WIFI CHANNELS AND AD-HOC INFRA TOGGLE

Under the guidance of **Prof. Neeraj Tyagi**

Harsh Narayan (2021CA041)
Nitin Kumar Gupta (2021CA070)
Vipin Kumar Yadav (2021CA114)
Pawan Patidar (2021CA075)
Subhojit Kundu (2021CA106)

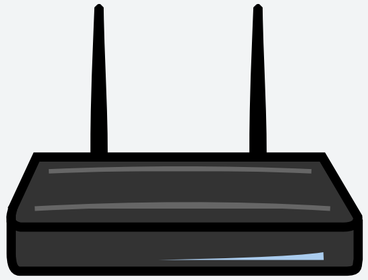
PROBLEM STATEMENT

Design the map for the wifi access point layout in the Swami Vivekanand Boys Hostel.

Develop a method to stream movies between two devices in auto switch mode between ad hoc and infrastructure.

TOOLS AND TECHNOLOGIES USED

ubuntu



Non-overlapping channels

There are 13 channels available on the 2.4GHz band, channels 1 – 13. You should never use overlapping channels that are close to one another. You can use channels 1,6, and 11 on three different Wi-Fi transmitters without them overlapping each other.

READINGS

To study the range and interference of the CISCO router we tested the access points available in the Patel Hostel building based on its range and frequency and channel set up.

We studied four routers of the mentioned MAC address, two of which were situated on the ground floor and the rest of the two were installed at first.

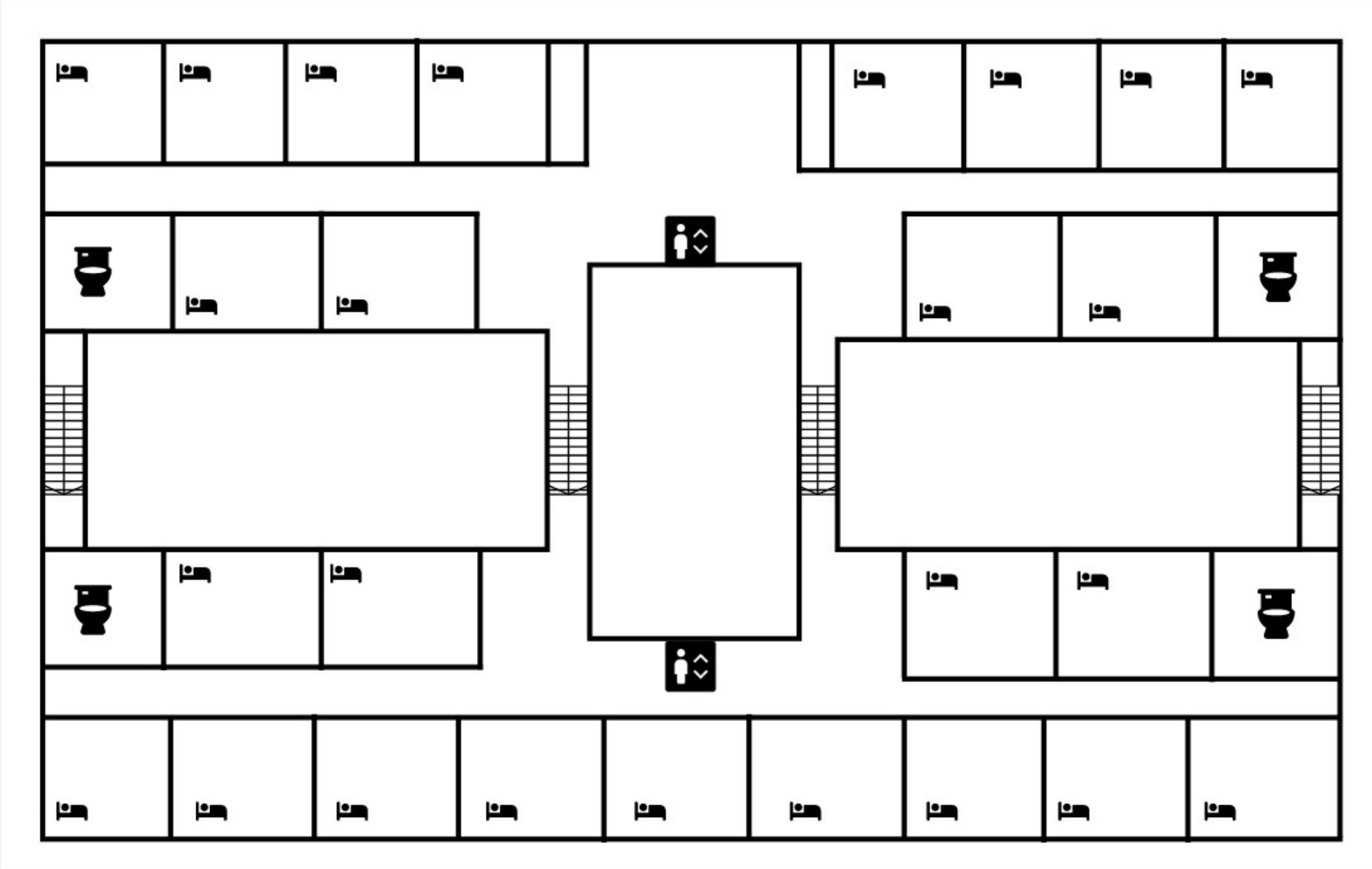
ROOM NO	MAC ADDRESS	FREQ	CHANNEL
19	C4: B3 : 6A: 1D : F3 : 0F	5 GHZ	64
27	C4: B3 : 6A: 1D : F6 : C0	2.4 GHZ	11
134	C4: B3 : 6A: 91 : 61 : 00	2.4 GHZ	11
141	C4: B3 : 6A: 91 : 5C : 0F	5 GHZ	60

