



# 2013 ONS Tutorial 2: SDN Market Opportunities

Network Virtualization – Real World Views

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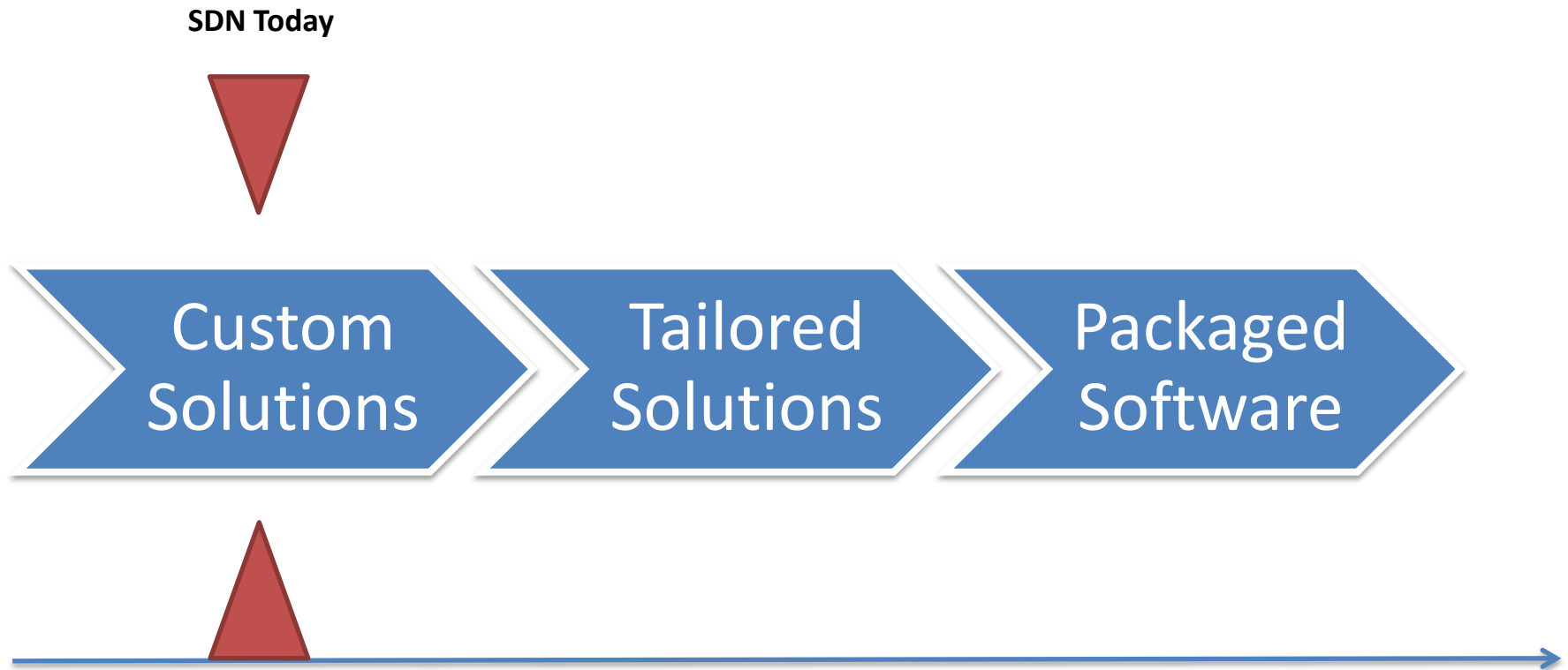


# Agenda

- Context Setting
- What is Network Virtualization?
- Approaches to Network Virtualization
- Use Cases
  - Data Center
  - Service Provider
- Relationship with NFV
- Lessons Learned and Best Practices
  - Challenges to address
- Key Questions to Ask Vendors
- Wrap Up

