

# A Study on Router access restriction on a VLAN Network

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## **Project Description:**

An organization uses a VLAN based network. There are 4 VLAN's on the network, namely VLAN 1, VLAN 2, VLAN 3 and VLAN 4. The VLAN'S are mapped with the IP networks 192.168.1.0/24, 192.168.2.0/24, 192.168.3.0/24, and 192.168.4.0/24. It is required that only VLAN A should be able to remote access the router using telnet. All the other VLAN's should be blocked. To demonstrate the solution a lab is set up with Cisco routers and switches with the topology simulated. The necessary configurations required to achieve the solution are identified.

## **Networking requirement:**

1. Network Design strategy.
2. VLAN and IP network Design.
3. Network Topology diagram.
4. Configurations required on switches, routers, and PC.

## **Network Design strategy:**

Unique VLAN's are assigned to the different departments. VLAN 1 is assigned to A, VLAN 2 is assigned to B, VLAN 3 is assigned to C and VLAN 4 is assigned to D. The VLAN's are mapped with unique network addresses. Appropriate configurations are performed on the router for communication between the

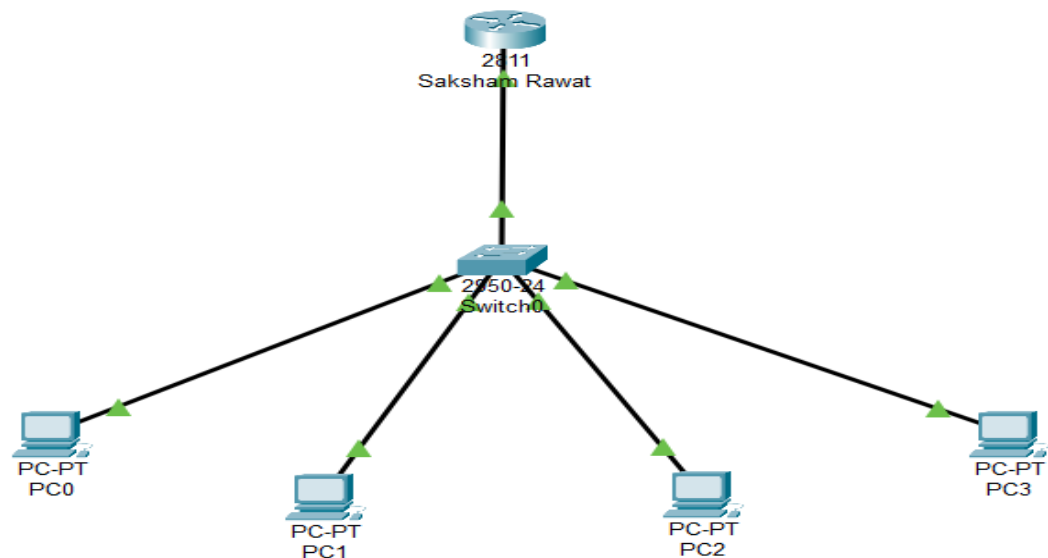
users belonging to the different departments (VLAN'S). Access control lists are used on VLAN'S to provide restrictions to the router.

### VLAN and IP Network Design

VLAN	Department	IP Network
VLAN 1	A	192.168.1.0/24
VLAN 2	B	192.168.2.0/24
VLAN 3	C	192.168.3.0/24
VLAN 4	D	192.168.4.0/24

The VLAN's are mapped with the network addresses as shown in the above table. The users (PC) belonging to the different department are configured with IP addresses belonging to the IP network address range as shown in the table.

### Network Topology Diagram:



# Network and System Integration

The PC's belonging to respective departments are configured with IP addresses belonging to the network address of the specific VLAN'S. The respective ports on the switches are made members of the appropriate VLAN's. A link is connected to the router from the switch, which is used for carrying traffic from different VLAN's and for Inter-VLAN communication.

