ICT1010 Computer Networks

2021-2022 Trimester 2

Laboratory 4b:
From Packet Tracer to Real Network Devices - Building a Simple Switch and Router Network

LEARNING OUTCOMES

Upon completion of this laboratory exercise, you should be able to:

- Part 1: Build a network using Cisco Packet Tracer
- Part 2: Export configurations from Cisco Packet Tracer
- Part 3: Import configurations to Cisco network devices
- Appendix A: Backup configurations from network devices

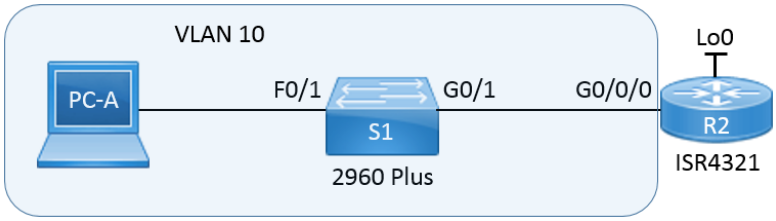
REQUIRED HARDWARE

- 1 x Rack of Cisco network devices
- 1 x Box of Cables containing
  - USB-to-DB9/DB9-to-RJ45 console cables
  - Ethernet cables
- 2 x Laptops

REQUIRED SOFTWARE

- Cisco Packet Tracer 7.3.0
- Tera Term 4.105 https://ttssh2.osdn.jp/
- Driver for USB-Serial (USB-to-DB9/DB9-to-RJ45) console cable if needed

TOPOLOGY



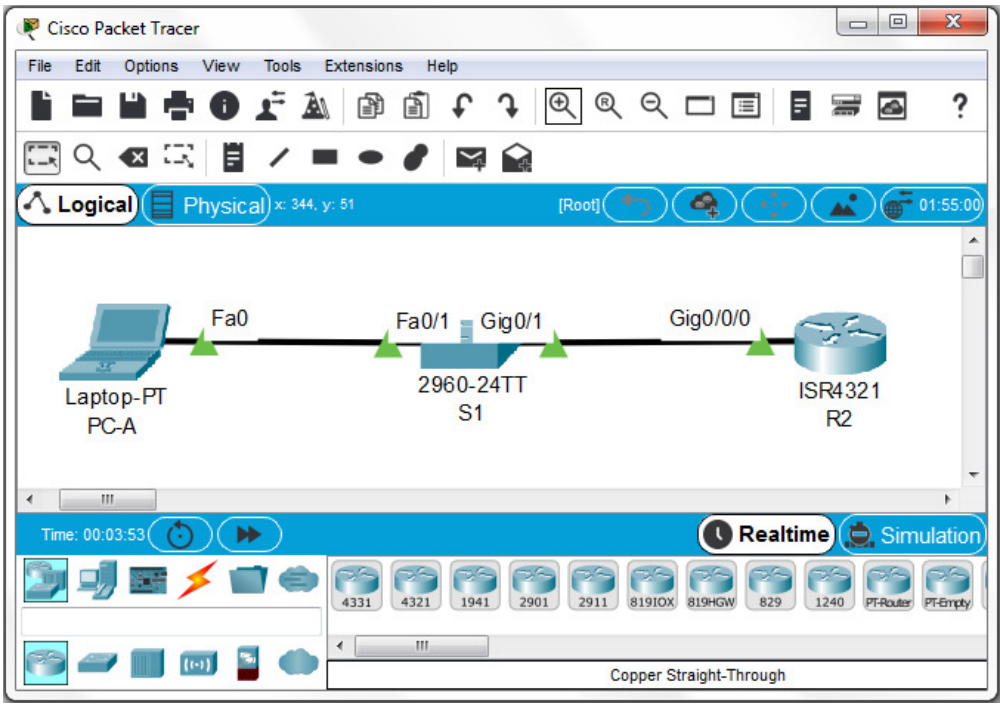
ADDRESSING TABLE

Device	Interface	VLAN	IP Address	Subnet Mask	Default Gateway
R2	G0/0/0	N/A	192.168.1.1	255.255.255.0	N/A
	Lo0	N/A	209.165.200.225	255.255.255.224	N/A
S1	G0/1	10	N/A	N/A	N/A
	F0/1	10	N/A	N/A	N/A
PC-A	NIC	N/A	192.168.1.3	255.255.255.0	192.168.1.1

