SUMMER TRAINING

on

Integrated Telecom/Data Network & Cyber Security

With

Mini Project on "Traffic Security Aspects in a Campus with multiple DHCP"

Submitted by

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(June – July 2022)

Acknowledgment

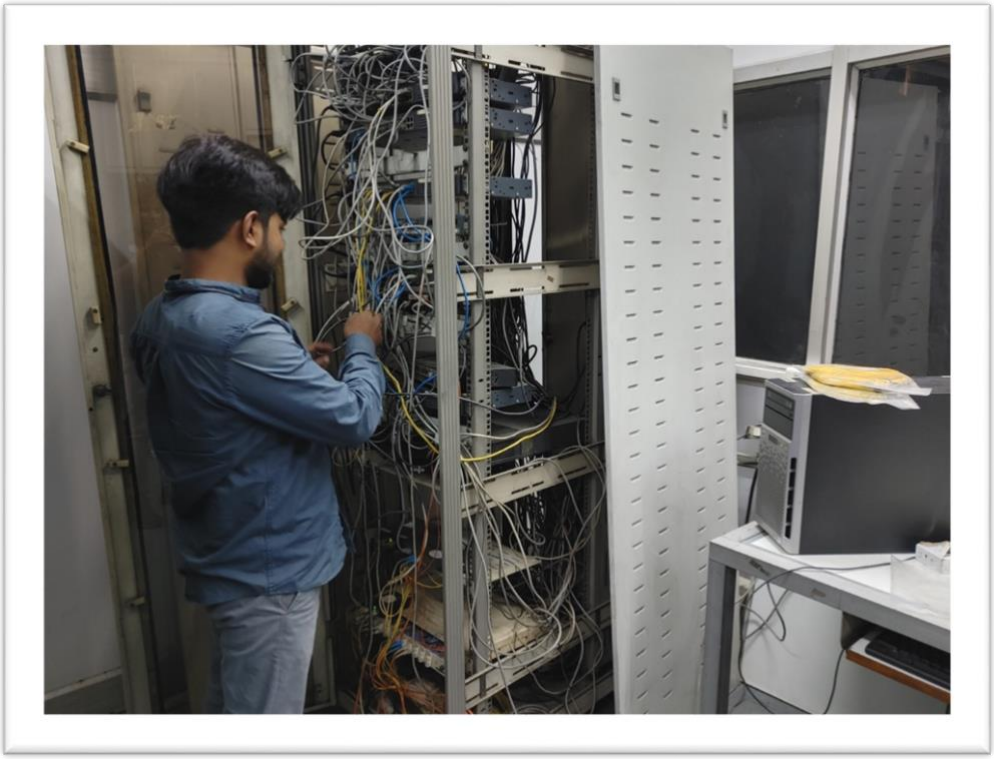
I would like to express warm thanks to my trainer **Mr. Krishan Kumar Singh Yadav**, Assistant Director Telecom, ALTTC for the continuous support of my study and related research, for their patience, motivation, and immense knowledge and for providing me access to laboratory and research facilities.

I take this opportunity to express my profound gratitude and deep regard to my guide **Gaganpreet Kaur Mam**, School of Computer Application, *Lovely Professional University* for her exemplary guidance, monitoring, and constant encouragement throughout the course of this project work.

I want to thank all the faculty members of School of Computer Application, *Lovely Professional University* for providing me with the optimal learning environment to enable me to take this project.

I express my deepest thanks to Training and Placement Coordinator, School of Computer Application, Lovely Professional University for allowing me to grab this opportunity. I choose this moment to acknowledge his contribution gratefully by giving necessary advice and guidance to make my training good learning experience.

Ankit Kumar
12000935



Training Certificate
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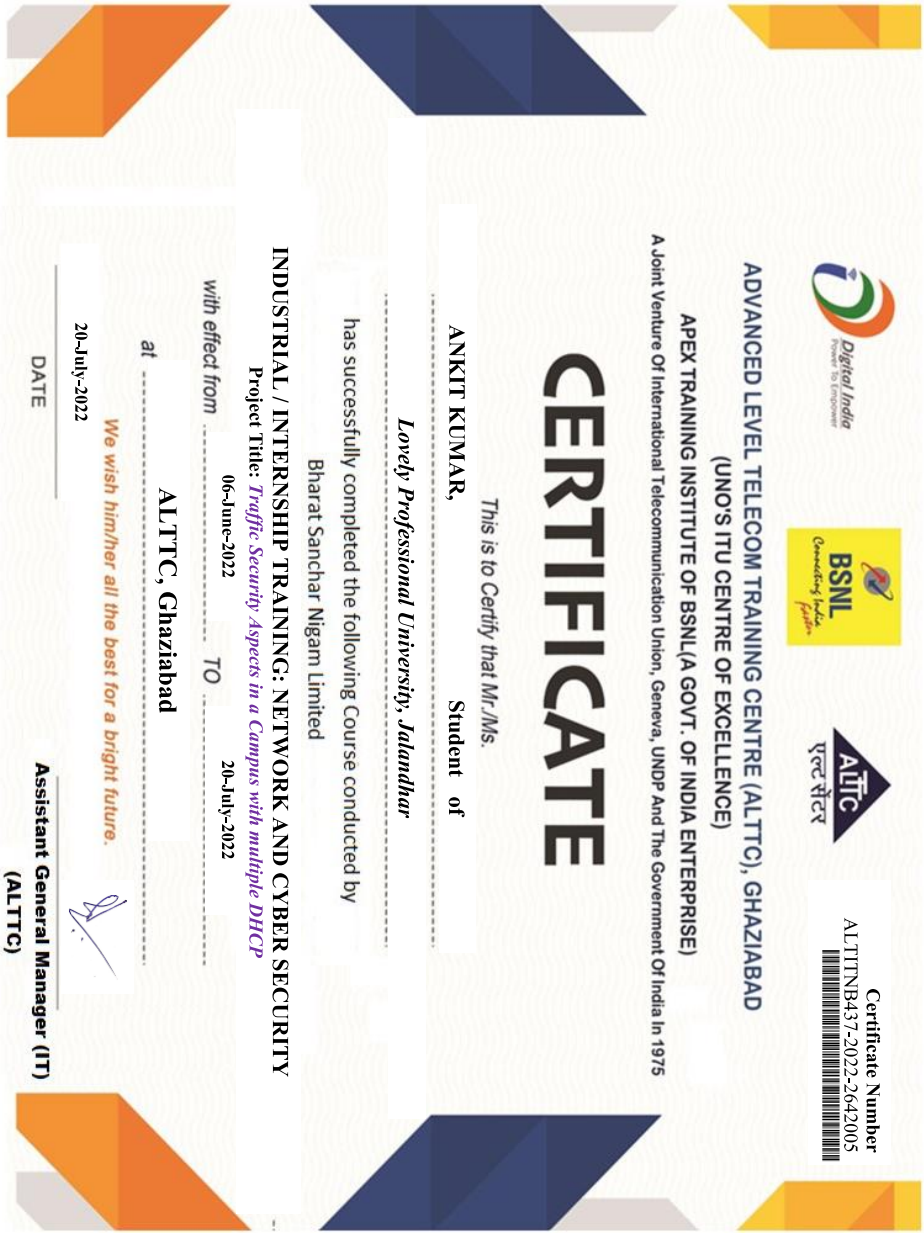

ADVANCED LEVEL TELECOM TRAINING CENTRE (ALTTC), GHAZIABAD
(UNO'S ITU CENTRE OF EXCELLENCE)
APEX TRAINING INSTITUTE OF BSNL(A GOVT. OF INDIA ENTERPRISE)
A Joint Venture Of International Telecommunication Union, Geneva, UNDP And The Government Of India In 1975

Certificate Number
ALTTTNB437-2022-2642005

CERTIFICATE

This is to Certify that Mr./Ms.

ANKIT KUMAR, Student of

Lovely Professional University, Jalandhar

has successfully completed the following Course conducted by
Bharat Sanchar Nigam Limited

INDUSTRIAL / INTERNSHIP TRAINING: NETWORK AND CYBER SECURITY
Project Title: *Traffic Security Aspects in a Campus with multiple DHCP*
with effect from 06-June-2022 TO 20-July-2022

at ALTTC, Ghaziabad

We wish him/her all the best for a bright future.

20-July-2022
DATE

Assistant General Manager (IT)
(ALTTC)

CERTIFICATE

Certified that **ANKIT KUMAR** has carried out the project work titled **"Designing a Smart and Secure Home"** from **6th June to 20th July 2022** for the award of the degree **Bachelor of Computer Application** from **Advanced Level Telecom Training Centre** (ALTTC) under my supervision. The thesis embodies result of original work and studies carried out by Student herself and the contents of the thesis do not form the basis for the award of any other degree to the candidate or to anybody else.

Mr. Krishan Kumar Singh Yadav
Assistant Director Telecom (IT)
ALTTC, Ghaziabad

ABSTRACT

Today's society needs technology. There is a need to have a smart home that can turn a smart device on or off via a smartphone. Earlier we used to press the switch or remote button to turn the device on or off. To design smart home in cisco Packet Tracer using IoT where we can test system, check Network configuration. Through smartphones we can test various IoT devices that can be controlled and monitored.

IoT devices are connected to internet to allow the distant monitoring and controlling of different home appliances such as lighting, heating, cooling, and alarming.
CISCO PACKET TRACER simulation software is used to implement smart home. The features include different sensor, actuator and different smart devices which is used for home automation.

Keywords: IoE / IoT, Sensor, Cisco packet tracer 8.1 simulator, Router, Switches, wireless

Table of contents

ABBREVIATIONS

Abbreviate	Details
CLI	Command Line Interface
IoT	Internet of Things
IoE	Internet of Everything
ISP	Internet Service Provider
LAN	Local Area Network
DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
NIC	Network Interface Card
VPN	Virtual Private Network
WLAN	Wireless Local Area Network
SSID	Service Set Identifier

LIST OF FIGURES AND TABLES

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1.	The devices used for the design are	25

1. INTRODUCTION

1.1. INTRODUCTION TO BSNL

India is the fourth largest telecom market in Asia after China, Japan and South Korea. The Indian telecom network is the eighth largest in the world.

TYPE: COMMUNICATION SERVICE PROVIDER

COUNTRY: INDIA

AVAILABLITY: NATIONAL EXCEPT DELHI & MUMBAI

OWNER: THE GOVERNMENT OF INDIA

WEBSITE: www.bsnl.co.in

1.1.1 HOW BSNL CAME IN TELECOM MARKET:

The initial phase of telecom reforms began in 1984 with the creation of Centre for Department of Telematics (C-DOT) for developing indigenous technologies and private manufacturing of customer premise equipment. Soon after, the Mahanagar Telephone Nigam Limited (MTNL) and Videsh Sanchar Nigam Limited (VSNL) were set up in 1986.The Telecom Commission was established in 1989. A crucial aspect of the institutional reform of the Indian telecom sector was setting up of an independent regulatory body in 1997 – the Telecom Regulatory Authority of India (TRAI), to assure investors that the sector would be regulated in a balanced and fair manner. In 2000, DoT corporatized its services wing and created Bharat Sanchar Nigam Limited.

1.1.2 INSTITUTIONAL FRAMEWORK:

It is defined as the system of formal laws, regulations, and procedures, and informal conventions, customs, and norms, that broaden, mold, and restrain socio-economic activity and behaviour. The

country has been divided into units called Circles, Metro Districts, Secondary Switching Areas (SSA), Long Distance Charging Area (LDCA) and Short Distance Charging Area (SDCA).

In India, DoT is the nodal agency for taking care of telecom sector on behalf of government. Its basic functions are:

- Policy Formulation
- Review of performance
- Licensing
- Wireless spectrum management
- Administrative monitoring of PSUs
- Research & Development
- Standardization/Validation of Equipment

1.1.3 BSNL CONTRIBUTION TO DEVELOPMENT OF TELECOM:

Bharat Sanchar Nigam Limited was formed in year 2000 and took over the service providers role from DOT. BSNL's roadmap for providing customer with access to the latest telecommunications services without losing sight of universal service access has been by way of utilizing optimally the existing infrastructure and accelerating advances in technological component by innovative absorption.

