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SAP ID: 37520

Course: Network Security

Submitted to: Mr. Tajamul Shahzad

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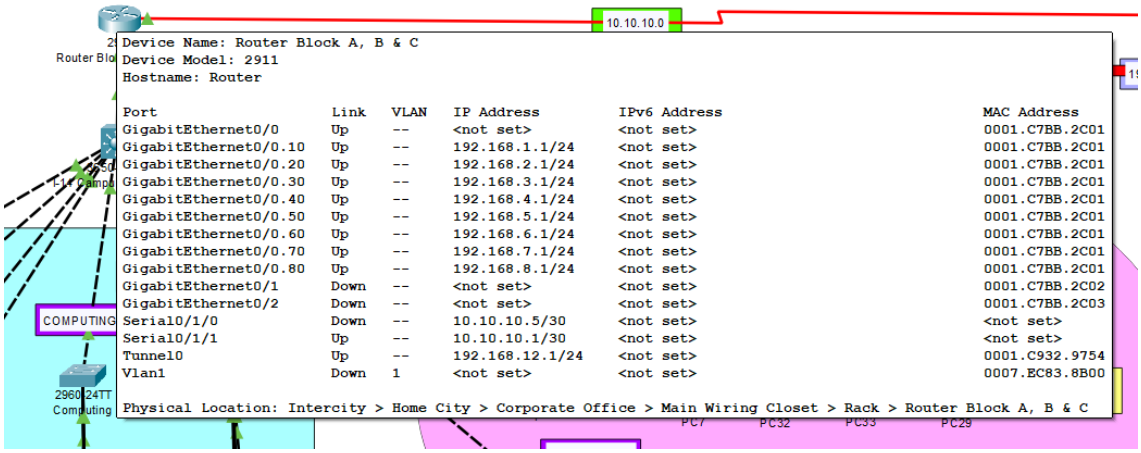
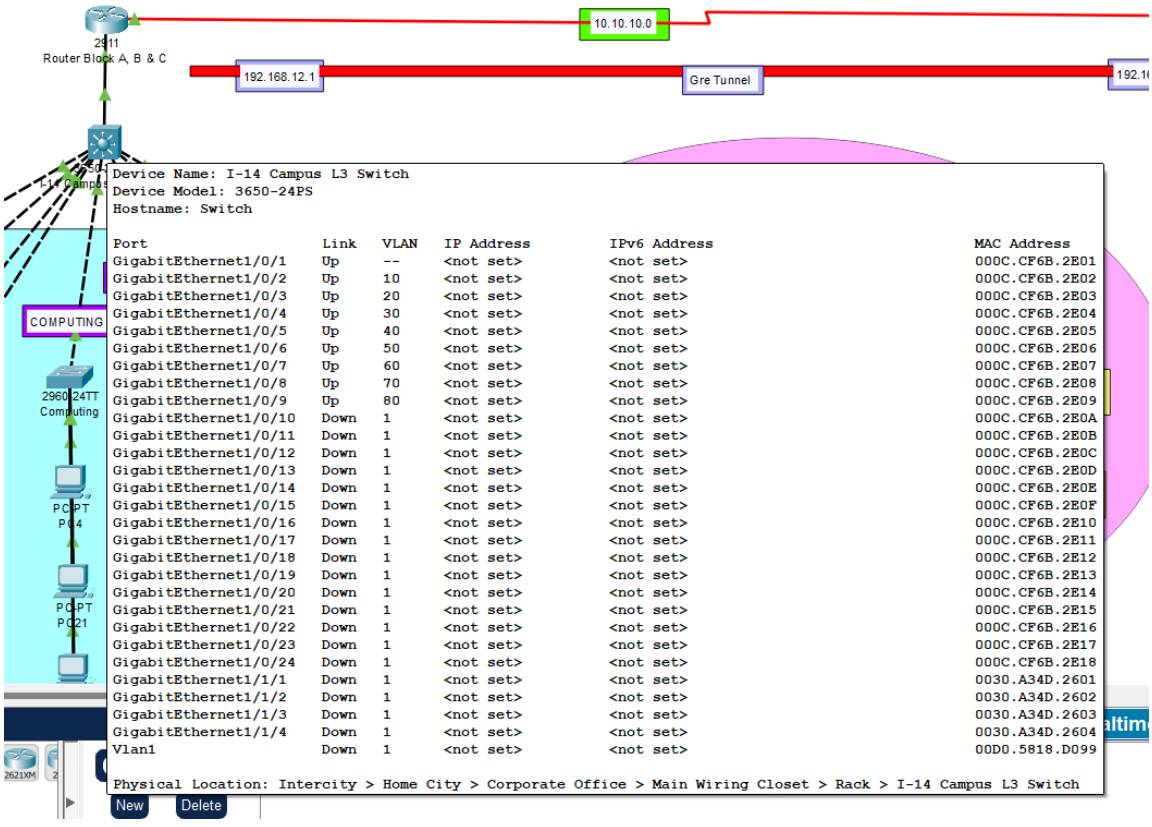
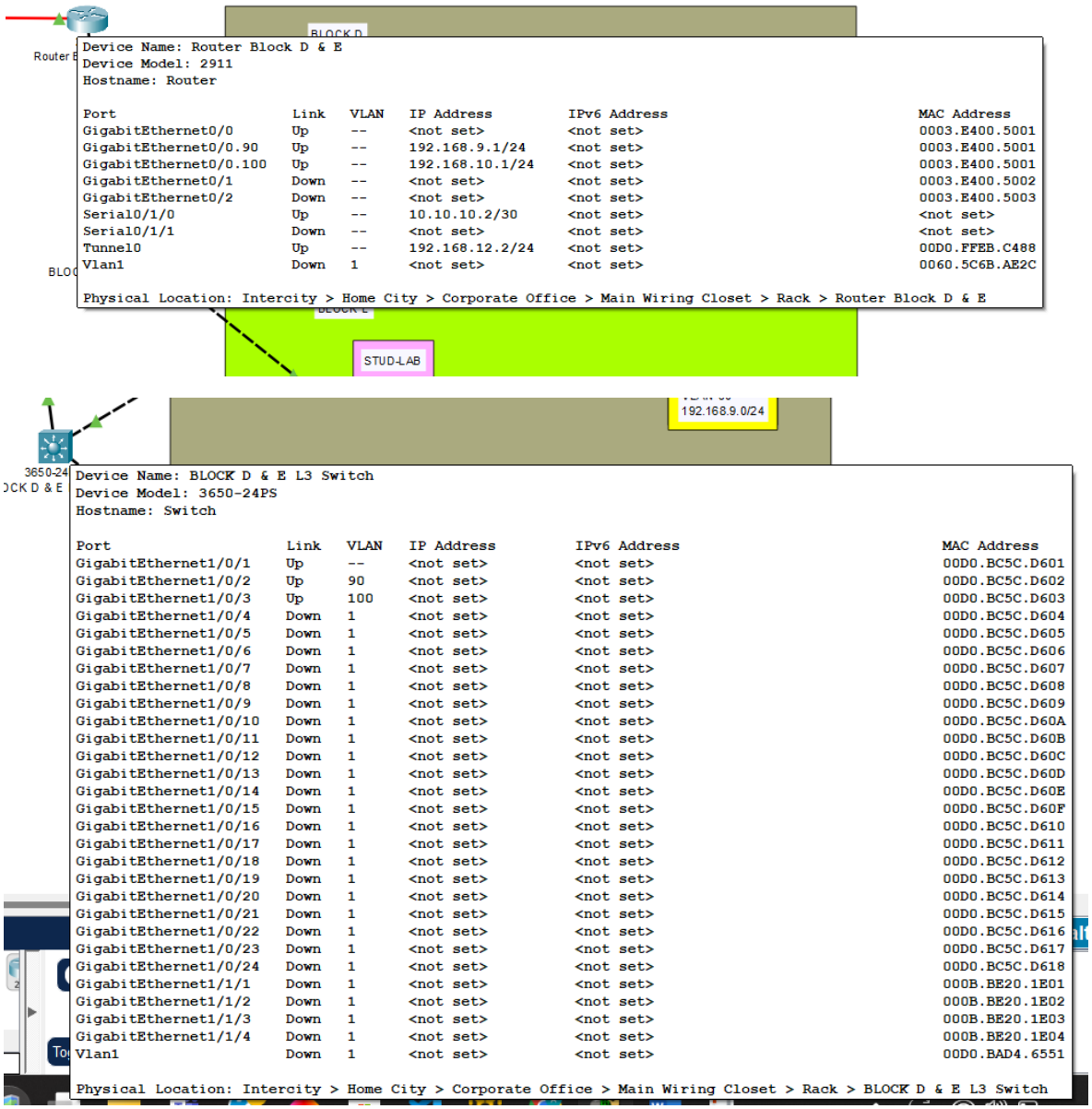
Enhanced Campus Networking System

