PARTNERSHIP WITH PLYMOUTH UNIVERSITY

Name
Student Reference Number:

Module Code: CNET237SL	Module Name: COMPUTER NETWORKS

Coursework Title: **Disaster Management System**

Deadline Date:	Member of staff responsible for coursework: Mr.Saliya Patabandi

Programme:

Please note that University Academic Regulations are available under Rules and Regulations on the University website www.plymouth.ac.uk/studenthandbook.

Group work: please list all names of all participants formally associated with this work and state whether the work was undertaken alone or as part of a team. Please note you may be required to identify individual responsibility for component parts.

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We confirm that we have read and understood the Plymouth University regulations relating to Assessment Offences and that we are aware of the possible penalties for any breach of these regulations. We confirm that this is the independent work of the group.

Signed on behalf of the group: _____

Senila Lakith Udara Muthugala

Individual assignment: ***I confirm that I have read and understood the Plymouth University regulations relating to Assessment Offences and that I am aware of the possible penalties for any breach of these regulations. I confirm that this is my own independent work.***

Signed:

Use of translation software: failure to declare that translation software or a similar writing aid has been used will be treated as an assessment offence.

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Overall mark _____% **Assessors Initials _____** **Date_____**

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Introduction.

Our solution for “NSCS” university includes different type of technologies. For an example we use “EIGRP” as our routing protocol , which brings lots of benefits to our network solutions. As well we use VLAN technologies without using physical LANS everywhere. We use regency protocols like HSRP. Also we have used VLAN trucking protocol. Also we use VLSM for subnetting.

Table of Contents

(BOM IS INCLUDED IN EXEL FILE)

BOM including all necessary equipment and materials to build the network.

(BOM is included with the EXEL file and it also displays in below tables with screen shots)

Brand / Model				Cabling	Cyberpower	Cisco Cat6 Patch Panel		Cisco Catalyst 2960-L Switch		Cisco WAP371 Wireless	Cisco 2900 Series	Cisco Catalyst 3560 Series		
Building/Branch	Copper ports	ystone jack per bran	double Face plate Per Branch	Wall MountNetwork Rack	UPS	Patch Panel 24 port	Patch Panel 48port	Switch 24 port	Switch 48 port	Acess point	Router	Multy layer switch	RJ45	Sunbox
School of computing														
Lab1	50	50	25										400	25
Lab2	50	50	25	21U	1KV	1	3						400	25
Lab3	50	50	25										400	25
Lab4	50	50	25										400	25
Lab5	50	50	25	21U	1KV	1	3	3	6				400	25
Lab6	50	50	25										400	25
Lab7	20	20	10							1	0	0	400	10
Lab8	20	20	10	12U	1KV	0	1						80	10
Lectures Rooms	15	15	8										60	8
Head of departments rc	5	5	3										20	3
Program admin	8	8	4	21U	1KV	0	1	0	1				32	4
Dean's office	11	11	6										44	6
School of Business														
Lab 1	50	50	25	21U	1KV	1	2	1	2				400	25
Lab 2	50	50	25										400	25
Lecture Rooms	23	23	16										92	16
HOD rooms	7	7	4										28	4
Program admin	11	11	6	12U	1KV	1	1	1	1	1	0	0	44	6
Dean's office	13	13	7										52	7
School of Business														
Lab 1	50	50	25	21U	1KV	1	2	1	2				400	25
Lab 2	50	50	25										400	25
Lecture Rooms	23	23	16										92	16
HOD rooms	7	7	4										28	4
Program admin	11	11	6	12U	1KV	1	1	1	1	1	0	0	44	6
Dean's office	13	13	7										52	7
Administration division														
Examinations	25	25	13					0	1				100	13
Library	25	25	13					0	1				100	13
Finance	25	25	13	21U	1KV	1	3	0	1	1	0	0	100	13
HR	25	25	13					0	1				100	13
Maintenance	25	25	13					0	1				100	13
Marketing	25	25	13					0	1				100	13
Colombo	10	10	10	8U	1KV	1	0	1	0	0	1	0	40	10
Kandy	10	10	10	8U	1KV	1	0	1	0	0	1	0	40	10
Server Room	10	10	10	42U	10KV	0	0	0	0	0	1	2	40	10

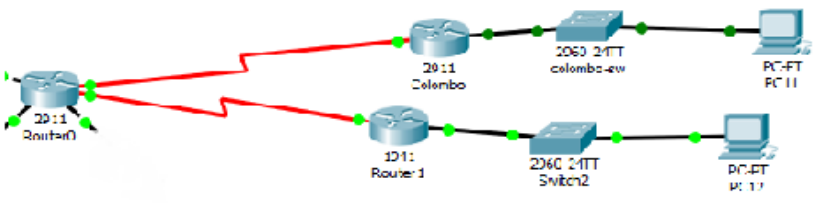
Topology for each internal network

There are few physical LAN networks and Virtual LAN networks on our solution.
For each network we suggest creating the network with start topology.

- Computing lab – Star Topology.
- Computing Staff network (Dean office, Program office, Lecture room, Head of Department) - Star topology.
- Business lab - Star topology.
- Business Staff network - (Dean office, Program office, Lecture room, Head of Department) – Star Topology.
- Administrative marketing office – Star topology.
- Administrative Maintains office – Star topology.
- Administrative Exam office – Star topology.
- Administrative Library – Star topology.
- Administrative Finance – Star topology.
- Administrative HR – Star topology.

WAN topology for interconnecting two marketing offices.

For connecting 2 marketing offices in Colombo and Kandy We propose a Star topology network.



Appropriate private IP address plan for the whole network

Proposed VLANs For the Network

1. VLAN10 computing lab
2. VLAN20 computer management (School of computing Staff)
3. VLAN30 business management (School of Business Staff)
4. VLAN40 business lab
5. VLAN50 admin-marketing
6. VLAN60 admin-HR
7. VLAN70 admin-finance
8. VLAN80 admin-library
9. VLAN90 admin-maintenance
10. VLAN100 admin-exam
11. VLAN110 WIFI

- Computing Lab(50 lab 6, 20 machine 2 labs)
  - ✓ "Subnet Mask" 255.255.254.0
  - ✓ "Network ID" 192.168.0.0
  - ✓ "Total Usable addresses" 510
  - ✓ "Addresses want" 340
  - ✓ "First IP address" 192.168.0.1
  - ✓ "Last usable IP address" 192.168.1.254
  - ✓ "Broadcast Address" 192.168.1.255

- Business (50 lab 2)

  - ✓ “Subnet Mask” 255.255.255.128
  - ✓ “Network_ID” 192.168.2.0
  - ✓ “Total Usable addresses” 126
  - ✓ “Addresses require” 100
  - ✓ “First usable IP address” 192.168.2.1
  - ✓ “Last usable IP” 192.168.2.126
  - ✓ “Broadcast Address” 192.168.2.127

- Business management [staff] (Dean office, Program office, Lecture room, Head of Department)

  - ✓ “Subnet Mask” 255.255.255.192.2/26
  - ✓ “Network_id” 192.168.2.128
  - ✓ “Total Usable addresses” 62
  - ✓ “Addresses require” 54
  - ✓ “First usable” 192.168.2.129
  - ✓ “Last usable” 192.168.2.190
  - ✓ “Broadcast address” 192.168.2.191

- Computing management [Staff] (Lecture hall, Head of Department, Program office, Dean office)

  - ✓ “Subnet Mask” 255.255.255.192/26
  - ✓ “Network_ID” 192.168.2.192
  - ✓ “Total Usable Addresses” 62
  - ✓ “Addresses require” 39
  - ✓ “First usable IP” 192.168.2.193
  - ✓ “Last usable IP” 192.168.2.254
  - ✓ “Broadcast Address” 192.168.2.255

- Administration division - Maintains

  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network_id” 192.168.3.0
  - ✓ “First usable IP” 192.168.3.1
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “Last usable IP” 192.168.3.30
  - ✓ “Broadcast address” 192.168.3.31

- Administration division – Exam

  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network _ID” 192.168.3.32
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “First usable IP” 192.168.3.33
  - ✓ “Last usable IP” 192.168.3.62
  - ✓ “Broadcast address” 192.168.3.63

- Administration division - Library

  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network_id” 192.168.3.64
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “First usable IP address” 192.168.3.65
  - ✓ “Last usable IP address” 192.168.3.94
  - ✓ “Broadcast address” 192.168.3.95

- Administration division – Finance

  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network_id” 192.168.3.96
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “First usable IP address” 192.168.3.97
  - ✓ “Last usable IP address” 192.168.3.126
  - ✓ “Broadcast address” 192.168.3.127

- Administration division – HR

  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network _ID” 192.168.3.128
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “First usable IP address” 192.168.3.129
  - ✓ “Last usable IP address” 192.168.3.158
  - ✓ “Broadcast address” 192.168.3.159

- Administration division – Marketing

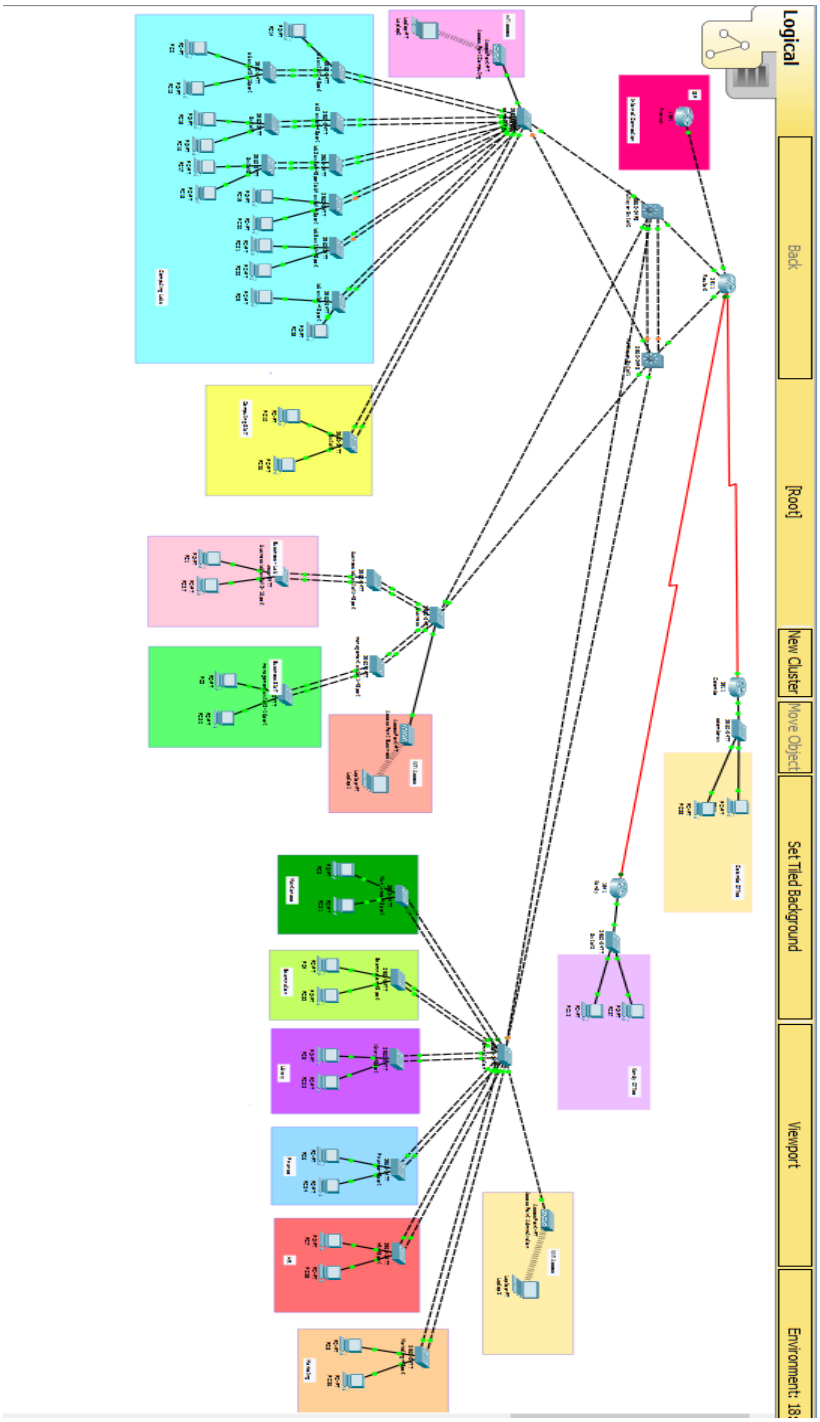
  - ✓ “Mask” 255.255.255.224/27
  - ✓ “Network _ID” 192.168.3.160
  - ✓ “Total Usable Addresses” 30
  - ✓ “Addresses require” 25
  - ✓ “First usable IP address” 192.168.3.161
  - ✓ “Last usable IP address” 192.168.3.190
  - ✓ “Broadcast address” 192.168.3.191

- Colombo Marketing Office
  - ✓ “Mask” 255.255.255.0
  - ✓ “Network_ID” 192.168.4.0 /24
  - ✓ “Total Usable Addresses” 254
  - ✓ “Addresses require” 10
  - ✓ “First usable IP address” 192.168.4.1
  - ✓ “Last usable IP address” 192.168.4.254
  - ✓ “Broadcast address” 192.168.4.255

- Kandy Marketing Office
  - ✓ “Mask” 255.255.255.0
  - ✓ “Network_ID” 192.168.5.0 /24
  - ✓ “Total Usable Addresses” 254
  - ✓ “Addresses require” 10
  - ✓ “First usable IP address” 192.168.5.1
  - ✓ “Last usable IP address” 192.168.5.254
  - ✓ “Broadcast address” 192.168.5.255

- FOR WIFI
  - ✓ “Mask” 255.255. 254.0
  - ✓ “Network_ID” 192.168.6.0 /24
  - ✓ “Total Usable Addresses” 510
  - ✓ “First usable IP address” 192.168.6.1
  - ✓ “Last usable IP address” 192.168.7.254
  - ✓ “Broadcast address” 192.168.7.255

Using Cisco packet tracer or other network simulation software configure all network devices to a level of fully functional network.



