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*50 Years of Growth, Innovation and Leadership*

## Raising the Bar on Desktop Virtualization

Understanding the important considerations and use cases to make the most of your desktop virtualization initiative

The modern workplace continues to evolve with demands for improved work mobility, new bring-your-own-device (BYOD) initiatives and a need for an increasingly agile, productive and collaborative workforce. IT needs to balance these requirements with on-going concerns for data protection, compliance and security, as well as lower TCO and improve operational efficiency.

Cisco and Citrix have teamed up to deliver an end-to-end desktop and application virtualization solution that supports the disparate needs of various work-groups, while delivering an uncompromised user-experience that is efficient, mobile and secure. The Cisco Desktop Virtualization Solution with Citrix XenDesktop combines Cisco's data center technologies together with Citrix's industry-leading desktop and application virtualization technologies to deliver increased business efficiency, productivity and agility and enables an exceptionally flexible and secure workspace on any device in any location.

A  
Market Insight by  
Frost & Sullivan  
in collaboration with  
Citrix and Cisco

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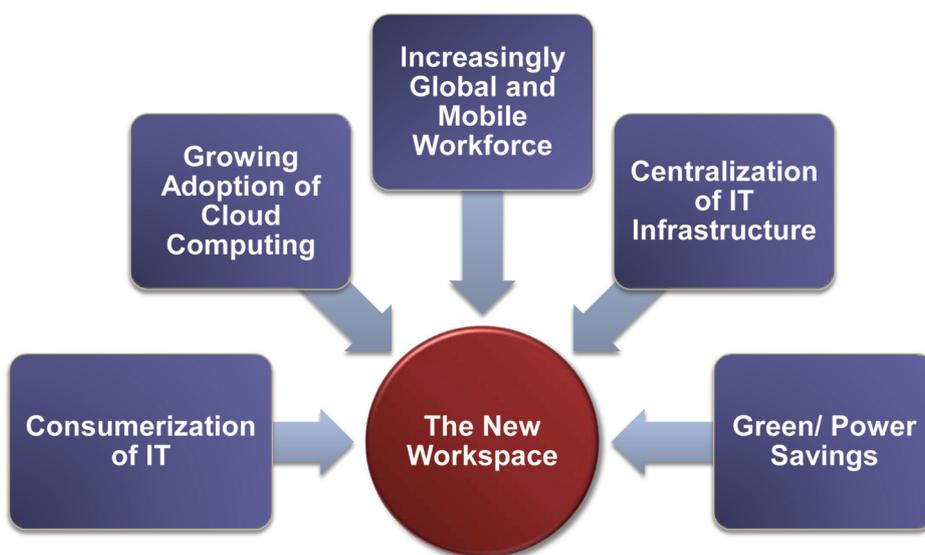
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## INTRODUCTION

In recent years, the user workspace has gone through major changes that untether the employee from the physical work environment, device and location, and allow greater flexibility for time-slicing personal and work responsibilities. Organizations everywhere must come to terms with this workspace evolution, either by supporting true Bring Your Own Device (BYOD) or Corporate Owned Personally Enabled (COPE) devices coming into the workplace to augment or replace the traditional PC. Work has now become more mobile, intimate and casual across a range of devices and locations. This is attributable to five key driving factors.

**Figure 1: Factors driving evolution of workspace in the post PC era**



Source: Frost & Sullivan

**Consumerization of IT:** The proliferation of multiple end-user devices is fast proving to be a game changer, especially in accessing corporate IT resources. In addition to utilizing standard devices provided by the IT department, employees have a strong preference towards using personal endpoint devices such as notebooks, tablets and smart phones, in a workplace setting. For IT managers, the BYOD trend leads to a complex multiple device strategy and support matrix. While it presents new opportunities, it has created a potential minefield of complexities as IT seeks to align evolving user requirements with security and compliance demands.

**Growing Adoption of Cloud Computing:** Cloud services are creating new challenges for IT staff as they experience increased momentum and gain critical mass in a growing number of enterprises. IT managers are feeling increasing pressure from top management to adopt cloud services, which can offer multi-fold benefits. Many IT departments view data storage and back up, communication and collaboration services, and Infrastructure as a Service (IaaS) as early use case candidates for cloud service adoption.

**Increasingly Global and Mobile Workforce:** Workforce mobility is proving attractive to businesses that believe that, by freeing the worker from the constraints of the physical workplace, they can attract the best talent and increase productivity regardless of location. Most users today are also demanding anywhere, anytime access to information, in line with the emergence of new work styles and an increasingly global and mobile workforce. These trends are driving IT to find secure, reliable ways to deliver a complete workplace environment.

**Centralization of IT Infrastructure:** Enterprise IT architectures are witnessing increasing centralization. What originated primarily as a means to bring about cost efficiencies through a utility-based pricing model has evolved. This shift is affecting the way IT is procured and delivered.

**Green/Power Savings:** Green IT is becoming an increasingly important consideration not only for businesses, but also for the prospective talent that they want to attract. Enterprises today are highly focused on cost efficiencies and going green helps to reduce IT costs. Users are also becoming concerned about their impact on the environment.

Additionally, the rapid evolution of end-user preferences, usage patterns and disruptive technologies has translated the management of endpoints into a complex exercise for IT departments, giving rise to new challenges for IT managers.

**Figure 2: Challenges in managing today’s multiple endpoints**



Source: Frost & Sullivan

**Regulatory Compliance:** Regulatory guidelines for sensitive information across most industries, such as Payment Card Industry Data Security Standards (PCI DSS) and the Data Protection Act in the UK, mandate that the organization knows where its data is stored at all times. With shadow IT kicking in with penetration of personal devices and the use of third-party applications not authorized by the IT team, tracking data location at all times is becoming an increasingly challenging exercise for most IT executives.

**Loss of Intellectual Property:** The ability to store data and information on a device, which the organization has not secured, may lead to loss of sensitive information or even intellectual property if the device is lost or stolen. The inability of the organization to track or remotely manage/erase data stored on these devices is a major concern for such losses. Furthermore, the ease of using cloud storage solutions has further compounded these issues.

