

VALIDATED REFERENCE DESIGN GUIDE

AOS-CX SWITCH AND VMWARE NSX-T INTEROP SOLUTION GUIDE

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Aruba AOS-CX Switch and VMware NSX-T Interop Solution Guide

Introduction

VMware NSX is a network virtualization solution that virtualizes multiple network functions like Switch, Router, firewall, NAT, and VPN. This document provides guidance on setting up the VMware NSX-T and AOS-CX Switch interop. This interop solution provides L2 network connectivity between Virtual Machines in different Racks and attached to NSX-T logical switches. The NSX-T Logical Router provides L3 routing capability between L2 segments within the NSX Virtual world. This document covers three scenarios.

1. Layer 2 Data Centers with AOS-CX switches used for the underlay
2. Layer 3 Data Centers with AOS-CX switches used for the underlay
3. BGP routing with AOS-CX and NSX-T edge VM

AOS-CX 10.3 on 8320, vSphere 6.7 and NSX-T Version 2.4.2 were used in the creation of this guide.

This document applies to all other AOS-CX switching products also.

Figure 1 describes the network topology that will be used in this document

- An Out of Band (OOB) management network (10.10.8.0/24) is used for communication between the vCenter, NSX-T Nodes. The Aruba AOS-CX switches (8320) were used to interconnect the ESXi Nodes.
- The Inband underlay network (99.99.11.0/24, 99.99.22.0/24) is used for connectivity between the ESXi Nodes, which will be used as Tunnel End Points (TEP) for Generic Network Virtualization Encapsulation (GENEVE) tunnels. The underlay network can be a L2 or L3 network since all tunnels are created and torn down by NSX-T.
- Two logical switches / virtual networks (192.10.10.0/24 & 192.20.20.0/24) are used for overlay connectivity between the VM's and the Tier-1 Logical router which is used to interconnect both logical switches.

Brief comparison between NSX-T and NSX-V

The current shipping solution is VMWare NSX-V.

- NSX-V is tightly integrated with VMware and requires VMware vCenter
- Uses VXLAN for overlay encapsulation
- Leverages DLRs (distributed logical router) for centralized routing within vSphere.

NSX-Transformers (NSX-T) adds support for multi-hypervisor environments which enables NSX-T to also support KVM, Docker, Kubernetes, and OpenStack as well as AWS.

- NSX-T can be deployed without vCenter
- Uses GENEVE for overlay encapsulation, VXLAN is not required for overlay with NSX-T
- supports multiple vCenters
- uses a two-tier distributed routing model
- Supports multi-hypervisors
 - VMware vSphere(ESXi)

- Kernel-based Virtual Machine (KVM)

NSX-T supports Hybrid Cloud Networking and native AWS deployments, also it can be integrated with Docker, and Open Stack

Requirements

- Ensure DNS and NTP server infrastructure are in place
 - all devices (ESXi host, vCenter, NSX-T) nodes should point to these
 - NTP is in sync on these devices
 - DNS resolution between devices should work (all devices should have DNS host entries)
- VMware NSX-T should be deployed according to instructions stated here
 - <https://docs.vmware.com/en/VMware-NSX-T-Data-Center/2.4/installation/GUID-67731519-E70F-4BC5-87CD-9F426E250349.html>
- Make sure all the components (ESXi Version, ESXi Drivers, Bare metal its firmware, vCenter) are compatible with NSX-T 2.4.2 version
- Installation of ESXi's, vCenter & NSX-T Manager & Controller
- Utilize the flash based web client (FLEX) instead of HTML 5, some NSX features only exist in the FLEX client

Note : NSX-v and Aruba AOS-CX integration is documented

https://arubapedia.arubanetworks.com/arubapedia/images/5/53/VMware_NSXv_and_8325_Integration.pdf

Physical Topology

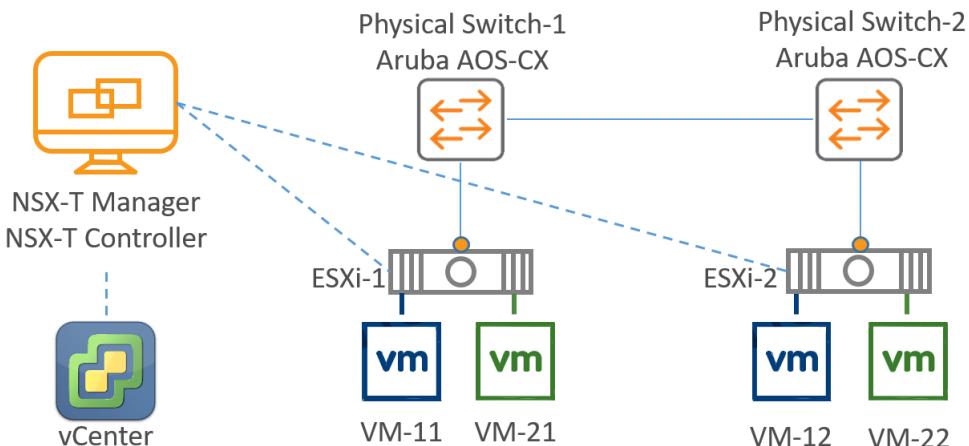


Figure 1: Physical Topology

ESXi node physical connections

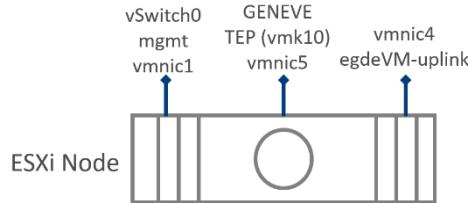
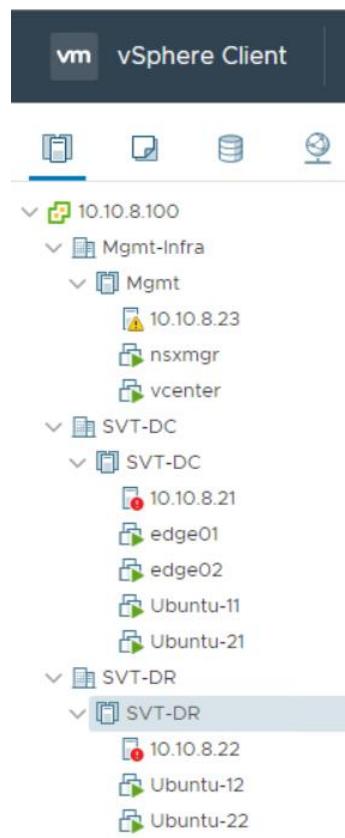


Figure 2: ESXi Node connections

vSphere information

- In this example, there are two clusters, each Hypervisor which is part of NSX fabric acts as one TEP. Usually the cluster deployments are workload clusters and Management cluster. Work load clusters hosts the tenant workload VMs (Example: Production, Development test VM's).
- In this example, Cluster (SVT-DC & SVT-DR) hosts the workload VM's and each ESXi node in the cluster terminates a GENEVE Tunnel End Point (TEP) to interconnect the VM's.
- Management cluster (Mgmt-Infra) hosts the management VMs such as NSX Manager, Controllers, vCenter VMs and vRA, vROPS appliances.



NSX-T Preparation

- Configure the underlay hardware (AOS-CX switches) and interfaces involved in the GENEVE tunnels with MTU min as 1600. In this example configured mtu is 9000. If the ESXi nodes are L3 apart, then configure all the transit interfaces as route interfaces with ip mtu 9000
- Add VMware vCenter to NSX-T as Compute Manager

Launch NSX-T

The screenshot shows the NSX-T Management interface with the URL <https://10.10.8.99/nsx/#/app/system/home/components?p=L25zeC9ze>. The left sidebar has 'Fabric' selected. The main panel is titled 'Overview' and shows the following details:

- Management Cluster:** STABLE | ADD NODES
- Virtual IP:** Not Set | EDIT
- System Load:** Used 4% | RAM 71.06%
- Interface Status:**

Interface	Tx	Rx
eth0	198 GB	346 MB
lo	92.7 GB	92.7 GB

- Add vCenter as Compute Manager

System > Fabric > Computer Managers > Add

The screenshot shows the NSX-T Management interface with the URL <https://10.10.8.99/nsx/#/app/system/compute-managers>. The left sidebar has 'Compute Managers' selected. The main panel is titled 'Compute Managers' and shows the following table:

	Compute Manager	ID	Domain Name/IP Address	Type	Registration Status	Version	Connection Status	Last Inventory Update
	vCenter-8-100	dbd9...8942	10.10.8.100	vCenter	Registered	6.7.0	Up	Sep 14, 2019 12:45:...

Usecase-1: Data Centers are L2-Adjacent

In this use case (ref to [Figure 1: Physical Topology](#)), there is one data center, both ESXi nodes are in same data-center which are L2-Adjacent. The uplink ports from the servers are configured within a VLAN on the AOS-CX Switch. The AOS-CX Switch stretches that same VLAN to the other AOS-CX switches so that the ESXI hosts are in the same L2 VLAN Segment.

