Cloud: Powered by the Network

What a Business Leader Must Know

Foreword

We address this paper to business leaders with an understanding that many of you have already been exposed to a deluge of technical treatises and marketing messages on Cloud. In this paper, we offer our thoughts on where we believe Cloud is going from a *business perspective* and why it's relevant for your organization. Our aim is to inspire creative thinking and spark dialog. For more perspectives on Cloud and to share your thoughts, please visit http://www.cisco.com/go/cloud.

Cloud is a new computing paradigm that opens the door to bold new possibilities. In Cloud, IT resources and services are abstracted from the underlying infrastructure and provided on-demand and at scale in a multi-tenant environment. Cloud is already having a broad impact, with implications that are relevant even to the most non-technical person.

Cloud will change the way the world lives, works, plays, and learns. Imagine having access to nearly unlimited computing power on any device from anywhere. Imagine bringing new products to market months faster than you can today. Imagine speeding up your innovation cycles, with fewer barriers to scaling up successes and shutting down failures. Imagine accessing your content—music, movies, books—from any location. Imagine connecting with friends, family, and colleagues around the globe with a rich and secure experience, accessible to everyone.

Though Cloud is a reality today, even greater functionality is on the horizon. As Cloud matures into a market-place, we can expect more revenue opportunities, shorter time-to-market, and a richer set of applications and services. We will witness more powerful development capabilities, accessible even to non-technologists. We will experience better quality communication platforms. Lastly, we will achieve more efficient, scalable, and environ-mentally sustainable IT infrastructure.

At Cisco, we are helping to shape and drive the revolution that is Cloud. We believe the future of computing must encompass diverse technologies and business models, with contributions from a rich ecosystem of players. However you choose to deploy or consume IT, we aspire to provide the most flexible platform for delivering the powerful capabilities that you and your business require.

Cisco contributes unique capabilities to this revolution. Our network platform enables the rapid, safe, and flexible deployment of Cloud capabilities. We provide choice along multiple dimensions, from the type of service you want to consume to the deployment model that is most appropriate for your applications. We allow a pragmatic evolution within the revolution: our technologies safeguard your investments and future-proof the transition. With our ecosystem of partners, Cisco stands ready to help you capture the Cloud opportunity.

In this paper, we share our vision of Cloud, with a point of view on Cloud today, and a framework for how we might create the future together with you. Our hope is that this paper inspires new ways of thinking about Cloud in your business. We know that writing it has inspired us to think about ours.

Padmasree Warrior
Chief Technology Officer, Cisco

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Cloud Service Models

Infrastructure as a Service (IaaS) provides users with processing, storage, networks, and other computing infrastructure resources. The user does not manage or control the infrastructure, but has control over operating systems, applications, and programming frameworks.

Platform as a Service (PaaS) enables users to deploy applications developed using specified programming languages or frameworks and tools onto the Cloud infrastructure. The user does not manage or control the underlying infrastructure, but has control over deployed applications.

Software as a Service (SaaS) enables users to access applications running on a Cloud infrastructure from various end-user devices (generally through a web browser). The user does not manage or control the underlying Cloud infrastructure or individual application capabilities other than limited user-specific application settings.

Cloud Deployment Models

Private clouds are operated solely for one organization. They may be managed by the organization itself or by a third party, and they may exist on-premises or off.

Public clouds are open to the general public or a large industry group and are owned and managed by a Cloud service provider.

Hybrid clouds combine two or more clouds (private or public) that remain unique entities but are bound together by technology that enables data and application portability.

Community clouds feature infrastructure that is shared by several organizations and supports a specific community. They may be managed by the organizations or a third party and may exist on-premises or off.

Source: NIST

Chapter 1
The Power of Cloud

We live in a more connected and fast-moving world than ever before. Small startups overtake established incumbents to dominate their markets with increasing speed. Developing countries leapfrog massive landline investments and jump straight to mobile communications. While our growing interconnectedness brings many benefits, it also means greater vulnerability and a heightened sensitivity to risk.

