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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.

Acknowledgement

Primarily, i would like to thank god for being able to complete this project in although there was a lockdown because our college held online classes which was new things to us somehow, we were successful to adapt it in online class we would like to thank our subject teacher Mr. Pratik karki who does not let us to feel that we were in online class I feel like we are in class as usual. He has taught us the methodology to do Coursework as clearly as possible. It was a great privilege and honor to work under your guidance. Due to his valuable guidance helped us to patch this project and make it full proof success. Due to his suggestion and instruction, I was able to complete the project.

Throughout this coursework, I have learned many things like design networking model and documentation in a proper way. I am making this coursework not only for marks but to also increase my knowledge. This helped me get extra knowledge of networking while researching I come to know about son many new things about networking.

Finally, thanks to all my beloved friends that who always stick together to help me for the good coursework and with all afford and responsibility and to finish work within the limited time given by the college. Hope that my all afford and dedication will give me a lot of benefits. This course work would not be completed without the help of our beloved professor Mr. Pratik karki. With sincere thanks and best regards;

Sujan Chaudhary

Abstract

In this coursework task is divided into two-parts part A and part B. task is about implementation of value in commnet according to scenario given. Part B is writing history of wireless network, advantages and disadvantages many more. Researched answers from different journals, books, etc. After designing network model in commnet the simulated report is present in the charts and table which is made with the help of MS.excel.

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1. Task A

1.1 Introduction

COMMNET is the application which is used to make design a model of network connection here we found processing nodes, computer group and also links like token ring and CMSAD links. CommNet user interface is so handy and easy to use which user can easily adopt. CommNet crash so many times during simulation or any time so saving doing every change is recommended because it is very old application. It has feature of drag and drop icons or import network topology which accelerate designing. It is easy to understand. COMMNET is used worldwide for network designing. The COMNET III object's parameters are easily adjusted.

A Mythical company namely Asia bank is a multinational bank with headquarters in Edinburg. The bank is willing to set up two ATM (Automatic Teller Machines) transaction networks in Nepal. The two locations in Nepal are Itahari and Butwal consisting 30 ATM and 1 single teller machine in both locations respectively. The design should be done complete by giving proper value given from the scenario. Nepal LAN should set up using IEEE 802.3 CSMA/CD 10 BaseT Ethernet network and the Edinburgh LAN should set up using IEEE 802.5 16 Mbps token passing standard with an ATM processing server. Two message sources for Nepal Lan and Respond source for Edinburg LAN

1.2. WAN model

WAN stand for wide area network it designed by two or more local area network (LAN). WAN use different technologies could be used to connect the computers, systems or individual networks. Actual technologies used vary. Cisco Systems, Inc. (2000) provide a good summary of WAN technologies like circuit switching, frame switching, cell switching, X.25 switching, frame/cell, ATM, and 2 others (Cisco Systems, Inc., 2000, p.17). it widely use in cities, countries and world wide

A WAN may consist of connections to a company's headquarters, branch offices, colocation facilities, cloud services and other facilities.

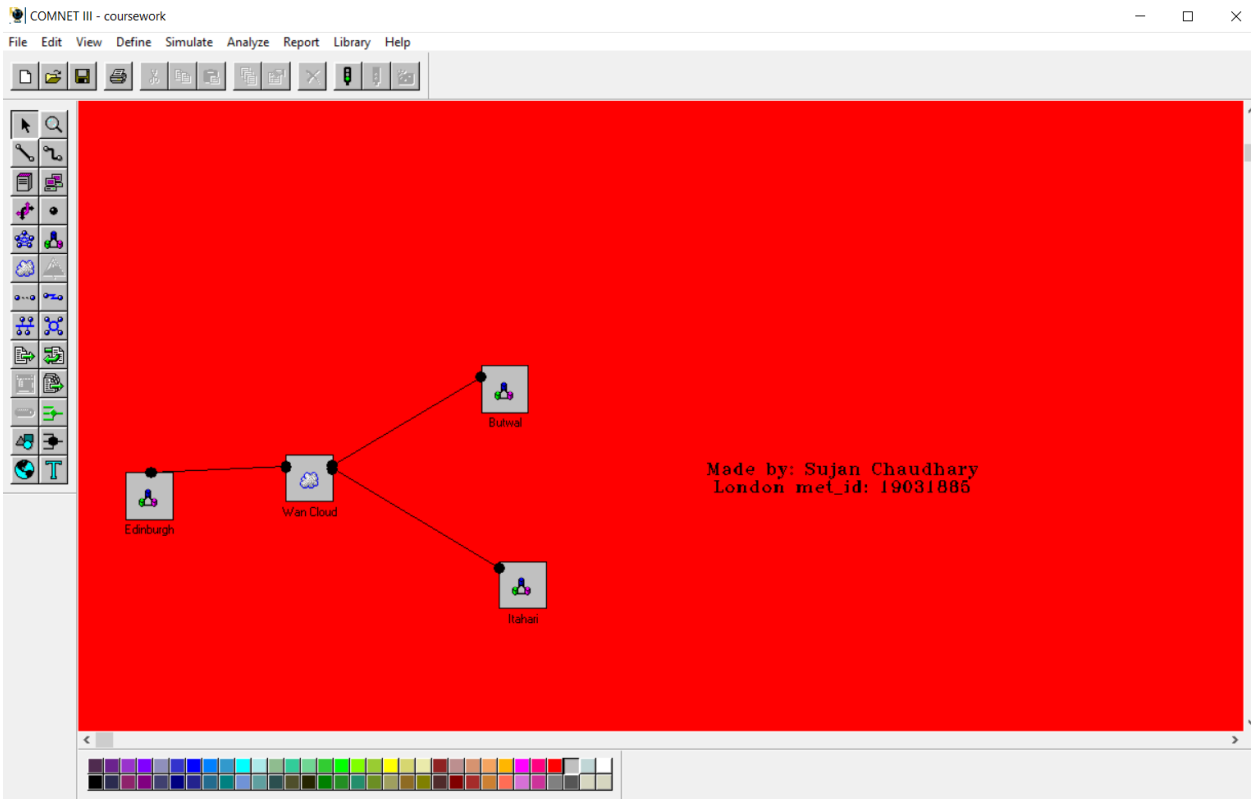

Figure 1:WAN model

This model is designed according to the scenario given in coursework. Thus WAN is made by two or three LANs in the above picture WAN is also made of three LANs named as Itahari, Butwal and Edinburgh. All LANs are connected to WAN to share messages and data. Subnets are used to create LANs in COMMNET and for WAN cloud is used.

1.2.1. EDINBURG LAN

Local area network (LAN) is set up of two or more computer connected together with in the coumpound example like school, college, shopping mall, home, offices etc.

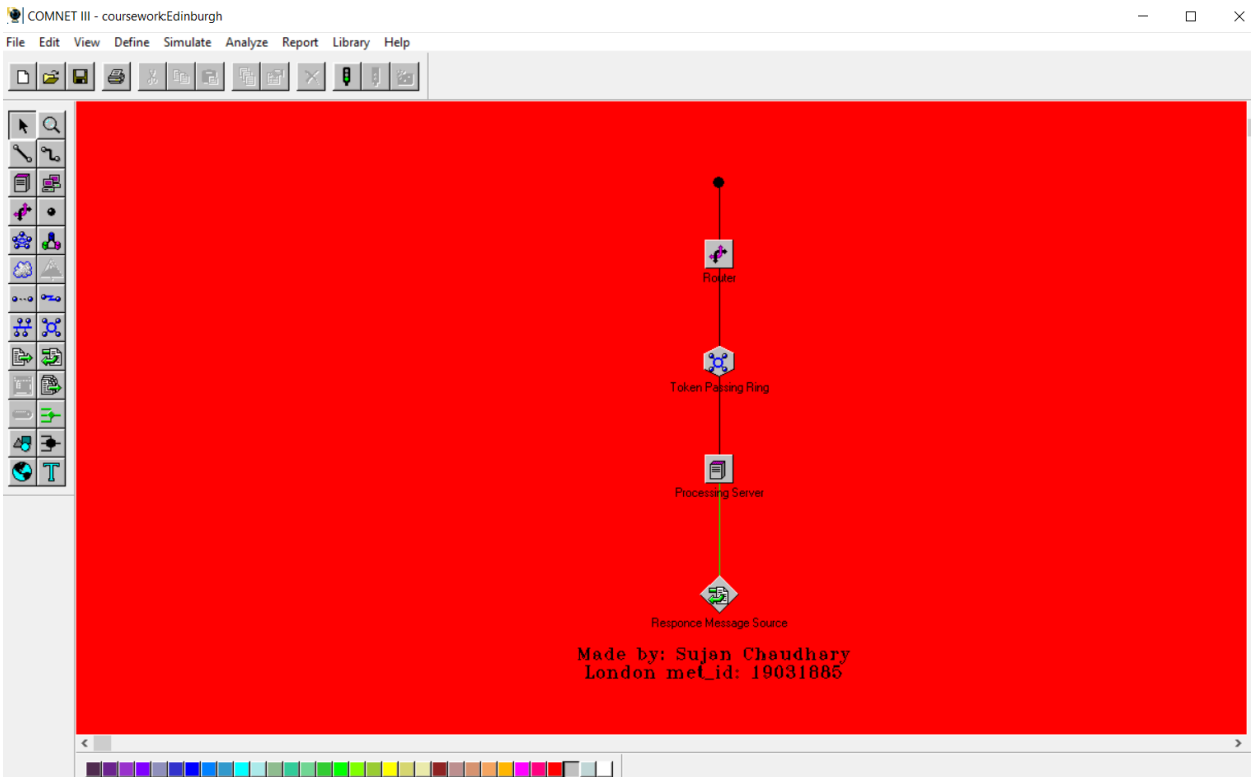

Figure 2:Edinburgh LAN

Edinburgh LAN consist access point, network device, token passing link, processing node and message respond. All are configured according to the scenario. LANs is connected to the frame relay cloud through a cisco 7010sp,V10.0 router. Token ring having parameters 802.5.16 Mbps.

1.2.1.1 TOKEN PASSING LINK

Token ring is the Lan protocol defined in the IEEE 802.5 where all workstations are connected in a ring and each workstation can directly hear transmission from its immediate neighbor. It second mostly used protocol Local area networks after ethernet. Collision occurs when two PCs transmits data at same time. In order to avoid the collision, there was a need to control the access to the network. Token is used to avoid collision of data transmission.

(sidhu, 2016)

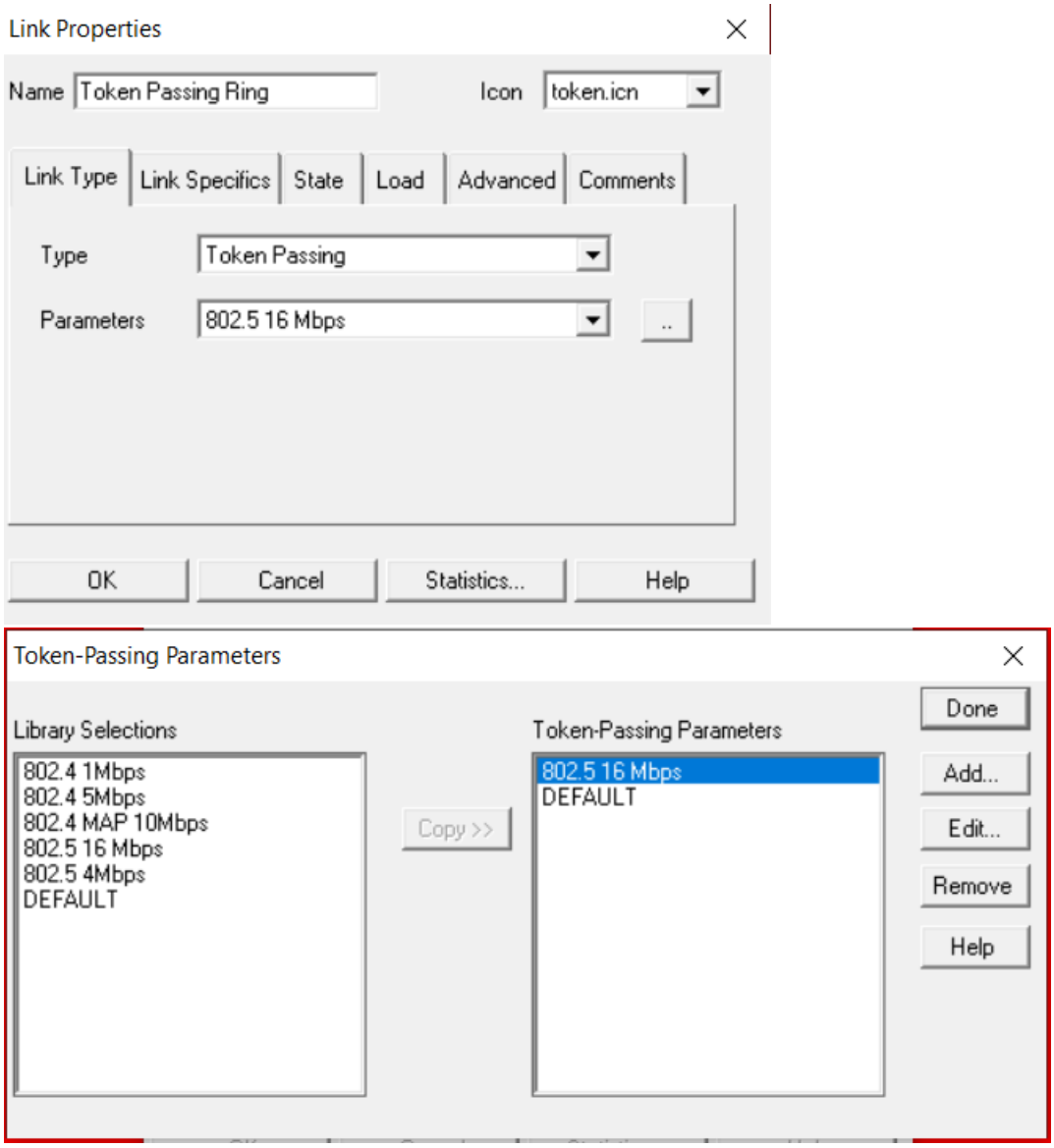

Figure 3: Token passing link

1.2.1.2. NETWORK DEVICE: ROUTER

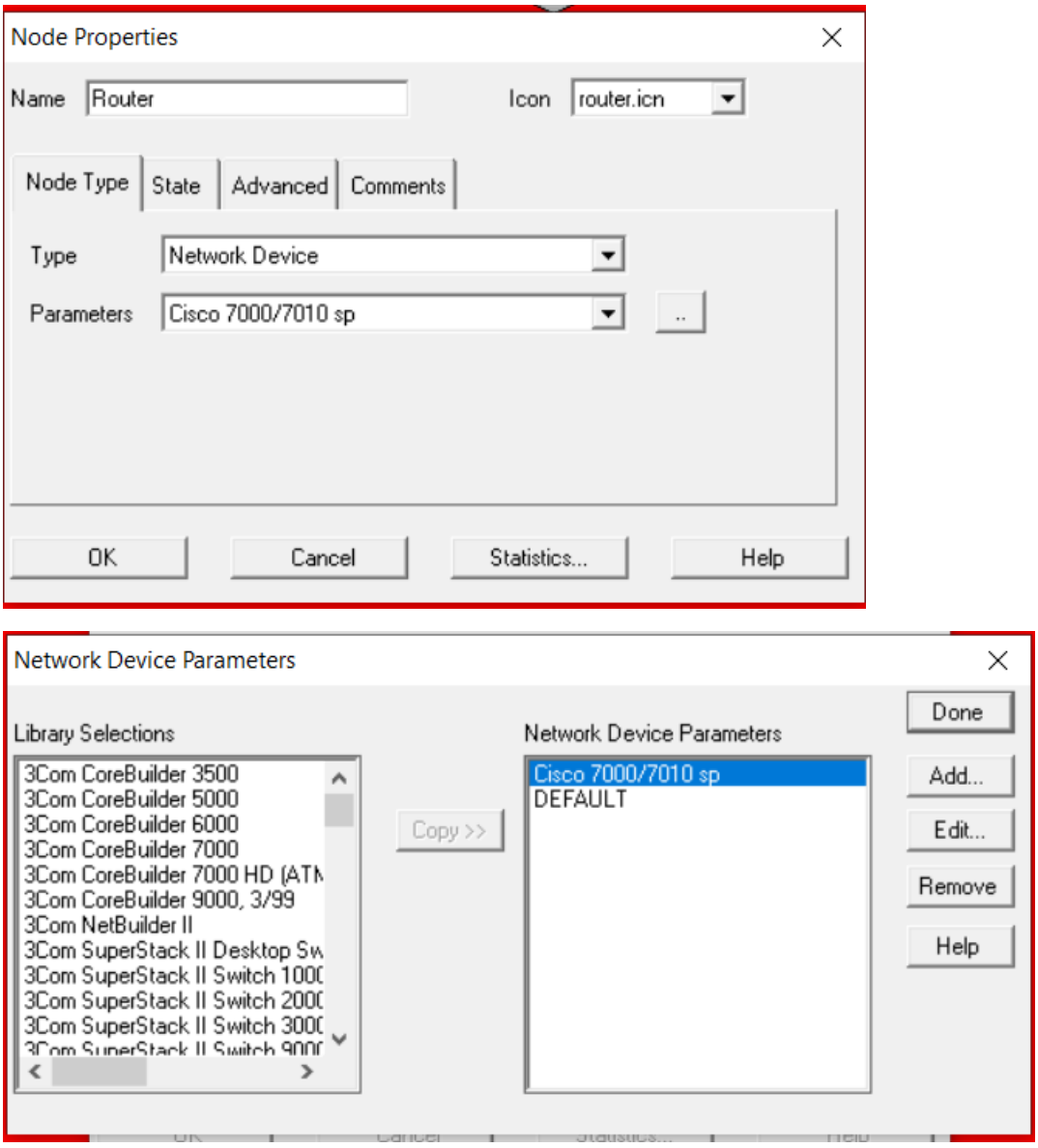

Figure 4: Network device

Edinburgh router has parameter Cisco 7000/7010 sp type is network device. It is a networking device which is used to connect two or more networks together for data transmission. The handle of moving a packet of information from SOURCE to DESTINATION. Routing is more often than not performed by a committed device called a Router. It has two types of routing static routing and dynamic routing. It can also be defined as a disseminating information that enables them to select routes between any two nodes on a computer network.

(Omprakash Ghorse, 2013)

1.2.1.3 PROCESSING SERVER

Processor nodes model computer hosts as well as communication processing devices. Each Processor node has an internal processor that executes software applications and processes packets. A Processor node also has a disk storage device to simulate file reads and writes.

(CACI, Copyright © 1998)

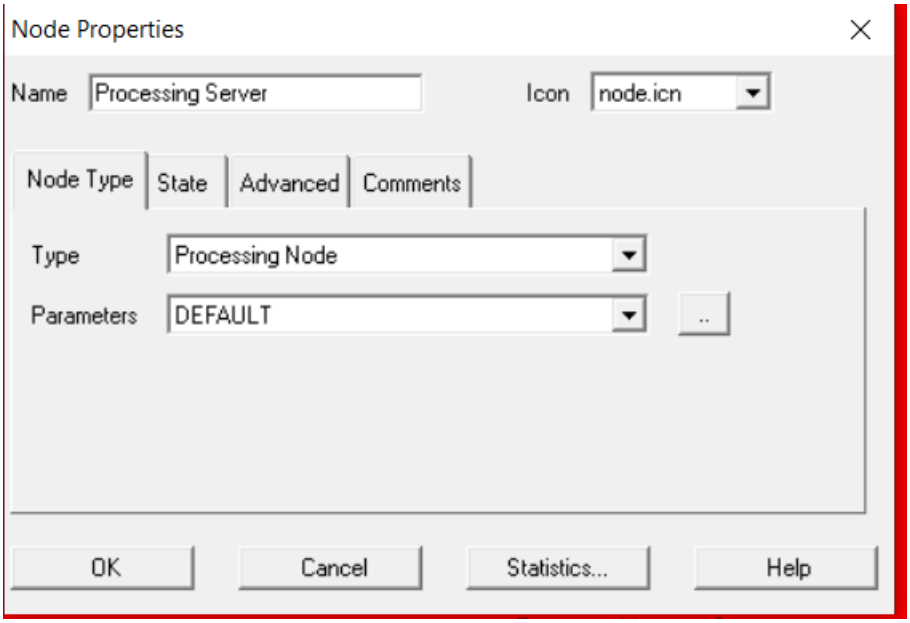

Figure 5:processing server

1.2.1.4 RESPONSE SOURCE

Respond source receives message from message source and give response to a message.

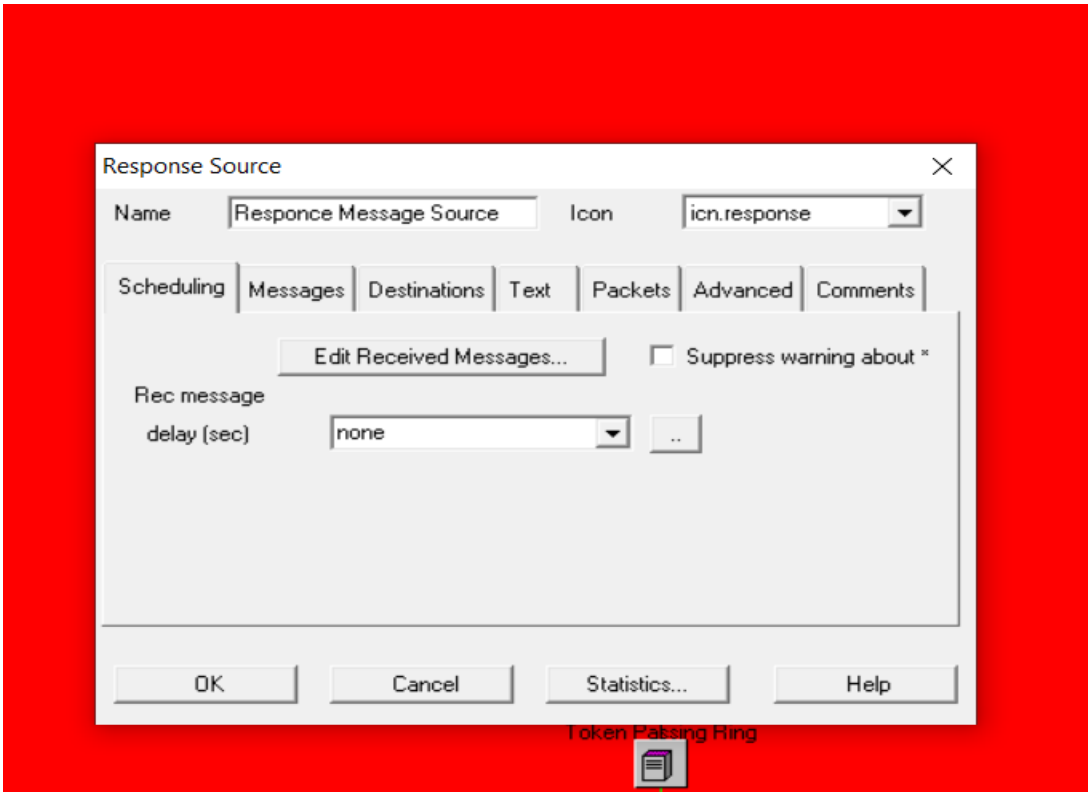

Figure 6:response source

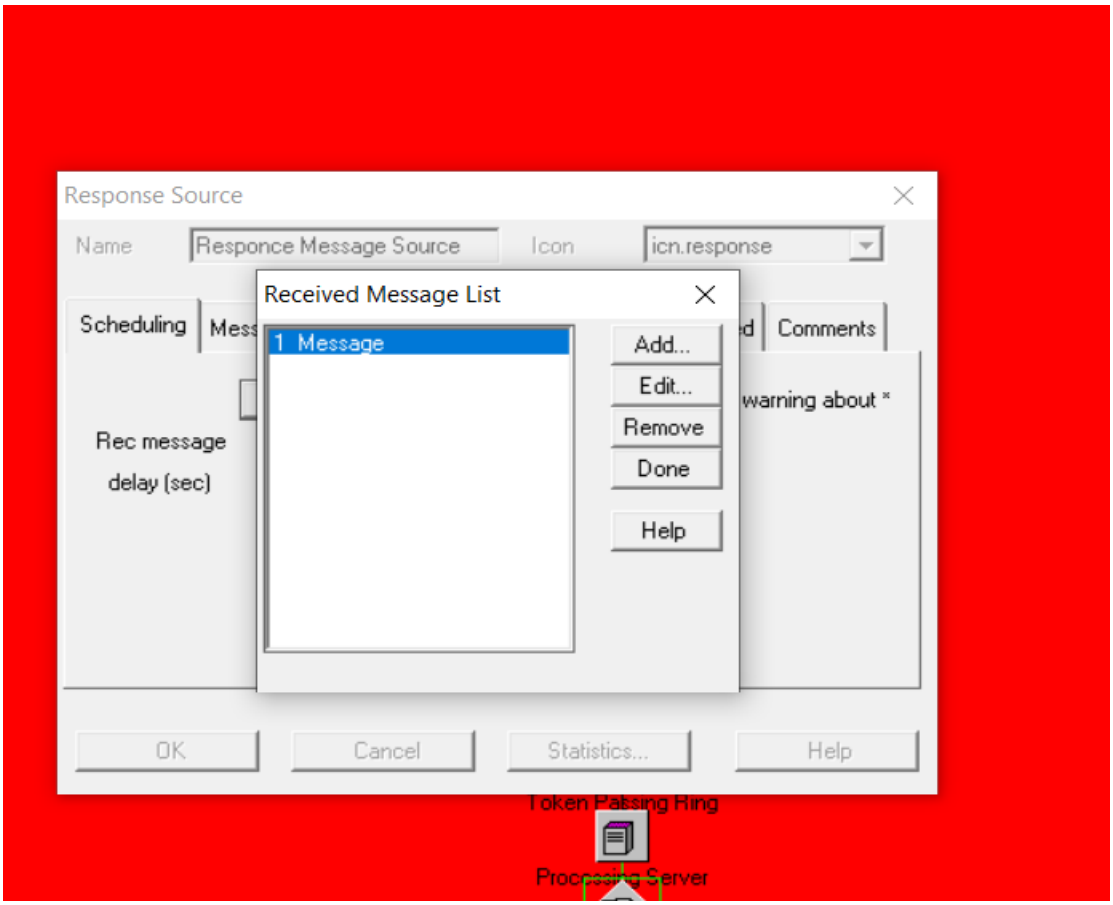

Figure 7: received message list

The message is sent from message source to response source the message should be scheduled by set to Received message named as Message in message source.