# Context – Where We Believe SDN Is

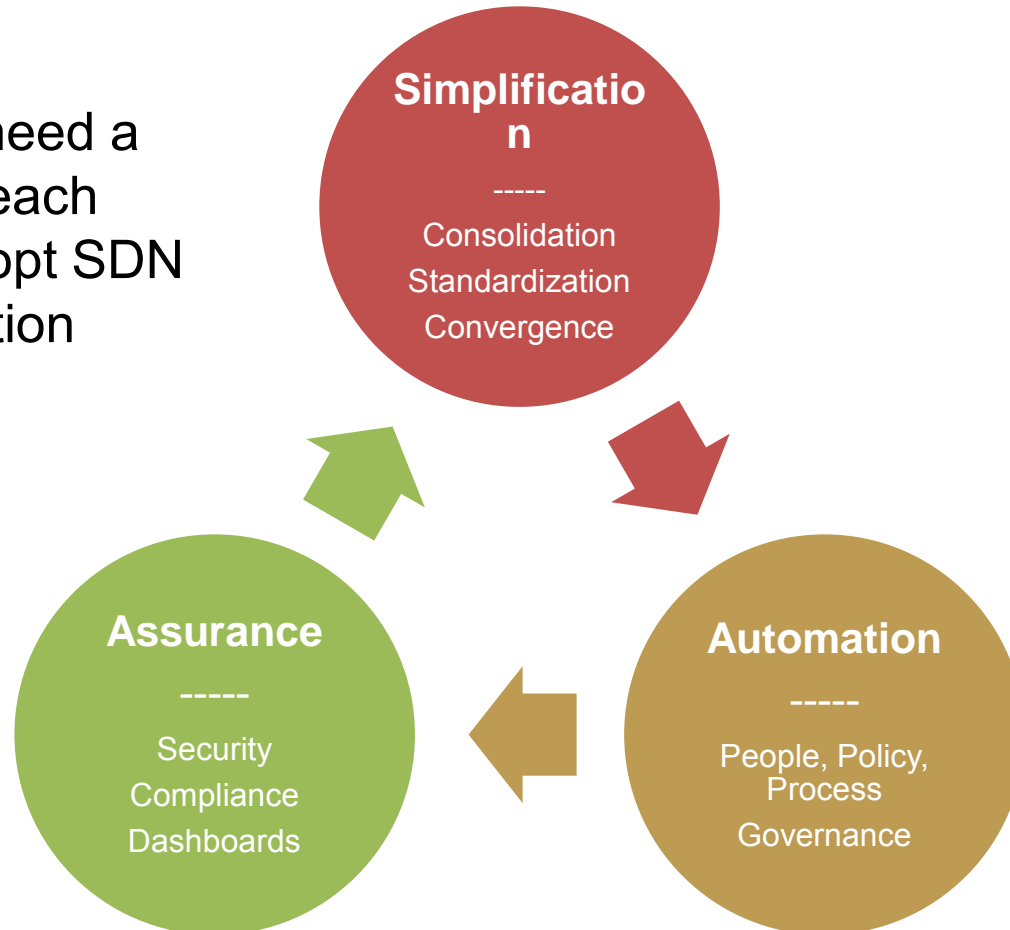
Custom solutions mostly but there are specialized situations where SDN value can be extracted – particularly Network Virtualization



# What's Core to SDN Use Cases

## Including for Network Virtualization

Customers need a portion of each element to adopt SDN in production



# SDN Pioneers

(Arrows Not Included)

