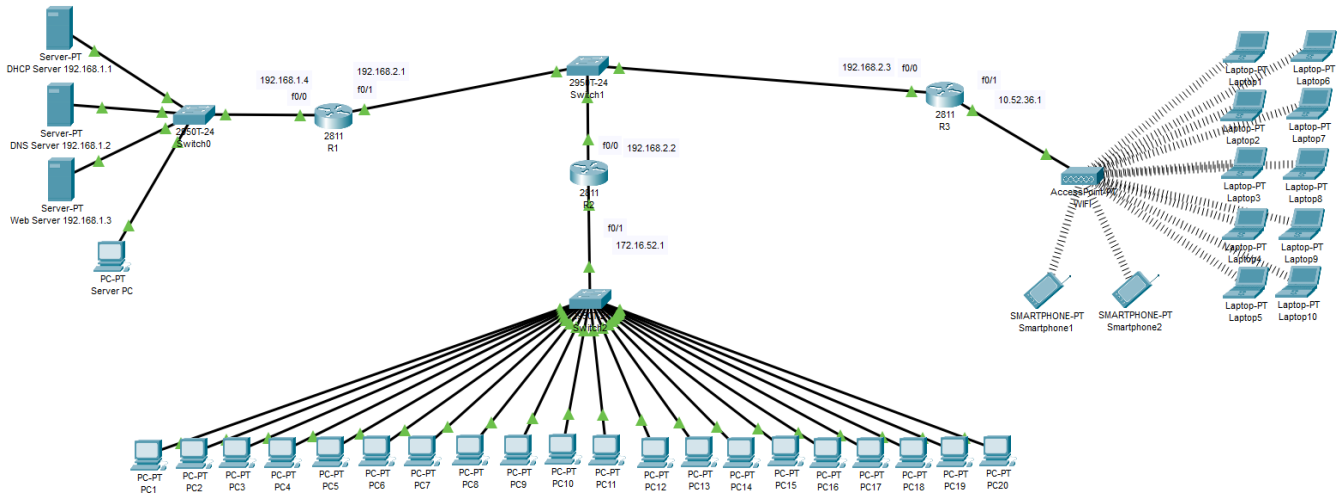
The Title of the project – Simple Network
The student's name – Sandro Megrelishvili
The professor's name - *Prof. Dr. Rand Kouatly*
The course title - IT Platforms
The date – 18/12/2023

Introduction:

The purpose of the Simple Network is to create fully functional network that includes 3 servers (DHCP, DNS, and Web Servers (HTTP)), 3 Routers, 3 Switches, 1 Wireless Access Point, 1 Wan PC, 20 Workstations, 10 Laptops, and 2 Smartphones.

Network Design:



As you can see, the network topology consists of three routers connecting different segments. On the left side, the router R1 is connected to servers and both servers and routers have class 3 IP addresses. In the middle side, the router R2 is connected to 20 workstations which have class 2 IP addresses. And on the right side, the router R3 is connected to the wireless access point WIFI which connects 10 laptops and 2 smartphones to R3. These devices have class 1 IP addresses. All their IP addresses are given by the DHCP server, and every device can connect to each other without any issue other than the very first ping which is because a pc doesn't know anything about the MAC address of the router. But after that the pc has enough information to generate the ping packet and send it out. On the DNS server, there is a website, sandro.com, which addresses to the HTTP

