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1.1 Revision History

DATE	VERSION	EDITOR	CHANGES
17 Nov 2019	0.1	Ariya Parsamanesh	Initial creation
18 Nov 2019	0.2	Ariya Parsamanesh	Added the L2 configuration

2 CX switch OVA setup

Here in this short technote we'll go through and setup the virtual environment on Windows 10 laptop so that we can run a number of Aruba CX switch OVA as well as NetEdit OVA to configure them.

We'll make use of GNS3, VirtualBox and Aruba switch and NetEdit OVAs.

2.1 Things you need

- Windows 10 with min version of 10.0.16299.1387, that has at least 16G of memory
- VirtualBox version 6.0.8-130520
- GNS3 version 2.1.20
- 👽 VirtualBox-6.0.8-130520-Win.exe
- 🚯 GNS3-2.1.20-all-in-one-regular.exe

3 Win10 Laptop Setup

In this section we'll create a loopback interface so we can use it to connect our virtual CX switches to the outside networks.

3.1 Loopback Interface Configuration

Open your Device Manager, select "Network Adapters" and add Legacy hardware



🛃 Device Manager	
File Action View Help	🛃 Device Manager
	File Action View Help
Audio inputs and outputs	
Add Hardware	CRDMBPD5NH
Select the device driver you want to install for this hardware.	Add Hardware The wizard is ready to install your hardware
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.	Hardware to install:
Manufacturer Model Intel Corporation Generic Virtual Network Channel Device Intel(R) Corporation Hyper-V Virtual Switch Extension Adapter Microsoft Microsoft Hyper-V Network Adapter MSFT Wake on Lan pattern Install Section This driver is digitally signed. Have Disk Tell me why driver signing is important	To start installing your new hardware, dick Next.
< Back Next > Cancel	< Back Next > Cancel

Once you finish the installation you can then assign a valid IP address to that interface.

3.2 Loopback Interface IP Address

Open the control panel and select "Network and sharing Centre" and then click on "change adapter setting", your KM-Test adapter should be listed there, select it and then choose to rename it to "loopback" so that you can identify it easier. Then assign a static IP address to it and save setting.

Here is my setup, I have assigned 192.168.99.254/24 to it.

```
C:\>ipconfig/all
Windows IP Configuration
  Host Name . . . . . . . . . . . . . . . . . AriyaP
  Primary Dns Suffix . . . . . :
  IP Routing Enabled. . . . . . . . Yes
  WINS Proxy Enabled. . . . . . . . . No
  DNS Suffix Search List. . .
                         . . . : home
Ethernet adapter Ethernet:
  Connection-specific DNS Suffix . : home
  Description . . . . . . . . . . . . . . . . Intel(R) 82579LM Gigabit Network Connection
  Physical Address. . . . . . . . . . . F0-DE-F1-64-0A-82
  DHCP Enabled. . . . . . . . . . . . Yes
  Autoconfiguration Enabled . . . . : Yes
  Lease Obtained. . . . . . . . . . . . Sunday, November 17, 2019 8:39:39 AM
  Lease Expires . . . . . . . . . . . . . . . . Monday, November 18, 2019 10:13:51 AM
  Default Gateway . . . . . . . . : 192.168.1.1
  192.168.1.1
  NetBIOS over Tcpip. . . . . . . : Enabled
Ethernet adapter Ethernet 3:
  Connection-specific DNS Suffix . :
  Description . . . . . . . . . . . . . . . Npcap Loopback Adapter
```

Physical Address.		•	•	•	•	•	•	:	02-00-4C-4F-4F-50
DHCP Enabled		•		•				:	No
Autoconfiguration	Ena	ble	d	•	•		•	:	Yes
IPv4 Address				•	•			:	172.16.2.10 (Preferred)
Subnet Mask		•		•			•	:	255.255.255.0
Default Gateway .		•		•			•	:	
NetBIOS over Tcpip	. .		•	•	•			:	Enabled

Ethernet adapter Loopback:

Wireless LAN adapter Wi-Fi:

 $C: \setminus >$

4 VirtualBox

Here we'll cover the installation and setup of VirtualBox. Try to get this specific version as it works nicely with most of the windows and MAC laptops, however you can also use other version and spend time getting it to work.

The installation is straight forward so we won't be covering it here. We'll start with importing the OVA images.

4.1 Importing Aruba OVA Images

Here we'll have 2x OVA images that we want to import

- 1. ArubaOS-CX_10_04_0001.ova
- 2. Aruba_NetEdit-2.0.0.ova

We'll start with the CX ova file.



Do the same for the NetEdit ova as well. Next we'll edit the setting for the ArubaOS-CX machine.

Tools	New Settings Discard Start	
ArubaOS-CX_Virtual Devered Off	Reneral Name: ArubaOS-CK_Virtual Operation System: Other Linux (64-bit)	Preview
nete O ArubaOS-CX_Virtua	I - Settings	? X
 System Display Storage Audio Network Serial Ports USB Shared Folders User Interface 	Basig Adjvanced Departption Disk Encryption Name: AnubaOS-CV_Virtual Type: Linux Version: Other Linux (64-bit)	(Vormal, 8.02 GB)

Check to see that CPU is set to 2 and memory is set to 4G and set the checkbox for "Hardware clock in UTC Time"

😔 ArubaOS-CX_Virtua	I - Settings ? X	🥝 ArubaOS-CX_Virtu	al - Settings ? X
General	System	E General	System
System	Motherboard Processor Acceleration	System	Motherboard Processor Acceleration
Display	Base Memory:	Display	Processor(s):
Storage	4MB 16384MB	Storage	Execution Cap:
Audio	goot Order:	Audio	1% 100% Extended Features: C Enable PAE/NX
Network	e Retwork	Serial Ports	Enable Nested <u>V</u> T-x/AMD-V
USB	Pointing Device: PS/2 Mouse	SB	
Shared Folders	Extended Features: E Enable I/O APIC	Shared Folders	
User Interface	Hardware Clock in UTC Time	User Interface	
	OK Cancel		OK Cancel

Then go to the Network section and select these setting only for the Adapter1, leave the rest of the Adapters 2-4 as their default settings.

ArubaOS-CX_Virtua	ıl - Settings	?	×
E General	Network		
System	Adapter <u>1</u> Adapter <u>2</u> Adapter <u>3</u> Adapter <u>4</u>		
Display	Enable Network Adapter		
Storage	Attached to: Bridged Adapter		
🕩 Audio	Name: Microsoft KM-TEST Loopback Adapter		•
Network	Adapter Type: PCnet-PCI II (Am79C970A)		•
Serial Ports	Promiscuous Mode: Deny		•
🄗 USB	MAC Address: 0800274DFA2C		9
Shared Folders	E Connected Port Forwarding		
User Interface			
	OK	Ca	ncel

Here we are ensuring that first adapter will be on the same network as the loopback interface. It will be clearer as we dot the GNS3 configuration.

Save all the changes you have made and don't power up the host from VirtualBox, we'll do all that from GNS3.

5 GNS3 Installation

Here we'll install GNS3 and since we are using windows platform, you get many options that needs to be covered here.

