



# DELL EMC NETWORKING N2000 SERIES SWITCHES

Energy-efficient, cost-effective 1GbE switches for modernizing and scaling network infrastructure

The N2000 switch series offers a power-efficient Gigabit Ethernet (GbE) network-access switching solution with integrated 10GbE uplinks. With high-performance capabilities and wire-speed performance, utilizing a non-blocking architecture to easily handle unexpected traffic loads, the switches offer simple management and scalability via an 84Gbps (full duplex) high availability stacking architecture that allows management of up to twelve switches from a single IP address. An integrated 80PLUS-certified power supply and features such as Energy-Efficient Ethernet and short cable detection provide energy efficiency to help decrease power and cooling costs.

## Modernize campus network architectures

Modernize campus network architectures with a power-efficient and resilient 1/10GbE switching solution with Power over Ethernet Plus (PoE+). Select N2000 models offer 24 or 48 ports of PoE+ to deliver clean power to network devices such as wireless access points (APs), Voice-over-IP (VoIP) handsets, video conferencing systems and security cameras. For greater interoperability in multivendor networks, N2000 switches offer the latest open-standard protocols and include technology to interface with Cisco protocol RPVST+ and devices using CDP. The N2000 series is also fully tested and validated to work with Dell EqualLogic™ PS-Series storage arrays.\*

## Leverage familiar tools and practices

All N-Series switches include Dell EMC Networking OS 6, designed for easier deployment, greater interoperability and a lower learning curve for network administrators. One common command line interface (CLI) and graphic user interface (GUI) using a well-known command language gets skilled network administrators productive quickly. With USB auto-configuration, network administrators can rapidly deploy mirrored configurations to numerous devices by simply inserting a USB key.

## Deploy with confidence at any scale

N2000 series switches help create performance assurance with a data rate up to 220Gbps (full duplex) and a forwarding rate up to 256Mpps. Scale easily with built-in rear stacking ports. Switch stacks of up to 600 1GbE ports can be managed from a single screen using the highly-available stacking architecture for high-density aggregation with seamless redundant availability. N-Series switches help provide certainty with a lifetime warranty that covers software upgrades, hardware repair or replacement, and optics and cables purchased with the switch. Details at [Dell.com/LifetimeWarranty](http://Dell.com/LifetimeWarranty)\*\*

## Hardware, performance and efficiency

- Up to 48 line-rate GbE RJ-45 ports and two integrated 10GbE SFP+ ports.
- Support for 24 ports of PoE+ in 1RU or up to 48 ports of PoE+ with an optional external power supply.
- N2128PX-ON supports PoE 60W over its 4 2.5GbE ports, delivering up to 60W per port and bandwidth for Wave 2 wireless.
- Up to 600 1GbE ports in a 12-unit stack for high-density, high-availability in IDFs, MDFs and wiring closets.
- Non-stop forwarding and fast failover in stack configurations.
- Energy-Efficient Ethernet and lower power PHYs reduce power to inactive ports and idle links, providing energy savings from the power cord to the port.
- Dell Fresh Air compliance for operation in environments up to 113°F (45°C) helps reduce cooling costs in temperature constrained deployments.

## Deploying, configuring and managing

- USB auto-configuration rapidly deploys the switch without complex TFTP configurations or sending technical staff to remote offices.
- Management via an intuitive and familiar CLI, embedded web server (GUI), SNMP-based management console application (including Dell OpenManage Network Manager), Telnet or serial connection.
- Private VLAN extensions and Private VLAN Edge support.
- AAA authorization, TACACS+ accounting and RADIUS support for comprehensive secure access support.
- Authentication tiering allows network administrators to tier port authentication methods such as 802.1x, MAC Authentication
- Bypass and Captive Portal in priority order so that a single port can provide flexible access and security.
- Achieve high availability and full bandwidth utilization with MLAG and support firmware upgrades without taking the network offline.
- Interfaces with RPVST+ protocol for greater flexibility and interoperability in Cisco networks.
- Layer 3 Standard IPv4 and IPv6 functionality including static routing, RIP, and OSPFv2 support.

\*Contact your Dell EMC representative for a full list of validated storage arrays.

\*\*Select Networking products carry a Lifetime Limited Warranty with Basic Hardware Service (repair or replacement) for life. Repair or replacement does not include troubleshooting, configuration, or other advanced service provided by Dell ProSupport.

