A Laboratory Manual For

Data Communication And

Computer Networking (22414)

Semester –IV



Maharashtra State Board of Technical Education, Mumbai

(Autonomous) (ISO 9001: 2015) (ISO/IEC 27001: 2013)



Maharashtra State Board of Technical Education, (Autonomous) (ISO 9001 : 2008) (ISO/IEC 27001 : 2005) 4th Floor, Government Polytechnic Building, 49, Kherwadi, Bandra (East), Mumbai 400051.

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MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

Certificate

This is	s to certify	y that Mr. / Ms:					
Roll	No.		, of	Fourth	Semester	of	Diploma
in							of
Institute					(Co	ode:) has
complete	ed the terr	n work satisfacto	rily in cours	e . Data Com i	munication and	Comput	er Network
(22414)	for the	academic year	20 To	20 as I	Prescribed in c	curriculun	1
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Subject '	Teacher		Head of	Department		Pri	ncipal

Sr. No.	Practical Outcome	СО	СО	СО	СО	СО
NO.		a.	b.	c.	d.	e.
1	Configure Peer-to-Peer Network at least three Host	V				
2	Create desired standard network cable including Cross cable and test it by using cable tester		V			
3	Connect computer using given topology with wired media.			V		
4	Connect Computers Using Wireless Media			V		
5	Write a C Program for CRC Error Detection			V		
6	Create a Network Using Bluetooth			V		
7	Share a Printer and Folder in Network				√	
8	Install Operating System Windows Server 2008				V	
9	Configure File Server				V	
10	Configure client to file server and use file services				V	
11	Configure static and dynamic IP addresses					√
12	Configure DHCP server					V
13	Run basic utilities and network commands: ipconfig, ping,tracert,netstat, pathping,route					√
14	Create two subnets and implement it with calculated subnet masking					V
15	Set access rights and security permissions for user.					√
16	Create IPv6 environment in a small network using simulator					√
17	Setting up wireless network				V	

Sr. No.	Practical Outcome	Page No.	Date of Performa nce	Date of Submissi on	Assess ment Marks (25)	Dated sign of teacher	Rem arks
1	Configure Peer-to-Peer Network at least three Host	1					
2	Create desired standard network cable including Cross cable and test it by using cable tester	13					
3	Connect computer using given topology with wired media.	22					
4	ConnectComputersUsingWirelessMedia	32					
5	Write a C Program for CRC Error Detection	40					
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17	Setting up wireless network	119					

Practical No: 1

Configure Peer - to - peer network with at least three hosts.

I. Practical Significance:

a. Student should be able to configure peer-to-peer network. This will help to understand different issues involved in peer-to-peer network.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice :** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- Individual and team work: Function effectively as a leader and team member in diverse/multi disciplinary teams.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

❖ Ability to install and configure TCP/IP protocol.❖Ability to configure peer network.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

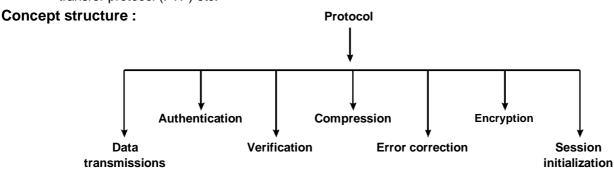
- Understand concept of TCP/IP model.
- Understand types and formats of ip address.
- Understand concept of peer to peer network.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

- It is a set of rules and conventions used for communication between network devices.
- Protocols include mechanisms for devices to identify and make connections with each other, as well as formatting rules that specify how data is packaged into messages sent and received.
- Some protocols also support message acknowledgement and data compression designed for reliable and/or high-performance network communication.
- It determines the type of error checking to be used.
- e.g. Transmission control protocol (TCP), Internet protocol (IP), Hyper text transfer protocol (HTTP), File transfer protocol (FTP) etc.

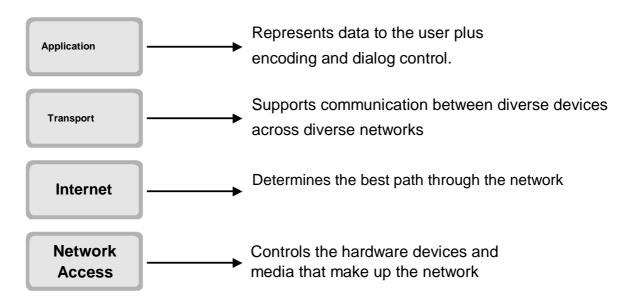


Functions of protocol

Proposition 2. TCP/IP:

- Transmission Control protocol/Internet Protocol, used to connect computers on the internet or network.
- TCP/IP is built into the UNIX operating system and is used by the Internet, making it the de facto standard for transmitting data over networks.
- Transmission Control Protocol, manages the assembling of message of file into smaller packets that are transmitted over the Internet and received by a TCP layer that reassembles the packets into the original message.
- Internet Protocol, handles the address part of each packet so that it gets to the right destination.
- TCP/IP protocols map to four-layer conceptual model known as the DARPA model, named after the U.S. government agency that in itially developed TCP/IP. The four layers of the DARPA model are: Application, Transport, Internet, and Network Interface.

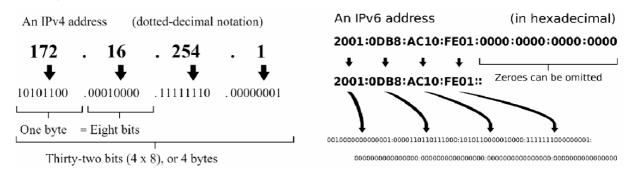
Concept structure:



Proposition 3. ip address:

- An **Internet Protocol address (IP address)** is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for Communication.
- □ An IP address is an identifies for a computer or device on a TCP/IP network.
- Two versions of the Internet Protocol (IP) are in use: IP Version4 (IPv4) and IP Version6 (IPv6).
- □ IPv4 addresses are of 32 bits that are canonically represented in dot-decimal notation, which consists of four decimal numbers, each ranging from 0 to 255,, separated by dots, e.g., 172.16.254.1
- Ipv6 addresses are of 128 bits that are represented as eight groups of four hexadecimal digits separated by colons. e.g. 2001:0db8:85a3:0042:8a2e:0370:7334
- The IPv4 address space can be subdivided into 5 classes Class A, B, C, D and E. Each class consists of a contiguous subset of the overall IPv4 address range.

Concept structure:



IPv4 address example

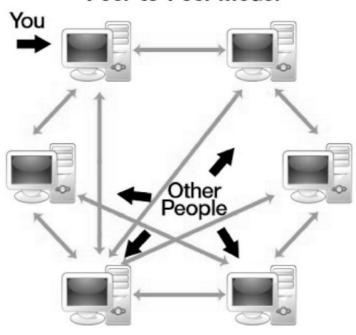
IPv6 address example

Proposition 4. Peer to Peer network:

- A peer-to-peer (P2P) network is type of decentralized and distributed network architecture in which individual nodes in the network i.e. computer (called "peers") act as both suppliers and consumers of resources.
- It differs from client-server networking, where certain devices have responsibility for providing or "serving" data and other devices consume or otherwise act as "clients" of those servers.
- Omputers in a peer to peer network run the same networking protocols and software. peer networks are also often situated physically near to each other typically in homes, small businesses or schools.
- Peer-to-peer networks are generally simpler, but they usually do not offer the same performance under heavy loads.

Concept structure:

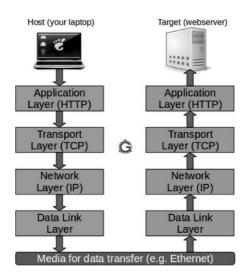
Peer-to-Peer Model



Peer to Peer network model (Refer color picture 30)

VIII. Diagram:

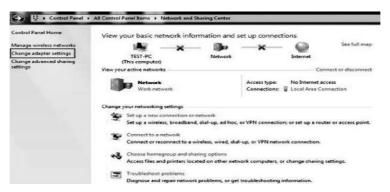
- ❖ A set of computers with NIC card installed in it.
- Transmission media and connector.



Communication in TCP/IP model (Refer color picture 31)

IX. Stepwise procedure:

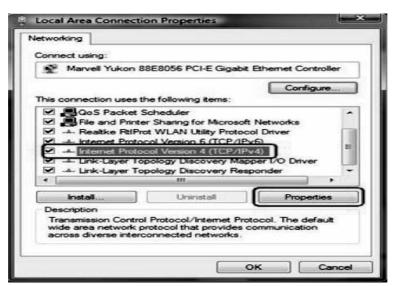
- > Install and configure TCP/IP:
- Click Start->Control Panel->Network and Internet-> View network status and tasks or Network and sharing Center, Click on Change adapter settings.



□ Select the connection, right click it and select properties.

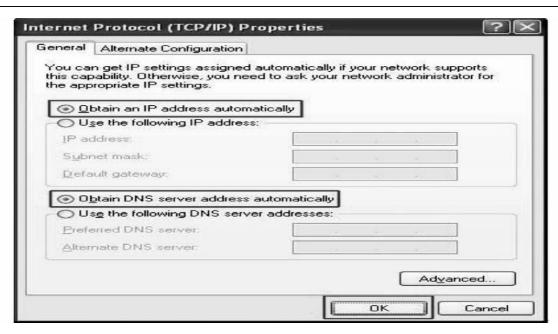


- □ Click Install then. Click Protocol, and then click Add. Click Have Disk. Type the location as c:\windows\inf and then click OK. On the list of available protocols, click Internet Protocol (TCP/IPv4), and then click OK. And it would be installed on your computer.
- □ Select Internet Protocol Version 4 (TCP/IPv4), double click it or click Properties.



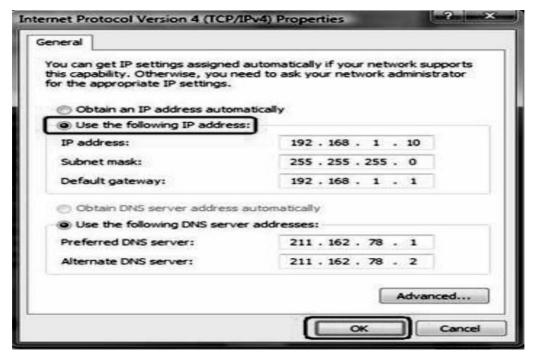
- ☐ There are two ways to configure the TCP/IP Properties, Assigned by DHCP server automatically or manually.
- □ 1. Assigned by DHCP Server :

Select Obtain an IP address automatically and Obtain DNS. Server address automatically, if necessary, then click OK to Save the settings.



□ 2. Assigned manually :

Select Use the following IP address, type address, subnet mask and default gateway IP address into it. Select Use the following DNS server addresses, type your local area DNS server IP addresses into it, if necessary, then click OK to save the settings.



□ Click **OK** to save and apply your settings:

Note:

- If the modem/router's LAN IP address is 192.198.1.1, type IP address is 192.168.1.x (x is from 2 to 253), subnet mask is 255.255.255.0, and default gateway is 192.168.1.1
- If the modem/router's LAN IP address is 192.168.0.1, type IP address is 192.168.0.x (x is from 2 to 253), subnet mask is 255.255.255.0, and default gateway is 192.168.0.1
- In some cases, the DNS server addresses are provided by your Internet service provider.

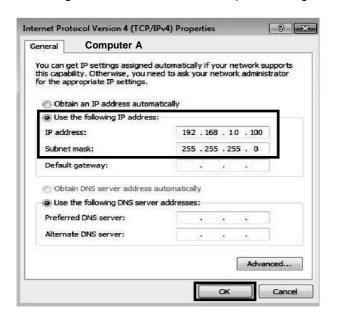
> Configure Peer to Peer network :

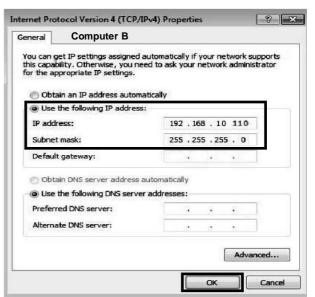
Let two computers to be connected in peer to peer network. Connect two computers Using UTP cables that are configured to cross arrangement into the port LAN card on computer A and computer B.

Let following are configuration details for both computers :

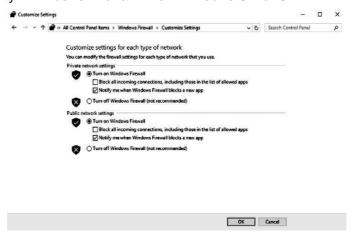
Configuration	Computer A	Computer B
IP address	192.168.10.100	192.168.10.110
Subnet mask	255.255.255.0	255.255.255.0
Computer Name	Prl-01	Prl-02
Workgroup	PRL-LAB	PRL-LAB

- For computer A and Computer B open control panel > Network and Internet > Network and Sharing center > Change adapter settings.
- □ Assigned IP address to both computers using TCP/IP configuration explained in previous procedure.





☐ Then turn off windows Firewall, so connections can be monitored using cmd. to do this open, Control Panel > System and security > Windows Firewall > Turn Windows ON or OFF.



• In Order both computers can connect to each other, the workgroup of both computers must be the same. Change its by, Start > Computer > Properties > Advanced system Settings. Then Select the Computer Name tab > Change. Use the same name between Computer A and Computer B.





• To know both computers are connected open command prompt and type ping ip address.

For Computer A

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 192.168.10.100

Pinging 192.168.10.100 with 32 bytes of data:

Reply from 192.168.10.100: bytes=32 time<10ms TTL=128

Ping statistics for 192.168.10.100:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

For Computer B

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 192.168.10.100

Pinging 192.168.10.100 with 32 bytes of data:

Reply from 192.168.10.100: bytes=32 time<10ms TTL=128

Ping statistics for 192.168.10.100:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

 You will get four replies back from the ping message. If you receive foru lines of information showing successes, then Connection is successful.

X Resources required:

- A set of computers with NIC card installed in it.
- Transmission media and connector.

XI Precautions:

- Follow safety practices.
- Handle network devices carefully.

Name of computer

XII Results:

Student shall install configure TCP/IP and configure peer to peer network in laboratory and write the information in the following table

	Physical address
	IP address
	Subnet mask
	Default gateway
	Preferred DNS server address
	Alternative DNS server address
	Workgroup name
XII	 Question for confirmation of learning: (Student shall write answers to these questions independently in the laboratory itself to have self-feedback.) Sive any three functions of protocol.
	❖ How TCP and IP protocol is used to send message from one computer to another computers?
	❖ Which are two versions of IP address?
	State the meaning of peer to peer network.
XI	Conclusion:
	 Assembling of message into packets is managed by(TCP/IP)
	Pv4 is(32/64) bit address where IPv6 is64 (64/128) bit address.
	TCP/IP protocol contains(4/7) layers.
	If user connects 2 computers in peer to peer network then(0/1/2) computer can send request to other computers with in network to get resources.

