DATE: / /
PAGE NO:

EXPERIMENT 1

AIM: Connect two computers and transfer the packet using tracer.

Software Used: CISCO packet tracer

Theory:

Introduction to Packet Tracer

-> Packet Tracer is a cross platform visual simulation tool designed by CISCO that allows users to create & network topologies and initiate modern computer networks and understand abstract networking concepts.

-> It allows us to design complex and large networks.

-> lastly, it also provides additional components, including an authoring system, network protocol simulation and improving knowledge of assessment system

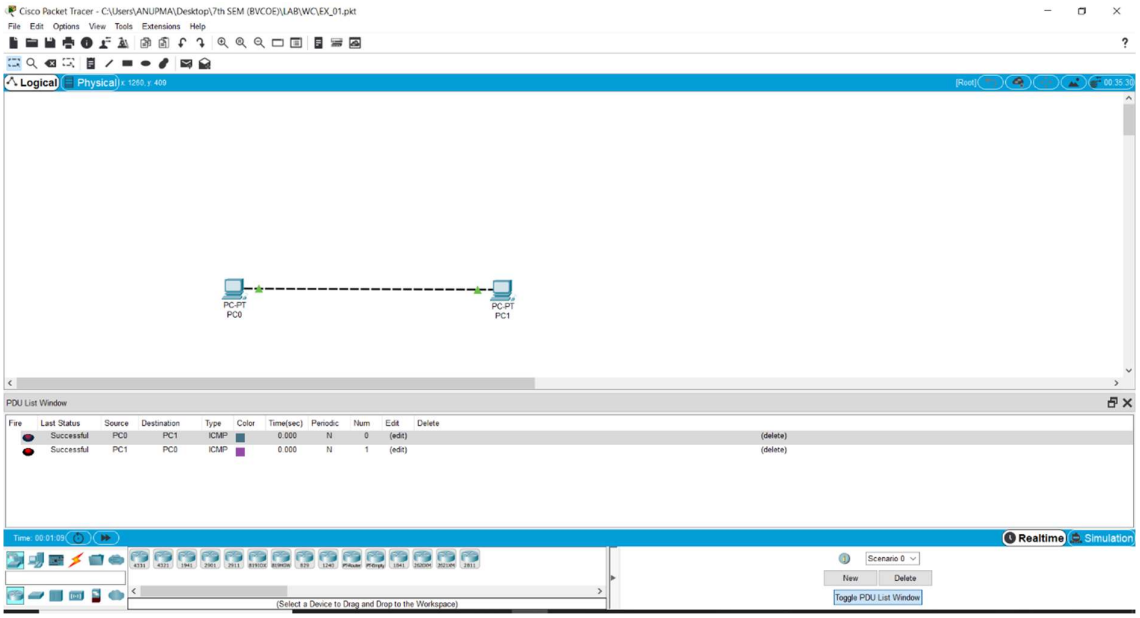
Result

We have successfully studied about packet tracer and its usage and also connected two computers to transfer the data packet.

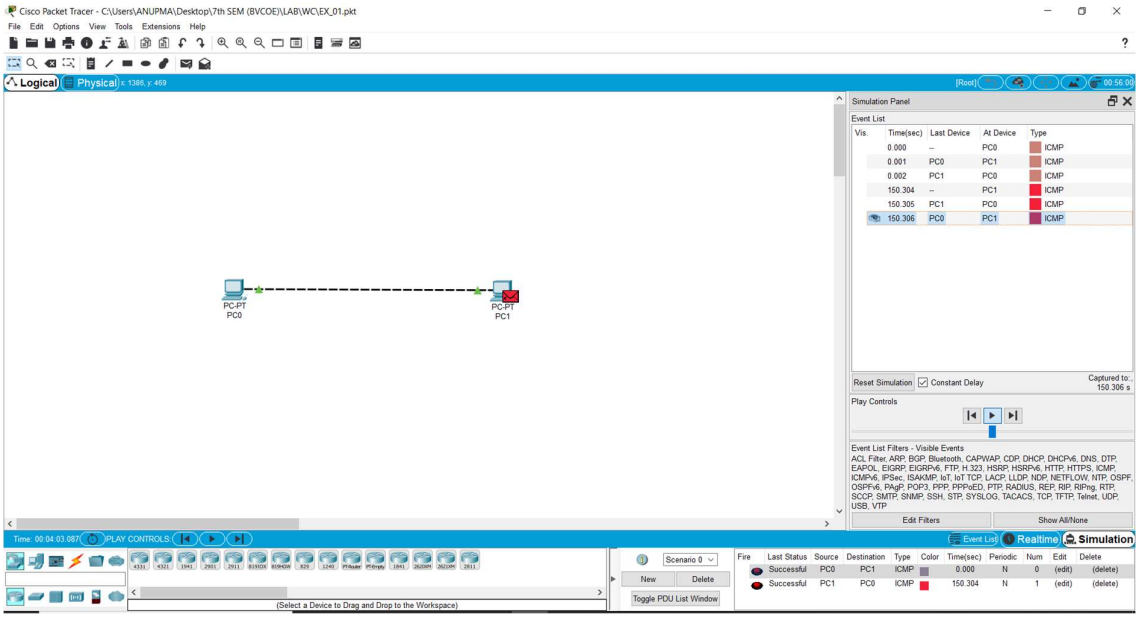
Sign.....

OUTPUT

Real Time Mode



Simulation Mode



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EXPERIMENT 2

Aim: Create a network using switch and transfer the packet using packet tracer.

Software Used: CISCO packet tracer

Theory:

Switch: is a networking device that connects devices on a comp. network by using packet switching to receive and forward data to destination device. It connects other devices together and also manages the flow of data across a network by transmitting a received packet only to the one or more devices for which the packet is intended

Switching: Process of forwarding packets coming in from one port to a port leading towards the destination

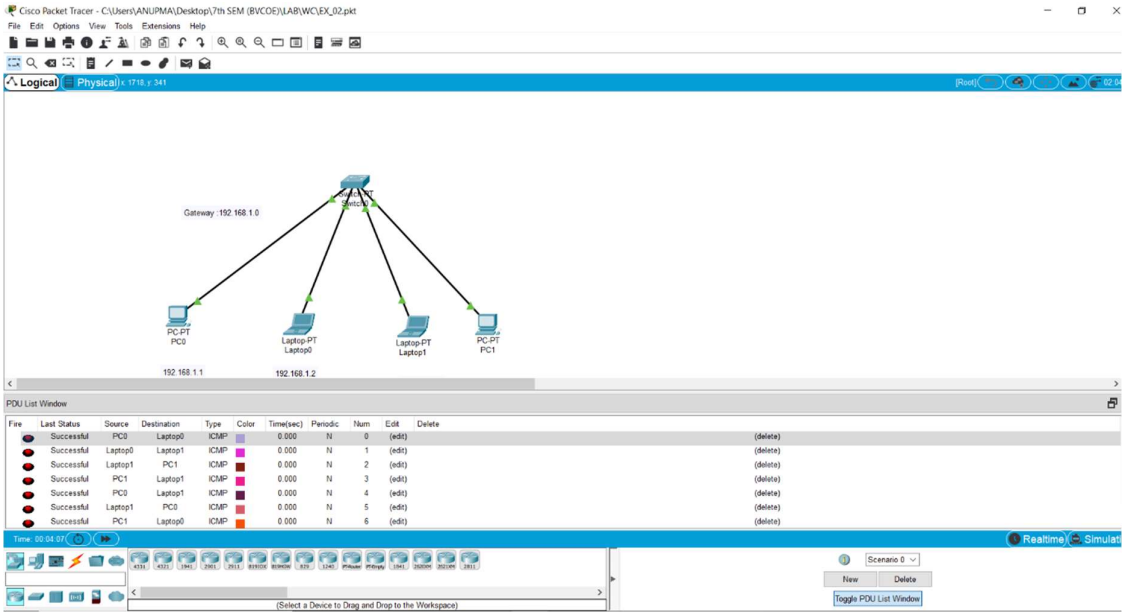
Types of Switching Two major categories would be connectionless and connection oriented. Now these can be further sub categorised as: Circuit Switching, packet switching and message switching.

Result: Successfully connected a network through a switch and transfered the data packets.

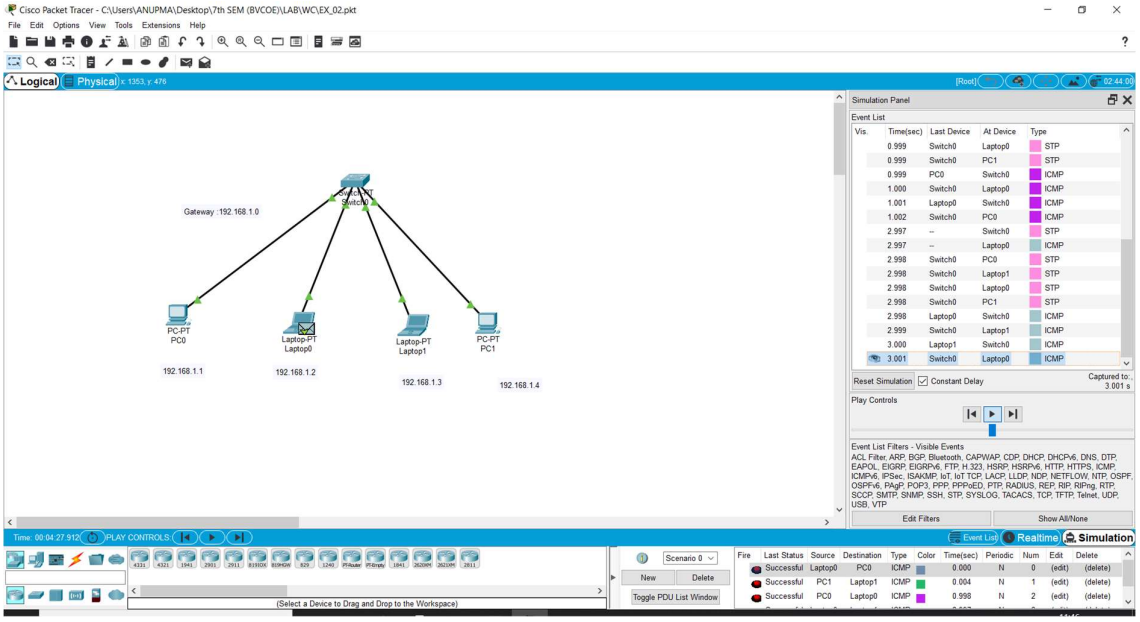
Sign.....

