A Progress Report

on

Hotel Chain Network

carried out as part of the course Computer Networks Lab CS1631

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in partial fulfilment for the award of the degree of

BACHELOR OF TECHNOLOGY
In
Computer Science & Engineering

MANIPAL UNIVERSITY
JAIPUR

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School of Computing and IT,
Manipal University Jaipur,
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Certificate

This is to certify that the project entitled 'Hotel Chain Network' is a bonafide work carried out as part of the course ***Computer Networks Lab***, under my guidance by ***Priyanka Goyal, Rimjhim Gupta and Ragini Gaurav***, students of B.Tech in Computer Science and Engineering, 6th Semester at the Department of Computer Science & Engineering , Manipal University Jaipur, during the academic semester ***6,***in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Computer Science & Communication Engineering, at MUJ, Jaipur.

Further, we declare that we will not share, re-submit or publish the code, idea, framework and/or any publication that may arise out of this work for academic or profit purposes without obtaining the prior written consent of the Course Faculty Mentor and Course Instructor.

Place: Manipal University Jaipur

Abstract

Hotel Chain Network is a project taken up to understand the networking within multiple branches of a single hotel chain, and how the different departments communicate with each other. Crimson Hotels have their branches in Delhi, Mumbai and Jaipur. Each branch has 5 departments to help with smooth functioning and organisation. The departments are:

1) Reception
2) Reservation
3) Accounts
4) Food and Beverage
5) Guest Rooms

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Introduction

Scope of Work

There are three main routers for each city, and they are connected to one central router, which is further connected to the dns and http servers. The main routers are then connected to the switches/wireless access points designated for the departments via a main switch. The department switches are connected to the end devices. There is also a wireless network facility for the rooms and food court for the guests to use. The data related to the hotels and its website is stored on the central web server. The website www.crimsonhotels.in is the website for our hotel chain.

Network Scenarios

- **optimal path for data transfer**

  Open Shortest Path First (OSPF) is a link-state routing protocol that is used to find the best path between the source and the destination router using its own Shortest Path First). OSPF is developed by Internet Engineering Task Force (IETF) as one of the Interior Gateway Protocol (IGP), i.e, the protocol which aims at moving the packet within a large autonomous system or routing domain. It is a network layer protocol which works on the protocol number 89 and uses AD value 110. OSPF uses multicast address 224.0.0.5 for normal communication and 224.0.0.6 for update to designated router(DR)/Backup Designated Router (BDR).
  example: A packet is to be transferred from pc3(delhi area) to pc23(jaipur area), using its ospf protocol it is transferred via router4, then router8, then router6, and finally pc23, but if the connection between router8 and router6 is removed, it opts another path. that is now the same packet is transferred via router 4 , then router 6 and then to then destination pc23.

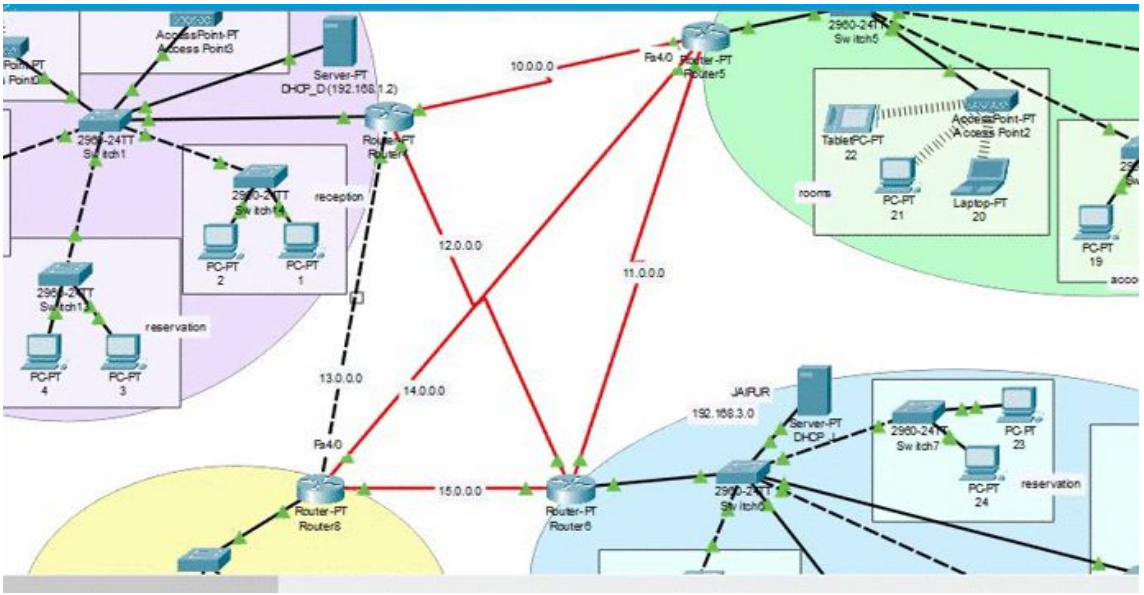


fig1. packet transfer between pc4(delhi network) to pc23(jaipur network)