🔗 GNS3 2.1.20 Setup		_	×	🚷 GNS3 2.1.20 Setup			-		×
				License Agreement					
2	Welcome to	GNS3 2.1.20 S	Setup	Please review the license terms	s before installing GNS3	2.1.20.			É
	Setup will guide you t	hrough the installation of	of GNS3 2.1.20.	Press Page Down to see the re	est of the agreement.				
GNS3	It is recommended th before starting Setup relevant system files computer. Click Next to continue	at you dose all other ag . This will make it possib without having to reboo	plications le to update it your	GNU GENERAL PU Version 3, 29 Ju Copyright (C) 2007 Free Softv Everyone is permitted to copy of this license document, but o Preamble The GNU General Public Licens software and other kinds of wo If you accept the terms of the agreement to install GNS3 2.1.3 GNS3 2.1.20 installer	BLIC LICENSE ine 2007 ware Foundation, Inc. < y and distribute verbatim changing it is not allower use is a free, copyleft lice orks. agreement, dick I Agree 20.	chttp://fsf.o ocopies d. ense for e to continue	e. You must ad	ccept the	*
•		Next >	Cancel	A	< E	Back	I Agree	Cano	el
GNS3 2.1.20 Setup Choose Start Menu Folder Choose a Start Menu folder from the start Menu folder fol	or the GNS3 2.1.20 shor	-tcuts.		GNS3 2.1.20 Setup Choose Components Choose which features of GNS	53 2.1.20 you want to in:	stall.			×
Select the Start Menu folder i can also enter a name to crea	n which you would like to ate a new folder.	o create the program's	shortcuts. You	Check the components you wa install. Click Next to continue.	ant to install and unchec	k the compor	nents you don	't want to	
ZVSE 7-Zip Accessibility Accessibility Accessibility ACCESSIB AOMEL Partition Assistant St CCleaner Dual Server FortiClient Image Writer ImgBurn TTunes lenovo	andard Edition 8.0			Select components to install: Space required: 176.7 MB	✓ GNS3 ✓ WinPCAP 4.1.3 ✓ WinPCAP 4.1.3 ✓ Wireshark 3.0.2 ✓ Dynamips 0.2.17 QEMU 2.4.0.8 0.1 ✓ VPCS 0.6.1 ✓ Cpulimit TightVNC Viewer 2 <	▲ 11.0	Description Position your over a compo see its descri	mouse onent to ption,	
GN53 2,1,20 installer				GNS3 2.1.20 installer					
	<	Back Next >	Cancel		< 6	Back	Next >	Cano	el

I choose the above extra bits, VPCS, Cpulimit and SolarPutty. None of them are mandatory but with these you can get added benefits, for example with solar putty, it gives you a tabbed putty session which can be very handy.





5.1 GNS3 Configuration

When GNS3 is started, you get this window.



Then you get that the connection is successful but you get this error, click ok and the cancel out of it.

🔗 GNS3			_	🚱 GNS3		-
<u>Eile E</u> dit <u>V</u> ie	🚯 Setup Wizard		? ×	<u>File Edit V</u> ie	😵 Setup Wizard	? ×
	Local server status Validation of the cor	figuration of the local server			GNS3 VM In order to run the GNS3 VM you must first have VMware or VirtuaBox installed and the GNS3 VM.ova imported with or	ie of these software.
	Connection to local serve	r successful			Virtualization software:	SAVE
-				€	Wware (recommended) WrtualBox	GNS3 Exclusive
Ţ				\Box	The 0453 WI can <u>downloaded here</u> . Emport the VM in your virtualization software and hit refresh.	BUY NOW
0		Whware Vitaura unsure tool could not be found. Vitaura on the VITADI (counted for		0	VMname:	▼ <u>R</u> efresh
 € 4 € 4		VMwate vimon tool could not be found, VMwate of the VX.APV (required for VMwate player) is probably not installed. Your and download if from https:// www.wmeare.com/support/developer/vi-api/. After installation you need to restart GNS3. OK		0 ₽ 0 0	1 RAM size: 2946 MB	\$ •
Con	1:			Con		
GNS Run Cop Use	с г 1			GNS: Runr Copy Use I		
=> " Time Time VMw	7 2 2 2			->1 Time Time VMw		
4	-	< 8adk Next	> Cancel	4	< gack	Next > Cancel

Then this is our final windows before we can start.

🐣 GNS3						_		×
<u>F</u> ile <u>E</u> dit	<u>V</u> iew Control Node Annotate <u>T</u> oo	ıls <u>H</u> elp						
 	🖿 🕓 🔣 >_ 🕨				0			
		Please create a pro	iect		Topology Summary Node Con Servers Summary AriyaP CPU 9.5	sole %, RAM 2	25.3%	ØX
5	4							
	Console							0 🗙
	GNS3 management console. Running GNS3 version 2.1.20 on Windows (64 Copyright (c) 2006-2019 GNS3 Technologies. Use Help -> GNS3 Doctor to detect common iss => Timeout after 2 seconds for request http://ad Timeout after 2 seconds for request http://ad VMware vmrun tool could not be found, VMwar	bit) with Python 3.6.8 Qt 5.12.1 and Py ues. /admin@127.0.0.1:3080/v2/version. Pleas nin@127.0.0.1:3080/2/version. Please e or the VIX API (required for VMware p	Qt 5.12. ase check the connection is not check the connection is not bloc check the connection is not bloc layer) is probably not installed.	blocked by a firew cked by a firewall o cked by a firewall o You can download i	all or an anti-virus. r an anti-virus. r an anti-virus. it from https://www.vmwai	re.com/su	pport/dev	eloper/

Now we want to create a new virtual appliance to represent Aruba CX switches.

😚 GNS3				
<u>F</u> ile <u>E</u> dit	t <u>V</u> iew Control Node Annotate	<u>T</u> ools <u>H</u> elp		
	🕞 🕓 🔣 >_ 🗅		ର୍ ପ୍	0
	Switches	Ø 🕱		🔶 Тор
	Installed & Available appliances	•		No
O	Filter			
	Arista vEOS	A		
		😵 New appliance template	? ×	
-	ArubaOS-CX Simulation Softwa			
	ATM switch	Import an appliance template file		
ų.		OR		
	CEOS	\bigcirc <u>A</u> dd an IOS router using a real IOS image (supported by Dynamips)		
	🔆 Cisco IOSvL2	<u>A</u> dd an IOU (IOS on UNIX) device using a L3 or L2 IOU image		Ser
U	Girco 101112	<u>A</u> dd a Qemu virtual machine		
-		Add a VirtualBox virtual machine		
⊗ 🖨	Cisco NX-OSv	Add a VMware virtual machine		
$\mathbf{\nabla}0$	Cisco NX-OSv 9000			
~				
	Cumulus VX			
2	Ethernet hub	Add a cloud		
	New appliance template	Add a generic ethernet hub		
	Console	 Add a generic ethernet switch 		
	GNS3 management console. Running GNS3 version 2.1.20 on Windov Copvright (c) 2006-2019 GNS3 Technolog	OK Cancel	Help)



Then once you click on finish button, you are presented with the ArubaOS-CX template that needs to be edited.