1.2.2. WAN CLOUD

The WAN Cloud contains an access link for each node connected to the cloud. An access link models the connection from a user site to a network service's point-of-presence. Each access link is a point-to-point link with some number of channels, a channel transmission rate, and a propagation delay.

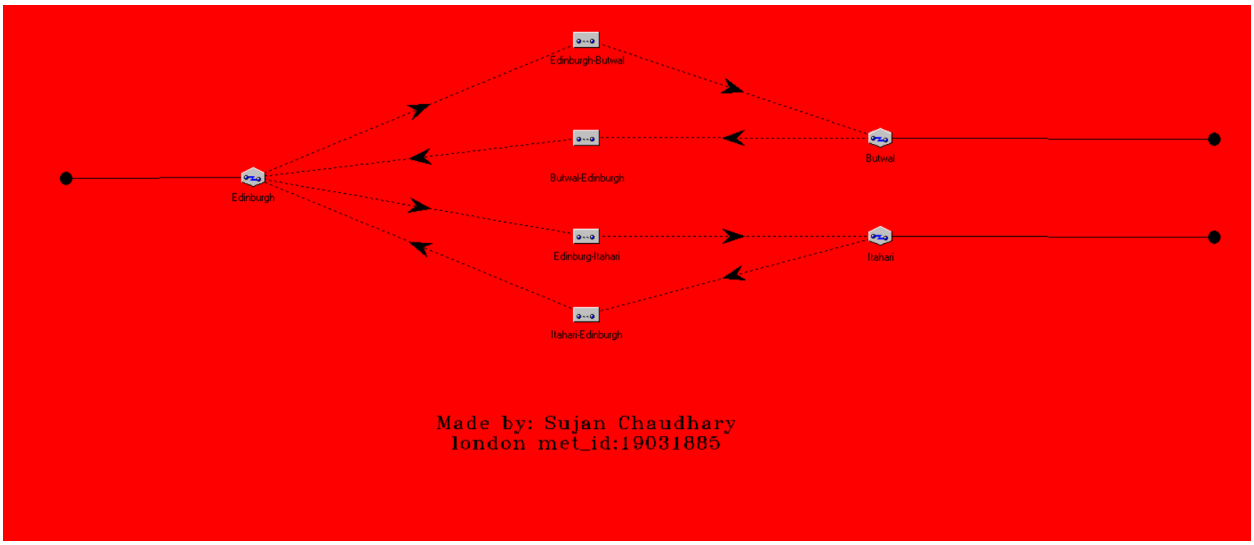

Figure 8:WAN Cloud

1.2.2.1. Access link

Access link is connected to different virtual circuits for transmission of message from Edinburgh to Butwal, Butwal to Edinburgh, Edinburgh to Itahari and Itahari to Endinburgh. A frame is the link-layer transmission unit within COMNET III. For transmission on a link, packets are segmented or assembled into frames. There is a frame size (minimum and maximum), a frame overhead and a frame error rate for each link.

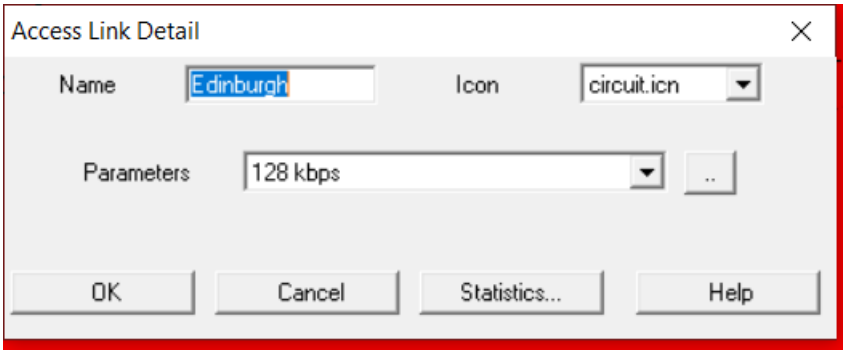

Figure 9:Edinburgh access link

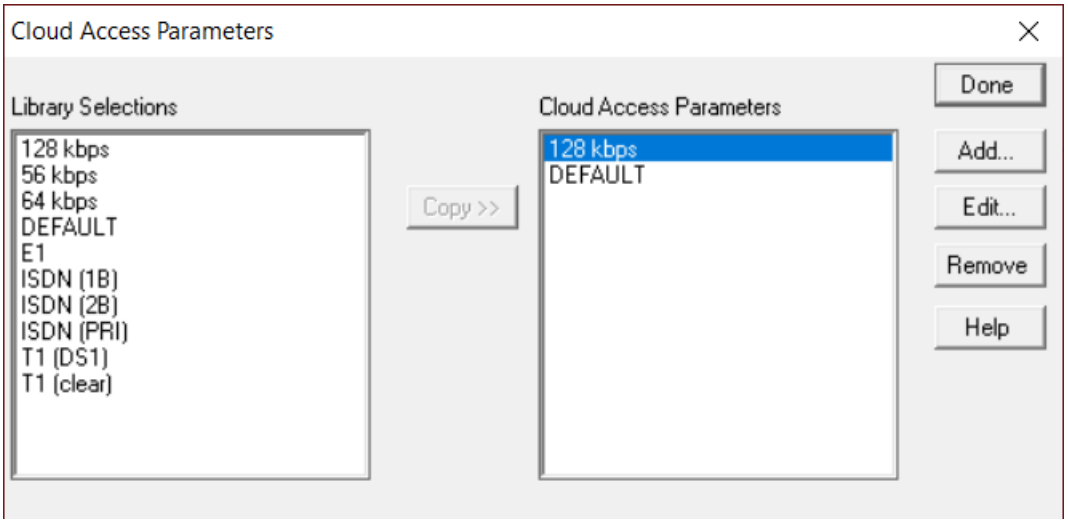

Figure 10: Edinburgh access link parameter

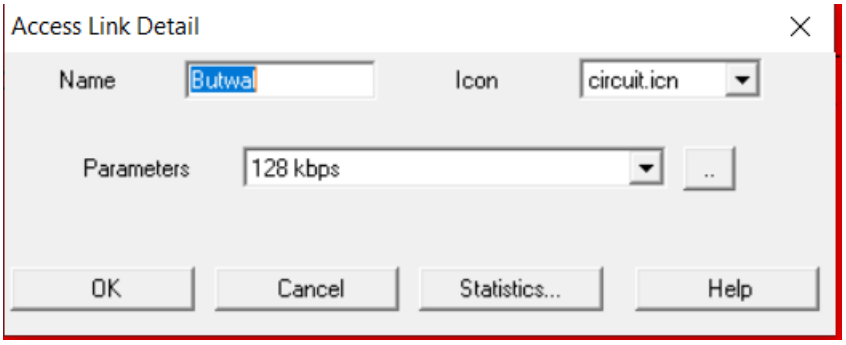

Figure 11: Butwal access link

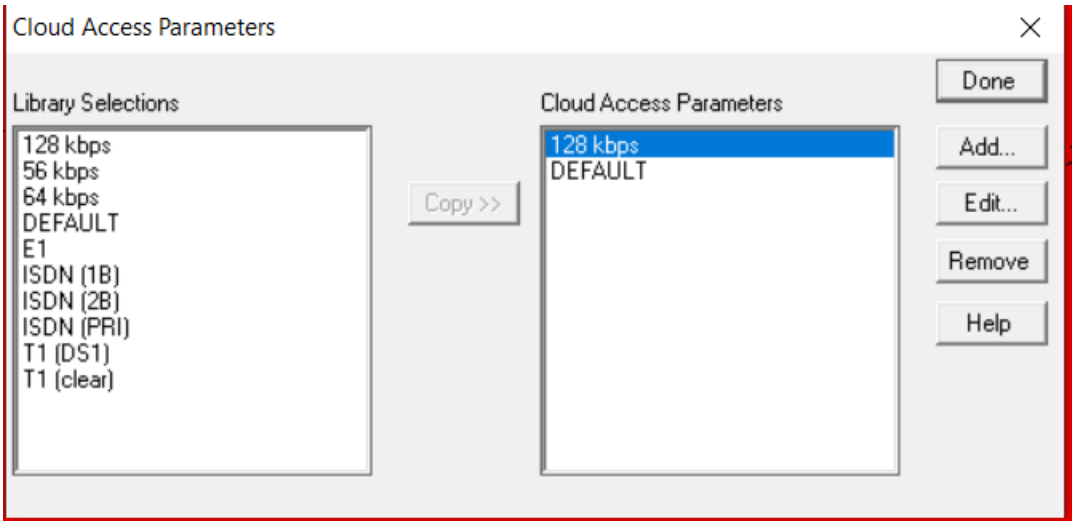

Figure 12: Butwal access link parameter

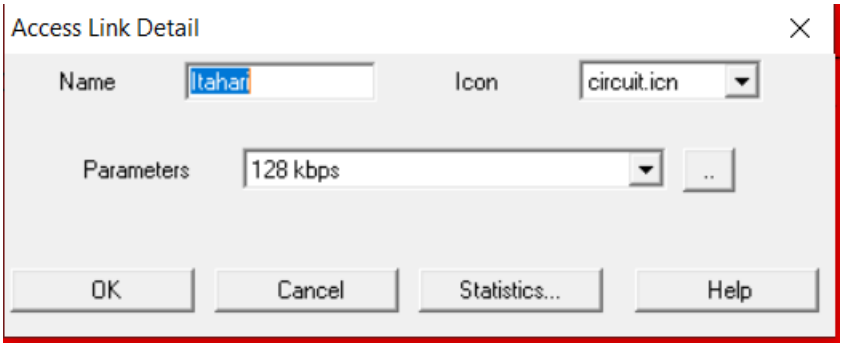

Figure 13: itahari access link

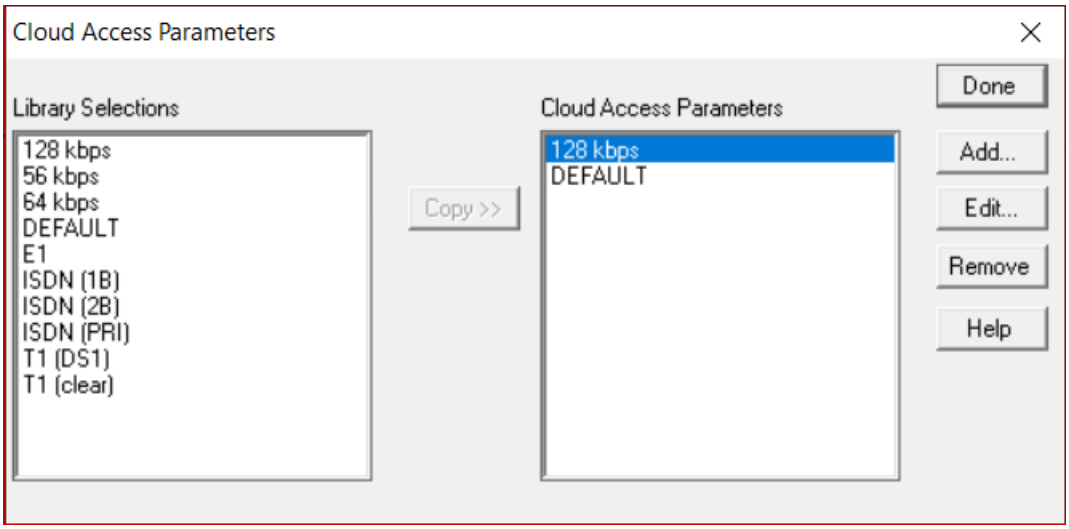

Figure 14: Itahari access link parameter

All access link has same parameter 128 kbps the data transmission between WAN AND LAN in tunnel is 128 Kbps.

1.2.2.2. VIRTUAL CIRCUIT

A virtual circuit is a physical path and destination for data packets in a packet switching environment. It is a connection-oriented network. In virtual circuit resource are reserve for the time interval of data transmission between two nodes. This network is a highly trustable medium of transfer. Virtual circuits are very expensive.

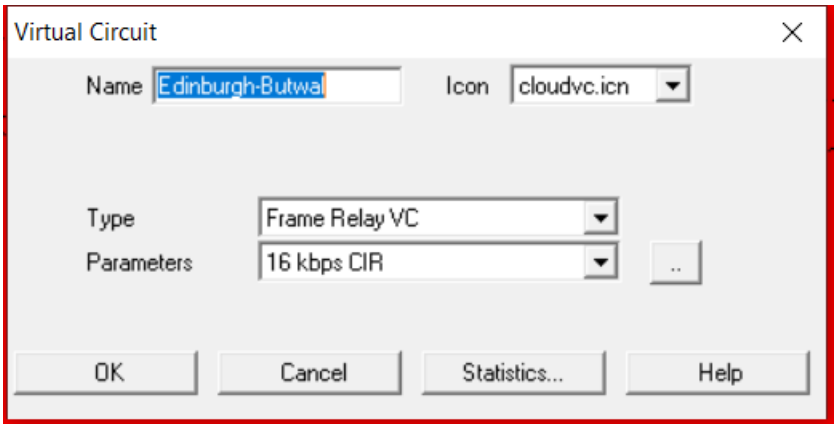

Figure 15: Edinburgh-butwal virtual circuit

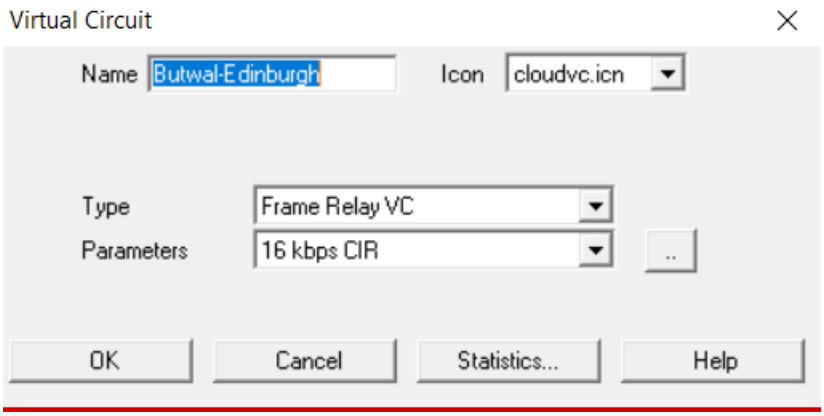

Figure 16:Butwal-Edinburgh virtual circuit

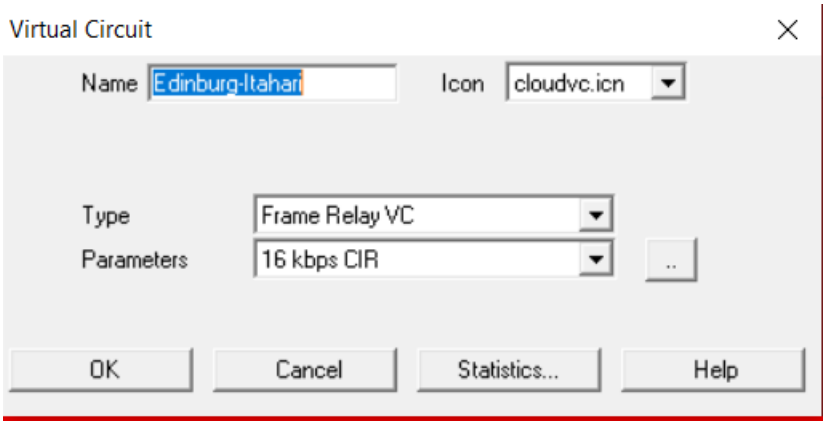

Figure 17: Edinburgh-Itahari virtual circuit

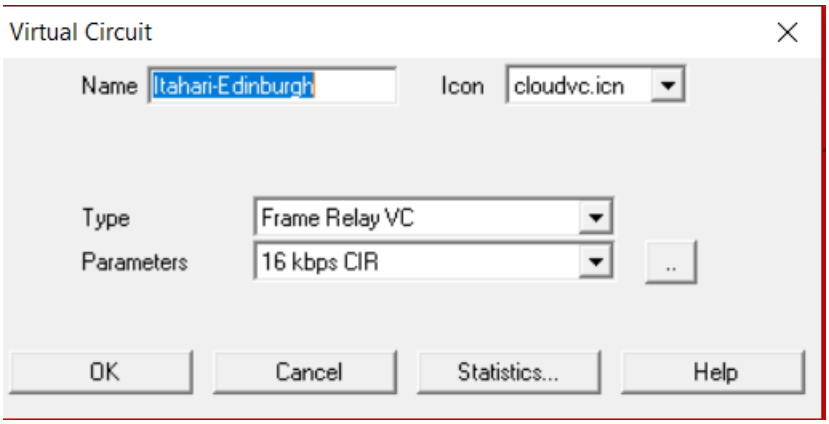

Figure 18: Itahari-Edinburgh virtual circuit

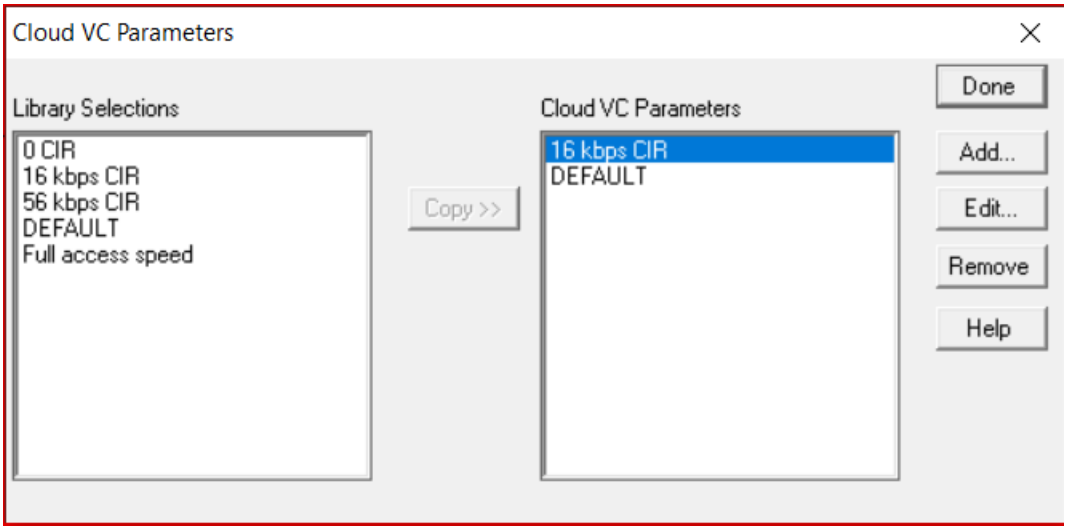

Figure 19: parameter of virtual circuit

Frame Relay VC type is used and 16 Kbps CIR is used all Virtual circuit (VC) uses same parameter. It has speed of 16 kbps for data transmission.

1.2.3. ITAHARI AND BUTWAL LAN

For both LANs access point, network device, processing node, CSMA/CD, computer group, message source is same so only one LAN screenshot is given below. Another is in appendix.

1.2.3.1. NETWORK DEVICE: ROUTER

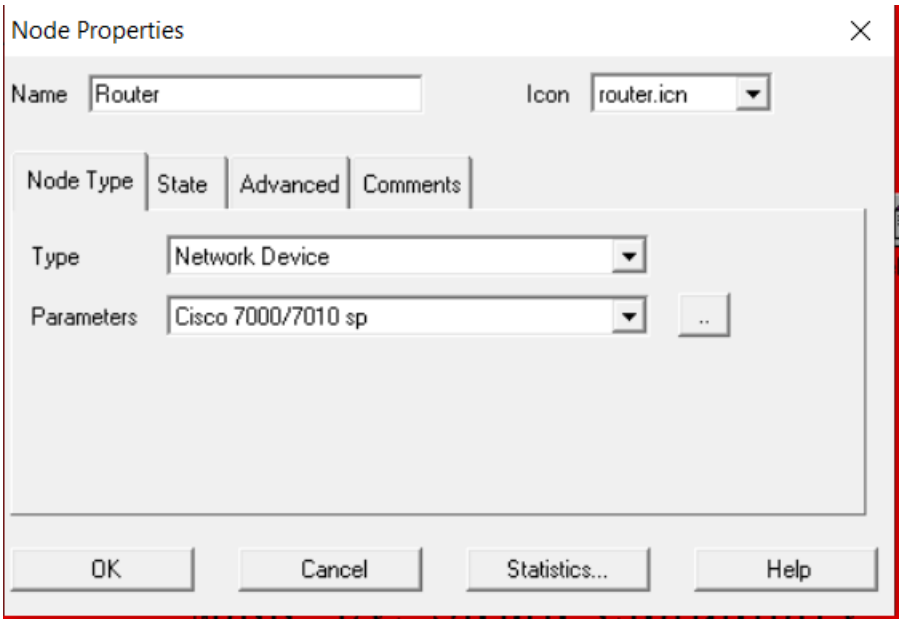

Figure 20: Router

Butwal router has parameter Cisco 7000/7010 sp type is network device. It is a networking device which is used to connect two or more networks together for data transmission. The handle of moving a packet of information from SOURCE to DESTINATION. Routing is more often than not performed by a committed device called a Router. It has two types of routing static routing and dynamic routing. It can also be defined as a disseminating information that enables them to select routes between any two nodes on a computer network.

(Omprakash Ghorse, 2013)

1.2.3.2. CSMA/CD LINK

CSMA/CD stands for Carrier Sense Multiple Access/ Collision Detection. It a media control method which was used mostly in old ethernet technology. It defines how network devices respond when two devices attempt to use a data channel simultaneously and encounter a data collision.

