Softek TDMF™, Open Systems Edition Administrator's Guide for Windows NT™ and Windows 2000™

Version 1.2

FUJITSU

FUJITSU SOFTWARE
TECHNOLOGY CORPORATION

SOFTEK *TDMF* ™ Open Systems Edition

Administrator's Guide for Windows NT™ and Windows 2000™

Version 1.2

Revision Notice

This is the first release of this manual. A complete revision history is provided at the end of the manual.

Abstract

The *Softek TDMF, Open Systems Edition, Administrator's Guide for Windows NT and Windows 2000, Version 1.2* (**ML-144XXX-001**), contains information on how to configure and manage the Softek TDMF, Open Systems Edition software. For information on installing and removing the product, see the Softek TDMF, Open Systems Edition Installation Guide for Windows NT® and Windows 2000®, Version 1.2.

For Further Information

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Restriction On Use

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Preface

Description of the Manual

The *Softek TDMF™, Open Systems Edition, Version 1.2, Administrator's Guide for Windows NT™ and Windows 2000™*, contains information on how to configure and manage the Softek TDMF Block software once it is installed. For information on installing and removing the product, see the Softek TDMF™, Open Systems Edition Installation Guide for Windows NT™ and Windows 2000™, Version 1.2.

Throughout the manual, the Softek TDMF, Open Systems Edition product will be referred to as Softek TDMF.

Audience for this Manual

The information in this guide is intended for system administrators who are responsible for installing software and maintaining the servers and clients on a network. Operators who monitor the daily backups may also find this manual useful.

Contents of this Manual

Chapter	Describes
Introduction	Overview of Softek TDMF, Primary System and Secondary System overviews, tunable parameters, asynchronous, synchronous, and near synchronous modes, and operating modes.
Getting Started	Configuring Softek TDMF, distributing the configuration files, launching the PMD, and creating the initial mirror
Administration	Monitoring Softek TDMF, setting up the Event Viewer, setting tunable parameters, working with logical groups and local/mirror partition pairs, using the Checkpoint feature, running Softek TDMF commands from both systems, re-synchronizing the Primary and Secondary Systems, working with the pstore, resizing the BAB, and disaster recovery.
Complex Configurations	Symmetric Configuration, one-to-many, chaining, and loopback configuration.
Commands	All Softek TDMF commands.
Glossary	Definitions of terms found in this manual.

Notation Conventions

This supplement uses the following typographic conventions and symbols to make information easier to access and understand.

Softek TDMF Notations

Convention	Indicates	Example
boldface	Names of DOS or UNIX line commands, daemons, options, programs, or scripts	The **start** command starts the Softek TDMF Block Server.
italic in text	Pathnames, filenames, computer names, new terms defined in the Glossary or within the chapter, or emphasized words	The default install location is *C:\Program Files\Softek_tdmf*
italic in command line	A variable that you need to provide in the command line	`spec /dfs` *target_site*
fixed-width	Examples and information displayed on the screen	`Are you sure you want to uninstall all Softek TDMF components?`
fixed-width, boldface	Commands and options that you must type exactly as shown	**pause on**
<italic in brackets>	Variables that appear in messages	Unable to open logical group device *<deviceid>*.
[text | text]	Message variables that can display two different values	License file has keyword that is not [PMD | RMD]_LICENSE.
Menu_Name> Command> Command	A path or an order to follow for making selections in the GUI	Maintenance>Add Specification>Global Exclude
Note:	Important information that you must read and follow to ensure successful backup and recovery of your data	☞ **NOTE:** You must exclude the Softek TDMF DATA directory from tape backups.

Related Documentation

The following publications contain related information.

Softek TDMF, Open Systems Edition Installation Guide for Windows NT and Windows 2000, Version 1.2
(ML-144XXX-001)

Softek TDMF, Open Systems Edition Message Log Guide for Windows NT and Windows 2000, Version 1.2
(ML-144XXX-001)

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1

Introduction

This chapter provides a conceptual overview of Softek TDMF Block, including the product architecture and operations.

Overview of Softek TDMF

Softek TDMF is a network-based, disk-mirroring product that enables data exchange and synchronization in support of local applications, data sharing among remote sites, and disaster recovery.

Softek TDMF ensures that users have uninterrupted access to usable data. In an unplanned outage, it provides a recoverable copy of coherent application data—that is, a copy that can be accessed and used—on a secondary system. Softek TDMF mirrors disk-based data from partitions on a primary system to partitions on a secondary system, across any available network connection supporting TCP/IP. Data is duplicated in near real time to assure integrity between the two systems in the event of failure. Softek TDMF accomplishes this through time-sequenced transfers of data from the primary to the secondary system over the network.

Should a failure occur on the primary system, the secondary system can provide immediate access to contemporary data. Both primary and secondary systems must have sufficient amounts of disk storage, and adequate network bandwidth to accommodate the flow of data.

Softek TDMF allows you to begin mirroring existing data by simply incorporating the partitions on which this data is stored into the Softek TDMF configuration. Disks do not need to be repartitioned or reformatted, and data does not need to be imported or exported.

☞ **NOTE**:
Softek TDMF does not support the replication of the system drive, or of any partition that has a paging file *(pagefile.sys)* currently in use.

Implementations

Softek TDMF functions as a data management solution for both planned and unplanned events. The following sections describe a few ways in which the product can be implemented.

Disaster Recovery

Softek TDMF provides a continuously updated copy of data on a secondary system, which ensures that data can be accessed when the primary system goes down. The continuous mirroring of data across the network reduces data loss in case of disaster, and simplifies recovery operations.

