

CAMPUS NETWORKING QUICK REFERENCE GUIDE

Last update: September 2018



CAMPUS CORE

| Series | N4000 Series | | | |
|--------------------------------|---|--------|---|--------|
| Overview | High density, power efficient and flexible 1/10/40GbE switches for large enterprise campus distribution and small network cores. | | | |
| Models (all sized 1RU) | N4032 | N4032F | N4064 | N4064F |
| Performance | | | | |
| Switch capacity (Gbps) | 640 | | 1280 | |
| Forwarding capacity (Mpps) | 476 | | 952 | |
| Buffer size | 9MB | | | |
| Ports | | | | |
| 10/100/1000 Base-T | - | - | - | - |
| 1GbE (SFP) | - | - | - | - |
| 10GbE | 24 (up to 32 using 2 QSFP ports and cables) | | 48 (up to 64 using 4 QSFP ports and cables) | |
| 40GbE (QSFP+) | 2 using module | | 2 built-in (up to 4 using module) | |
| Expansion module slots | 1 slot with 3 optional modules: 2 port QSFP+, 4 port SFP+, 4 port 10GBase-T | | | |
| Power-over-Ethernet ports | - | | | |
| Power and cooling | | | | |
| Max. power consumption (watts) | 240 | 176 | 395 | 220 |
| AC power supplies | 2 hot-swappable power supply bays, 2 PSUs included | | | |
| Redundant power | Yes, built-in | | | |
| Airflow | I/O panel to PSU | | | |
| Features | | | | |
| Stacking | Stacks up to 12 using 10Gb or 40Gb user ports | | | |
| VLANs | 4094 | | | |
| VLAN support | Voice VLAN, Private Edge, Protocol and MAC-based, GVRP | | | |
| Layer 2 and 3 | Layer 3 Advanced | | | |
| IPv4/IPv6 routing | IPv4/IPv6, RIP, OSPFv3, VRRP, static routing | | | |
| Multicast support | IGMP v1/v2/v3, IGMP Proxy, IGMP Snooping and Querier, DVMRP, PIM-DM, PIM-SM | | | |
| Rapid deployment | Ready rails, deploy switch configuration files, stacking commands and firmware updates by simply inserting a USB device into the port. | | | |
| iSCSI optimization | iSCSI aware (detect and prioritize iSCSI traffic into pre-defined QoS); iSCSI auto-configuration (switch configuration routine automatically sets up and optimizes performance with Dell EqualLogic storage arrays) | | | |
| Management and security | | | | |
| Switch security | Strong passwords, password masking, management access control - privilege levels. RADIUS and TACACS+ support, 802.1x port-based authentication. | | | |
| SNMP support | SNMPv1/2/3 | | | |
| sFlow | Yes | | | |
| Management | GUI access via http/https. CLI via console, Telnet, SSH | | | |

The Dell EMC Campus Vision: One Network

The Dell EMC Networking portfolio of enterprise-class wired and wireless, next-generation management and industry-leading support combines into "One Network" designed to meet the needs of your business. Our cost-effective, future-ready solutions reduce complexity and integrate seamlessly into existing networks for flexible growth and investment protection.

| C9000 Series | | | | C1048P |
|--|---------------------------------|--------------------------------|-------------------------------|--|
| Next-generation, multi-rate capable modular switching platform for medium to large campus and mid-market data center networks. | | | | Rapid access node for the C9000 switching platform |
| 2.56T Route Processor Module (RPM) | 6-port 10/40GbE QSFP+ line card | 24-port 1/10GbE SFP+ line card | 24-port 1/10GBASE-T line card | 48-port 10/1000BASE-T PoE+ rapid access node |
| | | | | |
| <p>C9010 network director 8RU platform with modular slots for up to 10 line card modules, two route processor modules (RPM), three fan modules and four power supply modules. Integrated backplane is 100GbE multi-rate capable (up to 600Gbps to each line card slot).</p> | | | | |

Lifetime Warranty

All the switches in this guide (except X-series**) are backed by an industry-leading, Lifetime Warranty which guarantees Basic Hardware Service (hardware repair or replacement) for as long as you own the product*.

*Repair or replacement does not include configuration or other advanced service and support provided by Dell ProSupport Services.