Increasingly we look to technology to support both our personal and professional lives. As individuals, we expect instantaneous and ubiquitous access to communications, data, content, and applications. We increasingly look to social media to inform our personal and business decisions. As business leaders, we expect technology to deliver cost efficiencies, improve customer experience, drive revenue growth, and foster innovation. At the same time, we expect constant availability and end-to-end security.

This combination of rising expectations and a rapid rate of change challenge traditional approaches for information technology. Business cycles keep shortening, but business system complexity keeps escalating. Information technology is too often described as equal parts business accelerator and business obstructer.

A new approach is needed to free individuals and organizations from the constraints of traditional information technology. We believe that Cloud is part of the answer and will play a central role in the next era of IT.

Cloud is a new computing paradigm. In Cloud, IT resources and services are abstracted from the underlying infrastructure and provided on-demand and at scale in a multi-tenant environment. Cloud has several characteristics:

- Information technology, from infrastructure to applications, is delivered and consumed as a service over the network
- Services operate consistently, regardless of the underlying systems
- Capacity and performance scale to meet demand and are invoiced by use
- Services are shared across multiple organizations, allowing the same underlying systems and applications to meet the demands of a variety of interests, simultaneously and securely
- Applications, services, and data can be accessed through a wide range of connected devices (e.g., smart phones, laptops, and other mobile internet devices)

Cloud encompasses several variations of service models (i.e., IaaS, PaaS, and SaaS) and deployment models (i.e., private, public, hybrid, and community clouds), as defined in the sidebar.

SITUATION

· Global organizations face real collaboration challenges. Employee expertise is distributed across headquarters and regional and branch locations around the world. Technology and travel limit responsiveness to customer needs. Cultural differences hamper internal teamwork and organizational agility

· Enterprise-wide collaboration is particularly difficult to improve due to the communications silos created by existing infrastructure and disparate technology environments

· Strong collaboration enables organizations to extend services reach and improve relationships with customers. Poor collaboration can result in customer dissatisfaction and competitive exposure

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

· Cloud-based collaboration solutions enable employees at all levels of the organization to connect and collaborate

· Collaboration services built in the Cloud can also integrate with and enhance business processes and applications

CONSIDERATIONS

· Proper collaboration architecture design relies on a thorough understanding of technology, people, and processes. The architecture must also be able to integrate with the desired business applications and processes

· High-quality collaboration experiences require end-to-end solutions

CISCO'S DIFFERENTIATION

· Secure and real-time collaboration solutions, including rich, video-enabled offerings that provide immersive collaboration across multiple locations

· Advanced capabilities, including real-time resource discovery, integration with frequently-used communication services (e.g. email, phone, voicemail, instant messaging, video), and on-demand collaboration

· Experienced services team and partners with expertise in designing and implementing scalable, agile and robust collaboration solutions

· Proven track record of achieving increased workplace productivity and reduced operational costs

Cloud Benefits

Cloud accelerates your business by allowing you to transform ideas into marketable products and services with greater speed. Cloud can provide nearly limitless scalability, enabling your business to grow without time and resource intensive IT build-outs.

Cloud transforms the economics of IT from capital-intensive to pay-as-you-go. Service level agreements guarantee the capabilities you need, when you need them. Costs are tiered and metered to accurately reflect your requirements and usage. All applications, including legacy, run more efficiently and sustainably with greater utilization of the underlying infrastructure.

Cloud brings powerful IT resources to the masses. Organizations of all sizes, across all geographies, can access information technology resources that previously were out of reach. World-class applications and computing infrastructure are available to all without considerable up-front investment.

Cloud makes new business models possible and unlocks revenue potential, for any business. Companies can enter new markets, respond more quickly to changing customer needs, collaborate more effectively to drive innovation and business value, and execute on strategies that might not have been cost-effective in the past.

Cloud can improve information management and reduce operating risks. Coupled with context-aware systems, Cloud protects sensitive information through automated policy enforcement. Additionally, the resilience of Cloud deployments increases uptime and simplifies disaster recovery.