OUTPUT

Real Time Mode



Simulation Mode



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EXPERIMENT 3

Aim: Connect a network through router and transfer the packet using packet tracer

Software Used: Cisco Packet Tracer

Theory

Router: It's a networking device that forwards data packets b/w a computer network. Performs the following 2 functions:

Forwarding - Receives the packet, performs required checks, find output port and forwards the packets onto that port

Routing - Ascertains the best path for the packet to reach the destination. Maintains a routing table.

Types of Routing

i) **Static** Manually add routes in routing table AKA non adaptive routing & is more secure.

ii) **Dynamic** Makes automatic adjustments of the routes according to the current state of the route in the table. It uses protocols to discover the routes and the network destination to be reached by them.

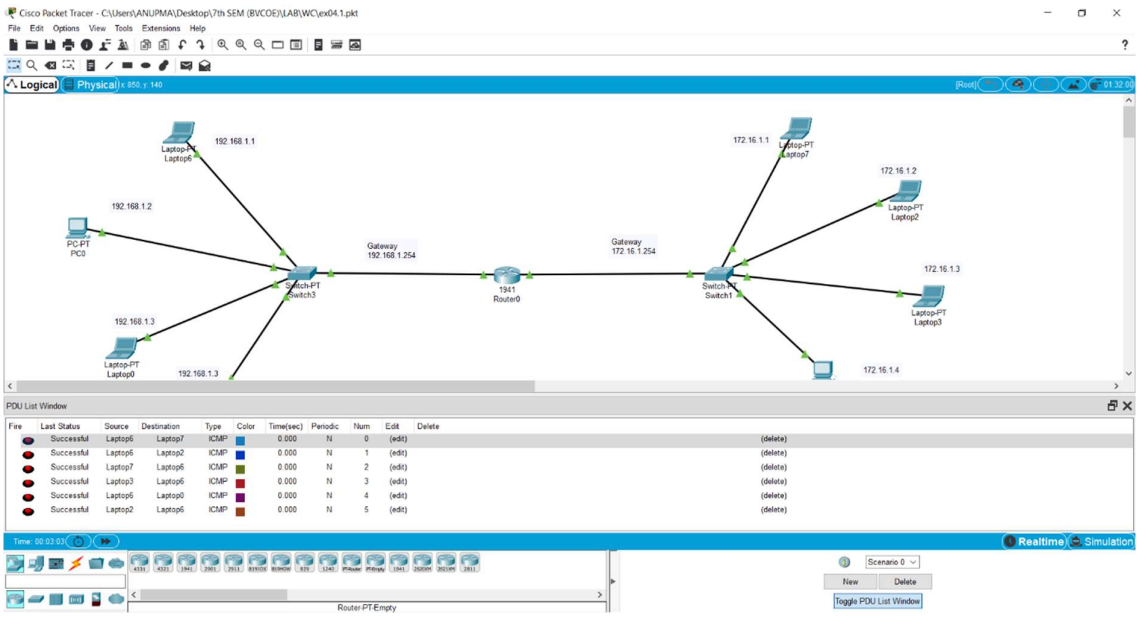
Result: Successfully connected network through router and transfered the packet using packet tracers.

Be Positive

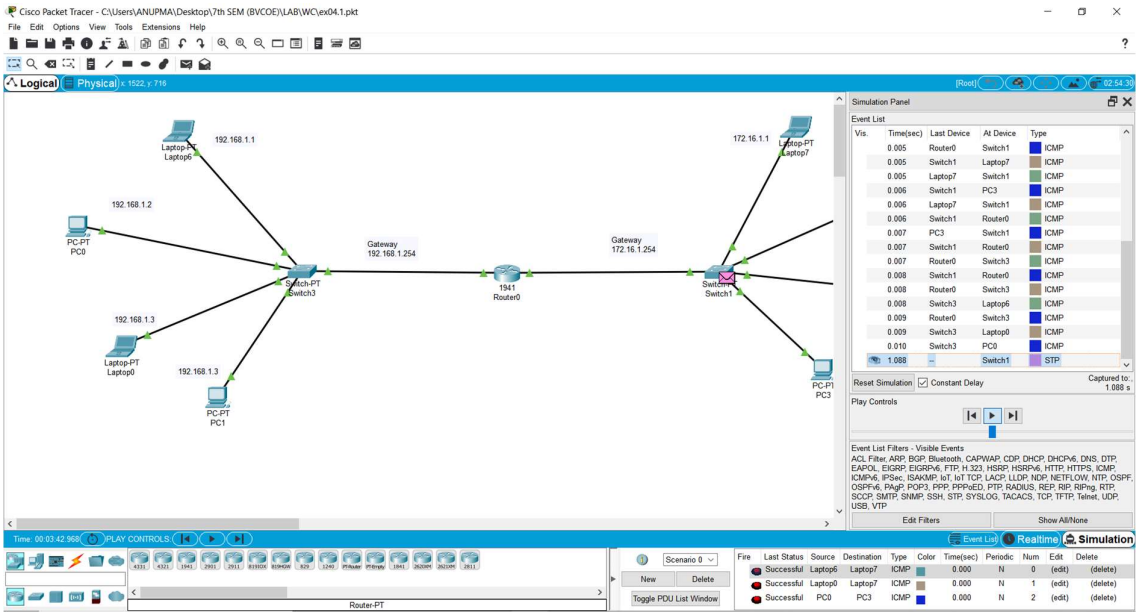
Sign

OUTPUT

Real Time mode



Simulation mode



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EXPERIMENT 4

Aim: Create a LAN network and transfer the packet using packet tracer

Software Used Packet Tracer

Theory:

LAN (Local Area Network) A computer that interconnects devices connected together in one physical location within a limited area such as a residence, school, laboratory, university campus or office building.

There are two types of LAN as follows:

i) Client/Server LAN: several devices connected to a cultural server. Client can be any devices running on access applications or the internet.

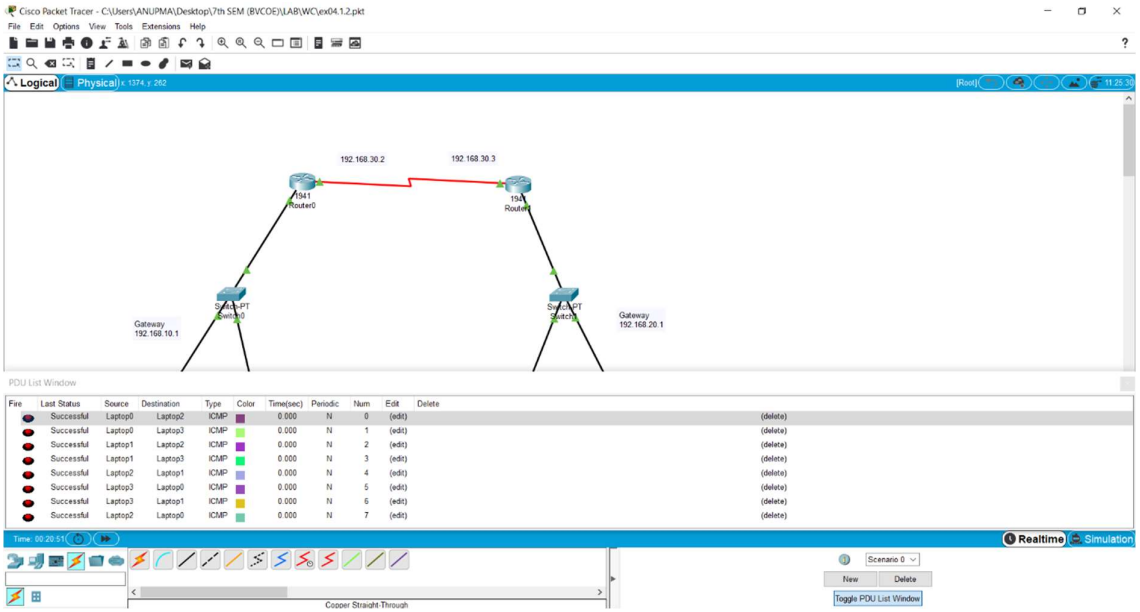
ii) Peer-to-Peer LAN: Doesn't have a central server, can't handle heavy workloads like the former can, to typically smaller. Each device shares equally in the functioning of the networking.

