



IT Evolution to a Hybrid Enterprise Drives the Need for Location- Independent Computing

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Introduction: IT Becomes Network Centric

Enterprise IT has gone through several waves of evolution since the birth of computing. The computing platform has evolved from mainframe computing to minicomputers, shifted to client/server computing, and finally moved to Internet computing in the cloud era. Each transition saw computing evolve in the following ways:

- The cost of computing fell by orders of magnitude, enabling businesses to deploy more compute resources to handle almost every business process.
- The primary computing location has continued to change. Compute resources have shifted from the data center to the campus and branch office, back to the data center, and now to endpoints and the cloud. IT has had to continually adapt as the primary compute location has changed.
- The network has continued to grow in importance with each successive compute transition. Historically, the network has tied all of the compute resources together. The network plays a more important role today, though, as increasingly more applications have become network centric. The network can optimize application flows and provide the necessary visibility required to manage emerging compute models such as mobile and cloud.
- Core network infrastructure has expanded. Historically, routers and switches were the building blocks of the network because they created the connections between points. However, connectivity alone isn't enough to run the business efficiently. The network must provide users with an optimized experience to maximize productivity. Because of this, technology such as WAN optimization and network management tools now must be considered core network infrastructure.

As enterprise computing has evolved, businesses have been shifting to a “hybrid enterprise” where core applications and data can be located in private data centers and public clouds. The growth of hybrid cloud deployments accelerated the transition to hybrid wide-area networks (WANs). Private networks, such as MPLS, are being joined by Internet connections that offer a choice in delivery channels—costly, but predictable, networks for mission-critical loads and cheaper public networks for bulk loads such as data backups.

The transition to a hybrid environment has created challenges in optimizing application performance because the primary compute location has shifted and become distributed. One of the challenges is that legacy deployment models dictated that there was a single, best computing location. As stated earlier, this location has shifted from the data center to branch offices to the cloud and mobile devices. Each of these locations has different strengths and weaknesses depending on the application. Some applications work fine over a WAN, but others operate better with a branch-centric deployment model close to the users accessing the application.

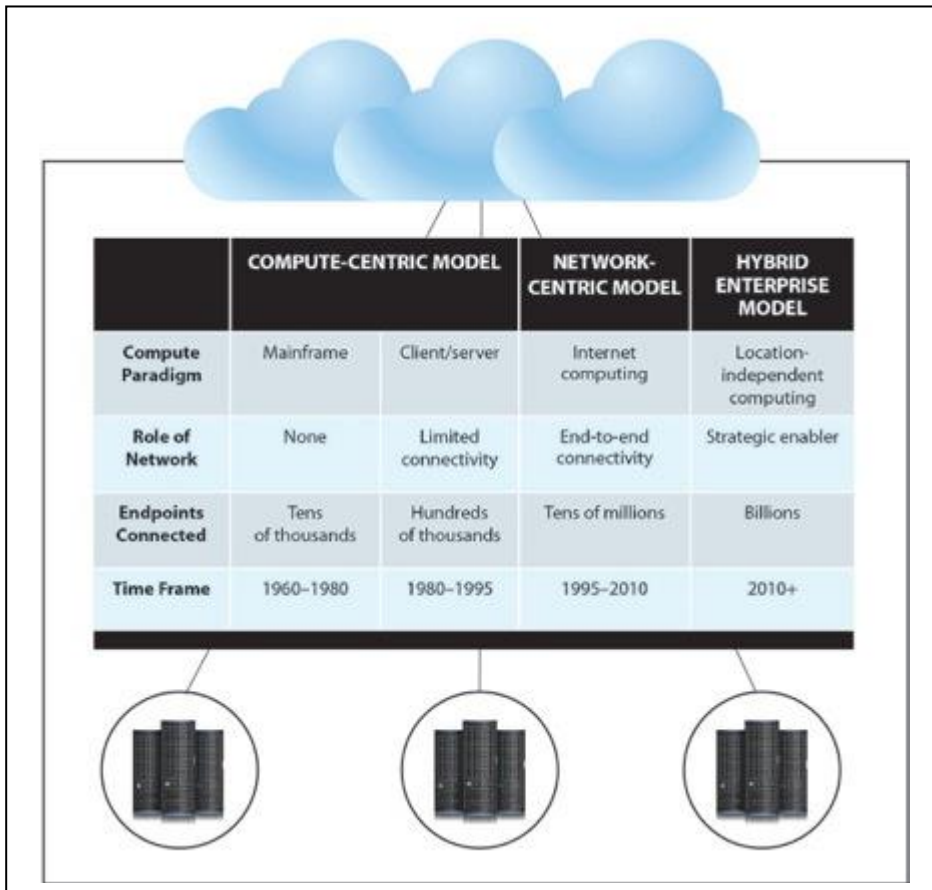
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Influence and insight through social media