Cloud is Not a Panacea

Cloud will challenge organizations to rethink governance processes for consuming, delivering, and managing IT resources. Many organizations have undergone efforts to eradicate shadow IT, centralizing IT decisions and spend. Cloud services are available to budget owners across the organization with the swipe of a credit card. Legal and risk management departments will require standards to assure security, privacy, SLA conformance, and compliance.

Cloud is neither an instantaneous nor simple transformation, but can be adopted in a controlled and pragmatic way. Cloud involves new technologies, new service and deployment models, and new IT skills sets and processes. Migration of legacy applications to Cloud can be a real challenge. That said, legacy platforms can co-exist with Cloud deployments and be migrated only as appropriate.

Cloud does not always offer the best business solution. Some Cloud solutions limit the ability to customize functionality or cannot guarantee quality of service. Some workloads may have stringent compliance or technical requirements that demand other approaches. Organizations will need to determine where Cloud is most appropriate, based on workload-specific requirements around cost, risk, and performance.

Many Paths on the Cloud Journey

Cloud is not a "one-size-fits-all" proposition—the right approach depends on your organization's needs and priorities. Different service and deployment models can be adopted to match the requirements of different types of workloads from across the business.

To illustrate these trade-offs, we profile four types of organizations: small and medium-sized businesses (SMBs), large enterprises, public-sector organizations, and information technology and communications service providers.

Small and Medium-Sized Businesses (SMB)

Many SMBs are already using public cloud services today, citing key benefits of value for the money, access to innovation, and focus on business and not techology. Through Cloud, SMBs gain access to new applications that help them manage their business more effectively. These applications are easy to use and don't require the SMB to deploy, manage, or maintain IT systems. Furthermore, SMBs can purchase these Cloud services via a subscription model, paying only for what they need as their business changes

Large Enterprises

While large enterprises also see tangible benefits in using public clouds, we expect private and hybrid cloud models to be more common. Large enterprises may use public clouds for burst or peak capacity and for select services. However, these organizations often require a higher degree of control over their data, applications, and systems than current public clouds allow. At scale, a private cloud offers the efficiency and agilty of a public cloud without the loss of control. Still, the IT services a pure private cloud can offer are limited to what internal IT can develop or deploy.

Hybrid clouds will come in many flavors, including the virtual private cloud model in which an organization has access to dedicated resources in a public cloud. An increasing percentage of total IT spend will move to hybrid clouds as technology matures and corporate cultures and governance adapt.

Public-Sector Organizations

Government entities (including agencies, armed forces, and educational institutions) will use a variety of Cloud configurations. Those of sufficient scale will adopt similar Cloud models to those of large enterprises. Organizations with common needs and interests may join together to build and share community clouds. Some government services may even be provided through public clouds. A major issue for public-sector organizations will be balancing concerns and regulations regarding privacy and security with aspirations for transparency and sharing information.

Customer Use Case #2

Community Clouds within Public Sector Organizations

SITUATION

- Governments are challenged to provide seamless, open, and transparent access to services and information while protecting security interests
- End-users (e.g., constituents, journalists, government analysts, law enforcement, military, intelligence analysts) need secure access to information from various media, formats, and geographies
- Traditionally, public sector organizations have taken a siloed approach to data management (e.g., mapping specific information to specific communities of users). While the siloed approach offers some security benefits, it limits true collaboration potential

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

- Community clouds offer a consolidated approach to shared resources, allowing data and applications to be stored collectively
- Different end-users are able to work securely and collaboratively using these common datasets, thereby increasing transparency, cooperation, and efficiency

CONSIDERATIONS

- Security and compliance policies must still be defined and managed (particularly for sensitive data sets)

CISCO'S DIFFERENTIATION

- Infrastructure solutions for building community clouds and shared data centers
- Context-aware network, compute, and services with embedded security (e.g., policy-based enforcement of security and access, separation of network traffic)
- Collaboration solutions to support secure and rich collaboration experiences within and across government agencies, and with external organizations

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Customer Use Case #3

Public and Virtual Private Cloud Service Provider for Enterprises

SITUATION

· Many enterprise-focused service providers (SPs) have an opportunity to create higher-value, differentiated service offerings. They have unique capabilities they can leverage, including customer relationships, physical assets, and operational excellence

