

Network Design Proposal for a 3 - Star Hotel

GROUP-12

A PROJECT REPORT

Submitted by

Shubhankar Garg [Reg No: RA1811003010262]

Arpit Manocha [Reg No: RA1811003010264]

Rishabh Prakash [Reg No: RA1811003010272]

Atul Kumar Amresh [Reg No: RA1811003010276]

Under the guidance of

Mrs. S. Poornima

(Associate Professor, Department of Computer Science & Engineering)

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE & ENGINEERING

of

FACULTY OF ENGINEERING AND TECHNOLOGY



S.R.M. Nagar, Kattankulathur, Kancheepuram District

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Under Section 3 of UGC Act, 1956)

BONAFIDE CERTIFICATE

Certified that this project report titled “Home Wireless Network Design” is the bonafide work of [“Shubhankar Garg”, “Arpit Manocha”, “Rishabh Prakash”, “Atul Kumar Amresh”], who carried out the 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.

SIGNATURE

Mrs.S.Poornima

GUIDE

Associate Professor

Dept. of Computer Science &
Engineering

Signature of the Internal Examiner

SIGNATURE

TABLE OF CONTENTS

ABSTRACT	3
ABBREVIATIONS	Error! Bookmark not defined.
1 INTRODUCTION.....	
2 LITERATURE SURVEY.....	
2.1 HISTORY	
2.2 PROJECT SCOPE.....	
3 NETWORKING REQUIREMENTS.....	
4 REQUIREMENT ANALYSIS.....	
5 NETWORK DESIGN STRATEGY.....	
6 NETWORK DIAGRAMS.....	
7 NETWORK SETUP.....	
8 RECOMMENDED PRODUCTS.....	

ABSTRACT

Designing a network architecture has always been a challenging topic and an active research area. The network has to be analysed for it to be consistent and reliable. The network design proposal is made to accommodate the requirements for a 3-star Hotel that has ADSL Internet available for the hotel. The project is focused on WLANs and associated wireless technology. Hence, further to wireless technology, the guide also delves into security issues. The network and devices provided by the management have firewall and security software installed in it. The hardware and tools used for the project are Router, Switch, Desktop, Broadband MODEM / Wireless Router, Ethernet cable, Cisco Packet Tracer to create a prototype for the proposal.

This project will result in understanding how an organization operates its network architecture, how it administers and maintains the security of the network and what are the challenges faced while architecting the network. A prototype was built which simulates the build and function of the network using virtual tools.

ABBREVIATIONS

WLAN-Wireless Local Area Network

IP- Internet Protocol

PC- Personal Computer

OSI - Open Systems Interconnection

ADSL- asymmetric digital subscriber line

WAP- Wireless Access Point

CHAPTER 1

INTRODUCTION

A wireless network is the sort of network that uses wireless data connections between network nodes.

Wireless networking is a way in which homes, telecommunications networks and business installations remove the cost factor of the internet previously seen due to the cables required in wired communications. The implementation of wireless connection takes place at the physical level (layer) of the OSI model network structure.

Examples of wireless networks include cell phone networks, wireless local area networks (WLANs), wireless sensor networks, and terrestrial microwave networks. Not only for general purpose but wireless communication is needed for aerospace communication between satellites, and spacecrafts.

We can send texts, audio, video through within seconds through the means of wireless communication at any place and any time provided network signals can be detected by your device. There's no wonder why most of the technology developing in our decade and upcoming decade are using more and more of wireless devices and thus a reason we rarely see wired network communication.

The most exciting development of wireless communications has been due to remote access of the wireless devices. These machines/devices are being accessed through the process of sensors and data receivers which receive their information through the wireless communication taking place between two end devices through various process.

With the great usage of remote access, it also faces problem of security. Routers and Access Points are always attempted to be remotely accessed and if it connects to the wrong person's device, then the person can do damage to your privacy and could possibly get access to financial accounts, etc.

