NETWORK DESIGN FOR LIBRARY AND COMPUTER DEPARTMENT OF FACULTY OF ENGINNERING UNIVERSITY OF JAFFNA

SENEVIRATHNA S.J

2018/E/110

FACULTY OF ENGINEERING

20 MAR 2021

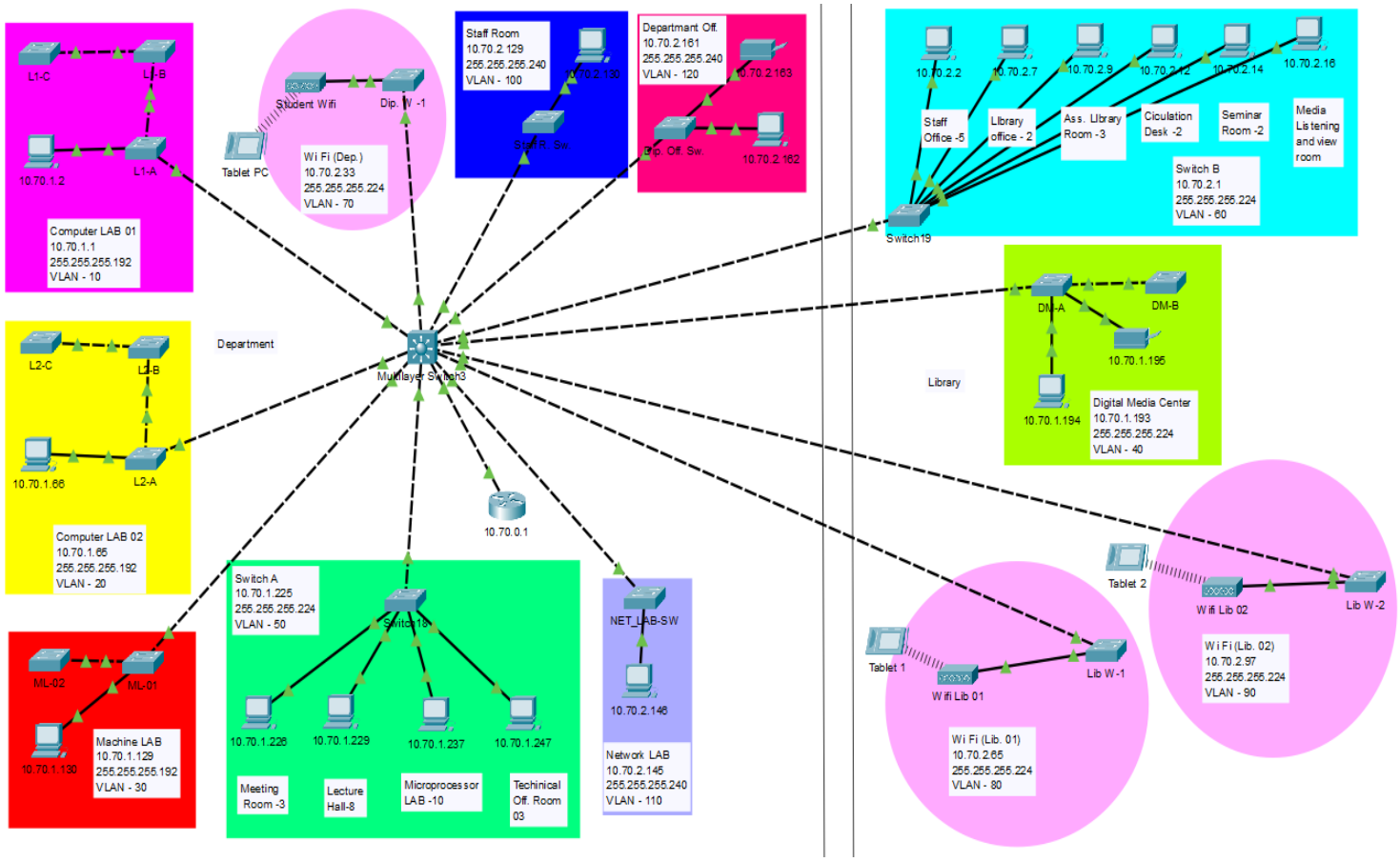
VLAN Table

VLAN Name	`	Needed Size
10	computer Lab 01	60
20	computer Lab 02	50
30	machine Lab	40
40	***Digital media center***	***30***
50	meeting R+L. Hall+ Micro LAB+ Tech Officers	24
60	***Lib Off+ ASS. Lib Off.+Cir. Desk +Semina R.+ Staff Off.+ med***	***24***
70	Wi-Fi routers (Department)	Not given exact number -20
80	***Wi-Fi routers (Lib 1)***	***Not given exact number -20***
90	***Wi-Fi routers (Lib 2)***	***Not given exact number -20***
100	staff R	15
110	network E lab	8
120	Department office	3