· At the same time, over-the-top services (e.g., Skype-like VoIP offers) threaten traditional SP revenue streams (e.g., wireline voice)

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

· Cloud is unlocking huge growth potential through new service offerings (e.g., infrastructure as a service, collaboration as a service)

· SPs offering Cloud services have several avenues of differentiation in terms of deployment models (e.g., public cloud, virtual private cloud, hybrid cloud) and service types (e.g., infrastructure, collaboration)

· Cloud architectures can also reduce SPs' overall cost of delivery through more efficient and sustainable infrastructure platforms

CONSIDERATIONS

· As table-stakes, SPs offering Cloud services must ensure security and isolation of customer data in a multi-tenant environment. They must also offer a comprehensive suite of basic services (e.g., voice, collaboration)

· Initial customer acquisition will be driven by distinctive solutions with differentiated services and end-to-end SLAs

· Over the long term, SPs must be able to deliver cost-effective services with viable margins

CISCO'S DIFFERENTIATION

· Deep expertise in SP delivery models and decades of industry experience

· Unified, pre-integrated, pre-tested, and extensible service delivery platforms

· Versatile ecosystem with comprehensive partner offerings

· Complementary co-marketing and sales capabilities

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Service Providers

Service providers will also be consumers of Cloud. However, their primary role will be to implement and deliver the services customers will seek from public, virtual private, and hybrid clouds. Providers have the opportunity to extend their current offerings, which may already include hosting, communications, media, and application services. Moreover, Cloud enables service providers to extend their reach beyond traditional footprints.

Service providers must be prepared to address customer concerns ranging from policy compliance to end-to-end security to quality of service management to technical customization. They must be able to deliver a range of functionality, service levels, and payment models.

Role of the Network Platform in the Cloud

Seamless access to critical data, services, resources, and people

- Core fabric connects resources within the data center and data centers to each other
- Pervasive connectivity links users and devices to resources and each other
- Identity and context based access to data, services, resources, and people

Granular control of risk, performance, and cost

- Manages and enforces policies to ensure security, control, reliability, and compliance
- Manages and enforces service level agreements and consistent quality of service within and between clouds, enabling hybrid models and workload portability
- Meters resources and utilization to drive transparency around cost and performance

Robustness and resilience

- Supports self-healing, automatic redirection of workload, and seamless rollover
- Scalability enables on-demand, elastic power through dynamic configuration

Innovation in Cloud-specific services

- Context-aware services appreciate identity, location, proximity, presence, and device
- Resource-aware services discover, allocate, and pre-positions services or resources
- Comprehensive insight accesses and reports on all data that flows in the Cloud

Chapter 2
Cisco's Vision for Cloud

Cisco envisions the next era of IT ecosystem where the networked Cloud transforms the way we live, work, play and learn.

Our approach to Cloud is to maximize customer choice and industry innovation. In concert with our partners, we provide platforms, solutions and services that leverage the network platform to: speed time to capability and business impact; achieve transformational agility and efficiency; unlock more effective collaboration with employees, customers and partners; and enable others to build advanced functionality and offer innovative services.

Four core beliefs about the future of Cloud underpin our vision:

1. Adoption will be motivated initially by cost and agility
2. The network platform is required to deliver on the full promise of Cloud
3. Multiple approaches are required to accommodate diverse customer objectives
4. Innovation will flourish across the IT industry

BELIEF #1: Adoption will be motivated initially by cost and agility

We expect many customers will initially adopt Cloud to dramatically lower their infrastructure cost per compute or application cost per end-user, or to take advantage of the new economics of IT. Cloud accommodates a range of payment options, most notably pay-per-use operating expense models. Cloud also affords customers the ability to match expense to the value of the workload, granularly metering costs based on desired service levels and unlocking unprecedented transparency on information technology expenses.

Many customers will also turn to Cloud to speed IT responsiveness to business needs. Quicker IT deployments, end-user self-service, and reduced start-up costs equate to faster time-to-market for many organizations. Others will want to take advantage of the ability to pivot more quickly and adapt to changes—elastic computing and "scale or fail" innovations for example.

