

**-** School of Innovation, Design & Technology **-**

**IT5506 Bachelor of Information Technology**

**IT5487 Diploma in Information Systems**

**(Level 5)**

Practical Lab 1.1

# Configure switch-based Ethernet network

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**Score:** **\_\_\_\_\_\_ / 100 points**

Details

Due Date: **18 August 2023**

This Lab is worth 10**%** of the over-all course grade.

Learning Outcomes:

On successful completion of this assessment, the learner will be able to:

1. Describe network protocol models and devices to explain the layers of communications in data networks.
2. Design and calculate IP addresses and subnet masks for both IPv4 and IPv6 for given simple networks, using IPv4 and IPv6.
3. Explain fundamental Ethernet concepts.

Task Overview

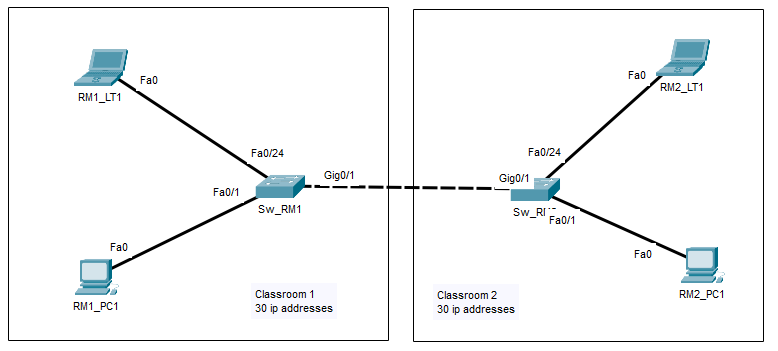
The assessment is made up of 2 files that will need to be completed and uploaded to Moodle for marking. You can find them on our class Moodle page under the **Assessment Details** tab

1. Lab 1.1 assessment tasks v2023T2 (this file)
2. Lab 1.1 PT assessment file v2023T2

For this lab, you will be using the Cisco Packet Tracer application software to configure a small switch-based Ethernet network consisting of 2 ethernet LAN switches and 2 personal computers and 2 laptops as shown in the topology diagram below.

Both desktop computers have been preconfigured with IP addresses. You will need to add the 2 laptops, using appropriate media to connect them to the switches and then configure the IP address settings. Network switches will need to be connected using the appropriate network media then configured based on network specifications.

**Topology Diagram**



**IP Addressing Table**

The network will use the IP Address range of **10.10.10.0** and subnet mask of **255.255.255.0**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Hostname** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| Switch | Sw\_RM1 | 10.10.10.253 | 255.255.255.0 |  |
| Switch | Sw\_RM2 | 10.10.10.252 | 255.255.255.0 |  |
| Laptop | RM1\_LT1 | 10.10.10.30 | 255.255.255.0 | 10.10.10.254 |
| Laptop | RM2\_LT1 | 10.10.10.60 | 255.255.255.0 | 10.10.10.254 |
| Computer | RM1\_PC1 | 10.10.10.1 | 255.255.255.0 | 10.10.10.254 |
| Computer | RM2\_PC1 | 10.10.10.31 | 255.255.255.0 | 10.10.10.254 |

INSTRUCTIONS

Part One: Create Network Topology

**Task 1: Download the Packet Tracer assessment file**

Download the ***Lab 1.1 PT assessment file v2023T2*** from our class Moodle page. You will need Packet Tracer application version 8.1 or higher

Note. To download a copy of Packet Tracer v8.1.1 64-bit application you can find a download on the Cisco Network Academy Program (CNAP) website at [www.netacad.com](http://www.netacad.com/)

**Task 2: Build the network based on the Topology Diagram 9 marks**

1. Based on the topology diagram, add the appropriate devices needed to build the LAN i.e two laptops.
   1. The computers have been connected to the switches and preconfigured with their IP address settings.
2. Based on the TIA/EIA network media standards select the appropriate network patch cables and connect the laptops to the specified switch ports. You will then connect the switches to each other.
   1. Connect switch Sw\_RM1 port g0/1 to switch Sw\_RM2 port g0/1. What type of network patch cable did you use?

|  |
| --- |
| **Copper Cross-over** |

* 1. Connect Laptop RM1\_LT1 to switch Sw\_RM1 port f0/24. What type of network patch cable did you use?

|  |
| --- |
| **Copper Straight-Through** |

* 1. Connect Laptop RM2\_LT1 to switch Sw\_RM2 to port f0/24. What type of network patch cable did you use?

|  |
| --- |
| **Copper Straight-Through** |

Part Two Configure Network Devices

Each classroom needs 30 IP addresses to cater for all the computing devices needed in the classroom. Classroom 1 will get the first set of 30 IP addresses. Classroom 2 will get the second set of 30 IP addresses. The third set of 30 ip addresses has been reserved for use by the school printers, servers and other networking devices.