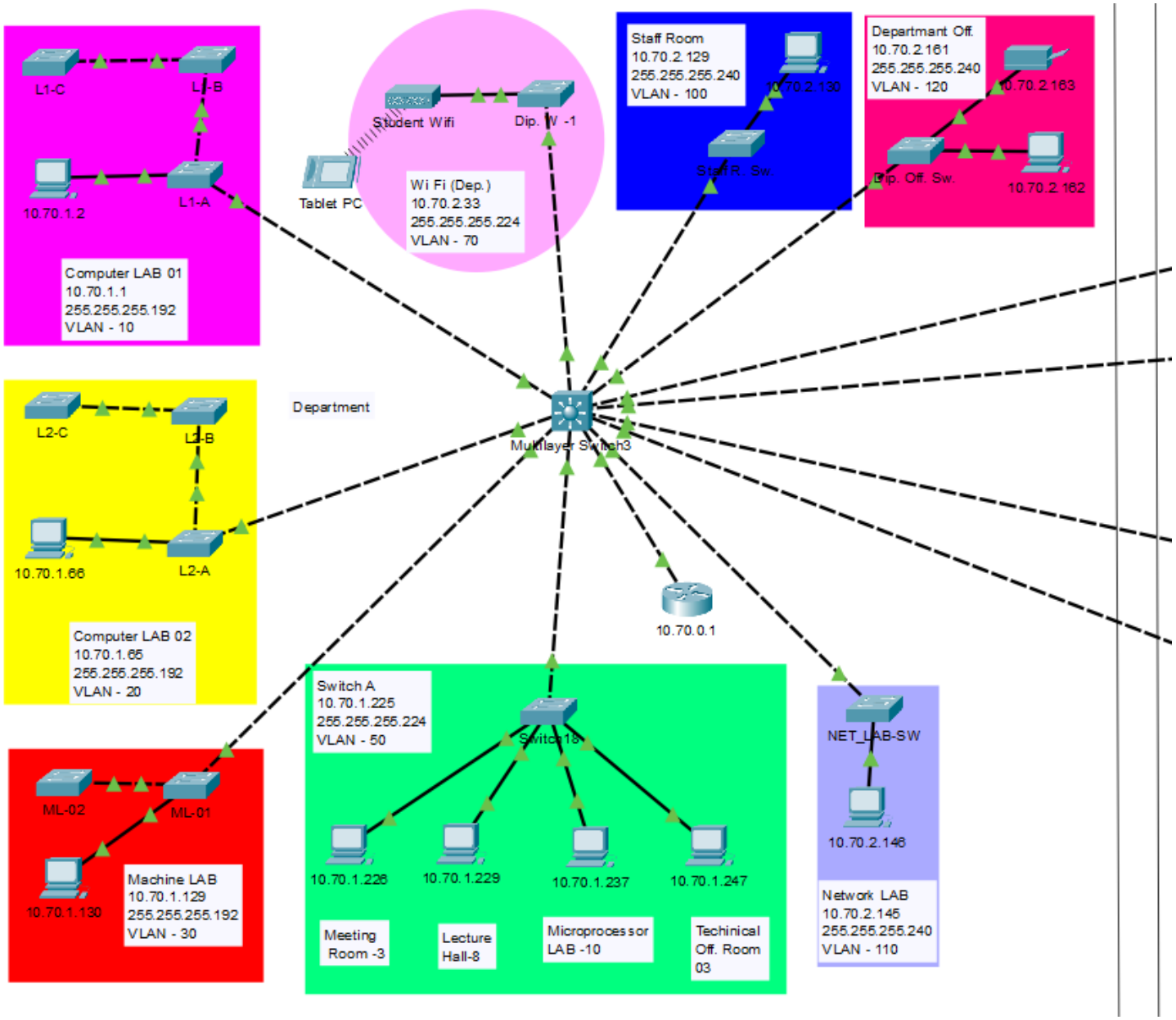
Assign IPs for Each VLANs

VLAN	Allocated Size	Address	Range	Sub net mask
10	64	10.70.1.0	10.70.1.1 - 10.70.1.63	255.255.255.192
20	64	10.70.1.64	10.70.1.65 - 10.70.1.127	255.255.255.192
30	64	10.70.1.128	10.70.1.129 - 10.70.1.191	255.255.255.192
40	***32***	***10.70.1.192***	***10.70.1.193 - 10.70.1.223***	***255.255.255.224***
50	32	10.70.1.224	10.70.1.225 - 10.70.1.255	255.255.255.224
60	***32***	***10.70.2.0***	***10.70.2.1 - 10.70.2.31***	***255.255.255.224***
70	32	10.70.2.32	10.70.2.33 - 10.70.2.63	255.255.255.224
80	***32***	***10.70.2.64***	***10.70.2.65 - 10.70.2.95***	***255.255.255.224***
90	***32***	***10.70.2.96***	***10.70.2.97 - 10.70.2.127***	***255.255.255.224***
100	16	10.70.2.128	10.70.2.129 - 10.70.2.143	255.255.255.240
110	16	10.70.2.144	10.70.2.145 - 10.70.2.159	255.255.255.240
120	16	10.70.2.160	10.70.2.161 - 10.70.2.175	255.255.255.240

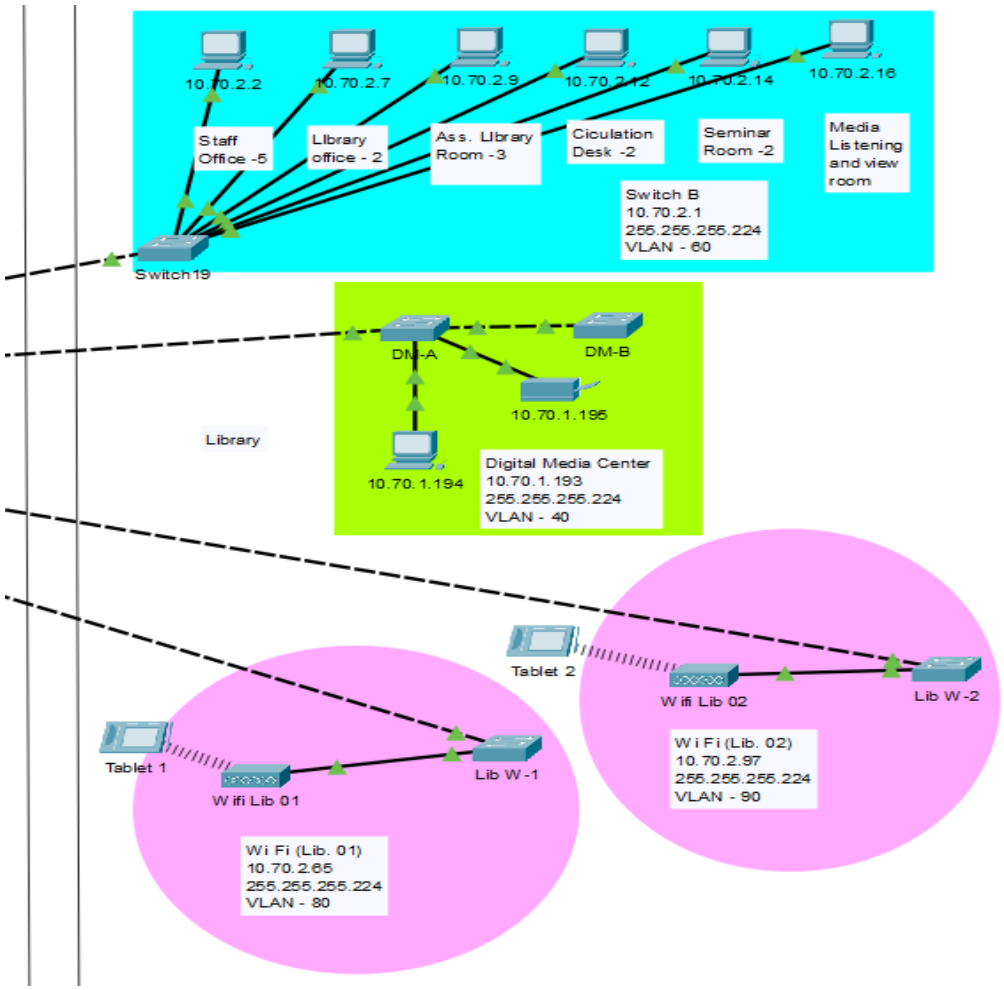
Diagram of Network.



Department


L1-C
L1-B
10.70.1.2
L1-A
Computer LAB 01
10.70.1.1
255.255.255.192
VLAN - 10
Student Wifi
Dip. W -1
Tablet PC
Wi Fi (Dep.)
10.70.2.33
255.255.255.224
VLAN - 70
Staff Room
10.70.2.129
255.255.255.240
VLAN - 100
10.70.2.130
Staff R. Sw.
Department Off.
10.70.2.161
255.255.255.240
VLAN - 120
10.70.2.163
Dip. Off. Sw.
10.70.2.162
L2-C
L2-B
10.70.1.66
L2-A
Computer LAB 02
10.70.1.65
255.255.255.192
VLAN - 20
Department
Multilayer Switch3
10.70.0.1
Switch A
10.70.1.225
255.255.255.224
VLAN - 50
Switch18
10.70.1.226
10.70.1.229
10.70.1.237
10.70.1.247
Meeting Room -3
Lecture Hall-8
Microprocessor LAB -10
Techinical Off. Room 03
ML-02
ML-01
10.70.1.130
Machine LAB
10.70.1.129
255.255.255.192
VLAN - 30
NET_LAB-SW
10.70.2.146
Network LAB
10.70.2.145
255.255.255.240
VLAN - 110