Result: Successfully created LAN and transferred the data packets

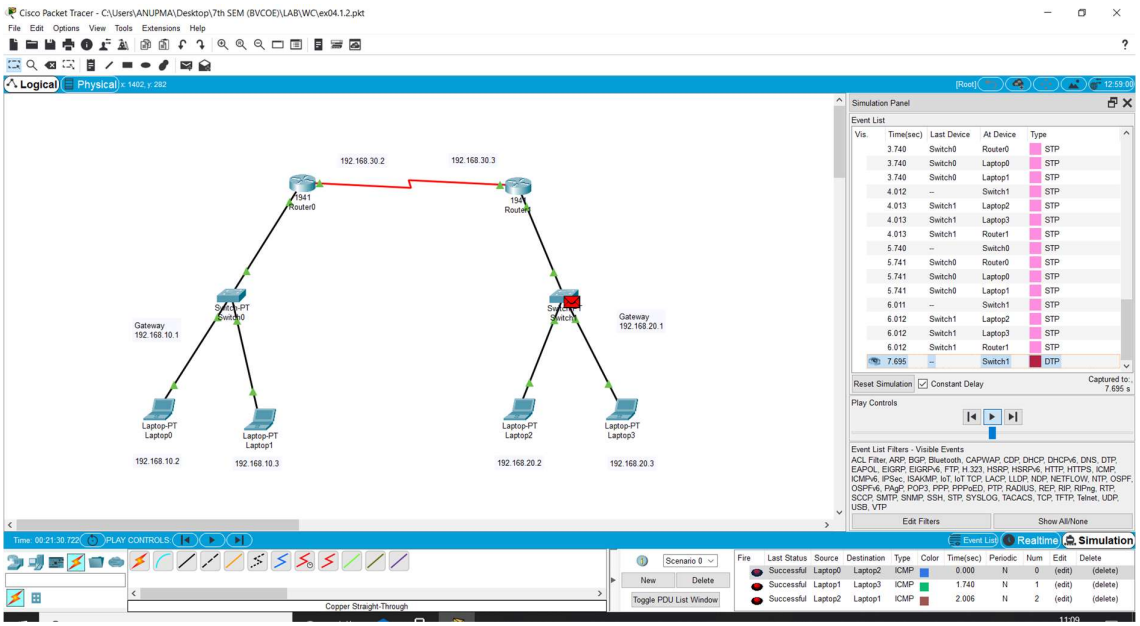
Sign.....

OUTPUT

Real Time Mode



Simulation Mode



DATE / /
PAGE NO

EXPERIMENT 5

Aim: Create a network and transfer packet using RIP routing packet tracer.

Software Used: Cisco Packet Tracer

Theory:

RIP (Routing Information Protocol) based on routers to exchange network topology information

Uses hop count as a routing metric to find the best path b/w source and destination network.

-> Characterised as an interior gateway protocol, and is typically used in small / med networks

-> RIP uses a distance vector algorithm to decide which path to path to put a packet on to get its destination.

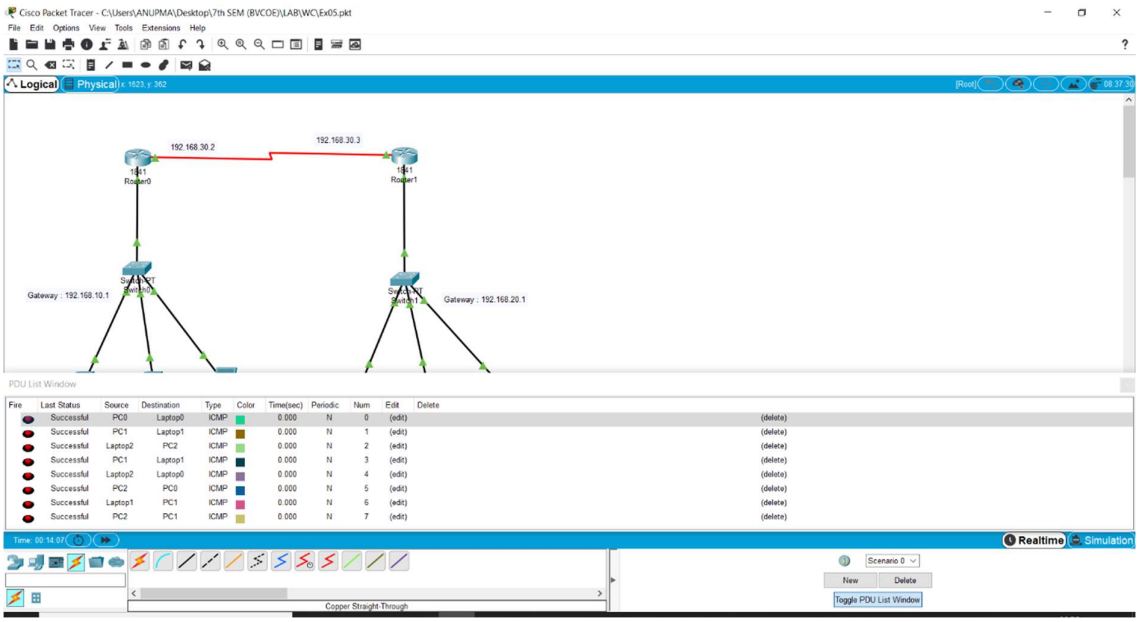
-> Each RIP router maintains a routing table, which is a list of all the destinations the routers knows how to reach.

Result Successfully created the network and transferred the packets using RIP routing.

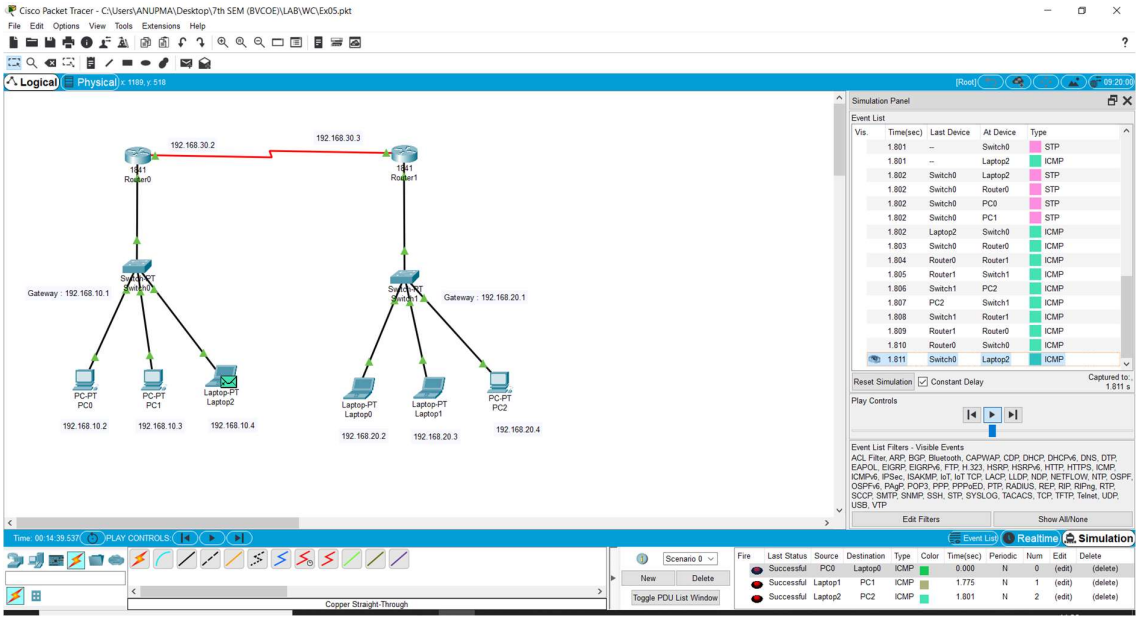
Sign.....

OUTPUT

Real Time Mode



Simulation Mode



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PAGE NO:

EXPERIMENT 6

Aim: Create a network using different types of topology. (Bus, Star, Ring, Mesh, Hybrid) and transfer packets.

Software Used: Cisco Packet Tracer

Theory:

Topology: Arrangement of a network which comprises of nodes and connecting lines via sender and receiver is referred as network topology. Various topologies are:

i) Bus - Every computer and network device is connected to single cable. Transmits data in a single direction.

ii) Star - All devices are connected to single cable. Transmits data in single direction. Hub is the central node can be active or passive. Active hubs have repeaters in them

iii) Mesh - Every Device is connected to another device in a particular channel. For N devices, total no. of ports required by each device is N-1 & the no. of dedicated links required is ${}^{N}C_{2}$

iv) Ring: is formed connecting devices with its exactly two neighbouring devices. To prevent data loss, repeaters are used. One station is known as monitor station and takes all responsibility to perform the operation

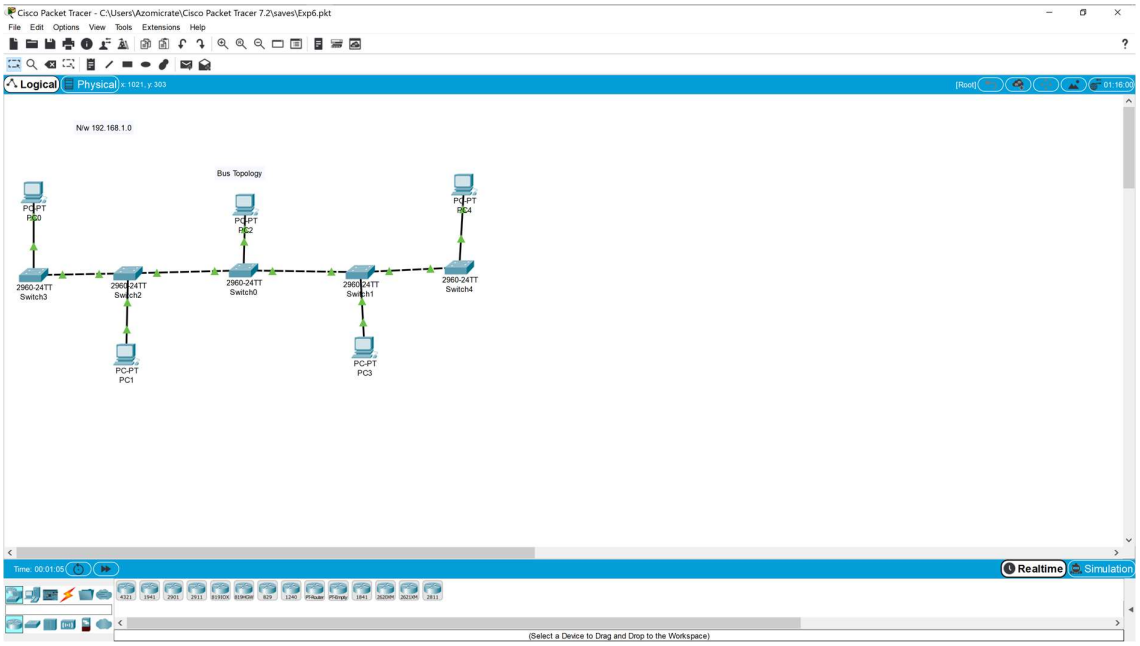
v) Hybrid: a combination of two or more topology. For e.g. a combination of star and mesh or bus.

