

Putting **IPv6** to work



North American IPv6 Summit

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Rocky Mountain IPv6 Task Force



IPv6 Best Operational Practices of Network Functions Virtualization (NFV) With VMware NSX

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Overview

- NSX as it pertains to NFV
- How NSX works
- NSX IPv6 Capabilities & Limitations
- How to deploy IPv6 on NSX
- Using IPv6 on NSX
- IPv6 NSX Demo!



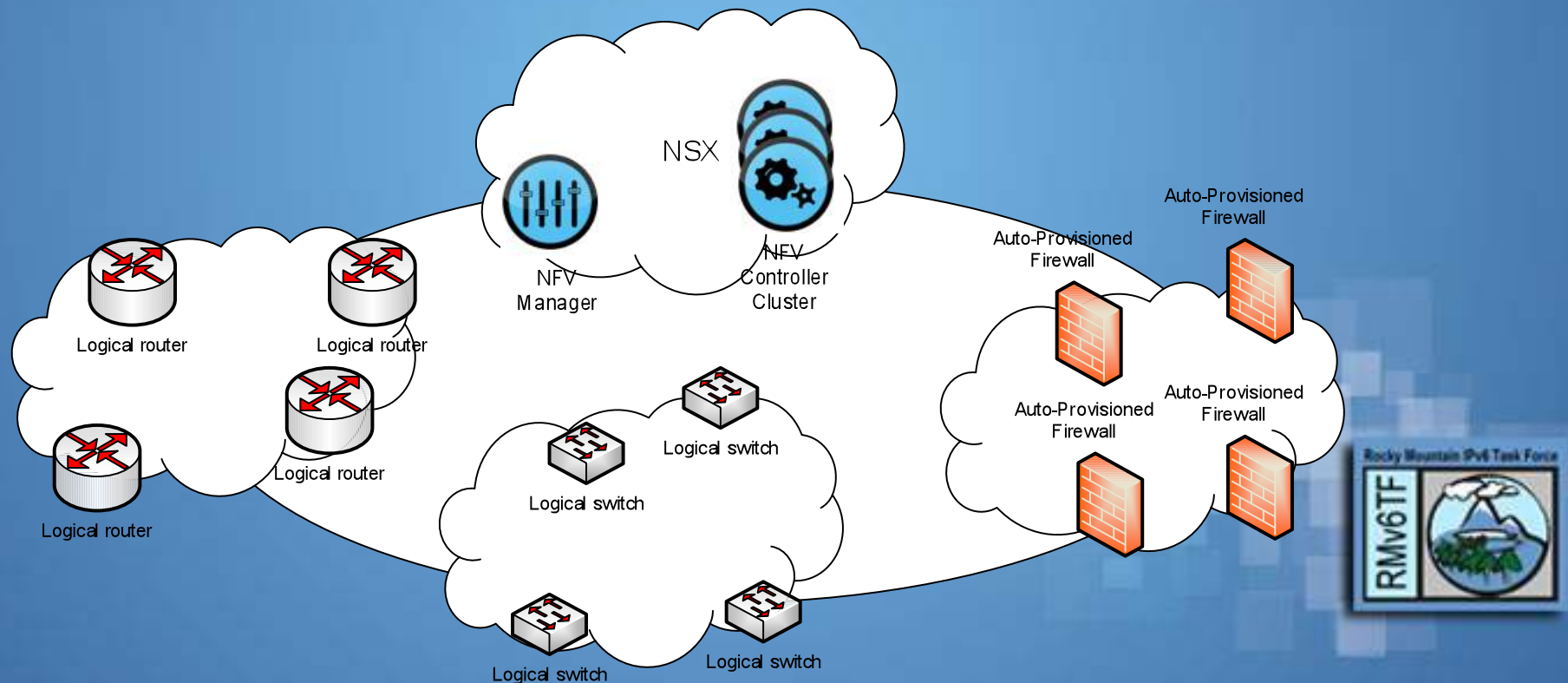
NSX is NFV

- NSX is Vmware's answer to Network Functions Virtualization (NFV)
- It provides the same capabilities
 - Distributed switching
 - Logical routing
 - Distributed firewalling
 - Distributed load-balancing
 - VXLAN tunneling
 - VPN tunneling services
- Very comparable to OpenStack's Neutron



NSX is NFV, cont.

