AMC Lab 2   Homework   Deadline: 4.1.2021
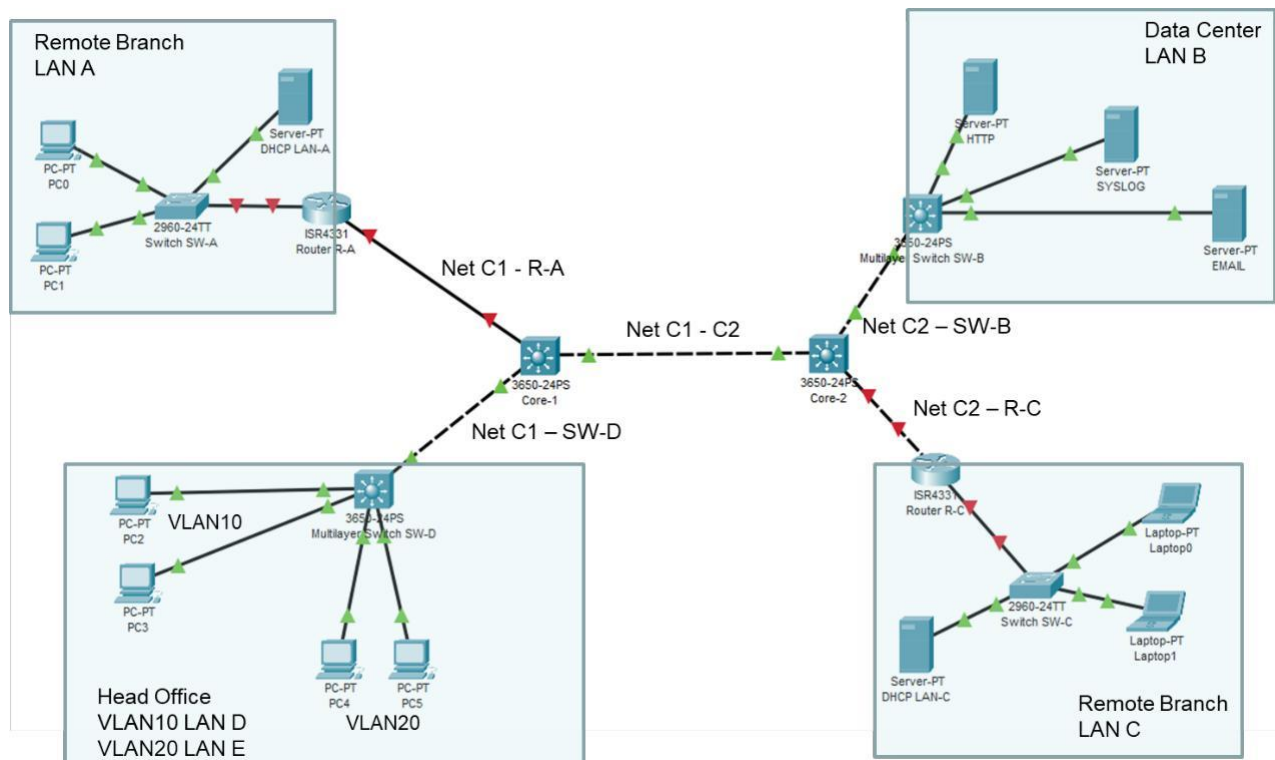
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Enterprise IP Network

In this AMC lab you prepare an enterprise network, which is the basic network for final QoS implementation.