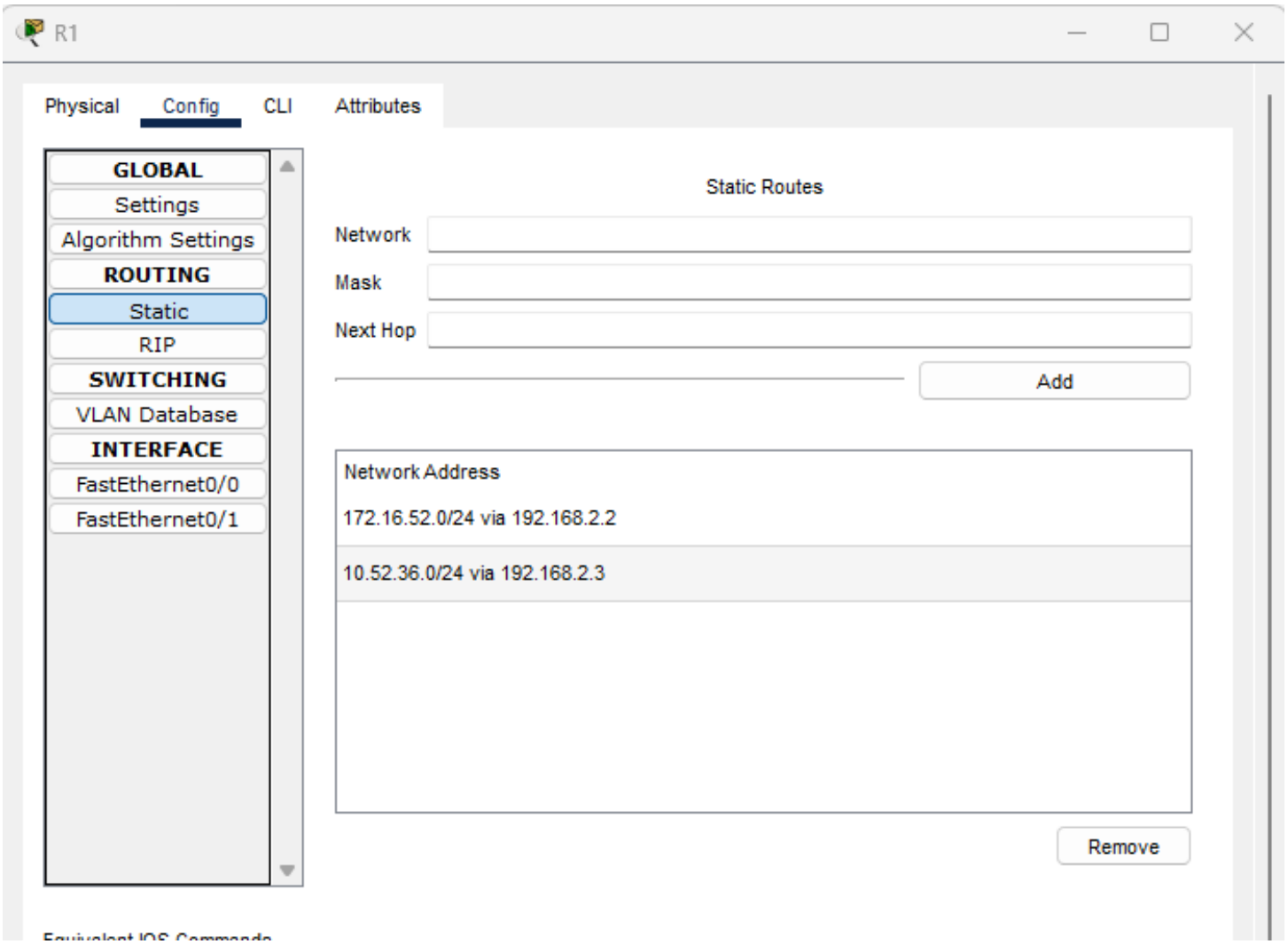
server, so whenever someone tries to use the website, information will be send to the Web Server.

Equipment:

- 3 Servers
- 21 Pcs
- 10 Laptops
- 2 Smartphones
- 3 Routers – Model 2811
- 3 Switches – Model 2950T-24
- 1 Wireless Access Point

Troubleshooting:

After connecting everything to each other, the very first problem I got was that devices connected to R2 and R3 couldn't get DHCP information. Therefore, I used static routing on each router to deliver the data to its destination. For example, on R1 I added R2's and R3's network addresses, and I did the same things for the other two routers, so everything could work out well.

