Mini Project Report Cover Sheet

SRM Institute of Science and Technology

College of Engineering and Technology

Department of Electronics and Communication Engineering

18ECC303J COMPUTER COMMUNICATION NETWORKS

Sixth Semester, 2020-21 (Even Semester)

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Register No. : **RA1811004010087**

Title of the project : **Home IOT Implementation using Cisco Packet Tracer**

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RA1811004010092 Narayana Vijaya Durga

Lab Supervisor : **B Priyalakshmi**

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Mark split up ↓	Maximum Marks	Marks obtained	Marks obtained	Marks obtained
Novelty in the project work / Abstract	**5**			
Level of understanding of the design / Configuration	**10**			
Individual Contribution to the project	**5**			
Report writing	**5**			
Total	**25**			

REPORT VERIFICATION

Lab supervisor Signature with date :

HOME IOT IMPLEMENTATION USING CISCO PACKET TRACER

ABSTRACT:

A smart home is implemented using internet of things technology to automate different types of activity at home. Automation of devices can be used to control smart home. An IOT refers to the communication between the things such as actuators, sensor, and devices and to the people with distinct identifiers. This smart home is implemented using the current version of cisco packet tracer 8.0 version with new released and updated version of all IOT devices such as sensors. The smart home is designed using different types of IOT device with enabling security, safety and home environment prosperity. [1]

MOTIVATION / CHALLENGE:

The main motivation for this project is to design using the smart objects to improve the home activities in advance; this can be used to perform automating activities of smart home without user's involvement. A smart home is designed not only for the activities to be performed but also implemented with the security [2].

OBJECTIVE:

The smart home is implemented with cisco packet tracer 8.0, which included different smart objects used for the home automation such as Thermostat, Bluetooth speaker, lawn sprinkler, web cam, siren, portable music player, garage, fan, lamp, RFID components, servers, home gateway.

SOFTWARE / HARDWARE REQUIREMENTS:

Cisco Packet Tracer 8.0 version.

ENGINEERING STANDARDS:

IOT

In particular, the project IEEE P2413, Standard for an Architectural Framework for the Internet of Things (IoT), has a sub working group focused on Quadruple Trust i.e. "Protection, Security, Privacy and Safety". [4]

DHCP

The Dynamic Host Configuration Protocol (DHCP) provides configuration parameters to Internet hosts. IEEE 1394 : RFC 2855 - DHCP for IEEE 1394. [5]

WPA2PSK

WPA2 replaced WPA. WPA2, which requires testing and certification by the Wi-Fi Alliance, implements the mandatory elements of IEEE 802.11i. In particular, it includes mandatory support for CCMP, an AES-based encryption mode. [3]

REALISTIC CONSTRAINTS:

When an actual network is being designed, there might be some loss of signal and hence efficiency of the network will be lesser than theoretical efficiency. But here since it is a simulation of a network, Outcomes will be very accurate. The main challenges that we faced are clustering had to done due to excess components, adding background images.

DELIVERABLES:

IOT

The **Internet of Things** (**IoT**) refers to a system of interrelated, internet-connected objects that are able to collect and transfer data over a wireless network without human intervention. [6]

