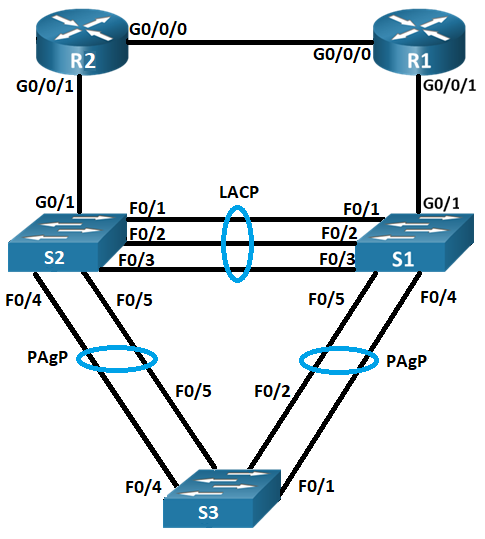
NTWK-2010 Midterm Project

# Topology



# Overview

For this project you are required to build a network topology implementing initial switch and router configuration, Inter-VLAN routing, Trunks, EtherChannel, STP and DHCP. You will demonstrate that your end device (Laptop) can **only** access all intermediary devices via SSH, acquire a DHCP lease from each VLAN and reach all router gateways.

# Objectives

Part 1: Label, Cable and Configure Basic Device Settings

Part 2: Create VLANs and Assign Switch Ports

Part 3: Configure 802.1Q Trunks and EtherChannel

Part 4: Configure Spanning-Tree Protocol

Part 5: Configure DHCPv4, Stateless DHCPv6 and IP Helper

Part 6: Verify and test connectivity

# Required Resources

* Laptop installed with Windows 10 or Mac OSX and connection to the Internet
* Packet Tracer version 8.0 or later

# Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | Logical Network | Logical Host | Comment |
| R1 | G0/0/0 | 192.168.1.240/30 |  | First Host |
| G0/0/1.10 | 192.168.1.0/25 |  | Last Host |
| G0/0/1.20 | 192.168.1.128/26 |  | Last Host |
| G0/0/1.100 | 192.168.0.0/24 |  | Last Host |
| 2001:db8:acad:a::/64 | 2001:db8:acad:a::1 | GUA |
| fe80::/8 | fe80::1 | Link-Local |
| G0/0/1.1000 | N/A | N/A | Native |
| R2 | G0/0/0 | 192.168.1.240/30 |  | Last Host |
| G0/0/1.30 | 192.168.1.192/27 |  | Last Host |
| G0/0/1.40 | 192.168.1.224/28 |  | First Host |
| G0/0/1.100 | 192.168.0.0/24 |  | First Host |
| G0/0/1.1000 | N/A | N/A | Native |
| S1 | VLAN 100 | 192.168.0.0/24 |  | Second Host - SVI |
| S2 | VLAN 100 | 192.168.0.0/24 |  | Third Host - SVI |
| S3 | VLAN 100 | 192.168.0.0/24 |  | Fourth Host - SVI |

# VLAN Table

|  |  |  |
| --- | --- | --- |
| VLAN | Name | Interface Assigned |
| 10 |  | R1: G0/0/1.10  S1: F0/6-10  S2: F0/6-10  S3: F0/6-10 |
| 20 |  | R1: G0/0/1.20  S1: F0/11-15  S2: F0/11-15  S3: F0/11-15 |
| 30 | QualityControl | R2: G0/0/1.30  S1: F0/16-19  S2: F0/16-19  S3: F0/16-19 |
| 40 | Guest | R2: G0/0/1.40  S1: F0/20-21  S2: F0/20-21  S3: F0/20-21 |
| 100 | Management | R1: G0/0/0  R2: G0/0/1  S1: F0/24  S2: F0/24  S3: F0/24 |
| 999 | ParkingLot | Unused |
| 1000 | Native | N/A |

# Instructions

## Label, Cable and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings on the routers and switches.

### Cable the network as shown in the topology.

1. Open Midterm Project.pka
2. Label and cable all devices **exactly** as shown in the topology above.

Note: For routers use model 4321. For switches use model 2960

### Configure basic settings for each switch and router

Open configuration window

* + - 1. Console into the device and enable privileged EXEC mode.
      2. Assign a device name.
      3. Disable DNS lookup.
      4. Assign a domain-name.
      5. Assign **class** as the privileged EXEC encrypted password.
      6. Assign **cisco** as the password for console line access.
      7. Assign a username: **admin** and password: **cisco** for VTY line access.
      8. Enable only SSH access.
      9. Encrypt the plaintext passwords.
      10. Create a banner that warns anyone trying to access the CLI that unauthorized access is prohibited and to contact your RRC academic email for access.
      11. Save the configuration to NVRAM.