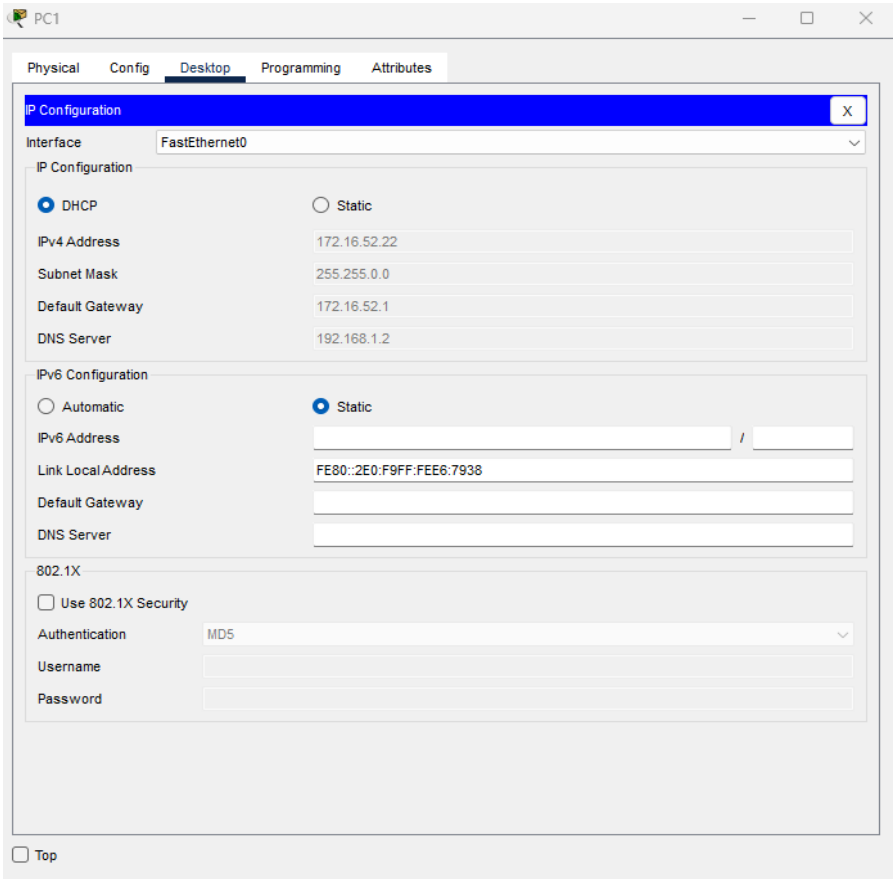


And of course, to get access to DHCP, I added several pools to the server to be able to give DHCP information to devices across the network.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool4	192.168....	192.168....	192.168....	255.255....	246	0.0.0.0	0.0.0.0
serverPool3	10.52.36.1	192.168....	10.52.36...	255.0.0.0	246	0.0.0.0	0.0.0.0
serverPool2	172.16.5...	192.168....	172.16.5...	255.255....	246	0.0.0.0	0.0.0.0
serverPool	192.168....	192.168....	192.168....	255.255....	246	0.0.0.0	0.0.0.0