Dell.com/LifetimeWarranty

Network Management

As your infrastructure gets larger and more complex, it can be a real headache to keep track of every device in your network.

OpenManage Network Manager allows you to view complete physical and logical inventories of your network, get detailed connectivity information of each device, and automate network functions. Try it free.

Dell.com/NetworkManager

Lifecycle Services

Most organizations benefit from additional levels of support to protect their IT investment and maximize productivity. Choose:

- Consulting Services
- Deployment Services
- Managed Services
- Support Services

Get a free business consultation at

DellEMC.com/Services

1/10GbE (LAYER 2/3 SWITCHING)

| Series | N3000 Series | | | | | | N2000 Series | | | | |
|--------------------------------|---|------------|------------|-----------------------------------|------------|--|--|-------|-------------------|---------|------------|
| Overview | Power efficient and resilient 1/10GbE switches with advanced Layer 3 distribution and dense PoE+ for small to medium-sized businesses and office wiring closets. | | | | | | Powerful 1/10GbE switches providing efficient Layer 2+ access for personal computers, entry-level servers and other network devices. | | | | |
| Models (all sized 1RU) | N3024ET-ON | N3048ET-ON | N3024EF-ON | N3024EP-ON | N3048EP-ON | N3132PX-ON | N2024 | N2048 | N2024P | N2048P | N2128PX-ON |
| Performance | | | | | | | | | | | |
| Switch capacity (Gbps) | 212 | 260 | 212 | 212 | 260 | 328 | 172 | 220 | 172 | 220 | 192 |
| Forwarding capacity (Mpps) | 158 | 193 | 158 | 158 | 193 | 428 | 128 | 164 | 128 | 164 | 256 |
| Buffer size | 4MB | | | | | 5MB | 4MB | | | | 2MB |
| Ports | | | | | | | | | | | |
| 10/100/1000 Base-T | 24 | 48 | - | 24 | 48 | 32 | 24 | 48 | 24 | 48 | 24 |
| 1GbE (SFP) | 2 combo | 2 combo | 24 | 2 combo | 2 combo | 4 | - | | | | 2 |
| 10GbE | 2 fixed SFP+ and 2 modular (auto-negotiate 1/10Gb) | | | | | 4 | 2 SFP+ (auto-negotiate 1/10Gb) | | | | 4 PoE 60W |
| Expansion module slots | 1 slot with 2 optional modules: 2 port SFP+, 2 port 10GBase-T | | | | | - | - | - | - | - | - |
| Power-over-Ethernet ports | - | | | 24 PoE+ | 48 PoE+ | 32x 60w PoE | - | - | 24 PoE+ | 48 PoE+ | 24x PoE+ |
| Power and cooling | | | | | | | | | | | |
| Max. power consumption (watts) | 52.8 | 74.8 | 67.1 | 1287* | 2145* | 2145 | 42.9 | 53.9 | 913* | 1738* | 1039.8 |
| AC power supplies | 2 hot swappable power supply bays, 1 PSU included | | | | | 1 | 1 | | | | |
| Redundant power | Optional (internal) | | | Yes, dependent upon configuration | | | External RPS-720 | | External MPS-1000 | | |
| Airflow | I/O panel to PSU | | | | | | | | | | |
| Features | | | | | | | | | | | |
| Stacking | Stacks up to 12 using dedicated ports (N132PX-ON requires optional stacking module) | | | | | | | | | | |
| VLANs | 4094 | | | | | | | | | | |
| VLAN support | Voice VLAN, Private Edge, Protocol and MAC-based, GVRP | | | | | Voice VLAN, Private Edge VLAN, Protocol-based VLANs, Guest VLANs, GVRP, 802.1x Auto VLAN | | | | | |
| Layer 2 and 3 | Layer 3 Advanced | | | | | Layer 3 Standard | | | | | |
| IPv4/IPv6 routing | IPv4/IPv6, RIP, OSPFv3, VRRP, static routing | | | | | IPv4/IPv6, static routing, RIP, OSPFv2 | | | | | |
| Multicast support | IGMP v1/v2/v3, IGMP Proxy, IGMP Snooping and Querier, DVMRP, PIM-DM, PIM-SM | | | | | IGMP v1/2/3 snooping and querier | | | | | |
| Rapid Deployment | Ready rails, deploy switch configuration files, stacking commands and firmware updates by simply inserting a USB device into the port. | | | | | Deploy switch configuration files, stacking commands, and firmware updates by simply inserting a USB device. | | | | | |
| iSCSI optimization | iSCSI aware (detect and prioritize iSCSI traffic into pre-defined GoS); iSCSI auto-configuration (switch configuration routine automatically sets up and optimizes performance with Dell EqualLogic storage arrays) | | | | | N/A | | | | | |
| Management and security | | | | | | | | | | | |
| Switch security | Strong passwords, password masking, management access control - privilege levels. RADIUS and TACACS+ support, 802.1x port-based authentication. | | | | | | | | | | |
| SNMP support | SNMPv1/2/3 | | | | | | | | | | |
| sFlow | Yes | | | | | | | | | | |
| Management | GUI access via http/https. CLI via console, Telnet, SSH, HiveManager NG | | | | | | | | | | |

