

## WHITE PAPER

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# Enabling IaaS for Service Providers with Unified Service Delivery

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## IN THIS WHITE PAPER

This white paper investigates the transformation of IT delivery and the growing interest in and adoption of delivering IT within a service-oriented architecture. The paper focuses on the advent of infrastructure as a service (IaaS), the growing role of the service provider, and the inherent challenges faced by service providers to profitably develop, scale, and manage such an environment. The paper then takes a closer look at the emerging role of a unified infrastructure approach and the solutions, services, and useful tools offered by Cisco aimed at optimizing the delivery of IaaS through its service provider partners.

## EVOLVING REALITIES IN THE DATA CENTER

New business realities and increasing demands on the management and delivery of information are transforming the way IT is developed and delivered within business organizations. Today's businesses expect instant access to data and applications, higher levels of collaboration, and continuous improvements in productivity. At the same time, consumers are equally demanding in terms of expecting a robust multimedia experience that protects personal information and spans multiple devices.

For enterprise IT organizations responsible for enabling both business- and consumer-based activity, the technology, operational, and business implications are complex and challenging. The landscape is rapidly moving to an intense focus on reducing, if not eliminating, many capital and operational expenditures (capex/opex) and at the same time rapidly provisioning and delivering new services to mobile, branch, regional, and telecommuting personnel.

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## Increasing Business and Operational Pressures

The demands placed on today's IT organizations are accelerating on all fronts, with IT executives and administrators feeling the pressure to address a variety of challenges regarding growth, scalability, and management. From a business perspective, organizations must consider increasing pressures on a variety of fronts.

First and foremost, organizations must find ways to reduce or eliminate capital expenditure and move to more streamlined, predictable control of operational expenditure. Commensurate with the troubled economies during the past two years, IT budgets are seldom increasing, yet strain on resources and IT architecture continues to mount.

At the same time, organizations must now deliver IT services to increasing numbers of internal and external users, including a growing base of mobile users. The rising amount of data from mobile users not only increases strain on the network and storage environments but also increases complexities regarding data access and security management associated with mobile users. Often, adding support for these users is just not possible within an existing corporate data center due to concerns about costs, unpredictable network loads, and service availability.

In addition to reducing capital and operational expenditures while facing increased capacities and numbers of users, organizations are finding that the requirements to effectively leverage the inherent value of data are growing. This activity of managing the long-term archive and timely retrieval of information is largely driven by regulatory and/or business governance mandates as well as an increased desire for business analytics.

These business realities are intensifying and are translating to a new wave of pressures from a technological and operational perspective. IT organizations are now faced with quickly developing and offering a growing number and variety of applications across a wide range of internal/external users, needs, and interoperability levels.

To satisfy the growing pressure to reduce capital and operational spending, organizations must realize the most efficient deployments where possible and improve asset utilization over an increasingly complex association of networking, physical and virtual server, and storage infrastructure. This translates to the ability to gain control over the incessant growth, long-term management, and security of information, with increasing requirements to deliver layers of management that protect, extend, and leverage the value of data.

In addition, there are increasing requirements to reduce and move to more predictable energy consumption for power and cooling, as this can be a tremendous burden on operational expense.

Table 1 presents a summary of the business and operational pressures facing enterprise organizations.

<b>TABLE 1</b>	
Summary of Business and Operational Pressures Facing Enterprise Organizations	
Business Pressures	Operational Pressures
Reduce or eliminate capex	Offer a growing number and variety of applications
Streamline and predict opex	Provide access to growing base of users
Comply with regulations/governance	Improve asset utilization
Deliver IT services to expanding base of users	Obtain control over incessant growth
Leverage inherent value of business data	Reduce and move to more predictable energy consumption
Rapidly provision, deploy, and retire services	

Source: IDC, 2010

The confluence of the business and operational demands listed above is causing many organizations to struggle with their ability to satisfy their newfound requirements with existing, traditional approaches to delivering IT.

