



# Improve the XenApp or XenDesktop experience for branch and mobile workers with CloudBridge

Maintaining or improving the user experience for everyone is essential for a successful desktop or application virtualization deployment

When implementing an app or desktop virtualization solution, IT must ensure that the user experience is the same or better than what employees receive through traditional, localized PC sessions. Otherwise, when the shift to the new desktop delivery method occurs, any degradation in performance will generate complaints and potentially cause the virtualization initiative to fail.

Ensuring a positive experience for workers co-located with the enterprise datacenter is not a problem. However, for the remote workforce, which includes branch and mobile workers, achieving this goal is more challenging. Not only can poor performance over the WAN degrade the virtual desktop experience, but also the WAN is typically outside the control of enterprise IT.

In the following paragraphs, we discuss how the WAN affects virtualization and how the Citrix® CloudBridge™ platform is uniquely capable of solving the related challenges.

### **How the WAN impacts desktop and application virtualization**

WAN problems are more than just the occasional disconnects caused by a failed firmware upgrade or poorly conceived configuration change. The most bothersome problems are more subtle and often add up over the duration of a virtualized desktop or application session. For example, a document that took five seconds to load an hour ago now takes five minutes, even though the person remains in the same location on the same network. When this occurs, the person typically remembers how wonderful life was under the “old way” of doing things, with all applications and desktop sessions running locally.

Desktop virtualization may lead to daily user dissatisfaction, which is not something the IT team wants to tell management. Upon digging deeper into the problem, IT quickly discovers that virtualization software is not the issue—the root cause is the WAN.

### **WAN latency and congestion**

When users are performing highly interactive tasks across the network, fast application response time is essential to a superior experience and high productivity. Many people accept slow response times when accessing public websites but find them unacceptable when performing work-related tasks and remotely accessing the corporate network.

These delays are often due to latency and congestion in the WAN. In corporate LAN networks, round-trip time (RTT) is often within tenths of a millisecond. Over the WAN, however, RTT can range from tens to hundreds of milliseconds depending on distance, network design and traffic congestion. As latency and congestion conditions worsen, higher RTTs turn virtual desktop sessions into a waiting game for branch and mobile users.

### Bandwidth capacity

Network bandwidth is simply the amount of data the network can transfer at any given time. The remote user feels the impact of limited bandwidth most acutely when downloading or uploading files, watching streaming multimedia or conducting other activities that require large session input/output (I/O). Each WAN link has finite bandwidth and allocates a certain amount of pipeline to each user session. The network topology (routers, servers, network software) can prioritize bandwidth on a per-user or per-application basis.

By definition, delivering virtual desktops to remote endpoints requires more bandwidth than executing local applications. In hosted desktop sessions, all elements related to desktop and application delivery reside in the datacenter and all activities, from screen updates to keystrokes, execute across the WAN. Therefore, bandwidth requirements increase in direct proportion to the number of virtualized desktop sessions.

A new factor that is increasing demands on bandwidth is video content usage within the enterprise. In fact, Gartner forecasts that by 2016, large companies will stream more than 16 hours of video per worker, per month. One reason is the migration to video-based training classes aimed at reducing travel costs. In fact, many enterprises have developed video-based classes to meet government requirements for routine training in certain HR topics and to communicate corporate policies on insider trading and conflicts of interest. In addition, marketing departments are now recording product announcements and product training classes to distribute to sales teams and partners. Enterprises are even adding internal video content sites for sharing business-related materials.

While video provides a richer training, marketing and collaboration experience, its transmission to branch and mobile workers consumes large amounts of costly WAN bandwidth and may congest the WAN pipe. The situation is even worse in the case of mandatory training and compliance videos where the same content is watched over and over by multiple branch employees, leading to repeated downloads. Or if a popular video goes viral within the enterprise, the same files will traverse the WAN link from server to branch multiple times. These scenarios result not only in a poor viewing experience but also in slower response time for any other business-critical applications that operate over the same links.

