Does Deploying Citrix in the Cloud Make Performance Monitoring Easier?

Analysis of Citrix Cloud Deployment Options, Performance Challenges, and Monitoring Solutions

An eG Innovations White Paper

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Introduction

After years of hype and promise, cloud computing has finally arrived for end-user computing! A recent Forbes survey reveals that in 15 months, 80% of all IT budgets will be committed to cloud solutions. Citrix customers and service providers are adopting cloud-based services for its flexibility and scalability, as well as to eliminate the overhead of managing some of the non-core components of a Citrix infrastructure. Subscription models ensure that organizations only pay for what they use and that their usage can scale up or down, depending on their business needs.

> *32% of organizations are using virtual desktops or virtualized applications in the cloud, while 48% are considering this in the future.*
>
> **Survey by eG Innovations and DABCC**

There are two options for organizations to choose from as they look to the consume Citrix services from the cloud:

- Citrix Cloud
- XenApp Essentials and XenDesktop Essentials

In this white paper, we will provide an overview of these cloud offerings and explore whether the adoption of cloud eliminates the need for Citrix infrastructure monitoring.

Citrix Cloud™

Citrix Cloud is a hybrid cloud service targeted at simplifying the maintenance and operation of Citrix services for organizations. The Citrix components deployed in the datacenter in a traditional on-premises environment are split into two groups in a Citrix Cloud deployment.

	Control Plane	Resource Plane
Component	Delivery Controller, StoreFront, NetScaler Gateway, SQL Server, Studio, License Server, Citrtix Director	XenApp Server, XenDesktop VDA, Active Directory, Citrix Cloud Connector
Deployment	Citrix Cloud	On-premises, public, private, or hybrid cloud infrastructure
Managed By	Citrix	Customer

For each enterprise (Citrix customer), a control plane is set up in the cloud and managed by Citrix Systems. The control plane includes the Citrix Delivery Controller, StoreFront, NetScaler, datastore, License Server, etc. (see Figure 1). The enterprise IT team does not need to manage deploying, upgrading and maintaining any of these components.
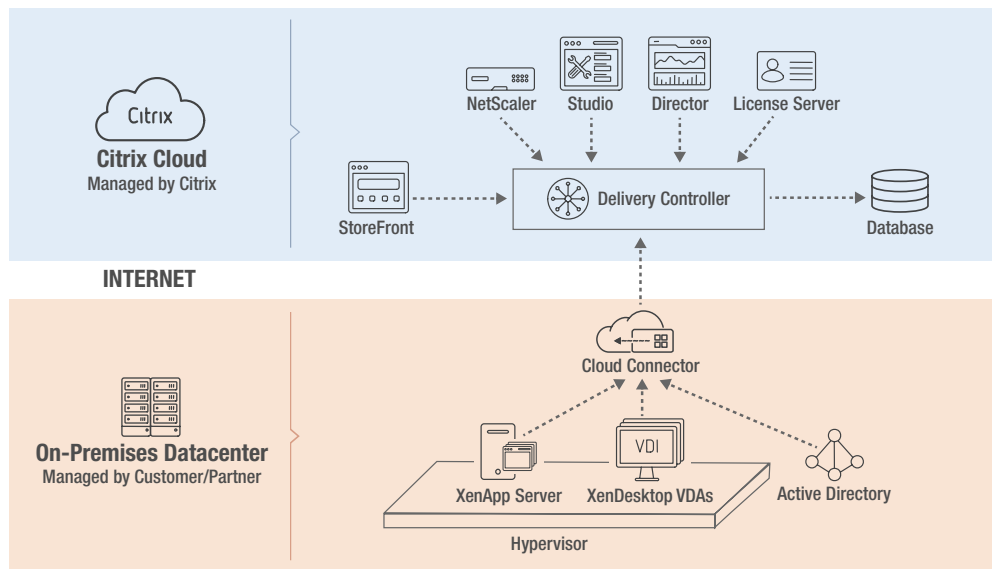

Figure 1: A typical Citrix Cloud deployment

Within the enterprise datacenter, a new Citrix component – the Cloud Connector™ – securely proxies communications between the cloud hosted components and the resource plane, which includes Citrix XenApp servers (with published applications) and XenDesktop VDAs and related support services (e.g., Provisioning Services, profile servers, RDS license servers, etc). The resource plane can reside anywhere – in a public, private or hybrid cloud. The operation and maintenance of these components are the enterprise IT team's responsibility. Infrastructure services required for Citrix delivery, such as Active Directory, DNS and DHCP, continue to be implemented within the enterprise network.

