nGenius 4200 Series Packet Flow Switch

Hardware-accelerated Packet Optimization for Performance Monitoring and Security Systems on 40G Networks

HIGHLIGHTS

- 2 Rackmount Unit (RU) chassis with hot-swappable architecture
- 640 Gbps unidirectional (1.28 Tbps bidirectional) throughput and non-blocking switching fabric
- Up to 4 swappable chassis modules
- Up to 64 non-blocking ports of 1GE and/or 10GE per chassis
- Up to 16 non-blocking ports of 40GE per chassis
- Line rate performance on all features, including rate conversion, aggregation, replication, filtering, load balancing, port tagging, time stamping, de-duplication, protocol stripping & de-encapsulation, conditional masking and slicing, and encapsulated balancing
- IP Tunnel termination (e.g. ERSPAN, NVGRE)
- Reliable and secure WAN tunneling
- Active inline traffic forwarding and tool chaining, with fail-safety
- Intelligent fully meshed stacking/interconnect (vMesh)
- Management via command line, XML API, and graphical user interfaces for local and remote access
- NEBS III Compliant

Product Description

The nGenius® 4200 series packet flow switch (PFS) is a NEBS level III compliant, highly scalable modular system that bridges the gap between 1G/10G and 40G Ethernet networks and tools.

The nGenius 4204 packet flow switch model consists of a 2RU chassis that supports up to four chassis modules, with each module supporting up to 160 Gbps throughput – for a chassis total of 640 Gbps of unidirectional (or 1.28 Tbps of bidirectional) throughput and up to 64 ports. All ports on each chassis module are enabled by default, with each port configurable as a network traffic, intermediate (service), or monitoring tool port.

With the vMesh self-organizing architecture, traffic capture devices can be deployed in a redundant, low-latency meshed architecture for dynamic and fault-tolerant visibility that can scale to over 4000[1] ports across LAN and WAN environments.

Delivery Optimization

Beyond scalable aggregation, replication, and speed conversion, nGenius 4204 packet flow switch supports line rate hardware-based packet filtering and session-based load balancing of packets to tools.

User-independent filtering allows traffic to be distinguished according to source and/or destination MAC address, IP address, SCTP/TCP/UDP port, as well as by specific protocols, such as HTTP, VoIP (SIP, RTP), and others. A custom filter enables more granularity, specifically within the payload of a packet. Filters can be ingress, egress, and overlapping.

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

[1] Total number of ports in a single vMesh is dependent on quantity and complexity of filtering.

nGenius 4204 PFS | Up to 64 Port 1/10 GE or up to 16 Port 40 GE

Packet Optimization

In addition to delivering the right traffic to the right tools, nGenius 4200 series packet flow switch optimizes the packets themselves to improve the efficiency and effectiveness of the monitoring applications.

nGenius 4200 series packet flow switch advanced hardware-acceleration enables packets to be optimized at line-rate, with minimal latency and with negligible jitter, for a broad range of functions, which include removal of duplicate packets, removal of tunneling or encapsulation protocol headers, removal of undesired (or authorized) payload, addition of a timestamp, and others.

Security Optimization

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

nGenius 4204 packet flow switch, with active inline forwarding and tool chaining, allows aggregation, filtering, and load-balancing of actual network traffic toward multiple inline security applications whilst maintaining only a single intrusion into each network link. The integration of PowerSafe chassis modules ensures that the security policies are adhered to during power failure, and the deployment of application-specific health checks (not just heartbeats) in conjunction with policy-based triggering facilitates automatic failure scenarios including high availability.

Management

The nGenius 4200 series packet flow switch can be locally managed via a serial console and remotely managed via a Web GUI, CLI, XML API, and Management Center (vMC™) using HTTP, HTTPS, SSH, or Telnet. Users can monitor the system via use of Syslog and SNMP.

All PFS devices support field software updates for additional features and performance enhancements. The vMC supports full management and configuration of nGenius 4200 series packet flow switch, as well as nGenius 2200 series packet flow switch and nGenius 6000 series packet flow switch devices.

The nGenius packet flow switch series, including nGenius 4204 packet flow switch, provides automated event-driven monitor output traffic direction and responses (Syslog messages, SNMP traps, light front LED, deactivate ports) with a variety of user-definable trigger event types.

Power and Compliance

nGenius 4200 series packet flow switch is NEBS III compliant; it is available with hot-swappable power supplies, fans, air filters, and chassis modules. Redundant power supplies allow seamless transitions between power systems to ensure uptime.