1.1.4 ACHIEVEMENTS OF BSNL:

- BSNL has a customer base of over 9 crore and is the fourth largest integrated telecom operator in the country.
- BSNL is the market leader in Broadband, landline and national transmission network.
- BSNL is also the only operator covering over 5 lakh village with telecom connectivity.
- Area of operation of BSNL is all India except Delhi & Mumbai.

1.2 Training Organization - ALTTC:

Advanced Level Telecom Training Centre (ALTTC), Ghaziabad is the **apex training institute of BSNL**.ALTTC was set up as a joint venture of International Telecommunication Union, Geneva, UNDP, and the Government of India in 1975. ALTTC functions on the frontiers of telecom technology, finance and management and imparts training to the leaders in the business. The strength of ALTTC lies in the state of art labs, massive infrastructure and trained, talented and qualified human resource pool.

The Centre's Mission statement is **"To Deliver Excellence Through Training".**

ALTTC has excellent facilities for training. The lecture rooms at the ALTTC are equipped with modern teaching aids. Emphasis is given on simulation of conditions existing in the work environment. Hands-on training on systems is encouraged. CBT packages are available for self-paced learning. ALTTC has well equipped laboratories / model installations for training in various telecommunication systems. The facilities include Ericsson 2G lab, Nokia 3G lab, Next Generation Network lab equipped with IP TAX and IMS, IPV6 lab, Broadband & MPLS lab.

ALTTC aspires to be one of the trusted, technologically advanced & valued telecom training centers in the world.

1.3. Technical Learnings from the Training

1. Brief about Tradition, Current & Future Telecom/ISP Network
2. Telecommunication Vs. Data Communication
3. Transmission Media for Data Communication
4. Network Terminology: Mandatory Software and Hardware
5. Implementation of Data Communication in an Area/Campus Through Simulator
6. Brief about Cyber Security
7. Network Security Implementation
8. Different types of Telecommunication System (Satellite/Mobile etc)

1.4. GENERAL OVERVIEW OF MINI PROJECT

The Objective of this project is to implement Smart Home with the help of the simulator.

The tool chosen for the simulations is **Cisco Packet Tracer**. Main strength of the tool is the offering of a variety of network components that simulate a real network, devices would then need to be interconnected and configured to create a network. In the last version of the tool Cisco introduced IOT functionalities, and now it is possible to add to the network smart devices, components, sensors, actuators, and devices that simulate microcontrollers. All the IOT devices can run on standard programs or can be customized by programming them with Java, Python. This makes Cisco Packet Tracer an ideal tool for building Smart Home practical simulations.

The technology has been growing from day to day in human life. The necessity for the development of technology is to lead human life comfortably.

Human basic need to lead his/her life comfortable building/ house. A building with updated latest technology which means a smart Building.

The IOT is a system which is equipped for everything to the web through remote sensor networks.

1.5. OBJECTIVE

The technology has been growing from day to day in human life. The necessity for the development of technology is to lead human life comfortably.

Human basic need to lead his/her life comfortable building/ house. A building with updated latest technology which means a smart Building.

The IOT is a system which is equipped for everything to the web through remote sensor networks. A SMART building is one equipped with the telecommunications infrastructure that enables it to continuously respond and adapt to changing condition, allowing for a more efficient use of resources increasing the comfort and security of its occupants. A smart home is intelligent because its daily activities are monitored by the computer. A smart home consists of many technologies through home networking for improving the living quality.

IoT is short for **I**nternet **o**f **T**hings. The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems.

Advantages and Disadvantages of Smart Building

The Smart Building has following advantages:

- More secure and safe home.
- Simplified staff tracking.
- Minimal administration costs.
- Less costs by sharing infrastructure.
- University systems by easier integration.
- Information can be transferred to everyone in any manner.
- Increased mobility-not tied to a specialist workstation.
- Using standard operating environments training is minimized.

The Intelligent Building has following disadvantages.

- Complexity of system is more.
- Initial cost is very high.

How does IOT work?

To make IOT work we need 5 basic things:

- ✓ **Things:** This refers to anything which could be anything from person or animal to robot or computer. Here the thing is anything that can be tracked, measured, and monitored.
- ✓ **Identifier:** To track, measure and control anything we need to identify them. So, they should have some identity.
- ✓ **Sensors:** The objects should have inbuilt sensors. These sensors can collect the information from the environment.
- ✓ **Network:** The network provides connectivity, power, computation, security, and manageability. The data moves through the network without requiring any human interaction to the computer.
- ✓ **Data analyzer:** Once a large amount of data has been collected. By analyzing it we can find a pattern and act accordingly.

1.6. PROBLEM DEFINITION

In this era, where energy management is the concern of everyone, the buildings are being constructed in a manner to provide maximum comfort and ease to the people with minimum energy utilization. This whole thing is only possible with the help of controlling devices that are to be installed in a building during construction. This controlling can be of any type, from simple switching on and off the lights, to water motor control and many more.

This smart building is mainly designed to manage and supervise the following activities:

- Lighting Control
- Air Conditioning System
- Fire Alarm & Fire Fighting
- Public Address
- CCTV System Monitoring
- Elevators
- Access Control, Parking Access, Intrusion Detection
- PABX
- UPS
- Water Consumption

The major advantages of this system include good control of internal comfort conditions, possibility of individual room control, effective monitoring and targeting of energy consumption, improved reliability, and life, save time and money during the maintenance, control of building, central or remote control and monitoring of building.

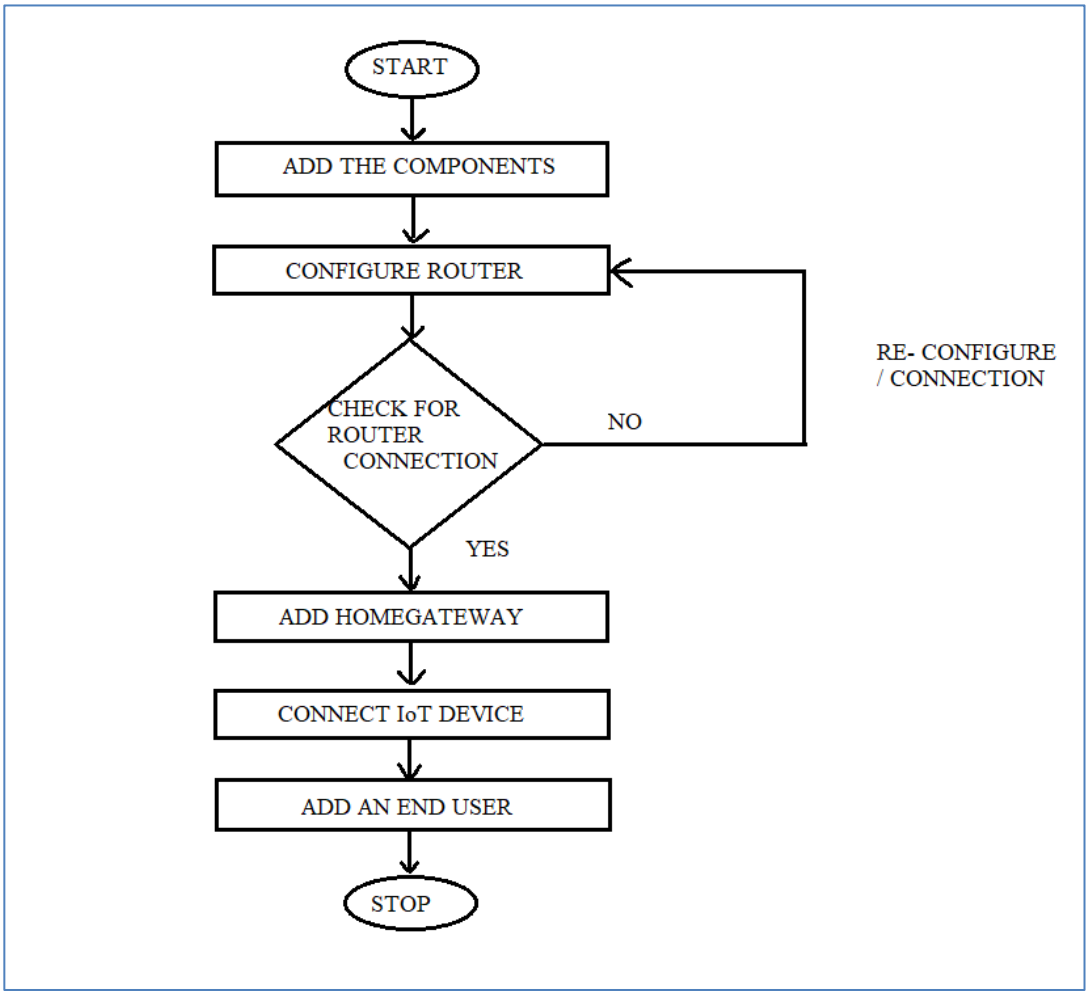
1.7. PROPOSED SOLUTION:

The work plan of the study was as follows:

- ✓ Theory cum practical knowledge through class contacts by experts of ALTTC.
- ✓ Overview of use of cisco packet tracer tool and implement few networks.
- ✓ Study of smart building and its implementation on cisco packet tracer simulation software.

2. DETAILS AND DESIGNING STRATEGY FOR THE PROBLEM

2.1 FLOWCHART



The Algorithm is explained as follows:

- Step 1: Start the project.
- Step 2: Open the pkt. file and save the file.
- Step 3: Add the required components to the workspace as packet tracer simulator.
- Step 4: Connect all devices in workspace Using cables.
- Step 5: Configure the device and setup internet service provider router.
- Step 6: Add Home Gateway to the Network.
- Step 7: Connect smart Devices to the Wireless Network.
- Step 8: Add End User Device to the Network
- Step 9: Stop

2.2 IMPLEMENTATION

In this section we implemented the various smart home cases. The purpose is to analyze the network and IOT layout in a smart building.

2.2.1 Smart Building I – giving access to device from home using smartphone.

In this case we will design a smart home using smart device and home gateway.

Home Gateway

The home gateway is used to manage smart devices remotely or locally using Ethernet cable or wirelessly. The IOT devices are connected to home gateway using Ethernet cable or wirelessly.

Home gateway is also used as DHCP server which provides automatic IP address to all the devices connected to it. The Home Gateway internal IP address is 192.168.25.1. It has 4 Ethernet ports in addition to a wireless access point configured with the "Home Gateway" SSID.