READINGS

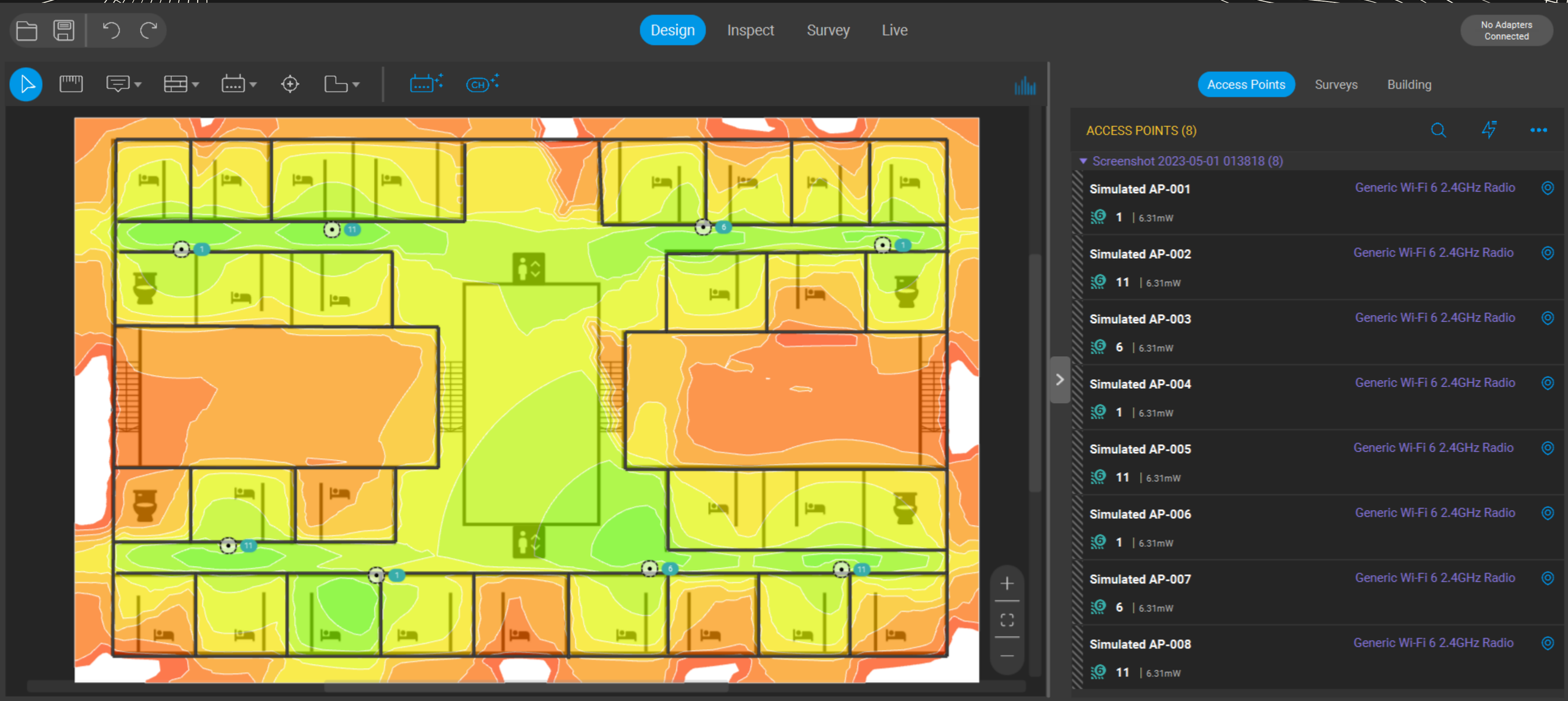
As it is clearly visible from the table above, two routers were of 5GHz and two of 2.4GHz in alternate sequence. This is done to minimise interference between the channels of the same band.
This was the reading of the signal strength and distance between each router from each room (point of connection)

