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SDN & NFV: Building Blocks for the New IP

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Networking Needs are Evolving to Align with Modern Compute

Yesterday's Networking Requirements

Stable network operation

Vendor interoperability

Support for a wide range of protocols

*CIE Methods and practices

SNMP and MIBs

Roadmap accuracy and timing



Tomorrow's Networking Requirements

Adaptability, network agility

Openness – Support for Open Source and standard data models

Standard northbound and southbound interfaces

Programmability

RESTful interfaces and YANG Data Model

Agile development, customer visibility of supplier development methodology



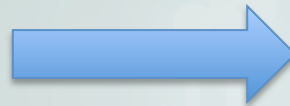
SDN: Challenging Conventional Wisdom

THE NEW IP DISRUPTS THE STATUS QUO

Conventional Wisdom:
Stability above all.

- Network performance
- Suppliers
- Gradual migrations

Challenge



New IP Thinking:
Adaptability

- Cloud, infra & app virtualization
- Service velocity
- Agile methodology

Brocade Vyatta Controller Value Proposition:

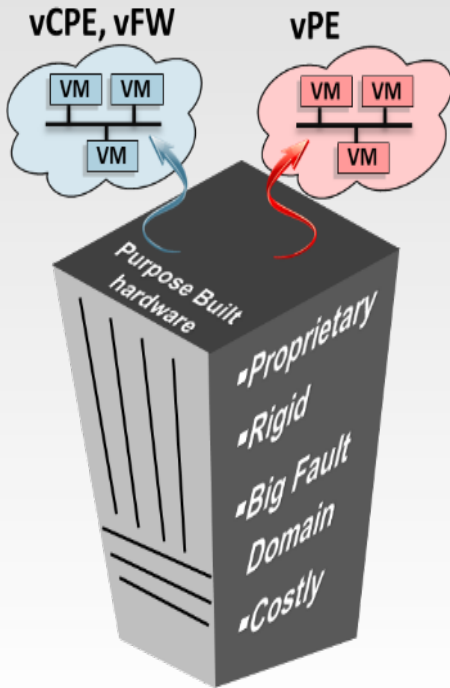
- Simple On-Ramp to SDN
- Enables self-service innovation
- Leverages the power of open-source community



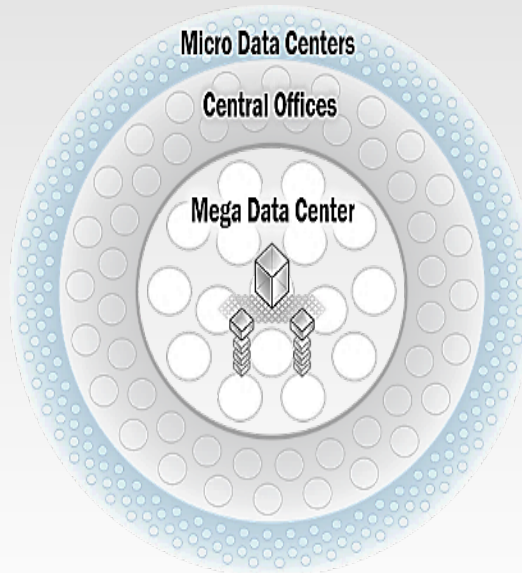
Industry Trends Influencing SW Networking Innovation

