

**DEPARTMENT OF BUSINESS, ADVANCED MANUFACTURING AND LOGISTICS**

ICT50220 Diploma of Information Technology

Assessment

**Learner**

**ICTNWK543 Install, operate and troubleshoot medium enterprise switches**

Assessment Book

# Assessment Task 4: Switching and Routing SA

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| Course code and name | **ICT50220 Diploma of Information Technology** |
| Unit code and name | **ICTNWK543 Install, operate and troubleshoot medium enterprise switches** |
| Due date | ….. / ….. / …… (See on Moodle) |
| Resources required | * Learner resource ICTNWK543 * Cisco Netacad.com curriculum * Access to computer and Internet * Access to Moodle * Access to Cisco Packet Tracer simulator * Access to routers and switches * Microsoft Word Application * MP Tech Solutions Profile.docx * MP Tech Solutions ICT Policies.docx * 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable) * 2 Switches (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable) * 2 PCs (Windows with a terminal emulation program, such as Tera Term) * Console cables to configure the Cisco IOS devices via the console ports * Ethernet cables as shown in the topology |
| Decision making rules | To achieve an overall satisfactory result for this assessment task:   * All questions must be answered satisfactorily * Learners must achieve a satisfactory result for each item in the Assessment Checklist. |
| Learner Instructions | This is a scenario based lab project assessment composed of practical tasks and written questions. There are 4 parts to this task:   * Part 1: Initialise, reload, and configure basic device settings * Part 2: Configure network infrastructure settings (VLANs, Trunking) * Part 3: Configure host support * Part 4: Test and verify IPv4 and IPv6 end-to-end connectivity   For this task you will:   * Complete it individually. * Write answers to all questions * Complete it in class at a time determined by your assessor. * Have time to read and review the assessment task in class. * You must submit your assessment electronically via Moodle and use the following naming convention: “Student ID\_Student Name\_ Assessment Task 4: Lab Project - Switching and Routing SA”   **Example**:  “s123456\_Sathish\_ Assessment Task 4: Switching and Routing SA.pkt”  “s123456\_Sathish\_ Assessment Task 4: Switching and Routing SA.docx   * You must agree (by clicking on the ‘I confirm radio button) with the assessment submission terms and conditions in Melbourne Polytechnic Moodle prior to the submission |

## Scenario

In this switching and routing lab project, you will configure the devices in a medium network. You must build the topology and configure a router, switches, and PCs to support both IPv4 connectivity for supported hosts as per the organisation requirements. The organisation that you are working for has certain criteria for the networking devices to comply with as indicated on the “Required Resources” below. Your router and switch must also be managed securely. You will configure inter-VLAN routing and port-security.

Required resources:

* 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
* 2 Switches (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
* 2 PCs (Windows with a terminal emulation program, such as Tera Term)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology

#### Topology

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| This topology contains 1 router, 2 switches and 2 PCs. The router R1 has a loopback0 interface. R1 G0/0/1 is connected to S1 F0/5. PC-A is connected S1 F0/6. The switches S1 and S2 are connected to each other via F0/1 and F0/2. PC-B is connected to S2 F0/18. |

**Topology for Switching and Routing Lab Project**

#### VLAN Table

| VLAN | VLAN Name |
| --- | --- |
| 2 - 192.168.8.0 /26 | Bikes |
| 3 - 192.168.8.64 /27 | Trikes |
| 4 - 192.168.8.96/27 | Management |
| 5 | Parking |
| 6 | Native |

#### Addressing Table

| Device / Interface | IP Address / Prefix | Default Gateway |
| --- | --- | --- |
| R1 G0/0/1.2 (subinterface .2) | 192.168.8.1 /26 | N/A |
| R1 G0/0/1.3 (subinterface .3) | 192.168.8.65 /27 | N/A |
| R1 G0/0/1.4 (subinterface .4) | 192.168.8.97 /27 | N/A |
| R1 Loopback0 | 209.165.201.1 /29 | N/A |
| S1 VLAN 4 | 192.168.8.98 /27 | 192.168.8.97 |
| S2 VLAN 4 | 192.168.8.99 /27 | 192.168.8.97 |
| PC-A NIC | 192.168.8.2/26 | 192.168.8.1 |
| PC-B NIC | 192.168.8.66/27 | 192.168.8.65 |

**Note**: There is no interface on the router supporting VLAN 5.

## Part 1 – Initialise and Configure Basic Devices

The Packet Tracer file that you are making is the evidence of creation of the topology and as well as for the configuration. You will have to submit fully configured Packet Tracer file together with this word document file for further evidence.