GNIS2 GNIS2 Preferences					?	×		
General	VirtualBox VM templa	tes						
Server	The and the complete							
GNS3 VM Packet capture • Built-in Ethernet hubs Ethernet switches Cloud nodes • VPCS VPCS nodes • Dynamips IOS routers • IOS on UNIX IOU Devices • QEMU Qemu VMs • VirtualBox VMs • VintualBox VMs • VMware VMware VMs • Docker Containers	ArubaOS-CX_Virtual	 General Template name: VirtualBox name Default name format: RAM: Statistics mode enabled: ACPI intudenon enabled: Linked base WM: Metwork Adopters: Name format: Use any adapter: Type: 	ArubaOS-CX_Virtual ArubaOS-CX_Virtual ArubaOS-CX_Virtual 4095 Ariya Faise Faise True 1 Ethernet(0) Faise Intel PRO/1000 MT Desktop	p (82540EM)				
		New	Edit	ок	Delete Cancel Apply Apply Cancel I error 5 warnin	y ngs		
😵 VirtualBox VM cor	nfiguration			? ×	🚱 VirtualBo	ox VM c	configuration	? ×
ArubaOS-C	X_Virtual				Aruba	OS-	CX_Virtual	
General settings	Network				General	settings	: Network	
Template name:	Aruba8400				Adapters	s:	8	\$
Default name form	at: {name}-{0}				First por	t name:		
Symbol:	:/symbols/vbox_guest.svg][Browse	Name fo	rmat:	1/1/{0}	
Category:	Switches			•	Segment	t size:	0	\$
RAM:	4096 MB			\$	Type:		PCnet-PCI II (Am79C970A)	-
Enable ACPI sh	nutdown				Allov	w GNS3 t	to use any configured VirtualBox adapter	
Start VM in hea	adless mode							
✓ Use as a linked	base VM (experimental)							
			ОК	Cancel				OK Cancel

Note the changes we have made to the template, now apply and save it.

We can also change the symbol to an Aruba 8400 icon, this is what I have done.

		😵 Lab-8320 - GNS3	
🐣 VirtualBox VM configuration	? ×	<u>File Edit View</u> Control Node Annotate <u>T</u> ools <u>H</u> elp	
Aruba8400			
General settings Network		Instaled & Available appliances	
Template name: Aruba8400		Arista vEOS	
Symbol: 8400.PNG	Browse	Aruba8400	
Category: Switches RAM: 4096 MB		ATM switch	
Enable ACPI shutdown		Cisco IOSvL2	
 ✓ Start VM in neadless mode ✓ Use as a linked base VM (experimental) 			
		Cisco NX-OSv	
	OK Cancel	Ethernet nub	
	Current		

Next we'll drag and drop the Aruba 8400 switch to our new project as shown below.

🐣 Lab-8	320 - GNS3	-		\times
<u>F</u> ile <u>E</u> di	t <u>V</u> iew Control Node Annotate <u>T</u> ools <u>H</u> elp			
	🗁 🕔 🔣 >_ 🕨 📕 CC 🗹 🖾 🗔 🔿 🖉 Q 🔯			
	Aruba8400-1 Aruba8400-2	Console telnet 127 telnet 127	7.0.0.1:50	00
	Servers Summary AriyaP CPU 9,	3%, RAM	24.8%	ØX
Now	we'll powered them on.			
🐣 Lab-8	320 - GN53	-		×
<u>F</u> ile <u>E</u> di	: <u>View</u> Control Node Annotate <u>T</u> ools <u>H</u> elp			
	┢ () 🖾 >_ ▶ 📕 C 🛛 🖬 🛄 ் / Q Q 🔯			
	Aruba8400-1 Aruba8400-2	Console elnet 127. elnet 127.	:0.0.1:500 .0.0.1:500	0 x)0)1
V	Servers Summary			0 ×
	AriyaP CPU 91	.5%, RAM	1 28.5%	

Next we'll open a console connection to both to configure their OOBM ports. You can double click on both the switches and that will open a solarwinds putty tabbed session.



We are going to assign 192.168.99.1/24 and 192.168.99.2/24 to the switches.

```
hostname 8400-1
interface mgmt
   no shutdown
   ip static 192.168.99.1/24
   default-gateway 192.168.99.254
https-server rest access-mode read-write
https-server vrf mgmt
ssh server vrf mgmt
hostname 8400-2
interface mgmt
   no shutdown
   ip static 192.168.99.2/24
   default-gateway 192.168.99.254
https-server rest access-mode read-write
https-server vrf mgmt
ssh server vrf mgmt
```

Note that the IP addressing is on the same IP subnet as that of our laptop loopback interface.

8400-1# sh int mgmt		
Address Mode	:	static
Admin State	:	up
Mac Address	:	08:00:27:29:2f:f5
IPv4 address/subnet-mask	:	192.168.99.1/24
Default gateway IPv4	:	192.168.99.254
IPv6 address/prefix	:	
IPv6 link local address/prefix	κ:	
Default gateway IPv6	:	
Primary Nameserver	:	
Secondary Nameserver	:	
8400-1#		
8400-2# sh int mgmt		
Address Mode	:	static
Admin State	:	up
Mac Address	:	08:00:27:81:f8:1b
IPv4 address/subnet-mask	:	192.168.99.2/24

```
Default gateway IPv4: 192.168.99.254IPv6 address/prefix:IPv6 link local address/prefix: fe80::a00:27ff:fe81:f81b/64Default gateway IPv6:Primary Nameserver:Secondary Nameserver:8400-2#
```

Now we should have full connectivity to the switches and should be able to ping them from our laptop.

```
C:\>ping 192.168.99.1
Pinging 192.168.99.1 with 32 bytes of data:
Reply from 192.168.99.1: bytes=32 time<1ms TTL=64
Ping statistics for 192.168.99.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
   Minimum = Oms, Maximum = Oms, Average = Oms
C:\>ping 192.168.99.2
Pinging 192.168.99.2 with 32 bytes of data:
Reply from 192.168.99.2: bytes=32 time<1ms TTL=64
Ping statistics for 192.168.99.2:
   Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
   Minimum = Oms, Maximum = Oms, Average = Oms
```

```
C: \setminus >
```

