**Part 1: Basic Router Configuration**

**Step 1: Configure router Edge-Router with required settings.**

a. Open a command window on router **Edge-Router** and move to privileged EXEC mode.

b. Copy and paste the following configuration into the Edge-Router router CLI.

ip route 192.168.10.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.20.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.30.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.99.0 255.255.255.240 GigabitEthernet0/0/0

Be sure to press the <Enter> key after the last line to return to privileged EXEC mode prompt.

c. Configure the following settings on the router:

* The enable secret password.
* A console password
* Remote access to the VTY lines.
* A banner MOTD message.
* The device hostname according to the value in the addressing table.
* All clear text passwords should be encrypted.
* Interface addressing on G0/0/0 and S0/1/0.
* Interface descriptions on G0/0/0 and S0/1/0.

Router(config)#no ip domain lookup

Router(config)#enable secret class

Router(config)#line console 0

Router(config-line)#password cisco

Router(config-line)#login

Router(config-line)#exit

Router(config)#line vty 0 4

Router(config-line)#password cisco

Router(config-line)#login

Router(config-line)#exit

Router(config)#banner motd #Authorized Access Only!#

Router(config)#hostname Edge-Router

Edge-Router(config)#service password-encryption

Edge-Router(config)#interface g0/0/0

Edge-Router(config-if)#ip address 192.168.0.1 255.255.255.0

Edge-Router(config-if)#no shutdown

Edge-Router(config-if)#description Link to Sciences LAN

Edge-Router(config-if)#exit

Edge-Router(config)#interface s0/1/0

Edge-Router(config-if)#ip address 209.165.201.2 255.255.255.252

Edge-Router(config-if)#no shutdown

Edge-Router(config-if)#description Link to Internet

Edge-Router(config-if)#exit

**Note:** Be sure to make a record of the passwords that you create.

**Part 2: Basic Switch Configuration**

**Step 1: Configure Remote Management Addressing**

a. Configure SVI 99 on switch Sw-C with IP addressing according to the Addressing Table.  
b. The Sw-C switch SVI should be reachable from other networks.

Sw-C(config)#interface vlan 99

Sw-C(config-if)#ip address 192.168.99.18 255.255.255.240

Sw-C(config-if)#no shutdown

Sw-C(config-if)#exit

Sw-C(config)#

Sw-C(config)#ip default-gateway 192.168.99.17

**Step 2: Configure Secure Remote Access**

On switch Sw-C, configure SSH as follows:

* Username: **admin** password: **C1sco123!**
* Modulus bits **1024**
* All VTY lines should accept SSH connections only
* Connections should require the previously configured username and password.
* IP domain name: **acad.pt**

Sw-C(config)#ip domain-name acad.pt

Sw-C(config)#crypto key generate rsa

How many bits in the modulus [512]: 1024

Sw-C(config)#username admin privilege 15 secret C1sco123!

Sw-C(config)#enable secret C1sco123!