Library

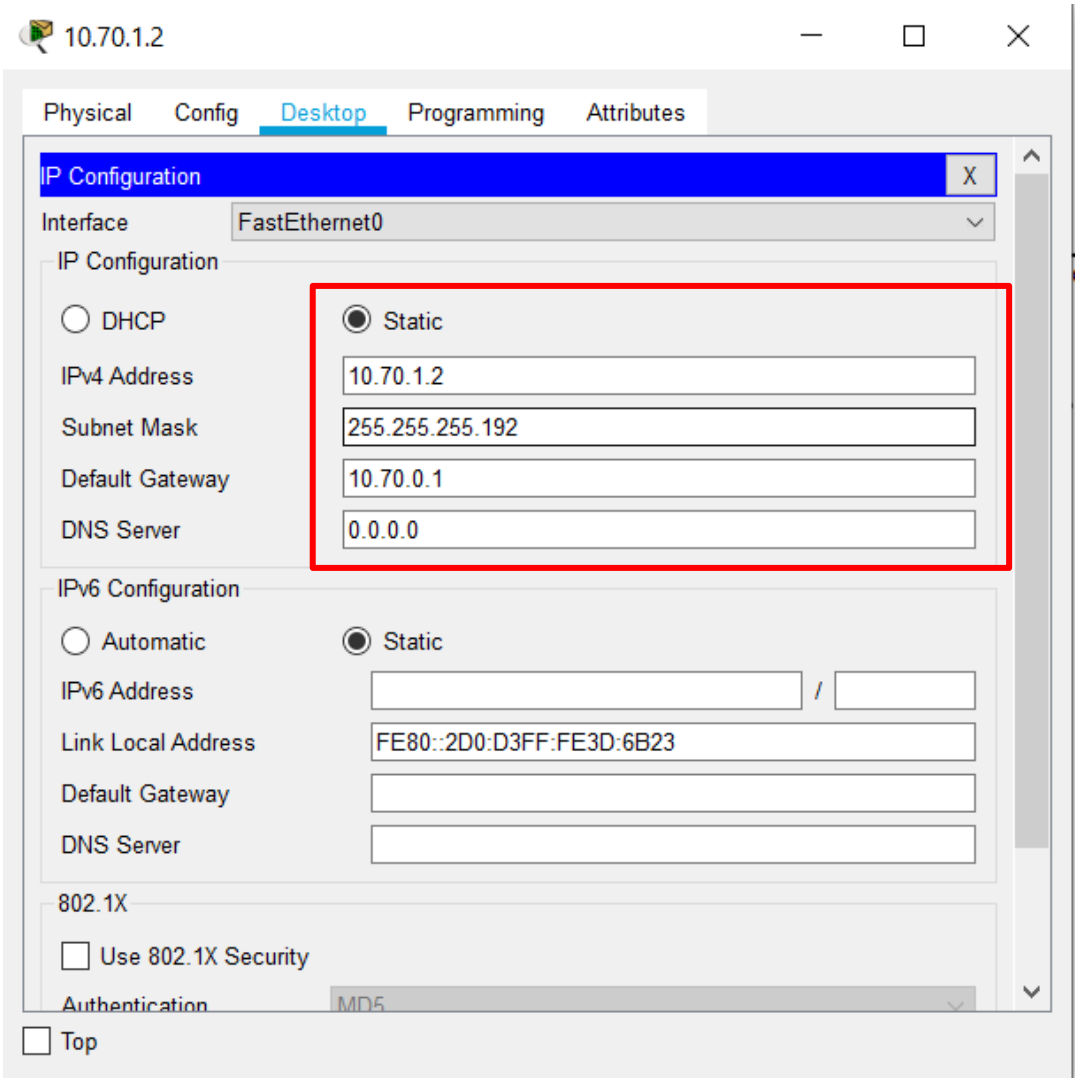


Notes:

1. IP addresses were allocated for future usage Specially in Laboratories. (Computer LAB 1,2, Machine Learning LAB, Networking LAB and Digital learning and media center)
2. 3 meeting room, 8 Lecture Hall Microprocessor LAB, Technical office room are connected to one switch called Switch A
3. 5 Staff office, Library office, Ass. Library rooms, Circulation Desk, seminar room, Media room are connected to one switch called Switch B.