Introduction

The Enhanced Campus Networking System project aims to establish a robust and efficient network infrastructure for a campus. The project uses two routers, two Layer 3 (L3) switches, ten 2960 switches, multiple PCs, and two servers. Key technologies implemented include VLANs (Virtual Local Area Networks), DHCP (Dynamic Host Configuration Protocol), GRE (Generic Routing Encapsulation) tunnels and ACL (Access Control Lists).







Device Name: Router Block D & E
Device Model: 2911
Hostname: Router

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
GigabitEthernet0/0	Up	--	<not set>	<not set>	0003.E400.5001
GigabitEthernet0/0.90	Up	--	192.168.9.1/24	<not set>	0003.E400.5001
GigabitEthernet0/0.100	Up	--	192.168.10.1/24	<not set>	0003.E400.5001
GigabitEthernet0/1	Down	--	<not set>	<not set>	0003.E400.5002
GigabitEthernet0/2	Down	--	<not set>	<not set>	0003.E400.5003
Serial0/1/0	Up	--	10.10.10.2/30	<not set>	<not set>
Serial0/1/1	Down	--	<not set>	<not set>	<not set>
Tunnel0	Up	--	192.168.12.2/24	<not set>	00D0.FFEB.C488
Vlan1	Down	1	<not set>	<not set>	0060.5C6B.AE2C

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Router Block D & E

Device Name: BLOCK D & E L3 Switch
Device Model: 3650-24PS
Hostname: Switch

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
GigabitEthernet1/0/1	Up	--	<not set>	<not set>	00D0.BC5C.D601
GigabitEthernet1/0/2	Up	90	<not set>	<not set>	00D0.BC5C.D602
GigabitEthernet1/0/3	Up	100	<not set>	<not set>	00D0.BC5C.D603
GigabitEthernet1/0/4	Down	1	<not set>	<not set>	00D0.BC5C.D604
GigabitEthernet1/0/5	Down	1	<not set>	<not set>	00D0.BC5C.D605
GigabitEthernet1/0/6	Down	1	<not set>	<not set>	00D0.BC5C.D606
GigabitEthernet1/0/7	Down	1	<not set>	<not set>	00D0.BC5C.D607
GigabitEthernet1/0/8	Down	1	<not set>	<not set>	00D0.BC5C.D608
GigabitEthernet1/0/9	Down	1	<not set>	<not set>	00D0.BC5C.D609
GigabitEthernet1/0/10	Down	1	<not set>	<not set>	00D0.BC5C.D60A
GigabitEthernet1/0/11	Down	1	<not set>	<not set>	00D0.BC5C.D60B
GigabitEthernet1/0/12	Down	1	<not set>	<not set>	00D0.BC5C.D60C
GigabitEthernet1/0/13	Down	1	<not set>	<not set>	00D0.BC5C.D60D
GigabitEthernet1/0/14	Down	1	<not set>	<not set>	00D0.BC5C.D60E
GigabitEthernet1/0/15	Down	1	<not set>	<not set>	00D0.BC5C.D60F
GigabitEthernet1/0/16	Down	1	<not set>	<not set>	00D0.BC5C.D610
GigabitEthernet1/0/17	Down	1	<not set>	<not set>	00D0.BC5C.D611
GigabitEthernet1/0/18	Down	1	<not set>	<not set>	00D0.BC5C.D612
GigabitEthernet1/0/19	Down	1	<not set>	<not set>	00D0.BC5C.D613
GigabitEthernet1/0/20	Down	1	<not set>	<not set>	00D0.BC5C.D614
GigabitEthernet1/0/21	Down	1	<not set>	<not set>	00D0.BC5C.D615
GigabitEthernet1/0/22	Down	1	<not set>	<not set>	00D0.BC5C.D616
GigabitEthernet1/0/23	Down	1	<not set>	<not set>	00D0.BC5C.D617
GigabitEthernet1/0/24	Down	1	<not set>	<not set>	00D0.BC5C.D618
GigabitEthernet1/1/1	Down	1	<not set>	<not set>	000B.BE20.1E01
GigabitEthernet1/1/2	Down	1	<not set>	<not set>	000B.BE20.1E02
GigabitEthernet1/1/3	Down	1	<not set>	<not set>	000B.BE20.1E03
GigabitEthernet1/1/4	Down	1	<not set>	<not set>	000B.BE20.1E04
Vlan1	Down	1	<not set>	<not set>	00D0.BAD4.6551

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > BLOCK D & E L3 Switch

Network Design Overview

The network is segmented into five blocks: A, B, C, D, and E. Each block has its own VLANs to segregate traffic efficiently. A GRE tunnel is used to encapsulate traffic between the two routers managing these blocks.