Product	Description
<b>N2000 series</b>	<p>N2024: 24x RJ45 10/100/1000Mb auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 100W PSU</p> <p>N2024P: 24x RJ45 10/100/1000Mb PoE+ (up to 30.8W) autosensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU (requires C15 plug)</p> <p>N2048: 48x RJ45 10/100/1000Mb auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 100W PSU</p> <p>N2048P: 48x RJ45 10/100/1000Mb PoE+ (up to 30.8W) autosensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU (requires C15 plug)</p> <p>N2128PX-ON: 24x RJ45 10/100/1000Mb PoE+ (up to 30.8W) auto-sensing ports, 4x RJ45 10/100/1000/2500Mb PoE 60W auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU (requires C15 plug)</p>
<b>Power cords</b>	<p>C13 to NEMA 5-15, 3M</p> <p>C13 to C14, 2M</p> <p>C15 to NEMA 5-15, 2M (C15 for POE N-Series only)</p>
<b>Power supplies (optional)</b>	<p>RPS720 external power supply for N2000 non-POE (720 watts): N2024 and N2048 (sold separately)</p> <p>MPS1000 external power supply for N2000 PoE+ switches (1000 watts): N2024P, N2048P, N2128PX-ON (sold separately)</p>
<b>Optics (optional)</b>	<p>Transceiver, SFP, 1000BASE-T</p> <p>Transceiver, SFP, 1000BASE-SX, 850nm wavelength, up to 550m reach</p> <p>Transceiver, SFP, 1000BASE-LX, 1310nm wavelength, up to 10km reach</p> <p>Transceiver, SFP, 1000BASE-ZX, 1550nm wavelength, up to 80km reach</p> <p>Transceiver, SFP+, 10GbE, LRM, 1310nm wavelength, up to 220m reach</p> <p>Transceiver, SFP+, 10GbE, SR, 850nm wavelength, up to 300m reach</p> <p>Transceiver, SFP+, 10GbE, LR, 1310nm wavelength, up to 10km reach</p> <p>Transceiver, SFP+, 10GbE, ER, 1550nm wavelength, up to 40km reach</p>
<b>Cables (optional)</b>	<p>Stacking cable 0.5m, 1m and 3m</p> <p>Dell Networking cable, SFP+ to SFP+, 10GbE, copper twinax direct attach cable, 0.5m, 1m, 3m, 5m and 7m</p>

## Technical specifications

### Physical

2 rear stacking ports (21Gbps) supporting up to 84Gbps (full duplex)

2 integrated front 10GbE SFP+ dedicated ports USB (Type A) port for configuration via USB flash drive

Auto-negotiation for speed and flow control

Auto MDI/MDIX, port mirroring

Flow-based port mirroring

Broadcast storm control

Energy-Efficient Ethernet per port settings

Redundant variable speed fans

Air flow: I/O to power supply

Integrated power supply: 100W AC (N2024, N2048), 1,000W AC (N2024P, N2048P, N2128PX-ON)

RJ45 console port with RS232 signaling (RJ-45 to female DB-9 connector cable included)

Dual firmware images on-board

Switching engine model: Store and forward

### Chassis

Size (1RU, H x W x D):

N2024 and N2048: 1.7 in x 17.3 in x 10.1 in (43.5 mm x 440.0 mm x 257.0 mm)

N2024P, N2048P, N2128PX-ON: 1.7 in x 17.3 in x 15.2 in (43.5 mm x 440.0 mm x 387.0 mm)

Approximate weight: 8.1351lbs/3.69kg (N2024), 14.0435lbs/6.37kg (N2024P), 8.9287lbs/4.05kg (N2048), 14.9914lbs/6.8kg (N2048P), 15.05lbs/6.8kg (N2128PX-ON)

Rack mounting kit with 2 mounting brackets, bolts and cage nuts

### Environmental

Power supply efficiency: 80% or better in all operating modes

Max. thermal output (BTU/hr): 117.44 (N2024), 3,113.33 (N2024P), 167.7 (N2048), 6069.80 (N2048P)

Power consumption max (watts): 42.9 (N2024), 913 (N2024P), 53.9 (N2048), 1738 (N2048P), 1039.8 (N2128PX-ON)

Operating temperature: 32° to 113°F (0° to 45°C)

Operating humidity: 95%

Storage temperature: -40° to 149°F (-40° to 65°C)

