

Replacing Fiber Distributed Data Interface Networks with Ether-Raptor Switching Systems

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OVERVIEW

FDDI (Fiber Distributed Data Interface) is a set of ANSI protocols for sending digital data over fiber-optic cable. FDDI networks are token-passing networks and support data rates of up to 100 Mbps (100 million bits per second). FDDI networks are typically used as backbones for wide-area networks.

An extension to FDDI, called FDDI-2, supports the transmission of voice and video information as well as data. Another variation of FDDI, called FDDI Full-Duplex Technology (FFDT) uses the same network infrastructure but can potentially support data rates up to 200 Mbps.

Why do users still operate FDDI networks when networking systems abound that are faster cheaper and take up less rack space? Because FDDI is a highly robust network technology that provides high-availability communication paths. FDDI has been operating in high-availability networks for over a decade (since the mid 1980s), and has shown a superlative record of reliability. With some FDDI devices having operational uptimes in years, it is not unusual for the end-user to want to keep using this technology. Many FDDI implementations are in areas where 99.999% uptime is the minimum acceptable requirement and 99.99999% is the requested level of uptime. So again for this reason many users want to only replace their FDDI networks with similar systems. FDDI's much vaunted self-healing ring technology allows it to be used in mission-critical operations such as air traffic control system, banking clearing houses, and Internet Mega POPs, such as MAE East and West, major internet service providers such as AOL®, and large enterprise customers such as Oracle®.

So why are users keeping their FDDI networks at all? FDDI has not progressed beyond the 100 Mbps range, and based on present data, never will. FDDI is not supported for the most part by any major networking technology vendor, and even the much vaunted GIGAswitch/FDDI from Digital Equipment Corporation® is disappearing at alarming rates. To purchase FDDI hardware today, the main area to seek is places such as EBAY® and other auction sites where FDDI items sometimes appear. So with hardware becoming a second user selection and software that is not being upgraded to deal with modern applications, FDDI is unfortunately a dying technology.

SO WHAT TO REPLACE IT WITH?

First let us discuss the reasons FDDI is chosen in the first place.

- FDDI is a ring technology with automatic self-healing capabilities, which activates in approximately 50 milliseconds.
- FDDI allows Servers, Workstations and other devices to "Dual Attach," that is, to connect to two different nodes of the ring and be able to communicate over either connection.
- FDDI allows multiple ring connections for nodes that is called "Dual Homing," so that even if the ring fails, communication continues over the secondary ring.

ATM technology was once considered to be the technology to replace FDDI, but interoperability issues and the demise of the Enterprise ATM market prevented this. ATM did address the "Dual Attach" requirement and went some way to addressing the "Dual Homing" requirement, but this was only available from certain vendors, and even these vendors no longer offer these facilities.

Ethernet switches are considered far too unreliable to perform the majority of the applications for which FDDI is used, As a result very little of the FDDI installed base has gone over to Gigabit Ethernet switching. Even modern Gigabit Ethernet switches are at best 99.999% uptime capable and, even when various redundant options are added to the large chassis based offerings, are seen as still being single points of failure. Gigabit Ethernet switches do not address the "Dual Attach" or "Dual Homing" requirement at all, but some FDDI users have accepted IEEE 802.3ad Link Aggregation to be a close match to "Dual Attach." The problem with this is that Gigabit Ethernet switches cannot carry out this IEEE 802.3ad function in two separate hardware units. Therefore, a single point of failure still exists that most FDDI users cannot accept. In addition some Gigabit Ethernet vendors have tried to emulate "Dual Homing" and the ring topology by using Fast Spanning Tree. This is normally unacceptable to FDDI users as the Fast Spanning Tree repair time is usually quoted as sub 5 seconds (or under 5000 milliseconds).

RAPTOR NETWORKS SOLUTION

Raptor Networks Technology has a product family that more closely addresses these major issues for FDDI Users. Ether-Raptor Layer 2/3/4-7 switches contain technology that allows a “unit-level” redundancy to exist, where IEEE 802.3ad can operate over a number of hardware platforms. In addition, using our own Very Fast Spanning Tree, we are capable of making a self-healing “Dual Homed” ring topology that meets or beats FDDI’s own 50-millisecond repair time.