**Task 3: Configure end-user devices 16 marks**

Configure the laptop IP addresses as specified in the IP Addressing table values. Note the computers have been preconfigured with IP addresses.

1. Based on the IP Addresses table what is the overall Network IP address

|  |
| --- |
| **10.10.10** |

1. What is the range of valid IP addresses needed for classroom 1.

|  |
| --- |
| **10.10.10.1 – 10.10.10.30** |

1. What is the range of valid IP addresses needed for classroom 2

|  |
| --- |
| **10.10.10.31 – 10.10.10.60** |

1. What is the range of valid IP addresses needed for the servers and printers

|  |
| --- |
| **10.10.10.61-10.10.10.253** |

1. Configure laptop RM1\_LT1 IP address, subnet mask and default gateway settings.
   1. Open the command prompt and issue the **ipconfig /all** command. Take a screenshot of the output and paste image below

|  |
| --- |
|  |

1. Configure laptop RM2\_LT1 IP address, subnet mask and default gateway settings.
   1. Open the command prompt and issue the **ipconfig /all** command. Take a screenshot of the output and paste image below

|  |
| --- |
|  |

**Task 4: Configure network switches 34 marks**

To complete this task, you need to access the switches management interface to be able to configure system settings. To do this you must connect the laptop to the switch console port and use the default Packet Tracer terminal emulation applicationcalled **Terminal.**

1. Connect the laptops to the switches console management port. According to TIA/EIA wiring standards what type of network patch cable did you use.

|  |
| --- |
| **Console cable** |

1. Open the Packet Tracer terminal emulation program.
   1. Click on your laptop
   2. Click on Desktop tab
   3. Click on the **Terminal** application
   4. Configure the following console management access settings

|  |  |
| --- | --- |
| Bits per second | 9600 |
| Data bits | 8 |
| Parity | None |
| Stop bits | 1 |
| Flow control | None |

* 1. Click on OK button.
  2. The terminal application user interface screen opens.

1. Configure the following switch settings

|  |  |  |
| --- | --- | --- |
| **Setting** | **Switch0** | **Switch1** |
| Host name | Sw\_RM1 | Sw\_RM2 |
| Secret Password | itsasecret | itsasecret |
| Console password | letmein | letmein |
| VTY password | cisco | cisco |
| Encrypt all passwords | encrypted | encrypted |
| Banner message | Authorised Access Only | Authorised Access Only |
| VLAN IP address | 10.10.10.253 | 10.10.10.252 |
| Save the settings | saved | saved |

1. What command is used to show the saved configuration file settings.

|  |
| --- |
| **show startup-config** |

1. Name 2 commands used to show the IP address settings on a switches interface

|  |
| --- |
| **show running-config, show ip interfaces** |

Part Three: Testing and Verification

**Task 5: Test connectivity between network devices 17 marks**

1. From laptop Rm1\_LT1 open the command prompt
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| No | Yes | Yes | No | No |

* 1. Issue the **arp –a** command to view the layer 2 MAC addresses of devices that have successfully connected to the laptop. Take a screenshot of the command output

|  |
| --- |
|  |

1. From laptop RM2\_LP1 open the command prompt
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| No | Yes | Yes | Yes | No |

* 1. Issue the **arp –a** command to view layer 2 MAC addresses of devices that have successfully connected to the laptop. Take a screenshot of the command output

|  |
| --- |
|  |

1. From switch Sw\_RM1 open the cli interface
2. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| No | Yes | Yes | Yes | No |

1. Issue the **show mac-address table** command to view the switches addressing table entries. Take a screenshot of the command output.

|  |
| --- |
|  |

1. From switch Sw\_RM2 open the cli interface
2. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| No | Yes | Yes | Yes | No |

1. Issue the **show mac-address table** command to view the switches addressing table entries. Take a screenshot of the command output

|  |
| --- |
|  |

1. Explain why the switches addressing table only contains layer two MAC addresses.

|  |
| --- |
| Switches addressing table only contains layer two mac address because it makes forwarding decisions. This is to determine how to handle incoming frames. |

Part Four: Troubleshooting

**Task 6: Fix the incorrect configuration settings 8 marks**

Based on findings from connectivity tests both desktop computers cannot be reached by the laptops and the switches. You must check the media type and address configuration settings of the computers and identify the reason why connectivity tests failed.

