Lab 05 – IPv4 Routing Migration from Static to Dynamic Routing Protocols with RIPv2 and OSPF

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

   - ✓ NY-PC1's FastEthernet connection is connected to interface F0/11 on NY-Switch
   - ✓ NY-PC2's FastEthernet connection is connected to interface F0/12 on NY-Switch
   - ✓ NY-Switch's interface G0/1 is connected to interface G0/1 on NY-Router
   - ✓ NY-PC1's RS232 connection is connected to the console line on NY-Router
   - ✓ NY-PC1's IP Address is 172.30.1.11/24
   - ✓ NY-PC2's IP Address is 172.30.1.12/24
   - ✓ NY-Router's interface G0/1 IP Address is 172.30.1.1/24
   - ✓ TX-PC3's FastEthernet connection is connected to interface F0/13 on TX-Switch
   - ✓ TX-PC4's FastEthernet connection is connected to interface F0/14 on TX-Switch
   - ✓ TX-Switch's interface G0/1 is connected to interface G0/1 on TX-Router
   - ✓ TX-PC3's RS232 connection is connected to the console line on TX-Router
   - ✓ TX-PC3's IP Address is 172.30.2.13/24
   - ✓ TX-PC4's IP Address is 172.30.2.14/24
   - ✓ TX-Router's interface G0/1 IP Address is 172.30.2.1/24
   - ✓ IL-PC5's FastEthernet connection is connected to interface F0/15 on IL-Switch
   - ✓ IL-PC6's FastEthernet connection is connected to interface F0/16 on IL-Switch
   - ✓ IL-Switch's interface G0/1 is connected to interface G0/1 on IL-Router
   - ✓ IL-PC5's RS232 connection is connected to the console line on IL-Router
   - ✓ IL-PC5's IP Address is 172.30.3.15/24
   - ✓ IL-PC6's IP Address is 172.30.3.16/24
   - ✓ IL-Router's interface G0/1 IP Address is 172.30.3.1/24
   - ✓ Internet-PC's FastEthernet connection is connected to interface F0/10 on Internet-Switch
   - ✓ Internet-Switch's interface G0/1 is connected to interface G0/1 on ISP-Router
   - ✓ Internet-PC's RS232 connection is connected to the console line on ISP-Router
   - ✓ Internet-PC's IP Address is 192.0.2.10/24
   - ✓ ISP-Router's interface G0/1 IP Address is 192.0.2.1/24
   - ✓ NY-Router's interface S0/0/0 is connected to interface S0/0/1 on TX-Router
   - ✓ NY-Router's interface S0/0/0 is the DCE interface
   - ✓ TX-Router's interface S0/0/0 is connected to interface S0/0/1 on IL-Router
   - ✓ TX-Router's interface S0/0/0 is the DCE interface
   - ✓ NY-Router's interface S0/0/0 IP Address is 172.30.12.1/24
   - ✓ TX-Router's interface S0/0/1 IP Address is 172.30.12.2/24
   - ✓ TX-Router's interface S0/0/0 IP Address is 172.30.23.1/24
   - ✓ IL-Router's interface S0/0/1 IP Address is 172.30.23.2/24
   - ✓ ISP-Router's interface S0/1/0 is connected to interface S0/1/1 on TX-Router
   - ✓ ISP-Router's interface S0/1/0 is the DCE interface
   - ✓ ISP-Router's interface S0/1/0 IP Address is 198.18.18.1/24
   - ✓ TX-Router's interface S0/1/1 IP Address is 198.18.18.2/24
   - ✓ All Ethernet (ie: FastEthernet and Gigabit Ethernet) connections use straight-through cables.

—MARIST—

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

   b) On each Router, configure:
      ✓ hostname
      ✓ an encrypted privileged mode password of 'cisco'
      ✓ the IP Address and Subnet Mask of the interfaces in use
      ✓ enable the interfaces in use
      ✓ set the clock rate on the DCE interfaces to 1000K
      ✓ enable 'logging synchronous' on the console line *(This enables the console line to synchronous the device with the terminal emulation program.)*
      ✓ password of 'cisco' on the console line
      ✓ enable a login prompt to appear when consoling into the router from the PC
      ✓ set the console line exec-timeout value to 30 minutes and 0 seconds
      ✓ 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 named running-config (stored in RAM) to the configuration file named startup-config (stored in NVRAM)
      ✓ display your G0/1 interface
      ✓ display your WAN interface(s)
      ✓ display your interfaces in use in an abbreviated format (ie: show ip int brief)
      ✓ display your routing table

   c) Configure static routing using the previously defined static route method you learned in class. In other words, do not configure "pass the buck" routing and do not configure an outbound interface. Instead, make sure you use recursive routing. Do NOT Add Static Routes for the 192… and the 198… networks.

   d) Configure a default static route on the TX-Router to the Internet-Router. Do not use the outbound interface in your routing statement; instead use the next hop router address. Configure another default static route from the Internet-Router to the TX-Router.

e) Verify connectivity from each device to each device in the topology. You should have full connectivity with this scenario! Provide a single screenshot demonstrating you have full connectivity from a NY PC destined for an IL PC and from a TX PC to the Internet PC.

f) Display TX-Router's routing table and provide the output in a single screenshot.

g) Save this .pkt file as "YOURFIRSTNAME.YOURLASTNAME-StaticRouting.pkt".

h) Configure the dynamic routing protocol of RIP version 2 on the New York, Texas and Illinois Routers. DO NOT configure this on the ISP-Router. Display your dynamic routing protocol properties with issuing a "show ip protocol" in the CLI.

i) Remove all of the specific static routes from the routers. Make sure you parse the running-config file for any command with "ip route" before and after your static routing to dynamic routing migration. Leave your default static route in place on the TX-Router.

j) Verify connectivity from each device to each device in the topology. You should have full connectivity again!

k) Display the routing protocols configured on each of the routers with HINT: "show ip…".

l) Display TX-Router's routing table and provide the output in a single screenshot.

m) Save this .pkt file as "YOURNAME.YOURLASTNAME-RIPv2Routing.pkt".

n) Configure the dynamic routing protocol of OSPF, using single-area OSPF where the only area is the backbone area, on the New York, Texas and Illinois Routers. DO NOT configure this on the ISP-Router. Display your dynamic routing protocol properties with issuing a "show ip protocol" in the CLI.

o) Verify connectivity from each device to each device in the topology. You should have full connectivity again!

p) Display the routing protocols configured on each of the routers with HINT: "show ip…". Has anything changed since you configured OSPF? Why do you think this is occurring?

q) Display TX-Router's routing table and provide the output in a single screenshot.

r) Configure default route injection within OSPF on the appropriate router.

s) Display the routing tables on each of the routers. Has anything changed since you configured default route injection? Explain what is occurring?

t) Save this .pkt file as "YOURNAME.YOURLASTNAME-OSPFRouting.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, Linux, or macOS.

Please NOTE: The router model you will be using in Cisco Packet Tracer is the 2901 Router. The switch model you will be using is the Cisco 2960 Layer 2 Workgroup Switch.

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 files 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!