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RESEARCH PAPER

REDUNDANCY OF AIR TRAFFIC MANAGEMENTS NETWORK

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ABSTRACT
Redundancy - Back up Servicein some applications, is an express wish that the technology employed should be redundant, there is a backup in the case that one line goes to down. It is therefore sometimes important to design the system in such a way that this redundancy is possible, which supports redundant networking. This means that the network designer can installthe network in a loop formation which enables the service to reach the center station even if one networkline goes down. This is often a requirement in emergency installations such as roadside fiber-basedhot system systems.Today's air traffic and the worldwide move to Air Navigation System (FANS) concepts demand a high level and reliable Air Traffic Control (ATC) network to accommodate customer requirements now and in the future.The purpose of this paper is to provide air traffic control network continuity assurance by creating multiple data paths within anetwork between any stations in network .The network is implemented using leased lines over fiber links for latency reduction.

KEYWORDS: Redundancy**,** Traffic, Management, Network

1. INTRODUCTION

Communication is the backbone of any air traffic control (ATC) activity and the Civil Aviation Authorities (CAAs) are responsible for delivering reliable communication services to airlines for supporting their mission critical applications.
The ideal solution for networks used in air traffic control requiring multiplexing of legacy voice and data systems as well as routing of IP traffic over popular WAN infrastructures Lease Lines using fiber optic .
Fiber optic networks are increasingly being used to communicate Voice, Data and Video in Industrial and Emergency Applications. In this paper we will examine the evaluations network engineer need to make when designing a VoIP network, including looking at open standard technology, voice quality and bandwidth capacity. The use of fiber optics for reliable communications to monitor, analyses and control equipment are increasing safety and production efficiency in many different environments.These Fiber Optic networks are used to manage, control and interconnect a wide range of technology.
The Air Traffic Applications Requirements:

- To redact in overall operating costs Network and Support.
- To minimizes latency.
- To provide high Network stability and reliability.
- To provide flexible network connections.
- To reduce transmission delays and preserving the quality of delay-sensitive traffic (voice/fax).
- To speed critical data to its destination.
- To allow any type of legacy traffic to be routed.
- To reducing outage by implementing two Networks main and backup.

In summary, when designing a Fiber Optic Network, the network engineer should:

- Specify Open Standard SIP (VoIP)
- Specify technology that supports QoS and ToS features as described in this paper.
- Check if the service comes with two built-in fiber ports (if redundancy is required)
- Specify a MOS score above 4.
- Ensure that the overall bandwidth which is 30% larger than anticipated Voice + Data requirements, or at least 3x the Voice over IP bandwidth, whichever is the largest. Be aware of possible Latency, Jitter and out of order data packets / plan your net.

2-SIMULATION

Using packet tracer simulation

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ISSN: 1858-6368

2-1 method

I have four stations connected directly with center station in mesh topology, each station has connection to the other three stations so that we can guarantee the availability and redundancy of the service in case of losing one or two connections. Using OSPF protocol, avoiding delay to achieve QoS,Many tests had done to assure availability and redundancy.

Also comparison done between the fourteen intervals for service of main and redundancy links, fromobservation very slight delay countered for redundancy links.

Simulation below Fig .1, mention network when work normally. The duration times for massage before link failure is 5 ms. while in links failure situation this duration is taking time between 5 to 7 ms.