**Step 1:** Design the topology, Initialise the router and switches.

1. Read “ICT Policies” of MP Tech Solutions and follow the policies accordingly.
2. Design and review the network topology as per indicated on the given topology and required resources to align with manufacturer expectations and organisational requirements. Troubleshoot any errors that may appear.
3. Analyse the numerical information that are provided on the Addressing Table, specifically with the IP addresses and its corresponding subnet masks and the gateway. Utilise the provided numerical information while building the topology so that desired performance and interoperability of network can be achieved.
4. Select required media, cables, ports and connectors to connect switches to network devices and hosts.
5. While designing the topology, take note of “VLAN Table and Addressing Table” for network segmentation and switching.

Make sure that prior to configuring the switch, delete the existing VLAN database (vlan.dat) and then reload the switch so that you will not be having any residue of previous VLANs on the switch.

Initial configuration tasks for **Switch,** include the following:

| Task | IOS Command |
| --- | --- |
| Delete the vlan.dat file on the Switch | Sws# **del vlan.dat**  (Verify by using the **show vlan** command and look for vlan 99, if vlan.dat file was deleted vlan 99 will not be listed.) |
| Reload the Switch. | Sws# **reload**  (To verify check to see if hostname is reset back to **Switch**.) |

**Step 2:** Configure S1 and S2

Configuration tasks for the switches include the following:

| Tasks | Specification |
| --- | --- |
| Disable DNS lookup |  |
| Switch name | **S1 or S2, as appropriate for the particular switch** |
| Domain name | **ccna-lab.com** |
| Encrypted privileged EXEC password | **ciscoenpass** |
| Console access password | **ciscoconpass** |
| Create an administrative user in the local database | Username: **admin**  Password: **admin1pass** |
| Set login on VTY lines to use local database |  |
| Set VTY lines to accept SSH connections only |  |
| Encrypt the clear text passwords |  |
| Configure an MOTD Banner |  |
| Generate an RSA crypto key | **1024 bits modulus** |
| Configure Management Interface (SVI)  NOTE:  This is related to VLAN | Set the Layer 3 IPv4 address |
| Configure Default Gateway | Configure the default gateway as 192.168.8.97 for IPv4 |
| Save the running config to the startup configuration |  |
| Verify the initial switch configuration and troubleshoot if desired output has not been obtained. |  |

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| Q1 | Provide screenshot output of switch S1 by using “show crypto key mypubkey rsa” as an evidence of generation of RSA crypto key. | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

## Part 2: Configure Network Infrastructure Settings with Network Segmentation (VLANs and Trunking) and Port Security.

**Step 1**: Configure S1.

Configuration tasks for S1 include the following:

| Task | **Specification** |
| --- | --- |
| Create VLANs | VLAN 2, name Bikes  VLAN 3, name Trikes  VLAN 4, name Management  VLAN 5, name Parking  VLAN 6, name Native |
| Create 802.1Q trunks that use the native VLAN 6 | Interfaces F0/1 and F0/5 |
| Create a Trunk that uses interface F0/1 | Use the standard protocol for negotiation |
| Configure host access port for VLAN 2 | Interface F0/6 |
| Configure port-security on access ports | Allow 3 MAC addresses |
| Secure all unused interfaces | Assign to VLAN 5, Set to access mode, add a description, and shutdown |
| Verify the switch configuration and troubleshoot if desired output has not been obtained. |  |

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| --- | --- | --- | --- |
| Q1 | Provide screenshot output of switch S1 by using “show vlan” as an evidence of creation of different VLANs such as -  VLAN 2, name Bikes  VLAN 3, name Trikes  VLAN 4, name Management  VLAN 5, name Parking  VLAN 6, name Native | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

