Open Networking

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Dell Networking

85%

plan to use **cloud** tools in the next 3 years (Gartner)

79%

experienced **security** incident in past year that caused financial and/or reputational impact (CP)

26Billion

# of devices managed by **Internet of things** (by 2020, MIT)

35ZB

Annual **data** generation by 2020 (35 trillion terabytes) (IDC)

Powerful disrupters to "IT as usual"

90%

% of world's **data** created in last 2 years (Microsoft)

63%

User-owned **mobile devices** used for work (sage)

78%

say **digital transformation** will become critical in 2 years (MIT)

79%

Use a smart phone when **shopping** (google)

Dell Networking innovation & thought leadership

2011
Data center chassis bottleneck
- ✓ **Active Fabric**
- ✓ **Open Automation Framework**

2012
East-west traffic optimization
- ✓ **MXL/IOA for M1000e**

Simplified fabric management
- ✓ **Active Fabric Manager**

2013
Network programmability
- ✓ **SDN – a choice**

In-rack convergence
- ✓ **S5000/S6000 ToRs**

Enterprise mobility
- ✓ **Modernized campus portfolio**

2014
Choice & Open Networking
- ✓ **Open Networking**
- ✓ **Z9500 Fabric Switch**
- ✓ **Active Fabric Controller**

2015
Open Networking
- ✓ **Extended partners**
- ✓ **Z9100-ON**
- ✓ **S4048-ON**
- ✓ **S3048-ON**

Campus/branch
- ✓ **N1500**
- ✓ **X-Series**

Network Computing

Dell N-Series Switches Bring OpenFlow to Campus Networks

NETWORKWORLD

Dell Dives Deeper into SDN with New Hardware and Software
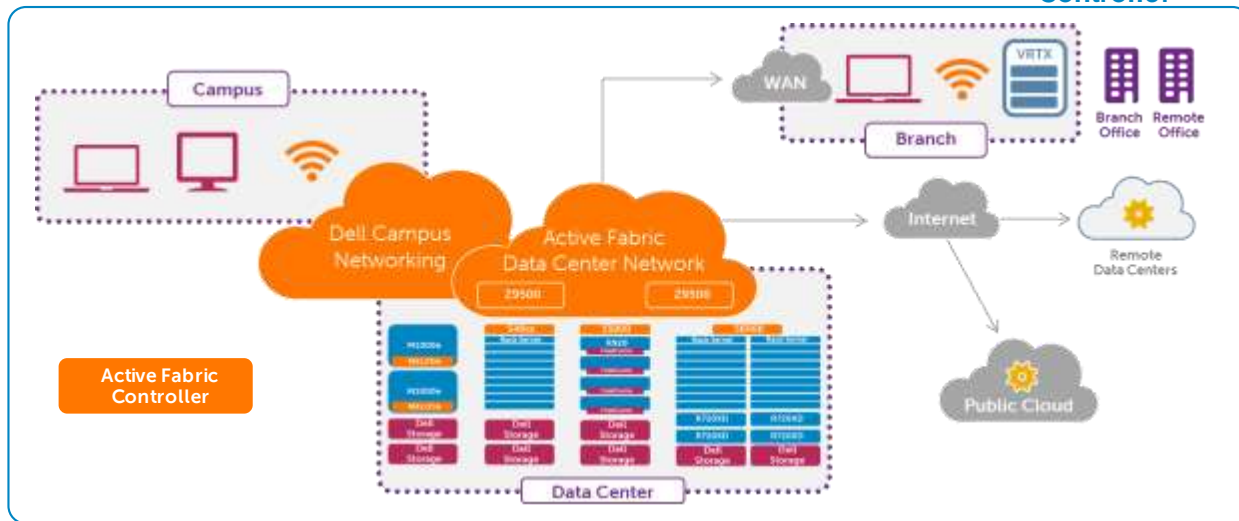
techday

Dell Unlocks New Era for Open Networking

siliconANGLE

Dell Goes All-in on Software-Defined Networking at #VMworld

Active Fabric Controller

Latest Gartner rating for Dell

> "**Dell** has emerged as a top four player in the data center networking space measured by port shipments. It has also been the **most-innovative and most-disruptive** mainstream data center networking vendor in the market over the past 12 months."
>
> **Gartner "Vendor Rating: Dell" April 2015**