**Lack of Business Agility in a PC World:** The business environment today is highly dynamic in nature and businesses need to be agile to respond to changing market conditions. As a result, employees, especially C-level executives and senior management, are demanding anytime anywhere access to important tools such as e-mail, collaboration and important data. PCs and laptops are no longer sufficient to meet these demands. Employees are demanding access to IT resources through their mobile devices.

**Huge Maintenance Costs:** Maintaining standard company issued endpoints involves significant costs in terms of management solutions costs and human resources. With employees increasingly using non-standard devices, the organization has to provision for a more diverse environment and invest in solutions and human resources to manage this increasingly complex endpoint environment.

**Loss of Productivity:** With new technologies, such as unified communications, mobility and cloud computing, the dependence on IT infrastructure has increased many fold over the last five years. Any downtime in IT environments can lead to significant loss of employee productivity. This may lead to loss of revenues too, if key employees do not have access to essential data to undertake their tasks, such as a sales manager is unable to access customer records due to unavailability of the Customer Resource Management (CRM) solution.

### The Cisco Desktop Virtualization Solution with Citrix XenDesktop

The Cisco Desktop Virtualization Solution with Citrix XenDesktop consists of a portfolio of validated designs tailored to various scale, performance and delivery model requirements.

With these solutions, Cisco and Citrix are collaborating to help businesses accelerate successful adoption of virtual application and desktop strategies so they can realize the full potential business value. The combined solution addresses a common vision of the changing workplace and aims to deliver the software, end-to-end networking, and a virtualization platform needed to empower IT departments to navigate today's rapidly changing business environment. The combined Desktop Virtualization Solution is a key pillar of the Cisco and Citrix strategy for enterprise mobility. It aims to provide a complete, integrated stack, designed to help IT to deliver appropriate mobile access to all applications, data, and communications services whether delivered virtually, natively or through web or SaaS models.

Building upon Cisco's capabilities in networking and the data center, along with Citrix's capabilities in virtualization and the delivery of desktop and application virtualization, the combined solution can help businesses to cost effectively deploy virtual workspaces to all the PCs, Macs, tablets, smart phones and thin clients owned by the organization or alternatively by employees and partners. The solution also raises the bar by expanding the set of user work-styles and workgroups that can be supported – from simple hosted virtual applications and virtual desktops, to more sophisticated virtual workspaces that also support rich media, voice and video.

The Cisco and Citrix Desktop Virtualization Solutions deliver a flexible, secure and uncompromised desktop and application virtualization experience. These claims are explained in Figure 3 below.

**Figure 3: Key characteristics of Cisco Desktop Virtualization Solutions with Citrix**



Source: Frost & Sullivan

## V (5) TOP-OF-MIND CONSIDERATIONS WHEN PLANNING FOR DESKTOP VIRTUALIZATION

**Figure 4: Five important considerations when planning desktop virtualization**

### End-to-End Solution

Desktop virtualization requires alignment across multiple technologies and associated IT domains. Coordinating these domains and putting together a solution from multiple vendors creates challenges at multiple levels - integration, compatability, lock-in, etc. Enterprises need to overcome these in order to put together a sustainable solution that meets their requirements for the long run. Instead of putting together a solution on a piecemeal basis, to reduce costs, deployment risks and time to delivery. Choose a solution that offers the entire value chain of offerings, from infrastructure to software to related services and support. A solution that has demonstrated its capabilities and can be customized to the scalability, performance and use case requirements of different enterprises today.

### User Experience

Collaboration and employee empowerment are at the heart of a "knowledge economy". An increasing number of employees expect a rich user experience on any device, anywhere, including access to all applications, content and rich media collaboration. Desktop virtualization has traditionally faced challenges supporting mobile and BYOD devices and also providing high quality communications. So enterprise architects need to plan for a complete workspace experience that can be delivered to a broad range of fixed and mobile devices.

### Agile Infrastructure

Since the desktop operating system together with data and applications is going to run on the data center infrastructure, it is important to plan for a scalable, secure and simplified compute infrastructure. High density servers and new storage technologies can offer better efficiencies and save costs through efficient scaling. They ensure optimal application performance and minimize fine-tuning issues. It is equally critical to attain seamless integration between compute, network and virtualization resources to simplify management and provisioning and ensure uncompromised application delivery.

### Optimized for All Networks

The promise of "LAN in a WAN" can only be delivered through an intelligent, robust network that can analyze and optimize application traffic. The network needs to not only support high throughput requirements but also be able to intelligently monitor, prioritize, secure and accelerate both traditional and virtual desktop traffic. With growing user demands for collaboration, the network should be capable of optimizing rich media traffic such as VoIP and video. Embedding virtual switches at the distributed hypervisor layer helps to meet the new network requirements of server virtualization and, when combined with application acceleration solutions, can reduce latency and improve security for both the data center and the WAN.

### Security and Compliance

While centralization of desktop infrastructure is bound to enhance security postures, it is equally important to ensure the security of the virtualization platform and data at rest and in motion. For example with "desktops" now residing in the data center itself, It is necessary to ensure the infrastructure hosting these desktops is isolated from infrastructure hosting mission critical applications and data. While traditional challenges of security such as patching, usage of anti-malware do not go away, they will become easier to manage due to centralization. Security postures need to be managed across the organization with equal emphasis on technology, people and processes.

Source: Frost & Sullivan

## X (10) COMMON DESKTOP VIRTUALIZATION USE CASES: BUSINESS AND TECHNOLOGY MOTIVATIONS FOR CONSIDERING A VIRTUAL DESKTOP STRATEGY

This section explores the ten common use cases of desktop virtualization to understand the challenges with traditional desktop environments and how desktop virtualization meets the demands of businesses, end-users and IT managers.

### Cisco and Citrix's Approach

The Cisco & Citrix approach brings the following benefits that make the desktop virtualization proposition for secure access and compliance stronger.