NSX-T Configuration

- Prepare **Transport Zone (Overlay) & N-VDS**

System > Fabric > Transport Zones

Edit Transport Zone - SVT-TZ

Name *

Description

N-VDS Name *

Host Membership Criteria Standard (For all hosts)
 Enhanced Datapath (For ESXi hosts with version 6.7 or above)

Traffic Type Overlay
 VLAN

Uplink Teaming Policy Names

- Prepare Uplink **Profile** (select a physical interface, in this case its vmnic5)

System > Fabric > Profiles

Edit Uplink Profile - SVT-UPLINK

Name *	SVT-UPLINK														
Description															
LAGs															
<div style="display: flex; justify-content: space-between;"> + ADD DELETE </div> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th><input type="checkbox"/> Name *</th> <th>LACP Mode</th> <th>LACP Load Balancing *</th> <th>Uplinks *</th> <th>LACP Time Out</th> </tr> </thead> <tbody> <tr> <td colspan="5">No LAGs found</td> </tr> </tbody> </table>				<input type="checkbox"/> Name *	LACP Mode	LACP Load Balancing *	Uplinks *	LACP Time Out	No LAGs found						
<input type="checkbox"/> Name *	LACP Mode	LACP Load Balancing *	Uplinks *	LACP Time Out											
No LAGs found															
Teamings															
<div style="display: flex; justify-content: space-between;"> + ADD CLONE DELETE </div> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th><input type="checkbox"/> Name *</th> <th>Teaming Policy *</th> <th>Active Uplinks *</th> <th>Standby Uplinks</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> [Default Teaming]</td> <td>Failover Order</td> <td>VMNIC5</td> <td></td> </tr> <tr> <td colspan="4">Active uplinks and Standby uplinks are user defined labels. These labels will be used to associate with the Physical NICs while adding Transport Nodes.</td> </tr> </tbody> </table>				<input type="checkbox"/> Name *	Teaming Policy *	Active Uplinks *	Standby Uplinks	<input type="checkbox"/> [Default Teaming]	Failover Order	VMNIC5		Active uplinks and Standby uplinks are user defined labels. These labels will be used to associate with the Physical NICs while adding Transport Nodes.			
<input type="checkbox"/> Name *	Teaming Policy *	Active Uplinks *	Standby Uplinks												
<input type="checkbox"/> [Default Teaming]	Failover Order	VMNIC5													
Active uplinks and Standby uplinks are user defined labels. These labels will be used to associate with the Physical NICs while adding Transport Nodes.															
Transport VLAN	0														
MTU <small>(B)</small>	9000														
CANCEL SAVE															

- Navigate to **System>Nodes**, select vCenter under “**Managed By**”, then select specific ESXi Node/ESXi Cluster click on **Configure NSX**, associate TZ, Uplink, IP Pool.
 - Create The **IP Pool**, **this ip pool** is used to assign IPs to various TEP as GENEVE-TEP-IP, in this example we used 99.99.11.0/24 as the pool

Configure NSX

- 1 Host Details
- 2 Configure NSX**

Configure NSX

[?](#) [X](#)

Transport Zone*	<input type="text" value="SVT-TZ"/> X	OR Create New Transport Zone
N-VDS Creation*	<input checked="" type="radio"/> NSX Created <input type="radio"/> Preconfigured	
+ ADD N-VDS		
New Node Switch		
N-VDS Name*	<input type="text" value="SVT-N-VDS"/>	
Associated Transport Zones	<input type="text" value="SVT-TZ"/>	
NIOC Profile*	<input type="text" value="nsx-default-nioc-hostswitch-profile"/>	
Uplink Profile*	<input type="text" value="SVT-UPLINK"/>	
LLDP Profile*	<input type="text" value="LLDP [Send Packet Disabled]"/>	
IP Assignment*	<input type="text" value="Use IP Pool"/>	
IP Pool*	<input type="text" value="GENEVE-TEP-IP"/>	
OR Create and Use a new IP Pool		
Physical NICs	<input type="text" value="vmnic5"/> ▼	<input type="text" value="VMNIC5"/> ▼
PNIC only Migration <input checked="" type="checkbox"/> No Enable this option if no vmks exist on PNIC selected for migration		
Network Mappings for Install	Add Mapping	
Network Mappings for Uninstall	Add Mapping	

[CANCEL](#) [PREVIOUS](#) **FINISH**

With the above steps, NSX-T will install NSX vibs on the ESXi hosts and configure the GENEVE tunnels. Here is the status after NSX configured properly.

Node	ID	IP Addresses	OS Type	NSX Configuration	Configuration State	Node Status	Transport Zones	NSX Version	N-VDS
SVTDR (1)	MoRef ID: ...								
SVTDC (2)	MoRef ID: ...								
ESXi-1	afcb...08c1	10.10.8.21	ESXi 6.7.0	Configured	Success	Up	SVT-TZ	2.4.2.0.0.14269...	1
ESXi-2	71a2...9f12	10.10.8.22	ESXi 6.7.0	Configured	Success	Up	SVT-TZ	2.4.2.0.0.14269...	1

The below screenshot shows the GENEVE tunnel between each ESXi node to the other node. Notice the IP address of both ESXi servers are in same subnet (L2-Adjacent)

Source IP	Remote IP	Status	BFD Diagnostic Code	Remote Transport Node	Ecap Interface	Ecap	Tunnel Name
99.99.11.11	99.99.11.12	Up	0 - No Diagnostic	ESXi-1	vmk10	GENEVE	geneve1667...
99.99.11.11	99.99.11.13	Up	0 - No Diagnostic	Edge01	vmk10	GENEVE	geneve1667...
99.99.11.11	99.99.11.14	Up	0 - No Diagnostic	Edge02	vmk10	GENEVE	geneve1667...

Interface Id	Admin Status	Link Status	MTU	Interface Details	Stats
vmnic0	Up	Up	1500		1
vmk10	Up	Up	9000		1
vmk0	Up	Up	1500		1
vmnic5	Up	Up	9000		1
vmnic4	Up	Up	1500		1
vmnic3	Up	Down	1500		1
vmk50	Up	Up	1500		1
vmnic2	Up	Down	1500		1

Aruba AOS-CX Switch configuration

The physical underlay infrastructure needs to support jumbo frames. The below configuration uses and MTU of 9000 between the ESXi Node and Switches.

8320-SW01 Configuration

```
interface 1/1/1
no shutdown
mtu 9000
description To ESXi-1 VMNIC5
no routing
vlan trunk native 1
vlan trunk allowed all
exit

interface 1/1/46
no shutdown
mtu 9000
description SW1-to-SW2
no routing
vlan trunk native 1
vlan trunk allowed all
exit
```

8320-SW02 Configuration

```
interface 1/1/1
no shutdown
mtu 9000
description To ESXi-2 VMNIC5
no routing
vlan trunk native 1
vlan trunk allowed all
exit

interface 1/1/46
no shutdown
mtu 9000
no routing
description SW2-to-SW1
vlan trunk native 1
vlan trunk allowed all
exit
```

Verifications from the CX Switch

SW01- Verification

```
8320-SW1# show interface brief
1/1/1      1      trunk  SFP+DA3      yes      up          10000
1/1/46     1      trunk  SFP+DA3      yes      up          10000
```

```
8320-SW01# show vlan
```

VLAN	Name	Status	Reason	Type	Interfaces
8	MGMT	up	ok	static	1/1/1,1/1/46

SW02- Verification

```
8320-SW02# show int brief
1/1/1      1      trunk  SFP+DA3      yes      up          10000
1/1/46     1      trunk  SFP+DA3      yes      up          10000

8320-SW02# show vlan
-----
VLAN  Name           Status  Reason   Type    Interfaces
----- 
8     MGMT           up      ok       static  1/1/1,1/1/46
```

Connect VM's using NSX-T Logical Switch - Data Centers are L2-Adjacent

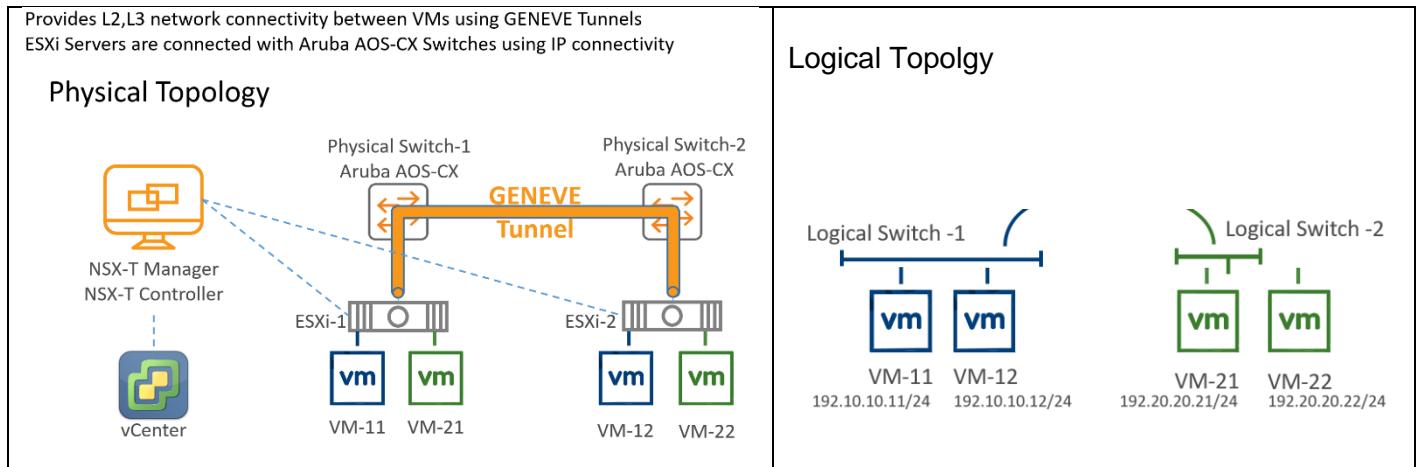


Figure 3: Interconnecting VM's using GENEVE overlay tunnel

As shown in the above topology, VM-11 and VM-12 are in same L2 segment but hosted in two diff hosts (ESXi). Similarly, VM-21 and VM-22 are in same L2 segment.

To interconnect VM-11 and VM-12, create a Logical Switch and associate the VM network interface with the appropriate Logical Switch. Interconnecting VM's across the logical Switch requires routing, which is covered in next section.