Result: Successfully created networks of different topologies: Bus, Star, ring, Mesh and hybrid and transfered the data packets.

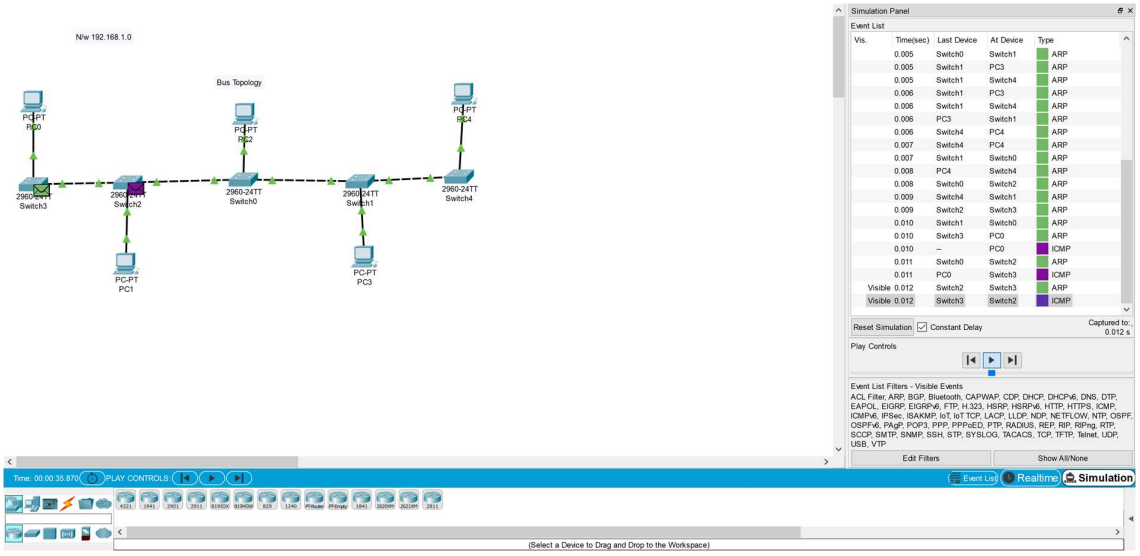
Sign.....