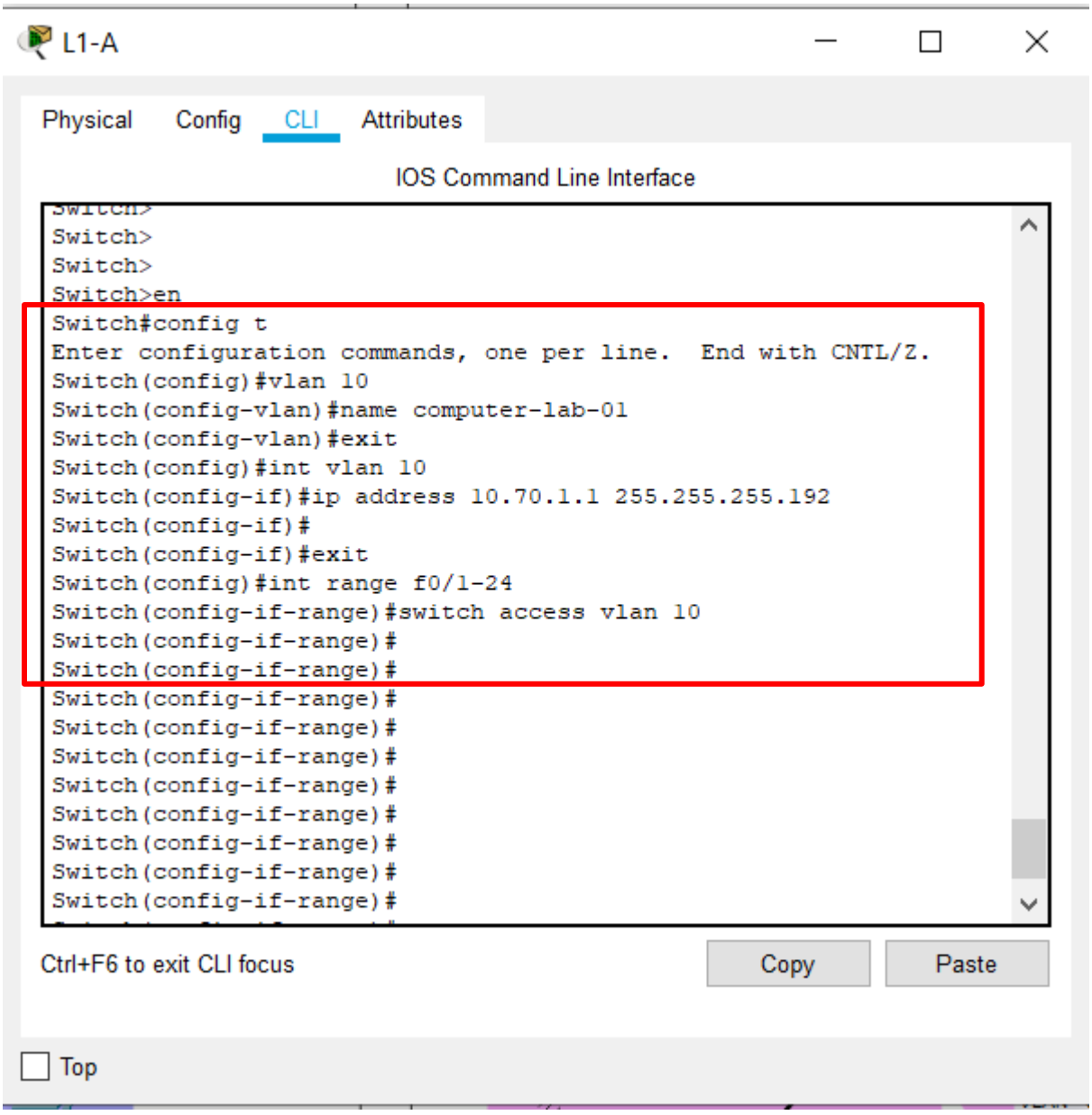
CREATING VLANs

1. PC configuration (For VLAN 01)

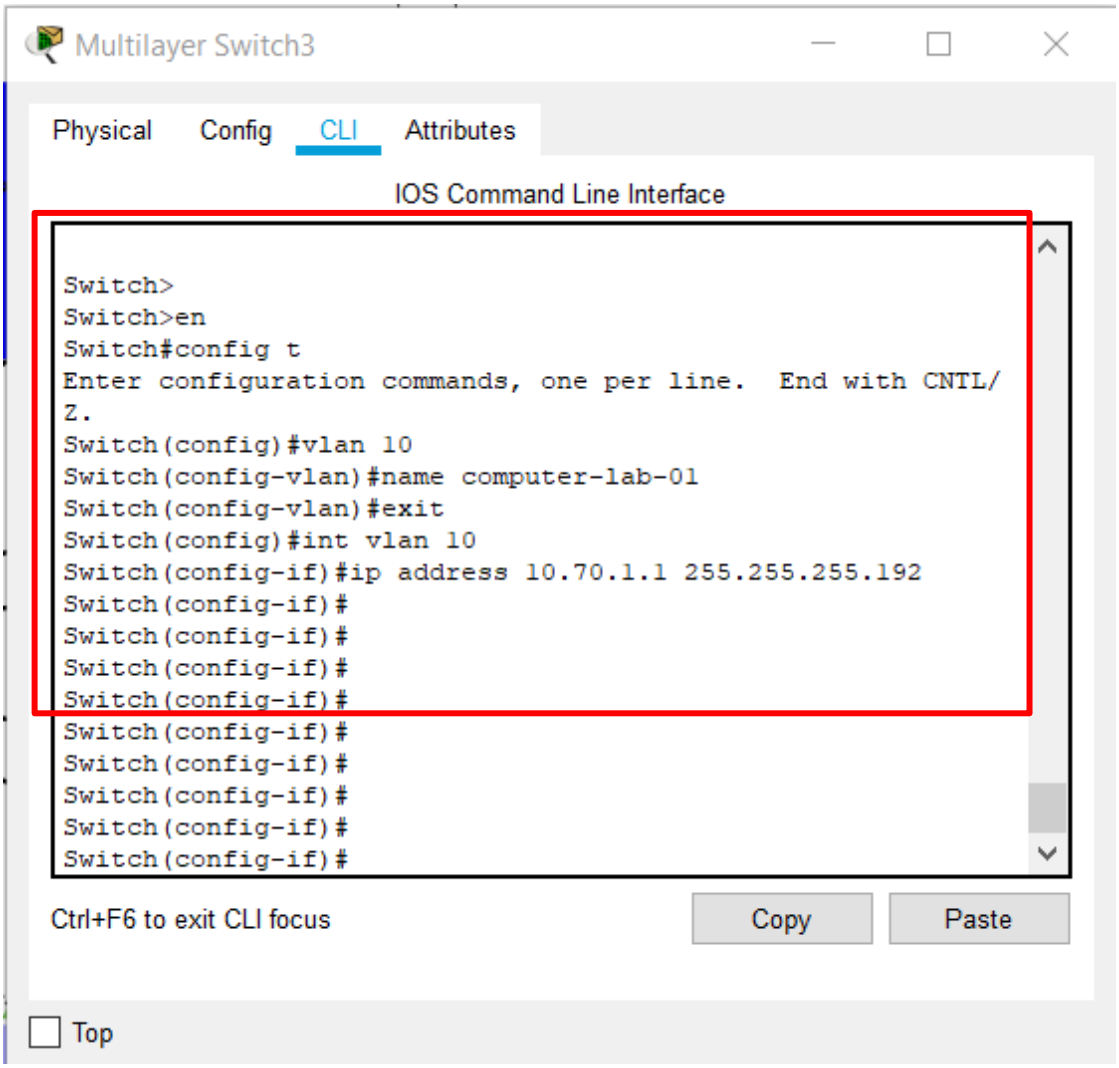


Configure the pc; by giving IP address, Subnet mask and Default gate way.

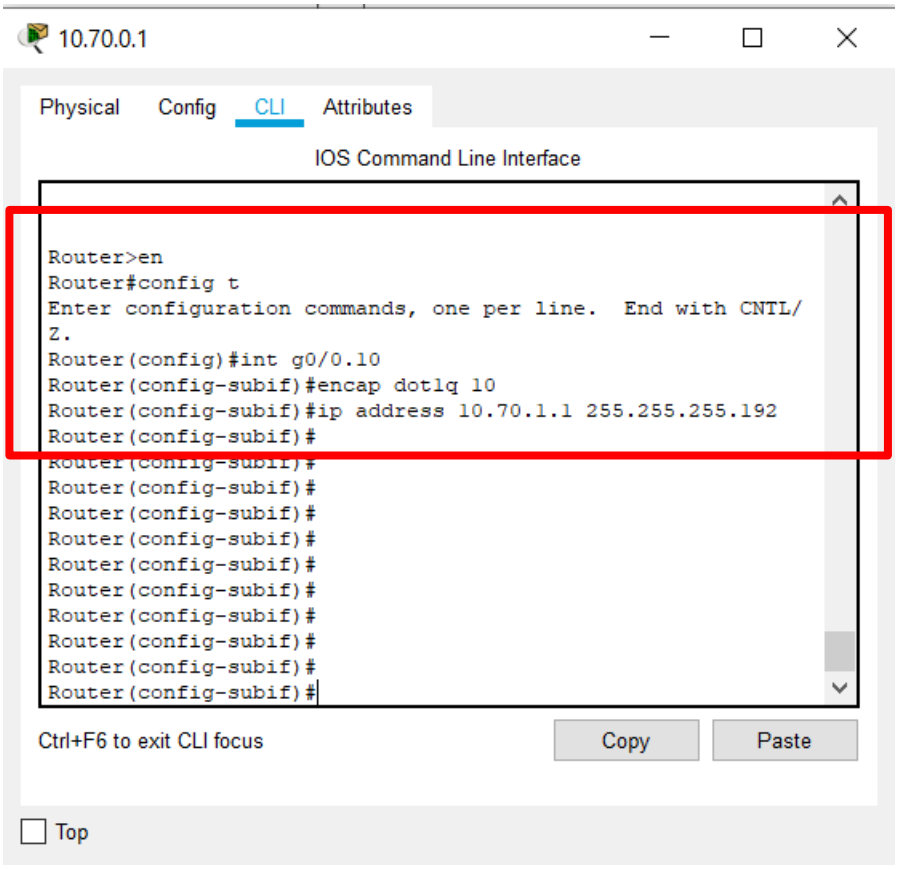
2. VLAN configuration On the Sub switch. (For VLAN 01)



