Lab 03 – LACP, RSTP, and InterVLAN Routing with a Router-on-a-stick

For this lab, you will:

1. Create a network topology within Cisco Packet Tracer using the following information:

   - ✓ NY-Switch1 is a Cisco 3560 switch
   - ✓ NY-Switch2 is a Cisco 2960 switch
   - ✓ NY-Switch3 is a Cisco 2960 switch
   - ✓ NY-PC11 is a Generic PC
   - ✓ NY-PC12 is a Generic PC
   - ✓ NY-PC21 is a Generic PC
   - ✓ NY-PC22 is a Generic PC
   - ✓ NY-PC31 is a Generic PC
   - ✓ NY-PC32 is a Generic PC
   - ✓ NY-Router is a Cisco 4321 router

   - ✓ NY-PC11's FastEthernet connection is connected to interface F0/11 on NY-Switch1
   - ✓ NY-PC12's FastEthernet connection is connected to interface F0/12 on NY-Switch1
   - ✓ NY-PC21's FastEthernet connection is connected to interface F0/11 on NY-Switch2
   - ✓ NY-PC22's FastEthernet connection is connected to interface F0/12 on NY-Switch2
   - ✓ NY-PC31's FastEthernet connection is connected to interface F0/11 on NY-Switch3
   - ✓ NY-PC32's FastEthernet connection is connected to interface F0/12 on NY-Switch3
   - ✓ NY-Switch1's interface G0/1 is connected to interface G0/0/1 on NY-Router
   - ✓ NY-Switch1's interface F0/21 is connected to interface F0/21 on NY-Switch2
   - ✓ NY-Switch1's interface F0/22 is connected to interface F0/22 on NY-Switch2
   - ✓ NY-Switch1's interface F0/23 is connected to interface F0/23 on NY-Switch3
   - ✓ NY-Switch1's interface F0/24 is connected to interface F0/24 on NY-Switch3
   - ✓ NY-PC11's IP Address is 172.23.17.111/24
   - ✓ NY-PC12's IP Address is 172.23.34.112/24
   - ✓ NY-PC21's IP Address is 172.23.17.121/24
   - ✓ NY-PC22's IP Address is 172.23.34.122/24
   - ✓ NY-PC31's IP Address is 172.23.17.131/24
   - ✓ NY-PC32's IP Address is 172.23.34.132/24
   - ✓ NY-Switch1's administrative vlan interface IP Address is 172.23.1.11/24
   - ✓ NY-Switch2's administrative vlan interface IP Address is 172.23.1.12/24
   - ✓ NY-Switch3's administrative vlan interface IP Address is 172.23.1.13/24
   - ✓ NY-Router's interface G0/0/1 does not have an IP Address
   - ✓ NY-Router's interface G0/0/1.1 IP Address is 172.23.1.1/24
   - ✓ NY-Router's interface G0/0/1.17 IP Address is 172.23.17.1/24
   - ✓ NY-Router's interface G0/0/1.34 IP Address is 172.23.34.1/24

   - ✓ Remember to use straight-through cables when making the PC to Switch connections.

- ✓ Remember to use cross-over cables when making the Switch-to-Switch connections.
- ✓ Use straight-through cables when connecting the Switch to the Router

Please NOTE: For your subnet mask, /24 = 255.255.255.0

You should specify all of your IP Addresses and subnet masks (in bit notation) within individual text boxes on your topology diagram for each interface or device that has one assigned. Make sure the interfaces are visible in your topology diagram as well.

2. Using the network topology from above, complete the following:

a) On each PC, configure:
- ✓ IP Address
- ✓ Subnet Mask
- ✓ Default Gateway *(The closest Router's Interface to the PC <u>on the same subnet</u>)*

b) On NY-Switch1, configure:
- ✓ hostname
- ✓ an encrypted privileged mode password of 'cisco'
- ✓ set the ip address and subnet mask on the administrative vlan
- ✓ enable this interface
- ✓ set the default gateway of the switch
- ✓ enable 'logging synchronous' on the console line
- ✓ password of 'cisco' on the console line
- ✓ enable a login prompt to appear when consoling into the router from the PC
- ✓ enable 'logging synchronous' on the first five virtual terminal lines
- ✓ password of 'cisco' on the first five virtual terminal lines
- ✓ enable a login prompt to appear when using the first five virtual terminal lines (ie: when you telnet into the router from the PC you should receive a login prompt)
- ✓ enable this switch as your VTP server
  - i. Use the VTP password of 'cisco'
  - ii. Use the VTP domain of 'INETLAB'
- ✓ create VLAN 17 and name it 'BLUE'
- ✓ create VLAN 34 and name it 'GREEN'
- ✓ setup the interface of the switch that NY-PC11 is connected to as an Access port.
- ✓ assign this interface to VLAN 17
- ✓ setup the interface of the switch that NY-PC12 is connected to as an Access port.
- ✓ assign this interface to VLAN 34
- ✓ setup an etherchannel using interfaces F0/21 and F0/22 to NY-Switch2 using LACP with the group identifier of 2
- ✓ setup the interfaces of the switch that are connected to NY-Switch2 as trunk ports using IEEE 802.1Q.