### Inefficient and “chatty” protocols

For users that run traditional client server applications alongside their virtual desktops, another issue that can arise is the significant communication overhead required due to “chatty” protocols. As it turns out, many common email, file sharing and productivity applications use protocols – such as CIFS and MAPI – that rely on considerable back-and-forth handshaking between the endpoint system and the corresponding datacenter-based server.

The problem in this case is that, with the relatively high RTT over a WAN link, the accumulated delay from all of these handshakes quickly adds up – with the end result being a significantly degraded user experience.

## Why traditional methods for ensuring the user experience fall short

### Adding bandwidth

When trying to solve a branch or mobile user experience challenge, the most common approach taken is simply to add more bandwidth. However, mobile users working from wireless hotspots or home often have no choice but to endure bandwidth and latency issues because they are beyond the control of the organization. Clearly, the local coffee shop is unlikely to invest in higher-capacity trunking for the roaming road warrior.

Branch offices can also present a dilemma for IT. In many cases, the branch office resides on a leased network trunk shared with other businesses, and connects to the corporate datacenter across the WAN. Multiple users and applications compete for the same bandwidth. In this scenario, IT must make a trade-off between user experience and cost of the shared network trunk. Adding more bandwidth means higher cost of ownership, delaying some of the ROI benefits associated with desktop and application centralization.

From a technical perspective, it is also important to recognize that although adding more bandwidth has the potential to alleviate congestion related performance issues, it actually does nothing to reduce the underlying latency of a WAN link (which is primarily a function of distance), or to resolve the problems caused by chatty applications and protocols.

### Adding branch office servers

Alternatively, IT may decide not to centralize everything at the headquarter's datacenter. Instead, servers running certain mission-critical applications can be installed in each branch office to reduce the amount of network traffic. While this approach solves the WAN related performance issues, IT must now manage the remote servers and ensure data replication, which adds costs and detracts from the benefits of centralization, consolidation and desktop virtualization initiatives.

Still another option is to create a local virtual desktop delivery infrastructure for certain branch offices. This alternative maintains alignment with the overall corporate virtualization initiative, but still increases infrastructure expenses. Additionally, this approach clearly does not solve the challenge facing employees who need to work from their homes or other remote locations—the WAN is still their only connection point.

### Generic router QoS optimization

The latest-generation network routers and trunked switches support features that prioritize network traffic and improve overall quality of service (QoS). Most of these solutions are designed to prioritize some packets ahead of others, as opposed to being truly application aware. To obtain a deeply granular view of application traffic and differentiate an interactive desktop virtualization session from a background printing activity, a different solution is needed.

## CloudBridge enhances the user experience essential for app and desktop virtualization

Citrix specifically engineered its CloudBridge WAN optimization platform to deliver a high-definition user experience with virtual desktops and apps hosted and delivered by Citrix XenDesktop® and Citrix XenApp®.

At the core of CloudBridge's ability to enhance the performance of all TCP-based applications and services, including XenDesktop and XenApp, is a comprehensive set of highly complementary optimization technologies. The inclusion of specific optimizations for HDX™ technology, the XenDesktop/XenApp delivery protocol, further ensures superior results when compared with any other WAN optimization product. This combination of HDX technology and WAN optimization designed for the HDX technology is something that competing virtual desktop solutions can't offer either, and this is one reason for the success of XenDesktop and XenApp for virtual desktop deployments.

**Adaptive TCP flow control.** Designed to overcome networks characterized by high packet loss rates and high latency, the CloudBridge flow control technology employs a collection of standards-based techniques to bypass conservative, default TCP flow control settings to more thoroughly utilize available bandwidth.

