Computer Practical – Week 12

Objectives

The aim of this week's computer practical includes:

- Learn how to configure devices with IPv6 addressing information
- Learn how to use Ping and Tracert for connectivity test and troubleshooting

Tasks

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

1. Packet Tracer – Configuring IPv6 Addressing
2. Packet Tracer – Testing Connectivity with Traceroute
3. Packet Tracer - Pinging and Tracing to Test the Path
4. Packet Tracer - Use ICMP to Test and Correct Network

Instructions of the activities are given on the next pages.

Assessment

This week's Computer Practical is assessed in class, and it is worth 2% of the total score of the course.

Notes:

- To be awarded marks for this computer practical, a student must:
  - attend week 12 Computer Practical class (being absent from the class will result in zero marks for week 12's computer practical), and
  - complete all the 4 tasks above and submit the PKA files for Tasks 1, 3, and 4 in class using the "Computer Practical-Week 12-Submission" link in Week 12 section of Learnonline course site. If you cannot finish all the tasks in class, let your tutor know before leaving the class, and submit the 3 PKA files (for Tasks 1,3 and 4 by Sunday 11:59 pm of Week 12. Late submission will result in zero marks for week 12's computer practical.

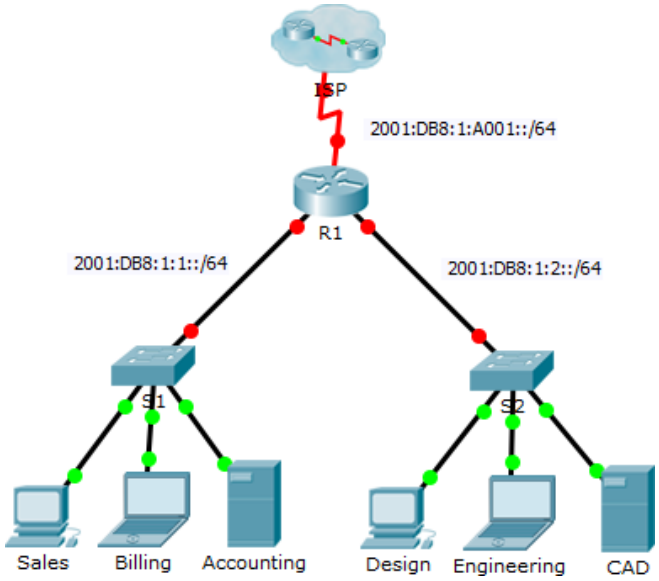
  Note that although you are not required to submit the PKA file or answer for Task 2, please make sure that you complete the activity and know how Tracert/Traceroute works)

Packet Tracer - Configuring IPv6 Addressing

Reminder:

1. Download from Learnonline course website (**Computer Practical-Week 12** folder) the Packet Tracer activity file: **`wk12-computer-prac-PKA-a-Config-IPv6.pka`**
2. Follow the instruction **given below** to complete this Packet Tracer activity

Topology



Addressing Table

Device	Interface	IPv6 Address/Prefix	Default Gateway
R1	G0/0	2001:DB8:1:1::1/64	N/A
	G0/1	2001:DB8:1:2::1/64	N/A
	S0/0/0	2001:DB8:1:A001::2/64	N/A
	Link-local	FE80::1	N/A
Sales	NIC	2001:DB8:1:1::2/64	FE80::1
Billing	NIC	2001:DB8:1:1::3/64	FE80::1
Accounting	NIC	2001:DB8:1:1::4/64	FE80::1
Design	NIC	2001:DB8:1:2::2/64	FE80::1
Engineering	NIC	2001:DB8:1:2::3/64	FE80::1
CAD	NIC	2001:DB8:1:2::4/64	FE80::1

Objectives

Part 1: Configure IPv6 Addressing on the Router

Part 2: Configure IPv6 Addressing on Servers

Part 3: Configure IPv6 Addressing on Clients

Part 4: Test and Verify Network Connectivity

Background

In this activity, you will practice configuring IPv6 addresses on a router, servers, and clients. You will also practice verifying your IPv6 addressing implementation.

