nGeniusONE

Service Assurance Platform

Highlights

- One platform supports data, voice and video services with multi-dimensional reporting and data analytics capabilities
- Scalable, distributed architecture for large geographically distributed deployments, supporting hundreds of locations, millions of subscribers and billions of transactions
- Supports comprehensive range of service provider production environments including mobile, fixed line voice, business services, residential triple-play, satellite and cable/MSO networks
- Supports a wide range of network intelligence use cases ranging from service and network assurance, to optimization, and user experience management initiatives enabling the consolidation of management platforms and probes
- Real-time Service Dashboard provides service visualization with Intelligent Early Warning for proactive service delivery management
- Simple, easy-to-use modern workflows with contextual launch points into subscriber data, voice and video session analysis and integrated deep-dive protocol analysis to streamline troubleshooting activities, enabling fast root cause determination
- Future-ready architecture supports emerging technologies including 100 Gigabit interfaces, SDN, NFV initiatives and WebRCS
- Seamless integration with third-party and custom developed Operational Support System (OSS) applications, Big Data and Business Intelligence platforms
- Backwards compatible with nGenius® Service Assurance Solution deployments for investment protection



Product Overview

The nGeniusONE™ Service Assurance platform provides a highly scalable and unified approach to managing service delivery that enables efficient, top-down service assurance and performance management across complex network, service and application tiers. The nGeniusONE platform supports a broad array of service provider network architectures including mobile, wireline, cable/MSO and satellite, and addresses a wide range of services including 2G, 3G and 4G/LTE mobile networks, packet and circuit switched voice, video services, carrier Wi-Fi and fixed broadband services.

The nGeniusONE platform provides a holistic end-to-end view into the performance characteristics of all aspects of data, voice and video service delivery to more effectively manage the performance, availability, quality and the user experience. Optimized for IP services, the nGeniusONE platform provides a single pane of glass with multi-layered analysis capabilities to support a wide range of proactive and reactive service delivery management activities. Top-down modern workflows enable a service-oriented approach to managing networks, services and users, revealing all interactions and dependencies to quickly isolate problems across complex, multi-technology and multi-generational service domains. Enabling the adoption of proactive management, the nGeniusONE platform automates the detection of emerging performance issues impacting service availability, quality and the user experience, and enables the rapid identification, triage and isolation of the root cause of performance problems.

Delivering massive scale that supports very large, distributed nationwide networks, the nGeniusONE platform leverages distributed data collection and analysis without the need for middleware or data aggregation servers. Leveraging the richness of data contained within live network traffic, NetScout's patented Adaptive Service Intelligence™ (ASI) technology analyzes all control and data plane traffic in real time, recognizing and reporting on all data, voice and video services crossing the network enabling highly granular views of network and service performance, availability and quality.

The nGeniusONE platform delivers a comprehensive range of operational intelligence to aid in optimization and planning, supporting activities such as capacity planning, new service and device rollouts, and helps in determining and validating policy definitions. With its deep view into all user actions, devices and service consumption, the nGeniusONE platform provides rich insight into the user experience through direct reporting from the platform, or through the export of network intelligence data to third-party business intelligence platforms, allowing service providers to consolidate management tools, lower capex and achieve better investment leverage.

Product Capabilities

- Single performance management platform supports multi-technology, multi-service networks for data, voice and video services
- Comprehensive voice services monitoring for legacy circuit switched voice, such as PSTN and SS7 networks and next-generation packet switched voice such as SIGTRAN, VoIP/IMS, and VoLTE technologies
- Real-time correlated data plane and control plane monitoring and analysis for IP and TDM traffic with response-time metrics for virtually all data plane applications and control traffic types
- Unified analysis architecture provides multi-layer analysis capabilities with contextual drilldown from high-level service views to comprehensive session and packet-level analysis
- Modern, service-oriented workflow supports proactive and reactive management activities to quickly identify, triage and resolve performance incidents
- Any device, anywhere access with HTML5-based analysis console
- Integral real-time Service Dashboard visualizes key services and provides automated anomaly detection for intelligent early warning of emerging performance problems
- Session-level analysis with hop-by-hop session and call trace for data, voice and video services
- Advanced protocol analysis with distributed processing to scale analysis velocity
- Real-time and historical analysis and reporting capabilities support SLA management and optimization and planning activities
- Multi-dimensional data analytics supports insight to user experience with extensive operational and executive reporting capabilities

Supports Multiple Operational Groups and Uses

The nGeniusONE platform delivers extensive operational intelligence supporting multiple operational needs for various groups within the service provider's organization. Leveraging a single data source and common data set, the nGeniusONE platform dynamically mines rich packet-flow data to support a broad range of activities benefiting network operations, planning and engineering, marketing, customer care and executive staff. Examples of operational intelligence use cases include:

- **Service and Network Assurance** – manage availability and quality of network and delivered services, reactive and proactive management, technology interoperability, new technology deployments, market turn-up, real-time and historical reporting, investigate customer complaints, and manage premium service experiences
- **Optimization and Planning** – optimize network infrastructure, forecast capacity, regain capacity without additional spend, eliminate sources of messaging overhead and retransmission that consume capacity, and understand OTT traffic patterns and impact
- **User Experience Management** – deep understanding and insight into user experience, service usage and behavior and device and handset performance, track usage trends for premium service, internet traffic and OTT services, identify new service opportunities, segment subscriber activities, manage new service and device roll-outs, and identify subscribers at risk of churning
- **Executive Reporting** – technology and business-focused reports and metrics improves knowledge and strengthen decision making; report on performance and service levels delivered per market, by subscriber class, types of devices or specific services; track success of a new market turn-up, and monitor the progression of a new service rollout

Distributed Network Visibility Powered by Adaptive Service Intelligence (ASI)

The foundation of the nGeniusONE monitoring architecture is the InfiniStream® appliance, which is deployed at critical links and key traffic aggregation points in:

- the network core,
- the data center, and
- at access portions of the service delivery network.

The InfiniStream appliance uses ASI technology to continuously monitor, captures and analyzes both data and control plane traffic crossing the link to deliver rich traffic flow analysis, as well as capture native network packets to local storage for forensic analysis.

Each InfiniStream appliance is powered by NetScout's ASI engine delivering multi-service, multi-protocol metrics to the nGeniusONE platform. ASI technology performs real-time granular data mining of all network traffic as it crosses the wire, and generates unique service-oriented metadata.

For network operators, in addition to Key Performance Indicators, ASI provides the analysis granularity required to extract rich network, service- and user-related metrics on devices, subscribers, base station ID, Location Area (LA), Routing Area (RA), QoS, SITE, Access Point Name (APN), Tracking Area Code (TAC), and VLAN. In addition, mobility and session management performance can be tracked, including handover and Inter-RAT performance between different generations of mobile networks.

The nGeniusONE monitoring architecture leverages a distributed processing data collection model, with each InfiniStream appliance performing all analysis activities locally and only sending necessary metadata to the nGeniusONE analytics platform as needed. The combination of the distributed analysis architecture and the ASI engine enables massive scale to support large, distributed service delivery environments with hundreds of geographic locations, millions of subscribers, thousands of services and billions of transactions.

InfiniStream Appliance	4500 Series	6900 Series	7900 Series
Dimension	1 RU	3 RU	3 RU
Port configuration	4 x 1 GbE | or 4 x 10 GbE	8 x 1 GbE or 4 x 10 GbE	2 x 10 Gbe or 4 x 10 GbE or 2 x 10 GbE and 4 x 1 GbE
Storage	12 TB standard; expandable to 60 TB	8 TB and 16 TB	48 TB standard; expandable to 144 TB

Figure 1: InfiniStream appliance family supports multiple interface and storage capacity options.

NetScout's ASI technology provides two unique types of metadata:

- Adaptive Service Intelligence (ASI) – contains unique metadata that that consists of metrics and dimensions and provides a comprehensive view of service, network, application, server performance and user experience.

  The key metrics derived from ASI data include KPIs, Key Traffic Indicators, Key Server Indicators and Key Error Indicators, traffic volumes, response times, throughputs, and aggregate error counts. ASI also provides key user experience metrics, for example, success/failure, latency, response time distributions, packet loss, Jitter, and MOS.

  In addition, ASI data can be dimensioned by cell tower, device type, access point, server, or application to provide focused insight and understanding of user experience.

  The dynamic nature of ASI technology enables support for growing traffic volumes and increasingly complex user session transactions. ASI technology is future-ready to support next-generation services such as Web-RCS, Adaptive Video and the monitoring of emerging technologies such as Software Defined Networks (SDN), Network Function Virtualization (NFV), server virtualization, and IPv6. In addition, ASI technology is a critical enabler to support next-generation network speeds by overcoming the physical limitations associated with recording and analyzing packet-flow from 40 and 100 Gigabit high¬speed network links, and a small hardware footprint reduces the requirements for power and cooling help organization achieve their "green" initiatives.

Broad Application and Service Recognition

nGeniusONE provides extensive recognition for thousands of networks, services, applications, user devices and protocols out of the box. Virtually any application or service can be supported through user-defined criteria such as protocols, port ranges or source IP addresses. Flexible configuration options allow the definition of dynamic or static applications such as Web-based or custom applications and user-defined URL grouping allowing system users to logically organize traffic for analysis. In cases where services are inter-dependent on multiple applications, such as multi-tier cloud services, third-party services, or applications that cross multiple data centers, traffic metrics can be aggregated into a single application group with each element of the service shown in context to better expose the impact of interrelationships and protocol dependencies on overall service delivery. Examples of application and service-level visibility provided by the nGeniusONE platform include:

- Identification of applications by IP addresses, URL, protocols and ports
- HTTP and other well-known applications running on random ports
- Web applications based on content-type, referrer, user-agent, long URLs, etc.
- User-defined, custom-developed applications
- Virtualized applications and server environments
- Complex applications using port ranging or port hopping
- VoIP and IP media protocols and applications
- Over-the-top applications and services
- Website categorization – gaming, education, etc.
- Message types for service identification (registration, authentication, policy)
- Video streaming, adaptive video and multicast
- HTTPS decryption and SSL header metrics
- Voice sessions including IMS support

Flexible Service Hierarchy

The nGeniusONE platform offers maximum flexibility in defining the service monitoring environment. Flexible user-defined service domains enable operational teams to create views that dynamically align with how services are delivered and the specific areas needed to be monitored. Domains are constructed based upon physical and logical attributes such as a specific protocol or service, specific procedure calls, physical site, logical service groupings, or geographic regions. This allows for an optimal customized view into end-to-end service delivery that meets the need of the particular user group.

