Name: _____ Karan _____ Roll No: _20ES62_____

Score:_____ Signature of the Lab Tutor:_____ Date: _____

OBJECTIVES

#	Topic	#. Of Lectures	CLO	Taxonomy level
1	To **understands** different network devices (Layer 01 to Layer 03). To **configure** and **troubleshoot** the network interface card.	3	1,2	C2, P4

OUTCOME(S)

a. An ability to apply knowledge of math, science, and engineering	**PLO1**: Engineering Knowledge:
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	**PLO5:** Modern Tool Usage

RUBRICS:

Performance Metric	Exceeds expectation (4-5)	Meets expectations (2-3)	Does not meet expectations (0-1)	Score
Knowledge and application [PLO1]	Applies the appropriate knowledge and concepts to the problem with accuracy and proficiency; shows precise understanding of these knowledge and concepts.	Applies the relevant knowledge and concept to the problem, possibly in a roundabout way; understands the major points of the knowledge, with possible misunderstanding or failure to recall minor points;	Fails to apply relevant knowledge and concepts to the problem; misunderstands or fails to recall critical points.	
Modern Tool Usage [PLO5]	Computer and software are extensively used in the course	Computer and software are somewhat utilized, effort was put into learning new software	Computer and software are not utilized, no attempt was made at learning new software	
			Total Score	

PERFORMANCE OBJECTIVE

Upon successful completion of this experiment, the student will be able to learn:
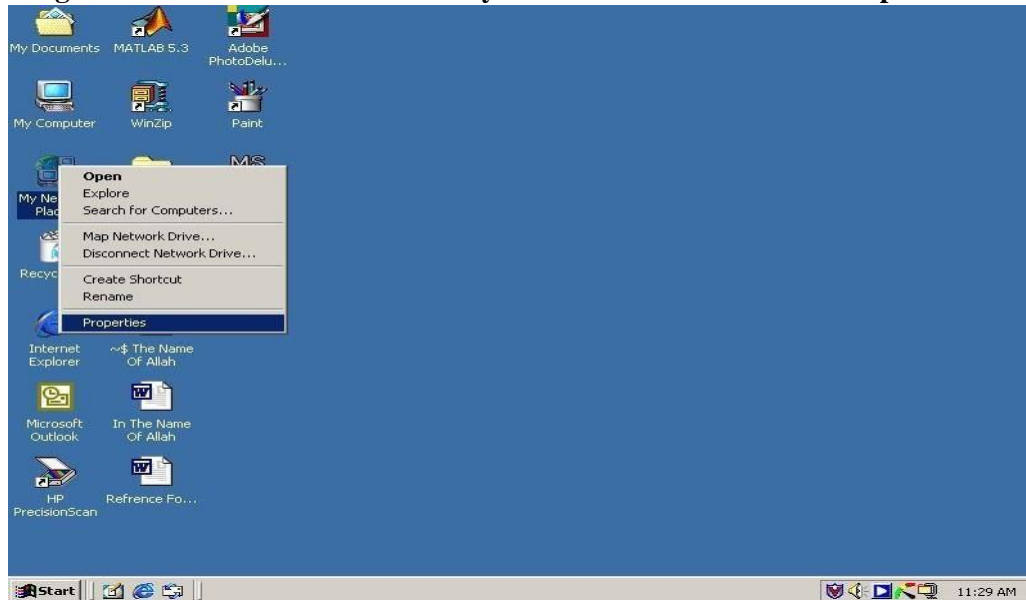
1. The configuration and troubleshooting of NIC/ LAN card 2.
What are network devices?