Part 1: Configure IPv6 Addressing on the Router

Step 1: Enable the router to forward IPv6 packets.

a. Enter the ipv6 unicast-routing global configuration command. This command must be configured to enable the router to forward IPv6 packets. This command will be discussed in a later semester.

```
R1(config)# ipv6 unicast-routing
```

Step 2: Configure IPv6 addressing on GigabitEthernet0/0.

a. Click **R1** and then the **CLI** tab. Press **Enter**.

b. Enter privileged EXEC mode.

c. Enter the commands necessary to transition to interface configuration mode for GigabitEthernet0/0.

d. Configure the IPv6 address with the following command:

```
R1(config-if)# ipv6 address 2001:DB8:1:1::1/64
```

e. Configure the link-local IPv6 address with the following command:

```
R1(config-if)# ipv6 address FE80::1 link-local
```

f. Activate the interface.

Step 3: Configure IPv6 addressing on GigabitEthernet0/1.

a. Enter the commands necessary to transition to interface configuration mode for GigabitEthernet0/1.

b. Refer to the **Addressing Table** to obtain the correct IPv6 address.

c. Configure the IPv6 address, the link-local address and activate the interface.

Step 4: Configure IPv6 addressing on Serial0/0/0.

a. Enter the commands necessary to transition to interface configuration mode for Serial0/0/0.

b. Refer to the **Addressing Table** to obtain the correct IPv6 address.

c. Configure the IPv6 address, the link-local and activate the interface.

Part 2: Configure IPv6 Addressing on the Servers

Step 1: Configure IPv6 addressing on the Accounting Server.

a. Click **Accounting** and click the **Desktop** tab > **IP Configuration**.

b. Set the **IPv6 Address** to **2001:DB8:1:1::4** with a prefix of **/64**.

c. Set the **IPv6 Gateway** to the link-local address, **FE80::1**.

Step 2: Configure IPv6 addressing on the CAD Server.

Repeat Steps 1a to 1c for the **CAD** server. Refer to the **Addressing Table** for the IPv6 address.

Part 3: Configure IPv6 Addressing on the Clients

Step 1: Configure IPv6 addressing on the Sales and Billing Clients.

a. Click **Billing** and then select the **Desktop** tab followed by **IP Configuration**.

b. Set the **IPv6 Address** to **2001:DB8:1:1::3** with a prefix of **/64**.

c. Set the **IPv6 Gateway** to the link-local address, **FE80::1**.

d. Repeat Steps 1a through 1c for **Sales**. Refer to the **Addressing Table** for the IPv6 address.

Step 2: Configure IPv6 Addressing on the Engineering and Design Clients.

a. Click **Engineering** and then select the **Desktop** tab followed by **IP Configuration**.

b. Set the **IPv6 Address** to **2001:DB8:1:2::3** with a prefix of **/64**.

c. Set the **IPv6 Gateway** to the link-local address, **FE80::1**.

d. Repeat Steps 1a through 1c for **Design**. Refer to the **Addressing Table** for the IPv6 address.

Part 4: Test and Verify Network Connectivity

Step 1: Open the server web pages from the clients.

a. Click **Sales** and click the **Desktop** tab. Close the **IP Configuration** window, if necessary.

b. Click **Web Browser**. Enter **2001:DB8:1:1::4** in the URL box and click **Go**. The **Accounting** website should appear.

c. Enter **2001:DB8:1:2::4** in the URL box and click **Go**. The **CAD** website should appear.

d. Repeat steps 1a through 1d for the rest of the clients.

Step 2: Ping the ISP.

a. Open any client computer configuration window by clicking the icon.

b. Click the **Desktop** tab > **Command Prompt**.

c. Test connectivity to the ISP by entering the following command:

```
PC> ping 2001:DB8:1:A001::1
```

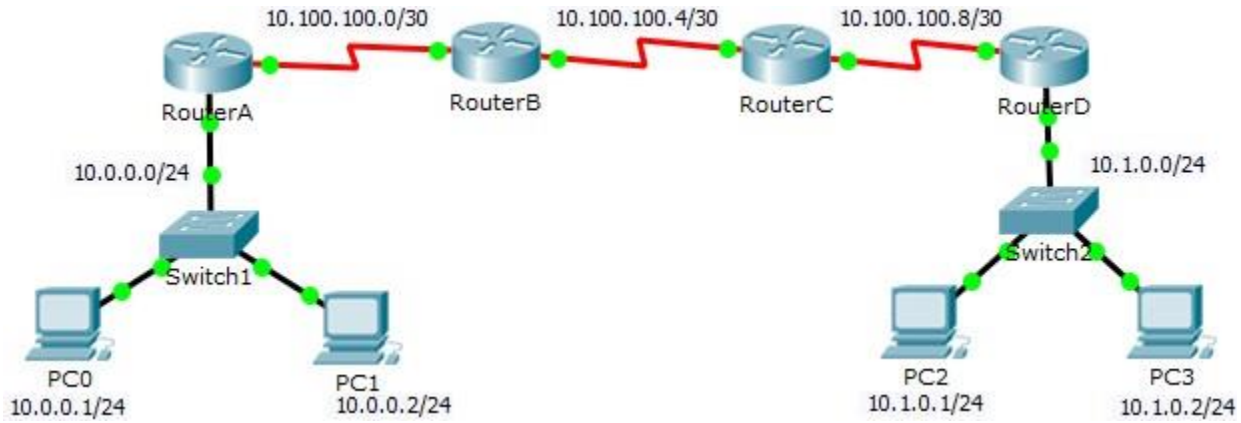
d. Repeat the **ping** command with other clients until full connectivity is verified.