Comprehensive Performance Metrics

The nGeniusONE platform tracks all aspects of service delivery, spanning network access, session establishment and service invocation, providing granular insight into the network and service performance from multiple dimensions, including:

- **Service and Network Accessibility** – measuring how successful the network is establishing connections to the end-user device and provides performance visibility for specific protocol messages types related to the attach/registration, authentication, paging, handover, and service methods

- **Service Availability and Retainability** – measuring how well the connections are maintained and provide visibility into the number of sessions dropped, number of short duration sessions, failed sessions, reason for failure, and error and cause codes to indicate the reason for failure
- **Service Integrity** – measuring service integrity and the quality of connections and links providing information such as network efficiency ratio, QoS, QCI for voice and signaling in LTE, voice quality and MOS, jitter, packet loss, and 802.1P markings
- **Service Performance** – measuring throughput, number of active subscribers and sessions, types of sessions, subscriber, device, application and location
- **Mobile dimensions** – measuring unique metrics for mobile networks including location, device, APN, OEM technology, roaming, handovers, location updates, VoLTE and CSFB

Integrated Analysis Architecture Enables Modern Service-Oriented Workflows

The nGeniusONE platform unifies multiple analysis views into a single pane of glass providing an integrated analysis architecture that simplifies and streamlines performance management activities. The modern, top-down focused approach enables end-to-end analysis that supports proactive or reactive workflows for granular problem identification, enabling system users to quickly move from identify, to triage, to resolve. High-level to deep-dive views reveal service topology and identify impacted components to identify which service and/or which element is impacting which users.

The seamless performance analysis layers of the nGeniusONE platform allow users to visualize the entire service delivery environment, incorporating network, services and users, on a national, regional, market or more granular basis. Leveraging a common set of underlying data, the workflows are optimized for analyzing IP service delivery, and enable service providers to simplify analysis activities while consolidating tools, improving knowledge and enhancing cross-organizational collaboration.

The nGeniusONE platform analysis layers include:

Real-Time Service Dashboard

The top-level Service Dashboard automates real-time visibility into the overall service delivery environment in an intuitive, easy-to-navigate format. A user-defined hierarchical view simplifies end-to-end visualization of the operating environment that can be organized to meet specific operational requirements. The nGeniusONE Service Dashboard provides high-level status summaries and topology maps that show the health of services, networks and enablers in real time. Intelligent automated analytics enable Intelligent Early Warning capabilities automate the detection of emerging issues enabling system users to quickly and proactively detect and locate performance and availability issues.

Network and Service Performance Analysis

The performance analysis layer supports detailed network and service performance analysis activities with correlated views of performance indicators of the signaling, bearer and enabler components from access, core, and service networks. The nGeniusONE platform presents performance metrics including traffic volume, packet integrity and service utilization, from the user device through the service network. System users can analyze top applications, services, traffic volumes and link utilization for each application traversing a specific monitored link. Specific protocol messages, errors, volume, and latencies are reported, and for mobile carriers, visibility also includes insight into handovers and mobility between different generation networks such as 3G and 4G/LTE.

Service and Traffic Monitors are specialized applets contained within the nGeniusONE platform Performance Analysis layer that facilitate visibility into the voice, video, and data session performance. The nGeniusONE platform offers both pre-defined and user-defined Service Monitors for mobile, fixed, and cable/MSO operators to support the analysis of any application, service or network protocol. Pre-defined Service Monitors, such as PDN Connection Monitor, Network Access Monitor, Cable Modem Monitor, and Subscriber Throughput Monitor are available for analyzing data services, and Voice Session Monitor, Circuit Switched Mobility Monitor, Circuit Switched Call Monitor, and Circuit Switched SMS Monitor are available for analyzing voice services. Custom Service Monitors can be constructed by system users' on-demand to meet a wide range of unique monitoring and analysis requirements.