Citrix XenApp and XenDesktop Essentials in Azure Cloud

XenApp Essentials is a cloud service that replaces Microsoft's Azure RemoteApp; and XenDesktop Essentials enables organizations to deliver Windows Enterprise virtual desktops to end-users. Both of these deployments make use of an Azure cloud instance and a Citrix Cloud setup that interact with one another. In the case of XenApp Essentials, the Azure cloud has virtual instances running Citrix XenApp servers. On the other hand, for XenDesktop Essentials, one Azure VM is spun up for every virtual desktop (see Figure 2). Aside from the Citrix XenApp servers and XenDesktop VMs, all the other parts of the Citrix supporting infrastructure are hosted in Citrix Cloud and managed by Citrix. These services are 100% cloud-based so the enterprise IT team no longer needs to handle any on-premises deployment or management.

Performance Monitoring for Citrix Cloud Services

Over the years, performance monitoring and management have been important for achieving high performance of Citrix services. In fact, Citrix XenApp and XenDesktop are among the most performance-sensitive workloads in enterprise networks today. Logon times of less than 30 seconds and application launches within a few seconds are just some of the expectations of users. But even a minor glitch in any tier of the infrastructure tiers supporting Citrix affects the user experience, resulting in loss of productivity, reduced user satisfaction, and ultimately, lower return on investment.

> *93% of organizations feel Citrix is one of the most performance-sensitive services in enterprise networks.*
>
> **Survey by eG Innovations and DABCC**

? **The adoption of Citrix cloud services raises a key question: "Is performance monitoring and management still important for organizations that are deploying Citrix cloud services?"**

Measuring user experience: As a Citrix Service Provider (CSP) or as an enterprise IT team offering Citrix services to your users, you are responsible for the overall experience for users when they access virtualized applications and desktops. Being able to measure all aspects of user
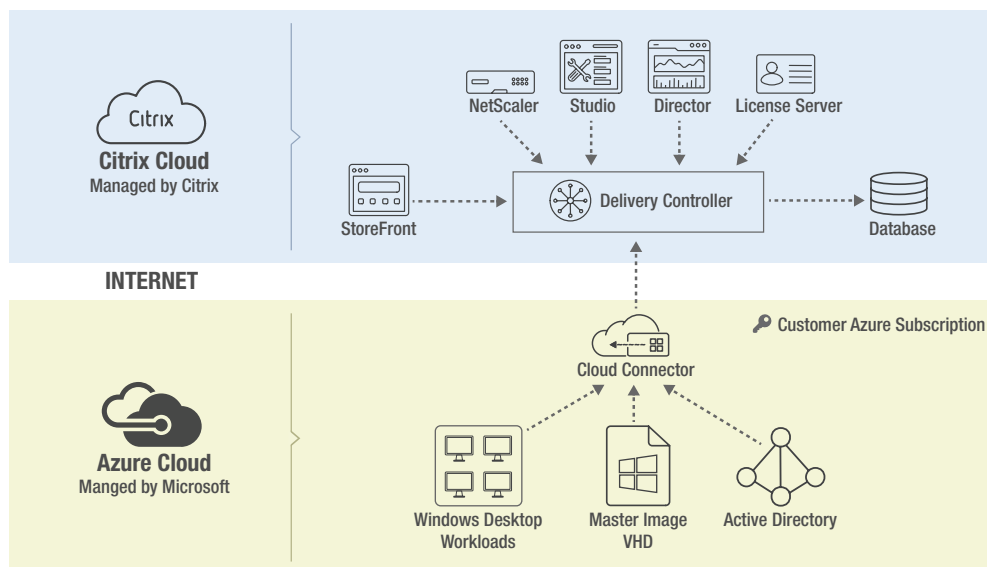

Figure 2: XenDesktop Essentials in Azure

experience is a key first step. Citrix Cloud services do not measure and report on all aspects of Citrix/VDI user experience. Therefore, as you deploy Citrix Cloud services you need monitoring tools to measure and report on the Citrix user experience.

