

HOME WIRELESS NETWORK DESIGN

A COURSE PROJECT REPORT

By

G R RAHUL (RA1911026010107)
N SAHITHI (RA1911026010125)
G VARUN TEJ GOWD (RA1911026010096)

Under the guidance of

DR. Saravanan T R

In partial fulfilment for the Course

of

18CSC302J - COMPUTER NETWORKS

in



FACULTY OF ENGINEERING AND TECHNOLOGY

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Kattankulathur, Chenpalattu District

NOVEMBER 2021

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Under Section 3 of UGC Act, 1956)

BONAFIDE CERTIFICATE

Certified that this project report "**HOME WIRELESS NETWORK DESIGN**" is the bonafide work of **G R RAHUL (RA1911026010107), N SAHITHI (RA1911026010125), G VARUN TEJ GOWD (RA1911026010096)** who carried out the project work under my supervision.

SIGNATURE

Subject Staff

Designation

Department

SRM Institute of Science and Technology **Data Science and Business Systems** Potheri, SRM Nagar, Kattankulathur, SRM Institute of Science and Technology Tamil Nadu 603203

Kattankulathur,

SIGNATURE

**Dr.E. Sasikala,
Course Coordinator
Associate Professor,**

Data Science and

Potheri, SRM Nagar,
Tamil Nadu 603203

ACKNOWLEDGEMENT

We express our heartfelt thanks to our honorable Vice Chancellor **Dr. C. MUTHAMIZHCHELVAN**, for being the beacon in all our endeavors.

We would like to express my warmth of gratitude to our Registrar **Dr. S. Ponnusamy**, for his encouragement. We express our profound gratitude to our Dean (College of Engineering and Technology) **Dr. T. V.Gopal**, for bringing out novelty in all executions.

We would like to express my heartfelt thanks to the Chairperson, School of Computing **Dr. Revathi Venkataraman**, for imparting confidence to complete my course project.

We wish to express my sincere thanks to Course Audit Professor **Dr.M.LAKSHMI**, Professor and Head, Data Science and Business Systems and Course Coordinator **Dr.E. Sasikala**, Associate Professor, Data Science and Business Systems for their constant encouragement and support.

We are highly thankful to our Course project Internal guide **Dr T R Saravanan** , Assistant Professor , Computer Science and Engineering, for his assistance, timely suggestion and guidance throughout the duration of this course project.

We extend our gratitude to the Students, **Dr.B.Amutha** ma'am (HOD) and my Departmental colleagues for their Support.

Finally, we thank our parents and friends near and dear ones who directly and indirectly contributed to the successful completion of our project. Above all, I thank the almighty for showering his blessings on me to complete my Course project.

TABLE OF CONTENTS

CHAPTERS	CONTENTS	PAGE NUMBERS
1	ABSTRACT	5
2	INTRODUCTION	6
3	REQUIREMENT ANALYSIS	7
4	ARCHITECTURE & DESIGN	8-12
5	IMPLEMENTATION	13-20
6	EXPERIMENT RESULTS & ANALYSIS	
	6.1. RESULTS	21-24
	6.2. RESULT ANALYSIS	25-26
	6.3. CONCLUSION & FUTURE WORK	27-29
7	REFERENCES	30

ABSTRACT

The pandemic has changed our lives and livelihood. We had to rely on internet for our daily chores. So, there is a need for wireless network for every house. With the widely growth of broadband technology, there is an increase in the number of ISPs and the home network equipment manufacturers. Thus planning a network properly proves to be a cost-effective.

Wireless networks allow users to access real-time information so they can roam around your company's space without getting disconnected from the network. It also may have a longer lifecycle than a traditionally connected network.

The most common reason to set up a home network is to share a broadband Internet connection with multiple computers. You can also share devices such as printers so that everyone in the house can print to a single printer rather than purchasing a printer for each computer.

So, there is a need for wireless network in every house. In this paper, a wireless network design is implemented and presented in cisco packet tracer.

INTRODUCTION

The main objective of our home wireless network design is to build a network which is suitable and very easy for usage, efficient and budget-friendly.

There is a tremendous increase in the number of home network users, mainly because of the increase in the number of computers due to lower price. Also due to advancement and improvement in networking technologies it is beneficial to distribute high speed internet connection among multiple computers. Other benefits of home networking include file sharing, printer sharing, multi-media sharing and enhanced entertainment.

Since there are various types of internet with low cost in comparison with other ISPs. The internet connection should also provide cheap technical support and less installation cost. Various network equipments should be used to take the advantage of cost involved in using the various services provided by an ISP. The main criteria to choose a particular internet connection is the download speed offered by an ISP, and the cost involved to setup and maintain a particular network connection.

REQUIREMENT ANALYSIS

3.1 HARDWARE REQUIREMENTS:

- ROUTER [1941]
- WIRELESS ROUTER [WRT300N]
- SWITCHES
- TABLET
- LAPTOP
- SMART PHONE
- PC

PROCESSOR :2.4/5 GHz Clock Speed

RAM :2 GB

3.2 SOFTWARE REQUIREMENTS:

OPERATING SYSTEM :WINDOWS 7 AND ABOVE

LOCAL PLATFORM :CISCO PACKET TRACER

ARCHITECTURE AND DESIGN

A wireless network consists of several components that support communications using radio or light waves propagating through an air medium. A user can be anything that directly utilizes the wireless network. One of the most common types of user is a person. For example, a business traveler accessing the Internet from a public wireless LAN at an airport is a user.

This architecture is very simple to be implemented and very useful for every household. This basically implements DHCP protocol and connects to the gateway.

DHCP:

Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automate the process of configuring devices on IP networks, thus allowing them to use network services such as DNS, NTP, and any communication protocol based on UDP or TCP.

Security is also provided by giving specific login credentials to user. The admin can change the number of connections, starting ip address and ending ip address using the password of admin.