The past decade has inspired advancements in technology and solutions that have enabled enterprise organizations to begin addressing new business and operational realities in the data center today. Advancements in server and storage virtualization have opened the doors to greater consolidation, improved utilization, and reduction in capital spending. The convergence and unification of infrastructure components comprising server, storage, and networking has fueled great improvements in operational efficiencies.

However, enterprise organizations today are increasingly unable to keep pace with rapidly evolving requirements, as described above, while reducing costs and decreasing solution deployment times. New applications are much less predictable in their loads, which often introduces risk in determining the correct levels of investment in IT and network assets. In addition, the nationwide or global scope of these new applications often requires a dispersal of server/storage/network facilities to meet quality-of-service expectations.

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## **A New Way of Thinking: Infrastructure as a Service**

In an effort to meet business and operational requirements forced on today's IT organization, many are seeking a new approach: leverage external, third-party resources and services to complement and/or replace traditional, internal IT delivery. This need goes beyond traditional outsourcing relationships, which are more about reducing IT administration costs and complexity. These new cloud-based services provide a fresh set of options for infrastructure operations, application development, and business software licensing. By leveraging the scale of service provider environments, even midsize and small enterprises can achieve cost savings and improved application availability.

This movement toward a cloud-based services approach builds on the evolution of collocation and hosting services. These cloud services are evolving into IaaS offerings that provide a more standard, scalable, flexible, and efficient methodology for acquiring basic IT services comprising compute, storage, and network resources. It is also the foundation upon which organizations can build and deliver more advanced offerings in the form of platform as a service (PaaS) and software as a service (SaaS) offerings.

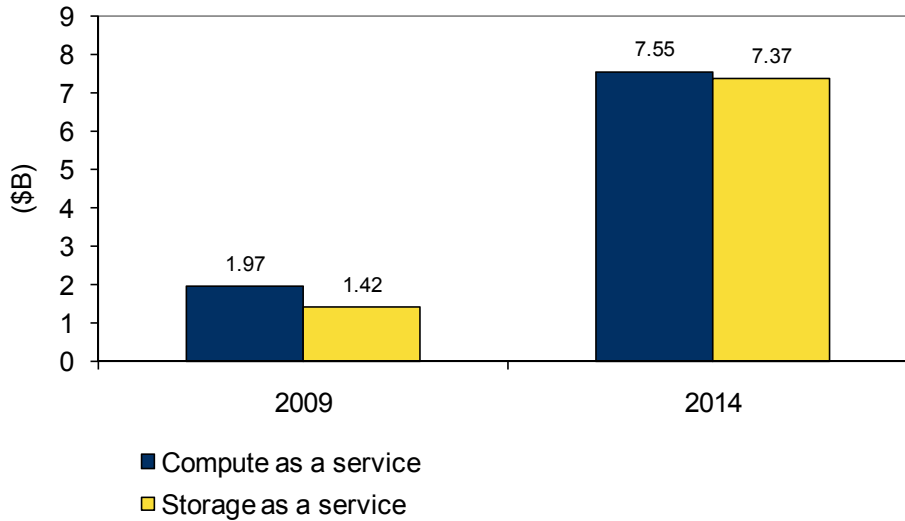
Moving toward a cloud-based approach to provide data center infrastructure can greatly aid an organization in achieving its business and operational goals. By offloading portions or the entirety of its infrastructure, the organization is effectively transferring many of the operational challenges to the third-party provider.

IDC forecasts the opportunity for IaaS, represented as the combined opportunity for compute and storage as a service, to accelerate over the next several years. While IDC does not forecast pure networking services as a cloud-based, "as a service" offering, it is critical to note the importance of the networking component when

considering the anticipated growth of IaaS. Figure 1 shows the opportunity for compute and storage services delivered by service providers in a cloud-based delivery model growing at a 34.4% CAGR from a combined \$3.4 billion in 2009 to \$14.9 billion in 2014.

**FIGURE 1**

Worldwide IaaS Revenue (Compute and Storage Services)



Source: IDC, 2010

### ***The Role of the Service Provider***

As IaaS continues to become a critical element in ongoing operational success for many enterprise organizations, the role of the service provider is increasing dramatically. However, similar to enterprise organizations, service providers face more intense challenges to develop, deploy, maintain, and scale solutions that serve a multitude of customers in a quick, efficient, and cost-effective manner.