Sw-C(config)#line vty 0 15

Sw-C(config-line)#transport input ssh

Sw-C(config-line)#login local

Sw-C(config-line)#exit

Sw-C(config)#ip ssh version 2

###### **L3-SW1**

L3-SW1(config)#vlan 10

L3-SW1(config-vlan)#name FL1

L3-SW1(config-vlan)#interface vlan 10

L3-SW1(config-if)#description FL1

L3-SW1(config-if)#ip address 192.168.10.1 255.255.255.0

L3-SW1(config-if)#exit

L3-SW1(config)#

L3-SW1(config)#vlan 20

L3-SW1(config-vlan)#name FL2

L3-SW1(config-vlan)#interface vlan 20

L3-SW1(config-if)#description FL2

L3-SW1(config-if)#ip address 192.168.20.1 255.255.255.0

L3-SW1(config-if)#exit

L3-SW1(config)#

L3-SW1(config)#vlan 30

L3-SW1(config-vlan)#name FL3

L3-SW1(config-vlan)#interface vlan 30

L3-SW1(config-if)#description FL3

L3-SW1(config-if)#ip address 192.168.30.1 255.255.255.0

L3-SW1(config-if)#exit

L3-SW1(config)#

L3-SW1(config)#vlan 99

L3-SW1(config-vlan)#name Management

L3-SW1(config-vlan)#interface vlan 99

L3-SW1(config-if)#description Management

L3-SW1(config-if)#ip address 192.168.99.2 255.255.255.240

L3-SW1(config-if)#exit

###### **Sw-A**

Sw-A(config)#vlan 10

Sw-A(config-vlan)#name FL1

Sw-A(config-vlan)#interface vlan 10

Sw-A(config-if)#description FL1

Sw-A(config-if)#exit

Sw-A(config)#

Sw-A(config)#vlan 20

Sw-A(config-vlan)#name FL2

Sw-A(config-vlan)#interface vlan 20

Sw-A(config-if)#description FL2

Sw-A(config-if)#exit

Sw-A(config)#

Sw-A(config)#vlan 30

Sw-A(config-vlan)#name FL3

Sw-A(config-vlan)#interface vlan 30

Sw-A(config-if)#description FL3

Sw-A(config-if)#exit

###### **Sw-B**

Sw-B(config)#vlan 10

Sw-B(config-vlan)#name FL1

Sw-B(config-vlan)#interface vlan 10

Sw-B(config-if)#description FL1

Sw-B(config-if)#exit

Sw-B(config)#

Sw-B(config)#vlan 20

Sw-B(config-vlan)#name FL2

Sw-B(config-vlan)#interface vlan 20

Sw-B(config-if)#description FL2

Sw-B(config-if)#exit

Sw-B(config)#

Sw-B(config)#vlan 30

Sw-B(config-vlan)#name FL3

Sw-B(config-vlan)#interface vlan 30

Sw-B(config-if)#description FL3

Sw-B(config-if)#exit

###### **Sw-C**

Sw-C(config)#vlan 40

Sw-C(config-vlan)#name BDG4

Sw-C(config-vlan)#interface vlan 40

Sw-C(config-if)#ip address 192.168.40.1 255.255.255.0

Sw-C(config-if)#description BDG4

Sw-C(config-if)#exit

Sw-C(config)#

Sw-C(config)#vlan 50

Sw-C(config-vlan)#name BDG5

Sw-C(config-vlan)#interface vlan 50

Sw-C(config-if)#ip address 192.168.50.1 255.255.255.0

Sw-C(config-if)#description BDG5

Sw-C(config-if)#exit

Sw-C(config)#

Sw-C(config)#vlan 60

Sw-C(config-vlan)#name BDG6

Sw-C(config-vlan)#interface vlan 60

Sw-C(config-if)#ip address 192.168.60.1 255.255.255.0

Sw-C(config-if)#description BDG6

Sw-C(config-if)#exit

Sw-C(config)#

Sw-C(config)#vlan 99

Sw-C(config-vlan)#name Management

Sw-C(config-vlan)#interface vlan 99

Sw-C(config-if)#ip address 192.168.99.18 255.255.255.240

Sw-C(config-if)#description Management

Sw-C(config-if)#exit

##### Step 2: Assign switch ports to VLANs.

###### **Sw-A**

Sw-A(config)#interface range f0/7-10

Sw-A(config-if-range)#switchport mode access

Sw-A(config-if-range)#switchport access vlan 10

Sw-A(config-if-range)#exit

Sw-A(config)#interface range f0/11-15

Sw-A(config-if-range)#switchport mode access

Sw-A(config-if-range)#switchport access vlan 20

Sw-A(config-if-range)#exit

Sw-A(config)#interface range f0/16-24

Sw-A(config-if-range)#switchport mode access

Sw-A(config-if-range)#switchport access vlan 30

Sw-A(config-if-range)#exit

###### **Sw-B**

Sw-B(config)#interface range f0/7-10

Sw-B(config-if-range)#switchport mode access

Sw-B(config-if-range)#switchport access vlan 10

Sw-B(config-if-range)#exit

Sw-B(config)#interface range f0/11-15

Sw-B(config-if-range)#switchport mode access

Sw-B(config-if-range)#switchport access vlan 20

Sw-B(config-if-range)#exit

Sw-B(config)#interface range f0/16-24

Sw-B(config-if-range)#switchport mode access

Sw-B(config-if-range)#switchport access vlan 30