Task1 – Create PT Topology

Task 2 – Map IP addressing from the Homework to the topology

Task 3 – Configure network devices

Task 4 – Configure hosts and servers
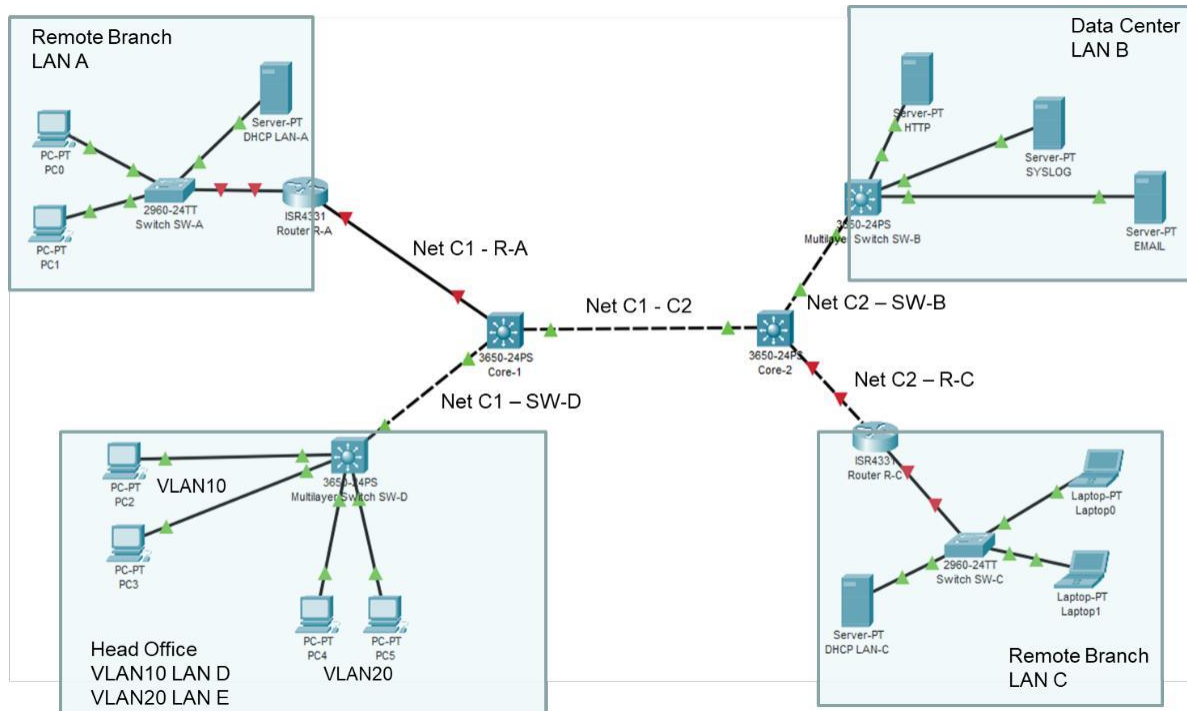
Task 5 – Test connectivity

Important Note: Write your answers in this PDF with red color

- with free Adobe Acrobat you may use

Comments/Notes Do not change the layout of this text

Do not use any other file format.

Do not create archive files

Homework / Preparation

Part 1: Calculate IPv4 Subnets

Step 1: Network Topology A

Given is the following network topology.

a. The **IP address range 172.16.0.0 / 16** is available for your IPv4 subnetting.

b. The following table show the required host IP addresses per subnet. Network address and broadcast address are not included and must be added.

c. Multilayer Switches (Core-1, Core-2, SW-B, SW-D) will work as layer 3 switches with routing capabilities.

d. All links which interconnect Routers or Multilayer Switches are minimum sized IP subnets with /30 mask.

Subnet Number	# IP addresses		Subnet Number	# IP addresses
LAN D	240		C1 – C2	2
LAN E	140		C1 – R-A	2
LAN A	50		C1 – SW-D	2
LAN C	40		C2 – SW-B	2
LAN B	20		C2 – R-C	2

Plan the IP subnets in the **IP address range of 172.16.0.0 / 16**. Design your subnet addressing scheme (decimal) starting from the largest network down to inter-router-links in the sequence of the table before.

The first network address starts at 139.6.0.0 and consecutive networks are engineered without any gap in IP addressing.

Calculate the appropriate minimum sized subnets, and record the addresses required in the table.

