Choosing the Best Approach for Monitoring Citrix User Experience

Where Should You Monitor From: Network, Server, or Client?

An eG Innovations Technical White Paper

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Total Performance Visibility

The Importance of Monitoring Citrix User Experience

Desktop virtualization and application virtualization technologies enable remote connectivity for users: inside corporate firewalls, across corporate networks, from a public network to a corporate network, or on-the-go, from anywhere at any time. Citrix technologies such as XenApp, XenDesktop and XenMobile are the predominant technologies being used in enterprise networks for applications and desktop virtualization. While these technologies make available a wide variety of new capabilities to users, they pose new challenges for IT administrators.

Citrix is one of the most performance-sensitive services in enterprise networks – a fact substantiated by 93% of respondents to the DABCC and eG Innovations 2016 Citrix Performance Survey. There are several reasons for this:

- Citrix access is session oriented: a session remains established for the entire period that a user accesses the server farm. A glitch in network connectivity, even for a few seconds, can result in the session being disconnected. This, in turn, results in lost work and unhappy users.
- Citrix technologies are accessed from thin clients with little processing power. Most of the processing required to support applications and desktops is on the server end, minimizing demand on the clients. For example, when a user moves his/her mouse, the processing of this action is on the server end. So, any lag in transmission of user requests to the server affects the user experience.
- Citrix access is also highly interactive, even more so than with browser-based web accesses. While web accesses tend to be request-response oriented (e.g., click on a link, download a page), Citrix accesses involve constant user interactions with applications hosted on Citrix servers and desktops. Performance degradation can result in keystrokes not showing up on time, or screen freezes, resulting in loss of productivity and frustration among users.

While monitoring the CPU, memory or disk usage of the servers in a Citrix infrastructure is no doubt useful, the most important requirement for Citrix administrators is to understand the user experience. 62% of Citrix professionals who participated in the recent Citrix performance survey highlighted user experience monitoring as their biggest need from a Citrix performance management solution (see Figure 1).

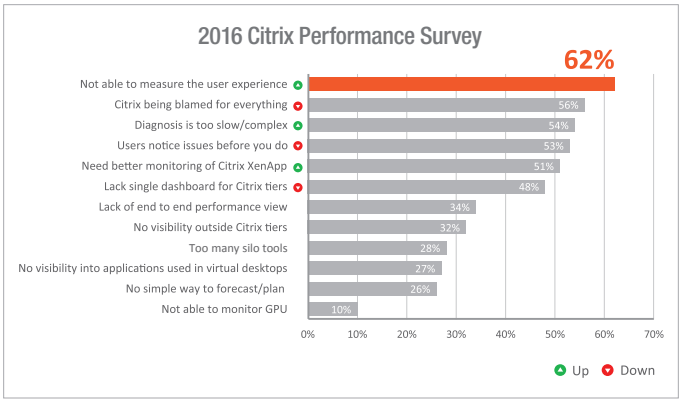


Figure 1: Top challenges of Citrix administrators

Monitoring the user experience of Citrix sessions can help administrators detect anomalies and deviations in session performance, allowing them to proactively fix issues before an affected user calls the service desk. The success of Citrix implementation depends on ensuring great user experience. Without the ability to monitor Citrix user experience, problem diagnosis and performance troubleshooting can be extremely difficult, and even daunting.

This whitepaper explores different aspects of monitoring Citrix user experience. We will define the various aspects of Citrix user experience monitoring, enumerate different ways of monitoring the Citrix user experience, present the pros and cons of each approach, and recommend a best practice approach for Citrix user experience monitoring.

What is Citrix User Experience?

There are many stages involved in accessing applications and desktops through a Citrix farm. Unavailability or slowness of any of these stages impacts the user. Figure 2 below highlights the different aspects of user experience:

- **Citrix StoreFront/NetScaler logon time:** First, users access the Citrix farm through Citrix NetScaler or Storefront. The ability for a user to access the NetScaler or Storefront web page and authenticate himself is the first measure of Citrix user experience.
- **HDX Session startup time:** Once the user has logged on to NetScaler/Storefront, he clicks on a

published application or desktop. The HDX session is established at this point. The ability to get an HDX session and the time taken for session establishment is the second measure of Citrix user experience.

The importance of logon time and session startup time depends on the frequency with which users logon to the Citrix infrastructure. In many domains, users logon only once in a day, whereas in domains like healthcare, the same user may be using several devices during a day – e.g., a doctor accessing a patient's medical records by logging in to the device connected to each hospital bed.

