

# nGenius InfiniStream Appliance

## Highlights

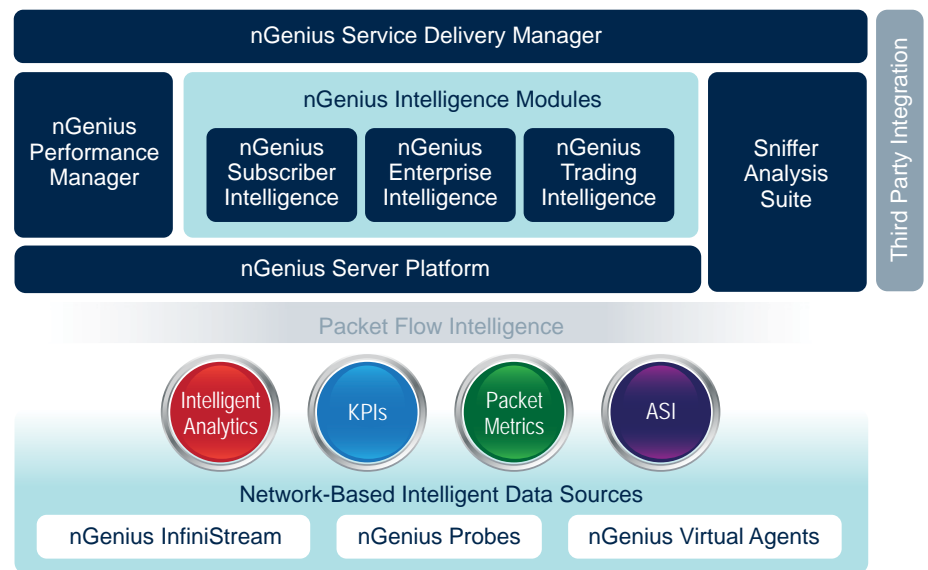
- Continuous, non-intrusive intelligent deep packet capture and analysis of network control and customer traffic
- Support for LTE/EPC, 3G UMTS/HSPA+, 2.5G GPRS, CDMA2000, IMS/VoIP, Wireline and Cable MSO service delivery networks
- Adaptive Session Intelligence™ (ASI) technology for cost-effective, scalable and efficient analysis of services, service enablers and network performance
- High-speed stream-to-disk capture of packets for advanced forensics with storage options from 2TB to 96TB
- Smart Recording and Data Mining (SRDM)—intelligent data reduction and storage optimization technology
- Operates as a standalone or as the foundational data source for the nGenius Service Assurance Solution

nGenius® InfiniStream® appliances are intelligent, passive devices that can non-intrusively monitor key links in IP-based service provider networks. They are deployed in a distributed fashion and operate in a unified manner to provide end-to-end performance visibility of mobile, wireline and wireless IP networks. The nGenius InfiniStream appliances utilize advanced deep packet capture and analysis technology with unsurpassed traffic scalability. With large scale stream-to-disk storage, they provide the forensic analysis needed to support rapid problem isolation to manage user experience across IP service delivery networks.

The nGenius InfiniStream appliance exploits the most important source of network and application performance data: the packet. Used standalone or as the foundation for the nGenius Service Assurance Solution, nGenius InfiniStream appliances provide the rich source of packet-level intelligence necessary to help solve complex service-affecting problems on a network-wide, multi-domain, multi-tier basis.

Recommended applications for nGenius InfiniStream appliances include:

- Continuous, end-to-end visibility into application usage and service performance
- Rapid, proactive identification of service performance issues
- Service and application performance reporting and trending
- New service and new network implementation
- Real-time IP voice service assurances
- Remote packet capture and real-time forensic analysis
- Intelligent data source for supporting third-party customer experience management, fault management and performance management applications



**Figure 1: Given the richness of data, the nGenius InfiniStream appliances are a primary data source of choice for the nGenius Service Assurance Solution.**

### Intelligent Data Source

The nGenius InfiniStream appliance generates packet-flow based metrics and Key Performance Indicators (KPIs) based on actual customer and network control traffic. In addition, session records are generated on both the control and data plane applications on a real-time, continuous basis that include metrics on application performance, subscriber information, user device information, error events and elements traversed. These can be used to reconstruct a multiprotocol, multi-tier view of customer transactions. Actual customer packets are also collected, indexed and stored for future reference for use in troubleshooting workflows requiring deep dive packet-level and protocol-level visibility.