EQUIPMENT

- PC with operating system
- NIC card
- HUB
- Switch
- Router

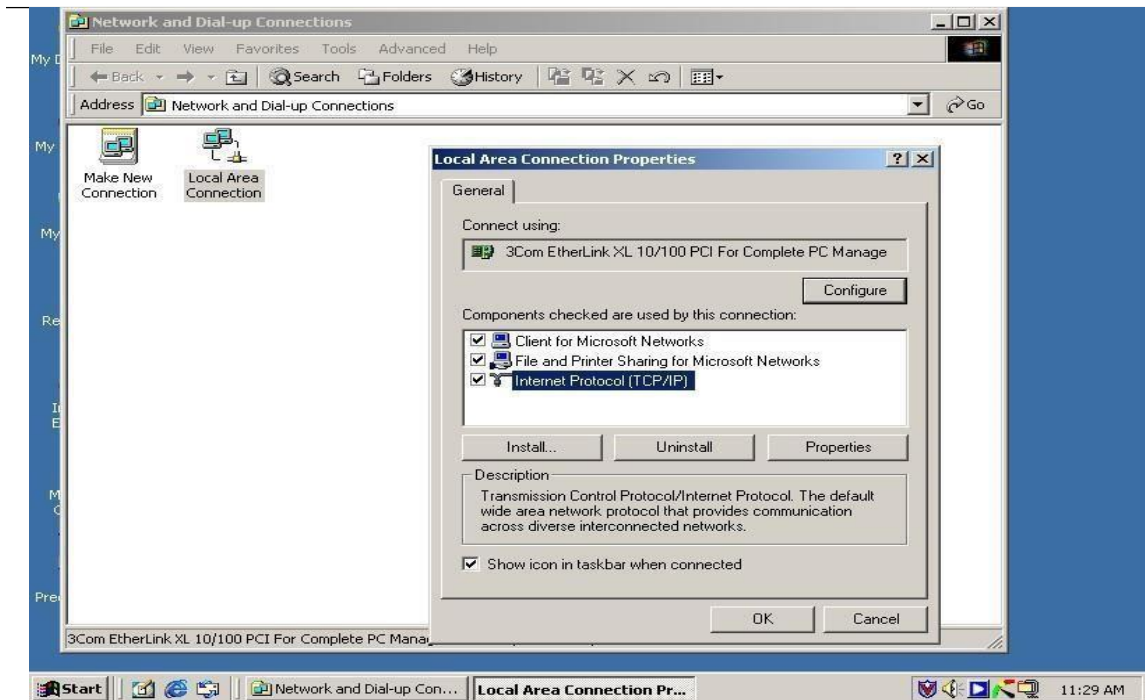## DISCUSSION & CONFIGRATION:

For configuration of NIC Write Click on My Network Places and Click Properties

Right Click Local Area Connection And Choose Properties. When The Local Area Properties Page Appear "Check The Show Icon In The Taskbar When Connected"

Double Click the Internet Protocol (TCP/IP)

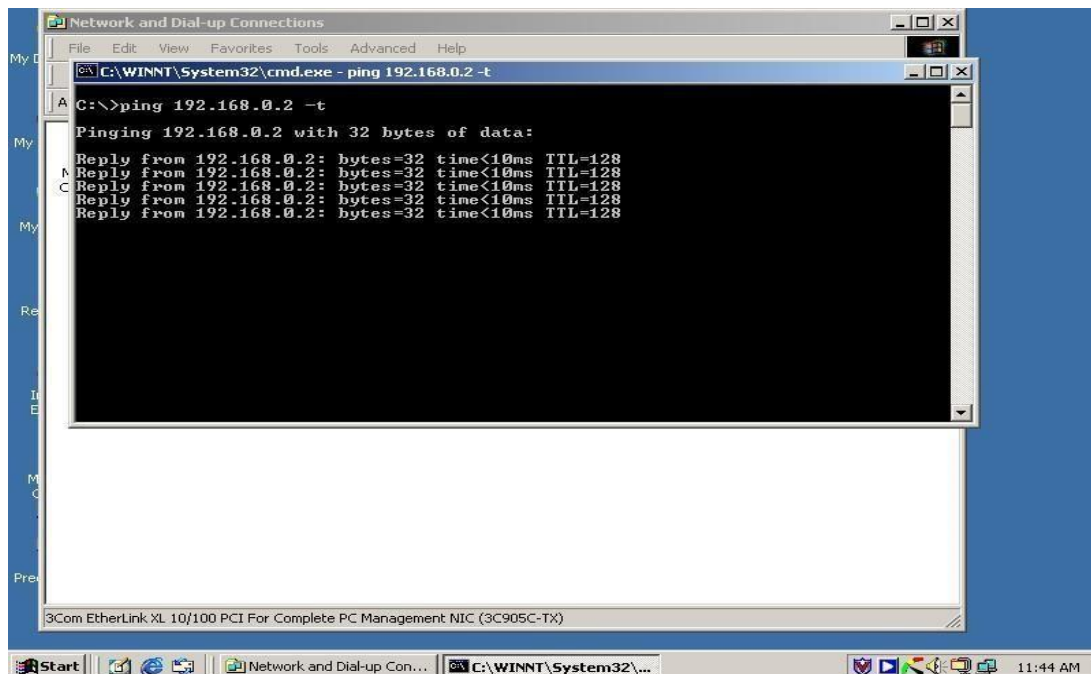**Highlight the Radio Button "Use the Following IP Address"**