	C4: B3 : 6A: 1D : F3 : 0F	C4: B3 : 6A: 1D : F6 : C0	C4: B3 : 6A: 91 : 61 : 00	C4: B3 : 6A: 91 : 5C : 0F
ROOM 19	DISTANCE - 0 M STRENGTH - 46 DB	DISTANCE - 22 M STRENGTH - 61 db	DISTANCE - 4 M STRENGTH - 79 Db	NA
ROOM 27	DISTANCE - 22 M STRENGTH - 80 DB	DISTANCE - 0 M STRENGTH - 59 DB	NA	DISTANCE - 4 M STRENGTH - 78 DB
ROOM 134	DISTANCE - 2 M STRENGTH - 57 DB	NA	DISTANCE - 0 M STRENGTH - 41 DB	DISTANCE - 22 M STRENGTH - 78 DB
ROOM 141	NA	DISTANCE - 2M STRENGTH - 57Db	DISTANCE - 22 STRENGTH - 70 DB	DISTANCE - 0 STRENGTH - 42 DB

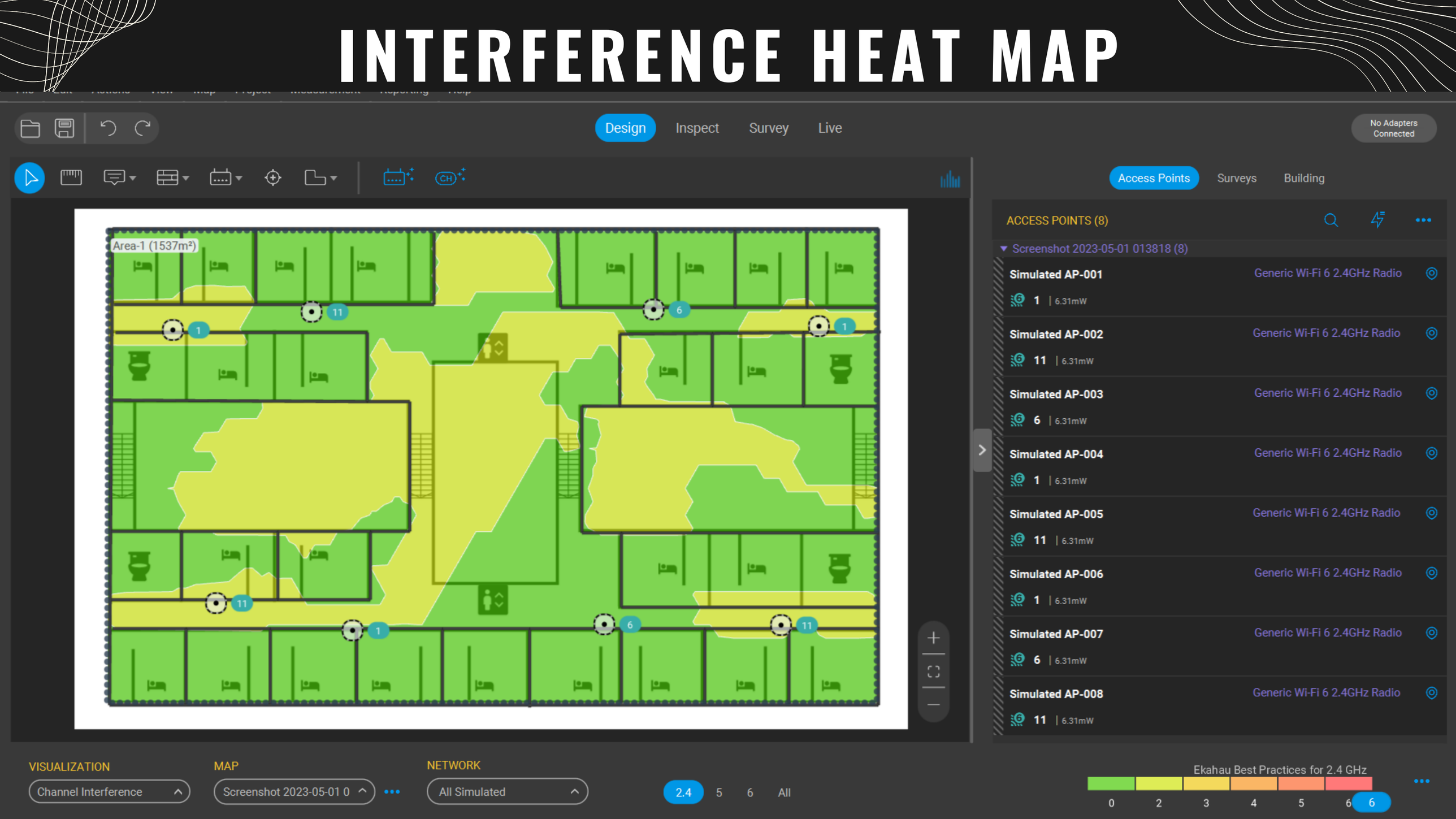
SVBH Floor Plan



SIGNAL HEAT MAP



INTERFERENCE HEAT MAP



MODES OF NETWORK

Ad-Hoc Mode

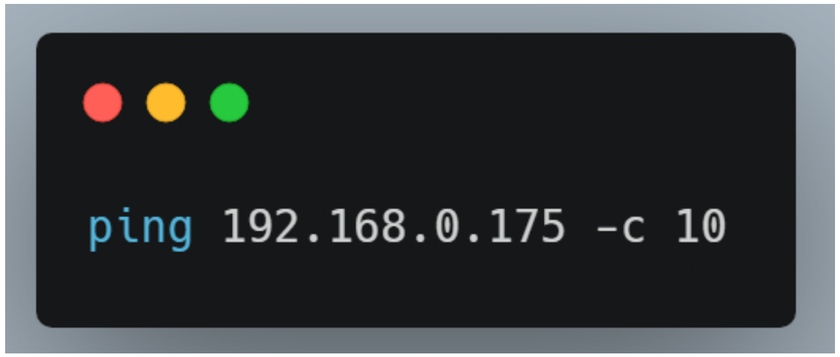
Ad-hoc mode refers to a wireless network structure where devices can communicate directly with each other. It is an additional feature that is specified in the 802.11 set of standards, which is referred to as an independent basic service set (IBSS).

Infrastructure Mode

Infrastructure mode is a wireless network framework that has a central WLAN access point / router at the heart of the network. In infrastructure mode, wireless devices communicate with each other through an WLAN access point/router.

```
#! /bin/sh
sudo iw dev
sudo iwconfig wlp2s0 mode ad-hoc
sudo iw dev
sudo ip link set wlp2s0 up
sudo rfkill unblock Wi-Fi
sudo ip link set wlp2s0 up
sudo iw dev wlp2s0 ibss join ibstest 2412 key d:1:5chrs
sudo iw dev
sudo iw dev wlp2s0 link
