Dell Networking C9010 network director and C1048P rapid access node
Providing next-generation scalability from edge to core

The Dell large enterprise network simplifies network deployment and management and extends the functionality of core devices all the way to the network edge. It achieves this by collapsing separate network tiers into a single logical switching tier, thereby removing complex protocols running between access and core/aggregation tiers, and centralizing management and control.

Next-generation modular chassis
The Dell Networking C9010 network director is a next-generation, multi-rate capable modular switching platform designed as the core/aggregation for medium to large enterprise campus and mid-market data center networks. The C9010 is the first platform delivering on the Dell unified enterprise network architecture, ushering in a new way to design and manage networks when used in conjunction with the C1048P rapid access node.

The C9010 can also be deployed as a traditional switching platform without the C1048P, serving to aggregate legacy switching platforms in wiring closets and server racks. In this deployment model, C1048P rapid access nodes can be introduced at any time to benefit from the new architecture, while maintaining investment protection for legacy switches.

The C9010 is an intelligently designed 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. The integrated backplane is 100GbE multi-rate capable (up to 600Gbps to each line card slot) and provides the investment protection necessary to deploy a modular chassis.

For line-rate designs, two RPMs provide the required bandwidth to each line card slot for inter-line card switching. Intra-line card switching is managed within the line card. Three line card options are available for design flexibility:
- 24-port SFP+ line card
- 24-port 10GBASE-T line card
- 6-port QSFP+ line card

Next-generation access
The Dell Networking C1048P extends the capabilities of the C9010 by providing 48 10/100/1000BASE-T PoE+ ports for user/server access, and two SFP+ uplinks for connectivity back to the C9010. The C1048P can be deployed stand-alone, or in a stacked configuration (up to eight units high) depending on required density and deployment model.

In this scenario, the C1048P rapid access nodes receive their configuration and software updates centrally from the C9010 network director, greatly simplifying initial deployment, and ongoing maintenance and operation.

Key applications
- Collapsed core designs
- Network tier simplification
- Medium-large network core/aggregation
- High-performance SDN/OpenFlow 1.3 enabled with ability to inter-operate with industry standard OpenFlow controllers

1 Performance rated over aggregate operation and with average packet transfers greater than 200 bytes.
Key features

- Up to 60 40GbE QSFP+ ports
- Up to 248 10GbE ports (240 SFP+ or 10GBASE-T ports plus eight SFP+ ports on two RPMs)
- Support for 2,000 virtual ports (via port extenders), and concurrent support for traditional Ethernet switches/devices
- Side-to-side airflow (right to left)
- VRF-lite enables sharing of networking infrastructure and provides L3 traffic isolation across tenants (including support for multicast and IPv6 routing)
- Enhanced automation capabilities (puppet agent, REST API extensions)
- Support for jumbo frames for high-end performance in virtualized environments and IP storage/server communication
- Removable chassis mid-walls for future support of full-width modules
- Tool-less mounting and optional ReadyRails™ port extenders stack up to eight units high
- Embedded Open Automation Framework adds VM awareness as well as automated configuration and provisioning capabilities to simplify the management of virtual network environments

Specifications: C9010 network director and C1048P rapid access node

C9010 network director
10 slot, includes 1x RPM, 1x AC PSU, 3x Fan Modules
C9010 Modular Switch, 10 slot, includes 1x RPM, 1x AC PSU, 3x Fan Modules, TAA

Redundant RPM
C9000 2.56T, Redundant RPM

Line cards
C9000 24-port 10GbE 10GBASE-T Line Card
C9000 24-port 10GbE SFP+ Line Card
C9000 6-port 40GbE QSFP+ Line Card

Redundant power supplies
C9000 2,900W Power Supply
Fans
C9000 Hot Swappable Fan Module

C1048P port extender
C1048P Port Extender, 48x 10/100/1000BASE-T PoE+ ports, 2x SFP+ ports, 2x stacking ports, 1 integrated 1000W power supply (requires C15 plug)

Software
Software, Dell Networking OS9.X, Force10 PVST+

Physical (C9010)
Up to 240 line-rate 1/10/100BASE-T ports
Up to 248 line-rate 1/10GbE SFP+ ports
Up to 60 line-rate 40GbE QSFP+ ports
3 fan modules
4 2,900W power supplies
Up to 2 RPMs
1x AC PSU, 3x Fan Modules, TAA

