

Department of Electronic and Telecommunication Engineering
University of Moratuwa



EN2150 - Communication Network Engineering

NETWORK ROUTING SIMULATION - OSPF

GROUP-TEAM MINI

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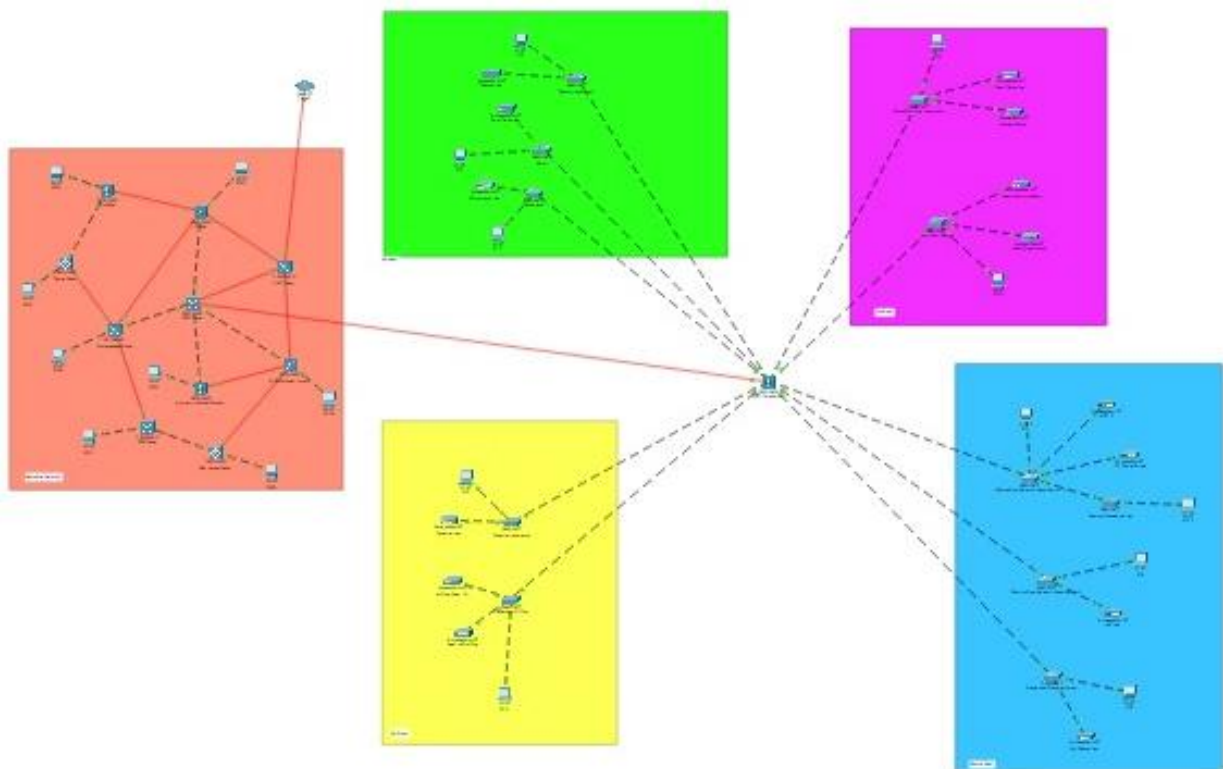
Abstract

This report presents a comprehensive design for the backbone network of the University of Moratuwa (UOM) and the internal network of the ENTC building. The focus of this design encompasses the routing plan, OSPF configuration, and simulations to ensure an efficient and resilient network infrastructure.

The allocated task involves the creation of a routing configuration for the backbone network, employing the OSPF (Open Shortest Path First) protocol. OSPF is preferred due to its capacity to offer redundancy and dynamic routing updates. To showcase different network scenarios, simulations are performed, highlighting the routing paths taken by network sessions accessing the Learning Management System (LMS) servers in the university data center.