sudo ip addr add 192.168.0.150/24 broadcast 192.168.0.255 dev wlp2s0
sudo ip route add 192.168.0.0/24 dev wlp2s0
```

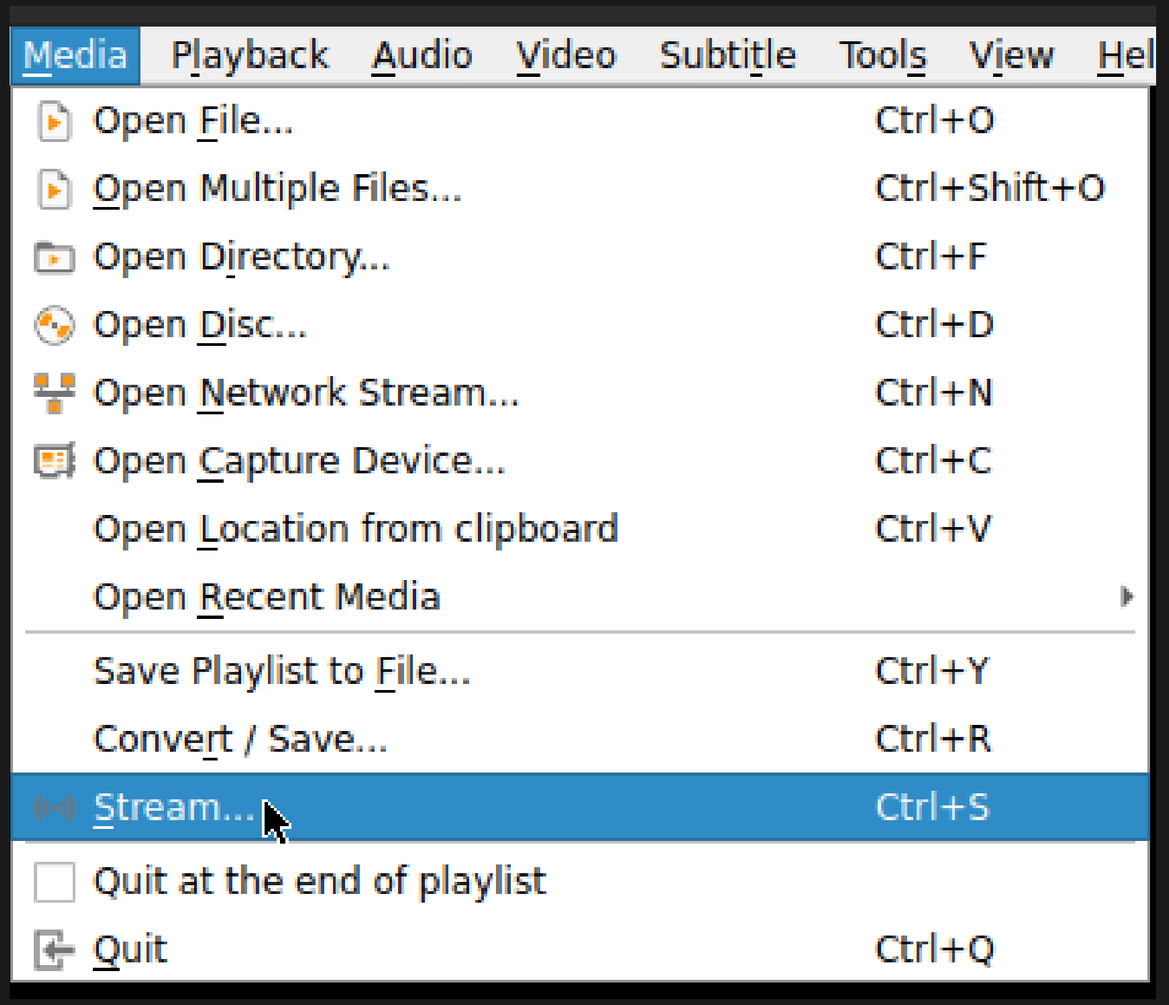
```
manish@manish-TUF-Gaming-FX505DY-FX505DY:~/Desktop/nitin$ ./createAdhoc.sh
[sudo] password for manish:
phy#0
        Interface wlp2s0
                ifindex 3
                wdev 0x1
                addr dc:f5:05:27:70:7b
                type managed
                txpower 20.00 dBm
                multicast TXQ:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt hashcol
                        16565   108     167     0       0       0       0
phy#0
        Interface wlp2s0
                ifindex 3
                wdev 0x1
                addr dc:f5:05:27:70:7b
                type IBSS
                txpower 20.00 dBm
                multicast TXQ:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt hashcol
                        16565   108     167     0       0       0       0
RTNETLINK answers: Operation not possible due to RF-kill
command failed: Operation not supported (-95)
phy#0
        Interface wlp2s0
                ifindex 3
                wdev 0x1
                addr dc:f5:05:27:70:7b
                type managed
                txpower 20.00 dBm
                multicast TXQ:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt hashcol
                        16565   108     167     0       0       0       0
Not connected.
RTNETLINK answers: File exists
```