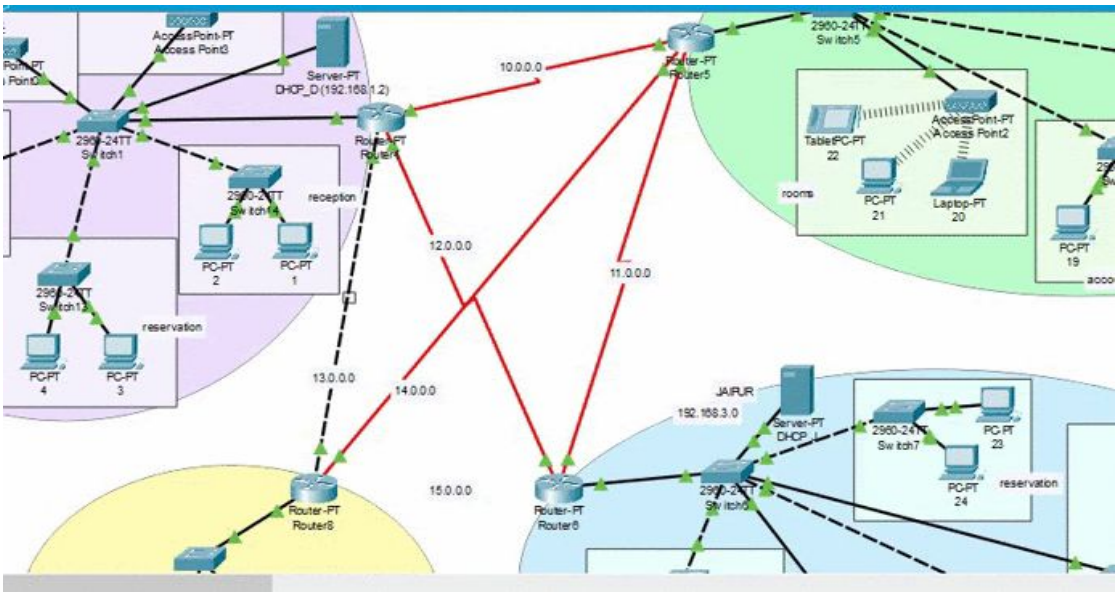


fig2. packet transfer between pc4(delhi network) to pc23(jaipur network), if a network disconnects

- **wireless access**

  Wireless networks are computer networks that are not connected by cables of any kind. The use of a wireless network enables enterprises to avoid the costly process of introducing cables into buildings or as a connection between different equipment locations.

  To configure wireless connections in rooms and food court areas, we have used wireless access points, ssid and password and the ports are switched on.To configure end devices, WMP300N module is integrated to the device(PCs, laptops), which provides wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.now end devices connects to the nearest wireless access point by typing in ssid and password.

