

HOME WIRELESS NETWORK DESIGN

A COURSE PROJECT REPORT BY

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BONAFIDE CERTIFICATE

Certified that 18CSS202J minor project report titled "HOME WIRELESS NETWORK DESIGN " is the bonafide work of " KAUSTUBH GUPTA (RA2011003010476) ,PRAJJWALDEEP GHOSH (RA2011003010482) ,SARIT ROY (RA2011003010498), VAIDEHI DESHMUKH (RA2011003010518), SAARU DARSHINI (RA2011003010537)"who carried out the minor project work under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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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
- PRINTER
- LAPTOP
- 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.

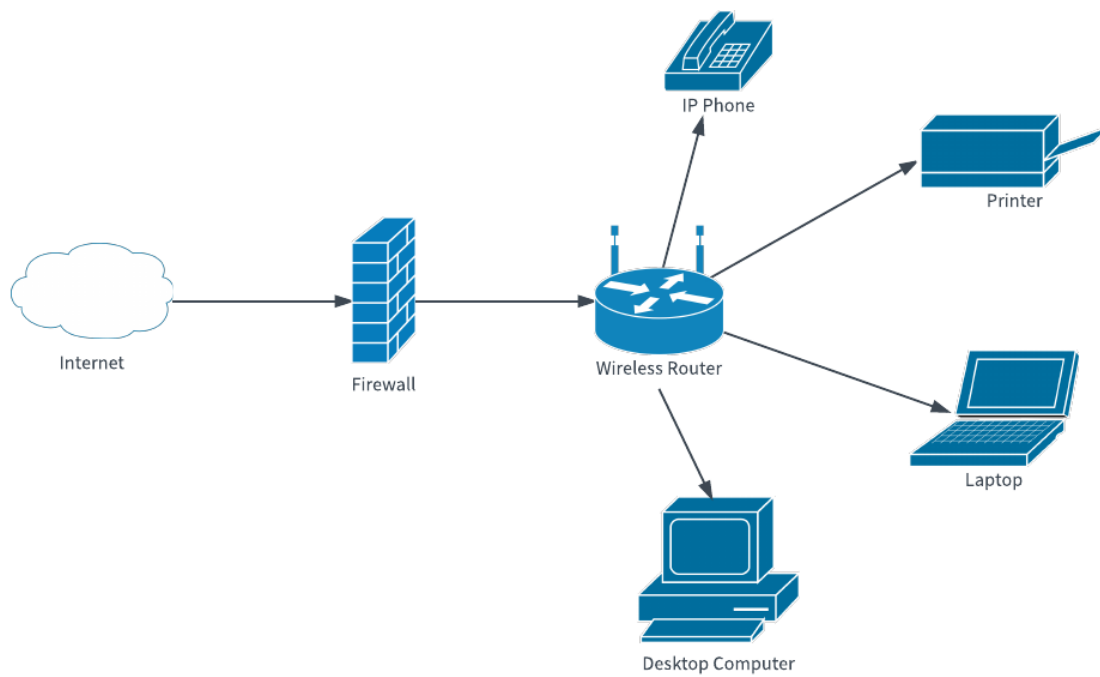
FUNCTIONAL REQUIREMENTS:

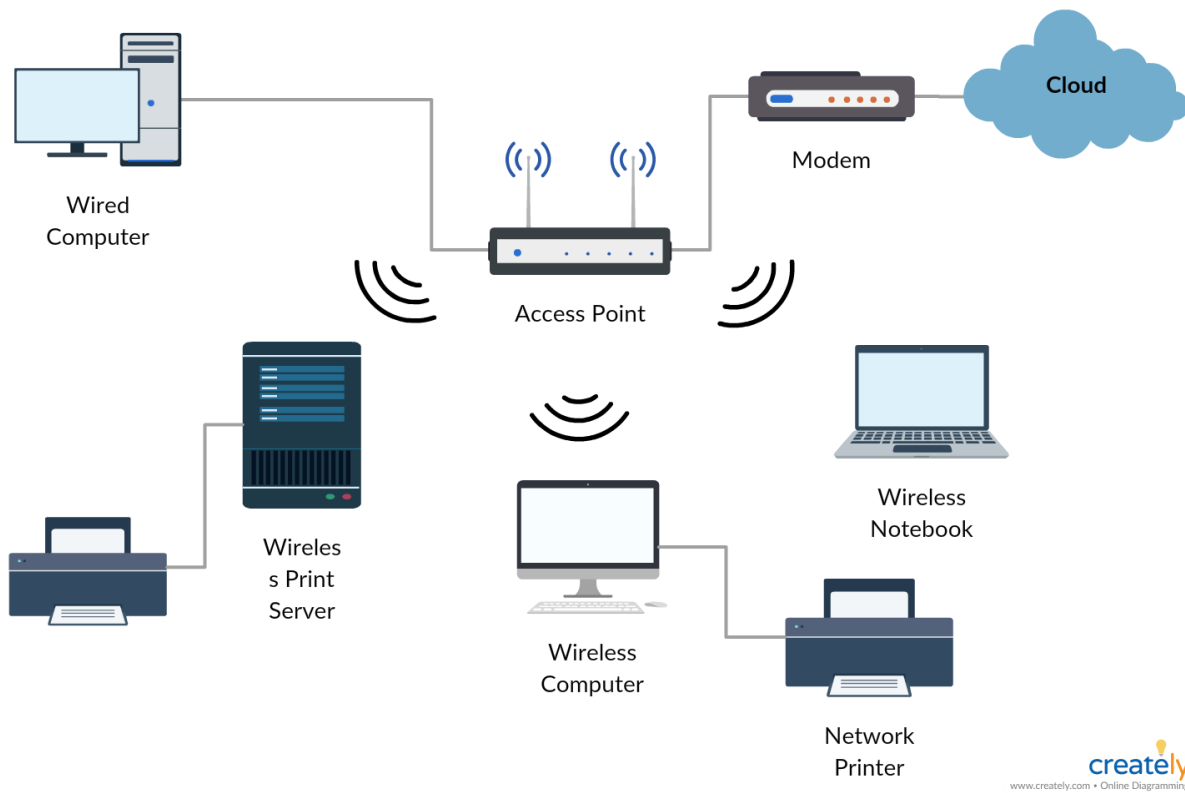
1. Verification of user
2. Providing Notifications
3. Internet Connectivity

NON - FUNCTIONAL REQUIREMENTS:

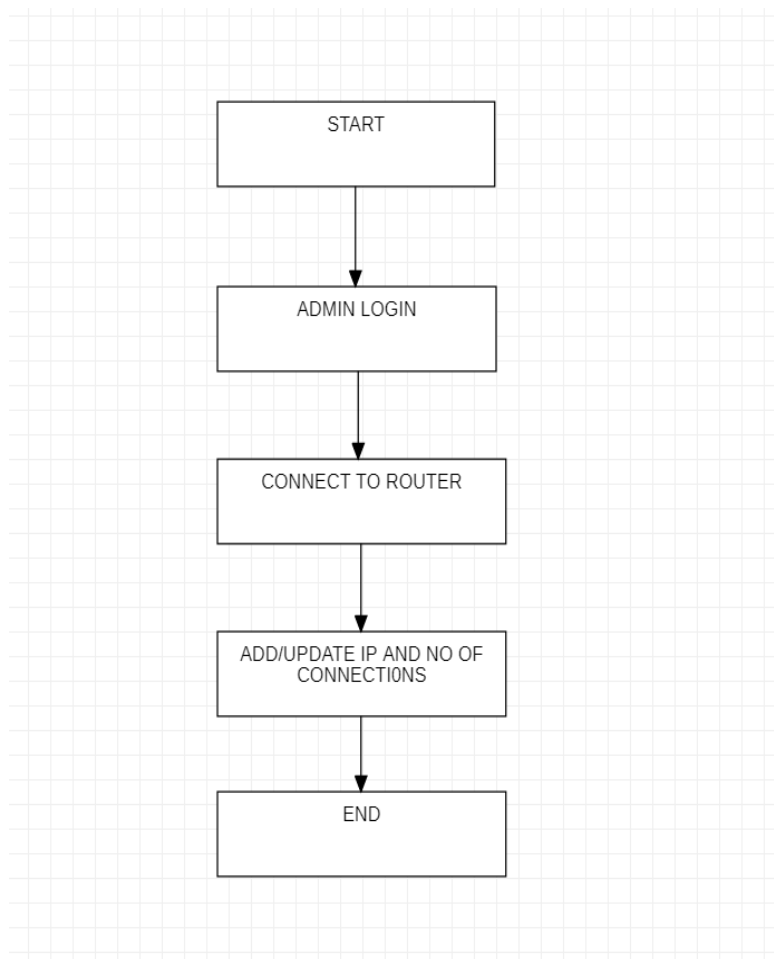
1. Security
2. Confidentiality of data
3. Gateway up gradation whenever required

