

Experiment - 3

Objective :- To install & configure LAN on a personal computer (PC)

Requirements :- i) PC ii) Cisco packet tracer
iii) Internet connection , etc .

Theory :-

- Installation :
 - 1) Count the number of computers you need to hardware
 - 2) Decide if you want to create a wireless network.
 - 3) Determine if you want all network devices to have internet access.
 - 4) Measure the distances for all hardware devices.
 - 5) Gather your network hardware as to create a LAN, you'll need a router or switch, which will act as the hub of your network.
 - 6) Set up your router
 - 7) Connect your modem to your router (if necessary).
 - 8) Connect your switch to your router (if necessary).
 - 9) Connect your computers to open LAN ports. Use ethernet cables to connect each computer to an open LAN port on your router or switch.

10) Setup one PC as a DHCP server if you are just using a switch.

11) Verify the network connection on each computer.

12) Set up file and printer sharing.

13) Set up your router.

14) Plug a computer into one of the router's LAN ports.

15) Type in the router's IP address.

16) Log in with the administrator account.

17) Ensure the wireless network is enabled

configuration :-

1) Determine the no. of computers you want to connect.

2) Determine your network layout.

3) Obtain the network hardware.

4) Connect your modem to the WAN port on the router.

5) Connect the switch to a LAN port on the router.

6) Find the Ethernet port on your PC.

7) Plug one end of an ethernet cable into your computer.

8) Plug other end of the cable into an open LAN port.

9) Test out your network (router only).

10) Right click on your network connection.

→ Click Open Network & Sharing Center.

→ Click the Ethernet link at the top of the window.

→ Click the Internet Protocol Version 4 (TCP/IPv4).

→ Click the Use the following IP Address radio button.

→ Type 255.255.0.0 into the Subnet Mask field.

→ Type 192.168.0.0 into Default Gateway field.

→ Click OK.

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- Open the Internet Protocol version 4 properties on the next computer.
- Click the USE the following IP address radiobutton.
- Type 192.168.1.51 into the IP address field.
- Enter the same values for SUBNET MASK and Default gateway.

Result :- We have studied about installation of LAN and its configuration.

Precautions :-

- 1) Power supply should be uniform
- 2) Connections should be tight.
- 3) PC should be of atleast or more than 4gb RAM.

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Experiment - 4

Objective : Write a program to implement various types of error correcting techniques.

Theory :-

Hamming code :- It is a set of error-correction codes that can be used to detect & correct errors that can occur when the data is moved or stored from the sender to the receiver. It is technique developed by R. W. Hamming for error correction.

Redundant bits - These are extra binary bits that are generated & added to the information-carrying bits of data transfer to ensure that no bits were lost during the data transfer.

formula :- $2^r \geq m+r+1$; r = redundant bit
m = data bit

Suppose the no. of data bits is 7, then the no. of redundant bits can be calculated using :

$$= 2^4 > 7+4+1$$

Thus, the no. of redundant bits = 4

Parity bits - It is a bit appended to a data of binary bits to ensure that the total number of 1's in the data are even or odd. Parity bits are used for error detection.

There are 2 types of parity bits

program :-

```
#include <stdio.h>
void main()
{
    int data[10];
    int dataatree[10], c, c1, c2, c3, i;
    printf ("Enter 4 bits of data one by one \n");
    scanf ("%d", &data[0]);
    scanf ("%d", &data[1]);
    scanf ("%d", &data[2]);
    scanf ("%d", &data[4]);
```

```
    data[6] = data[0] ^ data[2] ^ data[4];
    data[5] = data[0] ^ data[1] ^ data[4];
    data[3] = data[0] ^ data[1] ^ data[2];
```

```
    printf ("\n Encoded data is \n");
    for (i=0; i<7; i++)
        printf ("%d", data[i]);
```

```
c1 = dataatree[6] ^ dataatree[4] ^ dataatree[2] ^ dataatree[0];
c2 = dataatree[5] ^ dataatree[4] ^ dataatree[1] ^ dataatree[0];
c3 = dataatree[3] ^ dataatree[2] ^ dataatree[1] ^ dataatree[0];
c = c3 * 4 + c2 * 2 + c1;
```

```
if (c==0)
    printf ("\n No error while transmission of data\n");
else
    printf ("\n Error on position of %d", c);
    printf ("\n Data sent : ");
```

1. Even Parity bit: In this, for a given set of bits, the no. of 1's are counted. If that count is odd, the parity bit value is set to 1, making the total count of occurrences of 1's an even no.. If the total no. of 1's in a given set of bits is already even, the parity bit's value is 0.