Creating Logical Switch

Navigate to **Advanced Networking & Security > Networking > Switching > click Add**

Add New Logical Switch

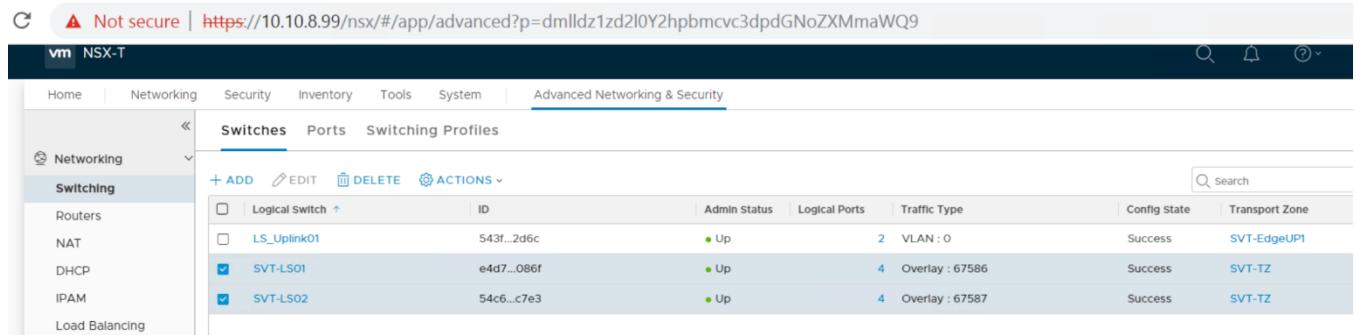
[General](#) [Switching Profiles](#)

Name *	SVT-LS01
Description	<input type="text"/>
Transport Zone *	SVT-TZ
Uplink Teaming Policy Name *	[Use Default]
Admin Status	<input checked="" type="button"/> Up
Replication Mode	<input checked="" type="radio"/> Hierarchical Two-Tier replication <input type="radio"/> Head replication
VLAN	<input type="text"/>

Only VLAN Trunk Spec is allowed (eg: 1, 5, 10-12, 31-35).

[CANCEL](#) [ADD](#)

Here are the two logical Switches that were created for the two logical segments

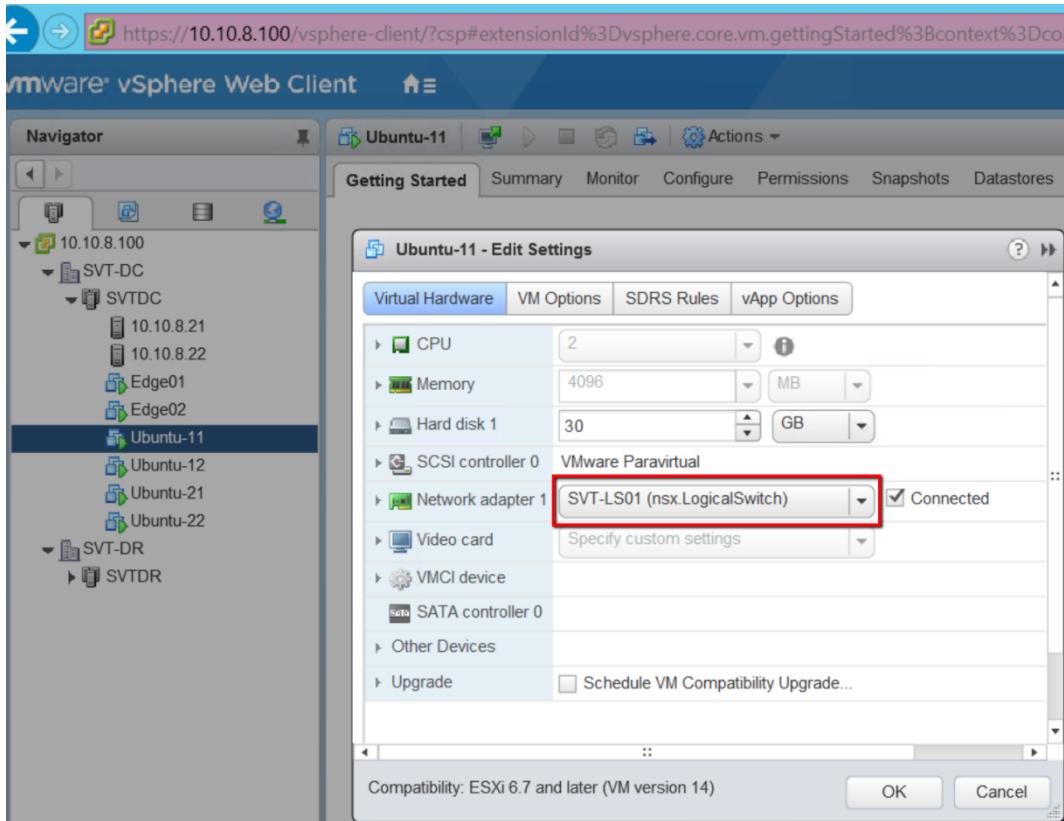


The screenshot shows the NSX-T interface with the URL <https://10.10.8.99/nsx/#/app/advanced?p=dmlldz1zd2l0Y2hpbmvc3dpdGNoZXMaWQ9>. The left sidebar is collapsed. The main navigation bar includes Home, Networking, Security, Inventory, Tools, System, and Advanced Networking & Security. Under Networking, the 'Switching' tab is selected. The 'Switches' tab is active, showing a table with the following data:

Logical Switch	ID	Admin Status	Logical Ports	Traffic Type	Config State	Transport Zone
LS_Uplink01	543f...2d6c	Up	2	VLAN : 0	Success	SVT-EdgeUP1
SVT-LS01	e4d7...086f	Up	4	Overlay : 67586	Success	SVT-TZ
SVT-LS02	54c6...c7e3	Up	4	Overlay : 67587	Success	SVT-TZ

Associate NSX Logical Switch with the respective VM

Associate each NSX Logical Switch with the respective VM's from vCenter as shown below.



Connectivity test

Connectivity test between the VM's within same Logical Switch

```
ubuntu@ubuntu01:~$ ping 192.10.10.11
PING 192.10.10.11 (192.10.10.11) 56(84) bytes of data.
64 bytes from 192.10.10.11: icmp_seq=1 ttl=64 time=0.025 ms
64 bytes from 192.10.10.11: icmp_seq=2 ttl=64 time=0.028 ms
^C
--- 192.10.10.11 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1008ms
rtt min/avg/max/mdev = 0.025/0.026/0.028/0.005 ms
ubuntu@ubuntu01:~$ ping 192.10.10.12
PING 192.10.10.12 (192.10.10.12) 56(84) bytes of data.
64 bytes from 192.10.10.12: icmp_seq=1 ttl=64 time=0.376 ms
64 bytes from 192.10.10.12: icmp_seq=2 ttl=64 time=0.211 ms
^C
--- 192.10.10.12 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1032ms
rtt min/avg/max/mdev = 0.211/0.293/0.376/0.084 ms
```

GENEVE Wireshark Capture

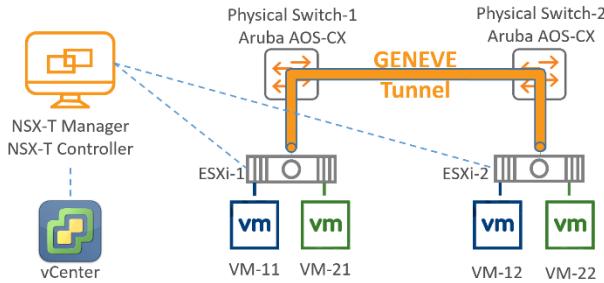
As shown below, the Wireshark capture shows the inner header as well as the overlay headers created by NSX-T

No.	Time	Source	Destination	Protocol	Length	Info
→ 11	0.846797	192.10.10.12	192.10.10.11	ICMP	156	Echo (ping) request id=0x0be2, seq=187/47872, ttl=64 (reply in 12)
← 12	0.846923	192.10.10.11	192.10.10.12	ICMP	156	Echo (ping) reply id=0x0be2, seq=187/47872, ttl=64 (request in 11)
<						
<pre>> Frame 11: 156 bytes on wire (1248 bits), 156 bytes captured (1248 bits) on interface 0 > Ethernet II, Src: Vmware_68:9d:e6 (00:50:56:68:9d:e6), Dst: Vmware_56:68:df:73 (Outer header) > Internet Protocol Version 4, Src: 99.99.11.11, Dst: 99.99.11.12 > User Datagram Protocol, Src Port: 57865, Dst Port: 6081 ▼ Generic Network Virtualization Encapsulation, VNI: 0x010802 version: 0 Length: 8 bytes > Flags: 0x40, Critical Options Present Protocol Type: Transparent Ethernet bridging (0x6558) Virtual Network Identifier (VNI): 0x010802 > Options: (8 bytes) > Ethernet II, Src: Vmware_82:f1:b8 (00:50:56:82:f1:b8), Dst: Vmware_82:e3:62 (00:50:56:82:e3:62) (Inner header) > Internet Protocol Version 4, Src: 192.10.10.12, Dst: 192.10.10.11 > Internet Control Message Protocol</pre>						

Inter Logical Switch Routing - Data Centers are L2-Adjacent

To enable inter Logical Switch routing, create a Tier 1 Logical Router which can handle the routing between the VMs on different segments.

Physical Topology



Logical Topology

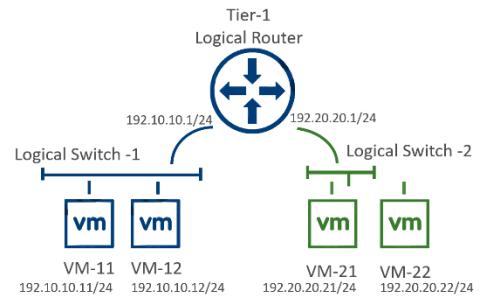


Figure 4: Interconnecting VM's between both logical Switches with NSX-T logical Router

Enable inter logical switch routing

As shown in the topology, enable routing between Logical Switches

Navigate to **Advanced Networking & Security > Networking > Routers > Add > Tier-1 Router**

Edit Tier-1 Router - SVT-T1-RTR ? X

Tier-1 Router Advanced

Name*

Description

Edge Cluster X ▾

StandBy Relocation Disable

CANCEL SAVE

Attach logical router port

Attach a Logical Router Port to the Tier 1 Logical router that was just created for each logical switch (LS) to enable inter LS routing.