OUTPUT

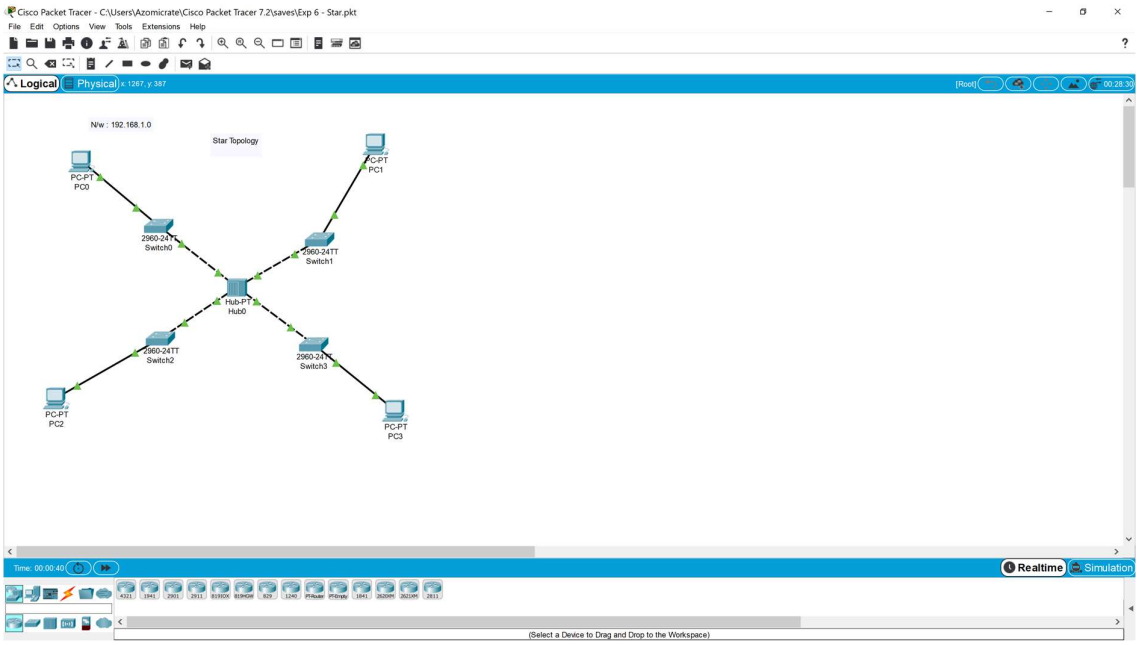
Real Time mode



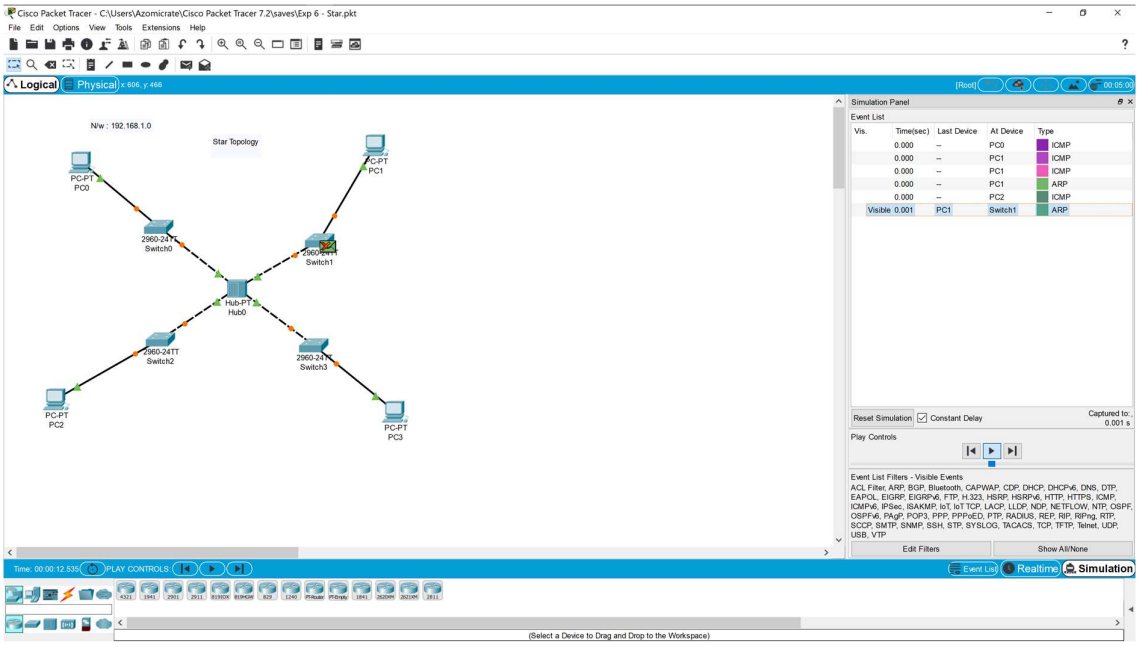
Simulation mode



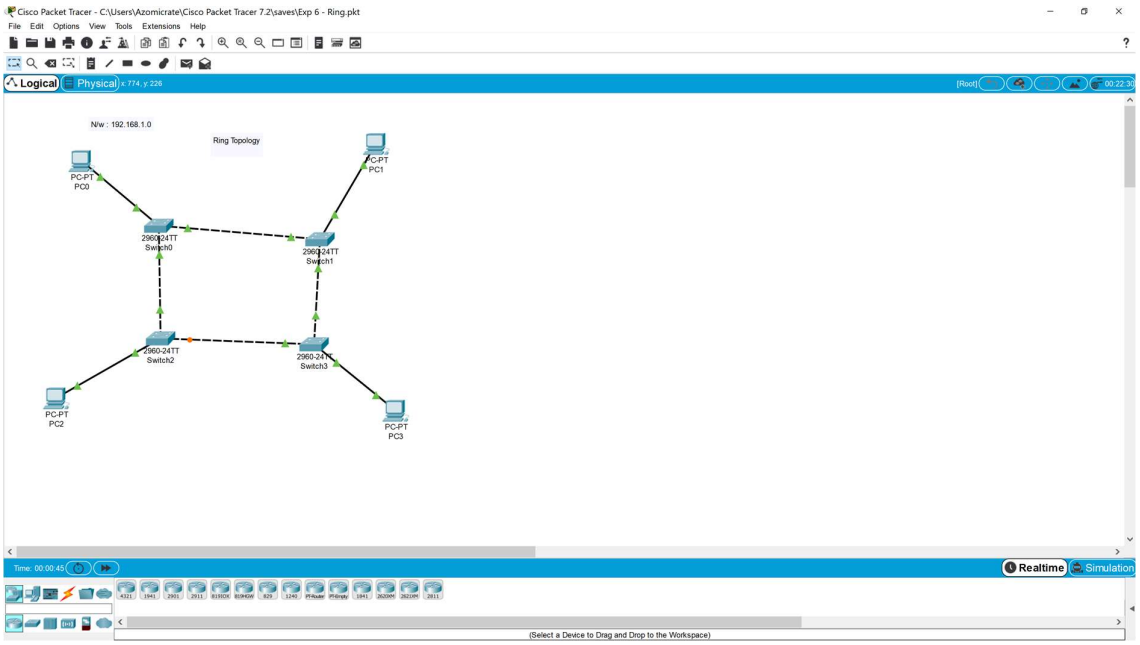
Real Time mode



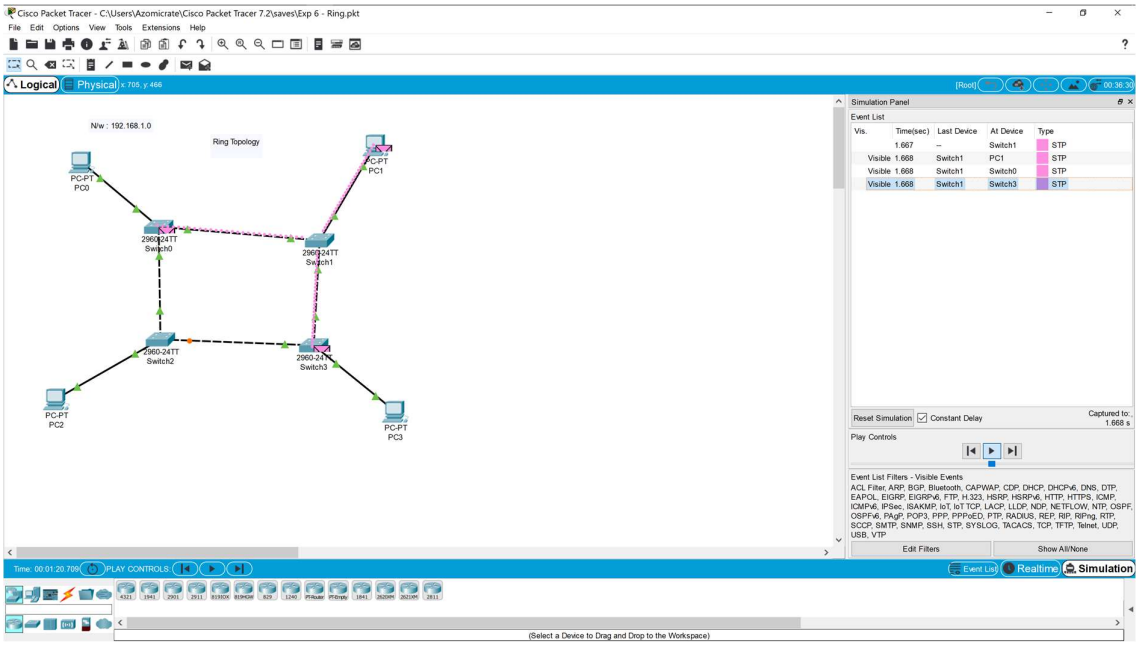
Simulation mode



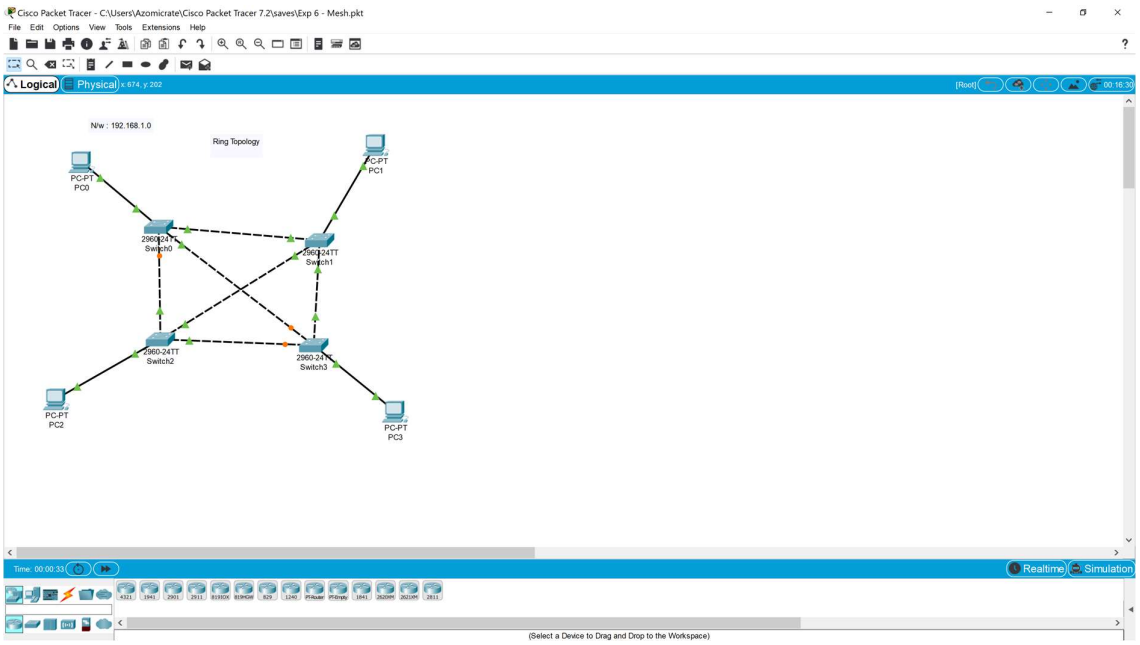
Real Time mode



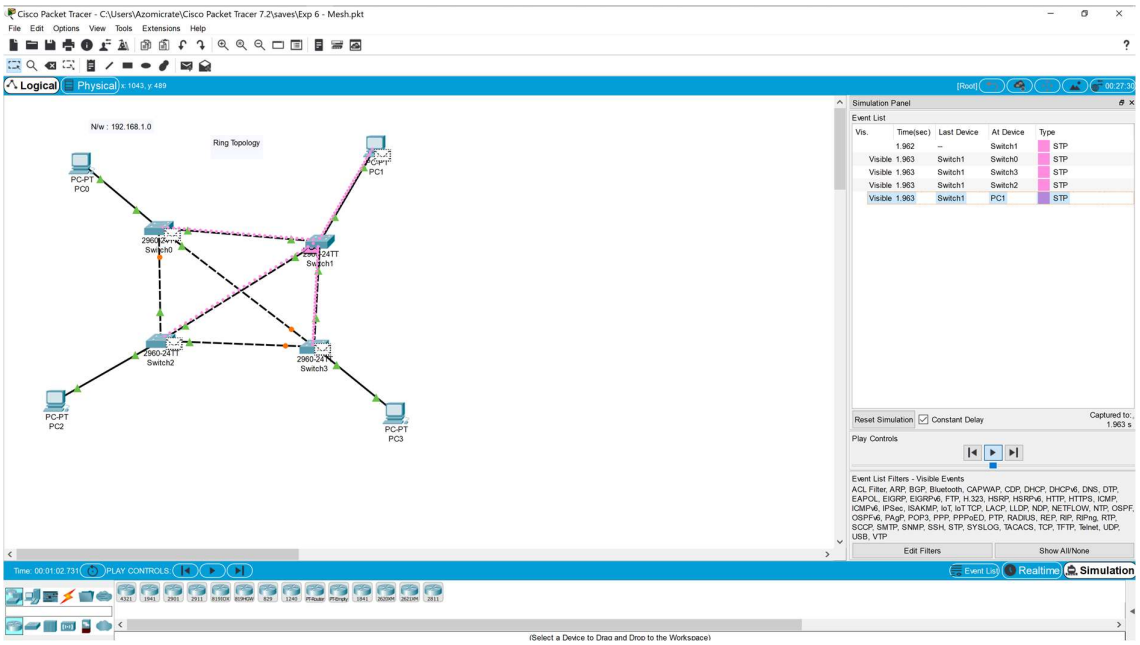
Simulation mode



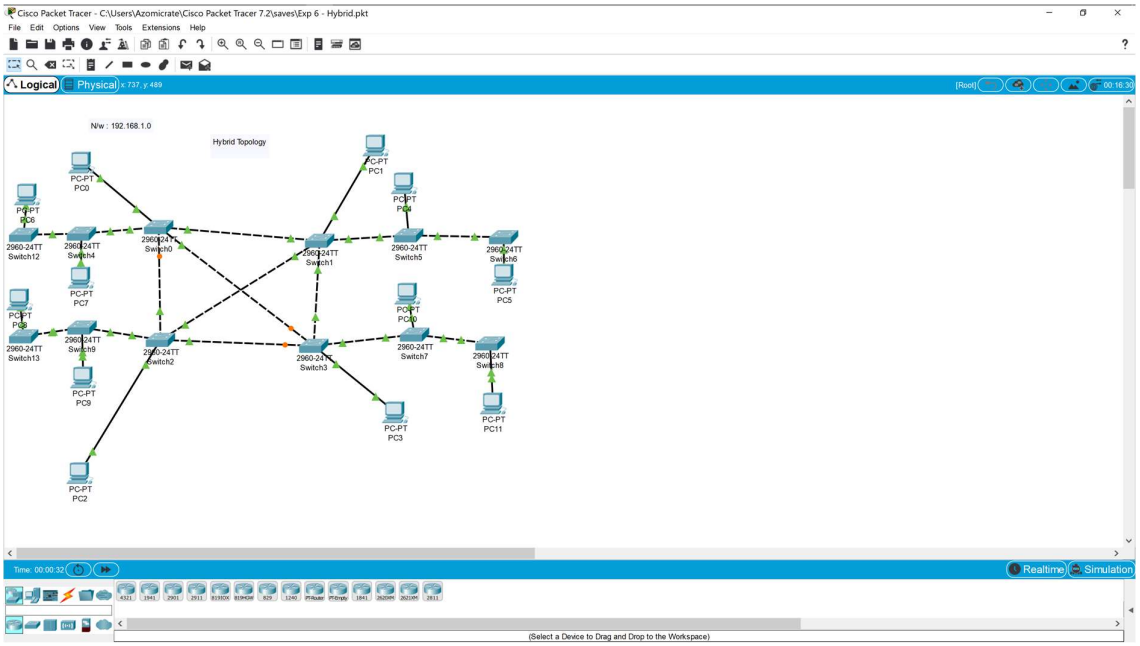
Real Time mode



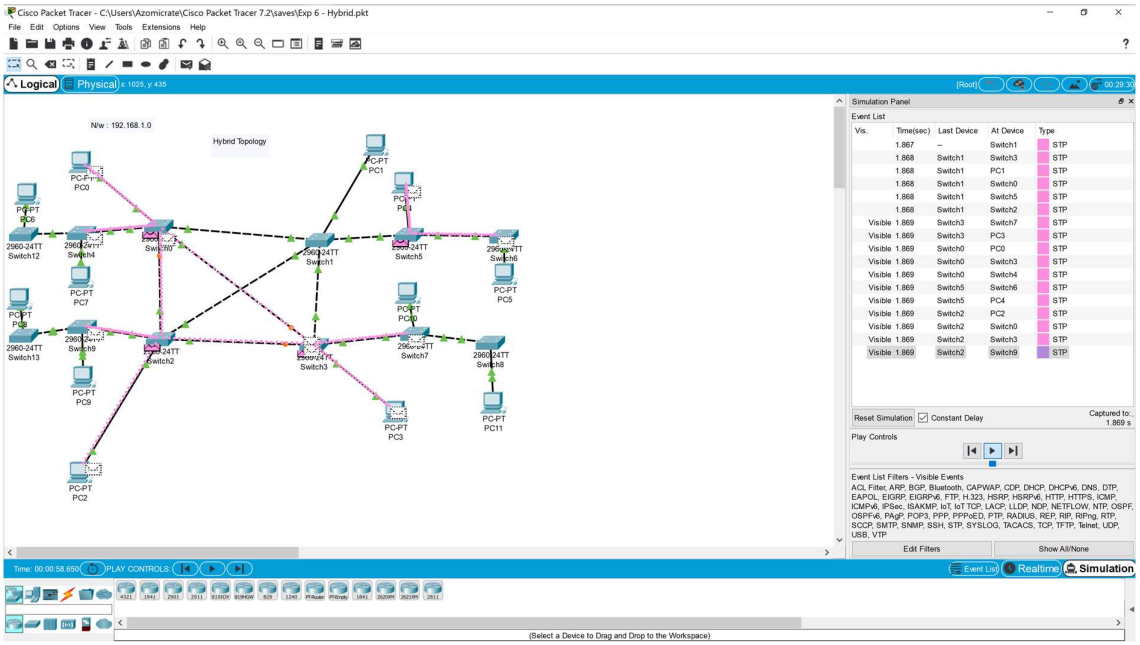
Simulation mode



Real Time mode



Simulation mode



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PAGE NO:

EXPERIMENT 7

Aim: To study GSM trainer kit and control function of Transmitter & Receiver.

Hardware Used: Scientech 2132 mobile phone trainer kit, Scientech 2133 GSM trainer kit.

Theory Global system for Mobile communication platform is a modem or mobile equipment for transmission of voice & data calls as well as SMS in GSM Network. To control the GSM modem there is an advanced set of AT commands according to GSM ETSI 07.07 & 07.05 implemented. The GSM standard has established itself across continents. The platform is well suited for studying AT commands by camping to real networks using SIM card.

ST2133 functions/features:

1. USB interface for communication.
2. Best suitable for IOT Gateway Application
3. External Connector to interface with any microcontroller
4. Easy understanding of AT commands
5. Real time operation
6. External Antenna

Procedure

1) Insert the SIM & power 'ON' the timer
2) Make a call to or from the trainer
3) Keep the call 'ON'.
4) Connect the probe of spectrum analyzer at TP(1) & observe the signal.
5) Now connect the probe to TP(2), observe in Rx band.
6) Connect 2 probe of CRO one at TP(3) & other on TP(4) observe the Rx burst. A similar Tx burst can be observed by connecting TP(5) & TP(6