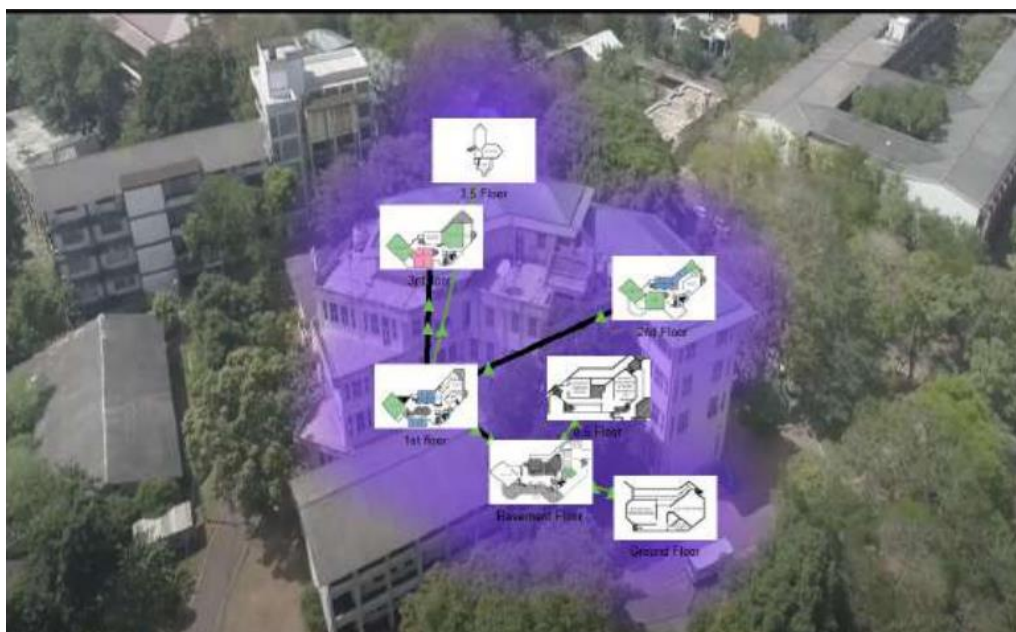
Throughout the project, meticulous attention is given to the IP addressing plan, ensuring efficient allocation of IP blocks and smooth functioning of the network. The results showcase the effectiveness of the OSPF-based routing configuration in providing redundancy and dynamic routing updates, enabling seamless communication between various departments and the university data center.

3.1 The backbone network for University of Moratuwa



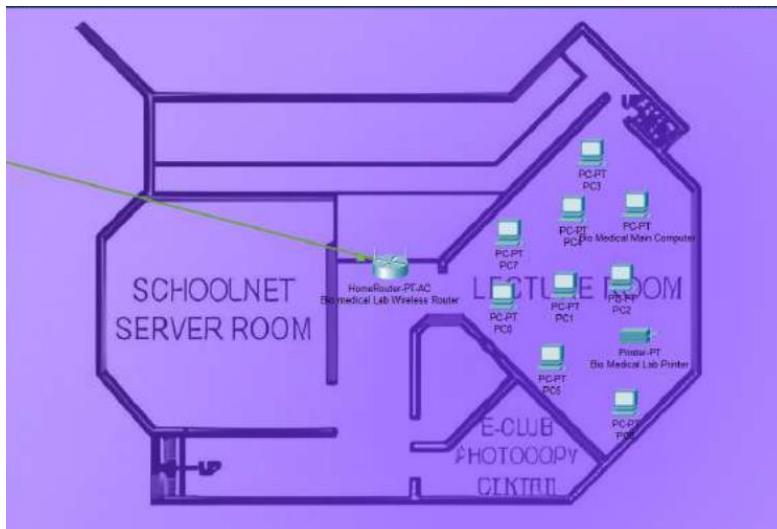
3.2 The internal network of ENTC Building