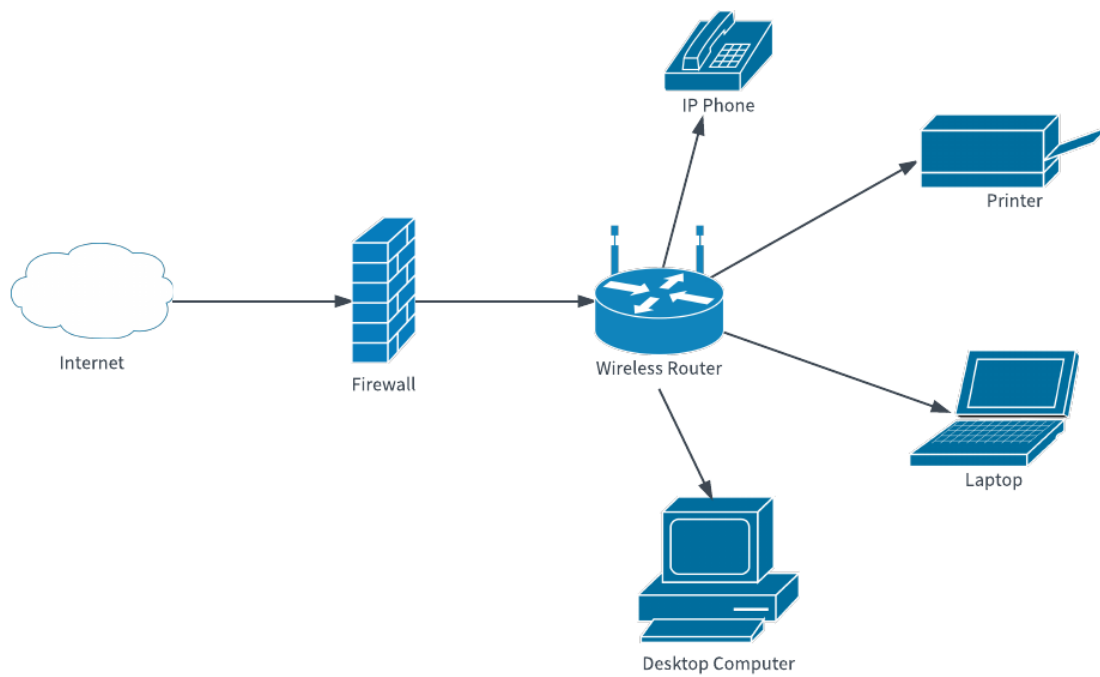
FUNCTIONAL REQUIREMENTS:

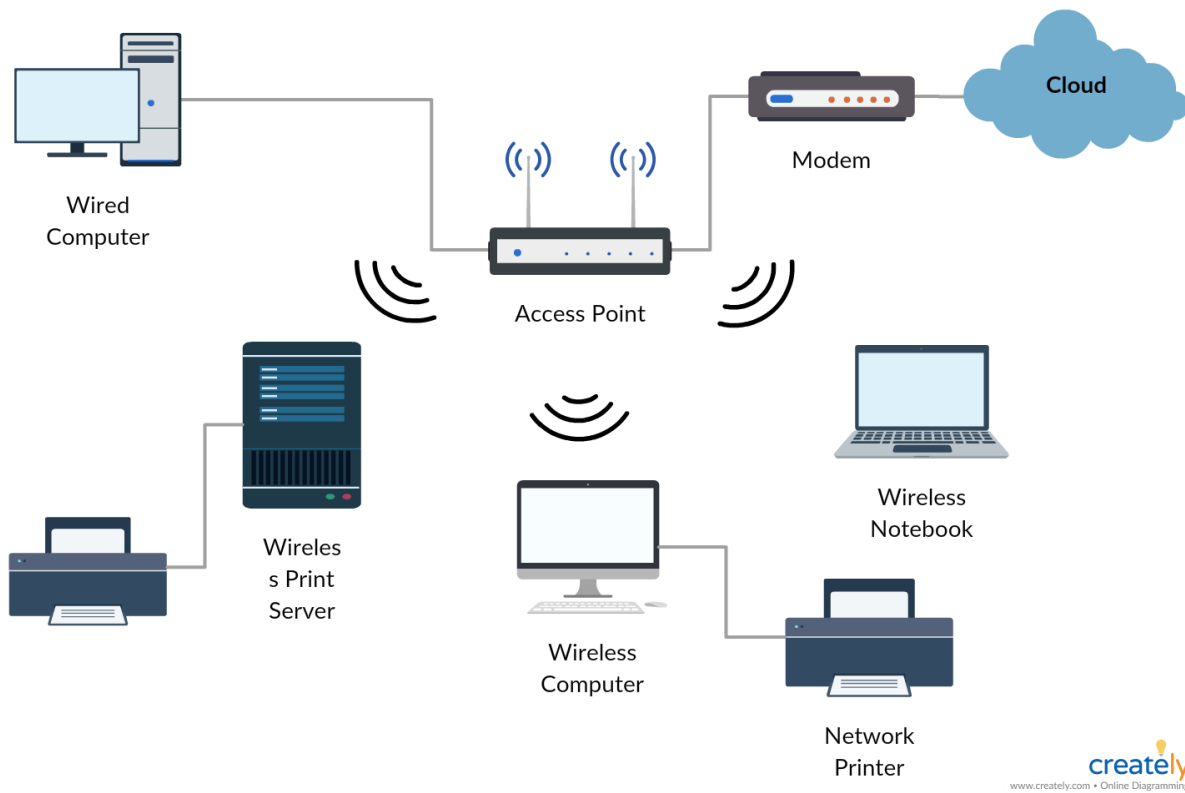
1. Verification of user
2. Providing Notifications
3. Internet Connectivity

NON - FUNCTIONAL REQUIREMENTS:

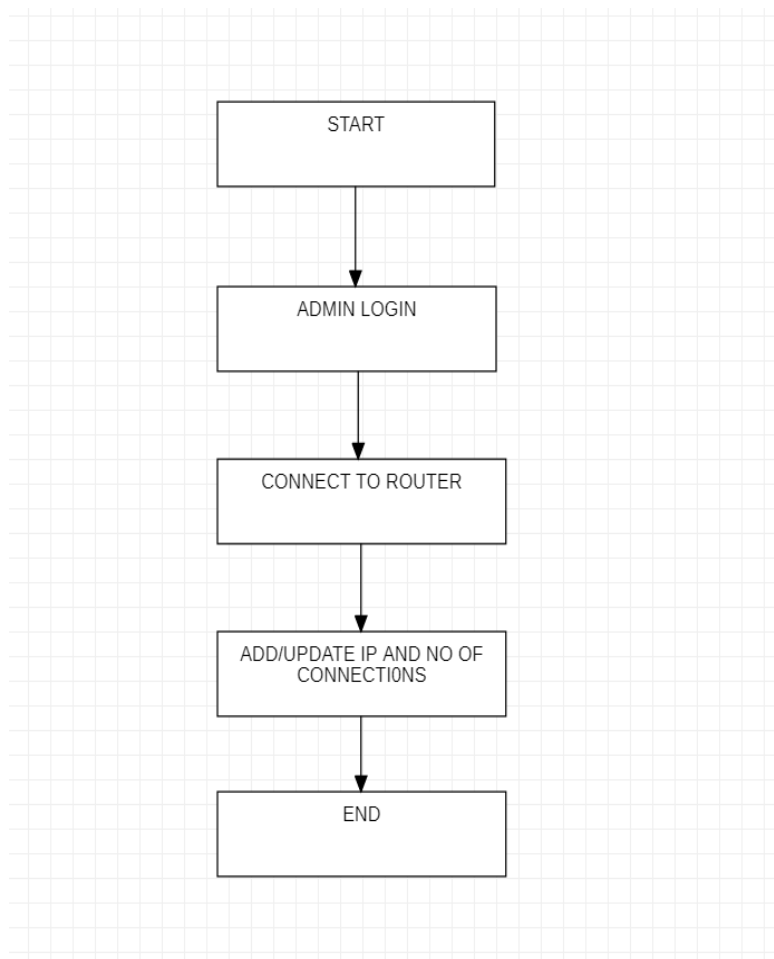
1. Security
2. Confidentiality of data
3. Gateway up gradation whenever required

ARCHITECTURE DIAGRAM





USER SIDE:



IMPLEMENTATION

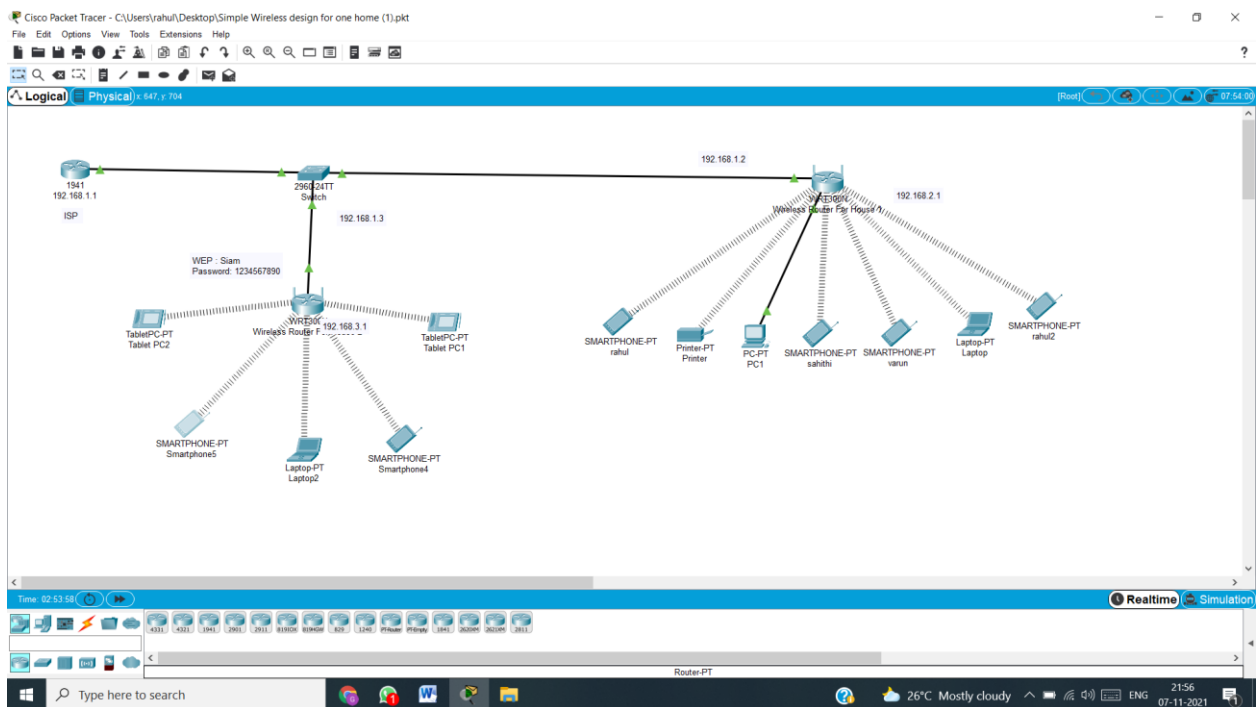
Firstly we will design our model in UML diagram format and then implement in the packet tracer to check if our proposed model is working fine or not. We should follow several steps and meet all requirements to make our model successful.