- It provides this by pushing networking to the hypervisor and managing it with a controller



How NSX Works

- Prerequisites
 - VMware Vcenter server 5.5+
 - VMware ESXi hypervisor 5.5+
 - VMware Virtual Distributed Switch (vDS)
 - All ESXi hosts must:
 - Be in a Datacenter Cluster
 - Use vDS version 5.5
 - Uplinks and vDS → MTU 1550+
 - 50 bytes for VXLAN



How NSX Works, cont.

- An NSX Manager installs all of the components
 - NSX Controllers
 - VXLAN transport interfaces
 - vShield firewall
 - Edge Services Gateway
- The NSX Controllers install all of the virtual networking on the ESXi hosts in a cluster



How NSX Works, cont.

vmware vSphere Web Client

Updated at 5:38 PM | saduncanj@corp.tachydynamics.com | Help

- Home
- Networking & Security
 - NSX Home
 - Installation
 - Logical Switches
 - NSX Edges
 - Firewall
 - SpoofGuard
 - Service Definitions
 - Service Composer
 - Data Security
 - Flow Monitoring
 - Activity Monitoring
- Networking & Security Inventory
 - NSX Managers 1

Installation

Management

Host Preparation Logical Network Preparation Service Deployments

NSX Manager

Actions

Filter

NSX Manager	IP Address	vCenter	Version
10.1.0.70	10.1.0.70	TDITWCVC002.corp.tachyodyn...	6.1.3.2591148

1 items

NSX Controller nodes



Filter

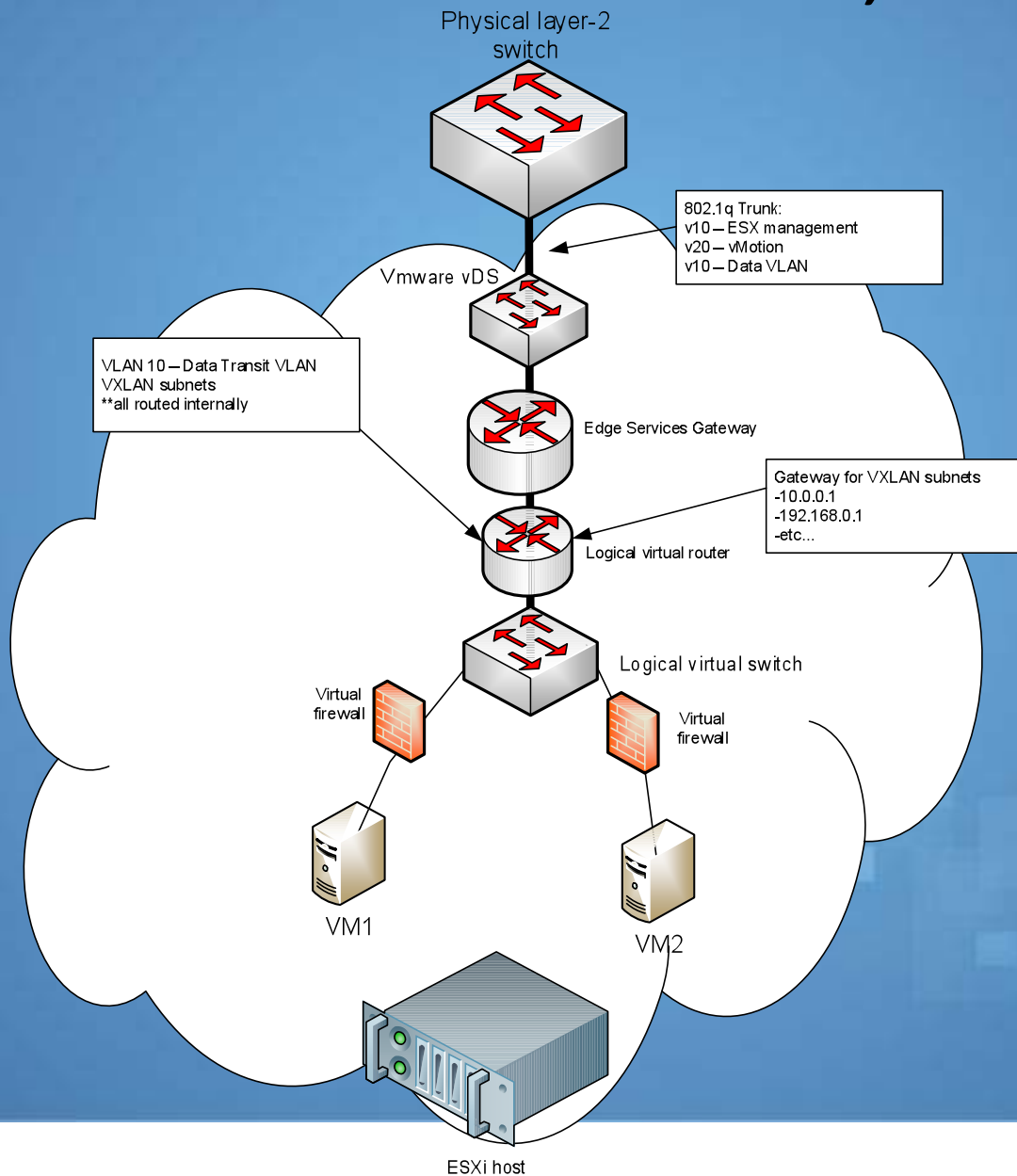
Name	Node	Status	Cluster/Resource P...	Datastore	Host	Software Version	NSX Manager
controller-2	10.1.0.100	✓ Normal	TW / Resources	TDITWESX003-DS	10.253.0.103	6.1.41894	10.1.0.70
controller-3	10.1.0.101	✓ Normal	TW / Resources	TDITWESX001-DS	10.253.0.101	6.1.41894	10.1.0.70