(computer hope, © 2020 Computer Hope)

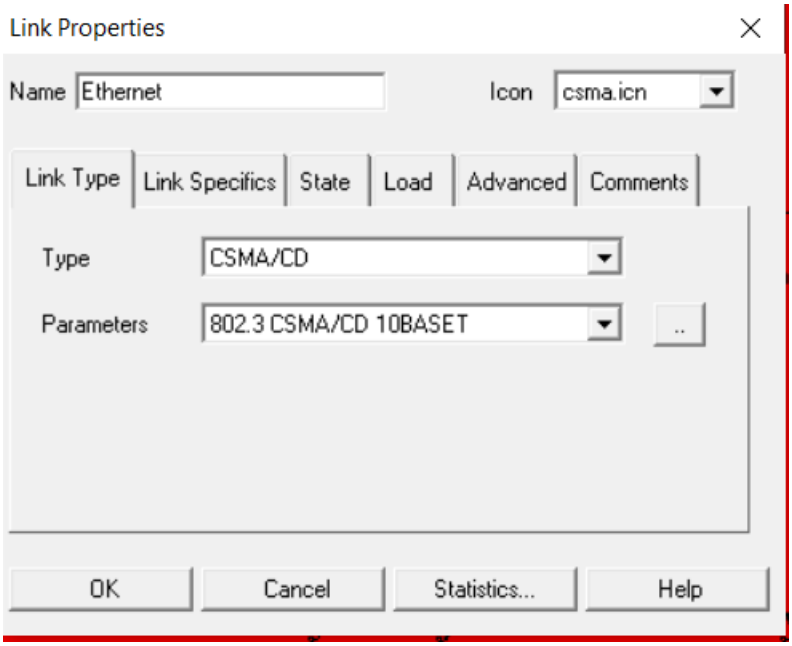

Figure 21:CSMA/CD link Ethernet

It is named as ethernet its type is CSMA/CD and parameter is 802.3 CSMA/CD 10BASET

1.2.3.3. PROCESSING NODE

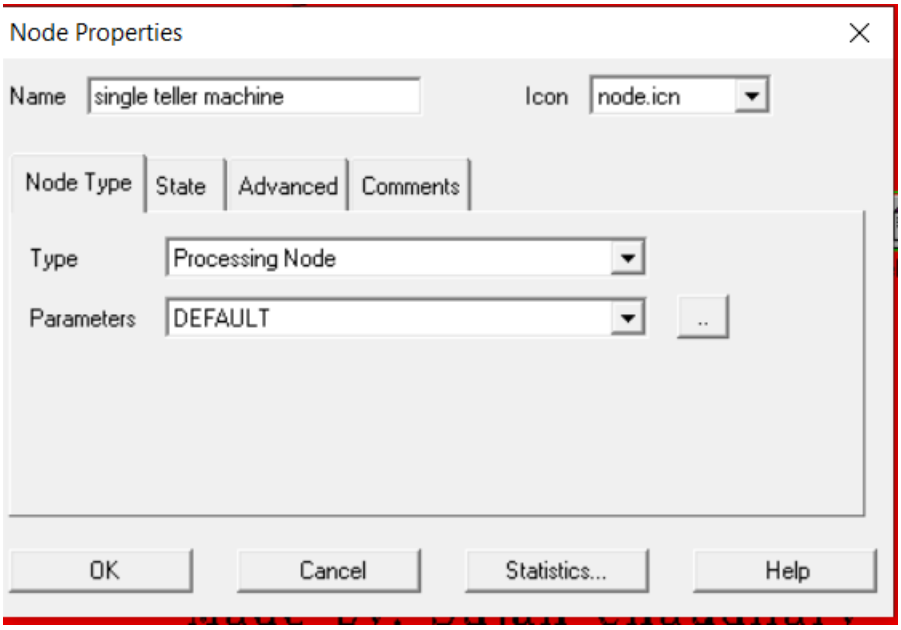

Figure 22:single teller machine

It is named as single teller machine and its type is processing node and parameter is set to DEFAULT.

1.2.3.4. COMPUTER GROUP

A group of computers connected as peer-to-peer local networks that facilitate easier sharing of files, internet access, printers, and other local network resources. In this scenario 30 atm are connected as peer to peer for file sharing.

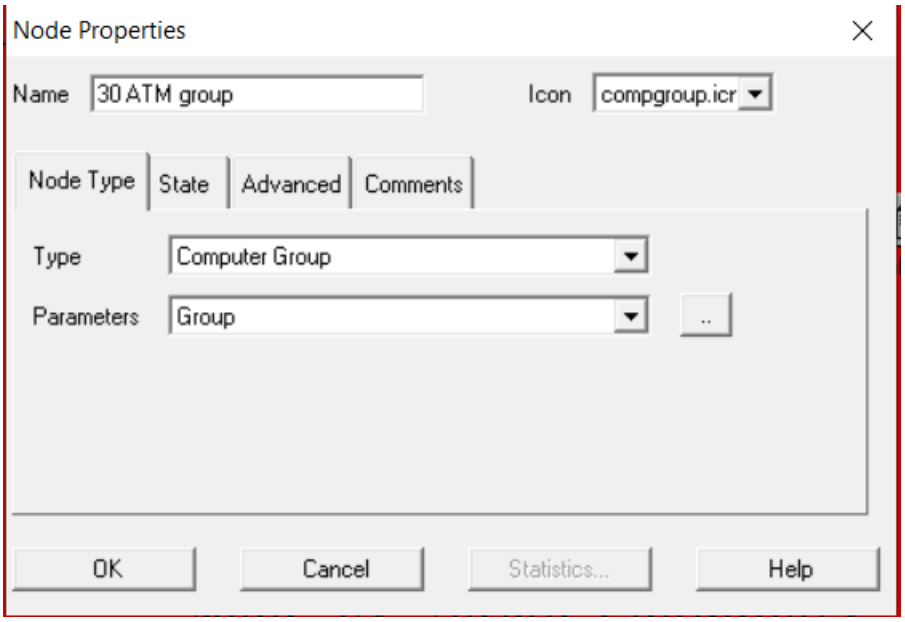

Figure 23: 30 Atm Group

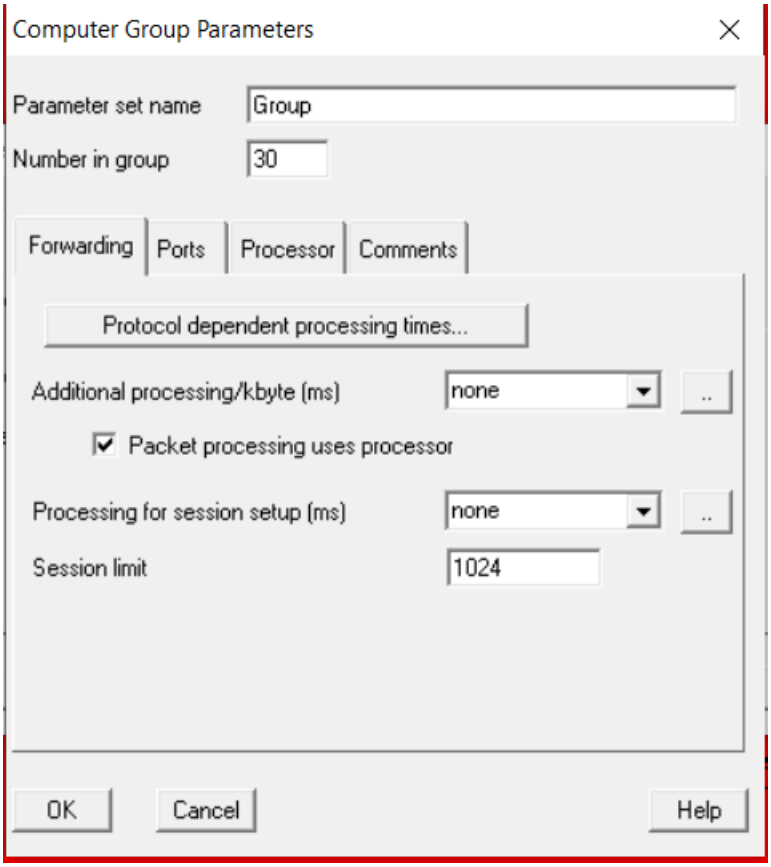

Figure 24: computer group parameter

It is named as 30 atm group and its type is computer group and parameter are Group with 30 nodes in a group.

1.2.3.5. MESSAGE SOURCE

It is a source of a message sending from one destination to another.

For 30 ATM group

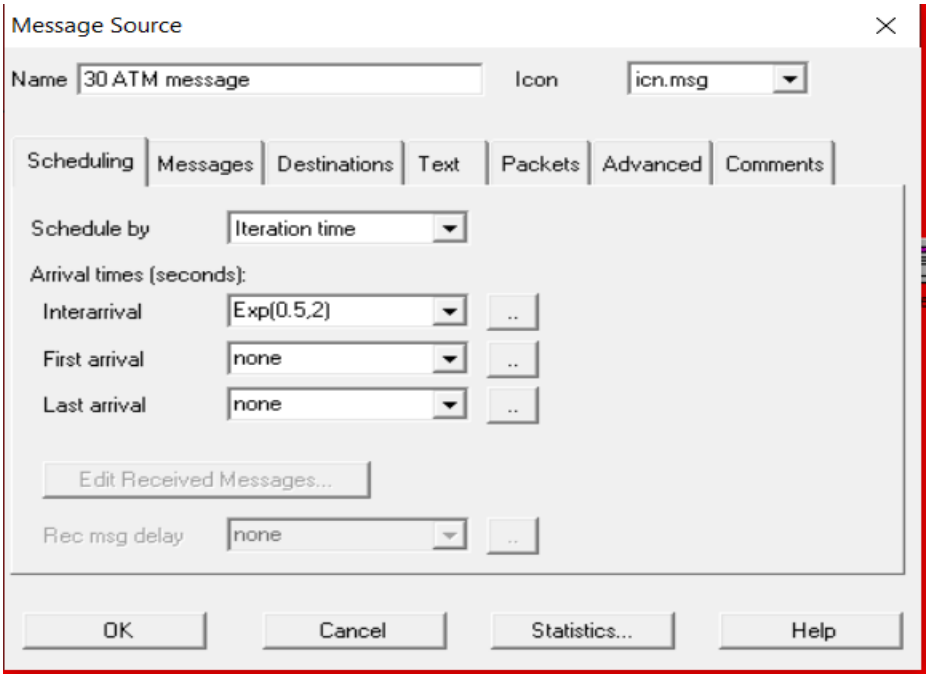

Figure 25: message source of 30 ATM message

It is named as 30 ATM message.

Scheduling

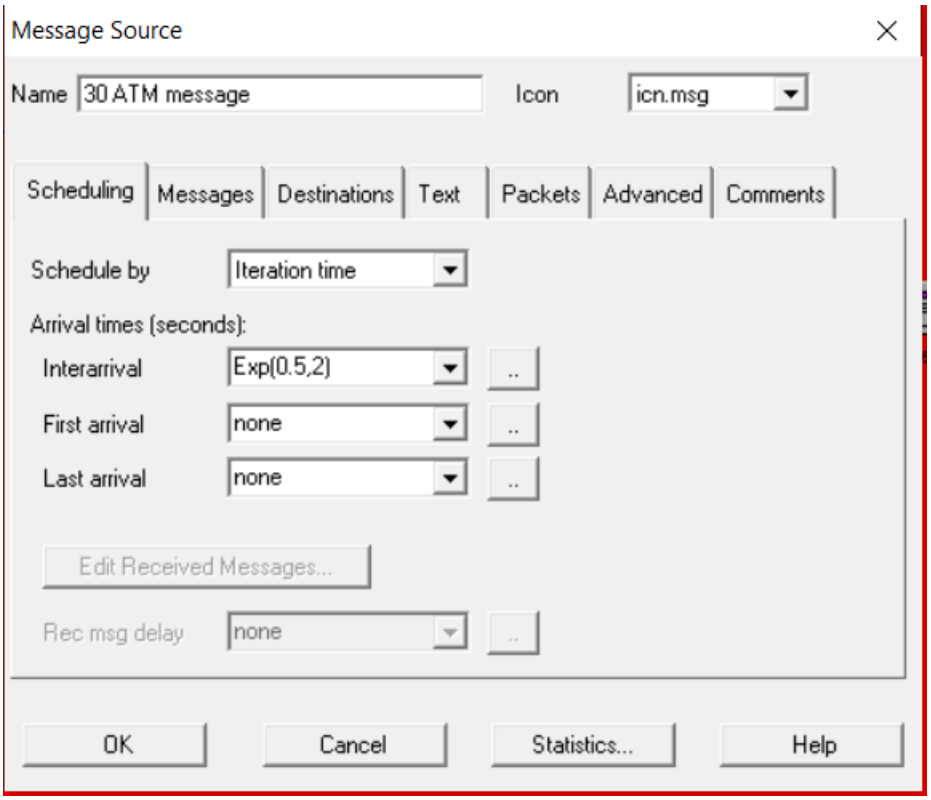

Figure 26: scheduling of 30 ATM message

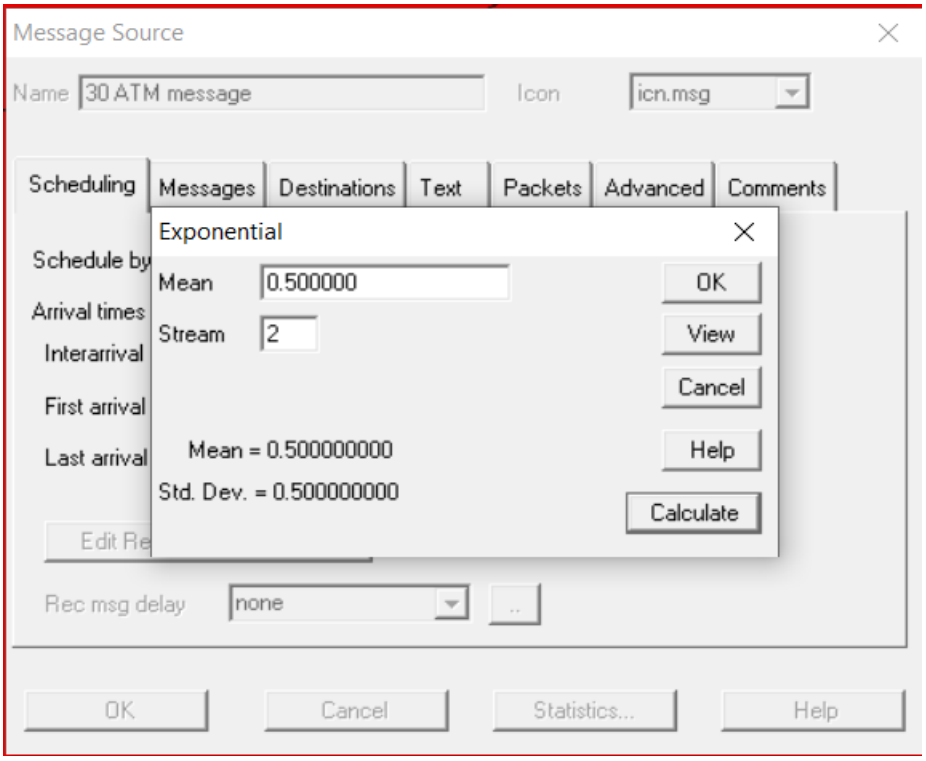

Figure 27: Exponential parameter

The message is scheduled which is to be generated in iteration time of exponential distribution having mean 0.5 seconds and stream value.

Message

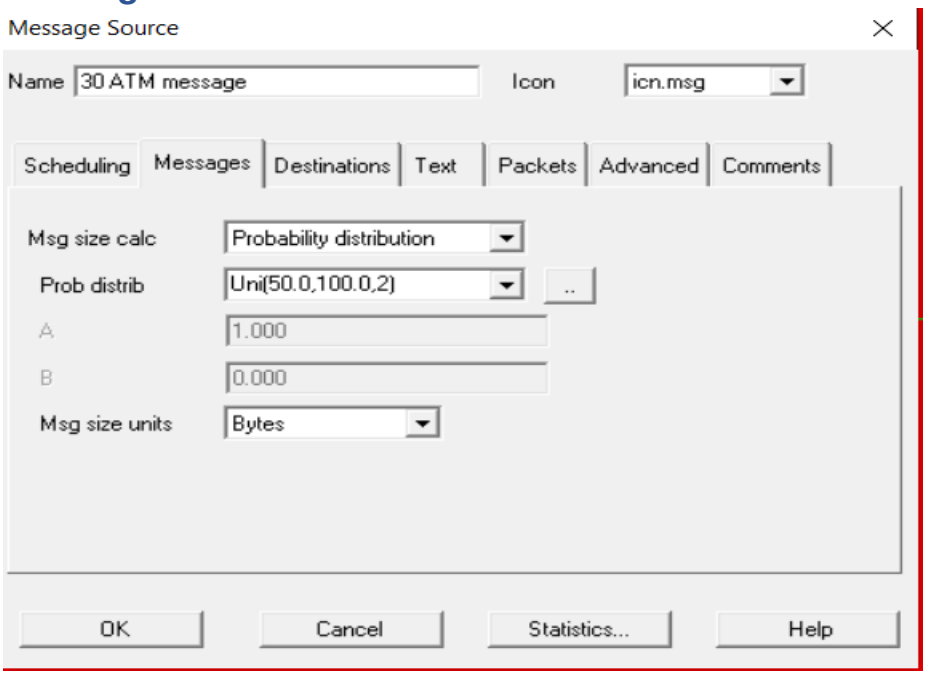

Figure 28: Message parameter

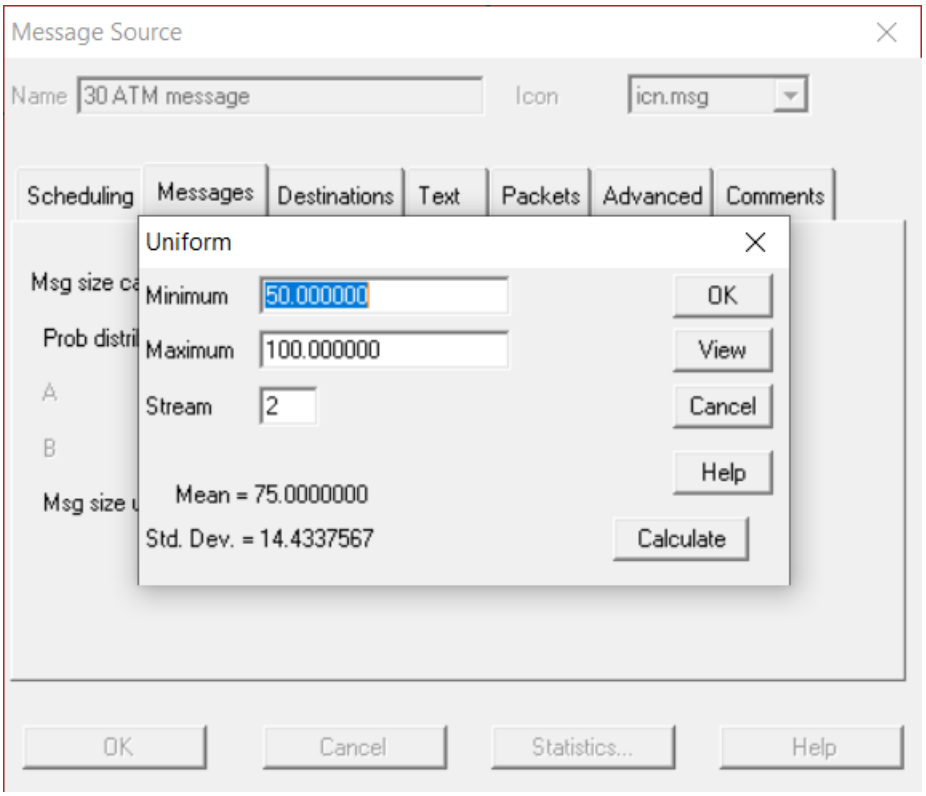

Figure 29: unifom parameter

The message with uniform distribution of minimum size of 50 byte and maximum size of 100 bytes with a stream value of 2 the size of message is evenly dispersed.

Destination

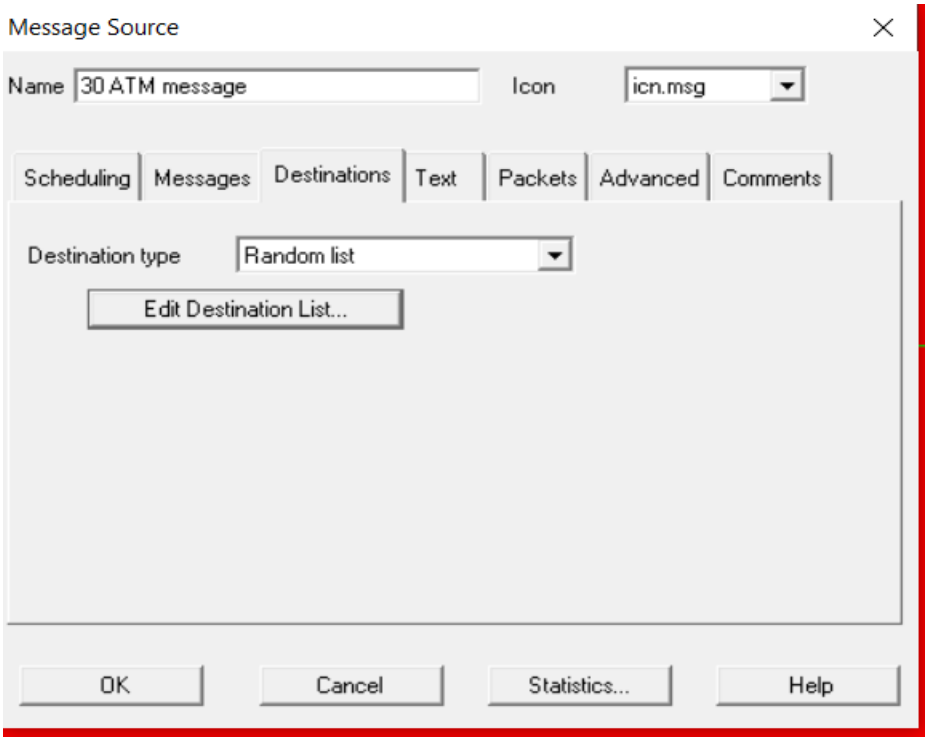

Figure 30: destination

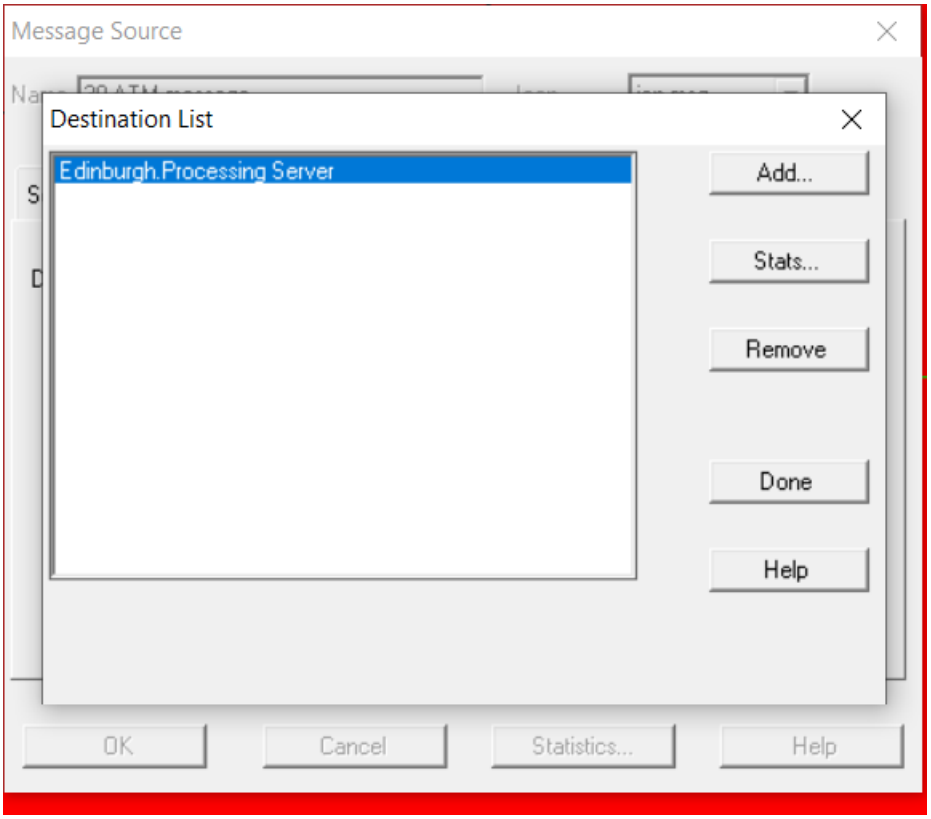

Figure 31: Destination list

The destination type is random list and destination is selected to processing sever in Edinburgh.

Text

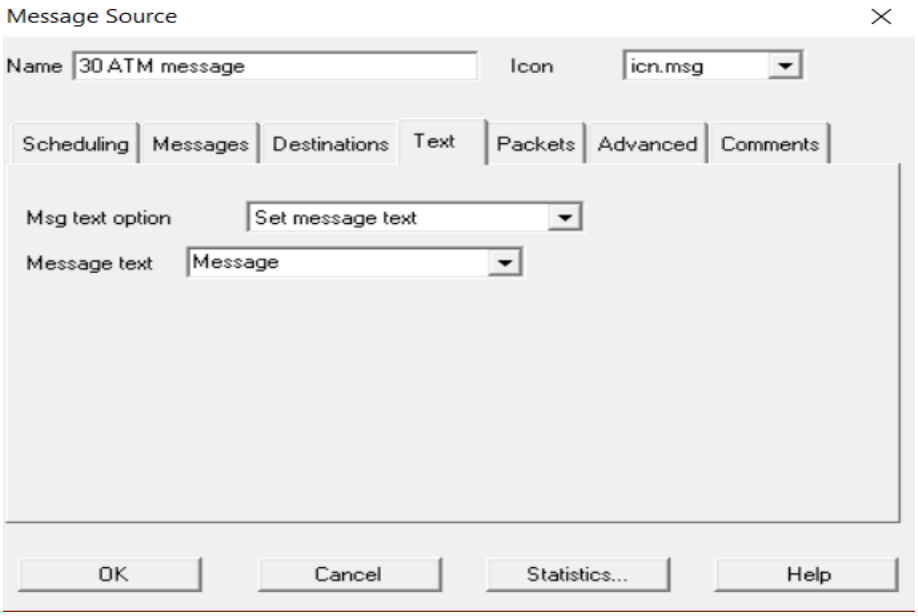

Figure 32: Text

Message is typed in message text to check either it is sending or transferring message or not.