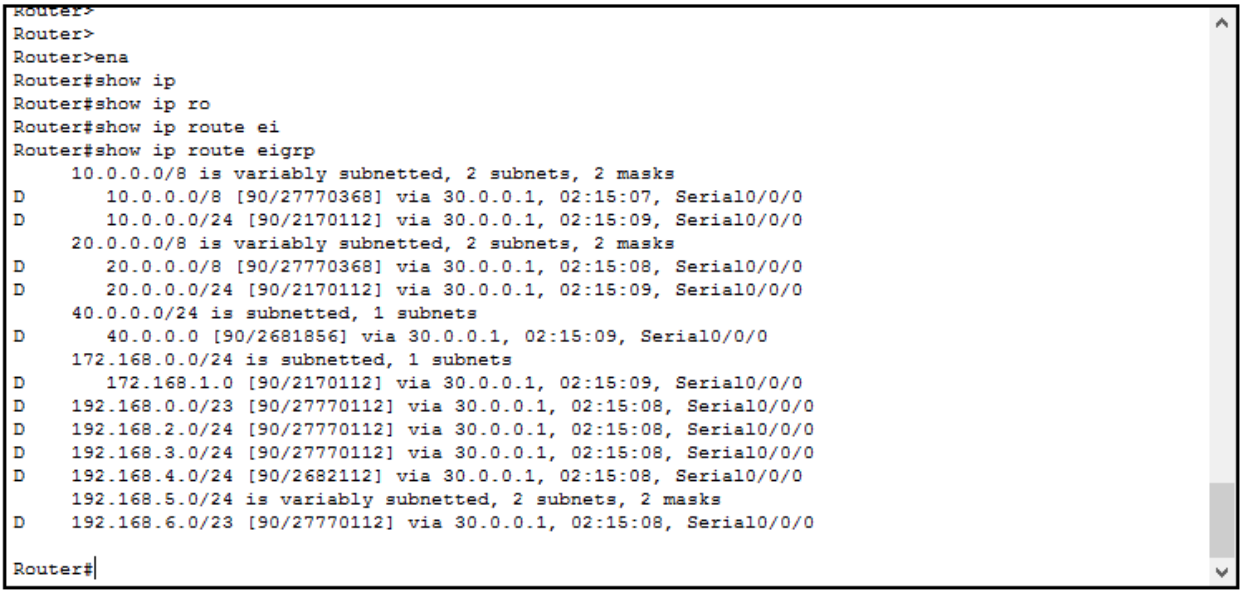
Decide routing architecture of the network and provide interface configurations of all routers in the template table given below.

Interface Number	Main Router IP Address	Kandy Branch Router IP Address	Colombo Branch Router IP Address	Multilayer 0	Multilayer 1	Multilayer Virtual IP (Standby IP)	Router ISP
interface GigabitEthernet0/0	10.0.0.2	-	-	-	-	-	192.168.7.252
interface GigabitEthernet0/1	20.0.0.2	192.168.5.254	192.168.4.254	10.0.0.1	20.0.0.1	-	-
interface GigabitEthernet0/2	172.168.1.2	-	-	-	-	-	-
interface Serial0/0/0	40.0.0.1	30.0.0.2	40.0.0.2	-	-	-	-
interfaceSerial0/0/1	30.0.0.1	-	-	-	-	-	-
interface Vlan10	-	-	-	192.168.1.252	192.168.1.253	192.168.1.254	-
interface Vlan20	-	-	-	192.168.2.252	192.168.2.253	192.168.2.254	-
interface Vlan30	-	-	-	192.168.2.188	192.168.2.189	192.168.2.190	-
interface Vlan40	-	-	-	192.168.2.124	192.168.2.125	192.168.2.126	-
interface Vlan50	-	-	-	192.168.3.188	192.168.3.189	192.168.3.190	-
interface Vlan60	-	-	-	192.168.3.156	192.168.3.157	192.168.3.158	-
interface Vlan70	-	-	-	192.168.3.124	192.168.3.125	192.168.3.126	-
interface Vlan80	-	-	-	192.168.3.92	192.168.3.93	192.168.3.94	-
interface Vlan90	-	-	-	192.168.3.28	192.168.3.29	192.168.3.30	-
interface Vlan100	-	--	-	192.168.3.60	192.168.3.61	192.168.3.62	-
interface Vlan110	-	-		192.168.7.252	192.168.7.253	192.168.7.254	-

Routing table of each router using the following template table. (Screen shots also included.)

- Kandy Router

Target Network	Next Step Router	Metric	Interface
172.168.1.0	30.0.0.1	2170112	Serial0/0/0
192.168.0.0/23	30.0.0.1	27770112	Serial0/0/0
192.168.2.0/24	30.0.0.1	27770112	Serial0/0/0
192.168.3.0/24	30.0.0.1	27770112	Serial0/0/0
192.168.6.0/23	30.0.0.1	27770112	Serial0/0/0
40.0.0.0	30.0.0.1	2681856	Serial0/0/0
10.0.0.0/24	30.0.0.1	2170112	Serial0/0/0
20.0.0.0/24	30.0.0.1	2170112	Serial0/0/0
10.0.0.0/8	30.0.0.1	27770368	Serial0/0/0
20.0.0.0/8	30.0.0.1	27770368	Serial0/0/0



- Colombo Router

Target Network	Next Step Router	Metric	Interface
10.0.0.0/8	40.0.0.1	27770368	Serial0/0/0
10.0.0.0/24	40.0.0.1	2170112	Serial0/0/0
20.0.0.0/8	40.0.0.1	27770368	Serial0/0/0
20.0.0.0/24	40.0.0.1	2170112	Serial0/0/0
30.0.0.0	40.0.0.1	2681856	Serial0/0/0
172.168.1.0	40.0.0.1	2170112	Serial0/0/0
192.168.0.0/23	40.0.0.1	27770112	Serial0/0/0
192.168.2.0/24	40.0.0.1	27770112	Serial0/0/0
192.168.3.0/24	40.0.0.1	27770112	Serial0/0/0
192.168.5.0/24	40.0.0.1	2682112	Serial0/0/0
192.168.6.0/23	40.0.0.1	27770112	Serial0/0/0

```
Router>
Router>
Router>enab
Router#show ip
Router#show ip ro
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       10.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       20.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2681856] via 40.0.0.1, 02:13:42, Serial0/0/0
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
D    192.168.0.0/23 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.2.0/24 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.3.0/24 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
D    192.168.5.0/24 [90/2682112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.6.0/23 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0

Router#
```

- Homagama Router

Target Network	Next Step Router	Metric	Interface
10.0.0.0/8	20.0.0.1	90/25626112	GigabitEthernet 0/1
20.0.0.8	10.0.0.1	90/25626112	GigabitEthernet0/1
192.168.0.0/23	10.0.0.1	90/25625856	GigabitEthernet0/0
192.168.0.0/23	20.0.0.1	90/25625856	GigabitEthernet0/1
192.168.2.0/24	10.0.0.1	90/25625856	GigabitEthernet0/0
192.168.2.0/24	20.0.0.1	90/25625856	GigabitEthernet0/1
192.168.3.0/24	10.0.0.1	90/25625856	GigabitEthernet0/0
192.168.3.0/24	20.0.0.1	90/25625856	GigabitEthernet0/1
192.168.4.0/24	40.0.0.2	90/2170112	Serial0/0/0
192.168.5.0/24	30.0.0.2	90/2170112	Serial0/0/1

```
Router>enabel
Translating "enabel"...domain server (255.255.255.255) % Name lookup aborted
Router>en
Router>enable
Router#show ip rou
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
D       10.0.0.0/8 [90/25626112] via 20.0.0.1, 02:03:35, GigabitEthernet0/1
     20.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
D       20.0.0.0/8 [90/25626112] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
     172.168.0.0/16 is variably subnetted, 2 subnets, 2 masks
D    192.168.0.0/23 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.2.0/24 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.3.0/24 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.4.0/24 [90/2170112] via 40.0.0.2, 02:03:36, Serial0/0/0
D    192.168.5.0/24 [90/2170112] via 30.0.0.2, 02:03:37, Serial0/0/1
D    192.168.6.0/23 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1

Router#
Router#
```

- Multilayer Switch 0

Target Network	Next Step Router	Metric	Interface
20.0.0.0/8	192.168.2.189	25625856	Vlan30
20.0.0.0/8	192.168.3.125	25625856	Vlan70
20.0.0.0/8	192.168.3.189	25625856	Vlan50
20.0.0.0/8	192.168.3.93	25625856	Vlan80
20.0.0.0/8	192.168.2.125	25625856	Vlan40
20.0.0.0/8	192.168.1.253	25625856	Vlan10
20.0.0.0/8	192.168.3.29	25625856	Vlan90
20.0.0.0/8	192.168.7.253	25625856	Vlan110
20.0.0.0/8	192.168.3.61	25625856	Vlan100
20.0.0.0/8	192.168.3.157	25625856	Vlan60
20.0.0.0/8	192.168.2.253	25625856	Vlan20
20.0.0.0/24	10.0.0.2	3072	GigabitEthernet0/1
30.0.0.0	10.0.0.2	2170112	GigabitEthernet0/1
40.0.0.0	10.0.0.2	2170112	GigabitEthernet0/1
172.168.1.0	10.0.0.2	3072	GigabitEthernet0/1

```
core1#show ip route ei
core1#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 is a summary, 08:12:50, Null0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/25625856] via 192.168.2.189, 02:37:43, Vlan30
                   [90/25625856] via 192.168.3.125, 02:37:43, Vlan70
                   [90/25625856] via 192.168.3.189, 02:37:43, Vlan50
                   [90/25625856] via 192.168.3.93, 02:37:40, Vlan80
                   [90/25625856] via 192.168.2.125, 02:37:40, Vlan40
                   [90/25625856] via 192.168.1.253, 02:37:40, Vlan10
                   [90/25625856] via 192.168.3.29, 02:37:40, Vlan90
                   [90/25625856] via 192.168.7.253, 02:37:39, Vlan110
                   [90/25625856] via 192.168.3.61, 02:37:39, Vlan100
                   [90/25625856] via 192.168.3.157, 02:37:39, Vlan60
                   [90/25625856] via 192.168.2.253, 02:37:39, Vlan20
D       20.0.0.0/24 [90/3072] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2170112] via 10.0.0.2, 02:37:43, GigabitEthernet0/1
     40.0.0.0/24 is subnetted, 1 subnets
D       40.0.0.0 [90/2170112] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/3072] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     192.168.2.0/24 is variably subnetted, 4 subnets, 3 masks
```

- Multilayer Switch 1

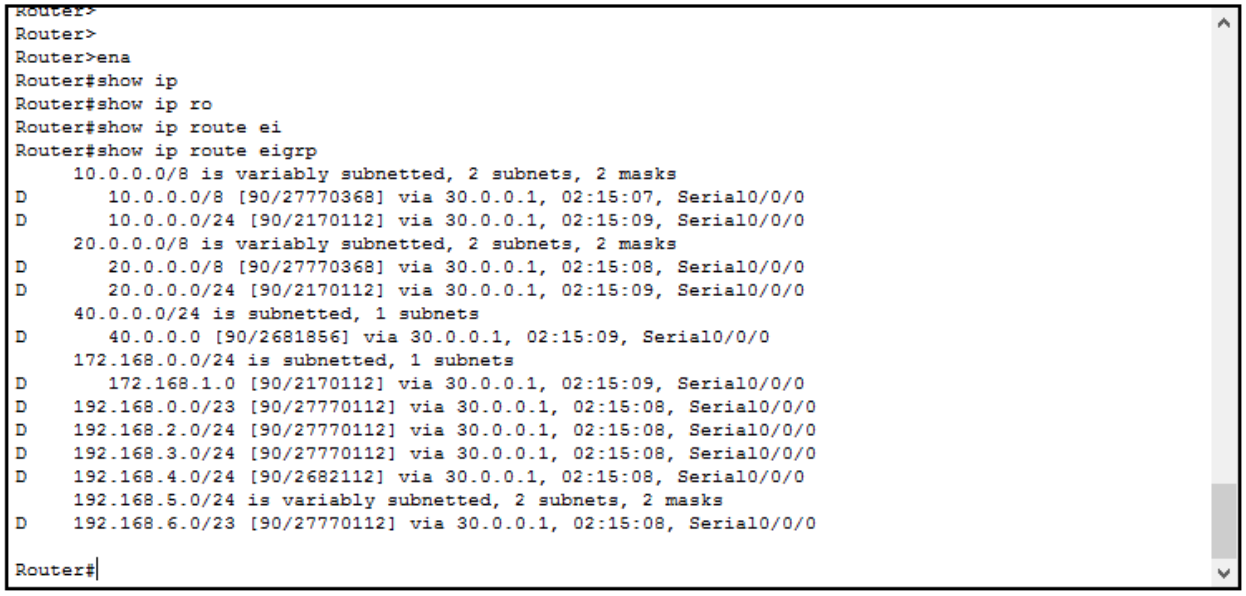
Target Network	Next Step Router	Metric	Interface
10.0.0.0/8	192.168.2.188	25625856	Vlan30
10.0.0.0/8	192.168.3.124	25625856	Vlan70
10.0.0.0/8	192.168.3.188	25625856	Vlan50
10.0.0.0/8	192.168.3.92	25625856	Vlan80
10.0.0.0/8	192.168.1.252	25625856	Vlan10
10.0.0.0/8	192.168.2.124	25625856	Vlan40
10.0.0.0/8	192.168.3.60	25625856	Vlan100
10.0.0.0/8	192.168.7.252	25625856	Vlan110
10.0.0.0/8	192.168.3.28	25625856	Vlan90
10.0.0.0/8	192.168.3.156	25625856	Vlan60
10.0.0.0/8	192.168.2.252	25625856	Vlan20
10.0.0.0/24	20.0.0.2	3072	GigabitEthernet0/1
30.0.0.0/24	20.0.0.2	2170112	GigabitEthernet0/1
172.168.0.0/24	20.0.0.2	3072	GigabitEthernet0/1
192.168.3.0/24	20.0.0.2	2170368	GigabitEthernet0/1

```
core2#show ip route ei
core2#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/25625856] via 192.168.2.188, 02:59:01, Vlan30
                   [90/25625856] via 192.168.3.124, 02:59:01, Vlan70
                   [90/25625856] via 192.168.3.188, 02:59:01, Vlan50
                   [90/25625856] via 192.168.3.92, 02:59:00, Vlan80
                   [90/25625856] via 192.168.1.252, 02:59:00, Vlan10
                   [90/25625856] via 192.168.2.124, 02:59:00, Vlan40
                   [90/25625856] via 192.168.3.60, 02:58:59, Vlan100
                   [90/25625856] via 192.168.7.252, 02:58:59, Vlan110
                   [90/25625856] via 192.168.3.28, 02:58:59, Vlan90
                   [90/25625856] via 192.168.3.156, 02:58:58, Vlan60
                   [90/25625856] via 192.168.2.252, 02:58:58, Vlan20
D       10.0.0.0/24 [90/3072] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 is a summary, 08:34:09, Null0
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2170112] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     40.0.0.0/24 is subnetted, 1 subnets
D       40.0.0.0 [90/2170112] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/3072] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     192.168.2.0/24 is variably subnetted, 4 subnets, 3 masks
D       192.168.2.0/24 is a summary, 08:34:09, Null0
     192.168.3.0/24 is variably subnetted, 7 subnets, 2 masks
D       192.168.3.0/24 is a summary, 08:34:09, Null0
D    192.168.4.0/24 [90/2170368] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
D    192.168.5.0/24 [90/2170368] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
```