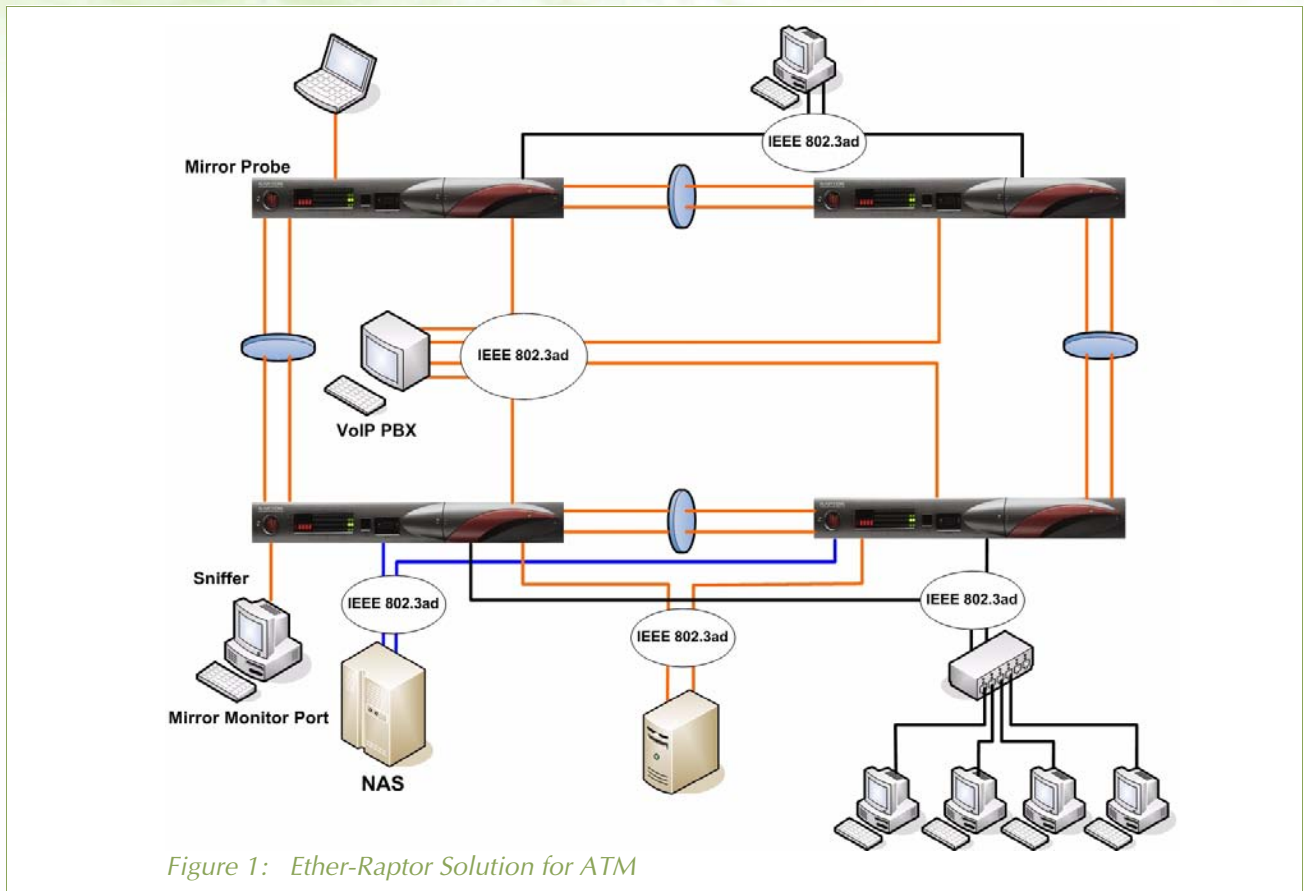


Figure 1: Ether-Raptor Solution for ATM

Ether-Raptor is a family of high-density Gigabit Ethernet and 10-Gigabit Ethernet switching systems that support a special Raptor Adaptive Switch Technology (RAST™) that allows us to perform these small miracles of IEEE 802.3ad over multiple hardware units and to allow a very fast self-healing ring-type topology to exist. In Figure 1 we see an FDDI replacement scenario that is a working alternative to an FDDI network. With the “unit level” redundancy of these systems, we can build FDDI replacement networks that meet and even exceed the 99.99999% of communication uptime that most FDDI users want.

Now we come to the problem of implementation. FDDI networks do not go down and applications over FDDI networks cannot stop. In many cases, if the implementation requires any major cutover, it is unacceptable.

For this reason any implementation strategy needs take into account cutovers between FDDI and the replacement technology. Most FDDI installations will want, and need, a measured item-by-item cutover scenario. This document discusses one specific way to arrange the cutover with a minimum of disruption and downtime.

The Ether-Raptor switch family does not support FDDI interfaces. Therefore, we need to find a way to keep the FDDI network up and operating. When we cutover devices (to the Ether-Raptor network), they need to “see” the FDDI side of the network. Raptor Networks, in partnership with Digital Networks Product Group (DNPG, the acknowledged experts in FDDI) have designed a cutover solution that is guaranteed to make implementation easy and allow all systems to stay up and operational during the procedure. The Ether-Raptor switch family supports 32 groups of IEEE 802.3ad in each switch unit, which allows a large number of devices to be “dual attached” to the network.