- **Secure connectivity and multi-factor authentication** – Using the Cisco Desktop Virtualization Solution with Citrix XenDesktop, IT departments can prevent data from leaving the data center. Citrix XenDesktop aims to protect mission-critical data with secure connectivity and multi-factor authentication to ensure that only authorized users connect with specified applications and data.
- **Secure inter VM traffic** – The Cisco Nexus 1000V and Cisco VSG secure inter VM traffic and allow user desktop segmentation and isolation from mission-critical applications. This allows greater control of what different workgroups are allowed to access, and gives increased protection from attacks.
- **Secure access, anytime, anywhere** – Cisco AnyConnect Secure Mobility and Cisco ASA provide 'always on' secure connectivity to virtual desktop environments, offering continuous, IT defined, policy control and enforcement.
- **Flexible policy enforcement** – Role-based access control with Cisco ISE integrated with Citrix XenMobile MDM provides the visibility across user identity, device type and posture to allow granular policy based control and enforcement for both virtual, native and BYOD devices
- **Single-instance management with Citrix XenDesktop** - This enables IT departments to separate the device, operating system, applications, data and user settings to maintain single master images of each. This capability dramatically reduces ongoing patching and maintenance efforts, with users running approved application and operating system images that have centrally approved patches and security settings.

### Use Case # 1: Ensuring secure access and compliance

Organizations face a variety of regulatory requirements to keep information private and confidential with controlled access. This is even more important today, in light of the recent instances of attacks on similar data stored with large global organizations and the trend towards use on non-corporate managed devices. Security is not limited to access of sensitive information; it also encapsulates malware that is highly prevalent today.

Compliance is a necessity for businesses. Most businesses need to adhere to multiple local and international regulatory requirements – these may include industry, state, or country requirements.

#### Typical challenges & key considerations

As organizations look at desktop virtualization for secure access and compliance, IT executives should consider:

- Centralized user data translates into a more confined attack surface on the organization's IT systems. It is essential to have significant safety measures around this.

#### Desktop virtualization drivers for secure access and compliance

In this scenario, desktop virtualization offers IT executives the ability to:

- **Enhance threat detection and isolation** – As all data resides centrally, it is easier to detect threats or malware and isolate it, eliminating the chances of expansion of the threat vector. Users are able to access only the content that is identified to be safe to use by the security solutions in place.
- **Complete control over end-points reduces risk** – Desktop virtualization shifts control of end-points to IT. With all data being tunneled through a secure network and the organization's firewall, the IT team can restrict usage and better manage potential security risks. In addition, the loss of data through physical drives is eliminated. Application activity monitoring can also be enabled through centralization of control. Network access for BYOD still needs to be carefully controlled to prevent associated risks.
- **Agile policy implementation** – Any changes in IT policies can be instantaneously implemented with desktop virtualization. The IT staff needs to replicate the policy across all the desktop templates and they take immediate effect.
- **Ensure compliance** – With desktop virtualization, ensuring compliance is easier given that all systems are centralized in the data center. Applying controls and policies to ensure compliance can be centrally implemented on all end-point VMs. Furthermore, a robust data center infrastructure provides for data protection, business recovery and disaster recovery capabilities, essential for regulatory compliance.

## Use Case # 2 Enabling BYOD (Bring Your Own Device) and IT Supported Devices

The concept of Bring Your Own Device (BYOD) is gathering pace as most organizations realize the potential benefits in terms of cost saving, productivity improvements and flexibility that can be gained by allowing employees to utilize self-owned devices such as tablets and smartphones for business purposes. This transformation is often led by the senior management team, leaving the IT teams with little choice but to support the transformation. Enterprises are adopting two approaches to address this trend. First, by allowing employees access to enterprise networks on self-owned devices, in addition to the standard devices provided by IT. Second, by offering employees a corporate budget to procure a device of their own choice. According to a Citrix [Bring-Your-Own \(BYO\) Index](#), 92 percent of IT organizations are aware that employees are using their own devices in the workplace.

### Typical challenges & key considerations

As organizations look at desktop virtualization to enable BYOD, IT executives should consider:

- **Securing enterprise data** - Securing enterprise data is a key concern for IT teams when opening up their IT systems to access by multiple user-owned devices.
- **Compatibility concerns** - With more users bringing their own devices, a larger number of disparate platforms are becoming part of the enterprise IT systems, creating a growing number of compatibility issues for IT staff to resolve.
- **Expansion of IT support:** Users expect the corporate IT teams to provide support for the devices that they may use for business purposes. With BYOD, the IT teams could be accountable for supporting a greater number of platforms and devices.
- **Process & People:** BYOD is as much about people and processes as it is about technology. Enterprises need to clearly understand the legal and business implications of the transition and have the right processes to underpin the initiative. People need to be adequately trained on the appropriate usage as well.

### Desktop Virtualization drivers for BYOD

In this scenario, desktop virtualization offers IT executives:

- **A secure corporate only environment:** Virtualization allows enterprises to deliver desktops and applications to user devices straight from the data center. Since the data is stored in the data center and not on the client device, it enhances security and adheres to corporate governance.
- **Centralized management:** Virtual desktops allow centralized management. Applications run independently of the client platform resolving a large portion of compatibility and device management issues for IT teams, thus helping to enhance productivity. In addition, because desktops run centrally, IT can maintain the corporate desktop and leave the support of the devices to the users themselves through the support contracts they acquired at the time of device purchase.