- **Block A**
- **Departments:** Admin, HR, Finance, Help Desk
- **VLANs:**

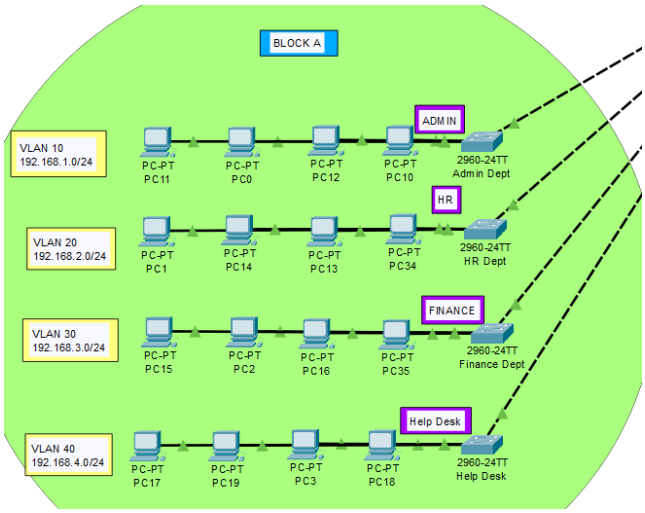
  VLAN 10 (192.168.1.0/24) - Admin Dept

  VLAN 20 (192.168.2.0/24) - HR Dept

  VLAN 30 (192.168.3.0/24) - Finance Dept

  VLAN 40 (192.168.4.0/24) - Help Desk

- **Switches:** Four 2960-24TT switches connected to an L3 switch, which uplinks to Router 2911.

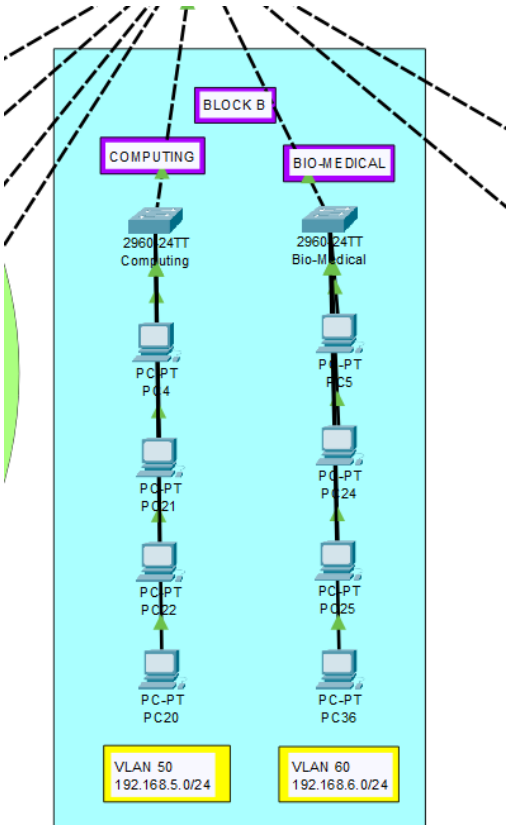


- **Block B**
- **Departments:** Computing, Bio-Medical
- **VLANs:**

  VLAN 50 (192.168.5.0/24) - Computing

  VLAN 60 (192.168.6.0/24) - Bio-Medical

- **Switches:** Two 2960-24TT switches connected to an L3 switch, which **uplinks to Router 2911.**

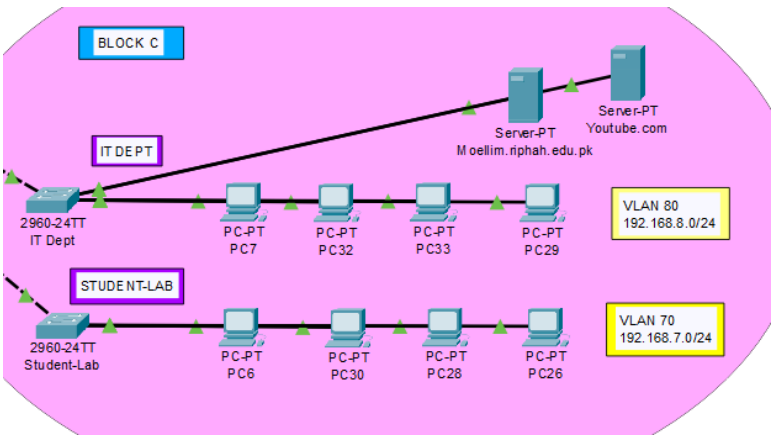


- **Block C**
- **Departments:** IT Department, Student Lab
- **VLANs:**

  VLAN 70 (192.168.7.0/24) - IT Dept

  VLAN 80 (192.168.8.0/24) - Student Lab

- **Servers:** Web Server and DNS Server
- **Switches:** Two 2960-24TT switches connected to an L3 switch, which uplinks to Router 2911.