Monitoring the resource plane and on-premises infrastructure supporting Citrix: With Citrix Cloud services, monitoring of the control plane is part of the cloud service offering. But the cloud services do not track the health of the components residing in the resource plane, which include the Citrix XenApp servers, the XenDesktop VMs, Provisioning Services, profile servers, RDS license servers or the enterprise applications that users access. These components must be managed by you – the CSP or the enterprise IT team. Infrastructure services such as Active Directory and DHCP are also in your dominion, and must be monitored and managed as usual. Ensuring high performance from all of these tiers is critical for seamless Citrix service delivery.

Multi-domain nature of cloud infrastructures makes root cause diagnosis more challenging: With Citrix Cloud services, the control plane is now hosted in the cloud and managed by Citrix, and it is no longer your responsibility to ensure that the Delivery Controller, License Server and SQL server are up and running. When a user logs into a Citrix session, both the Citrix-hosted infrastructure and the on-premises/cloud-hosted resource plane must work in concert.

> *When an end-user logs into a Citrix session, both the Citrix-hosted infrastructure and CSP-managed infrastructure have to work in concert.*

The Citrix StoreFront servers and Delivery Controllers hosted in the cloud are involved only during the time that a Citrix session is established. Even during session establishment, only a part of the logon processing is handled by the servers in the control plane.

The XenApp servers and XenDesktop VMs, profile servers, Active Directory servers in the on-premises/cloud infrastructure that you manage play a key role in logon processing. This means that any slowness in your on-premises/cloud infrastructure will affect Citrix logon performance. And, since logon processing is now split between tasks that span different domains – the Citrix Cloud portion and the local Citrix infrastructure – the real cause of the slowdown must be identified, whether it is in the Citrix-hosted control plane or in the resource plane that is managed and operated by your team.

Enterprise IT teams are still responsible for the most critical components of the Citrix infrastructure: Once a session is established, most of the processing required to support user access happens on the Citrix XenApp servers or in the XenDesktop VMs. These core components of the Citrix infrastructure are within your purview and control. Some of the key questions you must be able to answer include:

- Are the XenApp servers sized correctly for the current workload?

- Who is logged in, for how long, what applications are they accessing?

- Who are the top resource-consuming users?

- What are the logon times of users, how long does it take to launch an application, and what is the screen refresh latency seen by users in a Citrix session?

- How are the resource utilization levels on the hypervisors supporting the Citrix infrastructure?

When slowness is detected, you must be able to quickly and accurately determine the root cause: Is it because a user is connecting through a slow network link, or is it a problem in the data center, in the Citrix stack, in the virtualization tier, or storage device?

> *Challenges in Monitoring Citrix Cloud Services*
> - Multiple domains of control
> - No direct visibility to performance of Citrix cloud services
> - Multiple monitoring consoles

Keeping track of cloud connectivity: The integration of the resource plane with the control plane hosted in Citrix Cloud introduces one additional component in your infrastructure – the Cloud Connector. You must monitor the

Cloud Connector and its connections to the Citrix Cloud infrastructure. Typically, there are two Cloud Connectors installed in the resource plane on two separate Windows Servers. This is done for high availability and failover. And the performance of both individual Cloud Connector instances must be monitored at all times.

💡 **Therefore, to answer the question raised earlier: Performance monitoring is still essential for Citrix cloud services. In fact, the multi-domain, hybrid nature of Citrix Cloud services adds to the performance monitoring challenges.**

Monitoring XenApp/XenDesktop Essentials on Azure: The requirements for Citrix XenApp and XenDesktop Essentials are very similar. Citrix Cloud services are still used, but in this case, the XenApp servers, the XenDesktop VMs and supporting services are hosted on Microsoft Azure. So, when performance problems happen, you need to be able to determine if they are caused by the Azure infrastructure or not. Therefore, performance of the Microsoft Azure services is best monitored from the same console, to ensure that administrators are not forced to rely on multiple independent toolsets.