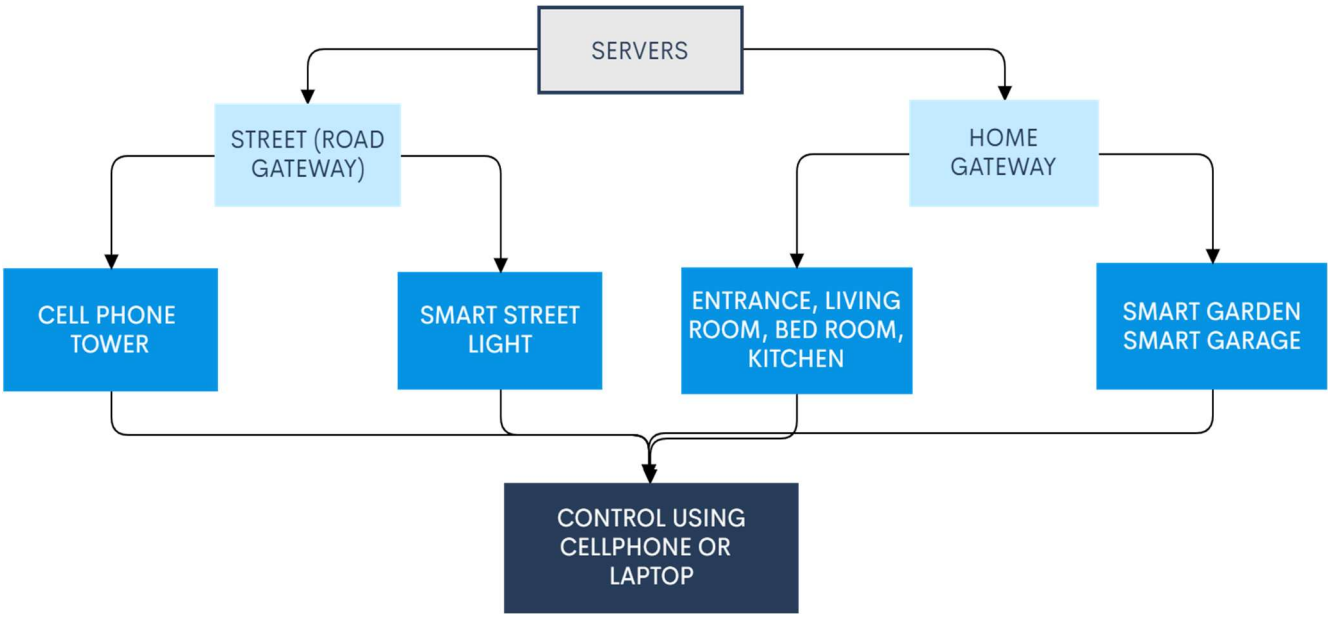
The Server address: 10.0.0.253 Username: admin Password: admin

WPA2-PSK

Home Gateway consist of 4 Ethernet ports in addition to that a wireless access point configured with the SSID of corresponding "SMARTIOE" To secure wireless connection WPA2 -PSK: 1234qwer. The Home Gateway internal (LAN) IP address is 192.168.25.1 but it can also be accessed through its Internet facing IP address. [1]

METHODOLOGY:

BLOCK DIAGRAM:



CONFIGURATION:

Current configuration: 1136 bytes version 15.1
hostname Router
ip dhcp excluded-address 209.165.201.225 209.165.20.229
ip dhcp excluded-address 209.165.201.225 209.165.201.229
ip dhcp excluded-address 209.165.200.225 209.165.200.229
ip dhcp pool CELL
network 209.165.201.224 255.255.255.224
default-router 209.165.201.225
dns-server 10.0.0.254
ip dhcp pool WAN
network 209.165.200.224 255.255.255.224
default-router 209.165.200.225
dns-server 10.0.0.254
interface GigabitEthernet0/0
ip address 10.0.0.1 255.255.255.0
interface GigabitEthernet0/1
ip address 209.165.200.225 255.255.255.224
interface GigabitEthernet0/2
ip address 209.165.201.225 255.255.255.224

DESCRIPTION

DEVICE FOR DESIGN:

SNO	DEVICE	FUNCTION
1.	Router (2911)	Used to link home to cellular network
2.	Cable modem	Used to connect to the internet at home
3.	Home gateway	Used to register smart objects and provide IP addresses
4.	IOT Server	Used for data collection, process and saving.
5.	DNS Server	Contains a database of public IP addresses and their associated hostnames
6.	Central office server	Used to link the router with the cellular network
7.	Laptop	Used to access IoT devices
8.	Fan	Used for ventilating the home
9.	Webcam	To record videos if there is a movement outside
10.	Siren	Alerts with sound in case of smoke in kitchen
11.	Light Lamp	Provide light
12.	Motion Detector	Detect movements
13.	Smart Door	Doors for house and bedroom
14.	Cell Tower	Provide cellular network coverage to monitor the appliances in remote mode
15.	Smart Phone	Used to control the home from outside
16.	CO2 Detector	Used to detect CO2 level in garage.
17.	Lawn Sprinkler	Used as a sprinkler based on humiture monitor conditions
18.	Bluetooth Speaker	Speaker that can be controlled with portable music player to play music
19.	Temperature Sensor	Used to sense the temperature of the home
20.	Old car	Used to produce smoke to trigger the C02 and smoke sensors
21.	Garage Door	Opens and closes based on the level of CO2
22.	Smart window	Open and close window in the house or garage.
23.	Smoke Detector	Used to sense the smoke level in kitchen
24.	Thermostat	Used to control the air cooler and the heating element attached to it.
25.	Temperature monitor	Displays the current temperature of house as detected by thermostat
26.	RFID Reader	Used to open the door based on card information.
27.	RFID Access card	Card to open the door.
28.	Appliance (Coffee)	Simulation of an appliance used in the kitchen.
29.	Music Player	Used to control the Bluetooth Speaker
30.	Cloud	Used to store IoT data
31.	Switch	Used to connect wide range of appliances

Table 1: Components used

CONDITIONS:

Name	Condition	Action
FAN ON	thermostat Temperature > 20.0 °F	Set fan Status to ON
FAN OFF	thermostat Temperature < 15.6 °F	Set fan Status to Off
Co2 ON	co2 Level >= 0.17	Set garage window On to true Set garage door On to true
Co2 OFF	co2 Level < 0.17	Set garage window On to false Set garage door On to false
CAM ON	motion On is true	Set camera On to true
CAM OFF	motion On is false	Set camera On to false
WATER ON	humiture monitor Humitor < 70	Set water sprinkler Status to true

WATER OFF	humiture monitor Humitor >= 70	Set water sprinkler Status to false
ACCESS ON	door access Card ID = 1001	Set door access Status to Valid
ACCESS OFF	door access Card ID != 1001	Set door access Status to Invalid
DOOR CLOSE	door access Status is Invalid	Set door Lock to Lock
DOOR OPEN	door access Status is Valid	Set door Lock to Unlock
LAMP ON	bedroom door Lock is Unlock	Set lamp Status to On
LAMP DIM	bedroom door Lock is Lock	Set lamp Status to Dim
SIREN ON	smoke detector Level >= 0.15	Set smoke alert On to true
SIREN OFF	smoke detector Level < 0.15	Set smoke alert On to false

Table 2: Conditions Given

ALGORITHM:

Step 1: Configure Home Gateway.

- Click Home to expand the cluster.
- Click Home Gateway. Click Config tab.
- Click Internet. Select DHCP for IP Configuration.
- Click Wireless. Enter SAMRTIOE as the SSID. Select WPA2-PSK as the authentication. Enter 1234qwer as the PSK Pass Phrase.
- Click Home PC. Click Desktop. Click IP Configuration. Select DHCP for IP Configuration.

Step 2: Smart Entrance:

- Detects movement using motion detector.
- Webcam turns on if motion detector is active.
- RFID access card opens the door. If the card number doesn't match the door remains closed.

Step 3: Smart Living Room:

- Laptop is used as a device to control the components.
- Portable music player is used to control the Bluetooth speaker.
- Bluetooth speaker is used to play music.

Step 4: Smart Bedroom:

- Automate temperature using the thermostat. The fan, ac and heater are also configured to the thermostat.
- Lamp turns on when the door is unlocked.
- Temperature Monitor display shows the temperature.

Step 5: Smart Kitchen:

- Appliances such as coffee maker are controlled using the end devices.
- Smoke detector detects the smoke.
- Siren in living room turns on when smoke level is high.

Step 6: Smart Garage:

- A CO2 detector, garage door, and windows have been installed.
- Start the old car by Alt + Click the Car.
- When the Co2 levels rise the garage door and windows open.

Step 7: Smart Garden:

- Watering the lawn is controlled through humiture monitor.
- Sprinkler turns on when humiture monitor is less than 70.
- Sprinkler turns off when humiture monitor is more than or equal to 70.