ARCHITECTURE DIAGRAM





USER SIDE:



IMPLEMENTATION

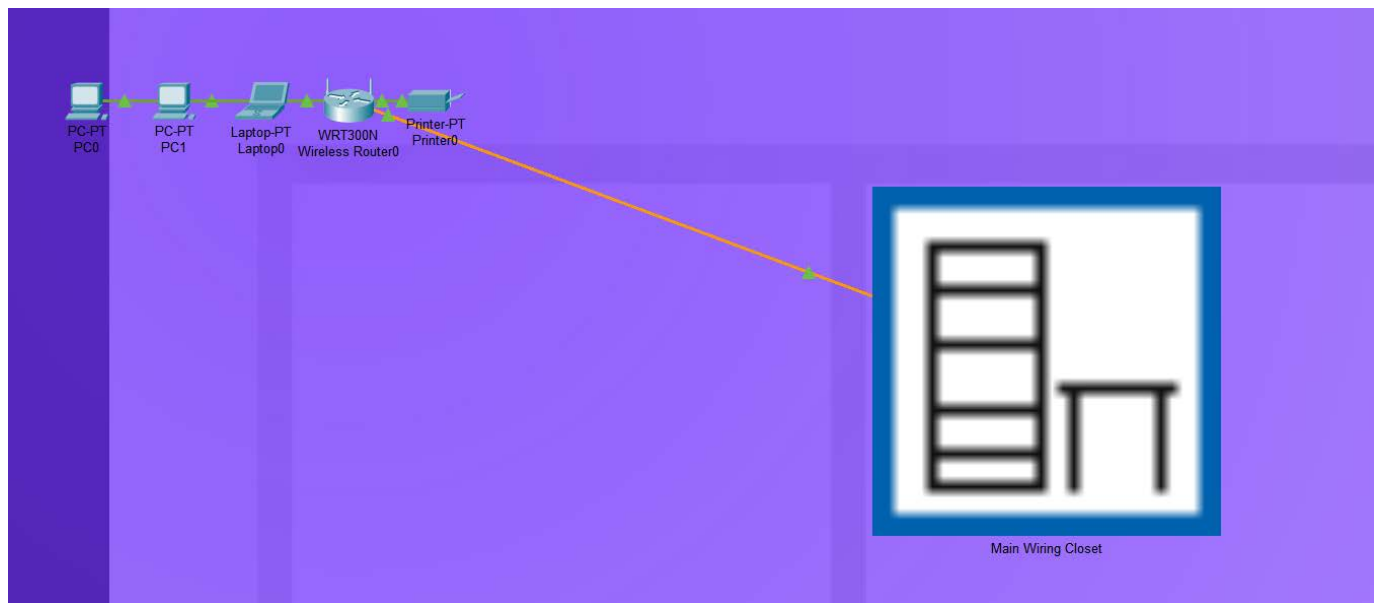
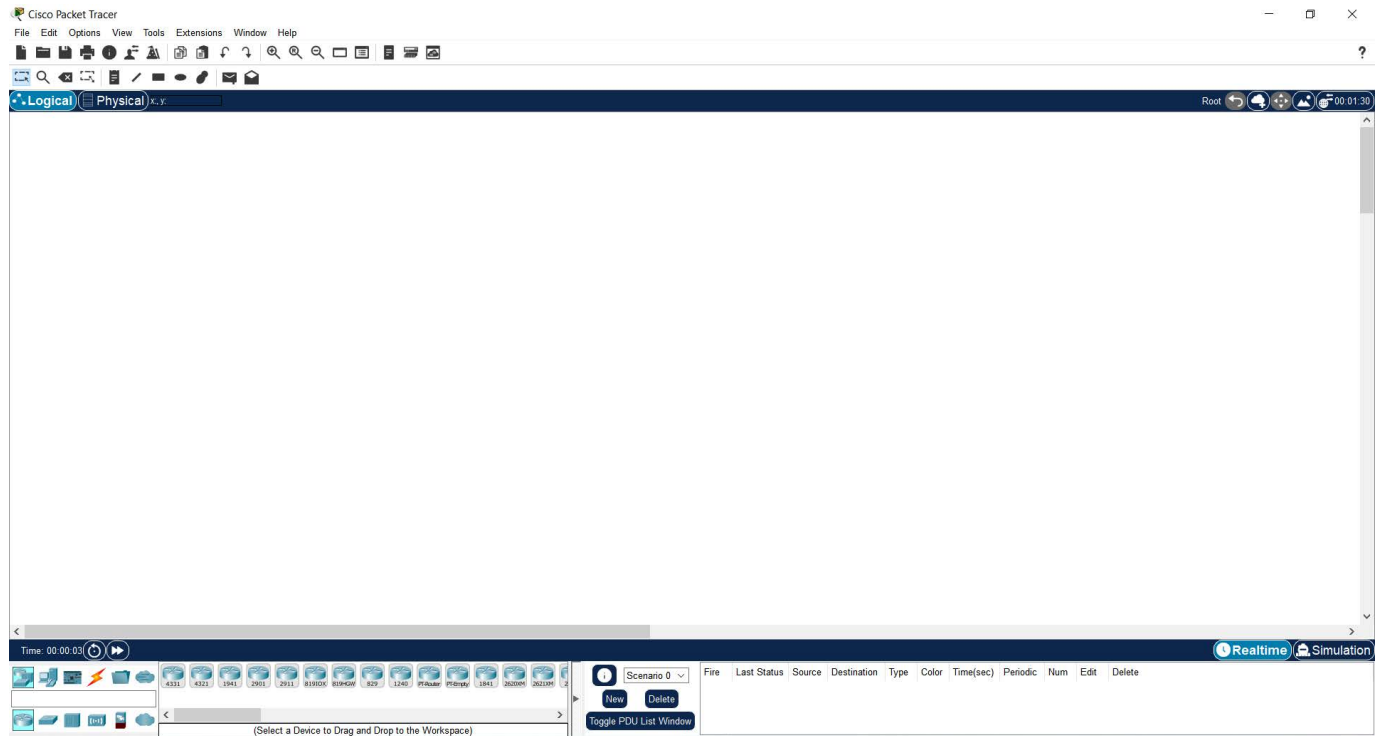
Firstly we will design our model in UML diagram format and then implement in the packet tracer to check if our proposed model is working fine or not. We should follow several steps and meet all requirements to make our model successful.

The model displays the main components required:

1. ROUTER (1941)
2. WIRELESS ROUTER
3. SWITCH
4. LAPTOP
5. PRINTER
6. PC

- > 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.