By using configuration commands getting the following information.

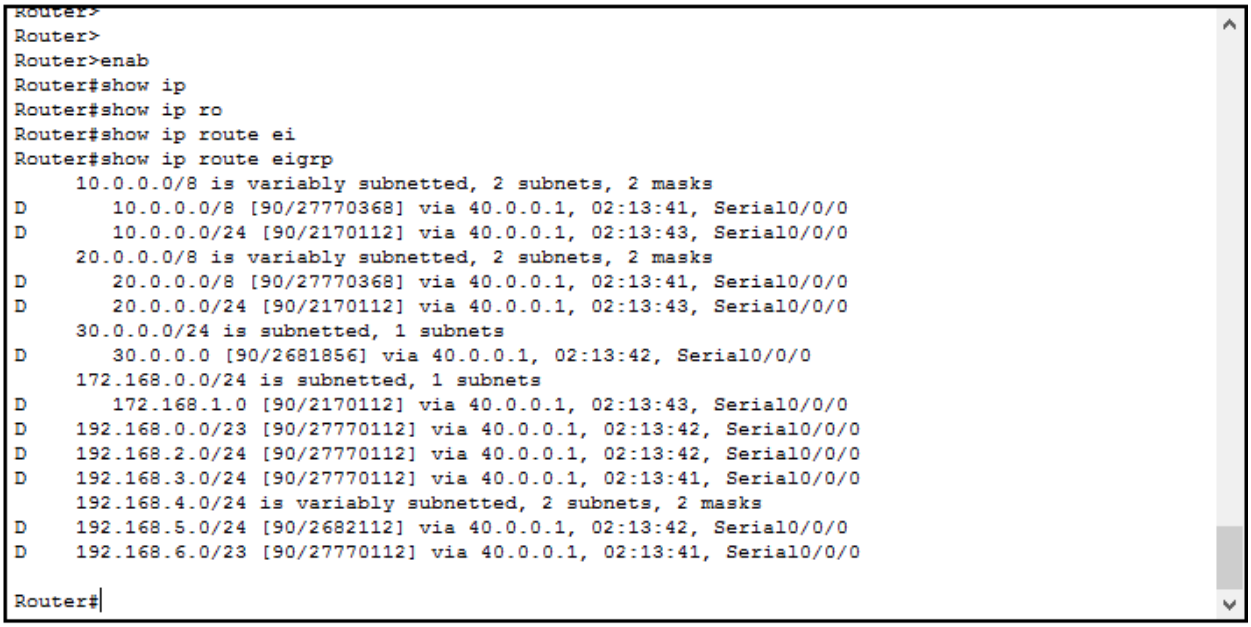
Routing tables output - screenshots

- Kandy Router



```
Router>
Router>
Router>ena
Router#show ip
Router#show ip ro
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/27770368] via 30.0.0.1, 02:15:07, Serial0/0/0
D       10.0.0.0/24 [90/2170112] via 30.0.0.1, 02:15:09, Serial0/0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/27770368] via 30.0.0.1, 02:15:08, Serial0/0/0
D       20.0.0.0/24 [90/2170112] via 30.0.0.1, 02:15:09, Serial0/0/0
     40.0.0.0/24 is subnetted, 1 subnets
D       40.0.0.0 [90/2681856] via 30.0.0.1, 02:15:09, Serial0/0/0
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/2170112] via 30.0.0.1, 02:15:09, Serial0/0/0
D    192.168.0.0/23 [90/27770112] via 30.0.0.1, 02:15:08, Serial0/0/0
D    192.168.2.0/24 [90/27770112] via 30.0.0.1, 02:15:08, Serial0/0/0
D    192.168.3.0/24 [90/27770112] via 30.0.0.1, 02:15:08, Serial0/0/0
D    192.168.4.0/24 [90/2682112] via 30.0.0.1, 02:15:08, Serial0/0/0
     192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks
D    192.168.6.0/23 [90/27770112] via 30.0.0.1, 02:15:08, Serial0/0/0

Router#
```

- Colombo Router



```
Router>
Router>
Router>enab
Router#show ip
Router#show ip ro
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       10.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       20.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2681856] via 40.0.0.1, 02:13:42, Serial0/0/0
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
D    192.168.0.0/23 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.2.0/24 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.3.0/24 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
D    192.168.5.0/24 [90/2682112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.6.0/23 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0

Router#
```

- Homagama Router

```
Router>enabel
Translating "enabel"...domain server (255.255.255.255) % Name lookup aborted
Router>en
Router>enable
Router#show ip rou
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
D       10.0.0.0/8 [90/25626112] via 20.0.0.1, 02:03:35, GigabitEthernet0/1
     20.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
D       20.0.0.0/8 [90/25626112] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
     172.168.0.0/16 is variably subnetted, 2 subnets, 2 masks
D    192.168.0.0/23 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.2.0/24 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.3.0/24 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1
D    192.168.4.0/24 [90/2170112] via 40.0.0.2, 02:03:36, Serial0/0/0
D    192.168.5.0/24 [90/2170112] via 30.0.0.2, 02:03:37, Serial0/0/1
D    192.168.6.0/23 [90/25625856] via 10.0.0.1, 02:03:36, GigabitEthernet0/0
                    [90/25625856] via 20.0.0.1, 02:03:36, GigabitEthernet0/1

Router#
Router#
```

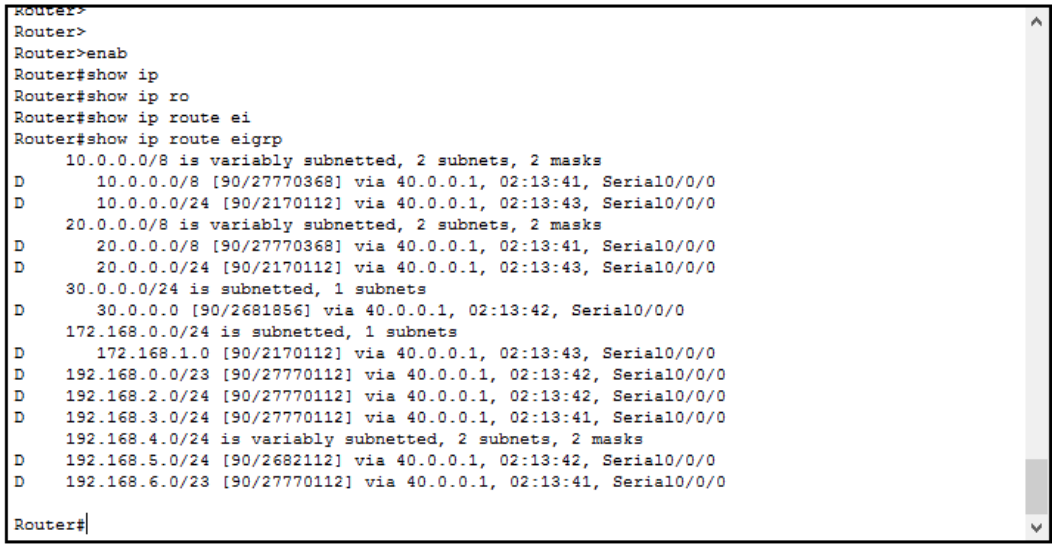
- Multilayer Switch 0

```
core1#show ip route ei
core1#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 is a summary, 08:12:50, Null0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/25625856] via 192.168.2.189, 02:37:43, Vlan30
                   [90/25625856] via 192.168.3.125, 02:37:43, Vlan70
                   [90/25625856] via 192.168.3.189, 02:37:43, Vlan50
                   [90/25625856] via 192.168.3.93, 02:37:40, Vlan80
                   [90/25625856] via 192.168.2.125, 02:37:40, Vlan40
                   [90/25625856] via 192.168.1.253, 02:37:40, Vlan10
                   [90/25625856] via 192.168.3.29, 02:37:40, Vlan90
                   [90/25625856] via 192.168.7.253, 02:37:39, Vlan110
                   [90/25625856] via 192.168.3.61, 02:37:39, Vlan100
                   [90/25625856] via 192.168.3.157, 02:37:39, Vlan60
                   [90/25625856] via 192.168.2.253, 02:37:39, Vlan20
D       20.0.0.0/24 [90/3072] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2170112] via 10.0.0.2, 02:37:43, GigabitEthernet0/1
     40.0.0.0/24 is subnetted, 1 subnets
D       40.0.0.0 [90/2170112] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/3072] via 10.0.0.2, 02:37:44, GigabitEthernet0/1
     192.168.2.0/24 is variably subnetted, 4 subnets, 3 masks
```

- Multilayer Switch 1

```
core2#show ip route ei
core2#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/25625856] via 192.168.2.188, 02:59:01, Vlan30
                   [90/25625856] via 192.168.3.124, 02:59:01, Vlan70
                   [90/25625856] via 192.168.3.188, 02:59:01, Vlan50
                   [90/25625856] via 192.168.3.92, 02:59:00, Vlan80
                   [90/25625856] via 192.168.1.252, 02:59:00, Vlan10
                   [90/25625856] via 192.168.2.124, 02:59:00, Vlan40
                   [90/25625856] via 192.168.3.60, 02:58:59, Vlan100
                   [90/25625856] via 192.168.7.252, 02:58:59, Vlan110
                   [90/25625856] via 192.168.3.28, 02:58:59, Vlan90
                   [90/25625856] via 192.168.3.156, 02:58:58, Vlan60
                   [90/25625856] via 192.168.2.252, 02:58:58, Vlan20
D       10.0.0.0/24 [90/3072] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 is a summary, 08:34:09, Null0
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2170112] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     40.0.0.0/24 is subnetted, 1 subnets
D       40.0.0.0 [90/2170112] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/3072] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
     192.168.2.0/24 is variably subnetted, 4 subnets, 3 masks
D       192.168.2.0/24 is a summary, 08:34:09, Null0
     192.168.3.0/24 is variably subnetted, 7 subnets, 2 masks
D       192.168.3.0/24 is a summary, 08:34:09, Null0
D    192.168.4.0/24 [90/2170368] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
D    192.168.5.0/24 [90/2170368] via 20.0.0.2, 02:59:01, GigabitEthernet0/1
```

Describe all routing table parameters (E.g. Destination network, next hop, cost, etc.) in one routing entry in one routing table. Use an entry for a remote network.



```
Router>
Router>
Router>enab
Router#show ip
Router#show ip ro
Router#show ip route ei
Router#show ip route eigrp
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       10.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       20.0.0.0/8 [90/27770368] via 40.0.0.1, 02:13:41, Serial0/0/0
D       20.0.0.0/24 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
     30.0.0.0/24 is subnetted, 1 subnets
D       30.0.0.0 [90/2681856] via 40.0.0.1, 02:13:42, Serial0/0/0
     172.168.0.0/24 is subnetted, 1 subnets
D       172.168.1.0 [90/2170112] via 40.0.0.1, 02:13:43, Serial0/0/0
D    192.168.0.0/23 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.2.0/24 [90/27770112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.3.0/24 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0
     192.168.4.0/24 is variably subnetted, 2 subnets, 2 masks
D    192.168.5.0/24 [90/2682112] via 40.0.0.1, 02:13:42, Serial0/0/0
D    192.168.6.0/23 [90/27770112] via 40.0.0.1, 02:13:41, Serial0/0/0

Router#
```

Eg :- D 10.0.0/8 [90/27770868] via 40.0.0.1 02:13:41 , Serial 10/0/0

- Router Source

  This identifies how router is learned about directly connected interfaces.
  E.g. – “D”

- Destination

  Identify the address of remote network.
  e.g. – 10.0.0.0/8

- Next hop

  Next closest router a packet can go through. When series of networks are connected to the network , next hop means the next possible destination for a data packet.
  E.g. – 40.0.0.1

- Administrative distance

Administrative distance is used by the router , for determining the best path when there is 2 concurrent paths for the destination.