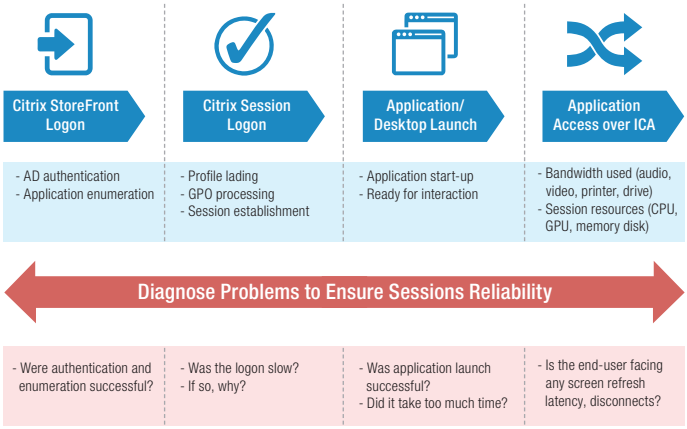


Figure 2: Different aspects of Citrix user experience

- **Citrix application launch time:** Once a user has connected to a session, he/she launches applications within the session. If it takes a long time for the application to launch and to become available for user interaction, it can leave users unhappy. Therefore, the application launch time is an important component of the Citrix user experience.
- **Latency when performing actions within a session:** Once an application is started, users interact with the application. The latency seen by users when they move their mouse, when they issue keystrokes, etc. are key measures of user experience. If screen refresh is slow or if keystrokes do not show up on time, this can lead to user dissatisfaction.
- **Session reliability:** In addition to the above measures, it is essential for good user experience that Citrix sessions remain reliable. If sessions repeatedly disconnect while a user is working, this can also affect the user's productivity. Therefore, session reliability is also an important component of the Citrix user experience.

Key performance questions that administrators need answers for:

- How long did Citrix logon take?
- What caused logon slowness: profile loading, AD authentication, GPO processing, etc.?
- How long did an application take to launch?
- What is the user's screen refresh latency?
- Is any user facing frequent disconnects?
- Is there any network latency in the client side that is affecting user experience?

Factors That Affect the Citrix User Experience

For Citrix administrators to be proactive, they must be able to measure all aspects of Citrix user experience, compare the user experience with pre-defined thresholds and be alerted to situations when users are affected. Once an administrator knows that there is a problem, the immediate next question will be "why is the user experience poor"?

Citrix infrastructures are distributed by nature, with many tiers of hardware and software involved in supporting user accesses. Furthermore, there are interdependencies between tiers and, as a result, a problem in one of the tiers can affect several other tiers as well. When a user experience problem is detected, an administrator's challenge is to accurately identify where the cause of the problem is (see Figure 3):

- **Is it the client?** Users connect from thin clients/terminals. Slowness on the endpoint (bad sector on disk, antivirus misconfiguration, memory leak with one of the applications running on the client device, etc.) can affect the user experience.
- **Is it the network?** If the intervening network connection from the user terminal to the Citrix server farm is slow, then user experience will be poor. Packet drops, jitter, bandwidth constraints, etc. also affect the user experience.

- **Could the problem be due to the Citrix stack?** To support application/desktop virtualization, many different Citrix technologies have to be deployed together – e.g., XenApp, StoreFront, NetScaler, Delivery Controller, Provisioning Services, License Server, etc. Performance bottlenecks in any of the Citrix tiers can affect the user experience.
- **Could the problem be due to the functioning of one of the non-Citrix tiers supporting the Citrix service?** Citrix services also depend on the supporting infrastructure components such as Active Directory, virtualization platform (XenServer, VMware, Hyper-V, etc.), and storage devices. A performance bottleneck in any of these backend tiers will have a direct impact on Citrix delivery and therefore will affect user experience.

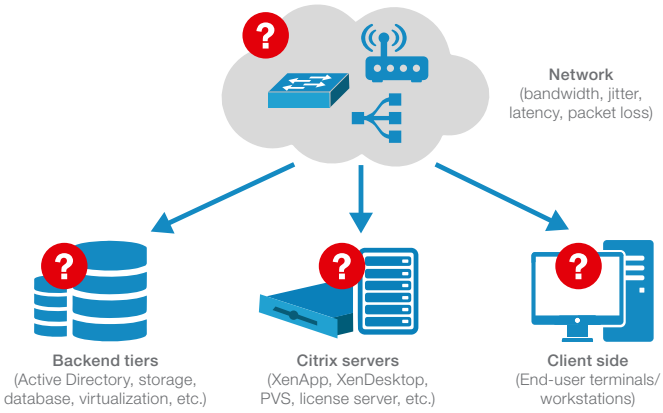


Figure 3: Which tier of the infrastructure is affecting Citrix user experience?

