Practical – Week 4

Objectives:

The aim of this week's practical includes:

- To learn how to build a local area network with a router.
- Learn how to configure router settings.
- To understand the concept and role of default gateway

Tasks:

Accordingly, you will need to complete the following two labs in this week's practical class:

a. Building a Switch and Router Network
b. Troubleshooting Default Gateway Issues

Instructions of the tasks are given on the next pages.

Assessment:

This week's Practical is assessed in class, and it is worth 3% of the total score of the course.

Notes:

- To be awarded marks for this Practical, a student must attend this week's Practical class ONLINE and submit the following 2 files using the "Practical-Week 4-Submission" link in Week 4 section of Learnonline course site:
  - The word document with your answers to the questions asked in instruction of the 1st lab - Building a Switch and Router Network
  - The completed .pka file for the 2nd lab - Troubleshooting Default Gateway Issues
- Students are expected to make the submission in your Practical class in Week 4, but if you cannot finish all the activities in class, you can complete them and submit the files as required by Sunday 11:59pm of Week 4.

Lab - Building a Switch and Router Network

Before starting the lab:

Review the contents related to this lab by trying to answer the following questions:

- Referring to the topology diagram and the IP addressing table below, would PC-A and PC-B be able to communicate with each other without the router, R1? Justify your answer.

- Which interfaces of R1 are PC-A and PC-B's default gateways, respectively?

- List the 4 major types of memories of a Cisco router. Which of them is volatile storage, which of them are non-volatile storage? Where is the startup configuration file stored? Where is the running configuration file stored?

- Which CLI command is used to show the routing table on a Cisco router?

- For the entries/rows in a Cisco routing table, what do the first letters "C" and "D" refer to respectively?

Reminder:

1. Download from Learnonline course website (Practical-Week4 folder) the Word file: `week4-practical-lab1-Instruction-AnswerSheet.docx`.

2. Follow the instruction in the Word document to complete this lab and answer ALL questions in the word document by typing your answers in the space provided in the Word document.

3. Save the Word document with your answers and submit the Word document as part of your Week 4 practical submission.

Packet Tracer - Troubleshooting Default Gateway Issues

Note:

1. Download from Learnonline course website (**Practical-Week 4** folder) the Packet Tracer activity file: `week4-practical-lab2-Troubleshoot-Gateway-Issues.pka`
3.Open the Packet Tracer activity file downloaded
4. Follow the instruction **given below** to complete this practical task.

Topology
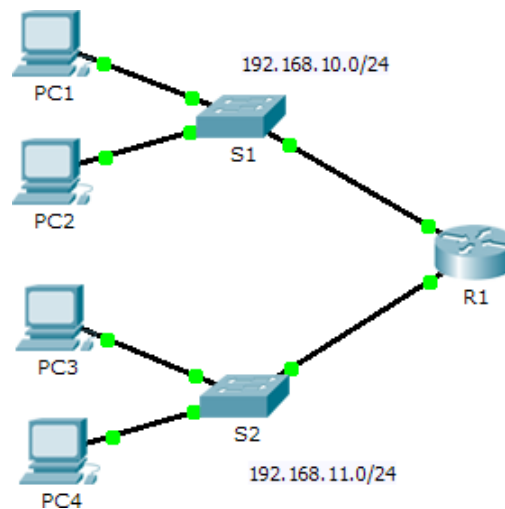
Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.10.1	255.255.255.0	N/A
	G0/1	192.168.11.1	255.255.255.0	N/A
S1	VLAN 1	192.168.10.2	255.255.255.0	
S2	VLAN 1	192.168.11.2	255.255.255.0	
PC1	NIC	192.168.10.10	255.255.255.0	
PC2	NIC	192.168.10.11	255.255.255.0	
PC3	NIC	192.168.11.10	255.255.255.0	
PC4	NIC	192.168.11.11	255.255.255.0	

Objectives

Part 1: Verify Network Documentation and Isolate Problems

Part 2: Implement, Verify, and Document Solutions

Background

For a device to communicate across multiple networks, it must be configured with an IP address, subnet mask, and a default gateway. The default gateway is used when the host wants to send a packet to a device on another network. **The default gateway address is generally the router interface address attached to the local network to which the host is connected**. In this activity, you will finish documenting the network. You will then verify the network documentation by testing end-to-end connectivity and troubleshooting issues. The troubleshooting method you will use consists of the following steps:

1) Verify the network documentation and use tests to isolate problems.