Step 8: Smart Street:

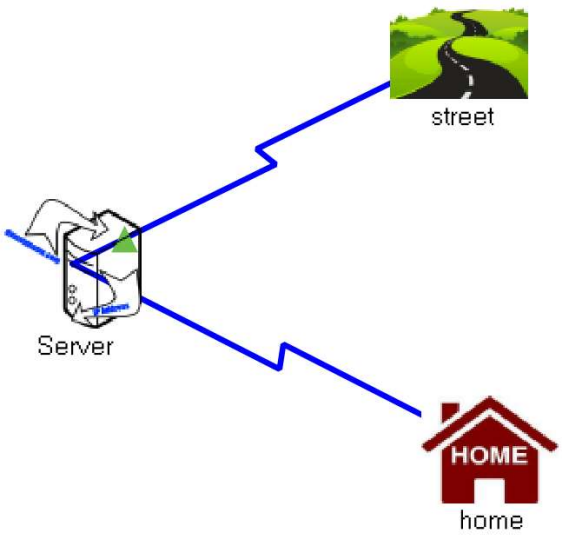
- The street lights turn on at night.
- The motion detector turns the light on when car passes by.
- The cell tower provides signal to the smart phone.

Step 9: Further investigation:

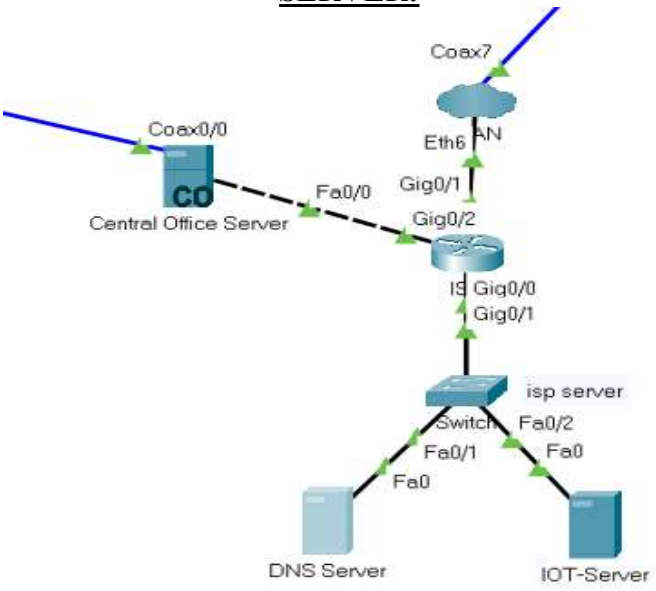
- Home Gateway and Registration Server can be used to control the IoT devices remotely. You can change how these devices are accessed remotely.
  1) Click the device.
  2) In the Device tab, select None, Home Gateway, or Remote Server. For the activity, the server address is www.iot.org (10.0.0.253) and admin as username and password.
  3) Within the server, you can add conditional statements for devices capable of actionable configurations.
- If you are interested in programming the IoT end devices, click the device and click Advanced. Select Programming. Select the desired files and review the codes.