### Configure R1 and R2 interfaces

1. Configure R1 and R2 interfaces using the IP address information in the Addressing Table above.

Note: VLAN 1000 is the native VLAN

1. Configure IPv6 unicast routing on R1
2. Document all active interfaces with descriptions.

Close configuration window

## Create VLANs and Assign Switch Ports

### Create VLANs on all switches.

Open configuration window

* + - 1. Create and name the required VLANs on each switch from the table above.
      2. Configure SVI’s on each switch using the IP address information in the Addressing Table.

### Assign VLANs to the correct switch interfaces.

* + - 1. Assign switchports to the appropriate VLAN (specified in the VLAN table above) and configure them for static access mode.
      2. Verify that the VLANs are assigned to the correct interfaces.
      3. Shutdown all interfaces assigned to ParkingLot VLAN.
      4. Document all active physical and virtual interfaces with descriptions.

Close configuration window

## Configure an 802.1Q Trunks and EtherChannel

### Manually configure trunk interface on switchport uplinks

Open configuration window

* + - 1. Change the switchport mode on each switch uplink interface to force trunking. Make sure to do this on all switches.
      2. Set the native VLAN to 1000 on all switches.
      3. As another part of trunk configuration, specify that only VLANs 10,20,30,40, 100 and 1000 are allowed to cross the trunk.
      4. Issue the **show interfaces trunk** command to verify trunking ports, the native VLAN and allowed VLANs across the trunk.

### Configure EtherChannel

* + - 1. Create a LACP-based EtherChannel unconditionally using group number 1 between S1 and S2. Reference the topology to know which switchport interfaces to bundle.
      2. Create a PAgP-based EtherChannel unconditionally using group number 2 between S1 and S3. Reference the topology to know which switchport interfaces to bundle.
      3. Create a PAgP-based EtherChannel unconditionally using group number 3 between S2 and S3. Reference the topology to know which switchport interfaces to bundle.
      4. Use the **show etherchannel summary** command to verify the EtherChannel configuration.

### Configure Default Gateway on S1, S2 and S3

1. Configure a default gateway for each switch using the R2 interface within the same broadcast domain as the switches SVI.

## Configure Spanning-Tree Protocol

1. Set spanning-tree mode to PVST.
2. Set S1 as the root bridge for VLAN 10 and 20.
3. Set S2 as the root bridge for VLAN 30 and 40.
4. Set S3 as the root bridge for all remaining VLANs.
5. All access mode ports should automatically move to forwarding state on link up.
6. All access mode ports should prevent rogue switches from connecting to the network.

Close configuration window

## Configure DHCPv4, Stateless DHCPv6 and IP Helper

### Configure R1 with DHCP pools for VLAN 10, 20, 30, 40 and 100

* + - 1. Exclude the first and last 4 useable addresses from each address pool.

Open configuration window

* + - 1. Create the DHCP pools using the VLAN name.

Note: Pool names must be exact.

* + - 1. Specify the network that this DHCP server is supporting.
      2. Configure the domain name as rrc.ca
      3. Configure the appropriate default gateway for each DHCP pool.

Note: For VLAN 100 use R1 interface as default gateway

* + - 1. Set name server (DNS) to 8.8.8.8.

### Configure R2 gateway interfaces with IP helper

1. Apply the ip helper-address command to gateway interfaces on R2 specifying R1’s G0/0/0 IP address.
2. Enter the following default static route on R1 to send traffic not a part of its routing table to R2 via next-hop IP:
   * **ip route 0.0.0.0 0.0.0.0 192.168.1.242**

### Configure a stateless DHCPv6 server on R1

* + - 1. Configure stateless DHCPv6 server with the pool name **R1-STATELESS**.

Note: Pool name must be exact.

* + - 1. Set the DNS server to 2001:db8:acad:a::254
      2. Set the domain name to rrc.ca
      3. Enable IPv6 dhcp server on G0/0/1.100 interface on R1

## Verify and test connectivity

1. Connect a laptop to VLAN 10,20,30 and 40 access ports on each switch and verify host gets IP settings via DHCP. Once a lease is obtained, try to ping each gateway.
2. Connect laptop to VLAN 100 and verify you’re able to SSH to S1, S2, S3, R1 and R2

Note: Assessment Items will become visible once score of 90% or higher is achieved.

1. Save the running configurations to NVRAM and Midterm Project.pka file then close packet tracer.
2. If all tests succeed, upload Midterm Project.pka and this document to Midterm Project dropbox in LEARN.

Last Revised July 2021