**Adaptive compression.** Depending on the type of traffic being sent and prevailing network conditions, CloudBridge dynamically selects among multiple compression, caching, and data de-duplication algorithms to dramatically reduce bandwidth consumption. Intimate knowledge of ICA® and direct communication with XenDesktop server processes ensure optimal treatment down to the level of individual virtual channels. A specially developed nano-pattern matcher further ensures maximum gains are achieved by delivering optimal compression for the mouse movements, keyboard entries, and screen update traffic typical of virtual desktop sessions.

**Adaptive protocol acceleration.** This technology orchestrates with XenApp or XenDesktop to provide intelligent acceleration of HDX by sensing and responding to the network and traffic conditions. Latency mitigation is provided by eliminating unnecessary round trips for HDX and several other application protocols. These include HTTP/HTTPS, CIFS, MAPI, FTP, NFS and more – some of which are utilized during negotiation of virtual desktop sessions, and to deliver desktops and applications that are streamed instead of hosted. See Figure 1.

### CloudBridge Accelerates Common Enterprise Applications

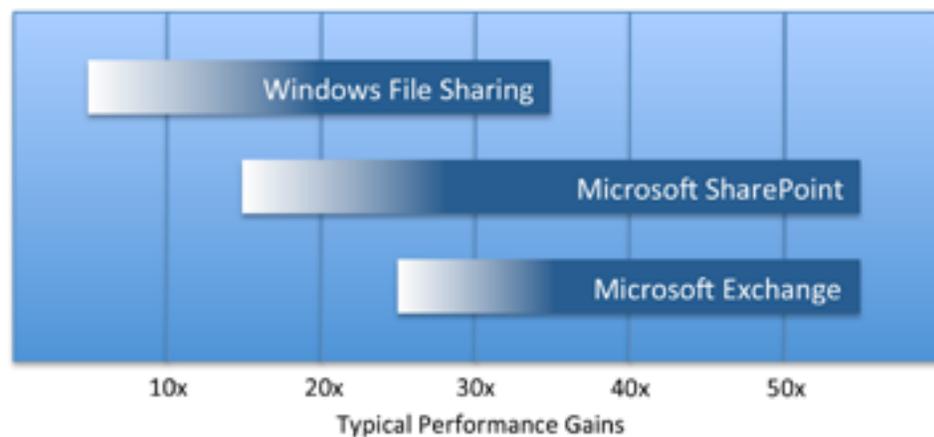


Figure 1: CloudBridge benefits many common applications

**Per-application performance monitoring.** In-depth, application-level performance monitoring is provided through native support for Citrix AppFlow® and Insight Center. An open, standards-based technology, AppFlow supplements the network-level data readily available via IPFIX/NetFlow with per-flow usage and performance data for individual applications, including XenDesktop and XenApp. A high-speed AppFlow collector, Insight Center includes embedded correlation capabilities that automatically organize collected records by resource (e.g., by user, application, and CloudBridge device). Administrators can then view reports of both real-time and historical statistics from a variety of corresponding entry points, while also leveraging multi-level drill-down capabilities to examine underlying data and reveal the actual source of any ongoing, imminent, or potential future application performance issues.

**Fine-grained Quality of Service (QoS).** CloudBridge uniquely supports classification and prioritization of discrete workflows within each XenDesktop session. As a result, interactive traffic such as screen refreshes and mouse movements can be given preference over traffic associated with file downloads or printing. Maximum bandwidth utilization is also assured as the priority queuing engine that reserves a configured percentage of bandwidth for each class of traffic, or queue, automatically makes any unused capacity available to other queues that need it.