The model displays the main components required:

1. ROUTER (1841)
2. WIRELESS ROUTER
3. SWITCH
4. LAPTOP
5. SMARTPHONE
6. PC
7. PRINTER
8. TABLET

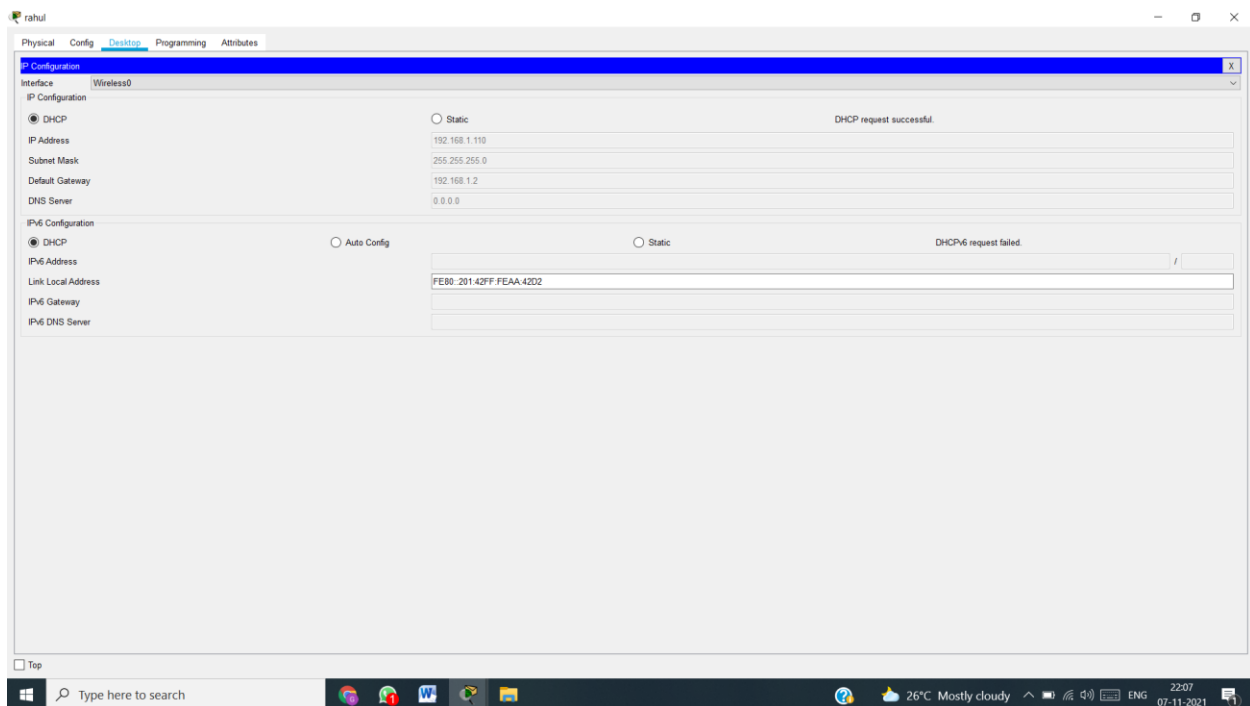
- > Take the required number of routers,switched and other devices.
- > Firstly we should give the ip addresses for all the components using DHCP.
- > After giving ip addresses using DHCP for wireless systems, connect the two routers by using a switch.
- > After connecting using a switch, give the ip addresses to establish connections between two routers.
- > In routers, give the name and password(pre-shared key) which can be used while connecting to the server.
- > Now the name and password(pre-shared key) has to be used to connect to the network.
- > Check the connectivity.
- > The connections are ready to use now.

PACKET TRACER



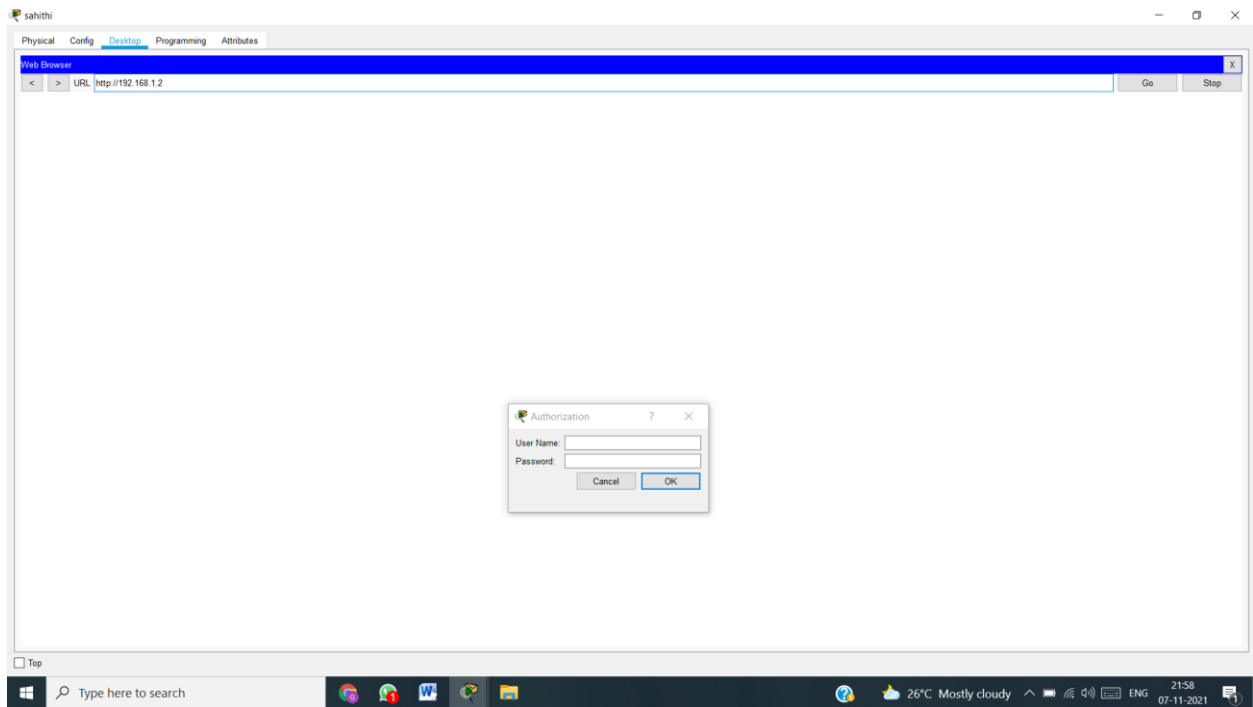
ASSIGNING IP ADDRESS USING DHCP:

IP address is assigned using Dynamic Control Host Protocol.