3. VLAN configuration On the Multi switch. (For VLAN 01)



4. VLAN configuration On the Router. (For VLAN 01)



5. All VLANs are created As Previous steps.

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
FastEthernet0/1	Up	10	<not set>	<not set>	0060.471D.6901
FastEthernet0/2	Up	20	<not set>	<not set>	0060.471D.6902
FastEthernet0/3	Up	30	<not set>	<not set>	0060.471D.6903
FastEthernet0/4	Up	50	<not set>	<not set>	0060.471D.6904
FastEthernet0/5	Up	40	<not set>	<not set>	0060.471D.6905
FastEthernet0/6	Up	60	<not set>	<not set>	0060.471D.6906
FastEthernet0/7	Up	70	<not set>	<not set>	0060.471D.6907
FastEthernet0/8	Up	80	<not set>	<not set>	0060.471D.6908
FastEthernet0/9	Up	90	<not set>	<not set>	0060.471D.6909
FastEthernet0/10	Up	100	<not set>	<not set>	0060.471D.690A
FastEthernet0/11	Up	110	<not set>	<not set>	0060.471D.690B
FastEthernet0/12	Up	120	<not set>	<not set>	0060.471D.690C
FastEthernet0/13	Down	1	<not set>	<not set>	0060.471D.690D
FastEthernet0/14	Down	1	<not set>	<not set>	0060.471D.690E
FastEthernet0/15	Down	1	<not set>	<not set>	0060.471D.690F
FastEthernet0/16	Down	1	<not set>	<not set>	0060.471D.6910
FastEthernet0/17	Down	1	<not set>	<not set>	0060.471D.6911
FastEthernet0/18	Down	1	<not set>	<not set>	0060.471D.6912
FastEthernet0/19	Down	1	<not set>	<not set>	0060.471D.6913
FastEthernet0/20	Down	1	<not set>	<not set>	0060.471D.6914
FastEthernet0/21	Down	1	<not set>	<not set>	0060.471D.6915
FastEthernet0/22	Down	1	<not set>	<not set>	0060.471D.6916
FastEthernet0/23	Down	1	<not set>	<not set>	0060.471D.6917
FastEthernet0/24	Down	1	<not set>	<not set>	0060.471D.6918
GigabitEthernet0/1	Up	--	<not set>	<not set>	0060.471D.6919
GigabitEthernet0/2	Down	1	<not set>	<not set>	0060.471D.691A
Vlan1	Down	1	<not set>	<not set>	0060.5C6B.1726
Vlan10	Up	10	10.70.1.1/26	<not set>	0060.5C6B.1701
Vlan20	Up	20	10.70.1.95/26	<not set>	0060.5C6B.1702
Vlan30	Up	30	10.70.1.129/26	<not set>	0060.5C6B.1703
Vlan40	Up	40	10.70.1.193/27	<not set>	0060.5C6B.1704
Vlan50	Up	50	10.70.1.225/27	<not set>	0060.5C6B.1705
Vlan60	Up	60	10.70.2.1/27	<not set>	0060.5C6B.1706
Vlan70	Up	70	10.70.2.33/27	<not set>	0060.5C6B.1707
Vlan80	Up	80	10.70.2.65/27	<not set>	0060.5C6B.1708
Vlan90	Up	90	10.70.2.97/27	<not set>	0060.5C6B.1709
Vlan100	Up	100	10.70.2.129/28	<not set>	0060.5C6B.170A
Vlan110	Up	110	10.70.2.145/28	<not set>	0060.5C6B.170B
Vlan120	Up	120	10.70.2.161/28	<not set>	0060.5C6B.170C

Hostname: Switch

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

In Router.

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
GigabitEthernet0/0	Up	--	10.70.0.1/26	<not set>	0000.0CCA.8401
GigabitEthernet0/0.10	Up	--	10.70.1.1/26	<not set>	0000.0CCA.8401
GigabitEthernet0/0.20	Up	--	10.70.1.65/26	<not set>	0000.0CCA.8401
GigabitEthernet0/0.30	Up	--	10.70.1.129/26	<not set>	0000.0CCA.8401
GigabitEthernet0/0.40	Up	--	10.70.1.193/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.50	Up	--	10.70.1.225/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.60	Up	--	10.70.2.1/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.70	Up	--	10.70.2.33/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.80	Up	--	10.70.2.65/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.90	Up	--	10.70.2.97/27	<not set>	0000.0CCA.8401
GigabitEthernet0/0.100	Up	--	10.70.2.129/28	<not set>	0000.0CCA.8401
GigabitEthernet0/0.110	Up	--	10.70.2.145/28	<not set>	0000.0CCA.8401
GigabitEthernet0/0.120	Up	--	10.70.2.161/28	<not set>	0000.0CCA.8401
GigabitEthernet0/1	Up	--	10.70.0.65/26	<not set>	0000.0CCA.8402
GigabitEthernet0/2	Down	--	<not set>	<not set>	0000.0CCA.8403
Vlan1	Down	1	<not set>	<not set>	00E0.A394.53EE

Hostname: Router

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

All Codes for VLANs.

**********vlan10**********

switch

```
vlan 10
name computer-lab-01
exit
int vlan 10
ip address 10.70.1.1 255.255.255.192
exit
int range f0/1-24
switch access vlan 10
```

router

```
int g0/0.10
encap dot1q 10
ip address 10.70.1.1 255.255.255.192
```

**********vlan20**********

switch

```
vlan 20
name computer-lab-02
exit
int vlan 20
ip address 10.70.1.65 255.255.255.192
exit
int range f0/1-24
switch access vlan 20
```

router

```
int g0/0.20
encap dot1q 20
ip address 10.70.1.65 255.255.255.192
```

**********vlan30**********

switch

```
vlan 30
name machine-lab
exit
int vlan 30
ip address 10.70.1.129 255.255.255.192
exit
int range f0/1-24
switch access vlan 30
```

router

```
int g0/0.30
encap dot1q 30
ip address 10.70.1.129 255.255.255.192
```

**********vlan40**********

switch

```
vlan 40
name digital-m-center
exit
int vlan 40
ip address 10.70.1.193 255.255.255.224
exit
int range f0/1-24
switch access vlan 40
```

router

```
int g0/0.40
encap dot1q 40
ip address 10.70.1.193 255.255.255.224
```

**********vlan50**********

switch

```
vlan 50
name switch-a
exit
int vlan 50
ip address 10.70.1.225 255.255.255.224
exit
int range f0/1-24
switch access vlan 50
```

router

```
int g0/0.50
encap dot1q 50
ip address 10.70.1.225 255.255.255.224
```

**********vlan60**********

switch

```
vlan 60
name switch-b
exit
int vlan 60
ip address 10.70.2.1 255.255.255.224
exit
int range f0/1-24
switch access vlan 60
```

router

```
int g0/0.60
encap dot1q 60
ip address 10.70.2.1 255.255.255.224
```

**********vlan70**********

switch

```
vlan 70
name wifi-dep
exit
int vlan 70
ip address 10.70.2.33 255.255.255.224
exit
int range f0/1-24
switch access vlan 70
```

router

```
int g0/0.70
encap dot1q 70
ip address 10.70.2.33 255.255.255.224
```

**********vlan80**********

switch

```
vlan 80
name wifi-lib-1
exit
int vlan 80
ip address 10.70.2.65 255.255.255.224
exit
int range f0/1-24
switch access vlan 80
```

router

```
int g0/0.80
encap dot1q 80
ip address 10.70.2.65 255.255.255.224
```

**********vlan90**********

switch

```
vlan 90
name wifi-lib-2
exit
int vlan 90
ip address 10.70.2.97 255.255.255.224
exit
int range f0/1-24
switch access vlan 90
```

router

```
int g0/0.90
encap dot1q 90
ip address 10.70.2.97 255.255.255.224
```

**********vlan100**********

switch

```
vlan 100
name staff-room
exit
int vlan 100
ip address 10.70.2.129 255.255.255.240
exit
int range f0/1-24
switch access vlan 100
```

router

```
int g0/0.100
encap dot1q 100
ip address 10.70.2.129 255.255.255.240
```