* with external power supply

1/10GbE (LAYER 2/3 SWITCHING)

| Series | N1100 Series | | | | | | N1500 Series | | | |
|--------------------------------|--|-----------|-------------------------------|-----------|-----------|-------------------------|---|-------|-------------------|---------|
| Overview | Fully managed 1/10GbE Layer 2 switching with Open Networking capabilities | | | | | | | | | |
| Models (all sized 1RU) | N1108T-ON | N1108P-ON | N1124T-ON | N1124P-ON | N1148T-ON | N1148P-ON | N1524 | N1548 | N1524P | N1548P |
| Performance | | | | | | | | | | |
| Switch capacity (Gbps) | 24 | 24 | 128 | 128 | 176 | 176 | 128 | 176 | 128 | 176 |
| Forwarding capacity (Mpps) | 18 | 18 | 96 | 96 | 132 | 132 | 128 | 164 | 128 | 164 |
| Buffer size | 1.5MB | 1.5MB | 2MB | 2MB | 2MB | 2MB | 1.5MB | | | |
| Ports | | | | | | | | | | |
| 10/100/1000 Base-T | 10 | 10 | 10 | 24 | 48 | 48 | 24 | 48 | 24 | 48 |
| 1GbE (SFP) | 2 | 2 | 2 | N | N | N | - | | | |
| 10GbE | N | N | 4 SFP+ (auto-negotiate 1/10G) | | | | 4 SFP+ (auto-negotiate 1/10Gb) | | | |
| Power-over-Ethernet ports | N | 4 | N | 12 | N | 24 | - | - | 24 PoE+ | 48 PoE+ |
| Power and cooling | | | | | | | | | | |
| Max. power consumption (watts) | 11.5 | 14.1 | 21.2 | 29.6 | 33.2 | 43.6 | 30.2 | 44.6 | 871* | 1704* |
| AC power supplies | 104W | 104W | 104W | 250W | 250W | 500W | One | | | |
| Redundant power | - | | | | | | External RPS-720 | | External MPS-1000 | |
| PoE power budget | - | 75W | - | 190W | - | 375W | - | | | |
| Airflow | IO to PSU (normal) | | | | | | I/O panel to PSU | | | |
| Features | | | | | | | | | | |
| Stacking | N/A | | 4 | | | Up to 4 using SFP ports | | | | |
| VLANs | 512 | | | | | | 512 | | | |
| VLAN support | Voice VLAN, Private Edge, Protocol-based, Auto VLAN | | | | | | Voice VLAN, Private Edge, Protocol-based, Auto VLAN | | | |
| Layer 2 and 3 | Layer 2 only | | | | | | Layer 2 with static routing and RIP | | | |
| IPv4/IPv6 routing | - | | | | | | IPv4/IPv6 | | | |
| Multicast support | - | | | | | | IPv4 MIB, IGMP v1/v2/v3 snooping and querier | | | |
| Rapid Deployment | Yes | | | | | | Yes | | | |
| Management and security | | | | | | | | | | |
| Switch security | Strong passwords, password masking, management access control - privilege levels, RADIUS and TACACS+ support, 802.1x port-based authentication | | | | | | Switch access password protection. Restricted IP address. RADIUS support, 802.1x port-based auth. | | | |
| SNMP support | SNMP v1/2/3 | | | | | | SNMPv1/2/3 | | | |
| sFlow | v1.3 draft 5 | | | | | | v1.3 draft 5 | | | |
| Management | GUI access via http/https, CLI via console, Telnet, SSH, (HiveManager NG soon) | | | | | | GUI access via http/https, CLI via console, Telnet, SSH, HiveManager NG | | | |