Exhibit 1: The Industry Is Shifting to a Hybrid Enterprise Model



Source: ZK Research, 2015

The key to building a robust, scalable IT foundation that’s capable of providing an optimized experience for all applications is to think of computing as being location independent *today*. There’s no single right answer for how or where computing is best done.

Consequently, enterprise architectures are evolving into hybrid models that balance the mix of public and private compute and network resources that suit their needs. The industry is in the midst of the next major compute transition—the shift to a hybrid enterprise model (Exhibit 1).

As businesses embrace cloud computing and look to the public Internet to provide increasingly more connectivity, they must maximize the investments they have already made in IT but also ensure that future IT expenditures meet the goals of the organization without breaking the bank.

Section II: Location-Independent Computing Drives the Shift to a Hybrid Enterprise

“Location-independent computing” (LIC) is a term used to describe a model that allows IT to host workloads anywhere in the hybrid enterprise while optimizing delivery of applications and data to maximize business performance and end-user productivity. This means that compute resources can be located virtually anywhere—even if the data for an application resides elsewhere. This model has taken shape as computing has evolved.

In most organizations, though, technology is rarely retired. It’s more likely that the legacy systems are kept in place and complemented with newer technology. This is one reason why IT systems are distributed across the enterprise.

The primary locations for compute today consist of the following:

- **Data centers:** Historically, most workloads have resided in the data center. This includes mainframes for batch processing and client/server systems. The applications served up from the data center are typically those used by the majority of employees. Email and database applications are examples of data center–based applications.
- **Departments:** Some business units within companies prefer to have applications deployed locally within the confines of a department. This is normally done to protect sensitive data. Payroll and financial applications are examples of departmentally deployed applications.
- **Branch offices:** Many applications do not run well over a WAN, such as “chatty” applications or those that are sensitive to delays. These applications are often deployed locally within a branch office. Backup/restore or voice systems are examples of applications found in branch offices. Some enterprises have tried to use desktop virtualization or thin client computing to overcome branch challenges. However, these solutions don’t address the fundamental problem of distance or inefficient protocols that run poorly over a network.
- **Cloud applications:** Recently, many organizations have turned to the cloud for application delivery. Cloud-based applications, including software as a service (SaaS), are an excellent alternative for organizations that want to shift their IT spend to more of an OpEx model. Email and CRM systems are some of the most widely deployed SaaS applications today.
- **Mobile applications:** The rise of bring your own device (BYOD) has made tablets and smart phones pervasive in businesses today. Initially, these devices were used to access email and a few web applications. However, application developers recently have been building mobile applications that leverage the unique capabilities of mobile devices and are primarily vertical in nature.

Over the years, IT leaders have struggled to determine the best place to locate applications to achieve the best balance of cost and performance. This has created a scenario where most organizations now have many “islands” of applications and are suffering from infrastructure sprawl.

The growth of cloud and mobility has made security and compliance top business initiatives. The ZK Research 2014 Purchase Intention Study shows that securing the network is the top driver for network investments today (Exhibit 2). Complying with regulatory requirements is third on the list of drivers for network spending. These regulatory requirements will increasingly dictate data residency, which will accelerate the path to LIC.

