DEBAGNIK KAR

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT)
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KIIT School of Electronics Engineering

1804373
ETC-06

WCN Lab Report (EC-3094)

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Experiment Number	01
Date of Experiment	15/12/2020
Date of Submission	12/01/2020
Name of student	Debagnik Kar
Roll Number	1804373
Section	ETC-06

Aim of the Experiment :-

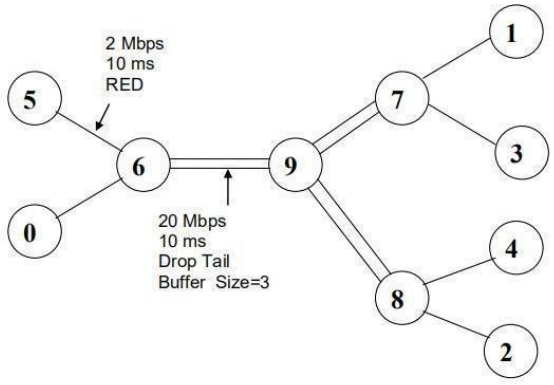
The aim of the experiment is simulation and calculation of throughput for a star connected network with 2 TCP and 1 UDP connection (using NS2 simulator).

Software Requirement :-

- Network Simulator 2
- Trace graph

Problem statement :-

Simulate and analyze the results for the following star connected network of 10 nodes with 2 TCP and 1 UDP connection (using NS2 Simulator).



In this network of 10 nodes (node ‘0’ through ‘9’), two FTP applications are running over TCP at nodes n(0) & n(1). Another CBR application is running over UDP at node n(2). The destinations of node 0, 1, 2 are 3, 4, and 5 respectively. The rest of the nodes are the intermediate routers. All the links are full duplex. Schedule: All the TCP connections start at 0.5 second and stop at 10.5 second. The UDP connection start at 1 sec and stops at 10 sec. Simulation time is from 0.5 sec to 11 sec.