Since Microsoft Azure offers a pay-per-use licensing model, it is also important that the provisioned cloud resources are being used optimally. An Azure subscription's value can be greatly reduced by overcommitting resources to VMs and continuing to pay for unused resources. Therefore, monitoring must also focus on comparing resource usage versus allocation levels, so administrators can be alerted to situations when the Azure VMs are oversized for the workload being supported.

Built-In Monitoring Support for Citrix Cloud Services

There is no lack of monitoring options for Citrix Cloud deployments:

- **For Citrix Cloud**, the Citrix Global Operations Team continuously performs monitoring tests from 60+ locations around the world. These include testing cloud-hosted StoreFront availability, Broker XML Services, customer site availability (session launch, access to Studio and Director within Citrix Cloud, etc.). Connectivity to the Citrix-hosted infrastructure

through Citrix Connectors can be monitored via the Citrix Cloud interface itself. Citrix Director is also available for Citrix Cloud customers to track the performance of Citrix brokering services and to view Citrix session activity.

- **For your on-premises/public cloud infrastructure** hosting XenApp servers and XenDesktop VMs, the Citrix Management packs for SCOM can be used for monitoring. However, this is only appropriate if you have Microsoft SCOM deployed in your enterprise already. Virtualization tools such as vRealize Operations for VMware, SCVMM for Microsoft Hyper-V, Nutanix Prism for Acropolis and Citrix XenCenter for XenServer can be used for monitoring the virtual infrastructure.

- **For XenApp/XenDesktop Essentials**, the Azure-hosted Citrix environments can be monitored using the Citrix SCOM Management Pack for XenApp and XenDesktop or Citrix Management Solutions for Microsoft Operations Management Suite (OMS). The performance of Windows and Linux VMs hosted on Azure can be monitored using the Azure Diagnostics Extension.

But, the most significant challenge for any organization looking at these options is the lack of a consolidated view of the entire infrastructure from a single console. With several different consoles, problem diagnosis is manual, cumbersome, and time-consuming. Often, experts are needed to analyze and correlate the metrics reported from the different tools. And as a result, mean time to repair is high.

THE MULTIPLE MONITORING TOOL CHALLENGE

Figure 3: Using multiple monitoring tools for performance monitoring is challenging

eG Enterprise: Integrated, End-to-End Performance Monitoring for Citrix Cloud Services

eG Enterprise is a comprehensive performance management platform that offers a single pane of glass to monitor the performance of all forms of Citrix cloud deployments: both Citrix Cloud and Citrix XenApp/XenDesktop Essentials. From a unified web console, administrators can get visibility into the control plane managed in the Citrix Cloud, as well as monitor every tier of the resource plane running on-premises or hosted in the public cloud. eG Enterprise monitors all critical aspects of the Citrix user experience, and helps quickly diagnose the cause of slowness, pinpoint bottlenecks, locate resource constraints, and analyze historical trends. Using intuitive topology maps, eG Enterprise allows administrators to easily visualize interdependencies between the control plane, the Cloud Connector, components in the resource plane, and the supporting on-premises/cloud infrastructure for root cause diagnosis.

Citrix logon simulation: The built-in Citrix logon simulator in eG Enterprise can be used to test if the entire Citrix delivery stream is working as expected. Citrix logon functions properly only when all components of the Citrix setup in the cloud and enterprise datacenter are working in concert. Using synthetic simulations of user logon scenarios, Citrix admins can test if a Citrix session can be established and published applications/desktops are available and launched quickly.

Figure 4: Simulate and monitor every step of the Citrix logon process

eG Enterprise's Monitoring Support for Citrix Cloud Deployments

Citrix-Hosted Cloud Infrastructure
(Control Plane)

- Delivery Controller
- StoreFront*
- NetScaler Gateway*
- License Server*
- Database*

Not monitored by eG Enterprise currently

Customer/CSP Infrastructure
(Resource Plane + Infra Services)

- XenApp servers (physical or virtual)
- XenDesktop VMs
- Cloud Connector
- Infra services (AD, DHCP, DNS, etc.)
- Hypervisor platform
- Network
- Storage