### Cisco and Citrix's Approach

The Desktop Virtualization approach brings the following benefits for enterprises encouraging BYOD:

- **Cisco Desktop Virtualization Solution with Citrix XenDesktop as part of a complete enterprise mobility solution** – supports any device, anywhere strategies allowing BYOD users to access their desktop applications from their own smart phones and tablets. In addition, there is no need for IT to have to worry about employee privacy issues, as there is no co-mingling of personal and company data on the employee's BYO device.
- **Citrix Receiver, Cisco AnyConnect and Cisco Jabber support a multitude of devices** – to allow secure access to corporate desktops, applications and data on a range of devices that include laptops, tablets and smart phones, irrespective of the platform they run on.
- **Centralized management with Citrix XenDesktop** - When using XenDesktop, the device management functions are highly centralized. For example, if an application needs to be updated, administrators only need to update the servers and not every single client device that employees and partners bring into the organization, saving the organization valuable time and money. This also resolves software incompatibility issues as well as security concerns.
- **Cisco Identity Services Engine (ISE) and Citrix XenMobile to Secure Access control for BYOD** – Cisco ISE provides full network access security and policy management by allowing only authorized and clean devices to access the network through end-point security policy enforcement and remediation support. In addition, ISE integration with Citrix XenMobile delivers enterprise grade mobile device management (MDM) with role-based management, configuration, security and support for both corporate and employee-owned devices.

## Cisco and Citrix's Approach

The desktop virtualization approach brings the following benefits for business continuity.

- **Platform and device independence** – Citrix and Cisco work with a wide variety of partners supporting diverse end-user devices, client operating systems and applications, thereby offering customers' flexibility in deployment and replacement of lost or stolen devices.
- **On-demand desktop delivery with Citrix XenDesktop** – With FlexCast and Receiver, enterprises can deliver on-demand services that can be accessed from traditional PCs, Macs, thin clients, smart phones, and tablets. This ensures that desktops can be accessed from multiple locations and devices, enabling disaster recovery and business continuity.
- **Data Center Recovery-** In the case of data center disruptions – disaster recovery and data center interconnect technologies with Cisco and Citrix can help bring virtual desktops back on-line rapidly.

## Use Case # 3 Ensuring business continuity planning and disaster recovery

Driven by regulatory compliance and in the aftermath of natural disasters such as the Japanese earthquake and Queensland floods, business continuity planning has emerged as a key priority for IT executives. Providing access to corporate desktops, applications and services on a 24 x 7 x 365 basis, is a monumental challenge due to the complexity of IT environments and the likelihood of unforeseen disasters.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for ensuring business continuity planning and disaster recovery, here are a few considerations to be mindful of:

- While the importance of a robust data center infrastructure and DR plan is increased even further now that both enterprise and user applications and data reside there, desktop backup and recovery are much simpler and less costly than transactional enterprise apps. Organizations need to think about resilience of both application / data and communications services in order to ensure continued business productivity.
- Building a business case for Business Continuity Planning (BCP) and providing a solid ROI model can often be challenging for many organizations.
- In the case of an external service provider providing user workspace as a service, issues of trust, compliance and data sovereignty assume high importance.

### Desktop virtualization drivers for business continuity

In this scenario, desktop virtualization offers IT executives the following ability:

- **“Always on” workspaces** – Centralization of desktops ensures that workspaces are available for use from anywhere. If the data center infrastructure is run in a redundant mode (with primary and backup centers), the IT resources are available to employees on an on-demand basis, from any device, even in case of disasters.
- **Adherence to compliance** – By making critical systems available on a continual basis, organizations will be able to comply with corporate governance guidelines pertaining to availability of critical infrastructure.
- **Continued productivity** – By ensuring continued access to applications, communications and data, businesses can be resilient during natural or man-made disruptions, thereby minimizing any potential loss of revenues. Desktop virtualization enables IT organizations to rapidly recover user desktop environments and get them up and running on a new device. In the case where transport is impacted or an office is closed, users can still access their work from a remote location.
- **Speedy recovery from disasters** – Organizations have an option of using a traditional approach to computing under normal circumstances and can leverage an external service provider during disasters. Such a hybrid approach will ensure access to workspace environments on an “as needed basis” while giving users quick access to the same desktop and applications that they are familiar with.

## Use Case # 4 Empowering Mobile Workers and Enhancing User Productivity

Workspaces have changed significantly over the last decade. We no longer just work from our desks in a central office, but we also work from airport lounges, homes, and hotel rooms. Over 25% of the workforce in a typical enterprise can be defined as mobile (i.e. they spend more than one-fifth of their time outside the office).

The need to enable this workforce with the same set of tools, applications and communications as if they were at the office becomes a key priority to ensure employee productivity and business agility. Many of the mobile workers are senior executives and sales teams for whom staying connected with the enterprise applications and collaboration tools is critical for the business.

IT executives need to be able to provide for the mobility needs of these users by enabling mobility of the complete workspace across devices and locations, and also, in some cases, manage and support the mobile devices themselves.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for mobile workers, IT should be mindful of:

- The need for a consistent mobile workspace experience across different corporate-owned and employee-owned devices.
- High latency or inability to use rich collaboration tools can become a major challenge.
- Mobile workers are used to quick response times for desktop applications, and hence latency in application access will become counter-productive for the users.
- IT executives need to consider the option of user-owned mobile devices or enterprise-owned mobile devices depending on the nature and frequency of mobile access. In fact, by introducing centralized device management, both managing and securing endpoints will become easier, thereby, eliminating the distinction between the two categories.

### Desktop virtualization drivers for mobile workers

In this scenario, desktop virtualization is a good solution for mobile workers as it provides:

- Consistent application experience – As mobile workers toggle between their desktop/laptops to their mobile or tablet devices, desktop virtualization can ensure a consistent application and desktop experience for the users.
- Secure access to applications – Desktop virtualization enables applications to be accessed by the authorized user, and the security policies of the enterprise are enforced on any connecting device.
- Virtual workspace anytime, anywhere – Desktop virtualization allows users to access their desktop, applications and data anytime from anywhere. The users could be outside the office, at a remote location (such as a customer office, an airport lounge, home, or hotel room) and still access the same workspace experience.

### Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits that make the desktop virtualization proposition for mobile workers stronger.