**********vlan110**********

switch

```
vlan 110
name network-lab
exit
int vlan 110
ip address 10.70.2.145 255.255.255.240
exit
int range f0/1-24
switch access vlan 110
```

router

```
int g0/0.110
encap dot1q 110
ip address 10.70.2.145 255.255.255.240
```

**********vlan120**********

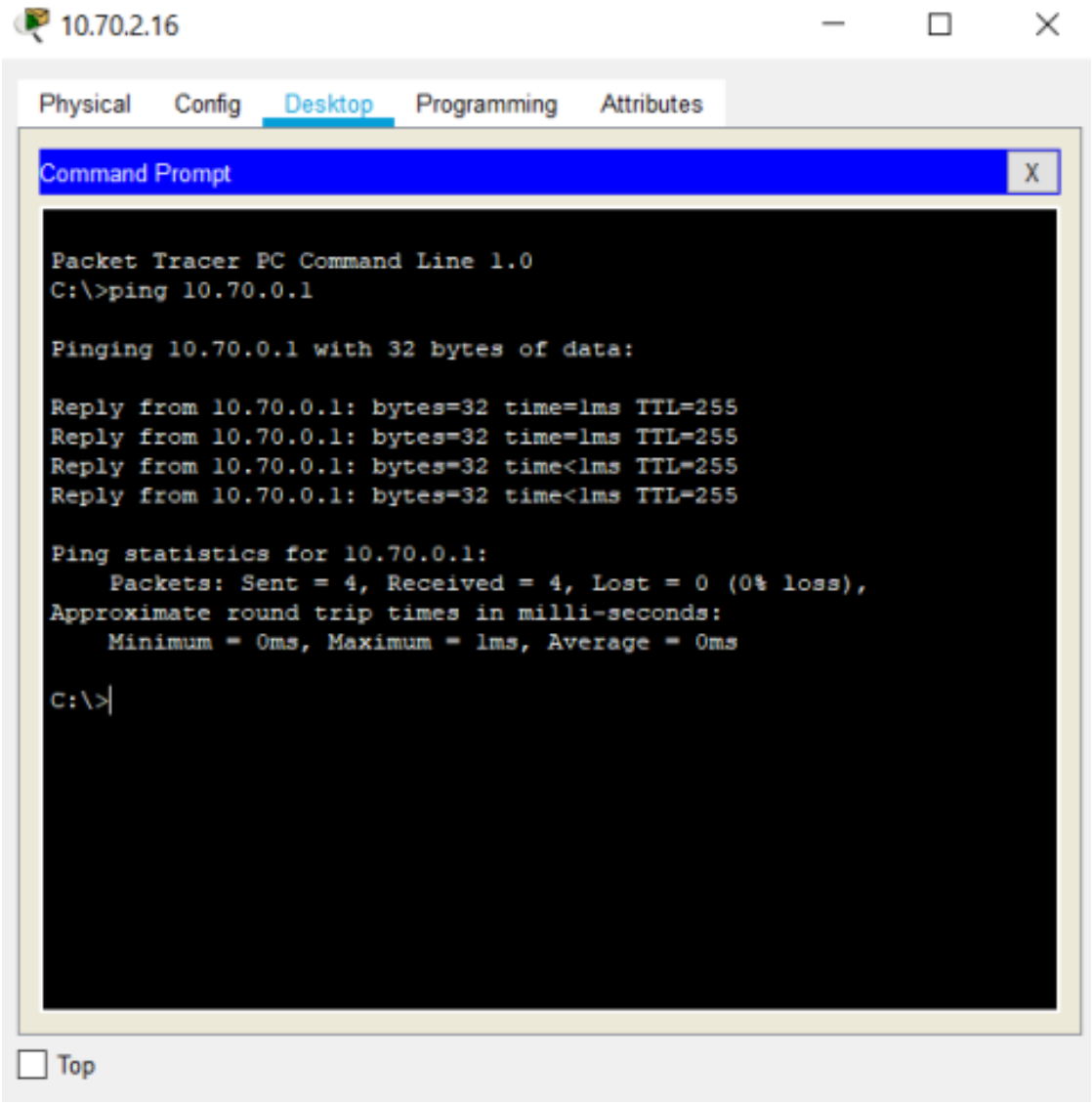
switch

```
vlan 120
name department-office
exit
int vlan 120
ip address 10.70.2.161 255.255.255.240
exit
int range f0/1-24
switch access vlan 120
```

router

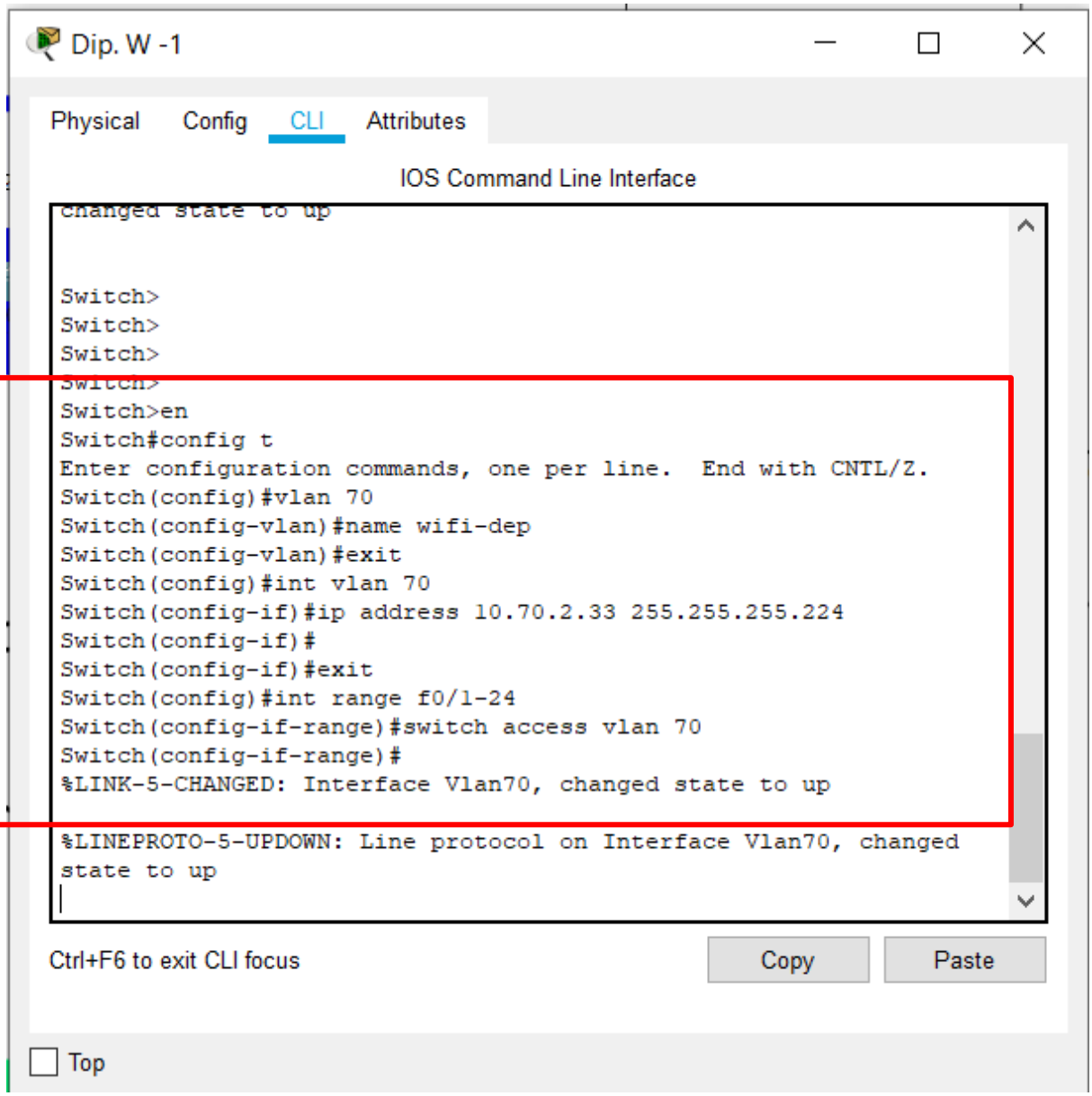
```
int g0/0.120
encap dot1q 120
ip address 10.70.2.161 255.255.255.240
```