Key Trends and Concepts

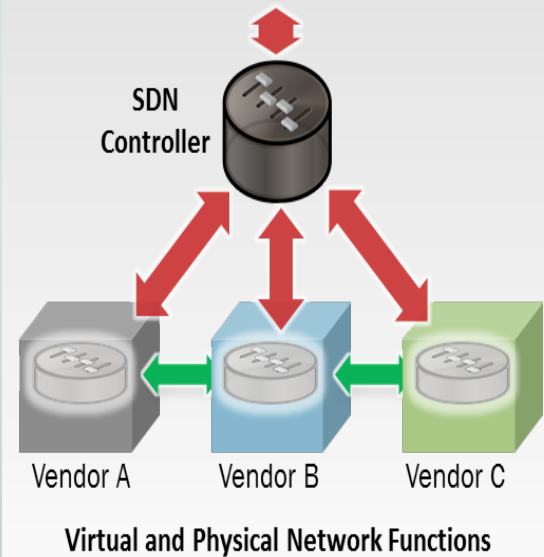
Promise of NFV



New IP DC Proliferation



SDN Complements NFV

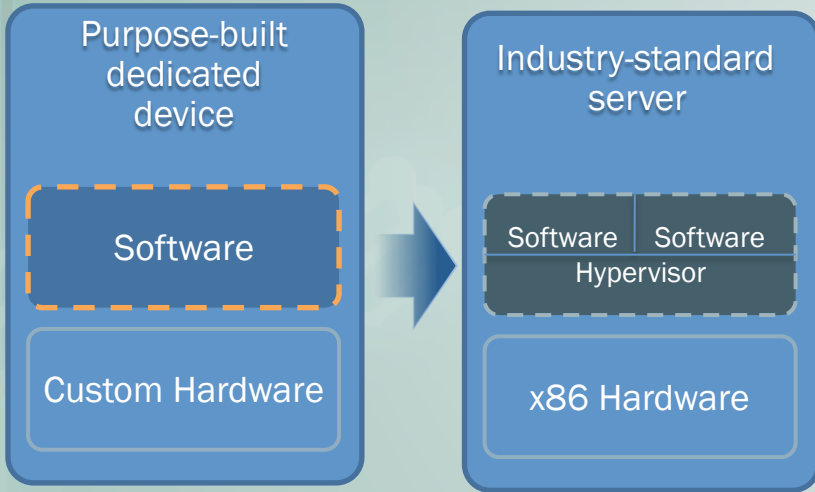




Differentiating SDN & NFV

COMPLIMENTARY, BUT INDEPENDENT TECHNOLOGIES

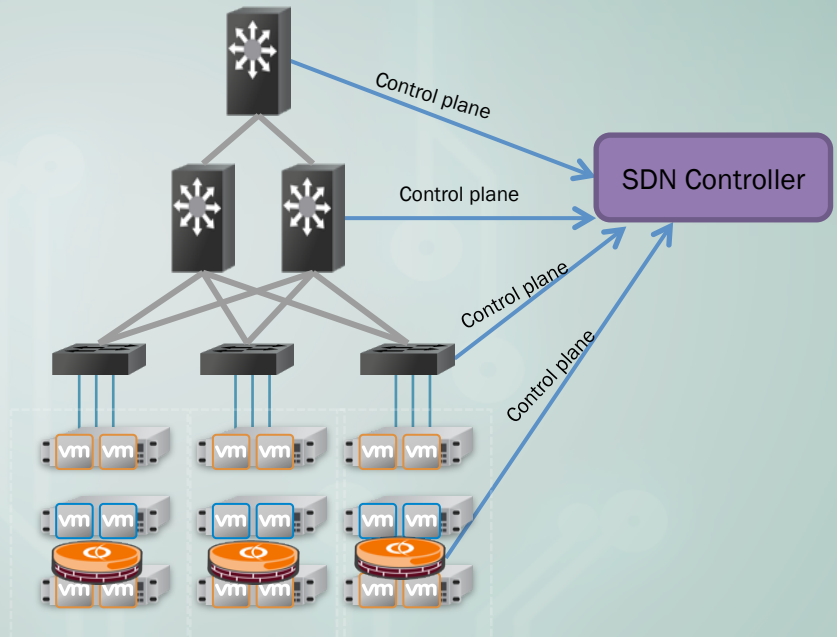
NFV



Consolidate diverse network equipment types (firewall, switching, routing, ADC, BRAS, EPC, etc.) onto industry-standard x86 servers using virtualization.

Benefits: Reduced cost and increased agility

SDN



Separate control plane from the data plane in network devices (physical and virtual) with intelligence and programmability centralized in a controller.

Benefits: Increased agility via automation and increased innovation via programmability