Navigate to **Advanced Networking & Security > Networking > Routers > Select the Router (double click) >** on the right pane, go to **Configuration > add** Logical router ports as below

Edit Router Port - T1-LS01

[?](#) [X](#)

Name *

Description

Type [▼](#)

URPF Mode Strict None

Logical Switch [X](#) [▼](#)
[OR Create a New Switch](#)

Logical Switch Port Attach to new switch port Attach to existing swi
Switch Port Name [X](#) [▼](#)

Subnets

[+ ADD](#) [\[\] DELETE](#)

<input type="checkbox"/> IP Address*	<input type="checkbox"/> Prefix Length*
<input type="checkbox"/> 192.10.10.1	24

Relay Service [X](#) [▼](#)

[CANCEL](#)

[SAVE](#)



Add one more logical Router port for Logical Switch-2

Edit Router Port - T1-LS02

Name *	T1-LS02						
Description							
Type	Downlink						
URPF Mode	<input checked="" type="radio"/> Strict <input type="radio"/> None						
Logical Switch	SVT-LS02 x v						
OR Create a New Switch							
Logical Switch Port	<input type="radio"/> Attach to new switch port <input checked="" type="radio"/> Attach to existing switch port						
Switch Port Name	T1-RTR-LS02-swPort x v						
Subnets							
+ ADD DELETE							
<table border="1"> <thead> <tr> <th><input type="checkbox"/> IP Address *</th> <th>Prefix Length *</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> 192.20.20.1</td> <td>24</td> </tr> <tr> <td colspan="2"> </td> </tr> </tbody> </table>		<input type="checkbox"/> IP Address *	Prefix Length *	<input type="checkbox"/> 192.20.20.1	24		
<input type="checkbox"/> IP Address *	Prefix Length *						
<input type="checkbox"/> 192.20.20.1	24						
Relay Service							
CANCEL SAVE							

Here is the list of the router interfaces connecting to both Logical Switches.

This will enable routing between the VM's from one logical Switch to other.

The screenshot shows the VMware NSX-T interface under the 'Advanced Networking & Security' tab. In the left sidebar, 'Routers' is selected. The main pane displays the 'SVT-T1-RTR' logical router. Under 'Logical Router Ports', there are two entries:

Logical Router ID	Type	IP Address/mask	Connected To	Transport Node
T1-LS01	d621..3b...	Downlink	192.10.10.1/24	SVT-LS01 (T1-RTR-LS01-SwP...)
T1-LS02	fb2e..bf...	Downlink	192.20.20.1/24	SVT-LS02 (T1-RTR-LS02-Sw...)

Connectivity test

Connectivity test between the VM's which are in two different Logical Switch.

```
ubuntu@ubuntu01:~$ ping 192.10.10.12
PING 192.10.10.12 (192.10.10.12) 56(84) bytes of data.
64 bytes from 192.10.10.12: icmp_seq=1 ttl=64 time=0.584 ms
64 bytes from 192.10.10.12: icmp_seq=2 ttl=64 time=0.242 ms
64 bytes from 192.10.10.12: icmp_seq=3 ttl=64 time=0.210 ms
64 bytes from 192.10.10.12: icmp_seq=4 ttl=64 time=0.210 ms
^C
--- 192.10.10.12 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3071ms
rtt min/avg/max/mdev = 0.210/0.311/0.584/0.158 ms
ubuntu@ubuntu01:~$ ping 192.20.20.22
PING 192.20.20.22 (192.20.20.22) 56(84) bytes of data.
64 bytes from 192.20.20.22: icmp_seq=1 ttl=63 time=1.36 ms
64 bytes from 192.20.20.22: icmp_seq=2 ttl=63 time=0.345 ms
64 bytes from 192.20.20.22: icmp_seq=3 ttl=63 time=0.304 ms
^C
--- 192.20.20.22 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2013ms
rtt min/avg/max/mdev = 0.304/0.672/1.368/0.492 ms
```

Usecase-2: Data Centers are L3-Apart

In this use case (as shown in below, [Figure 5: Physical Topology](#)), both ESXi nodes are in same data-center which are L3-Adjacent.

Since the DC fabric is a routed L3 fabric the uplink ports from each server are configured with IP addresses in separate network segments. Traffic in the underlay between servers needs to be routed by the AOS-CX switches.

In this environment, NSX-T can be used to provide L2 connectivity between hosts and VMs.

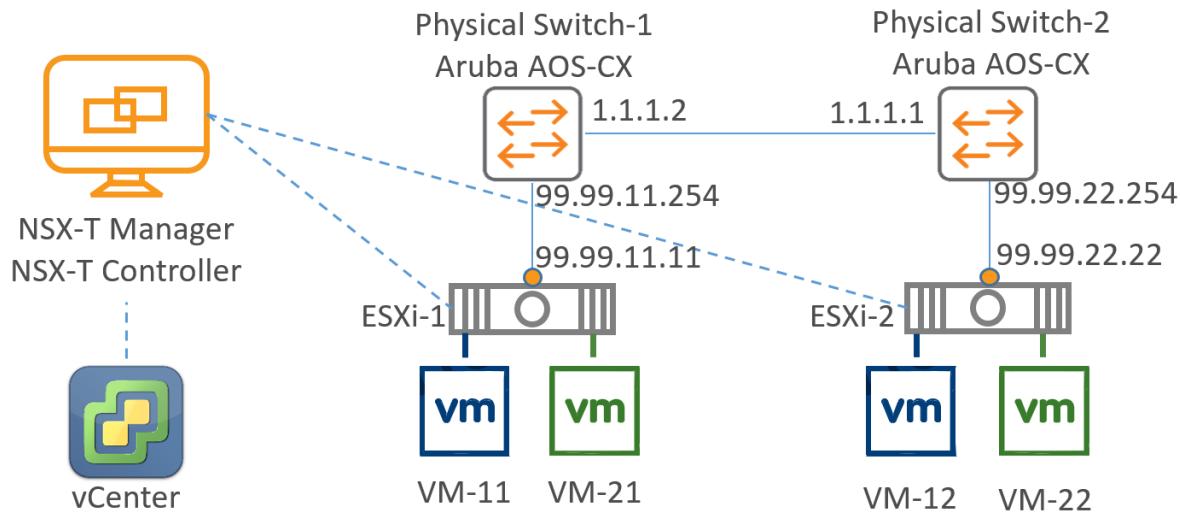


Figure 5: Physical Topology

NSX-T Configuration

- Prepare **Transport Zone** (Overlay) & N-VDS
- System > Fabric > Transport Zones

Edit Transport Zone - SVT-TZ-Overlay

(?) X

Name*

SVT-TZ-Overlay

Description

N-VDS Name*

SVT-NVDS-Overlay

Host Membership Criteria

Standard (For all hosts)

Enhanced Datapath (For ESXi hosts with version 6.7 or above)

Traffic Type

Overlay

VLAN

Uplink Teaming Policy Names

CANCEL

SAVE

- Prepare Uplink **Profile** (select a physical interface, in this case its vmnic5), in here Uplink profile created with a name **Overlay-Uplink-v21** (vlan 21 for SVT-DC) and **Overlay-Uplink-v22** (vlan 22 for SVT-DR)

System > Fabric > Profiles

Edit Uplink Profile - Overlay-Uplink-v21

[?](#) [X](#)

Name *	Overlay-Uplink-v21
Description	

LAGs

[+ ADD](#) [DELETE](#)

<input type="checkbox"/> Name *	LACP Mode	LACP Load Balancing *	Uplinks *	LACP Time
No LAGs found				

Teamings

[+ ADD](#) [CLONE](#) [DELETE](#)

<input type="checkbox"/> Name *	Teaming Policy *	Active Uplinks *	Standby Uplinks
<input type="checkbox"/> [Default Teaming]	Failover Order	vmnic5	

Active uplinks and Standby uplinks are user defined labels. These labels will be used to associate with the Physical NICs while adding Transport Nodes.

Transport VLAN	21	▼
MTU ?	9000	▼

[CANCEL](#) [SAVE](#)

- Navigate **System> Nodes**, select vCenter under “**Managed By**” then Select specific ESXi Node/ESXi Cluster click on **Configure NSX**, associate TZ, Uplink-Profile and IP Pool
 - Create **IP Pool** for TEP as DC-TEP-POOL, in here 99.99.11.0/24 created as a pool for SVT-DC.
 - Create **IP Pool** for TEP as DR-TEP-POOL, in here 99.99.22.0/24 created as a pool for SVT-DR.

- Associate appropriate “Physical NICs” to each node (in here, vmnic5 used as overlay nic)

Configure NSX

1 Host Details

2 Configure NSX

Configure NSX

Transport Zone* ? X

N-VDS Creation* OR Create New Transport Zone

NSX Created Preconfigured

[+ ADD N-VDS](#)

New Node Switch

N-VDS Name*	<input type="text" value="SVT-NVDS-Overlay"/>
Associated Transport Zones	<input type="text" value="SVT-TZ-Overlay"/>
NIOC Profile*	<input type="text" value="nsx-default-nioc-hostswitch-profile"/> OR Create New NIOC Profile
Uplink Profile*	<input type="text" value="Overlay-Uplink-v21"/> OR Create New Uplink Profile
LLDP Profile*	<input type="text" value="LLDP [Send Packet Enabled]"/>
IP Assignment*	<input type="text" value="Use IP Pool"/> OR Create and Use a new IP Pool
IP Pool*	<input type="text" value="DC-TEP-POOL"/>
Physical NICs	<input type="text" value="vmnic5"/> vmnic5

PNIC only Migration No
Enable this option if no vmks exist on PNIC selected for migration

Network Mappings for Install [Add Mapping](#)

Network Mappings for Uninstall [Add Mapping](#)

CANCEL
PREVIOUS
FINISH

With the above steps, NSX-T will install NSX vibs on the ESXi hosts and then configure the GENEVE tunnels. Here is the

status after NSX was configured properly.

The screenshot shows the NSX-T Management interface under the System tab. In the left sidebar, 'Fabric' is selected. The main area displays 'Host Transport Nodes' configuration. A table lists nodes managed by vCenter-8-100, including:

Node	ID	IP Addresses	OS Type	NSX Configuration	Configuration State	Node Status	Transport Zones	NSX Version	N-VDS
SVT-DR (1)	MoRef ID: ...								
10.10.8.22	1725...9603	10.10.8.22	ESXi 6.7.0	Configured	Success	Up	SVT-TZ-Overlay	2.4.2.0.0.14269...	
SVT-DC (1)	MoRef ID: ...				DCProfile				
10.10.8.21	1591...44f4	10.10.8.21	ESXi 6.7.0	Configured	Success	Up	SVT-TZ-Overlay	2.4.2.0.0.14269...	

