CONNECTING THE IT COMMUNITY

INTEROP®

vSphere Networking for the Network Admin

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Agenda

- What is virtualization?
- How does virtualization impact the network team?
- How should you approach virtualization?
- vSphere 101
- Where is the demarcation point?
- Integrating vSphere in to the physical network
- Common questions

What is Virtualization?

In computing, **virtualization** refers to the act of creating a virtual (rather than actual) version of something, including (but not limited to) a virtual computer hardware platform, operating system (OS), storage device, or computer network resources.

Why You Should Care

Normally Network Administrators don’t get too involved in end-server configuration.

Virtualization Changes Things

Server teams will need to collaborate more closely with the network teams.

Where Does It End?

That doesn’t mean you own the hypervisor, but you may own some of the configuration.

Network Team Demarcation

- Usually the demarcation for the network team is the ToR switch
  - Using integrated vSphere Networking
  - Or VMware NSX
- But the network team may be asked to manage 3rd party virtual switches
  - Cisco Nexus 1000v

VMware Products

- **vSphere** – Hypervisor that runs on physical servers
- **NSX** – Software Defined Networking platform that offers network abstraction and software services
- **vReal Automation Center (vRAC)** – Cloud Management Platform used to automate VM and app deployments

vSphere Networking 101

- vSphere is the hypervisor that sits on the hardware server and hosts virtual machines (VMs)
- Each vSphere host has its own internal virtual switching system
- Each VM has one or more virtual NICs (vNICs) connected to that switch