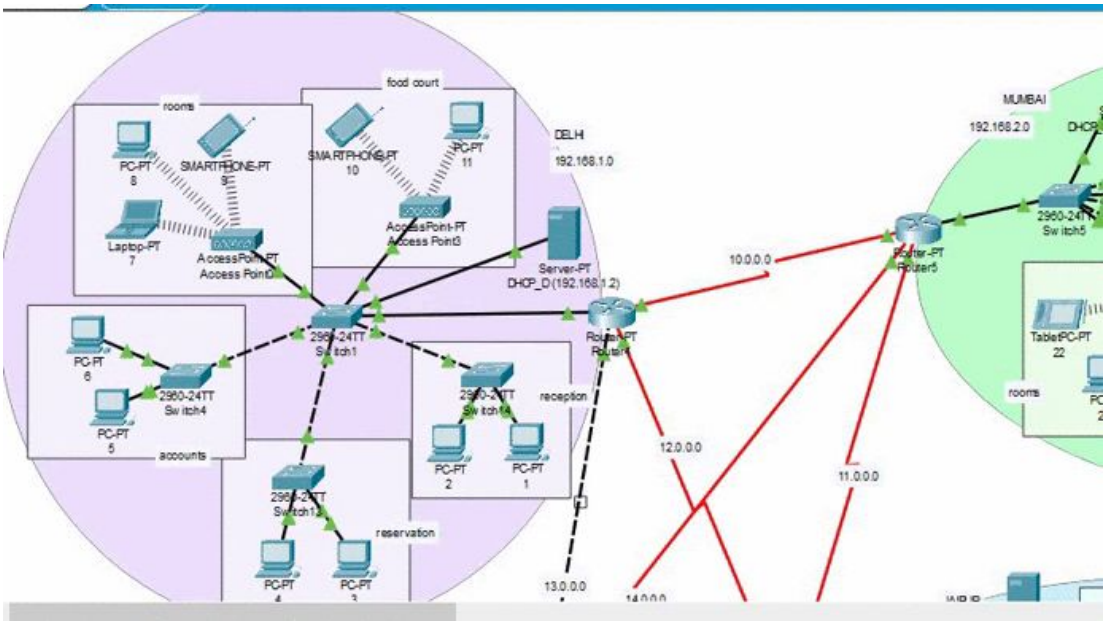


fig3. packet transfer between pc9 to pc11

- **accessing website**

  A DNS server is a computer server that contains a database of public IP addresses and their associated hostnames, and in most cases serves to resolve, or translate, those names to IP addresses as requested.
  A web server is server software, or hardware dedicated to running this software, that can satisfy client requests on the World Wide Web. A web server can, in general, contain one or more websites. A web server processes incoming network requests over HTTP and several other related protocols.

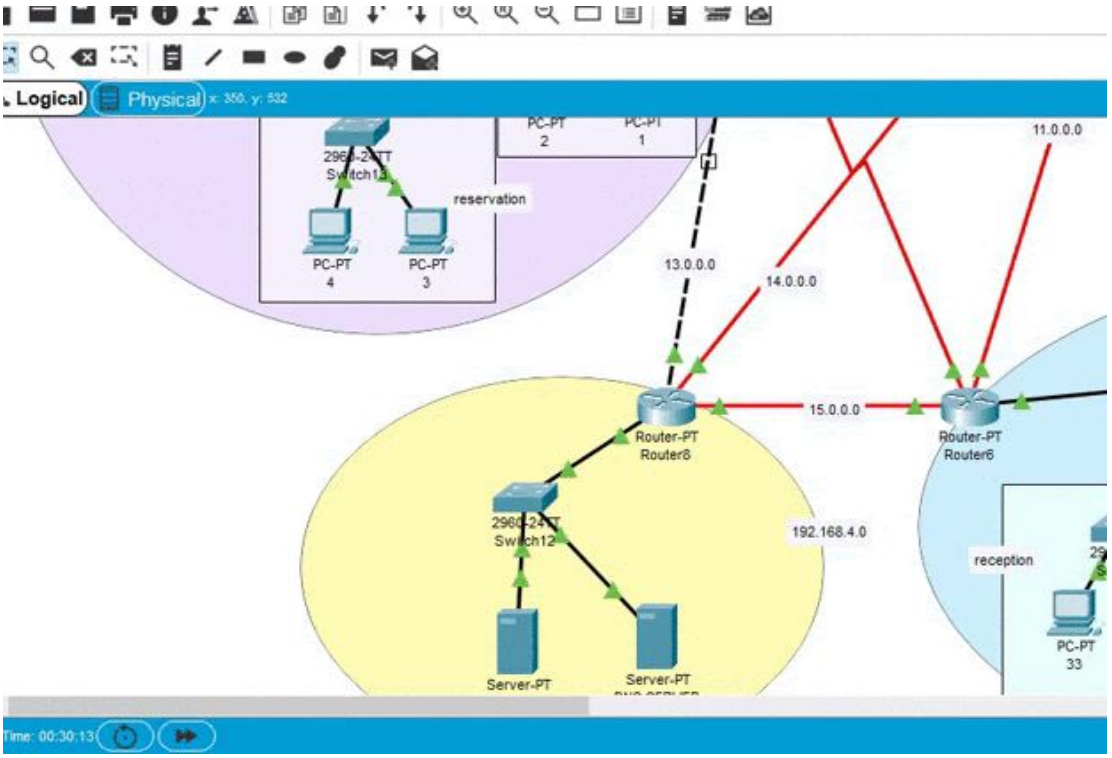


fig3. user can browse to hotel's website using url

Requirement Analysis

Functional Analysis

- Correct delivery of data packets from source to destination
- data packets takes optimal path, and packets reaches the destination even if any router aur connecting devices stops functioning
- ip address are assigned dynamically by dhcp server
- wireless connections are provided in rooms and food court area for guests
- The users can browse the hotel website at www.crimsonhotels.in using their web browsers.
- hotel staff can access server and view/store/update/delete data

Non-Functional Analysis

- **Usability Requirement :** The network allows the users to tranfer/access data from any device to another. It allows to access the company website and data from a central HTTP server.
- **Availability Requirement :** The network should be available 100% for the user and is used 24 hrs a day and 365 days a year.
- **Efficiency Requirement :** Ospf Routing protocol is used to ensure fast and efficient delivery of packets.
- **Accuracy :** The system accurately delivers packet to the destination ip adresses. The system shall provide 100% access reliability.
- **Performance Requirement :** The topology needs some time to load the address and information on opening the simulation device, Packet tracer or when updation of the routing table occurs. But in real application its performance will be good.
- **Reliability Requirement :** The system has to be 100% reliable due to the importance of data and the damages that can be caused by incorrect or incomplete delivery of data packets.

