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Analysis of Efficient FDDI Network

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ABSTRACT

Fiber Distributed Data Interface (FDDI) provides a 100 Mbit/s optical standard for data transmission in a local area network and can support thousands of users. FDDI can be implemented as a higher speed version of a token ring and is designed to work over fiber. In this Paper we have analyzed the performance of the FDDI systems depending on the various parameters. Also, the efficiency of the FDDI network can be increased by the analytical model proposed and by controlling the ring latency and by minimizing it. We have also analyzed the performance of FDDI network depending upon the response time. The response time can be improved by decreasing the transition delay and propagation delay. The performance of FDDI network has also been optimized depending on the data reliability. Also the Data reliability of the FDDI network can also be increased.

Key Words:**Data Reliability,FDDI Network, Efficiency, Response Time, Ring Latency;**

I. INTRODUCTION

Telecommunications is always a fascinating, fast paced industry that affects every aspect of our lives including simple voice telephone calls, access to the Internet, high speed data communications, satellite communications, surfing the World Wide Web, fax transmissions, video conferencing and cable TV. The basic elements of Telecommunication systems are: a transmitter that takes information and converts it to a signal.A transmission medium, also called the "physical channel" carries the signal. A receiver takes the signal from the channel and converts it back into usable information. Telecommunication systems are of two types; Simplex and Duplex Systems.

The rapid growth of Internet traffic has been the driving force for faster and more reliable data communication networks. Networking is a very promising technology to meet these ever increasing demands. Broadly speaking a computer network is an interconnected collection of interdependent computers that aid communication in numerous ways. Apart from providing a good communication medium, cost effectiveness and sharing of available resources (programs and data) are some of the advantages of networking. This rapid growth of internet traffic has been the driving force for faster and more reliable computer and data communication networks. Wavelength division multiplexing (WDM) is a very promising technology to meet the ever increasing demands of high capacity and bandwidth.

Fiber optic communications cables would provide the most reasonable solution for use in such a network. Whether using radio, copper or fiber, any fixed network has one inherent drawback over a wireless network: it is prohibitively expensive to run a separate fiber from the central controller to each node in the field in the "star topology" configuration. Another drawback of the star topology is that any cable break will isolate a field node from the central controller. To avoid the drawbacks of the star topology, a linear bus topology may be use. In this configuration, information from the master node is transmitted to the remote node closest to the master node, and from there it is retransmitted downstream to the next remote node further down the line until the end of the chain is reached. Data from the remote nodes is transmitted back upstream to the master node in a similar fashion. However, there are also problems associated with the linear bus; if power is lost at one of the intermediate nodes downstream, nodes can no longer communicate with the master. Similarly if a cable break occurs somewhere in the middle of the bus, the downstream nodes can no longer communicate with the master. Adding a battery backup to each node has solved the loss-of-power problem, but this is expensive and requires maintenance. Other important solution of this problem is Fiber Distributed Data Interface.

FDDI was considered an attractive campus backbone technology in the early to mid-1990s since existing Ethernet networks only offered 10 Mbit/s transfer speeds and Token Ring networks only offered 4 Mbit/s or 16 Mbit/s speeds. Thus it was the preferred choice of that era for a high-speed backbone, but FDDI has since been effectively obsolesced by fast Ethernet which offered the same 100 Mbit/s speeds, but at a much lower cost and, since 1998, by Gigabit Ethernet due to its speed, and even lower cost, and ubiquity.

Fiber Distributed Data Networks (FDDI) are designed to have two data transmission paths which provide redundancy when one of the two paths becomes unusable. FDDI can be implemented as a higher speed version of a token ring and is designed to work over fiber. This standard is also designed primarily for peer-to-peer communications but can certainly be used for the polled traffic modem. The underlying principle of the token ring is that access to the communications ring is limited to one modem at a time: A single modem transmits its message around the ring. Then, once the message travels completely around the ring, the modem removes the data from the ring and passes control (the token) to the next modem in line. This method promises to be an effective method of distributing data over the fiber.

II.LITERATURESURVEY

There are number of researchers working on the FDDI. The detailed literature review of the FDDI is covered in this section. The Terra Link laser communication (laser-com) system was developed by Isaac I. Kim et. al. [1] as a cost-effective, high bandwidth, wireless alternative to fiber optic transmission. The advantages of laser com over fiber optic cabling were primarily economic. They proposed that however, free-space laser com is subject to atmospheric effects, such as attenuation and scintillation, which can reduce link availability and may introduce burst errors not seen in fiber transmission. The Terra Link transceivers use large receives apertures and multiple transmit beams to reduce the effects of scintillation. By designing the laser com link with sufficient margin for atmospheric attenuation and scintillation, a bit error rate (BER) of 1029 or better can be achieved. Since they designed the Terra Link transceivers to be eye-safe at the transmit aperture, each system is range-limited. Link power budgets for the Terra Link systems were presented and link margin data were shown that quantitatively describe how the effective laser link range varies in different weather conditions.