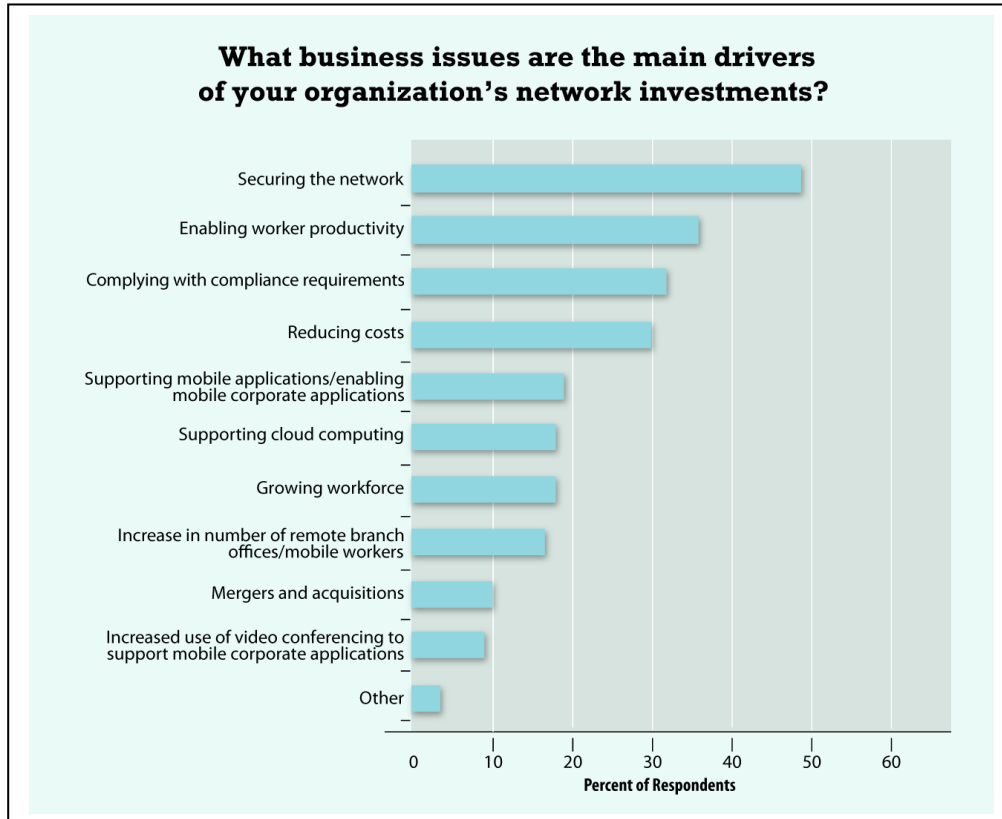
In a hybrid enterprise, infrastructure will be deployed virtually everywhere. So, how should an IT leader handle the explosion of infrastructure? Some organizations are looking to the cloud to help manage infrastructure sprawl. Although an “all cloud” strategy might make some sense for small businesses, the strategy isn’t practical for enterprises. The hybrid enterprise needs a mix of public and private compute resources to be successful.

Another strategy could involve trying to centralize all business applications in a data center; however, many applications operate better when they are local to the user. Again, a small business might be able to centralize all applications, but large enterprises are too geographically dispersed for this model to be effective.

The workload and business function should be the main factors that determine where computing is done and where infrastructure should be located. Historically, cost and convenience have outweighed business requirements, and this can no longer be the case. If the performance requirements can be met, then businesses would be best served by putting the infrastructure in a location close to the user. A computing strategy based solely on cost or convenience will only degrade performance and negatively affect end-user performance.

A hybrid enterprise with a location-independent computing strategy is based on the principle that infrastructure is deployed at the best possible location for a given workload or application. This means information and data must be able to easily move among the various compute locations to optimize workflows. Also, IT leaders must have both macro- and micro-level visibility into the network to quickly identify when problems happen and fix the issues before users are affected.

Developing a strategy for LIC is a must for IT and business leaders today to give users the best possible experience at the lowest cost.