Packet

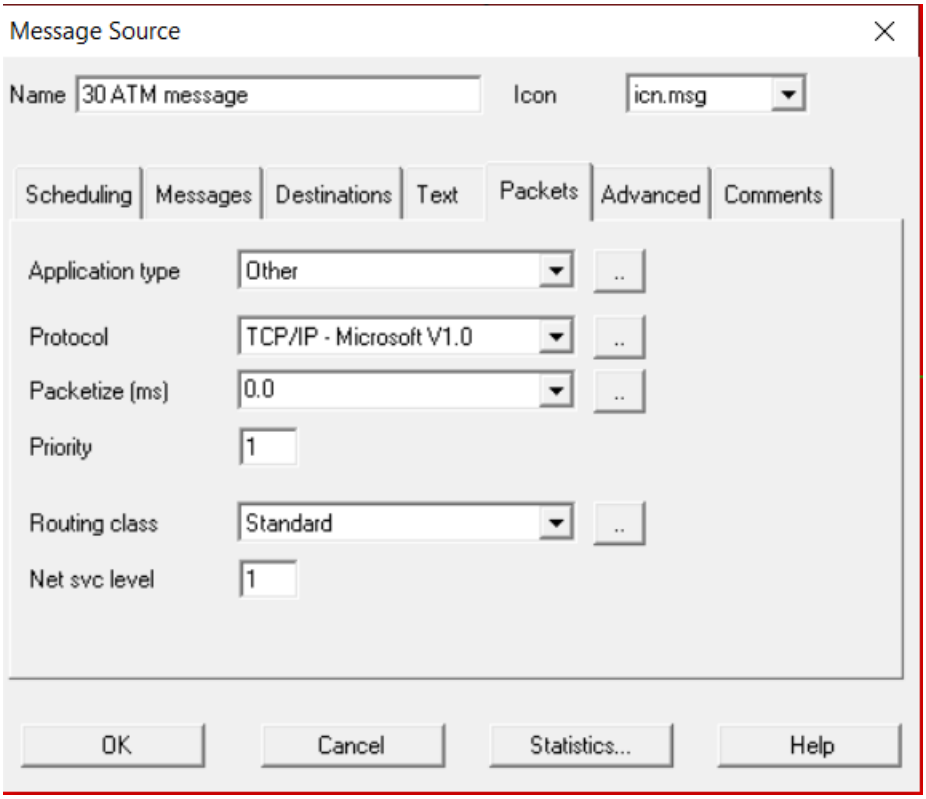

Figure 33: packet parameter

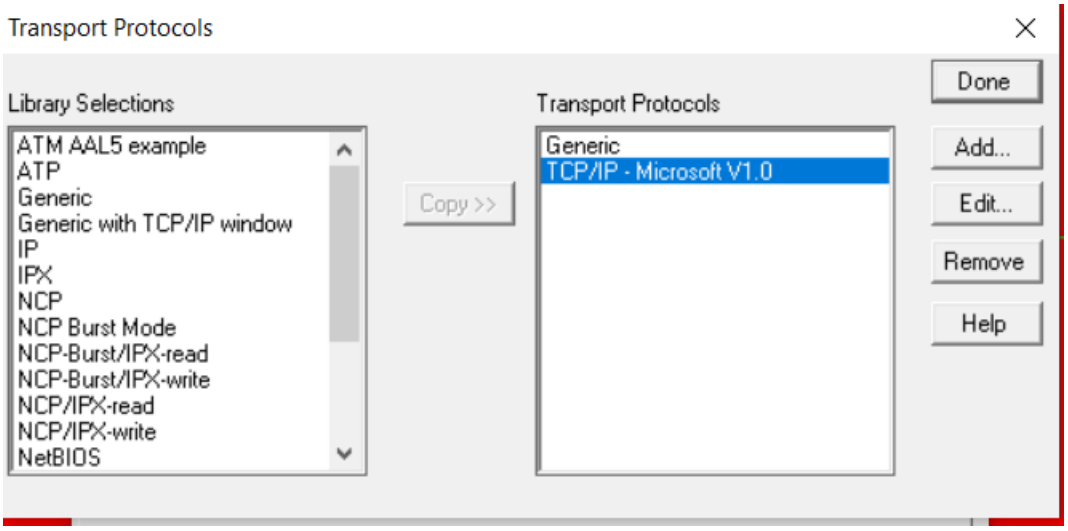

Figure 34: protocol

The transport protocol is used by message source is TCP/IP Microsoft V1.0 and packetize time is 10 milliseconds

Message Source for Single ATM Scheduling

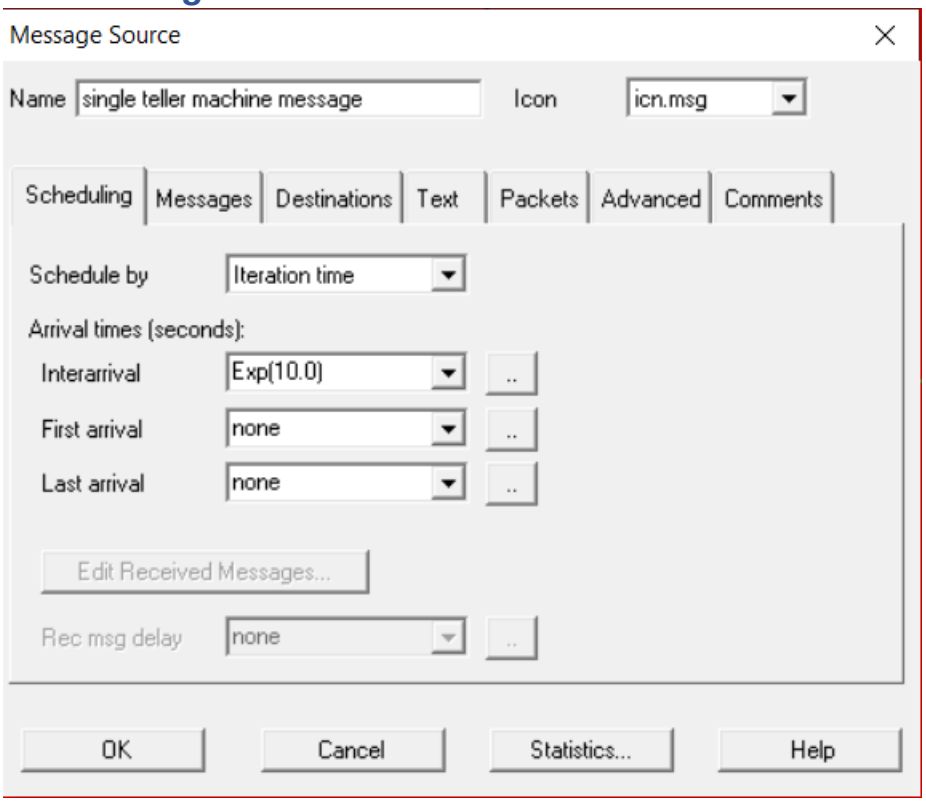

Figure 35:scheduling parameter

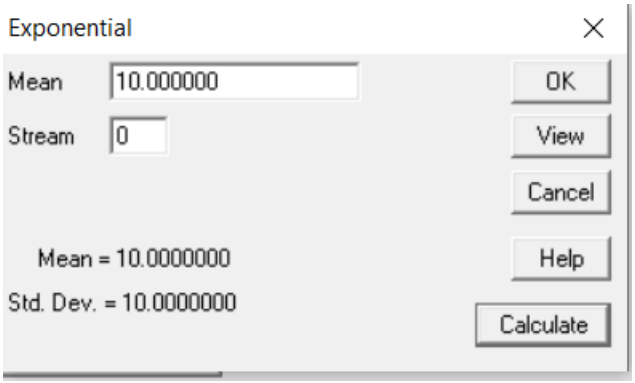

Figure 36: Exponential parameter

The message is scheduled which is to be generated in iteration time of exponential distribution having mean 10 seconds and stream value.

Message source

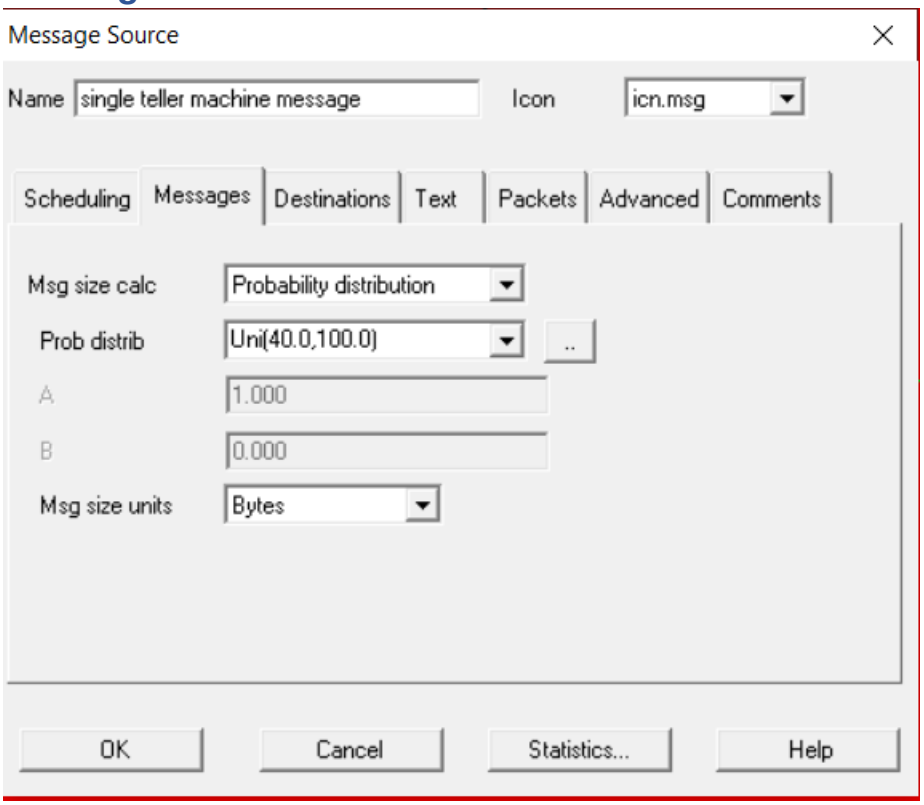

Figure 37: Message parameter

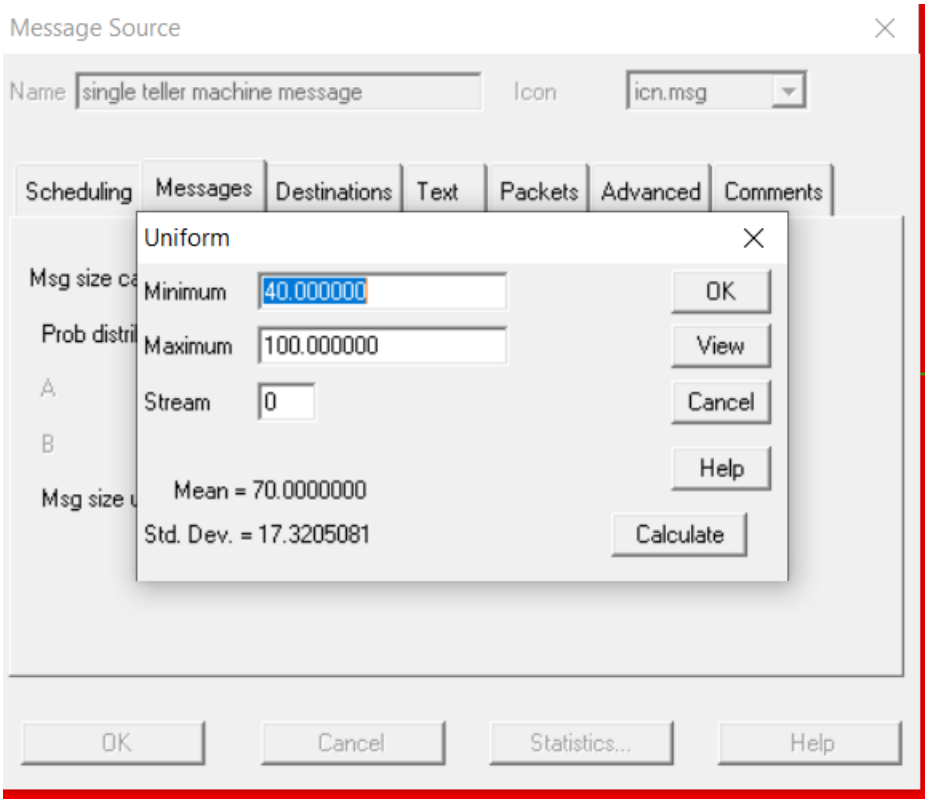

Figure 38: uniform parameter

The message with uniform distribution of minimum size of 40 byte and maximum size of 100 bytes with a stream value of 0 the size of message is evenly dispersed.

Destination

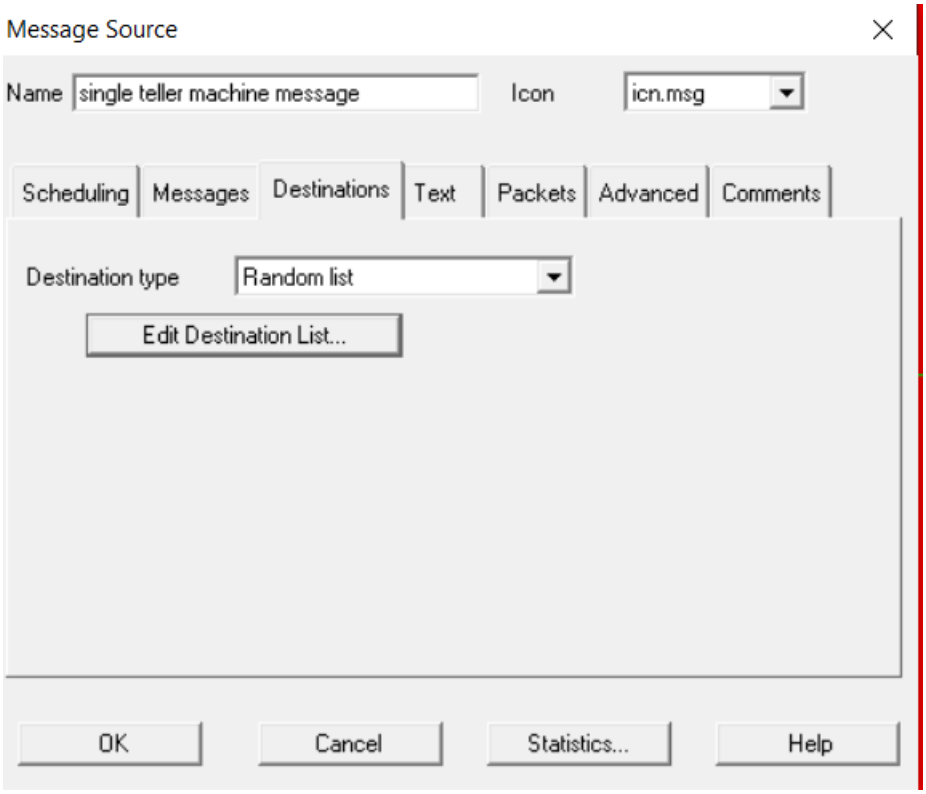

Figure 39: destination parameter

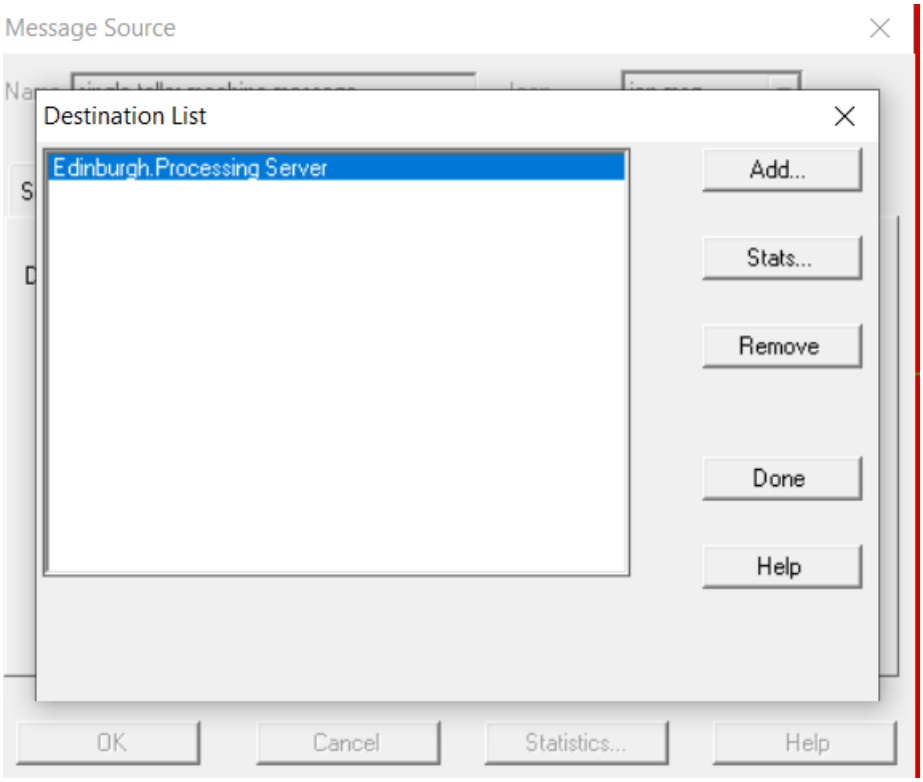

Figure 40: destination list

The destination type is random list and destination is selected to processing sever in Edinburgh.

Text

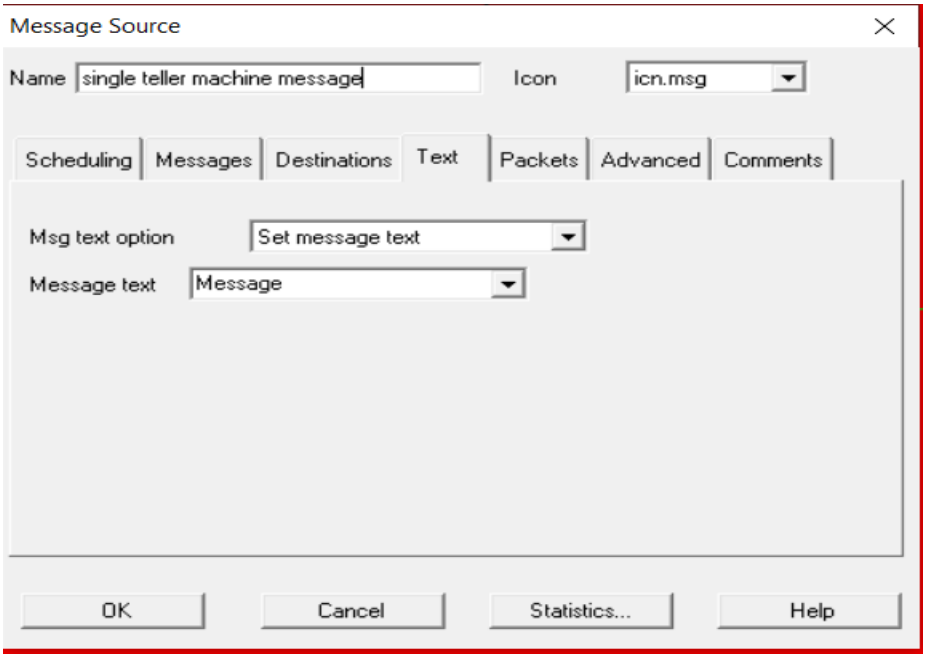

Figure 41: Message Text

Message is typed in message text to check either it is sending or transferring message or not.

Packet

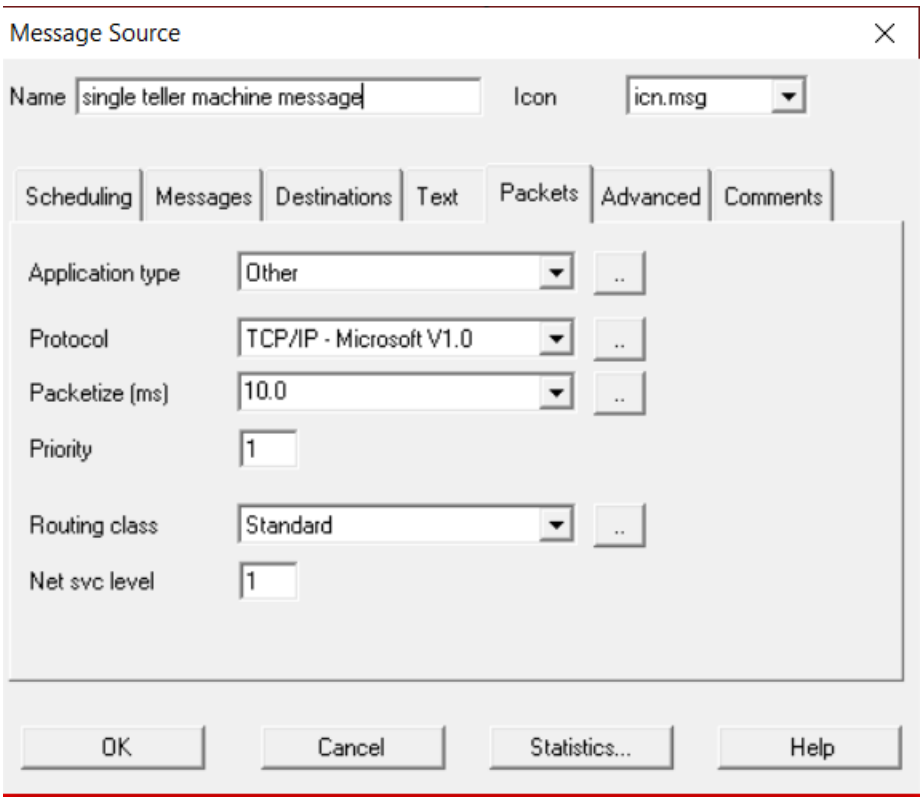

Figure 42: packet parameter

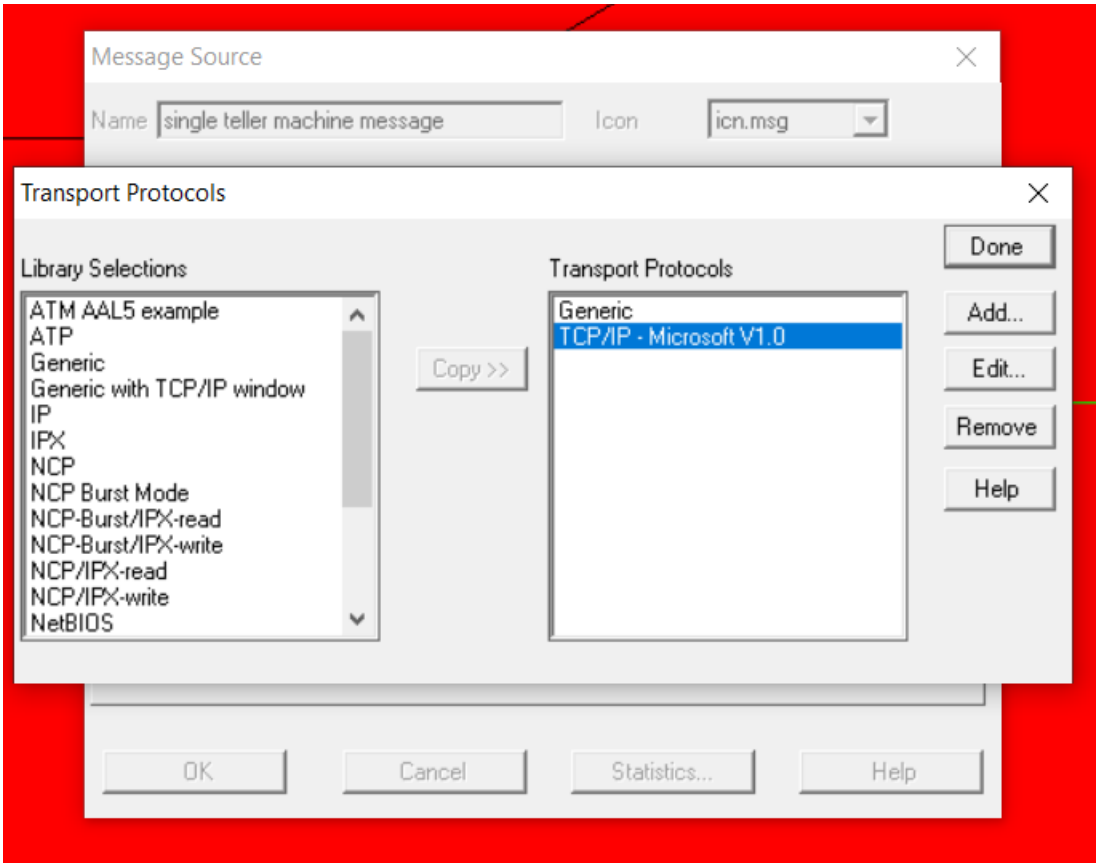

Figure 43: Protocol

The transport protocol is used by message source is TCP/IP Microsoft V1.0 and packetize time is 10 milliseconds

Itahari LAN

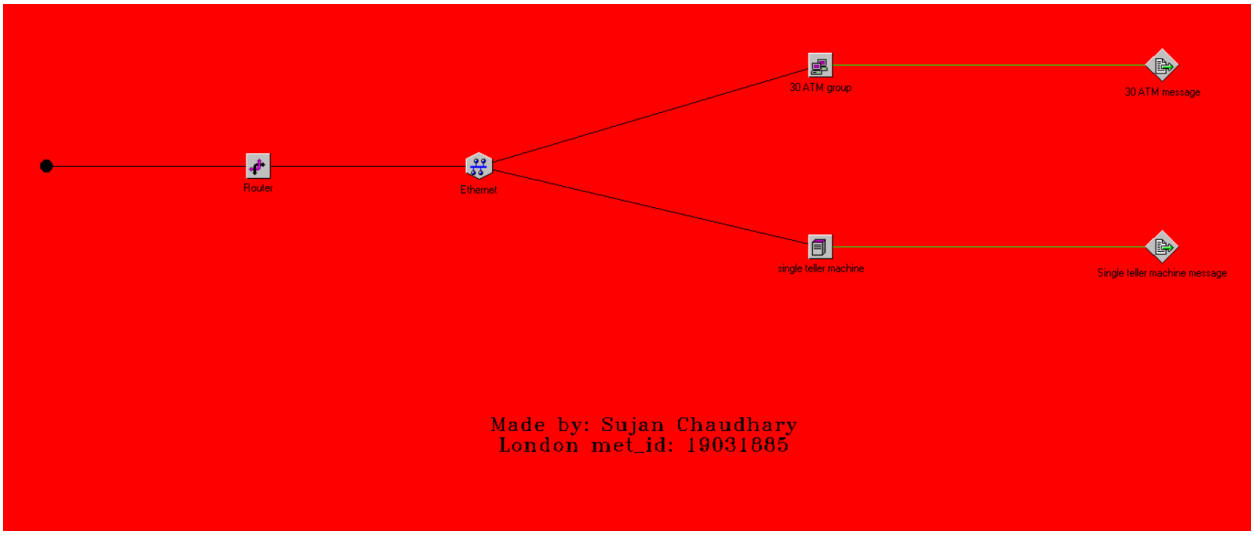

Figure 44: Itahari LAN

It has network device with parameter of Cisco 7000/7010 sp, token passing link type CSMA/CD with parameter 802.3 CSMA/CD 10BASET, Computer Group type Computer gropu with parameter named as Group, processing mode parameter default.

