can at least reduce the amount of their budget currently spent on MPLS. This can have a huge impact on network costs, particularly for international connections. Based on interviews with customers that have shifted to hybrid WANs, ZK Research estimates that businesses can reduce the cost of running a network by up to 95% when they shift away from MPLS.

Exhibit 3: Multi-Path Networking Provides Businesses with Architectural Choices
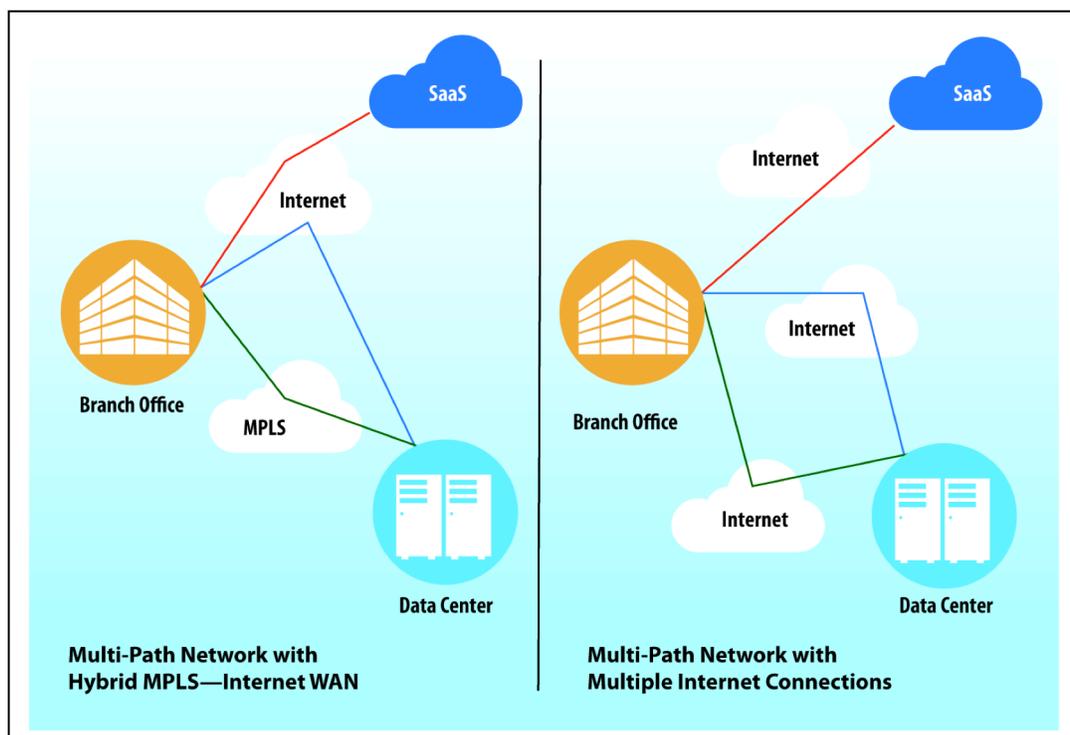
- **Improved application performance:** In a multi-path environment, all the bandwidth from each connection is active. Even though Internet traffic doesn't have the same "guarantees" as MPLS, multiple active connections protect against outages and ensure optimal performance. Businesses are likely to find a multi-path network will perform on par with or better than an MPLS network.
- **Improved security:** Contrary to common belief, an MPLS network is not secure. Because the traffic is unencrypted, any network breach means malware can spread to any point on the network quickly. When Internet connections are used, the traffic is typically encrypted from the source to the destination, offering better data protection.

Section IV: What to Look for in a Solution Provider

The shift to a cloud-ready WAN using multi-path technology needs to be an imperative for every IT leader. This evolutionary step can improve application performance, increase the level of security and improve network agility—all at a significantly lower cost compared to a legacy MPLS network. However, many solutions are available on the market today, and the choice of which vendor to use may not be clear. ZK Research recommends that businesses use the following criteria to help understand what features are most important in a multi-path network solution:

- **Granular, dynamic path control:** Multi-path networks are more than just a round robin of traffic across the separate WAN links. The solution should enable businesses to create policies to route traffic based on whatever criteria are most important to those organizations. This includes being able to create policies based on cost, application types, application performance or congestion. The solution should also have the ability to dynamically adjust as the network conditions change.
- **Choice of form factors:** There are many ways to deploy multi-path technology today. Solution providers should offer the solution as a physical appliance, a virtual solution and a cloud-based service so customers can use the solution that best fits their needs. Additionally, vendors should support all of the leading hypervisors, including ESX, KVM, Hyper-V and XenServer.

- **Zero-touch deployment features:** A cloud portal should be part of the solution so network managers can deploy, configure and manage the solution from a central location.

- **Global management system:** The solution should work independent of any particular service provider network. This will give the customer the broadest range of choices for Internet services.

- **Configuration options:** Offering a wide variety of configuration features ensures that the multi-path solution works in whatever network situation is in place. This includes overlay network services, IPsec tunnels, inline router mode and being able to subnet the network.

- **Application programming interface (API) support:** Comprehensive and well-documented open representational state transfer (REST) APIs can enable rapid integration into a wide range of ecosystem providers.

- **Path conditioning:** This feature can eliminate dropped and out-of-order packets to provide greater cost effectiveness and performance—and, consequently, it can bring private network performance to Internet connections.

- **Network visibility:** Alarms and alerts enable rapid resolution of service provider issues, resulting in the continuous performance of all network paths.

Section V: Conclusion and Recommendations

The era of cloud is here, and it will significantly change the way businesses operate and how employees work. The cloud has the power to increase an organization's level of business agility, and businesses that understand how to harness the power of the cloud will gain a significant competitive advantage. Those that can't will struggle to remain relevant.

However, the journey to the cloud requires a move away from the legacy hub-and-spoke network built on private IP connections, such as MPLS. Multi-path networking can enable the evolution away from an inflexible hub-and-spoke network to a dynamic, agile network that uses low-cost Internet connections. This will result in superior network performance at a significantly lower cost. To help businesses evolve the network, ZK Research recommends the following:

- **Rethink WAN strategies.** IT leaders must shed their conventional thinking about the Internet lacking the quality, reliability and security needed to be part of a business network. Multi-path is a game-changing technology in networking and can enable multiple Internet connections to give a "private network" experience.

- **Automate network management.** Traditional networks require management tasks to be handled manually on a box-by-box basis. This means that making even the simplest change to large networks can take several months to complete. Automating those tasks will allow network operations to better meet the demands of the business by enabling them to respond faster.

- **Use multi-path for the foundation of a software-defined WAN (SD-WAN).** Software-defined networking has reshaped the data center and will rapidly do the same to the WAN. However, migrating to an SD-WAN requires the use of a flexible, secure network as its foundation. Multi-path networking is a critical component of SD-WANs and a great starting point for any organization looking to make the shift in the future.