Enter the First Three Octets As Follows 192.168.0.
The Fourth Octet Is the MUST Correspond the Number on Your Monitor for Example the Machine Having Monitor Labeled ES-CN-002 Should Have an IP Address 192.168.0.2 Keep on Pressing Tab until It the Ok Tab Is Highlighted Then Press Ok
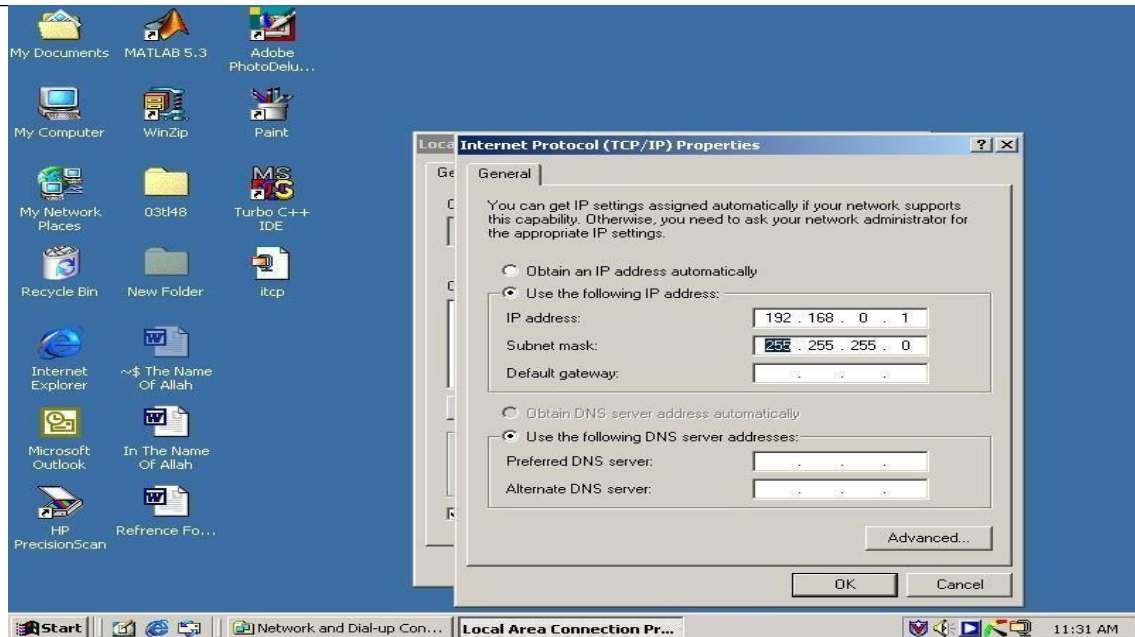
In Order To Confirm The Installation Of Your NIC Card Go To Start And Type Cmd (command prompt) The Space Type Ping 192.168.0. + The Number of the Monitor beside You Or Simply Ping 192.168.0.2