Fig 2.1.: Home Gateway in cisco packet tracer

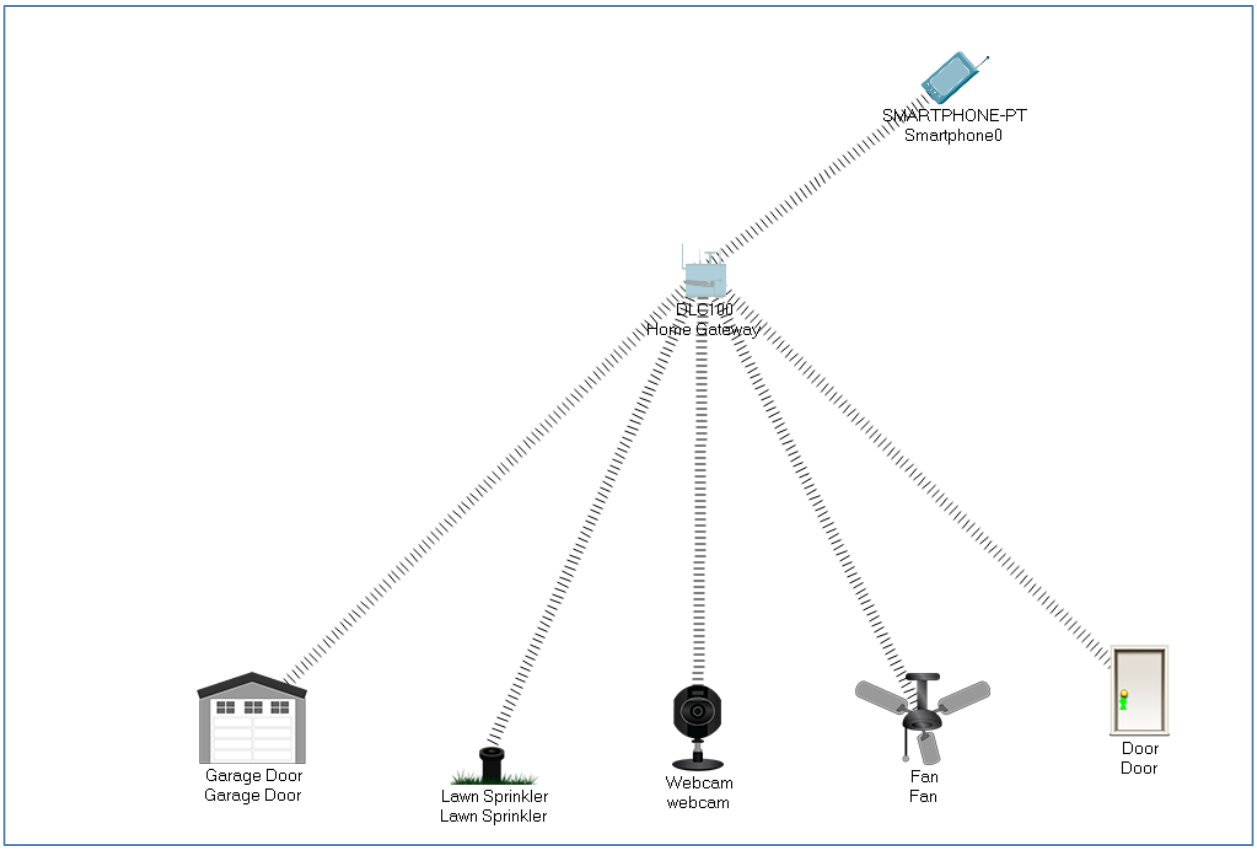


Fig 2.2: Smart Building 1

In this smart home we have connected the smart devices to home gateway. These smart devices are controlled by a smart phone.

STEPS:

A. Drag a home gateway on the packet tracer workspace.

B. Configure the network if any changes required from the default.

1.SSID: Home Gateway

2.LAN: 192.168.25.1

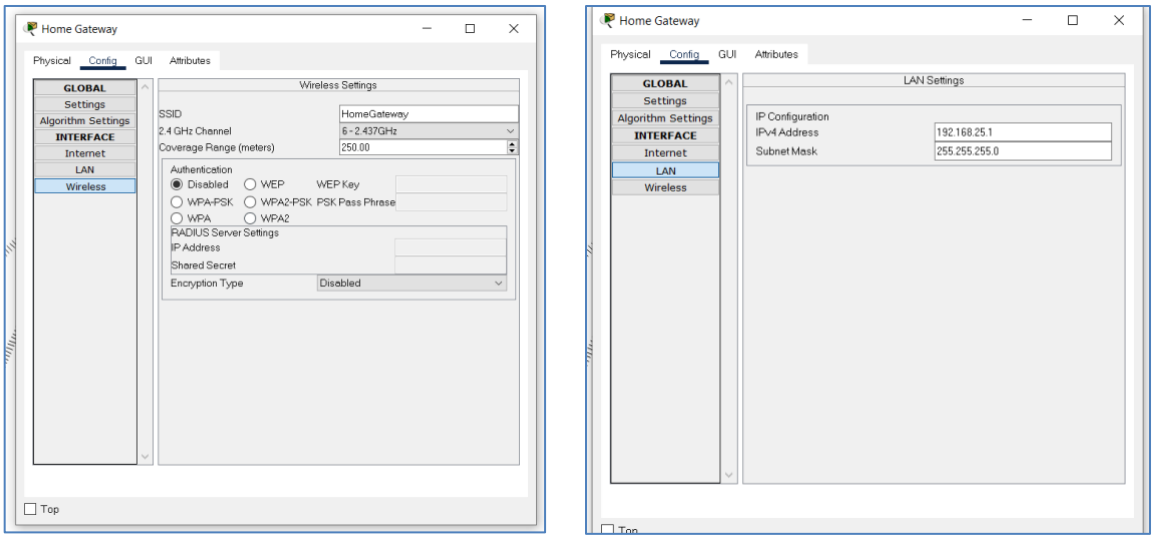


Fig 2.3: Home Gateway SSID and default IP Address

C. Drag a smart phone and some smart devices on the PT workspace.

D. Connect all the devices to home gateway and register them to it. To connect device wirelessly select wireless option in advanced settings. Otherwise use copper straight cable. To register to home gateway, select home gateway option in config in smart device.

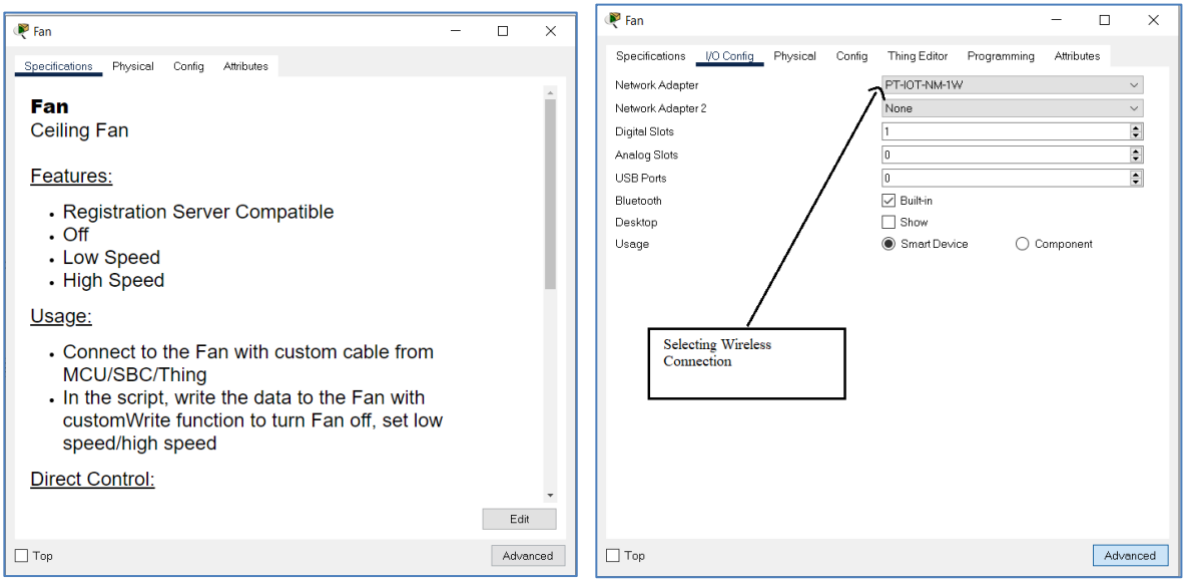


Fig 2.4: Smart Device Specification and selecting wireless to connect with home gateway.

E. Go to config mode select wireless0 left hand side and change the SSID: Default to Home Gateway. After that go to settings left hand side, go to IoT server select Home Gateway.

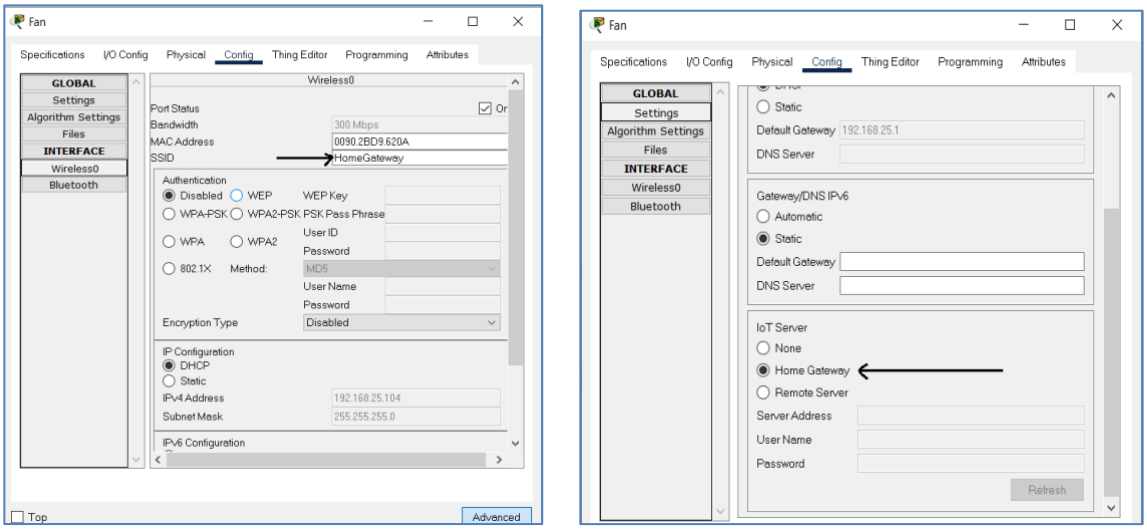


Fig 2.5: SSID and Home Gateway

F. Open the smart phone and click IOT monitor and login. By default, the password and the username are both admin. After login all the devices connected to the home gateway appears.