The various analysis modules in the nGenius Service Assurance Solution leverage the KPIs, intelligent analytics, and session records generated by nGenius InfiniStream appliances along with the packets stored on the devices. Because of this rich source of packet flow intelligence generated by the nGenius data sources, the nGenius Solution provides unmatched real time visualization, intelligent early warning and real-time and forensic analysis to help manage and optimize user experience in modern IP networks.

The nGenius InfiniStream appliance supports monitoring of traffic in an IPv6 environment. This in turn allows certain nGenius consoles (nGenius Service Delivery Manager, nGenius Performance Manager, InfiniStream Console, and nGenius Subscriber Intelligence) to display IPv6 addresses in their proper format.

### How It Works

The nGenius InfiniStream appliance combines the benefits of sophisticated statistical monitoring and packet capture technologies into a single robust database appliance. Using patented streaming methods, an nGenius InfiniStream appliance can capture packets and record them to disk for storage and future analysis. The nGenius InfiniStream appliance maximizes storage capabilities using algorithms that balance overall drive storage with quick retrieval and resilience.

nGenius InfiniStream appliances leverage an innovative technology called Adaptive Session Intelligence™ (ASI). ASI technology is a transformative real-time Deep Packet Analysis (DPA) engine that allows service providers to more effectively scale their service delivery management solution to accommodate the explosive growth in IP traffic and infrastructure migration to 40G and 100G technologies. ASI technology dynamically tracks, captures and analyzes complex service delivery transactions across multi-domain IP networks allowing comprehensive real-time analysis of the performance of applications and services across physical and virtual environments. ASI technology dramatically increases the speed of detecting and troubleshooting service delivery problems across distributed network architectures such as cloud environments, data centers and core and access networks.

The ASI engine is made up of the Adaptive-Common Data Model (A-CDM), Adaptive Session Records (ASRs) and Adaptive Session Trace (AST). As the packets are being stored, statistics are gathered on individual communication flows using A-CDM technology. A-CDM technology provides a consistent format against which data is accumulated from various network types. The data is collected into a common repository that includes everything from response time-based statistics to policy-based configurations for Voice over IP (VoIP), Multi Protocol Label Switching (MPLS), Quality of Service (QoS), and Virtual Private Networks (VPNs).

The nGenius InfiniStream appliances also extract a rich set of metadata from the packets that comprise individual control and data plane sessions. The appliances track and associate the sessions on a per application basis capturing the information in Adaptive Session Records (ASRs) for each application.

The ASRs are designed to be easily correlated across applications and tiers and can be used by the nGenius Service Assurance Solution analysis modules such as nGenius Subscriber Intelligence to generate summary information on a per subscriber, per session basis. This information can include:

- Subscriber information
- Mobile device model and manufacturer
- Applications accessed

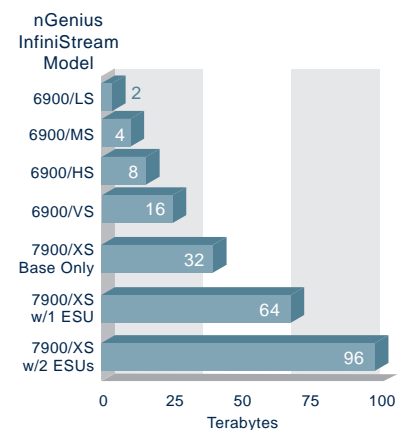
- Network elements involved
- Location where subscriber initiated the session
- Error codes and distributions on error codes and response codes for failed applications
- Multi-tier, multi-hop, multi-protocol ladder diagrams

This ability to generate high-level statistics, performance metadata and ASRs in real-time, then retain the packets for in-depth problem analysis and resolution makes the nGenius InfiniStream appliance one of the most feature-rich and powerful solutions for monitoring and managing services delivered over IP multiservice networks on the market today.

### Key Features

#### Flexible Storage Capabilities

Configured in a variety of rack-mounted chassis options, storage capabilities range from 2 TB to 96 TB. Minimizing footprint requirements is important in service provider central offices, hubs and data centers where space is an issue. nGenius InfiniStream appliances help operators better manage footprint impact with one of the industry's most scalable intelligent data capture devices. The nGenius InfiniStream 7900 Series with expanded storage units compact 96TB of storage into only 9 RUs of rack space.



**Figure 2: nGenius InfiniStream appliances are available in a wide variety of storage options up to 96 TB.**

## Remote Management

nGenius InfiniStream appliances are designed for deployment across the multiple tiers and multiple hops within a service provider's network. As such, remote management capabilities are available both in-band and out-of-band for most models to improve manageability and reduce total cost of ownership (TCO). Administrators can set up automatic polling for nGenius InfiniStream appliances and remotely install updates to one or more appliances to make it easier to manage both small and large nGenius implementations.