Exhibit 2: Security and Compliance Drive Network Spend

Source: ZK Research 2014 Network Purchase Intention Study

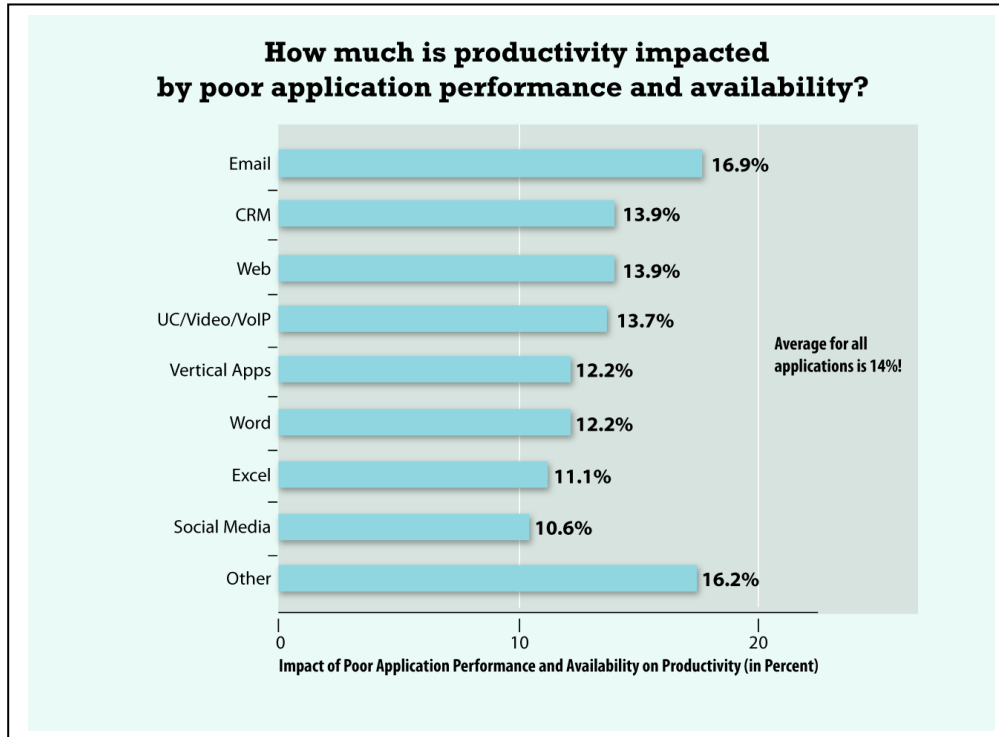
Section III: A Path to Location-Independent Computing for the Hybrid Enterprise

Shifting to LIC is a critical initiative for all businesses looking to empower employees and maximize worker productivity. However, businesses need to overcome several challenges to move LIC from vision to reality, including:

- Eliminating distance between locations:** When organizations have branch offices, there are often large distances between the different locations. Distance adds latency to application flows and can significantly impede the adoption of LIC.
- Scaling the infrastructure into the cloud:** Infrastructure technology historically has been designed to scale in a physical location. Although scaling the infrastructure was a challenge at one time, virtualization and multi-core processing have made scaling within a single location straightforward. LIC demands that infrastructure scale into the cloud. This means compute, network and storage resources now need the

ability to rapidly scale up and out to meet the demands of hybrid cloud environments.

- Adapting to the evolution of applications:** The applications themselves are evolving, being designed as very distributed, service-oriented, composite applications. The changing application landscape both requires and complicates LIC.
- Understanding the performance of the network and applications:** Computing today is highly network-centric, but the networks themselves are generally much more reliable than they were in the past. It's critical to have management tools that provide a holistic view of the network as it relates to the different corporate applications. However, most legacy tools only provide a single view of network or application visibility.
- Optimizing the user experience:** Poor application performance leads to lost productivity. In fact, according to the ZK Research 2014 Network Purchase Intention Study, workers are an average of 14% less productive because of poor network performance or availability (Exhibit 3). Managing the user experience can create a

Exhibit 3: Poor Application Performance Results in a Loss of Productivity

Source: ZK Research 2014 Network Purchase Intention Study

challenge for LIC because workers will be accessing corporate applications over different networks and devices.