Observation :-

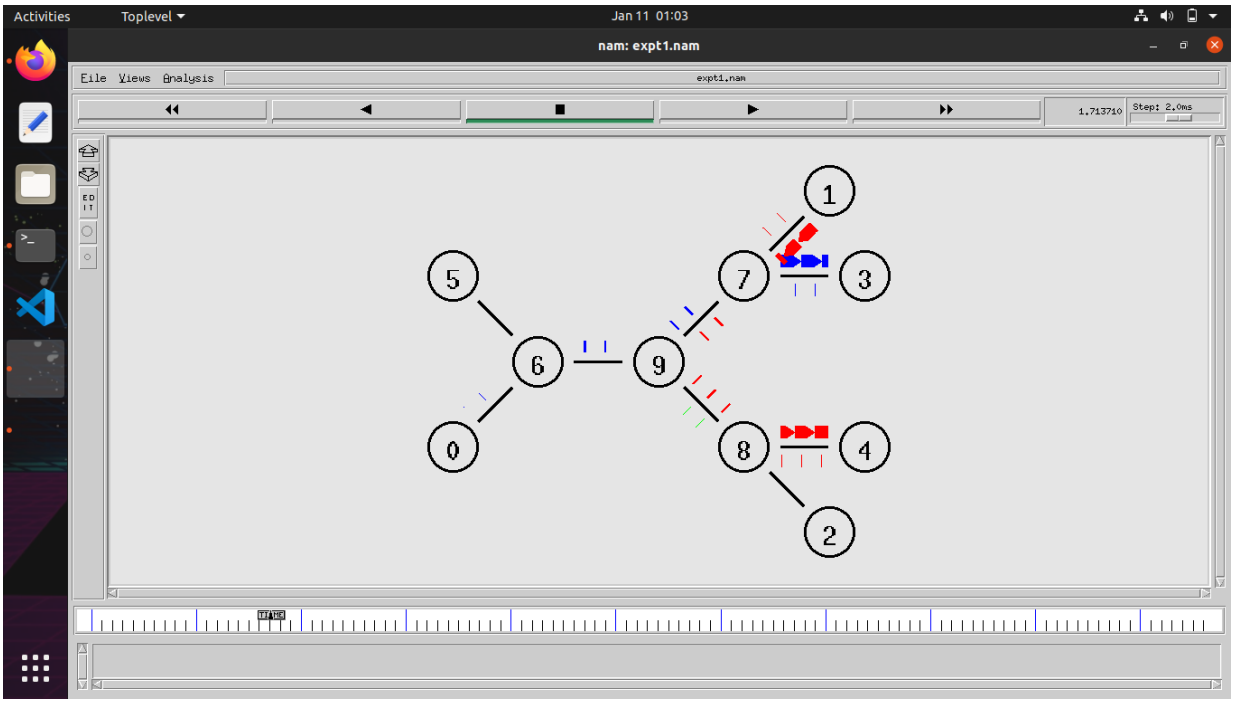


Fig 1.1: NAM Simulation of the code

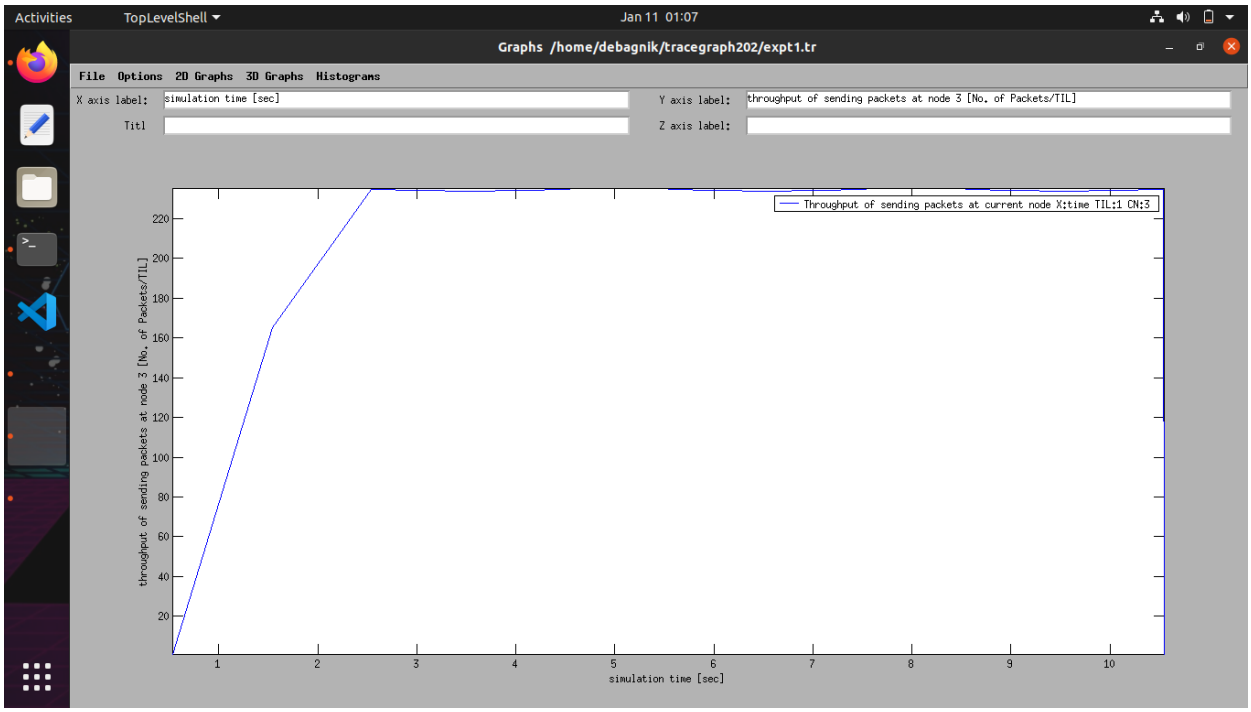


Fig 1.2: Throughput Diagram of sending packets at nodes 3

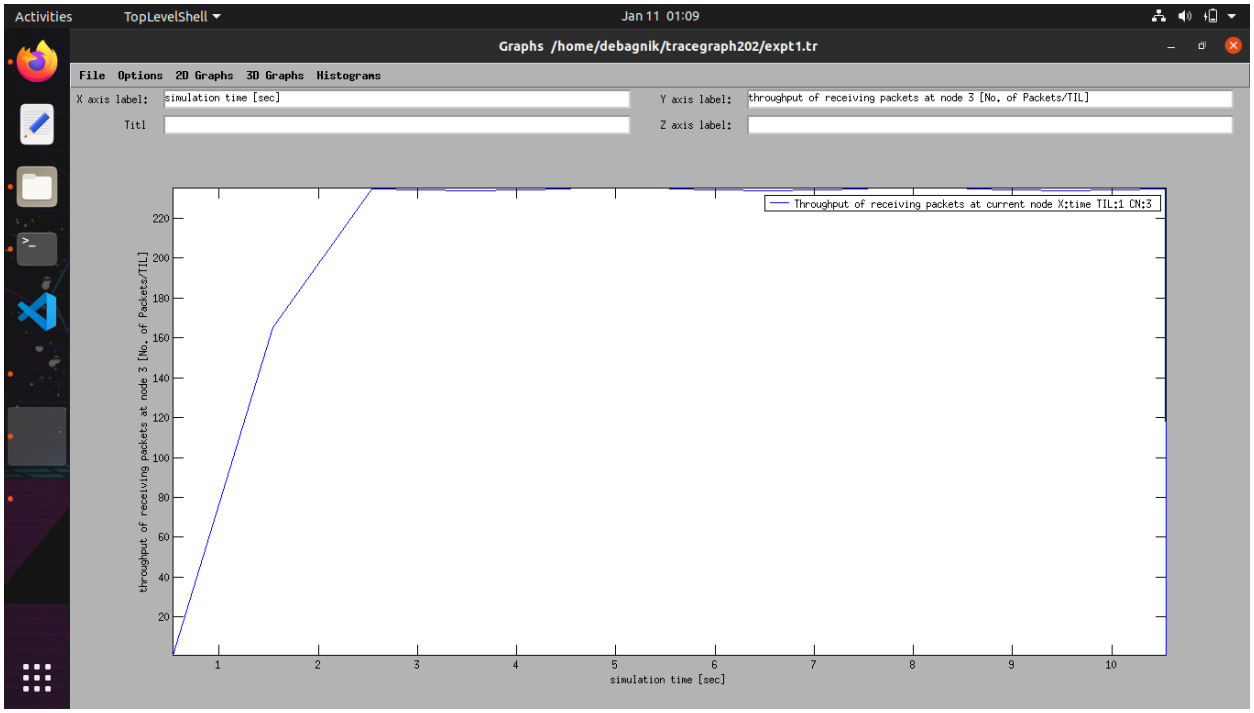


Fig 1.3: Throughput of receiving packets at current node

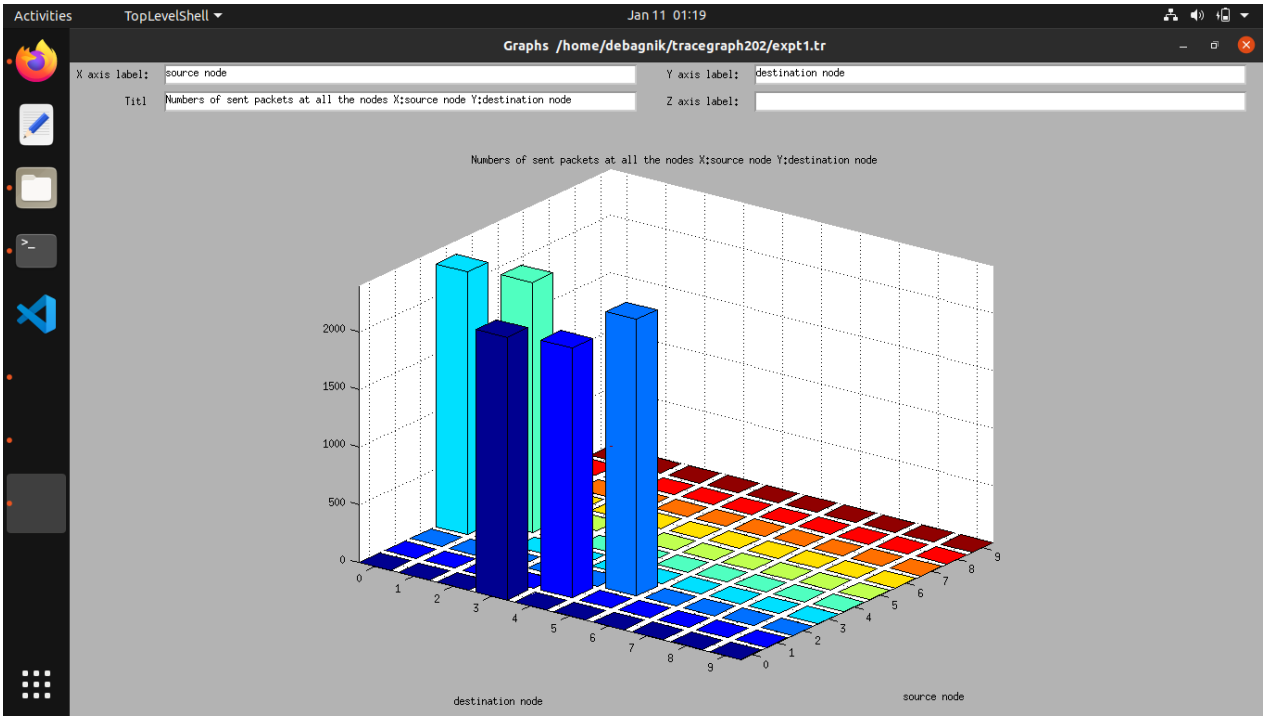


Fig 1.4: 3D diagram of number of packets at all the nodes

Conclusion :-

In this experiment we have constructed a star connected network and simulated with the help of NS2 software. After simulation both 2D and 3D graph was obtained and analyzed with the help of Trace Graph.

Experiment Number	02
Date of Experiment	22/12/2020
Date of Submission	12/01/2020
Name of student	Debagnik Kar
Roll Number	1804373
Section	ETC-06

Aim of the Experiment :-

Design and simulation of an IEEE 802.3 Ethernet Local Area Network (LAN) and observation of the TCP window using NS2 Simulator.