The below screenshot shows the GENEVE tunnel between each ESXi node to other node. Notice the IP address of both ESXi servers are in two different IP subnets (L3-apart)

The screenshot shows the NSX-T Management interface under the System tab. In the left sidebar, 'Nodes' is selected. The main area shows the details for host 10.10.8.22. The 'Monitor' tab is active, displaying resource usage metrics for Memory, Swap, /, /tmp, /var, /opt, /etc, and /lib/vmware. Below this, the 'Transport Node Status' section shows controller and PNIC connectivity. At the bottom, a table lists GENEVE tunnels:

Source IP	Remote IP	Status	BFD Diagnostic Code	Remote Transport Node	Encap Interface	Encap	Tunnel Name
99.99.22.22	99.99.11.11	Up	0 - No Diagnostic	10.10.8.21	vmk10	GENEVE	geneve1667...

Aruba AOS-CX Switch configuration

8320-SW01 Configuration

```
interface 1/1/1
no shutdown
mtu 9000
description To ESXi-1 VMNIC5
no routing
vlan trunk native 1
vlan trunk allowed all
exit
```

```
interface 1/1/46
no shutdown
mtu 9000
description SW1-to-SW2
no routing
vlan trunk native 1
vlan trunk allowed all
exit

interface vlan11
ip address 1.1.1.2/30
ip mtu 9000
exit

interface vlan21
ip address 99.99.11.254/24
ip mtu 9000
exit

ip route 99.99.22.0/24 1.1.1.1
```

8320-SW02 Configuration

```
interface 1/1/1
no shutdown
mtu 9000
description To ESXi-2 VMNIC5
no routing
vlan trunk native 1
vlan trunk allowed all
exit

interface 1/1/46
no shutdown
mtu 9000
no routing
description SW2-to-SW1
vlan trunk native 1
vlan trunk allowed all

interface vlan11
ip address 1.1.1.1/30
ip mtu 9000
exit

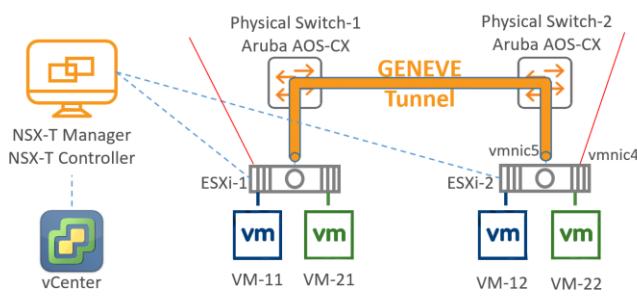
interface vlan22
ip address 99.99.22.254/24
ip mtu 9000
exit

ip route 99.99.11.0/24 1.1.1.2
```

To validate the VM communication, follow the same steps from Usecase-1 for
[Connect VM's using NSX-T Logical Switch and Inter Logical Switch Routing](#)

Usecase-3: BGP between NSX-T Edge VM & Aruba AOS-CX Switch

Physical Topology



Logical Topology

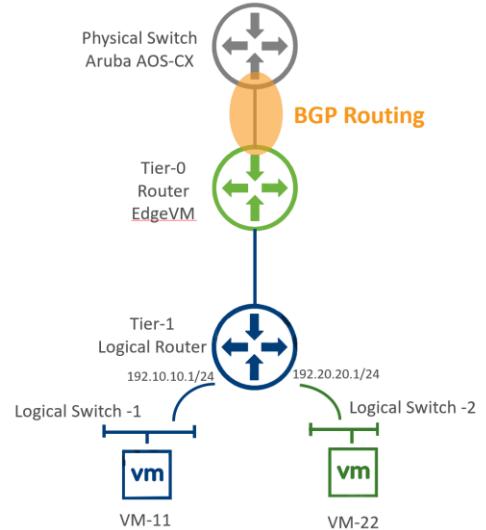


Figure 6: BGP Topology

Use case 3 details those environments that need to provide connectivity from VMs and Hosts within the overlay to targets that do not exist in the VMware NSX-T environment. In these cases (such as a VM needing to access the internet), NSX-T needs to create a routed environment between the VMware Hypervisor environment and the AOS-CX switch.

NSX-T Tier-1 routers facilitate multi-tenancy in the NSX platform. Each Tenant has their own T1 router which connects to a Tier-0 router for northbound access outside of the NSX-T environment. The link between T0 and T1 uses a reserved address space (100.64.0.0/16) and it assigns a /31 subnet on the T0-T1 link.

ESXi Host Preparation for EDGE VM

Create a DVS switch as shown below on the host where we are going to host EDGE VM's and port-groups for Transport overlay. Then configure uplinks to communicate with the AOS-CX Switch.

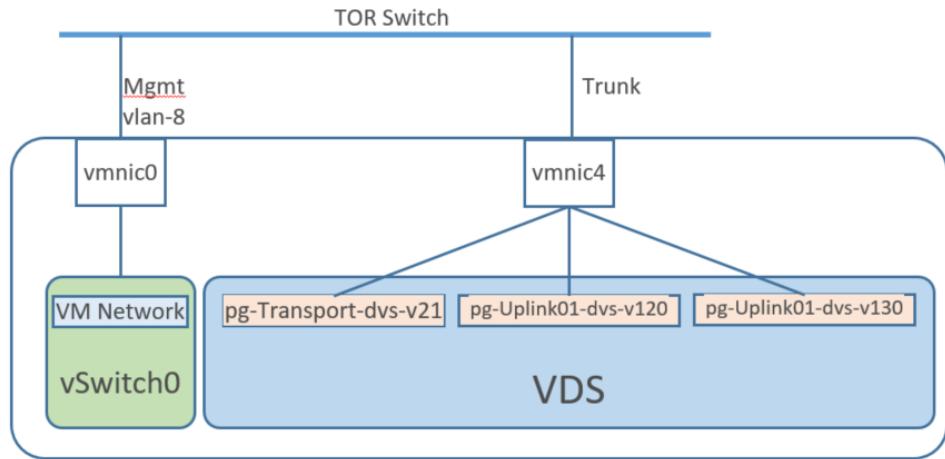


Figure 7: DVS Port-groups for EDGE VM

SVT-DC-DVS | ACTIONS ▾

Summary Monitor Configure Permissions Ports Hosts VMs **Networks**

Distributed Port Groups Uplink Port Groups

Name ↑	VLAN ID
pg-Transport-dvs-v21	VLAN access: 21
pg-Uplink01-dvs-v120	VLAN trunk: 0-4094
pg-Uplink02-dvs-v130	VLAN trunk: 0-4094

NSX-T Preparation

Create two Uplink logical switches for Edge VM in NSX-T, which enables connectivity with AOS-CX Switches

Navigate to **Advanced Networking & Security > Add Logical Switch**

Edit Edge-LS1-Uplink1

(?) X

General Switching Profiles

Name *

Edge-LS1-Uplink1

Description

Uplink Teaming Policy Name *

[Use Default]

Admin Status

Up

VLAN *

120

VLAN Id or VLAN Trunk Spec is allowed.

CANCEL

SAVE

Edit Edge-LS2-Uplink2

(?) X

General Switching Profiles

Name *

Edge-LS2-Uplink2

Description

Uplink Teaming Policy Name *

[Use Default]

Admin Status

Up

VLAN *

130

VLAN Id or VLAN Trunk Spec is allowed.

CANCEL

SAVE

Edge Transport Nodes

Add an NSX Edge VM which helps to enable connectivity between the overlay networks and the physical network.

Here is the IP connectivity between the EDGE VM's and the AOS-CX Switches

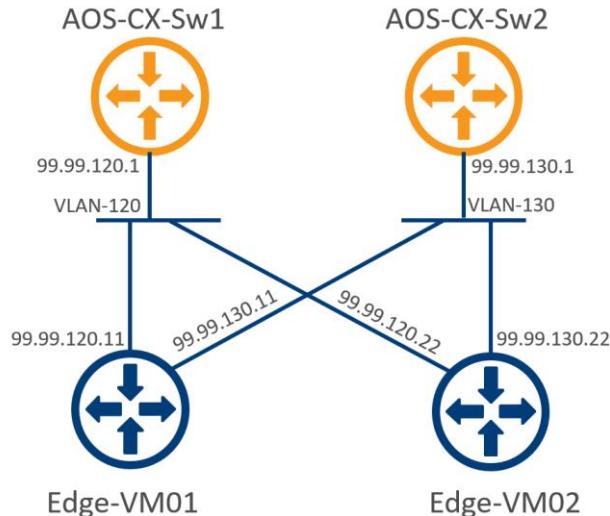


Figure 8: IP connectivity between EDGE VM's – AOS-CX Swithces

Navigate to System > Fabric > Nodes > Edge Transport Nodes > Add Edge VM

The screenshot shows the vSphere Web Client interface with the following navigation path:

- Home
- Networking
- Security
- Inventory
- Tools
- System**
- Advanced Networking & Security

In the 'Fabric' section, 'Nodes' is selected. The main content area displays the 'Edge Transport Nodes' tab, which includes the following controls:

- + ADD EDGE VM
- EDIT
- DELETE
- ACTIONS
- View All

The table below lists Edge Transport Nodes, showing columns for Edge, ID, Deployment Manager, Management Host, Configuration, Node Status, Transport Z, NSX Version, and N.

Click on “+ ADD EDGE VM”

Add Edge VM

1 Name and Description

2 Credentials

3 Configure Deployment

4 Configure Node Settings

5 Configure NSX

Name and Description

Name* edge01

Host name/FQDN* edge01.rb.loc
Enter Fully Qualified Domain Name (FQDN)
e.g. subdomain.example.com

Description

Form Factor*

<input type="radio"/> Small	<input checked="" type="radio"/> Medium	<input type="radio"/> Large
2 vCPU	4 vCPU	8 vCPU
4 GB RAM	8 GB RAM	32 GB RAM
200 GB Storage	200 GB Storage	200 GB Storage

CANCEL **NEXT**

Add Edge VM

1 Name and Description

2 Credentials

3 Configure Deployment

4 Configure Node Settings

5 Configure NSX

Credentials

CLI credentials will be set on the NSX Edge VM. These credentials can be used to login to the read only command line interface of the appliance.