Data Migration

When upgrading or moving your data center, it is common to install and ready a new server while the existing server continues to provide service. Even with parallel systems, the downtime can be lengthy to copy, transport and restore data from an old server to a new one. This downtime is significantly reduced by using Softek TDMF to create a mirror and continuously send changes to the new server until you are ready for a switchover.

Backup

Softek TDMF compliments tape backups. By using a secondary data set on a remote server, applications on the primary system are kept available while a tape backup is performed. Checkpointing is a mechanism for implementing a "hot backup" environment. For more information on checkpointing, see *Using the Checkpoint Feature* on page 44.

System Maintenance

You can use Softek TDMF to relocate data and applications to a secondary system while the primary system receives normal system maintenance.

Components

The following figure illustrates the interaction of Softek TDMF components. These components are described in the following two sections: *Primary System Overview* on page 5, and *Secondary System Overview* on page 7.

Figure 1.1: Softek TDMF Components
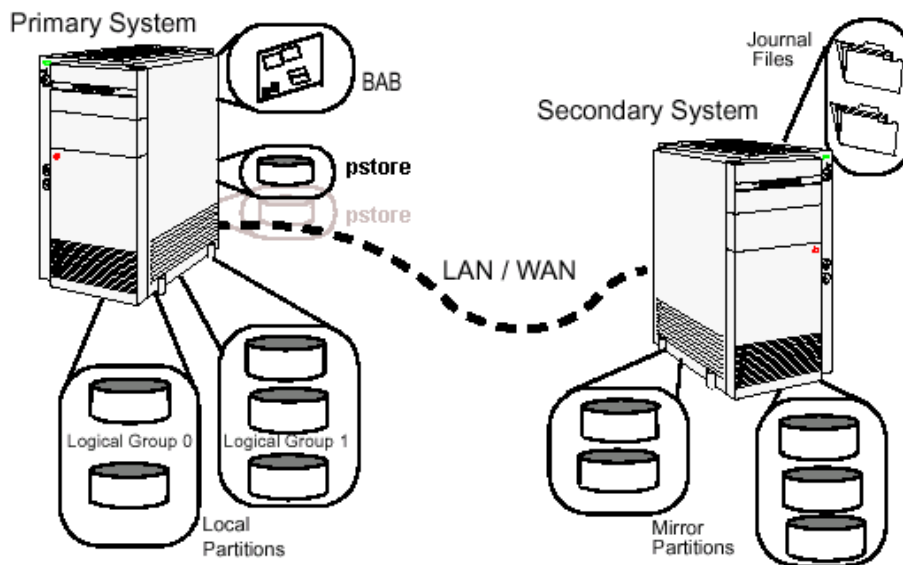
Primary System Overview

The *primary system* is the machine on which users run their primary applications and store their data. The primary system must be running Windows NT 4.0 or Windows 2000, have active network connections to the secondary system, and have enough disk space and memory available to run Softek TDMF.

The *device drive*r, *local partition*s, *logical group*s, the *BAB*, and the *pstore* are configured on the primary system.

The Device Driver

The *device drive*r, Softek TDMF Block, is installed just above the actual disk device drivers but architecturally below applications. This component allows the kernel to transfer data directly to or from the underlying local partition, independent of the file system or buffer cache.

Local Partitions

Local partitions are partitions on the primary system that store users' primary applications and data. During configuration, local partitions are defined and matched with corresponding mirror partitions on the secondary system. Data on the local partitions is sent across the network and ultimately saved on the mirror partitions.

Logical Groups

As *Softek TDMF Components* on page 4 illustrates, you can configure Softek TDMF to treat a collection of local partitions as a coherent unit, called a *logical grou*p. There is time-ordered write coherence between the local partitions in a logical group, and complete operational and state independence between logical groups. You can define up to 1000 logical groups; logical group numbers range from 0 to 999.

Some applications, especially databases, can work with a number of disk partitions at the same time. Chronological coherence must be maintained, not only within a single local partition, but also between local partitions, so that all partitions are in the same state. Logical groups maintain chronological coherence of I/O transfers between local partitions. You can maintain chronological coherence of I/O transfers by organizing the local partitions into a logical group.

You may want to define several logical groups for the following reasons:

- Logical groups can use independent network connections to the secondary system, creating an aggregated throughput greater than that of any single network connection.

- The failure of one logical group does not affect the operations of any other logical groups.

The BAB (Big Asynchronous Buffer)

Softek TDMF uses a big asynchronous buffer, called the BAB, for journal updates as they are written to the local partitions. This buffer resides in the primary system's physical kernel memory. Entries from the BAB are then transferred across the network connection to the mirror partitions on the secondary system. The size of the BAB must be allocated during initial configuration (although you can resize it later if needed) and cannot exceed 192 megabytes. Its default size is 64 megabytes.

The pstore (Persistent Store)

The *pstore* is a raw partition on the primary system which stores state information and tunable parameter definitions. During configuration, you must select the same pstore for all logical groups. The size of the pstore is directly related to the maximum number of partitions. A general rule to follow when planning your installation is to allow 140 KB per partition for the pstore. Pstores sized in excess of 100 MB are unnecessary.

The Softek TDMF Block Server

The *Softek TDMF Block Server* is a service that runs on all primary and secondary systems in the Softek TDMF enterprise. It establishes and manages the PMD (primary mirror) and RMD (remote mirror) service threads for each defined logical group.

The PMD

The *PMD* is a service thread that runs on the primary system. One PMD for each defined logical group is started by the Softek TDMF Block Server when the system boots or when the **tdmflaunchpmd** command is run. As a result, each logical group can connect to a unique secondary system.