Visionary furthest to the right

CHALLENGERS · LEADERS
- Cisco
- Arista Networks
- HP
- Brocade
- Dell
- Juniper Networks
- Extreme Networks
- VMware
- Huawei
- Avaya · Lenovo

ABILITY TO EXECUTE

COMPLETENESS OF VISION

NICHE PLAYERS · VISIONARIES

As of May 2015

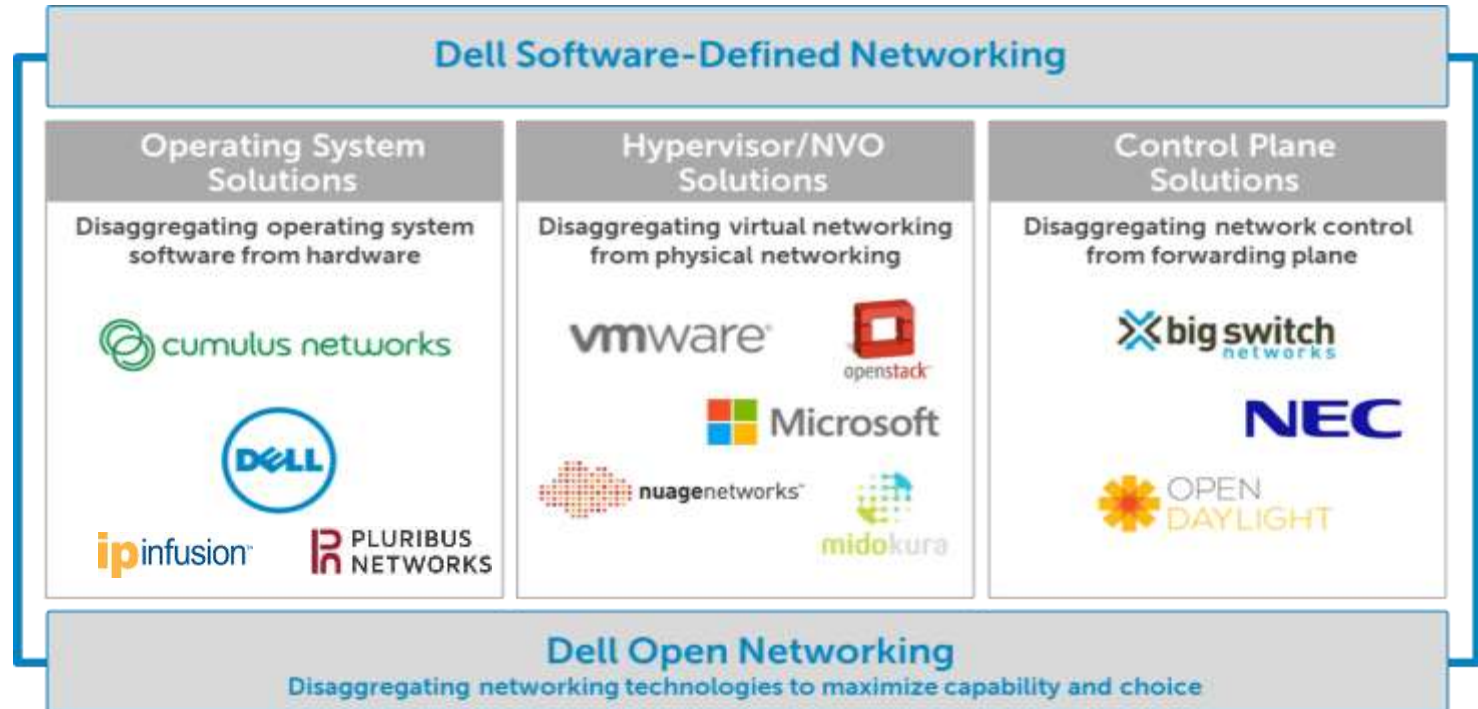http://www.dell.com/learn/us/en/uscorp1/analyst-relations-research-and-reports

Open Networking

Dell Software-Defined Networking in the data center
Powered by Open Networking, choice + innovation

Dell Software-Defined Networking

Operating System Solutions
Disaggregating operating system software from hardware

cumulus networks

DELL

ipinfusion   PLURIBUS NETWORKS

Hypervisor/NVO Solutions
Disaggregating virtual networking from physical networking

vmware   openstack

Microsoft

nuagenetworks   midokura

Control Plane Solutions
Disaggregating network control from forwarding plane

big switch networks

NEC

OPEN DAYLIGHT

Dell Open Networking
Disaggregating networking technologies to maximize capability and choice