Data, Voice and Video Session Analysis

For in-depth troubleshooting of service issues, the Session Analysis layer enables session tracing revealing a contextual hop-by-hop view of a specific user session. Leveraging ASI metadata, nGeniusONE intelligently correlates multiprotocol, multi-tier, multi-hop subscriber session information and displays all transactions in an end-to-end view. The standard Session Analysis capabilities of the nGeniusONE platform are ideally suited to support data center and cloud application services supporting next-generation Application Performance Management (APM) activities. The optional specialized nGenius Subscriber Intelligence module supports subscriber data session and voice session analysis for legacy Circuit Switched and next-generation Packet Switched voice networks. The nGeniusONE platform and this specialized session tracing module provides extensive support for a wide range of voice services including VoIP, VoLTE, CSFB, PSTN and SIGTRAN subscriber session analysis. The optional nGenius session analysis module leverages the same ASI data set and integrates seamlessly into the nGeniusONE platform analysis workflow.

Deep-Dive Packet Analysis

The nGeniusONE platform seamlessly integrates deep-dive packet and protocol analysis capabilities into the analysis workflow. Within the nGeniusONE platform console, users can either directly access the packet analysis layer, or may contextually drill down into the packet layer for deep-dive analysis or to collect forensic evidence. When accessing packet analysis from within a specific higher level analysis view such as Session Analysis, the nGeniusONE workflow brings the user directly to the relevant packets based upon the data being analyzed, speeding analysis time and reduce the processing burden on the system. To further improve performance, all packet decoding and analysis is performed locally in the InfiniStream appliance so only the decoded results are sent back to the nGeniusONE console, eliminating unnecessary network traffic.

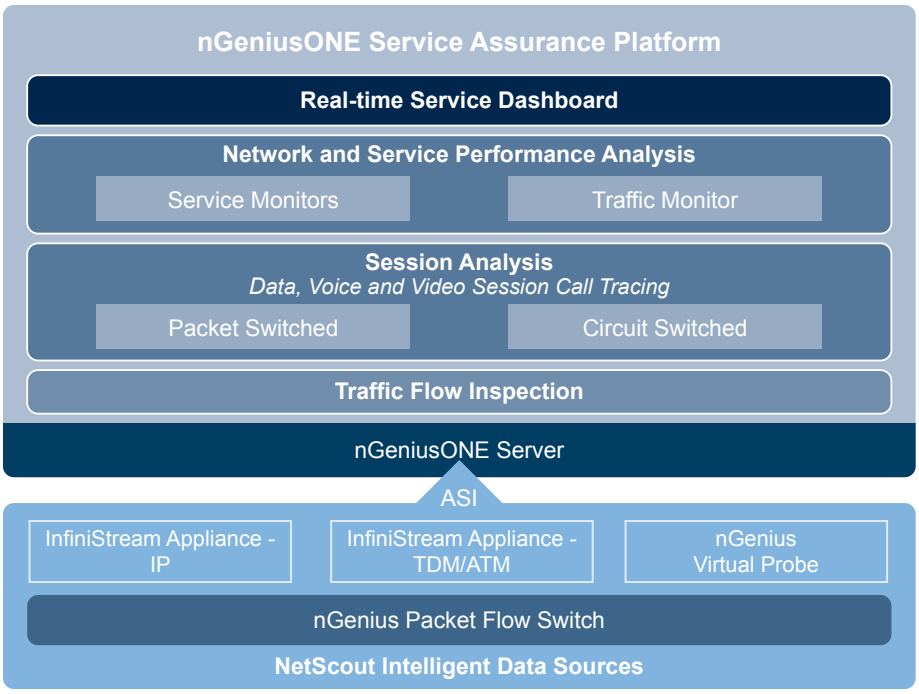


Figure 2: The nGeniusONE platform supports performance management of data, voice, and video services in a single platform to deliver correlated metrics and simplified workflows that dramatically streamline service management activities.

Intelligent Early Warning Detects Emerging Problems

The nGeniusONE Service Dashboard automates the early recognition of unfavorable service conditions as they occur with Intelligent Early Warning indicators that highlight emerging performance issues from across the service delivery environment. Notifications of impending problems generated through a combination of automated detection of anomalous service behavior and threshold crossings of KPIs, KTIs, KSIs and KEIs, and other dimensions including the rising and falling link and service volumes, service or application transaction failures, service enabler performance and errors and overall service and network responsiveness. In addition, availability alarms are triggered when no transactions are observed on certain nodes or when servers are identified as non-responsive. Time-based exclusions can be defined during certain busy hours or specific time intervals to improve alarming accuracy and ensure only relevant alarms are presented.

The predictive early-warning capabilities of the nGeniusONE platform provide the alerts, evidence and contextual information to proactively identify and resolve problems before they escalate into large-scale issues affecting large user populations. From the Service Dashboard, system users can contextually drill down into deeper analysis for granular problem analysis, including the end-to-end visualization of a specific user session associated with the anomalous service behavior. The Intelligent Early Warning notifications provided by nGeniusONE help speed the investigation, triage and diagnosis of service degradations and enable operators to move from a reactive break-fix approach to a proactive service management strategy that enhances operational continuity. nGeniusONE alarms can be forwarded to third-party OSS and management platforms via a RESTful API or SNMP traps.