**Step 2**: Configure S2.

Configuration tasks for S2 include the following:

| Task | **Specification** |
| --- | --- |
| Create VLANs | VLAN 2, name Bikes  VLAN 3, name Trikes  VLAN 4, name Management  VLAN 5, name Parking  VLAN 6, name Native |
| Create 802.1Q trunks that use the native VLAN 6 | Interfaces F0/1, |
| Create a Trunk that uses interface F0/1 | Use the Standard protocol for negotiation |
| Configure host access port for VLAN 3 | Interface F0/18 |
| Configure port-security on access ports | Allow 3 MAC addresses |
| Secure all unused interfaces | Assign to VLAN 5, Set to access mode, add a description, and shutdown |
| Verify the switch configuration and troubleshoot if desired output has not been obtained. |  |

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| Q2 | Provide screenshot output of switch S2 by using “show vlan” as an evidence of creation of different VLANs such as -  VLAN 2, name Bikes  VLAN 3, name Trikes  VLAN 4, name Management  VLAN 5, name Parking  VLAN 6, name Native | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

**Step 3:** Configure R1 for Inter-VLAN routing.

Configuration tasks for R1 include the following:

| Task | **Specification** |
| --- | --- |
| Create the sub-interfaces on the gigabit interface | Refer to Addressing Table |
| Activate encapsulation 802.1Q on the sub-interfaces with proper VLANs | Refer to Addressing Table and VLAN Table |
| Assign IP addresses to all the sub-interfaces | Refer to Addressing Table |
| Verify configuration details of Inter-VLAN routing by checking -  Sub-interface assignment  Encapsulation 802.1Q  Layer 3 IP addressing scheme  Troubleshoot if desired output has not been obtained |  |
| Save the configuration to NVRAM |  |

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| Q3 | Provide screenshot output of switch R1 by using “show ip interface brief” as an evidence of creation of various types of sub-interfaces | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

## Part 3: Configure Host Computers

Configure the host computers PC-A and PC-B to use IPv4. After configuring each host computer, record the host network settings with the ipconfig /all command.

| PC-A Network Configuration | |
| --- | --- |
| Description | N/A |
| Physical Address | N/A |
| IP Address | As per addressing Table |
| Subnet Mask | As per addressing Table |
| Default Gateway | As per addressing Table |

| PC-B Network Configuration | |
| --- | --- |
| Description | N/A |
| Physical Address | N/A |
| IP Address | As per addressing Table |
| Subnet Mask | As per addressing Table |
| Default Gateway | As per addressing Table |

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| --- | --- | --- | --- |
| Q1 | Provide screenshot output of PC-A by using “ ipconfig /all” as an evidence of IP address assignment on PC-A. | | |
|  | | **Satisfactory** | **Unsatisfactory** |
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| --- | --- | --- | --- |
| Q2 | Provide screenshot output of PC-B by using “ ipconfig /all” as an evidence of IP address assignment on PC-B. | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

| PC-A Network Configuration | |
| --- | --- |
| Description |  |
| Physical Address |  |
| IP Address |  |
| Subnet Mask |  |
| Default Gateway |  |

| PC-B Network Configuration | |
| --- | --- |
| Description |  |
| Physical Address |  |
| IP Address |  |
| Subnet Mask |  |
| Default Gateway |  |

## Step 4: Test and Verify End to End Connectivity

Use the ping command to test IPv4 and IPv6 connectivity between all network devices.

Note:

* If pings to host computers fail, temporarily disable the computer firewall and retest.
* Use the following table to methodically verify connectivity with each network device. Take corrective action to establish connectivity if a test fails:
* There are networking issues in the IP addressing that you will need to resolve if you have not already found them.
* Once you have finished the assessment you are to email your Assessor for demonstration for final approval before you will be allowed to submit the assessment. Paste the “Sent and Received” email below in the supplied space.