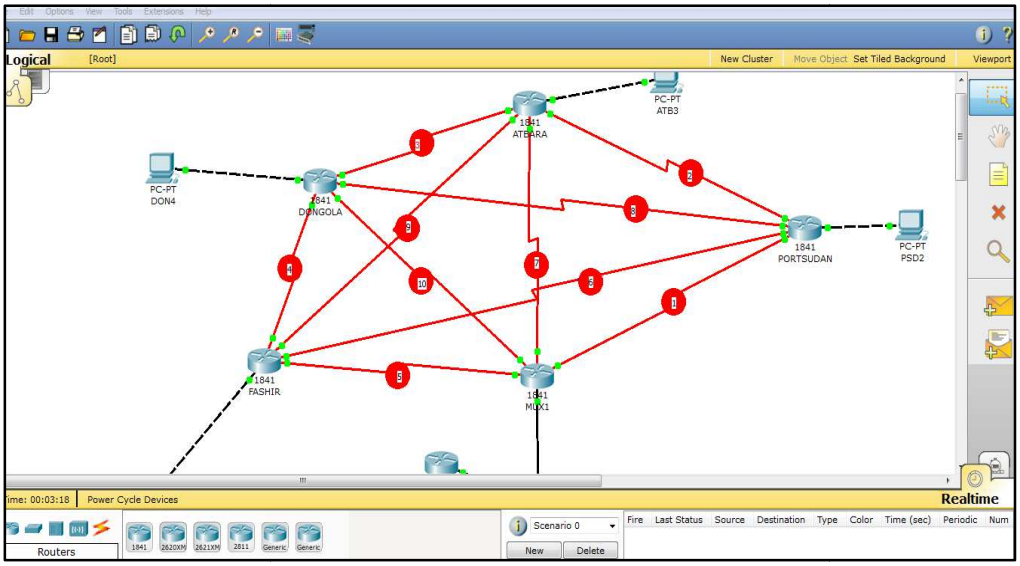
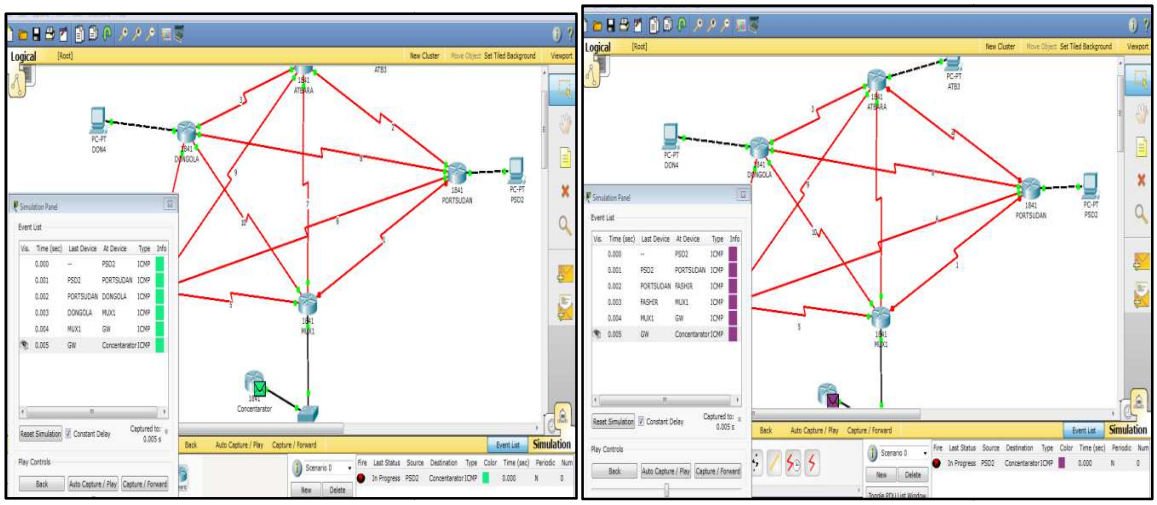


Figure.1.

There are many scenariosfor link failure between stations and center station,service's continuity to center station is granted throughlinkredundancy, mentioned below the fourteen scenarios.