▼ CLI Credentials

CLI User Name* admin

CLI Password*

CLI Confirm Password*

Allow SSH Login Yes

▼ Root Credentials

System Root Password*

System Root Confirm Password*

Allow Root SSH Login Yes

CANCEL **PREVIOUS** **NEXT**

Add Edge VM

- 1 Name and Description
- 2 Credentials
- 3 Configure Deployment**
- 4 Configure Node Settings
- 5 Configure NSX

Configure Deployment

Compute Manager* vCenter-8-100

Cluster* SVT-DC

Resource Pool Resources

Host

Datastore* datastore1

Did not find expected? Try refresh to fetch latest datastores from System.

CANCEL PREVIOUS NEXT

Add Edge VM

- 1 Name and Description
- 2 Credentials
- 3 Configure Deployment
- 4 Configure Node Settings**
- 5 Configure NSX

Configure Node Settings

IP Assignment* Static DHCP

Management IP* 10.10.8.41/24

Default Gateway 10.10.8.254

Management Interface* VM Network

Did not find expected? Try refresh to fetch latest interfaces from System.

Search Domain Names rc.loc

DNS Servers

NTP Servers

CANCEL PREVIOUS NEXT

Add Edge VM

- 1 Name and Description
- 2 Credentials
- 3 Configure Deployment
- 4 Configure Node Settings
- 5 Configure NSX

Configure NSX

Transport Zone*

OR Create New Transport Zone

+ ADD N-VDS

New Node Switch

Edge Switch Name* SVT-NVDS-Overlay

Associated Transport Zones SVT-TZ-Overlay

Uplink Profile* nsx-edge-single-nic-uplink-profile

OR Create New Uplink Profile

IP Assignment* Use IP Pool

IP Pool* DC-TEP-POOL

OR Create and Use a new IP Pool

DPDK Fastpath Interfaces* uplink-1

pg-Transport-dvs-v21

pg-Transport-dvs-v21 (dvportgroup-102)

pg-Uplink01-dvs-v120 (dvportgroup-103)

pg-Uplink02-dvs-v130 (dvportgroup-104)

VM Network (network-73)

CANCEL PREVIOUS FINISH

Add Edge VM

- 1 Name and Description
- 2 Credentials
- 3 Configure Deployment
- 4 Configure Node Settings
- 5 Configure NSX**

Configure NSX

Transport Zone*

SVT-TZ-Overlay
Edge-TZ-Uplink1
Edge-TZ-Uplink2

OR Create New Transport Zone

+ ADD N-VDS

>	SVT-NVDS-Overlay	DELETE
---	------------------	--------

▼ New Node Switch
DELETE

Edge Switch Name*	Edge-NVDS-Uplink1	
-------------------	-------------------	--

Associated Transport Zones	Edge-TZ-Uplink1	
----------------------------	-----------------	--

Uplink Profile*	nsx-edge-single-nic-uplink-profile	OR Create New Uplink Profile
-----------------	------------------------------------	------------------------------

IP Assignment*		
----------------	--	--

DPDK Fastpath Interfaces*	<div style="display: flex; align-items: center;"> uplink-1 pg-Uplink01-dvs-v120 </div> <div style="position: absolute; left: 51%; top: -10px; width: 48%; background-color: white; border: 1px solid #ccc; padding: 5px; border-radius: 5px; z-index: 1; display: none;"> pg-Transport-dvs-v21 (dvportgroup-102) pg-Uplink01-dvs-v120 (dvportgroup-103) pg-Uplink02-dvs-v130 (dvportgroup-104) VM Network (network-73) </div>	CANCEL PREVIOUS FINISH
---------------------------	---	---

Add Edge VM

- 1 Name and Description
- 2 Credentials
- 3 Configure Deployment
- 4 Configure Node Settings
- 5 Configure NSX

Configure NSX

Transport Zone* SVT-TZ-Overlay × Edge-TZ-Uplink1 × Edge-TZ-Uplink2 ×

[OR Create New Transport Zone](#)

+ ADD N-VDS

> SVT-NVDS-Overlay	DELETE
> Edge-NVDS-Uplink1	DELETE
New Node Switch	
Edge Switch Name* <input type="text" value="Edge-NVDS-Uplink2"/>	DELETE
Associated Transport Zones <input type="text" value="Edge-TZ-Uplink2"/>	
Uplink Profile* <input type="text" value="nsx-edge-single-nic-uplink-profile"/>	OR Create New Uplink Profile
IP Assignment*	
DPDK Fastpath Interfaces* <input type="text" value="uplink-1"/>	uplink-1 pg-Uplink02-dvs-v130 pg-Transport-dvs-v21 (dvportgroup-102) pg-Uplink01-dvs-v120 (dvportgroup-103) pg-Uplink02-dvs-v130 (dvportgroup-104) VM Network (network-73)

[CANCEL](#) FINISH

Create a second EDGE VM (edge02) in same way as above.

As these Edge VM's act like a WAN Edge for the fabric, it can be installed on a single ESXi or on a VMware Cluster for redundancy.

VM NSX-T

Home Networking Security Inventory Tools System Advanced Networking & Security

Host Transport Nodes Edge Transport Nodes Edge Clusters ESXi Bridge Clusters

										View	All																																	
Overview		Edge Transport Nodes																																										
Get Started		Fabric		Nodes		Profiles		Transport Zones		Compute Managers																																		
+ ADD EDGE VM EDIT DELETE ACTIONS		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ID</th> <th>Deployment Type</th> <th>Management IP</th> <th>Host</th> <th>Configuration Sta</th> <th>Node Status</th> <th>Transport Zones</th> <th>NSX Version</th> <th>N-VDS</th> <th>Edge Cluster</th> <th>Logical Routers</th> </tr> </thead> <tbody> <tr> <td>edge01</td> <td>5tb7...b908</td> <td>Virtual Machi...</td> <td>10.10.8.41</td> <td>10.10.8.21</td> <td>Success</td> <td>Up</td> <td>SVT-TZ-Over...</td> <td>2.4.2.0.0.142...</td> <td>3</td> <td>0</td> </tr> <tr> <td>edge02</td> <td>2a68...e7ba</td> <td>Virtual Machi...</td> <td>10.10.8.42</td> <td>10.10.8.21</td> <td>Success</td> <td>Up</td> <td>SVT-TZ-Over...</td> <td>2.4.2.0.0.142...</td> <td>3</td> <td>0</td> </tr> </tbody> </table>								ID	Deployment Type	Management IP	Host	Configuration Sta	Node Status	Transport Zones	NSX Version	N-VDS	Edge Cluster	Logical Routers	edge01	5tb7...b908	Virtual Machi...	10.10.8.41	10.10.8.21	Success	Up	SVT-TZ-Over...	2.4.2.0.0.142...	3	0	edge02	2a68...e7ba	Virtual Machi...	10.10.8.42	10.10.8.21	Success	Up	SVT-TZ-Over...	2.4.2.0.0.142...	3	0		
ID	Deployment Type	Management IP	Host	Configuration Sta	Node Status	Transport Zones	NSX Version	N-VDS	Edge Cluster	Logical Routers																																		
edge01	5tb7...b908	Virtual Machi...	10.10.8.41	10.10.8.21	Success	Up	SVT-TZ-Over...	2.4.2.0.0.142...	3	0																																		
edge02	2a68...e7ba	Virtual Machi...	10.10.8.42	10.10.8.21	Success	Up	SVT-TZ-Over...	2.4.2.0.0.142...	3	0																																		

The screenshot shows the VMware vSphere Web Client interface. On the left, the inventory tree displays a hierarchy of hosts and datacenters. A red box highlights the 'edge01' VM under the 'SVT-DC' host. The right pane shows a detailed summary for 'edge01'. The 'Summary' tab is selected, displaying information such as Guest OS (Ubuntu Linux 64-bit), Compatibility (ESXi 6.5 and later (VM version 13)), and VMware Tools status (Running, version:10247 (Guest Managed)). Other tabs include Monitor, Configure, Permissions, Datastores, and Networks. Below the summary, there are links to Launch Web Console and Launch Remote Console. The 'Related Objects' section shows associations with the 'Cluster' (SVT-DC) and 'Host' (10.10.8.21). The 'VM Hardware' section is also visible.

Create Edge Cluster

Group these two EDGE VM's in to an Edge Cluster.

Add Edge Cluster

Name* DC-Edge-Cluster

Description

Edge Cluster Profile nsx-default-edge-high-availability-profile

Transport Nodes

Member Type Edge Node

Available (0)	Selected (2)
<input type="checkbox"/> edge01	<input checked="" type="checkbox"/> edge01
<input type="checkbox"/> edge02	<input checked="" type="checkbox"/> edge02

No records found

< BACK NEXT > No record

CANCEL ADD

Now each edge VM's should be deployed, and the Management IP should be reachable.

Create Tier-0 Router

Create a Tier-0 Router and associate the new Edge Cluster with the Tier-0 Router.

The screenshot shows the NSX-T interface with the title bar "vm NSX-T". The navigation bar includes Home, Networking, Security, Inventory, Tools, System, and Advanced Networking & Security. The left sidebar under Networking has options for Switching, Routers (selected), NAT, DHCP, IPAM, and Load Balancing. The main content area shows the "Routers" tab selected under "Global Config". A table lists two routers: "Tier-0 Router" (selected and highlighted with a red box) and "Tier-1 Router". The table columns are ID and Type, with values 22c8...7bb1 and Tier-1 respectively. Action buttons include ADD, EDIT, DELETE, and ACTIONS.