Dell Networking data center strategic framework
Open Networking: choice & innovation

Application/Cloud environment	vmware	Microsoft	openstack	docker / Other	Chef, perl, puppet labs, python — **Automation & Programmability**
NVO/Controller software	vmware NSX	Active Fabric Manager	Active Fabric Manager / Active Fabric Controller	OPEN DAYLIGHT — Plus partners	DELL — **Management & Orchestration**
Open system software	Dell Networking Software	DELL	Plus open ecosystem for OS and L4-7 services		Plus partners
Standards-based hardware	Dell M-Series, FN-Series S-Series, Z-Series	DELL	Dell PowerEdge servers and converged systems		DELL — **Monitoring**
Merchant silicon	BROADCOM		intel		Plus partners

Integrated solutions
for SMB & mid-market

⬌

Disaggregated solutions
for large enterprise & carriers

Dell Networking Z9100-ON
Next generation fixed-form factor 10/25/40/50/100GbE fabric switch

NEW!

- **Dell's 1st 100GbE multi-rate 1RU fabric switch**
  - Multi-rate switching
    - 32 ports x 40GbE or 100GbE (QSFP28)
    - 128 ports x 10GbE or 25GbE
    - 64 ports x 50GbE.
    - Additional 2 fixed 1/10 GbE SFP+ ports
  - Support for Dell OS9.x & 3rd Party OS

- **Built for peak performance**
  - Cloud/Web2.0 , HPC & Higher Ed, Government & Enterprise/Campus/DC interconnects
  - Optimized for high performance, ultra-low latency Data Center requirements

- **Dell Innovation**
  - Flexible & multi-rate (1 to 100GbE)
  - QSFP28 100G form factor with low power, cost & space
  - Open Networking enabled with ONIE & choice of 3rd Party OS

INTERNET 2®

INTEROP BEST OF SHOW AWARD 2015

25G Ethernet 50G Consortium

Dell Networking Z9100-ON

7X
Higher density per RU vs Cisco Nexus 9504*

3X
Higher density per RU vs Juniper QFX10002*

* Source: Competitive Data Sheets

DELL

Latest Open Networking options

Chose Open Networking hardware based on your needs. Support for Open Networking Install Environment (ONIE)

 + 3rd Party OS

S3048-ON

New generation 1/10GbE top-of-rack switch

S4048-ON

New 10/40GbE top-of-rack switch
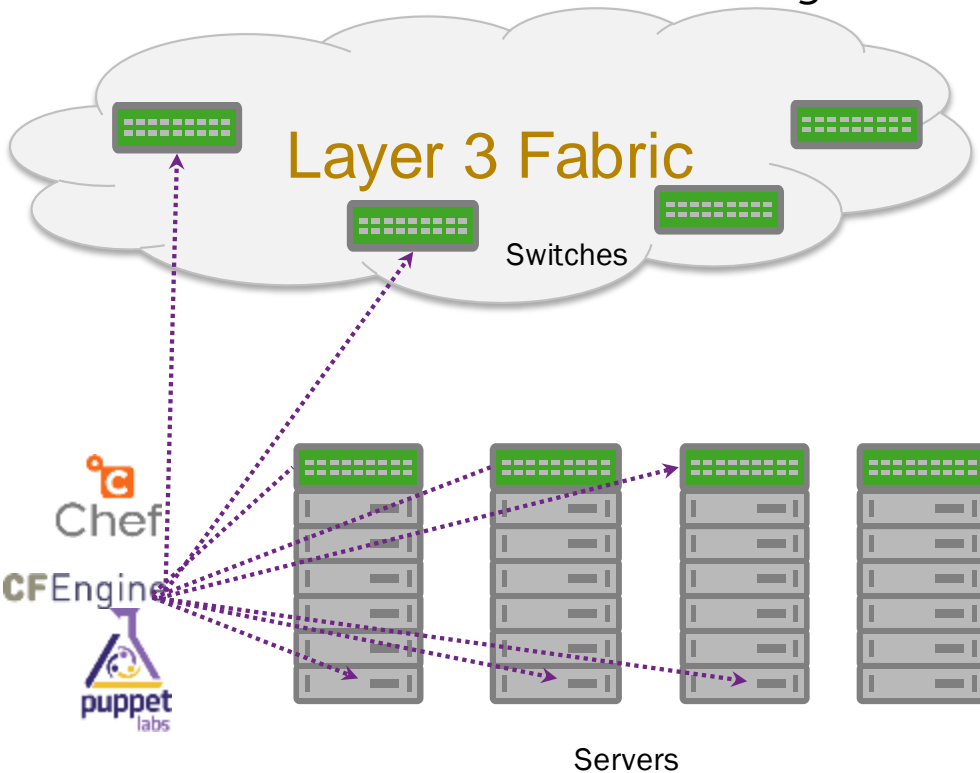48x10GbE & 6x40GbE with VXLAN