Butwal LAN

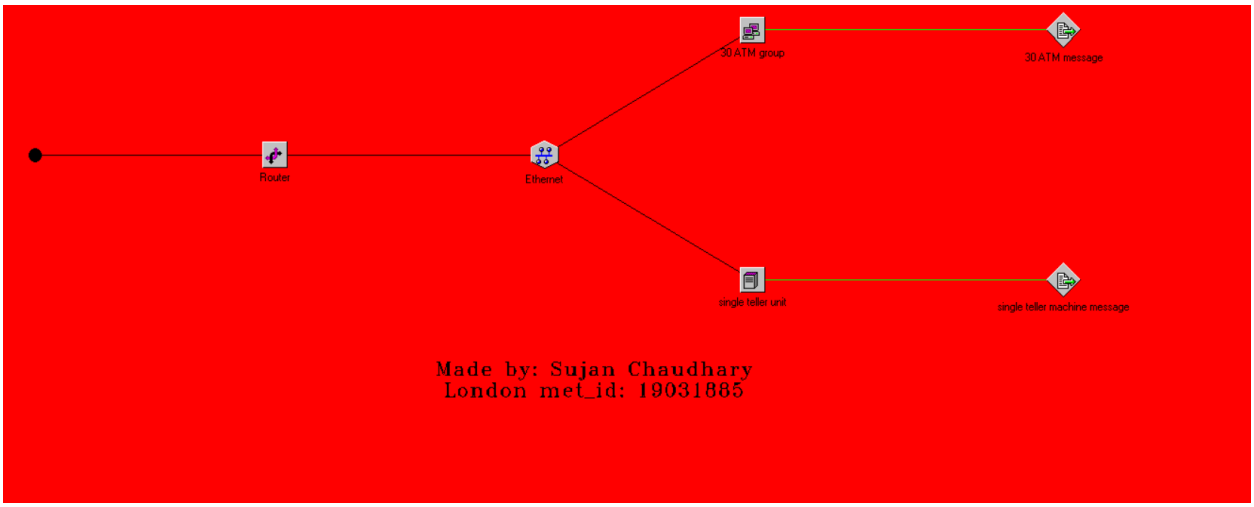

Figure 45: Butwal LAN

Edinburgh LAN

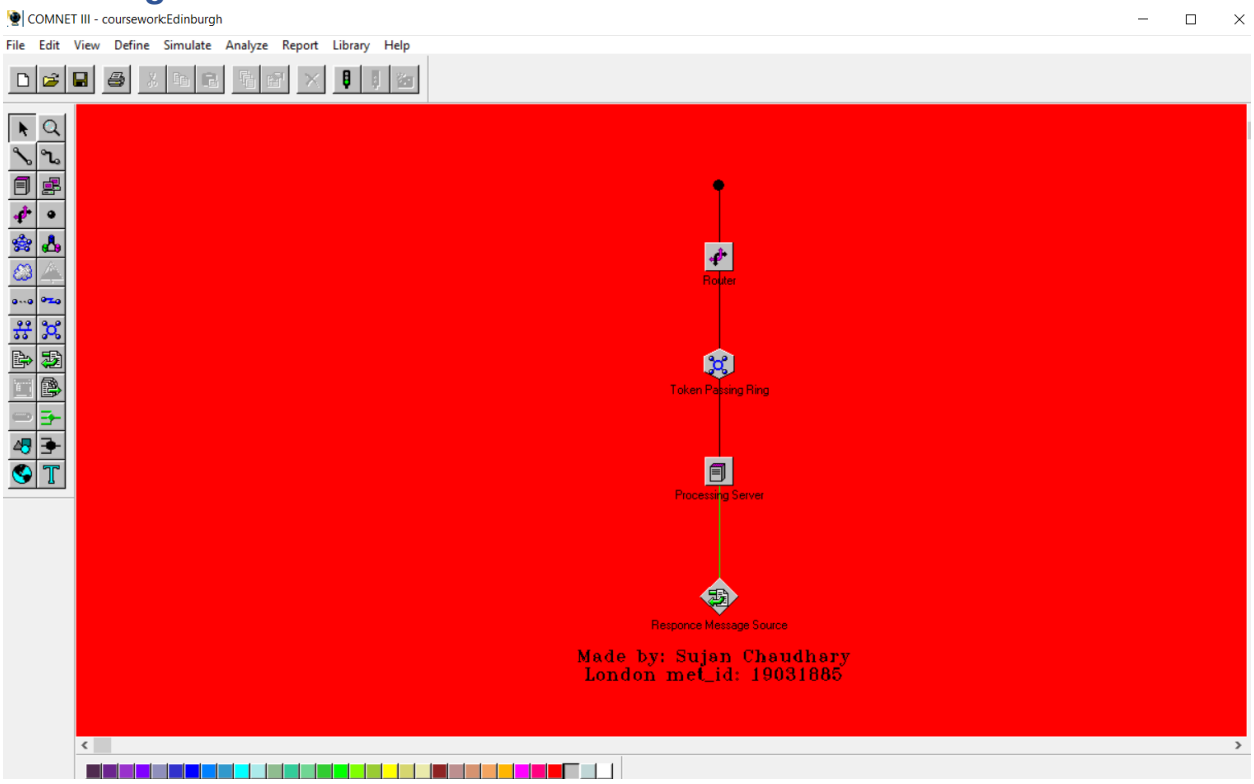

Figure 46: edinburgh LAN

WAN cloud

Wan Cloud for modeling wide-area network administrations at a better level of abstraction. The higher level of reflection is required for modeling network services where the physical network topology and the total traffic load on the network isn't known or isn't imperative for the answers looked for from the recreation. The WAN cloud can be utilized to show outline frame relay, cell relay (e.g., ATM), and packet-switching services.

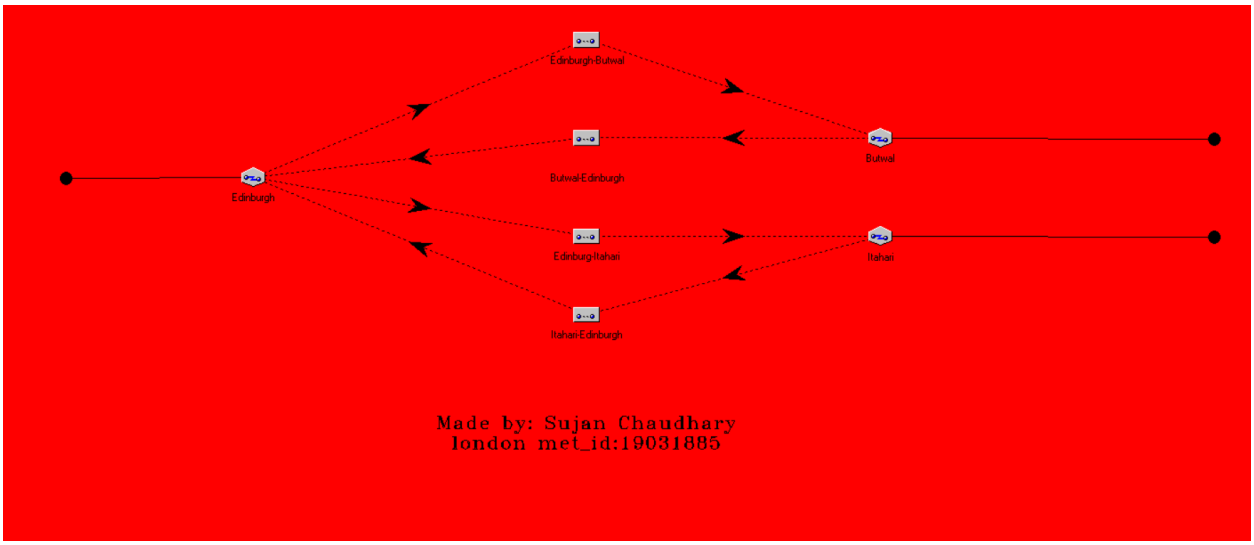

Figure 47: WAN Cloud

Simulation run parameter

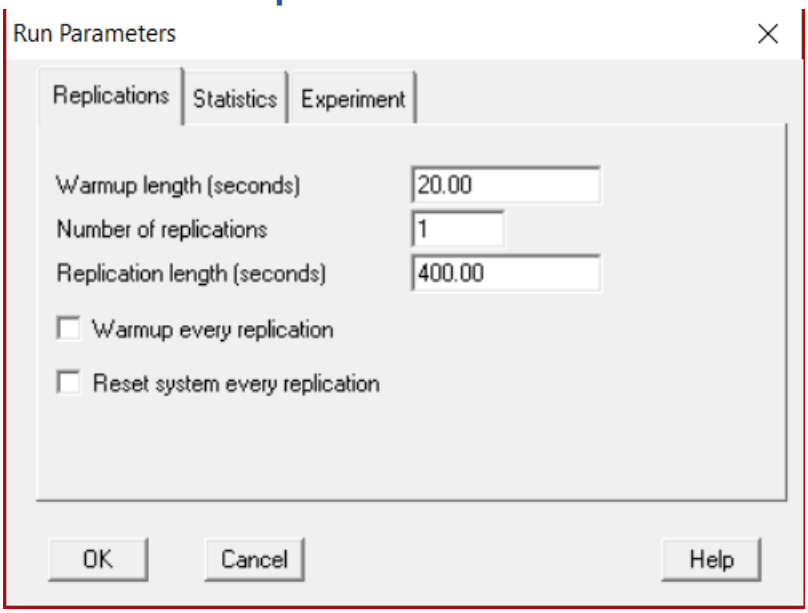

Figure 48:stimulation run parameter

The warmup length is 20 seconds, number of replications is 1and replication length is 400 second.

1.3. Description of Reports

From WAN model which is designed in COMMNET browse report the report select for this coursework are received message count, channel utilization, frame delay, frame count, Access link STAT which is listed below with there respective screen shot of chart and table. Drawn charts according to report extract from commnet of given scenario.

Node report:

1.3.1. Received Message Count

Receiver	Count	Message Name
Edinburgh.processing s	7708	Message
Itahari.single teller	4	Message
Itahari.30 ATM group	1578	Message
Butwal.single teller u	1	Message
Butwal.30 ATM group	1642	Message

Table 1: Received message count

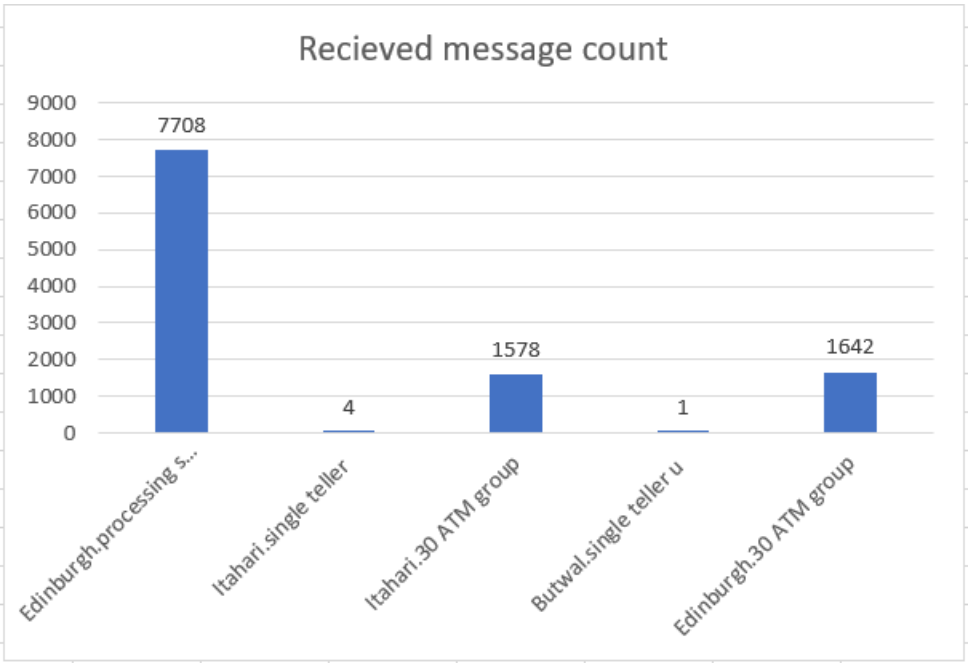

Figure 49: Recieved message count

Edinburgh processing server have highest message count 7708 and Butwal single teller has 1 as shown in the above picture of chart.

1.3.2. Channel utilization

Link	Frames		Transmission Delay (MS)			UTIL %
	Delivered	RST/ERR	Average	STD DEV	Maximum	
Edinburgh.Token Passing	152188	0	0.038	0.013	0.082	1.4281
Itahari.Ethernet	146667	0	0.072	0.029	1.382	2.5306
Butwal.Ethernet	147946	0	0.071	0.028	1.109	2.5390

Table 2: channel utilization

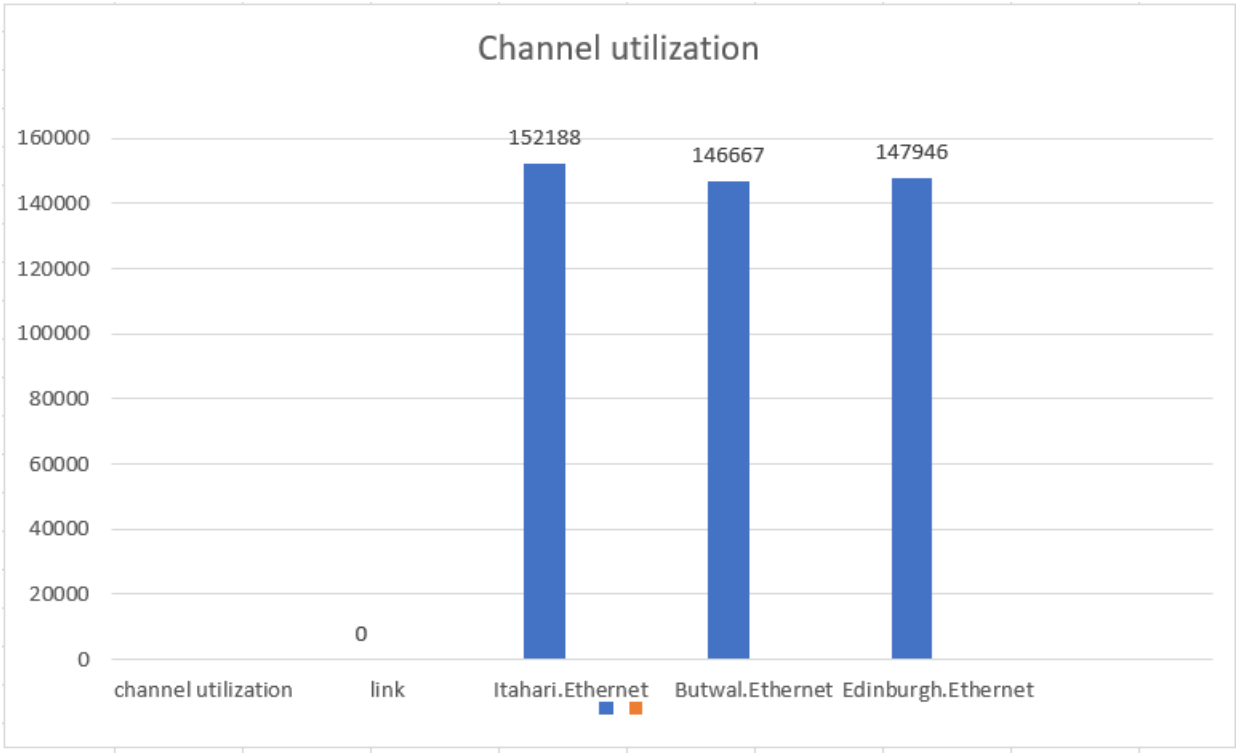

Figure 50: channel utilization

Itahari has highest channel utilization and Butwal have lowest channel utilization

1.3.3 WAN Cloud Report
Frame Delay by virtual circuit (VC)

Cloud VC	Frame Delay			Burst Size (KB)	
	AVG	STD	MAX	AVG	MAX
Edinburgh-Itahari	18	3	27	163	320
Butwal-Edinburgh	1262	722	2520	160	320
Itahari-Edinburgh	1269	722	2520	160	320
Edinburgh-Butwal	18	3	27	164	320

Table 3: Frame delay by VC

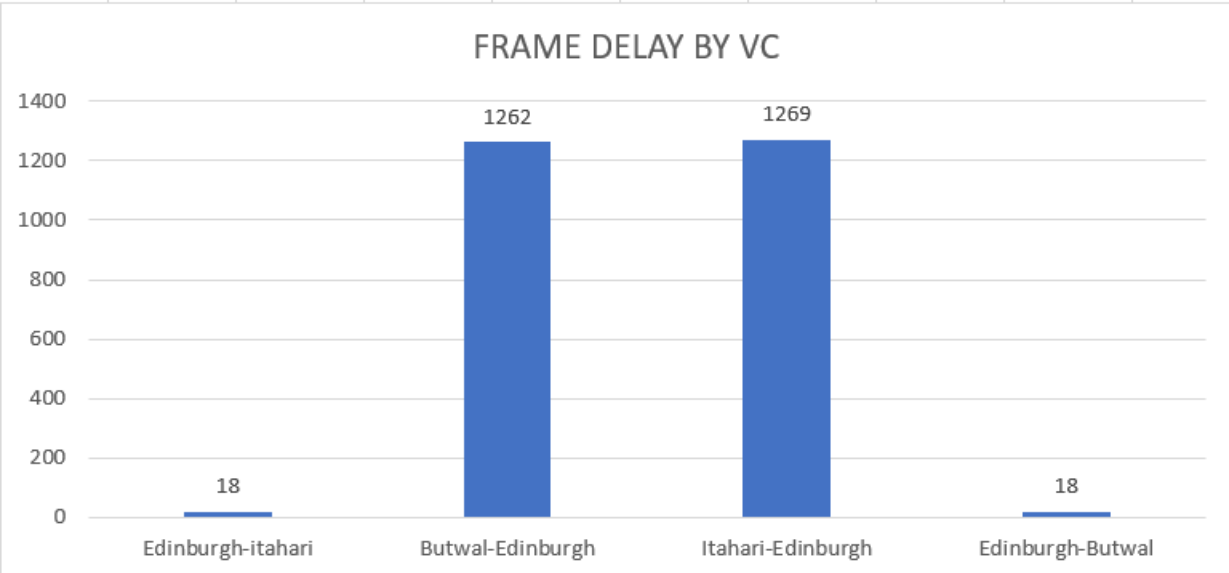

Figure 51: frame delay by of VC(virtual circuits)

Itahari-Edinburgh has the highest frame delay and Edinburgh-Butwal and Edinburgh-itahari have the same frame delay which is lowest frame delay.

Frame Counts by VC

Cloud VC	Frames/Kilobits			
Frames	Accepted		Dropped	
Kilobits	Normal	DE	Normal	DE
Edinburg-Itahari	12674	13611	0	25438
	5173	5096	0	9807
Butwal-Edinburgh	11887	11740	0	71659
	5246	5278	0	31528
Itahari-Edinburg	11378	11879	0	70191
	5257	5266	0	31671
Edinburgh-Butwal	12378	13361	0	27407
	5200	5121	0	10736
	Total Kilobits Transmitted = 41637			

Table 4: Frame count by VC

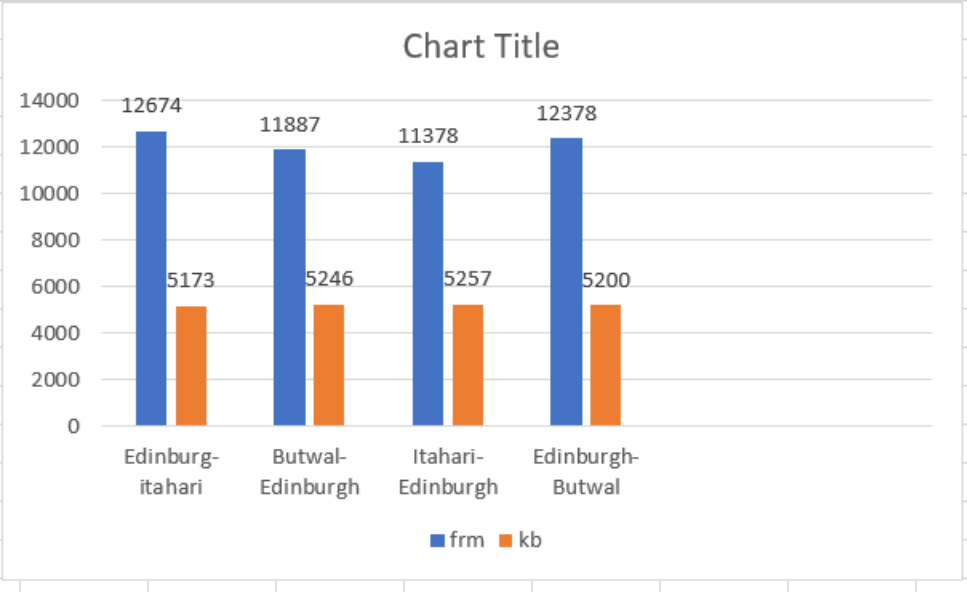

Figure 52: frame count by VC(virtual circuits)

Edinburgh-Itahari has the highest frame count and Itahari-Edinburgh has the lowest frame count by VC.