Subnet Number	Subnet IP Address	Subnet Mask	Last Usable Host IP Address	Broadcast IP Address
LAN D	172.16.0.0	255.255.255.0 172.16.0.1 (1st IP)	172.16.0.254	172.16.0.255
LAN E	172.16.1.0	255.255.255.0 172.16.1.1(1st IP)	172.16.1.254	172.16.1.255
LAN A	172.16.2.0	255.255.255.192 172.16.2.1(1st IP)	172.16.2.62	172.16.2.63
LAN C	172.16.2.64	255.255.255.192 172.16.2.65(1st IP)	172.16.2.126	172.16.2.127
LAN B	172.16.2.128	255.255.255.224 172.16.2.129(1st IP)	172.16.2.158	172.16.2.159
C1–C2	172.16.2.160	255.255.255.252 172.16.2.161(1st IP)	172.16.2.162	172.16.2.163
C1 – R-A	172.16.2.164	255.255.255.252 172.16.2.165(1st IP)	172.16.2.166	172.16.2.167
C1 – SW-D	172.16.2.168	255.255.255.252 172.16.2.169(1st IP)	172.16.2.170	172.16.2.171
C2 – SW-B	172.16.2.172	255.255.255.252 172.16.2.173(1st IP)	172.16.2.174	172.16.2.175
C2 – R-C	172.16.2.176	255.255.255.252 172.16.2.177(1st IP)	172.16.2.178	172.16.2.179

Part 2: Install Packet Tracer Network Simulation Tool

a. Install Packet Tracer from netacad.com.

- You can join the self-paced course „Introduction to Packet Tracer" following the link https://www.netacad.com/courses/packet-tracer/introduction-packet-tracer

- You may create an account and then you have access to the latest version in Windows or Linux. If necessary, create a VM to run Packet Tracer.

- You can exercise to work with Packet Tracer by using this self-paced course „Introduction to Packet Tracer".

- There are also many tutorials for Packet Tracer, e.g. following this YouTube link: https://www.youtube.com/watch?v=VqMeJ-WH4E0

b. When you implement routers, switches, server, PCs, etc. in Packet Tracer you have

- options to extend interface, power supply, etc. in physical chassis

- device and context-specific options to configure your devices by CLI (command line interface) or Config Context, or Services, or Desktop Applications, etc.

a. You may exercise Packet Tracer and Cisco device configuration with the "**Basic Cisco device configuration**" provide in Ilias AMC Lab folder. Use the CLI command line interface of routers and switches.

Part 3: Learn or remember Cisco IOS CLI Configuration Commands

a. Check the **Cisco IOS Command List**, provided for the Labs.

- If you already know Cisco console commands, you may **test** you answers with Packet Tracer.

- Or you **learn** how to configure by **exercising** the "**Basic Cisco device configuration**" in Packet Tracer.

- Or you **learn** how to configure by **exercising** the YouTube tutorials for Packet Tracer, e.g. following this link: https://www.youtube.com/watch?v=VqMeJ-WH4E0

Part 4: Review Cisco IOS CLI Configuration Commands

a. The following configuration steps are required for AMC Lab 2.

- When clicking to a device in Packet Tracer, open the **CLI** for routers or switches.

- PCs and Servers may be configured using the **Desktop**
  - o IP Configuration
  - o Command Prompt (Windows Style)

b. Which **IOS Commands** are necessary to configure the following tasks?

- Enter the **privileged mode** from startup mode.   **Router>** **enable**

- Enter the **configuration (EXEC) mode** from terminal. **Router#** **configure terminal**

- Set the **hostname** to R1.   **Router(config)#** **hostname R1**

- **Disable DNS lookup**.   **R1(config)#** **no ip domain-lookup**

c. Configure **Router Network Interfaces**

- Configure router interface g0/0/0 with the IP address 172.16.10.1, mask / 27 and switch-on the interface. (The mask must be provided in dotted decimal notation).