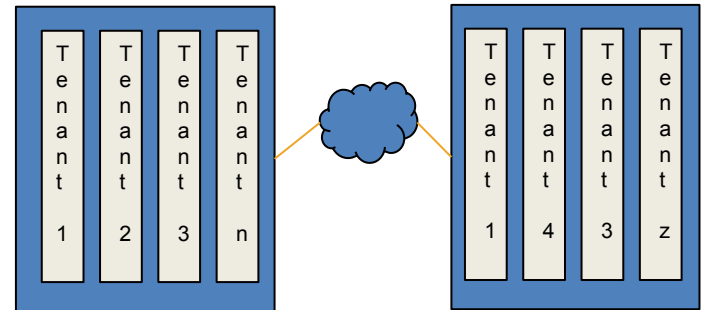
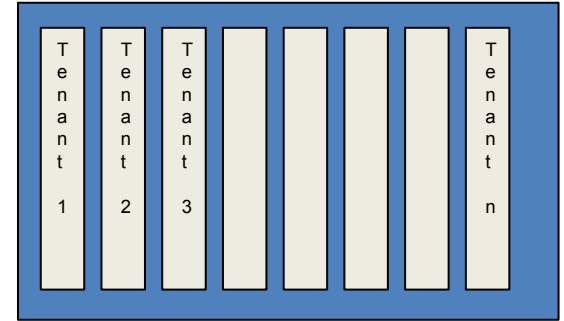
- Early adopters looking to reap competitive advantage
  - E.g. Financials, Web 2.0, Service Providers
- SDN is most valued when
  - Allows for innovation not previously possible
  - Replaces large expensive boxes and functions
- For Network Virtualization, SDN enables flexibility, agility and resource partitioning at a scale not possible with legacy networking

# What is Network Virtualization (NV)?

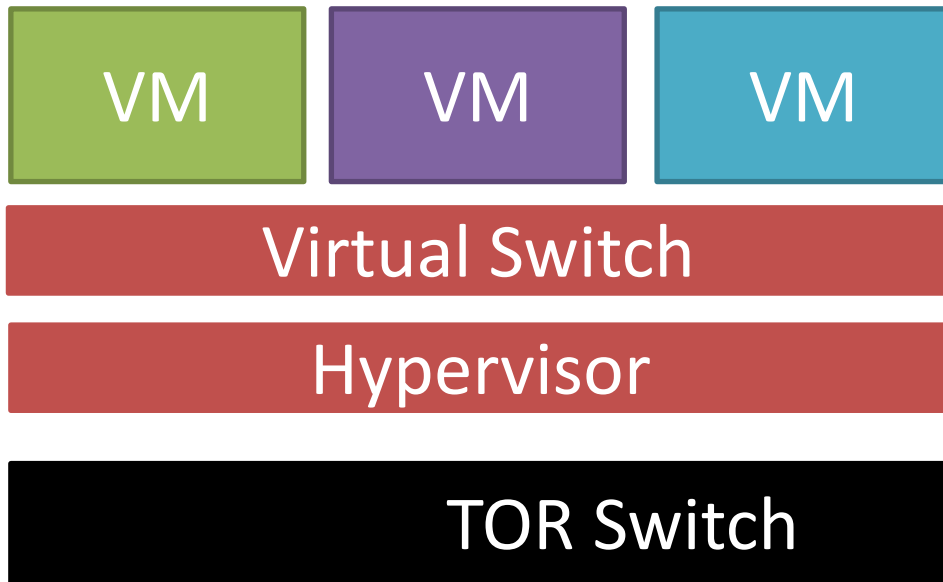
- Abstraction of physical network into virtual
- Multi-tenant segregation of network
  - Multiple networks sharing physical network
- Usually supports end-point mobility
- Can support other L3 and L2 constructs:
  - QoS
  - ACL
  - L3 routing
- May support L4-7 constructs:
  - Firewall
  - Load-balancer etc

# Problems that NV Solves

- Slicing the network
  - Multi-tenancy for private, public and hybrid clouds
  - Flexible network configuration – replicate existing topologies (NaaS)
- Stretching the network
  - Across racks within datacenter
  - Inter-datacenter for private and hybrid clouds
- Automation and orchestration
  - Coordination across all resources, including networks, compute, storage
  - VM mobility
  - L2-3 and L4-7 coordination and service insertion