Beyond better–faster–cheaper, Cloud will enable entirely new business models and revenue streams. Acceptance will accelerate as Cloud architectures prove out the opportunities for real business innovation and new functionality.

Service providers will be drawn to the potential of revenue growth and differentiation. Beyond basic offerings such as infrastructure as a service, Cloud unlocks several opportunities for higher-margin services such as collaboration as a service, enterprise-class service offers with tiered service level agreements, and industry-specific services.

BELIEF #2: The Network Platform is required to deliver on the full promise of Cloud

Cisco believes the network platform is a foundational component of Cloud. The network is critical to providing intelligent connectivity within and beyond the data center. It also enables distinctive functionality in a secure, trusted, and ubiquitous platform (see sidebar for examples).

The network is the natural home for management and enforcement of policies relating to risk, performance, and cost. Only the network sees all data, connected resources, and user interactions over the public internet, as well as within and between Clouds. The network is thus uniquely positioned to monitor and meter usage and performance of distributed Cloud services and infrastructure.

The network also has a pivotal role to play in promoting resilience and reliability. For example, the network supports dynamic orchestration, scheduling, and redirection of workloads and intelligent automation to reconfigure resources.

The network platform is also critical to advanced Cloud services. The network is inherently aware of the physical location of resources and users. Context-aware services can anticipate the needs of users and deploy resources appropriately, balancing end-user experience and cost of service.

BELIEF #3: Multiple approaches are required to accommodate diverse customer objectives

There is no single journey to Cloud, but rather a wide variety of entrance ramps and paths. On the demand side, organizations have different starting points and different objectives. On the supply side, service providers will seek to differentiate their offers. Regulatory regimes across different geographies will impose different constraints around data storage and transport.

Cloud will unleash an exciting mix of technologies, architectures, and organizational approaches. For both Cloud customers and Cloud enablers or providers, success depends on navigating a complex and rapidly changing landscape. Customers should aspire to decouple individual vendor offerings from the services they require, thus avoiding vendor lock-in. Vendors should adopt open standards for interoperability that enable best-of-breed players to contribute innovations while minimizing complexity.

Customers will look to industry players to help them manage the options and uncertainty. Technology providers will need to offer compliance solutions that account for context and content. Management solutions will need to span diverse technological and regulatory environments. Service providers and system integrators will need to be well-versed in various technological and regulatory eccentricities.

BELIEF #4: Innovation will flourish across the IT industry

A wide range of players must work in concert to deliver on the promise of Cloud. Substantial opportunities for innovation and value creation exist at all levels of the stack, from data center design to foundational systems to end-user applications to business processes.

Example "hot spots" of technology innovation include extended memory in servers, cache-enabling routers, solid-state storage systems, converged infrastructure, stateless infrastructure provisioning, ultra-scale distributed databases, real-time analytics, multi-channel content delivery, seamlessly integrated online and offline experiences, more intuitive user interfaces, and reduced power consumption. These innovations all act on different levers but ultimately result in more powerful, secure, efficient, and sustainable IT for end-customers.

Innovation in business processes already struggle to keep pace with the rapid advancements in technology. While Cloud promises to unlock new levels of automation, it will also create new opportunities for value-added systems integration and business process transformation services.

While we expect the actual sources of competition and value to change over time, a diverse ecosystem that fosters innovation is in the best interests of all.

SITUATION

- The media distribution landscape is rapidly changing from silos of distribution (e.g., cable, broadcast, retail) to multi-channel or digital distribution
- Content creators perceive several dangers in digital media: piracy, loss of control or direct relationships, and disintermediation
- Content creators also see an opportunity in real-time media consumption data integrated across distribution channels and devices

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

- A Cloud-based "content registry" that manages content access rights across users, content creators, distributors, and devices offers several benefits
- For end-consumers, the registry enables convenience, personalization, and community (e.g., access to content on multiple devices, new social experiences)
- Content creators and other providers of the registry can take advantage of new business models based on real-time data, personalization, and targeting
- The registry would drive incremental media purchases and greater consumption with "future-proofed" and protected content assets, enhanced discovery, and more powerful recommendation engines