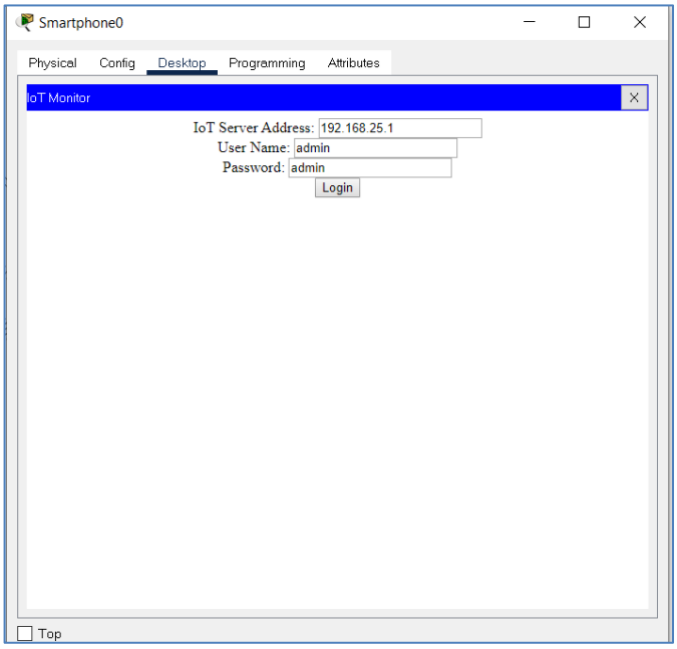


Fig 2.6: Login Window in Smart Phone

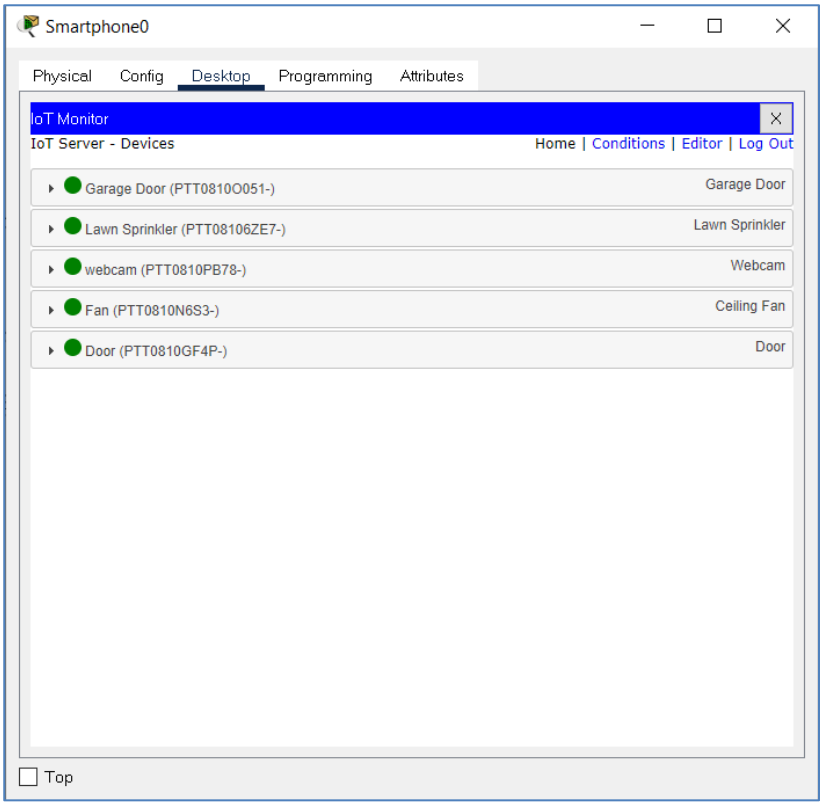


Fig 2.7: List of devices

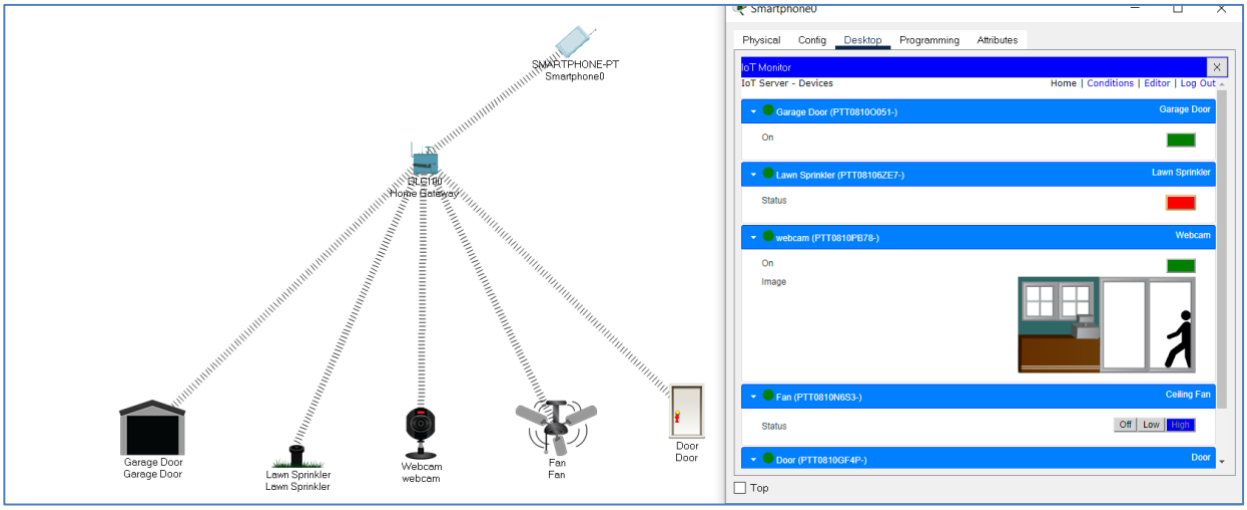


Fig 2.8: Registered IOT Device with Their Status

G. To control devices, we can set conditions of IoT device.

2.2.2 Smart Building II

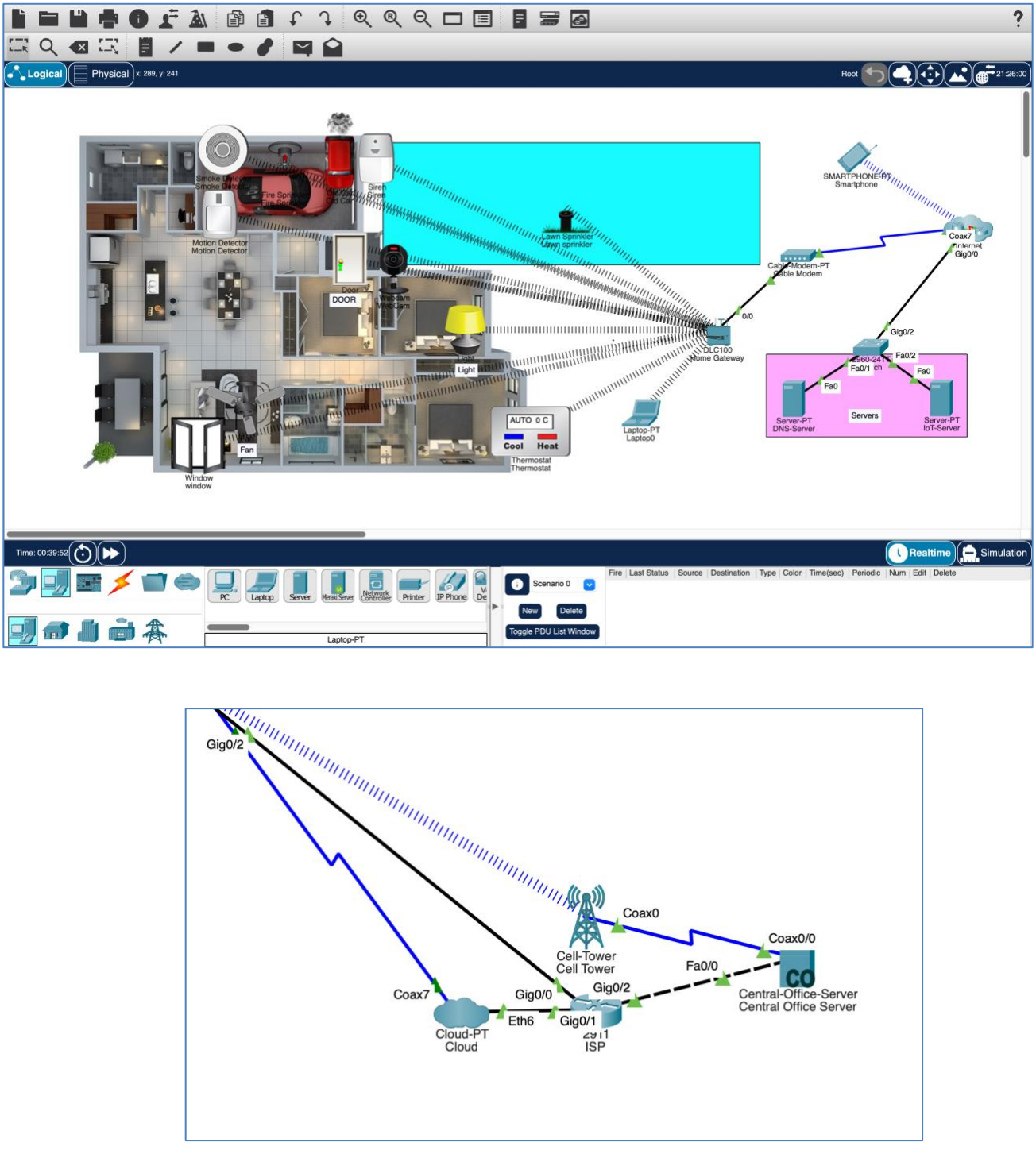


Fig 2.9: Architecture of Smart Building II and Inside the Internet cloud

This home is the variation of the first home. This home can be remotely controlled by the 3G network Smartphone. The IOT intelligence is remotely provided by the remote provider as a service.

In the above architecture of smart home all the devices are connected to Home Gateway wirelessly and wired medium. The backend logic was provided by the remote connection to cloud server hosted by a third party. The user has ability to connect to IOT control page using a Smartphone remotely via a 5G network.

The network layout in this smart home is as follows:

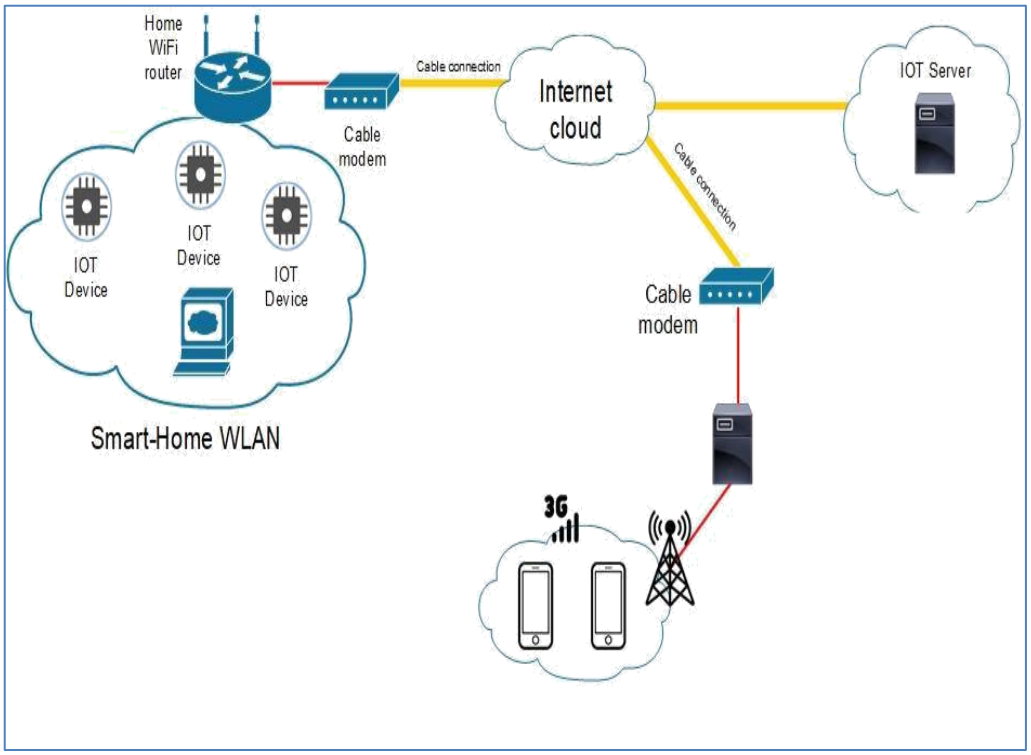


Fig 2.10: Network Topology

The network layer has four areas:

1. The home networks.
2. 5G mobile network.
3. The backend IOT intelligence provider
4. ISP provider

In the home network the devices are connected to the home gateway. This home gateway helps in providing the DHCP functionalities but not the IOT functionalities. Cable modem is only used to connect the home modem to the internet.

The ISP network connects different interfaces to each other to simulate internet connectivity. Coaxial cables coming from home modem and 5G network provider were linked to the Ethernet cable. Here the cloud IOT server was connected.

For the simulation of the remote network a mobile 5G provider infrastructure was utilized in this example. The homeowner can connect to the IOT monitoring page using its own mobile outside the home network that is remotely. This cellular network requires a cell tower and a central office server. This server consolidates the entire signal coming from the tower coaxial cables into an Ethernet backbone connection that was connected to the ISP network via cable modem.

The IOT server is connected to the ISP provider with the help of the router. The server has been given the static IP; this will ensure that the smart devices are always connected to the server. This IOT server will provide all the IOT functionalities.