E.g. – 90

- Cost

Routers assigns a cost for each route so that the highest cost-effective path can be chosen.

"EIGRP Metric= 256*((K1*Bandwidth) + (K2*Bandwidth)/(256-Load) + K3*Delay)*(K5/(Reliability + K4)))"[1]

E.g. – 27770368

- Route Time stamp

"Identifies from when the route was last heard"[2]

E.g. – 02:13:42

- Interface

The outgoing networks interface of a router, that use, when packet is forwarded into the destination.

E.g. - Serial 10/0/0

Router's interface IP addresses details and status (up/down)Provide screenshots

- Router Homagama

```
  Loopback            Loopback interface
  Serial              Serial
  Tunnel              Tunnel interface
  Virtual-Access      Virtual Access interface
  Virtual-Template    Virtual Template interface
  Vlan                Catalyst Vlans
  brief               Brief summary of IP status and configuration
  |                   Output Modifiers
  <cr>
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     10.0.0.2        YES manual up                    up
GigabitEthernet0/1     20.0.0.2        YES manual up                    up
GigabitEthernet0/2     172.168.1.2     YES manual up                    up
Serial0/0/0            40.0.0.1        YES manual up                    up
Serial0/0/1            30.0.0.1        YES manual up                    up
Serial0/1/0            unassigned      YES unset  administratively down down
Serial0/1/1            unassigned      YES unset  administratively down down
FastEthernet0/2/0      unassigned      YES unset  up                    down
FastEthernet0/2/1      unassigned      YES unset  up                    down
FastEthernet0/2/2      unassigned      YES unset  up                    down
FastEthernet0/2/3      unassigned      YES unset  up                    down
Vlan1                  unassigned      YES unset  administratively down down
Router#
Router#
Router#
Router#
Router#
Router#
Router#
```

- Router Colombo

```
Router>
Router>
Router>
Router>enab
Router#show ip int
Router#show ip interface bi
Router#show ip interface br
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  administratively down down
GigabitEthernet0/1     192.168.4.254   YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Serial0/0/0            40.0.0.2        YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router#
Router#
Router#
```

- Router Kandy

```
Router>
Router>
Router>
Router>
Router>ena
Router#show ip in
Router#show ip interface b
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  administratively down down
GigabitEthernet0/1     192.168.5.254   YES manual up                    up
Serial0/0/0            30.0.0.2        YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
```

- Multilayer Switch 0

```
core1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  up                    up
FastEthernet0/6        unassigned      YES unset  down                  down
FastEthernet0/7        unassigned      YES unset  down                  down
FastEthernet0/8        unassigned      YES unset  down                  down
FastEthernet0/9        unassigned      YES unset  down                  down
FastEthernet0/10       unassigned      YES unset  down                  down
FastEthernet0/11       unassigned      YES unset  down                  down
FastEthernet0/12       unassigned      YES unset  down                  down
FastEthernet0/13       unassigned      YES unset  down                  down
FastEthernet0/14       unassigned      YES unset  down                  down
FastEthernet0/15       unassigned      YES unset  down                  down
FastEthernet0/16       unassigned      YES unset  down                  down
FastEthernet0/17       unassigned      YES unset  down                  down
FastEthernet0/18       unassigned      YES unset  down                  down
FastEthernet0/19       unassigned      YES unset  down                  down
FastEthernet0/20       unassigned      YES unset  down                  down
FastEthernet0/21       unassigned      YES unset  down                  down
FastEthernet0/22       unassigned      YES unset  down                  down
FastEthernet0/23       unassigned      YES unset  down                  down
FastEthernet0/24       unassigned      YES unset  down                  down
GigabitEthernet0/1     10.0.0.1        YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  down                  down
Vlan1                  unassigned      YES unset  administratively down down
Vlan10                 192.168.1.252   YES manual up                    up
Vlan20                 192.168.2.252   YES manual up                    up
Vlan30                 192.168.2.188   YES manual up                    up
Vlan40                 192.168.2.124   YES manual up                    up
Vlan50                 192.168.3.188   YES manual up                    up
Vlan60                 192.168.3.156   YES manual up                    up
Vlan70                 192.168.3.124   YES manual up                    up
Vlan80                 192.168.3.92    YES manual up                    up
Vlan90                 192.168.3.28    YES manual up                    up
Vlan100                192.168.3.60    YES manual up                    up
Vlan110                192.168.7.252   YES manual up                    up
core1#
```

- Multilayer switch 1

```
core2#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES unset  up                    up
FastEthernet0/2        unassigned      YES unset  up                    up
FastEthernet0/3        unassigned      YES unset  up                    up
FastEthernet0/4        unassigned      YES unset  up                    up
FastEthernet0/5        unassigned      YES unset  up                    up
FastEthernet0/6        unassigned      YES unset  down                  down
FastEthernet0/7        unassigned      YES unset  down                  down
FastEthernet0/8        unassigned      YES unset  down                  down
FastEthernet0/9        unassigned      YES unset  down                  down
FastEthernet0/10       unassigned      YES unset  down                  down
FastEthernet0/11       unassigned      YES unset  down                  down
FastEthernet0/12       unassigned      YES unset  down                  down
FastEthernet0/13       unassigned      YES unset  down                  down
FastEthernet0/14       unassigned      YES unset  down                  down
FastEthernet0/15       unassigned      YES unset  down                  down
FastEthernet0/16       unassigned      YES unset  down                  down
FastEthernet0/17       unassigned      YES unset  down                  down
FastEthernet0/18       unassigned      YES unset  down                  down
FastEthernet0/19       unassigned      YES unset  down                  down
FastEthernet0/20       unassigned      YES unset  down                  down
FastEthernet0/21       unassigned      YES unset  down                  down
FastEthernet0/22       unassigned      YES unset  down                  down
FastEthernet0/23       unassigned      YES unset  down                  down
FastEthernet0/24       unassigned      YES unset  down                  down
GigabitEthernet0/1     20.0.0.1        YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  down                  down
Vlan1                  unassigned      YES unset  administratively down down
Vlan10                 192.168.1.253   YES manual up                    up
Vlan20                 192.168.2.253   YES manual up                    up
Vlan30                 192.168.2.189   YES manual up                    up
Vlan40                 192.168.2.125   YES manual up                    up
Vlan50                 192.168.3.189   YES manual up                    up
Vlan60                 192.168.3.157   YES manual up                    up
Vlan70                 192.168.3.125   YES manual up                    up
Vlan80                 192.168.3.93    YES manual up                    up
Vlan90                 192.168.3.29    YES manual up                    up
Vlan100                192.168.3.61    YES manual up                    up
Vlan110                192.168.7.253   YES manual up                    up
core2#
```

Multilayer Switch 0 load balancing (Standby and active)

- Vlan10 to Vlan50 – Active (Priority 150)
- Vlan50 to Vlan110 – Standby (Priority 120)

```
    Local virtual MAC address is 0000.0C07.AC01 (V1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 0.37 secs
  Preemption enabled
  Active router is local
  Standby router is 192.168.3.189
  Priority 150 (configured 150)

core1#show standby BR
core1#show standby BRief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State    Active          Standby         Virtual IP
Vl10        1    150 P Active   local           192.168.1.253   192.168.1.254
Vl20        1    150 P Active   local           192.168.2.253   192.168.2.254
Vl30        1    150 P Active   local           192.168.2.189   192.168.2.190
Vl40        1    150 P Active   local           192.168.2.125   192.168.2.126
Vl50        1    150 P Active   local           192.168.3.189   192.168.3.190
Vl60        1    120 P Standby  192.168.3.157   local           192.168.3.158
Vl70        1    120 P Standby  192.168.3.125   local           192.168.3.126
Vl80        1    120 P Standby  192.168.3.93    local           192.168.3.94
Vl90        1    120 P Standby  192.168.3.29    local           192.168.3.30
Vl100       1    120 P Standby  192.168.3.61    local           192.168.3.62
Vl110       1    120 P Standby  192.168.7.253   local           192.168.7.254
core1#
```

Multilayer Switch 1 load balancing (Standby and Active)

- Vlan10 to Vlan50 –Standby (Priority 120)
- Vlan50 to Vlan110 – Active (Priority 130)

```
  State is Standby
    10 state changes, last state change 05:35:16
  Virtual IP address is 192.168.2.254
  Active virtual MAC address is 0000.0C07.AC01
    Local virtual MAC address is 0000.0C07.AC01 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 1.621 secs

core2#show standby bri
core2#show standby brief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State    Active          Standby         Virtual IP
Vl10        1    120 P Standby  192.168.1.252   local           192.168.1.254
Vl20        1    120 P Standby  192.168.2.252   local           192.168.2.254
Vl30        1    120 P Standby  192.168.2.188   local           192.168.2.190
Vl40        1    120 P Standby  192.168.2.124   local           192.168.2.126
Vl50        1    120 P Standby  192.168.3.188   local           192.168.3.190
Vl60        1    150 P Active   local           192.168.3.156   192.168.3.158
Vl70        1    150 P Active   local           192.168.3.124   192.168.3.126
Vl80        1    150 P Active   local           192.168.3.92    192.168.3.94
Vl90        1    150 P Active   local           192.168.3.28    192.168.3.30
Vl100       1    150 P Active   local           192.168.3.60    192.168.3.62
Vl110       1    150 P Active   local           192.168.7.252   192.168.7.254
core2#
```

IP protocols

- Multilayer 0

```
core1#
core1#
core1#
core1#show ip pr
core1#show ip protocols ?
  <cr>
core1#show ip protocols

Routing Protocol is "eigrp  10 "
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
Redistributing: eigrp 10
  Automatic network summarization is in effect
  Automatic address summarization:
    10.0.0.0/8 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110
      Summarizing with metric 2816
    192.168.2.0/24 for Vlan10, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
    192.168.3.0/24 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
  Maximum path: 4
  Routing for Networks:
     10.0.0.0/24
     192.168.0.0/23
     192.168.2.128/26
     192.168.2.192/26
     192.168.3.0/27
     192.168.3.32/27
     192.168.3.64/27
     192.168.3.96/27
     192.168.3.128/27
     192.168.3.160/27

core1#
core1#
core1#
```

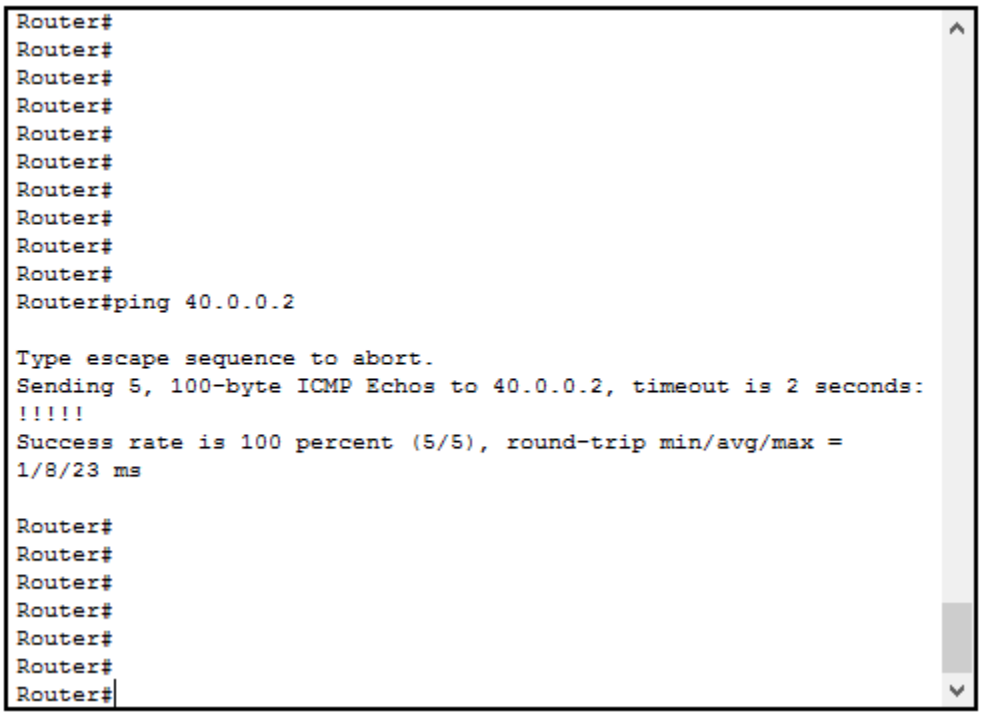
- Multilayer I

```
core2#show ip protocols

Routing Protocol is "eigrp  10 "
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
Redistributing: eigrp 10
  Automatic network summarization is in effect
  Automatic address summarization:
    20.0.0.0/8 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110
      Summarizing with metric 2816
    192.168.2.0/24 for Vlan10, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
    192.168.3.0/24 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
  Maximum path: 4
  Routing for Networks:
     20.0.0.0/24
     192.168.0.0/23
     192.168.2.0/25
     192.168.2.128/26
     192.168.2.192/26
     192.168.3.0/27
     192.168.3.32/27
     192.168.3.64/27
     192.168.3.96/27
     192.168.3.128/27
     192.168.3.160/27
     192.168.4.0/23
     192.168.6.0/23
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.2.124   90            20105100
    192.168.7.252   90            20105100
    192.168.3.60    90            20105100
    192.168.1.252   90            20105100
    192.168.3.92    90            20105100
```

```
    20.0.0.0/8 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110
      Summarizing with metric 2816
    192.168.2.0/24 for Vlan10, Vlan50, Vlan60, Vlan70, Vlan80, Vlan90, Vlan100, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
    192.168.3.0/24 for Vlan10, Vlan20, Vlan30, Vlan40, Vlan110, GigabitEthernet0/1
      Summarizing with metric 25625600
  Maximum path: 4
  Routing for Networks:
     20.0.0.0/24
     192.168.0.0/23
     192.168.2.0/25
     192.168.2.128/26
     192.168.2.192/26
     192.168.3.0/27
     192.168.3.32/27
     192.168.3.64/27
     192.168.3.96/27
     192.168.3.128/27
     192.168.3.160/27
     192.168.4.0/23
     192.168.6.0/23
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.2.124   90            20105100
    192.168.7.252   90            20105100
    192.168.3.60    90            20105100
    192.168.1.252   90            20105100
    192.168.3.92    90            20105100
    192.168.3.124   90            20106812
    192.168.3.188   90            20106812
    192.168.2.188   90            20106812
    20.0.0.2        90            20106984
    192.168.3.28    90            20109950
    192.168.3.156   90            20110179
    192.168.2.252   90            20110285
  Distance: internal 90 external 170

core2#
core2#
core2#
core2#
```