XV Industrial Applications:

- ❖ Today use of TCP/IP protocols and the Internet not only for entertainment and information, but to conduct our business by performing transactions, buying and selling products, and delivering services to customers.
- It was initilly successful because it delivered a few basic services that everyone needs (file transfer, electronic mail, remote logon) across a very large number of client and server systems. Several computers in a small department can use TCP/IP (along with other protocols) on a single LAN.
- The IP component provides routing from the department to the enterprise network, then to regional networks, and finally to the global Internet.
- Peer-to-peer networks underlie numerous applications.
 - Skype, an Internet telephony network, uses P2P technology.
 Instant messaging, systems and online chat networks.
 - □ **Bitcoin** and **PPCoin**, are peer-to-peer-based digital currencies.
 - Open Garden, connection sharing application that shares Internet access with other devices using Wi-Fi or Bluetooth.
 - □ Streaming media, P2PTV

XVI Exercise:

(Teacher shall form a group of 4-5 students each. Each group shall perform only one activity from list provided below. Teacher shall supervise)

- Student shall uninstall TCP/IP from the computers and install again.
- Student shall prepare a list of computer names and its ip address available in laboratory.
- Student shall connect 2 computers using peer to peer network.

XVII Assessments Scheme:

No.	Performance Indicators	Example
	Process related (15 Marks)	60%
1	Formation of wireless network.	25%
2	Execution of wireless Network	25%
3	Follow ethical Practices	10%
	Product Related (10 Marks)	40%
4	Correctness of wireless Network	15%
5	Timely Submission	15%
6	Answer to Sample questions	10%
	Total (25 marks)	100%

XVIII Theoretical Questions:

Write answers to Q	Q	Q	(Teache	er shall allot the	questions
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- 1. Define protocol
- 2. Give four examples of protocol with its full name.
- 3. Write the name of layers in TCP/IP?
- 4. Give the use of IP address.
- 5. Give and explain the address format of IPv4 and IPv6.
- 6. Give the use of network layer in TCP/IP.
- 7. How 192.168.2.76 is type of class C IP address?

- 8. Convert the IPv4 address "192.168.2.76" to binary format of 32 bits.
- 9. State the meaning of peer.
- 10. What is peer to peer network?
- 11. How peer to peer is differs from client-server network?
- 12. Give advantages of peer to peer network.
- 13. Give disadvantages of peer to peer network.
- 14. State the meaning of DNS server address.
- 15. Complete the following table for IP addresses :

Class	Address range	Subnet Mask	Example
А			
В			
С			

Space of Answers

List of Student Team M	ember
1	

•	
•	
_	
•	

Marks Obtained			
red (15) Product Related (10) Total (25)		of Teacher	
	Product Related (10)	Product Related (10) Total (25)	

Practical No: 2

Create desired standard network cable including Cross cable and test it by using cable tester.

I. Practical Significance:

a. Student should be able to create desired standard network cable including cross cable and test by using cable tester.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

- To identify different network cable.
- ❖ To Prepare straight and crossover network cable.
- ❖ To test network cable.

IV. Relevant Course Outcomes:

❖ Select relevant transmission media and switching technique as per need.

V. Practical Outcome (POS):

- Understand Use and color code of network cable.
- Understand use of connecter and crimping tool.
- Understand the procedure to create straight cable and crossover cable.

VI. Relevant Affective domain related outcomes:

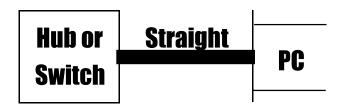
- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Straight network cable

- It is a type of Ethernet cable used to connect computing devices together directly. Straight through or patch cables were used to connect from a host network interface controller (a computer or similar device) to a network switch, hub or router.
- ❖ Both sides (side A and side B) of cables have wire arrangement with same color.
- These are used when connecting Data Terminating Equipment (DTE) to Data Communications Equipment (DCE)

Concept structure:

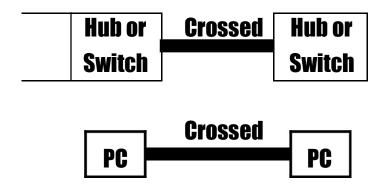


Pin ID	Side A	Side B
1	Orange - White	Orange - White
2	Orange	Orange
3	Green - White	Green - White
4	Blue	Blue
5	Blue - White	Blue - White
6	Green	Green
7	Brown - White	Brown - White
8	Brown	Brown

Proposition2. Crossover network cable :

- It is used to connect two devices of the same type: two computers or two switches to each other.
- Both sides (side A and side B) of cable have wire arrangement with different color.
- ❖ These are used when connecting Data Terminating Equipment (DTE) to Data Terminating Equipment (DTE) or Data Communications Equipment (DCE) to Data Communications Equipment (DCE).

Concept structure:



Pin ID	Side A	Side B
1	Orange - White	Orange - White
2	Orange	Orange
3	Green - White	Green - White
4	Blue	Blue
5	Blue - White	Blue - White
6	Green	Green
7	Brown - White	Brown - White
8	Brown	Brown

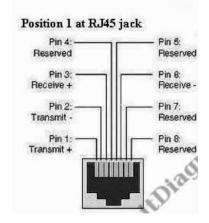
Color Code

Proposition 3. RJ45 Connector and Crimper:

- RJ45 is a standard type of connector for network cables. RJ45 connectors are most commonly seen with Ethernet cables and networks.
- * RJ45 connectors feature eight pins to which the wire strands of a cable interface electrically. Standard RJ45 pinouts define the arrangement of the individual wires needed when attaching connectors to a cable.
- ❖ A crimping tool is designed to crimp or connect a connector to the end of cable.
- Network cables and phone cables are created using a crimping tool to connect the RJ-45 and RJ-11 connectors to the end of the cable.



Crimping tool (Refer color picture 15)



RJ45 Pin out (Refer color picture 16)

VIII. Stepwise procedure:

- > Prepare straight and crossover cable :
- Cut into the plastic sheath 1 inch from the end of cut cable. The crimping tool has a razor blade that will do
 the trick.

Unwind it and pair of the similar colors.



(Refer color picture 19)

• Pinch the wires between your fingers and straighten them out.



(Refer color picture 20)

(The wire colors line up to form a standard cat 5 cable)

- Use scissors to make a straight cut across the wires 1/2 Inch from the cut sleeve to the end of the wires
- Push the wires into the connector.



(Refer color picture 21)

• A view from the top. All the wires are all the way in. There are no short wires.



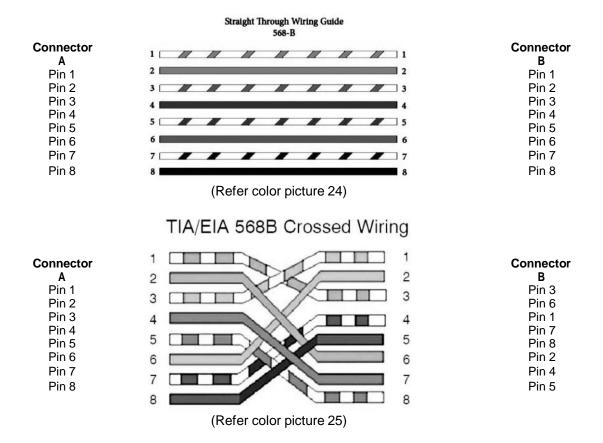
(Refer color picture 22)

CRIMPING THE CABLE: carefully place the connector into the Ethernet Crimper and cinch down on the
handles tightly. The copper splicing tabs on the connector will pierce into each of the eight wires, there is also
a locking tab that holds the blue plastic sleeve in place for a tight compression fit. When you remove the cable
from the crimper, the cable is ready to use.



(Refer color picture 23)

• For a Straight cable, repeat all steps on the other end of the Ethernet cable exactly. For a cross-over cable. make sure to get the color order right as per given on next page :



 Make sure to test the cables using line tester before installing them. An inexpensive Ethernet cable tester does this quite well



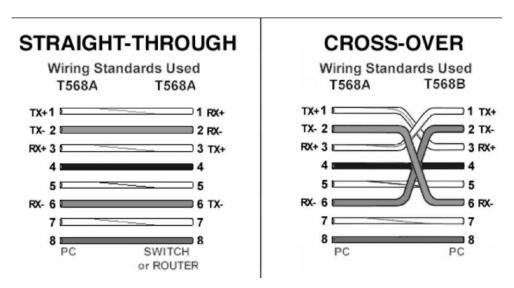
(Refer color picture 26)

IX. Resources Required:

- UTP/STP cable.
- Connector (Mainly RJ45 connector)
- Networks toolkit (Mainly Crimping tool.)
- Line tester or cable tester.
- Computer and Network control devices.

X Precautions:

- Handle carefully network devices.
- Follow safely Practices



Connections for network cable (Refer color picture 17)

XI Results:

• Prepare straight network and crossover network cable and write the name of color of each pins of bothside in the table on next page :

Pin no./id	Straight cable		Crossove	er cable
	Side A	Side B	Side A	Side B
1	Orange-white	Orange-white		
2				
3				
4				
5				
6				
7				
8				

XII	Ouestion	for	confirmation	of	learning:
	V CLUDIO			-	100111115

`	Student shall write answers to these questions independently in the laboratory itself to have self-feedback.) State the purpose to prepare straight network cable.
*	State the purpose to prepare crossover network cable.
*	State the purpose to use RJ45 connector.
*	Give the names of RJ45 pinout for each pin along with pin number.
III C	onclusion:
	Onclusion: To connect switch to switch (Straight/Crossover) cable is used.
	UTP cables consist of (2/4/8) pairs.
	In crossover cable colors at both sides of cable are (Same/different)

Device	Switch	Router	computer
Switch	Straight		
Router			
Computer			

XV Exercise:

(Teacher shall form a group form a group of 4-5 students each. Each group shall perform only one activity from list provided below. Teacher shall supervise)

- Student shall draw the diagrams to show cable connections for straight and crossover cable.
- Student shall prepare straight and crossover cable and use to connect different devices.

Complete the following table by writing type of the cable required to connect two devices.

Student shall draw color codes for straight and crossover cable

XIV Industrial Applications:

- To form network by physically connection networking devices to each other using transmission media.
- ❖ To solve the problem if two devices are not properly physically connected to each other.

XVI Questions:

Write answers to Q	Q	Q	(Teacher shall allot the guestions)

- 1. Give the use of transmission media.
- 2. List out types of twisted pair cables.
- 3. What is a use of straight network cable?
- 4. What is a use of crossover network cable?
- 5. Give any 2 examples of data terminating equipment.
- 6. Which tool is used to test network cable?

- 7. State the use of connector and give the name of connector used in laboratory.
- 8. Give the use of Crimping tool.
- 9. Give the meaning of TX and RX used for connector.
- 10. Write the category of UTP/STP cable along with its specifications.
- 11. If user want to connect 3 computers to each other then list out which components required with quantity.

Space of Answers

- 12. What is the difference between straight cable and crossed cable w.r.t order of wires?
- 13. What is the meaning of RJ?

Space of file wers	

Data Communication Com	puter Network (22414)		
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Data Commu	unication Computer Network (22414)			
List of S	Student Team Member			
3 -				
	Marks Obtained			Dated Signature
	Process Related (15)	Product Related (10)	Total (25)	of Teacher

Practical No: 3

Connect computer using given topology with wired media.

I. Practical Significance:

a. Student should be able to connect computers of laboratory in star topology using transmission media and network control devices.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limitation.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

- Ability to identify types of network topology.
- Ability to from star topology in laboratory.
- Ability to connect computers in star topology.

IV. Relevant Course Outcomes:

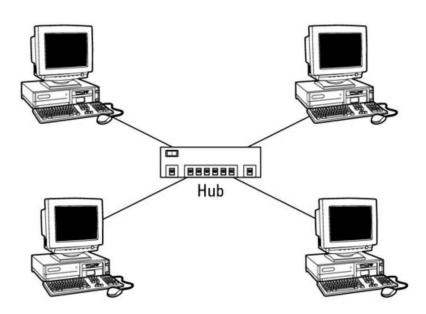
Configure various networking devices.

V. Practical Outcome (POS):

- Understand Concept of topology and its copy.
- Understand structure of different topologies.
- Understand to create Local area network using star topology.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.



Star topology using Switch / Hub

VII. Minimum Theoretical Background:

Proposition 1. Protocol

- It is the physical layout or fashion in which computers of a small area are connected to each other.
- There are two types of the topology.

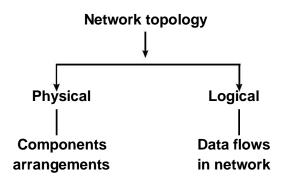
Physical topology :

- It refers to the placement of the various network's components, including device location and cable installation.
- The shape of the cabling layout used to link devices is called the physical topology of the network. This refers to the layout of cabling, the locations of nodes, and the interconnections between the nodes and the cabling.

Logical topology :

- It shows how data flows within a network, regardless of its physical design.
- If often closely associated with Media Access Control methods and protocols. Logical topologies are able to be dynamically reconfigured by special types of equipment such as routers and switches

Concept structure:



Proposition2. TCP/IP:

- Transmission Control protocol/Internet Protocol, used to connect computers on the internet or network.
- ❖ TCP/IP is built into the UNIX operating system and is used by the Internet, making it the de facto standard for transmitting data over networks.

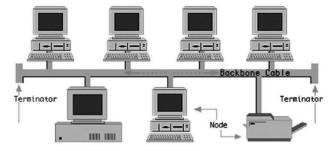
Proposition 2. Topology types:

Following are different types of topology which mainly used to connect computers with each other to form a network.

Bus topology :

- A bus topology consists of main System Bus with a terminator at each end in which all computers (node) are connected to the cable.
- A signal from the source travels in both directions to all computers connected on the bus cable until it finds the intended recipient. If the computer address does not match the intended address for the data, the computer ignores the data.

Concept structure:

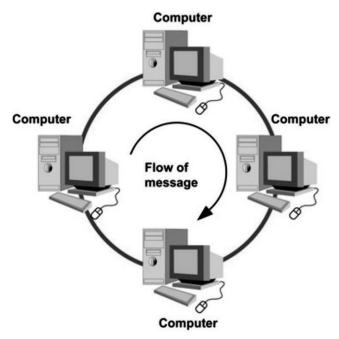


Bus topology (Refer color picture 32)

□Ring topology:

- In this all the computers (nodes) are connected to each-other in such a way that they make a closed loop.
- Each computer is connected to two other components on either side, and it communicated with these two adjacent neighbors. Data is sent around the ring until it reaches its final destination.

Concept structure:

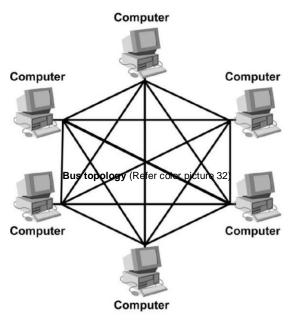


Bus topology (Refer color picture 32)

Mesh topology:

- This topology employs either or two schemes, called full mesh and partial mesh.
- In the full mesh topology, each computer is connected directly to each of the others. In the partial mesh topology, some computers are connected to all the others, and some are connected only to those other nodes with which they exchange the most data.
- ❖ If there are n computers, there will be (n x (n-1)), 2 cables in the network. For examples, if you have five computers in a mesh network, it will use 5 x (5 1), 2, which equals 10 cables.