To summarize, IT operations teams must use a two-pronged approach to monitoring and troubleshooting Citrix user experience issues:

Continuously **measure user experience** during Citrix sessions and identify issues proactively before users are impacted

Diagnose where the bottleneck is and get actionable insights for troubleshooting and problem resolution

Evaluating Four Approaches to Citrix User Experience Monitoring

Now that we understand the importance of monitoring Citrix user experience, let us look at various approaches that are available for monitoring, examine the pros and cons, and determine the best approach.

1 Simulation of Citrix Sessions for User Experience Monitoring

Simulation is a popular approach for monitoring Citrix environments. As the name indicates, this approach simulates a user accessing a Citrix farm. The sequence of operations/steps to be simulated is specified by the administrator. For example, a simulation could involve a user logging into Citrix, opening an SAP application, checking the inventory, updating the inventory catalog, closing the SAP application, and logging out of the Citrix session. This sequence of steps is recorded in a script that is replayed periodically. The script execution provides an indicator of the experience that users are likely to see when they access the Citrix farm.

This script to be run is recorded by the administrator and the playback is performed from one or more target endpoints. During playback, the availability of the service and the response time for each step are recorded. By comparing performance across different locations, administrators can identify location-specific performance issues. Analysis of performance against historical baselines highlights trends and variations that may merit attention.

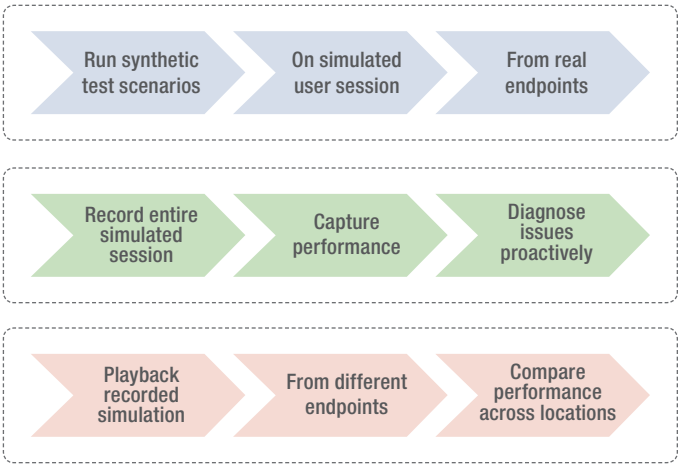


Figure 4: How synthetic Citrix session simulation works

Ideally, the simulation should be set up to test the entire service delivery infrastructure (see Figure 5). Since it repeats the same process periodically, simulation imposes a pre-defined workload on the infrastructure over time. Likewise, since it functions 24x7, simulation provides a measure of user experience, even during times when there are no users actively using the Citrix farm.

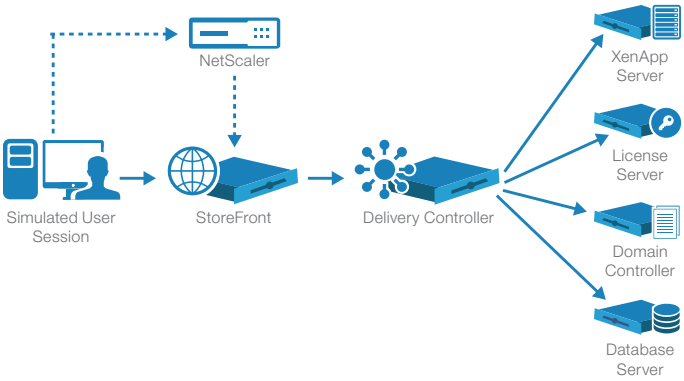


Figure 5: Periodic simulations help test the readiness of the entire Citrix delivery infrastructure

A variation of synthetic monitoring for Citrix is logon simulation. As the name indicates, this process only simulates a user logging on to a Citrix farm. Further steps, including accessing applications on Citrix, are not supported in this approach. Key user experience metrics such as logon availability, duration, time taken to process each step of the logon process (browser access, authentication, enumeration, HDX session establishment, application launch) are reported in order to proactively measure user experience problems.