Joining The Workgroup

In Order To Join A Particular Workgroup Right Click My Computer Icon On Your Desktop And Choose Properties. Choose Network Identification And Choose Properties Again
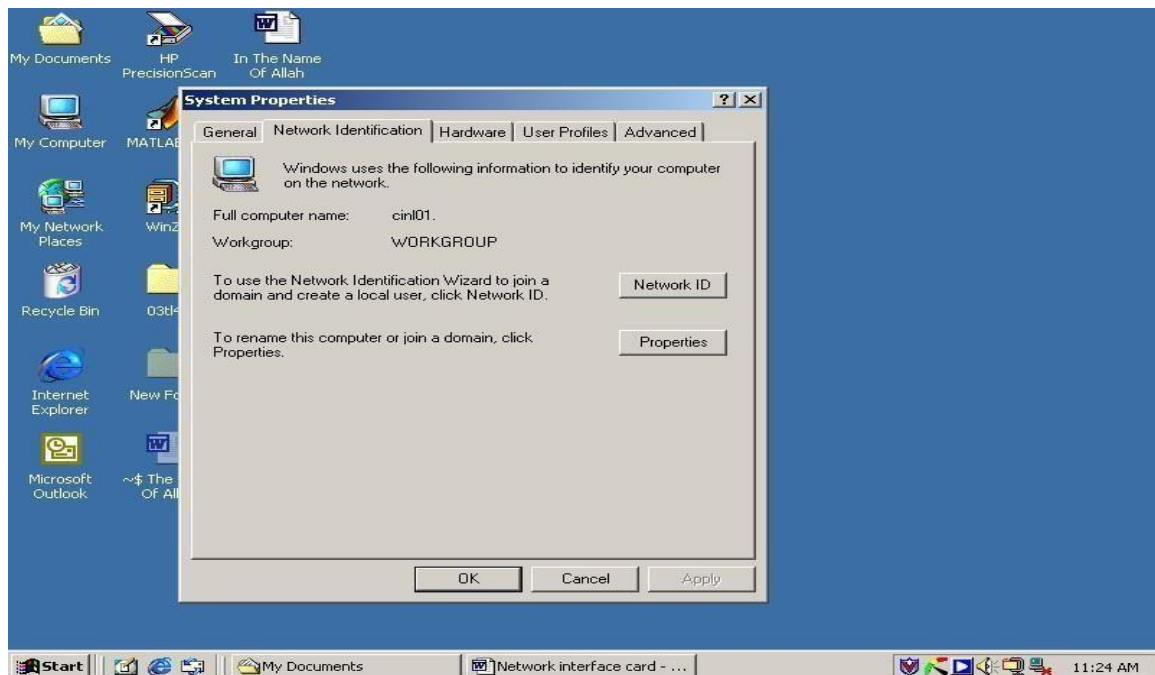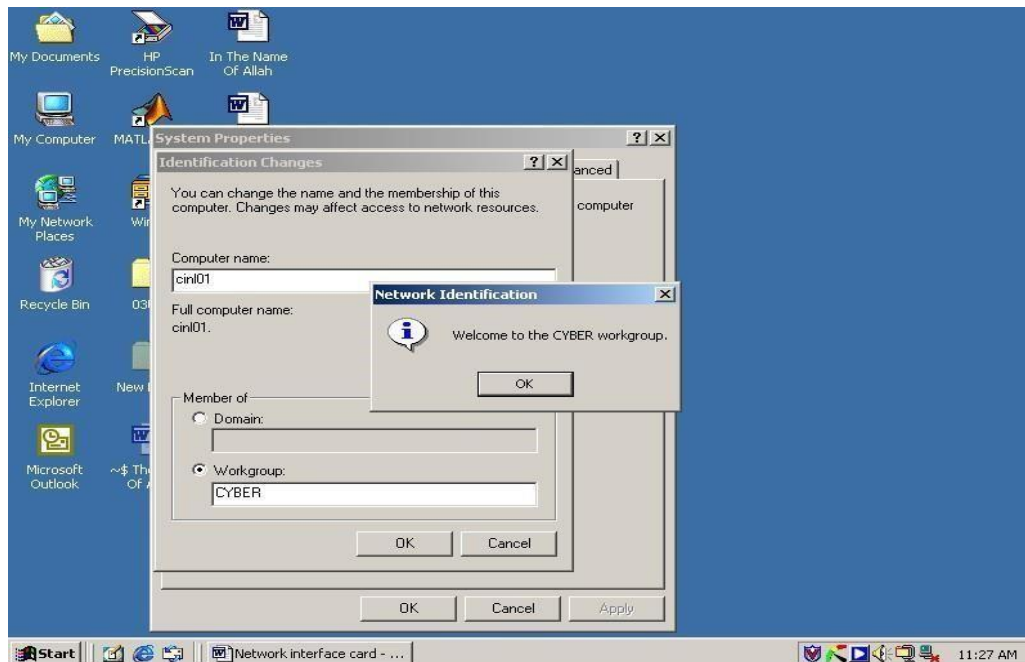