Packet Tracer - Testing Connectivity with Traceroute

Notes:

1. Download from Learnonline course website (**Computer Practical-Week 12 folder**) the Packet Tracer activity file: **`wk12-computer-prac-PKA-b-Traceroute.pka`**
2. Follow the instruction **given below** to complete this Packet Tracer activity

Topology



Objectives

Part 1: Test End-to-End Connectivity with the tracert Command

Part 2: Compare to the traceroute Command on a Router

Background

This activity is designed to help you troubleshoot network connectivity issues using commands to trace the route from source to destination. You are required to examine the output of **tracert** (the Windows command) and **traceroute** (the IOS command) as packets traverse the network and determine the cause of a network issue. After the issue is corrected, use the **tracert** and **traceroute** commands to verify the completion.

Part 1: Test End-to-End Connectivity with the tracert Command

Step 1: Send a ping from one end of the network to the other end.

Click **PC1** and open the **Command Prompt**. Ping **PC3** at **10.1.0.2**. What message is displayed as a result of the ping?

_____

_____

Step 2: Trace the route from PC1 to determine where in the path connectivity fails.

a. From the **Command Prompt** of **PC1**, enter the **tracert 10.1.0.2** command.

b. When you receive the **Request timed out** message, press **Ctrl**+**C**. What was the first IP address listed in the **tracert** output?

c. Observe the results of the **tracert** command. What is the last address reached with the **tracert** command? _____

Step 3: Correct the network problem.

Compare the last address reached with the **tracert** command with the network addresses listed on the topology. The furthest device from the host 10.0.0.2 with an address in the network range found is the point of failure. What devices have addresses configured for the network where the failure occurred?

a. Click **RouterC** and then the **CLI** tab. What is the status of the interfaces?

b. Compare the IP addresses on the interfaces with the network addresses on the topology. Does there appear to be anything extraordinary?

c. Make the necessary changes to restore connectivity; however, do not change the subnets. What is solution?

Step 4: Verify that end-to-end connectivity is established.

a. From the **PC1 Command Prompt**, enter the **tracert 10.1.0.2** command.

b. Observe the output from the **tracert** command. Was the command successful? _____

Part 2: Compare to the traceroute Command on a Router

a. Click **RouterA** and then the **CLI** tab.

b. Enter the **traceroute 10.1.0.2** command. Did the command complete successfully? _____

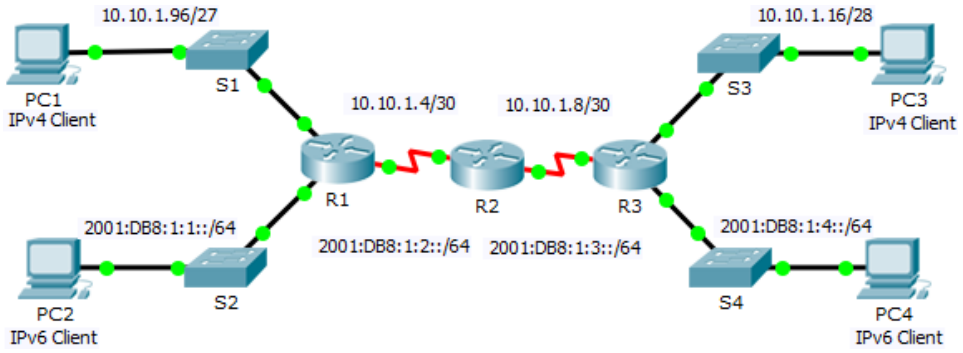
c. Compare the output from the router **traceroute** command with the PC **tracert** command. What is noticeably different about the list of addresses returned?