And the same from the virtual switches.

```
8400-1# ping 192.168.99.254 vrf mgmt
PING 192.168.99.254 (192.168.99.254) 100(128) bytes of data.
108 bytes from 192.168.99.254: icmp_seq=1 ttl=128 time=1.49 ms
108 bytes from 192.168.99.254: icmp_seq=2 ttl=128 time=0.325 ms
108 bytes from 192.168.99.254: icmp seq=3 ttl=128 time=0.408 ms
108 bytes from 192.168.99.254: icmp seq=4 ttl=128 time=0.254 ms
108 bytes from 192.168.99.254: icmp seq=5 ttl=128 time=0.463 ms
--- 192.168.99.254 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 0.254/0.589/1.495/0.458 ms
8400-1# ping 192.168.99.2 vrf mgmt
PING 192.168.99.2 (192.168.99.2) 100(128) bytes of data.
108 bytes from 192.168.99.2: icmp seq=1 ttl=64 time=0.558 ms
108 bytes from 192.168.99.2: icmp seq=2 ttl=64 time=0.596 ms
108 bytes from 192.168.99.2: icmp seq=3 ttl=64 time=0.563 ms
108 bytes from 192.168.99.2: icmp seq=4 ttl=64 time=0.481 ms
108 bytes from 192.168.99.2: icmp seq=5 ttl=64 time=0.447 ms
--- 192.168.99.2 ping statistics ---
```

```
5 packets transmitted, 5 received, 0% packet loss, time 4004ms
rtt min/avg/max/mdev = 0.447/0.529/0.596/0.055 ms
8400-1#
8400-2# ping 192.168.99.1 vrf mgmt
PING 192.168.99.1 (192.168.99.1) 100(128) bytes of data.
108 bytes from 192.168.99.1: icmp_seq=1 ttl=64 time=1.05 ms
108 bytes from 192.168.99.1: icmp_seq=2 ttl=64 time=0.783 ms
108 bytes from 192.168.99.1: icmp_seq=3 ttl=64 time=0.443 ms
108 bytes from 192.168.99.1: icmp_seq=4 ttl=64 time=0.544 ms
108 bytes from 192.168.99.1: icmp_seq=5 ttl=64 time=0.629 ms
--- 192.168.99.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4100ms
rtt min/avg/max/mdev = 0.443/0.689/1.050/0.214 ms
8400-2#
```

5.2 CX Switch WebUI Access

Now that we have the management interface up and running on the CX switches, we should also have full webUI access.



Note that because we were using bridged Adapter in VirtualBox VM setting for Adapter1, the Interface 1/1/0 of all CX switches will be connected to that loopback interface.

6 CX Switch Configuration

Now we use the connector icon to connect the switches. Note that every virtual CX switch will only have 8x interfaces, out of which 1/1/0 is the out of band mgmt. interface. So here we start with 1/1/1-2 interfaces.



Now we can use to toggle "show/hide interface label" under GNS3 view menu.



Adding the third CX switch and connecting it up. Note that I have changed the icons to reflect 8320s.



6.1 Switch Configuration

Here we'll go through some basic configuration. Furst thing is that the CX OVA will ave only 6x interfaces. Interface 1/1/0 is the mgmt. interface and 1/1/7 is used internally.

8320-1# show interface brief								
Port	Native VLAN	Mode	Туре	Enabled	Status	Reason		Speed (Mb/s)
1/1/1		routed		no	down	Administratively	down	
1/1/2		routed		no	down	Administratively	down	
1/1/3		routed		no	down	Administratively	down	
1/1/4		routed		no	down	Administratively	down	
1/1/5		routed		no	down	Administratively	down	
1/1/6 8320-1#		routed		no	down	Administratively	down	

6.1.1 Link Aggregation Configuration

We'll be configuring LACP for 1/1/1 and 1/1/2 for both 8320-1 and 8320-2 switches.

```
8320-1# conf t
8320-1(config) # int 1/1/1
8320-1(config-if) # no shut
8320-1(config-if) # int 1/1/2
8320-1(config-if) # no shut
8320-1(config-if)# ^Z
8320-2# conf t
8320-2(config) # int 1/1/1
8320-2(config-if) # no shut
8320-2(config-if) # int 1/1/2
8320-2(config-if) # no shut
8320-2(config-if)# ^Z
8320-2#
8320-1# sh lldp neighbor-info
LLDP Neighbor Information
_____
Total Neighbor Entries
                             : 0
Total Neighbor Entries Deleted : 0
Total Neighbor Entries Dropped : 0
Total Neighbor Entries Aged-Out : 0
LOCAL-PORT CHASSIS-ID
                            PORT-ID
                                         PORT-DESC TTL SYS-NAME
_____
8320-1# sh lldp neighbor-info
LLDP Neighbor Information
_____
                             : 2
Total Neighbor Entries
Total Neighbor Entries Deleted : 0
Total Neighbor Entries Dropped : 0
Total Neighbor Entries Aged-Out : 0
LOCAL-PORT CHASSIS-ID
                             PORT-ID
                                          PORT-DESC
                                                        TTL
                                                                SYS-NAME
```

1/1/1	08:00:09:72:d0:20	1/1/1	1/1/1	120	8320-2
1/1/2	08:00:09:72:d0:20	1/1/2	1/1/2	120	8320-2
8320-1#					

Next is the LACP configuration that you need on both the switches.

```
8320-1# conf t
8320-1(config) # interface lag 101
8320-1(config-lag-if) # no shutdown
8320-1(config-lag-if) # lacp mode active
8320-1(config-lag-if) # interface 1/1/1
8320-1(config-if) # mtu 2048
8320-1(config-if) # lag 101
8320-1(config-if) # interface 1/1/2
8320-1(config-if) # mtu 2048
8320-1(config-if) # lag 101
8320-1# sh lacp agg
Aggregate name : lag101
Interfaces : 1/1/2 1/1/1
Heartbeat rate : Slow
               : 13-src-dst
Hash
Aggregate mode : Active
8320-1#
8320-1# sh lacp interfaces
State abbreviations :
A - Active P - Passive F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync O - OutofSync
C - Collecting D - Distributing
X - State m/c expired
                                E - Default neighbor state
Actor details of all interfaces:
     Intf Aggr Port Port State System-ID
Name Id Pri
                                                     System Aggr Forwarding
                                                    Pri Key State
_____

      1/1/1
      lag101
      2
      1
      ALFOE
      08:00:09:c8:5a:12
      65534
      101
      lacp-block

      1/1/2
      lag101
      3
      1
      ALFOE
      08:00:09:c8:5a:12
      65534
      101
      lacp-block

                            ALFOE 08:00:09:c8:5a:12 65534 101 lacp-block
Partner details of all interfaces:
Intf Aggr Port Port State System-ID System Aggr
Name Id Pri Pri Pri Vou
_____
1/1/1lag101065534PLFOEX00:00:00:00:00:006553401/1/2lag101065534PLFOEX00:00:00:00:00:00655340
8320-1#
8320-1# sh interface brief
_____
        Native Mode Type
Port
                                    Enabled Status Reason
                                                                          Speed
         VLAN
                                                                          (Mb/s)
_____
1/1/1
         ___
               routed --
                                    yes
                                            up
                                                                          1000
                                   yes up 100

yes up 100

no down Administratively down --

no down Administratively down --

no down Administratively down --

no down Administratively down --
1/1/2
        ___
               routed --
                                                                          1000
1/1/3 --
1/1/4 --
               routed --
               routed --
1/1/5 --
1/1/6 --
lag100 --
               routed --
               routed --
                                     yes blocked --
               routed --
                                                                          auto
8320-1#
```

