Dell Networking N2000 series

Dell Networking N2000 is a series of energy-efficient and cost-effective 1GbE switches designed for modernizing and scaling network infrastructure. N2000 switches utilize a comprehensive enterprise-class Layer 2+ feature set, deliver consistent, simplified management and offer high-availability device and network design.

The N2000 switch series offers a power-efficient Gigabit Ethernet (GbE) network-access switching solution with integrated 10GbE uplinks. The N2000 switch series has 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 12 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, all N-Series switches offer the latest open-standard protocols and include technology to interface with Cisco protocol RPVST+* and devices using CDP. Achieve high availability and full bandwidth utilization with Multi-chassis Link Aggregation (MLAG). All N-Series switches support MLAG to create active/active loop-free redundancy without spanning tree.

Leverage familiar tools and practices

All N-Series switches include Dell 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. This allows network administrators to maintain consistent configurations by running one OS release across all N-Series products. 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 164Mpps. 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.**

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.

- 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 122°F (50°C) helps reduce cooling costs in temperature constrained deployments.

Deploying, configuring and managing

- USB auto-configuration rapidly deploys the switch without setting up 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.

- Advanced Layer 2+ IPv4 and IPv6 functionality including static routing and Routing Information Protocol support.

- Policy based forwarding provides access control for all packets that are bridged within a VLAN or that are routed into or out of a VLAN.

- Remote Switch Port Analyzer (RSPAN) monitors ports across a Layer 2 domain without costly dedicated network taps.

*Available starting with OS 6.1 release

**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.

Specifications: Dell Networking N2000 series

Dell SKU description

N2024: 24x RJ45 10/100/1000 Mb auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 100W PSU

N2024P: 24x RJ45 10/100/1000 Mb PoE+ (up to 30.8w) auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU

N2048: 48x RJ45 10/100/1000 Mb auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 100W PSU

N2048P: 48x RJ45 10/100/1000 Mb PoE+ (up to 30.8w) auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU

Power cords
125V, 15A, 10 feet, NEMA 5-15/C13
250V, 12A, 2 meters, C13/C14
Country- and region-specific power cord options available

Power supplies (optional)
RPS720 external power supply for N2000 non-POE (720 watts): N2024 and N2048 (sold separately)
MPS1000 external power supply for N2000 PoE+ switches (1000 watts): N2024P and N2048P (sold separately)

Optics (optional)
Transceiver, SFP, 1000BASE-T
Transceiver, SFP, 1000BASE-SX, 850nm wavelength, up to 550m reach
Transceiver, SFP, 1000BASE-LX, 1310nm wavelength, up to 10km reach
Transceiver, SFP, 1000BASE-ZX, 1550nm wavelength, up to 80km reach
Transceiver, SFP+, 10GbE, LRM, 1310nm wavelength, up to 220m reach
Transceiver, SFP+, 10GbE, SR, 850nm wavelength, up to 300m reach
Transceiver, SFP+, 10GbE, LR, 1310nm wavelength, up to 10km reach
Transceiver, SFP+, 10GbE, ER, 1550nm wavelength, up to 40km reach

Cables (optional)
Stacking cable 0.25m, 1m and 3m
Dell Networking, cable, SFP+ to SFP+, 10GbE, copper twinax direct attach cable, 0.5m, 1m, 3m, 5m and 7m

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)
RJ45 console port with RS232 signaling (RJ-45 to female DB-9 connector cable included)
Dual firmware images on-board

Chassis

Size (1RU): 1.7 in x 17.3 in x 10.1 in (43.5 mm x 440.0 mm x 257.0 mm) (H x W x D) (N2024 and N2048)
1.7 in x 17.3 in x 15.2 in (43.5 mm x 440.0 mm x 387.0 mm) (H x W x D) (N2024P and N2048P)
Approximate weight: 8.1351lbs/3.69kg (N2024), 14.0435lbs/6.37kg (N2024P), 8.9287lbs/4.05kg (N2048), 14.9914lbs/6.8kg (N2048P)
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)
Operating temperature: 32° to 122°F (0° to 50°C)
Operating humidity: 95%
Storage temperature: −40° to 149°F (−40° to 65°C)
Storage relative humidity: 85%