Microsoft Azure Infrastructure
(Resource Plane)

- XenApp server (on Azure VM)
- XenDesktop VMs
- Active Directory
- Azure services, resources

Citrix User Experience Monitoring

- Session start-up details
- Session performance
- Screen refresh, client network, Framehawk latencies
- Application and desktop launch
- Resource utilization
- HDX bandwidth

Automatic Root Cause Diagnosis

- Automated service-level topology
- Infrastructure dependency mapping
- Built-in correlative intelligence
- Anomaly detection and root cause analysis
- Auto-baselines through machine learning

Analytics and Reporting

- Capacity planning
- Historical data analytics
- Predictive intelligence
- Actionable insights and recommendations
- Compliance reporting

Figure 5: How eG Enterprise monitors cloud-based Citrix deployments

The logon simulator can also be used to benchmark Citrix logon performance in the cloud, and continuously test from various locations to ensure seamless connectivity for users accessing from different places, at different times.

Monitoring all aspects of real user experience: eG Enterprise provides deep visibility of Citrix user experience for XenApp and XenDesktop sessions in real time.

- Track real user experience, session start-up and disconnects

- Identify which step of user logon is taking too much time to execute: user profile loading, GPO processing, authentication, etc.

- Monitor all key ICA virtual channel metrics including screen refresh latency, client network latency, Framehawk latency, HDX bandwidth, line speed, and more

- Capture the time taken for every application launch and report on slowness

Figure 6: Monitoring Citrix ICA virtual channels

End-to-end visibility of every Citrix tier in the resource plane: eG Enterprise simplifies performance troubleshooting for cloud-hosted Citrix deployments. Providing out-of-the-box monitoring models for Citrix components including XenApp Server, XenDesktop VMs, and PVS, eG Enterprise allows administrators to track resource consumption, errors, usage patterns, and bottlenecks from a single dashboard.

Performance visibility of the control plane: eG Enterprise provides performance monitoring of the Citrix Delivery Controller hosted in the control plane. Leveraging

Figure 7: Monitoring every layer of the Citrix application

the APIs provided by Citrix, eG Enterprise captures key performance metrics from the cloud Delivery Controller and delivers them in purpose-built monitoring dashboards.

Monitoring the Citrix Cloud Connector: eG Enterprise also monitors the Cloud Connector service and the Windows Servers where this Cloud Connector is installed in the resource plane. As mentioned earlier, Cloud Connectors can be deployed in pairs for fault tolerance. There can be any number of Cloud Connectors deployed in the resource plane for load balancing. eG Enterprise monitors all the Cloud Connectors and instantly alerts admins about performance problems and service disruptions.

Automated dependency mapping and root cause diagnosis: eG Enterprise automatically correlates Citrix performance in the resource plane and control plane with that of the supporting tiers in the on-premises data center (network, AD, etc.) and the public cloud infrastructure (Azure, AWS, etc.) allowing Citrix admins to easily pinpoint the root cause of Citrix slowness. A service-level topology map helps visualize the entire Citrix delivery infrastructure and identify how a performance bottleneck in one tier affects other dependent tiers.
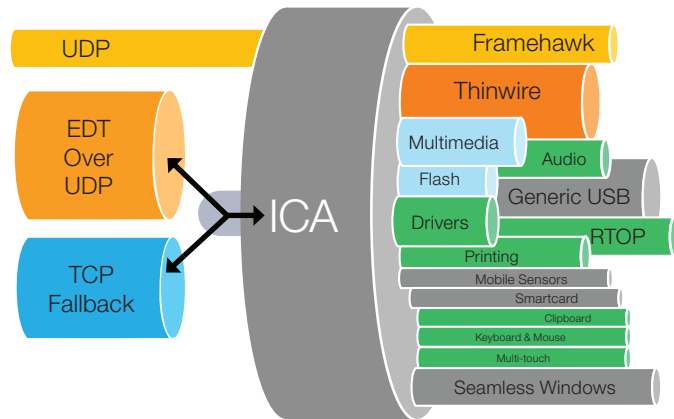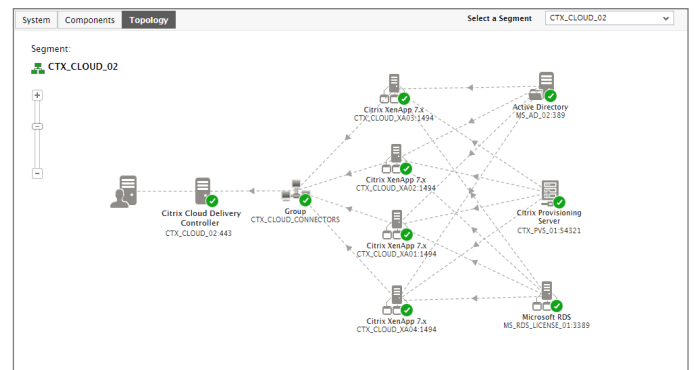