PING command output from each router to other two routers for verifying the connectivity. Provide screenshots

- Ping from Homagama to Colombo



- Ping From Homagama to Kandy

```
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#ping 30.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 30.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
1/5/13 ms

Router#
Router#
Router#
Router#
Router#
Router#
Router#
```

- Ping Form Multi layer 0 to Homagama Router

```
core1>
core1>
core1>ena
core1#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max =
0/3/15 ms

core1#
core1#
core1#
```

- Ping From Multi-Layer 1 to Homagama

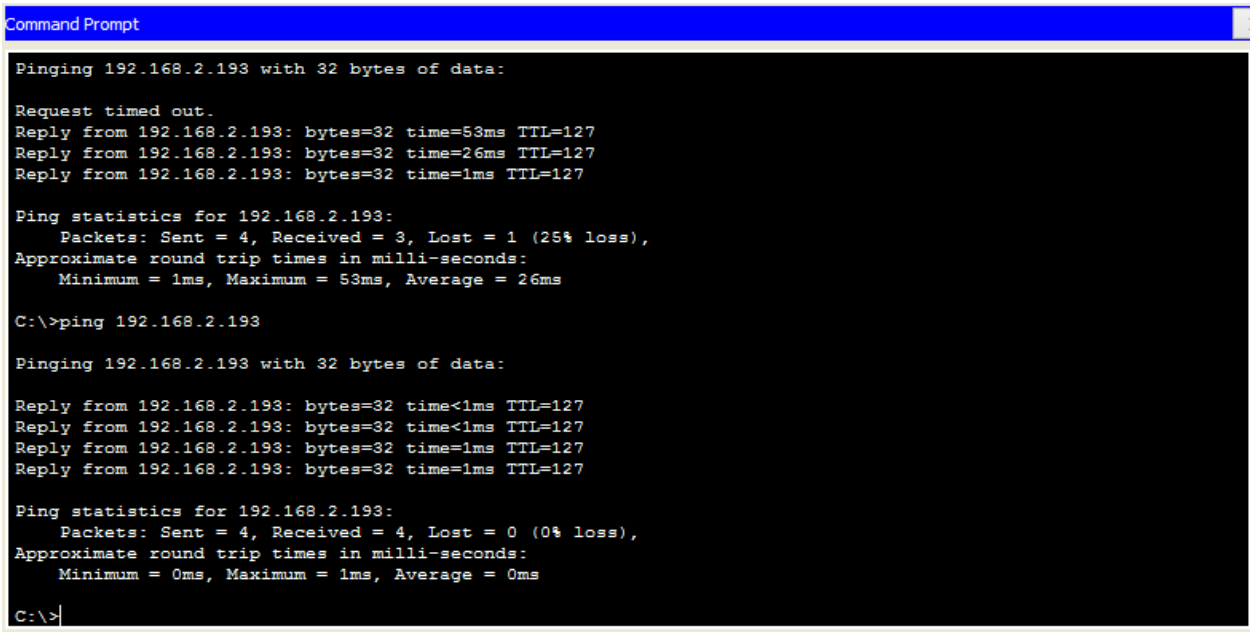
```
core2>
core2>
core2>
core2>ena
core2#ping 20.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 20.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0
ms

core2#
core2#
core2#
core2#
core2#
core2#
core2#
core2#
core2#
core2#
```

- Ping From Colombo To Homagama

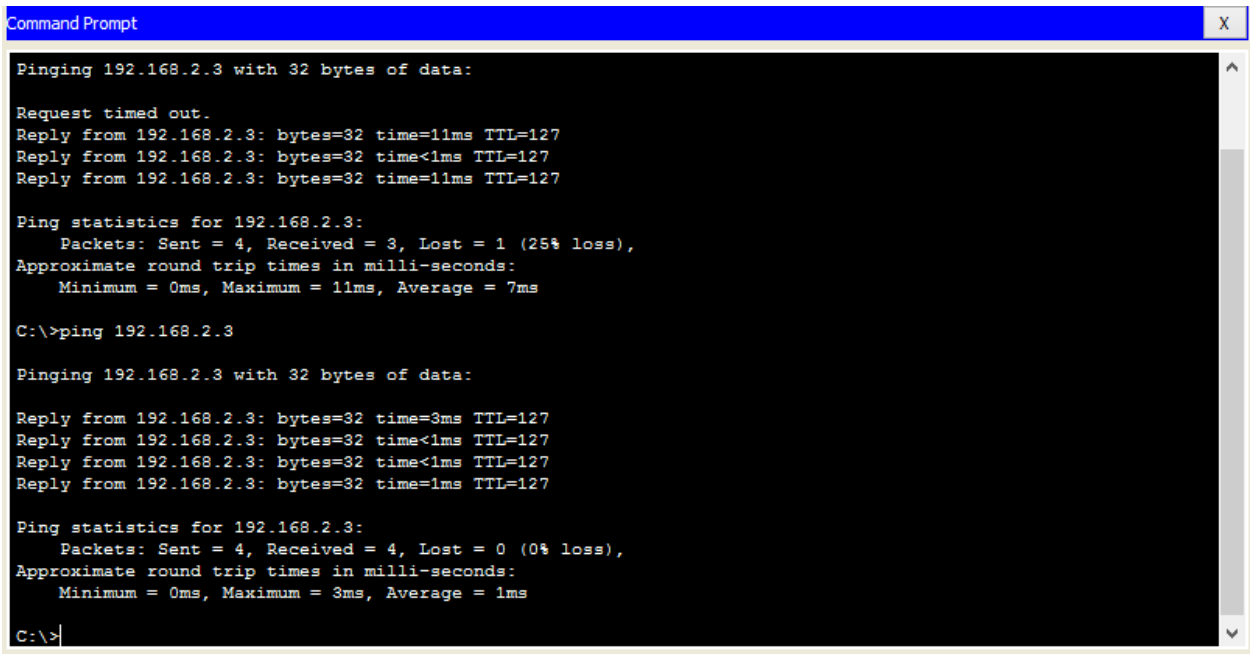
```
%DUAL-5-NBRCHANGE: IP-EIGRP 10: Neighbor 40.0.0.1 (Serial0/0/0)
is up: new adjacency

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ex
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
Router#
Router#ping 30.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 30.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/4/7
ms

Router#
```

Verify connectivity from one PC in one of the LANs to a PC in each of other LANs using PING command (screenshots).

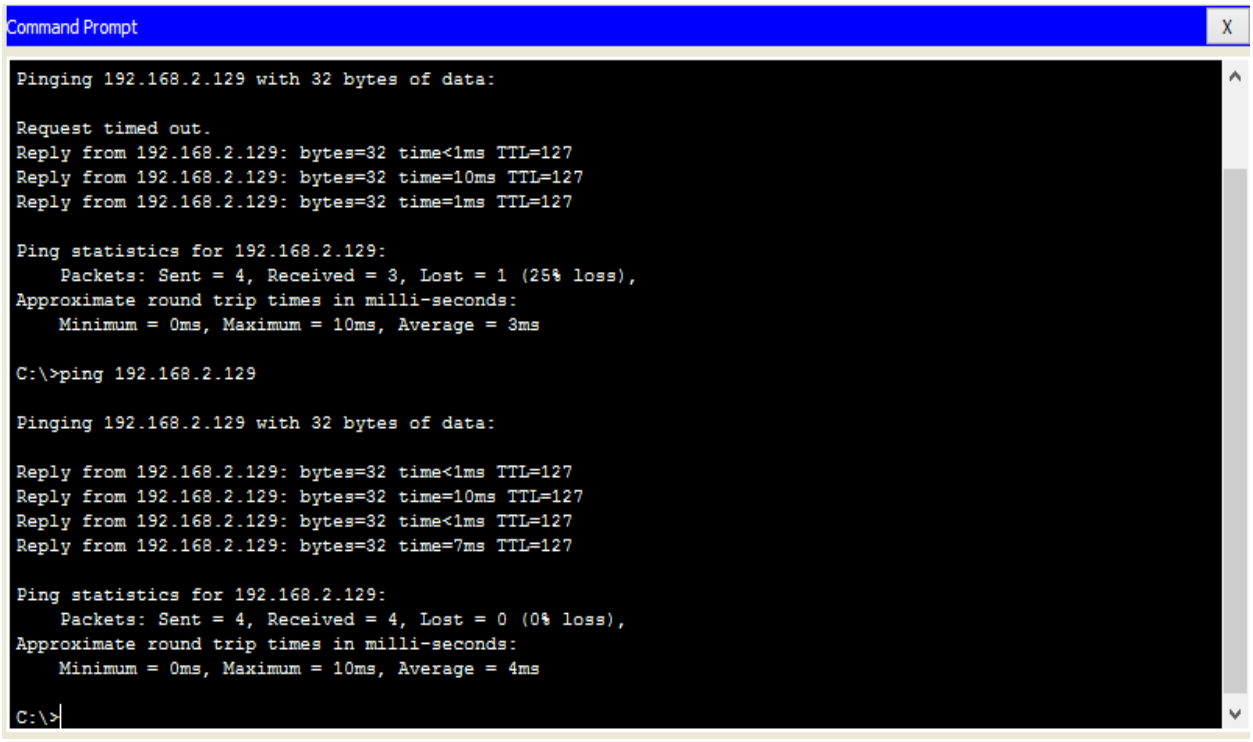
- Computing Labs VLAN To Computing Staff VLAN



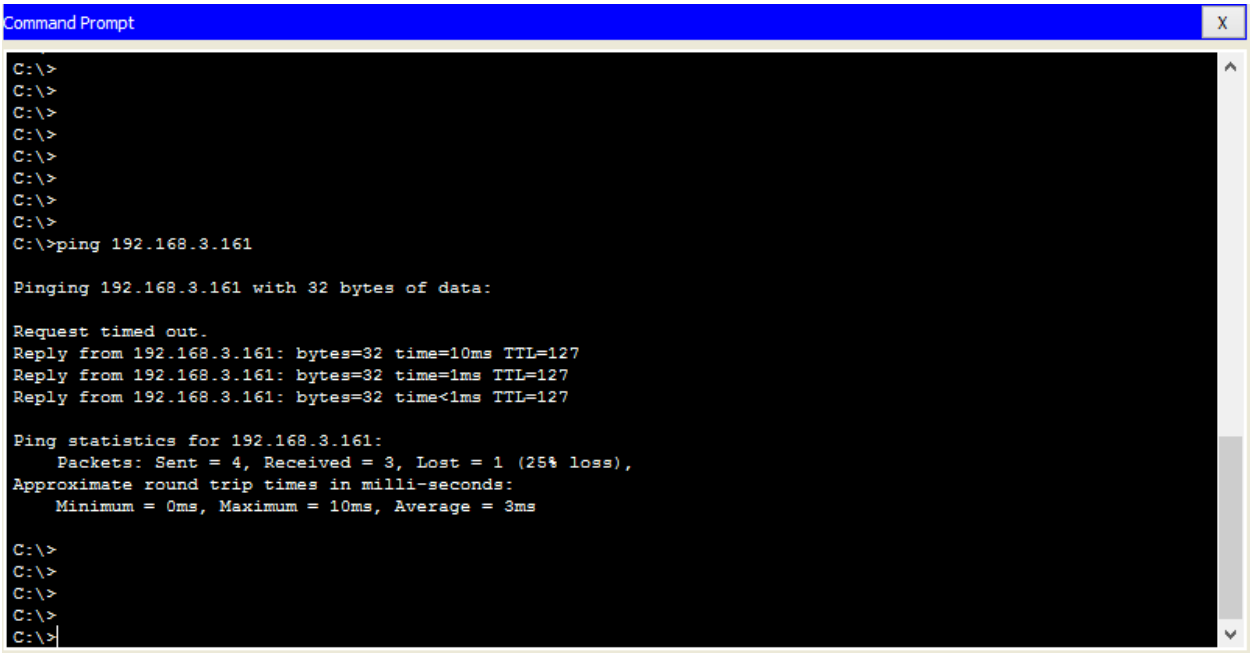
- Computing Labs VLAN To School Of Business Lab VLAN