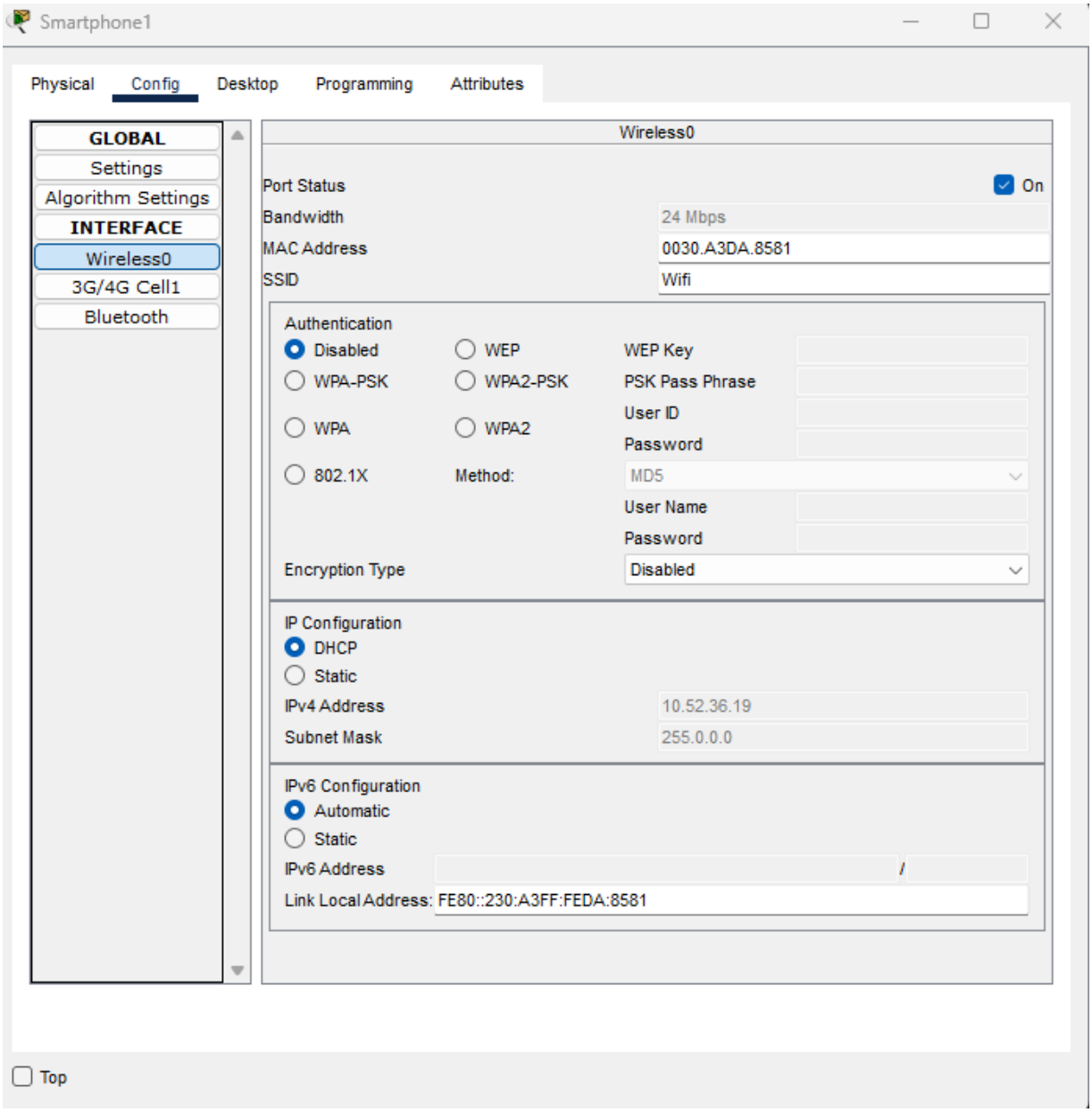
IP Addresses:

As I already mentioned, every router has a different class of IP. On R1 we have class C IP on both ports, f0/0 and f0/1. But on other routers it's different. R2 has two classes of IP. Class C on f0/0 which is connected to the switch to connect with other routers, and Class B on f0/1 which is connected to another switch filled with workstations. And since f0/1 is class B then every PC which is connected to that gateway will have a class B IP address. But exactly which address will it have, of course DHCP server will determine that.