Link (1) failurelink 1,2 failure

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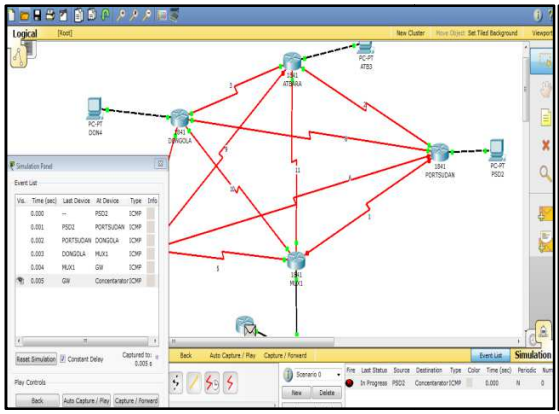
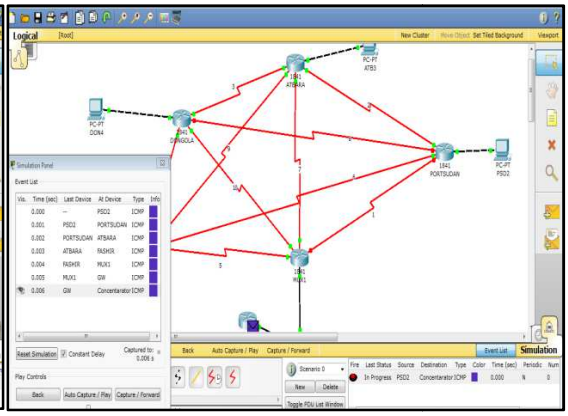
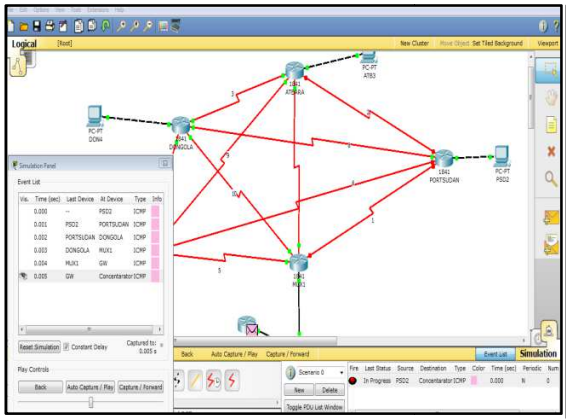