Pek-HooiSohet. al. [2] investigated that how evolutions of complex technologies and networks of innovators affect the development of emerging innovations. Building upon the theories of technological evolution and socio-organizational dynamics, they developed propositions to examine the stability and change of networks punctuated by successive technological changes. They argued that incumbents who are early advocates of standards in complex technological environments are more likely to survive via alliances. Based on 150 firms and 319 alliances in the US data communications industry from 1985 to 1996, they found support for their propositions and the characteristics of central-periphery structure best describe the patterns of industry networks.

William R. Hawe, Richard Graham and Peter C. Hayden [3] covered the overview of the FDDI and suggested some of the research actions. Raj Jain [4] analyzed the impact of various design decisions on the error detection capability of the protocol. In particular he quantify frame error rate, token loss rate and undetected error rate. Several characteristics of the 32 bit frame check sequence polynomial, which is also used in IEEE 802 LAN protocols, were also discussed. It was shown that every noise event results in two code bit errors, which in turn may result in up to four data bits errors. The FCP can detect up to two noise events. He justified the enhancements by quantifying their effect.

SaurabNog and David Kotz [5], suggested that Communication is a very important factor affecting distributed applications. Getting a close handle on network performance (both bandwidth and latency) is thus crucial to understanding overall application performance. They benchmarked some of the metrics of network performance using two sets of experiments, namely roundtrip and data hose. The tests were designed to measure a combination of network latency, bandwidth, and contention. They have repeated the tests for two protocols (TCP/IP and MPI) and three networks (100 Mbit FDDI (Fiber Distributed Data Interface), 100 Mbit Fast Ethernet, and 10 Mbit Ethernet). The performance results provided interesting insights into the behavior of these networks under different load conditions and the software overheads associated with an MPI implementation (MPICH).

III. PERFORMANCE ANALYSIS OF FDDI ON THE BASIS OF THROUGHPUT/EFFICIENCY

A simple model to compute the access delay and efficiency of the FDDI analytically will now be described. These metrics are meaningful only under heavy load and, therefore, it is assumed that there are n active stations and that each one has enough frames to keep the FDDI fully loaded. It is given that for an FDDI network with a ring latency of D and a TTRT value of T, the efficiency and maximum access delay can be given by equation (i) and (ii).

First consider a ring with three active stations. Assume that all stations are idle until $t = D$ when the three active stations suddenly get a large (infinite) burst of frames to transmit.

Thus, for a ring with three active stations, the efficiency and access delay are:

Efficiency; $\eta = \frac{3(T-D)}{3T+D}$

Maximum access delay; $MAD = (3-1)T + 2D$

The above equation can be generalized to n active stations by replacing 3 by n.

Efficiency; $\eta = \frac{n(T-D)}{nT+D}$ (i)

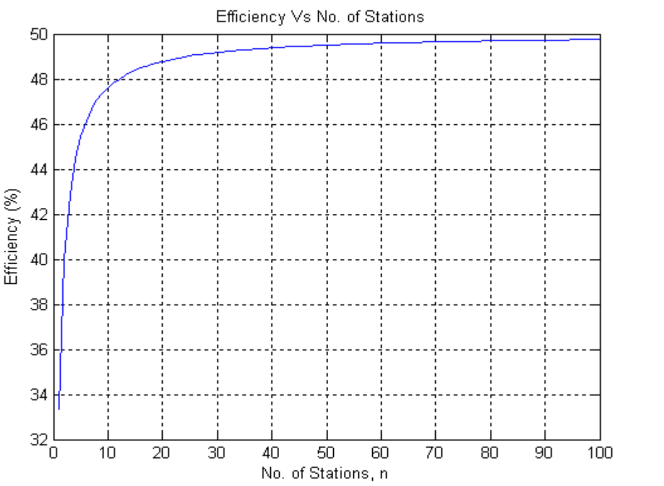
Maximum access delay;

$MAD = (n-1)T + 2D$ (ii)

Equations (i) and (ii) constitute the analytical model; these equations can be used to compute the Maximum access delay and Efficiency of FDDI systems.