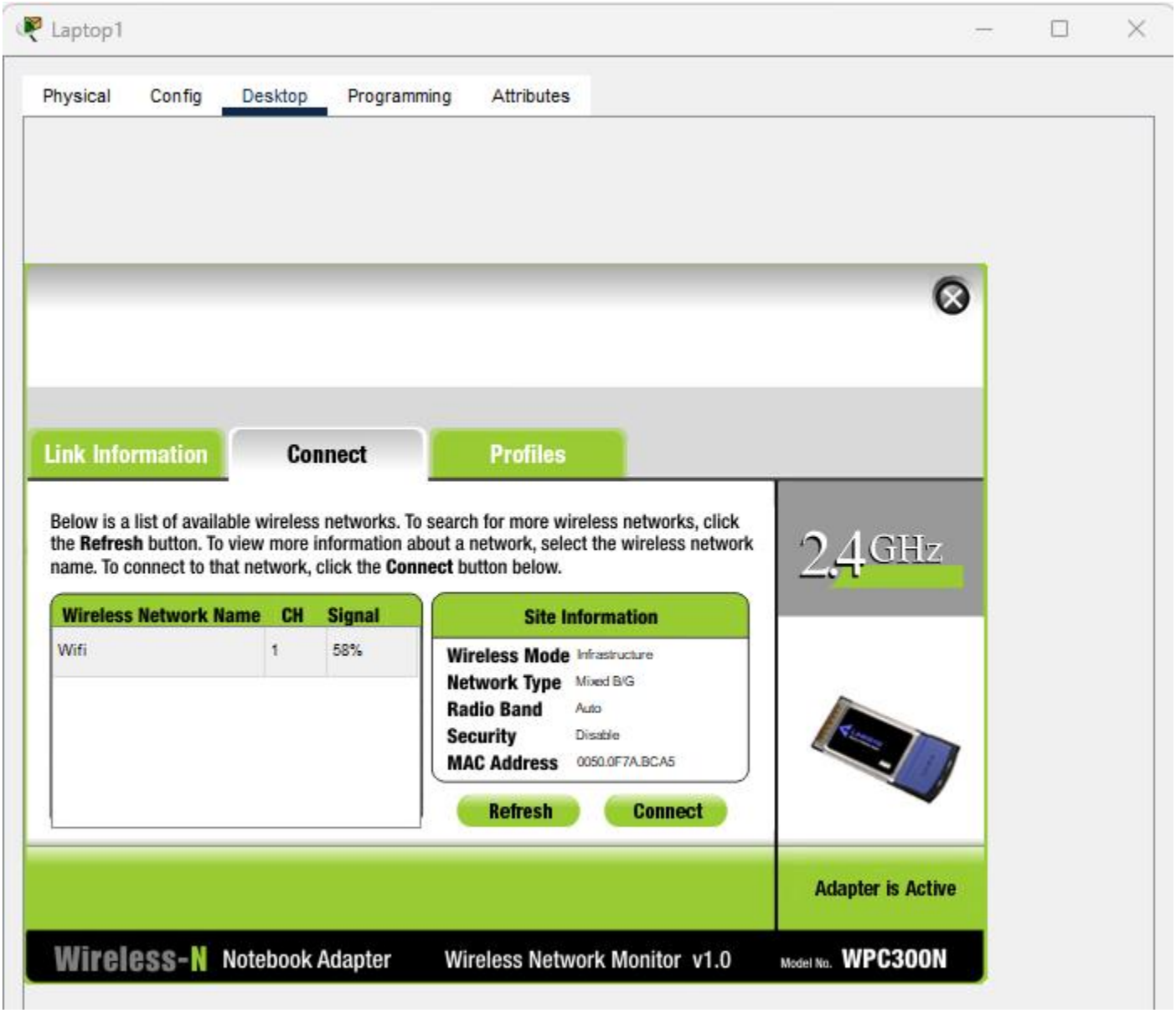
On the right side, we have R3 router which is like R2 but instead of having class B IP on the f0/1, it has class A IP which is connected to the wireless access point. That wireless access point is connected to 10 laptops and 2 smartphones. Setting up smartphones was probably the easiest task because they have built in wireless connectivity, and it automatically connects to the network if it's near the access point. But

in this case, we had to change SSID to the access point's name, so it could be connected to it. And as with the other devices we reviewed, their IP configuration is also determined by DHCP server. The only difference is that those have Class A IP addresses.



On the other hand, we have laptops. They themselves don't originally have wireless access, but with changing the module to WPC300N, they will be able to connect the wireless access point, you just need to connect it through the "PC wireless" option and that's it. And of

course, the configuration here is also done by DHCP server.