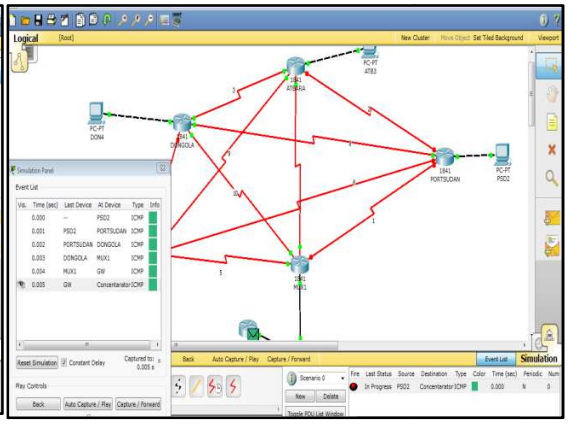
Link1,6 failure



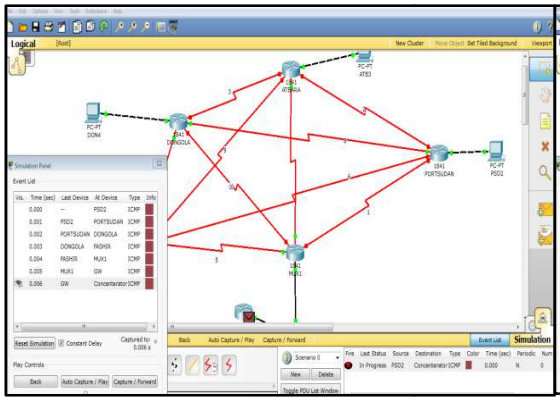
Link1,8 failure



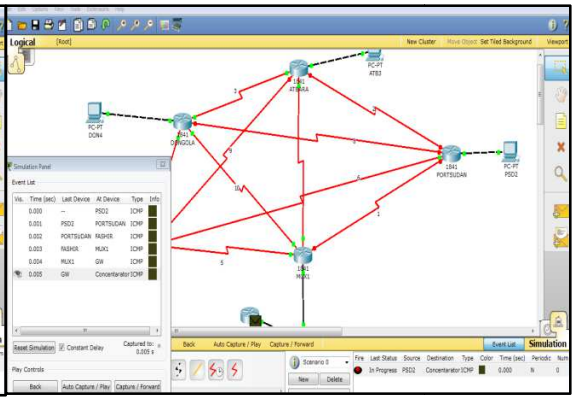
Link1,2,6 failure



Link1,2,6,4 failure



Link1,2,6,10 failure



Link1,2,8 failure

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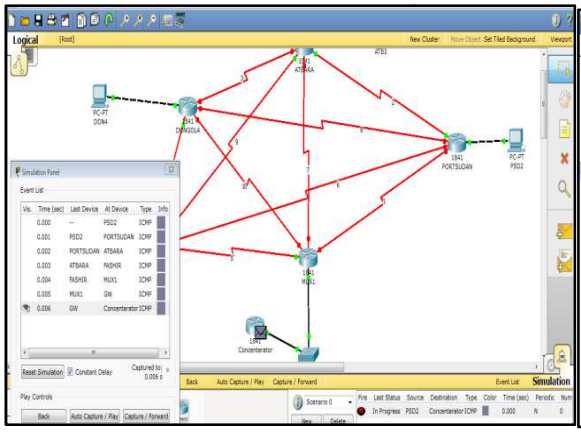
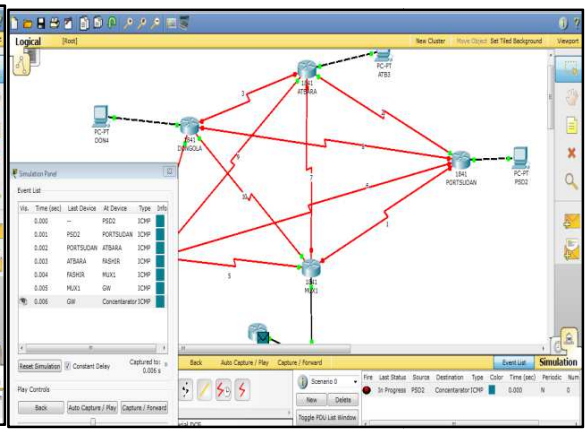
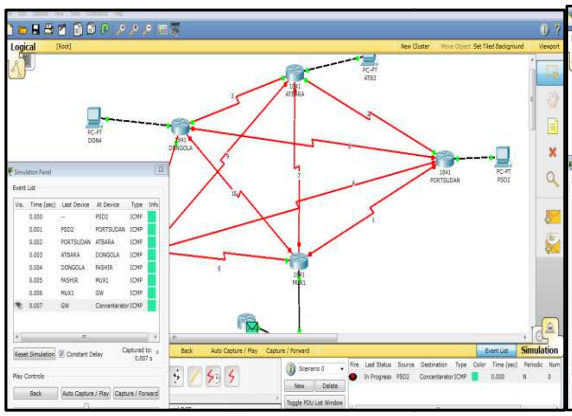