Concept structure:

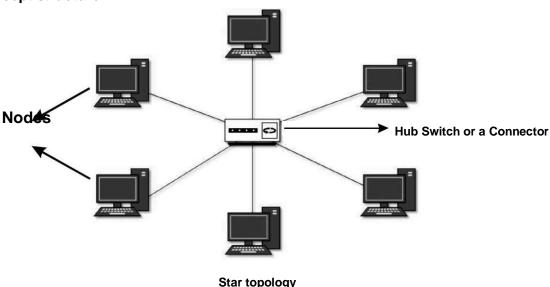


Mesh topology (Refer color picture 34)

Star topology :

- In this every node (computer workstation or any other peripheral) is connected to central node or device called hub or switch)
- All the data on the star topology passes through the central device before reaching the intended destination.
- a hub forwards data packets to all the ports. A switch is more intelligent. It recognizes which computer is connected to which port based on the MAC address and saves this information in a table. When a switch receives a data packet, it determines the recipient and forwards the packet to the correct computer.
- ❖ An advantage of the star topology is the simplicity of adding additional nodes. The primary disadvantage of the star topology is that the hub/switch represents a single point of failure.
- ❖ Extended Star topology uses the star topology to be created. It links individual stars together by linking the hubs/switches. this will extend the length of the network.

Concept structure:



VIII. Stepwise procedure:

❖ Teacher shall explain structure, advantage and disadvantage of each topology.

Physical formation of star topology :

- Power on the computers that want to connect in star topology and confirm whether operating system and NIC card is properly worked.
- Power on the central device i.e. switch or hub.
- Take cable and connect one end of one cable to port of the switch or hub and connect the other end of the same cable to computer's NIC port.
- The lights on port of the switch or hub and computer's NIC port should turn on. (On some devices, the lights will flicker on and off; this is normal activity.)
- This is the physical formation of star topology.

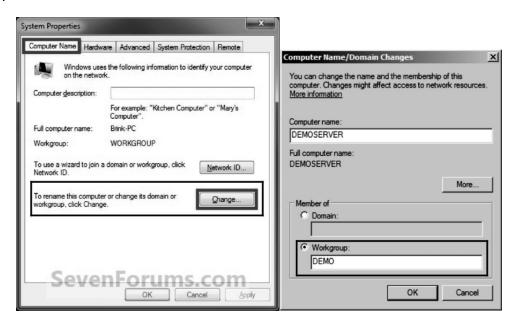
IX. Resources Required:

- A set of computers with updated configuration.
- Switch / Hub
- Transmission media and connector

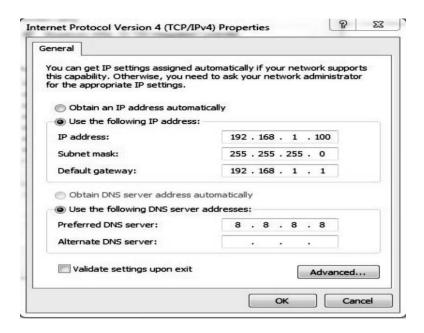
X Precautions:

- Handle carefully network devices.
- Follow safely Practices

 Check workgroup of computer or write name of workgroup under which all computers are connected to each other.



Assign IP address to computer using TCP/IP configuration.



Note:

- 1. The computers connected to switch or Hub must come under same workgroup.
- 2. IP address of each computer must be unique.
- Use ping command to check whether computer connected in network.
- Once whole network is formed, then go to Network and check whether All computers are connected in network or not.

ΥI	Results	
ΛI	Results	-

•	Student shall connect computer in star topology in a laboratory and write the information for following things
	in the given table as per observations:

Name of computer				
Physical address				
IP address				
Name of workgroup				
Port number of switch/hub where one				
of computer's NIC port is connected				
Total number of computers connected				
in star topology				
Duestion for confirmation of learning :				

XII (

×.	**************************************
(S	tudent shall write answers to these questions independently in the laboratory itself to have self-feedback.)
*	Define topology.
*	List out types of topology
*	How to Check whatever physical formation of star topology completed or not?

XIII Conclusion:

C	Imponents arrangement in network done in	Ph	ysical/Log	gical)	tor	poloc	γŗ	
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- ❖ In the laboratory computer is connected to_____(hub/switch) with____ports to from star topology.
- How many cables are required to connect 4 computers using following topologies?
 - a. Bus b. Ring c. Star d. Mesh -
- ❖ Which topology is preferred if used want to connect 3 computers to each other? Why?

XIV Industrial Application:

Industrial systems usually consist of two or more devices. As industrial system get larger, we must consider the topology to form network

- For most network used for industrial applications. user can use hybrid topology which is combination of star and bus topology to create larger network of hundreds, thousands of devices.
- User can configure many popular networks such as Ethernet, Device Net, Probfibus, CAN using star topology depending on application requirements.

Writ	te answers to QQQ(Teacher shall allot the questions)				
1.	What is Network topology?				
2.	What is use of physical and logical topology?				
3.	Which topology required terminator at both the ends of cable?				
4.	State why topology required in laboratory.				
5.	List out names of transmission media and network devices required to form star topology.				
6.	Give advantage and disadvantage of bus topology.				
7.	Give advantage and disadvantage of ring topology.				
8.	Give advantage and disadvantage of star topology.				
9.	Give advantage and disadvantage of mesh topology.				
10.	Give the meaning of extended star topology.				
11.	What is difference between hub and witch?Give the use of NIC card. Is it required to connect computers in star topology.Give the name of command which use to check whatever computer connected in network or not.				
14.	. Which is the best topology to be implemented in laboratory of 20 computers in terms of cables, money and failure of computer?				
15.	Write a formula to calculate how many cables are required to connect n computers in mesh topological				

Space of Answers	

	tion Computer Network (22414)			
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Connect Computers Using Wireless Media

I. Practical Significance:

Student should be able to connect Computers using wireless media.

II. Relevant Program Outcomes (POS):

- ❖ **Discipline knowledge:** Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limitation.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

- To create simple wireless network.
- To configure the Wireless router.
- To create wireless access point.

IV. Relevant Course Outcomes:

Analyze the functioning of data communication and computer network.

v Practical Outcome (POS):

Understand working of wireless network.

Understand concept of wireless access point.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Wireless Network

A wireless network is type of computer network that uses wireless data connections for connecting network nodes. Wireless networking is a method by which homes, telecommunications networks and enterprise installations avoid the costly process of introducing cables and other networking devices into building.

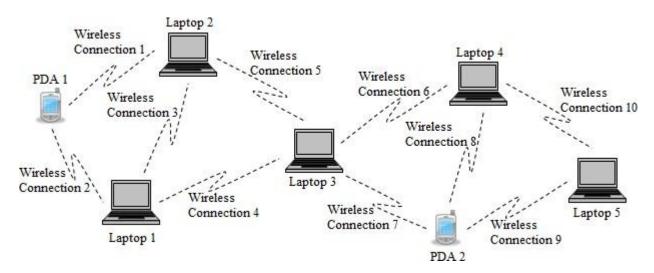
Wireless telecommunication networks are generally implemented and administered using radio communication. This implementation takes place at the physical layer of the OSI model network structure. Example of wireless network includes cell phone networks, Wi-Fi local networks and terrestrial microwave networks.

Proposition 2. Wireless personal area Network

Wireless personal area network (WPAN) interconnect devices within a relatively small area that is generally within a person's reach. For example, both Bluetooth radio and invisible infrared light provides a WPAN for interconnecting a headset to a laptop.

Proposition 3. Ad-hoc wireless network:

A wireless ad hoc network is decentralized type of wireless network. The network is ad-hoc because it does not rely on preexisting infrastructure, such as routers in wired networks or access points in managed wireless networks. In ad hoc wireless network each node participates in routing by forwarding data for other nodes. Determination of which nodes forward data is made dynamically on the basis of network connectivity. In addition to the classic routing, ad hoc networks can use flooding for forwarding data. The physical size of the network is determined by the maximum reliable propagation range of the radio signals. Ad-hoc wireless network are suited for temporary situations such as meetings and correctness.



Proposition 4: Wireless network adapter

A wireless network adapter allows a computing device to join a wireless LAN. Wireless network adapter Contain a built- in radio transmitter and receiver. Each adapter supports one or more of the Wi-Fi standards.

Proposition 5: Wireless access point:

A wireless access point is a device that allows wireless devices to connect to a wired network using Wi-Fi or related standards. The Wireless access point usually connects to a router (via a wired network) as a standalone device. It can also be an integral component of the router itself. The access point(AP) can also act as a repeater for wireless nodes, effectively doubling the maximum possible distance between nodes.

Proposition 5: Cellular Network:

A cellular Network or mobile network is a radio network distributed over land areas called cells. Each area is served by at least one fixed location transceiver, known as a cell site or base station. In a cellular network, each cell characteristically uses a different set of radio frequencies from all their immediate neighboring cells to avoid any interference. When joined together these cells provide radio coverage over wide geographic area. This enables a large number of portable transceivers to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

VII. Stepwise Procedure:

Configuring wireless Access points:

- 1. Connect WAN/internet port of wireless router to modem using network cable.
- 2. Connect at least one computer via Ethernet i.e. network cable.
- 3. Find the IP address of the router.
- 4. Open a web browser on the computer that is connected to the router. Enter IP address of the router into the address bar and press enter.
- 5. In order to access the configuration page a valid username and password is required. Username and password varies from model to model, but should be printed the or in the documentation.
 - > The most typical username is "admin". The most typical passwords are "admin" and "password".
 - Many routers will only require a username and a blank password, and some allow leaving all fields blank.
 - ➤ If username and password is not found then search for router model online to see the default login. If it has been changed ,press the RESET button on the back of the router for 10 seconds to restore factory defaults.
- 6. After log in into router, router's main menu or status or status screen shall be displayed. There will be several options to choose from. The wireless section will allow setting up your wireless network.
- 7. In the wireless section a field labeled SSID or Name is available. Enter a unique name for wireless network. This is what other devices will see when scanning for networks. Check the box to enable SSID broadcast. This will essentially "turn on" the wireless network.
- 8. Choose from the list of available security options.
 - For the best security, choose WPA2-PSK as the encryption method. This is the most difficult security to crack, and will give you the most protection from hackers and intruders.
- 9. Once security method is chosen enter in a passphrase for the network.
 - Password should be a difficult, with a combination of letters, numbers and symbols. Don't use any password that could be easily deduced from your network name or from knowing you.
- 10. Once finished naming and securing your wireless network click the Apply or save button .The changes will be applied to router, which may take a few moments .Once the router has finished resetting, wireless network will be enabled.
- 11. Scan for the wireless network from a computer, tablet or smart phone. On any device that supports wireless networks.

- 12. Select wireless network and it will prompt for the passphrase.
- 13. Enter wireless passphrase. Device will be automatically connected to the wireless network. The network will be stored in devices memory and will automatically connect whenever within range.

VIII. Resources Required:

- A set of computers with updated configuration.
- Wireless router, wireless network adapter.
- Mobile, modem

IX Precautions:

- Handle carefully network devices.
- Follow safely Practices.

	Question for confirmation of learning: What is wireless access point?
*	What is WPAN?
*	Which are different security options available within configuring router?
Con	clusion:
	Wireless network is more preferable in
	2. Advantages of wireless network are

XII.

Qu	estions:			
Wr	ite answers to Q	Q	Q	(Teacher shall allot the questions)
1.	What is wireless net	work?		
2.	What is ad-hoc netw	vork?		
3. 4.	What is flooding? Compare wireless n	etwork with wired	d network?	
5.	List the advantages			
6.	What is wireless net	work adapter?		
7.	What is wireless net			
8.	Explain how cellular	networking work	s?	
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-				

Space of Answers
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Data C	Communica	tion Computer Network (224/4)			
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Write a C Program for CRC Error Detection

I. Practical Significance:

Student should be able to write a C program for error detection.

II. Relevant Program Outcomes (POS):

- ❖ **Discipline knowledge:** Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

- ❖ To write a C program for CRC error detection.
- To gain knowledge about CRC.

IV. Relevant Course Outcomes:

Analyze the transmission errors with respect to IEEE standatrds.

V Practical Outcome (POS):

Understand working of CRC.

Understand concept of CRC.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Cyclic Redundancy Check (CRC)

A cycle redundancy check (CRC) in C programming is an error detecting commonly used in storage devices, etc. Block of data is entered and is checked and it is based on if the remainder is 0 or not and if it is not found to be zero then an error is detected in the code. CRCs are popular because they are simple to implement in binary hardware. CRCs basically are used as xor operation is performed between two numbers if remainder is zero then no error if it's not zero then error is detected.

VII. Stepwise Procedure:

- 1. Include "Stdio.h" and "conio.h"
- 2. Input first number (dividend) in array n [] usually larger number.
- 3. Input second number in array div [] smaller than the first number.
- 4. After input of both numbers few zeros(0) are added at the end of first array(n[]) and number of zeros are equal to the number of digits in divisor-1.

```
Window Help
    File Edit Search Run Compile Debug Project Options
                                  = CRC.C
#include<stdio.h>
#include<comio.h>
void main()
int i,f[20],n[50],div[50],j,temp,quotient[20],z[10];
printf (
         nter the numbers");
for(i=0;i<8;i++)
scanf("xd",&n[i]);
printf("enter the divisora"):
for(i=0;i<4;i++)
scanf ("kd", &div[i]);
for(i=8;i<12;i++)
n[i]=0;
                                                              CodeWithC.com
     — 1:12 ——
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
```

```
Window Help
    File Edit Search Run Compile Debug Project
                                                    Options
                                  CRC.C
for(i=8;i<12;i++)
n[i]=0;
for(i=0;i<8;i++)
temp=i;
if (n[i]==1)
for (j=0;j<4;j++)
if (n[temp]==div[j])
{n[temp]=0;
f[j]=0;}
else
{n[temp]=1;
f[j]=1;}
temp=temp+1;
                                                            CodeWithC.com
   — 36:12 ———
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
```

```
File Edit Search Run Compile Debug Project Options
                                                               Window Help
                                  = CRC.C
f[j]=1;}
temp=temp+1;
quotient[i]=1;
else
quotient[i]=0;
printf("Anthe quotient is An");
for(i=0;i<8;i++)
printf("xd",quotient[i]);
printf("\n and the remainder is \n "):
for(j=0;j<4;j++)
printf(",f[j]);
getch();
                                                             CodeWithC.com
    = 54:12 ===(1
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
```

VII. Resources Required:

- A set of computers with updated configuration.
- Turbo c.
- Transmission media and connector.

VIII Precautions:

• Handle carefully network devices.

