



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. 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 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 113°F (45°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.

*Contact your Dell 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.

Specifications: Dell Networking N2000 series

Dell SKU description

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

N2024P: 24x RJ45 10/100/1000Mb PoE+ (up to 30.8w) auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU (requires C15 plug)

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

N2048P: 48x RJ45 10/100/1000Mb PoE+ (up to 30.8w) auto-sensing ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W PSU (requires C15 plug)

Power cords

C13 to NEMA 5-15, 3M

C13 to C14, 2M

C15 to NEMA 5-15, 2M (C15 for POE N-Series only)

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

Switching engine model: Store and forward

Chassis

Size (RU): 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: 8.135lbs/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): 11744 (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 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: 8K (16K theoretical*)

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

Dynamic routes: 256 (IPv4)

Switch fabric capacity: 172Gbps (N2024 and N2024P)

(full duplex) 220Gbps (N2048 and N2048P)

Forwarding rate: 128Mpps (N2024 and N2024P)

Link aggregation:	164Mpps (N2048 and N2048P) 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)
802.3at	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 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	SMIPv1	2856	Text Conv. For High Capacity Data Types
1157	SNMPv1		Interfaces MIB
1212	Concise MIB Definitions	2863	2865
1213	MIB-II		RADIUS
1215	SNMP Traps	2866	RADIUS Accounting
1286	Bridge MIB	2868	RADIUS Attributes for Tunnel Prot.
1442	SMIPv2		RADIUS Extensions
1451	Manager-to-Manager MIB	2869	Internet Standard Mgmt. Framework
1492	TACACS+	3410	SNMP Management Framework
1493	Managed Objects for Bridges MIB	3411	Message Processing and Dispatching
1573	Evolution of Interfaces Resolvers MIB	3412	SNMP Applications
1612	DNS Resolver MIB	3412	User-based security model
1643	Ethernet-like MIB	3413	View-based control model
1757	RMOM MIB	3414	SNMPv2
1867	HTML/2.0 Forms with File Upload Extensions	3415	SNMPv2 MIB
1901	Community-based SNMPv2	3416	SNMP MIB
1907	SNMPv2 MIB	3417	SNMP MIB
1908	Coexistence Between SNMPv1/v2	3577	RMOM MIB
2011	IP MIB	3580	802.1X with RADIUS
2012	TCP MIB	3737	Registry of RMOM MIB
2013	UDP MIB	4086	Randomness Requirements
2068	HTTP/1.1		UDP MIB
2096	IP Forwarding Table MIB	4113	SSHv2 Protocol
2233	Interfaces Group using SMIPv2	4251	SSHv2 Authentication
2246	TLS v1	4252	SSHv2 Transport
2271	SNMP Framework MIB	4254	SSHv2 Connection Protocol
2295	Transport Content Negotiation	4419	SSHv2 Transport Layer Protocol
2296	Remote Variant Selection	4521	LDAP Extensions
2346	AES Ciphersuites for TLS	4716	SECSSH Public Key File Format
2576	Coexistence Between SNMPv1/v2/v3	6101	SSL
2578	SMIPv2	6398	IP Router Alert
2579	Textual Conventions for SMIPv2	Dell	Enterprise MIB supporting routing features draft-ietf-hubmib-etherif-mib-v3-00.txt (Obsoletes RFC 2665)
2580	Conformance Statements for SMIPv2	Dell	LAG MIB Support for 802.3ad Functionality sflow version 1.3 draft 5
2613	RMOM MIB	Dell	802.1x Monitor Mode
2618	RADIUS Authentication MIB	Dell	Custom Login Banners
2620	RADIUS Accounting MIB	Dell	Dynamic ARP Inspection
2665	Ethernet-like Interfaces MIB	Dell	IP Address Filtering
2666	Identification of Ethernet Chipsets	Dell	Tiered Authentication
2674	Extended Bridge MIB	Dell	RSPAN
2737	ENTITY MIB	Dell	Demo OpenFlow 1.0
2818	HTTP over TLS		
2819	RMOM 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.

*Available in 6.2 release under the capability to carve up the memory allocation.

© 2014 Dell Inc. All rights reserved. Dell, the DELL logo and the DELL badge are trademarks of Dell Inc. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell disclaims proprietary interest in the marks and names of others. This document is for informational purposes only. Dell reserves the right to make changes without further notice to the products herein. The content provided is as-is and without expressed or implied warranties of any kind. Additional features may be supported and not listed. For a detailed list, please contact your Dell representative.