IV. RESULT AND DISCUSSION

In this section we will cover the results for the performance analysis of the FDDI on the basis of efficiency. We have fixed the number of stations to 100 and analyzed the performance of the FDDI. The results shown in figure 4.1 to figure 4.6 depict the performance analysis of FDDI network on the basis of efficiency. The value of T was fixed to 4ms and the latency was taken as 2ms. Figure 4.1 shows the relationship between efficiency and the number of stations, the relationship between maximum access delay and TTRT has been illustrated in figure 4.2. Figure 4.3 shows the maximum access delay vs



number of stations and the relation of maximum access delay with ring latency can be illustrated with figure 4.4. The relation of efficiency with ring latency and TTRT is covered in figure 4.5 and 4.6.

Figure 4.1: Efficiency vs No of Stations for T=4ms and D=2ms

The results in figure 4.1 show that the maximum value of the efficiency for the available number of stations can range up to 50 % for the given values. Results shown in figure 4.2 prove that the maximum access delay increases with the increase in TTRT value. So we can control the maximum access delay by decreasing the value of TTRT.

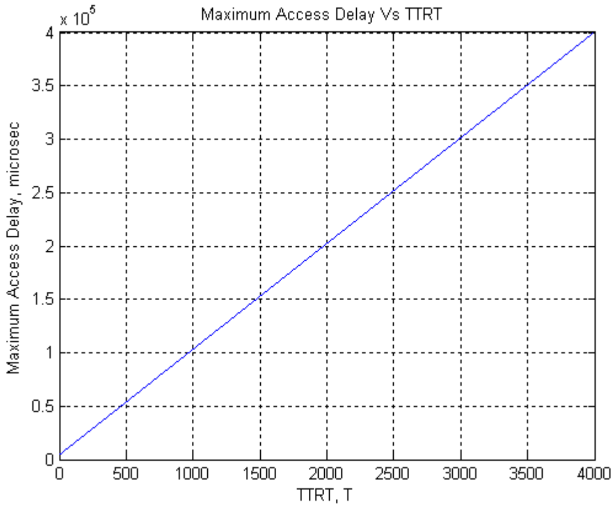


Figure 4.2: Maximum Access Delay vs TTRT for D=2ms

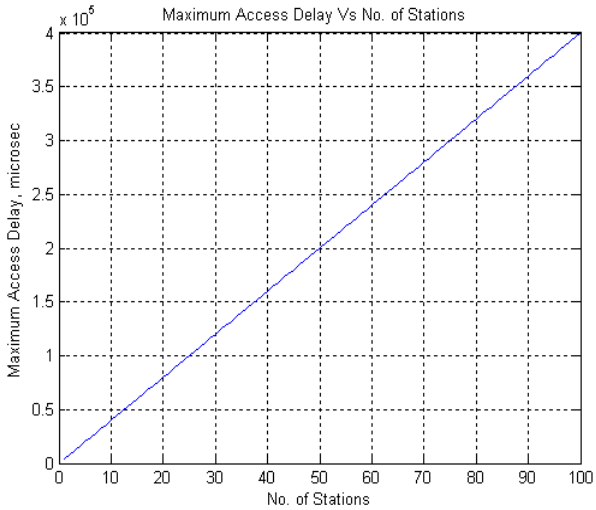


Figure 4.3: Maximum Access Delay vs No. of Stations for T=4ms and D=2ms

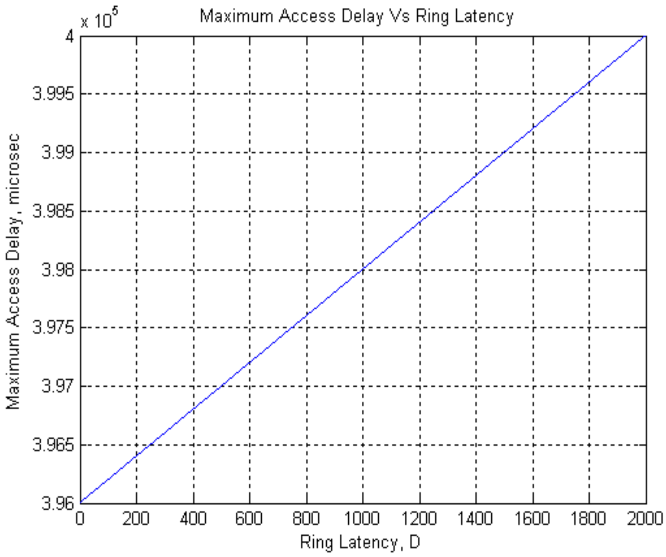


Figure 4.4: Maximum Access Delay vsRing latency for T=4ms

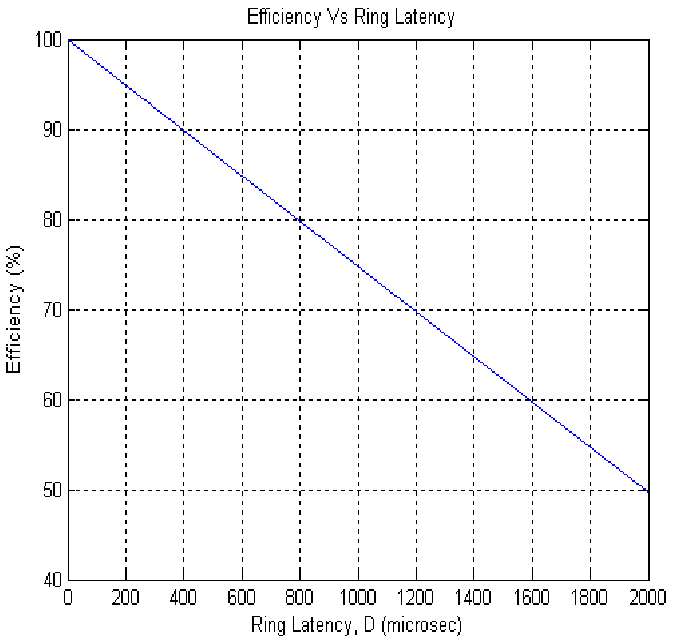


Figure 4.5: Efficiency Vs Ring Latency for T=4ms

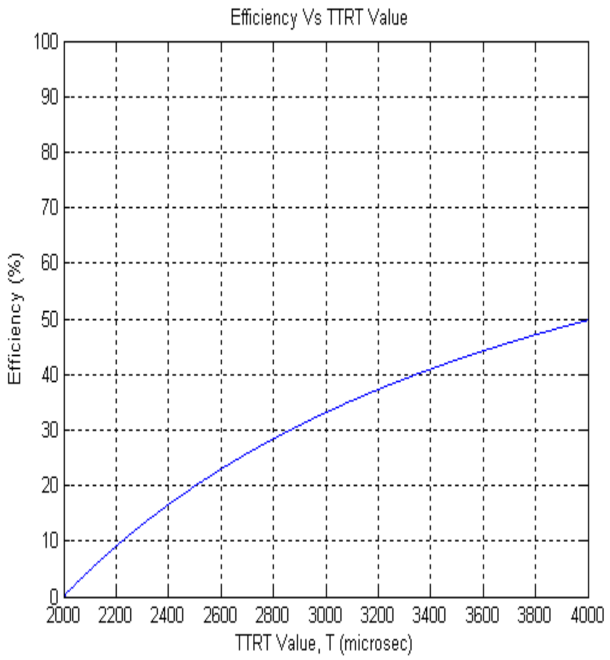


Figure 4.6: Efficiency vs TTRT for T=4ms and D=2ms

