

nGeniusONE Platform for Citrix in Healthcare Organizations

Healthcare IT technology continues to innovate, advance and mature as it takes a more patient-care centric approach to delivering healthcare services. Prompt, secure, cost-effective access to patient electronic medical records (EMRs), imaging services, and test results for collaboration with specialists and/or communication with patients is part of the daily activities in hospitals and clinics today. Citrix solutions are widely deployed in leading healthcare providers' IT environments to deliver unparalleled access, securely, to patient information and all the applications necessary to treat patients, using any device, from any location, for any healthcare organization.

Citrix service elements such as the XenApp® and XenDesktop® are broadly used as part of the infrastructure that enables doctors to carry tablets between patient rooms or update patient treatment instructions from home laptops. Citrix services are deployed as part of a broader IT environment that includes network infrastructure, EMR and imaging application servers, backend databases,

and service enablers such as DNS, DHCP, RADIUS and Active Directory®. The impact of degradations or outages in accessing patient information can mean delays in administering treatment or worse. With so many possible areas that could contribute to performance degradations, IT teams need a robust triage, network and application service assurance solution capable of isolating faults rapidly across multiple domains.

The nGeniusONE® platform provides real-time analysis for visibility of both patient care and business application traffic flows throughout the network. nGeniusONE is powered by Adaptive Service Intelligence™ (ASI), a patented highly scalable deep packet inspection engine that leverages rich traffic-flow data for extracting key performance metrics from across all the service domains. nGeniusONE helps to quickly triage performance issues impacting Citrix-based services, providing significant reductions in mean time to repair (MTTR) as well as in mean time to innocence (MTTI) by proving the problem is NOT the Citrix environment.

Benefits of nGeniusONE Solution for Citrix-based Healthcare Services

Many of the world's largest healthcare organizations rely on nGeniusONE to deliver end-to-end visibility into the performance of their integrated, Citrix-enabled, application environments that typically include XenApp, and XenDesktop. nGeniusONE uncovers the full context of service anomalies across all layers which may be contributing to slow application response times and poor user experience of their patient care and business services including:

- **Reduce time to pinpoint source of slow logins** – By providing metrics on response times, bandwidth availability, DNS activity and user authentication, clinicians in one medical building connecting to hospital resources in a data center can be optimized for best performance.
- **Triage disconnected sessions rapidly** – Through analysis of network connectivity between users and servers, root cause of issues can be determined to establish if it is part of the Citrix service, a network component or a specific application server causing the problem.
- **Improve analysis of EMR, imaging services or e-prescription application slowness** – Tracking session details and response times for application servers, XenApp/XenDesktop resources, and storage enables rapid identification of cause for quick restoral of services.
- **Improve analysis of global DNS environments** – As Citrix services heavily depend on the efficient operation of DNS service, breakdowns and views of poorly performing servers that include associated error codes or latency issues will help reduce time to resolve degradations.

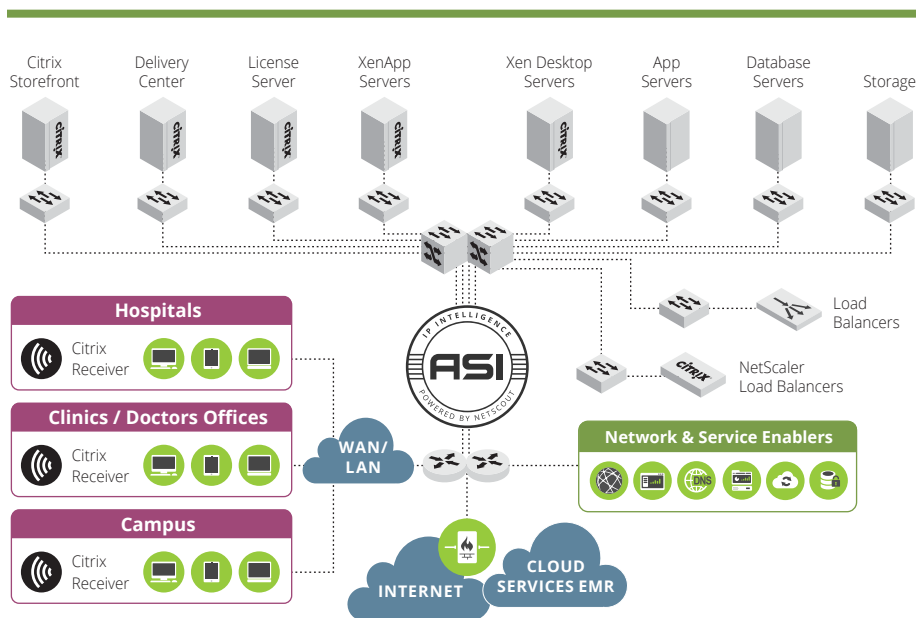


Figure 1: The nGeniusONE platform supports Healthcare services that depend on Citrix NetScaler, Storefront Web Tier, XenApp Application tier, Database MS SQL, service enablers, and network tier performance analytics for end-to-end service delivery assurance and management.