New Tier-0 Router



Tier-0 Router Advanced

Name* DC-Tier0-RTR

Description

Edge Cluster DC-Edge-Cluster x ▾

High Availability Mode Active-Active OR Create a New Edge Cluster
 Active-Standby

CANCEL

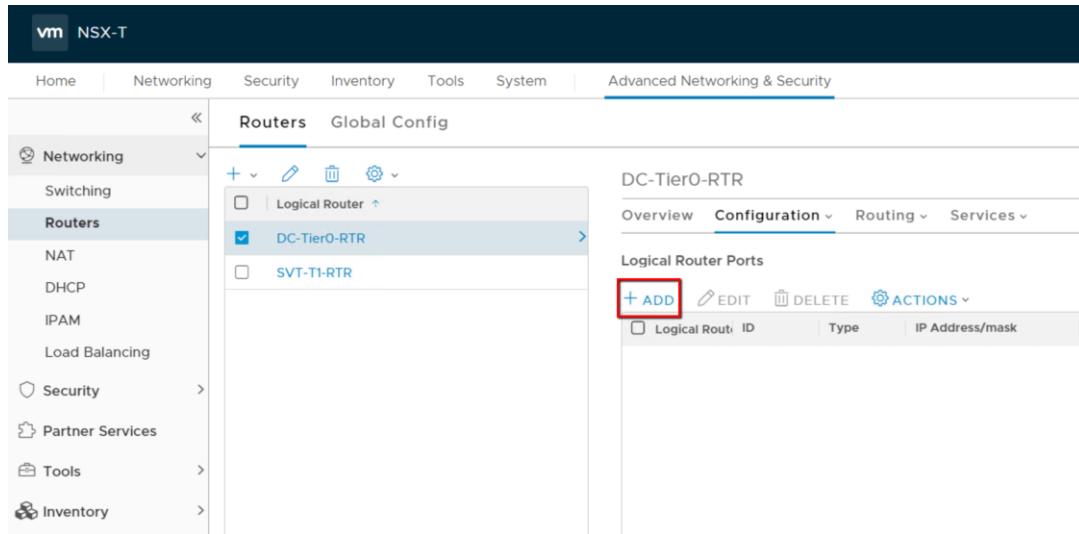
ADD

Adding router ports to the Tier-0 Router

Add router ports to the Tier-0 Router so it maps to the Mgmt., vlan120 and vlan130 port-groups using the logical switches

that are created at NSX-T Preparation section

Navigate to **Advanced Networking & Security > Networking > Routers** > Select **Tier0-RTR** (double click) > **Configuration** > Click on **Router ports** > **Add**



Edit Router Port - RP-Uplink01-Edge01-Tier0

(?) X

Name*	RP-Uplink01-Edge01-Tier0		
Description			
Type	Uplink	MTU <small>i</small>	1500
Transport Node*	edge01		
URPF Mode	<input checked="" type="radio"/> Strict	<input type="radio"/> None	
Logical Switch	Edge-LS1-Uplink1 <small>x v</small>		
<small>OR Create a New Switch</small>			
Logical Switch Port	<input type="radio"/> Attach to new switch port <input checked="" type="radio"/> Attach to existing switch port		
	Switch Port Name	sp-uplink01-edge01 <small>x v</small>	
Subnets			
+ ADD		DELETE	
<input type="checkbox"/> IP Address*		Prefix Length*	
<input type="checkbox"/> 99.99.120.11		24	

[CANCEL](#) [SAVE](#)

Edit Router Port - RP-Uplink02-Edge01-Tier0



Name*

Description

Type MTU

Transport Node*

URPF Mode Strict None

Logical Switch x v

OR Create a New Switch

Logical Switch Port Attach to new switch port Attach to existing switch port

Switch Port Name x v

Subnets

[+ ADD](#) [DELETE](#)

<input type="checkbox"/> IP Address*	Prefix Length*
<input type="checkbox"/> 99.99.130.11	24

[CANCEL](#) [SAVE](#)

Edit Router Port - RP-Uplink01-Edge02-Tier0

Name*

Description

Type MTU

Transport Node*

URPF Mode Strict None

Logical Switch [OR Create a New Switch](#)

Logical Switch Port Attach to new switch port Attach to existing switch port

Switch Port Name

Subnets

[+ ADD](#) [DELETE](#)

<input type="checkbox"/> IP Address*	Prefix Length*
<input type="checkbox"/> 99.99.120.22	24

[CANCEL](#) [SAVE](#)

Edit Router Port - RP-Uplink02-Edge02-Tier0

(?) X

Name*

Description

Type MTU

Transport Node*

URPF Mode Strict None

Logical Switch x v

[OR Create a New Switch](#)

Logical Switch Port Attach to new switch port Attach to existing switch port

Switch Port Name x v

Subnets

[+ ADD](#) [DELETE](#)

<input type="checkbox"/> IP Address*	Prefix Length*
<input type="checkbox"/> 99.99.130.22	24

[CANCEL](#) [SAVE](#)

Here is the summary where we configured two interfaces with IP Address on each Edge VM

NSX-T

Home Networking Security Inventory Tools System Advanced Networking & Security

Networking

- Switching
- Routers**
- NAT
- DHCP
- IPAM
- Load Balancing
- Security
- Partner Services
- Tools
- Inventory

Routers Global Config

DC-Tier0-RTR

Overview Configuration Routing Services

Logical Router Ports

+ ADD	EDIT	DELETE	ACTIONS	Logical Rout. ID	Type	IP Address/mask	Connected To	Transport Node	Relay Service	Statistics
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RP-Uplink1	Uplink	99.99.120.11/24	Edge-LS1-Uplink1	edge01	(sp-uplink01-edge...)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RP-Uplink2	Uplink	99.99.120.22/24	Edge-LS1-Uplink1	edge02	(sp-uplink01-edge...)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RP-Uplink3	Uplink	99.99.130.11/24	Edge-LS2-Uplink2	edge01	(sp-uplink02-edge...)	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RP-Uplink4	Uplink	99.99.130.22/24	Edge-LS2-Uplink2	edge02	(sp-uplink02-edge...)	

Configuring BGP on Tier-0 Router

Configure BGP to enable peering with attached AOS-CX switches.

Home Networking Security Inventory Tools System Advanced Networking & Security

Networking

- Switching
- Routers**
- NAT
- DHCP
- IPAM
- Load Balancing
- Security
- Partner Services
- Tools
- Inventory

Routers Global Config

DC-Tier0-RTR

Overview Configuration **Routing** Services

BGP Configuration EDIT

Status	● Enabled	Global Configuration
ECMP	● Enabled	Static Routes
Graceful Restart	● Disabl	IP Prefix Lists
Inter SR Routing	● Enabl	Community Lists
Local AS	65000	Route Maps
Route Aggregation	0	BGP
		Route Redistribution
		BFD

Neighbors

User System

+ ADD EDIT DELETE ACTIONS

IP Address	Local Address	ID	Admin stat
99.99.120.1	99.99.120.11,99...	a962...c68b	● Enabled

Add BGP peer

New Neighbor

(?) X

Neighbor Local Address Address Families BFD Configuration

Neighbor Address* 99.99.120.1

Description

Admin status Enabled

Maximum Hop Limit 1 ▲▼

Remote AS* 65333

Keep Alive Time (Seconds) 60 ▲▼

Hold Down Time (Seconds) 180 ▲▼

Password



CANCEL

ADD

Edit Neighbor - 99.99.120.1



Neighbor Local Address Address Families BFD Configuration

All Uplinks

Type Loopback ▾

<input type="checkbox"/> Available (0)
No records found

< BACK NEXT > No record

<input type="checkbox"/> Selected (2)
<input type="checkbox"/> 99.99.120.11 (RP-Uplink01-Edge01-Tier0)
<input type="checkbox"/> 99.99.120.22 (RP-Uplink01-Edge02-Tier0)

Max Limit: 8



[CANCEL](#) [SAVE](#)

Edit Neighbor - 99.99.120.1

(?) X

Neighbor Local Address Address Families BFD Configuration

+ ADD  DELETE

Type*	State*	In Filter	Out Filter	In Route Map	Out Route Map
<input type="checkbox"/> IPV4_UNICAST	 Enabled				



 CANCEL  SAVE

Edit Neighbor - 99.99.130.1

(?) X

Neighbor Local Address Address Families BFD Configuration

Neighbor Address* 99.99.130.1

Description

Admin status Enabled

Maximum Hop Limit 255

Remote AS* 65334

Keep Alive Time (Seconds) 60

Hold Down Time (Seconds) 180

[CANCEL](#) [SAVE](#)

Edit Neighbor - 99.99.130.1

[?](#) [X](#)

Neighbor Local Address **Address Families** BFD Configuration

Type Loopback 

<input type="checkbox"/> Available (0)


No records found

< BACK NEXT > No record

<input type="checkbox"/> Selected (2)
<input type="checkbox"/> 99.99.130.11 (RP-Uplink02-Edge01-Tier0)
<input type="checkbox"/> 99.99.130.22 (RP-Uplink02-Edge02-Tier0)

Max Limit: 8

[CANCEL](#) [SAVE](#)

Edit Neighbor - 99.99.130.1

(?) X

Neighbor Local Address **Address Families** BFD Configuration

+ ADD  DELETE

Type*	State*	In Filter	Out Filter	In Route Map	Out Route Map
<input type="checkbox"/> IPV4_UNICA...	● Enabled				



[CANCEL](#) [SAVE](#)

After adding the BGP peers , here is the summary

DC-Tier0-RTR

Overview Configuration ▾ Routing ▾ Services ▾

BGP Configuration | EDIT

Status	● Enabled
ECMP	● Enabled
Graceful Restart	● Disabled
Inter SR Routing	● Enabled
Local AS	65000
Route Aggregation	0

Neighbors

User System

+ ADD ⚪ EDIT ⚫ DELETE ACTIONS ▾

IP Address	Local Address	ID	Admin status	Maximum Hop	Remote AS	Address Family	BFD	Keep Alive	Hold Down
99.99.130.1	99.99.130.22,9...	2d11...5a45	● Enabled	255	65334	1	Disabled	60	180
99.99.120.1	99.99.120.11,99...	a962...c68b	● Enabled	255	65333	1	Disabled	60	180

Then configure redistribution to exchange routes, e.g directly connected networks, static routes etc.