Use case scenarios

- **transfer of packets**

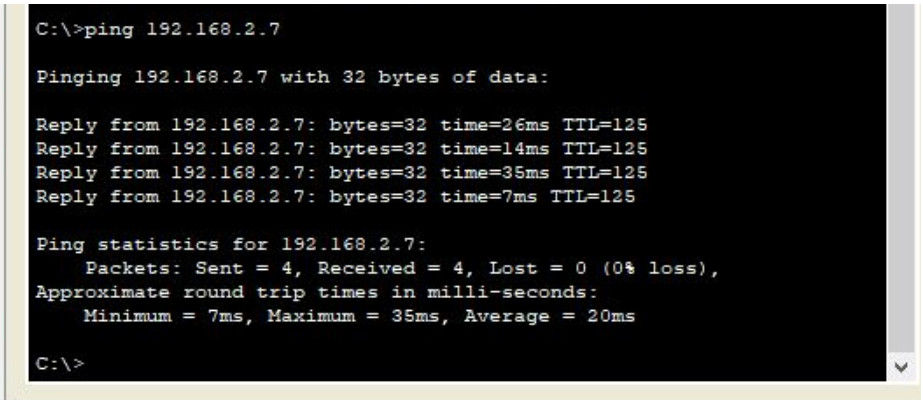


fig4. Pinging a wirelessly connect PC (in Delhi) to a wired PC in Mumbai

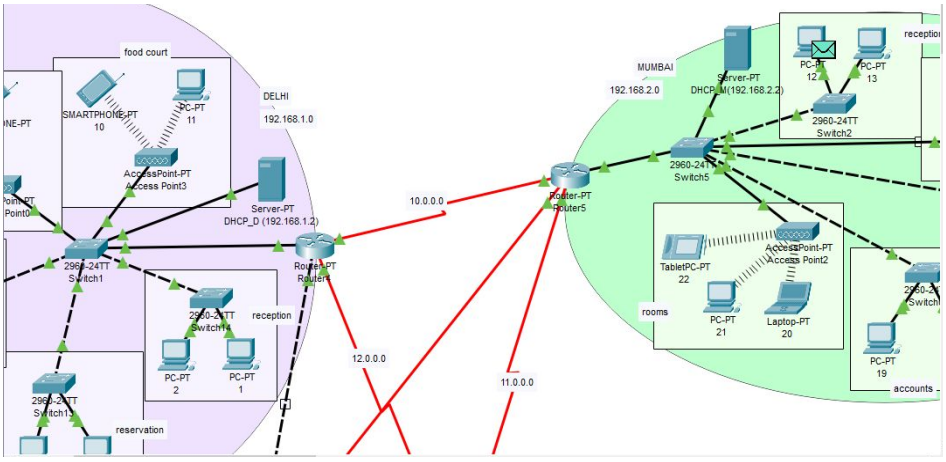


fig5 Sending a PDU from Smartphone PT10 in Delhi to PC-PT12 in Mumbai. PDU received

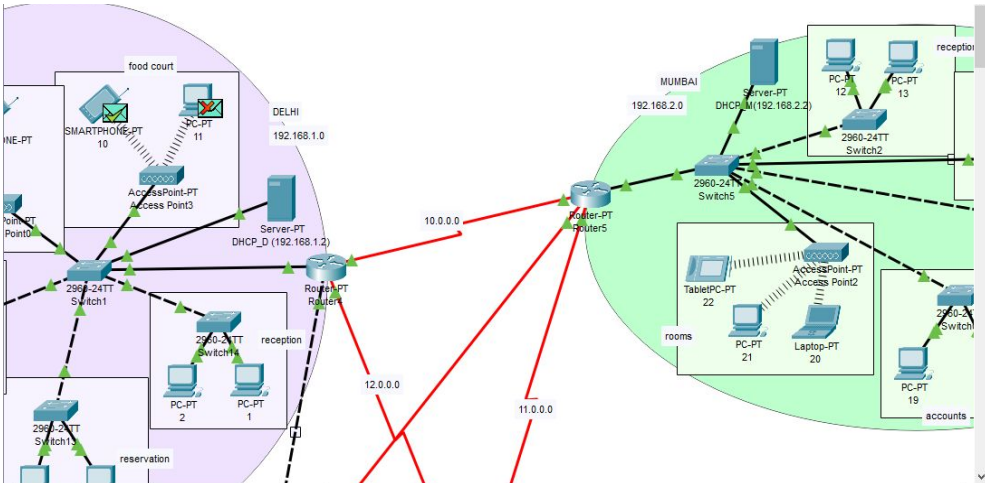


fig6. Acknowledgement of PDU received. Transmission complete.