Z9100-ON

New multi-rate switch
1/10/25/40/50/100GbE
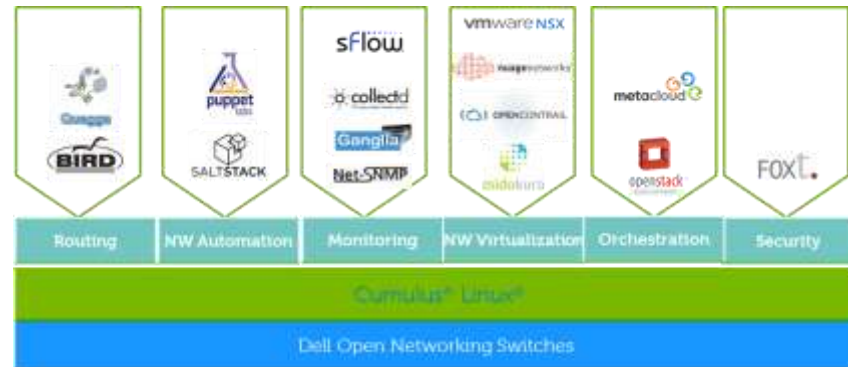32x100GbE & 2x1/10GbE

Cumulus offers significant value to customer

Consistent server-network management & rich ecosystem

Layer 3 Fabric

Switches

Servers

Common automation tools for managing servers and network
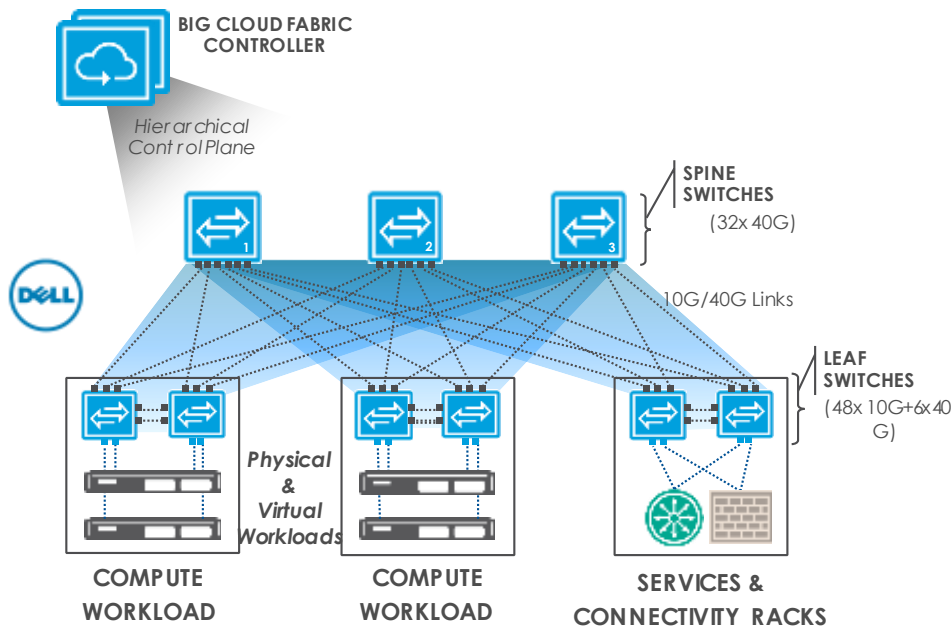
Leverage more robust tools
Move beyond basic SNMP and MIBs
Deploy agents directly on switches
Push stats and state instead of simple polling

BigSwitch cloud fabric overview

BIG CLOUD FABRIC CONTROLLER

Hierarchical Control Plane

SPINE SWITCHES
(32x 40G)

10G/40G Links

LEAF SWITCHES
(48x 10G+6x 40G)