- **Block D**
- **Department:** Staff
- **VLANs:**

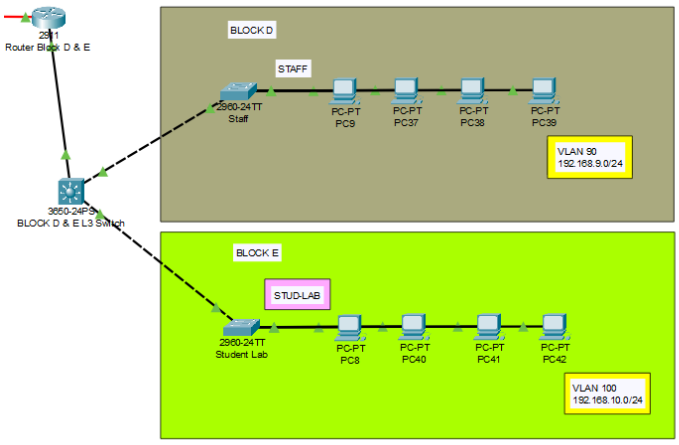
  VLAN 90 (192.168.9.0/24)

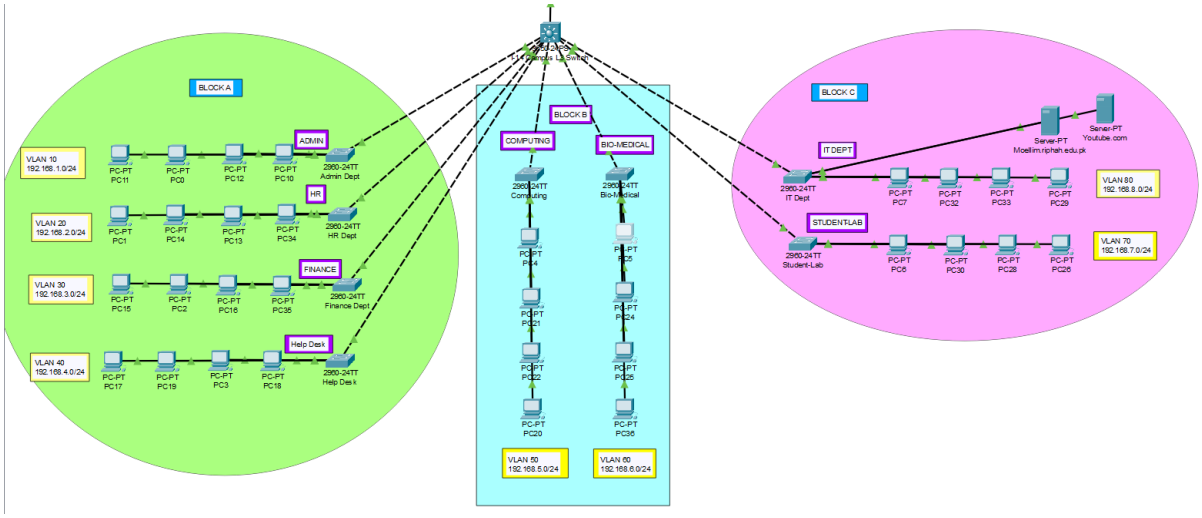
- **Switches:** One 2960-24TT switch connected to an L3 switch, which uplinks to Router 2911.

- **Block E**
- **Department:** Student Lab
- **VLANs:**

  VLAN 100 (192.168.10.0/24)

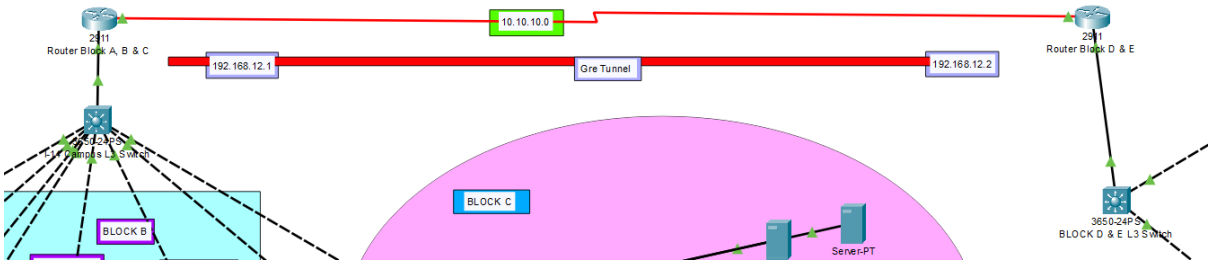
- **Switches:** One 2960-24TT switch connected to an L3 switch, which uplinks to Router 2911.