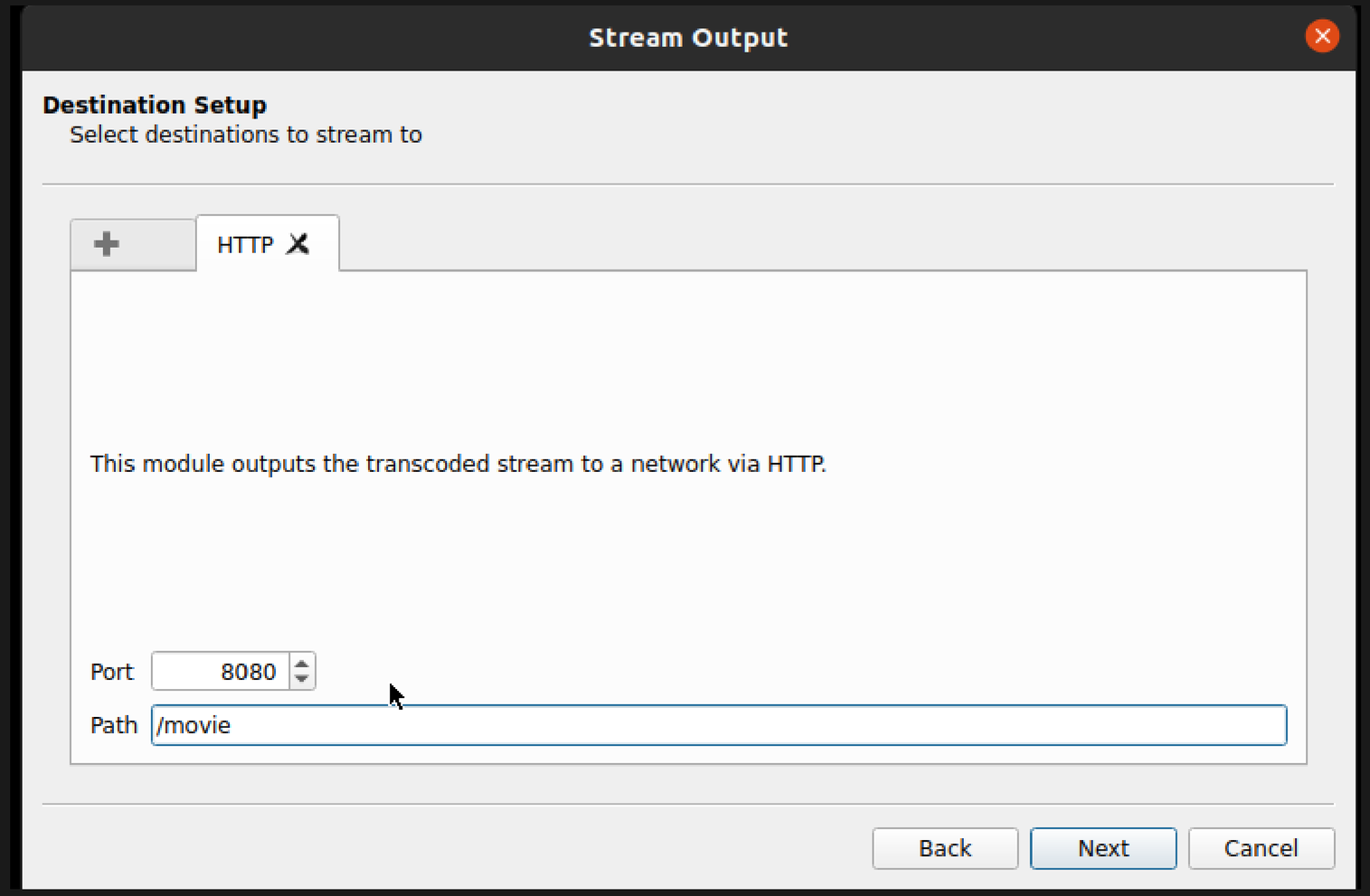

```
manish@manish-TUF-Gaming-FX505DY-FX505DY:~$ ping 192.168.0.175 -c 10
PING 192.168.0.175 (192.168.0.175) 56(84) bytes of data.
64 bytes from 192.168.0.175: icmp_seq=1 ttl=64 time=1.07 ms
64 bytes from 192.168.0.175: icmp_seq=2 ttl=64 time=1.24 ms
64 bytes from 192.168.0.175: icmp_seq=3 ttl=64 time=0.957 ms
64 bytes from 192.168.0.175: icmp_seq=4 ttl=64 time=1.48 ms
64 bytes from 192.168.0.175: icmp_seq=5 ttl=64 time=1.20 ms
64 bytes from 192.168.0.175: icmp_seq=6 ttl=64 time=1.16 ms
64 bytes from 192.168.0.175: icmp_seq=7 ttl=64 time=1.15 ms
64 bytes from 192.168.0.175: icmp_seq=8 ttl=64 time=1.22 ms
64 bytes from 192.168.0.175: icmp_seq=9 ttl=64 time=0.996 ms
64 bytes from 192.168.0.175: icmp_seq=10 ttl=64 time=0.964 ms

--- 192.168.0.175 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9011ms
rtt min/avg/max/mdev = 0.957/1.142/1.479/0.150 ms
```