Features and Benefits

Features	Benefits
Up to 64 line-rate ports in 2RU • 64 x 1G/10G • 16 x 40G • Mix of 1G/10G/40G Compatible with SFP, SFP+, QSFP+ MSA compliant transceivers including direct attach copper and active fiber cables.	**Highly scalable and modular system:** • Reduces per-port cost and increases flexibility • Condenses footprint (rack space) • Reduces power consumption • Simplifies management
I/O configurable • Full flexibility in selecting ports for network access, intermediate service, interconnect, or monitor output • IP tunnel (e.g. ERSPAN, GRE, NVGRE/L2GRE) termination	• Enables agile response to monitoring infrastructure changes • 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[2]
Selective aggregation • Fully flexible any-to-any port mapping	• Enables scalable aggregation to maximize agility and tool visibility • Addresses asymmetrical routing issues
Hardware-based filtering • User-independent • OSI Layers 2-7 • Custom offset • Ingress • Egress • Overlapping	• Allows only "traffic of interest" to be forwarded to each tool, which increases tool efficiency and reduces the number of required tool interfaces
Session-based/flow-aware load balancing • Distributes traffic load across multiple instances of a tool or tool port • Maintains session stickiness for full conversations • Up to 32 ports per group	• Prevents oversubscription of monitoring tools and security systems – eliminating blind spots without sacrificing session integrity • 10G and 40G copied traffic can be easily distributed across multiple lower speed tool ports, allowing users to preserve existing tool investments
Monitor traffic port tagging • Provides identification of traffic based on source network/link using – VLAN tagging, or – Port stamping	• Users can quickly and precisely pinpoint where an issue, such as latency or security event, is occurring in the network • Provides options for different tools to access port identification
Microburst mitigation • High Data Burst Buffering	• Prevents packet loss resulting from aggregation or speed conversion of bursty traffic (microbursts)
Microburst detection • vCapacity measurement	• Provides capacity planning data to analyze traffic profiles and burstiness
Hardware-based advanced packet optimization • Accurate time stamping (from 4.5ns) for latency analysis • Selective removal of duplicate packets • Protocol (Fabric Path, GRE, GTP, MAC-in-MAC, MPLS, NVGRE, TRILL, VLAN, VN-tag, VXLAN) header removal for broader tool support • Conditional packet masking (vMask™) for selective payload obfuscation • Conditional packet slicing (vSlice™) for selective payload removal • Adaptive load balancing of GTP, MPLS, and multi-VLAN encapsulated traffic	• Provides time-of-capture data, as well as greater granularity in selecting traffic for tools, enabling tools to perform faster, more effective analysis • Minimizes amount of traffic volume to backhaul • Ensures coherent forwarding of traffic to tools • Enabling compliance to privacy regulations

[2] Requires Advanced chassis module.

Features	Benefits
vStack+® • Enables vMesh architecture for local and remote interconnection of up to 256 PFS devices[3] as a single redundant system • Works over LAN and WAN connections • Tunneling packets over TCP/IP, optionally with encryption	• Ensures highly available monitoring • Scales visibility with network infrastructure and new tools • Ensures delivery of traffic across LAN or WAN to tools
Active inline access and forwarding • Failsafe access using PowerSafe • Aggregation towards any tool, including AIA translation • Filtering and load balancing • Efficient inline tool chaining • Customizable health check packets and triggering	• Maintains network uptime • Removes multiple points of failure • Gains visibility for a single inline security tool, e.g. security proxy, IPS • Easy deployment of layered security • Removes multiple points of failure including "positive" and "negative" checks
Policy-based event triggering and actions • Dynamic traffic redirection based on occurrence of events • Send alerts when specific events occur	• Policy-based automation reduces management overhead and enables faster response times to incidents
Local and remote management • XML API • CLI (Telnet/SSH) • GUI (HTTP/HTTPS) • vMC (HTTP/HTTPS) • SNMP (v1, v2, v3) • Syslog	• Easy to use via graphical interfaces or via CLI for users already familiar with using CLIs • Easy integration with applications using CLI or XML API • Alerts can be sent to any Syslog server or SNMP manager
Role-based access • Multiple user support • Flexible per-user privileges and access control	• Conforms to security policy needs of IT organizations
AAA security (RADIUS and/or TACACS+) and Local authentication	• Meets authentication policy needs of IT organizations
Network activity	• Packet statistics provided per port, for both Rx and Tx packet counts, throughput (bps), utilization (%), bad/errored packets, and packet drops
Warm swappable chassis modules	• Maintains high availability for 99.999% uptime (five-9s) or better • Scales to meet changing needs
Redundant, universal power supply units • AC and DC hot-swappable options	• Maintains high availability for 99.999% uptime (five-9s) or better

[3] Total number of packet flow switches in a single vMesh is dependent on device sizes, number of ports, and complexity of filtering.