Use following table to test and verify the End-to-End Connectivity. Write your ping results below.

| From | To | Protocol | IP Address | Provide Ping Results below |
| --- | --- | --- | --- | --- |
| PC-A | R1, G0/0/1.2 | IPv4 | 192.168.8.1 |  |
|  | R1, G0/0/1.3 | IPv4 | 192.168.8.65 |  |
|  | R1, G0/0/1.4 | IPv4 | 192.168.8.97 |  |
|  | S1, VLAN 4 | IPv4 | 192.168.8.98 |  |
|  | S2, VLAN 4 | IPv4 | 192.168.8.99 |  |
|  | PC-B | IPv4 | IP address will vary. |  |
|  | R1 Loop0 | IPv4 | 209.165.201.1 |  |
| PC-B | R1 Loop0 | IPv4 | 209.165.201.1 |  |
|  | R1, G0/0/1.2 | IPv4 | 192.168.8.1 |  |
|  | R1, G0/0/1.3 | IPv4 | 192.168.8.65 |  |
|  | R1, G0/0/1.4 | IPv4 | 192.168.8.97 |  |
|  | S1, VLAN 4 | IPv4 | 192.168.8.98 |  |
|  | S2, VLAN 4 | IPv4 | 192.168.8.99 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Q1 | Provide screenshot output of successful ping result from PC-A to PC-B. | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Q2 | Provide screenshot output of successful trace route from PC-A to PC-B. | | |
|  | | **Satisfactory** | **Unsatisfactory** |
|  | |  |  |

NOTE:

The Packet Tracer file that you are creating is the evidence of creation of the topology and corresponding configuration. You will have to submit Packet Tracer file together with this word document file as evidence.

Once you are finished with the entire Assessment, please contact your Assessor to demonstrate the network.

Router Interface Summary Table

| Router Model | Ethernet Interface #1 | Ethernet Interface #2 | Serial Interface #1 | Serial Interface #2 |
| --- | --- | --- | --- | --- |
| 1800 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 1900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2801 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 2811 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 4221 | Gigabit Ethernet 0/0/0 (G0/0/0) | Gigabit Ethernet 0/0/1 (G0/0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 4300 | Gigabit Ethernet 0/0/0 (G0/0/0) | Gigabit Ethernet 0/0/1 (G0/0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |

**Note**: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.

End of document

Assessment Checklist - Task 4: Switching and Routing SA.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Learner name** | |  | **Student ID** | |  | |
| **Assessor name** | |  | **Date** | |  | |
| Assessment checklist  assessor to complete the following | | | | | | |
| Observation and demonstration | | | | | | |
| **The LEARNER:** | | | | **SATISFACTORY** | | **NOT SATISFACTORY** |
| 1 | In part 1:   * Designed an appropriate topology and built the network. * Analysed the numerical information in the address table to achieve the desired performance. * Selected the required media, cables, ports, connectors, and connector switches as per the topology diagram and performed initial configuration. * Took note of the VLAN tale and addressing table for network segmentation and switching. | | |  | |  |
| 2 | In part 2:   * Configured switch 1 and 2 as per the instructions * Configured the router as per the instructions * Saved switch configuration and implemented switch security. | | |  | |  |
| 3 | In part 3:   * Configured the host computers using Ipv4. * Recorded the host network settings with ipconfig/all command | | |  | |  |
| 4 | In part 4:   * Used ping command to test Ipv4 and Ipv6 connectivity between all network devices. * Verified correct connectivity. | | |  | |  |
| 5 | * Correctly answered all questions throughout this task. * Provided a Packet Tracer File supporting all items in this assessment task. | | |  | |  |
| **Feedback -** Assessor must include feedback and learner responses | | | | | | |
|  | | | | | | |

# Assessment Task Summary - Task 4: Switching and Routing SA.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Trainer/Assessor to complete the following:  **THE LEARNER:** | | | | | | Yes | No |
| 1. | Satisfactorily completed Part 1 | | | | |  |  |
| 2. | Satisfactorily completed Part 2 | | | | |  |  |
| 3. | Satisfactorily completed Part 3 | | | | |  |  |
| 4. | Satisfactorily completed Part 4 | | | | |  |  |
| feedback **-** Assessor must include feedback | | | | | | | |
|  | | | | | | | |
| OVERALL TASK result | | | | | | | |
| Satisfactory  Not Satisfactory (resubmission required) – Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | |
| Date Assessment Returned | | |  | | | | |
| Trainer/assessor Name | | |  | | | | |
| Trainer/Assessor signature | | | X | | | | |
| **LEARNER DECLARATION**: Please read and sign below | | | | | | | |
| I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have been advised of the outcome of this assessment task.  PRINT NAME | | | | | | | |
| LEARNER Signature | | X | | Date |  | | |