* with external power supply

SMART WEB MANAGED

| Series | X Series | | | | | | | | |
|--------------------------------|---|-------------------------|---------|--------------------------|---------|-------------------------------|------------------|-------------------------------|------------------|
| Overview | Smart managed 1GbE and 10GbE switches designed for small and medium businesses who crave enterprise-class network control fused with consumer-like ease | | | | | | | | |
| Models (all sized 1RU) | X1008 | X1008P | X1018 | X1018P | X1026 | X1026P | X1052 | X1052P | X4012 |
| Performance | | | | | | | | | |
| Switch capacity (Gbps) | 16 | 16 | 36 | 36 | 52 | 52 | 176 | 176 | 240 |
| Forwarding capacity (Mpps) | 11.9 | 11.9 | 26.8 | 26.8 | 38.7 | 38.7 | 131 | 131 | 178.6 |
| Buffer size | 1MB | | | | | | | | 2MB |
| Ports | | | | | | | | | |
| 10/100/1000 Base-T | 8 | 8 | 16 | 16 | 24 | 24 | 48 | 48 | - |
| 1GbE (SFP) | - | - | 2 | 2 | 2 | 2 | - | - | - |
| 10GbE | - | - | - | - | - | - | 4 SFP+ | 4 SFP+ | 12 SFP+ |
| Power-over-Ethernet ports | - | 8 PoE, up to 123W total | - | 16 PoE, up to 246W total | - | 24 PoE/PoE+, up to 369W total | - | 24 PoE/PoE+, up to 369W total | - |
| Power and cooling | | | | | | | | | |
| Max. power consumption (watts) | 9.9 | 141.8 | 14.7 | 289.9 | 17.5 | 452.8 | 60.1 | 475 | 41.7 |
| AC power supplies | One (external) | | | One | | | | | |
| Redundant power | - | | | | | | | | |
| Airflow | Fanless | Fanless | Fanless | I/O panel to PSU | Fanless | I/O panel to PSU | I/O panel to PSU | I/O panel to PSU | I/O panel to PSU |
| Features | | | | | | | | | |
| Stacking | - | | | | | | | | |
| VLANs | 4094 | | | | | | | | |
| VLAN support | Protocol based, GVRP, Voice VLAN, Guest VLAN, Private VLAN | | | | | | | | |
| Layer 2 and 3 | Layer 2+ | | | | | | | | |
| IPv4/IPv6 routing | IPv4/IPv6, static routes | | | | | | | | |
| Multicast support | IPv4 MIB, IGMP v1/v2/v3 snooping and querier | | | | | | | | |
| Rapid Deployment | - | | | | | | | | |
| Management and security | | | | | | | | | |
| Switch security | Switch access password protection. Restricted IP address. RADIUS support, 802.1x port-based auth. | | | | | | | | |
| SNMP support | SNMPv1/2/3 | | | | | | | | |
| sFlow | v1.5 [on X1052, X1052P and X4012 only] | | | | | | | | |
| Management | Web managed switch with limited CLI | | | | | | | | |

* with external power supply

** Extended Life Limited Hardware Warranty (ELW): Dell EMC X-Series products carry an Extended Life Limited Hardware Warranty (ELW) with Basic Hardware Service, which extends until 5 years after Dell EMC stops selling the product model (End-of-Life or EOL), subject to the specific clarifications and limitations listed above. The Extended Life Limited Hardware Warranty is not transferable.

AEROHIVE WIRELESS SOLUTIONS

Aerohive wireless solutions are designed for the next-generation campus network. Aerohive access points integrate a wealth of robust BYOD and security features, and can be managed remote or on-premise via the cloud-based HiveManager NG network management utility. Find the Quick Reference Guide and more at DellEMC.com/Networking.