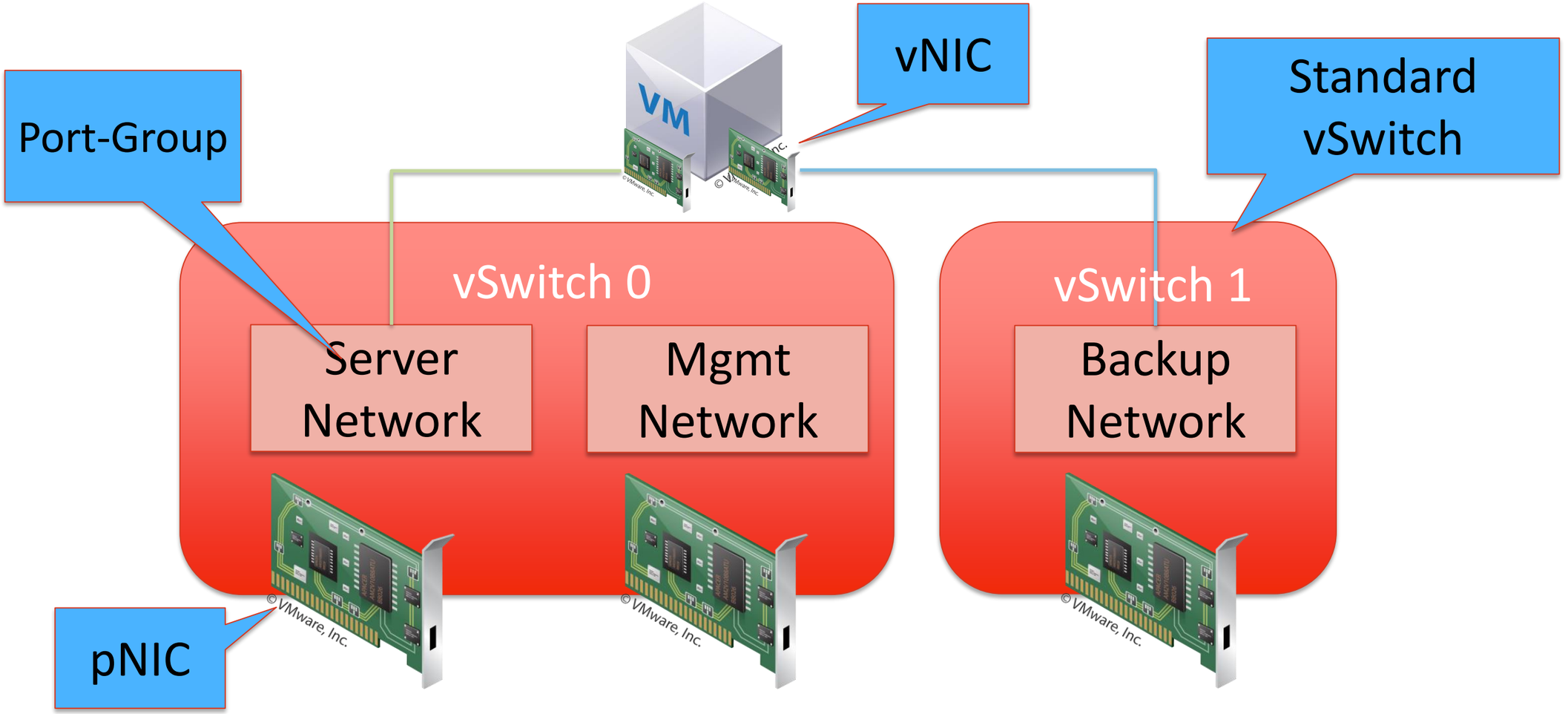
vSphere Network Terms

- **vSwitch** – Virtual Switch on each vSphere host
- **vNIC** – Virtual NIC(s) that each guest VM has
- **pNIC** – Physical NICs in the servers that connect the host to the network
- **Port-Group** – Think of them as a virtual network hub
- **Distributed Switch (VDS)** – Shared virtual switch avaialble in Enterprise Plus licensing
- **VMKernel** - Virtual management interface(s) on each vSphere host

Is a vSwitch a Switch?

- YES! Virtual Switches (vSwitch) are real, but…
  - No Spanning Tree
  - Performs its own loop detection
- It switches frames based on MAC addresses
- Understands VLAN tags
- Can do QoS services and tagging

Components of a vSwitch Architecture



Traffic Types – VM Traffic

- Network traffic to/from the virtual machine applications and guest OS
- Characteristics depend greatly on the application
  - vSphere doesn't change this
- Can be distributed using teaming methods
- Often on dedicated NICs

Traffic Types - Management

- Management traffic to control the vSphere host
  - SSH and vCenter
- Low bandwidth and pretty lenient latency requirements
- Not normally distributed over multiple NICs
  - But should do at least Active/Passive teaming

Traffic Types - vMotion

- Used to move live servers between hosts
- Very bursty and latency impacts application performance
  - Intra-DC is fine
  - Can go between DCs up to 100ms now
- Keep this traffic as local as possible
  - Is supported to route it under some instances

Traffic Types – Fault Tolerance

- Used to create mirror VMs on other hosts
  - Kept in complete lock-step for instant failover
- FT traffic is high bandwidth, constant, and latency sensitive
- Dedicate NICs and keep traffic local
  - Some configurations require 10Gb

Traffic Types – IP Storage

- Same as any other NFS or iSCSI traffic
  - iSCSI seems to be more finicky
- Dedicate NICs and watch for latency and drops
  - May dictate an upgrade in switches
- Can route NFS/iSCSI under some scenarios
  - But try to be as direct as possible

How Many VLANs?

- Like most things…it depends.
- One or more VLANs for VM traffic
  - Depends on the logical segmentation
- Dedicated VLANs for other types
  - Management
  - vMotion
  - FT
  - IP Storage

VLAN Span

- Traditionally all VLANs spanned racks for all vSphere hosts in a cluster
  - May have multiple clusters with different requirements
- Seeing more Leaf/Spine deployments
  - Rack is Layer 2 boundary
  - Routing of vMotion/IP Storage
- Gets in to a deeper discussion

What About Physical Connectivity?