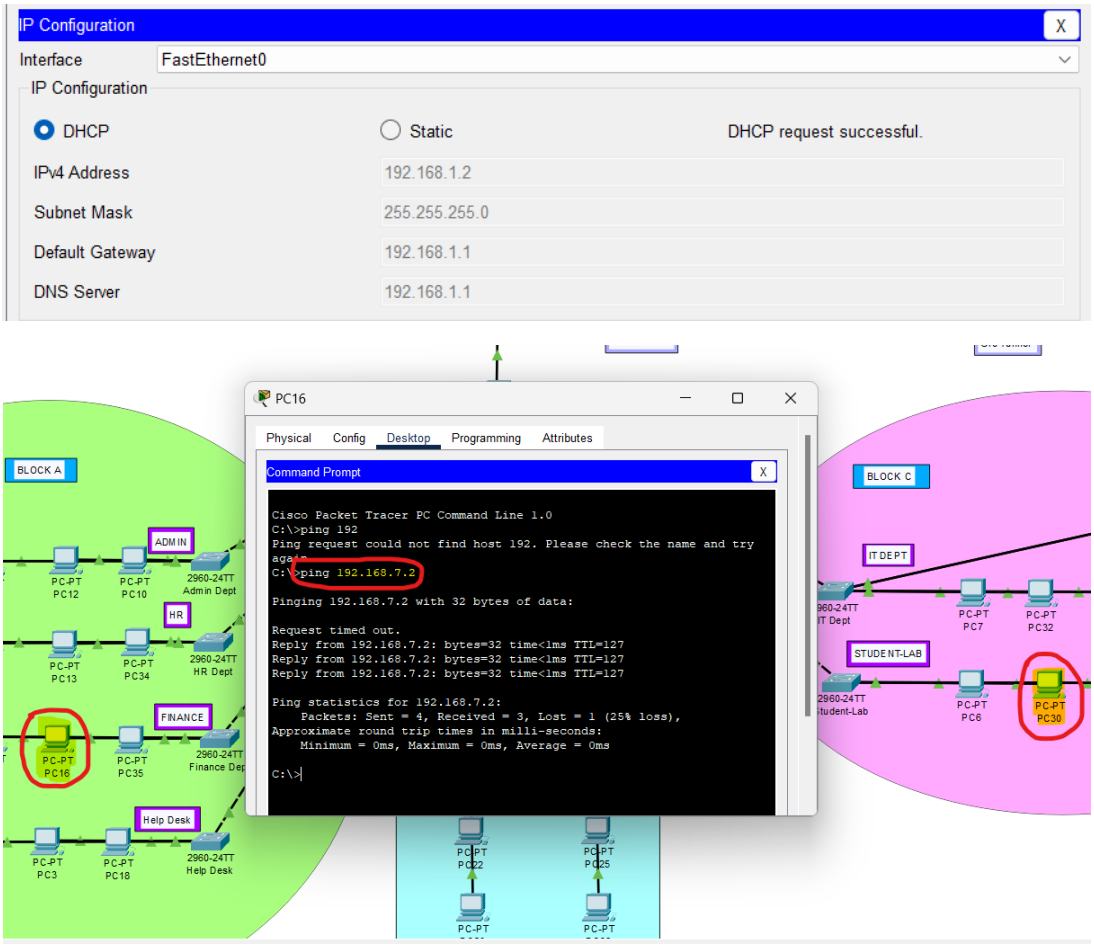
GRE Tunnel Configuration

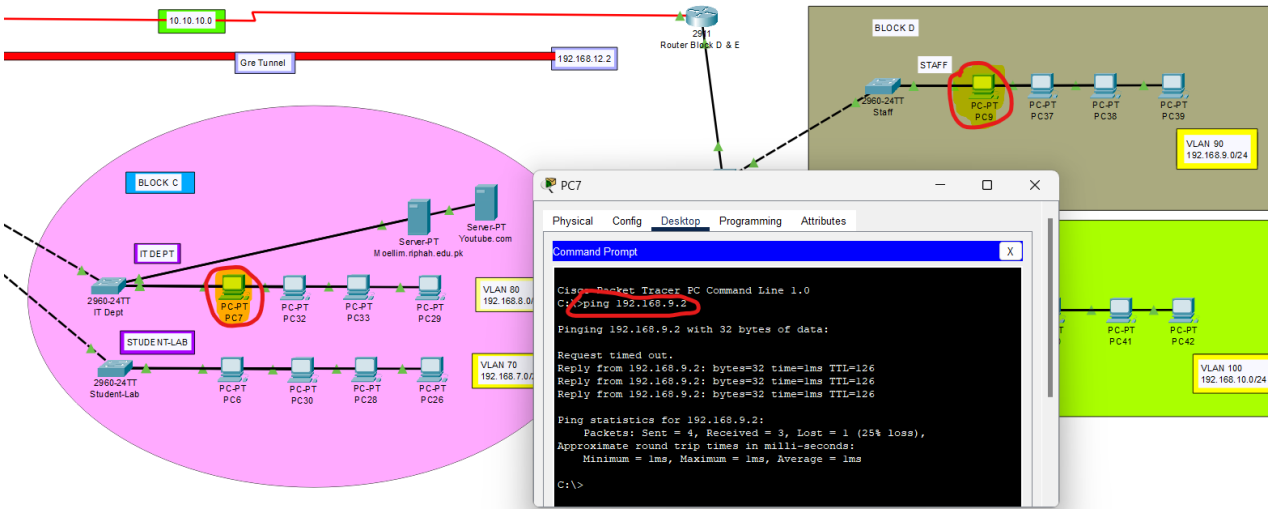
To ensure secure and efficient inter-router communication, a GRE tunnel is established between Router 2911 (Block A, B, C) and Router 2911 (Block D, E).