The PMD sends entries in the BAB across the network to the corresponding RMD on the secondary system (see *The RMD* on page 8). You can start one or more PMDs manually with the **tdmflaunchpmd** command or halt them manually with the **tdmfkillpmd** command. For more information on these commands, refer to *Commands* on page 67.

Figure 1.2: The PMD/RMD Relationship
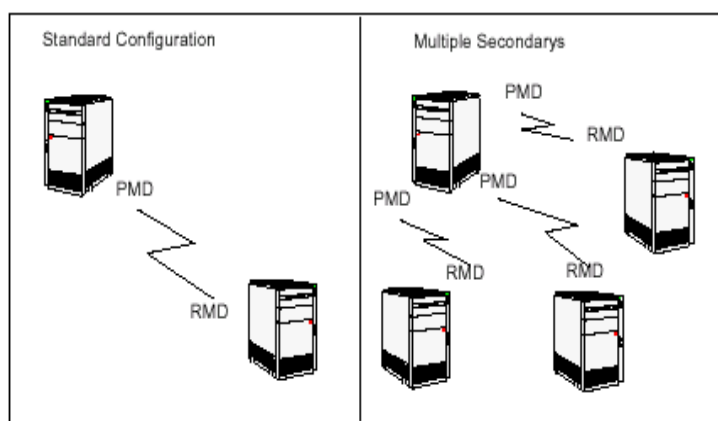
Secondary System Overview

The secondary system is the machine on which a copy of the primary system's local data is stored. The same Softek TDMF software is installed on both primary and secondary systems. The secondary system must also be running Windows NT 4.0 or Windows 2000.

☞ **NOTE**:

Softek TDMF does not support a Windows NT 4.0 primary with a Windows 2000 secondary, or vice versa.

If you want the secondary system to assume all activities in the event of primary system failure, the application software must be installed on both systems. In a standard Softek TDMF configuration, applications on the secondary system must not be executed until the system is required to act as primary. The exception is when *Checkpoint* is active.

Mirror partitions and the *journal file directory* are configured on the secondary system. The Softek TDMF Block Server running on the secondary system launches an RMD service thread for each logical group. The communication established between the PMD and the RMD supports the transfer of data from the primary system to the secondary one. The default TCP/IP port for these connections is 575.

Mirror Partitions

A *mirror partition* is a partition on the secondary system that is configured to "mirror" data received from the corresponding local partition on the primary system. One mirror partition is configured on the secondary system for each local partition on the primary system. The mirror partition must be the same size as (or larger than) the corresponding local partition.

During normal operation, the mirror partitions contain a coherent (usable) copy of the data stored on the primary system. The data on these partitions can be checkpointed and opened by applications other than Softek TDMF.

☞ **NOTE:**

If checkpoint is used, the mirror partition is opened in read/write mode. If data is changed on the mirror partition, it becomes unsynchronized with the local partition.

For more information about checkpoint, see *Using the Checkpoint Feature* on page 44.

The RMD

The *RMD* is a service thread that is started on the secondary system by the Softek TDMF Block Server. The RMD is responsible for writing data received from the primary system to the mirror partitions.

The RMD can operate in the following modes:

- MIRRORING: The RMD writes data directly to the mirror partition.
- JOURNALING: The RMD writes data to the journal files only.
- MIRRORING & JOURNALING: Data is written both to the mirror partition and journal.

When Softek TDMF is in MIRRORING & JOURNALING mode, the data on the mirror partition is in an incoherent but recoverable state.

An RMD is automatically brought down when the corresponding PMD is killed. You can use the **tdmfkillrmd** command on the secondary system to stop an individual RMD.

The Journal File Directory

Before the PMD and RMD service threads are started, you must create a *journal file directory* on the secondary system and configure Softek TDMF to recognize it.

Journal files handle situations during which the data being transferred is not chronologically ordered. The journal files are used during smart refresh operations to store updates (see *Smart Refresh* on page 12), which would place it into an incoherent state if applied to the mirror partition. Journal files are also used to store updates while checkpoint is active on the mirror partitions. A new journal file is created each time there is a state change, which causes the data being transferred to transition from a coherent to an incoherent state.

Journal files use the following naming conventions:

- j######.c (for coherent transfer of data)

- j######.i (for incoherent transfer of data)

where "j" indicates a journal file, the first set of three numbers represents the logical group to which the journal file belongs, and the second set of three numbers is the sequence number for the journal file within the logical group.

For example: for logical group 999, the first coherent data journal file would be named *j999001.c*

Tunable Parameters

Tunable parameters allow you to control certain aspects of Softek TDMF operations. These parameters are stored in the pstore and are frequently evaluated by the PMD. During configuration, you can optionally change tunable parameters. For descriptions of these parameters and how to set them, see *Setting Tunable Parameters* on page 31.

Asynchronous, Synchronous, and Near Synchronous Modes

In the standard configuration, Softek TDMF accumulates disk updates in the BAB independently of the transmission of these entries to the secondary system. This dissociation is referred to as *Asynchronous mode* (Async mode). In Async mode, applications are able to function with near-normal I/O performance while data is transferred using optimal network bandwidth.

You can use the SYNCHMODE tunable parameter to configure Softek TDMF to operate in *Synchronous mode* (Sync mode) or *Near Synchronous mode* (Near Sync mode). Sync mode does not return control to an application until after a disk update has been committed to both primary system's local partition and secondary system's mirror partition. In Sync mode, the mirror partitions are an exact copy of the local partition at all times.

Near Sync mode is a middle ground between Async and Sync modes. In Near Sync mode, disk updates are allowed to accumulate in the BAB asynchronously until a tunable number of entries has accumulated. When this number is reached, I/O operations are blocked by the application to allow updates to be written to the secondary system until the entries in the BAB fall below this limit. Near Sync mode reduces the performance penalty of Sync mode, yet adds confidence that the data on the mirror partition(s) is no more than a fixed number of disk updates behind the local partitions.

