

# Investigating of Network Failures and Performance Over Distributed WAN

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**Abstract - In this paper we have a tendency to at work to seek out network failures and application performance relationship over distributed Wide space web (WAN). So as to access connected application over the cloud there should be an online property which is able to facilitate the several workstations to access the remote server for applications being deployed over the network. Information measure improvement helps in reducing utilization over the network and it additionally helps in up Application potency of those Applications in terms of reaction time. Routers were designed beneath Enhance Interior entryway Routing Protocol (EIGRP) to cut back utilization and to confirm load sharing over the network. 3 situations were modelled and their performance potency was evaluated. A modelled network with and while not a fail Router beneath completely different situations and such Network was simulated with stress on the appliance Performance. The performance results show that increasing the information measure reduces utilization and additionally with the failure of 1 communication information measure, users will still access Network Application with a borderline price.**

**Index Terms - Wide Area Network, Enhance Interior Gateway Routing Protocol (EIGRP), Routers.**

## I.INTRODUCTION

Network performance has been one in every of the key indicators that determined the standard of Service a marketer or workplace is rendering to its customers or the approach and manner the network delivers supported the arrival of packet and different connected elements. Users of the aforesaid network complains additional oftentimes concerning the potency of the network once it is not delivering the expected preambles to the lots, the lots would wish to understand why the aforesaid network is underperforming and therefore this has necessitated the study to ascertain however the network may be optimized to spice up its performance in making

certain that quality of service is at its best. With high quantity of knowledge that area unit being injected into the network for service delivery has been the reason for a dwindling network therefore the employment of OPNET machine to model and study the performance of a model network by measure the key performance indicators supported traffic variation with relation to user behavior. To live network performance quantitatively, many connected side of the network area unit thought-about before drawing on any conclusions and such space would need to be studied for an amount of your time. Network application like File transfer protocol (FTP), machine-readable text transfer protocol (HTTP), Telnet, voice runs through the network and exponentially increase the packet injected into the network and these might lead to high likelihood block congestion, etc. [1] In field of technology network performance contains of the side of latent period, loss, signal/noise ratio. [11] in an exceedingly high optimized network, the pattern should be modelled in an exceedingly approach which will lead to resource reservation and management sure constant quantity indicators to produce totally different completely different} priority to different application users.

## II. LITERATURE REVIEW

Data Network may be telecom equipment that permits computers and different wireless systems to exchange information throughout transmission and most of the connections ar established either by cable media or wireless media by the individual Nodes inside the circuit. The performance of such network should systematically be monitored in guaranteeing a awfully smart indicator in satisfying the client inside the block. [2] In following the task of excellent performance, bound a part of the network should be fine- tuned to

satisfy the will commonplace of the required quality of service.[4] The crucial part in managing data effectively is by network optimisation. data technology is growing at associate degree dismaying rate with a lot of and a lot of application intense a bigger quantity of information measure further as manufacturing larger volumes {of information|of knowledge|of information} from application of that majority of those data should flow through company networks.[6]These circumstantial growths increase the strain of already over stress network inside the company platform. Things is unlikely to be solved or improved because the rate of usage of computers is on the rise and there's no ending to it. the sole feasible answer is to enhance the knowledge technology platform and also the management of information flow inside the same company. Optimizing electronic network starts at the meant work station and finds its thanks to the server farm till it's coupled to the IP cloud or through the native space Network (LAN).[9] so as to extend the potency of the Network, bound applications got to re-engineered and additionally structure method must be scrutinized internally in guaranteeing that folks managing and victimization the network resource inside the organization do thus a lot of expeditiously.[9]Comparatively the requirement for electronic network property over long distance from each other to the opposite was terribly eminent therefore wide space network. It provides answers of tasks that are at the so much finish of the world. Those remote networks permit users at the so much finish to access network resources. [11] The ability for any electronic network to exchange information in a veryn automation mode is one in every of the essential mechanisms required in an electronic network. [14] Wide space Network is that the initial to look, therefore the change of integrity of geographically distributed network at totally different location of the planet. supported the construct of WAN, several basic thoughts of ideology were introduced and swollen, therefore the subsequent Multilayer design mode of communication Packet shift Routing in heterogonous network. [8] With the continuing decline within the price of computing, there has been a dramatic increase within the range of freelance system used for scientific analysis and these machines don't add isolation and with their proliferation comes a requirement for appropriate communication network, significantly computers that may interconnect in a very distributed

automatic data processing system. [6] Whereas there's no single definition of native electronic network.