- **Anywhere, anytime, any device access with Citrix XenDesktop and Receiver** – The Cisco Desktop Virtualization Solution with Citrix XenDesktop provides desktops and applications as on-demand services that can be accessed from traditional PCs, Macs, thin clients, smart phones, and tablets. The solution enables user mobility and high employee productivity.
- **Cisco Collaboration solutions with Jabber** – Cisco's breadth of collaboration solutions are also available on a broad range of fixed and mobile end user devices. The ability to use tablets and smart phones for rich video collaboration sessions has become important for executives and sales teams.
- **Secure access with Citrix XenDesktop and Cisco AnyConnect and Cisco ASA** – can quickly and securely deliver individual applications or complete desktops to users leveraging mobile devices across different wireless networks.
- **Performance Optimization with Cisco WAAS** – Through partnership with Citrix, Cisco WAAS optimizes performance of Citrix HDX including support for MultiStream for mobile users through compression, caching and traffic prioritization.
- **Location-based policy control with Cisco ISE** – ensures that security and compliance rules can be applied based on device use and location

## Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits that make the desktop virtualization proposition for IT staff productivity stronger.

- **Simplify infrastructure operations** - Cisco UCS delivers unified infrastructure management that streamlines server and virtual desktop provisioning – supporting up to 30,000 virtual desktops in a single management domain. It allows for quicker deployment of servers and virtual desktops. In addition, the unified compute architecture results in much fewer servers, switches and cables to manage, again increasing operational efficiencies.
- **FlexCast allows IT departments to meet user demands with ease** – Citrix XenDesktop FlexCast delivery technology provides a range of desktop delivery options that can be tailored to meet the needs of specific users or groups of users, with differing performance and personalization requirements. With FlexCast technology, IT departments can deliver every type of virtual desktop and application, hosted or local, physical or virtual, each specifically tailored to meet the requirements of individual users.
- **Single instances enhance management** - With Citrix XenDesktop, IT departments can manage single instances of each operating system, application and user profile and then dynamically assemble them to greatly simplify desktop management. XenDesktop's open architecture enables customers to easily adopt desktop virtualization using any hypervisor, storage, or management infrastructure.
- **Faster time to productivity and improved business agility** – Customers can achieve faster server deployment and virtual desktop provisioning with Citrix XenDesktop, and Cisco UCS. They will be able to provision thousands of workspaces in minutes with rapid, storage-based cloning and server service profiles.

## Use Case # 5 Enhancing IT staff productivity, and simplifying IT management

IT staff within companies are usually divided into many disciplines such as server, desktop, communications, networking, etc. As the size of an organization's infrastructure grows, so does its requirement for IT staff. This puts a strain on the organizational resources and makes day-to-day management complex. Organizations also need to keep IT staff productive through varying cycles of deployment and servicing requests.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for IT staff productivity, IT should be mindful of:

- Desktop virtualization changes the IT infrastructure significantly, and IT disciplines that were once distinct, need to work much closer together to ensure better performance.
- While implementing desktop virtualization, IT staff may be required to learn new skills due to introduction of new concepts and the integration of multiple IT aspects.

### Desktop virtualization drivers for IT staff productivity

In this scenario, desktop virtualization offers IT executives the ability to:

- **Centralize support:** In a non-virtual environment, IT support staff are usually located in each branch office to service requests from local users. A desktop virtualization environment reduces the need for local support staff by having a centralized architecture. This enables support staff sitting in the headquarters of a company to easily manage virtual desktop images and service requests at remote locations.
- **Centralize procurement:** Procurement of IT hardware and software is usually done according to the local or regional policies of each organization. This can sometimes be a challenge in terms of application or hardware compatibility and can reduce efficiency of IT. With desktop virtualization, all IT requirements can be procured from a central location, thus increasing homogeneity and simplifying the procurement process.
- **Centralize maintenance:** With desktop virtualization, client hardware is drastically simplified while the software can be managed from a central location with much greater control and precision. This saves time and reduces the need to have a large IT staff to address multiple helpdesk calls. The saved time can be reassigned to activities that are more productive.

## Use Case # 6 Windows 7 and Windows 8 migration

As businesses look to upgrade to Microsoft Windows 7 and 8, in order to take advantage of its latest features, enhanced security, and simplicity, two key concerns emerge – cost and complexity. Upgrading an operating system usually requires a PC hardware refresh, which can be very expensive, and requires all existing applications to be tested in the new operating system to ensure compatibility.

This is necessary to ensure the new operating system can run older or custom applications with better performance.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for Windows 7 and 8 migration, IT should be mindful of:

- Windows licensing for desktop virtualization needs to be considered carefully to ensure cost comparisons for the initiative are accurate. Moving to a virtual desktop solution requires a re look at the licensing agreements for the Operating System and the proprietary software being consumed by the users.

### Desktop virtualization drivers for Windows 7 and 8 migration

In this scenario, desktop virtualization offers IT executives the ability to:

- **Lower long-term costs** – With desktop virtualization client machines no longer need to be full-fledged desktop systems. Thin or zero clients that are networked to a centralized data center can help reduce costs on hardware in the long term by a significant amount. This extends the hardware refresh cycle that is usually necessary when upgrading the operating system. Also, with the desktop being run from the data center, using a legacy desktop system does not affect performance.
- **Application virtualization** – Porting applications from a previous version of Windows can be challenging, especially when using custom applications that require older software versions. When moving to a virtual environment, businesses have the option of virtualizing existing applications, which removes the dependency of applications from the underlying operating system. Users are able to run older applications such as Internet Explorer 6, which is sometimes necessary when running custom-built software.
- **Centralized administration and management** – Moving to a virtual desktop will separate the underlying hardware from the software. This makes it easier to handle software or hardware issues and provides the ability to run a single Windows 7/8 image across different hardware types.
- **Reduce implementation process time** – Implementing a new operating system requires a significant amount of time due to the extensive testing required, as well as rolling out upgrades to hundreds of desktops. With desktop virtualization, this process is greatly simplified due to its centralized architecture and updates can be rolled out all at once.

### Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits that make the desktop virtualization proposition for Windows 7 and 8 migration stronger:

- **High Density Windows Virtual Desktop Hosting** - Windows 7 and 8 need high memory and processing requirements from the underlying hardware. Cisco UCS Intel Xeon processors, extended memory and unified fabric result in a balanced infrastructure to support hundreds of Windows virtual desktops on a single server.
- **Complete Windows desktop delivery with Citrix XenDesktop** – Users can access a high-performance Windows experience via PC, Mac, smart phone, iPad, netbook or thin client, and desktops can follow users from device to device—even to the same ones they use in their personal lives — while maintaining complete security and isolation.
- **Citrix XenDesktop separates applications from OS and hardware** – The separation allows IT to undertake rapid migration to Windows 7 or Windows 8 by eliminating the need to upgrade end user devices. Furthermore, Citrix's ability to run session-based applications allows users to run incompatible applications on the server. For example, with XenDesktop, organizations can run 16-bit applications in a 64-bit Windows 7 environment

## Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits for branch enablement.

- **Branch and desktop virtualization planning and design** - Cisco branch and desktop virtualization planning and design services helps customers virtualize the branch-office and desktop infrastructure as well as assess important applications that are suitable for the virtualized infrastructure. It helps them develop a financially viable strategy and create a phased roadmap, and supports them through design and deployment.
- **Cisco Branch-Office-in-a-Box** – This is a unified routing, switching, and server solution for the branch office that combines a WAN access router, a Gigabit LAN Switch, and an x86 blade server in a single Cisco Integrated Services Routers (ISR G2) router. Branch-Office-in-a-Box is a solution for providing access to the WAN and the Internet, enabling LAN connectivity between local devices, and hosting popular Windows services such as active directory, DHCP and DNS.
- **Branch Survivability and Performance for both Voice and Virtual Desktops** – The coming together of solutions such as survivable remote site telephony, WAN redundancy and the elimination of a single point of failure creates a highly resilient solution. The ability to overcome the hairpin effect for voice and video results in a superior user experience for branch workers.
- **Citrix XenDesktop with HDX enables enhanced user experience** – The HDX technology enables high definition desktop experience across branch offices over local peripherals, voice and video, creating a rich end-user experience.
- **Cisco Wide Area Application Services (WAAS) optimized for Citrix XenDesktop** – Cisco WAAS enables customers to accelerate their desktop virtualization rollouts at branch offices. It offers optimization of Citrix XenDesktop traffic, which includes Citrix XenApp virtualized applications, over the WAN, to support more virtual desktop sessions and enhance the end-user experience. WAAS can be deployed in a variety of form factors including virtual appliance, physical appliance and ISR G2 router module collaboration at branch locations.

## Use Case # 7 Branch enablement

IT infrastructures in branches including regional offices, retail stores, banks and remote agencies, might give users good application availability and performance, but managing a distributed IT environment can be complex and expensive. A distributed IT environment also increases the security risk of information loss, if proper controls are not enforced. Furthermore, it is challenging to replicate current policies and security postures across future branch expansions. It also slows down the ability to deploy new branches.

An increasingly viable alternative is to consolidate the branch-office IT resources into a single, centralized data center to simplify management and decrease operating costs while maintaining reliability and performance.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for branch office enablement, IT executives should be mindful of:

- Ensuring a LAN like speed in a WAN is extremely challenging due to the laws of physics, and latency that is created due to round-trip time between the users and the applications.
- Cultural and linguistic challenges may hamper adoption, particularly in scenarios where users are accustomed to a local support team that speaks their language and are available in person.

### Desktop virtualization drivers for branch office enablement

In this scenario, desktop virtualization offers IT executives the following ability:

- **Centralization and control** – By centralizing servers and storage, the IT team can have complete control over data. Centralization also helps in enforcing policies to users, in line with the corporate governance framework, thereby ensuring adherence to regulatory compliance laws.
- **Standardization** – By making the desktops centralized, IT managers are now able to standardize the desktops that can be delivered to users over the networks, allowing them to maintain easier control over licensing, patch management and application usage.
- **Rapid application rollout** – Due to centralization, application installation and upgrades can happen in a short span of time with no or little downtime to end users. Organizations are able to save considerable costs through reduced downtime and quicker time to market.
- **Rapid employee on boarding** – Because new users are provided a virtual desktop, and there is no need to physically send a formatted and configured laptop. New workers, consultants and contractors (and even complete new branches) can be on-boarded much more rapidly.

## Use Case # 8 Right-sizing the Solution to the Desktop Virtualization Use case Deployment Requirement

One of the traditional obstacles to desktop virtualization deployments has been the cost of deploying data center storage. Now instead of monolithic one-size-fits-all storage architectures, IT is looking to employ new storage technologies that can substantially reduce costs, while enhancing density and maintaining high performance and scalability.

### Typical challenges & key considerations

As organizations look at storage solutions for desktop virtualization, they should be mindful of the following:

- There is no one-size-fits-all infrastructure that can meet the needs of every user in every business. For example, the desktop and business requirements for mobile users, call center or training center employees (often categorized as task workers), accountants, marketing, human resources employees (often categorized as knowledge workers), or designers with needs for high-powered graphics are all very different. The business requires a greater level of security for mobile workers because they are predominately accessing the desktop from a network external to the corporate network. Task workers, such as call center employees, interact with the same one or two applications while they work, so desktops that are non-persistent are cost-effective and work well for these users. On the other hand, knowledge workers tend to use many different applications and work both within the corporate network and from other locations. Knowledge workers need a more flexible and persistent desktop environment. As a result, optimized configurations and architectures are essential to address different delivery models, user workloads, scalability, and performance needs.

### Desktop virtualization drivers for different use cases and organizations

In this scenario, Cisco and Citrix desktop virtualization offers IT the following:

- **An Architecture Portfolio:** To assist desktop IT managers in their mission and accelerate desktop virtualization deployments, Cisco, Citrix and their partners have developed four reference architectures that combine best-in-class data center computing, networking, and storage technologies. The reference architectures help to simplify, accelerate, and eliminate the risks associated with desktop virtualization deployments. These Cisco Desktop Virtualization reference architectures include the On-Board Architecture, Simplified Architecture, Scalable Architecture, and Converged Infrastructure. These reference architectures address a spectrum of IT challenges, desktop environments, and delivery approaches to enable high-performance, easy-to-manage, and cost-effective solutions.
- **A Broad Ecosystem:** Taking advantage of enhanced UCS features and expanding the eco-system of storage partners including Atlantis Computing, Fusion-io, LSI, Nexenta, Nimble Storage and Tegile, Cisco is defining a broader portfolio of data center architectures for delivering desktop virtualization solutions with Citrix.