The challenges that IaaS service providers face are many, as shown by the findings from a recent IDC survey on the requirements organizations have for their cloud service providers (see Figure 2). IDC groups the requirements into the areas noted in the following sections.

**FIGURE 2**

Growing Customer Requirements for Service Providers



n = 263

Source: IDC Enterprise Panel, 3Q09

**Demanding Customers**

Whether the service provider is offering services to an enterprise organization or directly to consumers, the demands of the service provider customer are increasing. Customers expect the service provider to nondisruptively accommodate a growing population of dynamic users and provide high-quality support when problems develop. They expect the service provider will provide constant and global on-demand access to data and resources; provide elastic scalability; and share, analyze, secure, and protect data at all times.

Among these demanding customers, the issue of trust and security has risen to become a leading concern. Two main themes are emerging behind the perception of the security concern. For one, customers must be comfortable with their important business data being stored and maintained by third-party providers. Secondly, as applications and data transfer become increasingly dynamic among a virtualized and often geodispersed environment, data security becomes top of mind.

Figure 3 shows the results of an IDC survey that address the top concerns among customers as they move to a cloud or "as a service" IT delivery model.

Along with top concerns such as security are expectations regarding availability, performance, and other perceived challenges with respect to adopting an "as a service" delivery model. While these perceptions are real among end users, service providers can address these challenges head-on if they choose to develop their infrastructure offerings wisely.

**FIGURE 3**

Customer Perception of Cloud Model Challenges



n = 263

Source: IDC Enterprise Panel, 3Q09

**Competition and Time to Market**

Technological advances such as virtualization; the unification of server, storage, and networking; and interconnection across distributed service provider and customer data centers have enabled a growing segment of service providers to expand their network offerings while taking advantage of previously unachievable economies of scale. As the

number of service providers increases and the race to provide services continues, time to market becomes critical to lock in a foothold in this growing opportunity.

### **Cost Reduction**

For a service provider to succeed, not only must it satisfy demanding customers, but it must do so at an acceptable, value-driven cost to the customer. This becomes a challenge for many service providers as the design and operational challenges of providing services can be significant to overcome in a cost-effective manner.

### **Design and Operational Challenges**

Service providers offering IaaS have many complex design and operational challenges to consider when deploying their own solutions. Collectively, these challenges can cause great expense and delay in time to market when delivering an effective IaaS solution. Some specific factors that a service provider will need to consider include:

- Vendor(s) selection process: single source versus integrated parts
- Design of appropriate architecture that will facilitate proper elastic scalability, load balancing, and dynamic workloads
- Strategy for security, data protection, and business continuity
- Documentation and development of service catalogs
- System integration and testing

IDC believes that service providers will become market leaders only if they are able to satisfy the concerns and demands of the customer while developing their environments quickly and efficiently and operating them cost-effectively.

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## **Cisco's Unified Service Delivery**

For a service provider to be successful, it is critical to streamline the process of developing, implementing, and operating the environment used to deliver IaaS. Without this streamlined process, the service provider is significantly more exposed to the forces of competition, higher cost, and delayed time to market, all of which are ingredients for failure.

The advent of the consolidated, virtualized, and unified data center has formed the foundation for the next step toward greater efficiency and low-cost IT delivery. Suppliers in the market that are focusing on the advancement of virtualized and unified infrastructure solutions are leading the market toward the vision of improved operational efficiency and resource optimization at dramatically lower cost.

One such company that has advanced this concept is Cisco. The company's Unified Service Delivery (USD) foundation incorporates virtualization and data center consolidation using an advanced unified fabric to lower costs and streamline delivery and time to market of IaaS environments for service providers. Simultaneously, it includes key foundational technologies to enable cloud-based service delivery.

The Cisco USD foundation provides a single, common suite of infrastructure that allows service providers to cut costs, increase time to market, optimize resources, and deliver a secure, virtual experience across the entire service provider portfolio.