# Where to Virtualize?



A. Shim/Device Driver/Agent

B. Inside the vSwitch

C. Explicit control over all switches



# Common Approaches to NV

Approach	Example Vendors	Pros	Cons	Best Fit Use Case
Guest VM shims/OS drivers	vCider (Cisco), Pertino (SMB)	Simple to deploy, connect VMs everywhere regardless of location	Requires client, driver on each host. Might have scalability limits. Little control over QoS. Only supports virtual L3, L4-7 services.	IaaS environments or where user has little control over infrastructure
Virtual Switch Centric/Hypervis or level	Nicira (OVS), VMware vDS (VXLAN), Cisco N1KV (VXLAN, InterCloud), IBM DOVE/SDN VE, Midokura (GRE)	No need for drivers on guest VMs, supports more VM Oses, VXLAN have HW vendor support to involve physical L3/L4-7 devices	Requires OVS/KVM, or VMware environment. Might have scalability limits. If VXLAN, need VTEP on physical switches to integrate physical devices.	KVM/OpenStack deployments, VMware environments where user has control over vswitches
Explicit control over all switches (using OpenFlow)	NEC PFC, Big Switch	No tunneling and encap/de-encap, fragmentation. Possible strong QoS/SLA controls.	Requires OpenFlow or vendor equipment throughout entire infrastructure.	Where user has complete control over entire infrastructure, and needs finer-grained control over QoS, SLA etc.

# What about NV in Carriers?

## Metro and Wide Area

Virtual switch across WAN, with mobile end-points  
Virtual segregated networks for enterprises across service-provider core and edge

## EPC

Virtual EPC services across multiple datacenters for maximum flexibility and resource utilization

## Services Edge

Virtual CPE, with NV in NFV services layer to provide mobility

# Relationship with NFV

## Network Function Virtualization

- Move physical appliances into virtualized instances running on hypervisors
- Provides flexible, elastic deployment of core network features such as EPC functions
- Lowers cost, increased automation, provide scale and flexibility



## Network Virtualization

Provides flexible multi-tenant networks with insertion and chaining of services

# Example Real-World NV Projects

- SP Data Centers
  - Evaluate multi-tenant network solution using OpenStack and Quantum plugins
  - Solution design using OpenStack, Ryu and combination of virtual and physical switches
- Enterprise Data Center
  - Create architecture for multi-tenant private cloud with unique security requirements and service insertion

# Real World Lessons Learned

- Not all NV solutions scale
  - Limited racks/vswitches
  - BUM problem
  - Manageability
  - Automation
- Problems in transition points between virtualized and physical
  - Interoperability challenges
  - Connect-back problem
  - L3 service insertion, L4-7 service insertion
- Security and compliance issues
  - No solution today provides enterprise-grade compliance, audit or even security
- Science project mindset

# Caveat Emptor on NV Vendors

## Open Source

- Limited developer communities / concentrated at few companies.
- Usually controlled by single commercial entity. Understand your risk and exposure.
- Lack of reference implementation slowing down OpenFlow.

## Established Vendors

- Scrambling to claim everything new is 'SDN'.
- Spotty and inconsistent support for SDN.
- Not one vendor / product fits all customers or specific problems.

## Start Ups

- Attempting to sell pre-packaged products at a stage where value is created by custom solutions.
- Few or no production customers.

# SDN Pitfalls to Avoid

## Attempting to Run before Crawling

Lack of clear business objective / problem statement

Failure to manage expectations

Failure to understand limitations of current software & hardware

## Believing people who say they know how to solve your problem

Usually set up to sell products

Product designed 2–3 years back before problems and use cases were well understood

Forces you on a path with solution that was never designed for your use case in mind

# So, What to Do in 2013?

Learn and read-up on SDN



Establish a valid business use-case where SDN can bring value



Work with trusted vendors and advisors to design a POC



Use learnings to determine appropriate next steps in late 2013, early 2014, when vendor products mature



# Questions to Ask SDN Vendors

How to separate SDN reality from SDN and vendor hype in an early market.

- How many production / paid deployments?
- How many current trials?
- How much money have you raised & when?
- Where does <insert your company name > sit on your priority list?
- Who are your typical customers?
- Are you SP or Data Center focused?
- How what use-cases / solutions do you support? Which one are you focused on?
- Do you provide products or services?



# Thank You

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