Monitoring FDDI Networks Using Ring Monitor

Introduction

Station Management (SMT) is the layer of the FDDI protocol that is responsible for monitoring network operation, detecting errors, and isolating faults. SMT initializes nodes, inserts nodes to the ring, and removes nodes from the ring.

Each FDDI node participates in ring management by exchanging SMT information (using SMT frames) with other nodes on the ring. There are different types of SMT frames, each used for a specific purpose. For example, SMT Status Report Frames are sent wherever there is a change in the ring configuration. Similarly, SMT Neighbor Information Frames are used by FDDI nodes to determine or announce their neighbors. These SMT NIF frames contain the address of the sender, the address of its nearest upstream neighbor, and additional information about the node itself. By capturing and analyzing these frames, a map of the ring can be built.

You use Ring Monitor to configure, display, and print FDDI statistics. In this chapter, you'll learn how you use Ring Monitor to look at your FDDI network. The FDDI Ring Monitor provides a list of active and inactive stations, including information about ring exit and enter times, nearest upstream neighbor, node class, etc. the list can be sorted by Ring Order, MAC address order, enter time, and exit time.

Building the Ring Map

The ring map is built by collecting SMT Neighbor Information Frames (SMT-NIFs). These SMT frames are exchanged periodically, in intervals between 2-30 seconds. When the FDDI ring monitor application is launched, the SwitchProbe FDDI probe starts collecting the SMT NIFs and building the FDDI ring map. However, the ring map is complete only when the probe has been able to collect SMT-NIFs from *all* the nodes on the ring. Until that happens, a partial ring map is displayed and the Ring Map Status in the Ring Monitor is displayed as Incomplete. When the ring map is complete (which typically takes 10-60 seconds), the Ring Map Status is displayed as Complete. Note that the ring map is rebuilt whenever there is a change in the ring configuration.

Although the time taken to build the ring map is typically less than 60 seconds, under certain conditions the ring map may take longer to be completed, or may never be completed at all. If the ring is overloaded, the nodes take longer (several minutes) to exchange SMT-NIFs. Therefore the time taken to build the ring map increases proportionately. If there a node on the ring that has stopped, or there is a node that does not exchange SMT-NIFs, the ring map will never be completed. This happens if the node has hung, is too busy to participate in the SMT-Neighbor Protocol, or if it does not conform to the SMT-NIF protocol.

Using Ring Monitor

To use Ring Monitor to monitor an FDDI network:

Step 1   Select an FDDI agent from the Agent list box in the TrafficDirector window.

Step 2   Click on the Ring Monitor icon on the TrafficDirector window. The Ring Monitor main window appears.

The Ring Station List window consists of an upper list box and a lower list box. The upper list box shows information about each of the nodes on the ring, and contains the following information:

Upper List Box	What it Tells You
Ring Order	The order of this station in the ring.
Station	The name of the station.
Address	The address of the station.
Last Enter Time	The last time the station entered the ring.
Last Exit Time	The last time the station exited the ring.
RIns	Ring insertions. The number of times a station has been inserted into the ring.
Status	Whether a station is active (currently in the ring) or inactive (not currently in the ring).

The lower list box shows information about the specific node highlighted in the upper list box. It contains the following information:

Lower List Box	What it Tells You
Station Address	The name and address of the highlighted station.
Nearest Upstream Neighbor Address	The address of the nearest active upstream neighbor of the highlighted station.
Node Class	FDDI nodes can be classified into Stations and Concentrators. The primary purpose of a Station is to transmit and receive information. Concentrators are like hubs, providing facilities to connect additional Nodes. Some types of Nodes can have zero, one or two MAC addresses. For example, a Dual Attachment Node with two MAC addresses is able to simultaneously receive and transmit frames on both the logical rings. This is not possible with a Dual Attachment Node that has only one MAC.

Lower List Box	What it Tells You
	Node Class indicates the node type and can be any one of the following:
	Single Attachment STATION (SAS).
	Single MAC - Dual Attachment STATION (SM-DAS).
	Dual MAC - Dual Attachment STATION (DM- DAS).
	MACless - Single Attachment CONCENTRATOR (SAC).
	Single MAC - Single Attachment CONCENTRATOR (SAC).
	Single MAC - Dual Attachment CONCENTRATOR (DAC).
	Dual MAC - Dual Attachment CONCENTRATOR (DAC).
Topology State	The topology state of the node indicates whether it is correctly connected on the ring. The states are indicated as follows:

The topology state of the node indicates whether it is correctly connected on the ring. The states are indicated as follows:

- **Normal**. The node is correctly connected.