Now when we configure LACP on the second switch, the link will come up.

```
interface lag 102
  no shutdown
  lacp mode active
interface 1/1/1
  no shutdown
  mtu 2048
  lag <mark>102</mark>
interface 1/1/2
  no shutdown
  mtu 2048
   lag <mark>102</mark>
8320-2# sh lacp aggregates
Aggregate name : lag102
Interfaces
            : 1/1/1 1/1/2
Heartbeat rate : Slow
             : 13-src-dst
Hash
Aggregate mode : Active
8320-2# sh lacp inter
State abbreviations :
A - Active P - Passive F - Aggregable I - Individual
S - Short-timeout L - Long-timeout N - InSync 0 - OutofSync
C - Collecting D - Distributing
X - State m/c expired
                           E - Default neighbor state
Actor details of all interfaces:
____
    _____
                                       System Aggr Forwarding
    Aggr Port Port State System-ID
Name Id Pri
Intf
                                            Pri Key State
 _____
                   -----
                                                  ____
1/1/1lag10221ALFNCD08:00:09:72:d0:2065534102up1/1/2lag10231ALFNCD08:00:09:72:d0:2065534102up
Partner details of all interfaces:
_____
Intf Aggr Port Port State System-ID System Aggr
Name Id Pri Pri Key
_____
1/1/1lag10221ALFNCD08:00:09:c8:5a:12655341011/1/2lag10231ALFNCD08:00:09:c8:5a:1265534101
8320-2#
8320-2# sh int b
_____
Port
      Native Mode Type
                               Enabled Status Reason
                                                              Speed
                                                              (Mb/s)
       VLAN
_____
       ---
1/1/1
            routed --
                               yes
                                     up
                                                              1000
1/1/2
       --
             routed --
                              yes
                                    up
                                                              1000
                      no down Administratively down --
1/1/3
      --
             routed --
1/1/4 -- routed --
1/1/5 -- routed --
1/1/6 -- routed --
lag102 -- routed -- yes up --
                                                              2000
8320-2#
```

6.1.2 VLAN Configuration

Now we'll configure couple of VLANs that will use the LACP link.

8320-1# sh vlan _____ VLAN Name Status Reason Type Interfaces down no member port 1 DEFAULT VLAN 1 default 8320-1#conf t 8320-1(config) # vlan 10,20 8320-1(config-vlan-<10,20>)# interface lag 101 8320-1(config-lag-if) # no routing 8320-1(config-lag-if) # vlan trunk allow 10,20 8320-1(config-lag-if) # end 8320-1# 8320-1# sh vlan _____ _____ VLAN Name Status Reason Туре Interfaces _____ _____ 1 DEFAULT_VLAN_1 10 VLAN10 20 VLAN20 default down no_member_port static lag101 static lag101 up ok ok up 8320-1# 8320-2# conf t 8320-2(config) # vlan 10,20 8320-2(config-vlan-<10,20>)# interface lag 102 8320-2(config-lag-if) # no routing 8320-2(config-lag-if) # vlan trunk allow 10,20 8320-2(config-lag-if) # end 8320-2# 8320-2# sh vlan _____ _____ VLAN Name Status Reason Туре Interfaces _____ _____ ------1 DEFAULT VLAN 1 down no member port default 10 VLAN10 20 VLAN20 ok static lag102 up ok static lag102 up 8320-2#

Adding VLAN interface IP address.

8320-1# conf t 8320-1(config)# interface vlan 10 8320-1(config-if-vlan)# ip address 10.0.10.1/24 8320-1(config-if-vlan)# interface vlan 20 8320-1(config-if-vlan)# ip address 10.0.20.1/24 8320-1(config-if-vlan)# end 8320-1#

```
8320-1# sh ip interface brief
Interface
             IP Address
                                   Interface Status
                                      link/admin
1/1/3
              No Address
                                     down/down
1/1/4
             No Address
                                     down/down
                                     down/down
1/1/5
             No Address
             No Address
                                     down/down
1/1/6
vlan10
              10.0.10.1/24
                                     up/up
              10.0.20.1/24
vlan20
                                     up/up
```

8320-1#

8320-2#conf t 8320-2(config) # configure t 8320-2(config) # interface vlan 10 8320-2(config-if-vlan)# ip address 10.0.10.2/24 8320-2(config-if-vlan)# interface vlan 20 8320-2(config-if-vlan) # ip address 10.0.20.2/24 8320-2(config-if-vlan)# end 8320-2# sh ip interface brief Interface Status Interface IP Address link/admin down/down No Address 1/1/3 down/down No Address 1/1/4 down/down No Address 1/1/5 No Address down/down 1/1/6 vlan10 10.0.10.2/24 up/up vlan20 10.0.20.2/24 up/up

8320-2#

Finally doing the ping test

```
8320-1# sh ip route
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
10.0.10.0/24, vrf default
        via vlan10, [0/0], connected
10.0.10.1/32, vrf default
       via vlan10, [0/0], local
10.0.20.0/24, vrf default
       via vlan20, [0/0], connected
10.0.20.1/32, vrf default
       via vlan20, [0/0], local
8320-1# ping 10.0.10.2
PING 10.0.10.2 (10.0.10.2) 100(128) bytes of data.
108 bytes from 10.0.10.2: icmp seq=1 ttl=64 time=26.5 ms
108 bytes from 10.0.10.2: icmp seq=2 ttl=64 time=3.41 ms
108 bytes from 10.0.10.2: icmp seq=3 ttl=64 time=3.68 ms
108 bytes from 10.0.10.2: icmp seq=4 ttl=64 time=3.60 ms
108 bytes from 10.0.10.2: icmp seq=5 ttl=64 time=3.83 ms
--- 10.0.10.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 3.412/8.224/26.583/9.180 ms
8320-1#
```

6.1.3 Configuring the third Switch

Now we'll configure couple of VLANs



```
8320-1# conf t
8320-1(config)# interface 1/1/3
8320-1(config-if)# no routing
8320-1(config-if)# no shut
8320-1(config-if)# vlan trunk allow 10,20
8320-1(config-if)# exit
8320-1(config)# exit
8320-1#
```

```
8320-2# conf t
8320-2(config) # interface 1/1/3
8320-2(config-if) # no routing
8320-2(config-if) # no shut
8320-2(config-if) # vlan trunk allow 10,20
8320-2(config-if) # exit
8320-2(config) # exit
8320-2#
```

```
8320-3# conf t
8320-3(config) # interface 1/1/1
8320-3(config-if) # no shutdown
8320-3(config-if) # interface 1/1/2
8320-3(config-if) # no shutdown
8320-3(config-if) # end
8320-3#
8320-3# sh lldp neighbor-info
LLDP Neighbor Information
_____
Total Neighbor Entries
                          : 2
Total Neighbor Entries Deleted : 0
Total Neighbor Entries Dropped : 0
Total Neighbor Entries Aged-Out : 0
LOCAL-PORT CHASSIS-ID PORT-ID PORT-DESC TTL SYS-NAME
_____

        1/1/1
        08:00:09:c8:5a:12
        1/1/3
        1/1/3
        120
        8320-1

        1/1/2
        08:00:09:72:d0:20
        1/1/3
        1/1/3
        120
        8320-2

        08:00:09:72:d0:20 1/1/3
                                                120
                                                         8320-2
1/1/2
                                    1/1/3
8320-3#
8320-3# sh int b
_____
Port Native Mode Type
                                Enabled Status Reason
                                                                  Speed
       VLAN
                                                                  (Mb/s)
_____
                                             ____
1/1/1 -- routed -- yes up
                                                                  1000
```