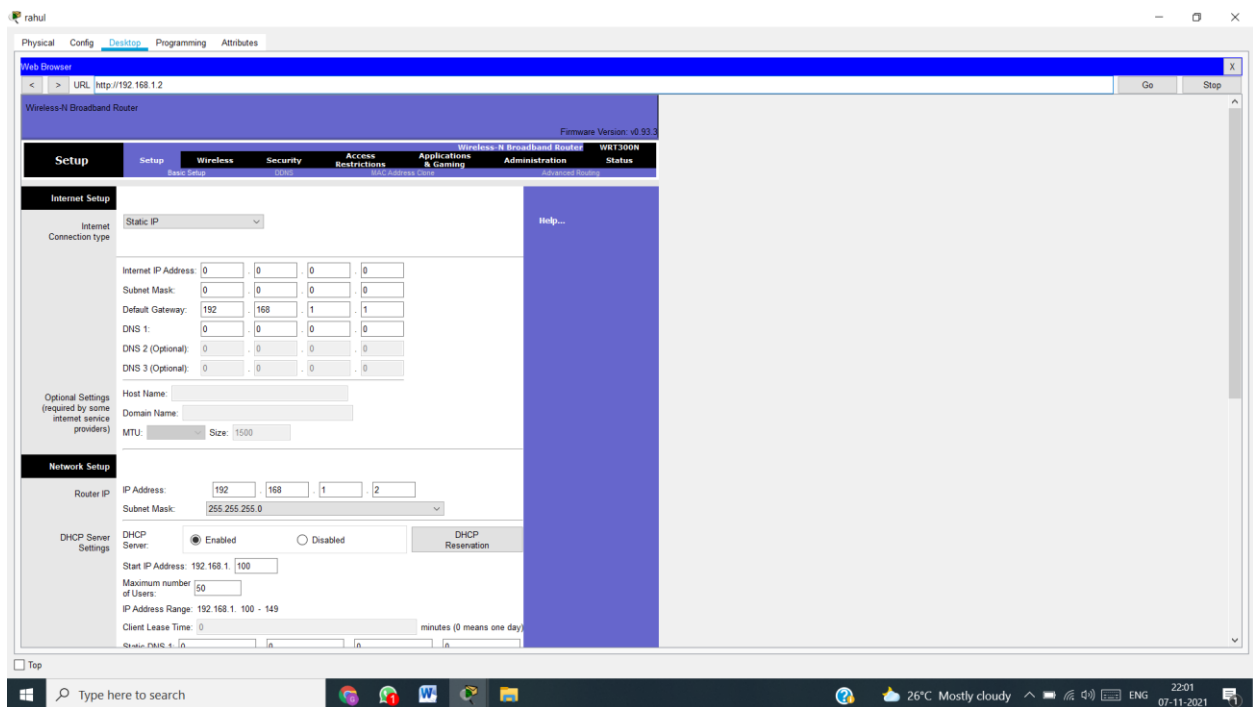
Admin Login:

The Admin login inputs Admin's ID and password and verifies the login credentials.



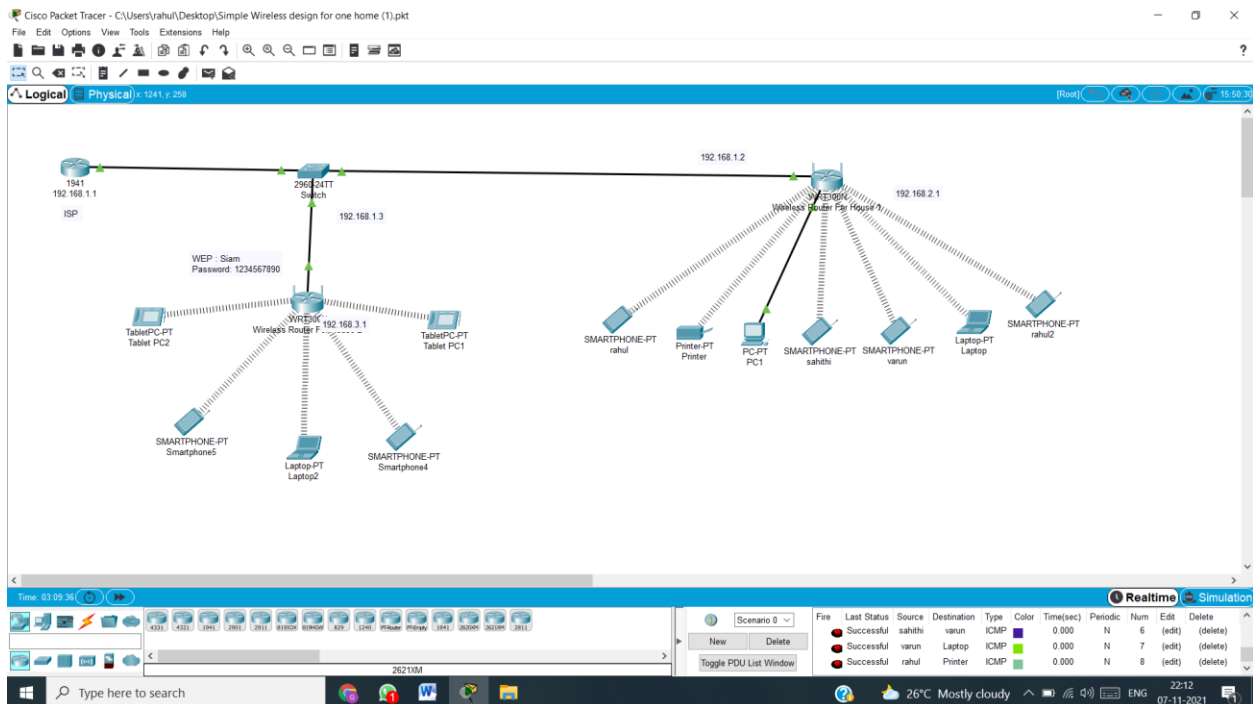
Providing conditions:

We assign the starting ip address, ending ip address,
maximum number of devices to get connected e.t.c...