The Cisco USD foundation for IaaS offers service providers a preengineered, pretested, and fully documented approach allowing for a tremendous improvement in the time and expense to bring an IaaS offering to market. Elements of the Cisco USD span data center compute, storage, and networking as well as communications within and among data centers by fully integrating distributed data centers to Cisco's IP Next-Generation Network (NGN), bringing an end-to-end solution to users. In addition, Cisco has developed a suite of best practices, professional services, and return-on-investment (ROI) tools specific to USD that allow service providers to take full advantage of the USD approach and dramatically increase ROI and profitability while minimizing overall time to market.

The elements of the USD foundation include the following:

### ***Data Center***

- ☒ **Unified Computing** leverages the power of a unified compute and storage delivered through the Cisco Unified Computing System (UCS). The UCS enables modular, elastic scale that is essential for service providers to offer IaaS cost-effectively.
- ☒ **Third-party interoperability** enables third-party servers to be fully integrated into the USD solution.
- ☒ **Virtualization**, through products such as Cisco Nexus 1000V, allows for optimizing resource utilization and managing the networking of virtual machines (VMs).
- ☒ **Unified Fabric** is delivered through Cisco's Nexus family of products for communication within the data center and allows for massive consolidation, simplification, and unification of LAN and SAN networks.
- ☒ **Advanced peering and interconnect** enables data centers to share resources across the network to scale more effectively to meet customer needs on demand.

### ***IP NGN***

Cisco's IP NGN allows for a secure, virtual connection between applications and users. Specifically, the IP NGN:

- ☒ Provides application-aware and subscriber-aware network intelligence and quality of service
- ☒ Ensures application performance and security
- ☒ Provides media-aware distribution
- ☒ Enables interoperability and interconnect capabilities

### ***Professional Services***

For service providers looking to take full advantage of the Cisco USD approach, Cisco offers a suite of professional services that further optimize the delivery of the solution. The comprehensive suite of USD services includes:

- ☒ **Advisory Services** — to define new business and service models and determine new operational processes
- ☒ **Advanced Services** — the next step to define, design, engineer, and implement USD solutions
- ☒ **Technical Services** — traditional maintenance support plus proactive diagnostic capabilities to ensure higher availability, lower operational costs, and reduced risk
- ☒ **Remote Management Services** — comprehensive 24 x 7 remote monitoring, issue resolution, and day-to-day management of the environment

### ***Cisco IaaS ROI & Configuration Guidance Tool for Service Providers***

As service providers consider future offerings, especially cloud-based options such as IaaS, one of the major challenges they face is simply getting started. For many, a majority of energy, time, and money is devoted to operating and maintaining the existing infrastructure, and the analysis behind developing the business case for new endeavors conveys thoughts of time and expense that the service provider cannot afford.

In addition to offering a full suite of preengineered solutions and services around the Cisco USD approach, Cisco has also developed an extremely useful tool to allow service providers to run scenario-based modeling. The tool allows service providers to predict ROI and to visualize the outcome and benefits of implementing the Cisco USD approach for enabling IaaS. It also provides guidance on what the bill of materials might look like for the particular scenario being modeled.

The Cisco IaaS ROI & Configuration Guidance Tool rapidly accelerates the up-front analysis associated with deploying IaaS on the Cisco USD foundation. Not only is the tool a useful instrument to quickly develop possible architectures to deploy IaaS, but the capital and operational cost analysis that the tool delivers has quickly become a source of great insight for C-level executives who demand an understanding of the business value behind offering IaaS.

This interactive tool allows service provider IT executives and administrators to input the full spectrum of needs regarding compute, storage, and networking requirements. The Web-based tool allows for real-time adjustment and scenario testing to obtain immediate analysis of the benefits and cost savings attributable to the Cisco USD approach.

### **Components of the Cisco IaaS ROI & Configuration Guidance Tool**

Given the business and operational pressures that service providers and large enterprise organizations are facing, most CIOs and executives are eager to see how new approaches to deploying and managing IT can reduce spending. With this in mind, Cisco developed its ROI tool with the granularity necessary to provide insight into both capital and operational costs.

Along the way, the tool incorporates brief but useful guides that provide context for the user when choosing values for specific metrics.