Physical **Config** Desktop Programming Attributes

GLOBAL
Settings
Algorithm Settings
INTERFACE
Wireless0
Bluetooth

Wireless0

Port Status ☒ On

Bandwidth 300 Mbps

MAC Address 0060.70B7.67B9

SSID Wireless

Authentication
☐ Disabled
☐ WPA-PSK
☐ WPA
☐ 802.1X

☒ WEP
☐ WPA2-PSK
☐ WPA2
Method:

WEK Key 1234567890

PSK Pass Phrase

User ID

Password

MD5

User Name

Password

40/64-Bits (10 Hex digits)

Encryption Type

IP Configuration
☒ DHCP
☐ Static

IPv4 Address 192.168.0.50

Subnet Mask 255.255.255.0

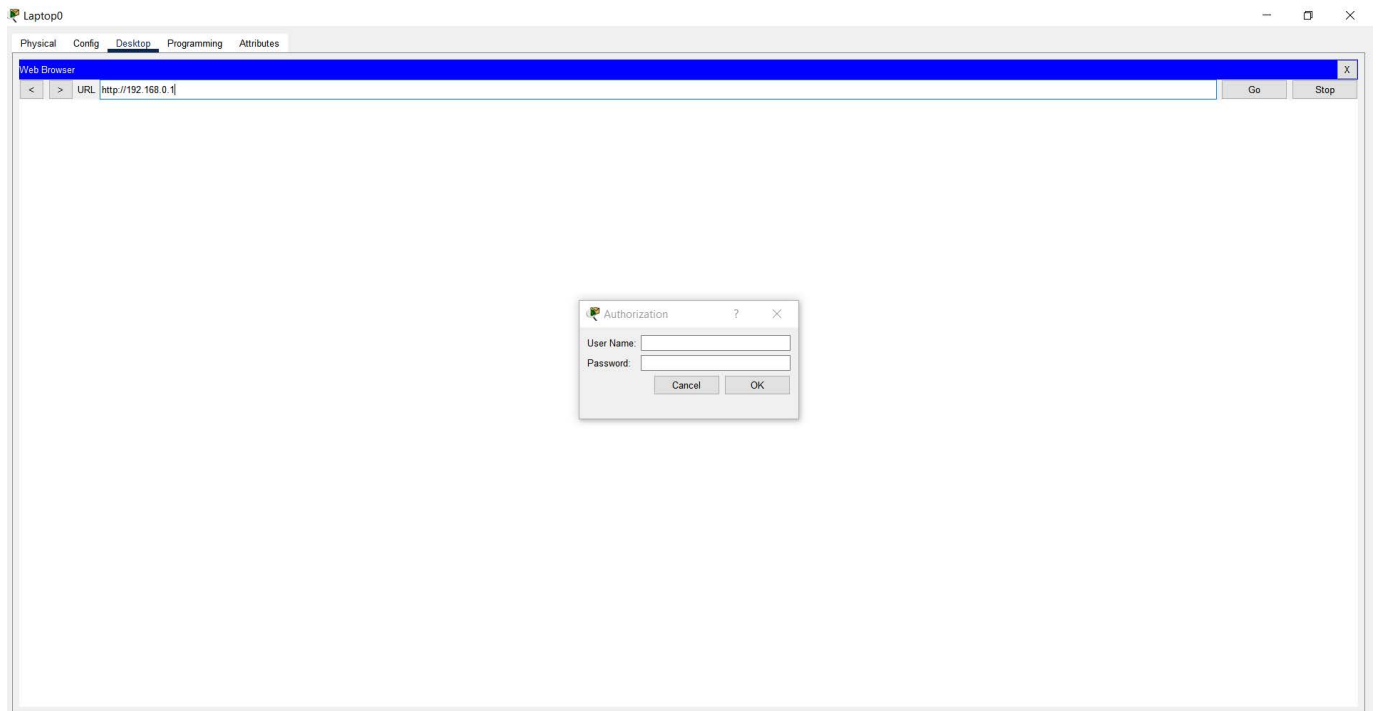
IPv6 Configuration
☐ Automatic
☒ Static

IPv6 Address

Link Local Address:

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...