CHAPTER 2

LITERATURE SURVEY

2.1 HISTORY

WIRELESS NETWORK

Admin telecommunications networks are normally introduced and administered using radio communication. This exercise takes place at the physical level of OSI (layer)

The first technical wireless network was established under the brand ALOHAnet at the University of Hawaii in 1969 and became operational in June 1971. The first commercial wireless network was the WaveLAN family of products developed by NCR in 1986.

ROUTERS

The concept of an Interface computer was first proposed by Donald Davies for the NPL network in 1966. The same idea was conceived by Wesley Clark the following year for use in the ARPANET. Named Interface Message Processors (IMPs), these computers had fundamentally the same functionality as a router does today. The idea for a router (called gateways at the time) initially came about through an international group of computer networking researchers called the International Networking Working Group (INWG). Set up in 1972 as an informal group to consider the technical issues involved in connecting different networks, it became a subcommittee of the International Federation for Information Processing later that year. These gateway devices were different from most previous packet switching schemes in two ways. First, they connected dissimilar kinds of networks, such as serial lines and local area networks. Second, they were connectionless devices, which had no role in assuring that traffic was delivered reliably, leaving that entirely to the hosts. This particular idea, the end-to-end principle, had been previously pioneered in the CYCLADES network.

SWITCH

A network switch is a multiport network bridge that uses MAC addresses to forward data at the data link layer (layer 2) of the OSI model. Some switches can also forward data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches.

Switches for Ethernet are the most common form of network switch. The first Ethernet switch was introduced by Kalpana in 1990. Switches also exist for other types of networks including Fibre Channel, Asynchronous Transfer Mode, and InfiniBand.

ADSL

ADSL was specifically designed to exploit the one-way nature of most multimedia communication in which large amounts of information flow toward the user and only a small amount of interactive control information is returned. Several experiments with ADSL to real users began in 1996. In 1998, wide-scale installations began in several parts of the U.S. In 2000 and beyond, ADSL and other forms of DSL are expected to become generally available in urban areas. With ADSL (and other forms of DSL), telephone companies are competing with cable companies and their cable modem services.

Ethernet

Ethernet was developed at Xerox PARC between 1973 and 1974. It was inspired by ALOHAnet, which Robert Metcalfe had studied as part of his PhD dissertation. The idea was first documented in a memo that Metcalfe wrote on May 22, 1973, where he named it after the luminiferous aether once postulated to exist as an "omnipresent, completely-passive medium for the propagation of electromagnetic waves." In 1975, Xerox filed a patent application listing Metcalfe, David Boggs, Chuck Thacker, and Butler Lampson as inventors. In 1976, after the system was deployed at PARC, Metcalfe and Boggs published a seminal paper. Yogen Dalal, Ron Crane, Bob Garner, and Roy Ogus facilitated the upgrade from the original 2.94 Mbit/s protocol to the 10 Mbit/s protocol, which was released to the market in 1980.

AccessPoint

A wireless access point (WAP), or Access Point (AP), is a networking device that allows other Wi-Fi devices to connect to a wired network. The WAP connects to a router through a wired network\ as a standalone device, but it can also be an integral component of the router itself. A WAP is differentiated from a hotspot which is a physical location where Wi-Fi access is available.

2.2 PROJECT SCOPE

Routers at a distance can't be contacted with efficiency. In this problem, we have 3 users one with a laptop and one with a pc at home, and we have to design a wireless network that can remotely be accessed from the office. All users have a high speed internet connection and a serial port printer is available for printing.

Chapter 3

NETWORKING REQUIREMENTS

- The hotel has 15 floors with 10 rooms in each floor
- The hotel has a lobby area.
- The hotel has a swimming pool area.
- ADSL Internet is available for the hotel.
- All the rooms should have computers installed.
- The computers in all the rooms should have internet connection.
- The swimming pool area and lobby should have wireless internet access.
- The guests in the rooms should have free internet access.
- The computers should have appropriate security software installed.
- The hotel management staff and the guests should be on different networks.
- There are 15 users on the hotel management who require computers.
- A hotel management server needs to be set up for the hotel management staff which should not be accessible by the guests.
- The wireless access in the lobby and swimming pool area should be secure.

