Enabling the IP Transformation:

nGenius Service Assurance Solution

for Service Providers

Overview

Mobile, cable and wireline operators face many difficult challenges in delivering IP-based services to their end users. The following key success factors are common to all operators who have to deal with the complexity of delivering services over modern IP networks:

- Reduce churn and improve top line revenue growth
- Deliver differentiated, highly valued services to existing and new customers
- Seamlessly introduce innovative user devices and appliances that enhance a personalized user experience
- Deliver exceptional user experience and high levels of QoE and QoS
- Optimize operational processes to take advantage of organizational efficiencies and cost reduction made possible by the migration to all-IP networks

The proliferation of IP-based services has transformed the concept of service delivery management for service providers. As more and more services are delivered over IP networks, service assurance strategies are changing from a reactive, network-element alarm focus, to a proactive approach that centers on quality of service and end-to-end performance. This proactive approach has considerable benefits because it better aligns with the workflows operators need to assure user experience at the same time enabling them to more rapidly monetize investments in their existing IP multi-service networks. The nGenius® Service Assurance Solution provides network operators the foundation to address these challenges and better capitalize on the opportunities that come with the transformation to all IP-based networks and services.

Solution: Unified Service Delivery Management

The nGenius Service Assurance Solution is a comprehensive implementation of the NetScout Unified Service Delivery Management framework for service providers. This framework enables operators to optimize, protect and simplify their IP multi-service networks. The various analysis modules and intelligent data sources within the nGenius Service Assurance Solution empower operators with the functionality they need to effectively and efficiently manage subscribers and services in modern IP networks. This includes:

- Intelligent early warning and service visualization
- Service performance management with subscriber context
- Service and policy validation
- Service optimization and capacity planning
- Forensics and historical analysis

The nGenius Service Assurance Solution is comprised of integrated analysis modules coupled with distributed, highly scalable passive monitoring appliances and software agents that can continuously capture, analyze and store packets. Together, they provide a unified solution that helps operators protect the user experience, optimize the delivery of IP based services and simplify their workflows and processes for more efficient use of operational resources and Capex/Opex budgets.
Customer satisfaction has many dimensions, but improving the quality and reliability of a service has a direct impact on the user experience and the customer’s propensity to churn. Service delivery problems over IP networks, whether they involve voice, data, video or an integrated combination of these applications, can occur in mobile, fixed and cable MSO networks at multiple points in the service delivery architecture. IP services consist of a complex interaction of application, session and transport layer protocols that operate in concert across multiple hops and network elements from the data center, to the core, and out to the access portions of the network. Understanding this complex interaction of IP protocols and all of the “moving parts” required to deliver a service is challenging for even the most skilled technical teams.

The service delivery supply chain encompasses multiple processes, resources, and network domains both within an operator’s span of control as well as external to it (for example, third party content). Successfully assuring the user experience in today’s IP multi-service networks requires a comprehensive solution that addresses performance challenges seen at various locations within the network and at peering points with other networks which together form the end-to-end service delivery supply chain. This solution needs to include visibility into the performance of the services, applications and the underlying networks that connect users to content and other subscribers. The nGenius Service Assurance Solution empowers service provider teams with the assurance capabilities that they need to confidently manage the delivery of services and more importantly, user experience, in modern IP networks.

Figure 1: The nGenius Service Assurance Solution provides the core capabilities that make up NetScout’s Unified Service Delivery Management framework for all-IP multiservice networks.

nGenius Service Assurance Solution provides the capabilities needed to help operators assure use experience by detecting and resolving problems that impact subscriber, service, application and network performance

Services, Devices, Subscribers, and Content
- Measure and report on service usage
- Packet flow based KPIs and per subscriber session tracing and detail summaries for analyzing and reporting on key services and devices
  - Voice quality, Mobile Broadband, Service Enablers, High Value Services, Smart Phones
- End-to-end service visualization and intelligent early warning

Applications
- Performance monitoring, alarming, on-demand and scheduled reporting
- Response time analysis on applications that comprise services delivered to customers
- Analytics based detection of anomalous application and server behavior

Networks
- Track link utilization and forecast capacity exhaust in the core and access networks
- Detect congestion, load balancing issues and causes of bandwidth spikes,
- Detect and analyze IP transport layer problems
- Identify which element or elements are generating the most delay, most error responses or have the highest congestion and conversations
nGenius Service Delivery Manager

nGenius Service Delivery Manager delivers real-time alarming, event notification and advanced analytics that address the challenges operators have in managing services, networks and subscribers in today’s complex IP networks. nGenius Service Delivery Manager forms the cornerstone of the nGenius Service Assurance solution and enables operators to move away from an inefficient, reactive break-fix service management strategy to a proactive and predictive approach specifically designed for modern IP networks. nGenius Service Delivery Manager provides comprehensive views of end-to-end service health and continuously displays the performance of services and their underlying components in an intuitive, easy to navigate dashboard.