### III. METHODOLOGY

#### A. DATA COLLECTIONS

Primary and Secondary information were sampled mistreatment unstructured interviews with Network Application users and technical professional in Networking Domain like computer user, Switch Engineers and Telecoms Managers to see, analyze and improve on the ideas of network failures and application performance in application protocol layered.

#### B. DESIGN

The behaviour and performance analysis of laptop and Telecommunication Network will best be investigated by the used of Simulation and analytical study or each. Preferences area unit given to simulation once finding out the behaviour of a particular network covering a particular space of topology. during this paper, the study of network performance and its failures relies entirely on framework and Event Driven machine by the utilization of OPNET. The Focus was load leveling and Link Utilization to examine the Generalised impact on the Network with regard to however the Applications deployed can performed. the need for the eventualities were as follows

Scenarios 1: fifty digital computer connected to the Network with T1 Link association (Single Router).

Scenario 2: fifty digital computer connected to the Network with 2 of the T1 Link association (Double Router by the used of EIGRP to ensured load balancing)

Scenario 3: fifty digital computer connected to the network with a Fail T1 Link association (Fail Router)

Scenario one was with initial fifty computers and therefore the company would wish to grasp the impact of doubling the Link association on the Network and its impact on the several Application thus state of affairs a pair of with EIGRP configuration. Once reaching to understand the impact of doubling the Link, they additionally would wish to grasp the performance of the Network once one Router has been fail thus state of affairs three. The connectedness of this can be to make sure business continuity and disaster recovery.

#### IV. IMPLEMENTATION

Figure 1, Figure 2 and Figure 3 describes the architecture of the models

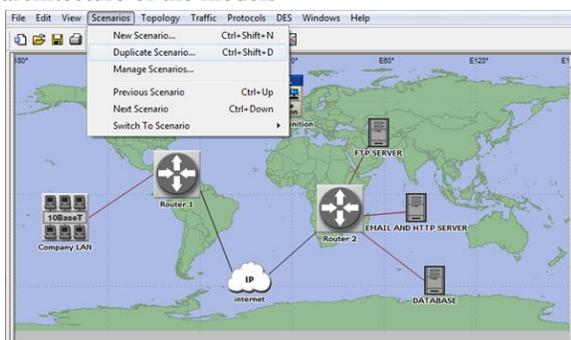


Fig. 1: Network model with TI Link connectivity

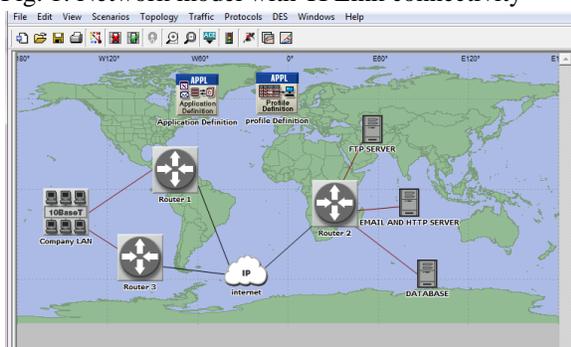


Fig. 2: Network model with Double TI Link connectivity

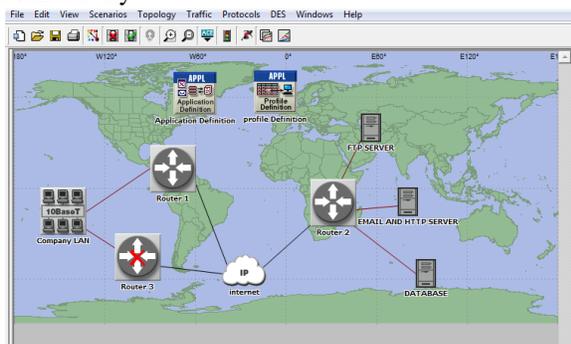


Fig. 3: Network model with Fail TI Link connectivity

#### V. SIMULATION

After the construct of the bailiwick summary of the Network and configuring the required element, the experiment was created to endure one hour simulation time at the same time whereas observance the performance of the network with it deployed Application specifically Emails, Ftp, info and communications protocol.

#### VI. RESULTS

In the event of the simulation a packet size of 1MB(Low),5MB(Medium) and 10MB(High) were obligatory onto the network with a varied link speed(Switching speed) of 500Mbps,1Gbps moreover as one.5Gbps were set between the Routers and also the cloud to examine the performance result on the network per the chosen matrices. The simulation experiment was run 10 consecutives times with one hour simulation amount and also the results taken for the primary 10 minutes and also the last Fiftieth minutes. The procedure used in achieving the results is that, a ratio is designed and is command constant for the network whiles varied the link speed to examine its behaviours diagrammatically for all the eventualities in rivalry. The Graph is of axis of simulation time as against Bit response. At Associate in Nursing interval of tenth and fiftieth minutes of simulation time, the corresponding bit response is taken for every state of affairs thence the varied figures within the application tables for all the deployed application among the network. These procedures ar recurrent for all packet size of various application among context to urge the required results.