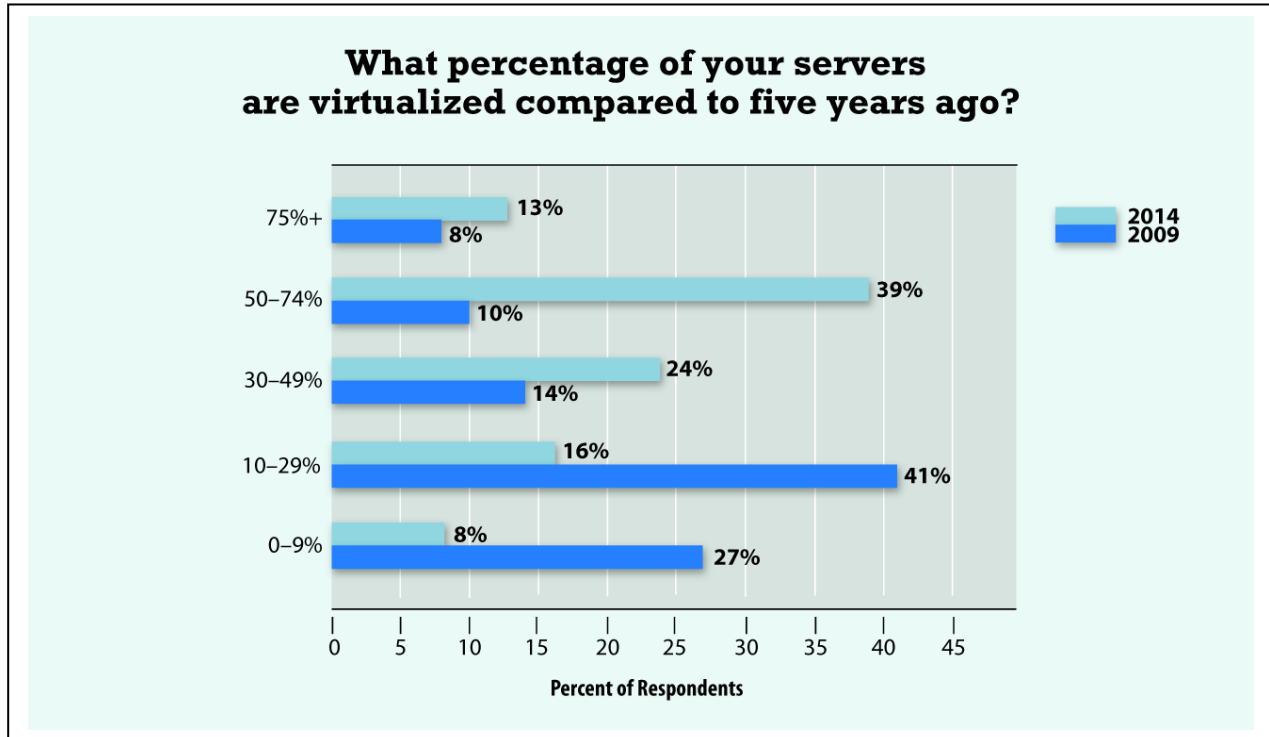
Although the challenges associated with LIC might seem significant, they can be overcome. The key is to allow the workload or business function to determine the best location for the infrastructure required to power it, and then have the right technology in place to optimize performance and tie the various islands together.

The following steps are necessary on the path to becoming a hybrid enterprise:

- 1. Adopt a hybrid WAN architecture.** Leverage the flexibility of a hybrid network. A network that was built solely on private network services, such as MPLS, was fine when all compute resources were located on the company premises. However, the hybrid enterprise requires a much more flexible, agile network. A hybrid WAN, composed of private network services and Internet connections, can deliver the necessary scale and agility for a hybrid enterprise to capitalize on LIC.
- 2. Deploy WAN optimization.** Historically, WAN optimization was considered a “nice to have” technology for large enterprises. However, it is a

foundational component of LIC because it can accelerate the delivery of applications to the branch and from the cloud. When WAN optimization is used, workers will experience LAN-like performance no matter where the application resides. WAN optimization also provides a point of visibility and control over applications that support application performance best practices.