## Configurations

### Switch configuration

**Create VLAN's on the switch with respective names.**

```
switch(config)#vlan 1
```

```
switch(config-vlan)#name A
```

```
switch(config-vlan)#exit
```

```
switch(config)#vlan 2
```

```
switch(config-vlan)#name B
```

```
switch(config-vlan)#exit
```

```
switch(config)#vlan 3
```

```
switch(config-vlan)#name C
```

```
switch(config-vlan)#exit
```

```
switch(config)#vlan 4
```

```
switch(config-vlan)#name D
```

```
switch(config-vlan)#exit
```

## **Create ports on the switch as members of different VLAN's**

The below configuration shows how Port 1 on the switch is made a member of VLAN 1.

```
switch(config)#interface fastethernet 0/1  
switch(config-if)#switchport mode access  
switch(config-if)#switchport access vlan 1  
switch(config-if)#exit
```

The below configuration shows how Port 5 on the switch is made a member of VLAN 2.

```
switch(config)#interface fastethernet 0/2  
switch(config-if)#switchport mode access  
switch(config-if)#switchport access vlan2  
switch(config-if)#exit
```

The below configuration shows how Port 6 on the switch is made a Member of VLAN 3.

```
switch(config)#interface fastethernet 0/3  
switch(config-if)#switchport mode access  
switch(config-if)#switchport access vlan3  
switch(config-if)#exit
```

The below configuration shows how Port 7 on the switch is made a member of VLAN 4.

```
switch(config)#interface fastethernet 0/4
```

```
switch(config-if)#switchport mode access
```

```
switch(config-if)#switchport access vlan4
```

```
switch(config-if)#exit
```

After the ports are made members of different VLAN's, the link connecting the switch to router is configured as a trunk port. The below configuration shows how to configure the port as a trunk. Port 8 on the switch is configured as a trunk port. The port would carry traffic from all the created VLAN's.

```
switch(config)#interface fastethernet 0/5
```

```
switch(config-if)#switchport mode trunk
```

```
switch(config-if)#switchport trunk allowed vlan all
```

```
switch(config-if)#exit
```

## **Router Configurations:**

### **Configure VLAN's with respective IP addresses**

Configures a sub interface on the physical interface fast Ethernet 0/1. The sub interface is created with the IP address 192.168.1.1. The interface is mapped with VLAN 1 and would be the gateway address for users belonging to VLAN 1. The configuration detail is shown below

```
router(config)#interface fast Ethernet 0/0.1
```

```
router(config-subif)#encapsulation dot1Q 1
```

```
router(config-subif)#ip address 192.168.1.1 255.255.255.0
```

```
router(config-subif)#no shutdown
```

```
router(config-subif)#exit
```

Configures a sub interface on the physical interface fast Ethernet 0/1. The sub interface is created with the IP address 192.168.2.1. The interface is mapped with VLAN 2 and would be the gateway address for users belonging to VLAN 2. The configuration detail is shown below

```
router(config)#interface fast Ethernet 0/0.2
router(config-subif)#encapsulation dot1Q 2
router(config-subif)#ip address 192.168.2.1 255.255.255.0
router(config-subif)#no shutdown
router(config-subif)#exit
```

Configures a sub interface on the physical interface fast Ethernet 0/1. The sub interface is created with the IP address 192.168.3.1. The interface is mapped with VLAN 3 and would be the gateway address for users belonging to VLAN 3. The configuration detail is shown below

```
router(config)#interface fastethernet 0/0.3
router(config-subif)#encapsulation dot1Q 3
router(config-subif)#ip address 192.168.3.1 255.255.255.0
router(config-subif)#no shutdown
```

Configures a sub interface on the physical interface fast Ethernet 0/1. The sub interface is created with the IP address 192.168.4.1. The interface is mapped with VLAN 4 and would be the gateway address for users belonging to VLAN 4. The configuration detail is shown below

```
router(config)#interface fastethernet 0/0.4
router(config-subif)#encapsulation dot1Q 4
```

```
router(config-subif)#ip address 192.168.4.1 255.255.255.0
router(config-subif)#no shutdown
router(config-subif)#exit
```

## **Telnet configuration on router:**

```
Router(config)# line vty 0 4 Router(config-line)# password cisco
Router (config)# enable password cisco (Configure enable password)
```

## **Access restriction to telnet:**

Create a standard ACL which would allow traffic from VLAN 4 (192.168.4.0 network)

```
Router(config)#access-list 1 permit 192.168.4.0 0.0.0.255.
```

Apply the ACL on the telnet interface Router(config)#line vty 0 4

```
Router(config-line)#access-class 1 in (1 is the access list number created
above)
```

The above configuration would ensure that only VLAN 4, which is the IT department can telnet to the router.

## PC Configuration:

PC	IP address	Switch Port
PC1 (A)	192.168.1.2	1
PC2 (B)	192.168.1.3	2
PC3 (C)	192.168.2.2	3
PC4 (D)	192.168.2.3	4

The gateway for the PC's are configured as the respective VLAN IP addresses configured on the router, as shown in the topology diagram.