Chapter 4

REQUIREMENT ANALYSIS

The 3-star hotel support 10 computers in each floor and the hotel has a total of 15 floors. The hotel has 15 staffs in the hotel management so 15 desktop computers would be required for management department. So, 165 desktop computers would be required. All the computers should have an antivirus software to secure all the computers. The guest computers will be connected to the Primary Router whereas the staff computers will be connected to Staff Router in order to provide different network for guests and staffs. So, we require a total of 2 routers.

To connect those computers with internet connection will need one switch for each floor. All switches are linked to the primary router so we need 15 Switches in total for the guest computers and we require two more switches, one to connect all the staff computers to Staff Router and one to connect the Wireless Repeater to ADSL. So, 17 switches would be required.

The Lobby and Swimming Pool area will be supported with wireless internet facility. To have a better bandwidth we'll repeat the signal of the wireless access point from primary router by wireless repeater. All the wireless connection supported with WAP/WAP2PSK protection to be secure.

Chapter 5

NETWORK DESIGN STRATEGY

- Hotel Room:
 - ✓ The strategy is to create a network that has highest quality and standards.
 - ✓ We can connect all the 10 computers on a floor directly with the router but its cost estimation is higher as compared to a switch.
 - ✓ We can also connect the PCs with a hub but it is inefficient because its speed of data transmitting is very unequal to a switch.
 - ✓ So, we'll use switch to connect the PCs using Fast Ethernet cables with the switch which will be further be connected to Primary Router.
 - ✓ For maintaining the privacy of the users, we'll ensure that one room's PC shouldn't be able to connect to another room's PC and appropriate security software's will be installed.
 - ✓ We'll implement Ethernet connection to provide internet for the guest so as to avoid complexity of Wi-Fi login id and password.
 - ✓ We'll use primary router in order to provide guests with a different network than the hotel staff.
- Hotel Management:
 - ✓ We have a total of 15 staff in the management department so we require a network design for them too.
 - ✓ All the Staff PCs are to be connected to the Staff Router with the help of a switch as we have done with the Hotel Room PCs.

- ✓ We'll provide the hotel management with Staff Router which will provide different network for the Staff and will not be accessible by guests.

- ADSL:

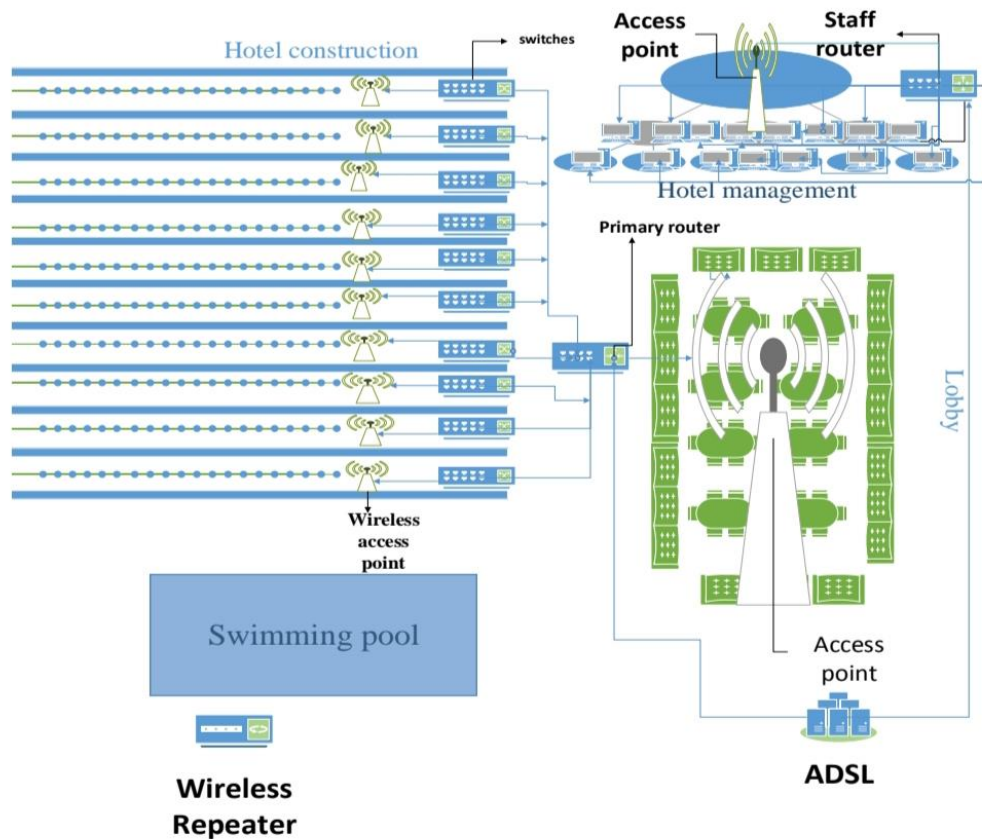
- ✓ Asymmetric digital subscriber line (ADSL) is a type of DSL broadband communications technology used for connecting to the Internet.
- ✓ ADSL allows more data to be sent over existing copper telephone lines when compared to traditional modem lines.
- ✓ We are provided with an ADSL connection which is already in use with the hotel.

- Lobby & Swimming Pool:

- ✓ The hotel has a Lobby and Swimming Pool area for its guests so that they can enjoy and relax.
- ✓ To provide internet connection in both the areas we'll be setting up Wi-Fi facility.
- ✓ Both of the Wi-Fi will be password protected so that other than the guests no one could access it.

Chapter 6

NETWORK DIAGRAM



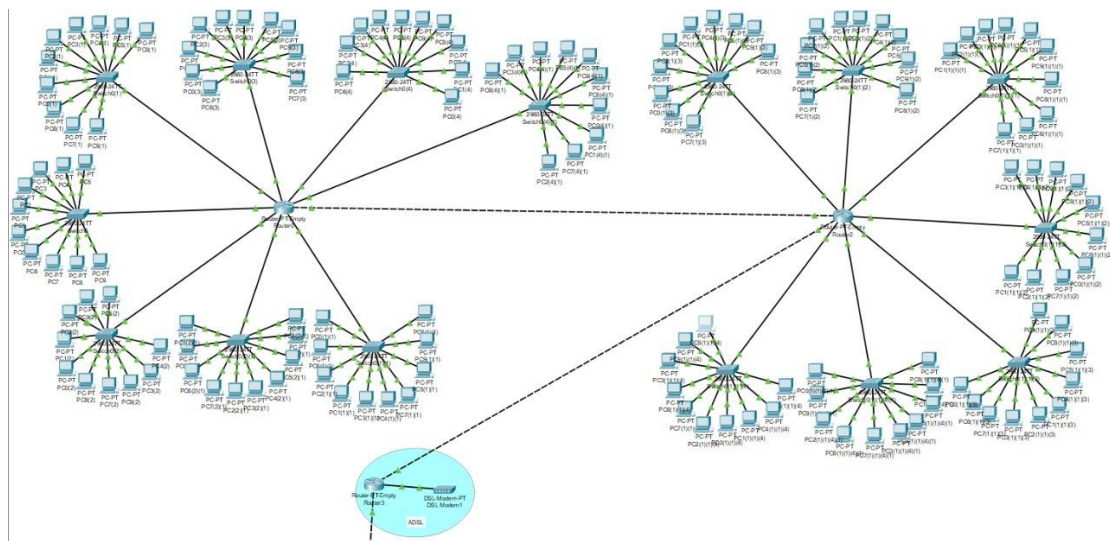
- The primary router has wired connection by access point to all the guests in the lobby. Also, primary router links the ten floor switches as LAN.
- Staff router provide wired internet connection to the Staff PCs of Hotel Management.
- In swimming pool there is a wireless repeater which repeats access point of primary router signal.
- ADSL provide an internet connection to primary router, staff router and Wi - Fi repeaters.