Follow safely Practices.

IX. Question for confirmation of learning:

•	What is CRC?
•	How to check error with CRC.
•	Explain importance of CRC.

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Data Communication Computer Network (22414)

Create a Network Using Bluetooth

I. Practical Significance:

Student should be able to create a network using Bluetooth.

II. Relevant Program Outcomes (POS):

- ❖ **Discipline knowledge:** Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- Engineering tools: Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

- To create a network using Bluetooth.
- To gain knowledge about wireless network.

IV. Relevant Course Outcomes:

Analyze functioning of data communication and computer network.

v Practical Outcome (POS):

Understand working of Bluetooth.

Understand concept of wireless network and Bluetooth.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Piconet

A piconet is the type of connection that is formed between two or more Bluetooth-enabled devices such as modern cell phones or PDAs. Bluetooth enabled devices are "peer units" in that they are able to act as either master or slave. However, when a piconet is formed between two or more devices, one device takes the role of the 'master', and all other devices assume a 'slave' role for synchronization reasons. Piconets have a 7 member address space (3 bits, with zero reserved for broadcast), which limits the maximum size of a piconet to 8 devices, i.e. 1 master and 7 slaves.

Proposition 2. Scatternet

A scatternet is a number of interconnected piconets that supports communication between more than 8 devices. Scatternets can be formed when a member of one piconet (either the master or one of the slaves) elects to participate as a slave in a second, separate piconet. The device participating in both piconets can relay data between m embers of both ad hoc networks. However, the basic Bluetooth protocol does not support this relaying - the host software of each device would need to manage it. Using this approach, it is possible to join together numerous piconets into a large scatternet, and to expand the physical size of the network beyond Bluetooth's limited range.

VII. Stepwise Procedure:

- 1. Turn on the Bluetooth of the mobile device. You can locate the Bluetooth on and off button on the "Settings" menu of the device.
- 2. Go to the "Start" menu of the PC and click on "Control Panel."
- 3. Look for the option "Add device" and click on it.
- 4. Search for the other device.
- 5. Pair the computer to the mobile device.

VII. Resources Required:

- A set of computers with updated configuration.
- Mobile phone.
- Transmission media and connector.

VIII. Precautions:

Handle carefully network devices.
 Follow safely Practices.

1. What is wireless network?

XII. Questions:

	What is piconet? What is scatternet?
_	

Data C	ommunica	tion and Computer Network (22414)			
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		Process Related (15)	Product Related (10)	Total (25)	of Teacher

Share a Printer and Folder in Network

I. Practical Significance:

a. Student will learn to share a Printer and folder in network.

II. Relevant Program Outcomes (POS):

- ❖ **Discipline knowledge**: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

- Ability to share printer in network.
- ❖ Ability to share folder and file in network.

IV. Relevant Course Outcomes:

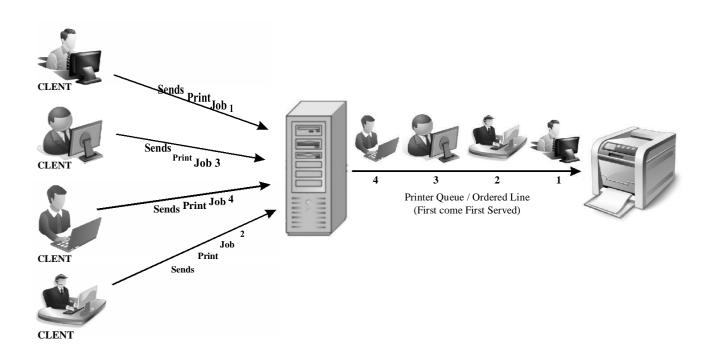
Configure various networking devices resources required.

V. Practical Outcome (POS):

- Understand use of resource sharing.
- Understand use of printer and folders in network.

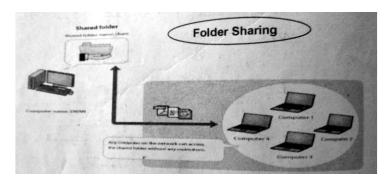
VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.



Star topology using Switch / Hub

Note: Print Server is local system on which printer is installed.

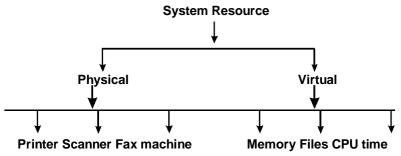


VII. Minimum Theoretical Background:

Proposition 1. Resource

- ❖ A resource, or system resource, is any physical or virtual component of limited availability within a computer system.
- Every device connected to a computer system is resource and every internal system component is also a resource
- Major resource types are CPU time, Fandom access memory, Hard disk space, Network throughput, Electrical power, External Devices, Input/output operations.
- Virtual system resources include files, network connections and memory areas, whereas a physical resource includes printer, scanner, fax machine etc.

Concept structure:



Proposition2. Resource Sharing:

- A shared resource or network share is a device or piece of information on a computer that can be remotely accessed from another computer typically via a local area network or an enterprises Intranet, transparently as if it were a resource in the local machine.
- Example are shared file access (also known as disk sharing adn folder sharing), shared printer acces (printer sharing). shared scanner access, etc.
- Resource sharing means reduction in hardware costs. Shared files mean reduction in memory requirement, which indirectly means reduction in file storage expenses.
- A network share can become a security liability when access to the shared files is gained (often by devious means) by those who should not have access to them. many computer worms have

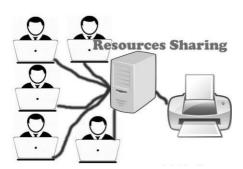
Concept structure:



Proposition 3. Printer and folder Sharing:

- Printer sharing is feature which allows you to access and use a printer from other computers in network.
- If there are employees in ans organization, each having their own computer, they will require ten printers if they want to use the resource at the same time. Printer sharing allows accessing the computers that can be interconnected using a network, and just one printer can efficiently provide the services to all ten users.
- Folder sharing is the public or private sharing of computer data or space in a network with various levels of access privilege.
- A user sitting at one computer that is connected to network can easily se files present on another computers, provided he is authorized to do so. This saves him/her the hassle of carrying a storage device every time data needs to be transported form one system to another system.

Concept structure:



VIII. Stepwise procedure:

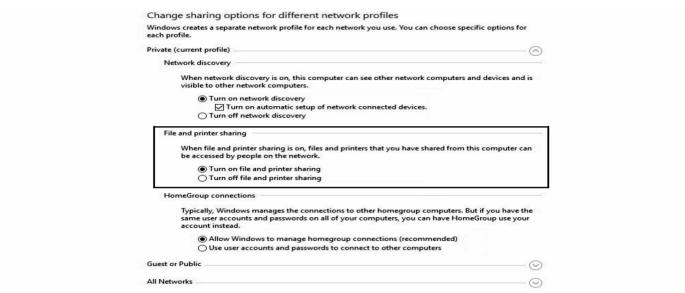
> Share Printer in Network :

- Ensure Windows Files and Printer Sharing services are enabled on the computer before beginning this procedure.
- On the Windows 7 computer goes into Start / Network and Sharing Center then click on Change advanced sharing settings.





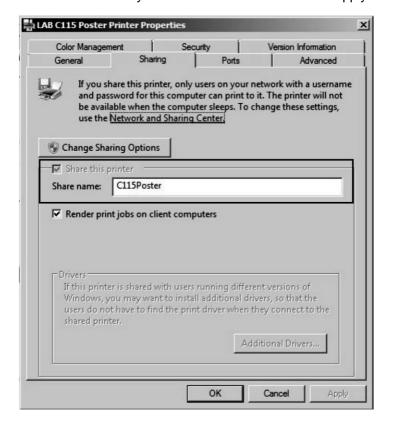
You will want to verity the following settings under File and Printer sharing



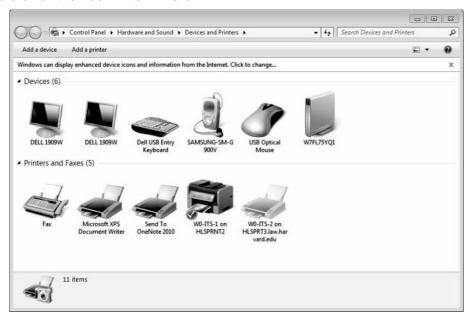
- On the computer that is wired to the printer (Called that host computer), open Printers and Faxes option form the Start menu.
- In the list of printers and faxes, select (single click) the icon for a printer you wish to share and select printer properties option.



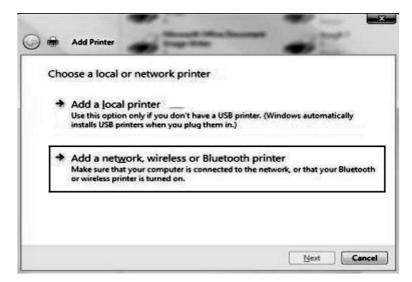
• In the Printer properties window, click on the Sharing tab and select the Share this printer radio button. In the Share name field, enter a descriptive name for the printer: This is the identifier that will be shown to other devices on the local network when they make connections. Click OK or Apply to complete this step.



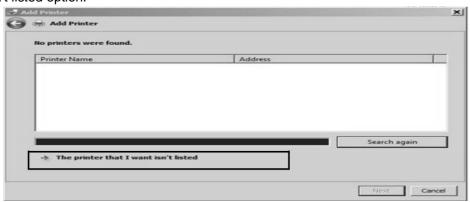
- To test sharing is configured properly for this printer, attempt to access it from a different computer on the local network.
- To set up the shared printer in other computer you will need to go into Devices and printers form the start menu and click on the Add Printer Wizard.



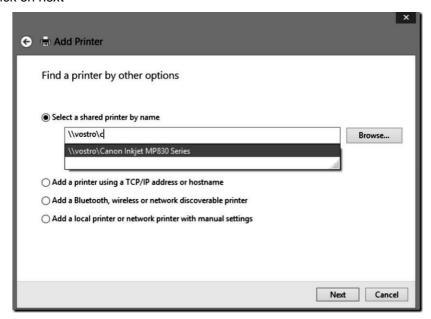
• Select option add Network, Wireless or Bluetooth printer



• After searching if that printer is available in the list then click on that name otherwise click on the printer that I want isn't listed option.



• Then click on radio button select printer by name and enter information of share printer name with computer name and click on next



Now share printer is added to your computer and you can access remotely or set as default printer.

Note:

• For other devices to access the shared printer, the host computer must be powered on and connected to the local network.

> Share Folder in nework :

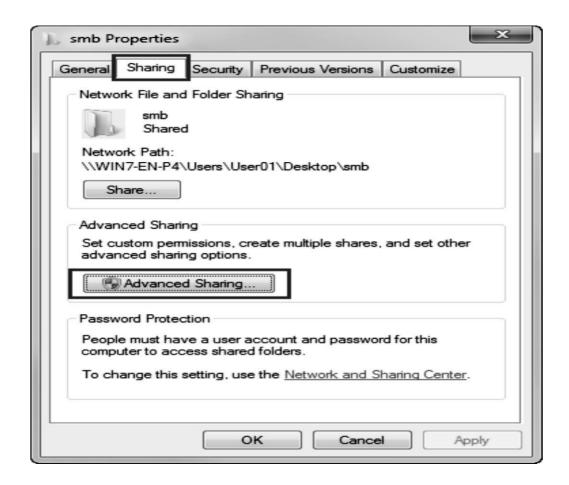
• Create a folder for sharing: New a folder in your personal computer or a file server. Put all your folders, documens and files that you want to share in the folder.



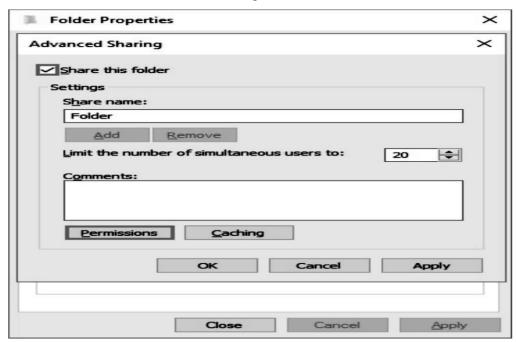
□ Right click the folder and click Properties at the bottom of the context menu.



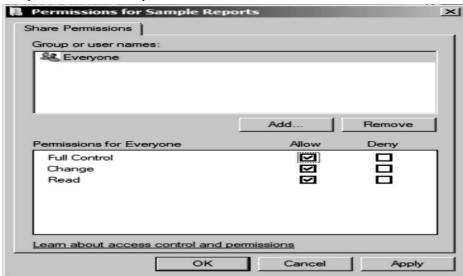
□ Click "Advanced Sharing..." on the "Sharing" tab



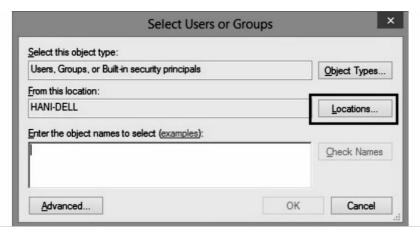
□ Click "Share this folder" in the Advanced Sharing window.



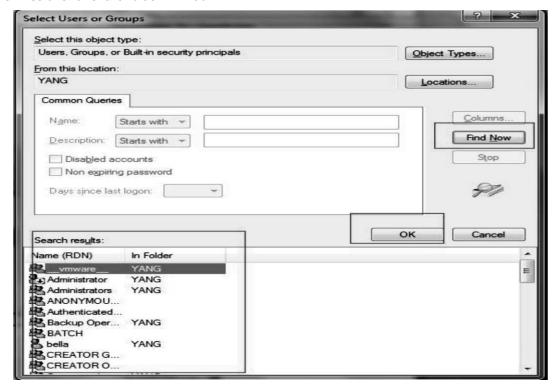
Click Permissions button to assign permissions for a user or group you want to share the folder with. The default setting permission is Read only. Here check "Full Control" to assign full to access permissions for "Everyone." If you can't find "Everyone", click "Add" button to find it.



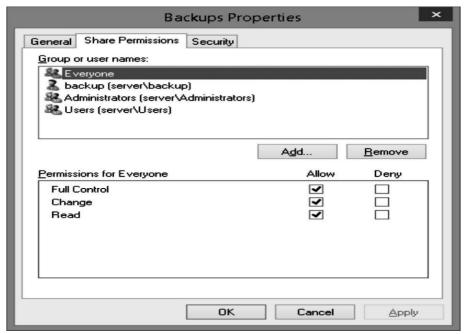
□ Click advanced button select "Everyone" or a certain user or group you want to share the folder with.



□ Click find Now button, select the user or group form the search results, click OK and back to the previous "Permissions for share folder" Window.



□ Check Full Control for the new user or group. Click Apply and OK. Then click apply and OK on Advanced Sharing window.



□ Click Share button on the Properties window and then choose the new user or group name form the drop down list and click Add.

Then click "Share"->"Close" and your folder is shared on Network now.