Early warning notifications of impending problems are rapidly identified through KPI threshold crossings, automatic alerting of anomalous service behavior and detection of abnormal traffic. Rich contextual information is automatically generated with each alert and includes service usage over time, error distribution of underlying service enablers and applications, and client and host details for sessions involving errors. nGenius Service Delivery Manager not only identifies what services are affected and where, but also what the problem is and the associated cause. This information is provided in a manner that is more easily understood by a greater number people across operations, engineering and customer care groups by reducing the need to go down to the protocol and packet level to determine the root cause of the problem. This helps increase team efficiency and accelerate the process of triaging complex IP service related issues.

nGenius Service Delivery Manager continuously monitors and automatically establishes baseline thresholds for link utilization, application (including voice over IP metrics) performance and host or server performance. Deviations and abnormalities in a given window of time are detected, assigned a severity and reported automatically. The action-oriented alarms generated provide powerful early warning of performance degradations and potential service delivery meltdowns before they affect subscribers, and they are displayed with actionable context for faster, more accurate problem diagnosis and isolation. This enables operators to move from a reactive break-fix approach to a proactive service management strategy that focuses more effectively on improving the user experience.
nGenius Performance Manager

nGenius Performance Manager enables service providers to reduce the operational complexity of assuring IP based services and gain visibility into the quality of experience that they are delivering to their subscribers. nGenius Performance Manager is a comprehensive, unified performance management solution that provides service providers with unprecedented views into the performance of complex IP service delivery networks. These views include:

- Application and network traffic recognition and monitoring
- Data and control plane visibility
- High definition packet-flow analysis for traffic volume and response time analysis and troubleshooting
- Reporting and capacity planning
- Data, voice, video, and mobility convergence management
- Alarming and event identification
- Packet decode and analysis

nGenius Subscriber Intelligence

nGenius Subscriber Intelligence provides data center-to-core-to-access visibility for analyzing and troubleshooting mobile data sessions in GPRS, UMTS, HSPA+ and CDMA2000 networks. nGenius Subscriber Intelligence provides per session data and control plane, multi-protocol correlated session information and displays it in an intuitive, easy to navigate browser based interface. nGenius Subscriber Intelligence utilizes Extended Data Record (xDR) technology, packet level stream-to-disk storage and a distributed nGenius InfiniStream® appliance architecture to provide unmatched, on demand core-to-access correlation—with subscriber, service, and network context—of both data plane and control plane traffic.

nGenius Subscriber Intelligence takes IP performance management and analysis of mobile networks to the next level by seamlessly integrating session visibility, useful summary details and deep-dive packet and protocol analysis. This enables rapid and more efficient troubleshooting and isolation of IP domain problems in today’s mobile data networks. Key features of the nGenius Subscriber Intelligence application include:

- Flexible filtering to specify completed or failed sessions based on technology specific criteria:
  - Subscriber, handset, network element or IP address, access point name, domain, cell sites, session status, or error code
- Correlated, multiprotocol multi-hop session trace of data and control plane traffic
- Isolation of problem sessions based on location, subscriber and handset

Figure 3: nGenius Performance Manager provides real time application KPIs for managing performance for services such as Blackberry, Multimedia Messaging Service (MMS).
The Sniffer Analysis software suite is included with each nGenius InfiniStream appliance. The InfiniStream Console is a component of the suite that provides a direct-connect interface to the InfiniStream appliance. The massive storage and stream-to-disk capabilities of the nGenius InfiniStream appliances ensure all packets are captured for real time and historical troubleshooting to rapidly isolate problems eliminating the need to try to recreate the event or hope that it happens again.