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PAGE NO

EXPERIMENT 8

Aim To implement GMSK modulation technique used in GSM

Software Used : MATLAB

Theory :

GMSK Modulation: is a form of modulation based on frequency shift keying that has no phase discontinuities & provides efficient use of spectrum as well as enabling high efficiency radio power amplifiers.

Soft Decision GMSK Demodulator: This model shows a system that includes convolutional coding & GMSK modulation. The receiver in this model includes 2 parallel paths, one that uses soft decisions & another that uses hard decisions. The model uses the bit error rate for the 2 paths to illustrate that the soft decision receiver performs better. Soft decisions enable the system to retain more information from the demodulation operation to use in the decoding operation.

Structure of the Model: Key components are:

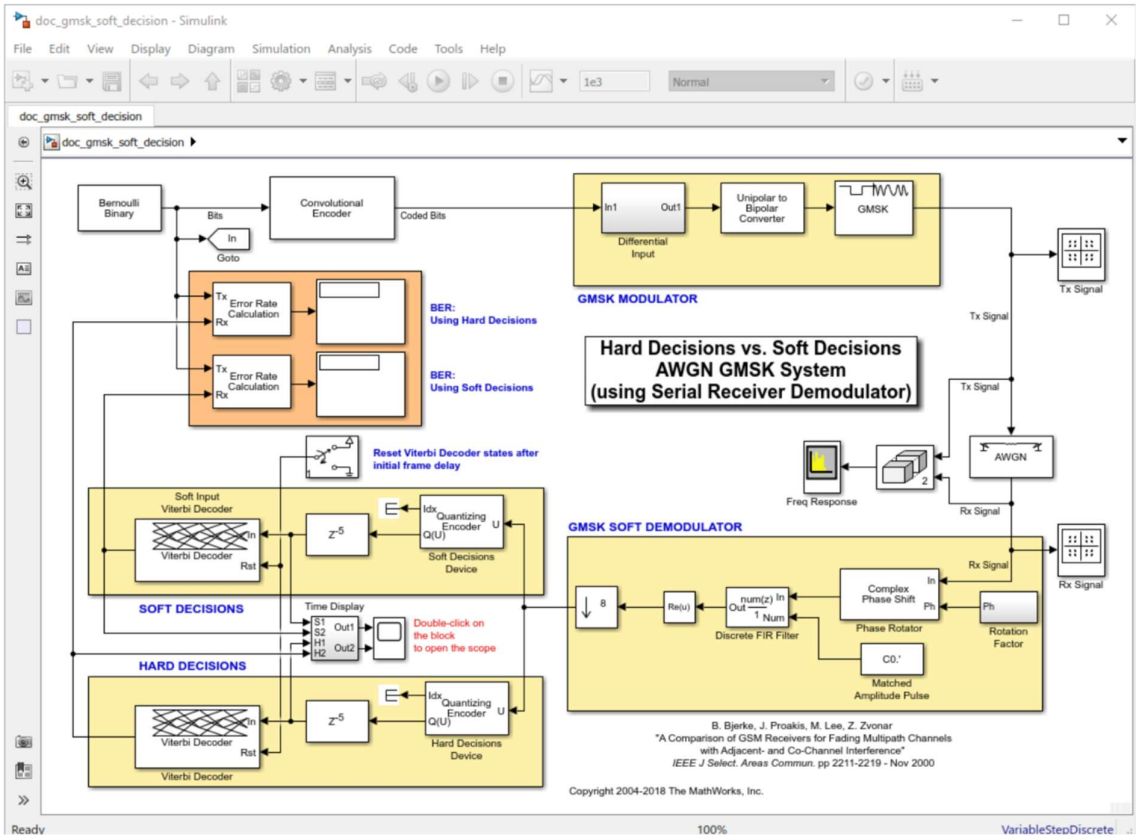
1) A Bernoulli Binary Generator block, which generates binary numbers
2) A convolutional encoder block, which encodes the binary numbers using a rate 1/2 convolutional code.
3) A GMSK demodulator section that implements the detector, called a serial receiver. It produces a noisy bipolar signal. The section labeled Soft decisions uses an 8-region partition in the Quantizing Encoder block to prepare 3 bit soft decision decoding using Viterbi decoder. The section hard decisions uses a 2-region to prepare for Hard decision Viterbi decoding. Using a 2 region partition here is equivalent to having the demodulator make hard decisions.
4) A GMSK modulator section, which complements the logical difference b/w successive bits & modulates the results using GMSK modulation Baseband