3.2.1 Overall Network Structure

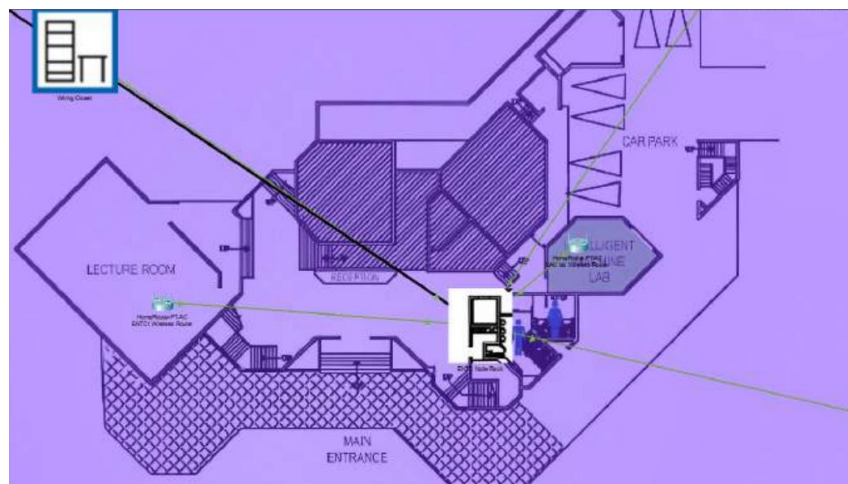


3.2.2 Internal Network Structure of ENTC Department

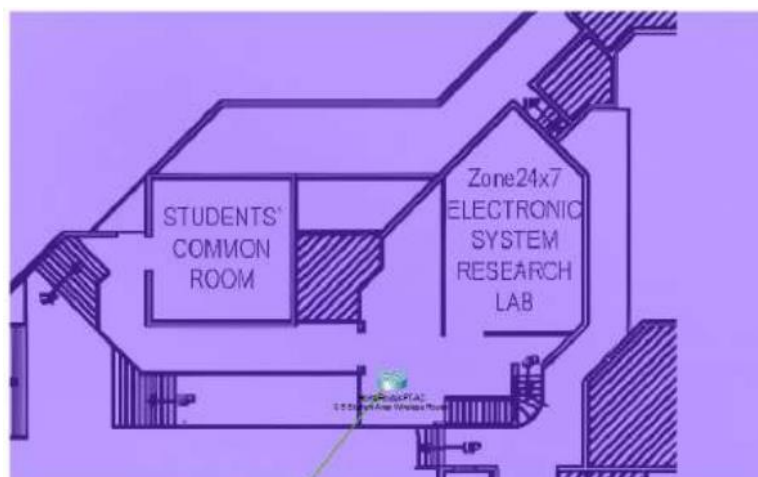
- View of Ground floor



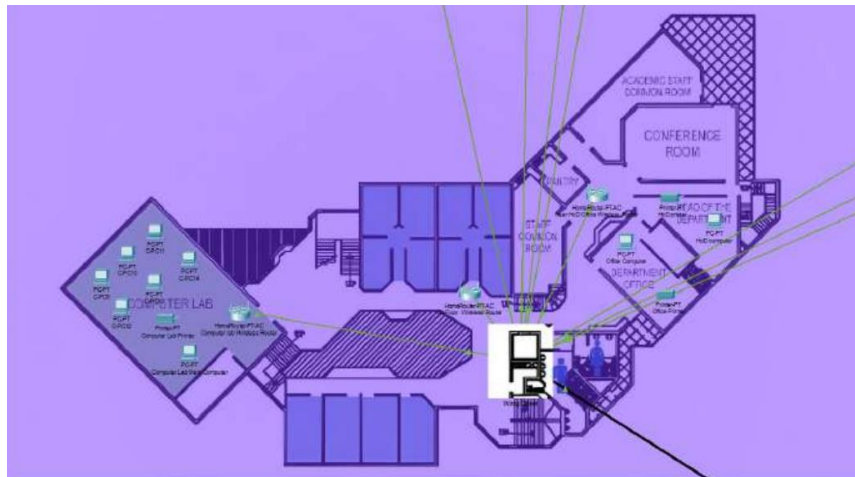
- View of Ground floor



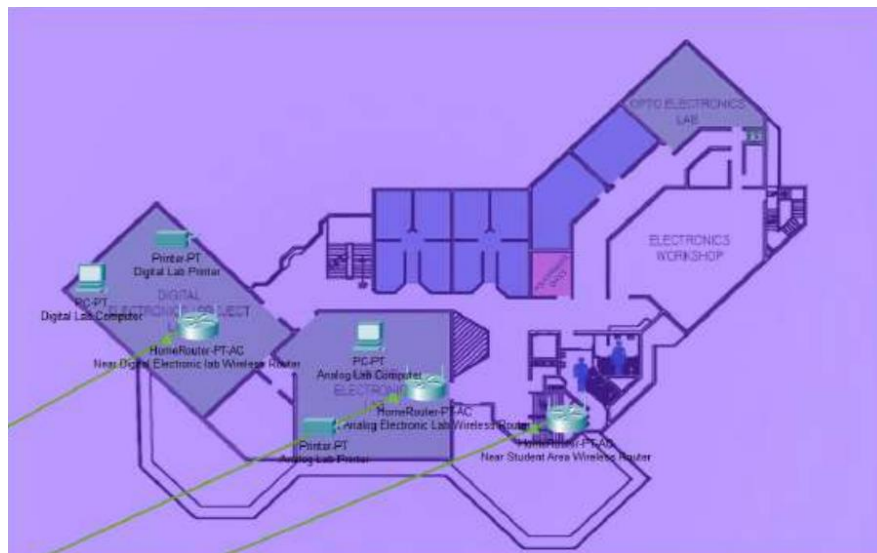
- View of 0.5 floor



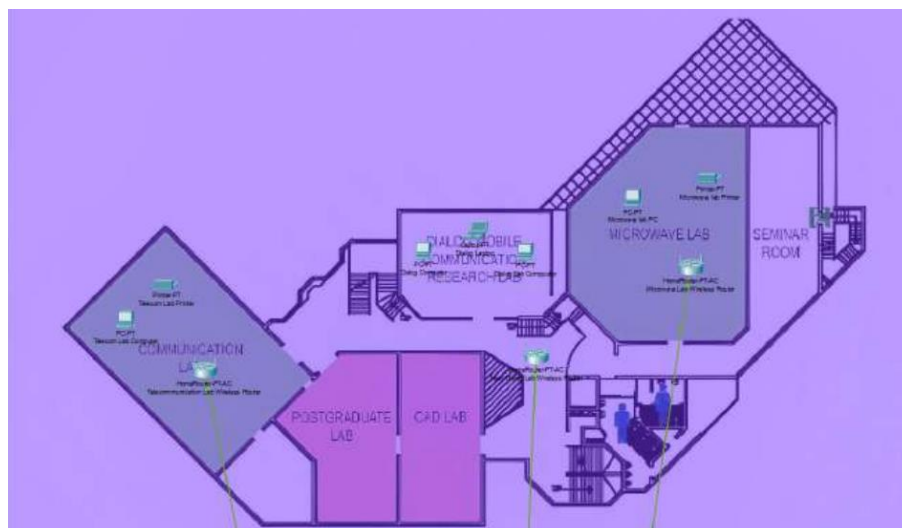
- View of first floor



- View of second floor