Software Requirement :-

- NS 2 (Network Simulator v2)
- NAM (Network Animator)
- Trace graph
- Xgraph

Theory:-

Ethernet is a set of technologies and protocols that are used primarily in LANs. It was first standardized in 1980s by IEEE 802.3 standard. IEEE 802.3 defines the physical layer and the medium access control (MAC) sub-layer of the data link layer for wired Ethernet networks. Ethernet is classified into two categories: classic Ethernet and switched Ethernet

IEEE 802.3: This was the original standard given for 10BASE-5. It used a thick single coaxial cable into which a connection can be tapped by drilling into the cable to the core. Here, 10 is the maximum throughput, i.e., 10 Mbps, BASE denoted use of baseband transmission, and 5 refers to the maximum segment length of 500m.

Observation :-

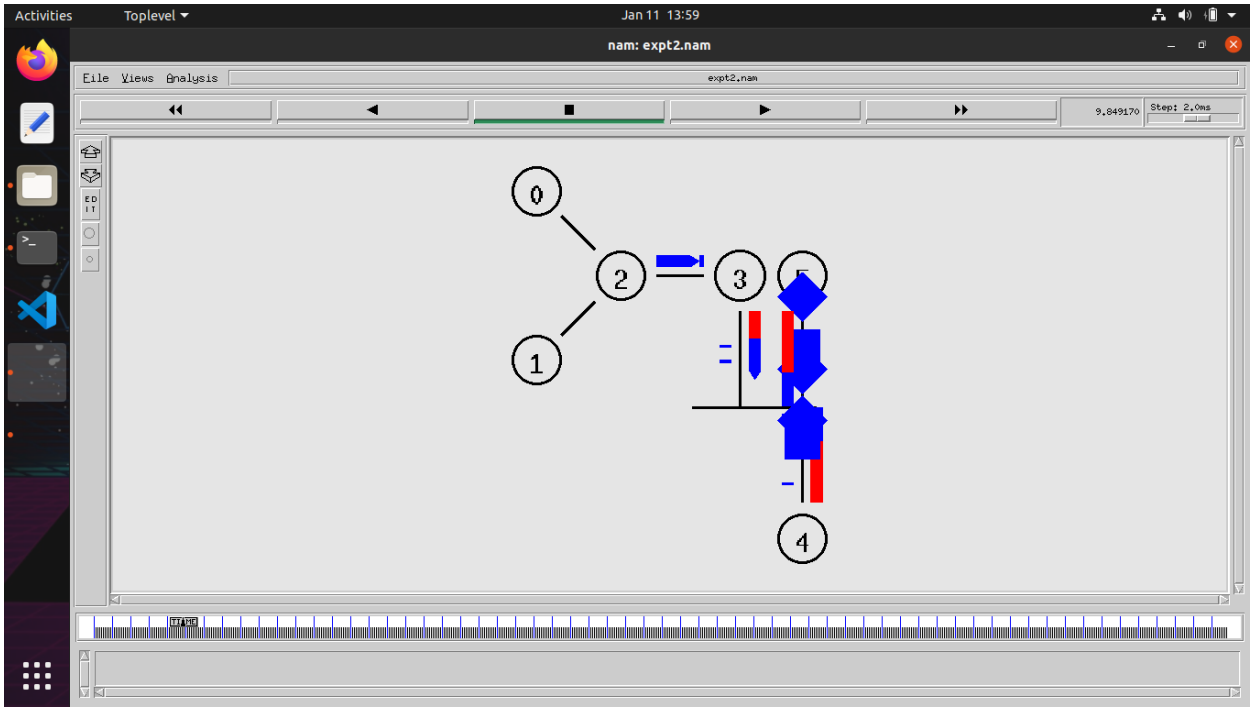


Fig 2.1: Network Animator simulation

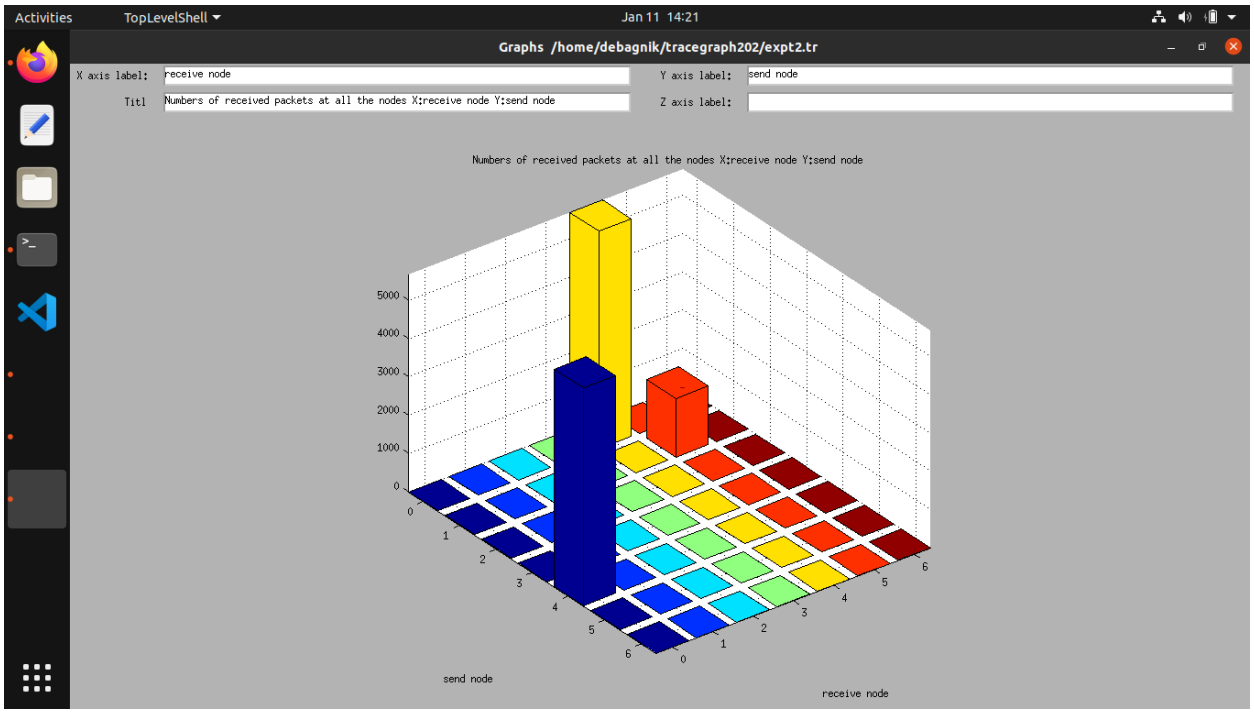


Fig 2.2: Graph of packets received at all nodes