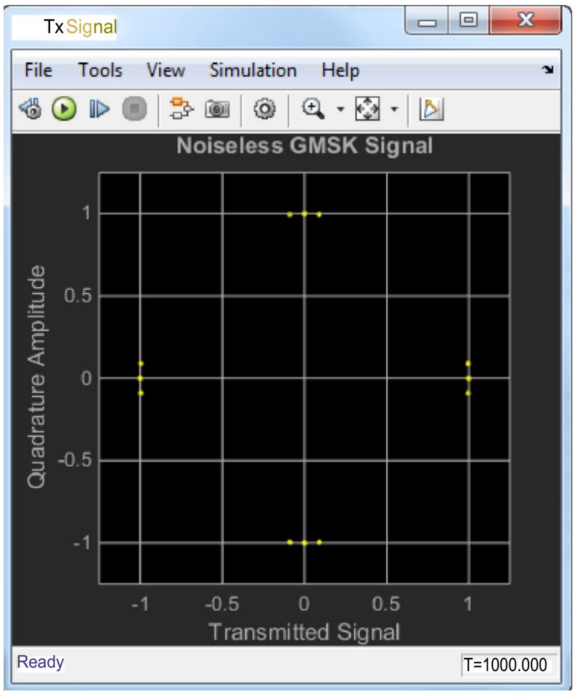
Sign

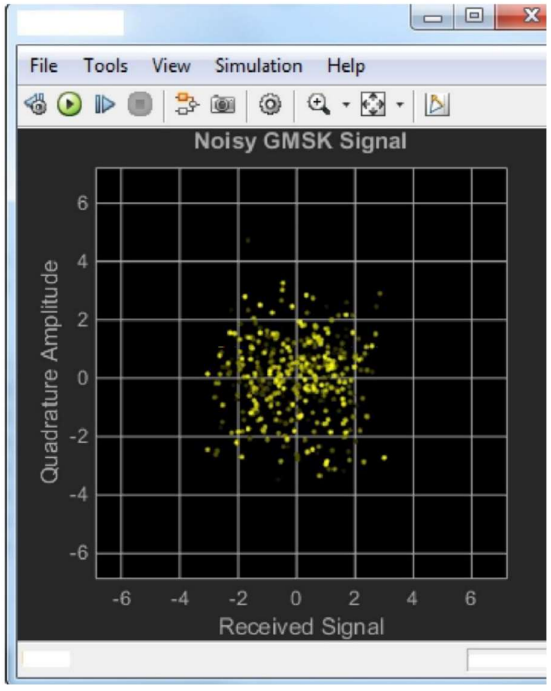
5 A pair of Error Rate Calculation blocks as well as Display (simulink) blocks that show the BER for the system with each type of decision

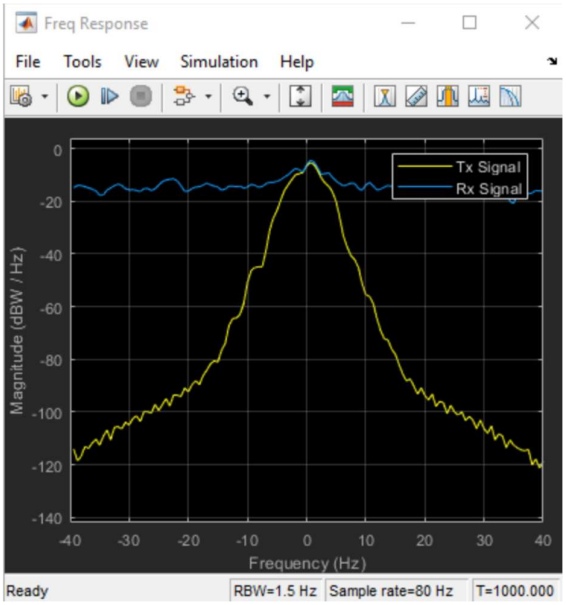
The Serial GMSK Receiver: It is based on the fact that GMSK can be represented as a combination of amplitude pulses & can therefore, be demodulated with a matched filter. The GMSK waveform used in this model has a BT product of 0.3 & a frequency pulse length of 4 symbols. As such it can be represented by 8 diff. amplitude pulses. The matched filter uses only the largest pulse of the 8, because of its simplicity of implementation. That yields BER performance that is inferior to more traditional Viterbi demodulator.

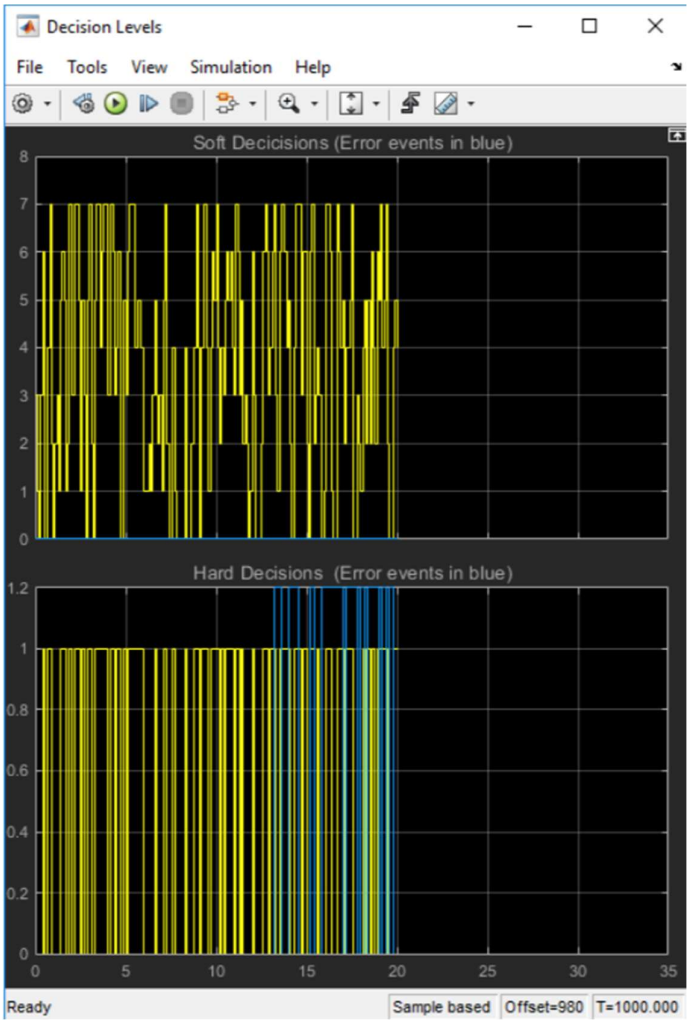
OUTPUT


doc_gmsk_soft_decision - Simulink
File Edit View Display Diagram Simulation Analysis Code Tools Help
Bernoulli Binary
Bits
Convolutional Encoder
Coded Bits
Goto
In1 Out1
Differential Input
Unipolar to Bipolar Converter
GMSK
GMSK MODULATOR
Tx Signal
Error Rate Calculation
BER: Using Hard Decisions
BER: Using Soft Decisions
Hard Decisions vs. Soft Decisions
AWGN GMSK System
(using Serial Receiver Demodulator)
Reset Viterbi Decoder states after initial frame delay
AWGN
Freq Response
Rx Signal
Soft Input Viterbi Decoder
Viterbi Decoder
Quantizing Encoder
Soft Decisions Device
SOFT DECISIONS
GMSK SOFT DEMODULATOR
Complex Phase Shift
Phase Rotator
Rotation Factor
Discrete FIR Filter
Matched Amplitude Pulse
Time Display
Double-click on the block to open the scope
HARD DECISIONS
Hard Decisions Device
B. Bjerke, J. Proakis, M. Lee, Z. Zvonar
"A Comparison of GSM Receivers for Fading Multipath Channels with Adjacent- and Co-Channel Interference"
IEEE J Select. Areas Commun. pp 2211-2219 - Nov 2000
Copyright 2004-2018 The MathWorks, Inc.
Ready
100%
VariableStepDiscrete


Tx Signal
File Tools View Simulation Help
Noiseless GMSK Signal
Quadrature Amplitude
Transmitted Signal
Ready
T=1000.000


File Tools View Simulation Help
Noisy GMSK Signal
Quadrature Amplitude
Received Signal


Freq Response
File Tools View Simulation Help
Tx Signal
Rx Signal
Magnitude (dBW / Hz)
0
-20
-40
-60
-80
-100
-120
-140
-40 -30 -20 -10 0 10 20 30 40
Frequency (Hz)
Ready
RBW=1.5 Hz
Sample rate=80 Hz
T=1000.000


Decision Levels
File Tools View Simulation Help
Soft Decicisions (Error events in blue)
8
7
6
5
4
3
2
1
0
Hard Decisions (Error events in blue)
1.2
1
0.8
0.6
0.4
0.2
0
0 5 10 15 20 25 30 35
Ready
Sample based
Offset=960
T=1000.000

DATE: / /
PAGE NO:

Content Beyond Syllabus 1

Aim: To implement a WAN network topology with the help of Cisco packet tracer.

Software Used: Cisco Packet Tracer

Theory: A Wide Area Network (WAN) is a collection of Local Area Networks (LANs) or other networks that communicate with one another. A WAN is essentially a network of networks. A WAN extends over a large geographical area for the primary purpose of computer networking. WAN are often established with leased telecommunication circuits..

WAN Router: A WAN Router, also known as an edge router or border router is a device that routes data packets b/w WAN locations giving an enterprise access to a carrier network. Several WAN protocols have been developed over time, including Packet over SONET/SDH, multiprotocol label switching (MPLS), ATM, & Frame Relay. A Rotater is a network device typically used to interconnect LANs to form a Wide Area Network (WAN) & as such is referred to as WAN device. IP routers us IP addresses to determine where to forward packets. An IP address is a numeric label assigned to each connected network device.

WAN Switch: A multipest internetworking device used in carrier networks. The devices typically switch traffic such as ATM & operate at the Data link layer of OSI Reference model. Public switched telephone networks switched may also be used within the cloud for circuit-switched connections like Integrated services digital network (ISDN) of analogue dialups.