How NSX Works, cont.

- VXLAN Transport interfaces created
- NFV tools to deploy:
 - Logical virtual switches
 - Logical virtual firewalls
 - Logical virtual routers
 - Logical virtual-load balancers
 - VPN services



How NSX Works, cont.



IPv6 Capabilities with NSX

- Edge Services Gateway (ESG) can route all IPv6 traffic over VXLAN Tunnel Interfaces
- Full support for IPv6 firewall rule creation
- IPv6 routing on ESG can support full static routing
- Full support for IPv6 load-balancing



IPv6 Limitations with NSX

- Logical virtual router does not support IPv6 addressing or routing
 - Edge Services Gateway (ESG) must route all IPv6
- ESG does not have support for IPv6 routing protocols (BGP, OSPFv3, etc)
- ESG does not send Router Advertisements or have DHCPv6 relay functionality
- This is being fixed soon!



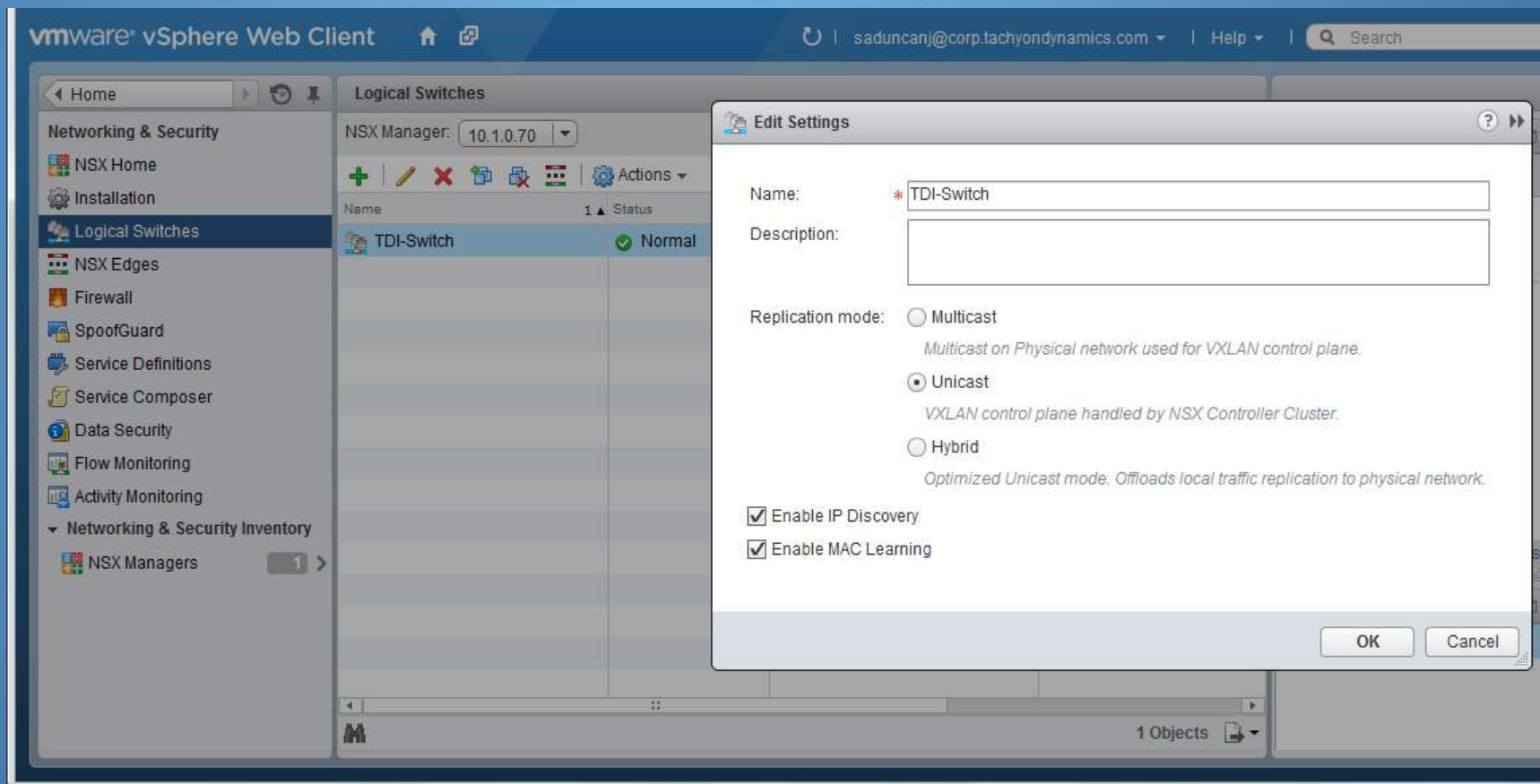
How To Deploy IPv6 on NSX

- Create IPv6-enabled VXLAN Tunnel Interfaces (VTI) on the Edge Services Gateway
- On the Logical Virtual Switch ensure this subnet is added as a VTI in Vcenter
- Attach the VTI to the virtual machine (VM)
- Configure IPv6 firewall rules for each VM
- Configure the IPv6 address on the VM



Using IPv6 on NSX

- Provision a Logical Switch



Using IPv6 on NSX

- Provision an Edge Services Gateway

Client | Home | Actions | saduncanj@corp.tachyondynamics.com | Help

TDI-ESG | Actions

Summary | Monitor | **Manage**

Settings | Firewall | DHCP | NAT | Routing | Load Balancer | VPN | SSL VPN-Plus | Grouping Objects

Configuration
Interfaces
Certificates

0 Job(s) In Progress

Configure interfaces of this NSX Edge.

✎ ✕ ✓ ⛔ ⚙ Actions

vNIC#	Name	IP Address	Subnet Prefix Length	Connected To	Type	Status
0	Uplink	10.90.0.4* 2001:470:e073:90::4*	29 64	VLAN30_NSX	Uplink	✓
1	vnic1	10.91.0.1* 2001:470:e073:91::1*	24 64	TDI-Switch	Internal	✓
2	vnic2				Internal	✕
3	vnic3				Internal	✕
4	vnic4				Internal	✕
5	vnic5				Internal	✕