Checking All are Working One by one

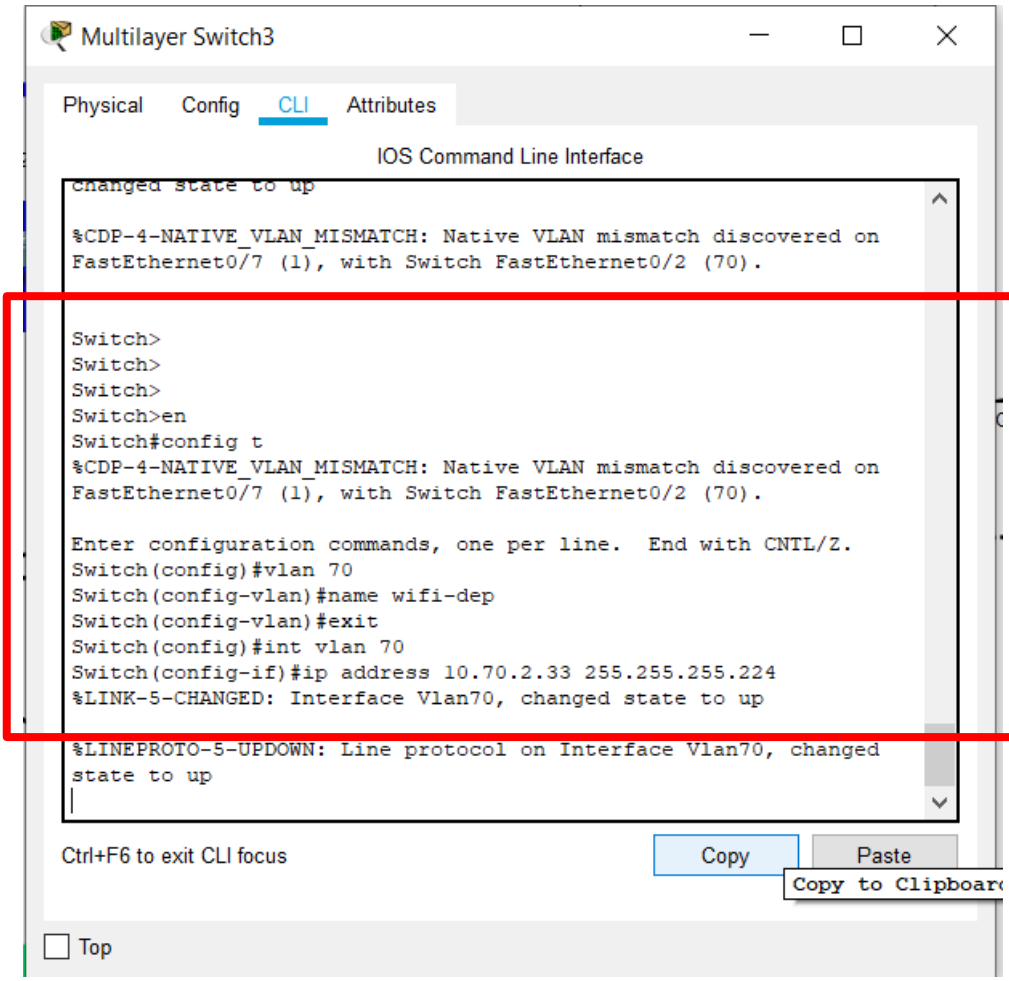


Wi-Fi Access Points Configuration Details

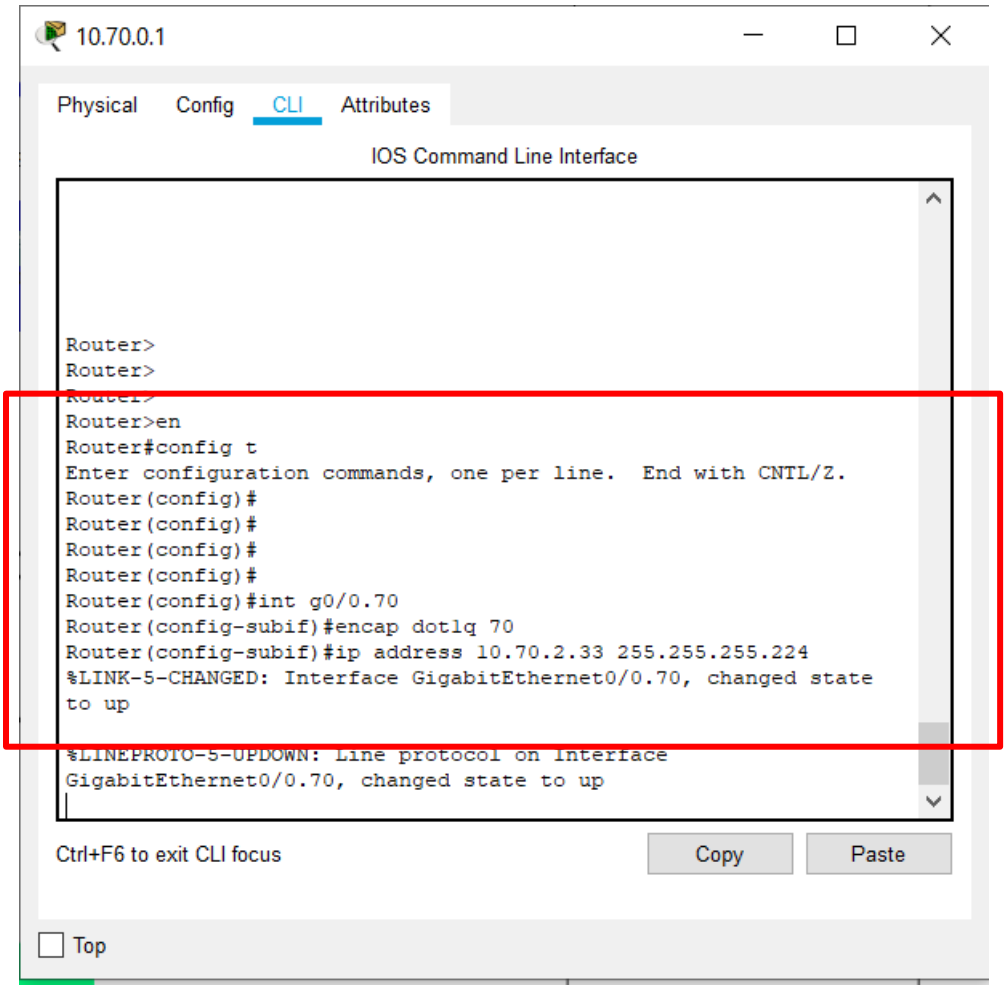
1. Wi-Fi configuration on Local Switch. (VLAN 70 – Lib Wi-Fi)