Packet Tracer - Pinging and Tracing to Test the Path

Reminder:

1. Download from Learnonline course website (**Computer Practical-Week 12 folder**) the Packet Tracer activity file: **`wk12-computer-prac-PKA-c-Test-Path.pka`**
2. Follow the instruction **given below** to complete this Packet Tracer activity

Topology



Addressing Table

Device	Interface	IPv4 Address / IPv6 Address/Prefix	Subnet Mask	Default Gateway
R1	G0/0	2001:DB8:1:1::1/64		N/A
	G0/1	10.10.1.97	255.255.255.224	N/A
	S0/0/1	10.10.1.6	255.255.255.252	N/A
		2001:DB8:1:2::2/64		N/A
	Link-local	FE80::1		N/A
R2	S0/0/0	10.10.1.5	255.255.255.252	N/A
		2001:DB8:1:2::1/64		N/A
	S0/0/1	10.10.1.9	255.255.255.252	N/A
		2001:DB8:1:3::1/64		N/A
	Link-local	FE80::2		N/A
R3	G0/0	2001:DB8:1:4::1/64		N/A
	G0/1	10.10.1.17	255.255.255.240	N/A
	S0/0/1	10.10.1.10	255.255.255.252	N/A
		2001:DB8:1:3::2/64		N/A
	Link-local	FE80::3		N/A
PC1	NIC			
PC2	NIC			
PC3	NIC			
PC4	NIC			

Objectives

Part 1: Test and Restore IPv4 Connectivity

Part 2: Test and Restore IPv6 Connectivity

Scenario

There are connectivity issues in this activity. In addition to gathering and documenting information about the network, you will locate the problems and implement acceptable solutions to restore connectivity.

Note: The user EXEC password is **cisco**. The privileged EXEC password is **class**.

Part 1: Test and Restore IPv4 Connectivity

Step 1: Use ipconfig and ping to verify connectivity.

a. Click **PC1** and click the **Desktop** tab > **Command Prompt**.

b. Enter the **ipconfig /all** command to collect the IPv4 information. Complete the **Addressing Table** with the IPv4 address, subnet mask, and default gateway.

c. Click **PC3** and click the **Desktop** tab > **Command Prompt**.

d. Enter the **ipconfig /all** command to collect the IPv4 information. Complete the **Addressing Table** with the IPv4 address, subnet mask, and default gateway.

e. Test connectivity between **PC1** and **PC3**. The ping should fail.

Step 2: Locate the source of connectivity failure.

a. From **PC1**, enter the necessary command to trace the route to **PC3**. What is the last successful IPv4 address that was reached? _____

b. The trace will eventually end after 30 attempts. Enter **Ctrl**+**C** to stop the trace before 30 attempts.

c. From **PC3**, enter the necessary command to trace the route to **PC1**. What is the last successful IPv4 address that was reached? _____

d. Enter **Ctrl**+**C** to stop the trace.

e. Click **R1** and then the **CLI** tab. Press **ENTER** and log in to the router.

f. Enter the **show ip interface brief** command to list the interfaces and their status. There are two IPv4 addresses on the router. One should have been recorded in Step 2a. What is the other? _____

g. Enter the **show ip route** command to list the networks to which the router is connected. Note that there are two networks connected to the **Serial0/0/1** interface. What are they? _____

h. Repeat step 2e to 2g with **R3** and the answers here. _____

Notice how the serial interface for R3 changes.

i. Run more tests if it helps visualize the problem. Simulation mode is available.

Step 3: Propose a solution to solve the problem.

a. Compare your answers in Step 2 to the documentation you have available for the network. What is the error? _____

b. What solution would you propose to correct the problem?

_____

Step 4: Implement the plan.

Implement the solution you proposed in Step 3b.

Step 5: Verify that connectivity is restored.

a. From **PC1** test connectivity to **PC3**.

b. From **PC3** test connectivity to **PC1**. Is the problem resolved? _____

Step 6: Document the solution.

Part 2: Test and Restore IPv6 Connectivity

Step 1: Use ipv6config and ping to verify connectivity.

a. Click **PC2** and click the **Desktop** tab > **Command Prompt**.

b. Enter the **ipv6config /all** command to collect the IPv6 information. Complete the **Addressing Table** with the IPv6 address, subnet prefix, and default gateway.

c. Click **PC4** and click the **Desktop** tab > **Command Prompt**.

d. Enter the **ipv6config /all** command to collect the IPv6 information. Complete the **Addressing Table** with the IPv6 address, subnet prefix, and default gateway.

e. Test connectivity between **PC2** and **PC4**. The ping should fail.