Operating Modes

The following figure shows Softek TDMF operating modes during normal operation. This section describes the different operating modes and how Softek TDMF goes from one to the other.

You can force a change in operating modes with the **tdmfoverride** command (see *tdmfoverride* on page 78).

Figure 1.3: Operating modes and state transitions during normal operations
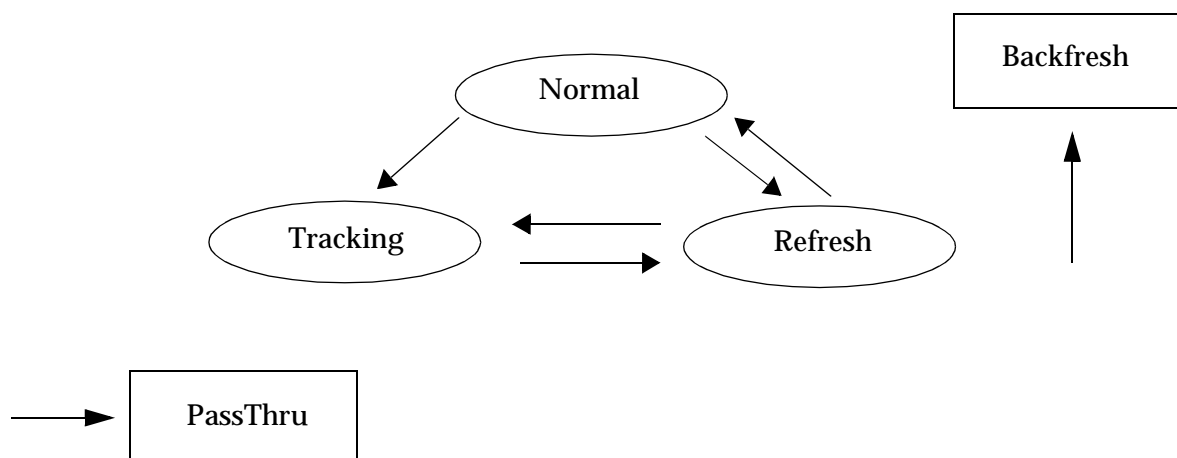
PASSTHRU Mode

Softek TDMF is in *PASSTHRU mode* by default when installed. In PASSTHRU mode, data is written to the local partitions only, not to the BAB. The PASSTHRU mode causes the mirror partitions to be out of sync with the local partitions. Some action (for example, **tdmflaunchrefresh**) is required to synchronize the data sets on the primary and secondary systems. Refreshing the data set is the standard method of moving a logical group from PASSTHRU mode to NORMAL mode.

NORMAL Mode

In *NORMAL mod*e, the local partitions handle read/write requests, and updates are applied to local partitions and written to the BAB. In this mode, Softek TDMF performs continuous mirroring, and a coherent, recoverable copy of data exists on the secondary system.

☞ **NOTE:**
Using the **tdmfoverride** command to put Softek TDMF into NORMAL mode does not initiate the mirroring. You must use the **tdmflaunchpmd** command after you use **tdmfoverride** to initiate the mirroring.

TRACKING Mode

TRACKING mode reduces the need for a full refresh in the case of network outage or loss of communication with the secondary system. In TRACKING mode, reads and writes are directed to the local partitions. Entries are not written to the BAB, although the BAB may contain entries that have not been migrated from an earlier NORMAL mode environment.

Updates received while in TRACKING mode are not mirrored to the secondary system, but are passed through to the local partitions. When Softek TDMF leaves this mode, the PMD performs a smart refresh, which is the standard method of transition from TRACKING mode to NORMAL mode.

☞ **NOTE:**
Leaving the TRACKING mode without performing a refresh operation—either smart or full—causes the primary and secondary systems to become out of sync.

REFRESH Mode

REFRESH mode is used to create an initial mirror and to synchronize the primary and secondary systems. REFRESH mode is a background operation, which means that it does not interfere with data mirroring.

Softek TDMF is placed in REFRESH mode with the **tdmflaunchrefresh** command (see *tdmflaunchrefresh* on page 77). This command verifies that a refresh is not already in progress and then initiates the operation.

A REFRESH mode transition also occurs automatically if the BAB becomes full while in NORMAL mode. In this case, the system automatically transfers its operating state first to TRACKING mode, then to REFRESH mode. While in REFRESH mode, updated data is not written to the BAB but is sent from the local partitions directly across the network.

Entries in the BAB have precedence during a refresh operation. The BAB must contain fewer than 2 x CHUNKSIZE entries before a refresh is started (CHUNKSIZE is a tunable parameter with a default value of 256 KB). When the number of entries in the BAB reaches this limit, the PMD sends updated data. As the BAB fills beyond this limit, the PMD starts sending BAB updates across the network.

A refresh is halted automatically when complete and Softek TDMF goes to NORMAL mode. You can explicitly kill a refresh operation with the **tdmfkillrefresh** command.

☞ **NOTE:**
Killing a refresh operation before completion results in a loss of synchronization of the primary and secondary systems.

You can perform three types of refresh operations: full, smart, and checksum.

Full Refresh

A *full refresh* (**tdmflaunchrefresh** -**f**) mirrors every block on the designated local partition(s) to the secondary system. You must use this method to create an initial mirror (see *Creating the Initial Mirror* on page 22).