DHCP Configuration

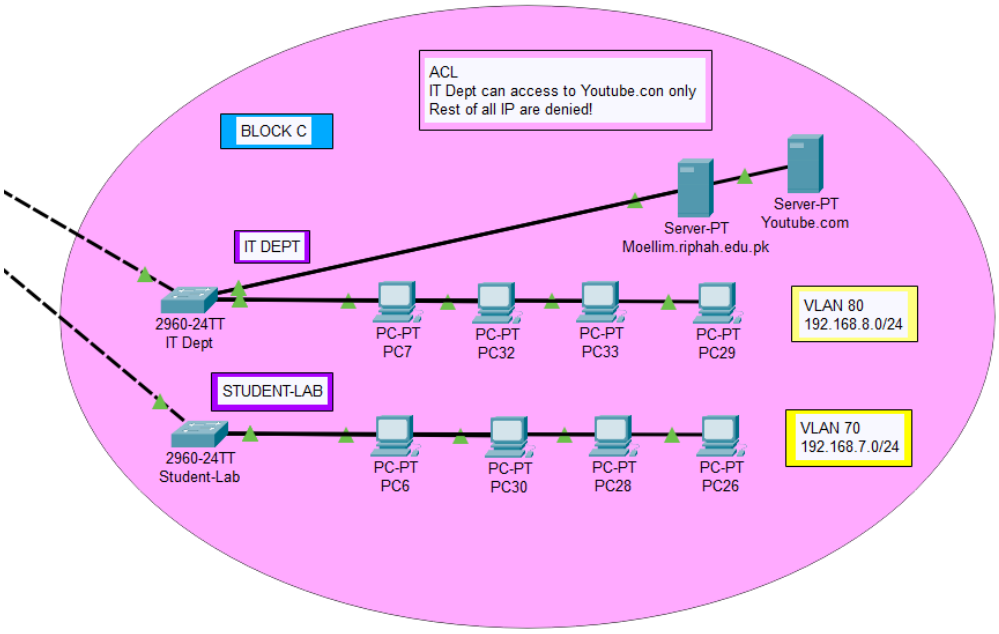
Each VLAN is assigned a DHCP pool for dynamic IP address allocation, ensuring devices can join the network seamlessly.