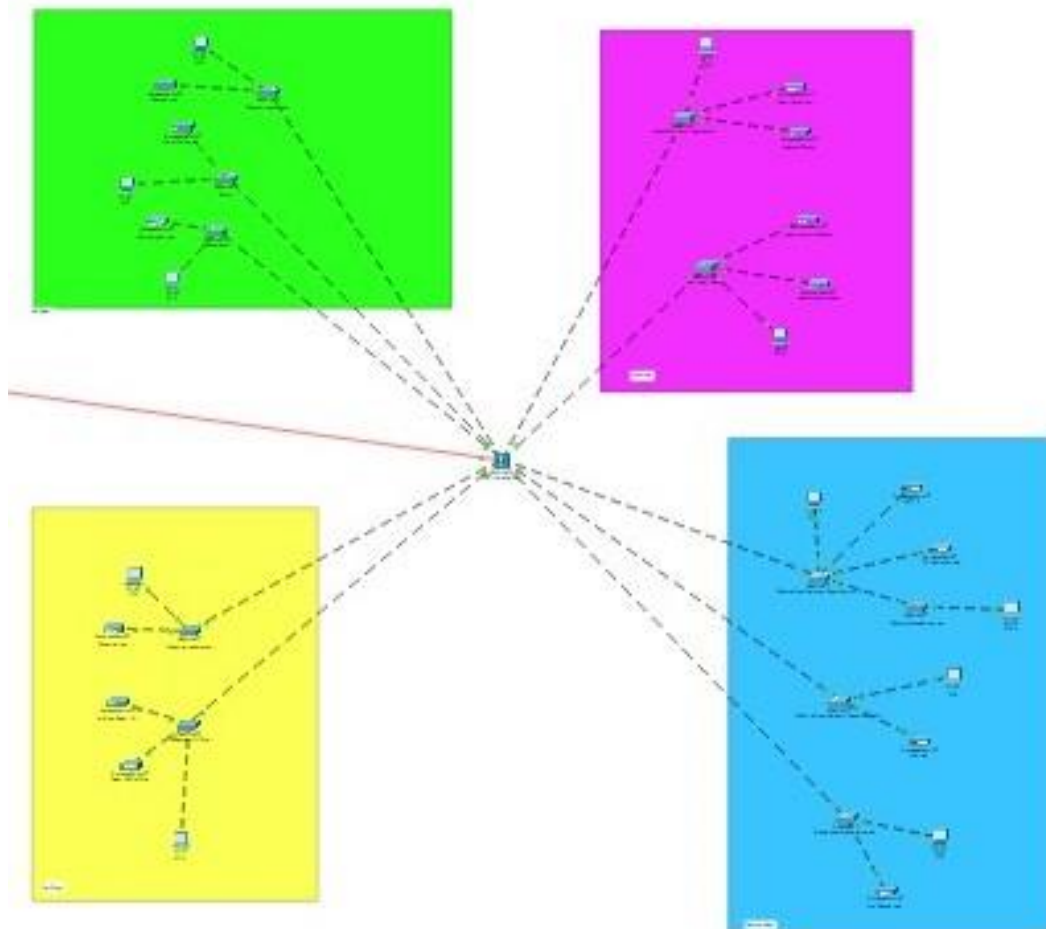
- View of Third floor



- View of 3.5 floor



3.2.3 The backbone network of ENTC building.



4. DEPARTMENT/DIVISION IP ADDRESSING SCHEME FOR NETWORK

4.1 IP address Allocation of Backbone Network

No	Building	No of Users	Subnet Mask	IP range
1	Admin+Library	2045	255.255.248.0	10.10.20.2-10.10.28.255
2	ENTC	509	255.255.254.0	10.10.18.2-10.10.19.255
3	Sumanadasa	1021	255.255.252.0	10.10.24.2-10.10.25.255
4	ERE	509	255.255.254.0	10.10.26.2-10.10.27.255
5	Civil	509	255.255.254.0	10.10.28.2-10.10.29.255
6	Mechanical	509	255.255.254.0	10.10.22.2-10.10.23.255
7	Textile	509	255.255.254.0	10.10.30.2-10.10.31.255
8	IT	509	255.255.254.0	10.10.14.2-10.10.15.255
9	Archi Steel Building	1021	255.255.252.0	10.10.16.2-10.10.19.255

5. THE ROUTING CONFIGURATION FOR THE BACKBONE NETWORK

a.