- **accessing hotel website**

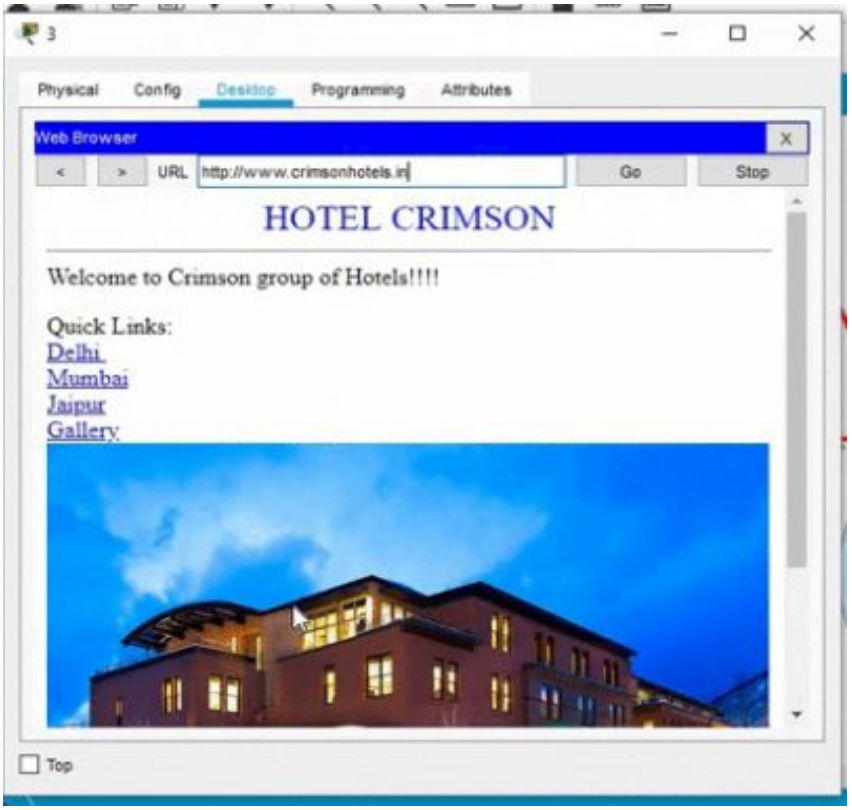


fig9. Web browser window on end device(pc,laptop,tablets,smartphones)

System Design

Design Goals

Our aim is to design a network in an efficient way, so we can communicate with the least cost, and least complexity. We plan to design the system in such a way that manual handling is least, and dynamism is maximum.

System Requirements

- CPU: Intel Pentium 4, 2.53 GHz or equivalent
- OS: Microsoft Windows 7, 8.1, 10, Linux Ubuntu 18.04.3 LTS (Ubuntu 16.04 and 14.04 LTS are no longer supported)
- RAM: 2 GB
- Storage: 500 MB of free disk space
- Display resolution: 1024 x 768
- Language fonts supporting Unicode encoding (if viewing in languages other than English)
- Latest video card drivers and operating system updates
- Cisco Packet Tracer 7.3

Detailed Design Methodologies

step1: The topology is designed in the following manner:

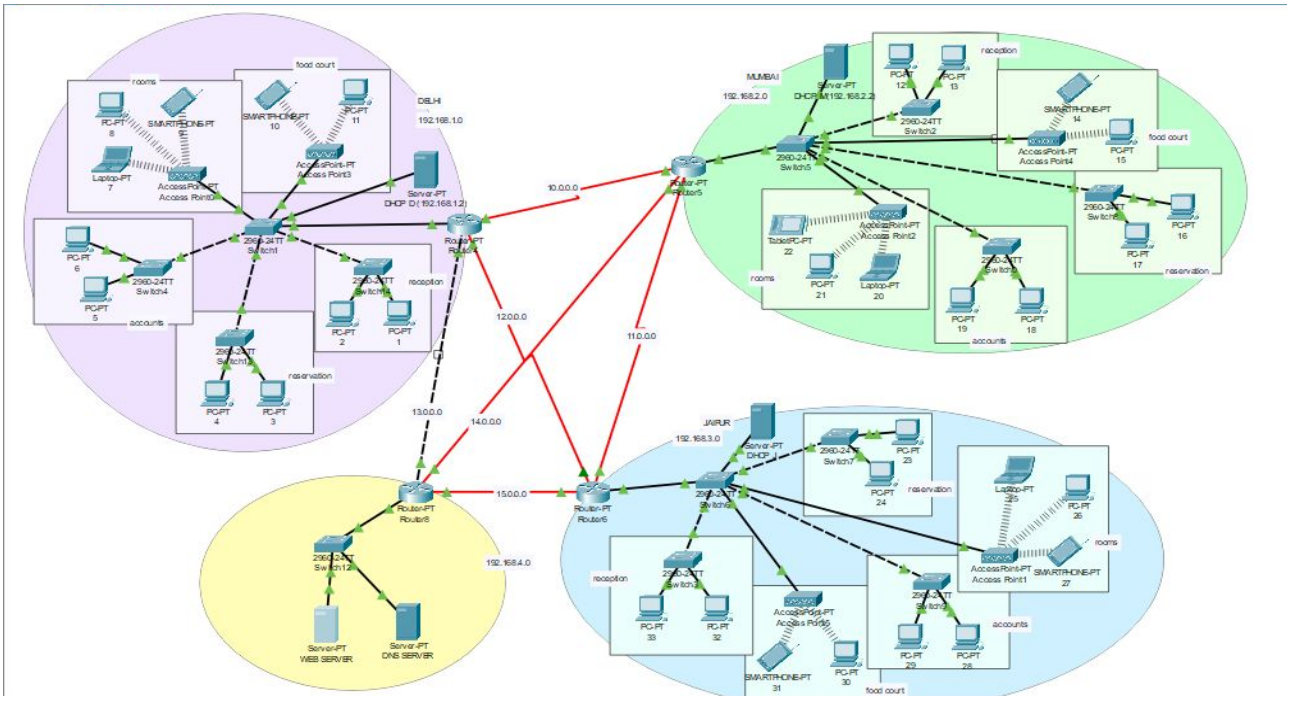
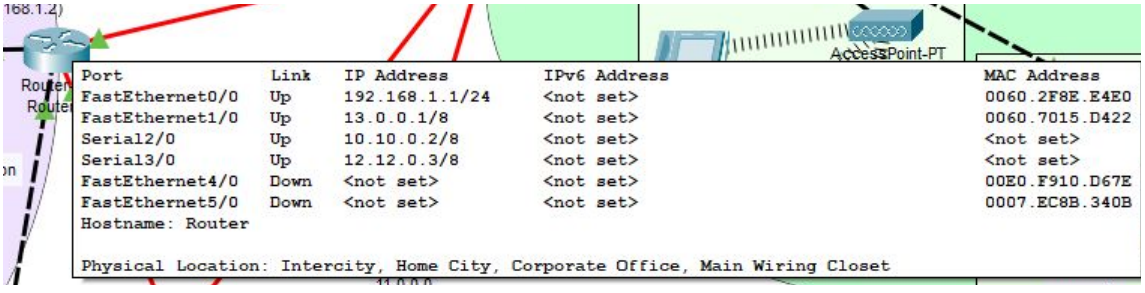


fig10. The Crimson Hotel Chain Topology

step2: The routers are configured on the fastethernet and serial interfaces.



Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Up	192.168.1.1/24	<not set>	0060.2F8E.E4E0
FastEthernet1/0	Up	13.0.0.1/8	<not set>	0060.7015.D422
Serial2/0	Up	10.10.0.2/8	<not set>	<not set>
Serial3/0	Up	12.12.0.3/8	<not set>	<not set>
FastEthernet4/0	Down	<not set>	<not set>	00E0.F910.D67E
FastEthernet5/0	Down	<not set>	<not set>	0007.EC8B.340B

Hostname: Router

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

fig11. Delhi Router Configurations

City	Network Address
Delhi	192.168.1.0
Mumbai	192.168.2.0
Jaipur	192.168.3.0
Central Network (DNS and web servers)	192.168.4.0

Table1: Network addresses for the cities

step3: The IP addresses to the end devices are assigned dynamically using the DHCP (Dynamic Host Configuration Protocol) via a server. For example, in Delhi, a server pool is created with the Starting address as 192.168.1.3 and default gateway as 192.168.1.1.