Figure 8: Topology view of Citrix Cloud deployment

Out-of-the-box Microsoft Azure Cloud Monitoring: eG Enterprise has pre-built dashboards to monitor workloads in a Microsoft Azure cloud infrastructure. It leverages Azure APIs to gather in-depth performance diagnostics and tracks the health of critical Azure services such as virtual machines, cloud services, storage, SQL databases, applications, resource groups, and more. eG Enterprise can discover XenApp Servers and XenDesktop VMs in Azure cloud and monitor their performance extensively, allowing Citrix admins to quickly discern where the problem is – in Azure infrastructure or the hosted Citrix applications.
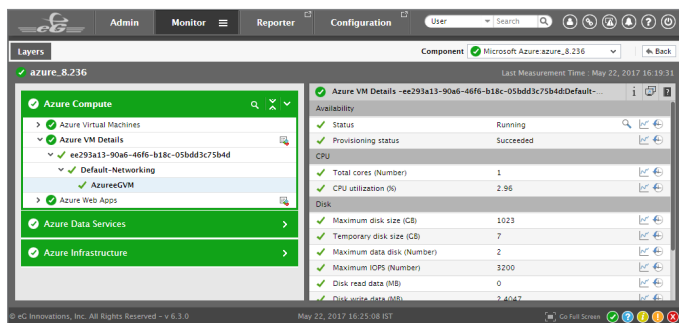
Figure 9: Deep diagnostics of Microsoft Azure infrastructure

Analytics and actionable insights: Using eG Enterprise's out-of-the-box capacity planning reports and predictive analytics, administrators can examine resource usage trends, and forecast how long existing resources will last and when to scale up cloud resources/VMs, helping them optimize cloud costs. eG Enterprise is available as a hosted service, which makes it easy for the Citrix admins to use it in tandem with their Citrix Cloud or Azure Cloud setup.

Conclusion

Cloud adoption is rapidly changing the IT landscape. As enterprises adopt Citrix services from the cloud, comprehensive performance monitoring and management will remain a priority for Citrix customers. Moreover, the inclusion of multiple domains of operation and control make performance management even more challenging. To effectively manage these increasingly complex environments, organizations need centralized and correlated visibility into all aspects of Citrix performance and user experience. eG Enterprise from eG Innovations provides this single-pane-of-glass insight, helping admins ensure successful deployments and a great user experience, every time.

Note:

eG Enterprise monitors all the Citrix tiers (XenApp Servers, XenDesktop VDAs, etc.) in the resource plane and the Citrix Cloud Connector.

For the Citrix-hosted infrastructure in the control plane, eG Enterprise currently monitors only the cloud-hosted Citrix Delivery Controller. For the other tiers such as StoreFront, NetScaler, License Server, etc., Citrix has not yet exposed the APIs for third-party vendors to collect metrics from the components in Citrix's control plane. As a result, administrators must rely on Citrix Director (available as part of Citrix Cloud) for monitoring these components.

Since eG Enterprise includes built-in support to monitor the Azure cloud infrastructure and the resource plane infrastructure (including XenApp server, XenDesktop VMs, PVS, AD, etc), the best approach for end-to-end monitoring is to use Citrix Director (for the control plane) in conjunction with eG Enterprise (for the resource plane, Cloud Connector, the Azure infrastructure, and any other supporting infra services).

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eG Enterprise for
Citrix Monitoring
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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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