Configurations:

```
R1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#ip add 192.168.1.4 255.255.255.0
R1(config-if)#no sh
R1(config-if)#
R1(config-if)#int f0/1
R1(config-if)#ip add 192.168.2.1 255.255.255.0
R1(config-if)#nosh
               ^
% Invalid input detected at '^' marker.

R1(config-if)#no sh
R1(config-if)#
```

```
R2>en
R2#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int f0/0
R2(config-if)#ip add 192.168.2.2 255.255.255.0
R2(config-if)#no sh
R2(config-if)#
R2(config-if)#int f0/1
R2(config-if)#ip add 172.16.52.1 255.255.0.0
R2(config-if)#no sh
R2(config-if)#
```

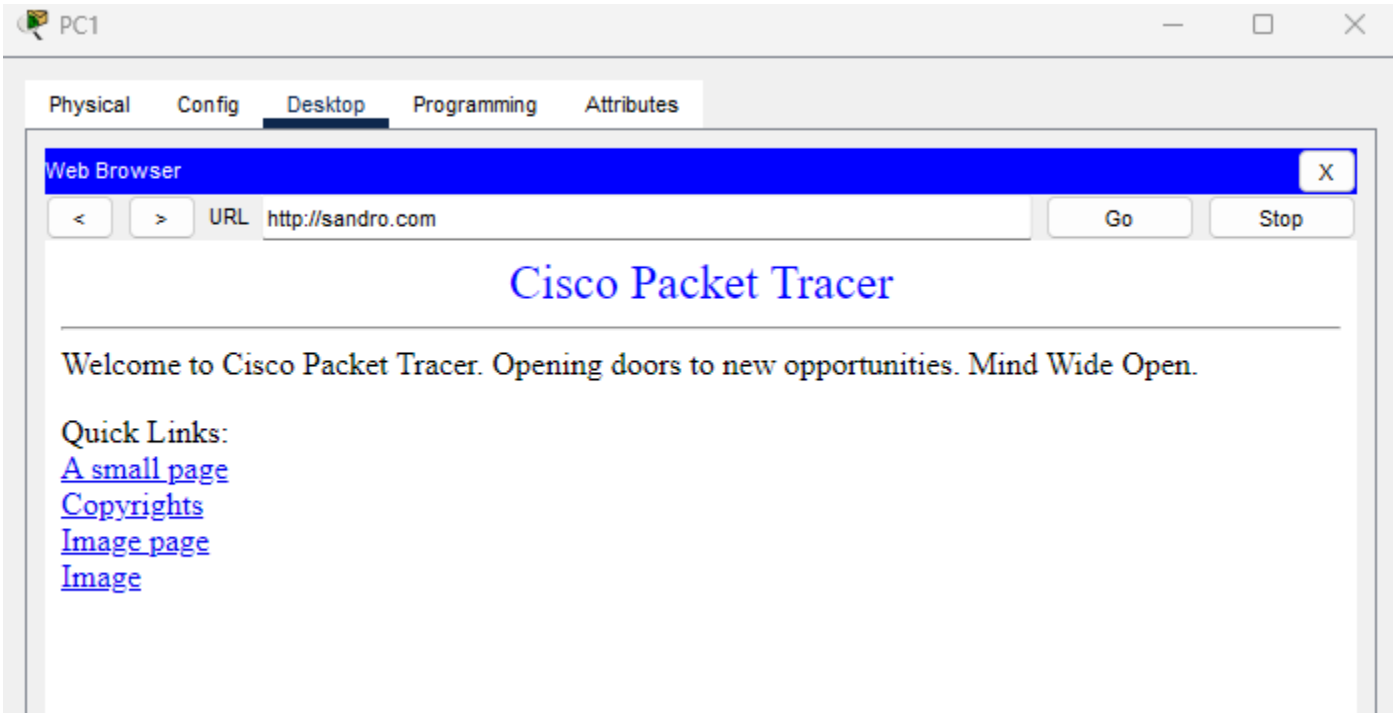
```
R3>en
R3#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int f0/0
R3(config-if)#ip add 192.168.2.3 255.255.255.0
R3(config-if)#no sh
R3(config-if)#
R3(config-if)#int f0/1
R3(config-if)#ip add 10.52.36.1 255.0.0.0
R3(config-if)#no sh
R3(config-if)#
```

Images above show how each router was configured. Each port has a different IP address. For R1 both ports have Class C IP address, so their subnet mask is 255.255.255.0. For R2, since f0/1 port has Class B IP address, its subnet mask is 255.255.0.0. And for R3, f0/1 has Class A IP address, therefore its subnet mask is 255.0.0.0.