The table below summarizes the pros and cons of a synthetic monitoring approach for Citrix user experience monitoring. Though the results of synthetically simulated user experience tests are useful, they are not reflective of the experience that real users may see (for example, the Citrix infrastructure may be working fine but one user or a group of users may be experiencing issues because the group policy being applied when they logon is different than that of other users).

The table below summaries the pros and cons of simulation for Citrix user experience monitoring.

What Simulation Provides	What Simulation Lacks
User experience: Only for simulated users – when there is no real user logging into a Citrix server/desktop	Real users may be seeing different issues (GPO, profile size can be different, etc.)
Diagnostics: Can test and understand user experience before product rollouts	Black-box approach: Limited diagnosis capability. Cannot confirm if the issue is on the server, network or client side.

In conclusion, simulation is:

- ✅ Useful for benchmarking the Citrix infrastructure and testing readiness from various locations
- ❌ Not a measure of real user experience. Not sufficient for troubleshooting performance issues.

2 Monitoring Citrix User Experience from the Network

Since all communication between the Citrix server and the user happens over the network, monitoring the wire data directly can provide access to user experience metrics such as network latency, ICA session latency, session login, bandwidth usage, etc. There are two ways to do this:

- A network TAP (Test Access Point) can be set up between two network nodes to monitor session traffic.

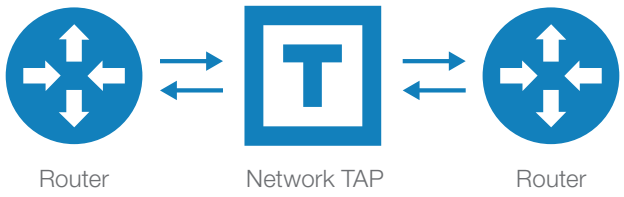


Figure 6: Installing a network TAP in between two network nodes

- A port mirror or SPAN (Switch Port Analyzer) port can also be used. When port mirroring is enabled, the network switch sends a copy of all network packets passing through one specified port to a target port, where the packets can be analyzed.

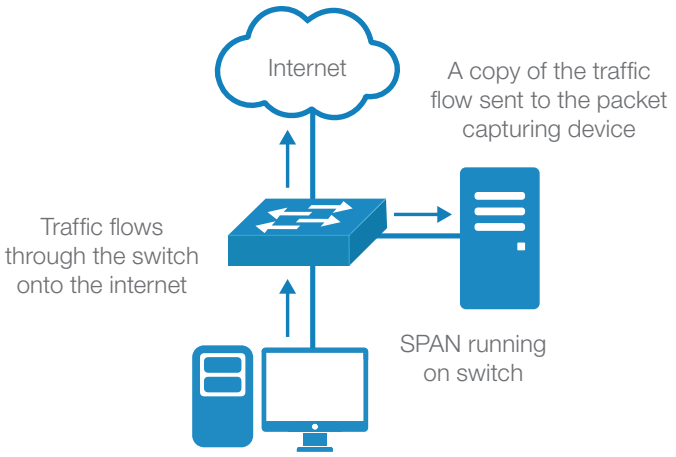


Figure 7: Using SPAN ports on switches for network-based user experience monitoring

Analyzing the data contained in the network packets is not easy. It requires reassembly of the raw, unstructured packets into structured transactions, flows, and sessions. Since all ICA channel data passes through the network, wire data analytics helps uncover critical user experience metrics about Citrix launch, login, latency, and session activity.

One of the benefits of this approach is that it does not require agents on the servers. All performance data is obtained directly by analyzing network packets. However, the biggest drawback is that it provides information only from the perspective of the network, and lacks visibility into server-side and client-side metrics.

The table below summarizes the pros and cons of Citrix user experience monitoring from the network.

What Network-based Monitoring Provides	What Network-based Monitoring Lacks
User experience: Provides key metrics such as network latency, ICA session latency, session login, bandwidth usage	Lacks visibility into server-side and client-side metrics
Diagnostics: Limited diagnostics data. Having performance metrics only from the perspective of the network is not sufficient for troubleshooting.	No access to critical diagnostic information such as memory leaks in the Citrix servers, CPU spikes, virtualization problems, GPU utilization, etc.

In conclusion, network-based Citrix user experience monitoring is:

- ✅ Useful for identifying if a Citrix user experiencing slowness
- ❌ Not able to provide diagnosis on why a slowdown is occurring. Not sufficient for troubleshooting.