Sniffer Analysis is well suited for multiservice mobile and fixed IP networks. The integrated protocol and packet analysis features provide unmatched intelligent drill-downs that summarize key statistics of layer two through layer seven performance at the same time exposing byte level detail of the actual packets.

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**Sniffer Analysis**

Sniffer Analysis software makes diagnosing complex problems easier through the use of logical, yet flexible workflows that seamlessly and contextually guide the user from high-level metrics into the depths of the packets. It allows operations staff to perform highly granular protocol analysis, mining and decode of packets captured and stored by nGenius InfiniStream appliances. Sniffer Analysis provides packet forensic analysis features that enhance and simplify troubleshooting. This packet-level analysis helps users quickly pinpoint performance anomalies and isolate root cause enabling operations personnel to rapidly solve the most challenging and complex application and network performance issues.

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**Summary details on session performance, service and application failures, connect latency, error distribution, elements traversed, handset type and subscriber**

**End-to-end service, application and network response times to isolate network versus application response time problems**

**Actionable drill-downs to packet-level protocol analysis**

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**Figure 4: nGenius Subscriber Intelligence provides rapid problem isolation on user experience issues with correlated, multi-protocol, multi-hop views with subscriber, handset and Service Area or Routing Area context.**
nGenius Intelligent Data Sources

The intelligent data sources that make up the nGenius Service Assurance Solution for service providers passively monitor data and control plane traffic at strategic points across the service delivery network. These data sources include software agents and a family of purpose-built hardware appliances that together operate in a unified manner within the nGenius Service Assurance Solution. They create powerful metadata statistics using NetScout technology that includes packet flow based Key Performance Indicators (KPIs) and Extended Data Records (xDRs) to generate information that provides operators with the best insight into the quality of service that their customers are actually experiencing. These NetScout technology innovations, along with the ability to capture and store actual packets, empower service providers with the intelligence needed to manage user experience and solve complex service problems in IP multiservice networks.

The intelligent data source products for service providers include nGenius InfiniStream appliances and nGenius Virtual Agents. nGenius InfiniStream appliances utilize deep packet capture and analysis technology and include high speed interface options up to 10GbE, stream-to-disk capabilities and expandable storage that scales up to 96TB per appliance in only 9 RUs (Rack Units) of space. They are strategically deployed across the network and non-intrusively capture, process and store all monitored packets on a 7x24 basis providing a complete, end-to-end view (data center, core, access, and subscriber) of service performance. The nGenius InfiniStream appliance family consists of the following:

- **6900 Series** — supports major aggregation points in access, core and data center environments
- **7900 Series** — supports the massive amounts of data and control plane traffic in service provider’s network

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![Figure 5: Sniffer Analysis provides remote packet decode and expert protocol analysis.](image)

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![Figure 6: nGenius intelligent data sources provide an extensive array of instrumentation options for modern IP networks.](image)
The breadth of the nGenius InfiniStream appliance family allows operators to instrument their service delivery network in a cost effective manner and optimize performance visibility across multiple technology domains.

nGenius Virtual Agent is a software-based intelligent data source that virtualizes hardware probe technology for deployment within cloud computing environments and extends the visibility of the nGenius Service Assurance Solution deeper into the data center. nGenius Virtual Agent is a self-contained virtual appliance easily deployed and managed. It lives within the virtual server and is contained within a protected and dedicated environment with no impact on other virtual applications. nGenius Virtual Agent automatically discovers all applications and their interdependencies providing visibility for intra-server, inter-server and virtual server to physical server traffic. Like all other intelligent data sources, nGenius Virtual Agent leverages packet-flow CDM technology to provide meaningful metrics and scales to meet service provider expectations.

Summary

The nGenius Service Assurance Solution provides service provider teams with a unified, integrated approach to help them optimize the delivery of IP-based services, protect the user experience, and simplify the complexity of delivering services over IP multiservice networks. The intelligent, early warning capabilities, advanced service visualization, analysis modules and intelligent data sources that comprise the nGenius solution make it one of the most comprehensive assurance solutions available to operators to help them confidently deploy and deliver IP-based services to their customers. The nGenius Service Assurance Solution supports GPRS, UMTS, HSPA+, CDMA2000 and LTE environments with real-time, end-to-end visualization of performance, user experience KPIs and forensic analysis down to packet level details. This provides actionable, service performance relevant information and enables complete work flows to proactively and rapidly identify, isolate and resolve problems impacting user experience.