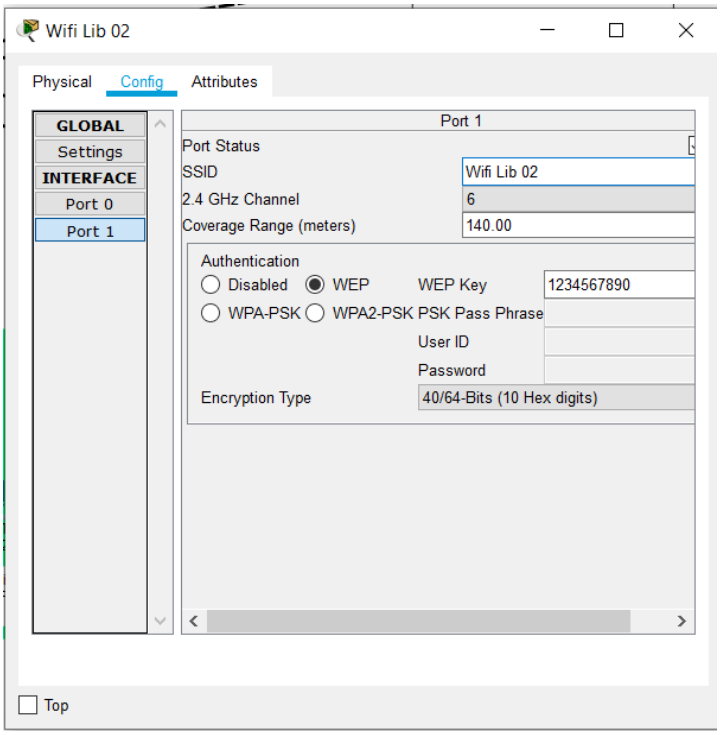
2. Wi fi configuration in Multilayer switch. (VLAN 70 – Lib Wi-Fi)



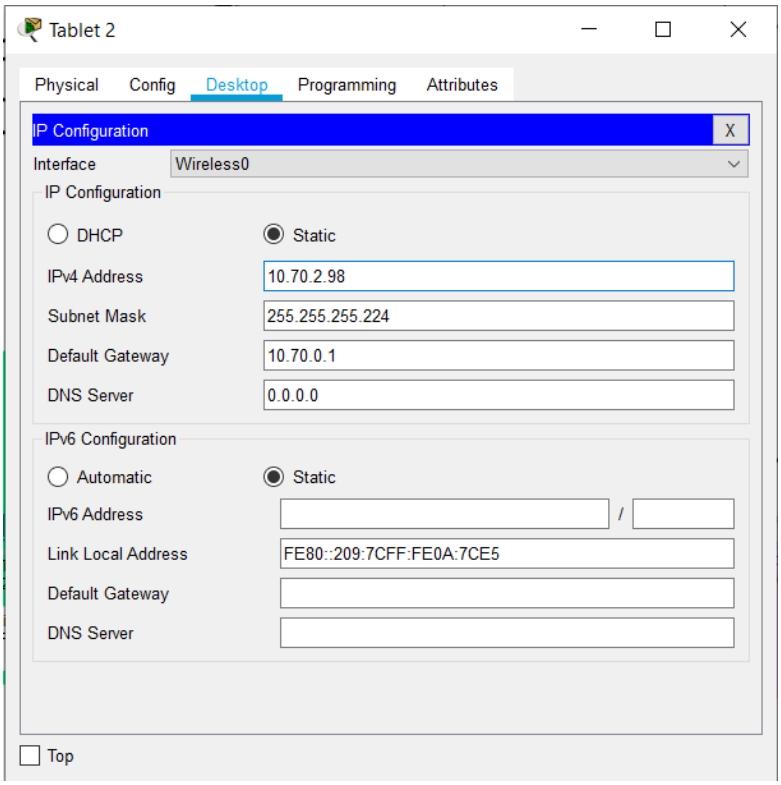
3. Wi fi configuration in Router. (VLAN 70 – Lib Wi-Fi)



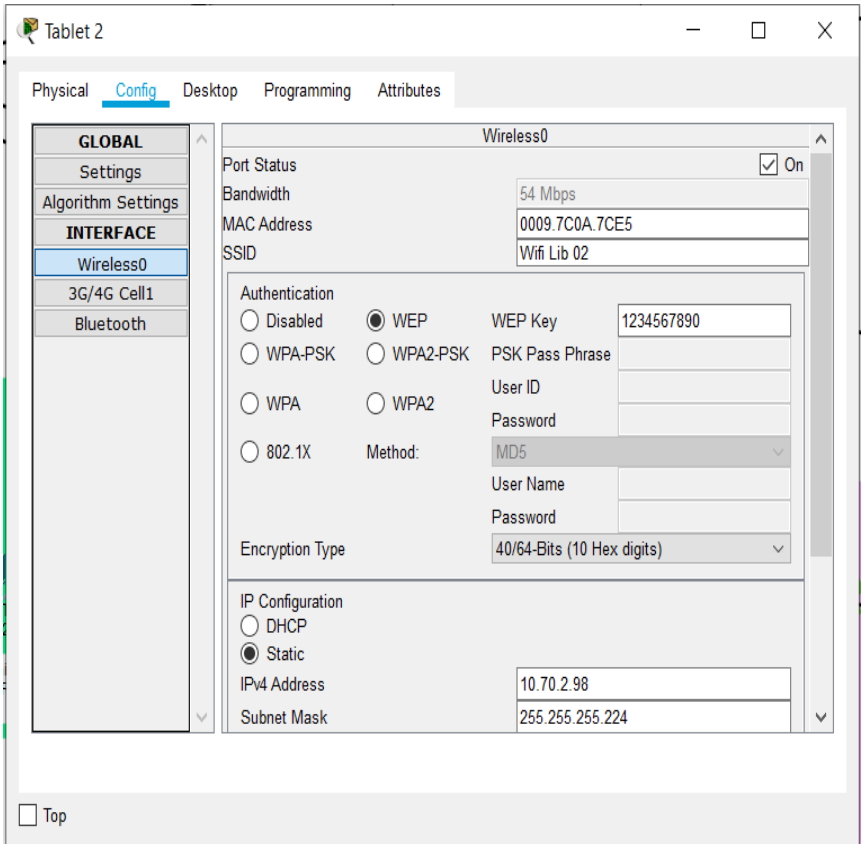
4. Wi-Fi SSID settings



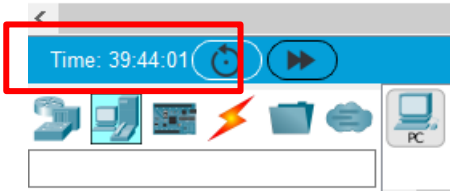
5. Tablet Configuration Settings.



6. Tablet Connected to Wi-Fi



7. Time Dedication on The Assignment



Discussion:

Network design is a category of systems design that deals with data transport mechanisms. As with other systems' design disciplines, network design follows an analysis stage, where requirements are generated, and precedes implementation, where the system (or relevant system component) is constructed. The objective of network design is to satisfy data communication requirements while minimizing expense. Requirement scope can vary widely from one network design project to another based on geographic particularities and the nature of the data requiring transport.

Network analysis may be conducted at an inter-organizational, organizational, or departmental level. The requirements generated during the analysis may therefore define an inter-network connecting two or more organizations, an enterprise network that connects the departments of a single organization, or a departmental network to be designed around specific divisional needs. Inter-networks and enterprise networks often span multiple buildings, some of which may be hundreds or thousands of miles apart. The distance between physical connections often dictates the type of technology that must be used to facilitate data transmission.