- ✓ setup an etherchannel using interfaces F0/23 and F0/24 to NY-Switch3 using LACP with the group identifier of 3
- ✓ setup the interfaces of the switch that are connected to NY-Switch3 as trunk ports using IEEE 802.1Q.
- ✓ setup the interface of the switch that is connected to NY-Router as trunk ports using IEEE 802.1Q.
- ✓ Ensure that NY-Switch1 is the root bridge for all VLANs.
- ✓ save your current configuration file to nvram (ie: the filename should be 'startup-config)
- ✓ display your vlans. Capture this output in a screenshot

c) On NY-Switch2, configure:

- ✓ hostname
- ✓ an encrypted privileged mode password of 'cisco'
- ✓ set the ip address and subnet mask on the administrative vlan
- ✓ enable this interface
- ✓ set the default gateway of the switch
- ✓ enable 'logging synchronous' on the console line
- ✓ password of 'cisco' on the console line
- ✓ enable a login prompt to appear when consoling into the router from the PC
- ✓ enable 'logging synchronous' on the first five virtual terminal lines
- ✓ password of 'cisco' on the first five virtual terminal lines
- ✓ enable a login prompt to appear when using the first five virtual terminal lines (ie: when you telnet into the router from the PC you should receive a login prompt)
- ✓ enable this switch as your VTP client
  - i. Use the VTP password of 'cisco'
  - ii. Use the VTP domain of 'INETLAB'
- ✓ setup the interface of the switch that NY-PC21 is connected to as an Access port.
- ✓ assign this interface to VLAN 17
- ✓ setup the interface of the switch that NY-PC22 is connected to as an Access port.
- ✓ assign this interface to VLAN 34
- ✓ setup an etherchannel using interfaces F0/21 and F0/22 to NY-Switch1 using LACP with the group identifier of 2
- ✓ setup the interfaces of the switch that are connected to NY-Switch1 as trunk ports using IEEE 802.1Q.
- ✓ save your current configuration file to nvram (ie: the filename should be 'startup-config)
- ✓ display your vlans. Capture this output in a screenshot
- ✓ display your interfaces that are trunks. Ensure that the appropriate port-channel interface is displayed as a trunk and not the physical interfaces. Capture this output in a screenshot.
- ✓ Display your etherchannel in a summarized format. Capture this output in a screenshot.

d) On NY-Switch3, configure:
- ✓ hostname
- ✓ an encrypted privileged mode password of 'cisco'
- ✓ set the ip address and subnet mask on the administrative vlan
- ✓ enable this interface
- ✓ set the default gateway of the switch
- ✓ enable 'logging synchronous' on the console line
- ✓ password of 'cisco' on the console line
- ✓ enable a login prompt to appear when consoling into the router from the PC
- ✓ enable 'logging synchronous' on the first five virtual terminal lines
- ✓ password of 'cisco' on the first five virtual terminal lines
- ✓ enable a login prompt to appear when using the first five virtual terminal lines (ie: when you telnet into the router from the PC you should receive a login prompt)
- ✓ enable this switch as your VTP client
    i. Use the VTP password of 'cisco'
    ii. Use the VTP domain of 'INETLAB'
- ✓ setup the interface of the switch that NY-PC31 is connected to as an Access port.
- ✓ assign this interface to VLAN 17
- ✓ setup the interface of the switch that NY-PC32 is connected to as an Access port.
- ✓ assign this interface to VLAN 34
- ✓ setup an etherchannel using interfaces F0/23 and F0/24 to NY-Switch1 using LACP with the group identifier of 3
- ✓ setup the interfaces of the switch that are connected to NY-Switch1 as trunk ports using IEEE 802.1Q.
- ✓ save your current configuration file to nvram (ie: the filename should be 'startup-config)
- ✓ display your vlans. Capture this output in a screenshot
- ✓ display your interfaces that are trunks. Ensure that the appropriate port-channel interface is displayed as a trunk and not the physical interfaces. Go back to NY-Switch1 and issue the same command. Capture this output in screenshots.
- ✓ Display your etherchannel in a summarized format. Go back to NY-Switch1 and issue the same command. Capture this output in screenshots.