#### VII. GRAPHICAL ANALYSIS

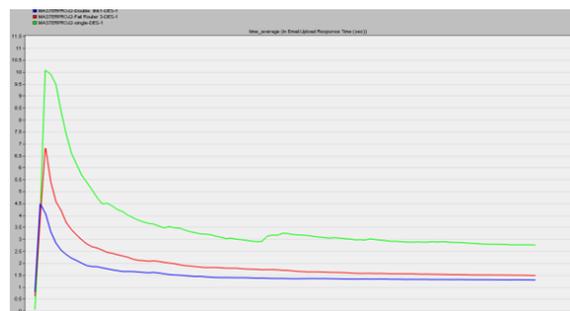


Fig 4 : Email upload Response Time

When the whole 3 situations were thought-about in figure four, single router association shows a high level of transfer time interval whiles performance appears to enhance underneath double routing protocol just because of the Enhance Interior entranceway Routing Protocol (EIGRP) configuration which reinforces load sharing on the network. It helps to modify routing call and it configuration parameters. EIGRP permits a router to share its info with a neighbor router regarding the pc network. EIGRP facilitate optimized the network by reducing the work

on any adjacent router that must be transmitted. unsuccessful Router appears to multiplex with Double Router property underneath EIGRP configuration. The time interval for Fail Router appears to merge that of double router property.

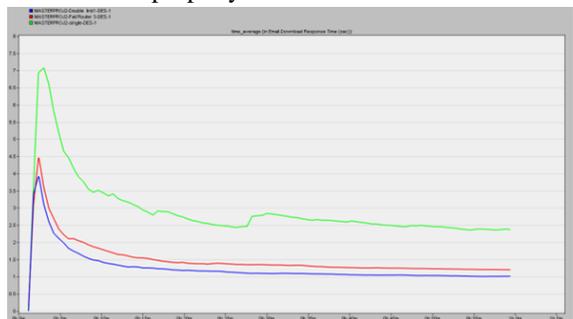


Fig. 5: Email Download Response Time

Per the Graphical analysis of the 3 state of affairs as pictured in Figure five for transfer latent period, it absolutely was detected that the only router property shown a high level of latent period creating it time delay within the analysis with a peak Figures of seven.081691-bit rate at the third minutes of the simulation time and in real time the digital computer begins to send the packet across the 10Mbps and T1 Link property. once the information measure was created to double for the second state of affairs the latent period decrease considerably by nearly fifty % creating it an improved network than the previous state of affairs however consequently once one amongst the link was created to fail it performance Deficiency wasn't all that affected as compared to the second state of affairs.

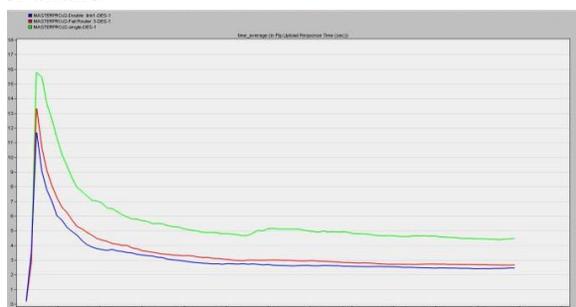


Fig 6 : Ftp Uploads (Bit rate) Vs Ftp Upload Response Time.

Figure Shows the transfer time interval for Ftp considering all situations in rivalry and it absolutely was realised that with the only Router property, a high level of time interval was seen with a peak figure of fifteen.781 with 2minutes simulation time. Per single channel communication policy during this situation, users on the network would got to queue thereby

leading to delays in system network. The second situation with Double Router property shown constant level of graphical pattern with a small amount rate of eleven.67 peak while making an attempt to transfer some files unto the network. The Fail Router appears to multiplex itself thereupon of the Double router showing apparently constant level of operational performance.

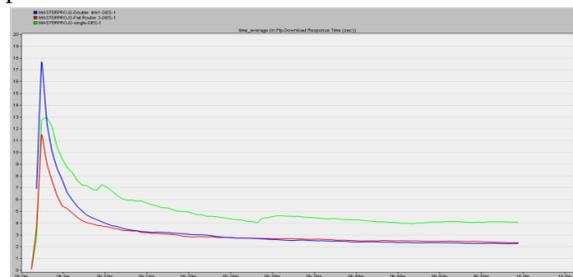


Fig 7 : Ftp Downloads (Bit Rate) VS Ftp Download Response Time.