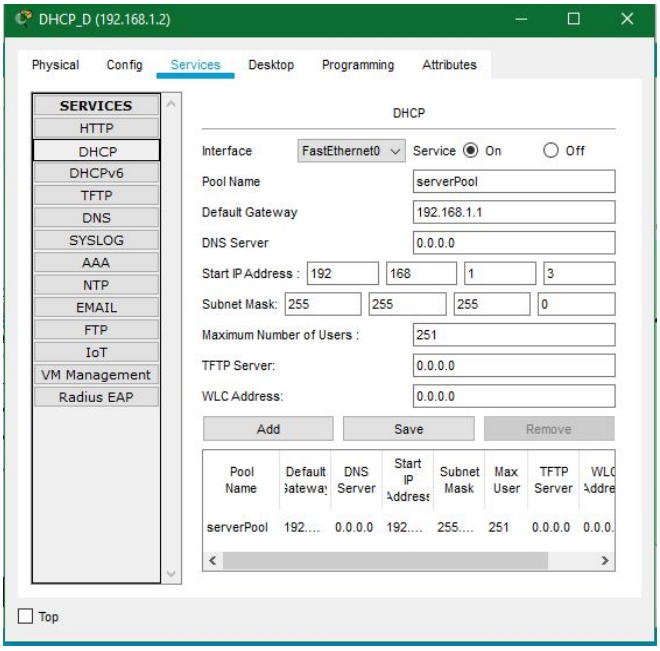


fig12. DHCP configuration at Delhi Server

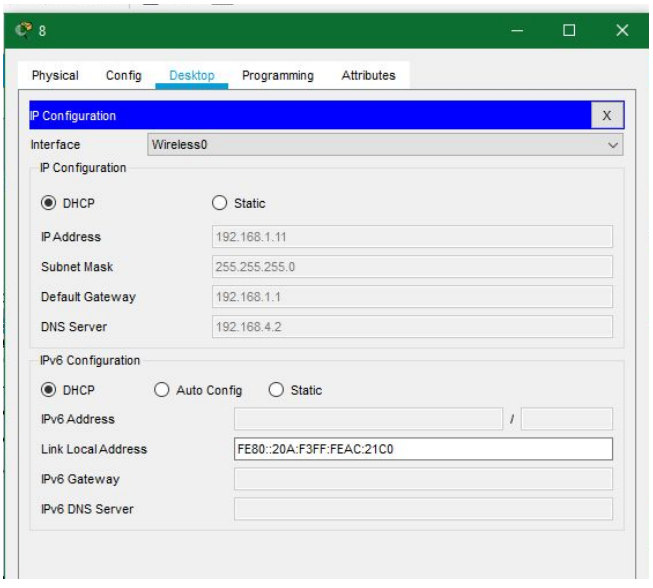


fig13. IP configuration at end device i.e. PC using DHCP

step4: The routers are routed using a dynamic protocol, OSPF (Open Shortest Path First), which minimises the costs.

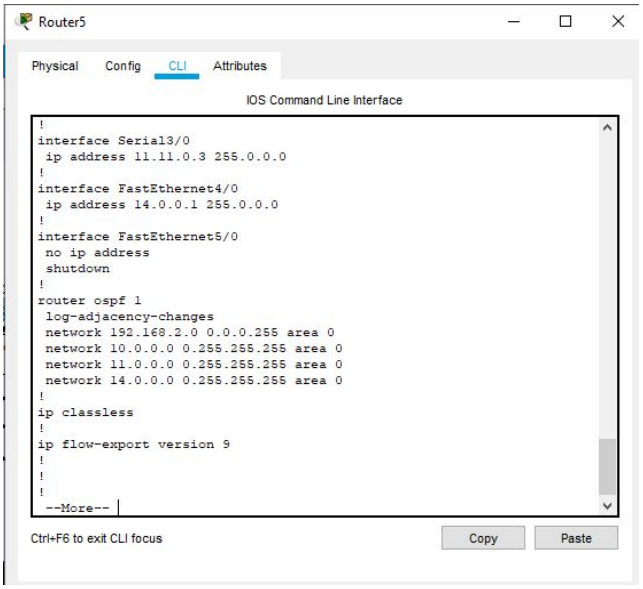


fig14. OSPF routing protocol network at jaipur network

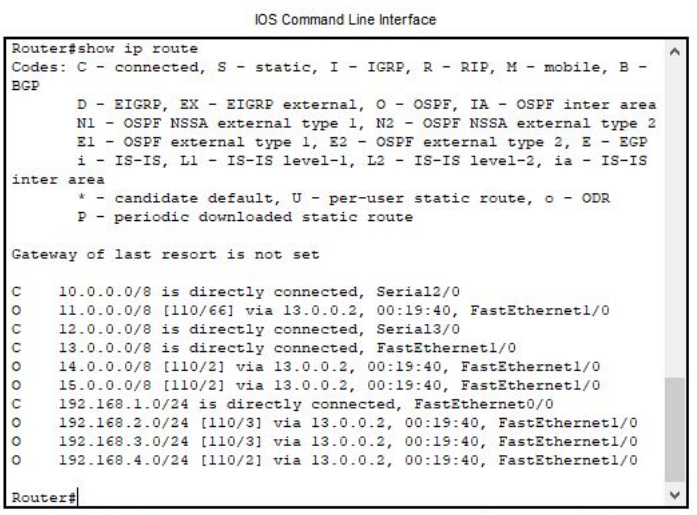


fig15. OSPF routes at Delhi router

step5: The wireless Access Points are assigned a SSID and password to keep the wireless network secure.