Storage relative humidity: 85%

### Performance

MAC addresses: 32K

Static routes: 256 (IPv4)/128 (IPv6)

Dynamic routes: 256 (IPv4)

Switch fabric capacity: 172Gbps (N2024 and N2024P) (full duplex); 192Gbps (N2128PX-ON); 220Gbps (N2048 and N2048P)

Forwarding rate: 128Mpps (N2024 and N2024P); 164Mpps (N2048 and N2048P); 256Mpps (N2128PX-ON)

Link aggregation: 128 LAG groups, 144 dynamic ports per stack, 8 member ports per LAG

Priority queues per port: 8

Line-rate Layer 2 switching: All (non-blocking)

Line-rate Layer 3 routing: All (non-blocking)

Flash memory: 256MB (512MB for N2128PX-ON)

Packet buffer memory: 4MB (5MB for N2128PX-ON)

CPU memory: 1GB (2GB for N2128PX-ON)

RIP routing interfaces: 256

VLAN routing interfaces: 256

VLANs supported: 4,094

Protocol-based VLANs: Supported

ARP entries: 1,024

NDP entries: 400

Access control lists (ACL): Supported

MAC and IP-based ACLs: Supported

Time-controlled ACLs: Supported

Max number of ACLs: 100

Max ACL rules system-wide: 2,048

Max rules per ACL: 1,023

Max ACL rules per interface (IPv4): 1,024 (ingress), 512 (egress)

Max ACL rules per interface (IPv6): 512 (ingress), 256 (egress)

Max VLAN interfaces with ACLs applied: 24

### IEEE compliance

802.1AB LLDP

Dell Voice VLAN

Dell ISDP (inter-operates with devices running CDP)

802.1D Bridging, Spanning Tree

802.1p Ethernet Priority (User Provisioning and Mapping)

Dell Adjustable WRR and Strict Queue Scheduling

802.1Q VLAN Tagging, Double VLAN Tagging, GVRP

802.1S Multiple Spanning Tree (MSTP)

802.1v Protocol-based VLANs  
 802.1W Rapid Spanning Tree (RSTP)  
 Dell RSTP-Per VLAN (compatible with Cisco's RPVST+)  
 Dell Spanning tree optional features: STP root guard, BPDU guard, BPDU filtering  
 802.1X Network Access Control, Auto VLAN  
 802.2 Logical Link Control  
 802.3 10BASE-T  
 802.3ab Gigabit Ethernet (1000BASE-T)  
 802.3ac Frame Extensions for VLAN Tagging  
 802.3ad Link Aggregation with LACP  
 802.3ae 10 Gigabit Ethernet (10GBASE-X)  
 802.3at PoE+ (N2024P and N2048P)  
 802.3AX LAG Load Balancing  
 Dell Multi-Chassis LAG (MLAG)  
 Dell Policy Based Forwarding  
 802.3az Energy Efficient Ethernet (EEE)  
 802.3u Fast Ethernet (100BASE-TX) on Management Ports  
 802.3x Flow Control  
 802.3z Gigabit Ethernet (1000BASE-X)  
 ANSI LLDP-MED (TIA-1057)  
 MTU 9,216 bytes

### RFC compliance and additional features

#### General Internet protocols

General Internet protocols are supported. For a detailed list, please contact your Dell EMC representative.

#### General IPv4 protocols

General IPv4 protocols are supported. For a detailed list, please contact your Dell EMC representative.

#### General IPv6 protocols

General IPv6 protocols are supported. For a detailed list, please contact your Dell EMC representative.

#### Layer 3 functionality

1058 RIPv1 2082 RIP-2 MD5 Auth  
 1724 RIPv2 MIB Extension 2453 RIPv2

#### Multicast

2365 Admin scoped IP Mcast 4541 IGMP v1/v2/v3  
 2932 IPv4 MIB Snooping and Querier  
 IEEE 802.1ag draft 8.1 – Connectivity Fault Management

#### Quality of service

2474 DiffServ Field 2697 srTCM  
 2475 DiffServ Architecture 4115 trTCM  
 2597 Assured Fwd PHB Dell L4 Trusted Mode  
 Dell Port Based QoS(TCP/UDP) Services Mode Dell UDLD

#### Dell Flow Based QoS

Services Mode (IPv4/IPv6)