1/1/2	 routed	yes	up		1000
1/1/3	 routed	no	down	Administratively down	
1/1/4	 routed	no	down	Administratively down	
1/1/5	 routed	no	down	Administratively down	
1/1/6	 routed	no	down	Administratively down	
8320-3#					

Checking the interface status on 8320-1 and -2

8320-1# sh int b

Port	Native VLAN	Mode	Туре	Enabled	Status	Reason	Speed (Mb/s)
1/1/1 1/1/2 1/1/3 1/1/4 1/1/5 1/1/6 vlan10 vlan20 lag101 8320-1#	1 1 1 1	trunk trunk trunk routed routed routed trunk	 	yes yes no no yes yes yes	up up down down down up up up	Administratively down Administratively down Administratively down	1000 1000

8320-2# sh int b

Port	Native VLAN	Mode	Туре	Enabled	Status	Reason	Speed (Mb/s)
1/1/1	1	trunk		yes	up		1000
1/1/2	1	trunk		yes	up		1000
1/1/3	1	trunk		yes	up		1000
1/1/4		routed		no	down	Administratively down	
1/1/5		routed		no	down	Administratively down	
1/1/6		routed		no	down	Administratively down	
vlan10				yes	up		
vlan20				yes	up		
lag102 8320-2#	1	trunk		yes	up		2000

Adding the VLANs to the third switch

vlan 3 intern no rou vlan t intern no rou vlan t 8320-3	10,20 face 1/1/1 uting crunk allow 10,20 face 1/1/2 uting crunk allow 10,20 B# sh vlan				
VLAN Interi	Name faces	Status	Reason	Туре	
1 10 1/1/2	DEFAULT_VLAN_1 VLAN10	down up	no_member_port ok	default static	1/1/1-
20 1/1/2 8320-3	VLAN20 3#	up	ok	static	1/1/1-

6.1.4 Configuring MSTP

The 802.1s multiple spanning tree protocol (MSTP) is the default mode for spaning tree on CX switches. Also note that spanning tree is disabled by default.

Run the following commands on the switches.

Switch name	Spanning tree command			
8320-1	spanning-tree config-name STP			
	spanning-tree config-revision 1			
	spanning-tree instance 1 vlan 10			
	spanning-tree instance 2 vlan 20			
	spanning-tree instance 1 priority 1			
	spanning-tree			
8320-2	spanning-tree config-name STP			
	spanning-tree config-revision 1			
	spanning-tree instance 1 vlan 10			
	spanning-tree instance 2 vlan 20			
	spanning-tree instance 2 priority 1			
	spanning-tree			
8320-3	spanning-tree config-name STP			
	spanning-tree config-revision 1			
	spanning-tree instance 1 vlan 10			
	spanning-tree instance 2 vlan 20			
	spanning-tree			

8320-1# sh spanning-tree mst 1

```
#### MST1
Vlans mapped: 10
BridgeAddress:08:00:09:c8:5a:12Priority:4096RootAddress:08:00:09:c8:5a:12Priority:4096
              Port:0, Cost:0, Rem Hops:20
                            State Cost Priority Type
Port Role
_____ _____
1/1/3DesignatedForwarding20000128point_to_pointlag101DesignatedForwarding2000064point_to_point
Topology change flag : True
Number of topology changes : 3
Last topology change occurred : 399 seconds ago
8320-1#
8320-1# sh spanning-tree mst 2
#### MST2
Vlans mapped: 20

        Bridge
        Address:08:00:09:c8:5a:12
        Priority:32768

        Root
        Address:08:00:09:72:d0:20
        Priority:4096

              Port:lag101, Cost:20000, Rem Hops:19
Port Role
                       State Cost Priority Type
AlternateBlocking20000128point_to_pointRootForwarding2000064point_to_point
1/1/3
lag101
Topology change flag : True
Number of topology changes : 3
Last topology change occurred : 483 seconds ago
8320-1#
```

This shows that 8320-1 is the root bridge for MST instant 1 which is for VLAN 10 and for instant 2, we have Root bridge with address of 08:00:09:72:d0:20. This happen to be the 8320-2 switch.

8320-2# sh spanning-tree mst 1 #### MST1 Vlans mapped: 10
 Bridge
 Address:
 08:00:09:72:d0:20
 Priority:32768

 Root
 Address:
 08:00:09:c8:5a:12
 Priority:4096
 Port:lag102, Cost:20000, Rem Hops:19 State Cost Priority Type Port Role _____ ____ _____ Designated Forwarding 20000 128 point_to_point Root Forwarding 20000 64 point_to_point 1/1/3 lag102 Topology change flag : True Number of topology changes : 3 Last topology change occurred : 581 seconds ago 8320-2# sh spanning-tree mst 2 #### MST2 Vlans mapped: 20
 Bridge
 Address:
 08:00:09:72:d0:20
 Priority:4096

 Root
 Address:
 08:00:09:72:d0:20
 Priority:4096
 Port:0, Cost:0, Rem Hops:20 State Cost Priority Type Port Role _____ _____ 1/1/3DesignatedForwarding20000128point_to_pointlag102DesignatedForwarding2000064point_to_point Topology change flag : True Number of topology changes : 5 Last topology change occurred : 579 seconds ago

8320-2#

And this is what we see on 8320-3

8320-3# sh spanning-tree mst 1 #### MST1 Vlans mapped: 10 BridgeAddress:08:00:09:9d:d1:f7Priority:32768RootAddress:08:00:09:c8:5a:12Priority:4096 Port:1/1/1, Cost:20000, Rem Hops:19 Port Role State Cost Priority Type _____ _____ RootForwarding20000128point_to_pointAlternateBlocking20000128point_to_point 1/1/1 1/1/2 Topology change flag : True Number of topology changes : 1 Last topology change occurred : 825 seconds ago 8320-3# sh spanning-tree mst 2 #### MST2 Vlans mapped: 20

Bridge Root	Address:08:00:0 Address:08:00:0 Port:1/1/2, Cos	09:9d:d1:f7 09:72:d0:20 st:20000, Rem	Priorit Priorit Hops:19	cy:32768 cy:4096	
Port	Role	State	Cost	Priority	Туре
1/1/1 1/1/2	Designated Root	Forwarding Forwarding	20000 20000	128 128	point_to_point point_to_point
Topology change flag Number of topology changes Last topology change occurred		: True : 2 : 827 seconds	s ago		
8320-3#					

6.1.5 Configuring RSTP+

Rapid spanning tree protocol (RSTP) requires less config and the RSTP+ version allows it run on per VLAN basis. We should remove the previous MSTP configs from the switches.

```
no spanning-tree
no spanning-tree config-name
no spanning-tree config-revision
no spanning-tree instance 1
no spanning-tree instance 2
```