Multi-Segment, Multi-Technology Session Tracing

The nGeniusONE platform provides correlated control and data plane session-level analysis capabilities for data, voice and video session tracing to help service provider operators analyze transaction-level details to pinpoint the cause of service degradations. Advanced multi-protocol session tracing and deep-dive analysis capabilities for service provider networks are supported through the optional nGenius Subscriber Intelligence analysis module for data sessions and voice analysis for legacy and next-generation IP voice session. Fully integrated with the nGeniusONE platform workflows and leveraging the same ASI metadata, this optional analysis module provides service providers with detailed analysis capabilities unique to subscriber-based environments to provide:

- Correlated hop-by-hop session tracing for data, voice and video sessions
- Support for Circuit Switch and Packet Switched voice services, including PSTN, Circuit Switched Voice, VoIP, VoLTE and IMS-based deployments
- Per-subscriber and per-session granularity with advanced data mining and filtering to focus analysis on sessions of interest
- Contextual control and data plane transactional view of sessions with one-click contextual drill down into deep-dive packet analysis

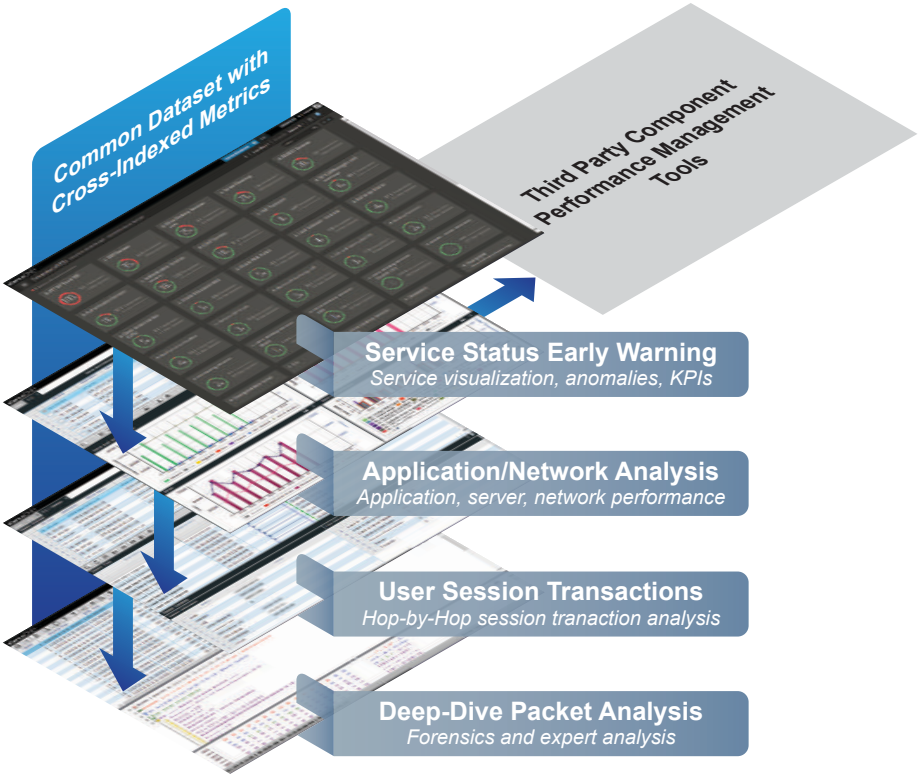


Figure 3: The nGeniusONE platform's top-down modern workflow automates the analysis process enabling a more service-centric and proactive operational model.

Flexible, Service-Oriented Reporting

The nGeniusONE platform provides extensive real-time and historical reporting capabilities to support a wide range of operational tasks from tracking operational performance metrics and dimensions to user and device experience reports for operational and business intelligence reporting workflows. Reports from the nGeniusONE platform can provide quantitative details on cell site, core network, data center or serving office performance, with the flexibility to provide details into service and traffic volumes, performance, latency and congestion, based upon groups of users or specific users, with precise end-device metrics.

Highly flexible any metric, any view reporting supports reporting requirements such as proactive service assurance, optimization and capacity planning, new service rollout, market turn-up performance metrics, policy validation and correlated usage metrics by device, and services consumed. Users can create pre-defined template-based reports on-demand or scheduled on a daily, weekly, or monthly basis, from within any view of the nGeniusONE platform to support specific user or extended audience requirements. Executive-level reports can be generated to provide insight into service performance, service levels and user experience by any number of cross-tabulated metrics.

Reports can be delivered via email as either a URL link or in PDF, CSV or RTF file formats to system users or interested business leads in operations and planning, the CTO office, product management or customer care and support teams. Users with authorized nGeniusONE system access can leverage contextual links to view the underlying metadata and drill through all relevant analysis layers in the platform. Data security and integrity is maintained through robust access controls allowing system administrators to control what data is delivered and access to drill-down metrics. To ensure compliance and support audit trail requirements, automated user activity reporting provides administrators visibility into the number and types of reports being generated and who is viewing them.