2. Odd Parity bit: In this, for a given set of bits, the no. of 1's are counted. If that count is even, the parity bit value is set to 1, making the total count of occurrences of 1's an odd number. If the total no. of 1's in a given set of bits is already odd, the parity bit's value is 0.

Determining the position of redundant bits -

These redundancy bits are placed at the positions which correspond to the power of 2.

(Hamming Code)

Result:- Linux Program is performed successfully without any errors.

Precautions:- 1) Check the code for errors.

2) Power Supply should be constant

3) Computer should be of 4GB RAM

21/2/2021

```

for(i=0; i<7; i++)
    printf ("%d", data[i]);
printf ("\n Data Received : ");
for(i=0; i<7; i++)
    printf ("%d", dataatrec[i]);
printf ("\n Correct message is \n");
if (dataatrec[7-c]==0)
    dataatrec[7-c]=1;
else
    dataatrec[7-c]=0;
for(i=0; i<7; i++) {
    printf ("%d", dataatrec[i]);
}

```

output :- enter 4 bits of data one by one

|
 0
 |
 |

Encoded data is

1010101

enter received databits one by one

|
 0
 0
 0
 |
 0
 |

error on position 5

Data received : 1000101

correct message is

1010101

Experiment - 5

Objective :- Write a program to implement various types of framing method.

Framing Methods :

Framing is a point-to-point connection b/w two computers or devices consists of a wire in which data is transmitted as a stream of bits. However, these bits must be framed into discernible blocks of information. Framing is a function of data link layer. It provides a way for a sender to transmit a set of bits that are meaningful to the receiver. Frames have headers that contain information such as error-checking codes.

At data link layer, it extracts message from sender and provide it to receiver by providing sender's & receiver's address.

Problems in Framing

- Detecting start of the frame : Station detect frames by looking out for special sequence of bits that marks the beginning of frame.

- How do station detect a frame :-

Every station listen to link for SFD pattern through a sequential circuit. Station checks destination address to accept or reject frame.

Program :-

```
#include <stdio.h>
#include <string.h>

void main() {
    int a[20], b[30], i, j, k, count, n;
    printf ("Enter frame length: ");
    scanf ("%d", &n);
    printf ("Enter input frame (0's & 1's only): ");
    for (i=0; i<n; i++)
        scanf ("%d", &a[i]);
    i=0; count=1; j=0;
    while (i<n) {
        if (a[i]==1) {
            b[j]=a[i];
            for (k=i+1; a[k]==1 && k<n && count<5; k++)
                j++;
            b[j]=a[k];
            count++;
            if (count==5)
                j++;
            b[j]=0;
            i=k;
        }
    }
    printf ("After stuffing the frame is: ");
    for (i=0; i<j; i++)
        printf ("%d", b[i]);
}
```

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Detecting end of frame: When to stop reading the frame.

Types of framing — There are 2 types of framing:

- i) Fixed size
- ii) Variable size
- a) Length field
- b) End Delimiter (ED)

Character / Byte Stuffing: used when frames consist of character. If the data contains ED then, byte is stuffed into data to differentiate from ED.

Result:- Studied how to implement various types of framing method.

Precaution:-
i) Power supply should be uniform
ii) connections should be tight
iii) computers should at least be of 4GB RAM

```
printf ("%d", b[i]);  
}
```

Output :-

Enter frame length : 5

Enter Input frame (0's & 1's only) :

1

1

1

1

1

After Stuffing the frame is : 111110