Sw-B(config-if-range)#exit

###### **Sw-C**

Sw-C(config)#interface range f0/1-5

Sw-C(config-if-range)#switchport mode access

Sw-C(config-if-range)#switchport access vlan 40

Sw-C(config-if-range)#exit

Sw-C(config)#interface range f0/6-10

Sw-C(config-if-range)#switchport mode access

Sw-C(config-if-range)#switchport access vlan 50

Sw-C(config-if-range)#exit

Sw-C(config)#interface range f0/11-15

Sw-C(config-if-range)#switchport mode access

Sw-C(config-if-range)#switchport access vlan 60

Sw-C(config-if-range)#exit

Sw-C(config)#interface f0/24

Sw-C(config-if)#switchport mode access

Sw-C(config-if)#switchport access vlan 99

Sw-C(config-if)#exit

##### Step 1: Configure EtherChannels

Create EtherChannels according to the EtherChannel Port Assignments Table. Use the Cisco LACP protocol. Both sides of the channel should attempt to negotiate the link protocol.

###### **L3-SW1**

L3-SW1(config)#interface range g1/0/1-2

L3-SW1(config-if-range)#channel-group 1 mode active

L3-SW1(config-if-range)#exit

L3-SW1(config)#

L3-SW1(config)#interface range g1/0/3-4

L3-SW1(config-if-range)#channel-group 2 mode active

L3-SW1(config-if-range)#exit

###### **Sw-A**

Sw-A(config)#interface range g0/1-2

Sw-A(config-if-range)#channel-group 1 mode active

Sw-A(config-if-range)#exit

Sw-A(config)#

Sw-A(config)#interface range f0/5-6

Sw-A(config-if-range)#channel-group 3 mode active

Sw-A(config-if-range)#exit

###### **Sw-B**

Sw-B(config)#interface range g0/1-2

Sw-B(config-if-range)#channel-group 2 mode active

Sw-B(config-if-range)#exit

Sw-B(config)#

Sw-B(config)#interface range f0/5-6

Sw-B(config-if-range)#channel-group 3 mode active

Sw-B(config-if-range)#exit

##### Step 2: Configure Trunking on the EtherChannels

a. Configure the port channel interfaces as static trunks. Disable DTP negotiation on all trunks.  
b. Troubleshoot any issues that prevent the formation of the EtherChannels.

###### **L3-SW1**

L3-SW1(config)#interface port-channel 1

L3-SW1(config-if)#switchport mode trunk

L3-SW1(config-if)#switchport trunk allowed vlan 10,20,30

L3-SW1(config-if)#exit

L3-SW1(config)#

L3-SW1(config)#interface port-channel 2

L3-SW1(config-if)#switchport mode trunk

L3-SW1(config-if)#switchport trunk allowed vlan 10,20,30

L3-SW1(config-if)#exit

###### **Sw-A**

Sw-A(config)#interface port-channel 1

Sw-A(config-if)#switchport mode trunk

Sw-A(config-if)#switchport nonegotiate

Sw-A(config-if)#exit

Sw-A(config)#

Sw-A(config)#interface port-channel 3

Sw-A(config-if)#switchport mode trunk

Sw-A(config-if)#switchport nonegotiate

Sw-A(config-if)#exit

###### **Sw-B**

Sw-B(config)#interface port-channel 2

Sw-B(config-if)#switchport mode trunk

Sw-B(config-if)#switchport nonegotiate

Sw-B(config-if)#exit

Sw-B(config)#

Sw-B(config)#interface port-channel 3

Sw-B(config-if)#switchport mode trunk

Sw-B(config-if)#switchport nonegotiate

Sw-B(config-if)#exit

**Note:** Packet Tracer requires configuration of trunking and DTP mode on both portchannel interfaces and the component physical interfaces.

##### Step 3: Configure a static trunk uplink

a. On the Sw-C switch, configure the port that is connected to Edge-Router G0/0/0 as a static trunk.  
b. Configure the Management VLAN as the native VLAN.  
c. Disable DTP on the port.

###### **Sw-C**

Sw-C(config)#interface g0/1

Sw-C(config-if)#switchport mode trunk

Sw-C(config-if)#switchport nonegotiate

Sw-C(config-if)#switchport trunk native vlan 99

Sw-C(config-if)#switchport trunk allowed vlan 40,50,60,99

Sw-C(config-if)#exit

#### Part 5: Configure Inter-VLAN Routing

##### Step 1: Configure inter-VLAN routing on the Layer 3 switch.

a. Configure Inter-VLAN routing on the L3-SW1 Layer 3 switch for all VLANs in the VLAN Table that are configured on L3-SW1.  
b. Configure the switchport on L3-SW1 that is connected to Edge-Router with an IP address as shown in the Addressing Table.