### Cisco and Citrix's Approach

The Cisco and Citrix approach enables stronger unified communications. Desktop virtualization requires a portfolio of solution architectures to address the full spectrum of business and user needs to effectively deploy virtual desktops and applications. Cisco Desktop Virtualization Solutions with Citrix offer a suite of solution architectures for desktop virtualization, each optimized for specific constraints and IT delivery models for environments of all sizes:

- **Cisco® On-Board Architecture** for non-persistent virtual desktops with integrated server-resident storage and management
- **Cisco Simplified Architecture** for persistent and non-persistent virtual desktops in an appliance-like configuration without the costs associated with a full SAN networking deployment.
- **Cisco Scalable Architecture** for persistent and non-persistent virtual desktops in a multi-thousand desktop scale-out configuration for environments with existing SAN investments.
- **Cisco Converged Infrastructure** with modularized infrastructure packaging that accelerates procurement and simplifies virtual desktop infrastructure (VDI) management, scaling, and support.

## Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits that make the cost reduction argument of desktop virtualization stronger:

- **UCS memory architecture means fewer servers** – Cisco can pack 60% more virtual machines on a server, thus providing the ability to reduce costs further as a single server can handle more desktops. With the latest Cisco UCS innovations with M200 M3 blades, up to 186 Citrix XenDesktop virtual desktops with knowledge worker profiles can be set up per blade. From a data center standpoint, this means fewer servers, less power & cooling costs, and less management costs.
- **Lower Integration and Support Costs** – through end-to-end validated designs, services and support. Because Cisco and Citrix publish Cisco Validated Designs (CVD) and Reference Architecture Designs for the joint Cisco and Citrix solutions that are constantly updated, IT can deploy desktop virtualization with lower investment in integration and testing. IT can also take advantage of the expertise and support for the complete solution, including third party technologies.
- **Citrix XenDesktop lowers desktop management costs** – XenDesktop provides a consistent architecture and management framework across application and desktop virtualization for greater operational efficiency. XenDesktop can also help IT departments control data access, reduce the number of desktop images that need to be managed, eliminate system conflicts, and reduce application regression testing.

## Use Case # 9 Supporting business goals for reduced IT costs

Desktop/PC procurement, provisioning, management and maintenance (upgrades, migrations, etc.) are significant cost components of the overall IT spend for an enterprise. Many IT executives are considering ways to reduce this cost, and are looking to desktop virtualization as a powerful alternative.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for reducing costs, IT should be mindful of:

- Not compromising on the user experience, which includes rich media collaboration.
- Total cost of ownership - As desktops get packed into servers in a data center, organizations need to be wary of the associated costs of space, power and cooling.
- Incremental cost of bandwidth, due to additional two-way traffic between the users and the data center.

### Desktop virtualization drivers for cost reduction

In this scenario, desktop virtualization offers IT executives the ability to:

- **Reduce procurement cost of desktops** – Centralized compute services in the data center eliminate the need to have desktops or laptops for all employees. Only desktop monitors and keyboards, i.e. thin clients, will be required, but the CPU, which is bulk of the cost, is reduced. Alternatively, organizations can take a BYOD approach and offer a fixed compensation for users to buy and manage their own devices.
- **Reduce management/support cost of desktops** – With desktop virtualization, IT will be able to centrally and remotely manage the desktop and its applications, hence having more control over the device and reducing management costs.
- **Reduce the cost of provisioning desktops** – With desktop virtualization, setting up new desktops becomes very easy through the centralized management console, and provisioning of a virtualized endpoint. The cost of Move-Add-Change is also reduced, as the desktops are now virtual and centrally serviced.
- **Reduce cost of refreshing desktops** – As enterprises decide to move from XP to Windows 7/8 (OS migration), or look to refresh old desktops with new powerful computing devices, the traditional approach of changing every desktop to meet the new minimum requirements becomes very expensive. With desktop virtualization, enterprises are able to extend desktop lifecycle and manage and future desktop OS migrations more easily.

## Use Case # 10 Enabling Agile Businesses

The business environment today is highly dynamic. This is making increasing demands on the organization's internal infrastructure, which needs to scale rapidly to meet the increasing business demands. However, scale is no longer the sole criterion. Infrastructure today needs to be highly agile and flexible, i.e., it needs to support rapid response and the ability to change according to evolving business requirements, while at the same time keeping costs low.

### Typical challenges & key considerations

As enterprises look at desktop virtualization for business agility, IT should be mindful of:

- Migration to a virtualized environment can be a challenging activity and needs to be carefully planned to ensure a smooth transfer of all user data into the virtualized environment.
- Slow or unreliable connectivity may lead to latency and reduce performance. It is necessary to ensure that the network infrastructure is secure.
- Training is very important, helping users work efficiently in a virtualized environment and leveraging the flexibility it offers.

### Desktop virtualization drivers for business agility

In this scenario, desktop virtualization offers IT executives the ability to:

- **Rapidly roll out new desktops** - Virtualization allows businesses to rapidly roll out desktops and applications for a growing work force, consultants or partner workgroups with complete automation. Hence, the time to go live at new locations is significantly reduced.
- **Meet changing business demands** – Since the compute and storage reside in the data center, there is no need to constantly upgrade user hardware. It can easily be provisioned at the server by the IT staff. This also lowers hardware refresh cycles.
- **Limited requirement for local support** – Desktop virtualization is enabling businesses to set up remote offices in a swift manner, with limited IT staff.
- **Anywhere anytime access** – With desktop virtualization, businesses are finding it easier to support virtual desktops with a variety of devices, based on preferences of the global workforce. The hardware agnostic nature allows compatibility with a myriad of end-user devices, providing anywhere anytime access to users.
- **Support all devices** – Through desktop virtualization, businesses can support all types of endpoint devices that are available in the market today, eliminating the need to define a standard set of devices. Furthermore, when the next 'must-have' gadget becomes available, it is almost instantly possible to access the user's workspace on it.