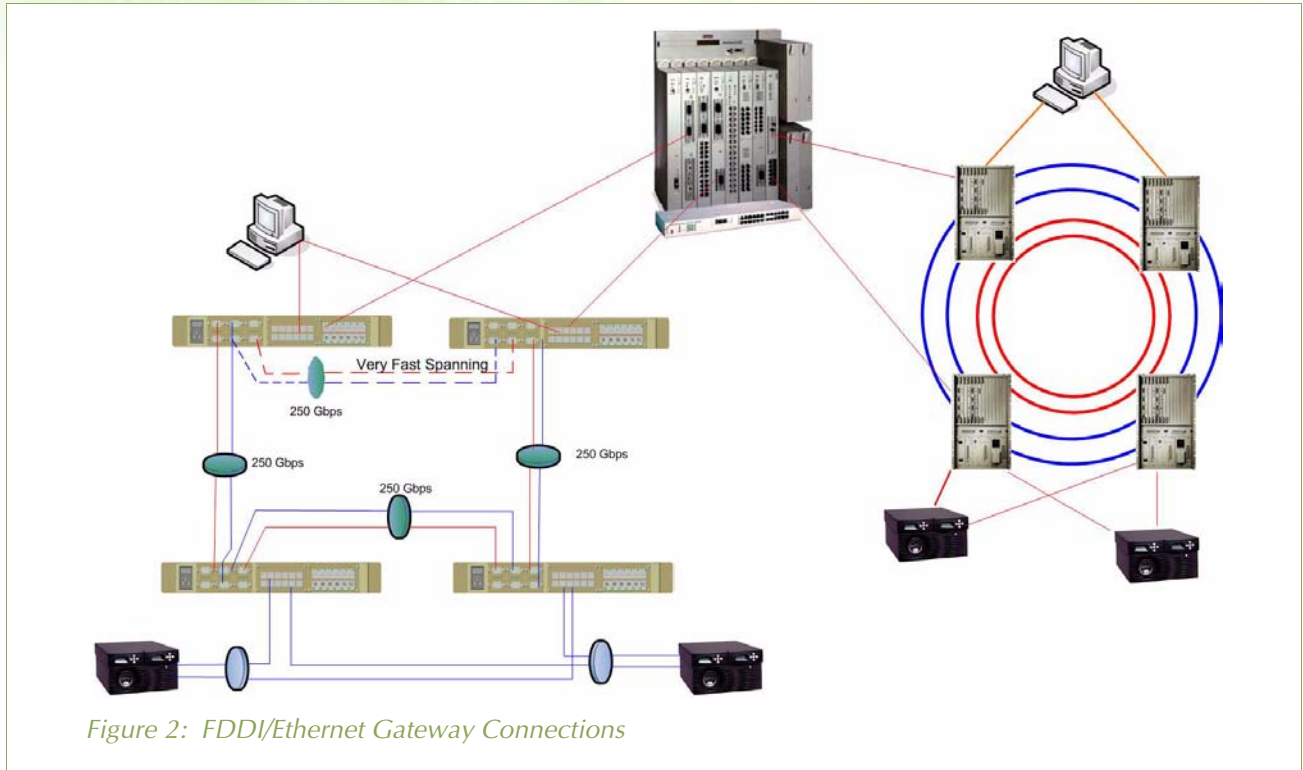


Figure 2: FDDI/Ethernet Gateway Connections

Figure 2 illustrates an FDDI/Ethernet Gateway. The FDDI/Ethernet Gateway connects to the FDDI network and converts the FDDI frames into Ethernet frames. The technology has been used for several years and is a highly accepted way of performing this operation. The FDDI/Ethernet Gateway connects to the Ether-Raptor network using standard 10/100 Ethernet connections.

Devices connected to the FDDI network must have dual Gigabit Ethernet NIC cards installed (with IEEE802.3ad support) and retain the FDDI NIC cards they presently have. Once this is done, the customer sequence can start.

Each device can be connected to the Ether-Raptor network as needed and at the time of the user's choosing. When connections are established, the FDDI connections can be removed. At all times the Ether-Raptor network is able to pass data between itself and the FDDI network, ensuring that all devices can “see” each other and establish their new links. The FDDI/Ethernet Gateway can be removed and the FDDI network decommissioned when the network is fully cut over.

SUMMARY

With the ability to emulate the most needed features of FDDI and the implementation planning that Raptor Networks and Digital Networks Product Group bring to the end-user, it is no longer a nightmare to replace the FDDI installation.

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