SDN AND CLOUD

WHEN (BUZZ)WORDS COLLIDE

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GARTNER HYPE CYCLE

- Technology Trigger
- Peak of Inflated Expectations
- Trough of Disillusionment
- Slope of Enlightenment
- Plateau of Productivity

? SDN?
SDN IN A NUTSHELL

- Disaggregating the 4 Primary Network Functions, which enables:
  - Choice of optimal processing platform for each function
  - Ability to **centralize** functions

**End Result is Better Network Efficiency and Agility**
**SDN IMPLEMENTATIONS**

**Original Focus**
Granular Control of Individual Network Elements

**Current Focus**
Control of Overlays over an IP Data Center “Transport”

**Centralized Node-by-Node**
- SDN Controller
  - e.g. OpenFlow
  - PCE
  - BGP-TE

**Centralized Edge Overlay**
- a.k.a. “Network Virtualization”
- SDN Controller
  - e.g. XMPP
  - OVSDB
  - Service Pool
EDGE OVERLAY NETWORK VIRTUALIZATION
FOR MULTIPLE TENANTS ON SHARED INFRASTRUCTURE

Overlay Control Plane
- e.g. Juniper Contrail
- e.g. VMware (Nicira) NSX
- e.g. Hyper-V Network Virt

On-Demand Overlay Tunnels
- e.g. VXLAN, NVGRE, STT, GRE

Physical Network “Substrate”

Resulting Logical Networks
INTEGRATING WITH THE IaaS CLOUD “STACK”

**IaaS** (i.e. compute and object storage services)

OpenStack Cloud Controller (Orchestration)

**Quantum (Network-as-a-Service)**

*Plug-in*

Overlay Control Plane
- e.g. Juniper *Contrail*
- e.g. Nicira (VMware) NSX
- e.g. Hyper-V Network Virtualization

Physical “Underlay”
- Capabilities
- Performance
- Security
A SIMPLE RESEARCH CLOUD

...BUT A LITTLE TOO SIMPLE
THE RESEARCH “HYBRID” CLOUD

DCI with “Seamless” Federation of Resources Across DC’s

IP/MPLS VPN for Campus Connectivity with Service Levels
BUT WAIT, WE’VE SEEN THIS BEFORE…

MPLS VPN

Juniper Contrail
(in the Data Center)
Overlay establishes a serial “chain” through multiple virtualized (or physical) network L4-7 services

Service insertion based on policy. (supports both inter and intra-tenant)
VIRTUAL NETWORKS TO MINIMIZE COMPLEXITY

NaaS (across geo’s w/DCI and VPN)

CONTROLLER
JunosV Contrail AUTOMATION & ORCHESTRATION
Control Plane

VIRTUAL NETWORKS
PRJCT1
PRJCT2
PRJCT3

PHYSICAL NETWORK
Switching Routing Security

Underlay Capabilities Matter

Standards-based architecture
Dynamically deploy and scale services
No forklift, investment protection
JUNIPER AND SDN

Orchestration and Automation

Network API support

- Routing MX
- Management JUNOS SPACE
- Switching EX,QFX
- Security SRX, vGW

Platforms

- Differentiated Architectures
- Operational Simplicity

Orchestration & Automation

- Contrail
- VMware
- OpenStack
- Puppet

Network API Support

- BGP
- OpenFlow
- VMware vCenter Director APIs

Platforms

- Comprehensive Portfolio
- Only 1-Tier fabric
- High Performance Security
SDN and Cloud

...more like

Thank You
JUNIPER’S SDN STRATEGY: 6-4-1

6 – General Principles
- Separate
- Centralize
- Use the cloud
- Common Platform
- Standard
- Apply Broadly

4 – Juniper Steps
- Centralize Management
- Extract Services
- Centralize Controller
- Optimize the Hardware

1 – Licensing Model

JUNIPER SOFTWARE ADVANTAGE
- Full Use/Elastic
- Transferable
- Software Lifetime Assurance
STANDARDS

Overall architecture
- IETF NVO3 WG
- ETSI NFV ISG

Overlay control plane protocols:
- XMPP: RFC 6120, draft-marques-l3vpn-end-system
- BGP L3VPN: RFC 4364
- BGP EVPN: draft-ietf-l2vpn-evpn
- NetConf: RFC 6241
- Multicast: draft-marques-l3vpn-mcast-edge

Overlay data plane encapsulation:
- MPLS over GRE: RFC 4797
- VXLAN (encapsulation only): draft-mahalingam-dutt-dcops-vxlan

Underlay control plane protocols:
Existing layer-2 or layer-3 protocols