Highlight the Radio Button Workgroup and Type CYBER Confirm Your Selection

Okay The Welcome Banner And Restart Your Machine

Networking devices:

To establish a computer network it is essential for the computers to be able to communicate together, in order to achieve this task some devices are used which are called networking devices.

1) **HUB:** Hub is one of the basic icons of networking devices which works at physical layer and hence connect networking devices physically together. Hubs are fundamentally used in networks that use **twisted pair cabling** to connect devices. They are designed to transmit the packets to the other appended devices without altering any of the transmitted packets received. They act as pathways to direct electrical signals to travel along. They transmit the information regardless of the fact if data packet is destined for the device connected or not. Hub has 1 collision domain and 1 broadcast domain, in other words hub acts as a broadcast device.

2) **Switch:** Switches are the linkage points of an Ethernet network. Just as in hub, devices in switches are connected to them through twisted pair cabling. But the difference shows up in the manner both the devices; hub and a switch treat the data they receive. **Hub** works by sending the data to all the ports on the device whereas a **switch** transfers it only to that port which is connected to the destination device. A switch does so by having an in-built learning of the MAC address of the devices connected to it. Since the transmission of data signals are well defined in a **switch** hence the network performance is consequently enhanced. Switches operate in **full-duplex** mode where devices can send and receive data from the switch at the simultaneously unlike in half-duplex mode. The transmission speed in switches is double than in Ethernet hub transferring a 20Mbps connection into 30Mbps and a 200Mbps connection to become 300Mbps. Performance improvements are observed in networking with the extensive usage of switches in the modern days

3) **Router:** Routers are network layer devices and are particularly identified as Layer-3 devices of the OSI Model. They process *logical* addressing information in the

Network header of a packet such as IP Addresses. Router is used to create larger complex networks by complex traffic routing. It has the ability to connect dissimilar LANs on the same protocol. It also has the ability to limit the flow of broadcasts. A router primarily comprises of a hardware device or a system of the computer which has more than one network interface and routing software.

When a router receives the data, it determines the destination address by reading the header of the packet. Once the address is determined, it searches in its **routing table** to get know how to reach the destination and then forwards the packet to the higher hop on the route. The hop could be the final destination or another router.

Static Routing: In static routing, the routing information is fed into the routing tables manually. It does not only become a time-taking task but gets prone to errors as well. The manual updating is also required in case of statically configured routers when change in the topology of the network or in the layout takes place. Thus static routing is feasible for tinniest environments with minimum of one or two routers.

Dynamic Routing: For larger environment dynamic routing proves to be the practical solution. The process involves use of peculiar routing protocols to hold communication. The purpose of these protocols is to enable the other routers to transfer information about to other routers, so that the other routers can build their own routing tables.