#### Network management and security

1155 SMIv1 1573 Evolution of Interfaces  
 1157 SNMPv1  
 1212 Concise MIB Definitions 1612 DNS Resolver MIB Extensions  
 1213 MIB-II 1643 Ethernet-like MIB  
 1215 SNMP Traps 1757 RMON MIB  
 1286 Bridge MIB 1867 HTML/2.0 Forms with File Upload Extensions  
 1442 SMIv2  
 1451 Manager-to-Manager MIB 1901 Community-based SNMPv2  
 1492 TACACS+ 1907 SNMPv2 MIB  
 1493 Managed Objects for Bridges MIB

1908 Coexistence Between SNMPv1/v2  
 2011 IP MIB  
 2012 TCP MIB  
 2013 UDP MIB  
 2068 HTTP/1.1  
 2096 IP Forwarding Table MIB  
 2233 Interfaces Group using SMIv2  
 2246 TLS v1  
 2271 SNMP Framework MIB  
 2295 Transport Content Negotiation  
 2296 Remote Variant Selection  
 2346 AES Ciphersuites for TLS  
 2576 Coexistence Between SNMPv1/v2/v3  
 2578 SMIv2  
 2579 Textual Conventions for SMIv2  
 2580 Conformance Statements for SMIv2  
 2613 RMON MIB  
 2618 RADIUS Authentication MIB  
 2620 RADIUS Accounting MIB  
 2665 Ethernet-like Interfaces MIB  
 2666 Identification of Ethernet Chipsets  
 2674 Extended Bridge MIB  
 2737 ENTITY MIB  
 2818 HTTP over TLS  
 2819 RMON MIB (groups 1, 2, 3, 9)  
 2856 Text Conv. For High Capacity Data Types  
 2863 Interfaces MIB  
 2865 RADIUS  
 2866 RADIUS Accounting  
 2868 RADIUS Attributes for Tunnel Prot.  
 2869 RADIUS Extensions  
 3410 Internet Standard Mgmt. Framework  
 3411 SNMP Management Framework

3412 Message Processing and Dispatching  
 3413 SNMP Applications  
 3414 User-based security model  
 3415 View-based control model  
 3416 SNMPv2  
 3417 Transport Mappings  
 3418 SNMP MIB  
 3577 RMON MIB  
 3580 802.1X with RADIUS  
 3737 Registry of RMOM MIB  
 4086 Randomness Requirements  
 4113 UDP MIB  
 4251 SSHv2 Protocol  
 4252 SSHv2 Authentication  
 4253 SSHv2 Transport  
 4254 SSHv2 Connection Protocol  
 4419 SSHv2 Transport Layer Protocol  
 4521 LDAP Extensions  
 4716 SECSH Public Key File Format  
 6101 SSL  
 6398 IP Router Alert  
 Dell Enterprise MIB supporting routing features draft-ietf-hubmib-etherif-mib-v3-00.txt (Obsoletes RFC 2665)  
 Dell LAG MIB Support for 802.3ad Functionality  
 Dell sflow version 1.3 draft 5  
 Dell 802.1x Monitor Mode  
 Dell Custom Login Banners  
 Dell Dynamic ARP Inspection  
 Dell IP Address Filtering  
 Dell Tiered Authentication  
 Dell RSPAN  
 Dell Change of Authorization  
 Dell OpenFlow 1.3  
 Dell Python Scripting  
 Dell Support Assist HiveManager NG

### Regulatory, environment and other compliance

#### Safety and emissions

Australia/New Zealand: ACMA RCM Class A  
 Canada: ICES Class A; cUL  
 China: CCC Class A; NAL  
 Europe: CE Class A  
 Japan: VCCI Class A  
 USA: FCC Class A; NRTL UL; FDA 21 CFR 1040.10 and 1040.11  
 Eurasia Customs Union: EAC  
 Germany: GS mark  
 Product meets EMC and safety standards in many countries inclusive of USA, Canada, EU, Japan, China.  
 For more country-specific regulatory information and approvals, please see your Dell EMC representative.

#### RoHS

Product meets RoHS compliance standards in many countries inclusive of USA, EU, China, and India. For more country-specific RoHS compliance information, please see your Dell EMC representative.

#### EU WEEE

EU Battery Directive

#### REACH

#### Energy

Japan: JEL

#### Certifications (available or coming soon)

Available with US Trade Agreements Act (TAA) compliance.

N-Series products have the necessary features to support a PCI compliant network topology.

## IT Lifecycle Services for Networking

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