CONSIDERATIONS

- A "content registry" requires significant coordination within the media industry (e.g., agreement on common methods for managing digital rights and common limits to each consumption model / rules of content use)
- The rights of both the content creators and the end-consumers must be protected in terms of how their respective data is accessed, protected, and used

CISCO'S DIFFERENTIATION

- Long tradition of partnering and adding value to industries in disruption
- Complementary offerings to support differentiated needs of media companies and service providers
- Demonstrated technology to support key consumption models and data collection
- Service provider relationships and footprint to enable broad device and data management

Chapter 3
Cisco's Cloud Leadership Role

Cisco is committed to delivering on the promise of Cloud. Our leadership in Cloud is broad in scope: we take a systems and architectural approach that builds upon the network-centric nature of Cloud. We are working in partnership with private and public Cloud providers as they build and operate Cloud services.

We participate directly in three broad Cloud-related product and service areas:

- Infrastructure, including networking and security technology, unified computing solutions, systems management, and modular Cloud elements
- Applications delivered as a service or deployed on-premises, including collaboration, security management, and targeted industry-specific solutions
- Professional services to assess needs, design, and implement Cloud infrastructure and services for customers and fast-track Cloud enablement with service providers and system integrators

We've engineered our technology to ensure ease of operation, offer a breadth of features, support a wide range of workloads, and facilitate migration. For example, the unified computing and unified fabric in our data center platform enables high workload consolidation while offering segmented service level guarantees and security policies over a stateless hardware infrastructure. Other benefits include dynamic resource allocation, tight integration with Cloud management tools, and more efficient operations. This makes them ideally suited for anyone designing Cloud capabilities in either private, public or hybrid deployments.

Our communication and collaboration solutions connect geographically dispersed organizations, communities, and individuals through rich, real-time experiences. Cisco is the market leader in unified communication and collaboration, providing the broadest array of Cloud-based applications through partner-delivered solutions.

We are also bringing to bear our market leadership in security, delivering context, content and identity awareness along with consolidated policy management.

Cisco is redefining the network. Our innovations within the network enable rich Cloud services that generate enormous value for our direct and indirect customers. Cisco is driving innovation at multiple levels, including core features, instrumentation, and intelligent automation services.

Our network platform plays a central role in reducing risk and accelerating the transition to Cloud. It provides simple to automated building blocks that are essential to making a hybrid cloud work (e.g., effective metering systems, tiered service levels, connectivity).

Cisco stands for choice. Our architecture provides the most flexible platform, regardless of how our customers choose to deploy, consume, or integrate their applications. Our data center architecture supports bare metal deployments, virtualization, and private, hybrid, and public clouds all on top of the same technology foundation. Similarly, our collaboration applications offer the same rich user experience, regardless of deployment through a private, public, or hybrid cloud.

Our IT platform supports the highest levels of backwards compatibility and heterogeneity across infrastructure, applications, and services. Our infrastructure supports Cloud and traditional IT deployments concurrently and integrates with existing systems management stacks. This means that customers can adopt Cloud at their own pace, with a more controlled and pragmatic approach.

To be sure, proprietary technologies have their place and can deliver value, but at Cisco we are fundamentally committed to open standards. An open approach fosters innovation at all levels in the stack, enables customers to combine "best of breed" technologies to deliver against their unique needs, and mitigates the risk of vendor lock-in. Working with our partners and customers, we are creating the required instrumentation and standards that power public, private, and hybrid clouds.

Cisco works with a rich ecosystem to deliver complete solutions. For example, we have partners that offer storage, systems management, virtualization software, application development, open source platforms, backup and disaster recovery solutions, and a variety of ready-to-deploy applications and solutions. In addition, our hosting and service provider partners are ready to provide connectivity and public Cloud services to businesses and consumers alike.

Our powerful open-standards-based infrastructure and collaboration platforms are extensible. We've provided our technology with "hooks" that allow ecosystem players—application developers, independent service vendors, and data and content providers—to build additional functionality that brings the power and richness of our network platform to all Cloud participants.