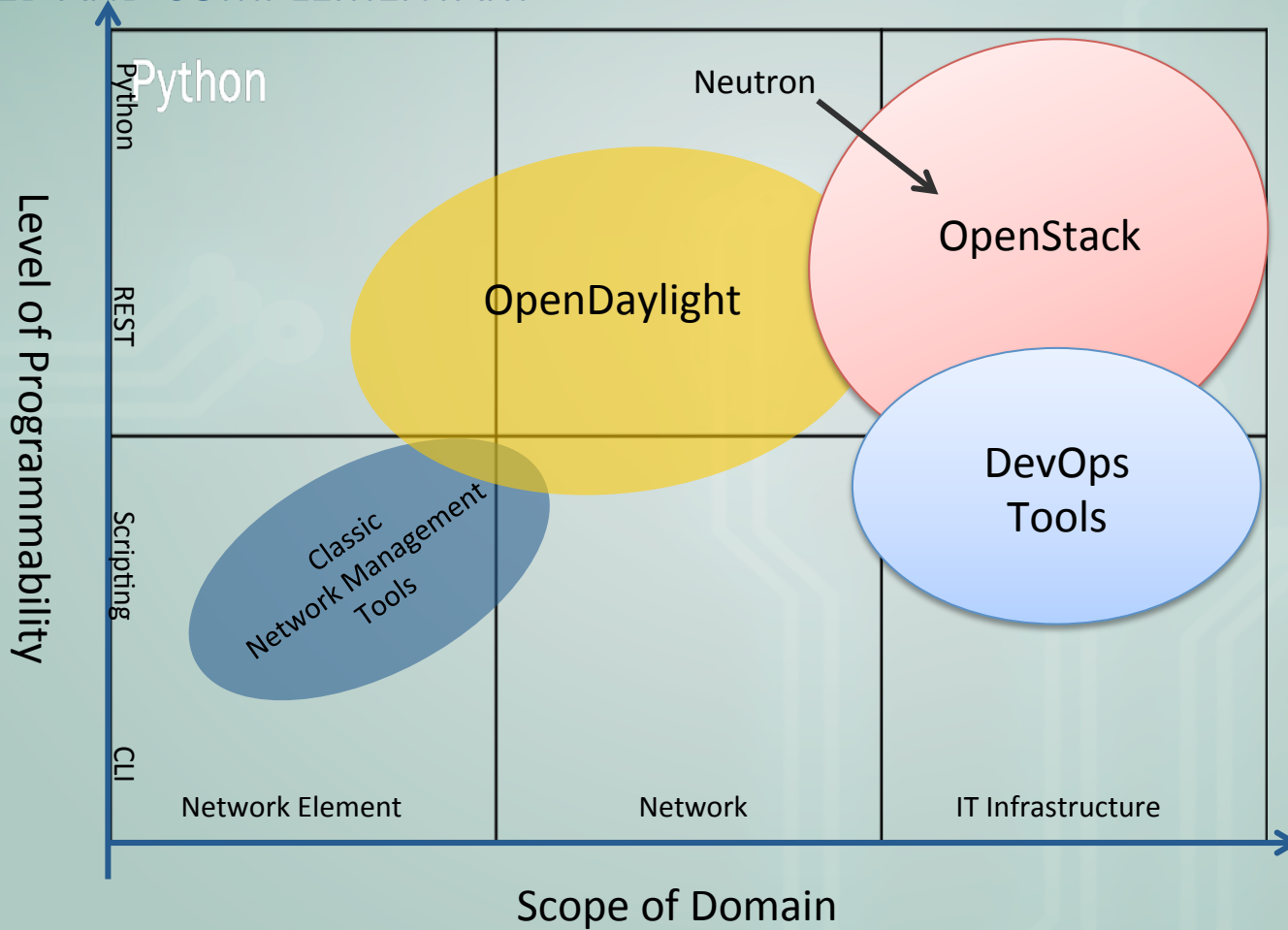
Technology Comparison

Software Defined Networking (SDN)		Network Function Virtualization (NFV)
Separate control and data, centralize control and programmability of network	Basic Concept	Relocate network functions from dedicated appliances to generic servers
Campus, data center / cloud	Target Location	Service provider network
Commodity servers and switches	Target Devices	Commodity servers and switches
Cloud orchestration and networking	Initial Applications	Routers, firewalls, gateways, CDN, WAN accelerators, SLA assurance
OpenFlow	New Protocols	None
Open Networking Foundation (ONF)	Formalization	ETSI NFV Working Group



Orchestration, Automation and SDN

RELATED AND COMPLEMENTARY





Who is Doing What?