IX. Resources Required:

• A set of computers with updated configuration.

Total Printers available in Laboratory

- Network of computer of above configuration.
- Printer

IX Precautions:

- Follow safety practices.
- Handle networking devices carefully.

X Results:

• Student shall connect computer in star topology in a laboratory and write the information for following things in the given table as per observations:

		Name of System on which printer locally installed	
		Name of the printer that shared in network	
		Name of Folder with full path that shared in network	
XI		actical related questions: udent shall write answers to these questions independ	lently in the laboratory itself to have self-feedback)
		Write names of various system resources?	
	*	what is use of Printer and Folder sharing in laboratory	
	*	How to check is a printer or folder shared in a network	
XII	Co	onclusion :	
	*	A Printer is type of(Physical/	Virtual) resource.
		A management and has also and if the constant and in	(Same Jahoratory/Network)
	*	A resource can be share if two systems are in	(Same laboratory/Network)
	* *	Within small organization resources shared in	·

XIII Industrial Application:

- In industry access to remote information is possible which involves interaction between a user and remote database on the network irrespective of the physical location of he resource and he user.
- It is an important financial aspect for organizations because it saves money and useful for person communication like e-mail.
- Resource sharing provides high reliability by having alternative source of data.

Write answers to QQ(Teacher shall allot the questions) 1. Define Network. 2. Which are features of computer network? 3. Define system resource. 4. Give the examples of physical and virtual resource. 5. Define resource sharing and state its needs. 6. Enlist the different network devices use in laboratory. 7. Give advantages and disadvantages of Printer sharing. 8. Give advantages and disadvantages of folder sharing. 9. How security is measure issue in resource sharing? 10. How firewall can be used to maintain security of resources that are shared in network? 11. Which are different privileges associated with folder? 12. Give 2 pointes difference between folder sharing and file sharing w.r.t. meaning and security.	XV.	Que	estions:
 Which are features of computer network? Define system resource. Give the examples of physical and virtual resource. Define resource sharing and state its needs. Enlist the different network devices use in laboratory. Give advantage and disadvantages of Printer sharing. Give advantages and disadvantages of folder sharing. How security is measure issue in resource sharing? How firewall can be used to maintain security of resources that are shared in network? Which are different privileges associated with folder? 		Wri	rite answers to QQQ(Teacher shall allot the questions)
 Define system resource. Give the examples of physical and virtual resource. Define resource sharing and state its needs. Enlist the different network devices use in laboratory. Give advantage and disadvantages of Printer sharing. Give advantages and disadvantages of folder sharing. How security is measure issue in resource sharing? How firewall can be used to maintain security of resources that are shared in network? Which are different privileges associated with folder? 		1.	Define Network.
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11. Which are different privileges associated with folder?		9.	How security is measure issue in resource sharing?
		10.	. How firewall can be used to maintain security of resources that are shared in network?
12. Give 2 pointes difference between folder sharing and file sharing w.r.t. meaning and security.		11.	. Which are different privileges associated with folder?
		12.	. Give 2 pointes difference between folder sharing and file sharing w.r.t. meaning and security.

Marks Obtained			Dated Signature	
Process Related (15)	Product Related (10)	Total (25)	of Teacher	

Install Operating System Windows Server 2008

I. Practical Significance:

a. Student should be able to install windows server 2008.

II. Relevant Program Outcomes (POS):

IP Address, Classfull addressing scheme, Classless addressing scheme.

III. Competency and Practical Skills:

- Ability to install the network Operating System,
- ❖ Ability to work with the Networking Operating System.

IV. Relevant Course Outcomes:

Analyze the functioning of data communication and computer network.

V. Practical Outcome (POS):

- Understand working of Windows 2008 server.
- ❖ Compare the server based/Nework operation system with Desktop Operating System.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Network Operating System (NOS)

Network Operating System is software that implements computer networking oriented operating system. It includes special functions for connecting computers and devices into a local-area network (LAN). Some operating systems. such as UNIX and he mac OS, have networking functions built in.

The term Network Operating System can also be referred as software that enhances a basic operating system by adding networking features.

For example, Operating System that runs on a server and enables the server to manage data, users, grops, security, applications, and other networking functions is a Network Operating System.

It is designed to allow shared file and printer access among multiple computers in a network. Novell Netware, Artisoft's LANtastic, Microsoft Windows Server, and Windows NT are examples of an NOS.

VIII. Stepwise procedure:

- 1. Insert Windows Server 2008 Installation media into your DVD drive.
- 2. Reboot the computer.
- 3. Windows Server 2008 installation files will start loading automatically.



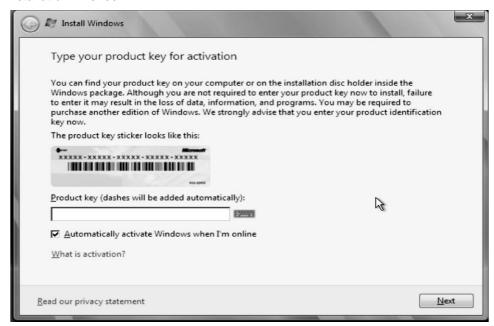
4. Select the appropriate Language and Press Next.



5. Press **Install Now** to begin the installation process.



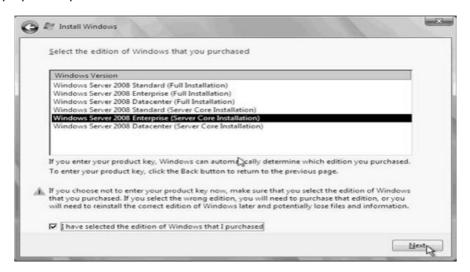
6. Enter Product ID in the window Note: For automatically activation Windows server 2008 clicks next and wait for installation finishes.



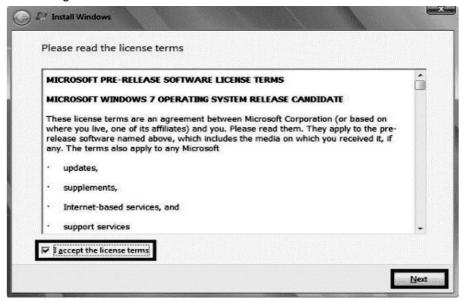
7. If product ID is not available right now, then leave the box empty, and click next. Provide the Product ID later, after the server installation is over. Press No.



8. Select Appropriate Option



9. Select the License agreement.



10. In the Select the type of installation window, click the only available options - Custom (Advanced)



11. Select the Disk partition for the installation.



12. After this installation of windows server 2008 now begins.



IX. Resources Required:

• Working of Desktop operating System, Minimum hardware requirement for Windows 2008 server

Component Requirement

Processor Minimum: 1GHz (x86 processor) or 1.4GHz (x64 processor)

Recommended: 2GXz or faster

Note: An Intel Platinum 2 processor is required for windows server 2008 for

Platinum-bzsed Systems.

Memory Minimum : 512MB RAM

Recommended: 2GB RAM greater

Maximum (32-bit systems): 4GB (Standard) or 64GB (Enterprise and

Datacenter)

Maximum (64-bit systems): 32 GB (standard) or 2TB (Enterprises, Datacenter

and Plantinum - based Systems)

Available Disk Minimum: 10GB

Space Recommended: 40GB or greater Note: Computers with more than 16GB of RAM

will require more disk space for paging, hibernation, and dump files

Drive DVD-ROM drive

Display and Super VGA (800 x 600) or higher-resolution monitor

Peripherals Keyboard, Microsoft Mouse or compatible pointing device.

X Precautions:

- Follow safety practices.
- Handle networking devices carefully.

XI Observations:

- Hardware configuration for the Windows server 2008 is different than the Desktop Computers.
- Network Operating System shall use NTFS Partition.
- After each phase during the installation process, system is automatically rebooted.

XII Practical related questions:

`	tudent shall write answers to these questions independently in the laboratory itself to have self-feedback.) Which edition of Windows server 2008 is selected for installattion?
*	In "Language and regional Language" settings which parameters are selected?
*	Type of installation of Windows server 2008 available are

*	Successfully installed windows Server 2008.			
*	Students should write conclusion on the basis of installation of windows server 2008 done Lab.			
/ E	xercise :			
Te	Teacher shall form four groups of students. each group shall perform only one allotted activity from the following. Teacher shall supervise.			
*	Install the Windows server 2008 standard editions.			
*	Upgrade the windows server 2008 with upgrade option.			
*	Install the Windows server 2008 Enterprise editions.			
*	Install the Windows server 2008 Datacenter Edition.			
Qı	uestions:			
Wr	rite answers to QQQ(Teacher shall allot the questions)			
1.	What is the minimum space requirement for windows 2008 server?			
2.	·			
3.				
4.				
5.	·			
6.				
7.	. List down advantage of Windows server 2008.			
8.	List down advantages of Windows server 2008.			
9.	Describe Client Server terminology.			
10.	. Compare the features of different Sever Operating Systems?			

Configure File Server

I. Practical Significance:

Student should be able to configure file server.

II. Relevant Program Outcomes (POS):

- ❖ **Discipline knowledge:** Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice:** Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- Engineering tools: Apply relevant computer technologies and tools with an understanding of the limitation.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

- To configure file server.
- To gain knowledge about client and server.

IV. Relevant Course Outcomes:

Analyze the functioning of data communication and computer network.

v Practical Outcome (POS):

Understand working of file server.

Understand concept of client and server.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

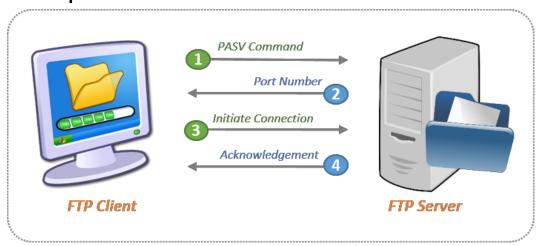
VII. Minimum Theoretical Background:

Proposition 1. File Server

A file server (or fileserver) is a computer attached to a network that provides a location for shared disk access, i.e. shared storage of computer files (such as text, image, sound, video) that can be accessed by the workstations that are able to reach the computer that shares the access through a computer network. The term server highlights the role of the machine in the client–server scheme, where the clients are the workstations using the storage. It is common that a file server does not perform computational tasks, and does not run programs on behalf of its clients. It is designed primarily to enable the storage and retrieval of data while the computation is carried out by the workstations. A file server may be dedicated or non-dedicated. A dedicated server is designed specifically for use as a file server, with workstations attached for reading and writing files and databases.



VII. Stepwise Procedure:



- Step 1: The client contacts the server using the PASV command on port 21.
- Step 2: The server replies using the port 2000. Here, port 2000 is the port that the server will be listening to for the data connection.
- Step 3: The client initiates the connection from port 1025 to 2000 (on the server).
- Step 4: The server sends back the ACK (acknowledgement).

Client side: Data and other communications from the client should reach the FTP server. Make sure you allow the outgoing data and other communications from the client to go to the FTP server.

Server side: Port 21 should be open, as that is the port which receives the PASV command for initiating the connection. The port used by the server to respond to the client can be anything between Port 22 to 1022. Because the FTP server specifies a random port (anything greater than 1023), those ports should be open for communication.

Prerequisites

- FTP depends on IIS (Internet Information Services). Both IIS and FTP services should be installed for the configuration of the FTP server.
- A root folder is required for FTP publishing. The folder can be created under

Passive FTP (sometimes referred to as PASV FTP because it involves the FTP PASV command is a more secure form of data transfer in which the flow of data is set up and initiated by the File Transfer Program (FTP) client rather than by the FTP server program.

VII. Resources Required:

- A set of computers with updated configuration.
- Transmission media and connector.

VIII. Precautions:

Handle carefully network devices.
 Follow safely Practices.

IX.

Question for confirmation of learning:				
❖ Wha	at is file server?			
• How	to establish connection between client and server.			
← Expl	ain PASV command in FTP.			
_				
List o	f Student Team Member			
-				
	Marks Obtained	Dated Signature of Teacher		

Product Related (10)

Total (25)

Process Related (15)

Data Communicat	tion Computer Network (22414)		

Configure Client to File Server and use file services.

I. Practical Significance:

a. Student should be able to study file server and file services.

II. Relevant Program Outcomes (POS):

- v **Discipline knowledge**: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- v **Engineering tools**: Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

v To configure client to file server.

To study file services.

IV. Relevant Course Outcomes:

Configure various networking devices.

V. Practical Outcome (POS):

	Un	der	stand	k	network	king	devices
_					c.,		

Understand file services.

VI. Relevant Affective domain related outcomes:

Follow safely measure.
Follow ethical practices.

VII. Minimum Theoretical Background :

Proposition 1. File Server

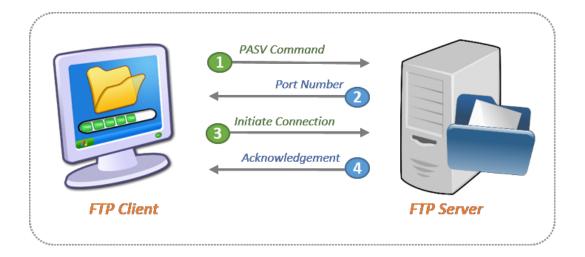
In computing, a file server (or fileserver) is a computer attached to a network that provides a location for shared disk access, i.e. shared storage of computer files (such as text, image, sound, video) that can be accessed by the workstations that are able to reach the computer that shares the access through a computer network. The term server highlights the role of the machine in the client–server scheme, where the clients are the workstations using the storage. It is common that a file server does not perform computational tasks, and does not run programs on behalf of its clients. It is designed primarily to enable the storage and retrieval of data while the computation is carried out by the workstations.

File servers are commonly found in schools and offices, where users use a LAN to connect their client computers.

Proposition 2.

Set Up an FTP Server on Windows

Primarily, the command channel is opened by the client to the FTP server on port 21. The client also opens two random, unprivileged ports on the client (typically a port greater than 1023). We'll call the first port P and the second port P+1. The FTP client initiates the connection to the server by sending a PASV command. The client connects to the server from port P to server port 21 with the PASV command. The server then opens another unprivileged port Q (any port greater than 1023), and sends the port information back as a reply to the PASV command. Now the client initiates the connection from port P+1 to port Q on the server to start the data transfer.



Step 1	The client contacts the server using the PASV command on port 21.
Step 2	The server replies using the port 2000. Here, port 2000 is the port that the server will be
Step 2	listening to for the data connection.
Step 3	The client initiates the connection from port 1025 to 2000 (on the server).
Step 4	The server sends back the ACK (acknowledgement).

Opening up channels on FTP client and server

Client side: Data and other communications from the client should reach the FTP server. Make sure you allow the outgoing data and other communications from the client to go to the FTP server.