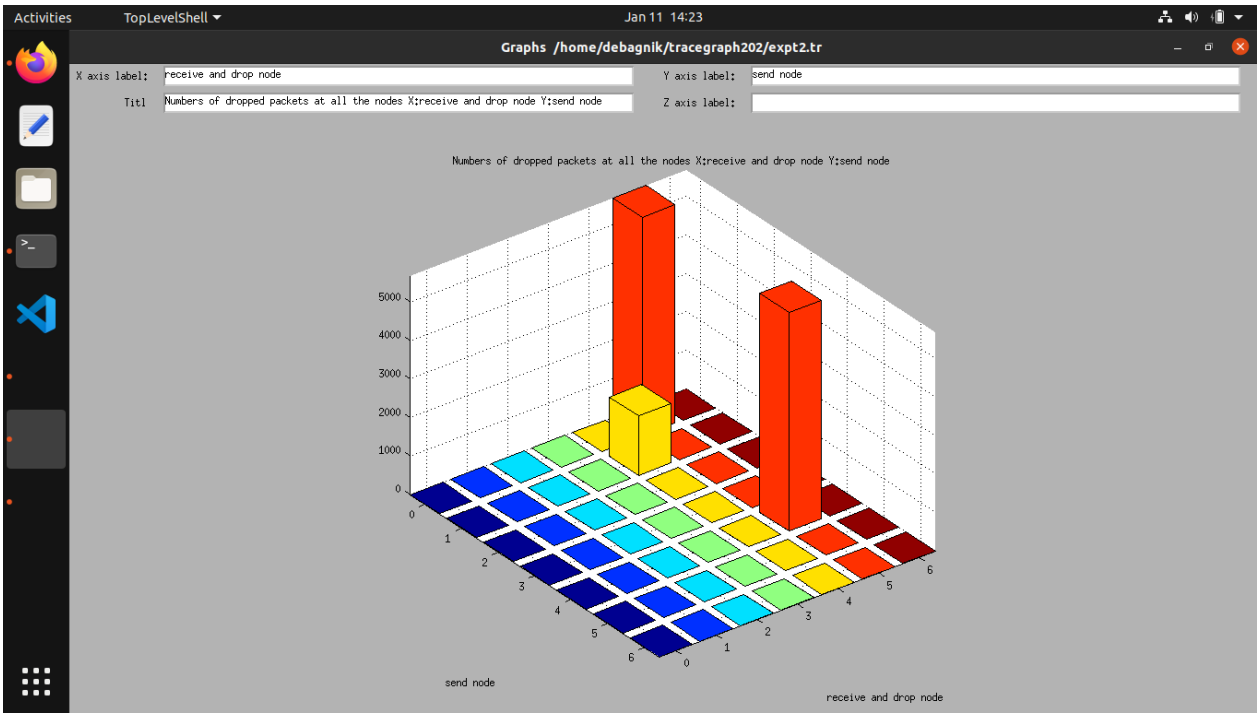


Fig 2.3: Graph of packets dropped at all nodes

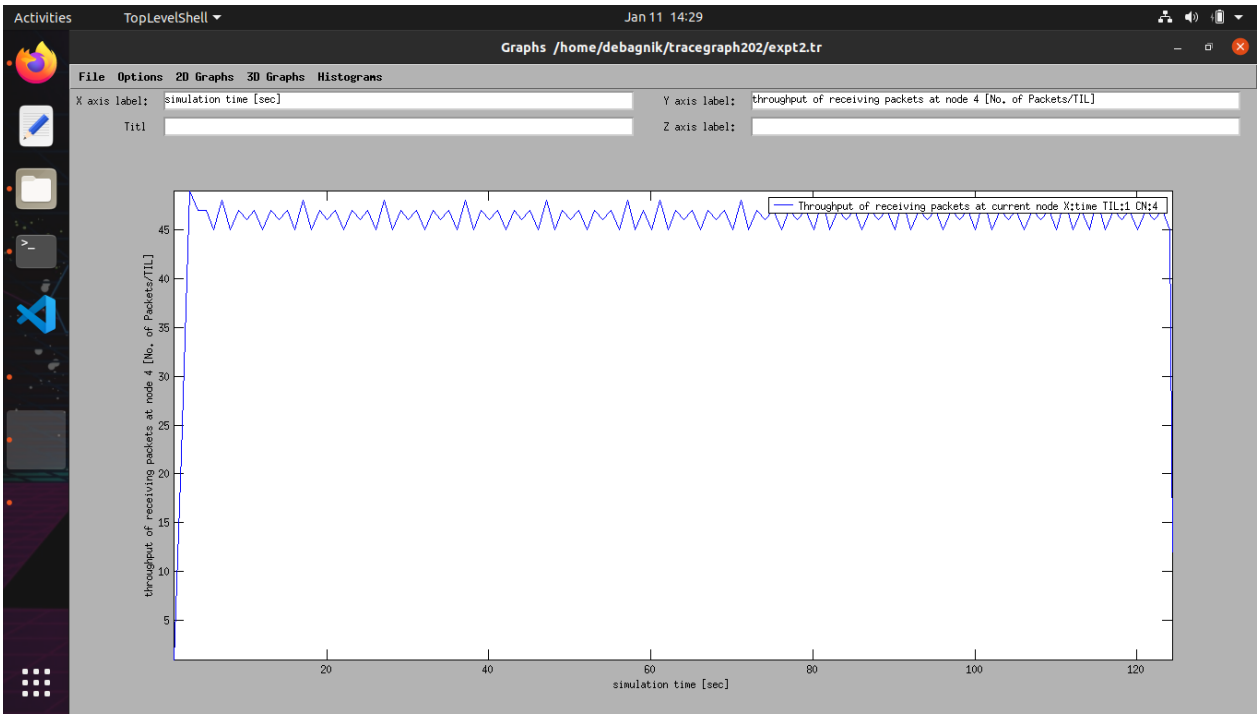


Fig 2.4: Throughput of the packets received between nodes 0 and 4

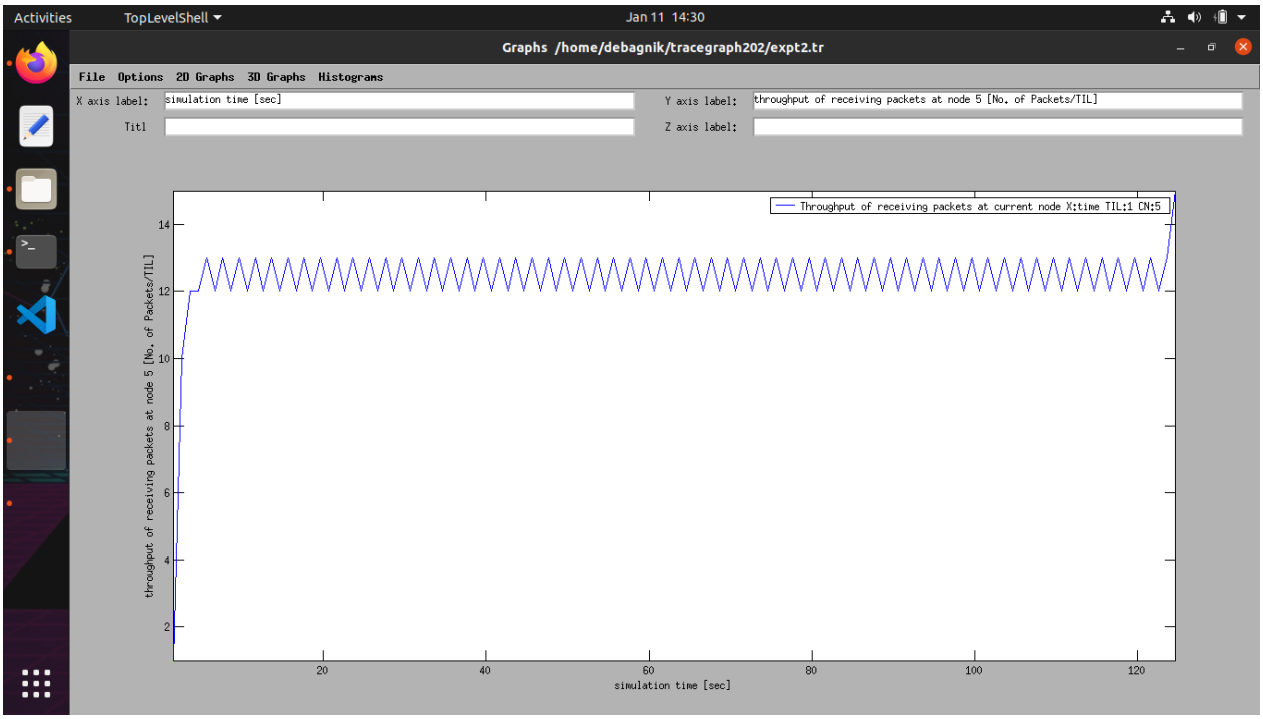


Fig 2.5: Throughput of the packet received between 1 and 5

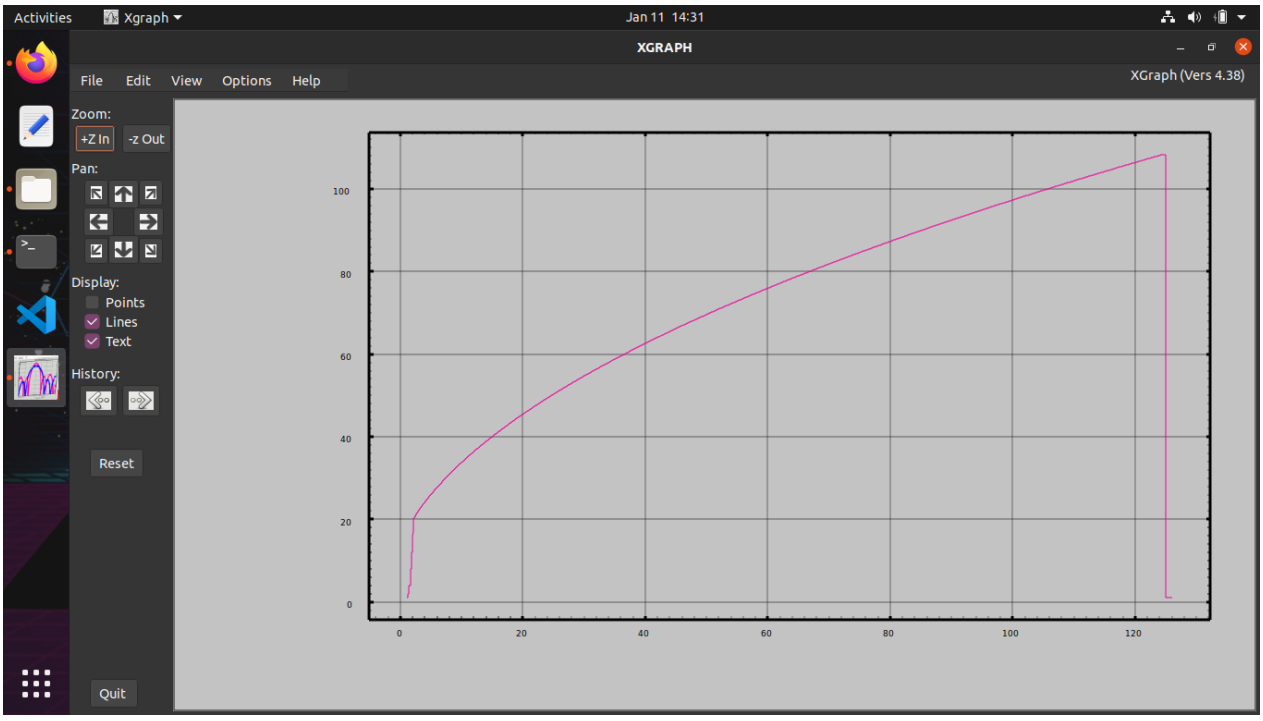


Fig 2.6: Plot of TCP Window by using XGraph

Conclusion :-

In this experiment we have constructed an IEEE 802.3 Ethernet Local Area Network (LAN) and simulated with the help of NS2 software. After simulation both 2D graphs were obtained and analyzed with the help of Trace Graph and XGraph.

Experiment Number	03
Date of Experiment	12/01/2021
Date of Submission	21/01/2021
Name of student	Debagnik Kar
Roll Number	1804373
Section	ETC-06

Aim of the Experiment :-

Simulation and investigation of the impact of 'Contention Window (cwnd)' size on the performance of IEEE 802.11 MAC protocol using NS2 Simulator.