## Interfaces and Speeds

Several models are available to accommodate deployments across the modern IP network. Monitoring speeds range from 10base-T, to Fast Ethernet, to high-speed 10-GbE interfaces. Port densities are available in 2-port, 4-port, and 8-port configurations, with support for either copper or fiber interfaces.

## Flexible Mining and Data Optimization

Sophisticated indexing provides flexible data mining to quickly retrieve the right information when it is required. The NetScout Smart Recording and Data Mining (SRDM) technology enables the user to selectively record and store the entire packet or just a portion of each packet of interest, thus extending the amount of data that can be recorded and the length of time data is available for retrieval. SRDM is available on a per-application basis and can be configured via nGenius Performance Manager.

## Hardened and Secure

The nGenius InfiniStream appliance runs on a hardened Linux® operating system custom-built for secured operation. Access to stored data is controlled and is password protected. Privileges can be tiered as well to control access to sensitive data.

## Voice Quality Monitoring

nGenius InfiniStream appliances enable real-time, highly accurate voice quality monitoring by leveraging the platform's deep packet capture and analysis capabilities. Employing an ITU compliant algorithm for calculating an objective voice score, the nGenius InfiniStream appliance captures and analyzes the actual VoIP media stream packets to generate the following metrics:

- Mean Opinion Score (MOS) voice quality scores tested for compliance with ITU-T P.564
- Packet loss
- Jitter statistics

The nGenius InfiniStream appliance supports a wide range of industry-standard and proprietary codecs used in fixed and mobile environments, making it ideal for VoIP, IMS and mobile applications.

Supported codecs include the following: G711a and  $\mu$  law, G729, G729a, G729ab, Enhanced Variable Rate Codec (EVRC, EVRC-B), narrowband Adaptive Multi-Rate codecs (AMR).

## Supported Protocols and Interfaces

nGenius InfiniStream appliances support a wide array of protocol decodes including the ones listed below. Many of these protocols and interfaces are also supported with both A-CDM based packet flow KPIs and metrics and ASRs:

- Fixed and Mobile: DNS, DNS-NAPTR, DNS-SRV, DHCP, RADIUS, Diameter, HTTP, SIP, RTP, RTCP, FRP, POP3, SMTP, SIGTRAN - SCTP, M3UA, ISUP, WAP, BCMCS, SMP, SMPP, MMS, PPP, WSP
- Mobile networks: GPRS/UMTS: GTP-C, GTP-U, GMM, SM, BSSGP, RANAP; CDMA2000: GRE, MIP; WiMAX WSP; LTE/EPC: X2AP, GTPv2, S1-AP, S1-NAS, EPS-Mobility Management, EPS-Session Management
- IMS and VoIP networks: SIP, DNS, Diameter, DNS-SRV, DNS-NAPTR, H.323, MGCP, RTP

## Supported interfaces include:

- GPRS-UMTS: Gb/IP, IuPS/IP, Gn, Gi, Gp, Gr, AAA, Direct Tunnel
- CDMA2000: A12, A10, A11, P-H, Pi

- LTE/EPC: S1-U, S1-MME, S2a, S3, S4, S5, S8, S10, S11, S12, S6a, Gx, SGi
- IP Voice: Session Border Controller interfaces, Border Gateway Control Function interfaces, Media Gateway Control Function (SIP-based), Media Gateway (RTP based), DNS Server, ENUM server

## nGenius InfiniStream Appliance for Service Provider Applications

The nGenius InfiniStream appliances share a common foundation of proven technology including packet-flow-based A-CDM KPIs and metrics, ASRs, continuous packet capture and analysis, high capacity packet storage and Sniffer® Analysis. The nGenius InfiniStream 6900 Series and 7900 Series appliances are designed to meet the traffic processing and storage requirements service providers need to manage today's modern IP service delivery networks.

## nGenius InfiniStream 6900 Series



nGenius InfiniStream 6900 Series appliance continues to lead the industry in deep packet capture and analysis-enabled devices. With robust performance, storage capacity and resiliency, the nGenius InfiniStream 6900 Series appliances are deployed at service aggregation points such as the core, data center server farms and other high-capacity locations.