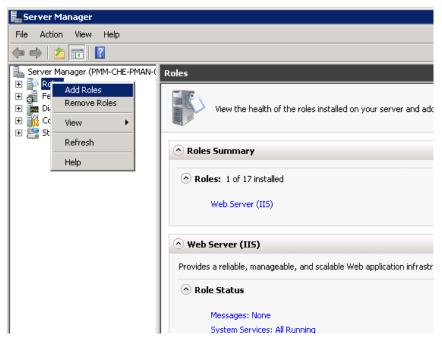
Server side: Port 21 should be open, as that is the port which receives the PASV command for initiating the connection. The port used by the server to respond to the client can be anything between Port 22 to 1022. Because the FTP server specifies a random port (anything greater than 1023), those ports should be open for communication.

Enabling FTP in Windows

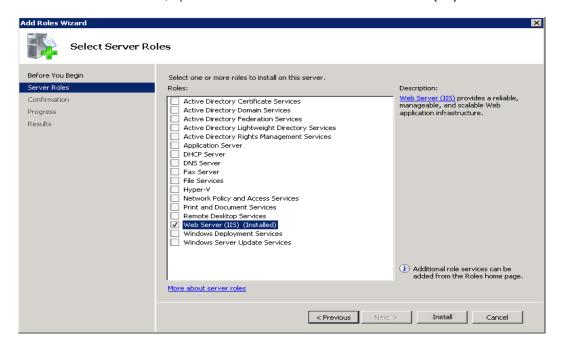
In this example, we will use Windows Server 2008 R2 to configure FTP.

If IIS is not installed,

- 1. Navigate to Start > Control Panel > Administrative Tools > Server Manager in Windows Server Manager
- 2. Go to Roles node. Right-click on Roles, and click Add Roles.



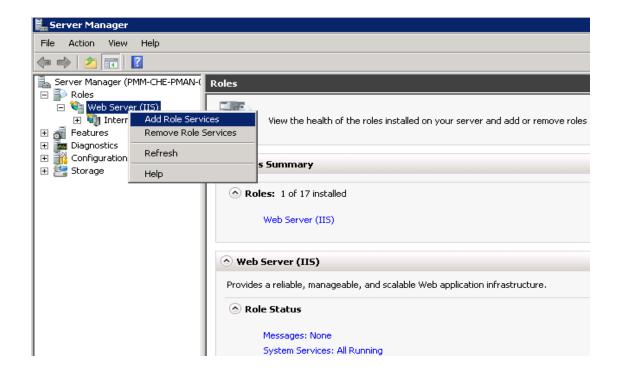
In the Add Roles window, open Server Roles and check Web Server (IIS).



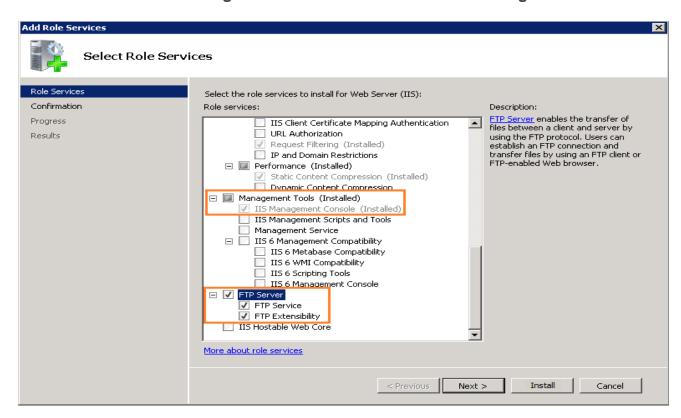
1. Proceed through the setup wizard, and click **Install**. Wait for the installation to complete.

If IIS is installed already (as a Web server),

- 1. Navigate to Start > Control Panel > Administrative Tools > Server Manager
- 2. In the Windows Server Manager, go to Roles node, and expand Web Server (IIS).
- 3. Right-click on Web Server (IIS), and click on Add Role Services.



- 1. In the Add Role Services window, go to Roles Services, and check FTP Server.
- 2. Confirm that IIS Management Console is checked under Management Tools.



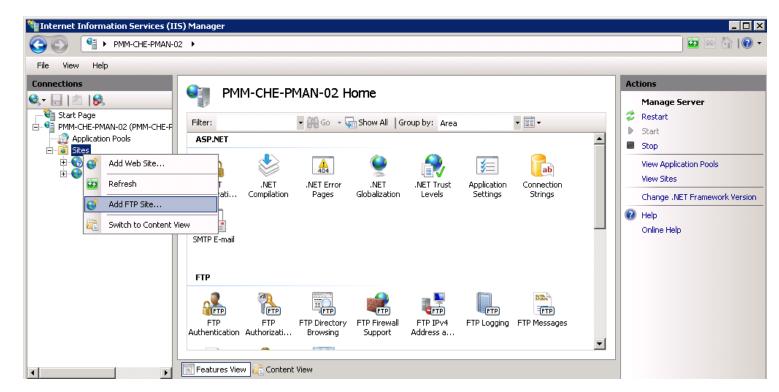
1. Click **Next**, and then **Install**. Wait for the installation to complete.

□ Transferring files

To transfer files, you should add an FTP site. Once the FTP site is enabled, clients can transfer to and from the site using the FTP protocol.

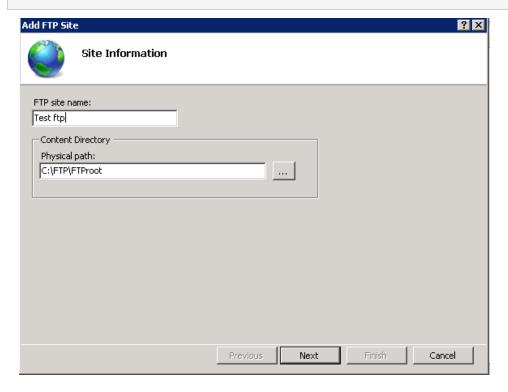
Setting up an FTP site

- 1. Navigate to Start > Control Panel > Administrative Tools > Internet Information Services (IIS) Manager.
- 2. Once the IIS console is open, expand the local server.
- 3. Right-click on Sites, and click on Add FTP Site.

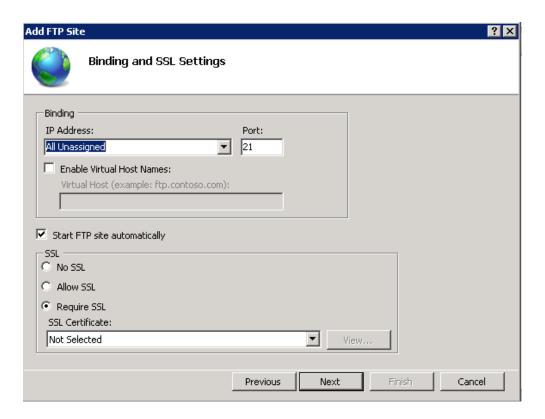


In the Add FTP Site window, type the FTP server name and the content directory path, and click Next. The directory path should be the same as the one we set permissions to allow anonymous access above, we used:

%SystemDrive%\ ftp \ftproot



In the Binding and SSL Settings window, type the IP address of the server. Check the **Start FTP Site Automatically** option. **Choose SSL Based on Constraint**. Click **Next**.



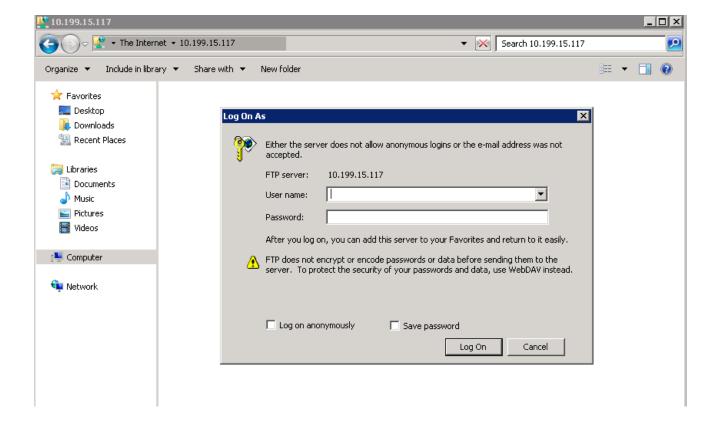
Now, select Basic for authentication.



1. Click **Finish**. Now, the FTP site creation is complete.

Accessing files on the FTP server

To access files on the FTP server, open a file explorer and type **ftp://serverIP**. The FTP server asks for a username and password. Enter the username and password (Windows or Active Directory credentials) and click **Logon**. The files and folders display under the FTP server.



XVI Questions:

Write answers to Q	Q	Q	Teacher shall allot the question

- 1. What file server?.
- 2. List file services.

3.	Write the procedure to configure client to file server.

Data C	ommunica	tion Computer Network (224/4)			
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List	of Stud	dent Team Member			
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		Marks Obtained	_		Dated Signature
		Process Related (15)	Product Related (10)	Total (25)	of Teacher
		, ,	, -	` '	

Configure Static and Dynamic IP addresses.

I. Practical Significance:

a. Student should be able to study ststic and dynamic IP addresses.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- To study static IP addresses.
- To study dynamic IP addresses.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1.

Setting a Static IP Address

- 1. Open a web browser. Click or double-click the app icon for your preferred web browser (e.g. Google Chrome).
- 2. Enter your router's address. In the address bar at the top of the browser window, type in the address you retrieved for your router, then press & Enter. This will open your router's page.
- 3 .Log in if necessary. If prompted for a username and/or password, type in the required credentials and press ← Enter.

If you didn't set a username and/or password, you'll probably need to use the factory credentials found either in the router's manual or on the router itself.

4. Find the list of connected Internet items. Since each router's page will vary in terms of item placement and titling, you may have to poke around the router page or menu to find this section.

For example, some routers place the Connected Devices button on the main page, while other router pages require you to click Settings or Advanced to see the list of connected items.

- 5. Find your computer's name. Look for the name that you found earlier in the list of connected items.
- 6 .Click the Reserve button. You'll probably find this next to (or below) the computer's name and address, though you may first have to click your computer's name to do so.
 - Again, your router's page may show a different option here.

- If prompted to confirm your choice or specify an unused IP address, do so before proceeding.
- 7 .Click Save or Apply. It's usually at the bottom of the page. This will save your changes and apply your new IP address to the computer.

Write answers to QQ(Teacher shall allot the questions 1. What is difference between static and dynamic addresses? 2. Why do IP addresses change? 3. What is dynamic address?	Questio	Questions:						
 What is difference between static and dynamic addresses? Why do IP addresses change? What is dynamic address? 			Q	Q	(Teacher shall allot the questions)			
2. Why do IP addresses change? 3. What is dynamic address?								
3. What is dynamic address?				aya				
	J. WHALIS	dynamic address) :					

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Configure DHCP server.

I. Practical Significance:

a. Student should be able to study DHCP server.

II. Relevant Program Outcomes (POS):

- ❖ Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- ❖ To install DHCP server.
- To configure DHCP server.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1.

Installing the DHCP Server

1.Add Roles and Features.

	Boot w12r2a10, if it is not running.
--	--------------------------------------

- Log on to the server when it completes booting.
- Notice that Server Manager is displayed upon a successful login using the Administrator account at the console logon prompt.
- Click Add Roles and features to display Add Roles and Features Wizard, Before you begin; it is this wizard that helps you manage roles, role services, and features.
- Click Next to display Select Installation Type.

2. Review Select Installation Type options

- Note that this is a role-based and feature-based installation.
- Click Next to display Select destination server.

3. Choose a Destination Server

.

- Note that this selection lets you select the server on which you want to do the installation. However in this example, there is only one server so there is only one option.
- Click Next to display Server Role and Feature Wizard so you can make a server role selection.

4. Select roles.

- Note that you can highlight a name in the center pane, so you can read the description in the right pane.
- Click the checkbox next to DHCP Server.
- Click Next to display Add Roles and Features.

5. Select features.

- Observe this popup is informing you that for DHCP Server to be installed, additional features, not already on the machine, needs to be installed.
- © Click Add Features, the popup disappears, and you are shown the DHCP Server checkbox checked.
- Click Next to display a list of features from which you can select.
- Note that in this step no additional selection is needed.
- Click Next to display a screen that gives an overview of DHCP Server.
- Click Next to display the Confirmation installation selections.

6. Review the Confirmation installation selections.

- Observe the confirmation step, gives you a chance to make changes to the items previously configured, or continue to accept the selection.
- Click install.
- Click Close when it completes.
- Move on to Configure DHCP Server, and keep learning.

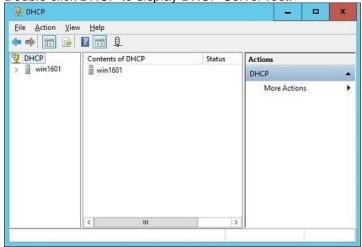
Proposition 2.

Configuring the DHCP Server

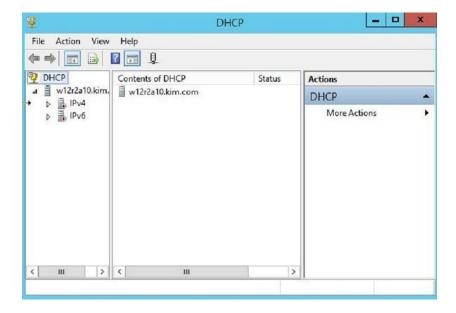
In this part you will use DHCP Manager to configure DHCP Server.

1.Start DHCP Manager

- Click Start, the Windows logo bottom left.
- Click Administrative Tools.
- Double click DHCP to display DHCP Server root.



Expand w12r2a10.kim.com to display DHCP branches.



2. Create scope name

Expand IPv4 to display a list of folders.



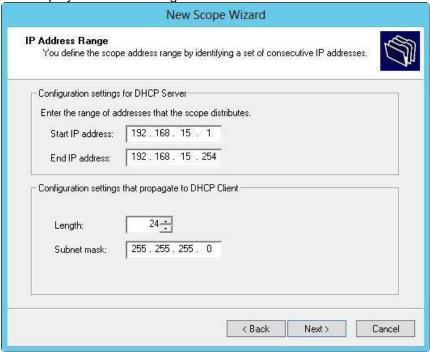
- Right click IPv4.
- Click New scope to display the New scope wizard.



Click Next to display Scope Name.



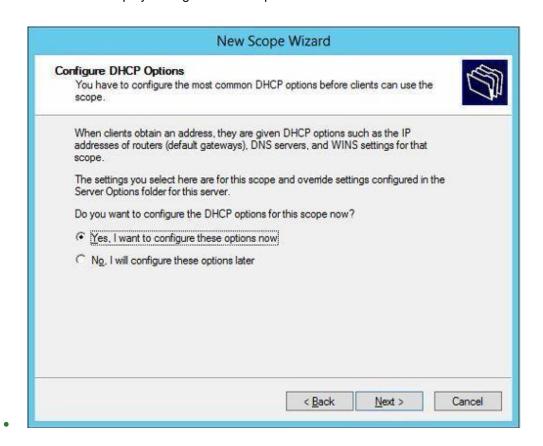
- Type net17216150, in Name.
- Type Scope for 17216150 subnet, in Description.
- Click Next to display IP Address Range.