ACCESS LINK STAT

Access Link	Entry / Exit	Frames Accepted	Frames Dropped	Buffer (BYTES) MAX	Buffer (BYTES) AVG	Buffer (BYTES) STD	UTIL %
Edinburgh	Entry	52024	52845	N/A	N/A	N/A	100.00
	Exit	47251	0	34488	8245	33	49.97
Itahari	Entry	23624	70191	N/A	N/A	N/A	100.00
	Exit	26285	0	237	15	33	24.99
Butwal	Entry	23627	71659	N/A	N/A	N/A	100.00
	Exit	25739	0	238	16	32	24.98

Table 5: Access link STAT

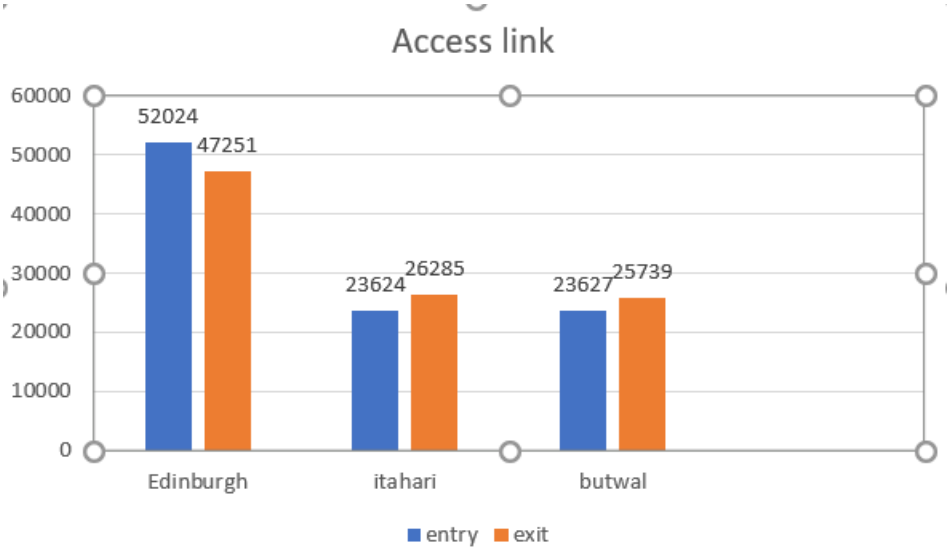

Figure 53: Access link

Edinburgh Access has the highest entry and exit frames and utilization. Butwal access is the lowest channel utilization in entry and exit frames.

1.3.4. Message and Report Response

Message Delay for All Nodes

Origin/MSG Name/Destination	MSG Assembled	Message Delay		
		Average (MS)	STD DEV (MS)	MAX (MS)
Edinburgh.Processing Server / src Responce Message Source: ECHO	801	216.56243 S	103.05552 S	410.32234 S
Itahari.single teller machine / src Single teller machine message: Edinburgh.Processing	2	410.32234 S	40466.72	170.37724 S
Itahari.30 ATM group / src 30 ATM message: Edinburgh.Processing	894	191.20382 S	14406.177	407.00511 S
Butwal.single teller unit / src single teller machine message: Edinburgh.Processing	1	240.63424 S	0.000 MS	240.63424 S
Butwal.30 ATM group / src 30 ATM message: Edinburgh.Processing	798	189.48032 S	105.22809 S	409.31077 S

Table 6: Message+response souce: Message Delay

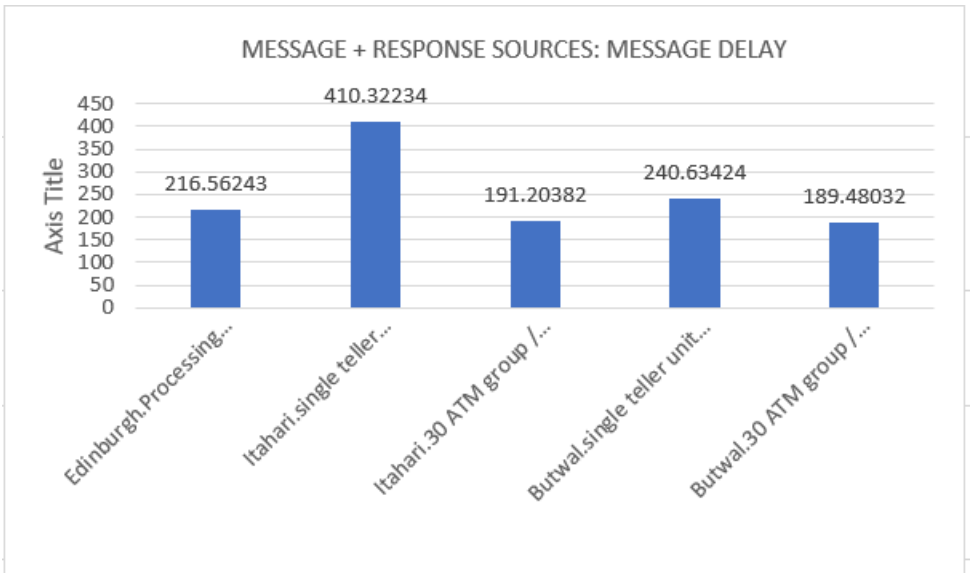

Figure 54: Message + response sources: Message Delay

the itahari single teller machine has the highest message collect and delay, and the Butwal 30 ATM group has the lowest message collect and delay.

1.4. **Conclusion**

Model is designed in COMMNET which has drag and drop feature which was very friendly experience with the application while designing the model according to the scenario given in the coursework. the device which is used in this project are processing node, network device, token passing ring, CSMA/CD link, point to point link, WAN link, access point and many more. the parameter is set according to the given scenario. The app get crash when simulating. It was easy to design in COMMNET. Commnet III is used to design the project of a mythical company named Asia bank. Two ATM transaction network had been setup in itahari and Butwal in which each network contained 30 ATM with one single ATM teller in each LANs. Each LAN had been set up using IEEE802.5 16 Mbps token passing standard. Similarly, ATM processing server was connected to IEEE 802.5 16 Mbps token passing standard which had been connected to frame relay cloud through cisco 7010sp,V10.0 router. After that, each network was connected to WAN Cloud with the help of point-to-point network. Each network was also connected with each other with the help of virtual circuit within WAN Cloud. All devices in the network were given different parameters according to the requirement. The warmup length is set

to 20s and replication is 400s time for fast report. Made a chart in excel according to the data of report. Commnet III had helped a very much in proper designation and stimulation of above project and also helped in generating the report. All screenshots are taken and then inserted in word described the screenshots what is done in the shown screenshot all screenshots taken by the help of snipping tool. according to CW guidelines. This coursework helps me to

2.0. Task B

2.1. Introduction

A network operating system (NOS) is a PC working operating system (OS) that is designed basically to help workstations, PCs and, in certain examples, more established terminals that are associated on a local area network (LAN). The product behind a NOS permits various gadgets inside an organization to convey and impart assets to one another. The composition of hardware that regularly utilizes a NOS includes various PCs, a printer, a server and server file with a local network that connects them together. The function of the NOS is to then give fundamental network services and features that help numerous inputs demands all the while in a multiuser environment. The Network O.S. basically runs on a effective computer, that runs the server program. It encourages the security and capability of managing the information, client, bunch, application, and other network functionalities. The most important advantage of using a network o.s. is that it facilitates the sharing of resources and memory among the independent computers within the network. It can too encourage the client PCs to get to the shared memory and assets managed by the Server PCs In other words, the Network O.S. is primarily planned to permit numerous clients to share records and assets over the network. There are many types of network but most common is local network area(LAN) and wide area network(WAN). LAN is set up using two or more computer with in the compound like school and building and WAN cover more area than LAN it common ly used in cities, countries and whole world.

There are two type of networking operating system:

Peer to peer: It allows users to share network resources saved in a common, accessible network location. It can be set up in low budget.

Client/server: it provides users with access to resources through a server. It provides a convenient way to interconnect programs distributed across different locations. Network is centralized control. It requires high budget to set up.

(After Academy, Copyright 2019)

(chakraborty, 2019)

AIM and objective

To make familiar with network designing and also knowledge of networking and operating system. History of networking and wireless networks and also advantage and disadvantages of wireless network. The wireless communication transformation has brought essential changes to data networking, media transmission, and has made coordinates networks a reality. Wireless Networks centers on the organizing and client perspectives of this field. It gives a single common and worldwide gathering for authentic esteem commitments reporting these quick developing zones of intrigued. The diary distributes refereed articles managing with inquire about, involvement and administration issues of remote systems. It permits per users to advantage from involvement, issues and arrangements portrayed. Frequently tended to issues incorporate: arrange designs for individual communication systems, wireless LANS, radio, strategic and other wireless networks, plan and investigation of conventions, arrange administration and organize execution, organize administrations and benefit integration, migrant computing, internets working with cable and other remote systems, standardization and administrative issues, particular framework depictions, applications and client int

2.1.1. Wireless network

Wireless network are PC networks that are not connected by links of any sort. The utilization of a wireless network empowers enterprises to keep away from the expensive cycle of bringing links into structures or as a connection between various equipment areas. The premise of wireless system are radio waves, an implementation that takes place at the physical level of network structure.

Wireless networks use radio waves to connect devices such as laptops, workstation to the web, the business network and applications. When laptops are connected to Wi-Fi hot spots in public places, the connection is built to that business's wireless network.

(technopedia, Copyright © 2020)

2.1.1.1. History of wireless network

In1970 College of Hawaii, beneath the authority of Norman Abramson, created the worlds to begin with computer communication arrange utilizing low-cost ham-like radios, named ALOHAnet. The bi-directional star topology of the framework included seven computers sent over four islands to communicate with the central computer on the Oahu Island without utilizing phone lines. In1979, F.R. Gfeller and U. Bapst distributed a paper within the IEEE Procedures announcing an exploratory remote neighborhood range arrange utilizing diffused infrared communications. In the blink

of an eye thereafter, in 1980, P. Ferrert detailed on an exploratory application of a single code spread range radio for wireless terminal communications within the IEEE National Broadcast communications Conference. In 1984, a comparison between Infrared and CDMA spread range communications for remote office data systems was distributed by [Kaveh Pahlavan] in IEEE Computer Netwroking Symposium which showed up afterward within the IEEE Communication Society Magazine. In May 1985, the endeavors of Marcusled the FCC to report test ISM groups for commercial application of spread range innovation. Afterward on, M. Kavehrad detailed on a test remote PBX system utilizing code division different access. These endeavors provoked critical mechanical exercises within the improvement of a unused era of remote nearby region systems and it updated several ancient discourses within the versatile and versatile radio industry. In 1999 remote was presented to the common open as a “nice to have” with the 802.11 a and b approvals. These measures had exceptionally moo speeds (up to 54 Mbps & 11Mbps individually) but it was alright, since there were no shrewd phones at that time to that utilized Wi-Fi and exceptionally few number portable workstations. By 2003, be that as it may, a few portable gadgets that utilized Wi-Fi were coming out and versatile tablets were getting to be more standard for both commerce and individual utilize. That's when 802.11g was ratified— conveying up to 54 Mbps within the 2.4 GHz space. As we moved closer to today, in 2007, the birth of the smartphone really came about and along with it came the ratification of 802.11n.

The “n” standard brought about faster processing speeds of up to 450 Mbps for Wi-Fi and it supported both 2.4 Ghz and 5 Ghz devices. Today, smart devices are robust enough to replace specialized, more expensive laptop technologies so wireless has had to catch up.

(tech ware, All Rights Reserved 2007-2009)

2.1.1.2. ADVANTAGE AND DISADVANTAGES

Advantage of wireless network

- Wireless is cheaper than wired network because it does not need cable which bring big difference in price.
- It more reliable and flexible
- Offer guest secured wireless network, including partner, and customers.
- Full access of network all around the organization wirelessly.
- It is secured network

Disadvantage of wireless network

- Transmission speed is less as compared to wired network.
- Unreliable as compared to wired network
- Traffic increased.

- Unsecured network it is exposed to attack by unauthorized user.
- Virus can spread to the other gadget all through a computer organize whereas sharing the message or information.

2.1.2. IEEE 802.11 Architecture

The architecture of the IEEE 802.11 WLAN is designed to support a network where most decision making is distributed to mobile stations. This type of architecture has several advantages. It is tolerant of faults in all of the WLAN equipment and eliminates possible bottlenecks a centralized architecture would introduce. The architecture is flexible and can easily support both small, transient networks and large, semipermanent or permanent networks. In addition, the architecture and protocols offer significant power saving and prolong the battery life of mobile equipment without losing network connectivity.

1) Stations (STA) − Stations contain all gadgets and equipment's that are associated to the remote LAN. A station can be of two type:
    - Wireless Access Points (WAP) − WAPs or simply access points (AP) are generally wireless routers that form the base stations or access.
    - Client. − workstations, computers, laptops, printers, smartphones, etc. are clients.

Each station has a wireless network interface controller.

2) Basic Service Set (BSS) −A fundamental benefit set may be a gather of stations communicating at physical layer level. BSS can be of two types depending upon mode of operation:

- Infrastructure BSS − Here, the gadgets communicate with other gadgets through access points.
- Independent BSS − Here, the gadgets communicate in peer-to-peer premise in an advertisement hoc manner.

3) Extended Service Set (ESS) − It could be set of all connected BSS.

4) Distribution System (DS) − It connects all access points in ESS.

(Moumita, 2019)

2.1.3. IEEE 802.11 priorities

Wireless LANs have been quickly extending during the last few years. The reasons are both the growing demands for cable-free communications, as well as advances in portable computers and semiconductor technology. In spite of the fact that, to begin with WLAN arrangements were expecting as cordless substitution for Ethernet systems, presently it gets to be apparent that WLANs must offer more extensive usefulness, counting back for mixed media activity. The ubiquity of remote organizing is driven by the ubiquity of versatile portable hand-held gadgets, and the comfort of untethered communications. With the expanding sending of mixed media substance on the Internet—such as computerized video, voice over IP (VoIP), videoconferencing, and multi-player organized games—along with the sending of time-sensitive basic applications, there's a solid inspiration to create QoS highlights to meet the more exacting execution requirements While the Web and information organizing models of the IEEE 802.11 WLAN innovation, which are based on the datagram conveyance demonstrate of IP, give basic, versatile and blame strong arrange, they are ill-suited to QoS provisioning. The basic datagram model of IP could be a best-effort service— i.e. whereas the arrange tries to convey packet to the destination accurately without any packet misfortunes, it makes no ensures. Multimedia applications, in specific, require more grounded ensures almost the least throughput and greatest latency to work satisfactorily. An costly arrangement for guaranteeing QoS is to overprovision. Most of the Web QoS exertion has centered on how to induce a organize with less capacity meet application

(Woźniak, (PWC’2001), August 8–10, 2001)

- 802.11a-1999: Higher Speed PHY Expansion within the 5 GHz Band
- 802.11b-1999: Higher Speed PHY Expansion within the 2.5 GHz Band
- 802.11c: Bridge Operation (Included to IEEE 802.1D)
- 802.11d-2001: Worldwide Harmonization (PHYs for other nations.)
  802.11e-2005: Quality of Benefit. •
- 802.11ai: Quick beginning connect set up. Quick AP discovery, arrange revelation, affiliation, verification, and IP address task. Anticipated November 2015.
- 802.11aq: Pre-association disclosure. Anticipated May 2016.
- 802.11ak: Improvements for travel joins inside bridged systems. High-speed 802.11 links can be utilized as inside joins rather like Ethernet in expansion to get to. Anticipated May 2016.

- 802.11ac: Exceptionally High Throughput WLAN. Gives high throughput (more noteworthy than 1 Gbps) operation in bands underneath 6 GHz. •
- 802.11m IEEE 802.11 Standard Maintenance and Amendment. Distributed as IEEE Std 802.11-2012 Gives support for the IEEE 802.11 standard by rolling distributed corrections into corrections of the IEEE 802.11 standard.
- 802.11ah Operation in Sub 1 GHz Frequencies. Underpins applications that advantage from extend expansion, such as smart meters.
- 802.11aj Exceptionally High Throughput. it is dynamic. Works within the millimeter-wave groups in China.
- 802.11ax High-efficiency Remote LAN. Affirmed (Walk 2014). Progressing range proficiency, region throughput and real-world execution in indoor and open-air deployments.
  (Aqsa Malik, 2014)

2.2.3. Wireless technologies

Wireless technology is the technology that allows us to communicate or transfer files, data without using cables or wires. latest smartphones have new feature is it can be charged wireless which I an example of wireless technology.
(Markert Business News , © 2020 - Market Business News. All Rights Reserved.)

2.2.3.1. WAP (WIRELESS APPLICATION PROTOCOL)

Since the early 1990s, there has been marvelous development within the worldwide wireless communications industry. Nearby this quick numerical development have been ceaseless mechanical improvements to meet rising requirements. One such prerequisite is for wireless networks to supply administrations other than the conventional voice, fax and moo bit rate information services. The Wireless Application Protocol (WAP) is outlined to supply progressed data and communication applications to wireless gadgets such as cellular phones and personal digital assistants (PDAs). The primary discharge of WAP (form 1.0) was in April 1998 and there are as of now more than 8 million WAP endorsers around the world. The Internet has grown rapidly in terms of both the number of Internet users and the number of Internet hosts. An Internet host is any computer system that is connected to the Internet, whether by permanent or temporary, dialup or direct connection, and has an connected domain name and Internet protocol (IP) address.
WAP is an enhanced communications convention stack and an application environment planned for the sending of progressed data and telephony services for wireless devices. It has been enhanced to manage with the imperatives of the

remote working environment, and the confinements of its focused on wireless gadgets.
(Singelée, 2005)

2.2.3.2. WML (WIRELESS MARKUP LANGUAGE)

It is small language it has only 35 tags and connected attributes 14 tag among 35 tag have no analog in HTML 4.01. WML is planned to permit the inactive show of content, tables, hyperlinks, monochrome pictures, and input areas. The person page is called a card, and a collection of these cards which are connected together is alluded to as a deck. There's more often than not an upper measure restrain (ordinarily ~1400 bytes compiled) for a card. WML is the standard language but it has different syntax from HTML that has been the language for web browsing.
(devguru, © Copyright 1999-2018)

2.3 Conclusion

It was very wonderful and learning experience while working on this coursework. I tried my best to include all necessary point required for this coursework by researching website, documents, books. While researching it allows me to get extra knowledge for my self-improvement. Due to this lockdown, we cannot have physical class so we cannot have access to library of the college in library we can barrow a book for reference and research but due to lockdown we cannot so in google it was very tough to find books, journal, we get books and journal but some website charge money for access of book or journal I am student so I can't afford. But also, somehow tackle the problem and succeed the coursework. provides deep knowledge about the history of networking and wireless networking when like when it was firstly invented or used. information exchange rate through the remote medium is much lower than the wired organize. Latest IEEE 802.11ac is the latest wireless technology which we use it is WIFI 5. Wireless network is being popular day by day people now want wire free office so, now all use wires less network which encrypted by WPA2 but wired connection is faster than wireless that is disadvantage of wireless networks. Since last few year wireless network is popular just because of smartphones in which network is connected wirelessly. Knowledge of WML (wireless markup language) how it works and fundamental. This course is very helpful for me because get know new things about wireless network and networking. It was a great experience doing this coursework it allows me to improve research skills and also interactive skills due to lockdown we are not able to do physical classes so in online class it not that easy to convey exact message what we are saying so there was a many problem but by tackling it I am able to succeed the coursework completely.

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4. APPENDIX

APPENDIX – A Screenshots of Simulation Report

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coursework

NODES: RECEIVED MESSAGE COUNTS

REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

RECEIVER	COUNT	MESSAGE NAME
Edinburgh.Processing S	7708	Message
Itahari.single teller	4	Message
Itahari.30 ATM group	1578	Message
Butwal.single teller u	1	Message
Butwal.30 ATM group	1642	Message

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coursework

LINKS: CHANNEL UTILIZATION

REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

LINK	FRAMES DELIVERED	FRAMES RST/ERR	TRANSMISSION DELAY (MS) AVERAGE	TRANSMISSION DELAY (MS) STD DEV	TRANSMISSION DELAY (MS) MAXIMUM	% UTIL
Edinburgh.Token Passin	152188	0	0.038	0.013	0.082	1.4281
Itahari.Ethernet	146667	0	0.072	0.029	1.382	2.5306
Butwal.Ethernet	147946	0	0.071	0.028	1.109	2.5390

coursework

WAN CLOUDS: FRAME DELAY BY VC

REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

CLOUD: VC	FRAME DELAY (MS) AVG	STD	MAX	BURST SIZE (kb) AVG	MAX
Wan Cloud					
Edinburg-Itahari	18	3	27	163	320
Butwal-Edinburgh	1262	722	2520	160	320
Itahari-Edinburgh	1269	722	2520	160	320
Edinburgh-Butwal	18	3	27	164	320

coursework

WAN CLOUDS: FRAME COUNTS BY VC

REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

CLOUD: VC: FRAMES KILOBITS		FRAMES / KILOBITS ACCEPTED NORMAL	DE	DROPPED NORMAL	DE
Wan Cloud	(TOTAL KILOBITS TRANSMITTED =	41637)			
Edinburg-Itahari	Frm	12674	13611	0	25438
	kb	5173	5096	0	9807
Butwal-Edinburgh	Frm	11887	11740	0	71659
	kb	5246	5278	0	31528
Itahari-Edinburg	Frm	11745	11879	0	70191
	kb	5257	5266	0	31671
Edinburgh-Butwal	Frm	12378	13361	0	27407
	kb	5200	5121	0	10736

coursework

WAN CLOUDS: ACCESS LINK STATS

REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

CLOUD: ACCESS LINK	(ENTRY) (EXIT)	FRAMES ACCEPTED	FRAMES DROPPED	BUFFER (BYTES) MAX	BUFFER (BYTES) AVG	BUFFER (BYTES) STD	% UTIL
Wan Cloud							
Edinburgh	Entry	52024	52845	N/A	N/A	N/A	100.00
	Exit	47251	0	34488	8245	10643	49.97
Itahari	Entry	23624	70191	N/A	N/A	N/A	100.00
	Exit	26285	0	237	15	31	24.99
Butwal	Entry	23627	71659	N/A	N/A	N/A	100.00
	Exit	25739	0	238	16	32	24.98

coursework

MESSAGE + RESPONSE SOURCES: MESSAGE DELAY

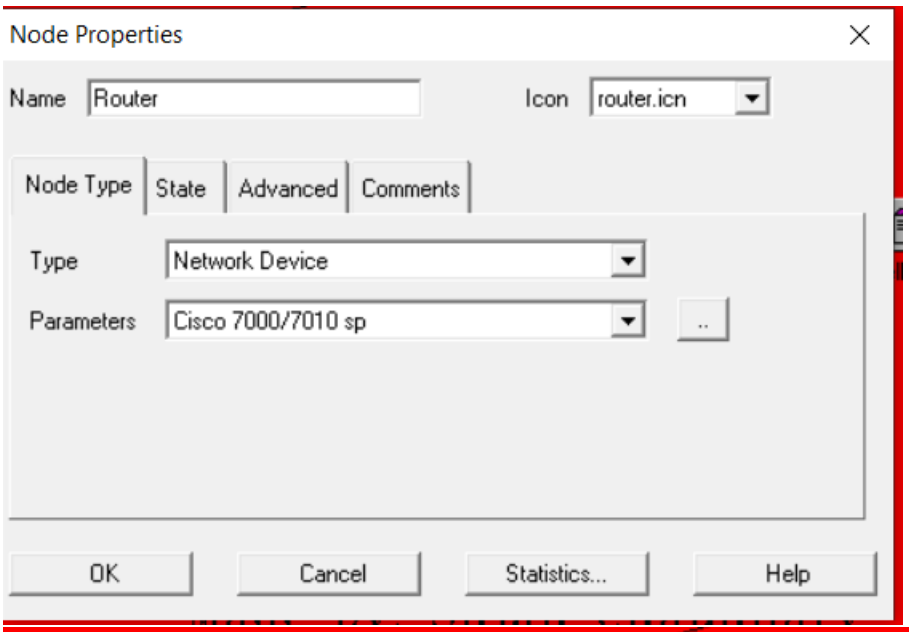
REPLICATION 1 FROM 20.0 TO 420.0 SECONDS