Customer Use Case #5
Private Cloud at Cisco

SITUATION

· Cisco's global enterprise IT organization supports diverse workloads, including traditional applications (e.g., desktop support), productivity software (e.g., email), collaboration (e.g., on-demand desktop, video, telepresence), and 3rd-party access through extranet

· Challenges include: scaling capacity while reducing TCO (to fund innovation, differentiation); increasing agility by reducing end-to-end provisioning time; transforming support into a strategy-enabling services organization encompassing M&A and partnerships; managing risks, including capacity forecasting and business continuity / disaster-recovery

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

· Cisco has implemented its own private cloud. The infrastructure employs a combination of virtualization, automation, and unified computing. Services offered include IaaS, security as a service (through ScanSafe and IronPort), unified communications as a service, and collaboration (e.g., Webex, Telepresence)

· In addition, Cisco has adopted an elastic IaaS model to mitigate demand forecasting risk, implemented virtual desktop infrastructure for secure partner integration and quicker acquisition productivity, and is consuming SaaS opportunistically

· Benefits of the architecture include substantial reduction in TCO (total reduction of 32% versus stand-alone virtualization), reduced time to capability (average provisioning time for virtual machines went from several weeks to mere minutes), and reduced complexity and time-to-launch

CONSIDERATIONS

· For Cisco, the transition to private cloud meant executing a multi-year journey of consolidation, automation, and self-service

· A key priority has been assuring security in multi-tenant or federated environments

· Cisco has also grappled with and overcome dependencies, policy changes, provider trust / lock-in, and standards

CISCO'S DIFFERENTIATION

· Innovative and Cloud-optimized infrastructure and services (e.g., unified fabric, unified computing, intelligent networking services)

· Scalable security and unified collaboration solutions

· Demonstrated credibility through "Cisco on Cisco" internal IT deployments

· Culture of advancing and leveraging market transitions for customer solutions

Where to Begin Your Own Journey

We are working with our broad ecosystem to partners to assist some of the world's leading institutions on their initial Cloud deployments. Enterprises, small and medium businesses, public sector organizations, and service providers alike expect Cisco to have a central role in their unique journey to the Cloud.

When the topic of Cloud comes up, the conversation often centers on the newest technologies and the latest service provider offerings. However, we believe every conversation needs to begin with an understanding of the expected business outcomes. Is the goal around lower TCO or enabling greater innovation, or some blend of the two? The journey to cloud has many forks in the road – starting the journey without a clear understanding of the destination typically leads to disappointing results.

Every journey starts by answering some basic questions:

· What is the expected impact of Cloud on my business?

· Which applications can and should I move to the Cloud?

· What kind of Cloud deployment model is best-suited for each of my applications?

· How do I transition my legacy applications to the Cloud?

· How do I maintain security and policy compliance in the Cloud?

· How do I transition my organization to best take advantage of Cloud?

The answers to these questions will fundamentally shape your cloud strategy. To help guide you through the initial process, Cisco recommends customers take advantage of the advisory services available through either our partner community or Cisco Services. Through these channels, we're helping customers define and implement a pragmatic approach to Cloud. We deliver solutions that address our customer's unique business architecture and needs, align with regulatory constraints, and optimize for the customer's individual preference for performance, cost, and risk.

As you begin your own journey to the Cloud, we invite you to discuss the right approach for your organization with your Cisco account manager, channel partners, and other IT advisors. For additional information on Cloud, please visit http://www.cisco.com/go/cloud.

We look forward to building the future of Cloud with you and our ecosystem of partners.