###### **L3-SW1**

L3-SW1(config)#ip routing

L3-SW1(config)#interface g1/1/1

L3-SW1(config-if)#no switchport

L3-SW1(config-if)#ip address 192.168.0.2 255.255.255.0

##### Step 2: Configure router-on-a-stick inter-VLAN routing on a router.

a. Configure inter-VLAN routing on Edge-Router for all the VLANs that are configured on the Sw-C switch. Use the information in the Addressing Table.  
b. Be sure to configure descriptions of all interfaces.

###### **Edge-Router**

Edge-Router(config)#interface g0/0/1

Edge-Router(config-if)#no shutdown

Edge-Router(config)#interface g0/0/1.40

Edge-Router(config-subif)#description "Gateway for VLAN40"

Edge-Router(config-subif)#encapsulation dot1q 40

Edge-Router(config-subif)#ip address 192.168.40.1 255.255.255.0

Edge-Router(config-subif)#exit

Edge-Router(config)#interface g0/0/1.50

Edge-Router(config-subif)#description "Gateway for VLAN50"

Edge-Router(config-subif)#encapsulation dot1q 50

Edge-Router(config-subif)#ip address 192.168.50.1 255.255.255.0

Edge-Router(config-subif)#exit

Edge-Router(config)#interface g0/0/1.60

Edge-Router(config-subif)#description "Gateway for VLAN60"

Edge-Router(config-subif)#encapsulation dot1q 60

Edge-Router(config-subif)#ip address 192.168.60.1 255.255.255.0

Edge-Router(config-subif)#exit

Edge-Router(config)#interface g0/0/1.99

Edge-Router(config-subif)#description "Gateway for VLAN99"

Edge-Router(config-subif)#encapsulation dot1q 99 native

Edge-Router(config-subif)#ip address 192.168.99.17 255.255.255.240

Edge-Router(config-subif)#exit

##### Step 3: Configure default gateways on hosts.

a. Configure default gateway addresses on all hosts on the LANs.

Default gateway on **WS-1.1** and **WS-1.4**: **192.168.10.1**  
Default gateway on **WS-1.2** and **WS-1.5**: **192.168.20.1**  
Default gateway on **WS-1.3** and **WS-1.6**: **192.168.30.1**

Default gateway on **WS-2.1**: **192.168.40.1**  
Default gateway on **WS-2.2**: **192.168.50.1**  
Default gateway on **WS-2.3**: **192.168.60.1**  
Default gateway on **Management PC**: **192.168.99.17**

#### Router Edge-Router

en

conf t

ip route 192.168.10.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.20.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.30.0 255.255.255.0 GigabitEthernet0/0/0

ip route 192.168.99.0 255.255.255.240 GigabitEthernet0/0/0

no ip domain lookup

enable secret class

line console 0

password cisco

login

exit

line vty 0 4

password cisco

login

exit

banner motd #Authorized Access Only!#

hostname Edge-Router

service password-encryption

interface g0/0/0

ip address 192.168.0.1 255.255.255.0

no shutdown

description "R1 G0/0/0"

exit

interface s0/1/0

ip address 209.165.201.2 255.255.255.252

no shutdown

description "R1 S0/1/0"

exit

interface g0/0/1

no shutdown

interface g0/0/1.40

description "Gateway for VLAN40"

encapsulation dot1q 40

ip address 192.168.40.1 255.255.255.0

exit

interface g0/0/1.50

description "Gateway for VLAN50"

encapsulation dot1q 50

ip address 192.168.50.1 255.255.255.0

exit

interface g0/0/1.60

description "Gateway for VLAN60"

encapsulation dot1q 60

ip address 192.168.60.1 255.255.255.0

exit

interface g0/0/1.99

description "Gateway for VLAN99"

encapsulation dot1q 99 native

ip address 192.168.99.17 255.255.255.240

end

copy running-config startup-config

#### Switch Sw-C

en

config t

interface vlan 99

ip address 192.168.99.18 255.255.255.240

no shutdown

exit

ip default-gateway 192.168.99.17

ip domain-name acad.pt

crypto key generate rsa

1024

username admin privilege 15 secret C1sco123!