Distributed Server Architecture Increases Scalability

The nGeniusONE platform supports the monitoring of highly complex, large-scale and geographically distributed deployments. Benefiting from a distributed data collection and analysis architecture, the nGeniusONE Server can support the collection and correlation of metadata and native packets from any NetScout Intelligent Data Source deployed anywhere in the monitored network. An nGeniusONE Server license can be deployed on physical or virtualized servers and each licensed nGeniusONE Server instance supports up to 50 physical network interfaces. In addition, up to two nGeniusONE Server instances (licenses) can be supported per physical local server device.

For large, multi-server geographically distributed environments, a separately licensed nGeniusONE Global Server can be added to integrate a multi-server deployment, allowing unified access to metrics and data from all nGeniusONE Server instances. Access to data collected in each server instance is fully integrated,

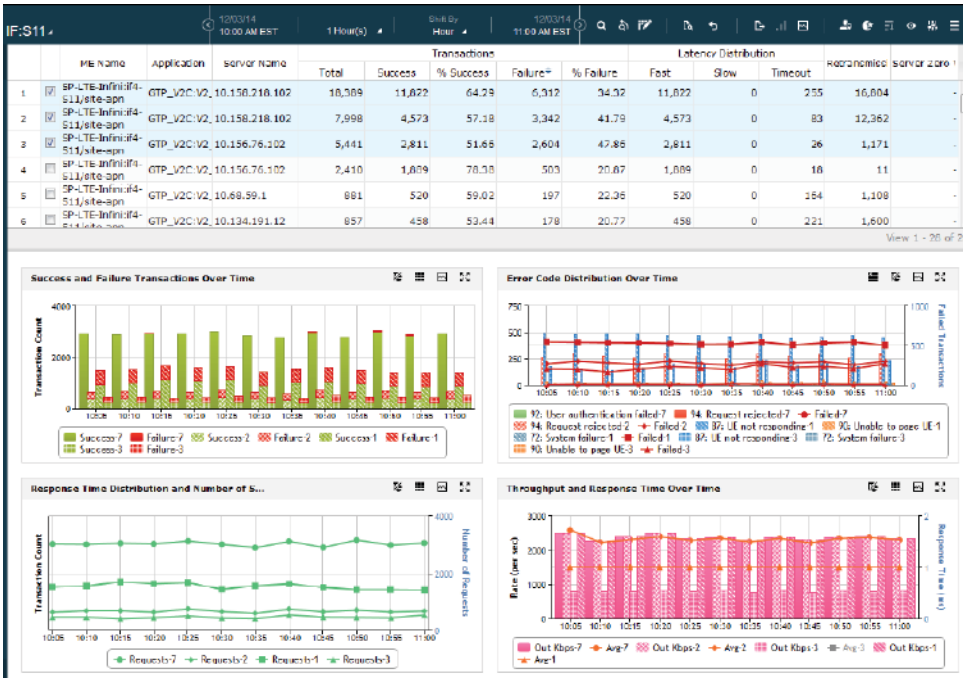


Figure 4: A set of pre-defined and user-defined applets contained within the nGeniusONE platform facilitate analysis of any data, voice, video application, service, or network protocol for mobile, fixed, and cable/MSO operators.

creating a seamlessly unified global analysis environment regardless of the actual number, or location, of the nGeniusONE Server licenses deployed. Supporting highly scalable operational requirements, all roll-up analysis processing takes place on the local nGeniusONE Server assigned to the NetScout Intelligent Data Source, ensuring accuracy, speeding analysis time and reducing network overhead.

Support for Resilient Operations

For resilient operational requirements, nGeniusONE can be deployed in a redundant configuration. When configured for redundant operation, the database in both servers is synchronized in real time so that if the active server fails, operation is switched over to the standby server to rapidly restore functionality. Redundant operation requires a separately licensed nGeniusONE Standby Server which is licensed on a one-to-one basis with the active server.

Secure Role-Based Any Device User Access

The nGeniusONE platform supports access from any HTML5-compatible device and securely controls access to collected metrics and network traffic information through role-based user defined permissions. Granular access rights may be defined on a per-user, per-role and per-group basis, ensuring access to only needed information. Access to specific monitored elements and the ability to access packet-level records can be allowed or restricted, ensuring each user has necessary level of access needed to perform their tasks, while maintaining compliance with data access policies.

The nGeniusONE platform offers six default user roles ranging from read-only to administrator-level access. Default user roles can be customized, and additional customized user roles may be defined as required. Users can be assigned access to multiple roles on either an individual or group basis.

User access controls and authentication is supported through standard mechanisms including TACACS+, LDAP, Radius and Active Directory. The nGeniusONE platform provides a fully searchable audit trail of all user activity and permissions within the system.

Scalable System Administration and Management

Configuration and settings for all NetScout Intelligent Data Sources are centrally managed from the nGeniusONE platform console or nGenius Global Server. To ensure accurate and consistent deployment, configurations and settings can be pushed globally to all data source appliances instead of requiring separate configuration of each appliance. From the Device Configuration view, system users can view firmware version, decode pack versions and device health, update firmware, configure logical monitored element groupings of physical or virtual interfaces, or remotely log into any connected data source appliances. A central database containing all collected metadata and element settings, along with server management settings, system backup configuration, message logging, software updates and user role and access permissions is accessed from this view.