Switch name	Spanning tree command		
8320-1	<pre>spanning-tree mode rpvst spanning-tree vlan 10,20 spanning-tree vlan 10 priority 1 spanning-tree</pre>		
8320-2	spanning-tree mode rpvst spanning-tree vlan 10,20 spanning-tree vlan 20 priority 1 spanning-tree		
8320-3	spanning-tree mode rpvst spanning-tree vlan 10,20 spanning-tree		

Checking the spanning tree status for VLAN 10

8320-1	8320-1# show	8320-1# show spanning-tree vlan 10 VLAN10											
	Spanning tre Root ID	Spanning tree status : Enabled Protocol: RPVST Root ID Priority : 4096 MAC-Address: 08:00:09:c8:5a:12 This bridge is the root Hello time(in seconds):2 Max Age(in seconds):20 Forward Delay(in seconds):15											
	Bridge ID	lge ID Priority : 4096 MAC-Address: <mark>08:00:09:c8:5a:12</mark> Hello time(in seconds):2 Max Age(in seconds):20 Forward Delay(in seconds):15											
	Port	Role	State	Cost	Priority	Туре							
	1/1/3 lag101	Designated Designated	Forwarding Forwarding	20000 20000	128 64	point_to_point point_to_point							
	8320-1#												
8320-2	8320-2# show	spanning-tree	e vlan 10										
	VLAN10 Spanning tre	e status : Ena	bled Protocol	RPVST									

	Root ID	ID Priority : 4096 MAC-Address: 08:00:09:c8:5a:12 Hollo time (in secondo):2 May Age (in secondo):20											
		Hello time(in Forward Delay	seconds):2 N (in seconds):1	Max Age(in secon 15	nds):20								
	Bridge ID	Priority : 32 MAC-Address: Hello time(in Forward Delay)	ciority : 32768 AC-Address: <mark>08:00:09:72:d0:20</mark> ello time(in seconds):2 Max Age(in seconds):20 prward Delay(in seconds):15										
	Port	Role	State	Cost	Priority	Туре							
	1/1/3 lag102	Designated Forwarding 20000 128 point_to_po Root Forwarding 20000 64 point_to_po											
	8320-2#												
8320-3	8320-3# show	-3# show spanning-tree vlan 10											
	VLAN10 Spanning tre Root ID Bridge ID	AN10 Janning tree status : Enabled Protocol: RPVST Root ID Priority : 4096 MAC-Address: 08:00:09:c8:5a:12 Hello time(in seconds):2 Max Age(in seconds):20 Forward Delay(in seconds):15 Bridge ID Priority : 32768 MAC-Address: 08:00:09:9d:d1:f7 Hello time(in seconds):2 Max Age(in seconds):20											
	Port	Role	State	Cost	Priority	Туре							
	1/1/1 1/1/2	Root Alternate	Forwarding <mark>Blocking</mark>	20000 20000	128 128	point_to_point point_to_point							
	8320-3#												

Checking the spanning tree status for VLAN 20

8320-1	8320-1# show spanning-tree vlan 20											
	VLAN20	N20										
	Spanning tre	ning tree status : Enabled Protocol: RPVST										
	KOOU ID	ot ID Priority : 4096 MAC-Address: <mark>08:00:09:72:d0:20</mark> Hello time(in seconds):2 Max Age(in seconds):20										
		Forward Delay(in seconds):15										
	Bridge ID	Bridge ID Priority : 32768										
		MAC-Address: 08:00:09:c8:5a:12										
	Hello time(in seconds):2 Max Age(in seconds):20											
		forward Derdy	(111 Seconds) .									
	Port	Role	State	Cost	Priority	Туре						
	1/1/3	Alternate	Blocking	20000	128	point_to_point						
	lag101	Root	point_to_point									
	8320-1#											
	8320-2# show	spanning-tree	vlan 20									
8320-2	0520 2# 51100	spanning cree	Vian 20									
	VLAN20											
	Spanning tre	e status : Enak	oled Protocol:	: RPVST								
	Root ID	Priority : 4	1096 18•00•09•72•d	1.20								
		This bridge is	s the root	J • 2 0								
		Hello time(in	seconds):2 N	Max Age(in seco	nds):20							
		Forward Delay	(in seconds):1	15								
	Bridge ID	Priority : 40)96									
	_	MAC-Address:	08:00:09:72:d	D:20								
		Hello time(in	seconds):2 N	Max Age(in seco	nds):20							

		Forward Delay	(in seconds):1	15								
	Port	Role	State	Cost	Priority	Туре						
	1/1/3	Designated	Forwarding	20000	128	point to point						
	lag102	Designated	Forwarding	20000	64	point_to_point						
	8320-2#											
8320-3	8320-3# show	spanning-tree	vlan 20									
	VLAN20 Spapping tree status - Enchlad Protocol: PDVST											
	Spanning tree status : Enabled Protocol: RPVST											
	Root ID	Root ID Priority : 4096										
	MAC-Address: 08:00:09:72:d0:20											
	Hello time(in seconds):2 Max Age(in seconds):20											
		Forward Delay(in seconds):15										
	Bridge ID	Bridge ID Priority : 32768										
		MAC-Address: (08:00:09:9d:d1	L:f7								
		Hello time(in	seconds):2 N	Max Age(in seco:	nds):20							
		Forward Delay	(in seconds):	15								
	Port	Role	State	Cost	Priority	Туре						
	1/1/1	Designated	Forwarding	20000	128	point to point						
	1/1/2	Root	Forwarding	20000	128	point_to_point						
	8320-3#											

And here is an easy way to find out who is the root bridge for various VLANs

8320-1	8320-1# Spanning Root br:	320-1# sh spanning-tree summary root panning tree status: Enabled Protocol: RPVST coot bridge for VLAN : 10									
	VLAN	Priority	Root ID	Root cost	Hello Time	Max Age	Fwd Dly	Root Po	ort		
	VLAN10 VLAN20 8320-1#	4096 4096	08:00:09:c8:5a:12 08:00:09:72:d0:20	020000	2	20 20	15 15	1	0 ag101		
8320-2	8320-2# Spanning Root bra	sh spannin g tree stat idge for Vi	ng-tree summary roc cus: Enabled Protoc LAN : 20	ot col: RPVST							
	RootHello Max FwdVLANPriorityRoot IDcostTimeAge Dly Root Port										
	VLAN10 VLAN20 8320-2#	4096 4096	08:00:09:c8:5a:12 08:00:09:72:d0:20	20000	2	20 20	15 15]	ag102 0		
8320-3	8320-3# sh spanning-tree summary root Spanning tree status: Enabled Protocol: RPVST Root bridge for VLAN :										
	VLAN	Priority	Root ID	Root cost	Hello Time	Max Age	Fwd Dly	Root Pc	ort		
	VLAN10 VLAN20	4096 4096	08:00:09:c8:5a:12 08:00:09:72:d0:20	20000 20000	2	20 20	15 15		1/1/1 1/1/2		
	8320-3#										

7 VPCS Testing

Here I have added a VPCS as PC-3 to GNS3 that is connected to 8320-3 switch on 1/1/3 interface.



You need to edit the VPCS to assign it an IP address.



