

# nGenius 7000 Series Packet Flow Switches

## Expand Your Visibility Fabric with Advanced Packet Broker Functionality

### HIGHLIGHTS

- 1- or 2-RU (Rackmount Unit) space-efficient, fixed configuration devices
- 720 Gbps to 6400 Gbps throughput with non-blocking switching fabrics
- 1GbE, 10GbE, 25GbE, 40GbE, and 100GbE port options
- Network packet broker functionality including rate conversion, aggregation, replication, filtering, load balancing, and source port tagging
- NVGRE tunnel origination (encapsulation) and termination (de-encapsulation)
- Protocol stripping & de-encapsulation (e.g. VLAN, VN-tag, VXLAN, MPLS)
- IP Tunnel termination (e.g. ERSPAN)
- Intelligent fully meshed stacking / interconnect (pfsMesh)
- Active inline traffic forwarding for active security or WAN optimization with customizable health checks
- Flexible policy defined triggers for event handling and high availability scenarios
- Management via command line, NETCONF, and graphical user interfaces for local and remote access
- Software-driven and powered by the NETSCOUT® Packet Flow Operating System (PFOS)

### Product Description

The nGenius® 7000 Series Packet Flow Switches (PFS) are dense, 1G to 100G models designed for dense 1 GbE to 100 GbE deployments and bridge the gaps between 1GbE, 10GbE, 25GbE, 40GbE, and 100GbE networks and tools.

The nGenius 7000 Series Packet Flow Switches offer SFP+, SFP28, QSFP+, and QSFP28 ports in various 1RU and 2RU fixed configuration form factors. All ports are enabled by default, with each port configurable as an input port, intermediate (service) port, or output port. With the NETSCOUT pfsMesh, a self-organizing architecture, the nGenius 7000 Series Packet Flow Switch can be deployed in a redundant, low-latency meshed architecture for dynamic and fault-tolerant visibility that can scale to over 4000<sup>1</sup> ports across LAN and WAN environments.

### Cost-Effective Feature Set

Providing a lot of interfaces into a compact form factor, the nGenius 7000 Series Packet Flow Switches support core network packet broker features including filtering, load balancing, replication, and aggregation. With an expansive feature set, the nGenius 7000 Series Packet Flow Switches are capable of managing a monitoring network independently. Connect the HD Fiber TAPs and any number of tools, including NETSCOUT's Service Assurance and Security Assurance products, to an nGenius 7000 Series Packet Flow Switch and easily manage a diverse and complex monitoring network. With NVGRE tunnel origination monitored packets can be forwarded across routed networks or to virtual monitoring applications.

Flow-aware load balancing enables intelligent control of traffic distribution to the monitoring tools, increasing output capacity while maintaining session integrity. For example, packets from a 40GbE TAP can be captured and automatically load-balanced across multiple 1GbE or 10GbE monitoring tool ports based on user-defined session criteria. Flow-aware load balancing can operate in tandem with hardware-based filtering or independently.

### Security Optimization

To take action as offenders and bad actors are detected active inline security tools need to see and handle all the traffic that needs to be inspected.

nGenius 7000 Series Packet Flow Switches with inline tool chaining allow aggregation, filtering, and load-balancing of production network traffic toward multiple inline security applications whilst adding only a single device to each network link. Application-specific health checks (not just ICMP heartbeats) ensure the active security tools are connected and functioning properly. External bypass TAPs can be used to ensure that the security policies are adhered to during power failure. Triggers allow automated event-driven behavior (such as redirecting traffic, deactivating ports, or sending notifications via syslog or SNMP) to enable highly available (HA) inline security configurations.



Model shown: nGenius 7100 packet flow switch.

<sup>1</sup> Total number of ports in a single pfsMesh is dependent on quantity and complexity of filtering.

## Management

The nGenius 7000 Series Packet Flow Switches can be managed via a Web UI, CLI, and NETCONF XML API using HTTP, HTTPS, or SSH and the system can be monitored via Syslog and SNMP. Each device ships with an intuitive and easy to use graphical element management system (EMS) out of the box. Simply point a web browser at the nGenius 7000 Series Packet Flow Switch and let the web-based user interface (WebUI) power the packet flow system. Management IP addresses can be manually assigned or obtained via DHCP.