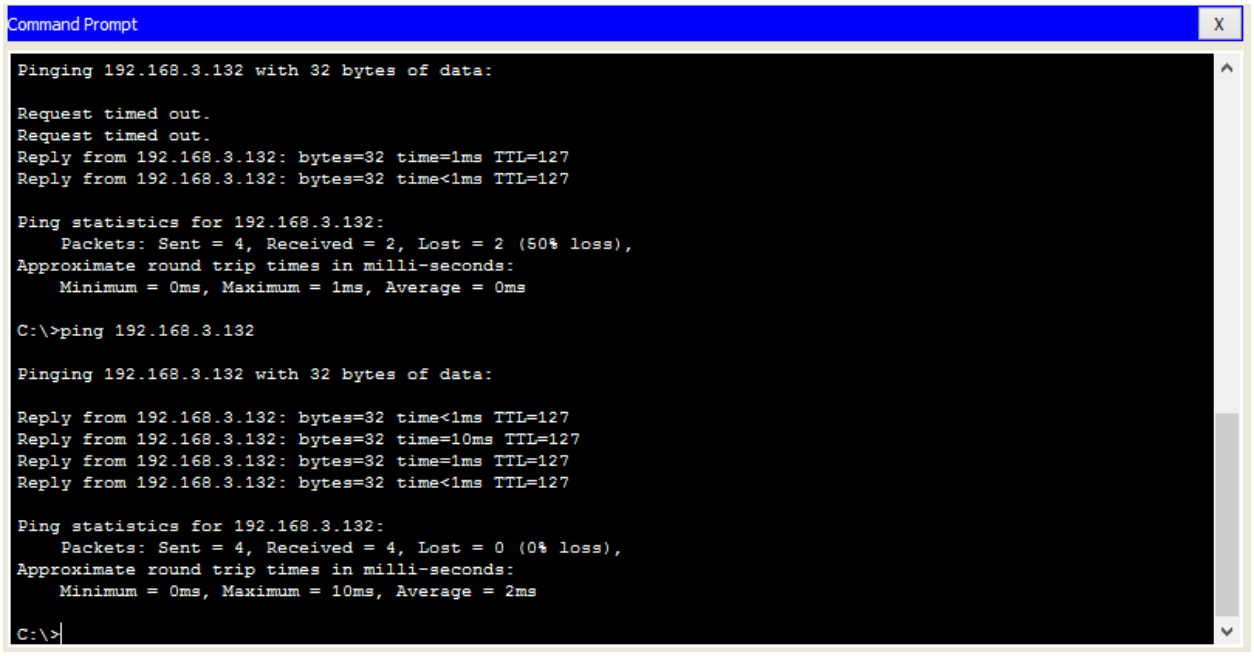
- Computing Lab To School Of Business Staff VLAN



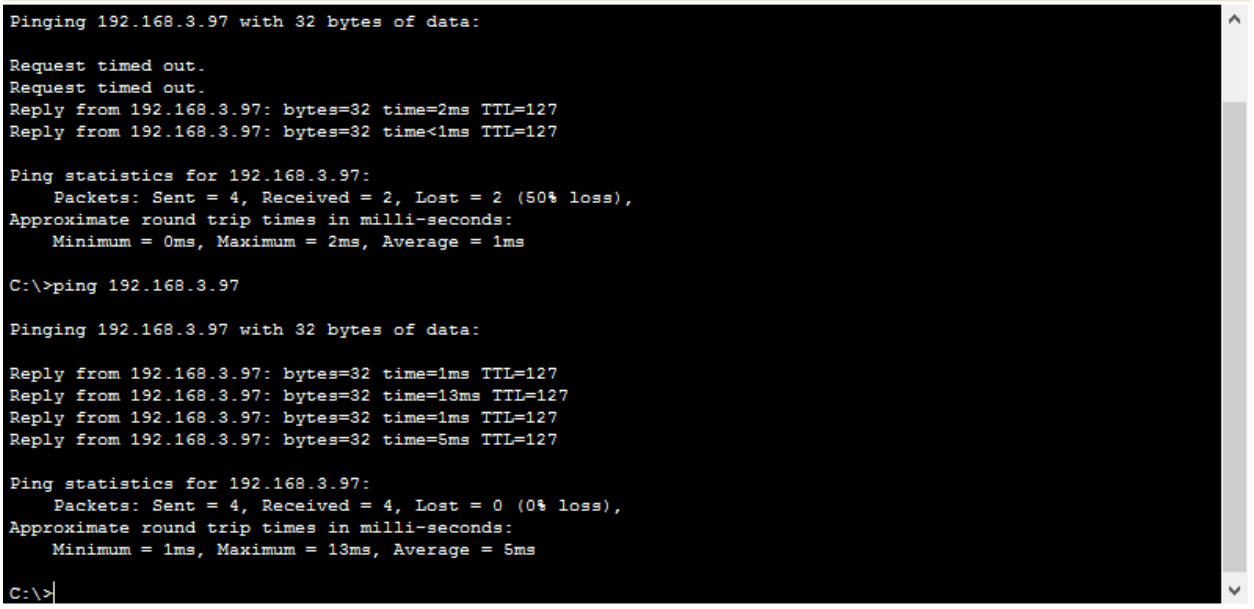
- Computing Lab To School Of Administration division Marketing VLAN



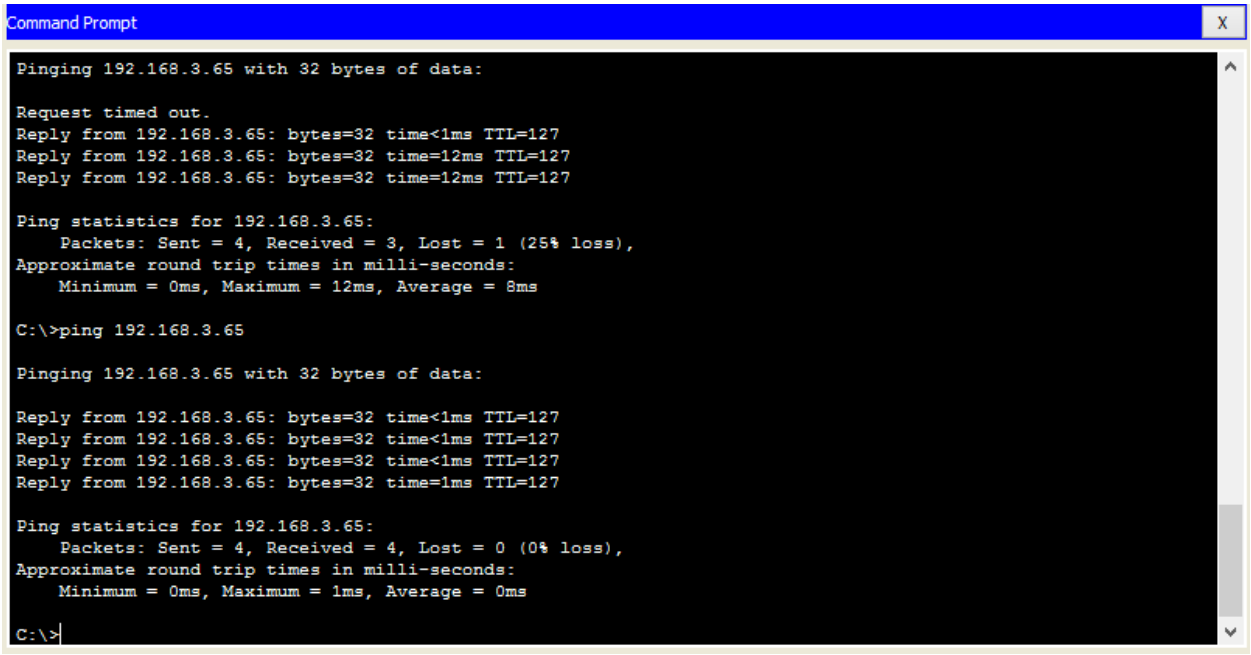
- Computing Lab To School Of Administration division HR VLAN



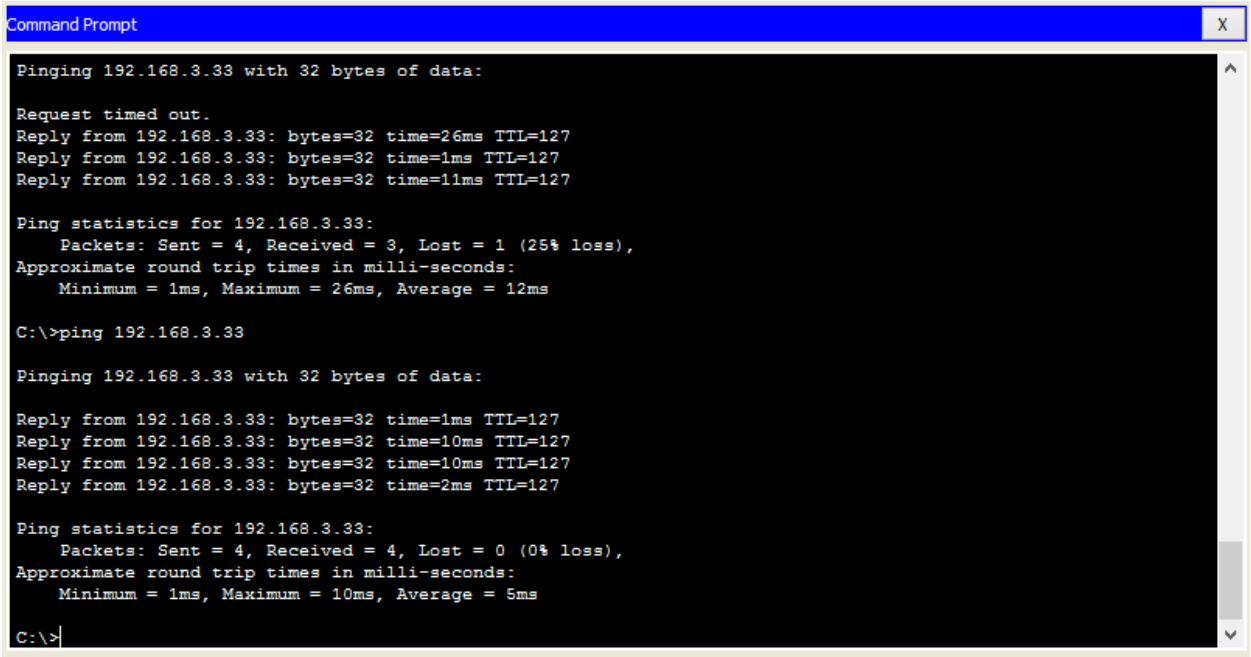
- Computing Lab To School Of Administration division Finance VLAN



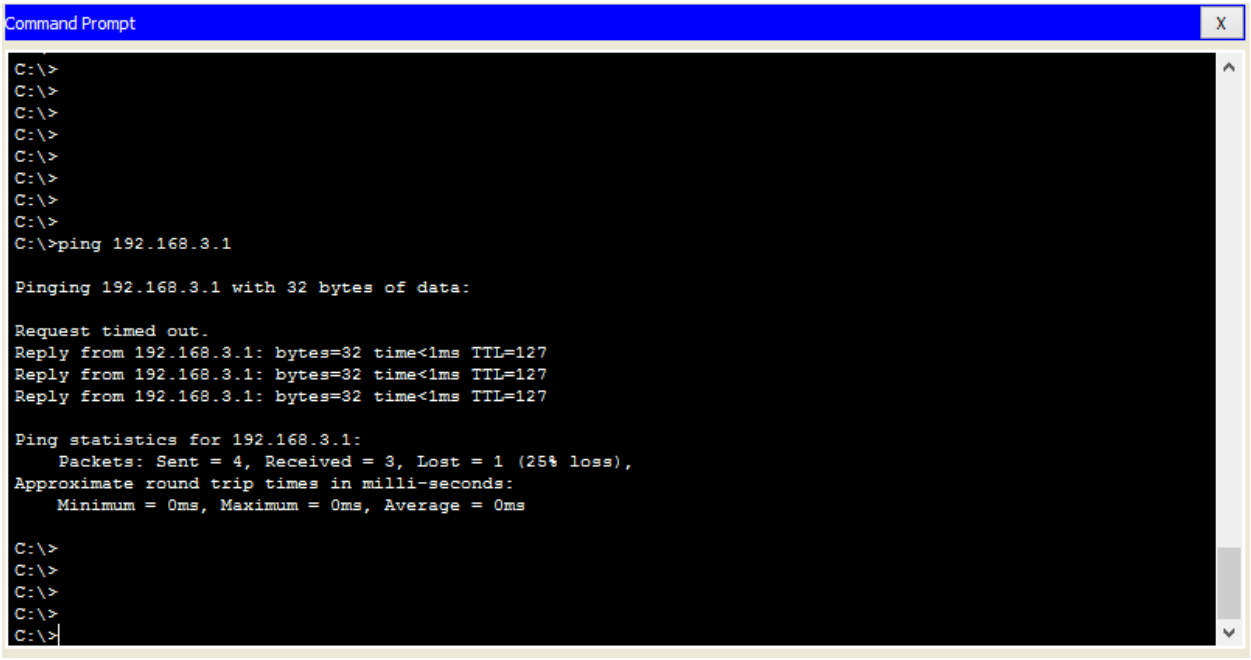
- Computing Lab To School Of Administration division Library VLAN