Now we'll configure the interface 1/1/3 on 8320-3 to be on VLAN 10.

8320-3# s	h int b							
Port	Native VLAN	Mode	Туре	Enabled	Status	Reason		Speed (Mb/s)
1/1/1	1	trunk		yes	up			1000
1/1/2	1	trunk		yes	up			1000
1/1/3		routed		no	down	Administratively do	own	
1/1/4		routed		no	down	Administratively do	wn	
1/1/5		routed		no	down	Administratively do	wn	
1/1/6		routed		no	down	Administratively do	own	

8320-3# conf t 8320-3(config)# int 1/1/3 8320-3(config-if)# no routing 8320-3(config-if) # vlan access 10 8320-3(config-if) # no shut 8320-3(config-if) # ^Z 8320-3# 8320-3# sh int b

Port	Native VLAN	Mode	Туре	Enabled	Status	Reason	Speed (Mb/s)
1/1/1	1	trunk		ves	 מט		1000
1/1/2	1	trunk		yes	up		1000
1/1/3	10	access		yes	up		1000
1/1/4		routed		no	down	Administratively down	
1/1/5		routed		no	down	Administratively down	
1/1/6		routed		no	down	Administratively down	
8320-3#							

Here are the successful pings from 8320-1

8320-1# ping 10.0.10.9 PING 10.0.10.9 (10.0.10.9) 100(128) bytes of data. 108 bytes from 10.0.10.9: icmp_seq=1 ttl=64 time=630 ms 108 bytes from 10.0.10.9: icmp_seq=2 ttl=64 time=22.6 ms 108 bytes from 10.0.10.9: icmp_seq=3 ttl=64 time=77.3 ms 108 bytes from 10.0.10.9: icmp_seq=4 ttl=64 time=331 ms 108 bytes from 10.0.10.9: icmp_seq=5 ttl=64 time=181 ms

--- 10.0.10.9 ping statistics ---5 packets transmitted, 5 received, 0% packet loss, time 4007ms rtt min/avg/max/mdev = 22.618/248.520/630.541/218.004 ms 8320-1#

And from 8320-2

```
8320-2# ping 10.0.10.9
PING 10.0.10.9 (10.0.10.9) 100(128) bytes of data.
108 bytes from 10.0.10.9: icmp_seq=1 ttl=64 time=1649 ms
108 bytes from 10.0.10.9: icmp_seq=2 ttl=64 time=436 ms
108 bytes from 10.0.10.9: icmp_seq=5 ttl=64 time=210 ms
--- 10.0.10.9 ping statistics ---
5 packets transmitted, 4 received, 20% packet loss, time 4056ms
rtt min/avg/max/mdev = 210.679/733.937/1649.112/549.674 ms
8320-2#
```

8 Appendix A – Running Configuration

8.1 Switch 8320-1 Configuration

```
8320-1# sh run
Current configuration:
!Version ArubaOS-CX Virtual.10.04.0001
!export-password: default
hostname 8320-1
user admin group administrators password ciphertext
AQBapdSJvDb18mCzVw141v+U2CPE819nioJBWwMxPn5DR/DVYgAAAEp2TDMjdoehptPcmQgMSyctoBezpsBIp9mGC
Tj8krTJwWclyo64nZbwZVA/9ekvKo7k3wvIAWu3Z3/Kd2Rc24Pjuu9H72TcgWJLMO+1MXVtUVi+vrTfiS/n3WZmfA
gVV6S/
led locator on
cli-session
    timeout 0
1
ssh server vrf mgmt
vlan 1,10,20
spanning-tree mode rpvst
spanning-tree
spanning-tree vlan 10,20
spanning-tree vlan 10 priority 1
interface mgmt
   no shutdown
   ip static 192.168.99.1/24
   default-gateway 192.168.99.254
interface lag 101
   no shutdown
   no routing
   vlan trunk native 1
   vlan trunk allowed 10,20
   lacp mode active
interface 1/1/1
   no shutdown
   mtu 2048
   lag 101
interface 1/1/2
   no shutdown
   mtu 2048
   lag 101
interface 1/1/3
   no shutdown
   no routing
   vlan trunk native 1
   vlan trunk allowed 10,20
interface vlan10
   ip address 10.0.10.1/24
interface vlan20
    ip address 10.0.20.1/24
https-server rest access-mode read-write
https-server vrf mgmt
8320-1#
```

8.2 Switch 8320-2 Configuration

8320-2# sh run Current configuration:

```
!
!Version ArubaOS-CX Virtual.10.04.0001
!export-password: default
hostname 8320-2
user admin group administrators password ciphertext
AQBapX+j5qWK7K7b03CfA30uBoX6dz3vNovtRL2jzam0b/NoYqAAABrOdm8ZBHGwRjPANCi6lGfa59dZFptfstxSa
KbHpkKwgQ+agwfeNRCCDUP/vw87aT31XksFQsa0wTJSdcTkR7hEyOFmWmME250vE8bTUvmn5ZVt0PDih6VqX7BUWs
zuTwQt
led locator on
cli-session
    timeout 0
1
ssh server vrf mgmt
1
vlan 1,10,20
spanning-tree mode rpvst
spanning-tree
spanning-tree vlan 10,20
spanning-tree vlan 20 priority 1
interface mgmt
    no shutdown
    ip static 192.168.99.2/24
    default-gateway 192.168.99.254
interface lag 102
    no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 10,20
    lacp mode active
interface 1/1/1
    no shutdown
    mtu 2048
    lag 102
interface 1/1/2
   no shutdown
   mtu 2048
   lag 102
interface 1/1/3
   no shutdown
   no routing
   vlan trunk native 1
   vlan trunk allowed 10,20
interface vlan10
   ip address 10.0.10.2/24
interface vlan20
   ip address 10.0.20.2/24
https-server rest access-mode read-write
https-server vrf mgmt
8320-2#
```

8.3 Switch 8320-3 Configuration

```
8320-3# sh run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.04.0001
!export-password: default
hostname 8320-3
user admin group administrators password ciphertext
AQBape4cFSNn+kHfqJrC5yqajUJ140pfWz5j0nlpwqe+KLwNYgAAAA4CROYIKzm6MhJD1Z1AEMVp30YVlmauMSfKe
j4Ry4zGJQ6+n8SOpV4IRNpktJcHZC1mYQDEGYRhaTEeGZOoGIYvFHmCju6BbkkhpC/yG9M40XC6m+dw51wzNXyn84
VOcthw
led locator on
```

```
!
ssh server vrf mgmt
!
vlan 1,10,20
spanning-tree mode rpvst
spanning-tree
spanning-tree vlan 10,20
interface mgmt
    no shutdown
    ip static 192.168.99.3/24
   default-gateway 192.168.99.254
interface 1/1/1
   no shutdown
   no routing
    vlan trunk native 1
   vlan trunk allowed 10,20
interface 1/1/2
   no shutdown
    no routing
    vlan trunk native 1
    vlan trunk allowed 10,20
interface 1/1/3
    no shutdown
    no routing
    vlan access 10
https-server rest access-mode read-write
https-server vrf mgmt
8320-3#
```