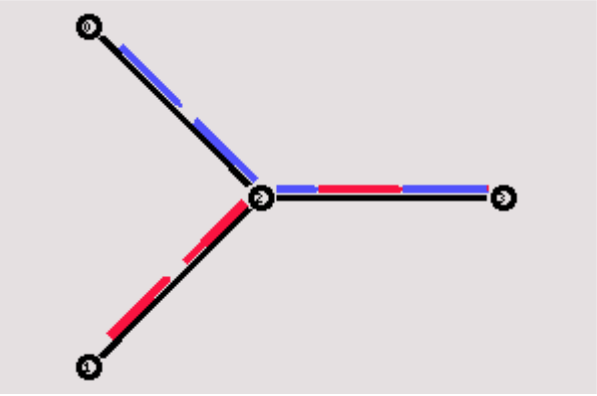
CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY
FACULTY OF TECHNOLOGY AND ENGINEERING
Department of Information Technology

Subject Name: COMPUTER NETWORKS **Semester:** V
Subject Code: IT344 **A.Y.:** 2018-19

Practical List

Instructions:
File Format: Aim, Knowledge Required, Theory, Algorithm, Program, Input and Output, Conclusion, Questions and Answers.

Sr. No.	Aim	Hrs.
	Basics & Compilation of NS-2	
	In telecommunications, a point-to-point connection refers to a communications connection between two nodes or endpoints. An example is a telephone call, in which one telephone is connected with one other, and what is said by one caller can only be heard by the other. This is contrasted with a point-to-multipoint or broadcast connection, in which many nodes can receive information transmitted by one node. Other examples of point-to-point communications links are leased lines, microwave relay links, and two way radio. The term is also used in computer networking and computer architecture to refer to a wire or other connection that links only two computers or circuits, as opposed to other network topologies such as buses or crossbar switches which can connect many communications devices. A point-to-point connection is one of the most common types of WAN connection. PPP connections are used to connect LANs to service provider WANs, and to connect LAN segments within an organization network. A LAN-to-WAN point-to-point connection is also referred to as a serial connection or leased-line connection because the lines are leased from a carrier (usually a telephone company) and are dedicated for use by the company leasing the lines.Simply, when you establish a connection to your ISP (Internet Service Provider) through a modem. The connection between the ISP and you make up two points on the network. Therefore, the protocol that is used for establishing this connectivity between the two of you is the Point-to-Point Protocol or the PPP.	
1	**A.** Design simple tcl script for Wired topology of 4 nodes in NS-2 and analyze various tcl parameters like network nodes, links, queues and topology. Queue Size :- 5 ,Duplex Link , Queue Type Droptail. 	2

Link	Bandwidth	Delay
no-n2	10Mbps	10ms
n1-n2	10Mbps	10ms
n2-n3	5Mbps	10ms

ftp0:
Packet Size: 1000
Rate: 1
Interval: 150

B.

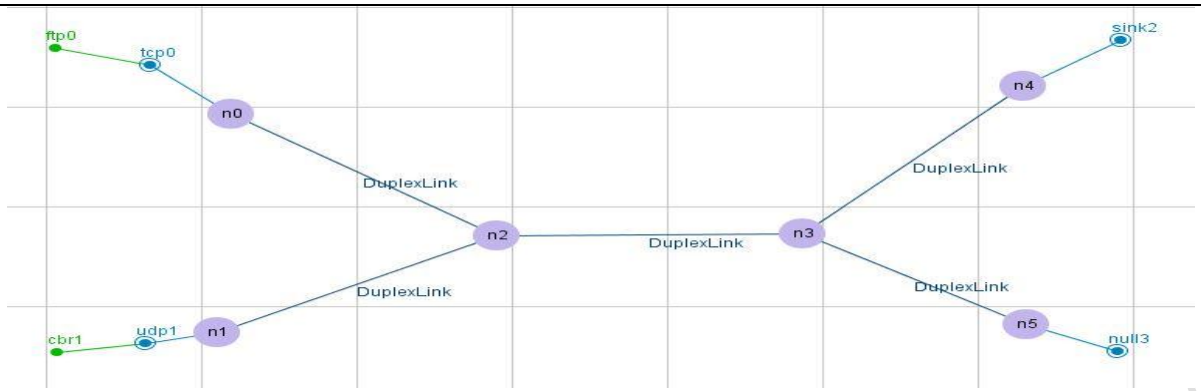
Design simple tcl script for Wired topology of 6 nodes in NS-2 and analyze various tcl parameters like network nodes, links, queues and topology.