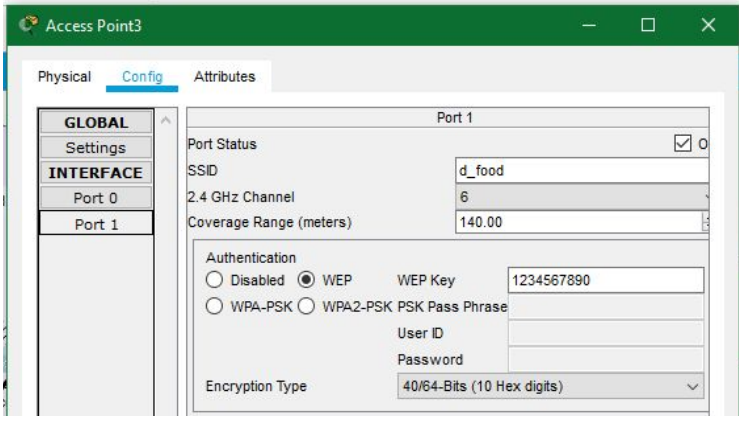


fig16. Access Point SSID for food and beverages

step6: DNS SERVER is configured to create www.crimsonhotels.in url having ip address 198.168.4.3. So that when a user types in the website name in its web browser, a Dns Query is generated and dns server returns the IP address of the the web page that is stored on HTTP SERVER.

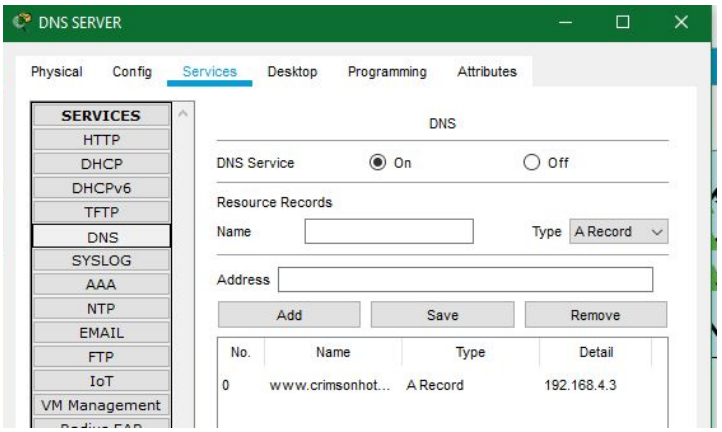


fig17. DNS service at the DNS Server

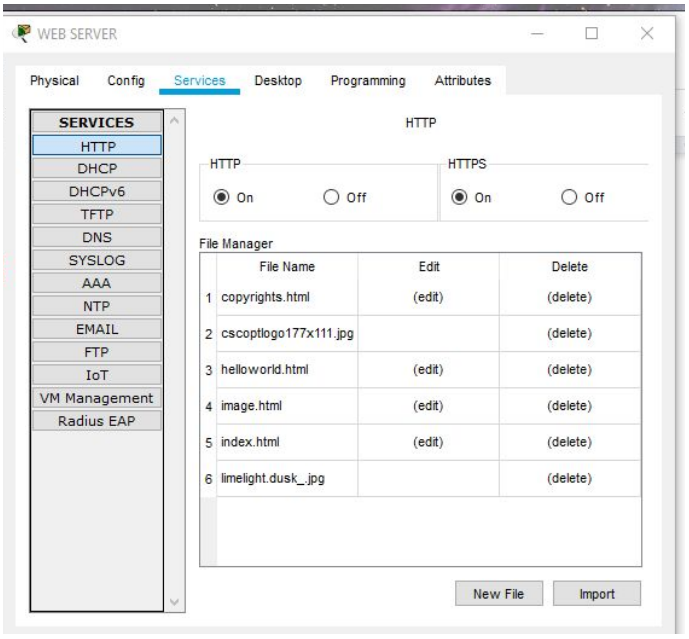


fig18 HTTP service at the Web Server

Work done

Development Environment

The project is developed using Cisco Packet Tracer (version 7.3).

Individual Contributions

Rimjhim Gupta:

- Designed the entire topology
- Configuring all the routers

Priyanka Goyal:

- Assigned IP addresses to end devices using DHCP via Servers
- Allotting SSIDs and passwords to wireless access points for guest rooms and food court

Ragini Gaurav:

- Applying OSPF routing protocol
- DNS and HTTP

Result and Discussions

The entire hotel chain is represented as the entire network. Each city represents a sub-network which is further divided into departments. The OSPF protocol applied allows a smooth functioning for the entire network. The wireless access point (WAP) allows guests to have wireless internet access in their guest rooms and food court.

Conclusion and Future Scope

The project revolves around a network of a hotel chain operating in three cities with each city having five departments- reception, reservations, accounts, food and beverages and guest rooms. Among these five departments, the guest rooms have a wireless access point(WAP) to allow wireless internet access to the guests. And the entire network uses the OSPF routing protocol.

In the future , we would like to expand the size of the hotel chain to more cities, thereby expanding the entire network. More departments can be added to each city. We can provide wireless connections in more departments, and not just in guest rooms. Also, depending on the size of the network, a better routing protocol can be used.