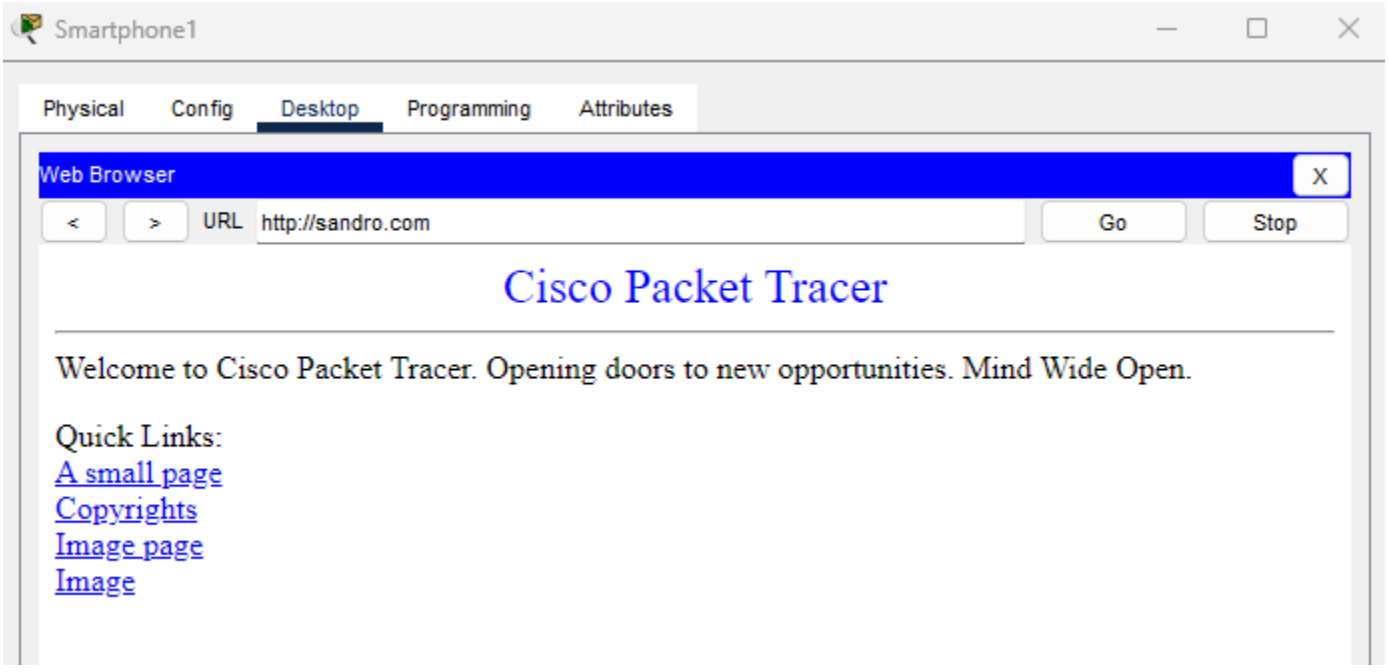
Website:

Images below show that website “sandro.com” is accessible form every device.