Redundancy
Hot swappable redundant RPMs
Hot swappable redundant power supplies

Performance
MAC addresses: 160K
IPv4 routes: 128k (in scaled mode); 16k in default mode
IPv6 routes: 32K (shared CAM space with IPv4)
RPM switch fabric capacity: 2.56Tbps (full-duplex)
1.28Tbps (half-duplex)
RPM throughput: 1,462 Mpps

MTU 12,000 bytes

IEEE compliance
802.1AB LLDP
802.18 R (Tagging/Detection/Distribution)
802.1D Bridging, STP
802.1P L2 Prioritization
802.1Q VLAN Tagging, Double VLAN Tagging, GVRP
802.1s MSTP
802.1w RSTP
802.1X Network Access Control
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) on optical ports
802.3af
802.3at
802.3u Fast Ethernet (10BASE-TX) on mgmt ports
802.3x Flow Control
802.3z Gigabit Ethernet (1000BASE-T)
ANSI/ETSI-1057 LLDP-MED
Force10 PVST+
MTU 12,000 bytes

Typical power consumption is 2,950W with full line-card load.
RFC and I-D compliance
3376 IGMPv3
3323 MD5
draft-ietf-pim-sm-v2-new-05
PIM-SM

General Internet protocols
768 UDP
793 TCP
854 Telnet
959 FTP

General IPv4 protocols
791 IPv4
826 ARP
1027 Proxy ARP
1035 DNS (client)
1042 Ethernet Transmission
1305 NTPv3
1519 CIDR
1542 BOOTP (relay)
1812 Requirements for IPv4 Routers
1918 Address Allocation for Private Internets
2474 DiffServ Field in IPv4 and IPv6
2596 Assured Forwarding PHB Group
3164 BSD Syslog
3195 Reliable Delivery for Syslog
3246 Expedited Assured Forwarding
3434 RMON High Capacity Alarm MIB
3584 Coexistence between SNMP v1, v2 and v3
3615 SNMP Traps
368 A Registry for PIM Message Types
3686 Simple Network Management Protocol (SNMP)
3687 TCP/UDP Port Numbers
4022 IP MIB
4032 IP Forwarding Table MIB
4042 Ethernet
4087 UDP
4095 Deprecation of Type 0 Routing Headers in IPv6
4113 UDP MIB

General IPv6 protocols
1997 Communities
2385 MD5
2386 Neighbor Discovery for IPv6
2439 Route Flap Damping
2796 Route Reflection
2842 Capabilities
2858 Multiprotocol Extensions
2918 Route Refresh
3065 Confederations
3424 IPv6 Stateless Address Autoconfiguration
3434 RMON High Capacity Alarm MIB
3435 IPv4 Routers
3492 Reverse Path Forwarding Vector TLV
3512 BGPv4
3550 BGPv4
3578 VRRPV

Multicast
1112 IGMPv1
2236 IGMPv2
3376 IGMPv3
5895 IPv6 Ready for both Host and Router*

Network management
113 IPv4
1155 SMIv1
1157 SNMPv1
1212 Concise MIB Definitions
1215 SNMP Traps
1493 Bridges MIB
1605 OSPFv2 MIB
1901 Community-Based SNMPv2
2011 IPv6
2096 IPv Forwarding Table MIB
2578 SMIV2
2579 Textual Conventions for SMIV2
2580 Congestion Formulations for SMIV2
2618 RADIUS Authentication MIB
2655 Ethernet-Like Interfaces MIB
2674 Extended Bridge MIB
2787 VRRP MIB
2819 RMON MIB (groups 1, 2, 3, 9)
2863 Interfaces MIB
3273 RMON High Capacity MIB
3410 SNMPv3
3411 SNMPv3 Management Framework
3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMPv3)
3432 SNMP Applications
3414 User-based Security Model (USM) for SNMPv3
3415 VACM for SNMP
3416 SNMPv2
3417 Transport mappings for SNMP
3418 SNMP MIB
3434 RMON High Capacity Alarm MIB
3584 Coexistence between SNMP v1, v2 and v3
4022 IPv6
4087 IPv Tunnel MIB
4113 UDP MIB