PART 1: BUILDING A SIMPLE SWITCH AND ROUTER NETWORK USING CISCO PACKET TRACER

1.1 Launch Cisco Packet Tracer from your laptop.

1.2 Follow the topology diagram and build the network on the Packet Tracer as shown:



1.3 Configure PC-A with IP address, subnet mask, and default gateway as shown in the Addressing Table.

1.4 Configure switch S1's interfaces F0/1 and G0/1 to VLAN 10.

1.5 Configure router R2's interface G0/0/0 with IP address, subnet mask, the optional interface description, and enable it as shown:

```
R2(config)# interface g0/0/0
R2(config-if)# description Connection to PC-A
R2(config-if)# ip address 192.168.1.1 255.255.255.0
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)# exit
R2#
```

1.6 Cisco router also has logical interfaces called loopback interfaces which are software interfaces inside the router; e.g. loopback 0 indicated as Lo0 in the topology diagram.

1.7 These loopback interfaces are useful for testing or emulating networks without the need to connect more routers and laptops.

1.8 To configure loopback interface, enter the commands as follows:

```
R2(config)# interface loopback 0
  or
R2(config)# interface lo0
R2(config-if)# ip address 209.165.200.225 255.255.255.224
```

Notes:

- loopback interface number may range from 0 – 2147483647
- loopback interfaces are always in 'up' state as long as the router is functioning, hence no requirement for the **no shutdown** command

1.9 Once done, verify the router interfaces are configured correctly:

```
R2# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   192.168.1.1     YES manual up                    up
GigabitEthernet0/0/1   unassigned      YES unset  administratively down down
Loopback0              209.165.200.225 YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
```

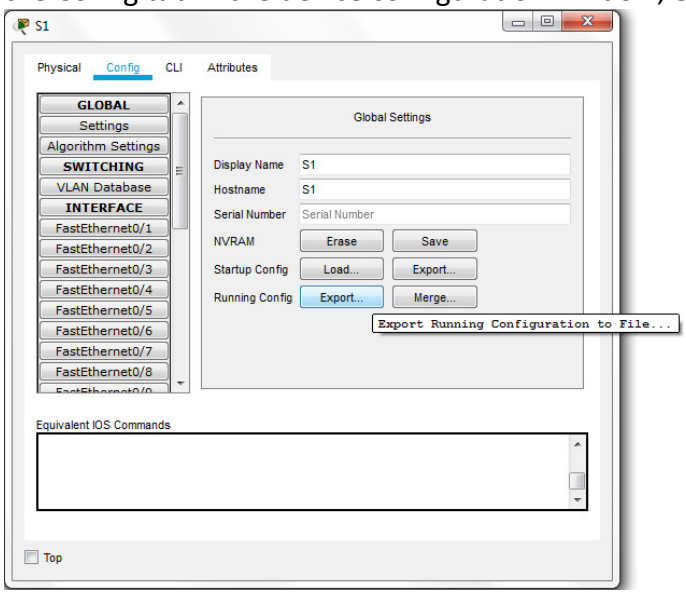
1.10 From PC-A, verify that you can ping R2 G0/0/0. Is the ping successful?

1.11 Similarly from PC-A, verify that you can ping Lo0. Is the ping successful?

Why is PC-A able to reach a host in different network?

PART 2: EXPORTING CONFIGURATIONS FROM CISCO PACKET TRACER

2.1 On the Packet Tracer workspace, select the network device and then click on the Config tab in the device configuration window, e.g. switch S1 as shown:



2.2 Next, click on the Export button to export the Running Config to a file, say S1_running-config.txt.

2.3 Follow the same steps to export the Running Config of router R2 to a different file, say R2_running-config.txt.

PART 3: IMPORTING CONFIGURATIONS TO CISCO NETWORK DEVICES

3.1 Follow the topology diagram and cable up the network using real devices.

3.2 Configure the laptop with IP address, subnet mask, and default gateway as shown in the Addressing Table.

3.3 Initialize and reload the Catalyst 2960 Plus switch and the ISR4321 router before importing the configurations.

3.4 Open the configuration files in Part 2 using a text editor, e.g. Notepad++.

3.5 Remove each instance of **--More--** if it exists.

3.6 Delete the initial lines so that the first line starts with the first configuration command as shown below:

```
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
```

3.7 For the router configuration file R2_running-config.txt, scroll down to interface G0/0/0 and insert the no shutdown command to enable the interface.

```
interface GigabitEthernet0/0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
```

Change to:

```
interface GigabitEthernet0/0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
```