Physical & Virtual Workloads

COMPUTE WORKLOAD

COMPUTE WORKLOAD

SERVICES & CONNECTIVITY RACKS

High Performance: Dense 10G/40G

Latest Merchant Silicon HW: Trident II

Scalable: Max scale of Trident II

Resilient: Headless Mode Operations

L4-7 Service Insertion & Chaining

Hypervisor: ESX, Hyper-V, KVM, Xen

Orchestration: OpenStack, CloudStack

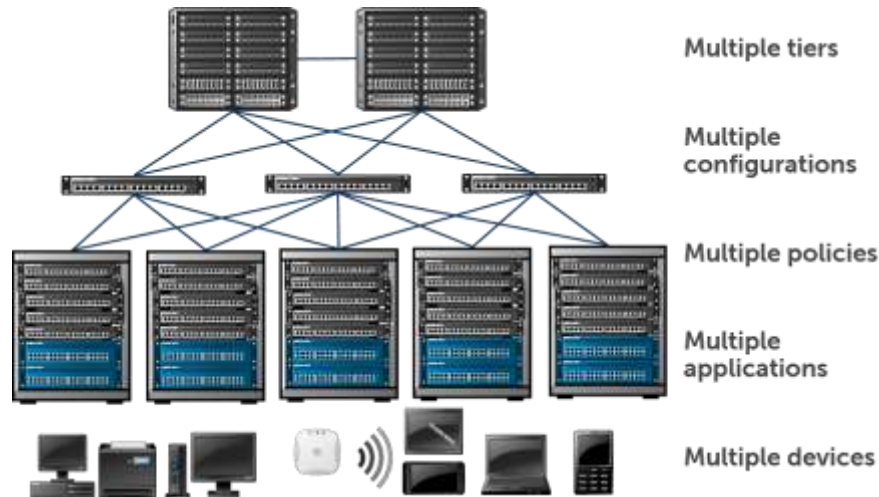| Private/Public Clouds	Big Data Analytics	VDI	…

Single "Logical" Switch (Zero-touch fabric, Dramatic TCO reduction)

Unified Campus Architecture

Traditional networks are not optimized for end users, Increases complexity for administrators