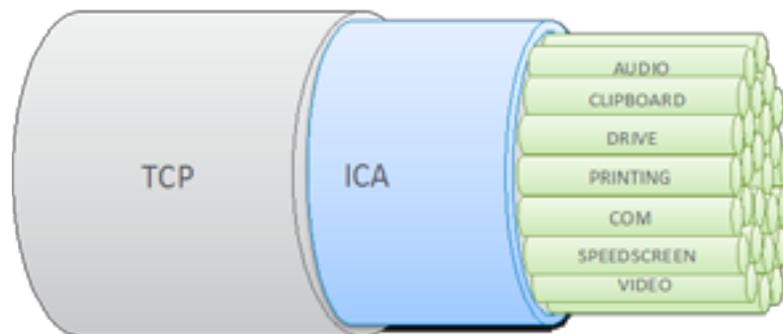


Figure 2.: CloudBridge is ICA aware

**Video optimization.** CloudBridge also improves the performance of video delivered within a XenDesktop and XenApp environment. By identifying, classifying and caching video content, CloudBridge significantly reduces associated WAN bandwidth demands while ensuring that business-related content is given a higher priority than other content employees may view.

For example, when a user at a branch office with a properly configured CloudBridge appliance plays a video from the video server hosted in the data center or on the public Internet, the request for video content will result in caching of that video on the local CloudBridge device. Once cached, the video will be served from the local CloudBridge appliance in response to all subsequent requests until the content is flushed or marked as stale.

Local video caching has two main advantages. First, performance is faster and video download times improve by a factor of 45 or more because the video is delivered at LAN speeds (Figure 3). Second, WAN link usage for redundant transfers is minimized. CloudBridge video caching supports all video content transmitted over HTTP including videos played directly within the browser or played in a XenApp/XenDesktop environment with HDX Flash redirection enabled.

## Video Caching Acceleration with CloudBridge

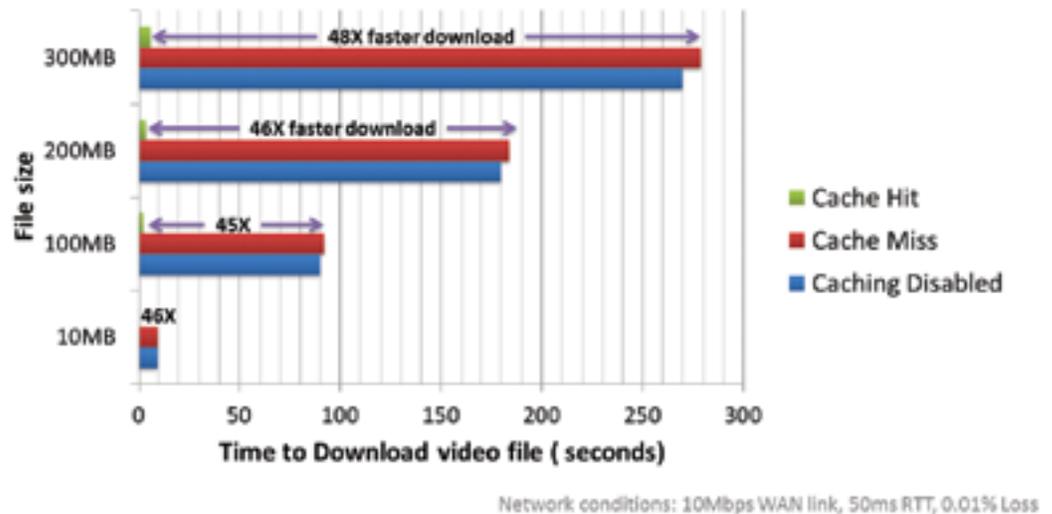


Figure 3: Download times with CloudBridge video caching

Another major strength of CloudBridge is the ability for seamless deployment. No configuration changes are required as it automatically orchestrates with XenDesktop and other service delivery components to maximize effectiveness. Examples include:

- Decrypting, optimizing, and then re-encrypting traffic natively encrypted by XenDesktop;
- Suppressing XenDesktop TCP optimization and compression functionality to avoid redundant and potentially conflicting processing, while also enabling data de-duplication to operate across multiple users' sessions (rather than on each session individually);
- Interoperating with NetScaler Gateway™ to optimize all TCP traffic within the secure tunnel for remote and mobile users; and,
- Ensuring the Plug-in for Citrix Receiver™ automatically defers to a CloudBridge appliance when a mobile user is operating from a branch office.