CHECKING THE MODEL:

Here we will check the model by sending the packets from one device to another.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	sahithi	varun	ICMP		0.000	N	6	(edit)	(delete)
	Successful	varun	Laptop	ICMP		0.000	N	7	(edit)	(delete)
	Successful	rahul	Printer	ICMP		0.000	N	8	(edit)	(delete)

CHECKING THE MODEL(USING PING):

The model is checked by pinging the devices.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.111

Pinging 192.168.1.111 with 32 bytes of data:

Reply from 192.168.1.111: bytes=32 time=37ms TTL=128
Reply from 192.168.1.111: bytes=32 time=32ms TTL=128
Reply from 192.168.1.111: bytes=32 time=22ms TTL=128
Reply from 192.168.1.111: bytes=32 time=27ms TTL=128

Ping statistics for 192.168.1.111:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 37ms, Average = 29ms

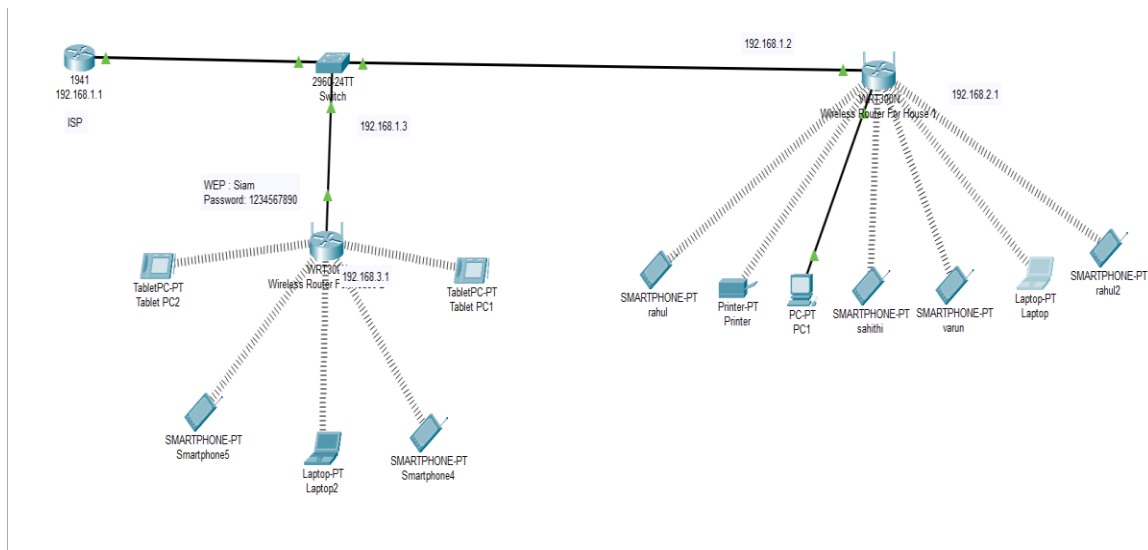
C:\>
```

EXPERIMENT RESULTS AND ANALYSIS

6.1 RESULTS

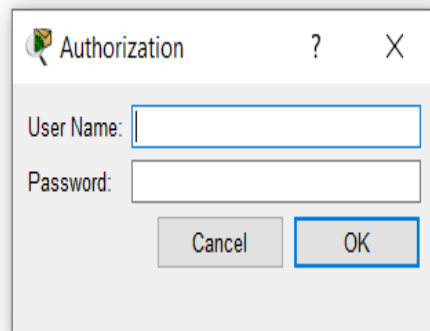
- In this Model we mostly concentrate on designing wireless network ,connect them using DHCP and implementing it.
- In this model we can also connect using cables.
- This is done to overcome the drawback of wireless networking.
- If we face any issue with wireless networks we can immediately switch to wired network and vice versa.
- This network also provides security.
- Security is provided by using a key to connect to the router.
- Admin has the access to change the ip address and maximum number of devices can be connected to the router.

WORKING MODEL DIAGRAM:



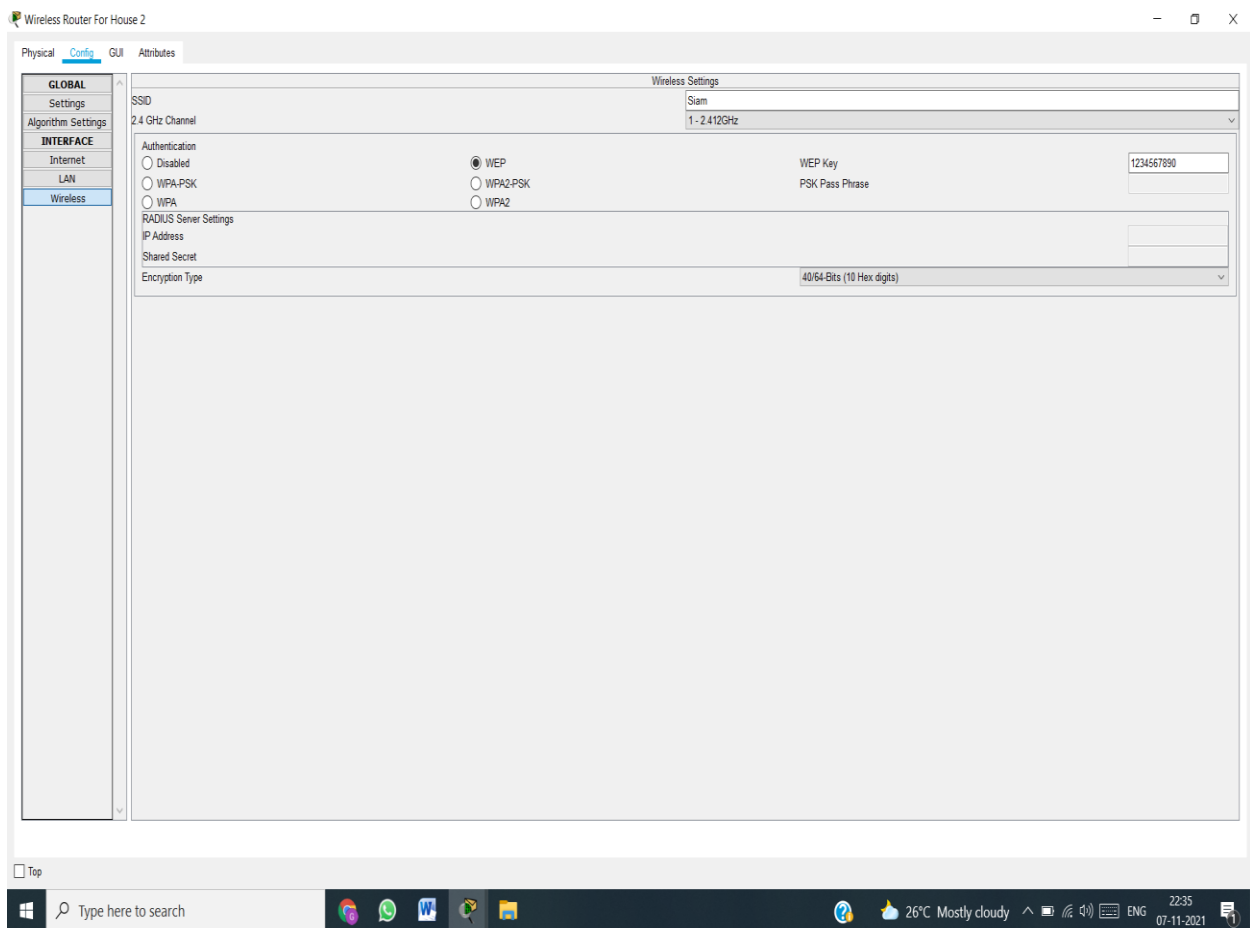
- This is the working model we have prepared.
- It is a hybrid network consisting of both wireless and wired network.
- It is consisting of pc's ,tablets,laptops,smartphones,printer et.c...

- If you want to connect to the network it asks for authorization.
- There we have to enter the username and password.
- If your credentials are wrong you won't be able to connect to the network.
- Admin has access to change the settings, for that admin needs to have a password.



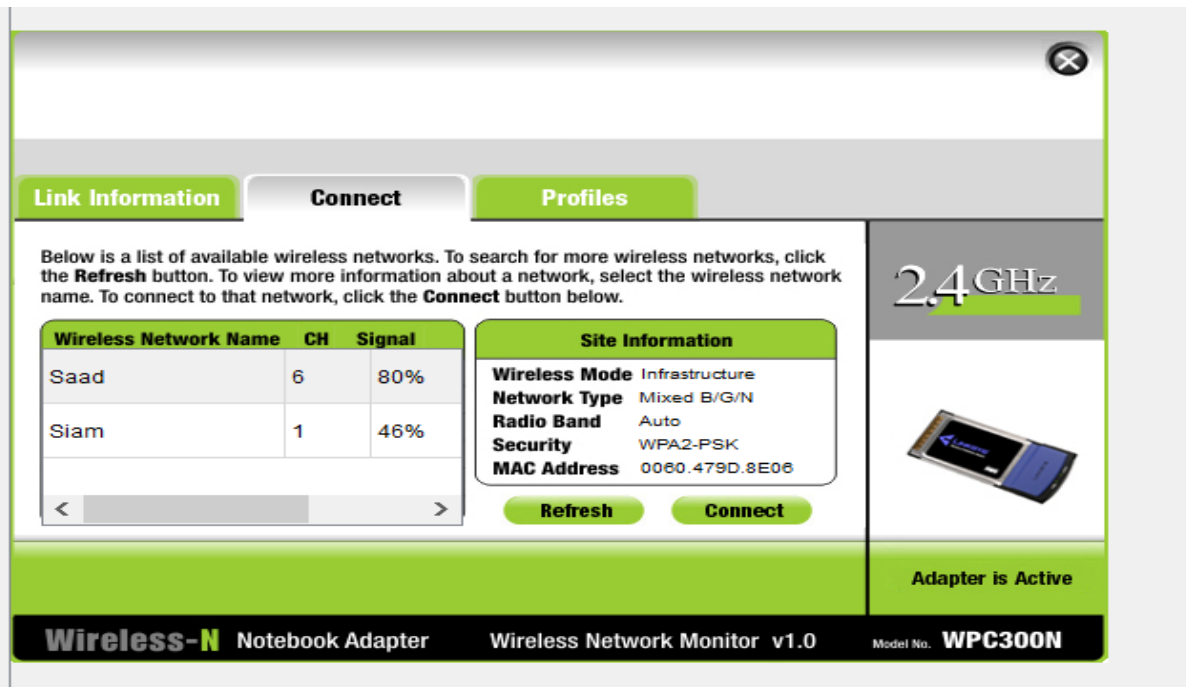
Authentication details for an user:

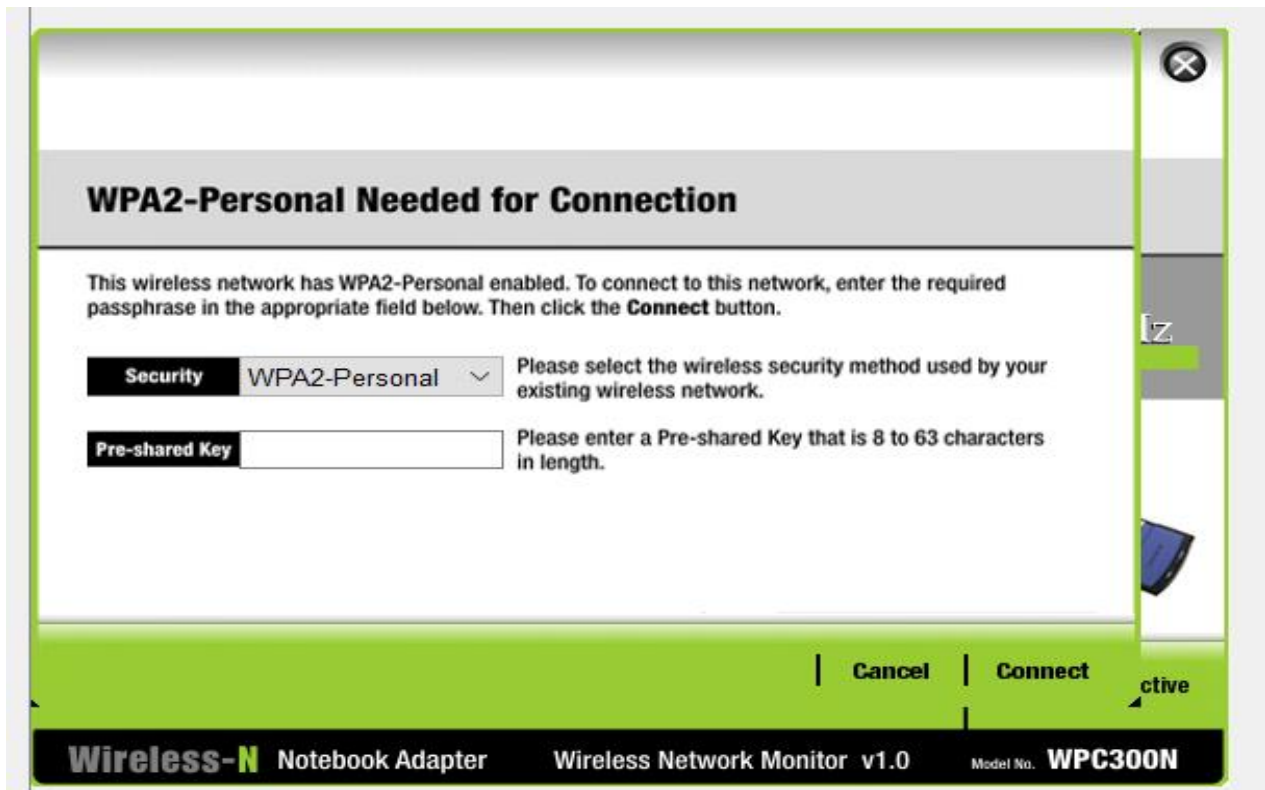
Here, Authentication is given by using WEP.



6.2 RESULT ANALYSIS

- First of all we need to set a name and authentication key in the router so that it can be used by an while connecting to this network.
- It ensures security.
- Now, connect the pcs , tablets ,computers, printers or any wireless devices using the authentication password.
- Passwords can be changed by admin.
- Passwords can be changed at any time.
- Admin can also change the starting ip address and ending ip addresses.
- Admin also has access to change the maximum number of devices that can be connected to the network at a time.





- > Here a pre-shared key i.e., the authentication password is required to connect to the network.
- > The length of pre-shared key must be atleast 8 characters in length.
- > Here ,it is ready to connect with the network if we type the correct pre-shared key.

6.3 CONCLUSION AND FUTURE WORK

We are now in a new era of information and it has become the core factor of social and economic development. Information technology has become the trend of the world. The use of the networks is more closely linked to human society, political, economic and daily work, and all aspects of life. What's more, the computer networks will be destined to become the most important infrastructure for the 21st century global information society.

In conclusion, wireless communications globally is **something that people can expect as technology advances**. Wireless communications has a lot of benefits and can make the world a lot more efficient. It does have concerns though as with every other new advancement that is made in today's world.

Many research efforts are under way to realize the commercial and military visions for wireless communications. Fueled by the success of cellular communications and projections of ever-expanding markets for wireless services, the commercial sector is pushing ahead in various areas. One objective is to enable portable devices to communicate at the high bit rates needed for advanced information services. Another objective is to advance the state of the