Data is not "journaled" during a full refresh operation, but is applied directly to the mirror partitions. Therefore, if a failure occurs during a full refresh, the mirror partitions are left in an incoherent and non-recoverable state. Coherence is achieved only when the full refresh is complete.

Smart Refresh

A *smart refresh* **(tdmflaunchrefresh**) mirrors only those blocks on the local partition that have changed. When the BAB becomes full, the system automatically transfers state to TRACKING mode, then to REFRESH mode. When the smart refresh is complete, the system goes back to NORMAL mode.

During a smart refresh, the data is written to a journal file on the secondary system. These entries are committed to the mirror partition only after all updates have been transferred. Data on the mirror partition is in an incoherent state while the journal entries are being applied. Coherence is achieved only when all entries have been committed to the mirror partition.

Checksum Refresh

A *checksum refresh* **(tdmflaunchrefresh -c)** compares all blocks on the local partition and the mirror partition using a checksum method to identify differences. Only blocks that have been modified (that is, those for which the checksum varies) are sent to the secondary system. A checksum refresh writes mirror data to the journal file system, not directly to the mirror partition.

BACKFRESH Mode

BACKFRESH mode synchronizes the primary system back from the secondary system. A backfresh operation causes all blocks of data on the mirror partitions differing from those on the local partitions to be moved to their corresponding partitions on the primary system. Softek TDMF detects changes by reading and comparing the blocks on the primary system with those on the secondary one.

To initiate a backfresh operation, run the **tdmflaunchbackfresh** command on the primary system with the required options (see *tdmflaunchbackfresh* on page 76). While the backfresh operation is running, the local and mirror partitions are considered off-line to applications, because the backfresh operation requires exclusive access to them.

☞ **NOTE:**

Backfresh is a maintenance-only mode. While in BACKFRESH mode, the data on the local partition is in an incoherent state; it cannot be used if a failure occurs during the backfresh operation. Coherence is achieved only once the backfresh is complete. While a backfresh is occurring, applications may not access either the mirror or the local partitions.

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Getting Started

This chapter provides the steps necessary to get started using the Softek TDMF Block software after you have installed it. Perform the procedures in the following order:

- *Configuring Softek TDMF*
- *Distributing the Configuration Files*
- *Launching the PMD*
- *Creating the Initial Mirror*

Configuring Softek TDMF

The Softek TDMF Block Configuration Tool (simply referred to as "Configuration Tool" in this guide) is the program you use to define the BAB size, primary and secondary systems, local and mirror partitions, and optionally, tunable parameters. (For information on setting tunable parameters, see *Setting Tunable Parameters* on page 31.)

Starting Configuration Tool

☞ **NOTE:**
Run Configuration Tool only on the primary system.

To start Configuration Tool, select Start>Programs>Softek_tdmf>ConfigTool.

(You can also start Configuration Tool with the **tdmfconfigtool** command.

To do this: open a command window, change to the *Softek TDMF Block* installation directory, and enter the command.)

Figure 2.4: Configuration Tool
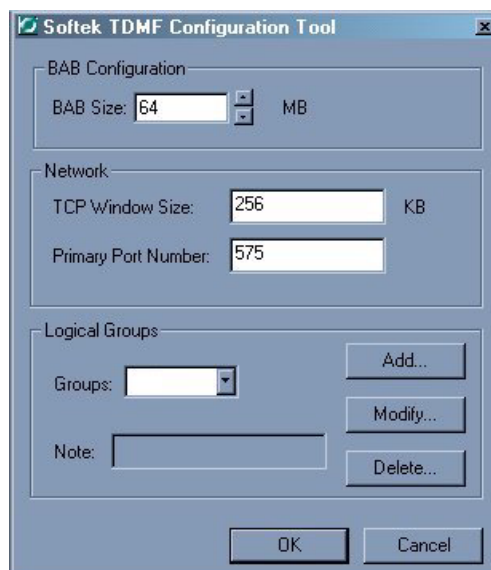
Configuring BAB Size and Network Options

You can change the default BAB size and network options if you want. The default settings are shown in the previous figure. To configure the BAB size and network options:

1. Beside **BAB Size** in Configuration Tool, use the arrows to change the BAB size as desired. By default, the BAB size is set to 64 megabytes of memory. The size is limited to a maximum of 50% of the total physical memory on the primary system, and cannot exceed 192 megabytes.

2. Change the Network options if desired, or use the default settings.

    TCP Window Size is the size of the TCP sliding window in bytes. This parameter overrides the operating system's TCP send and receive spaces. A larger window size can improve communication performance but uses more memory. It enables multiple frames to be sent before an acknowledgment is obtained from the receiver. (It is recommended that this parameter be changed only by an administrator with a thorough understanding of the operating system.)

    Port Number is the address of the port used by TCP/IP.

3. Define logical groups as described in the next section.

Defining Logical Groups

A logical group is a defined relationship between local and mirror partitions; it specifies the partitions on the primary system (local partitions) that will be mirrored, and the partitions on the secondary system (mirror partitions) that will be used to mirror them.

☞ **NOTE:**
Softek TDMF does not support the mirroring on the system drive, or of any partition that has a paging file *(pagefile.sys)* currently in use.

In the Softek TDMF enterprise, you can have up to 1000 logical groups (numbered from 0 to 999), and 32 partitions.

You can define a logical group to include one local/mirror partition pair, or several such pairs as part of the same logical group. By organizing partitions into a logical group, you maintain the chronological coherence of I/O transfers. You can also increase total system throughput, because logical groups can send data to the secondary system using independent network connections.

To define a logical group:

1. Under **Logical Groups** in Configuration Tool, click **Add**. The Add Group dialog box is displayed. (Instructions for modifying and deleting logical groups are provided in *Working with Logical Groups* on page 34.)