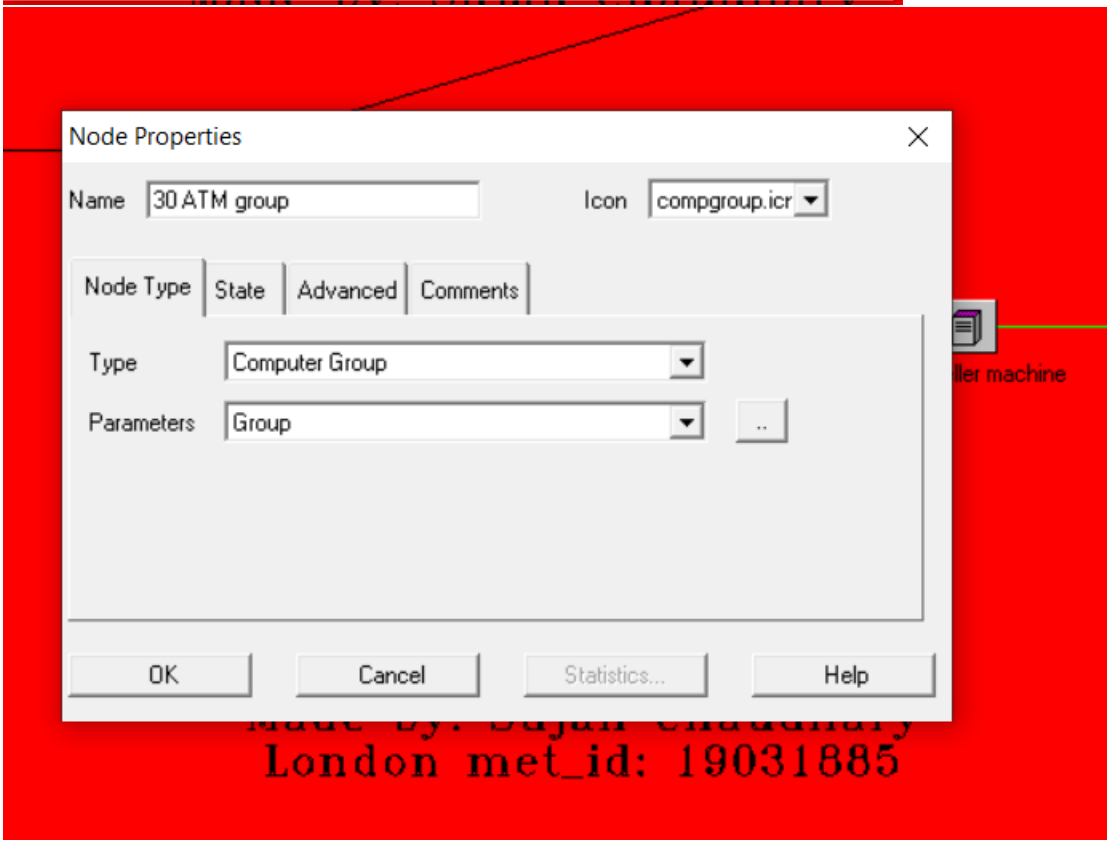
ORIGIN / MSG SRC NAME: DESTINATION LIST	MESSAGES ASSEMBLED	MESSAGE DELAY AVERAGE	MESSAGE DELAY STD DEV	MESSAGE DELAY MAXIMUM
Edinburgh.Processing Server / src Responce Message Source:				
ECHO	801	216.56243 S	103.05552 S	410.32234 S
Itahari.single teller machine / src Single teller machine message:				
Edinburgh.Processing	2	130.45217 S	39925.071 MS	170.37724 S
Itahari.30 ATM group / src 30 ATM message:				
Edinburgh.Processing	894	191.20382 S	100.81352 S	407.00511 S
Butwal.single teller unit / src single teller machine message:				
Edinburgh.Processing	1	240.63424 S	0.000 MS	240.63424 S
Butwal.30 ATM group / src 30 ATM message:				
Edinburgh.Processing	798	189.48032 S	105.22809 S	409.31077 S

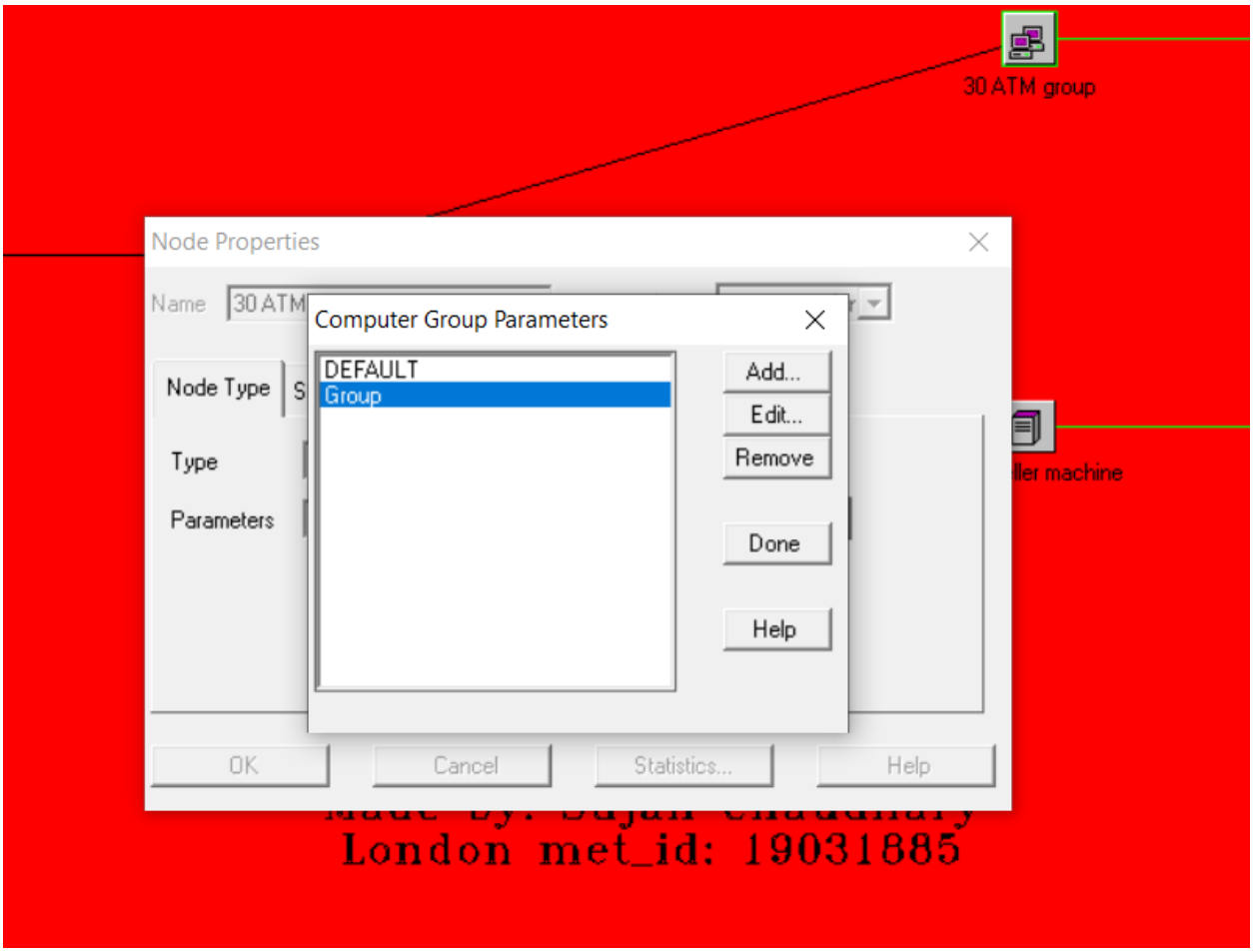
APPENDIX – B Additional Content of Task B

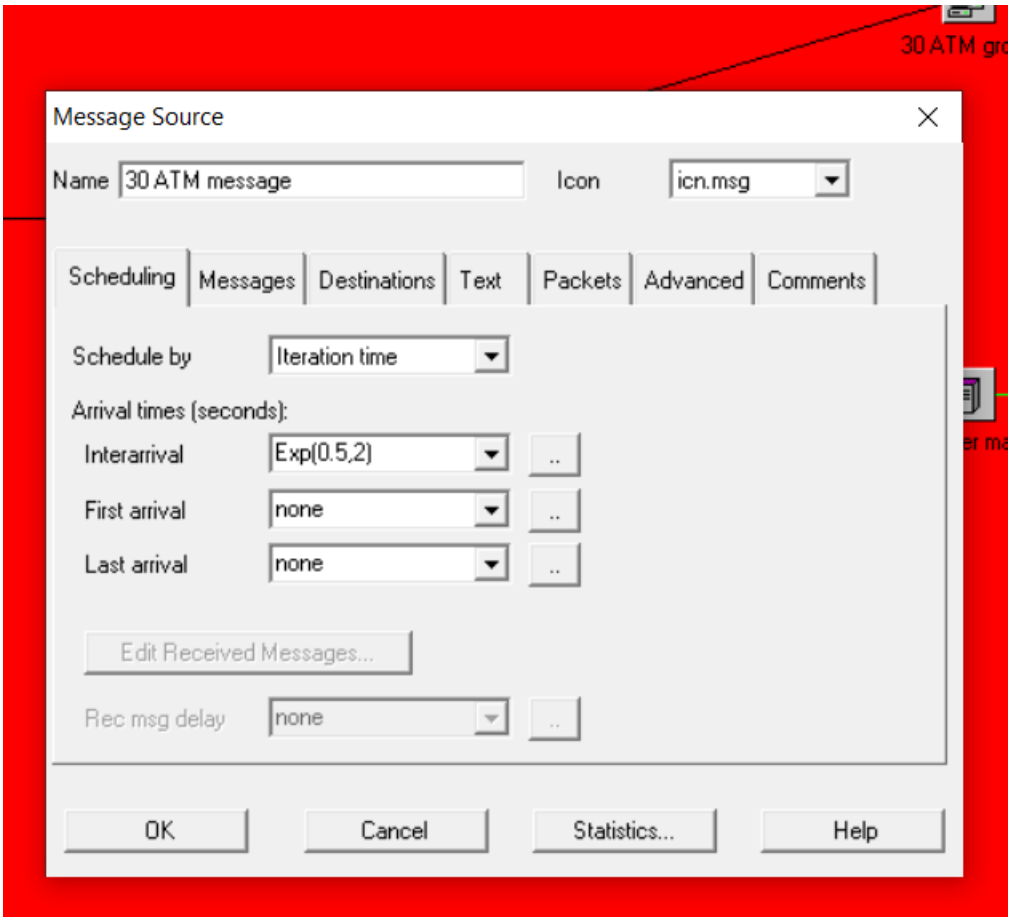
APPENDIX – C Glossary (Difficult Words Used in CW Task B meaning)

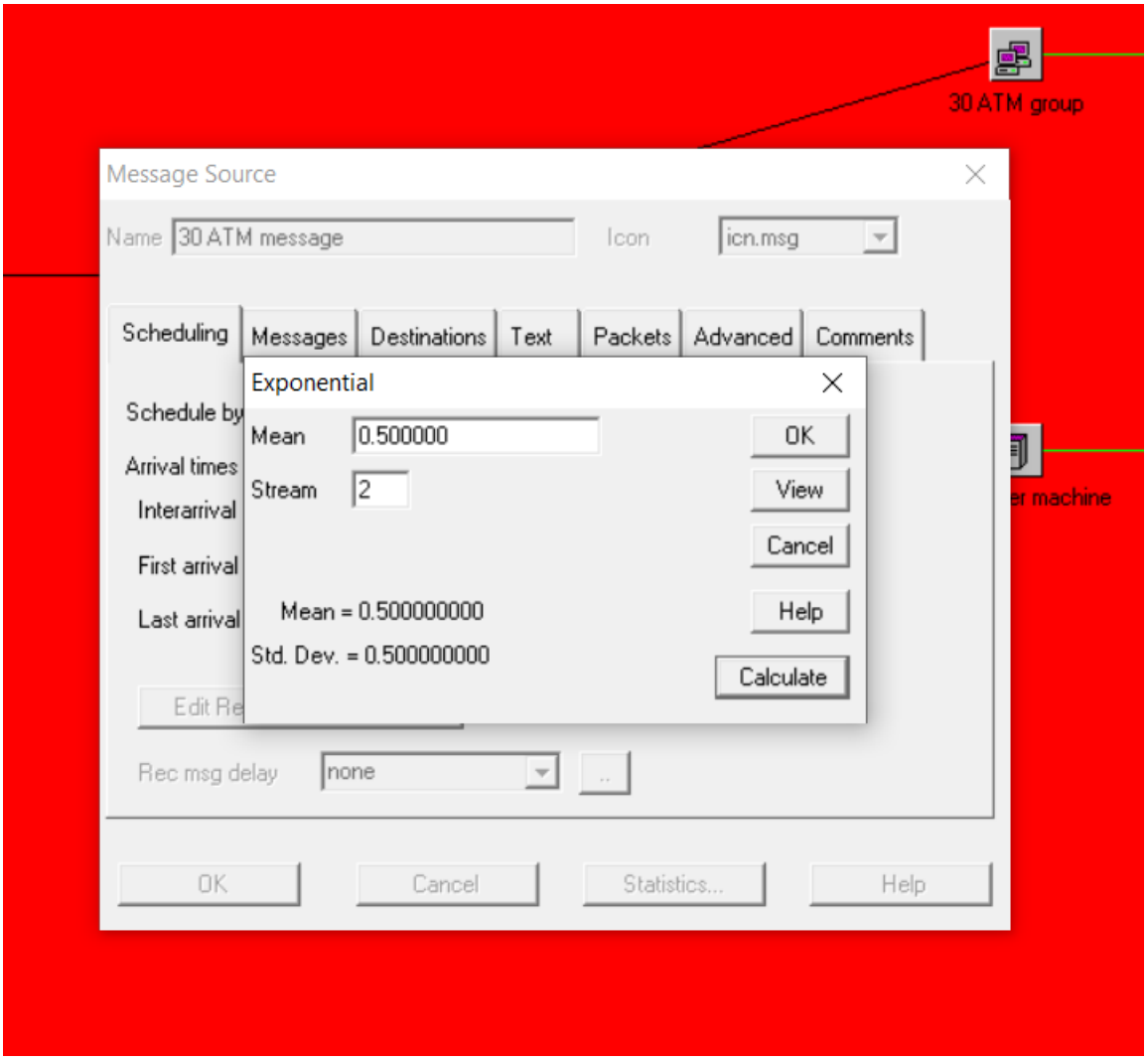
APPENDIX – D SCREENSHOTS OF ITAHARI LAN.






30 ATM group
Node Properties
Name
30 ATM
Node Type
Type
Parameters
Computer Group Parameters
DEFAULT
Group
Add...
Edit...
Remove
Done
Help
OK
Cancel
Statistics...
Help
London met_id: 19031885


30 ATM gr
Message Source
Name
30 ATM message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Schedule by
Iteration time
Arrival times (seconds):
Interarrival
Exp(0.5,2)
First arrival
none
Last arrival
none
Edit Received Messages...
Rec msg delay
none
OK
Cancel
Statistics...
Help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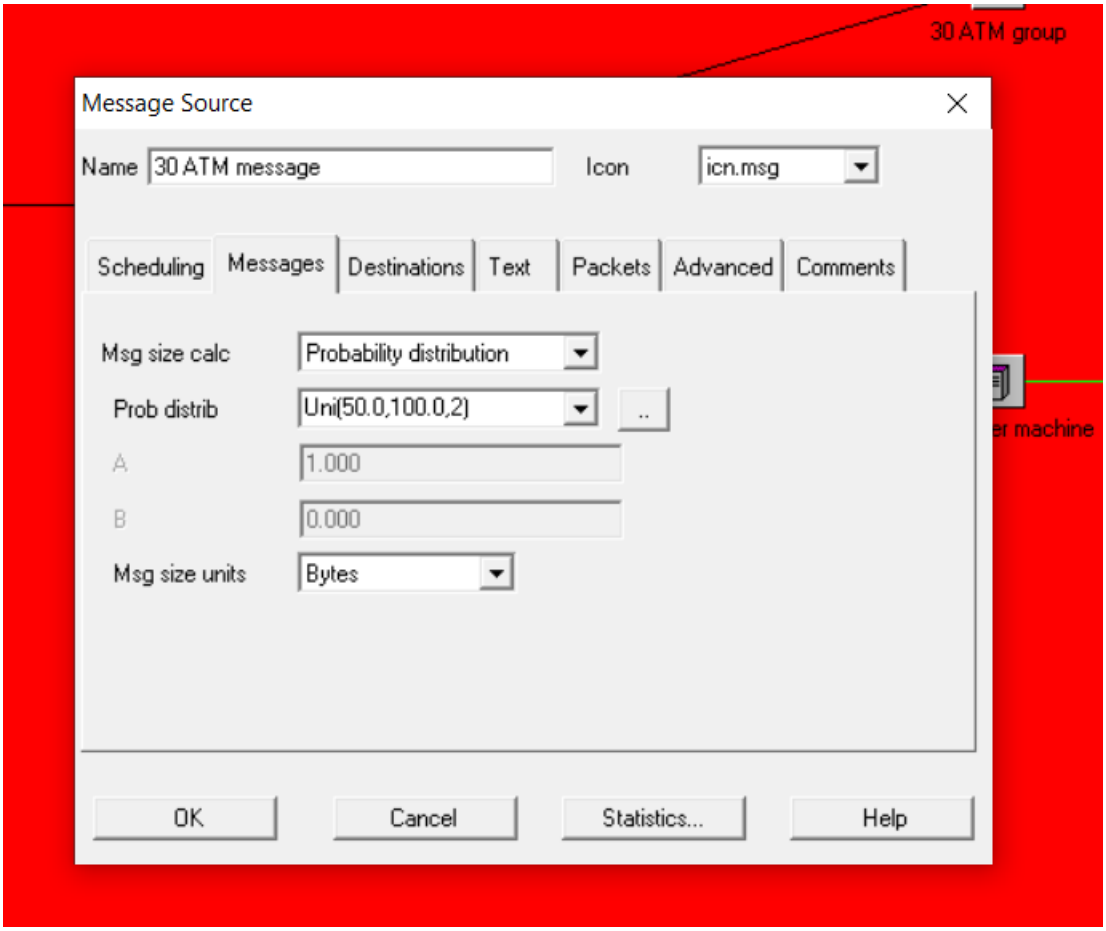
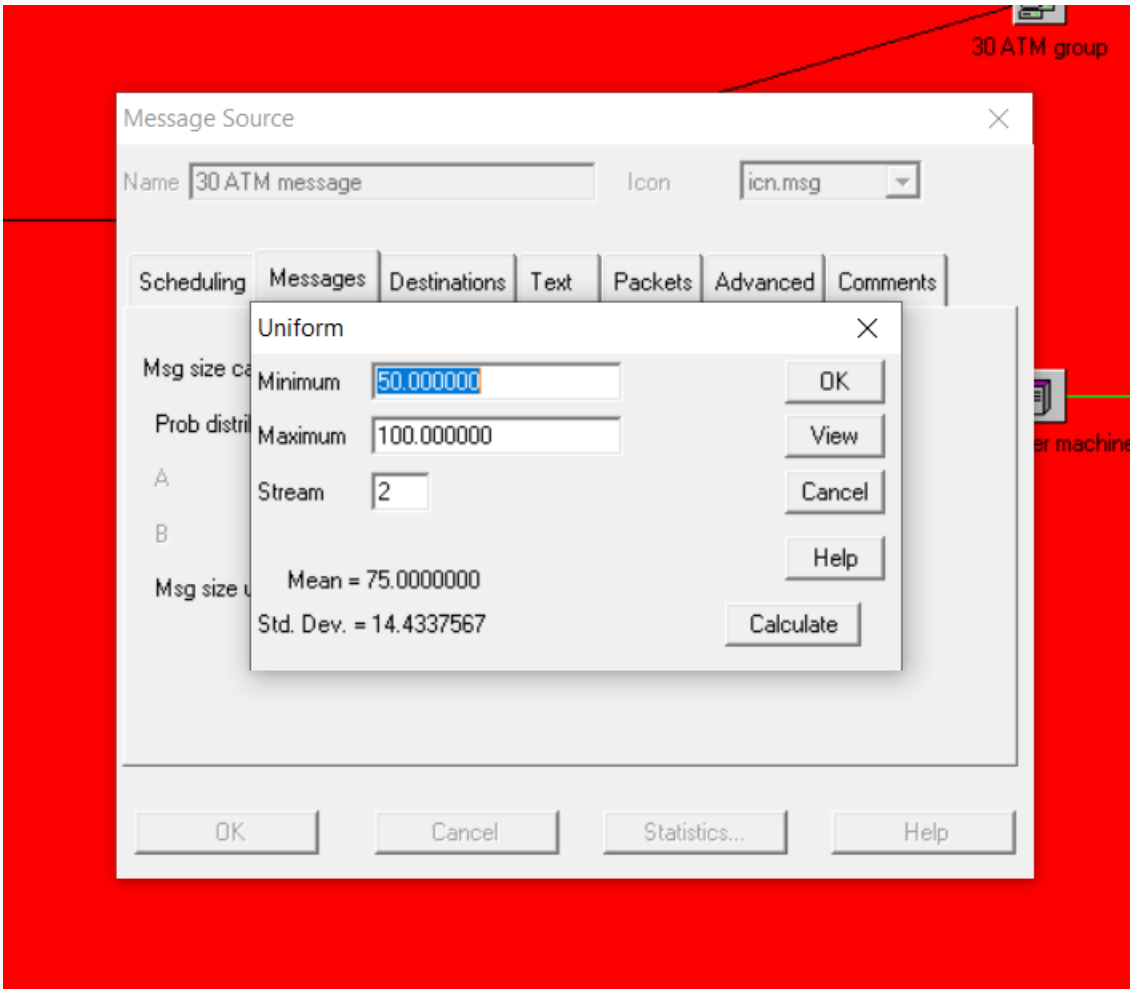
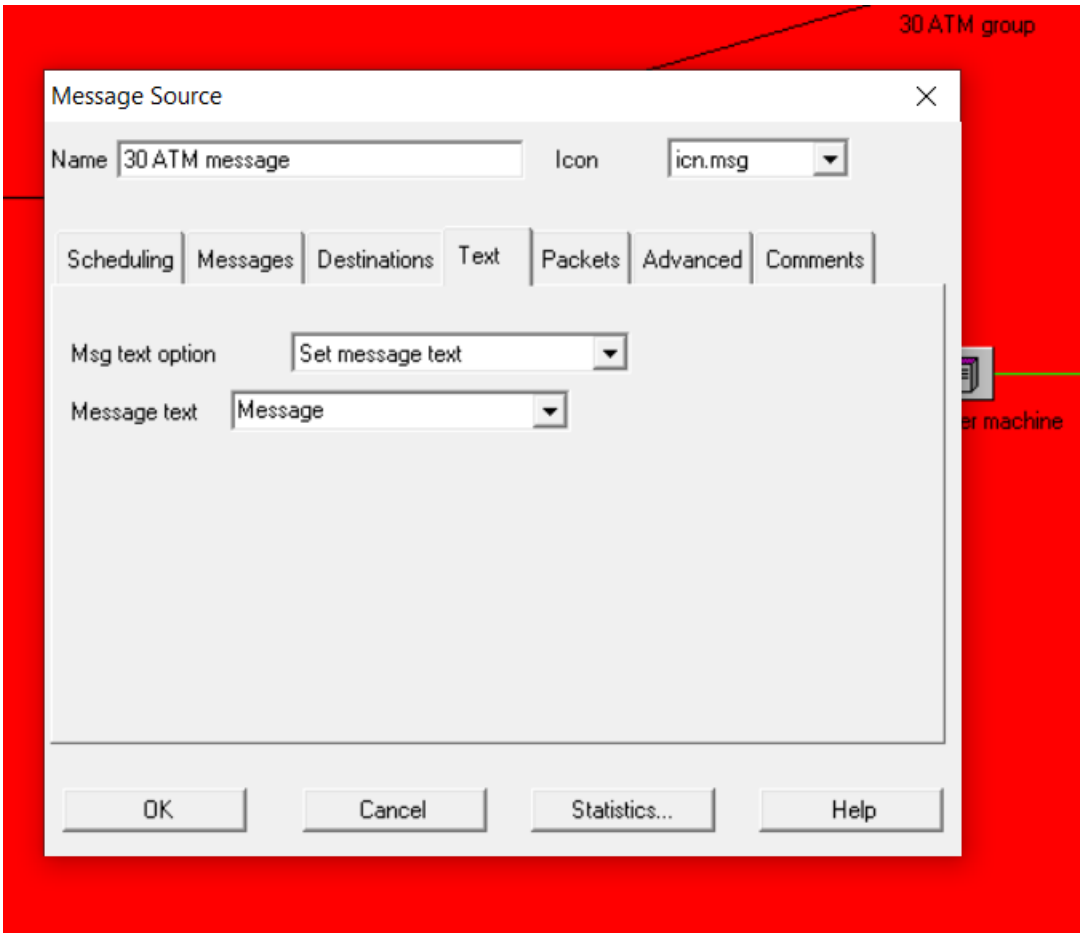
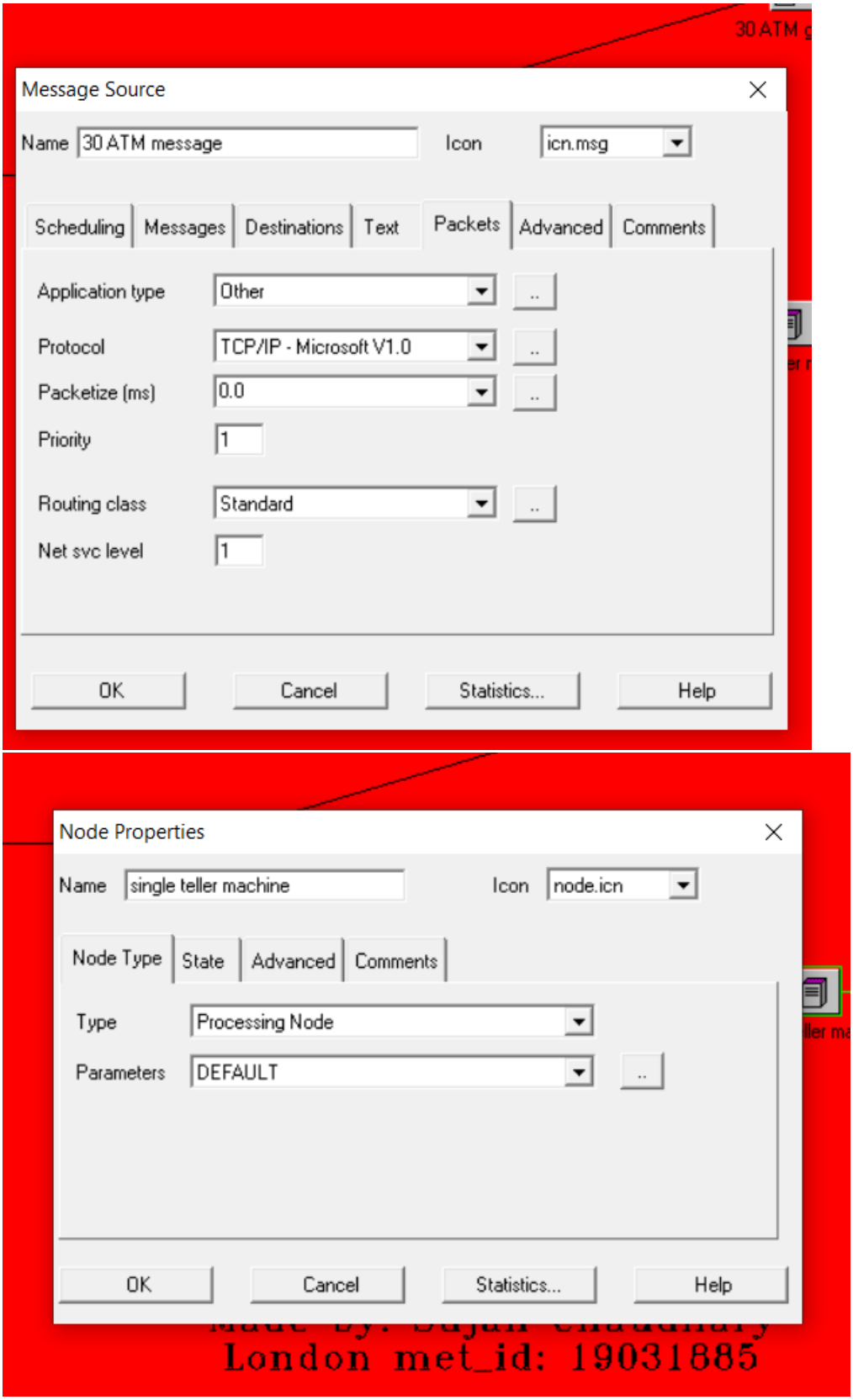
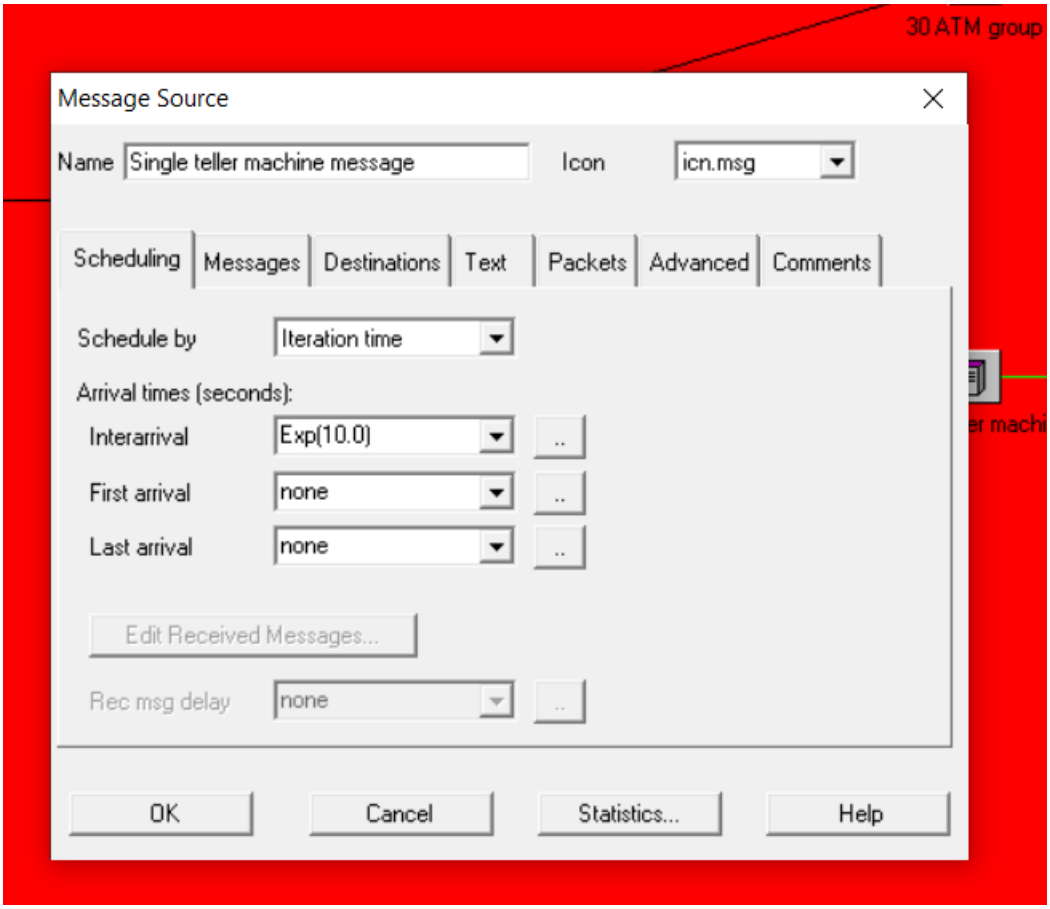
Message Source
Name
30 ATM message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Schedule by
Arrival times
Interarrival
First arrival
Last arrival
Edit Re
Rec msg delay
none
OK
Cancel
Statistics...
Help
Exponential
Mean
0.500000
Stream
2
Mean = 0.500000000
Std. Dev. = 0.500000000
OK
View
Cancel
Help
Calculate
er machine