Inter-Domain
Routing
2439 Route Flap Damping
2796 Route Reflection
2842 Capabilities
2858 Multiprotocol Extensions
2918 Route Refresh
3065 Confederations
3424 IPv6 Stateless Address Autoconfiguration
3434 RMON High Capacity Alarm MIB
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IPv6 Ready for both Host and Router*

Regulatory compliance
Safety
UL/CSA 60950-1, Second Edition
EN 60950-1, Second Edition
IEC 60950-1, Second Edition Including All National Deviations and Group Differences
EN 60825-1 Safety of Laser Products
Part 1: Equipment Classification Requirements and User’s Guide
EN 60825-2 Safety of Laser Products
Part 2: Safety of Optical Fibre Communication Systems
FDA Regulation 21 CFR 1040.10 and 1040.11

Emissions
Australia/New Zealand: AS/NZS CISPR 22: Class A
Canada: ICES-003, Issue-4, Class A
Europe: EN 55022: (CISPR 22:), Class A
Japan: VCCI Class A
USA: FCC CFR 47 Part 15, Subpart B: Class A

Immunity
EN 300 386 EMC for Network Equipment
EN 55024
EN 61000-3-2: Harmonic Current Emissions
EN 61000-3-3: Voltage Fluctuations and Flicker
EN 61000-4-2: ESD
EN 61000-4-3: Radiated Immunity
EN 61000-4-4: EFT
EN 61000-4-5: Surge
EN 61000-4-6: Low Frequency Conducted Immunity

RoHS
All C Series components are EU RoHS compliant.

Certifications
Available with US Trade Agreements Act (TAA) compliance
USGv6 Host and Router Certified on Dell Networking OS
9.5 and greater*
IPv6 Ready for both Host and Router*

*USGv6, IPv6 Ready, and UC APL certifications contingent upon successful test completion
| Description | Supports line rate switching between line cards within the chassis. Supports up to 2,000 virtual ports. Includes 4 integrated SFP+ ports for additional connectivity options. |
| Description | Supports line rate switching for 6 40GbE ports (24 10GbE ports using breakout cables). Supports up to 2,000 virtual ports. Local switching supported on the line card. Half-width line card maximum flexibility. Per-port status and activity LEDs. |
| Description | Supports line rate switching for 24 10GbE ports through optional SFP+ modules (1GbE supported via SFP modules). Supports up to 2,000 virtual ports. Local switching supported on the line card. Half-width line card maximum flexibility. Per-port status and activity LEDs. |
| Description | Supports line rate switching for 48 10GbE ports through integrated 10GBASE-T ports (1GbE port also supported). Supports up to 2,000 virtual ports. Local switching supported on the line card. Half-width line card maximum flexibility. Per-port status and activity LEDs. |

### Ports

<table>
<thead>
<tr>
<th>Ports</th>
<th>10/100/1000BASE-T</th>
<th>None</th>
<th>None</th>
<th>None</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Ports</td>
<td>10/100/1000BASE-T</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>24 RJ45</td>
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<td>None</td>
<td>None</td>
<td>None</td>
<td>24 RJ45</td>
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<tr>
<td>Ports</td>
<td>10/40 GbE Fiber</td>
<td>None</td>
<td>6 QSFP+</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Ports</td>
<td>PoE/PoE+ Ports</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>48 PoE/PoE+</td>
</tr>
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### Optics (sold separately)

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<td>Cables (sold separately)</td>
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<tr>
<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 0.5 Meter</td>
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<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 1 Meter</td>
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<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 3 Meters</td>
<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 5 Meters</td>
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<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 5 Meters</td>
<td>Cable, SFP+ to SFP+, 10GbE, Copper Twinax Direct Attach Cable, 7 Meters</td>
</tr>
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</table>

| Maximum Power/Thermal | 190W/648 BTU/hr | 125W/426 BTU/hr | 170W/580 BTU/hr | 205W/699 BTU/hr | 1.738W/6,070 BTU/hr |
| DRAM/Flash | 24GB/32GB | 2GB/4GB | 2GB/4GB | 2GB/4GB | 1GB/256MB |
| Packet Buffer | 9MB | 9MB | 9MB | 9MB | 4MB |
| Weight | 4.18kg(9.20lbs) | 2.11kg(4.63lbs) | 2.74kg(6.03lbs) | 2.74kg(6.03lbs) | 6.81kg(14.99lbs) |