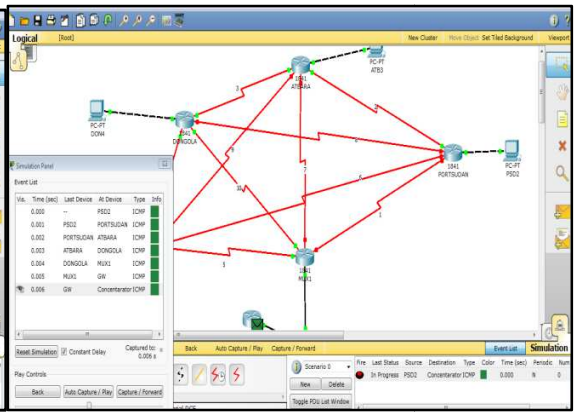
Link1,6,8,7,3,10 failure



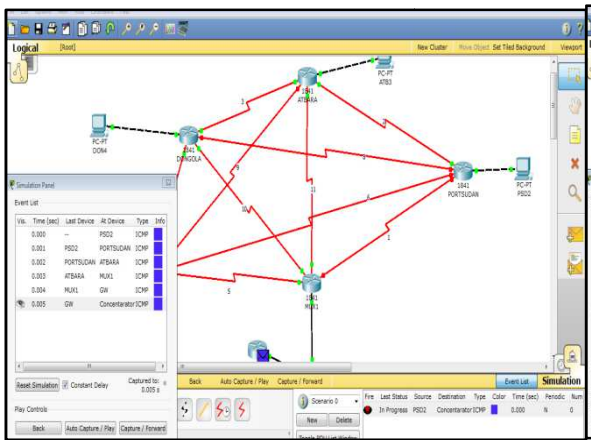
Link1,6,8,7,3 failure



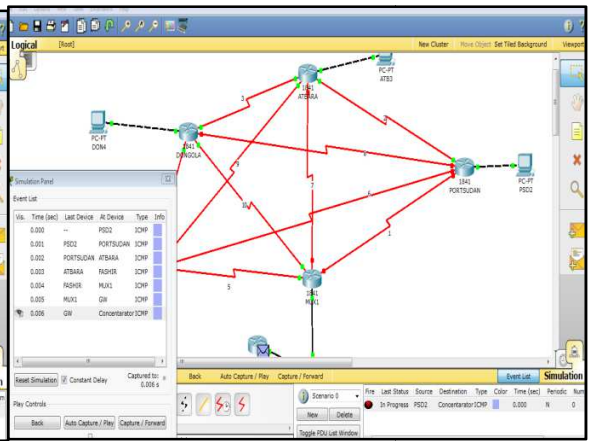
Link1, 6,8,7,9.10 failure



Link1, 6,8,7,9 failure



Link1,6,8, failure



Link1,6,8,7failure

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TABLE .1. Listed the result collected from fourteen scenarios concerning number of link failure,duration time of failure and number of hostinvolved.

No	Link failure	Number of host	Time
1	1	5	5 ms
2	1,2	5	5 ms
3	1,6	5	5 ms
4	1,8	6	6 ms
5	1,2,6	5	5 ms
6	1,2,8	5	5 ms
7	1,2,6,4	5	5 ms
8	1,2,6,10	6	6 ms
9	1,6,8	5	5 ms
10	1,6,8,7	6	6 ms
11	1,6,8,7,9	6	6 ms
12	1,6,8,7,9,10	7	7 ms
13	1,6,8,7,3	6	6 ms
14	1,6,8,7,3,10	7	7 ms

This flow chart between number of host and link failure.

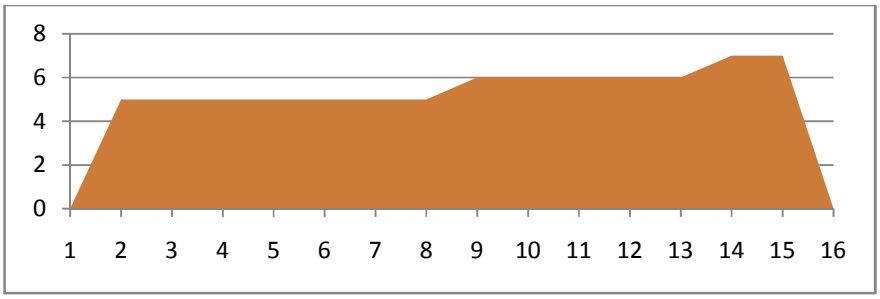

FIGURE.2. Number of host (Links failure)

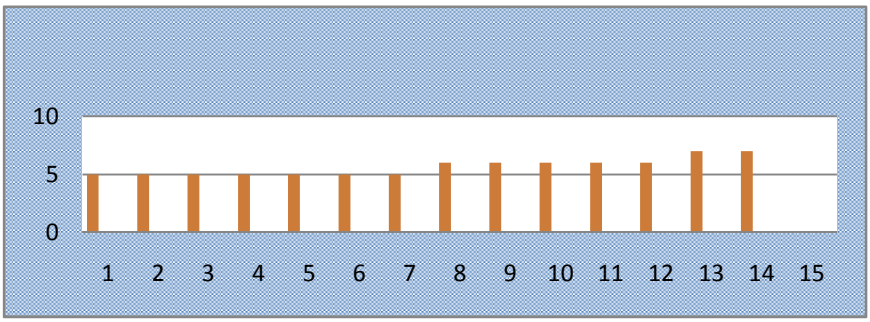

FIGURE.3. This flow chart between time and links failuretime(Links failure)

3. CONCLUSION

The network provides a complete system solution for organizations with wide area internetworking requirements.

Redundancy network offer significant value, they need little or no maintenance, they are self-healing system and thanks to fast recovery times, they can save money over long term, evenif a relatively small number off breaks occurs to disrupt communication flow.

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ISSN: 1858-6368

These networks are intended for a broad range of applications and serve the internet working needs of central and remote sites. Individual products utilize a common hardware platform and are available as standalone products or scalable rack mount models with integrated data, voice and RAN backhauling (software option) capabilities over any networks.

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