3. Specify IP Address Range, the range of addresses to allocate

- Type 172.16.150.1 In Configuration settings for DHCP server, Start IP address.
- Type 172.16.150.100 In End IP address.
- Change Length to 24 in Configuration settings that propagate to DHCP clients.
- Click Next to display Add Exclusions and Delay, leave the default.
- Click Next to display Lease Duration, leave the default.

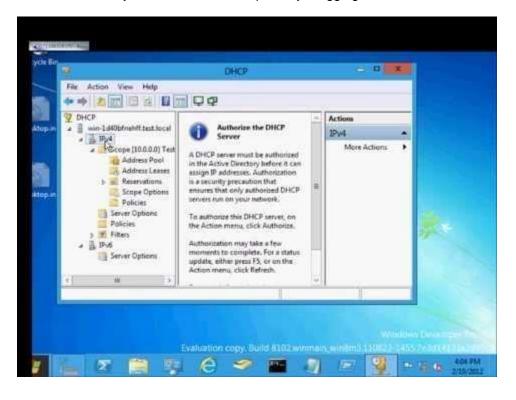
Click Next to display Configure DHCP Options.



- Click No, I will configure these options later, because in this example, there are no additional parameters to configure.
- Click Next on Completing the New Scope Wizard.
- Click Finish to display Authorize the DHCP Server.

4. Authorize the DHCP

Note that you can widen the left pane by dragging the divider.



Right click your DHCP Server root, w12r2a10.kim.com, and click Authorize DHCP, if necessary.

[Right click your DHCP Server root, w12r2a10.kim.com, and verify it says Unauthorize.	
5.A	ctivate Scope	
[Expand IPv4, If necessity in the left pane.	
•	Click Scope[172] to display Contents of Scope.	
[Click each item under IPV4 and view it in the center pane.	
[Notice that there are populated and unpopulated ones.	
(Right click Scope[172]	
[Click Activate.	
,	Right click Scope[172]	
[Notice it says Deactivate.	
VII	I Question for confirmation of learning:	
	(Student shall write answers to these questions independently in the laboratory itself to have self-feedback	:k.)
	What are the types of IP address assignment?	
	❖ Which types of IP address is assigned to DHCP server and why?	
	Which types of service(connection oriented/ connectionless) is provided by DHCP?	
IX	 Conclusion: DHCP protocol employs a connectionless service model, using the UserDatagram Protocol. After receiving IP address lease request from a client DHCP server reserves an IP address for the client 	nt
	After receiving IP address lease request from a client DHCP server reserves an IP address for the clie	III.
X	Questions:	
	Write answers to QQQ(Teacher shall allot the questions)	
	1. What is the purpose of the DHCP server?.	
	2. When a DHCP server is configured, which two IP addreses should never be assignable to hosts?.	
	3. Which two tasks does the Dynamic Host Configuration Protocol perform?	

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	Marks Obtained				Dated Signature
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Run basic TCP/IP utilities and networking commands.

I. Practical Significance:

 a. Student should be able to study and run basic TCP/IP utilities and networking commands: ipconfig,ping,tracert,netstat, pathping,route.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication :** Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- To study basic TCP/IP utilities.
- To run networking commands.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. TCP/IP utilities

- It is used to assist the management of TCP/IP. There are three types of TCP/IP based utilities.
- Connectivity utilities that you can use to interact with and use resources on a variety of systems...
- Diagnostic utilities that you can use to detect and resolve networking problems.

*

Utility Type	Examples(networking commands)
Connectivity	FTP, LPR,TELNET,TFTP,RSH,RCP
Diagnostic	Ping, Ipconfig, Tracert, ARP, Hostname
Server software	TCP/IP Printing service, Internet Information Services, Peer Web Services

TCP/IP Utilities

Proposition 2. Ipconfig

IPCONFIG is a command line tool used to control the network connections on Windows NT/2000/XP machines.

Ipconfig displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration

Proposition 3. Ping

The ping command is usually used as a simple way to verify that a computer can communicate over the network with another computer or network device. The ping command operates by sending Internet Control Message Protocol (ICMP) Echo Request messages to the destination computer and waiting for a response.

```
C:\\Ding 192.168.65.1

Pinging 192.168.65.1 with 32 bytes of data:

Reply from 192.168.65.1: bytes=32 time<1ms IIL=64

Ping statistics for 192.168.65.1:

Packets: Sent = 4, Received = 4, Lost = 8 (8% loss),
Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

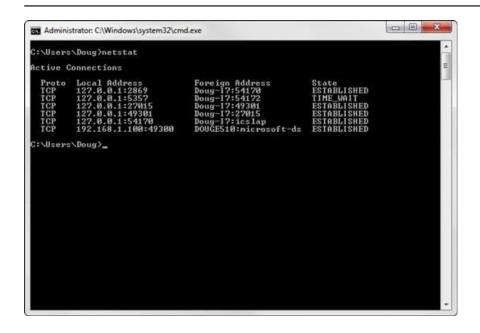
C:\\Ding www.yahao.com

Pinging www.real.wal.b.yahoo.com [69.147.76.15] with 32 bytes of data:

Reply from 69.147.76.15: bytes=32 time=31ms IIL=55
```

Proposition 4. netstat

Netstat is a common command line TCP/IP networking utility available in most versions of Windows, Linux, UNIX and other operating systems. Netstat provides information and statistics about protocols in use and current TCP/IP network connections.



Proposition 5. tracert

The tracert command is a Command Prompt command that's used to show several details about the path that a packet takes from the computer or device you're on to whatever destination you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded.

Proposition 6. pathping

Pathping is a TCP/IP based utility (**command**-line tool) that provides useful information about **network**latency and **network** loss at intermediate hops between a source address and a destination address. It does this by sending echo requests via ICMP and analyzing the results

VIII Ouestion for confirmation of learning:

,		Student shall write answers to these questions independently in the laboratory itself to have self-feedback.) What is the use of three types of TCP/IP utilities?.					
	*	Write the name of any	two connectivity	and diagnostic	cutility?		
	*	Give the name of con	d MAC address of computer.				
IX	(Conclusion:					
	*	Popular Ipconfig is (connectivity / diagnostic) type of TCP/IP utility.					
	*	Netstat command will not display connection information of (UDP/ TCP) packet.					
	*	(NSlookup/ Hostname)command used to display host name of local computer (System/Application)					
X	Qι	iestions :					
	W	rite answers to Q	Q	Q	(Teacher shall allot the questions)		

- 1. What is a purpose of TCP/IP utilities?
- 2. Which are the different things are checked using ping command?
- 3. Which are different statistics display for TCP using Netstat utility?
- Give a syntax of tracert command.
- 5. What is a use of pathping command?

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Install Wireshark and configure as a packet sniffer.

I. Practical Significance:

a. Student should be able to Install Wireshark and configure as a packet sniffer.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- * Engineering tools: Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expected to develop the following skills in you.

To study wireshark software installation.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand wireshark software.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Packet Sniffer

- ❖ It is used to assist the management of TCP/IP. There are three types of TCP/IP based utilities.
- Connectivity utilities that you can use to interact with and use resources on a variety of systems...
- Diagnostic utilities that you can use to detect and resolve networking problems.

Proposition 2. Wireshark

- ❖ Wireshark is an open source tool for profiling network traffic and analyzing packets. Such a tool is often referred to as a network analyzer, network protocol analyzer or sniffer.
- ❖ Wireshark, formerly known as Ethereal, can be used to examine the details of traffic at a variety of levels ranging from connection-level information to the bits that make up a single packet.
- ❖ The Wireshark GUI interface has five major components:
 - a. Command menus
 - b. Packet listing window
 - c. Packet-header details window
 - d. Packet-contents window
 - e. Packet display filter field

VIII. Stepwise procedure:

Download wireshark software

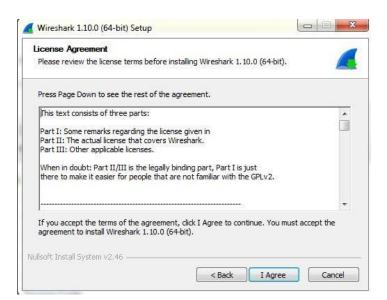
- Open web browser and type <u>www.wireshark.org/download.html</u> in the address bar then press enter key.
- Download windows installer(32 bit/ 64 bit) from stable release window and save to computer.

Wireshark installation and configuration:

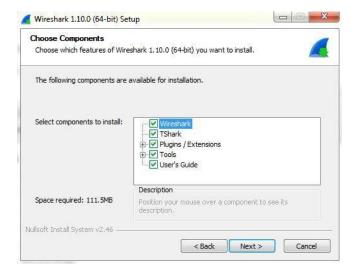
• Double click on exe file of wireshark that present in computer or downloaded from internet and click on next button.



Click on I Agree button to accept terms of agreement.



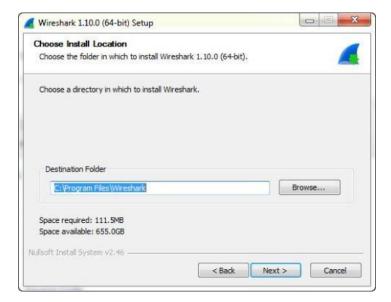
• Select check boxes for components that user want to install and note down space required for installing that components then click on Next button.



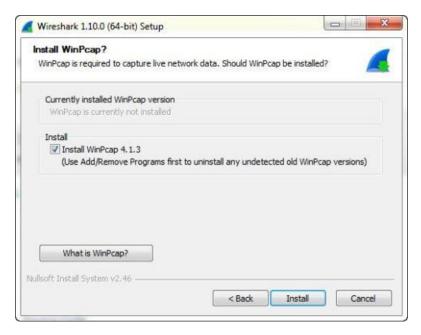
 Select check boxes to create shortcuts and also select check box for file extensions then click on Next button.



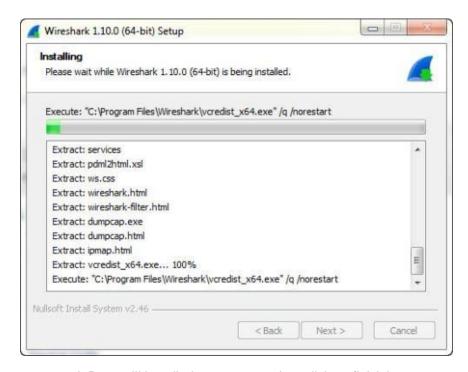
Select destination path to install wireshark then click on Next button.



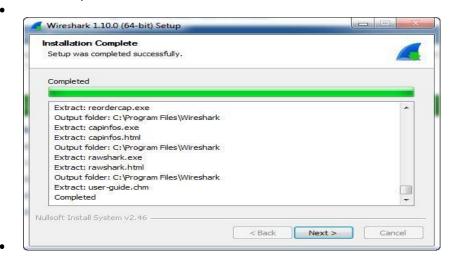
User has to install winPcap to capture live network data. If user not installs winPcap then using wireshark user can only see saved captured network data. Select checkbox for install winPcap then click on install button.



Installation of wireshark start and then window for winPcap installation appears. Clicks on next button then click on I Agree button then click on Install button.



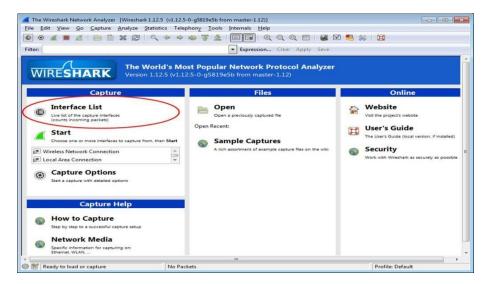
- winPcap will installed on computer then click on finish button.
- After completion of wireshark installation click on Next button.



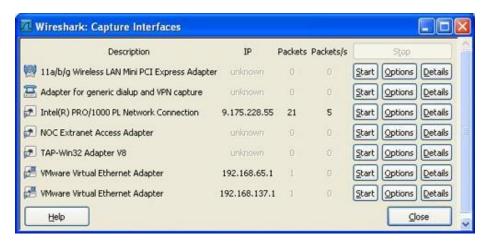
Select checkbox for run wireshark then click on finish button.



Wireshark installation compiled and GUI of wireshark is appearing.



Use the Capture→ interfaces dialog. Open this dialog by clicking on "Capture" on the toolbar and then "Interfaces "from the drop down menu.



- You may have multiple network interfaces on your system and may need to observe the "Packets" count to identify an active interface. When you have identified the active interface, click on the start button next to it. The Capture drop down menu also includes options for stopping and restarting a capture.
- Click on options button to get different options.
- Click on details button to get more information.

*	Name the two parts of a network packet. State the meaning of the term sniffing.
*	
	State the meaning of the term sniffing.
.*.	
.♦.	
*	State two components of packet sniffer and give their uses.
*	Write names of 5 components of wireshark GUI.
	nclusion:
*	Packet sniffer is originally (Active/ Passive)
*	Wireshark is (System/Application)
Qι	uestions :
Wr	ite answers to QQQ(Teacher shall allot the questions)
1.	What is wireshark?
2.	What kind of data are present in packet?
	Write any 5 usage of wireshark.
	Give the use of filter and search in wireshark.
5. 	What is use of wincap software? Is it necessary to install for wireshark? Why?

XII Assessments Scheme:

No.	Performance Indicators	Example
	Process related (15 Marks)	60%
1	Formation of Peer-to-Peer Network	25%
2	Execution of Peer-to-Peer Network	25%
3	Follow ethical Practices	10%
	Product Related (10 Marks)	40%
4	Correctness of Peer-to-Peer Network	15%
5	Timely Submission	15%
6	Answer to Sample questions	10%
	Total (25 marks)	100%

Space of Answers

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Set access rights and security permissions for user.

I. Practical Significance:

a. Student should be able to study DHCP server.

II. Relevant Program Outcomes (POS):

- Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- * Engineering tools: Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- Study to set access rights.
- Study to set access permissions to user.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands...

VI. Minimum Theoretical Background:

Proposition 1.

> Create user accounts and assign permissions

* Add a new user

- 1. From the **Settings** icon at the top right of the Partner Center, select **User management**.
- 2. Select Add user.
- 3. Enter the user's full name and unique email address.
- 4. Select the type of agent and/or the type of admin you want to assign to the user. Partner Center access is role-based, so you can assign permissions to customize the user's view to show only the features the user needs to complete specific tasks. If users want a role assignment, they can find account admins to contact by going to User management and filtering on account admin.
- 5. Select **Add** to create the user account. Confirm the user's details on the next page.

Proposition 2.

***** Assign user permissions

Partner Center access is role-based. The permissions you assign to a user customizes the user's view to show only the features the user needs to complete their specific tasks.

To work in the Partner Center, you must have an assigned role. There are two general types of roles: Admins and agents.