1. Investigate computer RM1\_PC1 settings
   1. Identify the faults

|  |
| --- |
| IP address, subnet mask and default gateway are configured incorrectly |

* 1. Explain how you fixed the faults.

|  |
| --- |
| Use addressing table to configure correctly |

1. Investigate computer RM2\_PC1 settings and identify the faults
   1. Identify the faults

|  |
| --- |
| The PC was turned off and incorrect cable connection to the switch |

* 1. Explain how you fixed the faults

|  |
| --- |
| Options, preferences and untick hide physical tab and hide all devices tab. Click on RM2\_PC1 and turn PC on showing green light. Change cable to copper straight through connection. |

**Task 7: Verify faults have been fixed 16 marks**

Once you have completed making the fixes conduct connectivity tests on the computers

1. On computer Rm1\_PC1 open the command prompt.
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_LT1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| Yes | Yes | Yes | Yes | Yes |

* 1. Issue the **arp –a** command to view layer 2 MAC addresses of devices that have successfully connected to the laptop. Take a screenshot of the command output.

|  |
| --- |
|  |

* 1. Issue the **ipconfig /all** command to view the computers ip address settings. Take a screenshot of the command output

|  |
| --- |
|  |

1. On computer Rm2\_PC1 open the command prompt.
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM2\_LT1 | Sw\_RM2 | Sw\_RM1 | RM1\_LT1 | RM1\_PC1 |
| Yes | Yes | Yes | Yes | Yes |

* 1. Issue the **arp –a** command to view layer 2 MAC addresses of devices that have successfully connected to the laptop. Take a screenshot of the command output

|  |
| --- |
|  |

* 1. Issue the **ipconfig /all** command to view the computers ip address settings. Take a screenshot of the command output

|  |
| --- |
|  |

1. From switch Sw\_RM1 open the cli interface.
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| Yes | Yes | Yes | Yes | Yes |

* 1. Issue the **show mac-address table** command to view the switches addressing table entries. Take a screenshot of the command output

|  |
| --- |
|  |

1. From switch Sw\_RM2 open the cli interface
   1. Use the **ping** command to test connectivity with all other device IP addresses. Enter **yes** or **no** to indicate the connectivity test was successful

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RM1\_PC1 | Sw\_RM1 | Sw\_RM2 | RM2\_LT1 | RM2\_PC1 |
| Yes | Yes | Yes | Yes | Yes |

* 1. Issue the **show mac-address table** command to view the switches addressing table entries. Take a screenshot of the command output

|  |
| --- |
|  |

Assessment complete, upload this file and your Packet Tracer file to Moodle

**Marking Schedule**

|  |  |
| --- | --- |
| **Tasks** | **Mark** |
| Task 2 Build the network based on the Topology Diagram   1. Connect switches and media used 2. Connect laptop to switch and media used 3. Connect laptop to switch and media used | **9**  3  3  3 |
| Task 3 Configure end-user devices   1. Overall network ip address 2. Class 1 ip address range 3. Class 2 ip address range 4. School servers and printers ip address range 5. Configure laptop RM1\_LT1 addressing and ipconfig /all screenshot 6. Configure laptop RM2\_LT1 addressing and ipconfig /all screenshot | **16**  2  2  2  2  4  4 |
| Task 4 Configure network switches   1. Connect laptop to switch console port and media used 2. Configure switches 3. Command used to save configuration 4. Two commands used to show a switch’s ip address settings | **34**  3  28  1  2 |
| Task 5 Test connectivity between laptops and all other network devices   1. Laptop RM1\_LT1 ping test 2. Laptop RM1\_LT1 arp screenshot 3. Laptop RM2\_LT1 ping test 4. Laptop RM2\_LT1 arp screenshot 5. Switch Sw\_RM1 ping test 6. Show mac-address table screenshot 7. Switch Sw\_RM1 ping test 8. Show mac-address table screenshot 9. Why does a switch’s address table only contain layer 2 mac addresses | **17**  2.5  1  2.5  1  2.5  1  2.5  1  3 |
| Task 6 Troubleshooting faults   1. Identify computer RM1\_PC1 faults 2. Fix faults 3. Identify computer RM2\_PC1 faults 4. Fix faults | **8**  2  2  2  2 |
| Task 7 Verify faults have been fixed   1. Computer RM1\_PC1 ping test, arp and ipconfig screenshot 2. Computer RM1\_PC1 ping test, arp and ipconfig screenshot 3. Switch Sw\_RM1 ping test and mac-address table screenshot 4. Switch Sw\_RM1 ping test and mac-address table screenshot | **16**  4.5  4.5  3.5  3.5 |
| **Total** | **100** |