Home | Networking | Security | Inventory | Tools | System | Advanced Networking & Security

Networking < Routers Global Config

Switching

Routers

- Logical Router ↑
- DC-Tier0-RTR** >
- SVT-T1-RTR

DC-Tier0-RTR

Overview Configuration ▾ Routing ▾ Services ▾

Route Redistribution | EDIT

Status	● Disabled
+ ADD ⚪ EDIT ⚫ DELETE	
<input type="checkbox"/> Name	
<input type="checkbox"/> Redistribute-ALL	Route Redistribution

Global Configuration
Static Routes
IP Prefix Lists
Community Lists
Route Maps
BGP
Route Redistribution
BFD

New Redistribution Criteria



Name

Description

Sources*

TO Connected

TO Uplink TO Downlink

TO CSP TO Loopback

TO Static TO NAT

TO DNS Forwarder IP TO IPSec Local IP

T1 Connected

T1 CSP T1 Downlink

T1 Static T1 LB SNAT

T1 NAT T1 LB VIP

T1 DNS Forwarder IP

Route Map ✖️ ▾

CANCEL ADD

Then Enable Route Redistribution as shown below

The screenshot shows the NSX-T interface under the 'Advanced Networking & Security' tab. In the left sidebar, 'Routers' is selected. The main pane shows the 'DC-Tier0-RTR' router selected. On the right, the 'Route Redistribution' tab is active, with an 'EDIT' button highlighted by a red box. Below it, the status is set to 'Enabled'. Under the 'Sources' section, there is a checkbox for 'Redistribute-ALL' which is checked. At the bottom are 'CANCEL' and 'SAVE' buttons.

Edit Route Redistribution Configuration

Status  Enabled

CANCEL

SAVE

Connect Tier-0 Router with Tier-1 Router

Now connect the Tier1 router with the Tier0 router.

The screenshot shows the AOS-CX Switch interface. The top navigation bar includes Home, Networking, Security, Inventory, Tools, and System. The Networking tab is selected. On the left, a sidebar under the Networking category lists Switching, Routers (which is selected and highlighted in blue), NAT, DHCP, IPAM, and Load Balancing. The main content area is titled "Routers" and "Global Config". It features a toolbar with icons for creating, editing, deleting, and configuring routers. A list of routers is shown, with "SVT-T1-RTR" selected and checked. To the right of the list is a context menu with several options: "Connect to Tier-0 Router" (which is highlighted with a red box), "Disconnect from Tier-0 Router", "Manage Tags", "Generate BGP Summary", "Download Routing Table", "Download Forwarding Table", and "Download Debug Information".

Select the Tier-0 Router from the drop down as shown below

The screenshot shows a modal dialog box titled "Connect to Tier-0 Router". It has a "Tier-0 Router*" input field containing "DC-Tier0-RTR", which is underlined in red. Below the input field are two buttons: "CANCEL" and "CONNECT", with "CONNECT" being highlighted in blue. The dialog box also includes a question mark icon and a close button.

Manage the routes from this step in-case if required to filter any specific routes from redistributing it to Tier-0

Routers Global Config

SVT-T1-RTR

Route Advertisement EDIT

Status	● Enabled
Advertise All Connected Routes	● Yes
Advertise All NAT Routes	● No
Advertise All Static Routes	● Yes
Advertise All LB VIP Routes	● No
Advertise All LB SNAT IP Routes	● No
Advertise All DNS Forwarder Routes	● No
Advertised Networks	2 Networks

Advertise Routes

+ ADD EDIT DELETE

Name

SVT-T1-RTR

Overview Configuration ▾ Routing ▾ Services ▾

Route Advertisement | EDIT

Status	● Enabled
Advertise All Connected Routes	● Yes
Advertise All NAT Routes	● No
Advertise All Static Routes	● Yes
Advertise All LB VIP Routes	● No
Advertise All LB SNAT IP Routes	● No
Advertise All DNS Forwarder Routes	● No

Advertised Networks

2 Networks

Advertised Networks

Network	Resource Name	Resource Type	Advertised Route	Advertised
192.10.10.0/24	LR01-LSw01	LogicalRoute...	T1_DOWNLINK	● Yes
192.20.20.0/24	LR01-LSw02	LogicalRoute...	T1_DOWNLINK	● Yes

2 Advertised Networks

AOS-CX BGP Configuration

Below is the AOS-CX switch configuration used in this example.

In BGP configuration, optionally, to allow BGP community values, use neighbor `x.x.x.x` send-community.

```
8320-SW1#
interface vlan120
  ip address 99.99.120.1/24
  no shut
  exit

router bgp 65333
  bgp router-id 99.99.120.1
  neighbor 99.99.120.11 remote-as 65000
  neighbor 99.99.120.11 update-source vlan 120
  neighbor 99.99.120.22 remote-as 65000
  neighbor 99.99.120.22 update-source vlan 120
  address-family ipv4 unicast
    neighbor 99.99.120.11 activate
    neighbor 99.99.120.11 next-hop-self
    neighbor 99.99.120.11 send-community
    neighbor 99.99.120.11 default-originate
    neighbor 99.99.120.22 activate
    neighbor 99.99.120.22 next-hop-self
    neighbor 99.99.120.22 send-community
    neighbor 99.99.120.22 default-originate
    network 99.99.120.0/24
  exit-address-family

8320-SW2#
interface vlan130
  ip address 99.99.130.1/24
  no shut
  exit

router bgp 65334
  bgp router-id 99.99.130.1
  neighbor 99.99.130.11 remote-as 65000
  neighbor 99.99.130.11 update-source vlan 130
  neighbor 99.99.130.22 remote-as 65000
  neighbor 99.99.130.22 update-source vlan 130
  address-family ipv4 unicast
    neighbor 99.99.130.11 activate
    neighbor 99.99.130.11 next-hop-self
    neighbor 99.99.130.11 send-community
    neighbor 99.99.130.11 default-originate
    neighbor 99.99.130.22 activate
    neighbor 99.99.130.22 next-hop-self
    neighbor 99.99.130.22 send-community
    neighbor 99.99.130.22 default-originate
    network 99.99.130.0/24
```

exit-address-family

BGP verification on AOS-CX

```
8320-SW1# sh bgp all summary
VRF : default
BGP Summary
-----
Local AS          : 65333      BGP Router Identifier : 99.99.120.1
Peers             : 2          Log Neighbor Changes   : No
Cfg. Hold Time    : 180        Cfg. Keep Alive       : 60

Address-family : IPv4 Unicast
-----
Neighbor        Remote-AS MsgRcvd MsgSent  Up/Down Time State      AdminStatus
99.99.120.11    65000      14      17      00h:09m:44s Established Up
99.99.120.22    65000      14      15      00h:09m:45s Established Up

Address-family : IPv6 Unicast
-----
8320-SW1# show ip route bgp

Displaying ipv4 routes selected for forwarding

'[x/y]' denotes [distance/metric]

99.99.130.0/24, vrf default
  via 99.99.120.22, [20/0], bgp
  via 99.99.120.11, [20/0], bgp
169.254.0.128/25, vrf default
  via 99.99.120.22, [20/0], bgp
192.10.10.0/24, vrf default
  via 99.99.120.22, [20/0], bgp
  via 99.99.120.11, [20/0], bgp
192.20.20.0/24, vrf default
  via 99.99.120.22, [20/0], bgp
  via 99.99.120.11, [20/0], bgp

8320-SW2# sh bgp all summary
VRF : default
BGP Summary
-----
Local AS          : 65334      BGP Router Identifier : 99.99.130.1
Peers             : 2          Log Neighbor Changes   : No
Cfg. Hold Time    : 180        Cfg. Keep Alive       : 60

Address-family : IPv4 Unicast
-----
Neighbor        Remote-AS MsgRcvd MsgSent  Up/Down Time State      AdminStatus
99.99.130.11    65000      5       5       00h:00m:14s Established Up
99.99.130.22    65000      5       6       00h:00m:14s Established Up
```

```
Address-family : IPv6 Unicast
-----
8320-SW2# sh ip route bgp

Displaying ipv4 routes selected for forwarding

'[x/y]' denotes [distance/metric]

99.99.120.0/24, vrf default
    via 99.99.130.22, [20/0], bgp
    via 99.99.130.11, [20/0], bgp
169.254.0.128/25, vrf default
    via 99.99.130.22, [20/0], bgp
192.10.10.0/24, vrf default
    via 99.99.130.22, [20/0], bgp
    via 99.99.130.11, [20/0], bgp
192.20.20.0/24, vrf default
    via 99.99.130.22, [20/0], bgp
    via 99.99.130.11, [20/0], bgp
```

BGP verification from Edge VM (NSX-T)

```
edge02> vrf 1
edge02(tier0_sr)> get bgp neighbor summary
BFD States: NC - Not configured, AC - Activating, DC - Disconnected
            AD - Admin down, DW - Down, IN - Init, UP - Up
BGP summary information for VRF default for address-family: ipv4Unicast

Router ID: 99.99.130.22 Local AS: 65000

Neighbor          AS      State Up/DownTime   BFD InMsgs OutMsgs InPfx OutPfx
OutPfx

99.99.130.1      65334   Estab 00:18:37     NC  27      23      1      5
169.254.0.130    65000   Estab 1d02h34m    NC  95912   95914   5      6
99.99.120.1      65333   Estab 00:29:04    NC  1524   850      1      5

BFD States: NC - Not configured, AC - Activating, DC - Disconnected
            AD - Admin down, DW - Down, IN - Init, UP - Up
BGP summary information for VRF default for address-family: ipv6Unicast

Router ID: 99.99.130.22 Local AS: 65000

Neighbor          AS      State Up/DownTime   BFD InMsgs OutMsgs InPfx OutPfx
OutPfx

169.254.0.130    65000   Estab 1d02h34m    NC  95912   95914   1      1

edge02(tier0_sr)> get route bgp ipv4

Flags: t0c - Tier0-Connected, t0s - Tier0-Static, B - BGP,
t0n - Tier0-NAT, t1s - Tier1-Static, t1c - Tier1-Connected,
t1n: Tier1-NAT, t1l: Tier1-LB VIP, t1ls: Tier1-LB SNAT,
```

```
t1d: Tier1-DNS FORWARDER, > - selected route, * - FIB route
Total number of routes: 1
b > * 0.0.0.0/0 [20/0] via 99.99.130.1, uplink-277, 00:00:02
b > * 0.0.0.0/0 [20/0] via 99.99.120.1, uplink-268, 00:00:02
```

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References

1. [NSX Data Center Installation Guide](#)
2. [NSX Data Center Admin Guide](#)