Software Requirement :-

- Network Simulator v2 (NS2)
- Network Animator (NAM)
- Linux Terminal
- XGraph

Theory:-

IEEE 802.11 is part of the IEEE 802 set of local area network (LAN) protocols, and specifies the set of media access control (MAC) and physical layer (PHY) protocols for implementing wireless local area network (WLAN) Wi-Fi computer communication in various frequencies including, but not limited to, 2.4 GHz, 5 GHz, 6 GHz, and 60 GHz frequency bands. (Basically, a Wi-Fi Protocol)

They are the world's most widely used wireless computer networking standards, used in most home and office networks to allow laptops, printers, smartphones, and other devices to communicate with each other and access the Internet without connecting wires. They are created and maintained by the Institute of Electrical and Electronics Engineers (IEEE) LAN/MAN Standards Committee (IEEE 802). The base version of the standard was released in 1997, and has had subsequent amendments. The standard and amendments provide the basis for wireless network products using the Wi-Fi brand. While each amendment is officially revoked when it is incorporated in the latest version of the standard, the corporate world tends to market to the revisions because they concisely denote capabilities of their products. As a result, in the marketplace, each revision tends to become its own standard.

Observation :-

Contention window size	3x3	3x3	3x3	4x4	4x4	4x4	5x5	5x5	5x5
	PS	PR	PDR	PS	PR	PDR	PS	PR	PDR
2	22498	3341	0.148	39868	2639	0.0662	62050	2373	0.0382
7	22464	3506	0.156	39808	2628	0.0660	62045	2132	0.0343
15	22452	3688	0.164	39927	3029	0.0758	62134	2229	0.0358
31	22441	4040	0.180	39878	3188	0.0799	62202	2552	0.0410
63	22404	4135	0.186	39828	3571	0.0896	62170	3104	0.0499
127	22444	4113	0.183	39791	3132	0.0787	62172	2610	0.0420

Table 3.1: Observation taken from linux terminal

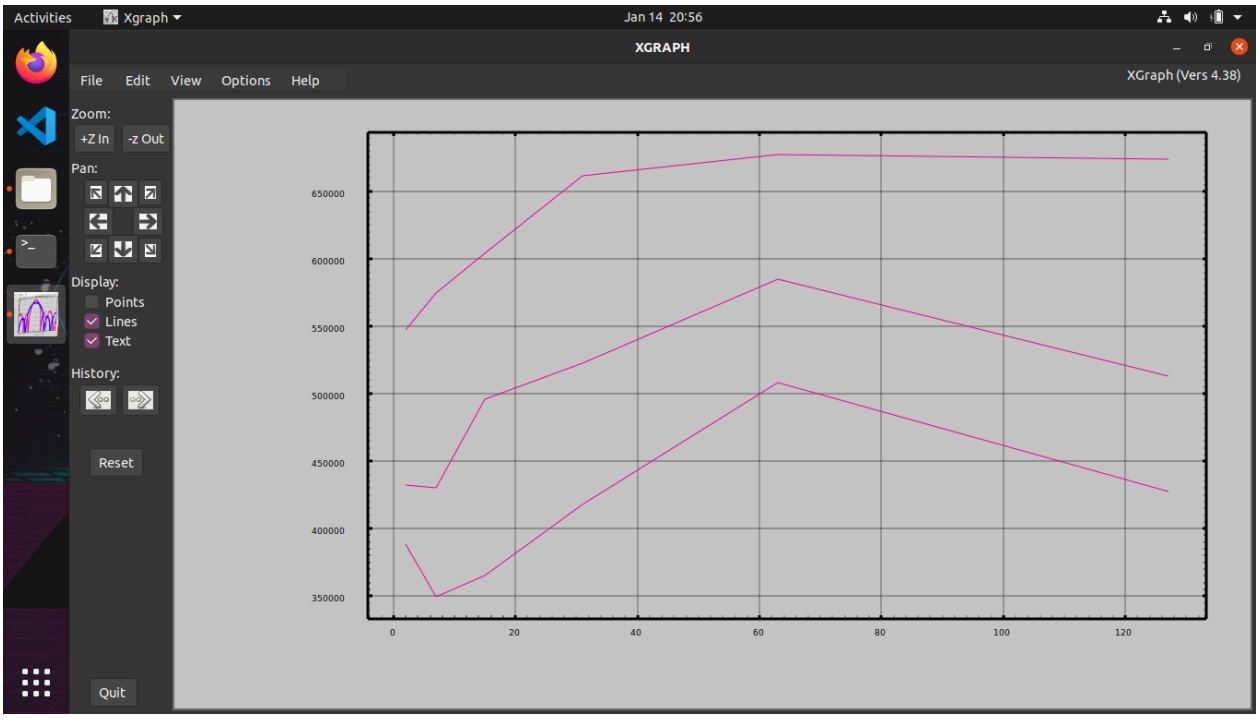


Fig 3.1: Throughput graph using XGraph

Inference/Discussion:-

We observe that PDR increases initially to a maximum value and then decreases, the optimal Contention window Size at 63 for each network population. We also observed that the CW Size varies inversely with the network population. Looking the trend of the observation we can predict that the CW Size will also be optimal at 63 and the PDR will be significantly lower than the observed nodes.

Conclusion :-

In this experiment we can conclude that the contention window size varies inversely with the population of the network and the PDR is optimal at a specific value of CW Size which is found to be 63.