Uplink

Internal

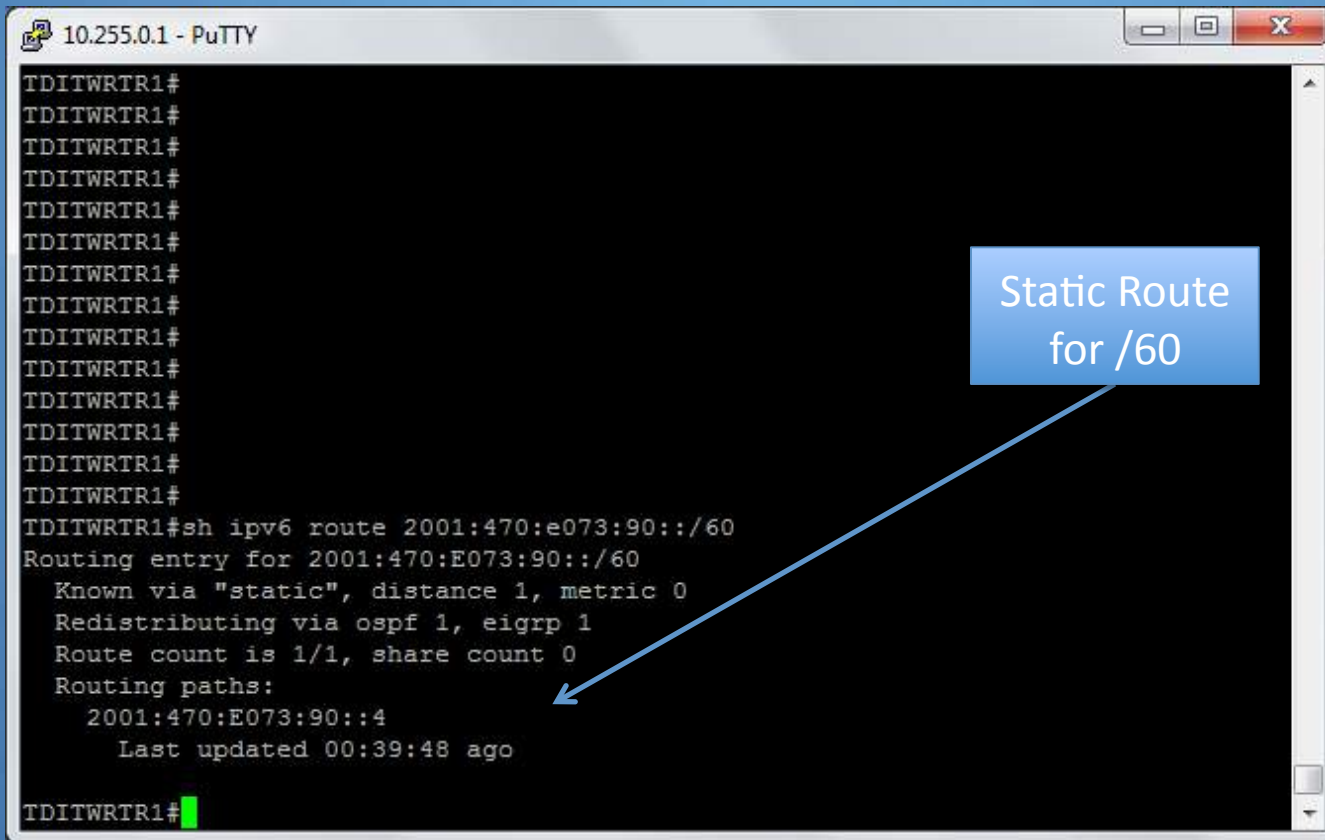
Using IPv6 on NSX

- Configure ESG routing (static)

[illegible]

Using IPv6 on NSX

- Configure physical route uplink routing



The screenshot shows a PuTTY terminal window titled "10.255.0.1 - PuTTY". The terminal displays the following commands and output:

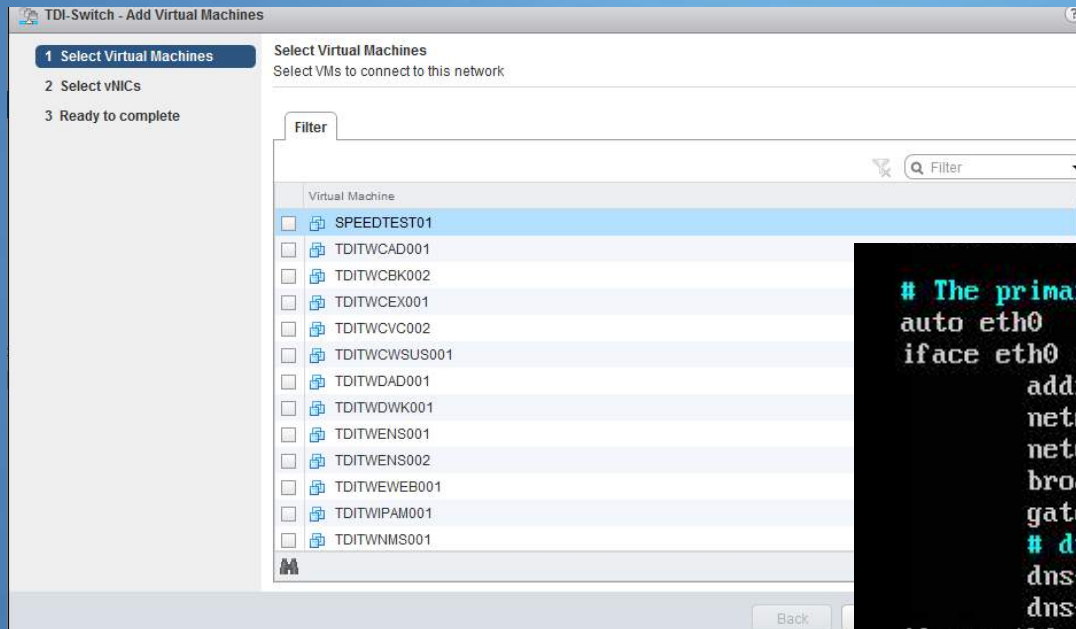
```
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#
TDITWRTR1#sh ipv6 route 2001:470:e073:90::/60
Routing entry for 2001:470:E073:90::/60
  Known via "static", distance 1, metric 0
  Redistributing via ospf 1, eigrp 1
  Route count is 1/1, share count 0
  Routing paths:
    2001:470:E073:90::4
    Last updated 00:39:48 ago
TDITWRTR1#
```