Appendix:
Additional Customer Use Cases

Customer Use Case #6

Private Cloud in Financial Services Firms

SITUATION

- Financial services companies must balance the need to protect client information (e.g., sensitive financial information pertinent to an M&A transaction) while giving their employees maximum flexibility to do their jobs
- Large volumes of sensitive client information are stored on desktops and laptops and would be put at risk in the event of loss or theft
- A variety of security approaches are used to safeguard this sensitive data: physical security (e.g., biometrics devices), end-user policies (e.g., password reset), and strict limits on the usage of laptops and other portable devices outside the office

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

- Desktop virtualization enables both data security and employee flexibility and mobility, by providing a way to administer all desktops centrally from a secure data center environment
- End-user devices never have to physically store sensitive data, thereby mitigating the threat of data leakage from loss or theft

CONSIDERATIONS

- End-user experience may suffer, particularly for users on remote or low-bandwidth networks

CISCO'S DIFFERENTIATION

- Market leader in security, with offers spanning firewalls, virtual private networks, router security, and more
- Location- and identity-aware policy engine technologies
- Transaction-level policy enforcement that logically separates an organization's virtual desktops into different zones (e.g., separating M&A / advisory from back-office functions) without dedicated or stove-piped infrastructure
- Common encryption protocols across devices and clients
- Data center technology and services to deliver virtual device interface
- Network topology capable of delivering video to desktops

Customer Use Case #7

Community Clouds for Citizen Services

SITUATION

- As populations balloon and government budgets are strained, cities face challenges in scaling key citizen services (e.g., healthcare, school systems, public safety, transportation, utilities) in a manner that ensures economic growth and quality of life over the long term
- Citizens might require access to a wide variety of services using various media, in multiple formats, at any time of day
- Traditionally, many city services are only available through an in-person visit during regular working hours. These access constraints limit true citizen-government interaction potential, make poor use of limited resources (budgets and personnel), and restrict the services available to the community.

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

- Community clouds offer a consolidated approach to share resources, allowing cities to be more efficiently planned, managed, and operated based on networked information
- For citizens, Cloud architectures would provide access to a wide range of services from a single community portal at any time of day. Example services include real-time traffic information, automation and remote monitoring of buildings, virtual healthcare services, real-time home energy consumption and management, and distance learning
- For governments, Cloud-based services can provide workflow automation (e.g., commercial construction license application process)
- The ability to access and combine many different Cloud-based information stores and applications from the public sector could unlock new research areas, innovations, and ultimately job growth

CONSIDERATIONS

- Public and Private partnerships will be essential for effective delivery and use of Cloud-based services; public partners need to create foundation with policy (security/compliance) settings in mind

CISCO'S DIFFERENTIATION

- Large portfolio of unique urban-focused solutions for building community clouds
- Collaboration solutions and context-aware network, infrastructure, and services with embedded security (e.g., policy-based enforcement of security and access, separation of network traffic)
- Extensive experience and expertise in working with various levels of government across the world
- Strong partnerships with service providers around the world to enable rapid expansion of coverage and reach

Customer Use Case #8

Public Cloud Service Provider for Consumers

SITUATION

· Consumers want their content anytime, any-where, on any device

· Consumers are migrating from cable television subscriptions to online media, threatening traditional revenue streams of both cable television providers and content producers (online sites are far less profitable than traditional media channels)

· Consequently, content producers are limiting both how much content is available online as well as which devices end-users can use to access content

ROLE FOR CLOUD AND CLOUD-LIKE TECHNOLOGIES

· Companies are building out public "media clouds" with vast libraries of content accessible to subscribers through a wide array of devices

· Some offers allow users to record and store content in the provider's media data center. Other offers feature a hybrid solution collaborating with set-top-boxes or in-home gateways

· Cloud-based transcoding (i.e., formatting content for different devices) simplifies content availability across multiple devices

CONSIDERATIONS

· Winning service providers must offer compelling value for end-consumers, based on breadth/depth of programming, flexibility to access content from multiple devices, and affordability

· At the same time, they must also protect the intellectual property and economic interests of content producers; maintaining security in the media cloud will be a critical success factor

· The biggest obstacle to widespread digital media adoption continues to be limitations in downstream bandwidth

CISCO'S DIFFERENTIATION

· Context-aware network, compute, and services with differentiated service delivery (e.g., based on content type and consumption mode)

· Deep experience in video, data center, content distribution networks, and Cloud

· Infrastructure solutions for offering "media" Cloud services

· Technology to provide video storage, retrieval, and sharing services