The devices used for the design are:

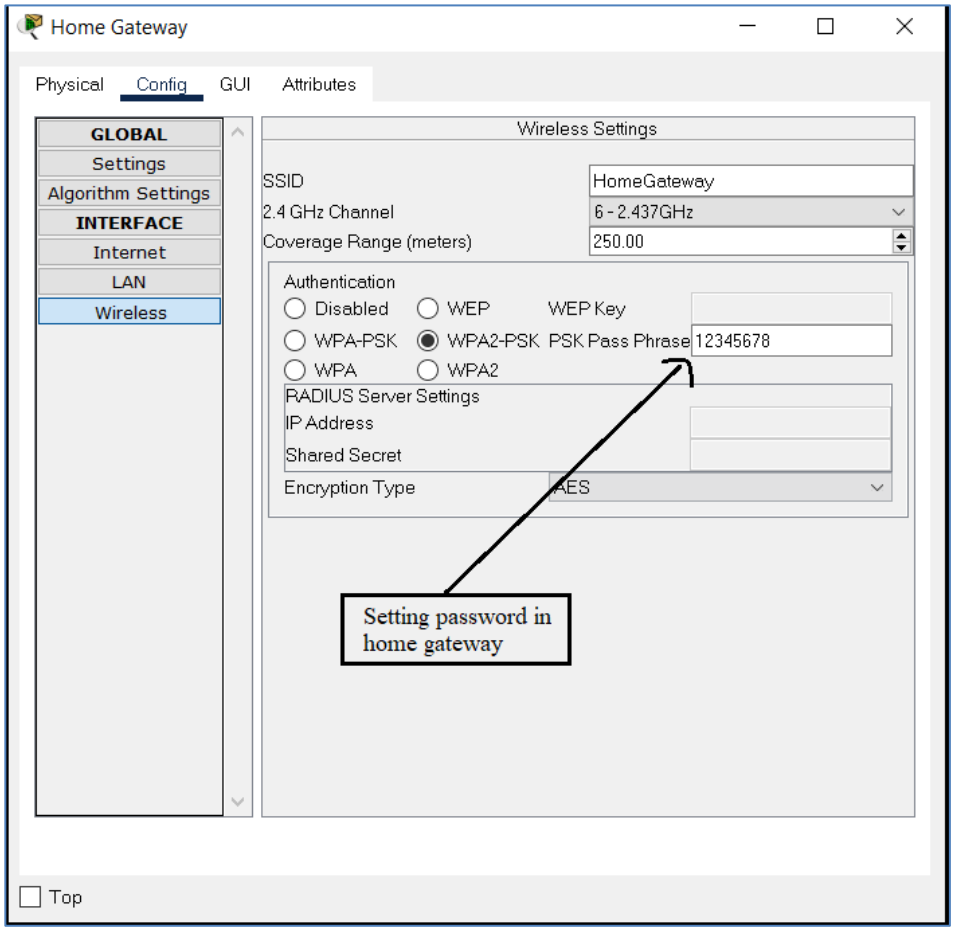
Devices	Functions
Home gateway	Used to register smart objects and provide smart objects with IP addresses.
Cable modem	Use to connect to the internet at home.
IOT Server	To monitor intelligent things that are recorded on it and to have specific database features
Router (2911)	Used to link home to the network of cellular.
Central office server	Used to link the router with the cellular network.
Laptop	Connect to home gateway to access the smart devices and to set conditions
Fan	Used for ventilating the home environment based on certain circumstances
Webcam	Control the home
Siren	Provide sound at home for some case
Light	Provide light
Smart Door	Link to your home getaway and provide an event based on functions
Cell Tower	Provide home user cellular network coverage to monitor the remote mode of the home appliance.
Lawn Sprinkler	Used as a sprinkler based on environmental water level

Window	Used to remotely control the window impacts Argon, Carbon Monoxide, Carbon Dioxide, Hydrogen, Helium, Methane, Nitrogen, O2, Propane, and Smoke.
Fire Sprinkler	A **fire sprinkler** or **sprinkler** head is the component of a **fire sprinkler** system that discharges water when the effects of a **fire** have been detected, such as when a predetermined temperature has been exceeded.
Thermostat	Measures the increase in the temperature of the environment.
Motion Detection	Link to your home getaway and detect motion
Garage Door	Used to open or close the garage door via smartphone through home gateway
Battery	Link with solar panel
Solar Panel	Detects Sunlight to generate electricity.
MCU-PT	Used to connect different intelligent things
Fire Motion	Detects the heating element.
Heating Element	Affects Ambient Temperature at a rate of 10°C per hour
Smartphone	Used to control all the smart devices

STEP required for design:

A. Drag a home gateway onto the PT workspace and configure the network from defaults and set password.

B. Drag all the required smart devices and connect them to the home gateway wired or wirelessly. The wireless connection is established using password that was set in home gateway.