3.8 Save your changes after you have made all the edits to the configuration files.

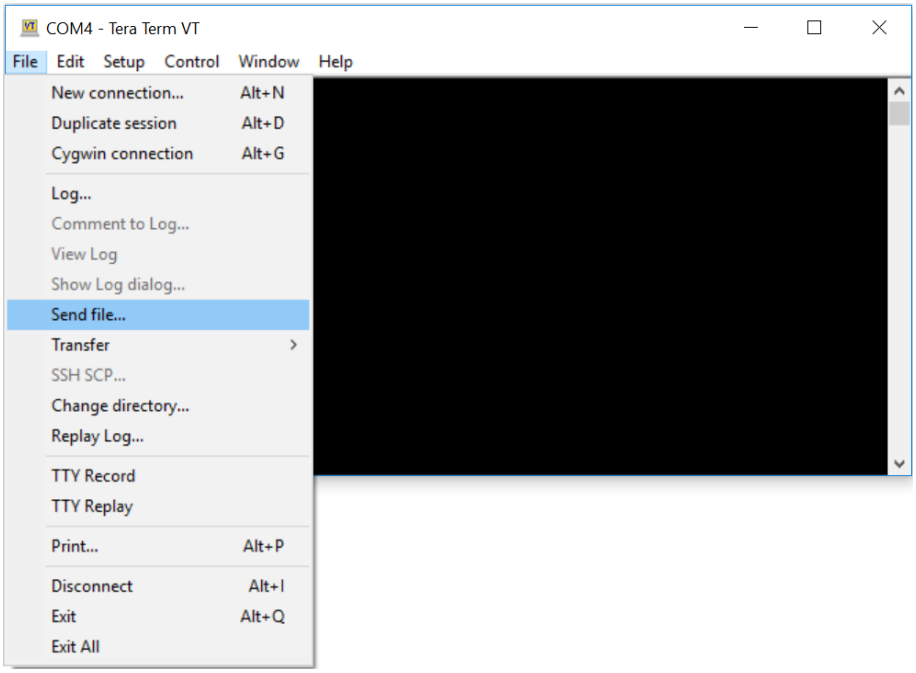
Part 3A: Using Terminal Emulation Software, e.g. Tera Term, to import Configurations

3.9 Launch Tera Term and establish a console connection to the Catalyst 2960 Plus switch.

3.10 Enter into the global configuration mode.

```
Switch> enable
Switch# configure terminal
Switch(config)#
```

3.11 From the Tera Term File menu, select Send file...



3.12 Locate the configuration file S1_running-config.txt and select Open.

3.13 Import is now in progress. When done, verify the running config and the VLAN in the switch.

3.14 For the ISR4321 router, you may follow the same steps to import the configuration file R2_running-config.txt.

3.15 Alternatively, if you have a FAT-formatted USB flash drive that is recognizable by the router, you may try Part 3B to import the configuration file into the router.

Part 3B: Using USB Flash Drive to import Configurations

3.16 Launch Tera Term and establish a console connection to the ISR4321 router.

3.17 Enter into privileged EXEC mode.

```
Router> enable
Router#
```

3.18 Insert the USB flash drive containing the configuration file R2_running-config.txt into the USB port on the router.

3.19 Verify the USB flash drive file system is mounted successfully.

```
R2# show file systems
File Systems:

        Size(b)       Free(b)      Type  Flags  Prefixes
              -             -    opaque     rw   system:
              -             -    opaque     rw   tmpsys:
*   3258179584    1374056448      disk     rw   bootflash: flash:
    1775206400    1693466624      disk     ro   webui:
              -             -    opaque     rw   null:
              -             -    opaque     ro   tar:
              -             -   network     rw   tftp:
              -             -    opaque     wo   syslog:
       33554432      33542092     nvram     rw   nvram:
              -             -   network     rw   rcp:
              -             -   network     rw   ftp:
              -             -   network     rw   http:
              -             -   network     rw   scp:
              -             -   network     rw   sftp:
              -             -   network     rw   https:
              -             -    opaque     ro   cns:
     3351904256    3351642112      disk     rw   usb0:
```

3.20 You may use the **dir** command to list the files on the USB flash drive:

```
Router# dir usb0:
```

3.21 Assume that the configuration file R2_running-config.txt is in the root directory of the USB flash drive, copy it into the router as follows:

```
Router# copy usb0:R2_running-config.txt running-config
```