- There are a number of things that dictate the design
  - 1Gb or 10Gb?
  - IP storage or FC storage?
  - Hardware switches, how many and what kind?
  - VM traffic requirements
- For a proper design you need to understand these requirements and constraints
- Make your configuration scalable

Connectivity Best Practices

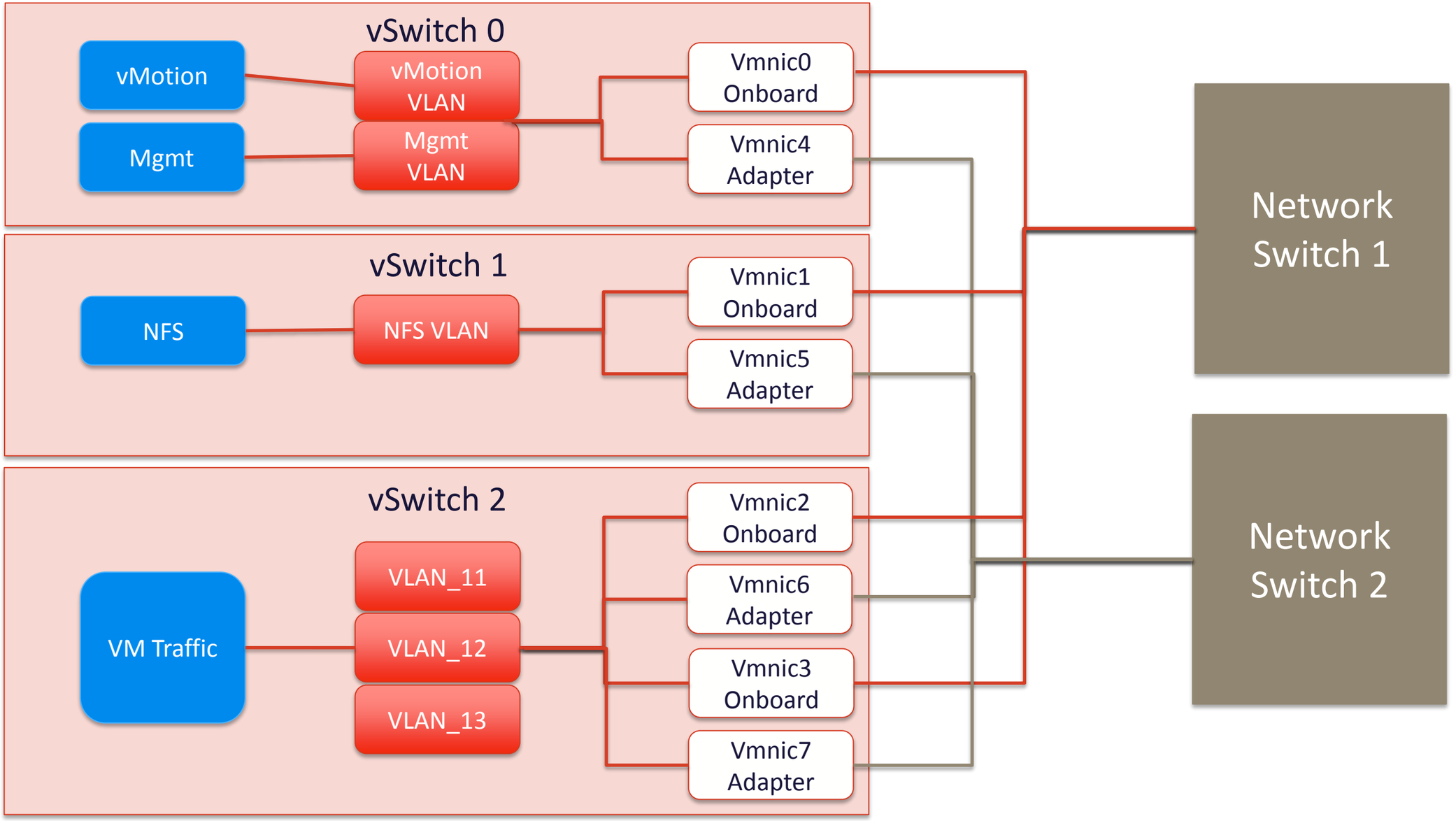
- If traffic types will be mixed look at the profile of that traffic
  - Bursty or sustained?
  - High or low?
  - Common to share NICs with vMotion and Management
- Suggested to never share NICs with IP storage
- Fault Tolerance ~~really wants~~ requires dedicated NICs
- Management traffic is very low, can be shared
  - Often with vMotion on a different VLAN