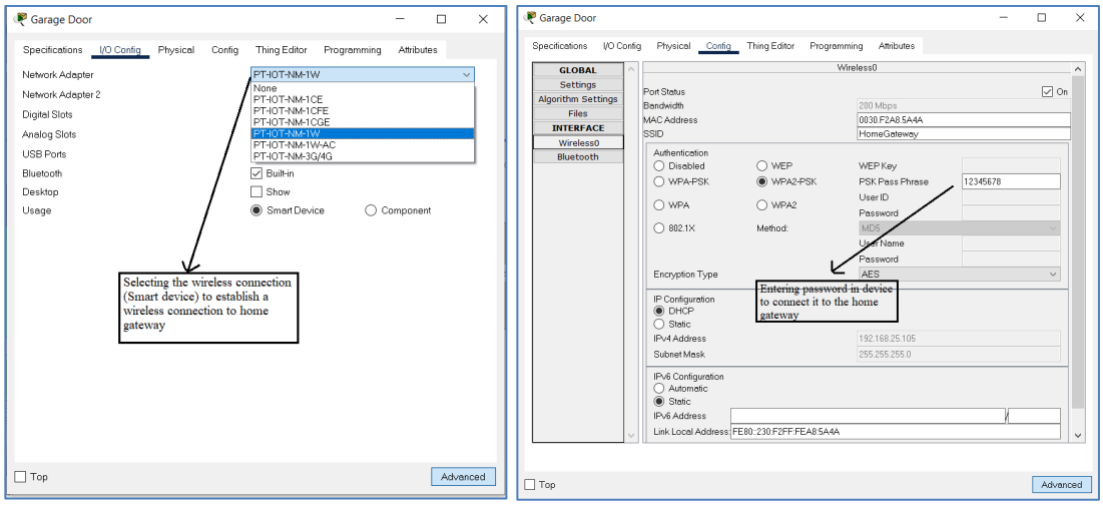


Fig 2.11: Configure Home Gatway and IoT devices

C. Drag all the other devices to form ISP network, IOT servers and Cellular 3G network and connect them.

D. Now we will configure the devices and setup the ISP router configuration.

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 10.0.0.1 255.255.255.0
Router(config-if)#shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to
administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed
state to down
no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed
state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 209.165.200.225 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 209.165.201.225 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
```

Fig 2.12 Assigning IP Address to The ISP Router

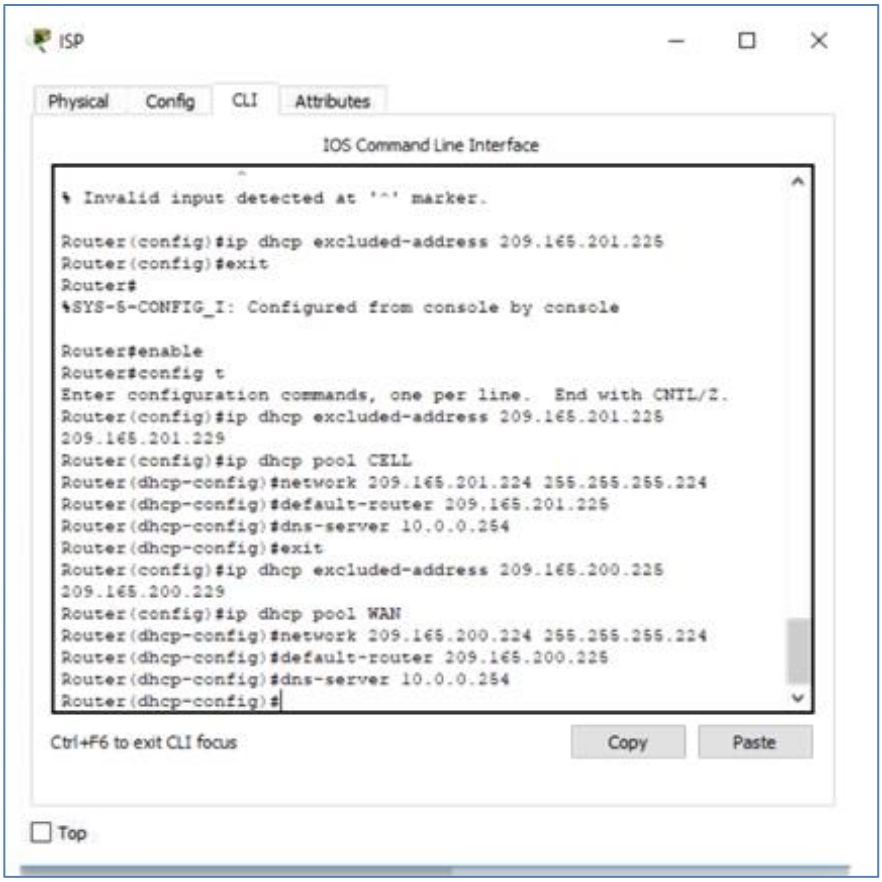


Fig 2.13 Configuring DHCP Server for Cell and IOT Device

E. Now after the creation of DHCP pool the central office server and the home gateway will get automatic IP address by the ISP servers.

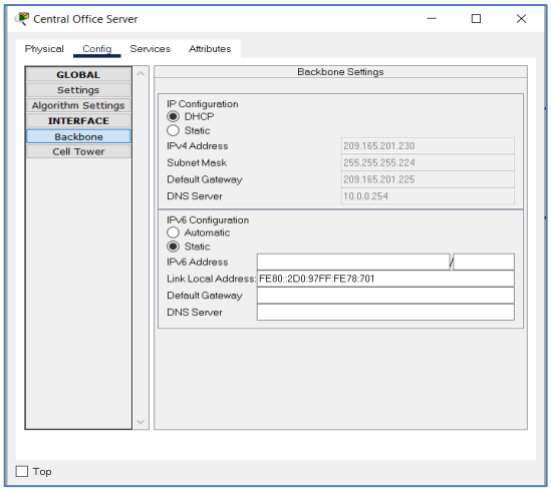


Fig 2.14 Central Office Server Getting Automatic IP

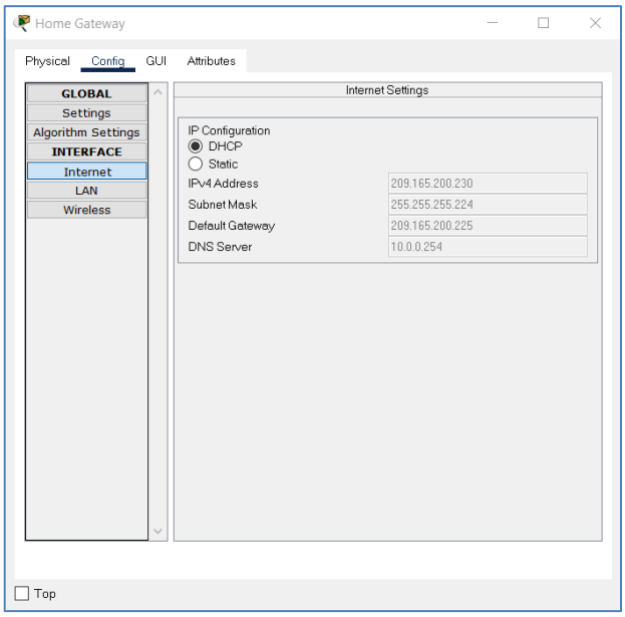


Fig 2.15 Home gateway Getting Automatic IP

F. Enable Services like HTTP, DNS etc.

Steps: -click on the DNS server->click on the service->enable different services like HTTP, DNS etc.

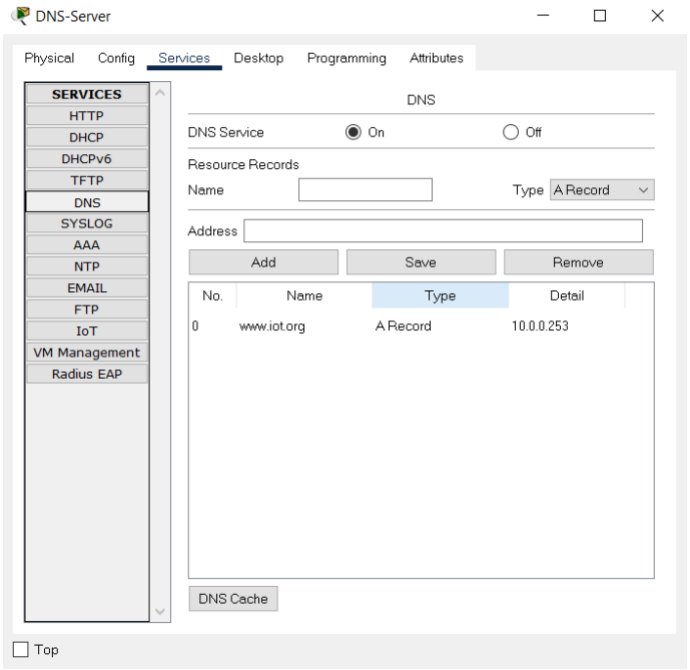


Fig 2.16 Enabling DNS Service

G. We will provide static IP to DNS server and IOT server. Giving static IP to DNS server and IOT server will ensure that the smart device is always connected to it.

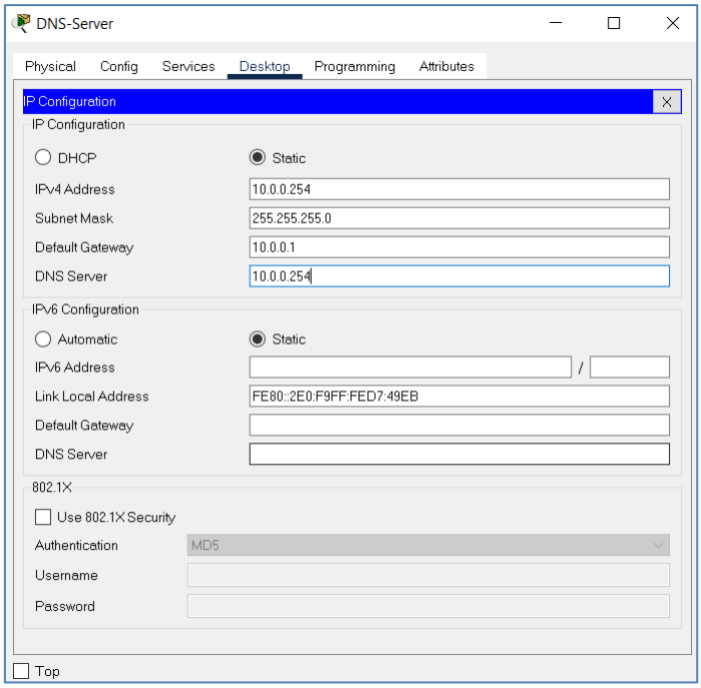


Fig 2.17 Giving Static IP to DNS Server

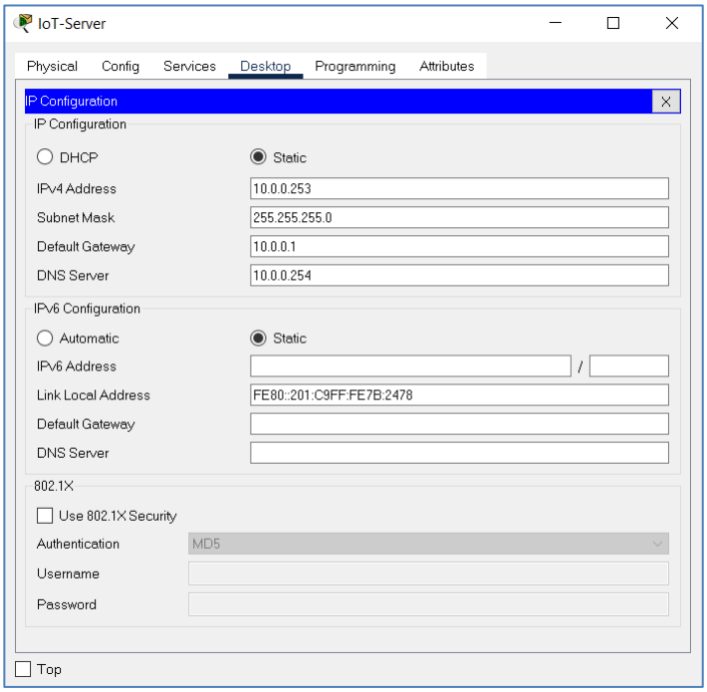


Fig 2.18 Giving Static IP to IOT Server

H. To check whether the data collected by sensors in smart devices will be sent to the IOT server successfully we will ping the server using laptop in home connected to Home Gateway.

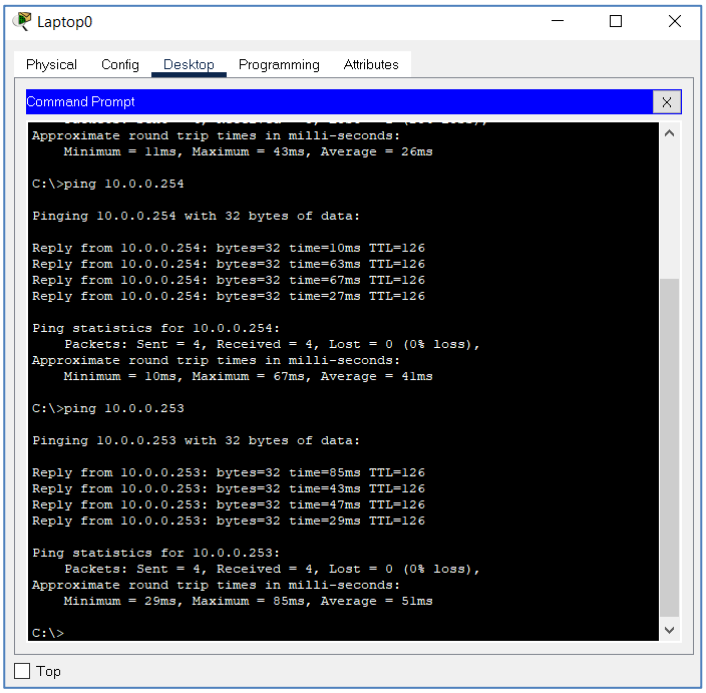


Fig 2.19 pinging

I. After the home gateway and the central office server are assigned the Automatic IP register all the IOT device to the IOT server.

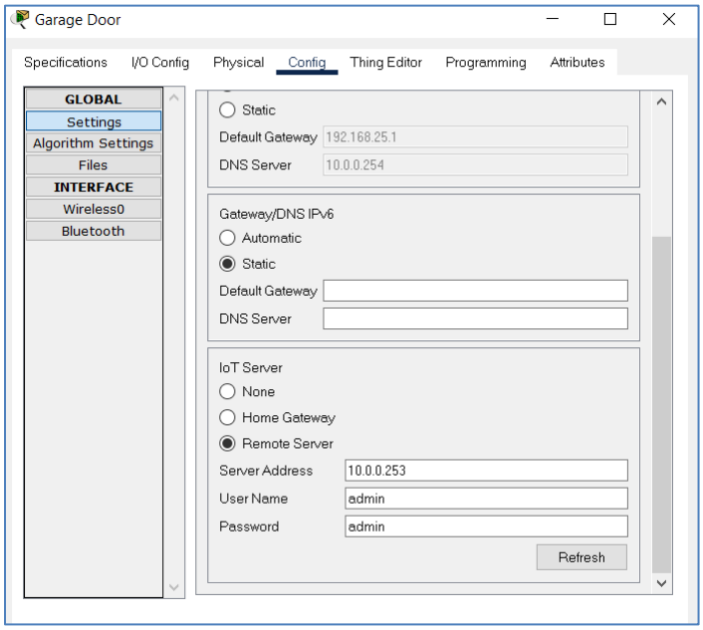


Fig 2.20 Registering Each Device to IOT Server

J. To access the IOT home page using laptop from we need to login to the system.

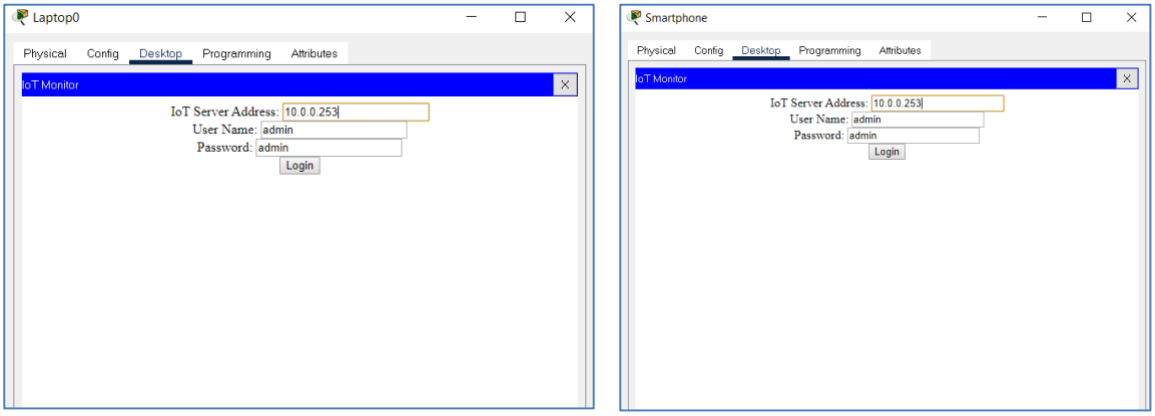


Fig 2.21 Login to The IoT Monitor through Laptop and Smartphone

K. After login to the system the status of all the smart devices will appear.

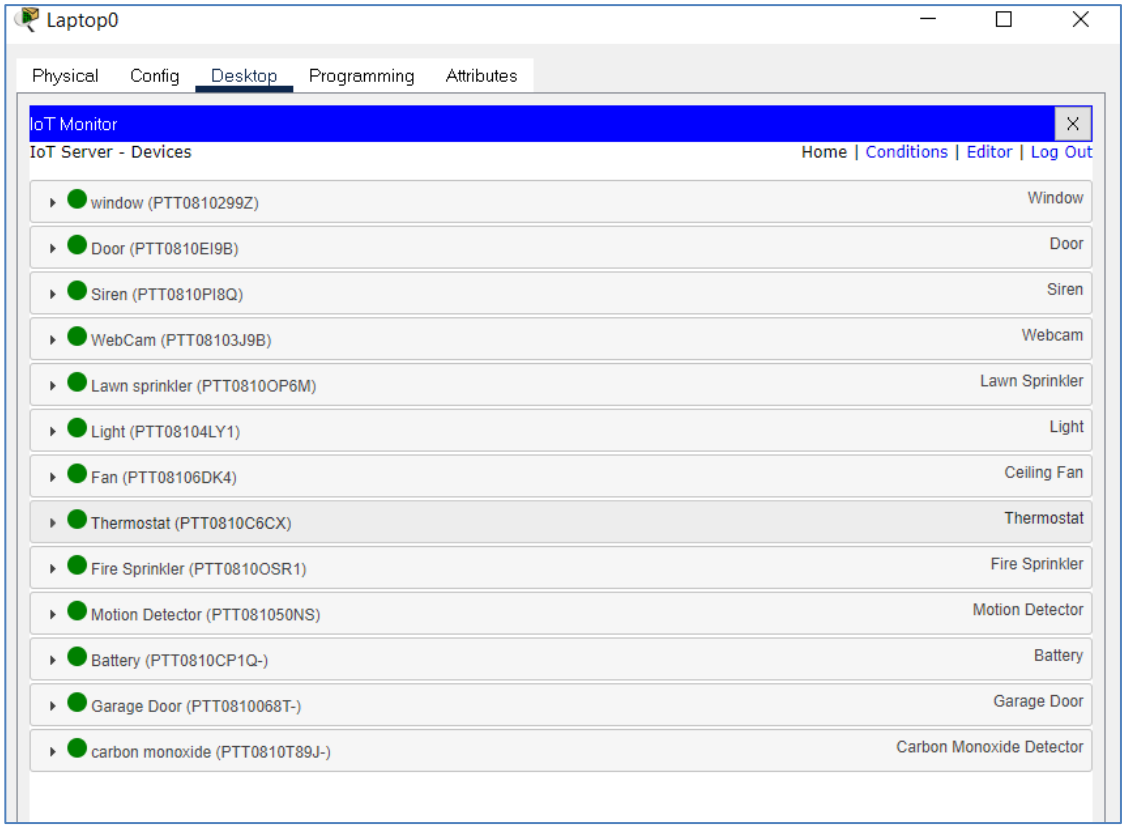


Fig 2.22 Registered Smart Devices to Home gateway

L. Device status, if it is red that means the device is off and when it is green that means the device is on.

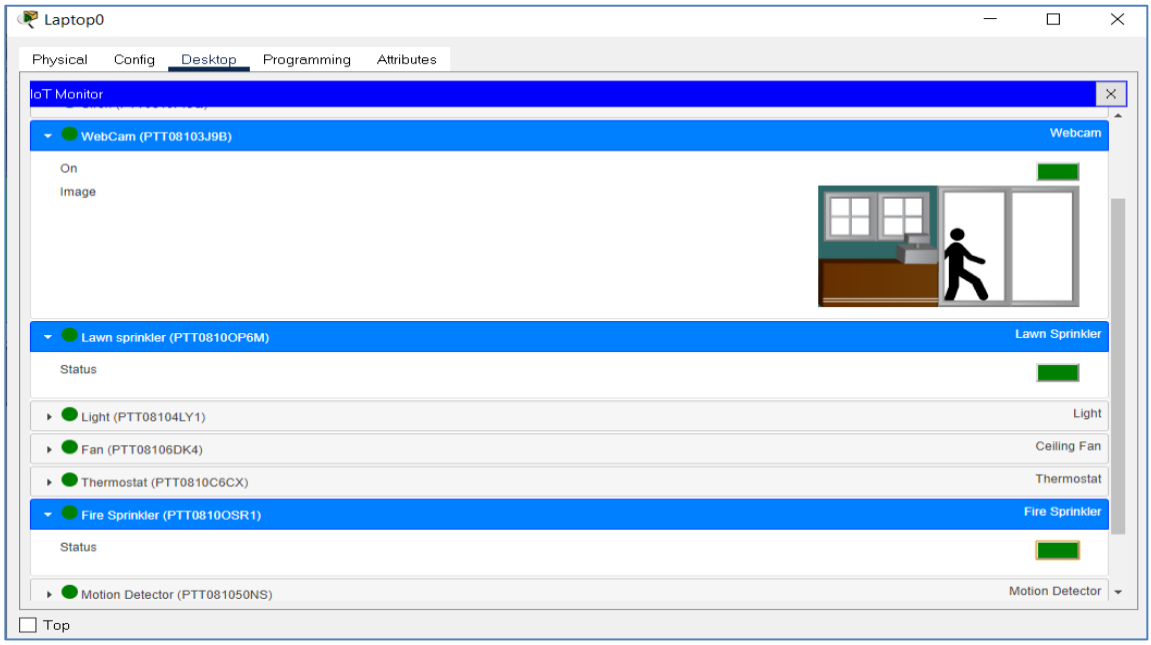


Fig 2.23: Status of the device

M. Conditions for devices how they work , when should they work. The user can set the condition.

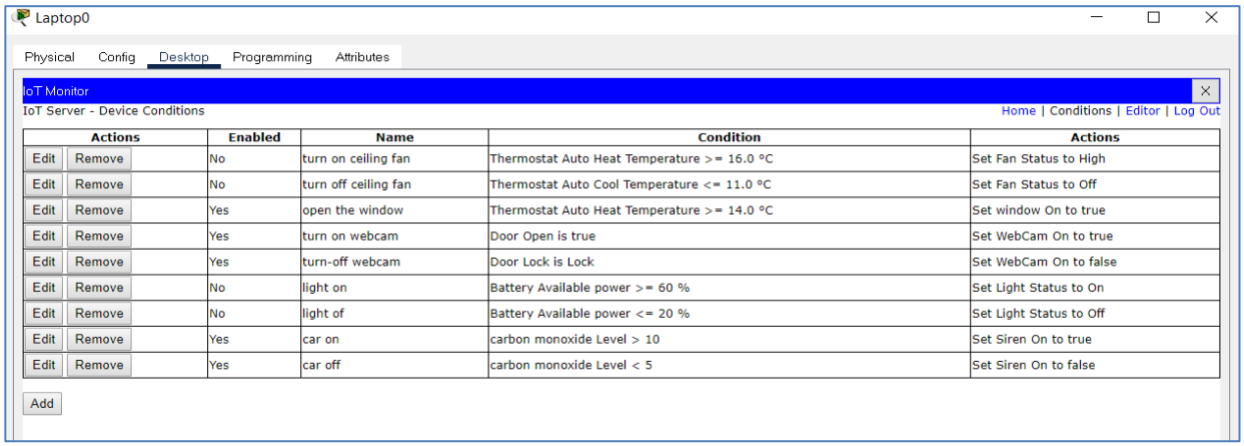


Fig 2.24: setting condition for controlling smart devices