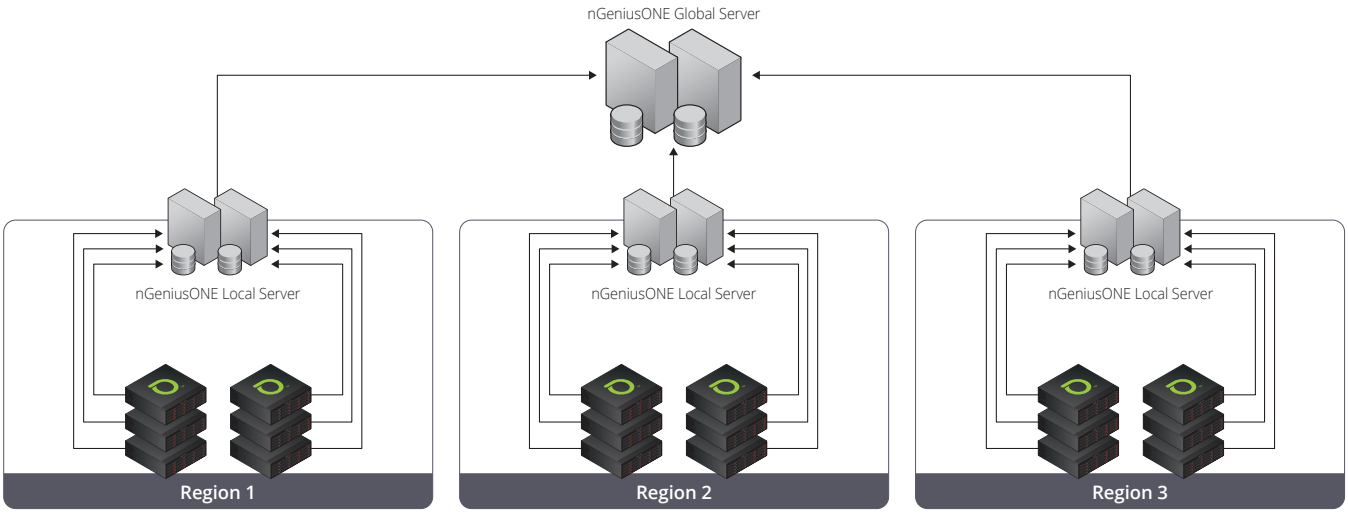


Figure 5: nGeniusONE has a distributed, scalable system architecture which enables unified visibility across mulitiple geographical locations.

System Health Monitoring

The nGeniusONE platform performs a number of automated integrity checking and reporting activities to ensure healthy operation of the platform and enable system administrators to more efficiently manage hardware resource allocation and maintain consistent software versions. These capabilities include advanced usage metrics, system logging and health alarms for the nGeniusONE analytics servers and NetScout Intelligent Data Sources. The nGenius Deployment Database collects and stores operational information about the nGeniusONE platform, including installed software versions of the different nGeniusONE local servers, license summary of all installed nGeniusONE Servers, server time zone, server operating system and NetScout Intelligent Data Source device types. System logs and system performance alarms can be viewed on the system, or forwarded dynamically to a third-party syslog server. nGeniusONE system health alarms are delivered on the Service Dashboard to notify administrators of system performance issues or failures with hardware, raid array, disk space, high memory utilization, excessive processing time, and process restarts within the nGeniusONE platform server or any deployed InfiniStream appliance.

Flexible Licensing Preserves Capex

Licensing for the nGeniusONE platform provides a scalable pay-as-you-grow cost model. Licensing costs are based upon monitored links, so as the monitoring footprint expands, additional interface licenses can be added, enabling the service provider organization to only pay for the monitoring coverage needed. There are no additional licensing costs or requirements based upon monitored protocols, applications, services or numbers of users to be monitored. The nGenius Subscriber Intelligence module is optional and licensed one-to-one in conjunction with the nGeniusONE platform license.

Backwards Compatible with nGenius Service Assurance Solution

The nGeniusONE platform software includes the full analytics suite from the nGenius Service Assurance Solution and leverages most existing InfiniStream appliances already deployed. To support and simplify the migration to the nGeniusONE platform, many of these deployed appliances can be configured to provide data to both the nGeniusONE platform and the earlier generation nGenius Service Assurance Solution analysis modules, enabling side-by-side operation and the leverage of investments in existing monitoring appliances.

Third-Party OSS Integration

The nGeniusONE platform supports out-of-the-box integration with third-party and custom developed OSS and management platforms. Leveraging a RESTful API, nGeniusONE supports two-way communication flows between third-party OSS and security platforms. Different levels of integration are available with more advanced integration including the delivery of nGeniusONE performance alerts passed to select OSS platforms with contextual drill down links embedded. Metrics from the nGeniusONE platform can be exported into a number of big data and Business Intelligence platforms to support broader user experience management activities through API integration and standard SQL queries.