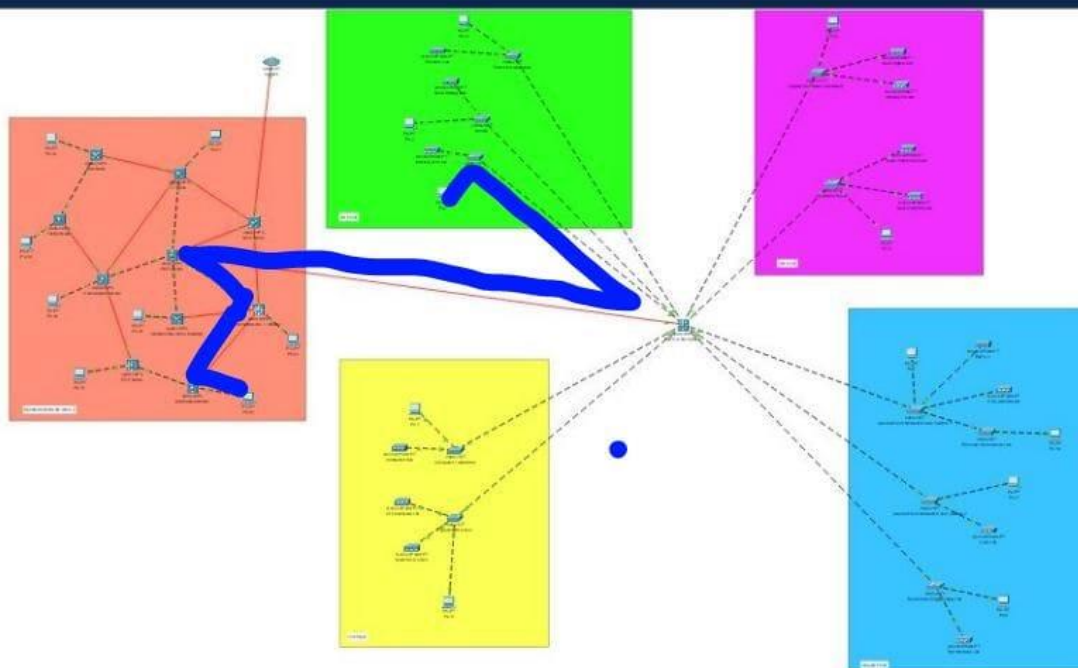
```
R3#show ip route
```

```
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2
        i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
        ia - IS-IS inter area, * - candidate default, U - per-user static route
        o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
        a - application route
        + - replicated route, % - next hop override, p - overrides from PfR
```

```
Gateway of last resort is not set
```

```
10.0.0.0/24 is subnetted, 2 subnets
D EX 10.1.1.0 [170/3072] via 203.0.113.1, 00:25:55, GigabitEthernet0/1
D EX 10.2.2.0 [170/3072] via 203.0.113.1, 00:25:55, GigabitEthernet0/1
D EX 192.0.2.0/24 [170/3072] via 203.0.113.1, 00:25:55, GigabitEthernet0/1
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/2
L 192.168.1.1/32 is directly connected, GigabitEthernet0/2
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.2.0/24 is directly connected, GigabitEthernet0/3
L 192.168.2.1/32 is directly connected, GigabitEthernet0/3
203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C 203.0.113.0/24 is directly connected, GigabitEthernet0/1
L 203.0.113.2/32 is directly connected, GigabitEthernet0/1
R3#
```

b.



ENTC Node

Physical Config CLI Attributes

IOS Command Line Interface

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 18 subnets, 4 masks

```

O    10.10.0.0/28 [110/2] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
C    10.10.32.0/22 is directly connected, GigabitEthernet1/0/1
C    10.10.36.0/24 is directly connected, GigabitEthernet1/0/2
C    10.10.37.0/24 is directly connected, GigabitEthernet1/0/3
O → 10.10.48.0/22 [110/3] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
C    10.10.76.4/30 is directly connected, GigabitEthernet1/0/4
O    10.10.76.8/30 [110/2] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
C    10.10.76.12/30 is directly connected, GigabitEthernet1/0/6
C    10.10.76.16/30 is directly connected, GigabitEthernet1/0/5
O    10.10.76.20/30 [110/2] via 10.10.76.14, 00:06:22, GigabitEthernet1/0/6
O    10.10.76.24/30 [110/3] via 10.10.76.14, 00:06:22, GigabitEthernet1/0/6
O    10.10.76.28/30 [110/3] via 10.10.76.34, 00:06:22, GigabitEthernet1/0/7
C    10.10.76.32/30 is directly connected, GigabitEthernet1/0/7
O    10.10.76.36/30 [110/2] via 10.10.76.34, 00:02:15, GigabitEthernet1/0/7
    [110/2] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
O    10.10.76.40/30 [110/2] via 10.10.76.34, 00:06:22, GigabitEthernet1/0/7
O    10.10.76.44/30 [110/3] via 10.10.76.34, 00:02:15, GigabitEthernet1/0/7
    [110/3] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
O    10.10.76.48/30 [110/2] via 10.10.76.18, 00:02:15, GigabitEthernet1/0/5
O    10.10.76.52/30 [110/2] via 10.10.76.34, 00:06:22, GigabitEthernet1/0/7
  
```

Switch#

C.