The overall impact of these technologies and capabilities is typically quite significant. Using CloudBridge in conjunction with XenDesktop, enterprises can expect to reduce the average bandwidth consumed per session by up to 80 percent (depending on the types of workflow being processed), reduce response times for workflow such as printing by up to 60 percent, and support up to five times as many users on a given connection before having to invest in increased bandwidth.

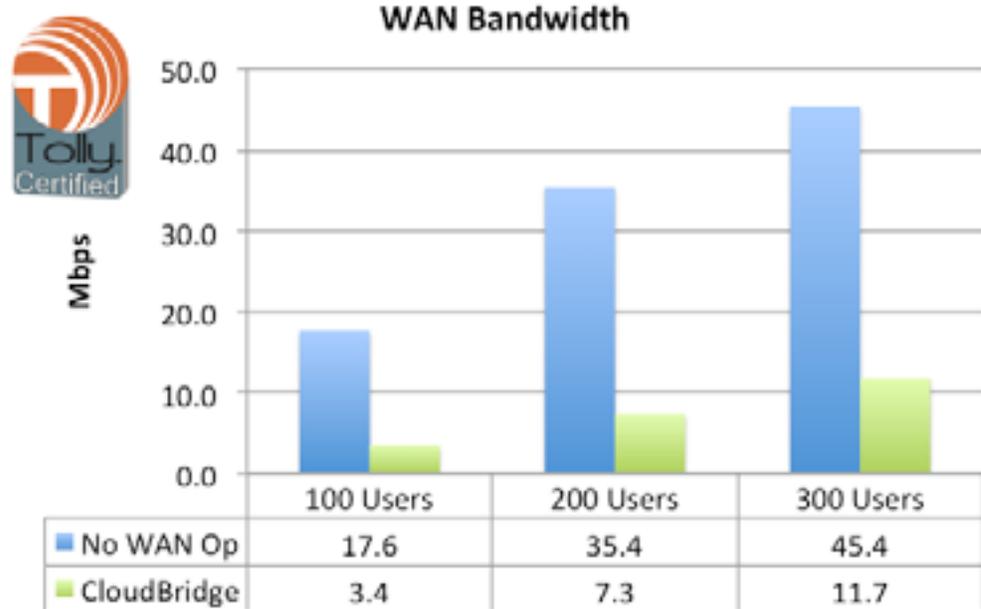


Figure 4: CloudBridge optimization for XenDesktop

The net result is that CloudBridge accelerates the ROI and time to value associated with desktop and application centralization and virtualization, while eliminating the costs and administrative burden of adding extra branch servers or upgrading network bandwidth. IT can build a single desktop virtualization infrastructure that provides an excellent experience for all users regardless of location or network conditions.

### Conclusion

App and desktop virtualization provide a smart, highly effective way to enhance user productivity and reduce remote infrastructure requirements while securely extending corporate data to employees on the go. However, once workers move outside the corporate headquarters boundary, they are at the mercy of their WAN connectivity. Innovative WAN optimization technologies are needed to provide granular visibility into WAN traffic for prioritization, while optimizing performance where it counts the most.

Citrix engineered its CloudBridge WAN optimization platform to deliver a high-definition user experience not only for typical enterprise applications, but also for XenDesktop and XenApp. CloudBridge accelerates time-consuming tasks such as printing, file downloads and page scrolling by up to five times, with a corresponding decrease in WAN bandwidth. With new video delivery optimization enhancements, CloudBridge can also reduce video traffic bandwidth requirements by a factor of 45. In addition to these benefits, enterprise IT can simplify branch office infrastructure by selecting a CloudBridge branch office appliance with an integrated Windows Server.

To learn more about CloudBridge and its benefits, please visit <http://www.citrix.com/products/cloudbridge/overview.html> or contact a Citrix sales representative.

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