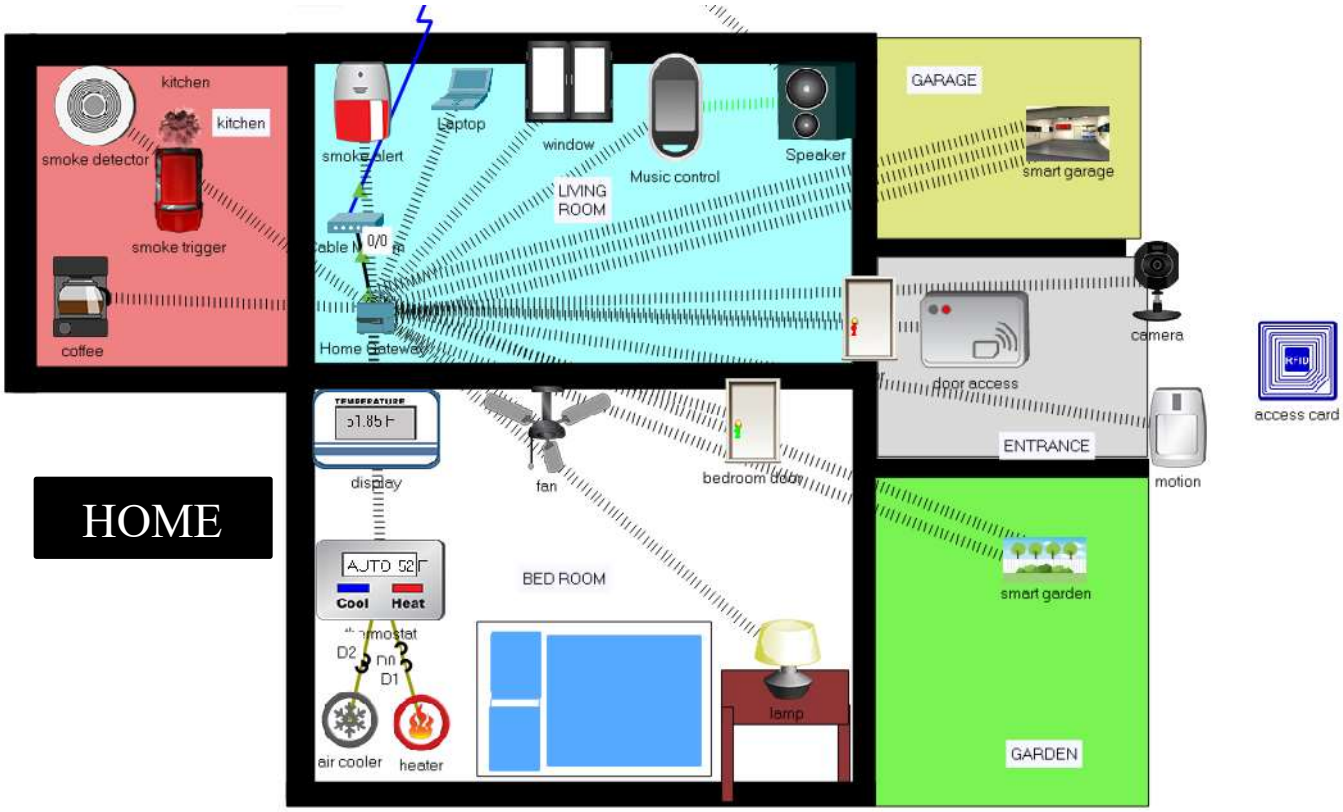
RESULT / ILLUSTRATION:

SERVER AND CLUSTERS:

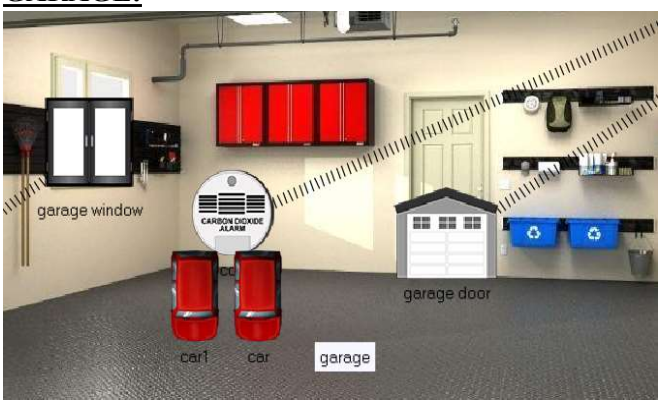


SERVER:

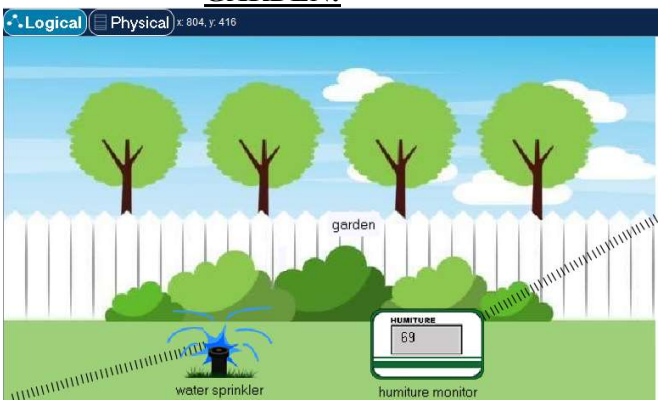




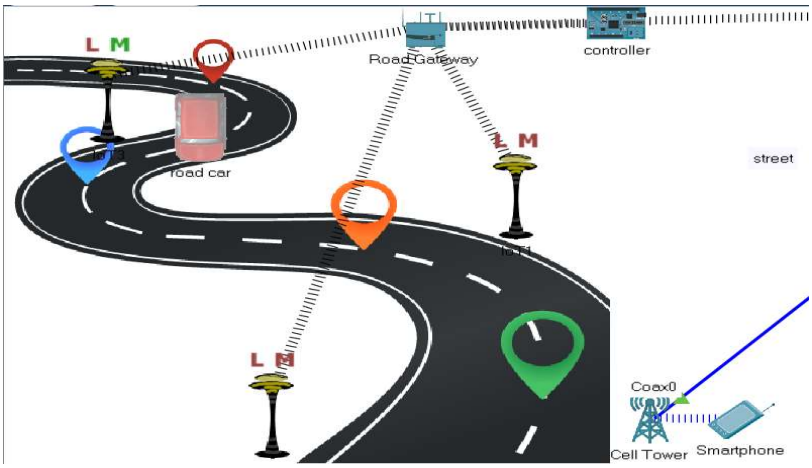
GARAGE:



GARDEN:



STREET:



ISP ROUTER ROUTING TABLE

Routing Table for ISP

Type	Network	Port	Next Hop IP	Metric
C	10.0.0.0/24	GigabitEthernet0/0	—	0/0
L	10.0.0.1/32	GigabitEthernet0/0	—	0/0
C	209.165.200.224/27	GigabitEthernet0/1	—	0/0
L	209.165.200.225/32	GigabitEthernet0/1	—	0/0
C	209.165.201.224/27	GigabitEthernet0/2	—	0/0
L	209.165.201.225/32	GigabitEthernet0/2	—	0/0

ISP ROUTER CONFIRGURATION:

ISP

Physical Config CLI Attributes

```
Router>en
Router#show run
Building configuration...

Current configuration : 1136 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
ip dhcp excluded-address 209.165.201.225 209.165.20.229
ip dhcp excluded-address 209.165.201.225 209.165.201.229
ip dhcp excluded-address 209.165.200.225 209.165.200.229
!
ip dhcp pool CELL
 network 209.165.201.224 255.255.255.224
 default-router 209.165.201.225
 dns-server 10.0.0.254
ip dhcp pool WAN
 network 209.165.200.224 255.255.255.224
 default-router 209.165.200.225
 dns-server 10.0.0.254
!
```

```
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 10.0.0.1 255.255.255.0
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 209.165.200.225 255.255.255.224
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 ip address 209.165.201.225 255.255.255.224
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
```