Protocols Supported

The nGeniusONE platform supports analysis of a wide range of mobile and fixed data and voice technologies and protocols. Contact NetScout for a complete list of supported interfaces and protocols. An example of some of the supported protocols and technologies include:

Technology	Interfaces and Protocols
LTE/EPC	Interfaces: Sgi, Gx, S6a, S3, S4, S5, S8, S10, S11, S12, S1-MME, S1-U Control and data plane protocols: GTPv1, GTPv2, S1-AP Non Access Stratum, S1-AP RAB Management, DIAMETER, HTTP, HTTPS, SMTP, POP3, FTP, GRE, IPIP
IMS, VoIP, VoLTE	Interfaces: Gm, Cx, ISC, Mw, Rf, Mn, Sh, Gx, Mb, Mg, Dh, Dx, Ma, Mi, Mj, Mk, Mm, Mx Control and data plane protocols: SIP, H.323, MEGACO/H248, RTP, RTCP, DIAMETER, RADIUS, MGCP
2G/2.5G (GSM/GPRS/EDGE)	Interfaces: GSMA, Internet, Gi, Gn, Gp, Gb, Gs, SGs Control and data plane protocols: SM, GMM, RANAP, GTPv0, GTPv1, DNS, DHCP, RADIUS, LDAP, Diameter, HTTP, HTTPS, SMTP, POP3, MMS, SMPP, FTP, GTPU-V1
UMTS, HSPA, HSPA+	Interfaces: Internet, Gi, Gn, Gp, IuPS, MAP (multiple releases), CAMEL, and IuCS/GSMA Control and data plane protocols: SM, GMM, RANAP, BSSAP, GTPv0, GTPv1, DNS, DHCP, RADIUS, LDAP, DIAMETER, HTTP, HTTPS, SMTP, POP3, MMS, SMPP, FTP, GTPU-V1
CDMA2000, EV-DO	Interfaces: Internet, Pi, PH, AAA, R-P, A01, A11, A12 Control and data plane protocols: MIP, DNS, DHCP, RADIUS, LDAP, Diameter, HTTP, HTTPS, SMTP, POP3, FTP, GRE, IPIP
Voice Quality Monitoring	Non-intrusive quality scoring based on ITU standards with computed Mean Opinion Score (MOS) for RTP, RTCP
SS7	BICC, ISUP, MAP, CAP, AIN, INAP (CS1 and CS2)
SIGTRAN	SCTP, M2PA, M2UA, M3UA, and SUA
Fixed Broadband and Cable	MGCP, SIP, AIN, ISUP, DHCP, TFTP, DNS, LDAP, RADIUS, DIAMETER, HTTP, FTP, EMAIL

Minimum Hardware Requirements

Component	Specification
Operating System	• Red Hat® Enterprise Linux® v6.x 64-bit (English only) • Windows® 2008 R2 x64 - Standard and Enterprise
Processors	Dual 2.4GHz, Quad-Core processors with multithreading support Dual 2.4GHz, Quad-Core processors with multithreading support
Available Operating System Memory	24 GB RAM with swap space equal to twice the capacity of physical memory
File System (Windows platform)	• Minimum 30 GB for the OS partition (if installing nGeniusONE on a second partition) • Virtual memory page file set for system management size • NTFS-formatted hard disk is required
File System (Linux platform)	• Minimum 100 MB for boot partition • Minimum 10 GB for the OS or /root partition
RAID Configuration	RAID 5; Ultra 320 SCSI, SATA, or SAS
Hard Drive Configuration	3 TB
Media Drive	DVD-ROM drive
Network Adapter	One 100/1000 Ethernet adapter
Power Supply Configuration	Dual, redundant power supplies
IP address	Static IP address

Ordering Information

Part Number	Description
5608L-DGM1	nGeniusONE, Dedicated Global Manager Server (Linux) Dedicated Global Manager for distributed server environments. Does not support local device management
9600L-ENT1	nGeniusONE (Linux) Permanent license for use up to 50 Type 1 interfaces and 10,000 Type 2 interfaces
9600L-STB1	nGeniusONE Standby Server (Linux) Permanent license for use up to 50 Type 1 interfaces and 10,000 Type 2 interfaces
9600L-INC1	nGeniusONE – Incremental License (Linux) The Incremental license extends an existing nGeniusONE License by up to an additional 50 Type 1 interfaces and 10,000 Type 2 interfaces
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9600W-STB1	nGeniusONE Standby Server (Windows) Permanent license for use up to 50 Type 1 interfaces and 10,000 Type 2 interfaces
9600W-INC1	nGeniusONE – Incremental License (Windows) The Incremental license extends an existing nGeniusONE License by up to an additional 50 Type 1 interfaces and 10,000 Type 2 interfaces

Subscriber Session Analysis Modules

Part Number	Description
9500W-SUB	nGenius Subscriber Intelligence (Windows) Permanent license for up to 50 Type 1 interfaces
5508L-SUB	nGenius Subscriber Intelligence (Linux) nGenius Subscriber Intelligence pre-installed on a Linux-based server

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