art for software radios as a means of fostering economies of scale in R&D and manufacturing in a world of diverse and changing technical standards. By using multiple types of operating software, such radios can serve as single hardware platforms capable of transmitting and receiving signals that conform to a variety of standards. Meanwhile, DOD is taking a dual approach to wireless technology development by both conducting its own research, focusing primarily on components, while also relying increasingly on commercial technologies to ensure interoperability and systems integration.

We can implement this model in the urban towns and cities .This would be very helpful to the residents living in the specific place to get high speed internet while doing work. Nowadays INDIA, one of the fastest developing country is facing lot of issues regarding this network speed. So our model can help in such cases so that we can find out the problem very quickly and create awareness among the people to eradicate this issue.





REFERENCES:

Bradley, M. 2017. Wireless Standards 802.11a, 802.11b/g/n, and 802.11ac. WWW document. Available at:
<https://www.lifewire.com/wireless-standards802-11a-802-11b-g-n-and-802-11ac-816553>

Bradley, M. 2017. What Hardware Is Required to Build a Wireless Network? WWW document. Available at:
<https://www.lifewire.com/required-to-build-wireless-networks-816542>

Karen, S and Derrick, D. 2007. Wireless Network Security for IEEE 802.11a/b/g and Bluetooth. PDF document. Available at:
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.109.6200&rep=rep1&type=pdf>

Abdelkarim, R. 2006. Security in Wireless Data Networks: A Survey Paper. WWW document. Available at
http://www.cs.wustl.edu/~jain/cse57406/ftp/wireless_security/index.html

<https://sites.google.com/site/avicodes/notes/advance-computer-network/acn-unit2/wireless-networks-wireless-communication-basics-architecture-mobility-management-wireless-network-protocols>

Brent, A. 2001. HomeRF and Bluetooth Wireless Communication Compared. WWW Document. Available at:
<http://www.informit.com/articles/article.aspx?p=24265&seqNum=4>