Set the following parameters for Duplex Link:

Link	Bandwidth	Delay	Queue Type	Queue Size	
no-n2	10Mbps	10ms	RED	10	
n1-n2	10Mbps	10ms	RED	10	
n2-n3	5Mbps	???	RED	???	
n3-n4	10Mbps	10ms	RED	10	
n3-n5	10Mbps	10ms	RED	10	

ftp0:- (Both node with ftp)
Packet Size: 1000
Rate: 1
Interval: 150
cbr0:- (Both node with cbr)
Packet Size: 1500
Rate: 0.05
Interval: 150
Total Simulation Time: 90sec

2 **A.**
To demonstrate various queuing mechanisms and make comparative analysis of various queuing techniques. (using trace file) (Droptail, RED,SFQ,FQ,FIFO) 04



Set the following parameters for Duplex Link:

Link	Bandwidth	Delay	Queue Type	Queue Size
no-n2	10Mbps	10ms	RED	10
n1-n2	10Mbps	10ms	RED	10
n2-n3	5Mbps	???	RED	???
n3-n4	10Mbps	10ms	RED	10
n3-n5	10Mbps	10ms	RED	10

ftp0:n0

Packet Size: 1000

Rate: 1

Interval: 150

cbr0:n1

Packet Size: 1500

Rate: 0.05

Interval: 150

Total Simulation Time: 90sec

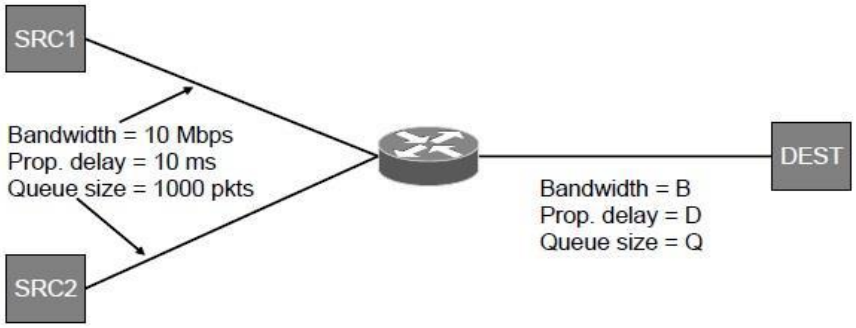
B.

To demonstrate the use of AWK script with NS2 trace file of scenario A. Find Out Throughput, Packet delivery ratio , Number Drop Packets for all Queues.

C.

As well as Change the parameters of scenario A in such a way that, packet loss becomes Zero, having all the parameters fixed except the queue size, and we have to change queue size and attain minimum packet loss.(For All Queue types) and generate Xgraph for Number of packet drop in each queue.

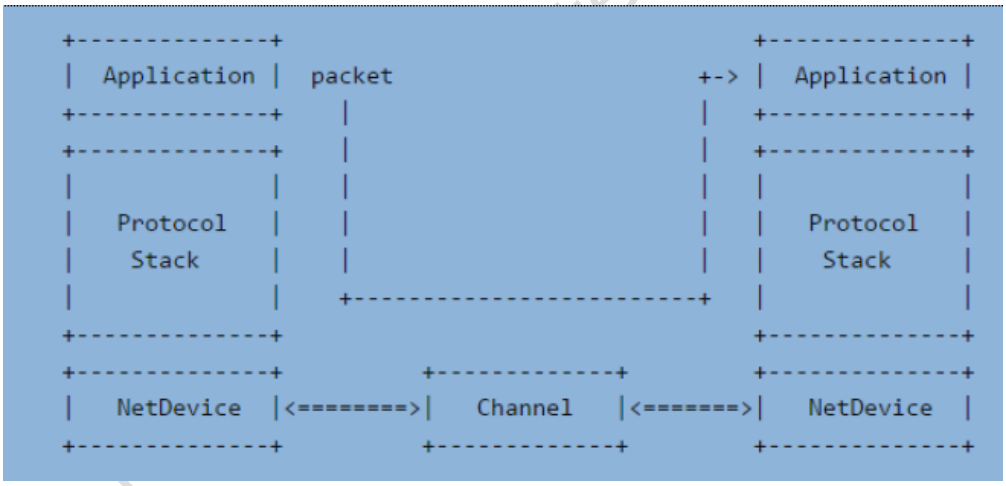
3.	Run a set of simulations using B=10 Mbps, D=10 ms, Q= 20 and draw xgraph of the following advertised windows: AW1=20, AW2=30 AW1=50, AW2=50 AW1=20, AW2=80 Consider the queue type = Drop tail	02