2) Determine an appropriate solution for a given problem.

3) Implement the solution.

4) Test to verify the problem is resolved.

5) Document the solution.

There is no set standard or template for troubleshooting. Each organization develops unique processes and documentation standards (even if that process is "we don't have one"). However, all effective troubleshooting methodologies generally include the above steps.

Note: If you are proficient with default gateway configurations, this activity might seem more involved than it should be. You can, most likely, quickly discover and solve all the connectivity issues faster than following these procedures. However, as you proceed in your studies, the networks and problems you encounter will become increasingly more complex. In such situations, the only effective way to isolate and solve issues is to use a methodical approach such as the one used in this activity.

Part 1:   Verify Network Documentation and Isolate Problems

In Part 1 of this activity, complete the documentation and perform connectivity tests to discover issues. In addition, you will determine an appropriate solution for implementation in Part 2.

Step 1. Verify the network documentation and isolate any problems.

a. Before you can effectively test a network, you must have complete documentation. Notice in the **Addressing Table** that some information is missing. Complete the **Addressing Table** by filling in the missing default gateway information for the switches and the PCs.

b. Test connectivity to devices on the same network. By isolating and correcting any local access issues, you can better test remote connectivity with the confidence that local connectivity is operational.

A verification plan can be as simple as a list of connectivity tests. Use the following tests to verify local connectivity and isolate any access issues. The first issue is already documented, but you must implement and verify the solution during Part 2.

Testing and Verification Documentation

Test	Successful?	Issues	Solution	Verified
PC1 to PC2	**No**	**IP address on PC1**	**Change PC1 IP address**	
PC1 to S1				
PC1 to R1				

Note: The table is an example; you must create your own document. You can use paper and pencil to draw a table, or you can use a text editor or spreadsheet. Consult your instructor if you need further guidance.

c. Test connectivity to remote devices (such as from PC1 to PC4) and document any problems. This is frequently referred to as *end-to-end connectivity*. This means that all devices in a network have the full connectivity allowed by the network policy.

Note: Remote connectivity testing may not be possible yet, because you must first resolve local connectivity issues. After you have solved those issues, return to this step and test connectivity between networks.

Step 2: Determine an appropriate solution for the problem.

a. Using your knowledge of the way networks operate and your device configuration skills, search for the cause of the problem. For example, S1 is not the cause of the connectivity issue between PC1 and PC2. The link lights are green and no configuration on S1 would cause traffic to not pass between PC1 and PC2. So the problem must be with PC1, PC2, or both.

b. Verify the device addressing to ensure it matches the network documentation. For example, the IP address for PC1 is incorrect as verified with the **ipconfig** command.

c. Suggest a solution that you think will resolve the problem and document it. For example, change the IP address for PC1 to match the documentation.

Note: Often there is more than one solution. However, it is a troubleshooting best practice to implement one solution at a time. Implementing more than one solution could introduce additional issues in a more complex scenario.

Part 2: Implement, Verify, and Document Solutions

In Part 2 of this activity, you will implement the solutions you identified in Part 1. You will then verify the solution worked. You may need to return to Part 1 to finish isolating all the problems.

Step 1: Implement solutions to connectivity problems.

Refer to your documentation in Part 1. Choose the first issue and implement your suggested solution. For example, correct the IP address on PC1.

Step 2: Verify that the problem is now resolved.

a. Verify your solution has solved the problem by performing the test you used to identify the problem. For example, can PC1 now ping PC2?

b. If the problem is resolved, indicate so in your documentation. For example, in the table above, a simple checkmark would suffice in the "Verified" column.

Step 3: Verify that all issues are resolved.

a. If you still have an outstanding issue with a solution that has not yet been implemented, return to Part 2, Step 1.
b. If all your current issues are resolved, have you also resolved any remote connectivity issues (such as can PC1 ping PC4)? If the answer is no, return to Part 1, Step 1c to test remote connectivity.