Support for Citrix Services

In order to help IT teams resolve poor user experience issues, nGeniusONE relies on the power of ASI.

Through continuous monitoring of application traffic in the healthcare environment, including the protocols used by Citrix such as, ICA/CGP, TLS/SSL, and HTTP, ASI data enables nGeniusONE to provide a holistic

view into the performance of traffic between components that could potentially cause Citrix performance problems.

This highly structured data provides operational insights and visibility into the potential causes for degradations impacting Citrix-based services, including which servers are delivering services to which users; if servers are over-burdened; what the responsiveness is for each server; which communities of users are most impacted by an issue; what errors are being generated; and the behavior of other applications and protocols running over the same infrastructure that may be affecting network performance.

The effect in healthcare environments, where dependence on Citrix-enabled services is high for doctors and nurses that are constantly updating and/or verifying patient information, is that the nGeniusONE platform ultimately improves triage and reduces MTTR with the ability to:

- Identify the cause of failed logins due to a privileges misconfiguration in Active Directory or DHCP.
- Isolate a widespread slowdown in Citrix-based services caused by problems with a load balancer or due to incorrect DNS configuration.
- Discover if the source of keyboard lag and application freezes are due to underpowered XenApp or Virtual Desktop servers.
- Pinpoint if a Citrix service degradation in a regional office is the result of network congestion over the remote WAN links or incorrect QoS settings.
- Investigate if the source of a slow Citrix application has nothing to do with Citrix and is actually due to a component in a back end tier such as slow database server or application server.

With a consistent set of service-oriented workflows, the nGeniusONE platform enables seamless, contextual transitioning across multiple layers of analysis. This facilitates efficient and informed hand-off of incident response tasks across the different IT groups involved in delivery of an application from one end to the other.

The nGeniusONE platform streamlines performance management for Citrix-enabled healthcare services by providing the following key analysis layers:

- **Service dashboard** – The dashboard delivers health status, metrics, alarms, and intelligent early warning of activity and issues impacting Citrix-based EMR and collaboration services. IT teams can use this to quickly spot performance issues related to a variety of elements necessary to deliver a holistic service in a single view for the front end (client to NetScaler® and Storefront™), and back end (including XenApp, XenDesktop, licensing, database servers), as well as other elements throughout the healthcare enterprise.
- **Service dependency map** – The service dependency map visualizes the current state of the Citrix service and application environment with discovery and mapping of client - server relationships to provide visibility into the dependencies among various components throughout the healthcare network.
- **Service monitor** – Comprehensive analysis of Citrix transactions is provided through service monitors that track and display successes and failures, latency, retransmissions, and response times to identify the root cause of Citrix-impacting performance issues. IT teams in healthcare organizations will leverage universal and application-specific service monitors for holistic visibility of packet-flow traffic to Citrix XenApp, Storefront, and license servers, as well as ability to focus analysis on the affected user communities such as a one medical building.
- **Session analysis** – Session-level analysis provides ladder diagrams with hop-by-hop analysis of message exchanges between clients and Citrix servers. This helps IT teams evaluate transaction latencies, network statistics, average round trip time, the number of TCP retransmissions and timeouts, as well as detailed session and traffic-flow information.

- **Packet analysis** – Using packet analysis, IT teams gain deep-dive visibility into Citrix-based services for protocol level analysis and forensic evidence collection.

For many healthcare organizations, a majority of Citrix-impacting performance issues can be efficiently triaged by using the dashboard and service monitor screens specifically. However, should deep dive troubleshooting be required, IT teams can drill down further to session and packet analysis layers.

Benefits of nGeniusONE for Citrix in Healthcare Environments

- **Quickly and efficiently triage Citrix-based healthcare service degradations** – Comprehensive service delivery platform covers the multi-layer Citrix XenApp and Xen Desktop environments including the hardware, access, resource and control layers so IT teams can efficiently pinpoint root cause of performance issues and reduce MTTR.
- **Protect patient-care user experience** – The passive packet-flow monitoring methodology helps IT teams rapidly troubleshoot problems with Citrix-enabled, patient-impacting application services.
- **Improve IT team collaboration** – Using the common nGeniusONE workflows across all application tiers, the platform improves mean time to knowledge across all aspects of the healthcare service delivery chain including the Citrix layer. The Citrix team can quickly visualize if it is their issues, or better still, if it is another aspect of the service, and they can provide the evidence to the other teams (network, server, application) to help fix the issues.
- **Reduce monitoring and vendor management complexities and costs** – Combined visibility of data, voice, and video for service assurance in the single nGeniusONE platform helps healthcare organizations optimize the performance of a converged IP network while simultaneously reducing OPEX and CAPEX costs with a complete solution.

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