   R1(config)# **interface g0/0/0**

   R1(config-if)# **ip address 172.16.10.1 255.255.255.224**

   R1(config-if)# **no shutdown**

d. **Static IP Route**
   In this lab we will use **ISR 4331** routers.

- Configure a static IP route to network 10.0.10.0/24 using the next hop router address 192.128.0.4 (**recursive static route**)
   R1(config)# **ip route 10.0.10.0 255.255.255.0 192.128.0.4**

- Configure a static IP route to network 10.0.10.0/24 using the R1 exit interface g1/0/2 (**directly connected static route**)

  R1(config)# ip route 10.0.10.0 255.255.255.0 g1/0/2

- Configure a static default IP route (network 0.0.0.0 /0) using the exit interface g1/0/2 of router R1 (**directly connected static default route**)

  R1(config)# ip route 0.0.0.0 0.0.0.0 g1/0/2

e. **Multilayer Switch Basic** Configurations.
   In this lab we will use **3650-24PS** multilayer switches.

   - Set the **hostname** to SW-1.

     Switch>enable

     Switch# configure terminal

     Switch(config)# hostname SW-1

     Final console output: **SW-1(config)#**

   - **Disable DNS lookup**.

     SW-1(config)# no ip domain-lookup

f. **Multilayer Switch VLAN and Trunk** Configurations.
   In this lab we will use **3650-24PS** multilayer switches for VLANs and VLAN trunking.

   - Create **VLAN 10** (name **voice**), **VLAN 20** (name **data**)

     SW-1(config)# vlan 10
     SW-1(config-vlan)# name voice
     SW-1(config-vlan)# vlan 20
     SW-1(config-vlan)# name data

     Create **access port mode** for **interface range g1/0/1 to g1/0/10** and map ports to **VLAN 10**

     SW-1(config)# interface range g1/0/1-g1/0/10
     SW-1(config-if-range)# switchport mode access
     SW-1(config-if-range)# switchport access vlan 10

   - Some parts of the creation of trunk port mode for interface g1/0/24 is given.

     SW-1(config)#interface g1/0/24
     SW-1(config-if)# switchport trunk encapsulation dot1q
     SW-1(config-if)# no switchport mode dynamic
     SW-1(config-if)# switchport mode trunk

     Set **native VLAN to VLAN1, allow VLAN 1,10,20**

     SW-1(config-if)# switchport trunk native vlan 1
     SW-1(config-if)# switchport trunk allowed vlan 1,10,20

g. **Multilayer Switch Routing** Configurations.
   In this lab we will use **3650-24PS** Multilayer Switches.
   When a Multilayer Switch is enabled **layer 3 router operations**, it will have layer 2 switch ports, and layer 3 router ports.

   - To **enable IP routing** for a Multilayer Switch SW-1 the following command is given

     SW-1(config)#ip routing

- To **disable switch port behavior** (layer 2 switching) at interface g0/0/0 and create a layer 3 router interface use the following command

  SW-1(config)#interface g0/0/0

  SW-1(config-if)#no switchport

- Configure Multilayer Switch router interface g1/0/2 with the IP address 172.16.10.1, mask / 27 and switch on the interface. (The mask must be provided in dotted decimal notation).

  SW-1(config)# interface g1/0/2
  SW-1(config-if)# ip address 172.16.10.1 255.255.255.224
  SW-1(config-if)# no shutdown

- Configure a static default IP route (network 0.0.0.0 /0) using the exit interface g1/0/2 of Multilayer Switch SW-1 (directly connected static default route)

  SW-1(config)# ip route 0.0.0.0 0.0.0.0 g1/0/2

h. **Display** important information about your network device

- Display the **running configuration**.   **R1# show running-config or sh run**

- Display the status of all **interfaces** in brief. **SW-1# show ip interface brief or #sh ip int br**

- Display the status of **interface g1/0/1**   **R1#show interface g1/0/1**

-          Display the routing table   **SW-1#show ip route**