N. Solar panel is used to charge the battery by detecting of sunlight to get electricity. In PT go to global and you can set the temperature at which time what temperature gonna be. You can change the current time and select current and transference rate and you will saw the temp value at that time. As solar and wind electricity generation was directly proportioned to the solar rays and wind gusts, the relative environmental variables were modified.

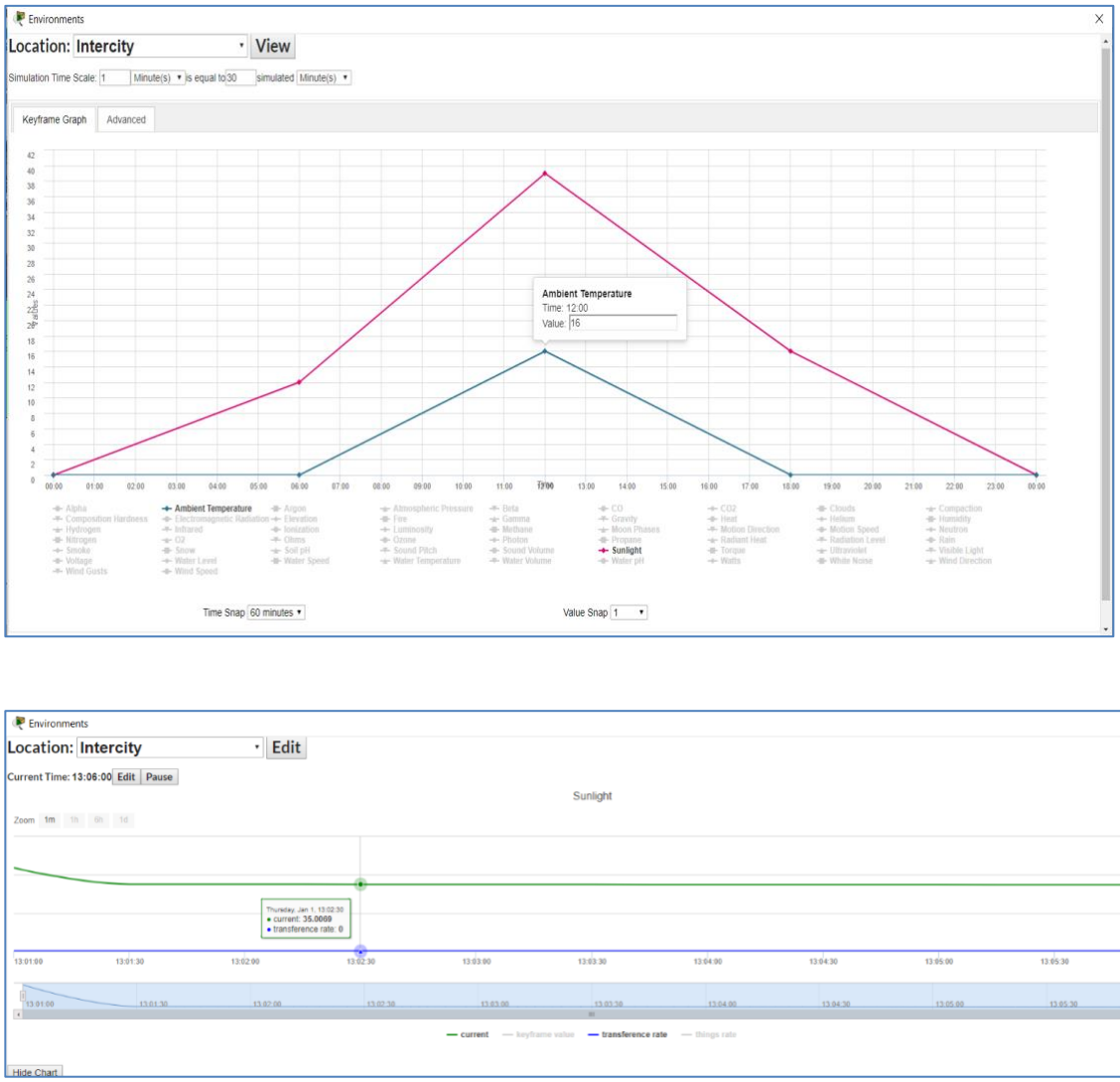


Fig 2.25: Environment

O. The microcontroller board is used to connect different objects internally and to offer programming upbringing with various languages to monitor the linked smart object.

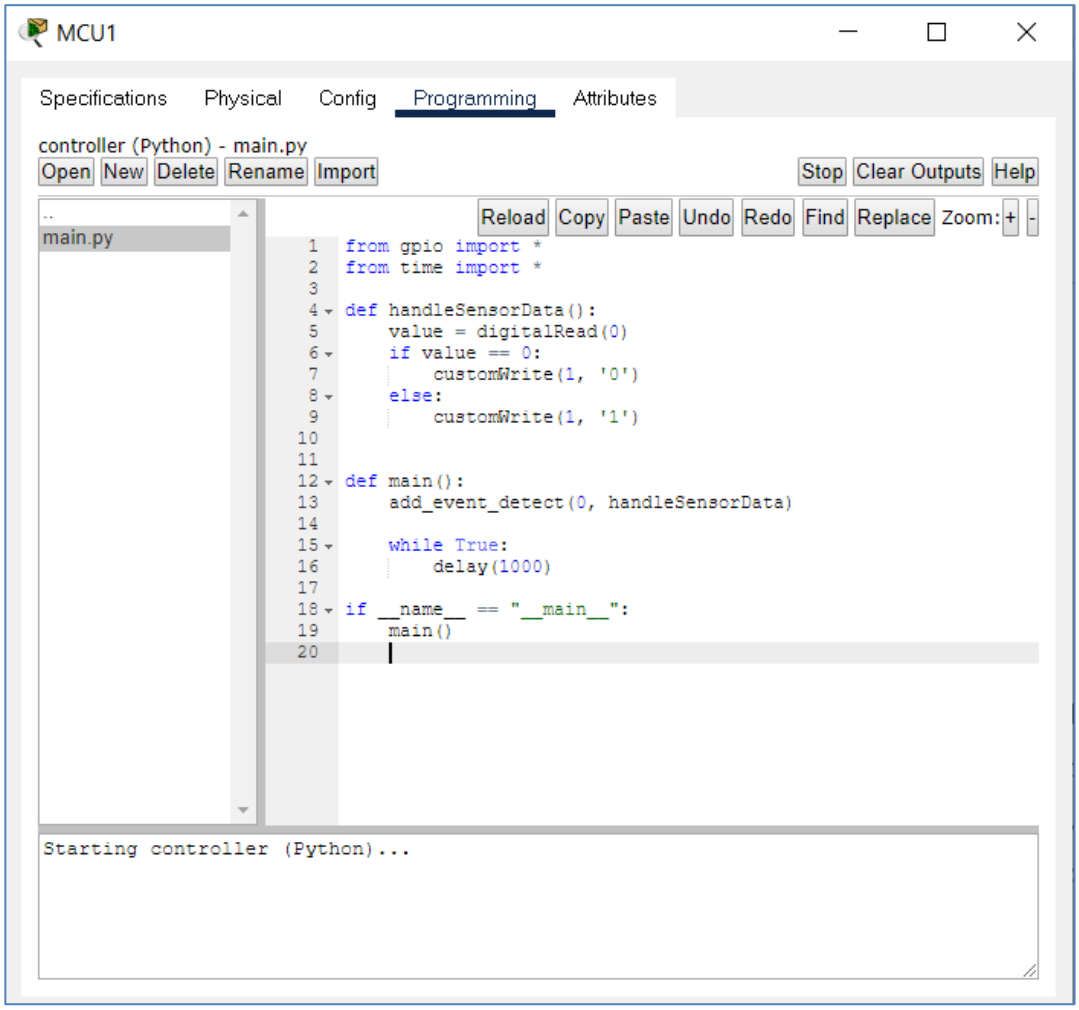


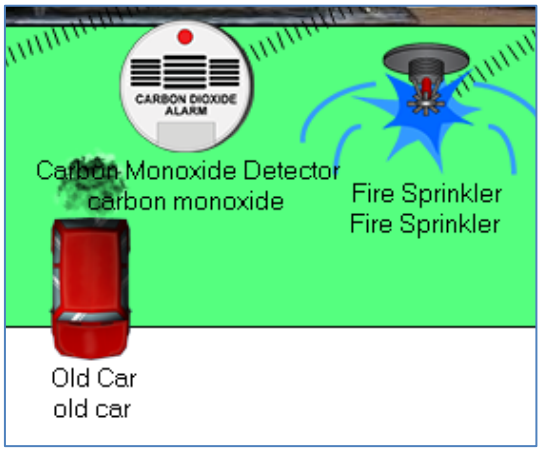
Fig 2.26: programming

So, this is how we can implement a smart home on a Cisco packet tracer.

In generalized way the working of whole smart home is as follows. The smart devices are embedded with the sensors. These devices are connected to the network. The sensors collect all the data about what is happening around, sense it and sends the collected data to the IOT servers. These IOT servers provide backend IOT functionalities that is each sensor request is responded by it according to the preset conditions. Thus, the required action is performed.

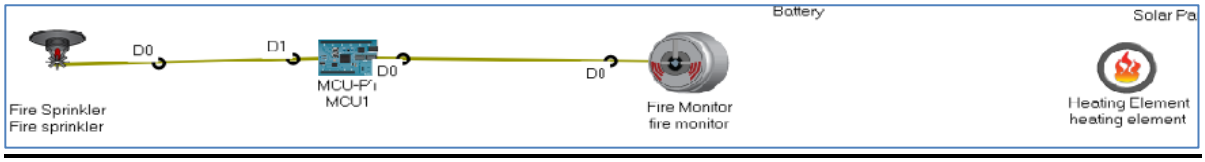
3. RESULT

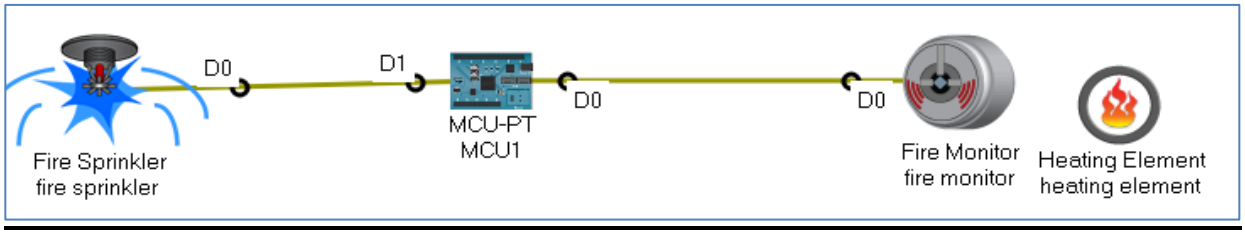
A). The figure below shows that based on conditions made on home gateway the fire sprinkler starts when smoke detector level rises above set value. To stimulate this scenario old cars has been used as the smoke from old car can be used to increase the smoke level of the smoke detector.



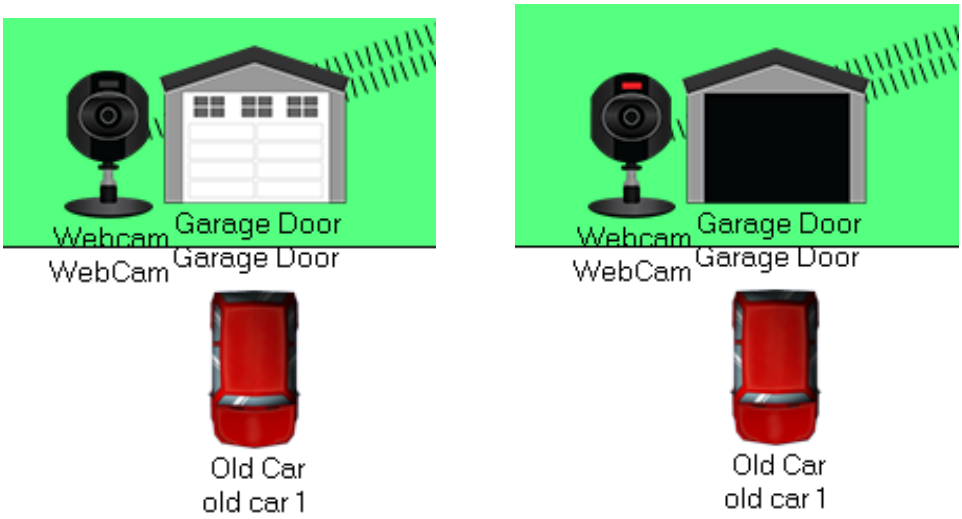
B). The figure below shows that when heating element was far from fire monitor then fire sprinkler was off.

when heating element was closer to fire monitor then fire sprinkler on.



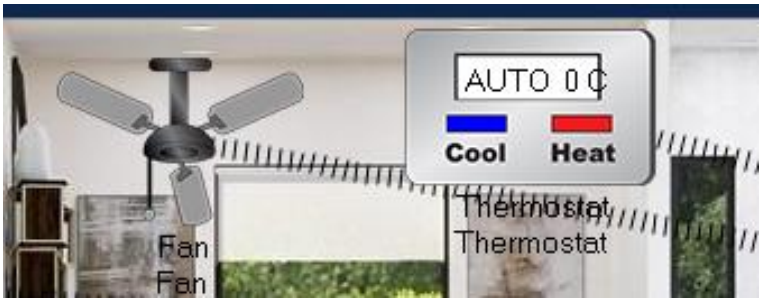


C). Via ALT press button the webcam detects, and garage door detect the car.



D).

Actions	Enabled	Name	Condition	Actions
Edit Remove	Yes	turn on ceiling fan	Thermostat Temperature > 10.0 °C	Set Fan Status to High
Edit Remove	Yes	turn off ceiling fan	Thermostat Temperature < 5.0 °C	Set Fan Status to Off



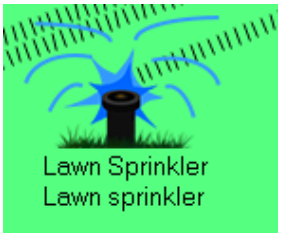
E). With the help of webcam, smart door, and motion detector we can save our home from unwanted intrusion like thieves. When the motion detector detects someone, the server will switch on the camera. This way the home user will get to identify the person.


DOOR
Door
Webcam Door
WebCam


Motion Detector
Motion Detector

F).


Lawn Sprinkler
Lawn sprinkler


Lawn Sprinkler
Lawn sprinkler

4. LIMITATION AND FUTURE SCOPE

Limitations:

- ✓ Costly
- ✓ Its dependency on internet
- ✓ Wireless network
- ✓ They are vulnerable to being hacked.
- ✓ Server down
- ✓ Cable problem

Future Scope:

The Smart Building is the future of India. The aim of having a Smart building starts with early planning in the design phase. The Reduced energy costs are shown as major benefit of Smart building technologies. However, other benefits, for example, reduced staff levels and improved occupant satisfaction, are often overlooked.

But the degree of confidence in Smart Building technologies is not very large because of lack of awareness and understanding among the population. There is also a lack of properly Smart building technology reference projects due to which people lack knowledge.