CHAPTER-7

NETWORK SETUP

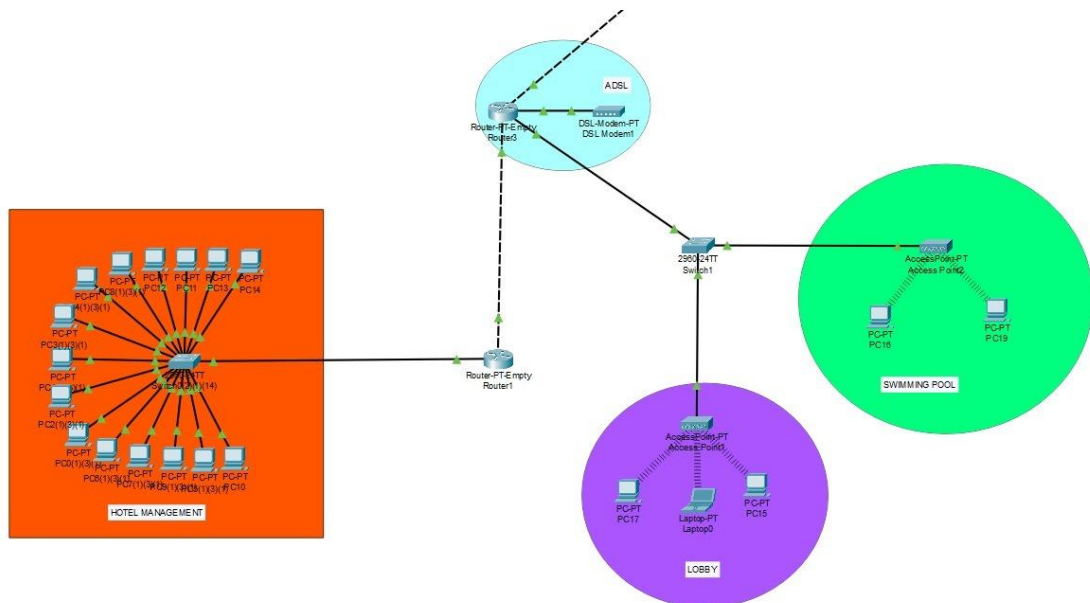
Hotel Rooms:

To demonstrate our project design and idea we have used Cisco Packet Tracer Software. As discussed, we connected the 10 PCs of one floor with one switch and same applies for rest of the floors. The Switches representing each floor are then connected to the Router, which is further connected to the ADSL.



We have used two routers in our Cisco Model as Cisco Routers (PT – Empty) provide a maximum of 10 port.

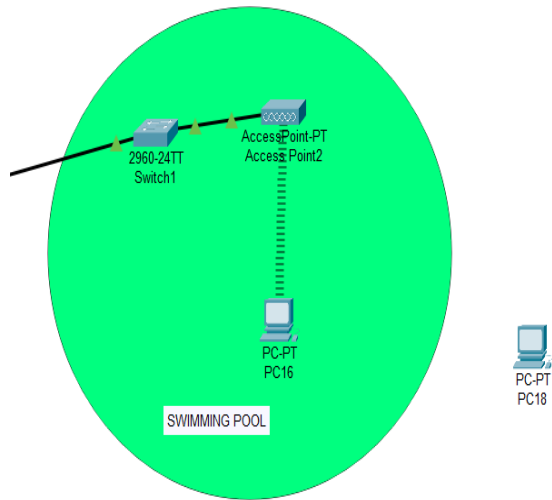
Hotel Management, Lobby & Swimming Pool:



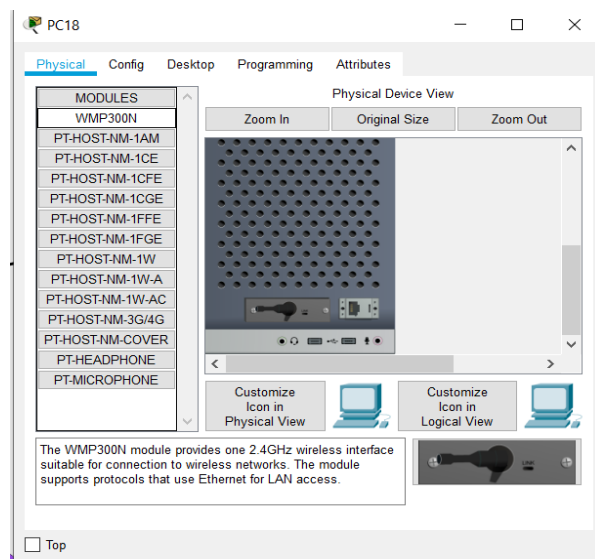
We have again used PT - Empty Router for the Staff Router and for connecting the lobby and swimming pool Wi- Fi to the ADSL we have used a Switch. For the ADSL design we have used a Router which is connected to DSL Modem which is under the category of WAN Emulation in the Networking Devices.

To demonstrate wireless internet access in the lobby and swimming pool area we have used Wireless Device AP – PT under the Networking Devices category of Cisco Packet Tracer. We have setup Wi - Fi for the lobby and swimming pool area with password protection.

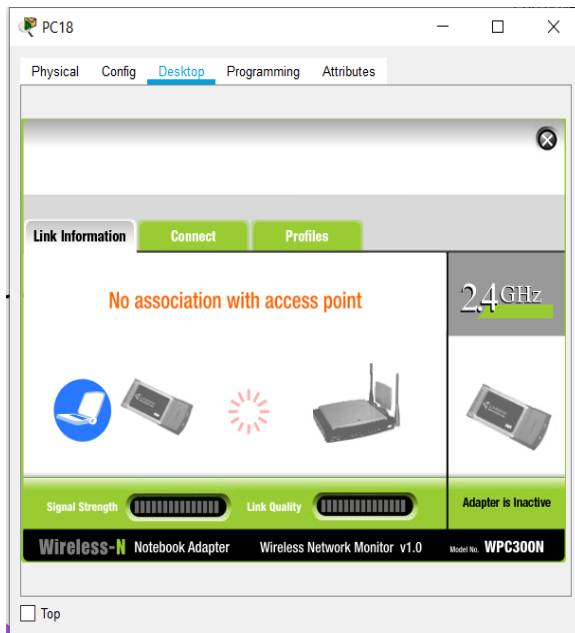
Here are some images of our project showing that Wi - Fi is functional and password protected.