LAB ASSIGNMENT

Design a network system diagram for three city offices. Requirements are given below.
   a) Karachi city has 5 departments, accounts, audit, services, O&M, support. These offices has 10, 5, 20, 20, and 30 computers respectively.
   b) Hyderabad city has 3 departments, accounts, audit, and services with 10, 5, 10 computers respectively.
   c) Jamshoro city has only two offices accounts and audit with 10, 10 computers respectively.
   d) Choose networking devices in a way that these three cities are connected together efficiently.

REVIEW QUESTIONS

1.   What is the purpose of NIC card?
_ANS: A NIC provides a computer with a dedicated, full-time connection to a network. It implements the physical layer circuitry necessary for communicating with a data link layer standard, such as Ethernet or Wi-Fi. Each card represents a device and can prepare, transmit and control the flow of data on the network.

2.   Why is link speed and duplex set to auto in NIC card? Give reason.

_ANS: Auto-negotiation, or negotiation speed, refers to a signaling mechanism that allows ethernet interfaces of two connected devices to determine the optimal speed and duplex mode of the connection

3.   How you can assign IP address statically in NIC card configuration?
ANS; Right-click on the network adapter you want to assign an IP address and click Properties. Highlight Internet Protocol Version 4 (TCP/IPv4) then click the Properties button. Now change the IP, Subnet mask, Default Gateway, and DNS Server Addresses. When you're finished click OK

4.   How to check IP configuration and Mac address using command prompt of a computer?
_ANS: In your computer's search bar, type cmd and press Enter. In the Command Prompt window, type ipconfig/all and press Enter. Locate the Ethernet adapter Ethernet section. The Physical Address is your computer's MAC address and the IPv4 Address is your computer's IP address.

5.   Discuss the most common causes for connectivity problems.

ANS: Cable default,Configuration mismatch

6.   Answer the following questions:

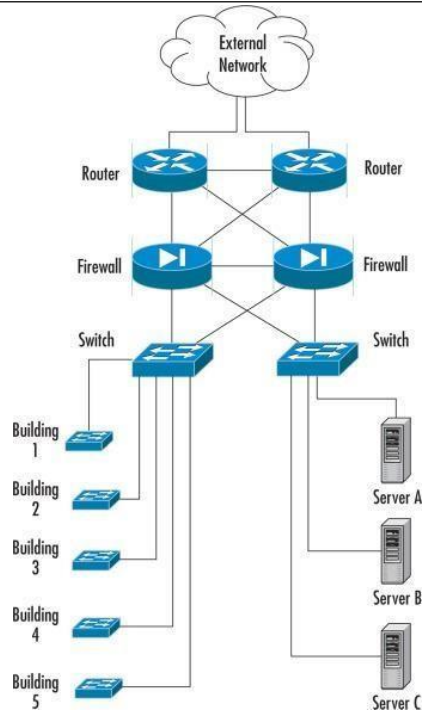a) What is the difference between straight through and cross over Ethernet cables?
ANS: straight-through cables are used for dissimilar devices and crossovercables are used for similar devices.
Straight-through cables will be used to connect different types of hosts to each other.
A crossover cable covers the other situations where you are connecting the same device type to each other.

b) Please provide two network scenario in which both straight through and cross over cables are used.

c) What is the difference between collision domain and broadcast domain?
    ANS: The Collision domain refers to a set of devices in which packet collision could occur. Broadcast domain refers to a logical set of reachable computer systems without using a router.

d) How many Collision domains and broadcast domains are there in an 8-port HUB and a 24- port SWITCH?
    ANS: Each switchport acts as its own collision domain and therefore on a 24-port switch there are 24 collision domains.
        A hub and repeater: are one collision domain and one broadcast domain.

FINAL CHECK LIST

1. Return all equipment and materials to their proper storage area.
2. Submit your Lab Handouts, before the next laboratory.

Cisco File Access: https://drive.google.com/drive/folders/1IVsCq6_L-w5pMgA5_RPioo6l-pkHH9GJ?usp=share_link