Wireless Router0

Physical Config **GUI** Attributes

Wireless-N Broadband Router Firmware Version: v0.93.3

Setup Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Basic Setup DDNS MAC Address Clone Advanced Routing

Internet Setup

Internet Connection type: Static IP

Internet IP Address: 0 . 0 . 0 . 0

Subnet Mask: 0 . 0 . 0 . 0

Default Gateway: 192 . 168 . 1 . 1

DNS 1: 0 . 0 . 0 . 0

DNS 2 (Optional): 0 . 0 . 0 . 0

DNS 3 (Optional): 0 . 0 . 0 . 0

Optional Settings (required by some internet service providers)

Host Name:











Domain Name:

MTU: Size: 1500

Help...

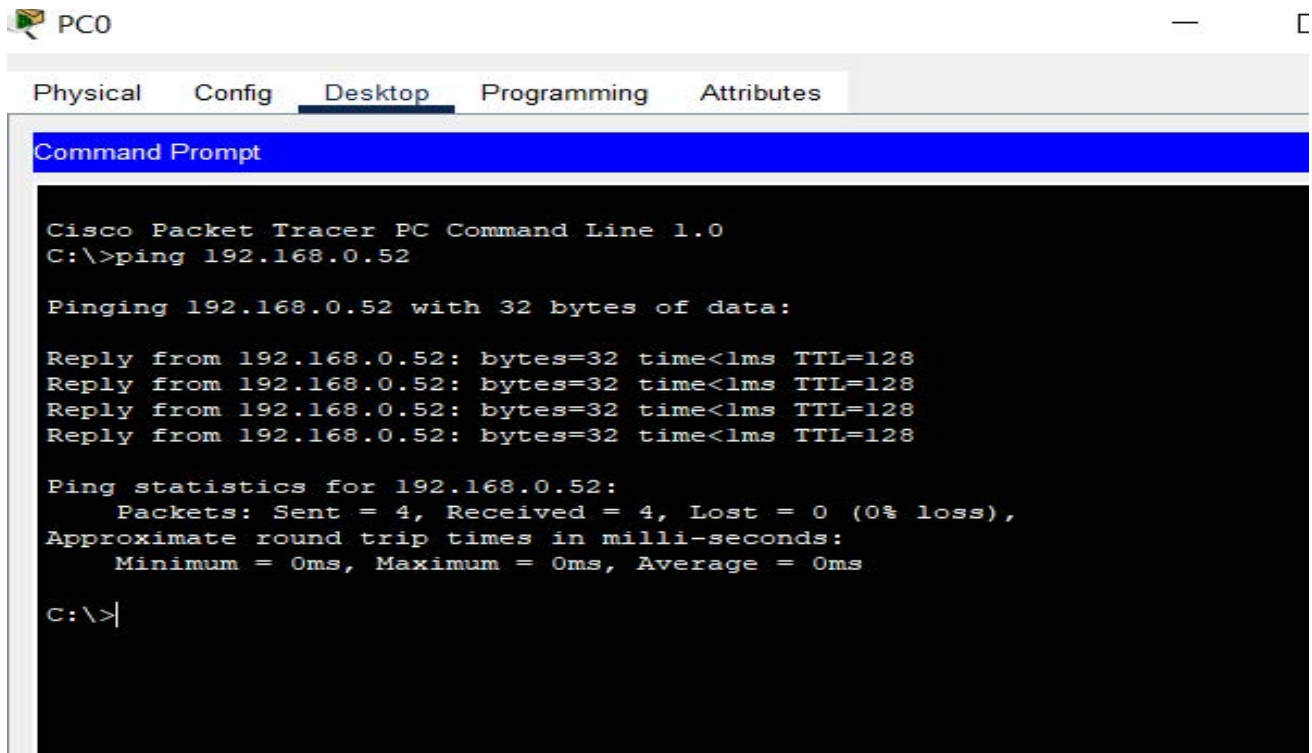
CHECKING THE MODEL:

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

	Successful	PC0	PC1	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC0	Laptop0	ICMP		0.000	N	2	(edit)	(delete)
	Successful	PC1	Laptop0	ICMP		0.000	N	3	(edit)	(delete)
	Successful	PC0	Printer0	ICMP		0.000	N	4	(edit)	(delete)
	Successful	Printer0	Laptop0	ICMP		0.000	N	5	(edit)	(delete)

CHECKING THE MODEL(USING PING):

The model is checked by pinging the devices.