Figure 2.5: Adding a logical group
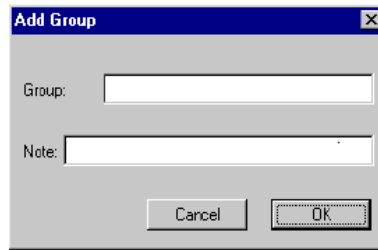
2. Type the group number; 333 for example. Group numbers can range from 0 to 999.

3. Type a note pertaining to the group if desired.

4. Click **OK**.

The **Systems** tab is displayed.

Figure 2.6: Defining primary and secondary systems

5. In the **Primary System** area:

   a. In the **IP Address** box, the primary system's IP address is supplied automatically. The IP address can be determined using a Host Name. To do this, simply click the **Host Name** button.

   If you want to configure a local loopback configuration (that is, a configuration in which the same machine acts as both primary and secondary), specify 127.0.0.1 for both primary and secondary systems.

☞ **NOTE:**
The primary and secondary systems must each have at least one static IP address to work with Softek TDMF. Use each system's static IP address in the configuration.

b. In the **Persistent Store Device** list, select the drive letter of the Persistent Store (pstore) partition. This list contains all raw partitions on the local system. If no partitions are shown, the pstore partition has either been formatted or was never created. In this case, you must create a raw (unformatted) partition and assign it a drive letter.

☞ **NOTE:**
You must use the same pstore partition for every logical group that you define.

6. In the **Secondary System** area:

a. In the **IP Address** box, specify the secondary system's IP address. The IP address can be determined using a Host Name. To do this, simply click on the **Host Name** button.

b. In the **Journal Directory** box, specify the directory on the secondary system where journal files will be written; for example, **f:\jrn**. The journal directory cannot be on a replicated partition, and the journal directory's partition must be formatted as NTFS.

c. The **Secondary Port** box contains 575, the default TCP/IP port number on the secondary system. You can change this number if needed.

d. Select **Chaining** if you have a complex configuration and want the second primary partition to be both readable and writable. (For more information, see *Chaining* on page 64.)

7. Type a note pertaining to the systems if desired.

8. Select the **TDMF Devices** tab.

Figure 2.7: Defining local and mirror partitions
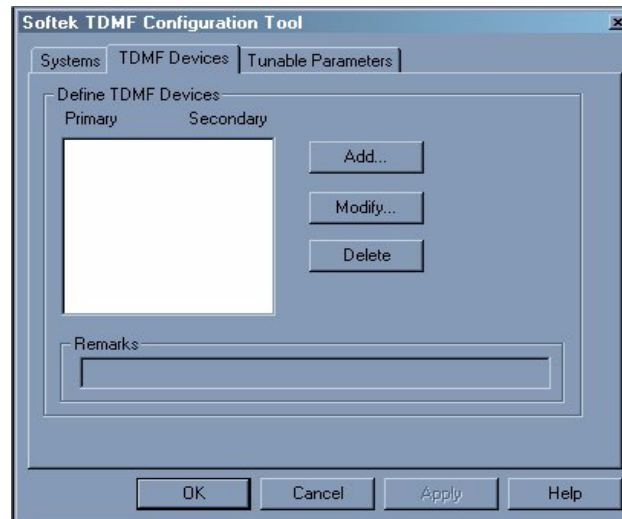
9. To add a local/mirror partition pair, click **Add**.

The Add/Modify Mirrors dialog box is displayed.

Figure 2.8: Adding local/mirror partition pairs
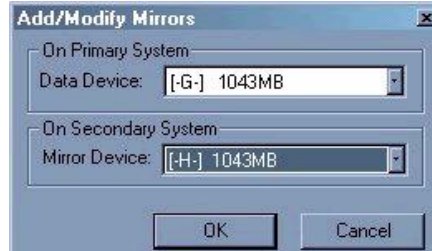
☞ **NOTE:**

As described in the *Installation Guide*, local and mirror partitions must be formatted as NTFS. Furthermore, Softek TDMF does not support the mirroring on the system drive or of any partition that is currently using a paging file *(pagefile.sys)*.

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10. Do the following:

   a. In the **Data Device** list, select the drive letter of the local partition on the primary system that you want to mirror.

   b. In the **Mirror Device** list, select the drive letter of the partition on the secondary system that will be used to mirror the local partition.

☞ **NOTE:**

The size of the mirror partition **(Mirror Device**) must be equal to or greater than that of the local partition **(Data Device**). If the mirror partition is larger than the local partition, it will be formatted to the same size as the local partition, and any extra space will be lost. It may be necessary to use Disk Administrator's Properties dialog box, or Windows NT (or Windows 2000) Explorer to determine the exact size of a partition.

11. Click **OK**.

12. Click **Yes** in response to the message,

```
"Would you like to start the logical group?"
```

Before you launch the PMD, you must distribute the configuration files as described in the following section.

Distributing the Configuration Files

Configuration Tool creates a configuration *(.cfg)* file for each logical group and places these files in the *Softek TDMF Block* installation directory on the primary system. Each *.cfg* file is named using the corresponding logical group's number. For example: *p000.cfg* corresponds to logical group 0, *p001.cfg* corresponds to logical group 1, and so on.

Since each logical group contains definitions for local and mirror partitions, these *.cfg* files need to reside on both primary and secondary systems.

☞ **NOTE:**

After you configure logical groups on the primary system, you must copy the corresponding *.cfg* files to the *Softek TDMF Block* installation directory on the secondary system, and rename them from *p###.cfg* to *s###.cfg* ("p" for primary, and "s" for secondary).