- Computing Lab To School Of Administration division Examination VLAN

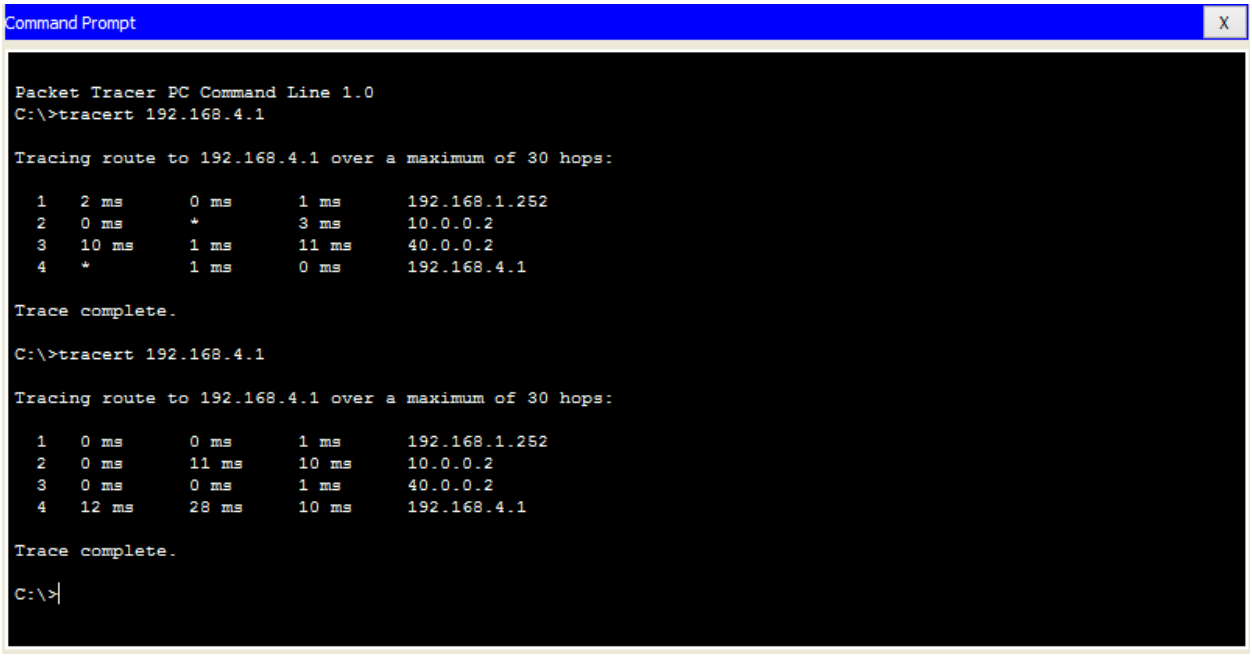


- Computing Lab To School Of Administration division Maintenance VLAN

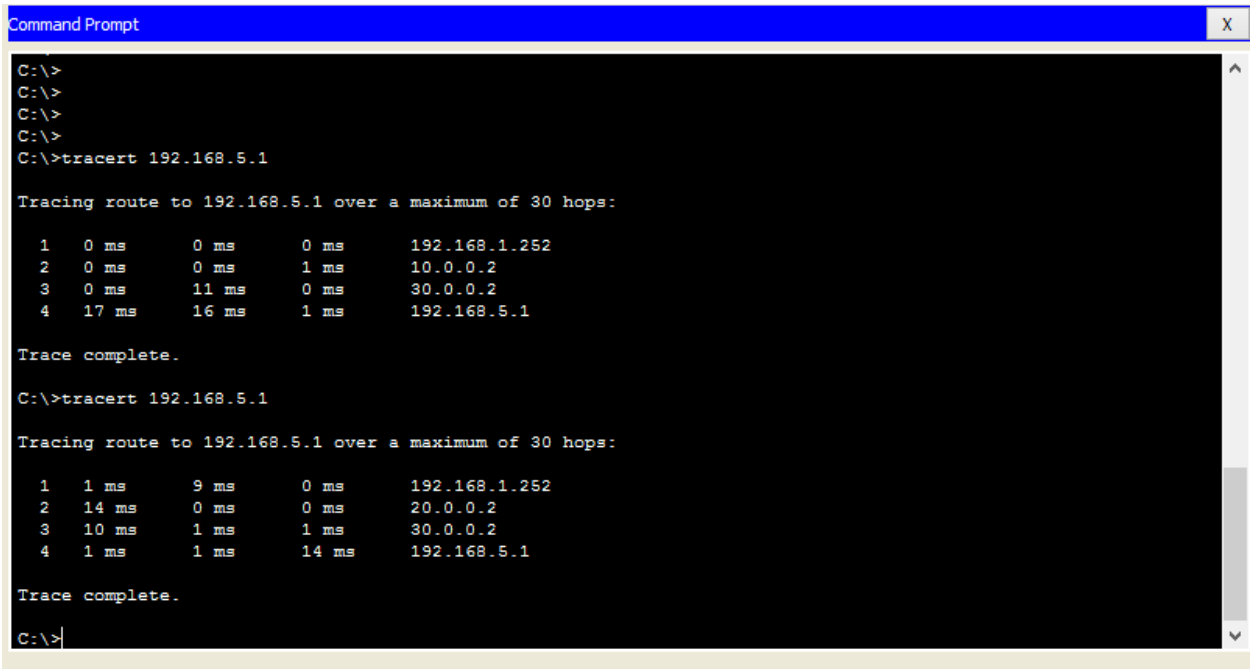


Do a trace route from a one location PC to another two location's PC and get the trace route output. Provide screenshots.

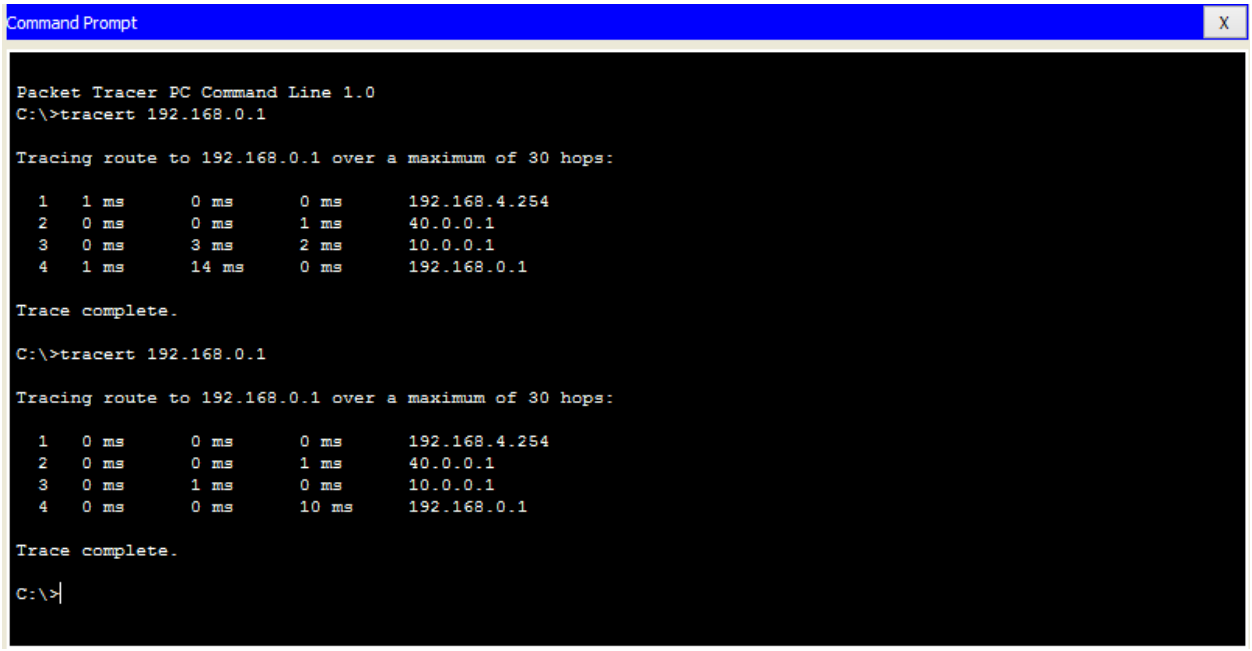
- Trace Route From Homagama to Colombo



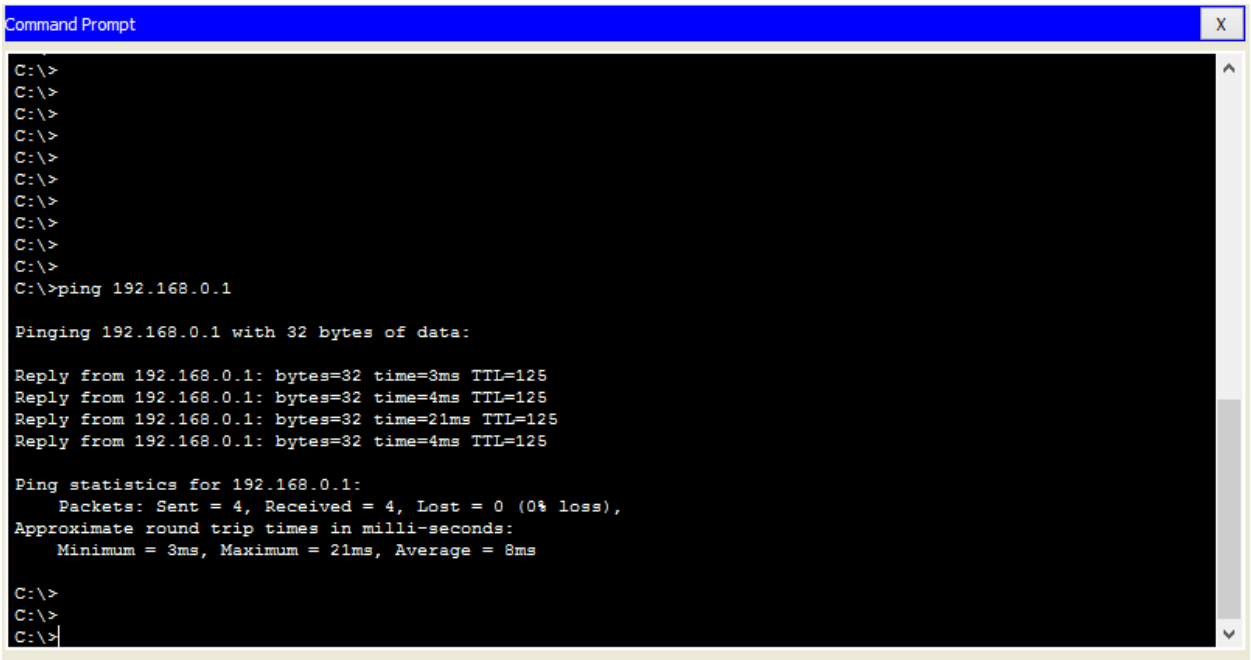
- Trace Route From Homagama To Kandy



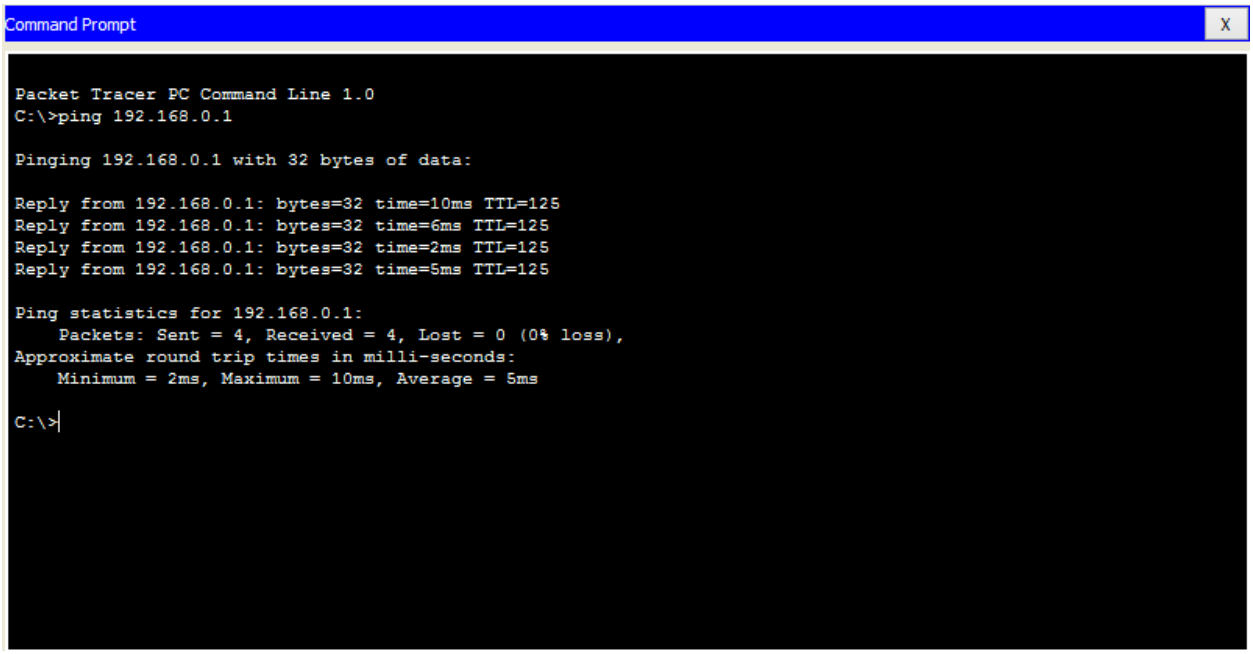
- Trace Route From Kandy to Homagama



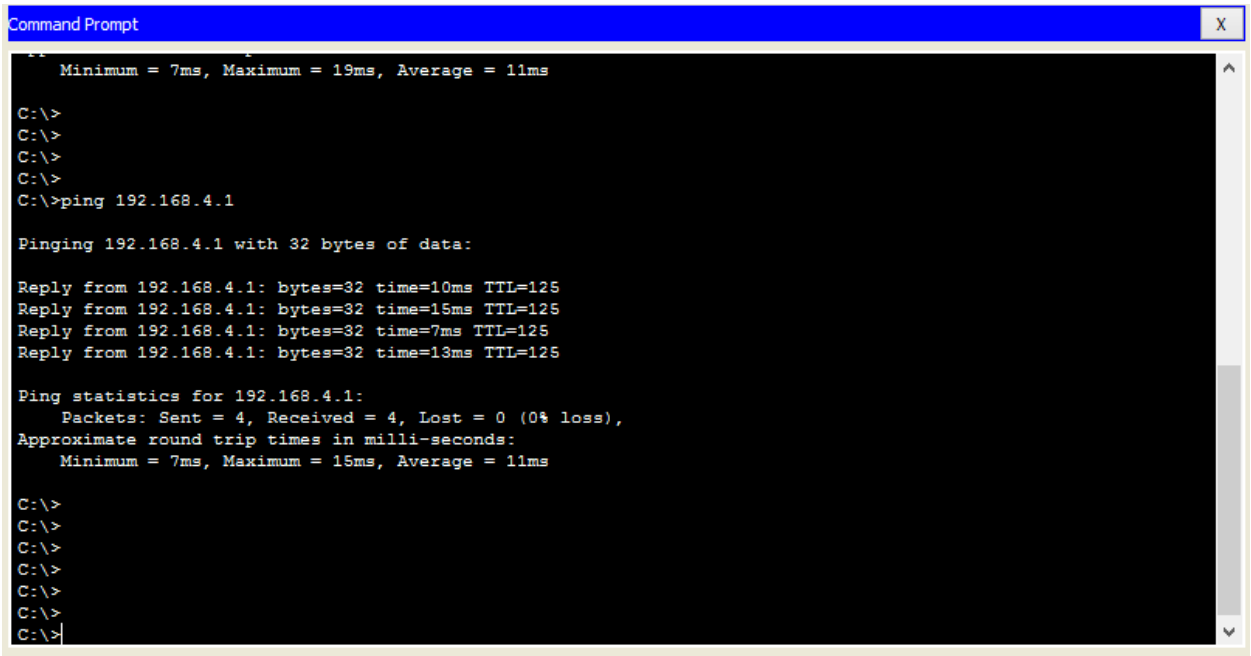
- Ping from Colombo To Homagama computing lab