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a Command Prompt. The command prompt shows the execution of the 'ping 192.168.0.52' command, which returns four successful replies with 32 bytes of data, a time of less than 1ms, and a TTL of 128. The ping statistics show 4 packets sent, 4 received, and 0% loss, with round trip times of 0ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.52

Pinging 192.168.0.52 with 32 bytes of data:

Reply from 192.168.0.52: bytes=32 time<1ms TTL=128
Reply from 192.168.0.52: bytes=32 time<1ms TTL=128
Reply from 192.168.0.52: bytes=32 time<1ms TTL=128
Reply from 192.168.0.52: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.52:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

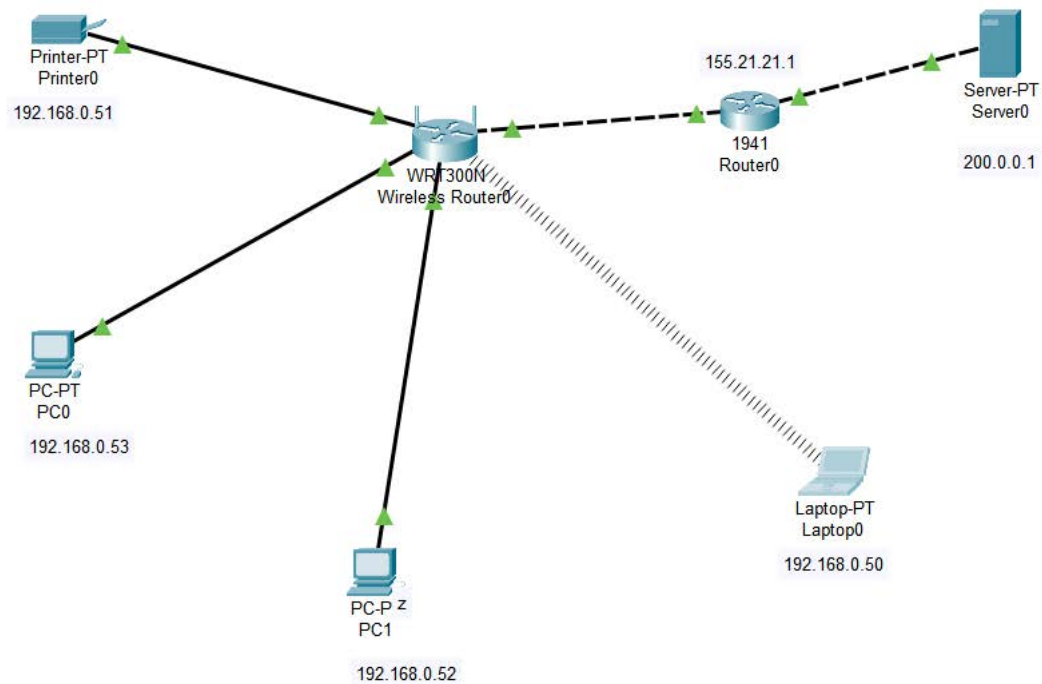
C:\>|
```

EXPERIMENT RESULTS AND ANALYSIS

6.1 RESULTS

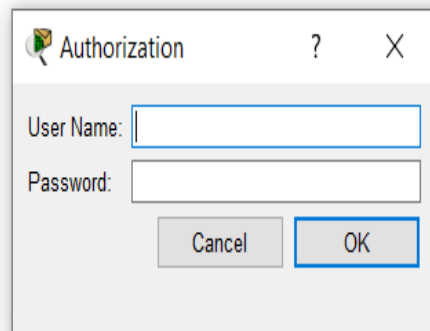
- In this Model we mostly concentrate on designing wireless network ,connect them using DHCP and implementing it.
- In this model we can also connect using cables.
- This is done to overcome the drawback of wireless networking.
- If we face any issue with wireless networks we can immediately switch to 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.