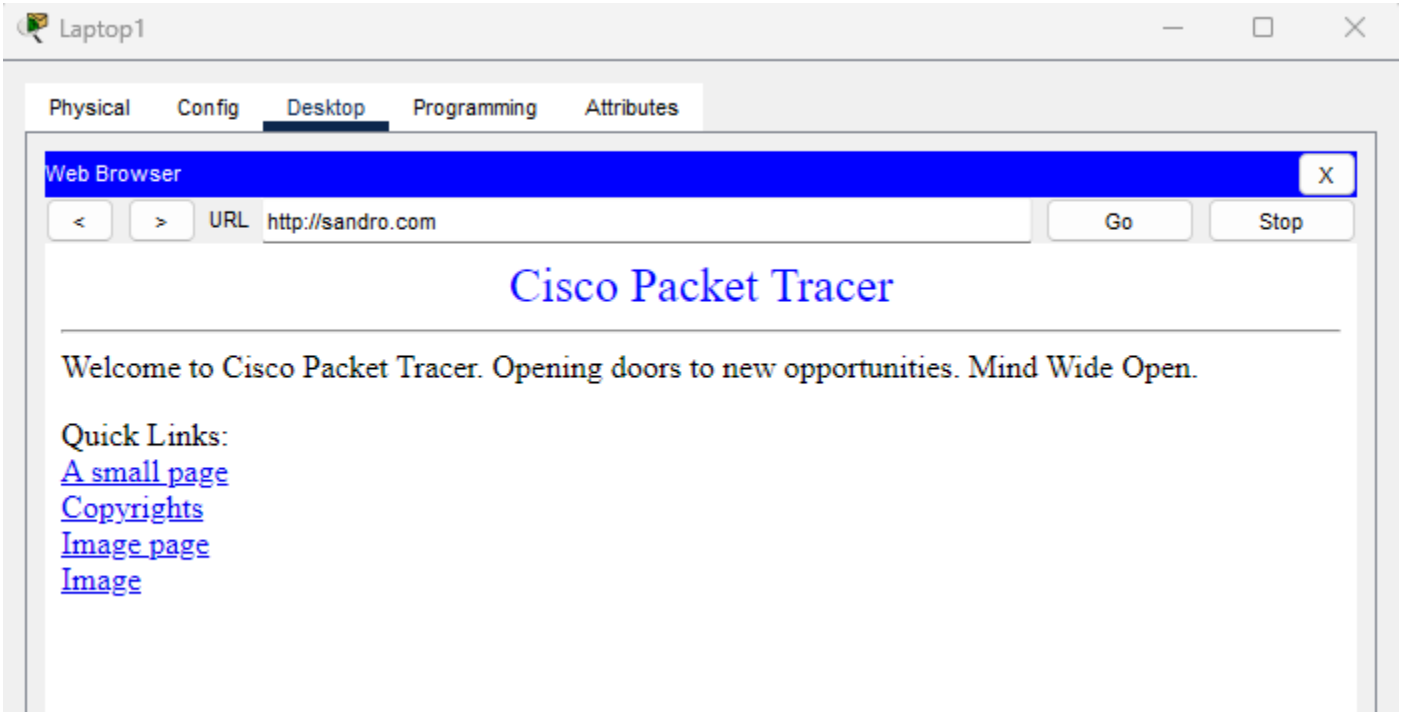
From PC



From Smartphone



From Laptop



Conclusion:

The implementation of the Simple Network has successfully achieved its purpose of creating a fully functional and interconnected network. The network comprises 3 servers (DHCP, DNS, and Web Servers), 3 routers, 3 switches, 1 Wireless Access Point, 1 WAN PC, 20 workstations, 10 laptops, and 2 smartphones.

The network topology is well-structured with three routers connecting distinct segments. R1 connects to servers, R2 to workstations, and R3 to the wireless access point. IP addresses are assigned based on classes, with Class 3 for servers and routers, Class 2 for workstations, and Class 1 for wireless devices. The DHCP server efficiently assigns IP addresses to every device, fostering seamless connectivity.

The initial challenge of devices connected to R2 and R3 not receiving DHCP information was addressed through the implementation of static routing on each router. Adding network addresses for R2 and R3 on R1, and similar configurations on other routers, resolved the issue. Additionally, DHCP server pools were configured to ensure the distribution of DHCP information across the network.

Each router is configured with distinct IP addresses, adhering to different classes. R1 uses Class C on both ports, R2 uses Class C on f0/0 and Class B on f0/1, and R3 uses Class A on f0/1. The dynamic assignment of IP addresses by the DHCP server ensures proper network functioning.

Verification of the network's functionality was demonstrated through successful website access from various devices. Whether accessed from a PC, smartphone, or laptop, the "sandro.com" website was responsive, affirming the effectiveness of the DNS and HTTP servers.

In conclusion, the Simple Network has been successfully designed and implemented, providing a robust infrastructure for efficient communication and connectivity. The troubleshooting steps addressed initial challenges, and the diverse range of devices connected to the network showcased its versatility. The network's ability to support dynamic IP assignments, along with the seamless access to the configured website, validates the overall success of the network implementation.