Crossover Cable: Connects 2 devices of same type

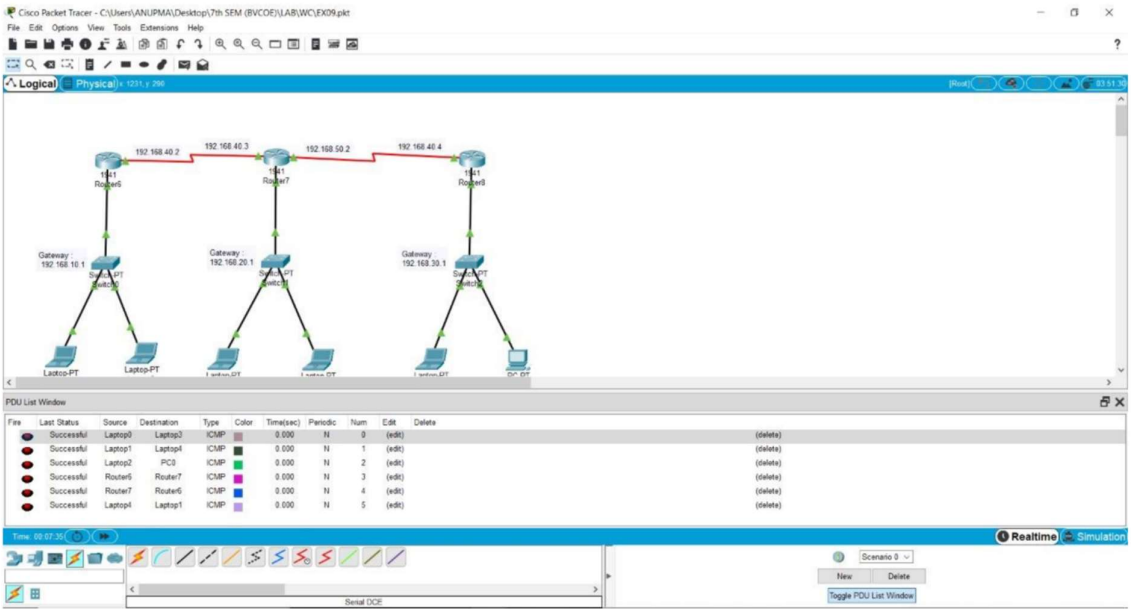
Straight through cable: A type of twisted pair cable that is used in a local area network or wide area network to connect a computer to network hub such as a router.

Be Positive

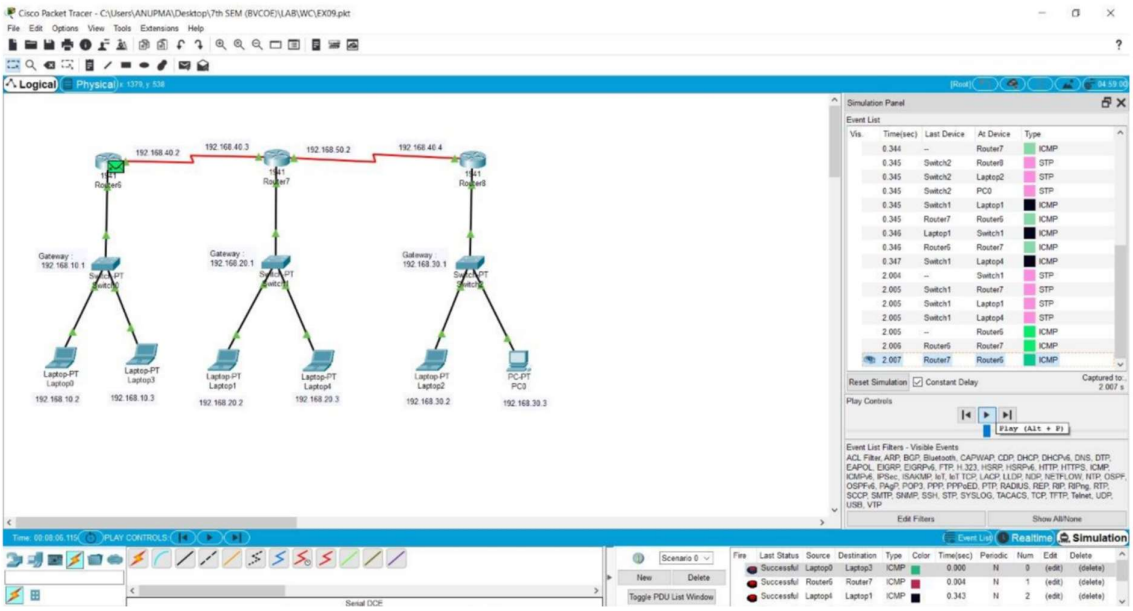
Sign.....

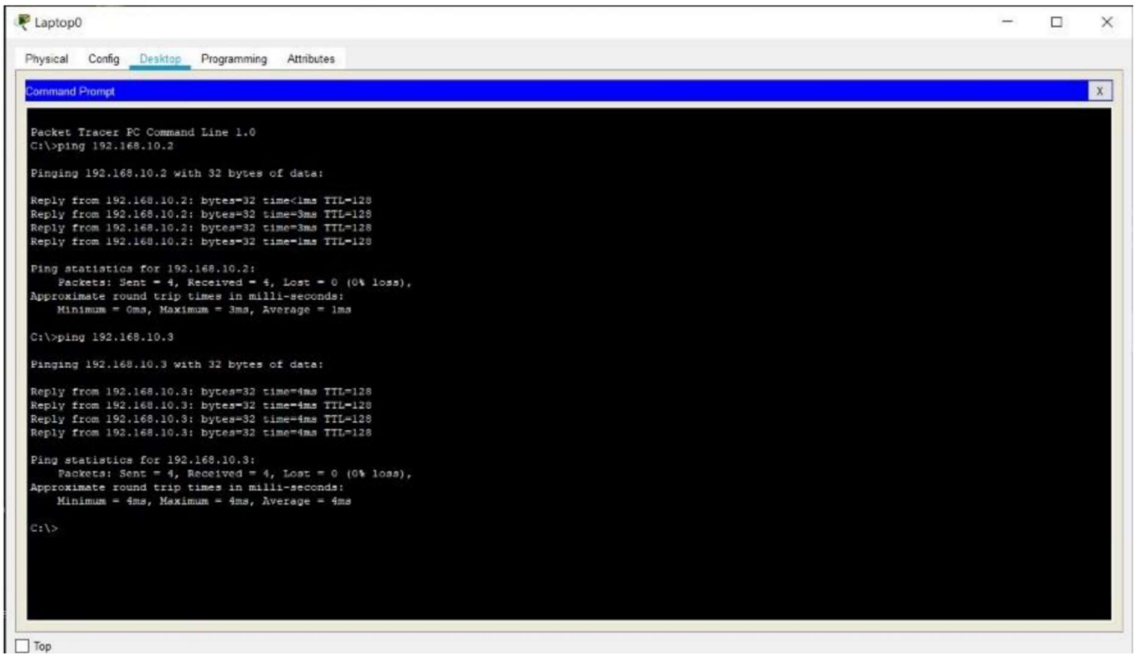
OUTPUT

Real Time mode



Simulation mode




Laptop0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2
Pinging 192.168.10.2 with 32 bytes of data:
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time=3ms TTL=128
Reply from 192.168.10.2: bytes=32 time=3ms TTL=128
Reply from 192.168.10.2: bytes=32 time=1ms TTL=128
Ping statistics for 192.168.10.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 3ms, Average = 1ms
C:\>ping 192.168.10.3
Pinging 192.168.10.3 with 32 bytes of data:
Reply from 192.168.10.3: bytes=32 time=4ms TTL=128
Reply from 192.168.10.3: bytes=32 time=4ms TTL=128
Reply from 192.168.10.3: bytes=32 time=4ms TTL=128
Reply from 192.168.10.3: bytes=32 time=4ms TTL=128
Ping statistics for 192.168.10.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 4ms, Average = 4ms
C:\>
Top

DATE: / /
PAGE NO:

CONTENT BEYOND SYLLABUS 2

Aim To implement a RIP based WAN technology

Software Used: Cisco Packet Tracer

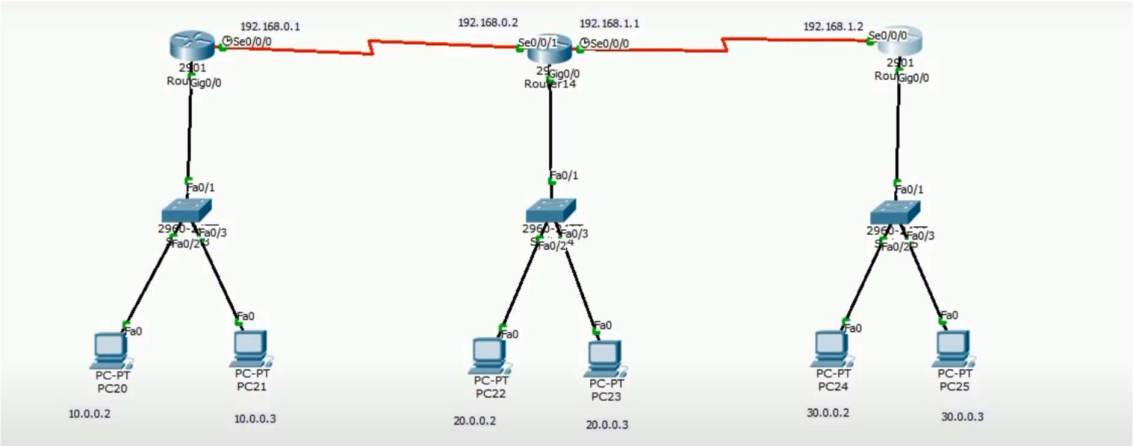
Theory: A Wide Area Network (WAN) is a collection of Local Area Networks or other Networks that communicate with one another. A WAN is essentially a network of networks, with the internet the world's largest WAN. A WAN is a telecommunication network that extends over a large geographical area for the primary purpose of computer networking. WAN is established with leased telecommunication circuits.

Routing Information Protocol

It is a protocol that routers can use to exchange network topology information which uses hop count as a routing metric to find the best path between the source and the destination network. RIP uses distances vector algorithm and decide which path to put a packet on to get to its destination. Each RIP routers maintain a routing table which is a list of all the destinations the routers know to reach.

Sign.....

Output



RIP configuration