### **Capital Expenditure Analysis**

The Cisco ROI tool includes the following key elements for modeling capital expenditure (i.e., cost associated with one-time events):

- ☒ **Networking** gives the user choice between Separate or Aggregated networking deployments based on the Nexus family of networking products.
- ☒ **Compute** allows the user to set parameters on the numbers and realized revenue of VMs needed to satisfy anticipated workload volume. The tool allows for a granular view among Power (e.g., heavy workloads, database servers), Average (e.g., disaster recovery and applications), and Light (e.g., developers and Web servers). The analysis also includes the average costs for virtualization software and memory associated with VMs.
- ☒ **Storage** allows the user to set parameters on the average cost per capacity of storage.
- ☒ **Data center buildout** (optional) allows some simple parameters to model the capital associated with building or expanding new or additional data center space to support the new infrastructure.

### **Operational Expenditure Analysis**

In addition to the capital expenditure analysis, the Cisco ROI tool includes the following key elements for modeling operational expenditure (i.e., cost associated with ongoing events):

- ☒ **Labor** — including the numbers of full-time employees, shift frequency, and labor rates
- ☒ **Growth rate** — a measure of the anticipated revenue growth rate of the organization's services
- ☒ **Power and cooling** — a measure of the typical costs associated with powering both IT equipment and HVAC equipment used to control the data center environment
- ☒ **Maintenance and service orchestration**

In addition, the tool provides the ability to input an assumed discount rate and net present value (NPV) parameters to reflect realistic pricing and costs for the particular ROI tool user's organization.

Finally, the tool provides multiyear, real-time results of the varying parameters, presented as projected revenues and margins associated with the current input and assumptions. Scenario results are presented as multiyear charts and summary tables, including the ability to save scenarios and print results in electronic formats to be shared among other users and stakeholders within the organization.

In summary, the Cisco ROI tool addresses the fundamental and most critical elements of deploying services based on a Cisco USD approach. By providing insight into both capital and operational expenditures, the tool quickly provides initial insight into the feasibility for service providers to enable such services as IaaS.

## CHALLENGES/OPPORTUNITIES

There is a tremendous opportunity for Cisco and its partners to help a growing population of service providers as they seek to develop and deliver IaaS solutions to a demanding set of customers. With opportunity come inherent challenges, and Cisco should consider the following as it seeks to expand its capabilities:

- ☒ Expand the scope of service profiles to match more specific IaaS use cases (e.g., storage for content distribution, on-demand compute for business analytics, solutions for VDI).
- ☒ Expand the capabilities to cover ROI and cost information for other, non-Cisco-specific IT components. Primarily this will need to be done in conjunction with Cisco's storage partners.
- ☒ As the vision of service delivery continues to mature among service provider CIOs and executives, so too must Cisco's ability to provide clear insight. One way to ensure this will be for Cisco to advance the granularity of its ROI analysis tool. Over time, increased granularity in the types and requirements of applications, increased choice in processor and memory allocation per virtual machine, and ability to project results in local currencies will continue to attract those looking for more sophisticated, global analysis.

## CONCLUSION

Today's competitive and demanding business environments are placing tremendous pressure on IT executives and administrators to align IT capabilities with new business realities. The requirements to reduce capital spending and optimize operational costs are intensifying. At the same time, companies need to respond more quickly and more accurately to dynamic information demands of employees, customers, and partners. The often conflicting priorities are causing many organizations to consider alternative IT deployment methods such as IaaS.

In turn, those service providers seeking to offer such IT delivery methods will face even more intense challenges to quickly develop IaaS solutions that serve a multitude of customers in an efficient and cost-effective manner.

Solutions such as Cisco's Unified Service Delivery that consider a holistic approach to deploy and manage this infrastructure will enable service providers to streamline the process of deploying and managing a consolidated, virtualized, unified, and flexible infrastructure.

Cisco, with its offering of unified technologies, professional services, and ROI tools, can greatly help service providers to quickly evaluate the business opportunities associated with offering IaaS, lower the cost to deploy, and speed time to market.

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