Step 2: Locate the source of connectivity failure.

a. From **PC2**, enter the necessary command to trace the route to **PC4**. What is the last successful IPv6 address that was reached? _____

b. The trace will eventually end after 30 attempts. Enter **Ctrl**+**C** to stop the trace before 30 attempts.

c. From **PC4**, enter the necessary command to trace the route to **PC2**. What is the last successful IPv6 address that was reached? _____

d. Enter **Ctrl**+**C** to stop the trace.

e. Click **R3** and then the **CLI** tab. Press **ENTER** and log in to the router.

f. Enter the **show ipv6 interface brief** command to list the interfaces and their status. There are two IPv6 addresses on the router. One should match the gateway address recorded in Step 1d. Is there a discrepancy? _____

g. Run more tests if it helps visualize the problem. Simulation mode is available.

Step 3: Propose a solution to solve the problem.

a. Compare your answers in Step 2 to the documentation you have available for the network. What is the error? _____

b. What solution would you propose to correct the problem?

_____

Step 4: Implement the plan.

Implement the solution you proposed in Step 3b.

Step 5: Verify that connectivity is restored.

a. From **PC2** test connectivity to **PC4**.

b. From **PC4** test connectivity to **PC2**. Is the problem resolved? _____

Step 6: Document the solution.

Packet Tracer - Use ICMP to Test and Correct Network Connectivity

Reminder:

1. Download from Learnonline course website (**Computer Practical-Week 12** folder) the Packet Tracer activity file: **`wk12-computer-prac-PKA-d-Correct-Connectivity.pka`**
2. Follow the instruction **given below** to complete this Packet Tracer activity

Addressing Table

Device	Interface	Address	Mask/Prefix	Default Gateway
RTR-1	G/0/0/0	192.168.1.1	255.255.255.0	N/A
		2001:db8:4::1	/64	N/A
	S0/1/0	10.10.2.2	255.255.255.252	N/A
		2001:db8:2::2	/126	N/A
	S0/1/1	10.10.3.1	255.255.255.252	N/A
		2001:db8:3::1	/126	N/A
RTR-2	G/0/0/0	10.10.1.1	255.255.255.0	N/A
	G0/0/1	2001:db8:1::1	/64	N/A
	S0/1/0	10.10.2.1	255.255.255.252	N/A
		2001:db8:2::1	/126	N/A
RTR-3	G0/0/0	10.10.5.1	255.255.255.0	N/A
	G0/0/1	2001:db8:5::1	/64	N/A
	S0/1/0	10.10.3.2	255.255.255.252	N/A
		2001:db8:3::2	/126	N/A
PC-1	NIC	10.10.1.10	255.255.255.0	10.10.1.1
Laptop A	NIC	10.10.1.20	255.255.255.0	10.10.1.1
PC-2	NIC	2001:db8:1::10	/64	fe80::1
PC-3	NIC	2001:db8:1::20	/64	fe80::1
PC-4	NIC	10.10.5.10	255.255.255.0	10.10.5.1
Server 1	NIC	10.10.5.20	255.255.255.0	10.10.5.1
Laptop B	NIC	2001:db8:5::10	/64	fe80::1
Laptop C	NIC	2001:db8:5::20	/64	fe80::1
Corporate Server	NIC	203.0.113.100	255.255.255.0	203.0.113.1
		2001:db8:acad::100	/64	fe80::1

Objectives

In this lab you will use ICMP to test network connectivity and locate network problems. You will also correct simple configuration issues and restore connectivity to the network.

- Use ICMP to locate connectivity issues.
- Configure network devices to correct connectivity issues.

Background

Customers have been complaining that they can't reach some network resources. You have been asked to test connectivity in the network. You use ICMP to find out which resources are unreachable and the locations from which they can't be reached. Then, you use trace to locate the point at which network connectivity is broken. Finally, you fix the errors that you find to restore connectivity to the network.

Instructions

All hosts should have connectivity to all other hosts and the Corporate Server.

- Wait until all link lights are green.
- Select a host and use ICMP ping to determine which hosts are reachable from that host.
- If a host is found to be unreachable, use ICMP trace to locate the general location of the network errors.
- Locate the specific errors and correct them.