Multiple tiers

Multiple configurations

Multiple policies

Multiple applications
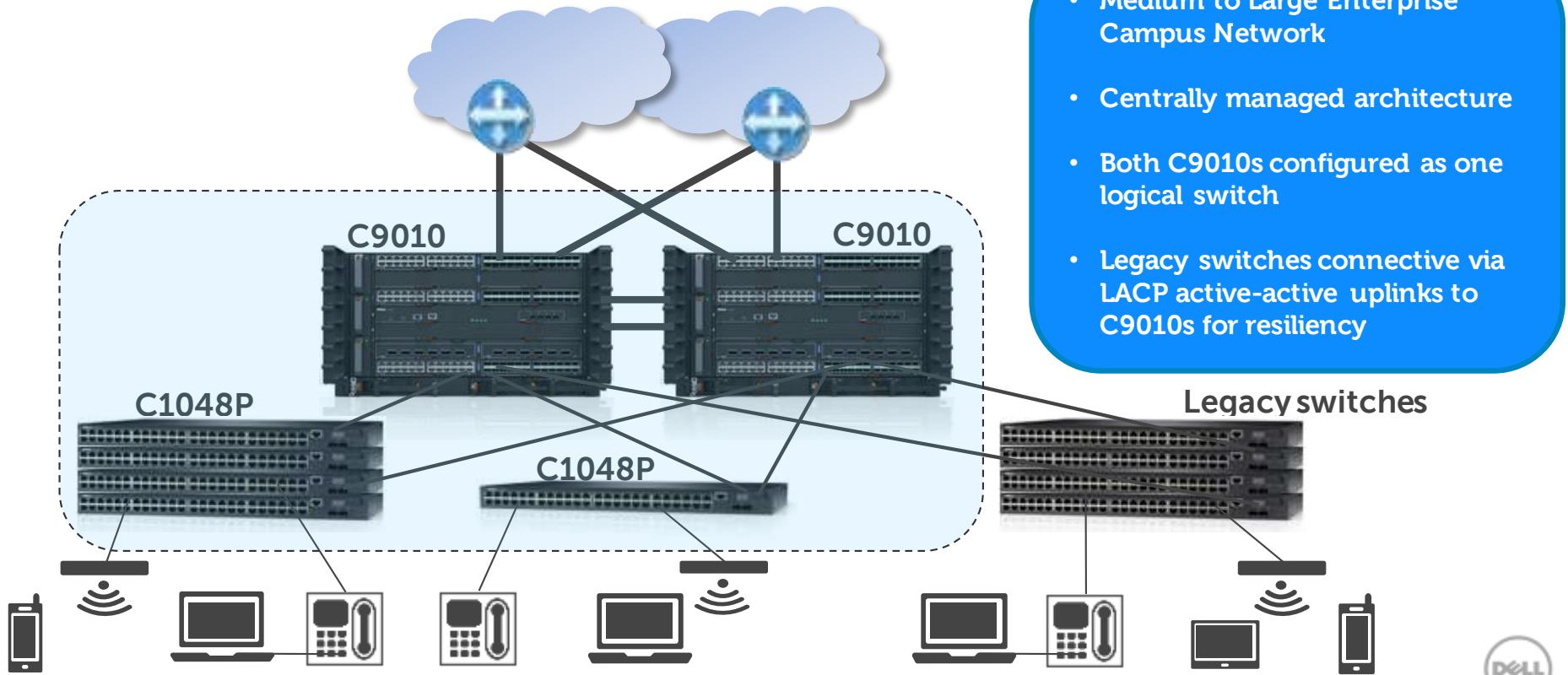
Multiple devices

Challenges

- Multiple protocols and tiering (both physical & logical)
- Policy enforcement (users, devices, content)
- Complex configurations (multiple devices & types)
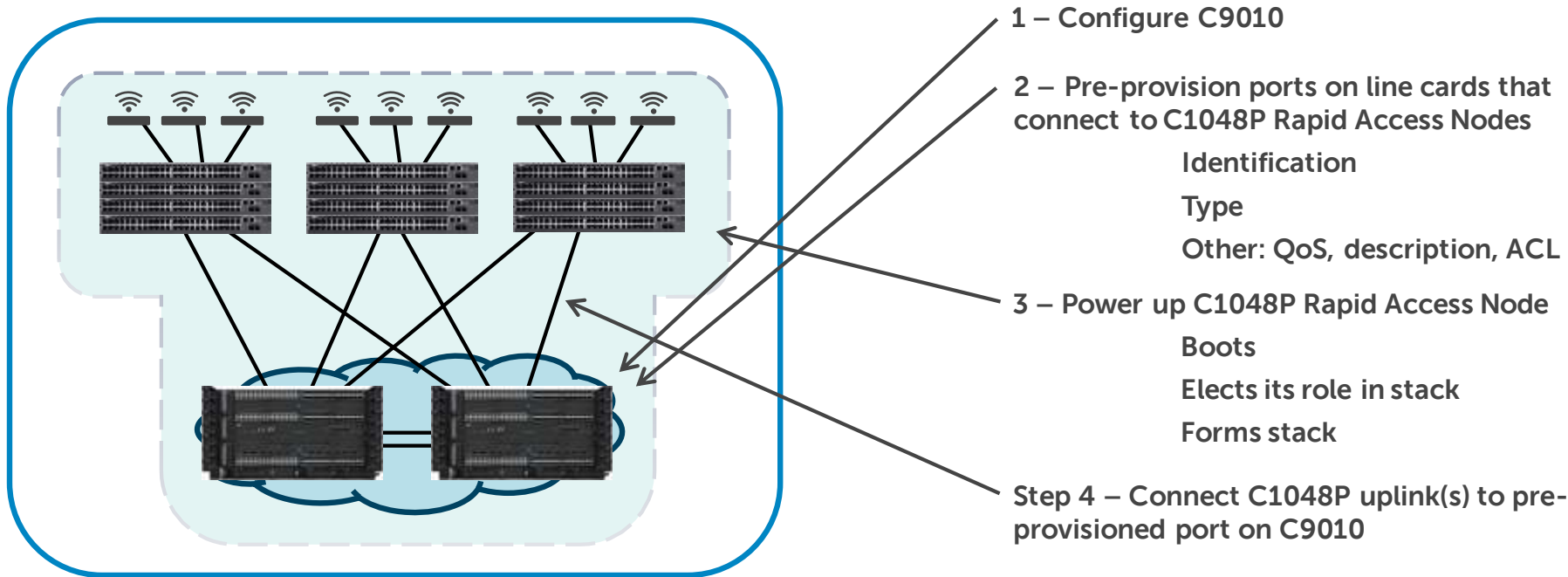- High operating costs/shrinking budgets