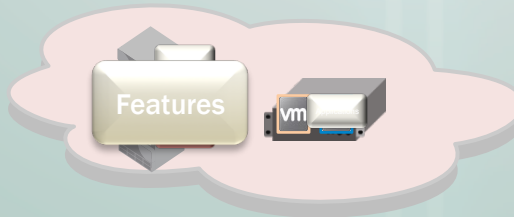
**Open
Innovation**

Applications



**Network
Functions
Virtualization**

Relocating

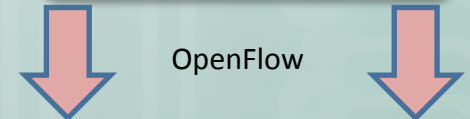


**Software Defined
Networking**

Programmatic



OpenFlow

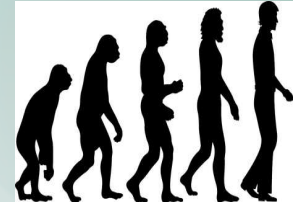




SDN Changes Everything for Customers

TECHNOLOGY, OPERATIONAL PRACTICES AND ROLES

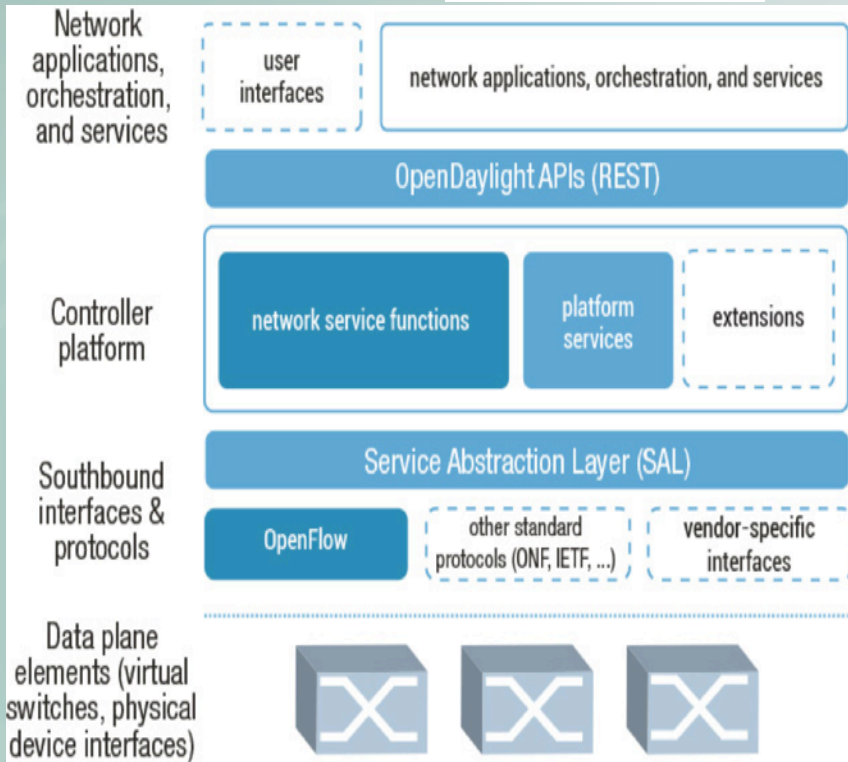
- **Technology**
 - Abstraction
 - Programmability
 - New control protocols (eg. OpenFlow, OVSDB, NETCONF)
- **Operations – Methods and Practices**
 - Focus on policy
 - Automation
 - “Agile” methodology
- **Organizational**
 - Software architecture matters
 - DevOps





The OpenDaylight Project

The Linux Foundation's open source control plane for SDN and NFV



- OpenDaylight is a widely supported framework for SDN and NFV control
- Supporting vendors include: Brocade, Cisco, Arista, Juniper, Ciena, Hewlett Packard, NEC, vmware, Huawei and many others