### Cisco and Citrix's Approach

The Cisco and Citrix approach brings the following benefits for agile businesses.

- **Enables rapid deployment** - The Cisco and Citrix solution dramatically speeds the deployment of virtual desktops and virtual applications, reducing the time it takes to give employees the tools they need to become productive. Policy-based deployment enables just-in-time provisioning of both virtual desktops and the underlying Cisco UCS infrastructure. With UCS Manager Service Profiles and XenDesktop template, configuration is easy and multiple desktops may be instantaneously provisioned from the same template.
- **Cisco Validated Designs (CVD) for Desktop Virtualization with Citrix help expedite deployment** – CVD encapsulates design considerations and guidelines for end-to-end VDI deployment, supported by reference architectures and best practices. The periodic CVD refreshes also ensure that new business-enabling innovations can be rapidly introduced.
- **Citrix FlexCast delivery technology** – Different types of workers across the enterprise have different performance and personalization requirements - some require simplicity and standardization, while others need high performance or a fully personalized desktop. The solution can address these requirements in a single solution thanks to FlexCast delivery technology.
- **Any device, anytime, anywhere** - Using Citrix Receiver as a lightweight universal client, Citrix XenDesktop users can access their desktop and corporate applications from any PC, Mac, thin client, or smart phone. This solution enables workplace flexibility, business continuity, and user mobility.
- **Open Architecture** - Cisco Desktop Virtualization with Citrix XenDesktop is validated with multiple hypervisor and storage infrastructures, enabling IT departments to use their current infrastructure investments while providing the flexibility to add or change hypervisors in the future. It supports XenServer, Hyper-V, and vSphere hypervisors as well as NetApp and EMC storage and other ecosystem partners.

## **I (I) INTEGRATED SOLUTION - THE BOTTOM LINE**

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Desktop and application virtualization are major trends in the industry and are being considered by many technology executives and IT decision makers across the globe as ways to enhance business agility and flexibility, reduce costs, manage and support desktops easily, and enable better security measures on desktops and application/data access.

The Cisco Desktop Virtualization Solution with Citrix XenDesktop brings together best-of-breed virtualization technologies along with networking and data center infrastructure. This collaborative approach can ensure smooth, seamless delivery of virtualized desktops and a portfolio approach that provides the choice of solution that best fits the needs of individual organizations. By recognizing the nature of desktop virtualization, where multiple solutions and vendors are coming together to deliver the solution, Cisco and Citrix are taking the initiative to offer a single integrated solution for the customer with end-to-end tested, validated and documented solutions and support. The joint solution provides a secure, seamless, flexible and centralized virtual desktop environment that addresses many of the varied needs of today's organizations.

## CONCLUSION

While desktop virtualization brings some obvious benefits, IT executives should consider a few things as they embark on this initiative.

- **Our workspace is changing** – we no longer work just at our desks, and we are collaborating a lot more. Hence, it is critical for IT executives to consider their desktop virtualization initiative as an important component of an overall enterprise mobility solution that enables multiple device work-styles, seamlessly from any location and delivers a rich media collaboration experience.
- **User expectations are high** – we expect things to work now. Users expect to access content from where ever they want, but this convenient access must not come at the expense of compromised corporate security. IT staff must be able to apply appropriate levels of security and access control even as they improve the experience for mobile users. Latency on application access and a LAN-like performance for remote users are becoming base expectations. IT executives need to ensure that the desktop virtualization initiative does not become counter-productive for users by ensuring the end-to-end performance across data center and network infrastructures.
- **Need for an end-to-end solution** – with desktop virtualization dependent on multiple factors, as discussed earlier, it is essential to choose a solution that has been tried and tested in the past and has been successful in meeting the varying needs of enterprises under different use cases. As enterprises and external environments evolve over time, a solution should be capable of keeping up with the changing requirements. Furthermore, one integrated solution removes the hassle of dealing with multiple vendors if an issue arises, and delivers post-installation support that optimizes application performance for end users using desktop virtualization.

Given the advantages of desktop and application virtualization, it is essential to evaluate the benefits that the solution can bring to your business. The Cisco Desktop Virtualization Solution with Citrix XenDesktop delivers a solution that addresses a common vision for the changing workplace. With the support of these vendors, the time is right to embrace desktop virtualization.



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Cisco, (NASDAQ: CSCO), is the worldwide leader in IT that helps companies seize the opportunities of tomorrow by proving that amazing things can happen when you connect the previously unconnected.

Founded in 1984, Cisco pioneered the development of Internet Protocol (IP)-based networking technologies. This tradition continues with the development of routing, switching, and other networking-based technologies such as collaboration, data center, security, service provider video products, and wireless. All of these technologies are made possible due to the evolution of the network.

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Citrix (NASDAQ: CTXS) is the cloud company that enables mobile work styles—empowering people to work and collaborate from anywhere, securely accessing apps and data on any of the latest devices, as easily as they would in their own office. Citrix solutions help IT and service providers build clouds, leveraging virtualization and networking technologies to deliver high-performance, elastic and cost-effective cloud services. With market-leading solutions for mobility, desktop virtualization, cloud networking, cloud platforms, collaboration and data sharing, Citrix helps organizations of all sizes achieve the speed and agility necessary to succeed in a mobile and dynamic world. Citrix products are in use at more than 330,000 organizations and by over 100 million users globally. Learn more at [www.citrix.com](http://www.citrix.com).

For more information on Cisco Desktop Virtualization Solution with Citrix XenDesktop, visit [www.cisco.com/go/citrix](http://www.cisco.com/go/citrix)

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