enable secret C1sco123!

line vty 0 15

transport input ssh

login local

exit

ip ssh version 2

vlan 40

name BDG4

exit

interface vlan 40

ip address 192.168.40.1 255.255.255.0

description BDG4

exit

vlan 50

name BDG5

exit

interface vlan 50

ip address 192.168.50.1 255.255.255.0

description BDG5

exit

vlan 60

name BDG6

exit

interface vlan 60

ip address 192.168.60.1 255.255.255.0

description BDG6

exit

vlan 99

name Management

exit

interface vlan 99

ip address 192.168.99.18 255.255.255.240

description Management

exit

interface range f0/1-5

switchport mode access

switchport access vlan 40

exit

interface range f0/6-10

switchport mode access

switchport access vlan 50

exit

interface range f0/11-15

switchport mode access

switchport access vlan 60

exit

interface f0/24

switchport mode access

switchport access vlan 99

exit

interface g0/1

switchport mode trunk

switchport nonegotiate

switchport trunk allowed vlan 40,50,60,99

switchport trunk native vlan 99

end

copy running-config startup-config

#### Switch L3-SW1

en

config t

vlan 10

name FL1

interface vlan 10

description FL1

ip address 192.168.10.1 255.255.255.0

exit

vlan 20

name FL2

interface vlan 20

description FL2

ip address 192.168.20.1 255.255.255.0

exit

vlan 30

name FL3

interface vlan 30

description FL3

ip address 192.168.30.1 255.255.255.0

exit

vlan 99

name Management

interface vlan 99

description Management

ip address 192.168.99.2 255.255.255.240

exit

ip routing

interface g1/1/1

no switchport

ip address 192.168.0.2 255.255.255.0

exit

interface range g1/0/1-2

channel-group 1 mode active

exit

interface port-channel 1

switchport mode trunk

switchport trunk allowed vlan 10,20,30

exit

interface range g1/0/3-4

channel-group 2 mode active

exit

interface port-channel 2

switchport mode trunk

switchport trunk allowed vlan 10,20,30

end

copy running-config startup-config

#### Switch Sw-A

enable

config terminal

vlan 10

name FL1

interface vlan 10

description FL1

exit

vlan 20

name FL2

interface vlan 20

description FL2

exit

vlan 30

name FL3

interface vlan 30

description FL3

exit

interface range f0/7-10

switchport mode access

switchport access vlan 10

exit

interface range f0/11-15

switchport mode access

switchport access vlan 20

exit

interface range f0/16-24

switchport mode access

switchport access vlan 30

exit

interface range g0/1-2

channel-group 1 mode active

exit

interface port-channel 1

switchport mode trunk

switchport nonegotiate

exit

interface range f0/5-6

channel-group 3 mode active

exit

interface port-channel 3

switchport mode trunk

switchport nonegotiate

end

copy running-config startup-config

#### Switch Sw-B

en

config t

vlan 10

name FL1

interface vlan 10

description FL1

exit

vlan 20

name FL2

interface vlan 20

description FL2

exit

vlan 30

name FL3

interface vlan 30

description FL3

exit

interface range f0/7-10

switchport mode access

switchport access vlan 10

exit

interface range f0/11-15

switchport mode access

switchport access vlan 20

exit

interface range f0/16-24

switchport mode access

switchport access vlan 30

exit

interface range g0/1-2

channel-group 2 mode active

exit

interface port-channel 2

switchport mode trunk

switchport nonegotiate

exit

interface range f0/5-6

channel-group 3 mode active

exit

interface port-channel 3

switchport mode trunk

switchport nonegotiate

end

copy running-config startup-config

#### Configure default gateway addresses on all hosts on the LANs.

Default gateway on **WS-1.1** and **WS-1.4**: **192.168.10.1**  
Default gateway on **WS-1.2** and **WS-1.5**: **192.168.20.1**  
Default gateway on **WS-1.3** and **WS-1.6**: **192.168.30.1**

Default gateway on **WS-2.1**: **192.168.40.1**  
Default gateway on **WS-2.2**: **192.168.50.1**  
Default gateway on **WS-2.3**: **192.168.60.1**

Default gateway on **Management PC**: **192.168.99.17**