The Organization of SDN

NETWORK ENGINEERING AND SOFTWARE, DEVOPS NEED TO COOPERATE



Software Engineering

Agile development

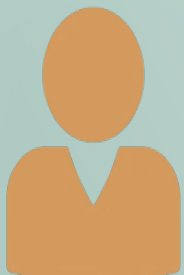
Standard data models

Adaptability, network agility

Open Source

Programmability

Policy and automation



Network Engineering

Roadmap accuracy and timing

Support for a wide range of protocols

Stable network operation

Vendor interoperability

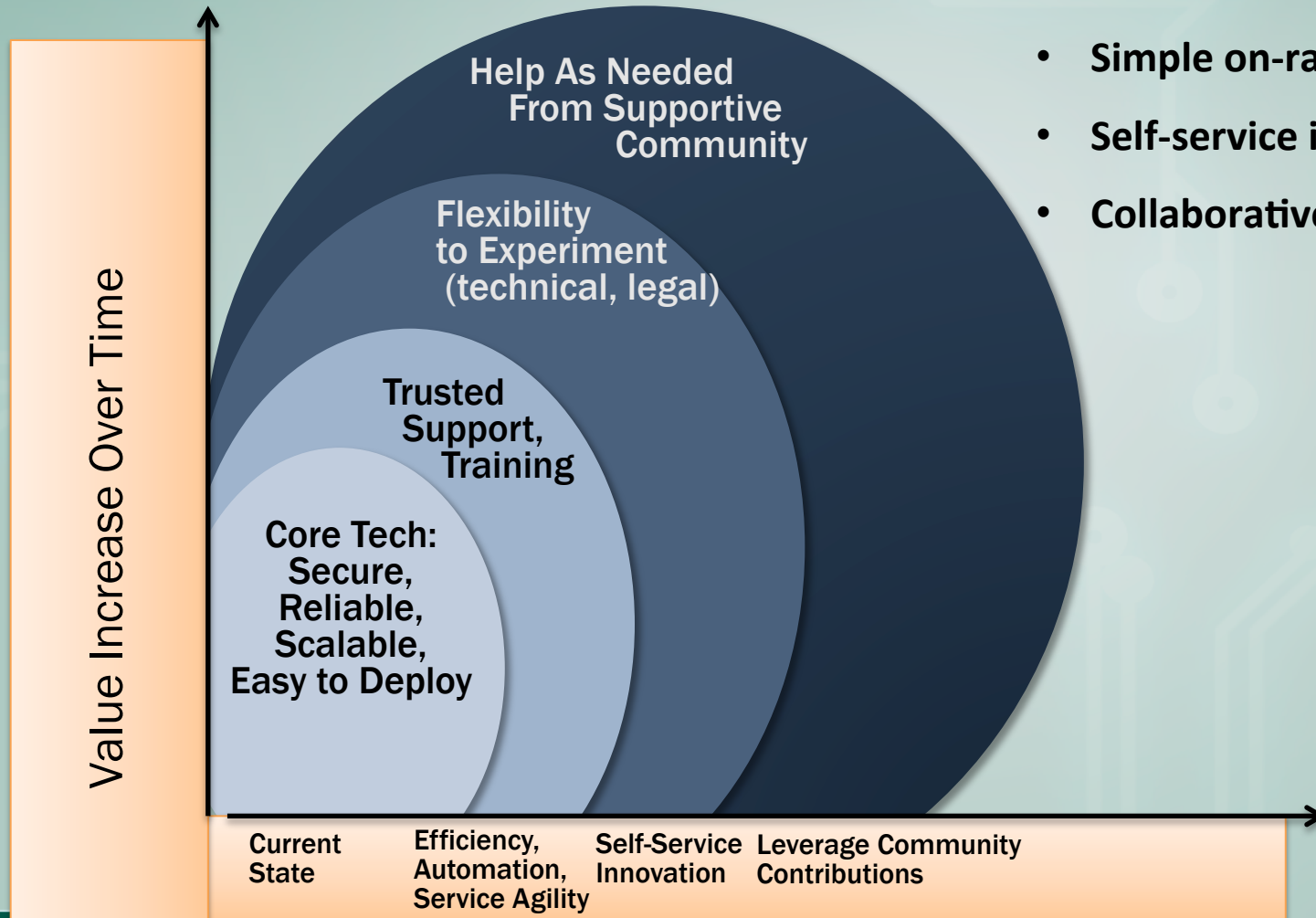
CCIE methods and practices

SNMP and MIBs



Realizing the true value of SDN

Community is the force multiplier



- Simple on-ramp to SDN
- Self-service innovation
- Collaborative community



Success Stories of Higher Education in Mexico

- 100GbE Interfaces
- 40GbE Interfaces
- NFV Implementation with Vyatta
- Hardware ready for SDN implementation
- Line rate interfaces





Summary

What Problems Are We Solving?

Dumb Plumbing – Limited Agility

Why Do We Need to Change?

Virtualization – Automation

What Is Software Defined Networking?

Paradigm Shift – Flexibility

Where Can We Use SDN?

Data Center – WAN – Campus