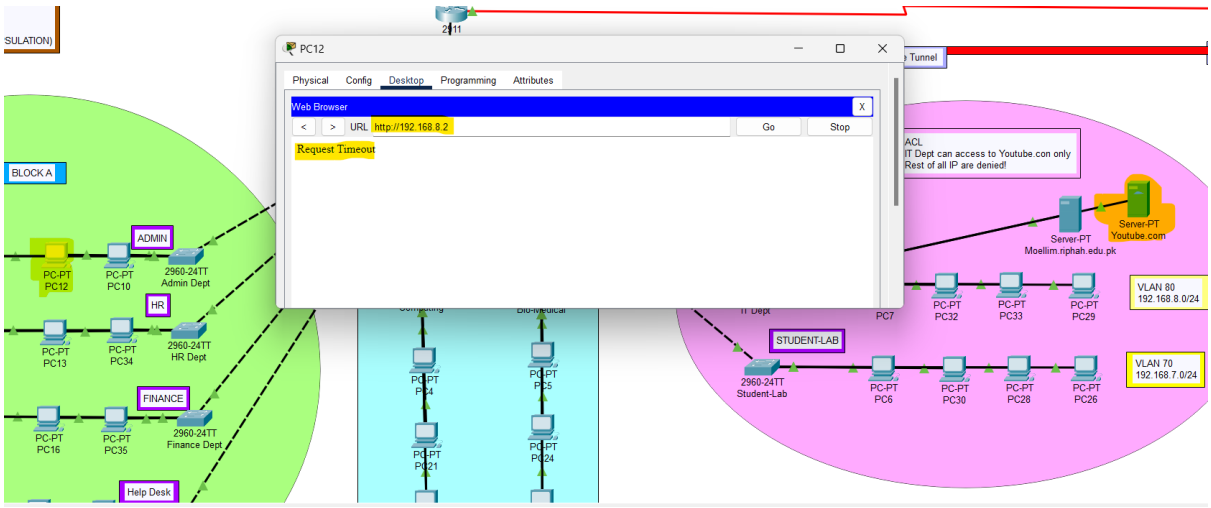


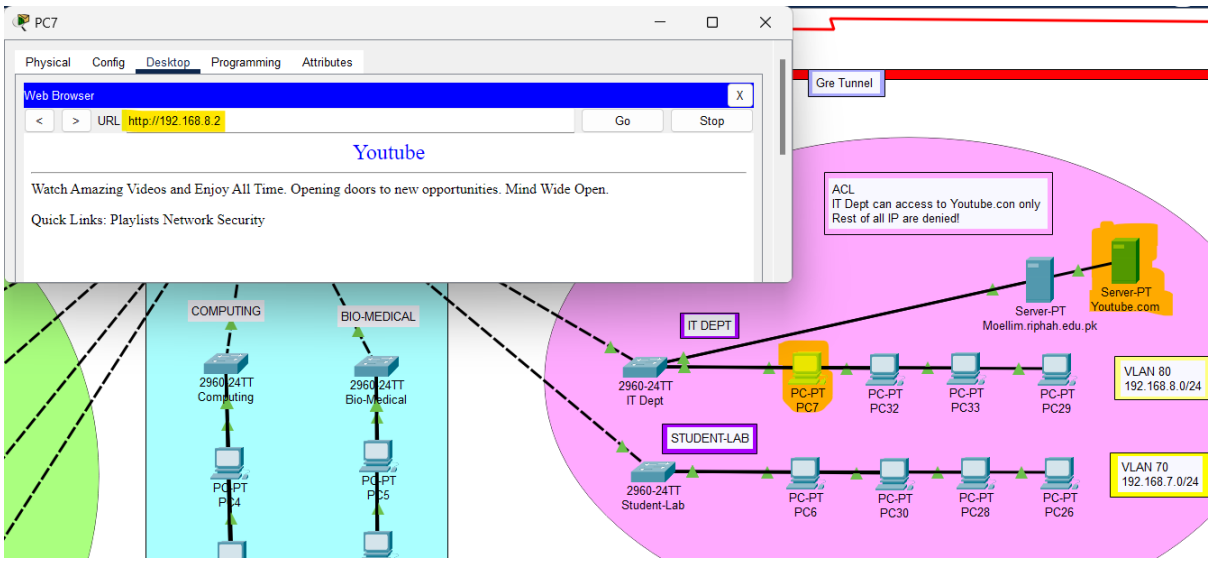


Access Control List (ACL) Configuration

Access Control Lists (ACLs) are a set of rules used to control network traffic and to secure networks by filtering traffic based on various criteria. ACLs can be used to permit or deny traffic based on IP addresses, protocols, ports, and other criteria. They are essential for managing traffic in routers and switches, enforcing security policies, and controlling access to network resources.




PC12
Physical
Config
Desktop
Programming
Attributes
Web Browser
URL
http://192.168.8.2
Go
Stop
Request Timeout
BLOCK A
ADMIN
HR
FINANCE
Help Desk
2960-24TT
Admin Dept
2960-24TT
HR Dept
2960-24TT
Finance Dept
PC-PT
PC12
PC-PT
PC10
PC-PT
PC13
PC-PT
PC34
PC-PT
PC16
PC-PT
PC35
Gre Tunnel
ACL
IT Dept can access to Youtube.con only
Rest of all IP are denied!
Server-PT
Youtube.com
Server-PT
Moellim.riphah.edu.pk
VLAN 80
192.168.8.0/24
VLAN 70
192.168.7.0/24
STUDENT-LAB
2960-24TT
Student-Lab
PC-PT
PC7
PC-PT
PC32
PC-PT
PC33
PC-PT
PC29
PC-PT
PC6
PC-PT
PC30
PC-PT
PC28
PC-PT
PC26
PC-PT
PC24
PC-PT
PC25
PC-PT
PC21


PC7
Physical
Config
Desktop
Programming
Attributes
Web Browser
URL
http://192.168.8.2
Go
Stop
Youtube
Watch Amazing Videos and Enjoy All Time. Opening doors to new opportunities. Mind Wide Open.
Quick Links: Playlists Network Security
COMPUTING
BIO-MEDICAL
2960-24TT
Computing
2960-24TT
Bio-Medical
PC-PT
PC24
PC-PT
PC25
Gre Tunnel
ACL
IT Dept can access to Youtube.con only
Rest of all IP are denied!
Server-PT
Youtube.com
Server-PT
Moellim.riphah.edu.pk
IT DEPT
2960-24TT
IT Dept
PC-PT
PC7
PC-PT
PC32
PC-PT
PC33
PC-PT
PC29
VLAN 80
192.168.8.0/24
STUDENT-LAB
2960-24TT
Student-Lab
PC-PT
PC6
PC-PT
PC30
PC-PT
PC28
PC-PT
PC26
VLAN 70
192.168.7.0/24