Requirements

- Personal device support
- "Seamless" mobility across network locations
- Multi-media usage for video, rich media
- Increased security needs
- Rapid service deployment (new services & applications)

Solution: Network Director & Rapid Access node

- Medium to Large Enterprise Campus Network

- Centrally managed architecture

- Both C9010s configured as one logical switch

- Legacy switches connective via LACP active-active uplinks to C9010s for resiliency

C9010

C9010

C1048P

C1048P

Legacy switches

Network Deployment of C9010 and C1048P

1 – Configure C9010

2 – Pre-provision ports on line cards that connect to C1048P Rapid Access Nodes

        Identification

        Type

        Other: QoS, description, ACL

3 – Power up C1048P Rapid Access Node

        Boots

        Elects its role in stack

        Forms stack

Step 4 – Connect C1048P uplink(s) to pre-provisioned port on C9010

Network Deployment of C9010 and C1048P

5 – C1048P says "hello" on the uplink(s)

6 – Once C9010 line card detects "hello", it advertises provision information to C1048P

7 – C1048P Configures itself and becomes operational

8 – All traffic can be sent to C9010 for switching, still C1048P provides:

    PoE+ power

    Policy enforcement

    802.1X-based security

Industry Leading Performance and Scalability

C9010 Network Director

Virtual Ports
Supports 2,000 Virtual Ports (40 Rapid Access Nodes) at RTS, and 4,000 Virtual Ports (80 Rapid Access Nodes) in a future release

Multi-Rate
C9010 backplane is designed to support multi-rate up to 100GbE

Stacking
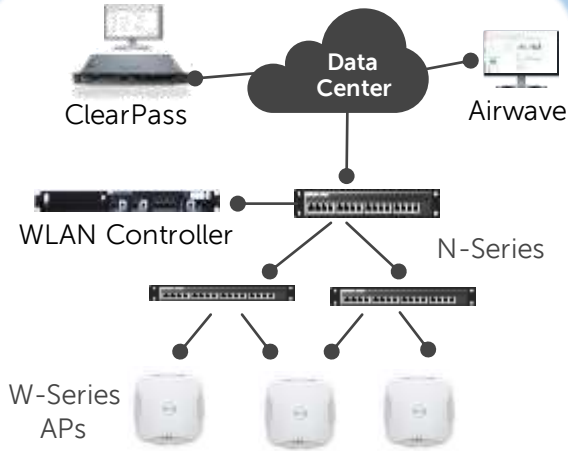Supports Rapid Access Node stacking up to 8 units high

Density
Supports up to 248 10GbE ports (SFP+ or 10GBASE-T)
Supports up to 60 40GbE ports

Mobility Solutions
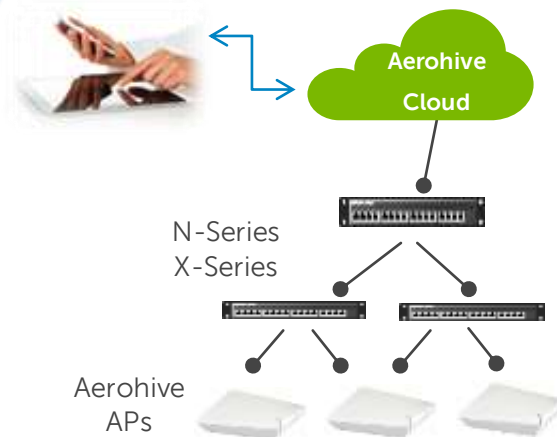
Dell Networking offers **wireless choice**

Enterprise Campus	Distributed Campus	Small Office/ROBO

Enterprise Campus

ClearPass

Data Center

Airwave

WLAN Controller

N-Series

W-Series APs

- **On-premise controller, management**
- **On-premise policy and enforcement**
  - ✓ **W-Series**

Distributed Campus

Aerohive Cloud

N-Series X-Series

Aerohive APs

- **Cloud-based management**
- **Policy management and enforcement**
  - ✓ **Aerohive**

NEW!