## Virtual Access

For accessing traffic that is completely virtualized and never makes it onto a physical network, traffic can be mirrored and forwarded from the virtual network to the physical network using tunneling protocols such as NVGRE (L2GRE) or ERSPAN which encapsulate the traffic of interest. The nGenius 7000 Series Packet Flow Switches can terminate these tunnels so the traffic can then be forwarded on to monitoring applications. Conversely, the nGenius 7000 Series Packet Flow Switches can also be used to forward packets from physical TAPs to virtual monitoring applications such as NETSCOUT's vSTREAM.

## Power and Cooling

Each of the nGenius 7000 Series Packet Flow Switches supports two redundant, hot-swappable power supplies. Redundant, hot-swappable fan modules (in an N+1 configuration) supply ample cooling in a front-to-back air flow configuration.

## Features and Benefits

Features	Benefits
<b>32 to 128 Ports in 1RU or 2RU, Fixed Configurations</b> Compatible with SFP, SFP+, SFP28, QSFP+, and QSFP28 MSA compliant transceivers – for complete details, please refer to the list of transceivers offered by NETSCOUT	<b>High Density Systems:</b> <ul style="list-style-type: none"> <li>• Drives cost-effectiveness by reducing per-port cost and increasing flexibility</li> <li>• Condenses the nGenius PFS footprint (rack space) into compact 1RU or 2RU of space in a fixed configuration</li> <li>• Reduces power consumption</li> <li>• Software-driven, simplifies management</li> </ul>
<b>Configurable I/O</b> <ul style="list-style-type: none"> <li>• Full flexibility in selecting ports for network access, intermediate service, interconnect, or monitor output</li> <li>• Dual network access &amp; monitor output port class</li> <li>• IP tunnel (e.g. NVGRE, ERSPAN) termination</li> </ul>	<ul style="list-style-type: none"> <li>• Enables agile response to monitoring infrastructure changes</li> <li>• Facilitates effectively doubled capacity for input and output</li> <li>• Allows virtualized traffic to be forwarded over an IP network to PFS ingress ports, and then forwarded onto monitoring devices as is, or de-encapsulated<sup>2</sup></li> </ul>
<b>Selective Aggregation</b> <ul style="list-style-type: none"> <li>• Fully flexible any-to-any port mapping</li> </ul>	<ul style="list-style-type: none"> <li>• Enables large scale aggregation to maximize tool visibility</li> <li>• Addresses asymmetrical routing issues</li> </ul>
<b>Flexible and Powerful Filtering</b> <ul style="list-style-type: none"> <li>• OSI Layers 2 - 7</li> <li>• Ingress</li> <li>• Overlapping</li> </ul>	<ul style="list-style-type: none"> <li>• Allows only traffic of interest to be forwarded to each tool, increasing tool efficiency and reduces the number of required tool interfaces</li> </ul>
<b>Session-Based/Flow-Aware Load Balancing</b> <ul style="list-style-type: none"> <li>• Distributes traffic load across multiple instances of a tool or tool port</li> <li>• Maintains session stickiness for full conversations</li> </ul>	<ul style="list-style-type: none"> <li>• Prevents oversubscription of monitoring tools and security systems – eliminating blind spots without sacrificing session integrity</li> <li>• Copied traffic can be easily distributed across multiple lower speed tool ports, allowing users to preserve existing tool investments</li> </ul>

<sup>2</sup> De-encapsulation may require a PFX or advanced PFS.