- **Twisted Ring A-A.** In case of a Dual Attachment Node, the A-port should be connected to the B-port of its Upstream Neighbor and the B-port should be connected to the A-port of its Downstream neighbor (except if *Dual Homing* is used). Connecting the A-port of Dual Attachment Node to the A-port of another Dual Attachment Node results in an undesirable topology that is referred to as a twisted ring.

- **Twisted Ring B-B.** This is similar to the Twisted Ring A-A topology explained above except that it is caused by connecting the B-port of a Dual Attachment Node to a B-port of another Dual Attachment Node.

- **Wrap.** FDDI defines a *redundant* topology network. If a fault occurs on the trunk ring, then the Dual Attachment Nodes on either side of the faulty link wrap around to bypass the faulty link These nodes are then said to be in a *Wrapped* state.

The following information indicates the manner in which the Node is connected to the FDDI ring:

- **Rooted Station/Station not Rooted.** Displayed if the node is a Station. A Station is *Rooted* if it does not have an active A, B, or S port in tree mode. This indicates whether the station is directly connected on the trunk ring, in which case it is said to be *Rooted*, or if it is connected through a concentrator as part of a tree topology, in which case it is said to be an *Unrooted* Station.

- **Attached Concentrator/Unattached Concentrator**. Displayed if the node is a Concentrator.

Lower List Box	What it Tells You
	• **UnAttached Concentrator.** Displayed if the node is a Concentrator. A Concentrator is *UnAttached* if it does not have an active A, B, or S Port. In an FDDI dual-ring topology or a dual-ring with trees topology, all concentrators are normally *Attached*. In an FDDI tree topology, any number of concentrators are arranged in a hierarchy, with a number of stations attached to each concentrator. In this topology one concentrator is the root of the tree. This concentrator is *UnAttached*. All other concentrators are *Attached* under normal conditions.
Synchronous Service	FDDI allows for two different types of traffic, synchronous and asynchronous. *Synchronous* traffic consists of delay-sensitive traffic such as voice packets, which need to be transmitted within a certain time interval. *Asynchronous traffic* consists of data traffic produced by various computer communication application such as file transfer, mail, etc. These data packets can sustain some reasonable delay.
	If the node supports Synchronous traffic then the following appears:
	Synchronous Service: Supported
	If it does not support Synchronous traffic, then the following appears:
	Synchronous Service: Not Supported
Duplicate MAC Address Test	On an operational FDDI ring, each node periodically checks to see if there exists any other node that has the same MAC Address as its own. If a duplicate MAC Address condition does not exist, then the following appears:
	Duplicate MAC Address test: Passed
	If not, then either of the following appears:
	Duplicate MAC Address test: Failed (My duplicate exists).
	Duplicate MAC Address test: Failed (My Upstream is duplicate).

Selecting Active Stations Only

You can view data on active stations. To do so:

Step 1 Select the **View** menu.

Step 2 Click on **Active Stations Only**.

Sorting List Box Information

You can change the way TrafficDirector sorts the information provided in the window's list box. You can use any of these variables to determine the sort order:

- **Ring Order.** The position of the station in the ring. The default.

- **MAC Order**. MAC addresses in descending order.

- **Enter Time**. The last time the station has entered the Ring. The sort is in descending order.

- **Exit Time**. The last time the station has exited the Ring. The sort is in descending order.

To change the list box sort order:

Step 1   Select the **Sort** menu.

Step 2   Click on the desired sort order.

Refreshing the Station Information

To refresh the station list box information to display the most recent data, click on the **Refresh** button in the Ring Monitor window. TrafficDirector updates the list box data.

Printing the Contents of the List Box

You may want to print the contents of the FDDI Ring Monitor window list box for future reference.

To print the contents of the list box:

Step 1   Select the **File** menu.

Step 2   Click on Print. The contents of the list box are printed on your default printer.

Exiting Ring Monitor

To exit Ring Monitor:

Step 1   Select the **File** menu.

Step 2   Click on Exit.