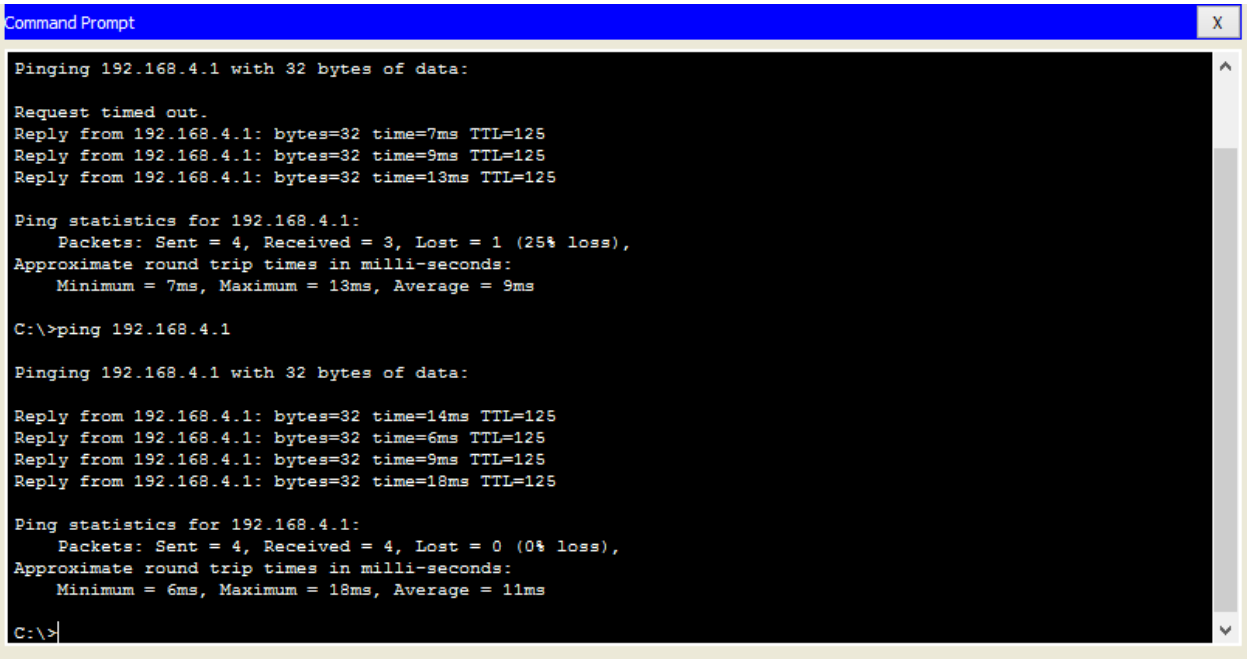
- Ping from Kandy To Homagama computing lab



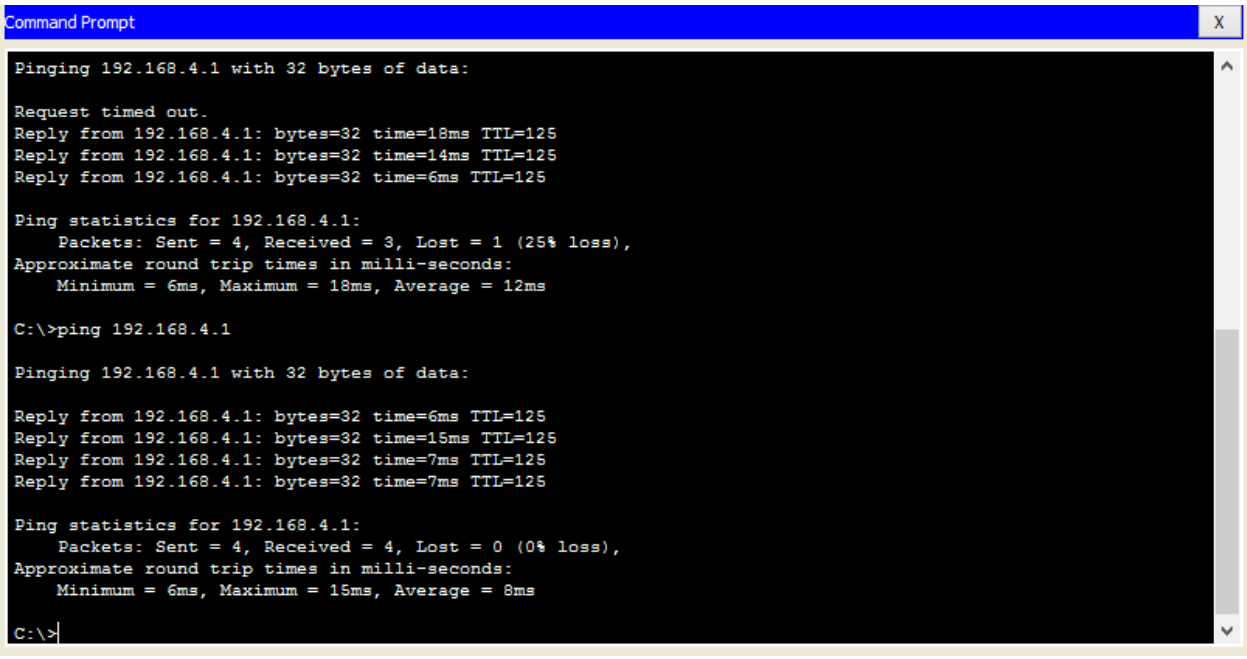
- Ping Form computing WIFI to Colombo Office



- Ping Form School of Business WIFI to Colombo Office



- Ping Form Administration division WIFI to Colombo Office



Justifying all configuration options we have chosen while comparing with possible alternatives.

1. **Why did we use 192.168.0.0 – 192.168.255.255 16 bit IP range other than using 24 bit block or 20 bit block ?**

Since 192.168.0.0 IP range can be used for 65,536 IP addresses, and the host that are in the university is less than that number we can use that range. Since it is the most common private IP range, We thought of using that range.

2. **Why did we use 6 switches in the administration division?**

Since Administration division have only 150 hosts we can use 4 switches in total. But We thought of in case if the university wants to change the location of the office, Its easy to change the place if we put each office into a separate switch. So the office can be moved with the switch without doing many changes to the network.

3. **Why did we use EIGRP without using OSPF, RIP or any other protocol?**

EIGRP (Enhanced Interior Gateway Routing Protocol) is a both distance vector and link state routing protocol, Which uses CPU, RAM , Bandwidth more Efficiently than OSPF. When we think about the design, if you are using OSPF area planning must be done vary carefully according to the future developments. When it comes to EIGRP you don't want to perform any such area planning. But EIGRP is not good protocol for multi-vender environments. Since we are only using cisco devices that won't be a problem.

4. **Why did we use Redundancy lines ?**

To increase the availability of the network, also the availability of data , we use redundancy lines. By using redundancy lines it also increases the reliability and performance of the network. Specially to reduce single point of failure, we came up with design ; redundancy lines.

5. **Why did we use VTP protocol ?**

Because it helps to reduce administrative overhead. When it comes to our case, in our network , there is more than 20 switches. Think if we are not going to use VTP , then we have to enter our VLANS to the each switches by configuring them one by one. But If we use VTP We can define our VLANS on the multilayer Switches then we have to set a VTP domain and the VTP mode as “Server” . Then Other switches which stay below multilayer switches, must set the VTP mode to client. Then all the VLANs we entered will communicate through the network.

To increase the security we must set passwords to VTP. This will help to decrease VTP failures.

6. **Why did we use multilayer Switches?**

In our Network We thought of using redundancy protocols for HIGH AVAILABILITY So We added 2, layer 3 switches to our network. There are few number of redundancy protocols , like HSRP (HOT Standby Routing Protocol), VRRP(Virtual Router Redundancy protocol), GLBP (Gateway Load balancing protocol). By considering All those three protocols, We came up with idea to use HSRP. Because Its easy to configure. Also it does not affect for routing tables or host configuration. Efficient Use OF network Resources and Higher Availability are other advantages of HSRP.

In our Solution we have added 11 VLANS. To Balance the network Traffic flow We Keep first 5 VLAN networks Active on the multilayer switch 0 and others kept as standby. In Multilayer Switch 1 we assign first 5 networks Standby and Others Active. We assign different IPs for VLANS in both layer 3 switches and one VIRTUAL IP for each VLAN . So We can access those VLANs using that virtual IP.

EX -

```
interface Vlan10
 mac-address 0001.c9b7.ec01
 ip address 192.168.1.252 255.255.254.0
 standby 1 ip 192.168.1.254
 standby 1 priority 150
 standby 1 preempt
!
```

```
interface Vlan90
 mac-address 0001.c9b7.ec09
 ip address 192.168.3.28 255.255.255.224
 standby 1 ip 192.168.3.30
 standby 1 priority 120
 standby 1 preempt
!
```

7. **Why did we use Different VLAN for WIFI ?**

Because using that VLAN Any user can access internet through WIFI. As well we can set DHCP to that VLAN.

8. **Why we use VLSM(variable length subnet masking).**

Usage of VLSM reduces the IP address wastage. So proper usage of IPs we use VLSM. “VLSM allows network engineers to divide an IP address space into a hierarchy of subnets of different sizes, making it possible to create subnets with very different host counts without wasting large numbers of addresses.”[3]

References

[1] [online]

“ http://www.omnisecu.com/cisco-certified-network-associate-ccna/eigrp-metric-calculation-formula-example.php”

[2] [online]

“http://www.ciscopress.com/articles/article.asp?p=2180210&seqNum=12”

[3] [online]
“https://searchnetworking.techtarget.com/definition/variable-length-subnet-mask”

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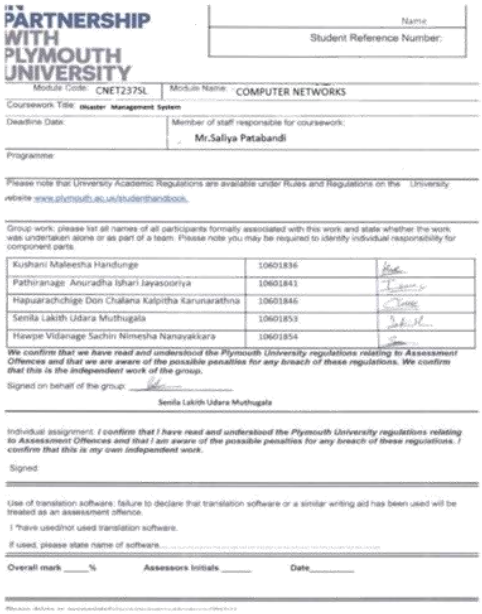

PARTNERSHIP WITH PLYMOUTH UNIVERSITY

Name

Student Reference Number:

Module Code: CNET237SL | Module Name: COMPUTER NETWORKS

Coursework Title: Disaster Management System

Deadline Date: | Member of staff responsible for coursework: Mr.Saliya Pathabandi

Programme:

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Group work: please list all names of all participants formally associated with this work and state whether the work was undertaken alone or as part of a team. Please note you may be required to identify individual responsibility for component parts.

Kushani Maleesha Handunge	10601836	
Pathiranage Anuradha Ishari Jayasooriya	10601841	
Hapuarachchige Don Chalana Kalpitha Karunarathna	10601846	
Senila Lakith Udara Muthugala	10601853	
Hewpe Vidanage Sachini Nimesha Nanayakkara	10601854	

We confirm that we have read and understood the Plymouth University regulations relating to Assessment Offences and that we are aware of the possible penalties for any breach of these regulations. We confirm that this is the independent work of the group.

Signed on behalf of the group:

Senila Lakith Udara Muthugala

Individual assignment: *I confirm that I have read and understood the Plymouth University regulations relating to Assessment Offences and that I am aware of the possible penalties for any breach of these regulations. I confirm that this is my own independent work.*

Signed:

Use of translation software: failure to declare that translation software or a similar writing aid has been used will be treated as an assessment offence.

I *have used/not used translation software.

If used, please state name of software:

Overall mark ____% Assessors Initials _____ Date_____