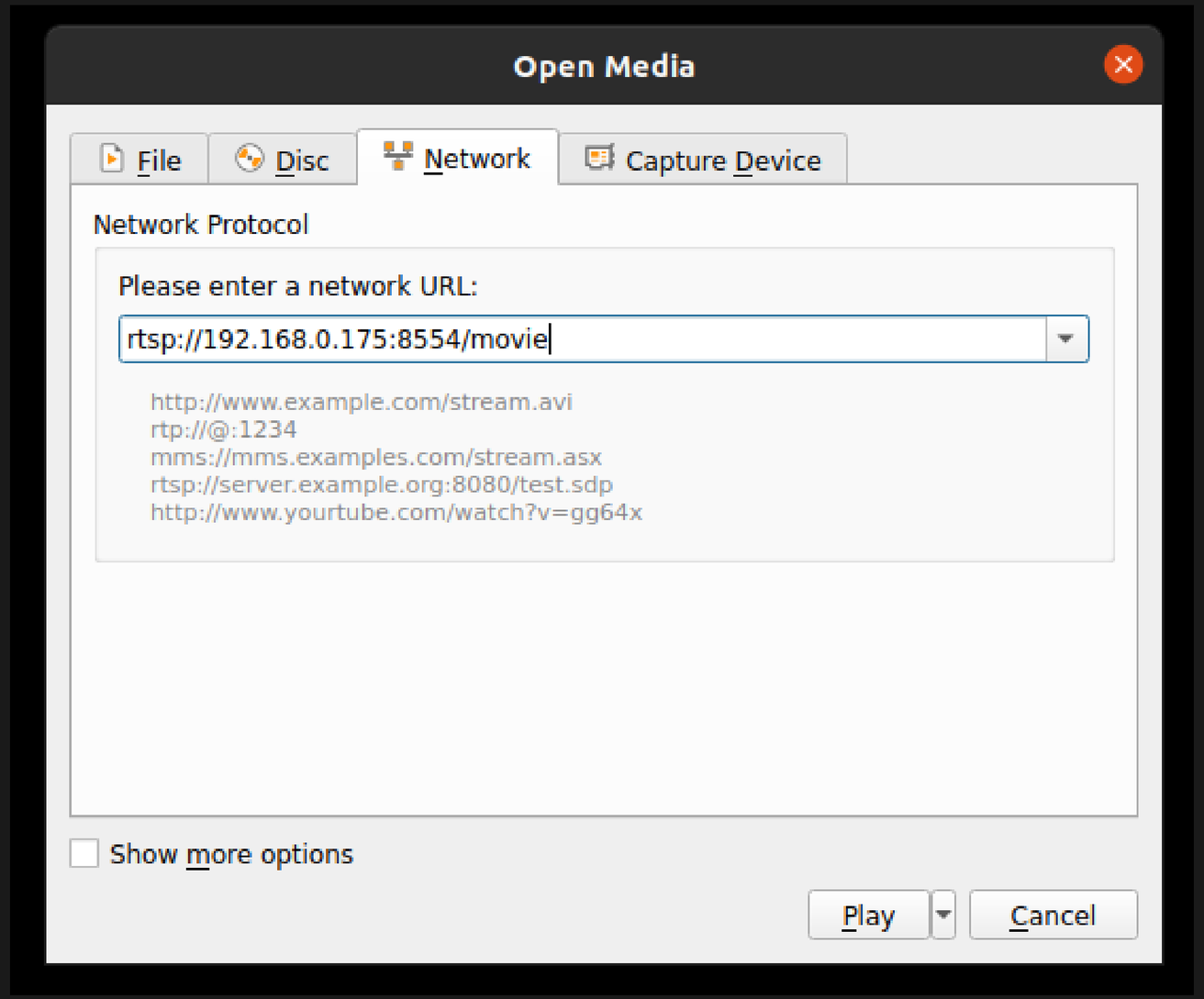
Now we set up our VLC Host laptop where we start the movie. Let us make the first device with IP 192.168.0.150/24 as a host. Then do the following steps:



Select HTTP as stream medium and set port number and path



For the VLC client device, we input the IP address and port number in the following manner:



```
# Function to switch to access point mode
switch_to_ap() {
    echo "Switching to access point mode..."
    current_ssid=$(nmcli -t -f active,ssid dev Wi-Fi | awk -F: '$1=="yes" {print
$2}')
    if [ "$current_ssid" == "$ap_ssid" ]; then
        echo "Already connected to access point. Resuming playback..."
        #vlc "$video_file"
        #vlc --file-caching=50000 --network-caching=10000 "$video_file"
    else
        sudo nmcli radio Wi-Fi on
        sudo nmcli device Wi-Fi connect "$ap_ssid" password "$ap_password"
        echo "Connected to access point. Resuming playback..."
        #vlc "$video_file"
        #vlc --file-caching=50000 --network-caching=10000 "$video_file"
    fi
}
```

```
switch_to_adhoc() {
    echo "Switching to ad hoc mode..."
    adhoc_connection=$(nmcli -t -f NAME con show --active | grep "$adhoc_ssid")

    if [ -n "$adhoc_connection" ]; then
        echo "Ad hoc network already created. Resuming playback..."
        #vlc --file-caching=50000 --network-caching=10000 "$video_file"
        #vlc "$video_file"
    else
       sudo nmcli radio Wi-Fi off
       sudo iw dev
       sudo iwconfig wlp2s0 mode ad-hoc
       sudo iw dev
       sudo ip link set wlp2s0 up
       sudo rfkill unblock Wi-Fi
       sudo ip link set wlp2s0 up
       sudo iw dev wlp2s0 ibss join ibstest 2412 key d:1:5chrs
       sudo iw dev
       sudo iw dev wlp2s0 link
       sudo ip addr add 192.168.0.150/24 broadcast 192.168.0.255 dev wlp2s0
       sudo ip route add 192.168.0.0/24 dev wlp2s0
       echo "Connected to ad hoc network. Resuming playback..."
       #vlc --file-caching=50000 --network-caching=10000 "$video_file"
    fi
}
```

```
# Check the network availability periodically
while true; do
    check_network
    if [ $? -eq 0 ]; then
        # Access point is available, switch to it
        echo "Ping Not available ap mode"
        switch_to_ap
    else
        # Access point is not available, switch to ad hoc mode
        switch_to_adhoc
    fi

    # Wait for some time before checking the network again
    sleep 2
done
```

VLC HOST STREAM

root@piyush-Inspiron-5570: /home/piyush

```
                multicast TXQ:
                        qsz-byt qsz-pkt flows   drops   marks   overlm
t hashcoltx-bytes tx-packets
                        0       0       0       0       0       0
       0      00
Not connected.
RTNETLINK answers: File exists
root@piyush-Inspiron-5570:/home/piyush# ping 192.168.0.150 -c 10
PING 192.168.0.150 (192.168.0.150) 56(84) bytes of data.
64 bytes from 192.168.0.150: icmp_seq=1 ttl=64 time=5.05 ms
64 bytes from 192.168.0.150: icmp_seq=2 ttl=64 time=0.940 ms
64 bytes from 192.168.0.150: icmp_seq=3 ttl=64 time=0.970 ms
64 bytes from 192.168.0.150: icmp_seq=4 ttl=64 time=1.12 ms
64 bytes from 192.168.0.150: icmp_seq=5 ttl=64 time=1.03 ms
64 bytes from 192.168.0.150: icmp_seq=6 ttl=64 time=11.3 ms
64 bytes from 192.168.0.150: icmp_seq=7 ttl=64 time=1.37 ms
64 bytes from 192.168.0.150: icmp_seq=8 ttl=64 time=2.02 ms
64 bytes from 192.168.0.150: icmp_seq=9 ttl=64 time=0.980 ms
64 bytes from 192.168.0.150: icmp_seq=10 ttl=64 time=0.916 ms

--- 192.168.0.150 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9013ms
rtt min/avg/max/mdev = 0.916/2.564/11.252/3.133 ms
root@piyush-Inspiron-5570:/home/piyush# ping 192.168.0.150
PING 192.168.0.150 (192.168.0.150) 56(84) bytes of data.
64 bytes from 192.168.0.150: icmp_seq=1 ttl=64 time=0.741 ms
64 bytes from 192.168.0.150: icmp_seq=2 ttl=64 time=0.871 ms
64 bytes from 192.168.0.150: icmp_seq=3 ttl=64 time=12.7 ms
64 bytes from 192.168.0.150: icmp_seq=4 ttl=64 time=0.779 ms
64 bytes from 192.168.0.150: icmp_seq=5 ttl=64 time=2.49 ms
64 bytes from 192.168.0.150: icmp_seq=6 ttl=64 time=0.821 ms
64 bytes from 192.168.0.150: icmp_seq=7 ttl=64 time=0.845 ms
64 bytes from 192.168.0.150: icmp_seq=8 ttl=64 time=2.23 ms
64 bytes from 192.168.0.150: icmp_seq=9 ttl=64 time=0.939 ms
64 bytes from 192.168.0.150: icmp_seq=10 ttl=64 time=0.744 ms
64 bytes from 192.168.0.150: icmp_seq=11 ttl=64 time=0.787 ms
64 bytes from 192.168.0.150: icmp_seq=12 ttl=64 time=2.36 ms
```