Smart building technologies are generally available, but not yet widely adopted due to which many changes and proper initiatives are needed for use of these technologies to become widespread.

5. CONCLUSION

This project is simulation of Smart Home on Cisco Packet Tracer. This project has proposed the idea about smart homes which can support the automation of the home.

This project involved an efficient approach for smart homes and discussed two cases of smart homes one to control all the smart devices from home using smart home or a laptop and other to control the smart devices remotely using smart phone via 3G network.

A series of experiments have been carried out on proposed smart home which shows various results like how fire sprinkler responds when there is smoke detected in house.

Also, how to detect if any intruder invades in the home using the smart camera and sending the notification to the legal person. This project also shows how any temperature rise can be detected and many other cases.

Using Cisco packet tracer, we can learn how to configure network and connect smart devices wired or wirelessly and set some conditions. With these simulations design and implementation planning can be done in building smart home and smart building and in turn smart city in real life which can help in efficient use of energy, making life of occupants easy. Thus, we can say a smart building ensures several functions such as energy efficiency, maintainability, and safety, comfort and health, accessibility, and mobility as well as environmentally friendly.

6. Grade sheet for Training

उच्चस्तरीय दूरसंचार प्रशिक्षण केंद्र
Advance Level Telecom Training Centre
Centre of Excellence (ITU)

TRAINING GRADING SHEET

Student: Ankit Kumar **Date:** 25/07/2022

Grading Areas	Max. Score	Score Given
Overall Grade for Assignments	10	9.5
Attended Training as scheduled	10	10
Participated in practical	10	10
Followed instructions	10	10
Appeared enthusiastic about training opportunity	10	9.5
Total Score		9.8

Trainer Signature: Krishna

सहायक निदेशक (आई0टी0–परीक्षा एवं कोर्स)
Assistant Director (IT-Course & Exam)
उच्चस्तरीय दूरसंचार प्रशिक्षण केन्द्र, बी.एस.एन.एल.
Advanced Level Telecom Training Centre, BSNL
भारत सरकार का उपक्रम
A Govt. of India Enterprise
गाजियाबाद / Ghaziabad-201002

Comments:

* Student are hardworking & good communication

Krishna
25/07/2022

7. REFERENCES

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[2] Pitcheri Praveen Kumar, Murali Krishna, M,R Ramprakash International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue-11S, September 2019

[3] Oloan Sihombing1* , Niskarto Zendrato2 , Yonata Laia1 , Marlince Nababan1 , Delima Sitanggang1 , Windania Purba1 , Diarmansyah Batubara1 , Siti Aisyah1 , Evta Indra1 , Saut Siregar1 1 Faculty of Technology and Computer Science, Universitas Prima Indonesia, Indonesia 2 Faculty STMIK Kristen Neuman Indonesia, Indonesia IOP Conf. Series: Journal of Physics: Conf. Series 1007 (2018) 012021 doi :10.1088/1742-6596/1007/1/012021

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[5] Design and Simulate Smart Home Networks in Packet Tracer by Mohammed Wed