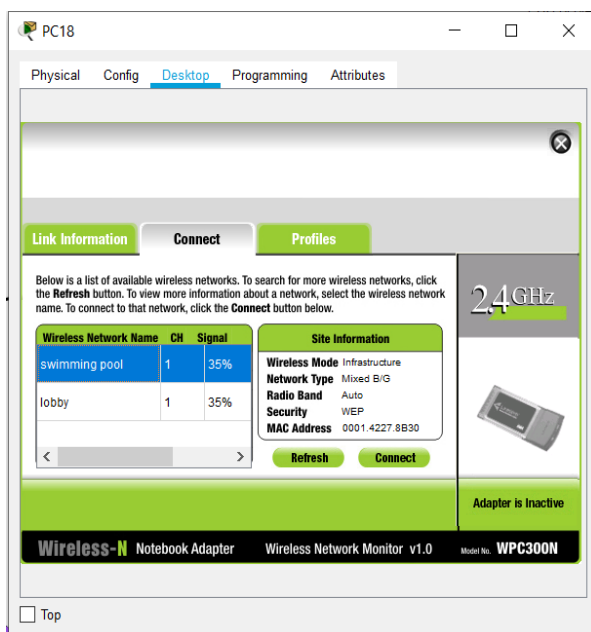
1



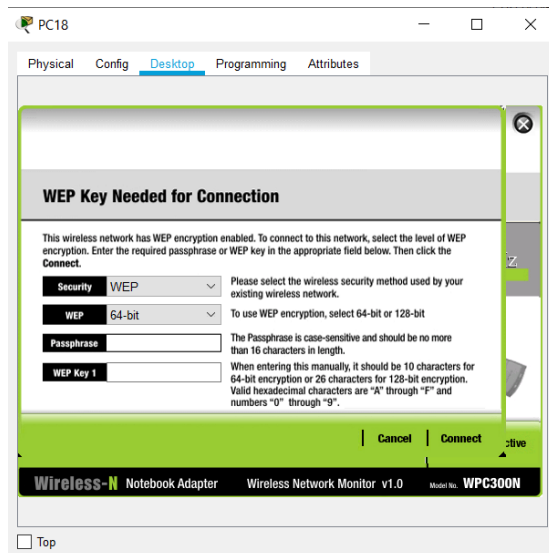
2



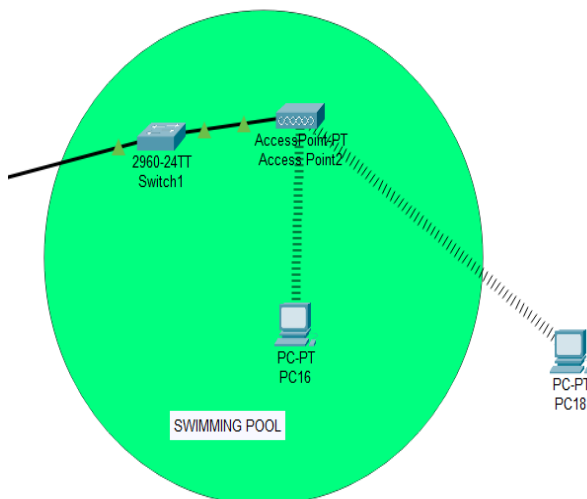
3



4



5



6

We are testing the Wi - Fi by bringing in a new PC and connecting it with the Wi - Fi. As we can see in the 4th image that both of the Wi - Fi are discoverable which shows that both of them are functioning properly.

When the user selects the required Wi - Fi and taps connect, he/she is asked to provide password for the Wi - Fi in the 5th image. On providing the correct password the PC get connected which we can see in the last image.

Maintaining User's Privacy:

A VLAN (virtual LAN) is a subnetwork which can group together collections of devices on separate physical local area networks (LANs). To avoid one guest from accessing another guest's PC or the Staff PC's we have assigned each PC with different VLAN.

Same applies for Staff PCs too. Advantage of VLAN is that it can allow different PCs having same VLAN value to connect to each other. So, we can have different groups of PCs that can have intra connectivity but not inter. For example, we can group all PCs of accounts department under one VLAN so that only accounts staff can access each other. Others won't be able to access Account Department's PC.