3 Monitoring Citrix User Experience from the Server Side

An alternative approach is to monitor the Citrix user experience from the server side. This approach uses Citrix APIs (e.g., OData for XenApp and XenDesktop, NITRO for NetScaler, etc.) and Microsoft Windows interfaces to collect metrics about the experience seen by users when they access the Citrix servers. Since most of the processing for applications is done by servers in a Citrix infrastructure, monitoring from the servers themselves – i.e., in the data center – makes sense.

In this scenario, agents must be deployed on Citrix XenApp servers. Agents can also be deployed on other key Citrix supporting application servers in the data center including StoreFront, Provisioning Services, Delivery Controller, License Server, Active Directory and more. Citrix XenDesktop VMs are often monitored agentless, using WMI to collect performance metrics from within the VMs.

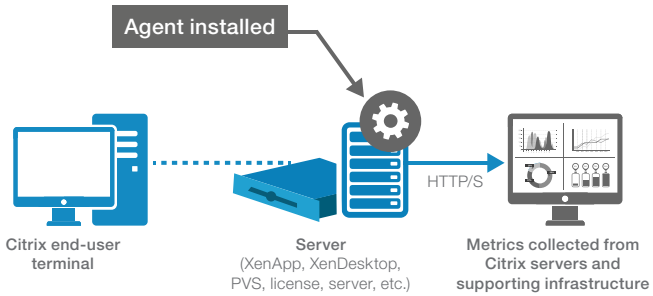


Figure 8: Agents deployed on Citrix servers for collecting performance metrics

Server-side monitoring provides deep insight into ICA channel metrics for every user and every session in real time, and covers all aspects of Citrix user experience. The table below highlights some of the key metrics that can be collected using this approach.

Session Activity - Session startup (server & client) - Disconnects - Application launch - Active/idle time	**Breakdown of Logon Time** - Brokering - Authentication - Profile load - Script execution
HDX Channel - Screen refresh latency - Client network latency - I/O bandwidth (media, print, audio) - Framehawk frame rate	**Session Resources** - CPU - Memory - I/O reads and writes - Page faults

In addition to providing a wide array of user experience metrics, server-side monitoring offers deep diagnostics information to troubleshoot user experiencing issues by looking at the functioning of every Citrix tier. Some of the common problems that can be detected with agents on the Citrix-supporting servers include:

- High StoreFront enumeration time
- Connection Broker failures
- High RAM cache utilization in Provisioning Server
- Delivery Controller not synched with the domain
- Data Store connection failure
- License Server running out of Citrix licenses

Server-side visibility is not just restricted to Citrix servers. There are many other infrastructure components that impact Citrix performance that can be monitored from the server side. This method helps pinpoint if the issue is with any of the supporting infrastructure tiers.

Virtualization - Memory ballooning - VM CPU ready - VM memory swap - VM sprawl - Resource usage metrics	**Network** - Network delay - Packet loss and errors - Bandwidth usage - TCP retransmissions - Connection drops
Database - Long running queries - Latches, locks, buffer, memory, cache metrics - Index fragmentation, SQL recompilation - Database growth	**Storage** - LUN capacity - I/O reads and writes - Disk pool metrics - Cache metrics - Hardware health

The table below summarizes the pros and cons of Citrix ser experience monitoring from the server.

What Server-based Monitoring Provides	What Server-based Monitoring Lacks
User experience: Provides granular details for every Citrix user and every session	Lacks visibility of problems originating from the client terminal
Diagnostics: Pinpoints if the issue is with the server, network, AD, storage, virtualization, or other infra tiers	No diagnostics for workstation issues impacting user experience

In conclusion, server-based Citrix user experience monitoring is:

✅ Well-suited for monitoring and diagnosis of majority of Citrix user experience problems

❌ Not able to find out if a user endpoint/workstation issue if affecting the user's access to Citrix

4 Monitoring Citrix User Experience from the Client Side

Another approach to monitor Citrix user experience is directly gathering monitoring data from the end-user terminals (workstations, laptops, desktops) that are used to access Citrix sessions. By deploying ICA-aware agents on the client terminals, administrators can gain access to ICA channel information and network data. Just like the network probe on the wire, the agent on the terminals needs to be able to break open the ICA packets and determine what traffic is flowing through, who is logged on, what applications are being accessed, etc.