It is clear from the results shown in figure 4.3 and figure 4.4 that the Maximum Access delay increases directly with the increase in number of stations and ring latency. Whereas, it is clear from the results shown in figure 4.5 that the efficiency of FDDI networks decreases with the ring latency and increases with the TTRT value.

V.CONCLUSION

In this paper, we covered the results for the performance analysis of the FDDI on the basis of efficiency. It is concluded that the maximum access delay increases with the increase in TTRT value. So we can control the maximum access delay by decreasing the value of TTRT. Also, the Maximum Access delay increases directly with the increase in number of stations and ring latency. Results showed that that the efficiency of FDDI networks decreases with the ring latency and increases with the TTRT value.

REFERENCES

[1] Isaac I. Kim, Ron Stieger, Joseph A. Koontz, Carter Moursund, Micah Barclay, PrasannaAdhikari, John Schuster and Eric Korevaar, “Wireless optical transmission of fast ethernet, FDDI, ATM, and ESCON protocol data using the Terra-Link laser communication system”, Opt. Eng. 37(12) 3143–3155. 1998.
[2] Pek-HooiSoha, Edward B. Roberts, “Networks of innovators: a longitudinal perspective”, *Research Policy* 32, 1569–1588, 2003.
[3] William R. Hawe, Richard Graham and Peter C. Hayden, “Fiber Distributed Data Interface Overview,” *Digital Technical Journal*,Vol. 3 No. 2 Spring 1991
[4] Raj Jain, “Error Characteristics of Fiber Distributed Data Interface (FDDI),” *IEEE Transactions on Communications*, Vol. 38, No. 8, August 1990.
[5] SaurabNog and David Kotz, “A Performance Comparison of TCP/IP and MPI on FDDI, Fast Ethernet, and Ethernet,” *Dartmouth Technical Report PCS-TR95-273*, Revised January 8, 1996.