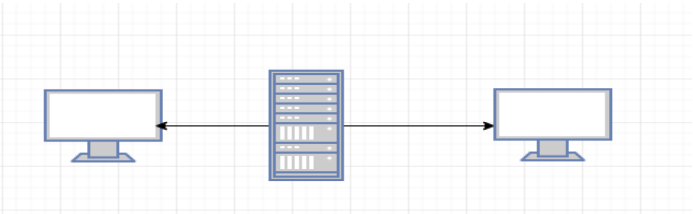
Note:- AW use in only tcp

Topological scenario using NS-3

4.	Briefing of Network Simulator • Introduction , Features and Network supported by NS3 and platform required to run Network Simulator • the waf build system • Backend Environment of Network Simulator • Installation steps of NS-3 in Ubuntu 14.04 or 16.04 LTS • Installation and configuration of NetAnim	4
5.	Design simple program for two nodes client server wired topology and analyze behavior of this topology by changing data rate and delay.(Point – to - Point)	2



Physicality and Topology key differentiator of industrial automation and control systems is the environment in which the manufacturing process is occurring. Physical constraints in the manufacturing industry are significant. The networking systems need to recognize challenges in spatial and environmental conditions. The end device may be located in physically disparate locations (up to miles away), and in non-controlled or even harsh conditions in terms of temperature, humidity, vibration, noise, explosiveness, electronic interference, and so forth. The physical layout of the manufacturing facility or the automation equipment also impacts the network topology for automation networks. Unlike traditional IT networks, which are largely redundant star topology networks, industrial automation and control networks have significant physical limitations that drive the use of topologies such as linear-bus and ring. In manufacturing plants with long production lines, or equipment with long runs and interconnected operations (such as a printing press, or similar types of equipment), it is often not feasible or cost-effective to use a redundant star topology. In manufacturing environments, the costs of cabling are significantly higher than typical office conditions to meet the harsh physical requirements. Although the redundant star network topology offers the best resiliency, convergence, and overall performance, the additional cabling complexity and constraints of a redundant star limit its applicability in manufacturing environments.In addition, current industrial

automation and control applications do not use significant bandwidth, and are therefore not significantly impacted by the potential bandwidth limitations of ring or linear-bus topologies. In many cases, the industrial automation and control network is a combination of topologies, with large rings connecting multiple star-based manufacturing cells.		
6.	Program in NS3 for connecting three nodes considering one node as a central node and generate trace file. 	02
7.	A Star Network Topology is best suited for smaller networks and works efficiently when there is limited number of nodes. One has to ensure that the hub or the central node is always working and extra security features should be added to the hub because it s the heart of the network. Program in NS3 to implement star topology and generate trace file as well as animation file.	02
8.	Program in NS3 to implement a bus topology and generate trace file as well as graph using gnu plot.	02
9	Program in NS3 for connecting multiple routers and nodes and building a hybrid topology and generate trace file as well as graph using gnuplot.	02
10	Every corporate network is unique, though there are guidelines and best practices in developing networks. As it is quite difficult to implement a pure topology within a company, using a hybrid network topology is considered a better solution. As a rule, such network assembles advantages and features of source topologies. This type of network topology means a conjunction of other network topologies. Such as star-bus, ring-mesh topologies, etc. It should be obviously diverse networks. The final computer network inherits both advantages and disadvantages of its ingredients. Hybrid networks combine two or more topologies in such a way that the resulting network does not exhibit one of the standard topologies (e.g., bus, star, ring, etc.). For example, a tree network (or star-bus network) is a hybrid topology in which star networks are interconnected via bus networks. However, a tree network connected to another tree network is still topologically a tree network, not a distinct network type. A hybrid topology is always produced when two different basic network topologies are connected. A star-ring network consists of two or more ring networks connected using a multi station access unit (MAU) as a centralized hub. Snowflake topology is a star network of star networks. So design a program in NS3 for connecting multiple routers and nodes and building a hybrid topology and then calculating network performance	04
11	To analyse network traces using wireshark software.	02
12 *	Bulk data transfer is software-based mechanism designed to move large data file using compression, blocking and buffering methods to optimize transfer times. Every single second of everyday, data moves from computer to another. Some move over the local area network, other over the wide area network or over the internet. Data can move from storage to another different physical media. But since these media have different capacities and transmission speeds. One of the most common ways to transfer bulk of data is by using the File Transfer Protocol (FTP). FTP is a client-server protocol which means that one computer acts as the server and another as the client. The FTP server runs a server software and constantly listens to requests on a network until a client initiates a request for file transfer. When the connection is established, the client can already do many sorts of files manipulation such as downloading, changing files names, creating folders, moving files between folders, and deleting files. An FTP server can services many simultaneous clients depending on the settings.	

	FTP runs over the TCP layers of the TCP/IP, a suite of protocols that the internet is heavily depending on for communication. FTP listens for connection on port 21. Program in NS3 to implement FTP using TCP bulk transfer.	

Prepared By:

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