The screenshot displays the configuration interface for a device named "Wireless Router0". The interface has a sidebar on the left with a tree view containing "GLOBAL" (with sub-items "Settings" and "Algorithm Settings") and "INTERFACE" (with sub-items "Internet", "LAN", and "Wireless", which is currently selected). The main content area is titled "Wireless Settings" and contains the following fields:

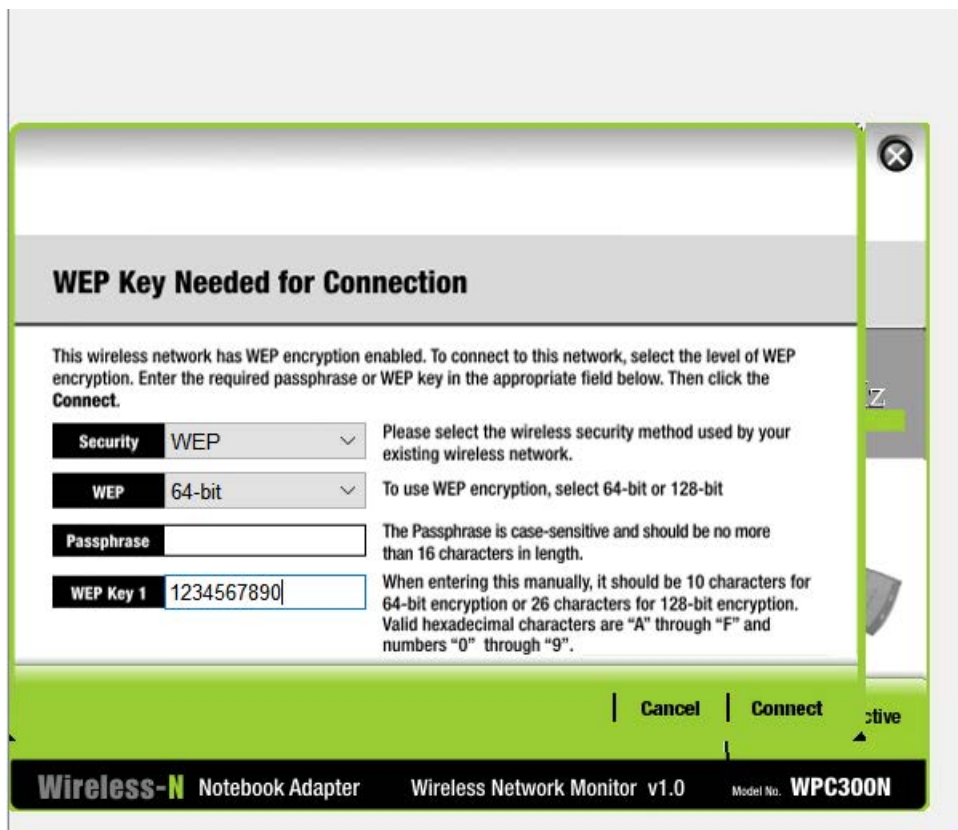
- SSID: Wireless
- 2.4 GHz Channel: 1 - 2.412GHz
- Coverage Range (meters): 250.00
- Authentication:
 - ☐ Disabled
 - ☒ WEP
 - ☐ WPA-PSK
 - ☐ WPA2-PSK
 - ☐ WPA
 - ☐ WPA2
- WEP Key: 1234567890
- PSK Pass Phrase: (empty field)
- RADIUS Server Settings: (empty section)
- IP Address: (empty field)
- Shared Secret: (empty field)
- Encryption Type: 40/64-Bits (10 Hex digits)

At the bottom left of the interface, there is a "Top" button with a small square icon next to it.

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 Laptops,Desktops, 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 SCOPE

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.





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