Chassis and Modules

nGenius 4204 PFS Components	Description
Base Chassis	Base 4-slot nGenius 4204 packet flow switch chassis, including: • 2 x Management port • 1 x Serial console port • 1 x GPS port • 1 x PTP port • 1 x 1PPS port • 2 x Power supply units (redundant) • 1 x Fan tray
1G/10G standard chassis module	16 x 10G/1G SFP+ standard edition chassis module for nGenius 4204 packet flow switch • Allows up to 64 x 10G/1G ports with base feature set
40G standard chassis module	4 x 40G QSFP+ standard edition chassis module for nGenius 4204 packet flow switch • Allows up to 16 x 40G ports with base feature set
1G/10G Advanced chassis module	16 x 10G/1G SFP+ Advanced edition chassis module for nGenius 4204 packet flow switch • Allows up to 64 x 10G/1G ports with advanced feature set
40G Advanced chassis module	4 x 40G QSFP+ Advanced edition chassis module for nGenius 4204 packet flow switch • Allows up to 16 x 40G ports with advanced feature set
1G/10G PowerSafe chassis modules	16 x LC Standard edition PowerSafe chassis modules for nGenius 4204 packet flow switch • Allows up to 64 x 10G/1G ports with active Bypass or active TAP, and base feature set • Multimode OM4 and Singlemode OS2 variants
40G PowerSafe chassis modules	4 x LC and MPO standard edition PowerSafe chassis modules for nGenius 4204 packet flow switch • Allows up to 8 x MPO or 16 x LC 40G ports with active Bypass or active TAP, and base feature set • Multimode OM4 MPO, Multimode OM4 BiDi LC, and Singlemode OS2 LC variants
AC Power Supply Unit	100 to 240V, 50/60 Hz AC Power Supply Unit (included in base chassis)
DC Power Supply Unit	-48V DC Power Supply Unit (included in base chassis)
Rear Fan Tray	Hot-swappable Rear Fan Tray

Product Specifications

Physical Characteristics

nGenius 4204 PFS Components	Height	Width	Depth	Weight
Base Chassis	2U (3.5 in. / 89 mm)	17.3 in. / 441 mm	27.5 in. / 699 mm	30.5 lb. / 13.8 kg
1G/10G standard chassis module	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	3.4 lb. / 1.54 kg
40G standard chassis module	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	3.1 lb. / 1.41 kg
1G/10G Advanced chassis module	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	4.2 lb. / 1.91 kg
40G Advanced chassis module	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	3.9 lb. / 1.77 kg
1G/10G PowerSafe chassis modules	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	3.6 lb. / 1.63 kg
40G PowerSafe chassis modules	1.6 in. / 40 mm	6.9 in. / 174 mm	12.1 in / 308 mm	3.3 lb. / 1.5 kg
AC Power Supply Unit	3.3 in. / 85 mm	4.2 in / 106 mm	9.2 in. / 234 mm	3.3 lb. / 1.5 kg
DC Power Supply Unit	3.3 in. / 85 mm	4.2 in / 106 mm	9.4 in. / 239 mm	2.8 lb. / 1.3 kg
Rear Fan Tray	3.3 in. / 85 mm	6.3 in / 159 mm	5.1 in. / 129 mm	1.3 lb. / 0.6 kg

Power Specifications

nGenius 4204 PFS Components	Specifications
Base chassis	100 to 240 V AC, 130 W. Fully loaded: 720 W, 8.0 A -48 V DC, 125 W. Fully loaded: 600 W, 15.0 A
1G/10G standard chassis module	39 W AC, 36 W DC
40G standard chassis module	33 W AC, 31 W DC
1G/10G Advanced chassis module	90 W AC, 85 W DC
40G Advanced chassis module	85 W AC, 80 W DC
1G/10G PowerSafe chassis modules	40 W AC, 38 W DC
40G PowerSafe chassis modules	34 W AC, 31 W DC
AC Power Supply Unit	720 W, 8.0 A
DC Power Supply Unit	600 W, 15.0 A
Rear Fan Tray	