The transfer Response per the system analysis goes to shows that there was a high level of performance deficiency in Double Router property with a peak figure of seventeen.8 bit rate while single router had a depreciative figures of thirteen bit rate as show in Figure seven. The 3 Graphs in competition shows a pulsing nature of the behavioral characteristics of the Network with the Double and Fail Router showing sensible performance at the top of the simulation amount.

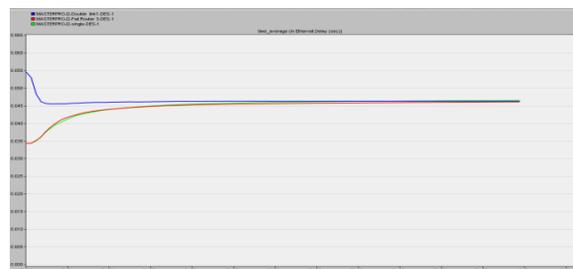


Fig 8 : Ethernet Delay

Ethernet Delay is one among the key indicators in crucial the performance potency of the network in different to establish truth characteristics of the network because it has been in telecommunication or electronic network. The delay of the network conjointly depicts however long a time a touch of information can traverse across the network from one Node purpose to the top purpose. Delay might defer slightly from one another base on the situation of any communication node. during this context of thought the whole delay of the network was thought of touching on a particular mensuration that was

undertook. The delay on these 3 situations was caused by the elements connected on this topology. The transistors and diodes at intervals the part possess some level of resistant therefore within the case of a motion packet there's a small level of impedance within the transmission medium therefore the requirement to review delays during this experiment and to recommendation on the simplest and worst situations. Double Router property started from higher level of Delay while merging with different situations showing a stable condition in Delays with a figure of zero.045 bit rate that was apparently smart operational Figures.

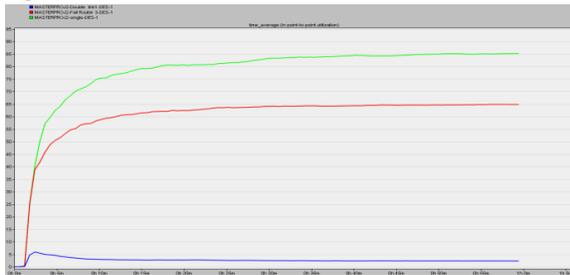


Fig 9 : Point to point utilization (Bits) Vs Downlink Utilization.

Network utilization is that the quantity and also the content of traffic light on the network compared to the utmost quantity of traffic, the network will support for and through the height hours and it's usually specific in percentiles. There square measure varied timings at intervals the network whereby the network becomes full because of user behavior which matches to substantiate to the actual fact that network utilization is on the high aspect, once this happens, user on the network expertise a holdup within the responsiveness of application. latent period issue conjointly grow over the expected therefore forestall users from operative with efficiency. once performance of a specific network drops below the traditional service level agreement (SLA), there's the tendency to lose capital revenues. Revenue is lost and user's experiences on the network conjointly diminish. Single Router property show a high level of utilization while dropping well. Figure eight shows cloud utilization and once extra a further an extra TI was connected with additional router tack below EIGRP configuration, it absolutely was observe that cloud utilization come by nearly seventieth as compare to single router property. In examination Fail router and Single Router, utilization went up steady from zero.021805 with every experiencing a peak price of

sixty four.662825 at the forty third minutes for the fail router while single router conjointly having a peak of eighty four.990267 at forty ninth min. each eventualities show associate degree considerable quantity of exponential increment from the beginning of the experiment to the tip of the experiment. There was a come by cloud utilization once extra TI was connected.

## VIII.CONCLUSION

Service level agreement should be a key consider guaranteeing network handiness of ninety nine.90% in any respect times although further funds are going to be needed to enhance the performance potency. Network failures might cause network degradation which is able to have an effect on the user thus badly thence making an attempt to supply completely different routing route for transmission ought to something happens at the opposite facet of the ring topology. Alternatives should always be provided in ensuring that total failure doesn't occur. We have a tendency to modelled a network with and while not a fail Router underneath completely different situations and such Network was simulated with a deep closeness on the appliance Performance. The Experiment was in deep trouble fifty workstations underneath 3 situations and these 3 situations were access and evaluated on experimental basis mistreatment OPNET to indicate the impact of Application Network performance. From the study it had been completed that if one transmission route fails, user signal can be created to route through a special transmission path that in an exceedingly approach much better than the one router property that shows high reaction time. Double router property operated at a minimum value of response.

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