Performance

MAC addresses:	8,192
Static routes:	256 (IPv4)/128 (IPv6)
Dynamic routes:	256 (IPv4)
Switch fabric capacity: (full duplex)	172Gbps (N2024 and N2024P) 220Gbps (N2048 and N2048P)
Forwarding rate:	128Mpps (N2024 and N2024P) 164Mpps (N2048 and N2048P)

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
Packet buffer memory:	4MB
CPU memory:	1GB
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)
802.3AX	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

*Available starting with Dell Networking OS 6.1 release

RFC compliance and additional features

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

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

General IPv6 protocols
General IPv6 protocols are supported. For a detailed list, please contact your Dell 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 Snooping and Querier
2932	IPv4 MIB		

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 (TCP/UDP)
Dell	Port Based QoS Services Mode		
Dell	Flow Based QoS Services Mode (IPv4/IPv6)		

Network management and security

1155	SMIv1	2856	Text Conv. For High Capacity Data Types
1157	SNMPv1	2863	Interfaces MIB
1212	Concise MIB Definitions	2865	RADIUS
1213	MIB-II	2866	RADIUS Accounting
1215	SNMP Traps	2868	RADIUS Attributes for Tunnel Prot.
1286	Bridge MIB	2869	RADIUS Extensions
1442	SMIv2	3410	Internet Standard Mgmt. Framework
1451	Manager-to-Manager MIB	3411	SNMP Management Framework
1492	TACACS+	3412	Message Processing and Dispatching
1493	Managed Objects for Bridges MIB	3413	SNMP Applications
1573	Evolution of Interfaces	3414	User-based security model
1612	DNS Resolver MIB Extensions	3415	View-based control model
1643	Ethernet-like MIB	3416	SNMPv2
1757	RMON MIB	3417	Transport Mappings
1867	HTML/2.0 Forms with File Upload Extensions	3418	SNMP MIB
1901	Community-based SNMPv2	3577	RMON MIB
1907	SNMPv2 MIB	3580	802.1X with RADIUS
1908	Coexistence Between SNMPv1/v2	3737	Registry of RMOM MIB
2011	IP MIB	4086	Randomness Requirements
2012	TCP MIB	4113	UDP MIB
2013	UDP MIB	4251	SSH Protocol
2068	HTTP/1.1	4252	SSH Authentication
2096	IP Forwarding Table MIB	4253	SSH Transport
2233	Interfaces Group using SMIv2	4254	SSH Connection Protocol
2246	TLS v1	4419	SSH Transport Layer Protocol
2271	SNMP Framework MIB	4521	LDAP Extensions
2295	Transport Content Negotiation	4716	SECSH Public Key File Format
2296	Remote Variant Selection	6101	SSL
2346	AES Ciphersuites for TLS	6398	IP Router Alert
2576	Coexistence Between SNMPv1/v2/v3	Dell	Enterprise MIB supporting routing features draft-ietf-hubmib-etherif- mib-v3-00.txt (Obsoletes RFC 2665)
2578	SMIv2		
2579	Textual Conventions for SMIv2		
2580	Conformance Statements for SMIv2	Dell	LAG MIB Support for 802.3ad Functionality
2613	RMON MIB	Dell	sflow version 1.3 draft 5
2618	RADIUS Authentication MIB	Dell	802.1x Monitor Mode
2620	RADIUS Accounting MIB	Dell	Custom Login Banners
2665	Ethernet-like Interfaces MIB	Dell	Dynamic ARP Inspection
2666	Identification of Ethernet Chipsets	Dell	IP Address Filtering
2674	Extended Bridge MIB	Dell	Tiered Authentication
2737	ENTITY MIB	Dell	RSPAN
2818	HTTP over TLS	Beta	OpenFlow 1.0
2819	RMON MIB (groups 1, 2, 3, 9)		

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
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 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 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.

Learn More at Dell.com/Networking