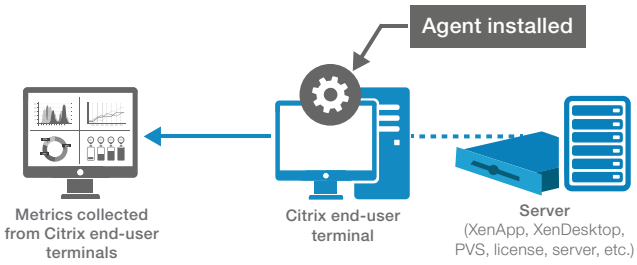


Figure 9: Agents deployed on Citrix user terminals for collecting performance metrics

Client-side monitoring provides resource usage information for the target endpoints, and user experience metrics specific to Citrix access.

User Experience - Client-side latency - Application usage - Wait time - Crashes, errors	**Resource Usage** - CPU and memory - Disk queue length - Top processes - Recent boots & health events

While this approach provides a wealth of metrics from the user terminal, it is limited in visibility to client-side issues only. For example, if there is a memory leak or a runaway process on the server that is affecting the user experience, client-side monitoring will not provide sufficient insights to enable these types of problems to be diagnosed quickly.

Client-based monitoring has other challenges as well:

- Client configurations can vary from device to device (different processors, memory, etc). A user may

experience different performance depending on the configuration of their client. This makes it difficult to set baselines and define thresholds for performance alerting.

- Also, installing and managing agents on all user end-points can present a major challenge. This can be a very tedious activity. Having agents on all endpoints means the monitoring tool must receive and process massive amounts of monitoring data – which presents additional overhead for the IT teams to manage. Administrators will be required to choose whether they really need to collect performance data from all endpoints, sift through and analyze it all to identify what is wrong.

The table below summarizes the pros and cons of Citrix user experience monitoring from the server.

What Client-based Monitoring Provides	What Client-based Monitoring Lacks
User experience: Metrics are obtained from every client workstation	There is no consistent measure and baseline for monitoring user experience. Different endpoints may have different configuration, and metrics can be biased due to this.
Diagnostics: Limited only to the client side issues	No visibility into Citrix servers (where most of the processing happens), or into network issues

In conclusion, client-based Citrix user experience monitoring is:

- ✓ Effective for diagnosis, but limited to problems originating from the client terminal
- ✗ Not able to provide sufficient visibility of performance issues that are not related to the client (i.e., server or network)

Evaluating the Four Citrix User Experience Monitoring Approaches

The table below summarizes the capabilities of the four different approaches to Citrix user experience monitoring.

Citrix session simulation is unique in its ability to monitor the real-time experience of a simulated user. At the same time, it does not provide any visibility into the real user experience.

User experience monitoring	Real time user experience	Visibility into ICA virtual channels	Server-side diagnostics	Network diagnostics	Client-side diagnostics
Session simulation	✓ Limited	✗	✗	✗	✗
Monitoring from the network	✓	✓	✗	✓	✗
Monitoring from the server side	✓	✓	✓	✓ Limited	✗
Monitoring from the client side	✓	✓	✗	✗	✓

Figure 10: Comparing the different approaches to Citrix user experience monitoring

Monitoring from the network does not provide visibility into the servers or the client. Similarly, monitoring from the client does not provide visibility into the servers nor, to a sufficient degree, into the network.

Monitoring from the server lacks the client-side view. And further, leveraging the integration with Citrix NetScaler Insight Center, or with additional instrumentation built into Citrix XenApp/XenDesktop 7.x, or even with an agent on a Citrix XenApp server/XenDesktop VM, it is possible to get insights into the network connectivity between the server farm and the client device. This information enables Citrix administrators to compare the screen refresh latency during the Citrix session with the network latency, to identify times when the network latency is responsible for Citrix slowness.

From the above analysis, it is clear that monitoring from the server has advantages over monitoring from the network or from the client. If you consider that most of the processing in a Citrix infrastructure occurs on the servers (for XenApp)/ virtual desktops (for XenDesktop), lack of visibility into the servers is a major limitation for network-based and client-based monitoring approaches. Without the server-side view of performance, it will be difficult to diagnose a large majority of problems (such as runaway process, memory leak in an application, GPU utilization, etc).

Another key reason to consider monitoring from the servers rather than from the clients, is assessing the impact of a problem. A client problem affects only the user who is using the client, whereas a problem on the server affects all the users accessing that server.