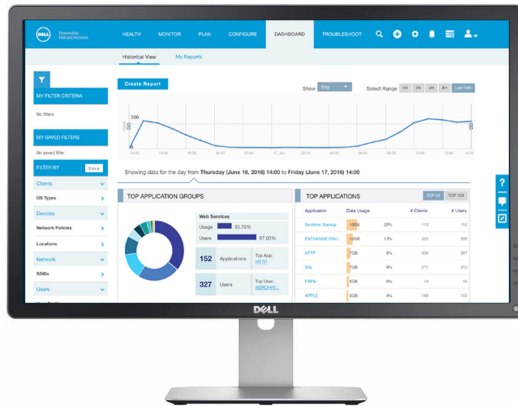


Aerohive Wireless Access Points

| Models | Overview |
|--------|---|
| AP122 | 2x2 two stream MIMO, 802.11ac, designed for low to medium density environments |
| AP130 | 2x2 two stream MIMO, 802.11ac, designed for high density environments |
| AP230 | 3x3, dual radio, three stream MIMO, 802.11n/ac, engineered for high capacity |
| AP245X | 3x3:3, dual radio, 802.11ac Wave 2 with external antenna connectors and extended temp range for challenging indoor environments |
| AP250 | 3x3:3, dual radio, 802.11ac Wave 2 with a software selectable radio, designed for extended coverage and capacity |
| AP550 | 4x4:4 dual radio, 802.11ac Wave 2 with a software selectable radio, designed for high capacity and high density environments |
| AP1130 | 2x2:2 MIMO, 802.11a/n/ac, durable design for outdoor high-bandwidth wireless deployment in harsh environments |

HiveManager NG Cloud-Based Network Management

HiveManager NG integrates the end user network by providing intuitive, powerful management for Dell N-Series switches and Aerohive wireless access points. This next-generation management solution sets a new standard for simplicity and flexibility with cloud-based, real-time monitoring, deployment and control. Learn more and register for a free 30-day trial via Dell.com/HiveManager.



RUCKUS WIRELESS SOLUTIONS

Ruckus wireless solutions, including access points, controllers and analytics for Smart Cities and Smart Enterprises, innovate across wireless and wired technology to meet industry-specific needs and the most demanding use cases. Find the Quick Reference Guide and more at DellEMC.com/Networking.



Ruckus Wireless Access Points

| Models | Overview |
|--------|--|
| R720 | High-end 802.11ac Wave 2 dual-concurrent AP with MU-MIMO, BeamFlex+ and 2.5Gbps backhaul |
| R710 | High-end 802.11ac Wave 2 dual-concurrent AP with MU-MIMO and BeamFlex+ |
| R610 | Mid-range 802.11ac Wave 2 dual-concurrent AP with MU-MIMO and BeamFlex+ |
| R510 | Mid-range 802.11ac Wave 2 dual-concurrent AP with MU-MIMO and BeamFlex+ |
| R310 | Entry level 802.11ac Wave 1 dual-concurrent AP with BeamFlex |
| H510 | 802.11ac Wave 2 dual-concurrent wall switch with five GbE ports and BeamFlex+ |
| H320 | 802.11ac Wave 2 dual-concurrent wall switch with two 10/100MbE ports and BeamFlex+ |
| T710 | High-end 802.11ac Wave 2 dual concurrent AP with BeamFlex+ |
| T610 | Mid-range 802.11ac Wave 2 dual concurrent AP with BeamFlex+ |
| T301 | Enterprise class 802.11ac AP with 120° or 30° directional integrated antennas |
| T300 | Enterprise class 802.11ac AP with integrated omni or external antennas (5GHz) |
| P300 | Point-to-Point / Multi-point bridge |

Ruckus Controllers

| Models |
|------------------------------|
| ZoneDirector 1200 |
| SmartZone 100 |
| SmartZone 300 |
| Virtual SmartZone |
| Virtual SmartZone Data Plane |
| Virtual SmartZone – H |

Ruckus Software

| Models |
|-------------------|
| SmartCell Insight |
| Zone Planner |

Learn More at DellEMC.com/Networking