Small Office/ROBO

Internet

X-Series
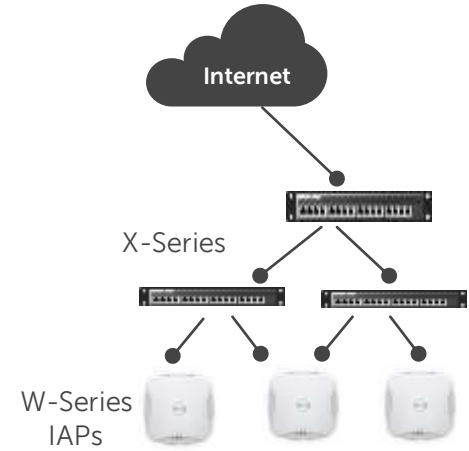
W-Series IAPs

- **Virtual controller built-in**
- **Easily expandable up to dozens of IAPs**
  - ✓ **W-Series**

Switch-like performance with 802.11ac Wave 2
Dell Networking W-320 Series high-performance access points

Best-in-class .11ac Wave 2 utilization

- Dual radio 4x4 802.11ac APs with multi-user MIMO
- Up to 1,733Mbps at 5GHz and 800Mbps at 2.4GHz
- Simultaneous multicast data transmission to multiple devices for max data throughput efficiency

Key differentiators

- Enhanced ClientMatch technology identifies and steers MU-MIMO capable mobile to the nearest AP
- Bluetooth Low-Energy (BLE) radio enables location based services with BLE-enabled mobile devices
- AppRF™ technology leverages deep packet inspection for management of over 1,500 enterprise apps
- Supports software upgrade for additional 5GHz spectrums

W-AP325/W-IAP325   W-AP324/W-IAP234

Products	
Model	**Details**
W-AP324/W-IAP324	2.4GHz and 5GHz radios, each with 4x4 MIMO support and a total of four combined, diplexed (dual-band) external RP-SMA antenna connectors
W-AP325/W-IAP325	2.4GHz and 5GHz radios, each with 4x4 MIMO support and a total of eight integrated omni-directional downtilt antennas

Number of Customers

Bar chart x-axis labels: Q1'09, Q2'09, Q3'09, Q4'09, Q1'10, Q2'10, Q3'10, Q4'10, Q1'11, Q2'11, Q3'11, Q4'11, Q1'12, Q2'12, Q3'12, Q4'12, Q1'13, Q2'13, Q3'13, Q4'13, Q1'14, Q2'14, Q3'14, Q4'14

Simple, Scalable, Secure Mobility

Proven with Over 20,000 Customers

Over 1 000 000 AP's shipped

Technology Pioneer

- Controller-less Architecture
- Cloud Networking
- Personalized Access
- Easy to expand

Dell Portfolio

802.11ac ACCESS POINTS
+
DELL SWITCHES

AP1130   AP130   AP230

HIVEMANAGER

ID MANAGER

VERTICAL APPLICATIONS
& ANALYTICS

Aerohive 802.11ac APs

	AP130	AP230	AP1130
	Indoor		Outdoor
	Dual Radio 802.11ac		
	2x2:2 300 + 867 Mbps 11ac High Power Radios	3x3:3 450 + 1300 Mbps 11ac High Power Radios	2x2:2 300 + 867 Mbps 11ac High Power Radios
	TPM Security Chip		
	1X Gig E	2X GigE w/ link agg	1X GigE
	802.3af powered	PoE (802.3af or at) and AC	PoE+ (802.3at)
	Plenum Rated		Water Proof (IP 67)
	0 to 40°C		-40 to 55°C
	No USB	USB for iBeacon	No USB
Dell - Int	$649 NAM /$699 INTL	$799 NAM/ $880 INTL	$1199 NAM/ $1549 INTL

Your cloud or ours?

Aerohive management systems run everywhere, private or public cloud—an industry first. Reduce CAPEX and OPEX by everaging the versatility of the Cloud to manage your network.

HiveManager – Cloud Management

] Centralized Configuration
] AP OS Management
] RF Planning
] Monitoring
] Reporting
] Dashboard
] Analytics
] Troubleshooting

Erbjudande: Finansiering av Dell nätverk till 0% ränta

Utrustning	• Dell nätverksprodukter med tillhörande service & mjukvara (upp till 20%)
Tillgängligt	• Kommersiella kunder i Sverige
Erbjudande & villkor	• Finansiell lease med 0% ränta från Dell Financial Services under 36 månader med betalning kvartalsvis i förskott
Belopp	• 85.000 –1.175.000 SEK
Giltighet	• Till och med 31:e januari 2016