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	2	--	0001.9762.9E66
FastEthernet0/2	Up	3	--	0060.70E3.48CA
FastEthernet0/3	Up	4	--	0000.0CB1.BC0D
FastEthernet0/4	Up	5	--	0010.11AE.BE5B
FastEthernet0/5	Up	6	--	0001.43D2.E777
FastEthernet0/6	Up	7	--	00E0.B06C.E115
FastEthernet0/7	Up	8	--	000A.41A9.A669
FastEthernet0/8	Up	9	--	0001.4396.2D8B
FastEthernet0/9	Up	10	--	0001.96BC.22A2
FastEthernet0/10	Up	11	--	0004.9AC4.A5C9
FastEthernet0/11	Up	1	--	0001.9668.13C2
FastEthernet0/12	Down	1	--	00D0.BC2E.7C49
FastEthernet0/13	Down	1	--	0060.5C8C.A840
FastEthernet0/14	Down	1	--	0001.96DE.792C
FastEthernet0/15	Down	1	--	00E0.F993.CCCA
FastEthernet0/16	Down	1	--	0010.1189.1087
FastEthernet0/17	Down	1	--	0030.F2A8.9C5D
FastEthernet0/18	Down	1	--	000D.BD5B.95B4
FastEthernet0/19	Down	1	--	0007.ECA3.4748
FastEthernet0/20	Down	1	--	0030.F2C6.8081
FastEthernet0/21	Down	1	--	0030.A39D.88B2
FastEthernet0/22	Down	1	--	00D0.97A8.AA72
FastEthernet0/23	Down	1	--	0001.64C6.6802
FastEthernet0/24	Down	1	--	0006.2A80.2718
GigabitEthernet0/1	Down	1	--	0004.9AC7.5A88
GigabitEthernet0/2	Down	1	--	0006.2A73.A835
Vlan1	Down	1	<not set>	0006.2A30.E5B9
Hostname: Switch				
Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet				

The above image shows VLAN configuration done in the each of the floor switches connected with the guest computer and the below one shows VLAN configuration done in switch connecting staff computers.

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	2	--	00E0.B078.ECD0
FastEthernet0/2	Up	3	--	0001.C96C.C823
FastEthernet0/3	Up	4	--	000C.CF94.19C5
FastEthernet0/4	Up	5	--	0090.212C.1807
FastEthernet0/5	Up	6	--	0005.5E81.858E
FastEthernet0/6	Up	7	--	0003.E400.7C90
FastEthernet0/7	Up	8	--	000A.F395.8673
FastEthernet0/8	Up	9	--	00D0.D3B4.831D
FastEthernet0/9	Up	10	--	0090.2BE7.8AD7
FastEthernet0/10	Up	11	--	0001.C91E.A862
FastEthernet0/11	Up	12	--	000C.CF3E.14EB
FastEthernet0/12	Up	13	--	0040.0B36.0028
FastEthernet0/13	Up	14	--	00E0.F7C8.C639
FastEthernet0/14	Up	15	--	0001.6438.56A6
FastEthernet0/15	Up	16	--	0000.0CE9.4D5C
FastEthernet0/16	Up	1	--	0003.E446.AEBC
FastEthernet0/17	Up	1	--	0030.F20A.E9A3
FastEthernet0/18	Down	1	--	0001.C9EE.12A4
FastEthernet0/19	Down	1	--	00E0.A39A.3B30
FastEthernet0/20	Down	1	--	0003.E4A2.3484
FastEthernet0/21	Down	1	--	0001.6319.555A
FastEthernet0/22	Down	1	--	000C.8558.097E
FastEthernet0/23	Down	1	--	00E0.8FA5.14AB
FastEthernet0/24	Down	1	--	00E0.A37B.6858
GigabitEthernet0/1	Down	1	--	00D0.BAB1.37C2
GigabitEthernet0/2	Down	1	--	00D0.583E.BD69
Vlan1	Down	1	<not set>	0004.9A66.B367

Hostname: Switch

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

Chapter-8

Recommended Products

- CISCO LINKSYS RV016 10/100 16-PORT VPN ROUTER -B2



- Switch Cisco SF 100-24 24-Port 10/100 SR224T



- Wireless Access Point Type of DAP-2310



- Amped Wireless SR300 High Power Wireless-300N Smart Repeater



- Media Bridge FBA 31-299-100B - Highly Durable Ethernet Cable