Features	Benefits
<b>Monitor Traffic Port Tagging</b> <ul style="list-style-type: none"> <li>Provides identification of traffic based on source network/link using VLAN tagging</li> </ul>	<ul style="list-style-type: none"> <li>Users can quickly and precisely pinpoint where an issue, such as latency or security event, is occurring in the network</li> <li>Allows different tools to access port identification</li> </ul>
<b>Packet Time Stamping (PFS 7120 only)</b>	<ul style="list-style-type: none"> <li>Provides time-of-capture information for latency analysis</li> </ul>
<b>Intelligent Stacking (pStack)</b> <ul style="list-style-type: none"> <li>Enables pfsMesh architecture for local and remote of up to 256<sup>3</sup> Total PFS devices as a single redundant system</li> </ul>	<ul style="list-style-type: none"> <li>Ensures highly available monitoring</li> <li>Scales visibility with network infrastructure and new tools</li> <li>Ensures delivery of traffic across LAN or WAN to tools</li> </ul>
<b>GRE Tunnel Initiation and Termination</b> <ul style="list-style-type: none"> <li>Send monitored packets over routed networks</li> </ul>	<ul style="list-style-type: none"> <li>Forward packets from remote offices to centralized tools</li> <li>Forward packets from physical TAPs to virtual tools</li> </ul>
<b>Line-Rate Header Stripping</b> <ul style="list-style-type: none"> <li>VLAN</li> <li>VxLAN</li> <li>VN-tag</li> <li>MPLS</li> </ul>	<ul style="list-style-type: none"> <li>Preserve tool resources (bandwidth and processing) by eliminating unnecessary headers</li> <li>Re-use legacy tools that may not understand newer protocol headers</li> <li>Enable native filtering and load balancing on inner packet fields</li> </ul>
<b>Policy-Based Event Triggering and Actions</b> <ul style="list-style-type: none"> <li>Dynamic traffic redirection based on occurrence of events</li> <li>Send alerts when specific events occur</li> </ul>	<ul style="list-style-type: none"> <li>Reduces management overhead and enables faster response times to incidents</li> </ul>
<b>Active Inline Access and Forwarding</b> <ul style="list-style-type: none"> <li>Aggregation of multiple network segments</li> <li>Filtering and load balancing towards applications/tools</li> <li>Easy to configure simple and complex inline tool chaining</li> <li>Customizable health check packets for “positive” (return) and “negative” (no return) checks</li> </ul>	<ul style="list-style-type: none"> <li>Removes multiple points of failure</li> <li>Gains visibility for a single inline security tool (e.g. security proxy, IPS) and/or WAN optimization</li> <li>Easy deployment of layered security</li> <li>Removes multiple points of failure by fully exercising tools</li> </ul>
<b>Local and Remote Management</b> <ul style="list-style-type: none"> <li>NETCONF XML API</li> <li>CLI (SSH)</li> <li>GUI (HTTP/HTTPS)</li> <li>SNMP</li> <li>Syslog (transport over UDP, TCP, or TLS)</li> </ul>	<ul style="list-style-type: none"> <li>Easy to use via graphical interfaces or via CLI</li> <li>Easy integration with applications using CLI or NETCONF XML API</li> <li>Alerts can be received by any Syslog server or SNMP manager, with option for sending securely</li> </ul>
<b>Role-Based Access</b> <ul style="list-style-type: none"> <li>Multiple user and user role support</li> <li>Flexible user/role defined privileges, unique screen views, and access control</li> </ul>	<ul style="list-style-type: none"> <li>Conforms to security policy needs of IT organizations</li> </ul>
<b>AAA Security with Remote (RADIUS and/or TACACS+)</b>	<ul style="list-style-type: none"> <li>Meets authentication policy needs of IT organizations and Local authentication</li> </ul>
<b>Redundant Power Supplies</b> <ul style="list-style-type: none"> <li>AC and DC hot-swappable options</li> </ul>	<ul style="list-style-type: none"> <li>Maintains high availability for the device</li> </ul>
<b>Traffic Statistics</b> <ul style="list-style-type: none"> <li>Port-level packet and throughput metrics, including overflow drops, bad packets, etc.</li> <li>Flow level packet and throughput metrics</li> </ul>	<ul style="list-style-type: none"> <li>Visibility into network and tool port activity</li> <li>Visibility into traffic type activity</li> </ul>

<sup>3</sup> Total number of ports in a single pfsMesh is dependent on quantity and complexity of filtering.

## Standards and Compliance

Standard	Specification(s)
Ethernet	IEEE 802.3, IEEE 802.3ab, IEEE 802.3ae, IEEE 802.3ba, IEEE 802.3by, IEEE 802.3z
VLAN	IEEE 802.1Q, IEEE 802.1ad
ARP	IETF RFC 826
IP	IETF RFC 791, 2460
UDP	IETF RFC 768
TCP	IETF RFC 793
SSH	IETF RFC 4251, 4252, 4253
HTTP	IETF RFC 2616, 2817
TLS (SSL)	IETF RFC 4492, 5246
SNMP	IETF RFC 1157, 3411-3418
Syslog	IETF RFC 5424, 5425
NTP	IETF RFC 5905
RADIUS	IETF RFC 2865, 2866
TACACS+	IETF RFC 1492
EMC	FCC Part 15 Subpart B/ICES-003 Class A, EN 55032 Class A, VCCI Class A, AS/NZS CISPR 32 Class A, EN 61000, EN 300 386 Class A, CNS 13138 Class A, KCC Class A, TUV-GS (PFS 7010 and 7100 only)
Safety	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013, UL 60950-1, CAN/CSA-C22.2 No. 60950-1, UL/CUL