Finally, a tool that can measure user experience is simply insufficient for most enterprises. These organizations need

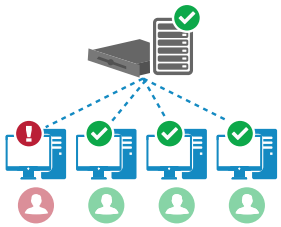
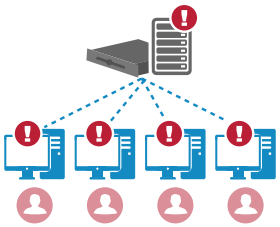
A client-side problem **affects user experience for the respective user** whose terminal has an issue.	Whereas, a server-side problem **affects user experience for all Citrix users** connected to the server.
	
Therefore, server-side monitoring is more important.	

Figure 11: Comparing the impact of a server-side problem with that of a client-side problem

the tool to be able to assist with and automate performance issue diagnosis. With the wealth of metrics collected, the expectation for a monitoring tool is to be useful for capacity planning, right-sizing and optimizing the Citrix infrastructure, in addition to diagnosis and troubleshooting. In a Citrix infrastructure, any conversation around capacity planning and right-sizing must focus on the servers and virtual desktops – for example, should additional CPU or memory or disk resources be added, and where? Without a server-side view of performance, it would be impossible to achieve these goals.

How You Can Go Beyond Monitoring and Diagnosis with Server-side Instrumentation

Optimize your Citrix farm by analyzing resource utilization patterns. Know when there typically are more users connecting, when there will be traffic spikes, which servers and virtual machines run out of resources sooner, etc. This will help you determine when to add more resources and load-balance your infrastructure to deliver enhanced performance.

Right-size your infrastructure by measuring resource utilization against resource availability. Discover over-provisioned and under-provisioned servers and virtual machines, and optimize resource allocation to get the most out of your infrastructure.

Capacity planning is an important activity that helps predict when your servers will run out of resources, helping you to forecast future capacity needs and be better informed for planning procurement and budgeting.

Auditing and compliance reporting is a common requirement in most organizations. Server-side monitoring provides a wealth of information about the infrastructure that can be obtained as reports and used for auditing purposes.

What is the Best Approach for Citrix User Experience Monitoring?

The best-practice approach that we recommend is based on the previous analysis of the different monitoring approaches:

- Server-side monitoring is sufficient to detect and troubleshoot a majority of Citrix issues. Since most issues happen on the server-side and their user impact is greater, it is recommended to consider server-side monitoring as the primary approach.
- Complement this with monitoring of network connectivity and bandwidth usage to detect network-level issues.
- Add client-side monitoring as on-demand only, when specific users report frequent problems and when server and network problems are ruled out
- Simulation of Citrix sessions is useful to have for pro-active monitoring and when there are no real users actively using the Citrix service.

Citrix User Experience Monitoring with eG Enterprise

eG Enterprise from eG Innovations is a purpose-built for Citrix environments that embeds years of domain expertise acquired from addressing the monitoring needs of many of the largest Citrix deployments in the world.

eG Enterprise adopts server-side monitoring as its primary approach for Citrix user experience and performance

monitoring. On an as needed basis, adminstrators can also deploy agents on client terminals for client-side diagnostics. Additionally, eG Enterprise has built-in capabilities for simulating Citrix logons and full sessions – making it a complete user experience management solution for Citrix administrators.

From a single pane of glass, administrators can monitor all components of the Citrix farm and supporting infrastructure tiers, using a combination of agent-based and agentless approach (see Figure 12). Agentless monitoring is preferred for monitoring network devices, Citrix NetScalers, storage devices, virtualization platforms with strong APIs like VMware vSphere and Citrix XenServer, and virtual desktops. For monitoring server applications running on legacy operating systems such as Microsoft Windows and Unix, eG Enterprise recommends an agent-based approach. Figure 13 summarizes the out of the box Citrix monitoring capabilities of eG Enterprise.