WEBSERVER: www.iot.org opens the iot server with ip address 10.0.0.253

Smartphone

Physical Config Desktop Programming Attributes

Web Browser

URL http://www.iot.org Go Stop

Use the IoT Monitor App to manage IoT Devices

By: Priyadharshini, Ananya and Durga

Laptop

Physical Config Desktop Programming Attributes

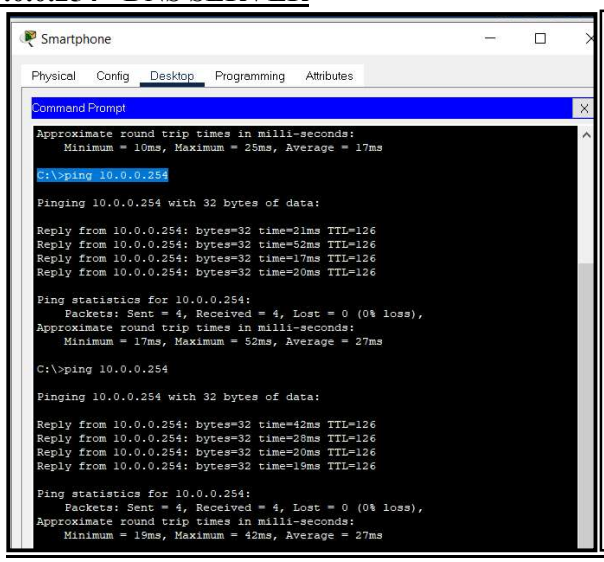
Web Browser

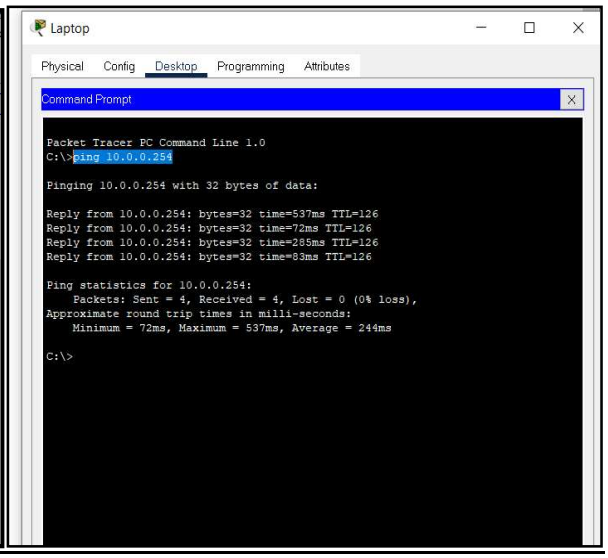
URL http://www.iot.org Go Stop

Use the IoT Monitor App to manage IoT Devices

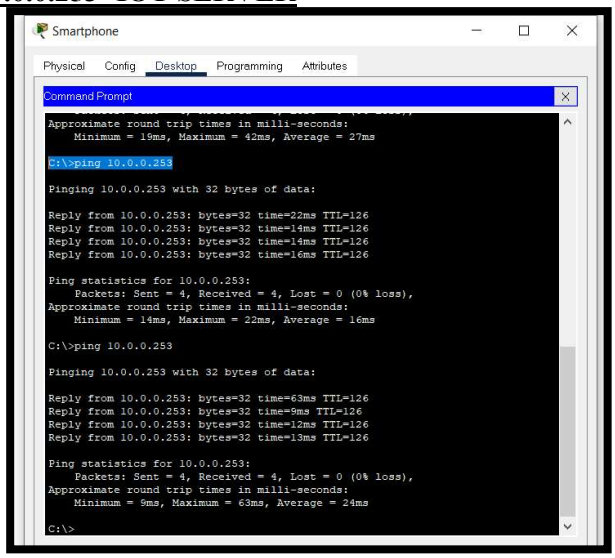
By: Priyadharshini, Ananya and Durga

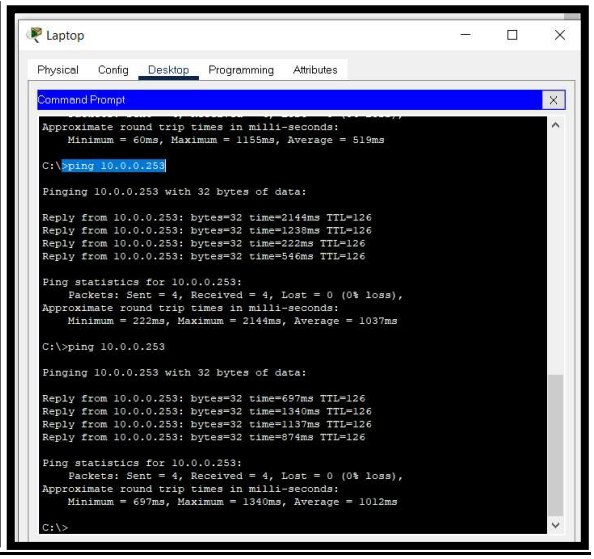
Ping 10.0.0.254 - DNS SERVER



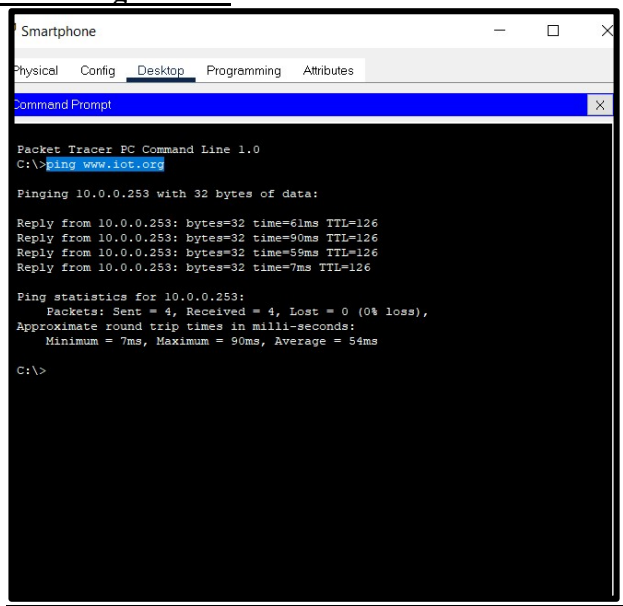


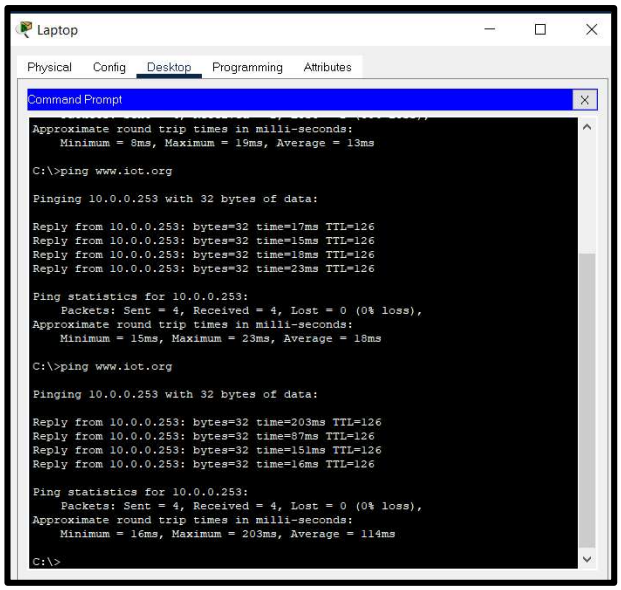
Ping 10.0.0.253- IOT SERVER





Ping www.iot.org address





CONCLUSION:

In this project, we used the cisco packet tracer to introduce smart home with a smart garage, garden, living room and bedroom with numerous IOE devices. A smart street also was designed. We used the home gateway for home automation and IoT Monitor for monitoring them.

INDIVIDUAL CONTRIBUTIONS:

Registration No	Name	Contribution
RA1811004010087	V Andal Priyadharshini	Designed Living Room, Entrance, Servers
RA1811004010089	Vemu Lakshmi Ananya	Designed Garden, Street, Kitchen
RA1811004010092	Narayana Vijaya Durga	Designed Garage, Bedroom

REFERENCES:

[1] Kumar, P. and Krishna M, M., 2019. *Designing Smart Home Using Cisco Packet Tracer 7.2 Simulator*. [online] Ijrat.org. Available at: < http://www.ijrat.org/downloads/Vol-7/aprils-2019/PaperID-74S201925.pdf > [Accessed 25 April 2021].

[2] Ijstr.org. 2020. *Implementation Of Smart Home By Using Packet Tracer*. [online] Available at: < http://www.ijstr.org/final-print/feb2020/Implementation-Of-Smart-Home-By-Using-Packet-Tracer.pdf > [Accessed 25 April 2021].

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[9] Youtube.com. 2017. *Controlling the door based on CO2 levels*. [online] Available at: < https://www.youtube.com/watch?v=mC2lq3FuJKQ > [Accessed 25 April 2021].