Specific functionalities of the nGenius InfiniStream 6900 Series include:

- Robust storage capacity options up to 16 TB
- High performance and fast packet processing
- High port density, with broad range of link interfaces/speeds - up to 10GbE
- AC/DC options, redundant power and RAID drives for "always-on" operation
- Hot-swappable drives and power supplies

## nGenius InfiniStream 7900 Series



The nGenius InfiniStream 7900 Series appliance is unique to the industry with its deep packet capture and analysis capabilities, modularity, extensive storage options, and small form factor (3RU to 9RU max). nGenius InfiniStream 7900 Series appliance is designed for large data centers, mobile and fixed core network locations and other sites that have high traffic volumes and extensive storage needs. nGenius InfiniStream 7900 Series is uniquely positioned to help service providers deploy and manage next-generation IP converged networks and LTE/EPC architectures.

Specific functionalities of the nGenius InfiniStream 7900 Series include:

- Robust storage capacity options starting at 32 TB and field-expandable to 96 TB
- High performance and fast packet processing
- Optimized for 10 GbE interfaces
- AC/DC options, redundant power & RAID drives for “always-on” operation
- Hot-swappable drives and power supplies

### Sniffer Analysis (Standalone Mode)

Sniffer Analysis works with the nGenius InfiniStream appliance in standalone mode, providing sophisticated forensic analysis without the need for additional equipment or centralized monitoring consoles. nGenius InfiniStream appliances include the direct-connect InfiniStream Console to summarize packet data and serve as a platform from which to mine data from the extensive packet storage available on individual appliances. Sniffer Analysis simplifies troubleshooting issues and helps speed root cause determination, leveraging back-in-time analysis on the retrieved data and automatically identifies and decodes a wide array of applications.

For detailed packet analysis requirements, Sniffer decodes and experts are readily available. Sniffer Analysis is perfect for solving intermittent problems or any time forensic analysis is required.

### Time Synchronization Options

The nGenius InfiniStream appliances have multiple synchronization options to ensure proper time stamping of packets as they are processed and stored. Time synchronization options include:

- Network Time Protocol (NTP)
- IEEE 1588 Precision Time Protocol (PTP) version 1 and 2
- Code Division Multiple Access (CDMA) or Global Positioning System (GPS) based timing using an approved UTC (Universal Coordinated Time) time receiver connected to the serial port of the nGenius InfiniStream appliance chassis
- nGenius Time Synchronization Adapter: the nGenius Time Synchronization Adapter leverages the precise clock time of GPS. As many as four nGenius InfiniStream appliances can connect to a single adapter using the supplied connector cables, thereby coordinating timing across appliances. The nGenius Time Synchronization Adapter supports all nGenius InfiniStream appliances.

### Foundation of the nGenius Service Assurance Solution

nGenius InfiniStream appliances are a critical component of the nGenius Service Assurance Solution. Through full integration with other nGenius applications, operators can support multiple workflow paths for faster detection, analysis, and isolation of service and network problems. Other solution components include:

### nGenius Service Delivery Manager

- Intelligent early warning of performance degradation
- Service-aware dashboard with proactive and predictive alarming and alerting
- Flexible representation of end-to-end services with regional, local or geographic views
- Automatic detection and alarming of anomalous service behavior
- Cyberthreat detection
- Integration with ArcSight

### nGenius Performance Manager

- Real-time and historical views of traffic volume, usage, application and network response times, error code distribution
- Real-time mobile data analytics with handset, subscriber and cell site context
- Advanced reporting and performance visualization
- Integrated launch points into subscriber session-level analysis and packet decodes
- Seamless integration into third-party and customer-developed Operational Support System (OSS) applications

### nGenius Subscriber Intelligence

- IP-based correlated, multiprotocol, multi-tier, multi-hop subscriber-level session analysis with end-to-end data and control plane visibility
- Advanced data mining and filtering to rapidly hone in on sessions of interest
- Failure analysis and subscriber analysis workflows with a rich set of contextual information – subscriber, handset, routing area/cell sites – automatically displayed

### Sniffer® Analysis

- Packet-level analysis
- Deep-dive problem analysis and troubleshooting
- Per-subscriber visibility

### nGenius Packet Flow Switch

- Powerful aggregator with flexible intelligent filtering capabilities
- Up to 24 ports of 10 or 1 Gigabit Ethernet in a single rack unit
- Wire-speed, ultra-low latency for high-performance environments
- Dynamic support for one-to-many and many-to-one connectivity