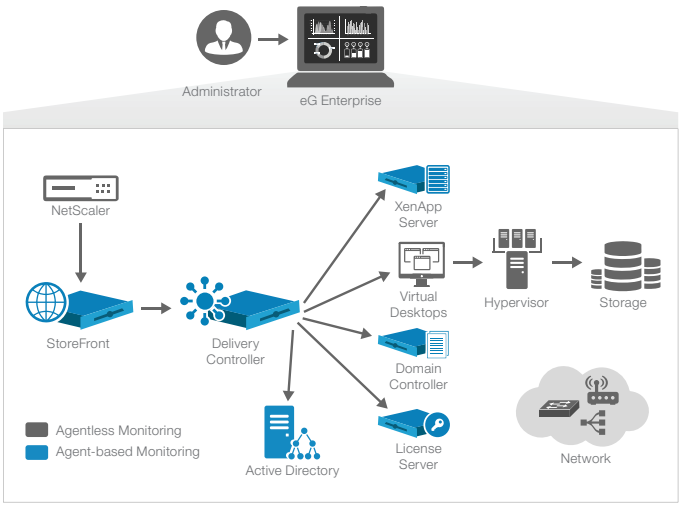


Figure 12: Deployment model of eG Enterprise

User Experience	HDX Channels	User & Application Activity
• Logon time • Profile load time • Application launch time • Screen refresh latency • Client network latency • StoreFront response time	• Bandwidth used • Audio bandwidth • Video band width • Printer bandwidth • Drive bandwidth • Framehawk frames per second	• Top users by CPU, memory, IOPS, GPU • Top applications by CPU, memory, IOPS, GPU • URLs accessed by users
XenApp Sessions	**Performance of Citrix Tiers**	**Performance of Supporting Infrastructure**
• Who logged in and when • What application did they access • When disconnects happen • Idle time in session • Top users by session duration	• NetScaler • StoreFront • Provisioning Services • Delivery Controller • License server • Data store	• Virtualization platform • Storage • Network in data center • Network to user terminals • Infra services – AD, DNS • Cloud

Figure 13: Out-of-the-box Citrix user experience and performance metrics in eG Enterprise

What eG Enterprise Delivers for Citrix User Experience Monitoring

- Get real user experience metrics about user logon and identify the cause of slowdown: profile loading, Active Directory authentication, GPO processing, etc.
- Be the first to know when application launches are slow and when there are session disconnects
- Compare screen refresh latency with client network latency to find out if slowness is due to the server or network issue
- Easily search by user and drill down into every session for deeper diagnostics of session performance
- Auto-correlate Citrix user experience with the performance of each of the supporting tiers (NetScaler, StoreFront, PVS, License Server, AD, virtualization platform, storage, network, etc.) to identify the root cause of a problem
- Built-in analytics, auto-baselines, composite alerts, and out-of-the-box Citrix reports simplify trouble-shooting and performance optimization

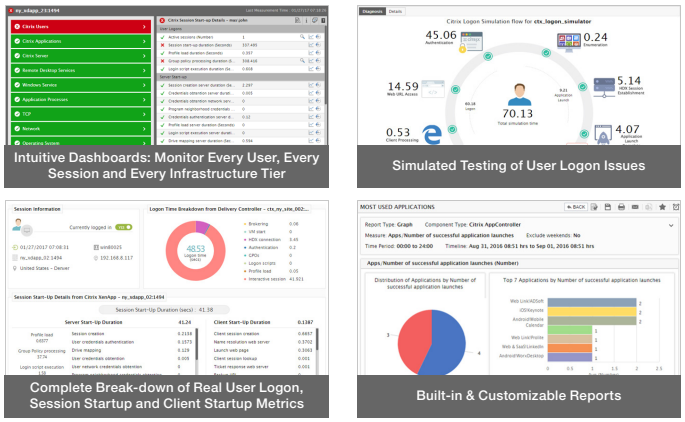


Figure 14: The eG Enterprise web console, dashboards and reports for Citrix monitoring

> *eG Enterprise makes it fast and easy to identify whether it is a Citrix, network, system, or an application issue and fix bottlenecks quickly. And with predictive alerting, we are one step ahead to resolve emerging problems before they impact the end-user.*
>
> **Mike Montano**
> Senior Manager, Allscripts

Next Steps

For more information, please visit https://www.eginnovations.com/solutions/citrix-monitoring, or email us at info@eginnovations.com

LIVE DEMO

Request a personal walkthrough to learn first hand how eG Enterprise can help improve performance and operations in your business environment.

FREE TRIAL

15-days of free monitoring and diagnosis, in your own infrastructure. Try it and learn exactly how eG Enterprise helps you ensure a great end-user experience and improve IT operations.

About eG Innovations

eG Innovations provides the world's leading enterprise-class performance management solution that enables organizations to reliably deliver mission-critical business services across complex cloud, virtual, and physical IT environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations' award-winning solutions are trusted by the world's most demanding companies to ensure end user productivity, deliver return on transformational IT investments, and keep business services up and running. Customers include 20th Century Fox, Allscripts, Anthem Blue Cross and Blue Shield, Aviva, AXA, Biogen, Cox Communications, Denver Health, eBay, JP Morgan Chase, PayPal, Southern California Edison, Samsung, and many more.

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Total Performance Visibility