A blue callout box with the text "Static Route for /60" has an arrow pointing to the "Routing paths:" section of the output.



Using IPv6 on NSX

- Attach a virtual machine to the Logical Switch & address with 2001:470:e073:91::/64 subnet



```
# The primary network interface
auto eth0
iface eth0 inet static
    address 10.91.0.10
    netmask 255.255.255.0
    network 10.91.0.0
    broadcast 10.91.0.255
    gateway 10.91.0.1
# dns-* options are implemented by the resolvconf pack
    dns-nameservers 8.8.8.8
    dns-search tachyondynamics.com
iface eth0 inet6 static
    address 2001:470:e073:91::10
    netmask 64
    gateway 2001:470:e073:91::1
iface eth0 inet6 auto
```

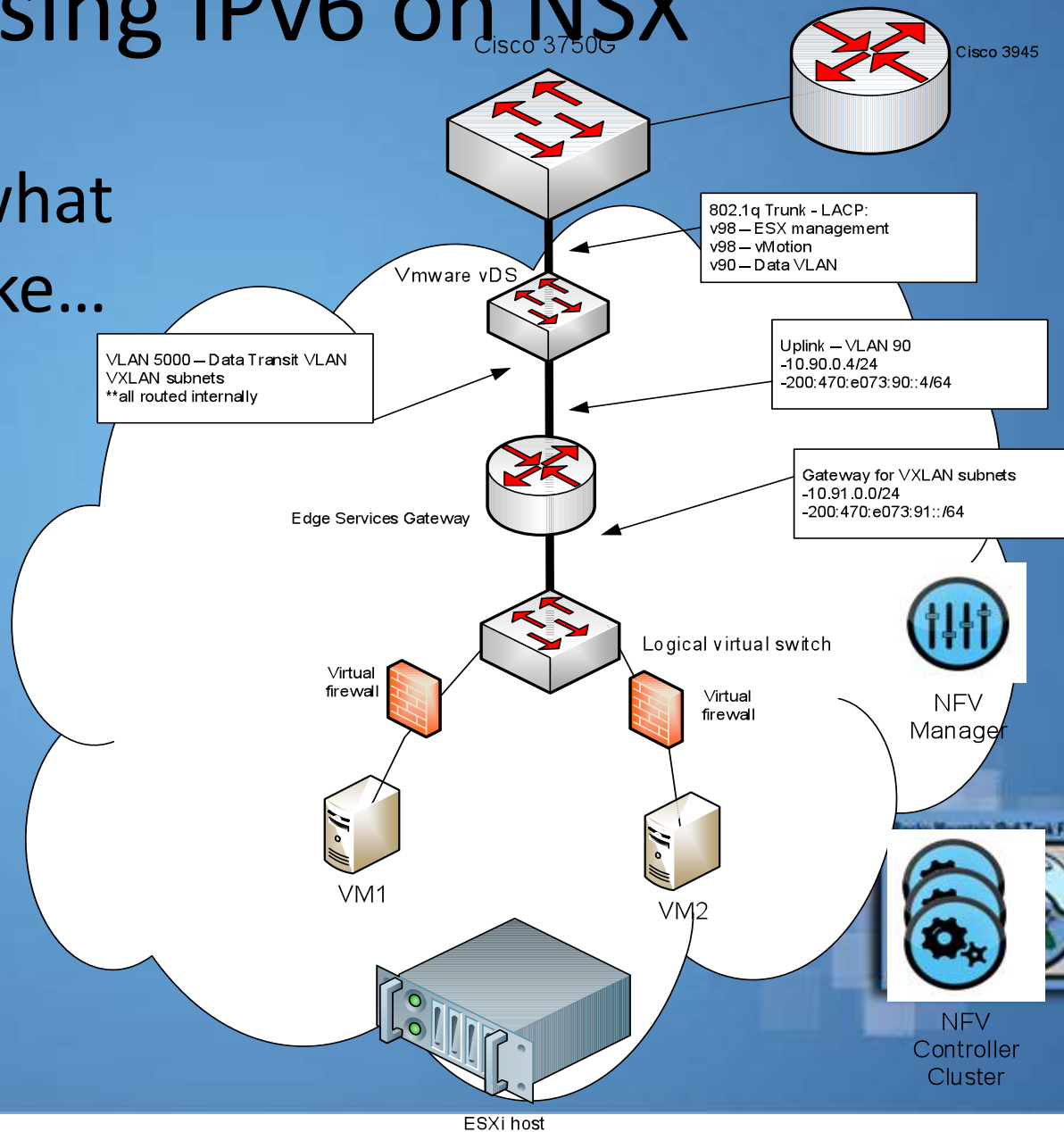
Using IPv6 on NSX

- All happy to Google

```
root@test-web-nsx:~#  
root@test-web-nsx:~# ping6 google.com  
PING google.com(iad23s26-in-x03.1e100.net) 56 data bytes  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=1 ttl=54 time=19.4 