e) Verify NY-PC11 is able to reach NY-PC21 and NY-PC31. Capture this output in a screenshot.

f) Verify NY-PC12 is able to reach NY-PC22 and NY-PC32. Capture this output in a screenshot.

g) On NY-Router, configure:
- ✓ hostname
- ✓ an encrypted privileged mode password of 'cisco'
- ✓ remove the IP Address from the physical interface G0/0/1, if one exists

- ✓ create subinterfaces for each VLAN you are using within the topology
- ✓ set the encapsulation to IEEE 802.1Q and the appropriate vlan for each subinterface
- ✓ set the IP Address and Subnet Mask for each subinterface in use
- ✓ enable the physical interface used for all of the subinterfaces in use
- ✓ enable 'logging synchronous' on the console line
- ✓ password of 'cisco' on the console line
- ✓ enable a login prompt to appear when consoling into the router from the PC
- ✓ enable 'logging synchronous' on the first five virtual terminal lines
- ✓ password of 'cisco' on the first five virtual terminal lines
- ✓ enable a login prompt to appear when using the first five virtual terminal lines (ie: when you telnet into the router from the PC you should receive a login prompt)
- ✓ save your current configuration file to nvram (ie: the filename should be 'startup-config)
- ✓ display your interfaces in use in an abbreviated format (ie: show ip int brief). Capture this output in a screenshot
- ✓ display your routing table. Capture this output in a screenshot
- ✓ Go back to NY-Switch1 and display your interfaces that are trunks. Capture this output in a screenshot

h) Verify all PCs are able to reach their own default gateway (ie: the closest router to that PC that is also on the same subnet/network that the PC belongs to) in the topology using the Windows CLI commands you learned in class. You should provide a screen capture of the output within your lab journal for the verification.

i) Verify NY-PC11 is able to reach NY-PC12, NY-PC22, and NY-PC32. Capture this output in a screenshot.

j) Verify NY-PC12 is able to reach NY-PC11, NY-PC21, and NY-PC31. Capture this output in a screenshot.

k) Can the PCs reach ALL of the PCs and ALL of the Switches? Explain why.

l) Implement Rapid Spanning-Tree Protocol on all of the switches. Display a screenshot demonstrating the protocol changed and is currently in use.

m) Save this file as “YourFirstNameYourLastName-Lab03.pkt”

Please NOTE: When you provide a screenshot capture, please do not capture the entire screen. Minimize this to a specific window or output you are focusing on.

Please NOTE: Download and install Cisco Packet Tracer. This software is supported on Windows, macOS, or Linux. The way you implement IEEE 802.1Q may differ from switch to switch depending upon the model used.

Please NOTE: The router model you will be using in Cisco Packet Tracer is the 4321 Router. Remember to add the NIM-2T modules in the right module slots of the physical view of the router.

Make sure you save your packet tracer file frequently (and make a backup copy) so you do not lose your work in case the application crashes. It is always nice to revert back to a previous backup in case the file is corrupt.

3. Create a lab report document and include the following information:

    a) **Description:** Brief Description of what topic or technology you are concentrating on within this lab. Keep this short and to the point.

    b) **Topology/Diagram:** Take the original topology you created within Cisco Packet Tracer and take a screenshot of the topology. Paste this into your Document. Please do not submit a screen capture of your entire screen or window. This should ONLY be of the topology. Make sure you include IP Addresses in your topology with the interfaces showing.

    c) **Syntax:** Table of Command Syntax and the associated description (ie: If you issued a cli command within the Cisco IOS or within the Windows CMD prompt, list it here and write a description as to what it does in your own words) – please make sure this is written in a nice, easy-to-read table format. (CLI Command on the left, description on the right, and (optionally) add another column for what mode of Cisco IOS you are in when issuing the CLI command.)

    d) **Verification:** This is screenshot based. You will be asked to provide screenshots to verify that you have completed the assignment correctly. Please only include the screenshots I ask of you. Make sure you answer any questions asked of you within this lab. These are listed above within the specifications of the lab.

    e) **Conclusion:** Wrap up your lab report with a short conclusion. If something did not work, state it. If everything did work successfully, state that as well.

    Please NOTE: Your submission should not include one screenshot per page. Please maximize the space on each page. The lab report should (most likely) be less than four or five pages – It could even be two to three pages in length depending upon the screenshots I ask you to submit for verification. Please make sure the screenshots are legible though!

4. Submit your lab report as a .pdf file and your .pkt to the appropriate assignment within iLearn.

(Please do not zip these files nor should you submit multiple .pngs, .gifs, .jpgs, etc…)

Good Luck with your lab!