Specification	690x - 698x	699x	7900 Base	7900 ESU
Rack Unit	3 Rack Unit (3RU)			
Weight	77lbs. (35kg)	78.3lbs (36.7kg)	70.35lbs (31.91kg)	
Dimensions	Chassis 30.5"D x 19"W x 5.25" H (77.cm x 48.3cm x 13cm)		25.5"D x 17.2"W x 5.2"H (64.3cm x 43.7cm x 13.2cm)	
Side Rails	Rack Mount Side Rails Included			
Capture Ports	691X – 4 Ports 10/100/1000BaseT 698X – 8 Ports 10/100/1000BaseT 6990X – 2 Port XFP 6995X – 4 Port XFP		7990 – 2 Port XFP  7995 – 4 Port XFP	N/A
Storage Capacity	Model LS – 2TB Model MS – 4TB Model HS – 8TB Model VS – 16TB		Base Unit – 32TB	32TB Each ESU
Management Port	RJ-45			Not Applicable
Console Port	DB9 Serial Port			Not Applicable
Embedded Linux Support	Two (2) separate drives dedicated to OS		Solid State Drive (SSD) dedicated to OS	Not Applicable
Power Rating	100-240VAC, 50/60Hz, 800W 12A @ 100VAC, 6A @ 240VAC, 1 + 1 Hot Swappable redundant Power	100-240VAC, 50/60Hz, 750W 12A @ 100VAC, 6A @ 240VAC, 1 + 1 Hot Swappable redundant Power	100-240VAC, 50/60Hz, 900W 12A @ 100VAC, 6A @ 240VAC, 1 + 1 Hot Swappable redundant Power	
Optional DC Power	48VDC , 800W, 15A (x2), 1 + 1 Hot Swappable Power Supply		48VDC , 1000W, 24A (x2), 1 + 1 Hot Swappable Power Supply	
Max Power Consumption (AC)	4.1A, 448W, 1529 BTU/hr (total across all power supplies)	5A, 534W, 1822 BTU/hr (total across all power supplies)	5.5A, 620W, 2116 BTU/hr (total across all power supplies)	2A, 235W, 602 BTU/hr (total across all power supplies)
Max Power Consumption (DC)	9A, 450W, 1536 BTU/hr (total across all power supplies)	10.5A, 504W, 1720 BTU/hr (total across all power supplies)	13A, 624W, 2130 BTU/hr (total across all power supplies)	5A, 240W, 819 BTU/hr (total across all power supplies)
Environmental Specifications	Operating Temperature: 50° to 95°F (10° to 45°C), Operating Humidity 5% - 80% (non-condensing)		Operating Temperature: 50° to 95°F (10° to 45°C), Operating Humidity 5% - 85% (non-condensing)	
Regulatory Agency Approvals	Regulatory Model Number: AFM3U2, FCC Part 15 Class A, CE Mark (EN 55022 Class A, EN 55024, EN 61000-3-2, EN 61000-3-2), VCCI (Japan) Class A, NOM (Mexico), UL 60950-1 CAN/CSA C22.2	Regulatory Model Number: AFM3U2, FCC Part 15 Class A, CE Mark (EN 55022 Class A, EN 55024, EN 61000-3-2, EN 61000-3-2), VCCI (Japan) Class A, NOM (Mexico), UL 60950-1 CAN/CSA C22.260950, EN 60950, CB Report, UL-GS (DEMKO)	Regulatory Model Number: AFM3U2, FCC Class A, CE Mark (EN 55022 Class A, EN 55024, EN 61000-3-2, EN 61000-3-2), VCCI (Japan) Class A, NOM (Mexico), UL 60950-1 CAN/CSA C22.2 No. 60950, EN 60950, CB Report, UL-GS (DEMKO)	Regulatory Model Number: V3, FCC Part 15 Class A, CE Mark (EN 55022 Class A, EN 55024, EN 61000-3-2, EN 61000-3-2), VCCI (Japan) Class A, UL 60950-1 CAN/CSA C22.2 No. 60950, IEC 60950-1, EN 60950-1, CB Report, UL-GS (DEMKO)



**Americas East**  
310 Littleton Road  
Westford, MA 01886-4105  
Phone: 978-614-4000  
Toll Free: 800-357-7666

**Americas West**  
178 E. Tasman Drive  
San Jose, CA 95134  
Phone: 408-571-5000

**Asia Pacific**  
17F/B  
No. 167 Tun Hwa N. Road  
Taipei 105, Taiwan  
Phone: +886 2 2717 1999

**Europe**  
One Canada Square  
29th floor, Canary Wharf  
London E14 5DY, United Kingdom  
Phone: +44 207 712 1672

NetScout offers sales, support, and services in over 32 countries.

For more information, please visit [www.netscout.com](http://www.netscout.com) or contact NetScout at 800-309-4804 or +1 978-614-4000

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