Topology Suggestions

- The final configuration depends on how many NICs you have per server
  - Common to see 6 or 8 Gb NICs, have seen up to 12
- Utilizing FT and/or IP storage will add additional requirements
  - Both should have dedicated NICs
- Recommended to have 6 NICs for Fibre Channel storage or 8 NICs for IP (iSCSI/NFS) storage

A Bigger Hammer – 10Gb Ethernet

- Utilizing 10Gb greatly reduces NIC requirements
  - Commonly see just two NICs per host
- Be careful though, with vSphere 4.1 and newer vMotion can use up to 8Gb
- Recommended to use Network I/O Control (NIOC) or other method for traffic shaping with 10Gb
  - Without some form of shaping VMs may experience I/O starvation



If FT were required then reduce VM NICs or share with vMotion

Physical Switch Configuration

- Your physical switch configuration must match the vSwitch configuration
  - VLANs
  - Load-balancing mechanism (discussed later)
- Should also tell the switch that the vSphere system is an “end host” or connected to an “edge port” and not another switch
  - Greatly reduces or eliminates Spanning-Tree delay
  - Tells the port this device does not participate in Spanning-Tree
  - Want failover to be instant

Load-Balancing and Teaming

- Another very common area of confusion is load-balancing and teaming
- First, there is no load-balancing mechanism that truly balances load
  - Why I often call it load-distribution instead of balancing
- Which method you choose depends on several things
  - Type of physical switches
  - Traffic profile going to/from your VMs
  - VMware license level
  - vSwitch type

Simple Team Options

- Simplest are
  - Hash by Virtual Port ID
  - Hash by MAC Address
- No configuration needed on switch
  - No LACP, EtherChannel, etc
- Virtual Port ID is default for a reason

IP Hashing

- Simple forced port-channel
  - Configure your switches
- Hashes on source/destination IP
  - Only option available
- Useful to balance traffic from one VM across multiple pNICs

LACP

- LACP was added in recent versions of vSphere
  - Much improved in v5.5
- Bundle pNICs together and designate one of the 23 supported algorithms
  - Just match it on the physical side
- Works fine with stacks and vPCs

Load-Based Teaming

- Requires Enterprise Plus licensing and VDS
- Default VM/pNIC placement is Virtual Port ID
- If a pNIC is 75% utilized for 30 seconds VMs are moved
  - Positioned to the least loaded pNIC
- Does not distribute single "conversation" over multiple pNICs

Network I/O Control (NIOC)

- Feature in the VDS that lets you define priority, shares, and limits to network traffic
  - Designated by traffic types and port-groups
- Easy way to manage 10Gb+ interfaces
  - So that vMotion/FT don't cause I/O starvation
- Can also tag outgoing traffic with 802.1p tag

Monitoring

- VDS supports NetFlow
  - V10/IPFIX
- Also supports SPAN/ERSPAN
  - Call Port Mirroring
- Many network monitoring tools understand vSphere vSwitches

The Future

- Software Defined Networking (SDN) rapidly maturing
  - VMware's offering is NSX
- Allows for
  - Distributed Firewalling
  - Distributed Routing
  - Edge Services
  - Network Overlay
- Heavily used in cloud/automation systems

Questions?

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Feel free to reach out after the session for any questions.