For example, the configuration file:

> *primary_install_dir***p001.cfg**

is copied and renamed to:

> *secondary_install_dir***s001.cfg**

Storing the configuration files in the installation directory on each system allows the systems to operate as both primary and secondary without conflict. For more information on advanced configuration options, see *Complex Configurations* on page 57.

Launching the PMD

After you have defined and started your logical groups, and distributed the configuration files to the secondary systems, you can launch the PMD. The PMD must be launched before Softek TDMF can begin mirroring data.

1. Open a command window, and change to the *Softek TDMF Block* installation directory.

2. Run the **tdmflaunchpmd** command using the -**a** or the -**g** option to launch the PMD for all logical groups or for specific groups (see *tdmflaunchpmd* on page 76).

3. Run the **tdmfinfo** command using the -**a** or the -**g** option to verify that the mirrored partitions are running in PASSTHRU mode, which is the default operating mode upon installation (see *tdmfinfo* on page 73).

4. Create an initial mirror as described in the following section.

Creating the Initial Mirror

You are now ready to synchronize the primary and secondary systems to create an initial mirror of the data.

To create the initial mirror, enter the following command at the prompt:

tdmflaunchrefresh -g *group#* **-f**

Every data block on the primary system is transferred to the secondary system, synchronizing both. If either system halts during the refresh operation, the process restarts when the system is rebooted.

☞ **NOTE:**

You can start using the local partitions for active I/O while the refresh synchronization is taking place without worrying about data integrity issues. However, the data on the mirror partitions is in an incoherent, non-usable state until the refresh operation completes.

You can monitor the progress of the refresh with the **tdmfinfo** command, Monitor Tool, or the Windows NT or Windows 2000 Performance Monitor. (For more information, see *Monitoring Softek TDMF* on page 25.)

Once the refresh operation is complete, Softek TDMF goes to NORMAL mode and assumes normal operations.

■   ■

3

Administration

Monitoring Softek TDMF

You can use three different monitoring tools to monitor your system while Softek TDMF is running. You can use the Windows NT or Windows 2000 Performance Monitor, as well as two utilities that are provided with Softek TDMF: Monitor Tool and the **tdmfinfo** command.

☞ **NOTE:**

Run these tools on the primary system.

Windows NT Performance Monitor

You can use the Windows NT Performance Monitor on the primary system to graphically portray the status of various Softek TDMF activities, and the effect they have on your system.

To add Softek TDMF items to the Performance Monitor:

1. Open Windows NT Performance Monitor.

2. Select Edit>Add to Chart (or click the [+] button). The **Add To Chart** dialog box is displayed.

Figure 3.9: Selecting Items for Monitoring
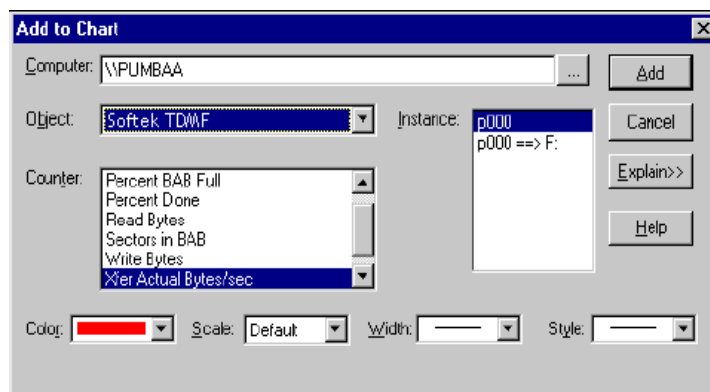
3. Select **Softek TDMF** in the **Object** list.

    The Softek TDMF items that you can monitor are displayed in the **Counter** list. Logical groups and their corresponding partitions are displayed in the **Instance** list.

4. Select the **Counter** and the **Instance** you want to monitor, and click **Add**. Repeat this step for each item you want to monitor.

    To see a counter description, select the counter in the list, then click **Explain**>>.

5. When you have finished selecting items to monitor, click **Done**.

Windows 2000 Performance Monitor

To add Softek TDMF items to the Performance Monitor:

1. Open the Windows 2000 Performance Monitor.

2. Select Console Root>System Monitor. A monitoring chart now appears on the right of the window.

Figure 3.10: Windows 2000 Performance Window
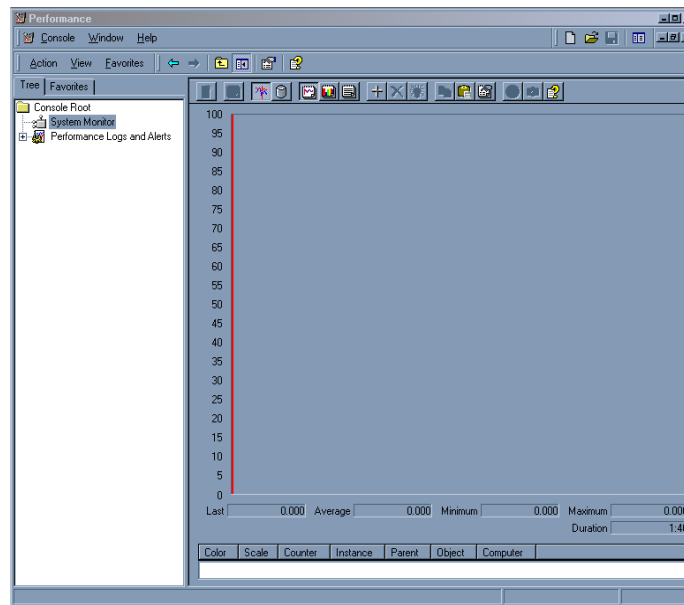
3. Right click the chart and select **Add Counters**. The **Add Counters** dialog box is displayed.