- Admin permissions control the level of access the user has to the Partner Center features. This setting has
 impact outside of the Partner Center -- a billing admin can access bills for all Microsoft services (even those
 unrelated to CSP), and a global admin can access user accounts and customer accounts beyond CSP as well.
- Agent permissions control what kind of customer data and account information the user can see and change.

The general categories of roles are:

- Admin roles
- Agent roles
- Incentives roles
- Referral and marketing roles

Within each of these general categories, a user can only have one role, but that same user can have roles in the other general categories as well.

Find your global admin

Sometimes a user might need to have their role changed or a new user may want a specific role assignment.

To find a global admin who can make role changes or assign roles to a new user, from the **Settings icon** at the top right of the Partner Center, select **User management** and filter on global admin.

For specific information on the roles and what each role can do, see Assign user permissions.

Proposition 3.

> Different types of access

- You can grant or deny the following types of access to users and groups: Read, Create, Change, Delete,
 Publish, and Administer.
- You can set access rights to content for a single user. For example, you can set the access rights so
 only Ann (and system administrators) can edit the Book a Demo page. You can add Ann to any number of
 pages and content, and set Ann's access rights to each content item the same (or differently) for each page.
- If you have a number of users that should have common access to content, managing access rights on a
 user-by-user basis can become complex. You should create user groups that have similar access needs, add
 the users to each user group, and then use the user group to set access rights to content. This lets you
 manage access rights more easily. You can add a user to one or more groups.
- For example, add users Ann, Bob, and Cam to a Marketing user group and give access rights to any number
 of pages and content to the Marketing group instead of each individual. To add Dan to all of the Marketing
 content, (or remove Ann), you modify the Marketing user group. You do not have to visit each page or content
 item to update each individual user's access rights.

> Setting access rights

Go to admin view > Admin tab > Set Access Rights. The Set Access view appears with a content tree structure of the website.

Click on a node in the content tree (for example, Marketing). Typically, a content item shows Administrators (with all access rights) and Everyone (with Read only access rights). You can change these rights or add new users or groups.

If the users or groups are inactive (grayed out) for a content item, then the content item inherits the access rights of its parent content item. To set access rights for this content item, clear the Inherit settings from parent item check box.

To add settings to the selected node's subitems without affecting their existing settings, select the Apply settings for all subitems; see section Setting access rights for all subitems below.

Click Add Users/Groups. A dialog box appears.

Select the type you want: Users, Groups, or Visitor Groups.

Leave the Name field blank and click Search to display all items of the type you selected. You can also type one or more characters in the Name field to filter and display a subset of items. (You can also search for a user by Email address.)

Write answers to Q	Q	Q	(Teacher shall allot the questions)
1. List different types of acc	ess.		
2. How to add new use?			
3. How to set access rights?	?		

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Practical No : 16

Create IPV6 based small computer network using a simulator.

I. Practical Significance:

a. Student should be able to study IPV6.

II. Relevant Program Outcomes (POS):

- ❖ Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- To study IPV6 concepts.
- To set network using a simulator.

IV. Relevant Course Outcomes:

Configure different TCP/IP services.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1.

❖ The characteristics of IPv6

- Larger address space: Increased address size from 32 bits to 128 bits
- Streamlined protocol header: Improves packet-forwarding efficiency
- Stateless autoconfiguration: The ability for nodes to determine their own address
- Multicast: Increased use of efficient one-to-many communications
- Jumbograms: The ability to have very large packet payloads for greater efficiency
- Network layer security: Encryption and authentication of communications
- Quality of service (QoS) capabilities: QoS markings of packets and flow labels that help identify priority traffic
- Anycast: Redundant services using nonunique addresses
- Mobility: Simpler handling of mobile or roaming nodes

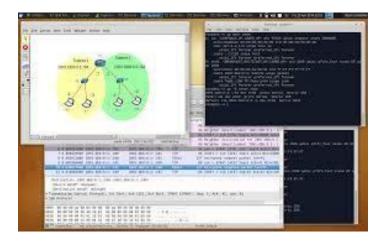
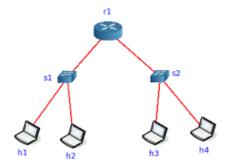


Fig.IPV6 addressing in a network simulator

Set up the network configuration

Use the CORE Network Simulator to set up the network shown in the diagram below with one router, two switches, and four hosts. We will investigate IPv6 addressing fundamentals using this simple network.

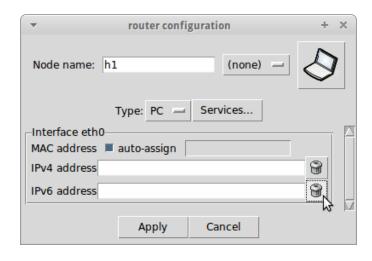


To make the network diagram easier to read, use the View → Show menu command to hide all information except node names (to clean up the display). Also, you can click on Selection Tool and grab the text that represents each node name and move it to a spot where it is not hidden by the link. Then, use the Configure right-click menu command on each node to change the node name so that the network look like the following image:

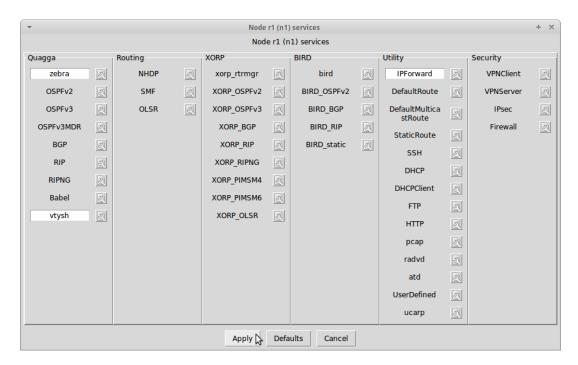
***** Configure the simulated nodes

We want to study the same procedures we would use in a real network without allowing the CORE Network Emulator to set the network configurations for us, so we will clear the IP addresses that the CORE Network Emulator configures by default on every interface before starting the simulation.

Right-click on each router and host and select the Configure contextual menu command. Then, clear the IPv4 address and IPv6 address field on every node.



Also, since we will not use dynamic routing in this scenario, we will change the settings on the router r1 so that dynamic routing protocols are not started when the node starts up.



In the Configure dailogue box, after clearing the IP addresses on both of the router's interfaces, click on the Services... button, then clear the OSPFv2 and OSPFv3 services. Also clear the radvd service (because we will explore stateless address auto configuration in a later post). Then press the Apply button.

Start the simulation

Start the network emulation by clicking in the *start the session* icon in the tool bar or by clicking on the menu command, $Session \rightarrow Start$.

Examine the link-local unicast IPv6 addresses

After we start the network simulation we created, we expect to observe that the interfaces on each simulated router and on each simulated host have link-local IPv6 addresses automatically configured.

We will also run some simple network tests and observe the results. With the current configuration, nodes on the same link should be able to communicate with each other but nodes that are separated by the router should not be able to communicate with each other1. For example, host h1 should be able to ping host h2, but not host h4.

Link-local unicast IPv6 address, defined

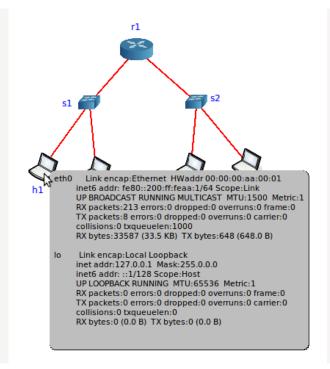
When an IPv6 interface starts up, it is required to automatically configure itself with a *link-local*unicast IPv6 address2. Link-local IPv6 addresses consist of a specific 64-bit IPv6 prefix, fe80::/64, and a unique 64-bit *interface identifier* derived from the MAC address of the interface3.

Link-Local unicast IPv6 addresses are created for purposes such as auto-address configuration and neighbor discovery on a single link. A link may be a point-to-point connection between two interfaces or a switched layer-2 domain such as an Ethernet network.

Link-local unicast addresses only work on the link on which they are configured because IPv6 routers are required to not forward any packets with link-local source or destination addresses to other links.

Using the *ifconfig* Observer Widget

We can use the Core Network Emulator's *Observer Widget* tool to view the interface configuration on each node and take note of the IPv6 address on each interface. Click on the Observer Widget tool (the magnifying glass icon in the toolbar) and select the *ifconfig* widget. Then, hover the mouse pointer over each node to see the displayed interface configuration.



Using the *ip* command

Alternatively, we can open up a terminal window on each node running in the simulated network and use normal Linux commands to view the configuration

Double-click on any node to open a terminal window (for example, host h1). Then, execute the command.

☐ Record all IPv6 addresses

Write down the IP addresses and MAC addresses on each node in a table for future reference. This will be useful when we are running programs like *ping* where we need to know the IPv6 address of the destination node. Knowing the MAC addresses is useful when we are analyzing packets in the *Wireshark* protocol analyzer.

In our example, the CORE Network Emulator assigns MAC addresses, in numerical order4, starting with 00:00:00:aa:00:00 and incrementing by one for every other interface attached to a link.

After inspecting each node using either the *Observer Widget* or the Linux *ip* command, we generate the following table:

Node name	Interface	MAC address	IPv6 addresses
Router r1	eth0	00:00:00:aa:00:00	fe80::200:ff:feaa:0/64
	eth1	00:00:00:aa:00:03	fe80::200:ff:feaa:3/64
Host h1	eth0	00:00:00:aa:00:01	fe80::200:ff:feaa:1/64
Host h2	eth0	00:00:00:aa:00:02	fe80::200:ff:feaa:2/64
Host h3	eth0	00:00:00:aa:00:04	fe80::200:ff:feaa:4/64
Host h4	eth0	00:00:00:aa:00:05	fe80::200:ff:feaa:5/64

VIII	Questions:			
	Write answers to Q	Q	Q	(Teacher shall allot the questions)
	1. List the characteristics	of IPv6.		
	2. What is IPV6 address?	?		
	3. What is network simula	ator?		
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		Process Related (15)	Product Related (10)	Total (25)	of reacher

Practical No: 17

Setting up a wireless network.

I. Practical Significance:

a. Student should be able to study settings of wireless network.

II. Relevant Program Outcomes (POS):

- ❖ Discipline knowledge: Apply computer engineering discipline specific knowledge to solve core computer engineering related problems.
- **Experiments and Practice**: Plan to perform experiments and practices to use the results to solve broad based computer engineering problems.
- **Engineering tools:** Apply relevant computer technologies and tools with an understanding of the limition.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical Skills:

This practical is expect to develop the following skills in you.

- ❖ To configure wireless access point.
- To study settings of wireless networking.

IV. Relevant Course Outcomes:

Configure various networking devices.

V. Practical Outcome (POS):

- Understand basic of TCP/IP utilities.
- Understand networking commands.

VI. Relevant Affective domain related outcomes:

- Follow safely measure.
- Follow ethical practices.

VII. Minimum Theoretical Background:

Proposition 1. Wireless network

A wireless network is a computer network that uses wireless data connections between network nodes. Wireless networking is a method by which homes, telecommunications networks and business installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations. Wireless telecommunications networks are generally implemented and administered using radio communication. This implementation 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, satellite communication networks, and terrestrial microwave networks.



Proposition 2. Wireless access point

A wireless access point (WAP) is a hardware device or configured node on a local area network (LAN) that allows wireless capable devices and wired networks.

The AP usually connects to a router (via a wired network) as a standalone device, but it can also be an integral component of the router itself. An AP is differentiated from a hotspot, which is the physical location where Wi-Fi access to a WLAN is available.



Proposition 3. Wireless personal area network (WPAN)

A WPAN (wireless personal area network) is a personal area network - a network for interconnecting devices centered around an individual person's workspace - in which the connections are wireless. Typically, a wireless personal area network uses some technology that permits communication within about 10 meters - in other words, a very short range. One such technology is Bluetooth, which was used as the basis for a new standard, IEEE 802.15.

Proposition 4. Wireless network adapter

A wireless adapter is a hardware device that is generally attached to a computer or other workstation device to allow it to connect to a wireless system. Before the advent of consumer devices with built-in Wi-Fi connectivity, devices required the use of wireless adapters to connect to a network.



VIII. Stepwise procedure:

How to Set Up Your Home Wi-Fi Network

- **Find the best location for your wireless router**. Its optimal placement is in a central location of your home, free from obstructions that could cause wireless interference, such as windows, walls, and even the microwave.
- Turn off the modem. Power off the cable or DSL modem from your Internet service provider before connecting your equipment.
- Connect the router to the modem. Plug an ethernet cable (typically provided with the router) into the router's WAN port and then the other end to the modem.

- Connect your laptop or computer to the router. Plug one end of another ethernet cable into the router's LAN port (any will do) and the other end into your laptop's ethernet port. Don't worry this wiring is temporary!
- Power up the modem, router, and computer -- Turn them on in that order.
- Go to the management webpage for your router. Open a browser and type in the IP address of the router's administration page; this info is provided in your router documentation (it's usually something like 192.168.1.1). The login information will also be in the manual.
- Change the default administrator password (and username if you wish) for your router. This setting is usually found in a tab or section called administration. Remember to use a strong password that you won't forge
- Add WPA2 security. This step is essential. You can find this setting in the wireless security section, where you'll select which type of encryption to use and then enter a passphrase of at least 8 characters -- the more characters and the more complex the password, the better. WPA2 is the latest wireless encryption protocol, much more secure than WEP, but you may need to use WPA or mixed mode WPA/WPA2 if you have an older wireless adapter in any of your devices. WPA-AES is the strongest encryption available to date.
- Change the wireless network name (SSID). To make it easy for you to identify your network, choose a descriptive name for your SSID (Service Set Identifier) in the wireless network information section.
- Optional: change the wireless channel. If you're in an area with a lot of other wireless networks, you can minimize interference by changing your router's wireless channel to one less used by other networks. You can use a wifi analyzer app for your smartphone to find the least crowded channel or just use trial and error (try channels 1, 6, or 11, since they don't overlap).
- Set up the wireless adapter on the computer. After saving the configuration settings on the router above, you can unplug the cable connecting your computer to the router. Then plug your USB or PC card wireless adapter into your laptop, if it doesn't already have a wireless adapter installed or built-in. Your computer may automatically install the drivers or you may have to use the setup CD that came with the adapter to install it.
- Finally, connect to your new wireless network. On your computer and other wireless-enabled devices, find the new network you set up and connect to it



IX	Qı	Question for confirmation of learning:							
	(S	tudent shall write answ	ers to these ques	tions independ	ently in the laboratory itself to have self-fe	edback.)			
	*	What is wireless acce	ss point?						
	*	What is WPAN?							
	*	❖ Which are the different security options available while configuring router?							
	*	Write the IP address o	of wireless router i	n your college.					
X	Qı	estions :							
	Wı	rite answers to Q	Q	Q	(Teacher shall allot the question	ıs)			
	1.	List advantages of wir	eless network.						
		Compare wireless net		etwork.					
		What is a wireless net							
	4.	How cellular networking							

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