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=2 ttl=54 time=19.1 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=3 ttl=54 time=19.3 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=4 ttl=54 time=19.3 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=5 ttl=54 time=19.2 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=6 ttl=54 time=19.0 ms  
6/6 packets, 0% loss, min/avg/ewma/max = 19.029/19.254/19.344/19.479 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=7 ttl=54 time=19.2 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=8 ttl=54 time=19.8 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=9 ttl=54 time=19.5 ms  
64 bytes from iad23s26-in-x03.1e100.net: icmp_seq=10 ttl=54 time=25.8 ms
```

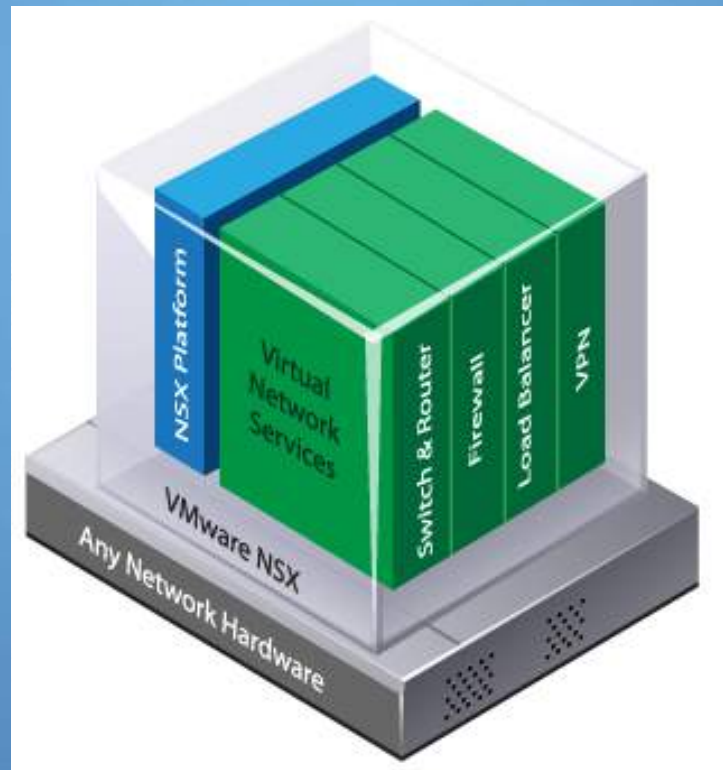
Using IPv6 on NSX

- And this is what it all looks like...



IPv6 with NSX Demo!

- Using the Vcenter Web Console
- Tachyon Dynamics live network!



Questions?

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