Environmental Specifications

Temperature	Operating: 32 to 122 °F / 0 to +45 °C Storage: -4 to 212 °F / -20 to +100 degrees °C
Humidity	Operating: 20% - 80%, non-condensing Storage: 5% – 95%, non-condensing

Electrical and Optical Characteristics

Aspect	
Data rates	1Gbps, 10Gbps, 40Gbps
Interface types	Ethernet: 1000 Base-T, 1000 Base-SX, 1000 Base-LX, 1000 Base-ZX, 10G Base-LR, 10G Base-ER, 10G Base-ZR, 10G Base-SR, 10G SFPwire, 40G BiDi SR2, 40G Base-SR4, 40G Base-LR4, 40G Base-ER4, 40G Quadwire FDR
Propagation delay	< 3.2µs for 10G and 40G, <13.2µs for 1G

Standards and Compliance

Standard	Specification(s)
Ethernet	IEEE 802.3, IEEE 802.3u, IEEE 802.3ab, IEEE 802.3ae, IEEE 802.3z
VLAN	IEEE 802.1Q, IEEE 802.1ad
PTP	IEEE 1588-2008
NTP	IETF RFC 5905
ARP	IETF RFC 826
IP	IETF RFC 791, 2460
UDP	IETF RFC 768
TCP	IETF RFC 793
FTP	IETF RFC 959, 2228
Telnet	IETF RFC 854
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
RADIUS	IETF RFC 2865, 2866
TACACS+	IETF RFC 1492
EMC	FCC Part 15 Class A, VCCI Class A, EN55022/CISPR-22 Class A, Australia/New Zealand AS/NZS CISPR-22 Class A, CE Mark EN 55022 Class A, ETSI EN300 386 V1.3.2, EN61000-4-2, EN 61000-4-3, 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-3-2
Safety	UL 60950-1, CSA C22.2 EN 60950-1, IEC-60950-1
NEBS Level 3	GR-63, GR-1089
RoHS	RoHS 6, EU directive 2002/95/EC

Ordering Information

Part Numbers	Description
4204NA000000	nGenius 4200 series packet flow switch – 4204 chassis (4-slot), AC power
4204ND000000	nGenius 4200 series packet flow switch – 4204 chassis (4-slot), DC power
4200NMGA2000	4200 Series – 1/10G chassis module with 16 x 1Gb/10Gb SFP+ Ports
4200NMHM4000	4200 Series – 40G chassis module with 4 x 40Gb QSFP+ ports
4200NMGA2J0A	4200 Series – 1/10G Advanced chassis module with 16 x 1Gb/10Gb SFP+ & FPGA ports
4200NMHM4H0A	4200 Series – 40G Advanced chassis module with 4 x 40Gb QSFP+ & FPGA ports
4200NMGA2JDC	4200 Series – 1/10G PowerSafe chassis module with 12x 1/10G LC MM 50micron SX/SR & 4x 1/10G LC SM LX/LR ports and 8 x Bypass pairs
4200NMGA2JBC	4200 Series – 1/10G PowerSafe chassis module with 16 x 1Gb/10Gb LC SX/SR MM 50micron ports and 8 x Bypass pairs
4200NMHM4GEC	4200 Series – 40G PowerSafe chassis module with 4 x 40Gb MPO SR4 MM 50micron ports and 1 x Bypass pair
4200NMHM4HGC	4200 Series – 40G PowerSafe chassis module with 4 x 40Gb LC SR2 BiDi MM 50micron ports and 2 x Bypass pairs
4200NMGA2JAC	4200 Series – 1/10G PowerSafe chassis module with 16 x 1Gb/10Gb LC SX/SR MM 62.5micron ports and 8 x Bypass pairs
4200NMGA2JCC	4200 Series – 1/10G PowerSafe chassis module with 16 x 1Gb/10Gb LC LX/LR SM ports and 8 x Bypass pairs
4200NMHM4HFC	4200 Series – 40G PowerSafe chassis module with 4 x 40Gb LC LR4 SM ports and 2 x Bypass pairs

For transceivers, please refer to list of SFP, SFP+, and QSFP+ transceivers offered by NETSCOUT®.

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