3.22 When the import is done, verify the running config and the interfaces in the router.

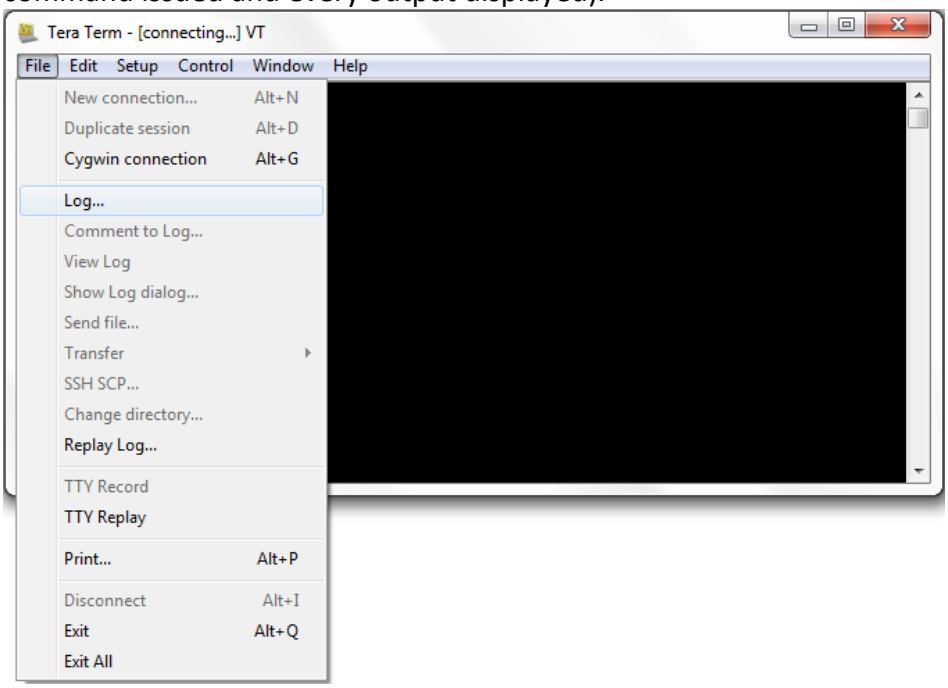
3.23 Finally from PC-A, verify that you can ping R2 G0/0/0. Is the ping successful?

3.24 Similarly from PC-A, verify that you can ping Lo0. Is the ping successful?

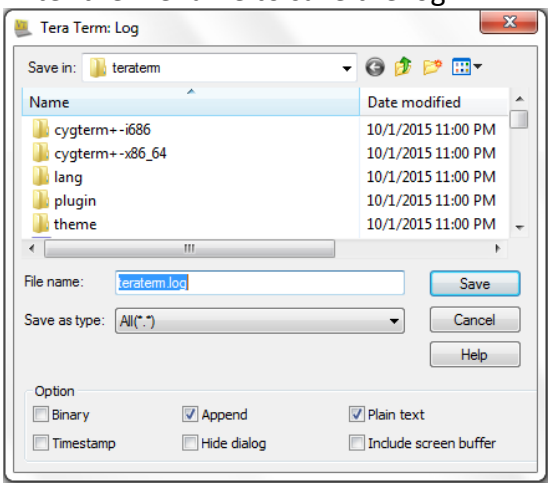
Appendix A: Backup Configurations from Network Devices

A.1 Launch Tera Term and establish a console connection to the network device, e.g. Catalyst 2960 Plus switch.

A.2 From the Tera Term File menu, select Log... (which will create a record of every command issued and every output displayed).



A.3 Enter the filename to save the log.



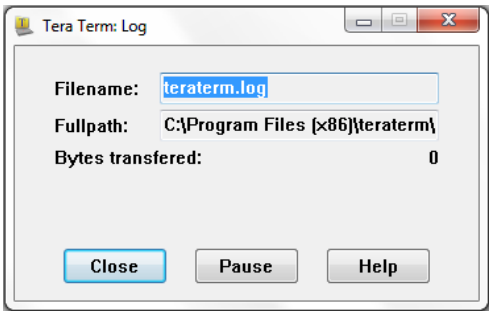
A.4 Enter into privileged EXEC mode.

```
S1> enable
S1#
```

A.5 Issued the **show running-config** command.

A.6 Continue pressing the space bar when **--More--** is displayed until you see the switch S1# prompt again.

A.7 Click the **Tera Term:Log** icon on the Windows Task bar to bring up the pop-up box.



A.8 Click the **Close** button to end log session.

A.9 **Note**: You can also copy and paste the running-config output from the Tera Term window directly into a text editor and save it.

A.10 Or if you have a USB flash drive that is recognizable by the network device, you can use the **copy** command to copy the running-config to it directly.

```
Router# copy runing-config usb0:
```