Converting file:///home/piyush/Downloads/ps1.mkv - VLC media player

Media Playback Audio Video Subtitle Tools View Help

03:07 -2:43:48

VLC CLIENT STREAM

manish@manish-TUF-Gan

```
                    0       0       0       0       0       0       0       0               0
RTNETLINK answers: Operation not possible due to RF-kill
phy#0
        Interface wlp2s0
                ifindex 3
                wdev 0x1
                addr dc:f5:05:27:70:7b
                type IBSS
                txpower 20.00 dBm
                multicast TXQ:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt hashcol tx-bytes        tx-packets
                        0       0       0       0       0       0       0       0               0
Not connected.
RTNETLINK answers: File exists
manish@manish-TUF-Gaming-FX505DY-FX505DY:~$ ping 192.168.0.175 -c 10
PING 192.168.0.175 (192.168.0.175) 56(84) bytes of data.
64 bytes from 192.168.0.175: icmp_seq=1 ttl=64 time=1.07 ms
64 bytes from 192.168.0.175: icmp_seq=2 ttl=64 time=1.24 ms
64 bytes from 192.168.0.175: icmp_seq=3 ttl=64 time=0.957 ms
64 bytes from 192.168.0.175: icmp_seq=4 ttl=64 time=1.48 ms
64 bytes from 192.168.0.175: icmp_seq=5 ttl=64 time=1.20 ms
64 bytes from 192.168.0.175: icmp_seq=6 ttl=64 time=1.16 ms
64 bytes from 192.168.0.175: icmp_seq=7 ttl=64 time=1.15 ms
64 bytes from 192.168.0.175: icmp_seq=8 ttl=64 time=1.22 ms
64 bytes from 192.168.0.175: icmp_seq=9 ttl=64 time=0.996 ms
64 bytes from 192.168.0.175: icmp_seq=10 ttl=64 time=0.964 ms

--- 192.168.0.175 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9011ms
rtt min/avg/max/mdev = 0.957/1.142/1.479/0.150 ms
manish@manish-TUF-Gaming-FX505DY-FX505DY:~$ ping 192.168.0.175 -c 10
PING 192.168.0.175 (192.168.0.175) 56(84) bytes of data.
64 bytes from 192.168.0.175: icmp_seq=1 ttl=64 time=2.47 ms
64 bytes from 192.168.0.175: icmp_seq=2 ttl=64 time=0.865 ms
64 bytes from 192.168.0.175: icmp_seq=3 ttl=64 time=0.911 ms
64 bytes from 192.168.0.175: icmp_seq=4 ttl=64 time=0.814 ms
64 bytes from 192.168.0.175: icmp_seq=5 ttl=64 time=4.17 ms
64 bytes from 192.168.0.175: icmp_seq=6 ttl=64 time=1.41 ms
64 bytes from 192.168.0.175: icmp_seq=7 ttl=64 time=0.792 ms
64 bytes from 192.168.0.175: icmp_seq=8 ttl=64 time=0.707 ms
64 bytes from 192.168.0.175: icmp_seq=9 ttl=64 time=0.949 ms
64 bytes from 192.168.0.175: icmp_seq=10 ttl=64 time=0.724 ms

--- 192.168.0.175 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9094ms
rtt min/avg/max/mdev = 0.707/1.380/4.169/1.057 ms
manish@manish-TUF-Gaming-FX505DY-FX505DY:~$ ping 192.168.0.175 -c 10
PING 192.168.0.175 (192.168.0.175) 56(84) bytes of data.
64 bytes from 192.168.0.175: icmp_seq=1 ttl=64 time=0.741 ms
64 bytes from 192.168.0.175: icmp_seq=2 ttl=64 time=0.820 ms
```

movie - VLC media player

Media Playback Audio Video Subtitle Tools View Help

01:48 -01:48

125%

THANK YOU
OPEN FOR QUESTIONS