- 3. Shift to virtual infrastructure in the data center.** Server virtualization is widely deployed today (Exhibit 4). Initially, virtualization was used to consolidate the number of physical servers. However, many organizations recently have started to mobilize virtual workloads for performance or maintenance purposes. This drives the demand for the other infrastructure that sits alongside servers, such as application delivery controllers, to be virtualized as well so they can migrate with the servers.
- 4. Redesign the branch.** A tremendous amount of infrastructure and data resides in branch offices today. Branch infrastructure is difficult to manage, and the data is challenging to back up and restore when required. IT leaders should drive toward the vision of the serverless branch office and look to consolidate as many applications as possible into the data center.

Exhibit 4: Virtual Servers Are Now the Norm

Source: ZK Research 2014 Network Purchase Intention Study

5. **Manage the infrastructure with an application perspective.** Managing infrastructure through the lens of the network or the servers provides no insight into user experience. As compute and data are continually migrated and relocated, it's critical that businesses gain or maintain an application perspective. Doing so helps them to answer questions about the end-user experience and enables IT to move to a more predictive support model.
6. **Maintain an end-to-end view of the network.** Businesses should deploy tools that can provide a holistic view of the network and its associated flows. This helps them to catalog the various applications running on the network and identify points of congestion.
7. **Shift to a hybrid cloud model.** There's a great debate today regarding whether companies should use private cloud or public cloud services. Both are viable options; businesses should use public clouds for standardized applications or for extra compute resources and leverage private clouds where greater control is desired.
8. **Monitor the end-user experience.** With a hybrid enterprise, it's critical that IT departments have the capability to monitor the end-user experience. This can be accomplished with management tools that are capable of setting baseline

performance levels and monitoring deviations from the baseline.

Businesses that choose to adopt location-independent computing will realize many benefits, including:

- **Greater control of infrastructure:** LIC enables applications and data to be hosted in the best location to ensure optimized performance, the highest levels of security and the fastest recovery times possible.
- **Proactive IT support:** With better visibility across the network and applications, IT finally will be able to monitor the end-user experience. This will enable IT to quickly identify and fix problems before end users notice.
- **Optimized end-user experience:** LIC ensures that applications get to the worker as fast as possible. This reduces the number of help desk calls and increases business productivity to new levels.
- **Lower overall total cost of ownership:** With LIC, IT can prioritize mission-critical applications to run over fast network connections and offload low-priority applications over the Internet.

Section IV: Conclusion and Recommendations

Today, IT sits on the precipice of the next big computing revolution—the shift to location-independent computing in the hybrid world. The vision of location-independent computing is to remove all the barriers that distance and location create and seamlessly tie together the islands of infrastructure that exist today. This is essential in order for hybrid enterprises to take advantage of the cost and flexibility benefits of cloud services and the economics of Internet transport.

Adopting this new computing model must be a top priority for IT and business leaders today. However, the path to location-independent computing may not be clear. To help navigate this journey, ZK Research recommends the following:

- **Make the shift to a hybrid enterprise.** When it comes to private and public clouds and networks, there's no single correct choice. Rather, all businesses will adopt both private and public network and compute resources. Organizations should embrace the concept of a hybrid enterprise and make it a strategic initiative.
- **Assess your level of location dependence.** Compare your current computing model to your current ideal state. Then project out the ideal state to two years and five years. This gap analysis should be a collaboration between IT and the business, and the business should use the outcome to develop a location-independent computing hybrid enterprise strategy.
- **Create a road map to location independence.** Use the results from the gap analysis of the business's current and ideal state to build a deployment plan. The plan should enumerate and prioritize the initiatives to execute. This should be a collaborative effort among the different IT domains and business stakeholders.
- **Ensure visibility, control and optimization.** Leverage best-of-breed technologies to ensure you have the visibility, control and optimization tools needed to inspect, direct and protect application traffic over any network—regardless of where the app is hosted and where the user is located.