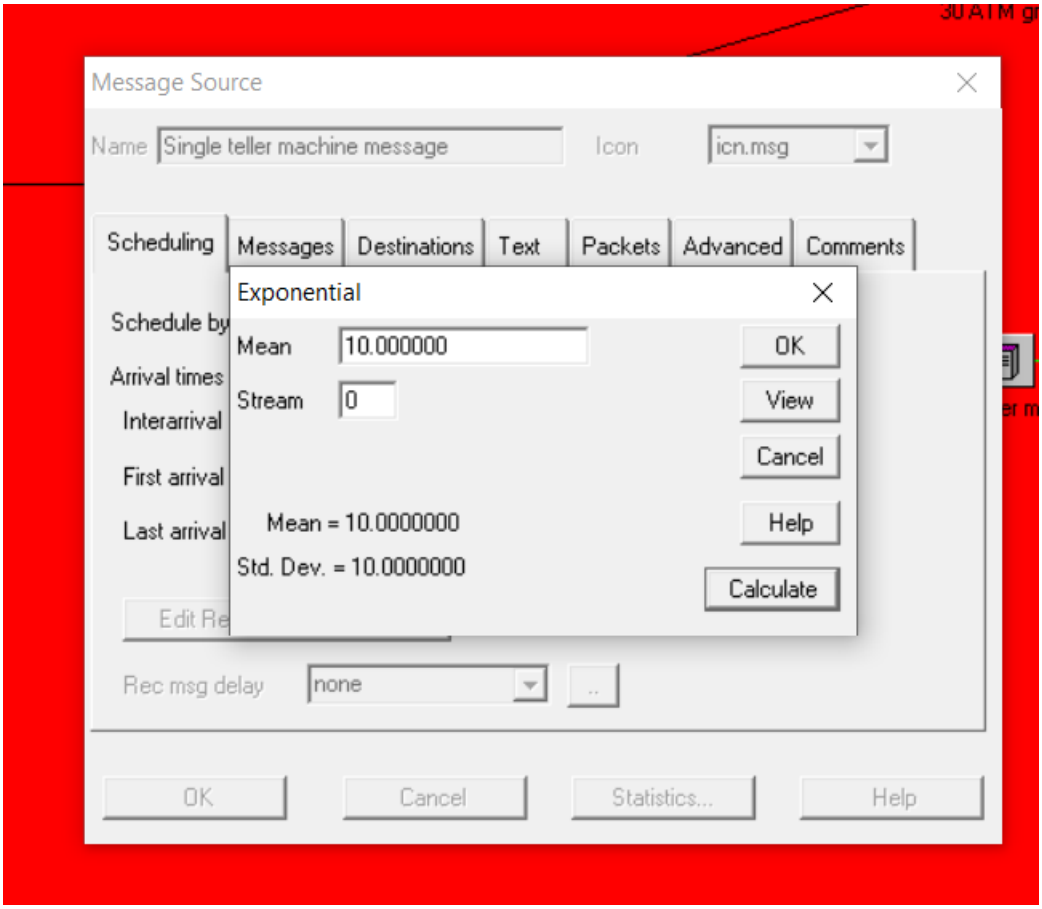

30 ATM group
Message Source
Name
30 ATM message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Msg size calc
Probability distribution
Prob distrib
Uni(50.0,100.0,2)
..
A
1.000
B
0.000
Msg size units
Bytes
OK
Cancel
Statistics...
Help
er machine

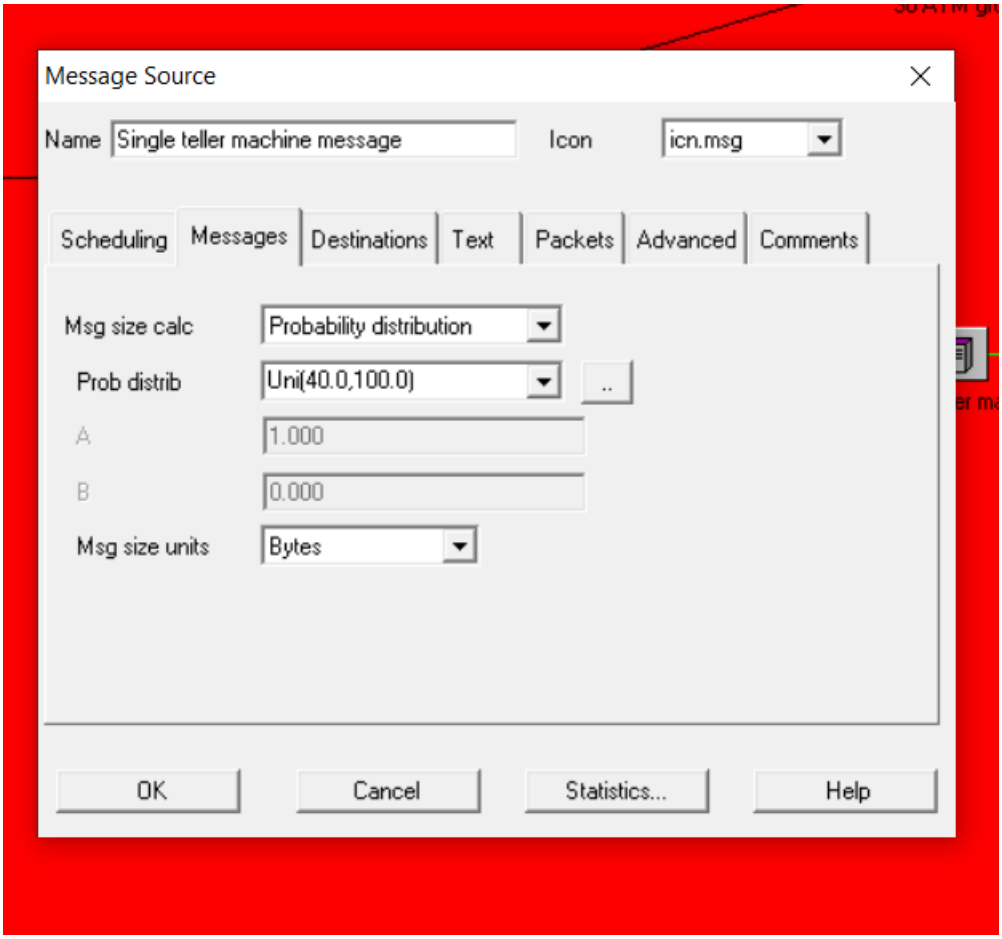

30 ATM group
Message Source
Name
30 ATM message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Uniform
Minimum
50.000000
Maximum
100.000000
Stream
2
OK
View
Cancel
Help
Mean = 75.0000000
Std. Dev. = 14.4337567
Calculate
Prob distri
A
B
OK
Cancel
Statistics...
Help


30 ATM group
Message Source
Name
30 ATM message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Msg text option
Set message text
Message text
Message
OK
Cancel
Statistics...
Help
er machine


30 ATM
Message Source
Name 30 ATM message
Icon icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Application type
Other
Protocol
TCP/IP - Microsoft V1.0
Packetize (ms)
0.0
Priority
1
Routing class
Standard
Net svc level
1
OK
Cancel
Statistics...
Help
Node Properties
Name single teller machine
Icon node.icn
Node Type
State
Advanced
Comments
Type
Processing Node
Parameters
DEFAULT
OK
Cancel
Statistics...
Help
London met_id: 19031885


30 ATM group
Message Source
Name
Single teller machine message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Schedule by
Iteration time
Arrival times (seconds):
Interarrival
Exp(10.0)
First arrival
none
Last arrival
none
Edit Received Messages...
Rec msg delay
none
OK
Cancel
Statistics...
Help


Message Source
Name
Single teller machine message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Schedule by
Arrival times
Interarrival
First arrival
Last arrival
Edit Re
Rec msg delay
none
OK
Cancel
Statistics...
Help
Exponential
Mean
10.000000
Stream
0
OK
View
Cancel
Help
Calculate
Mean = 10.0000000
Std. Dev. = 10.0000000


Message Source
Name
Single teller machine message
Icon
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Scheduling
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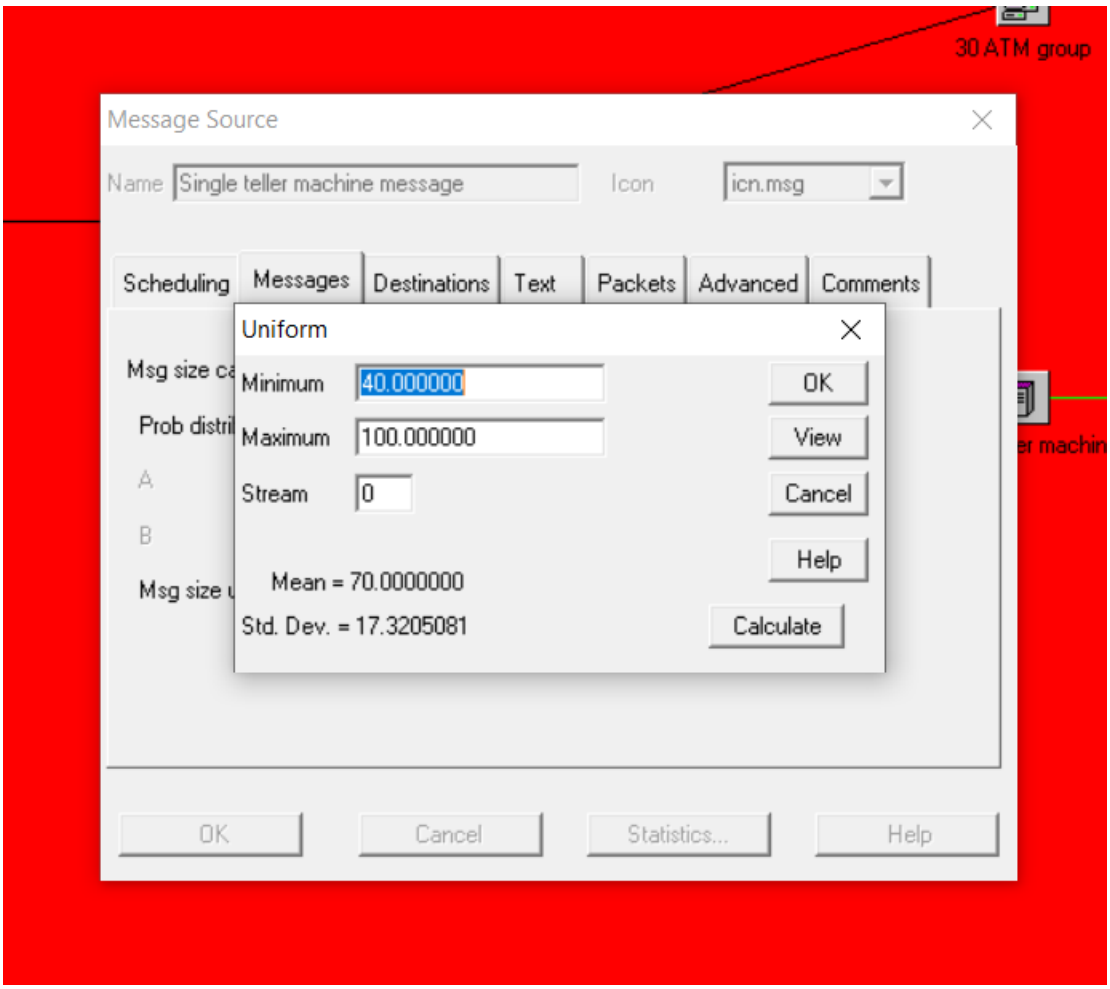
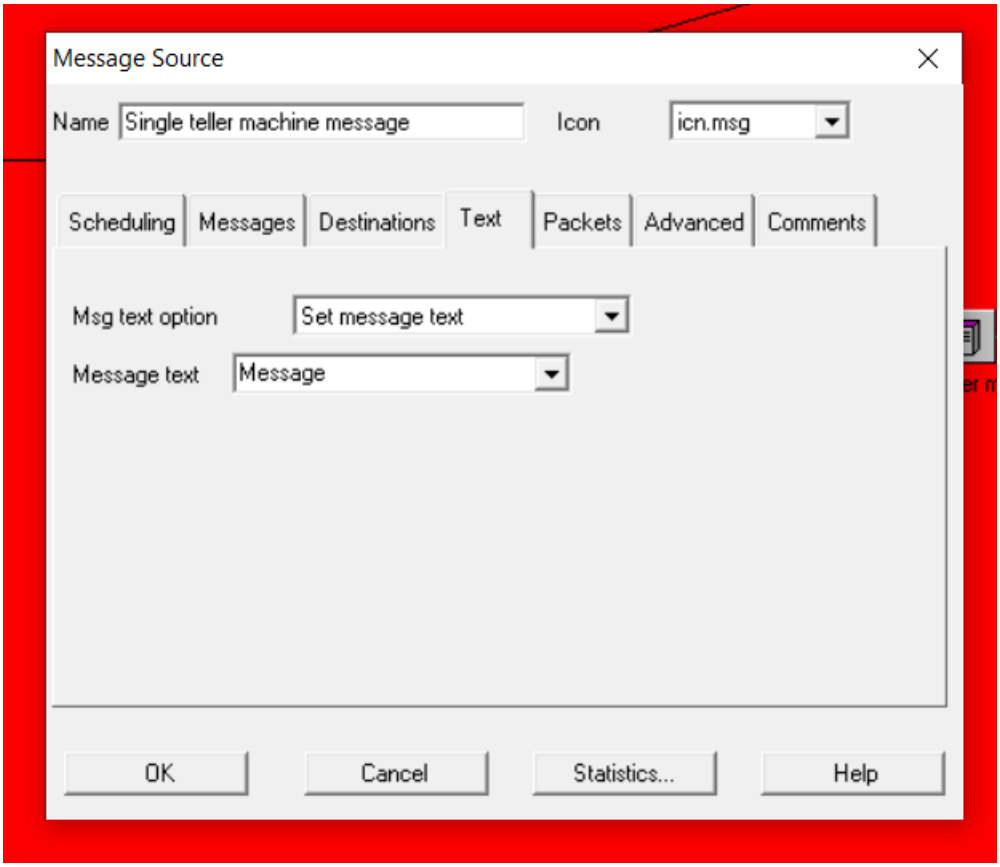
Destinations
Text
Packets
Advanced
Comments
Msg size calc
Probability distribution
Prob distrib
Uni(40.0,100.0)
..
A
1.000
B
0.000
Msg size units
Bytes
OK
Cancel
Statistics...
Help


30 ATM group
Message Source
Name
Single teller machine message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Uniform
Minimum
40.000000
Maximum
100.000000
Stream
0
OK
View
Cancel
Help
Mean = 70.0000000
Std. Dev. = 17.3205081
Calculate
Prob distri
A
B
OK
Cancel
Statistics...
Help


Message Source
Name
Single teller machine message
Icon
icn.msg
Scheduling
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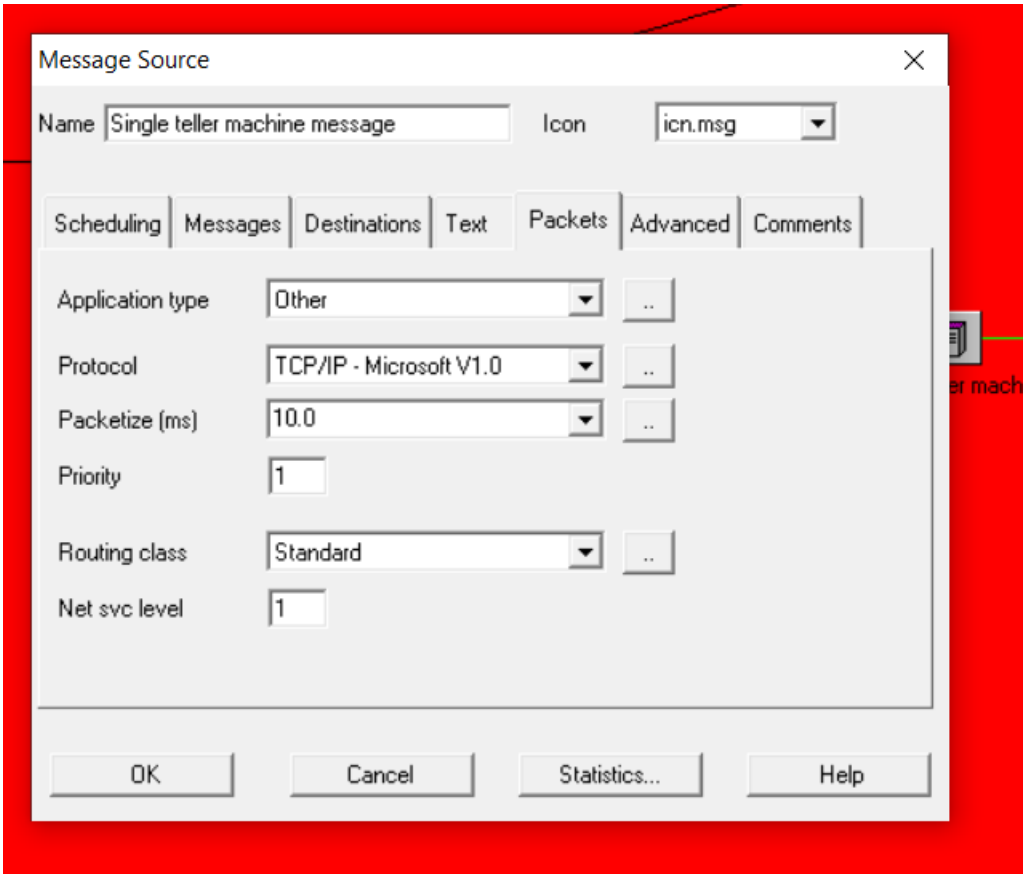
Destinations
Text
Packets
Advanced
Comments
Msg text option
Set message text
Message text
Message
OK
Cancel
Statistics...
Help


Message Source
Name
Single teller machine message
Icon
icn.msg
Scheduling
Messages
Destinations
Text
Packets
Advanced
Comments
Application type
Other
Protocol
TCP/IP - Microsoft V1.0
Packetize (ms)
10.0
Priority
1
Routing class
Standard
Net svc level
1
OK
Cancel
Statistics...
Help