## Ordering Information

Part Numbers	Description
70FCNANQH0J0	7010 Switch with 48 x 1/10Gb SFP+ and 6 x 40Gb QSFP+ or up to 72 x 10Gb Ports, AC Power
70FCNDNQH0J0	7010 Switch with 48 x 1/10Gb SFP+ and 6 x 40Gb QSFP+ or up to 72 x 10Gb Ports, DC Power
71FCNANBB0H0	7100 Switch with 32 x 40/100Gb QSFP28 Ports or up to 128 x 10/25Gb Ports, AC Power
71FCNDNBB0H0	7100 Switch with 32 x 40/100Gb QSFP28 Ports or up to 128 x 10/25Gb Ports, DC Power
71FCNANQK000	7110 Switch with 48 x 1/10/25Gb SFP28 and 6 x 40/100Gb QSFP28 or 72 x 10/25Gb Ports, AC Power
71FCNDNQK000	7110 Switch with 48 x 1/10/25Gb SFP28 and 6 x 40/100Gb QSFP28 or 72 x 10/25Gb Ports, DC Power
71FCNANRE000	7120 Switch with 64 x 40/100Gb QSFP28 or up to 80 x 10/25Gb and 44 x 40/100Gb Ports, AC Power
71FCNDNRE000	7120 Switch with 64 x 40/100Gb QSFP28 or up to 80 x 10/25Gb and 44 x 40/100Gb Ports, DC Power

For transceivers, please refer to the list of transceivers offered by NETSCOUT.

## SPECIFICATIONS

	nGenius 7010 PFS	nGenius 7110 PFS	nGenius 7100 PFS	nGenius 7120 PFS
Physical Switching Ports				
SFP/SFP+	48			
SFP28		48		
QSFP+	6			
QSFP28		6	32	64
Switching Port Speeds				
1G Ports	48	48 <sup>4</sup>		
10G Ports	48 (72 with QSFP+ breakout)	48 (72 with QSFP+ breakout)	0 (128 with QSFP+ breakout)	0 (80 with QSFP+ breakout)
25G Ports		48 (72 with QSFP28 breakout)	0 (128 with QSFP28 breakout)	0 (80 with QSFP28 breakout)
40G Ports	6	6	32	64
100G Ports		6	32	64
Management Ports	1 RJ45 100/1000BASE-T 1 RJ45 serial console			
Rack Unit	1 Rack Unit (1RU)			2 Rack Units (2RU)
Height	1.71 in (43 mm)	1.73 in (44 mm)	1.75 in (44 mm)	3.5 in (88 mm)
Width	17.4 in (443 mm)	17.3 in (438 mm)	17.3 in (438 mm)	17.2 in (438 mm)
Depth	18.6 in (473 mm)	18.6 in (473 mm)	20.3 in (515 mm)	22.8 in (580 mm)
Weight (with PSUs)	19.73 lbs. (8.95 kg)	20.78 lbs. (9.43 kg)	23 lbs. (10 kg)	31.1 lbs. (14.1 kg)
Power Supplies	Dual redundant, hot swappable PSUs			
Power Input (AC)	100 to 240VAC/50-60Hz	90 to 240VAC/50-60Hz	100-240VAC, 50-60Hz	90 to 240VAC/50-60Hz
Power Input (DC)	-48 to -72VDC	-36 to -72VDC	-36 to -72VDC	-36 to -72VDC
Power Consumption	282W (962 BTU/hr) max (without transceivers) 400W (1365 BTU/hr) max (with transceivers)	583W (1989 BTU/hr) max	350W (1194 BTU/hr) max (without transceivers) 650W max (2218 BTU/hr) max (with transceivers)	760W (2593 BTU/hr) max
Fans	5 redundant (4+1), hot-swap fan modules		6 redundant (5+1), hot-swap fan modules	4 redundant (3+1), hot-swap fan modules
Airflow	Front-to-back			
Operating Temperature	32° to 104°F (0° to 40°C)	32° to 113°F (0° to 45°C)		
Storage Temperature	-40° to 158°F (-40° to 70°C)			
Operating Humidity	5% - 95% (non-condensing)			

<sup>4</sup> 1GbE fiber (IEEE Clause 37) auto-negotiation is not supported by the PFS 7110 so use of 1GbE fiber should be limited to use with TAPs. 1GbE copper does not have this restriction.

**NETSCOUT**



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