Figure 3.11: Add Counters Dialog Box
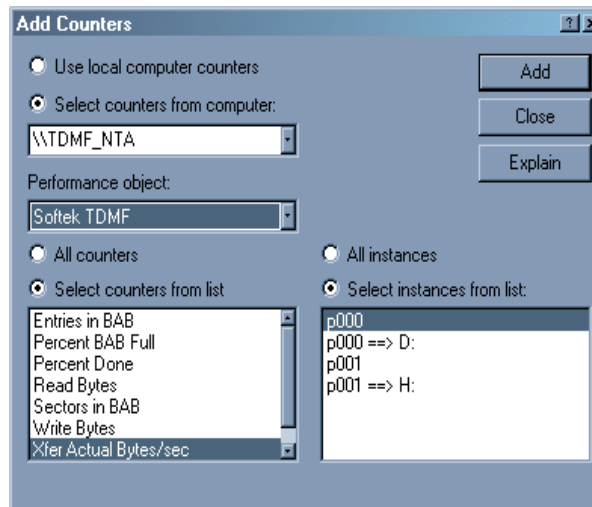
4. Select **Softek TDMF** in the **Performance object** list.

   The Softek TDMF items that you can monitor are displayed in **Counters** list. Logical groups and their corresponding partitions are displayed in the **Instances** list.

5. Select the **Counter(s)** and **Instance(s)** you want to monitor, and click **Add**.

   To see a counter description, select the counter in the list then click **Explain**.

6. Repeat steps 3, 4, and 5 for each item you want to monitor.

Monitor Tool

Monitor Tool provides a comprehensive picture of Softek TDMF activity and state information. It should only be run on the primary system.

To start Monitor Tool, on the primary system, select Start>Programs> Softek_tdmf>MonitorTool. (You can also open Monitor Tool using the **tdmfmonitortool** command.)

Monitor Tool displays status and error messages, warnings from the monitored primary system and all secondary systems associated with the primary, and the status of logical groups and partitions.

Error and Warning Messages

Error messages and warnings are displayed in the upper portion of Monitor Tool. This scrolling list can contain up to 200 messages. The messages and warnings are listed from newest (at the top of the list) to oldest (at the bottom of the list). Each update cycle obtains new error or warning messages from the primary system and secondary systems associated with it. Each message shows the date and time that the message was generated and the system name (or IP address) from which it originated.

Device Information

Device information is displayed in the lower portion of Monitor Tool. The information is described as follows:

Group / Device

The logical group number and the drive letter of the local partition defined for that device.

Connection

The status of the PMD and RMD. Values can include:

CONNECTED - Box is green. The logical group's PMD and RMD are connected and active, and will transfer any entries in the BAB.

ACCUMULATE - Box is red. The logical group's PMD and RMD are not present. Changes made to the local partition are accumulating in the BAB.

NOT CONNECTED- Box is yellow. The logical group's PMD is active and attempting to create a connection with the RMD on the secondary system. Changes made to the local partition are accumulating in the BAB.

Mode / % Done

Indicates the current operating mode and the percent done.

Read Kbps

The rate at which data is being read from the BAB.

Write Kbps

The rate at which data is being written to the mirror partition.

Actual Net

The actual rate of data flow (amount of data flow without compression) over the network.

Effective Net

The effective data rate (amount of data flow with compression and smart refresh taken into consideration).

Entries

The number of entries in the BAB.

% In BAB

The percentage of BAB being consumed by the entries. If the percentage is between 1 and 50, the box is green. If the percentage is between 51 and 80, the box is yellow. If 80 or more percent of the BAB is in use, the box is red.

The tdmfinfo Command

The **tdmfinfo** command generates an ASCII report for one or more local partitions from the perspective of the device driver (Softek TDMF Block) and the BAB. It should only be run on the primary system.

The command output indicates if the driver has been placed in a special mode—for example: PASSTHRU or REFRESH mode. It also shows many performance metrics specific to the BAB, and indicates whether checkpoint is on or off.

For information about the command options, see *tdmfinfo* on page 73.

Figure 3.12: tdmfinfo Command Output

Setting up the Event Viewer

Softek TDMF uses the Windows NT (or Windows 2000) Event Viewer on both primary and secondary systems to log system events. You can set up the Event Viewer to overwrite events as needed to keep the viewer from filling up and ceasing to log events.

To set up the Event Viewer to overwrite events as needed, do the following on both primary and secondary systems.

In Windows NT

1. Select Start>Programs>Administrative Tools>Event Viewer.

2. In the Event Viewer window, select Log>Log Settings. The Event Log Settings dialog box is displayed.

Figure 3.13: Event Log Settings In Windows NT
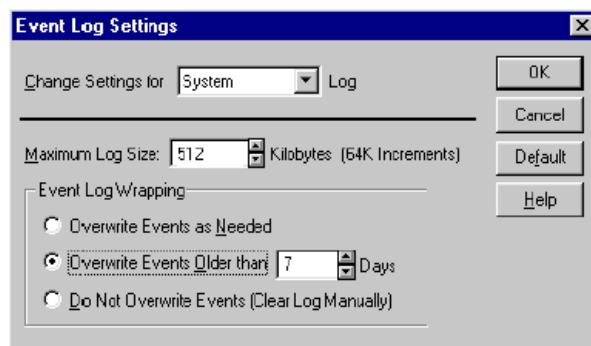
3. Select **Overwrite Events as Needed**.

4. Click **OK**.

In Windows 2000

1. Select Start>Control Panel>Administrative Tools>Event Viewer

2. In the Event Viewer window, right click **Event Viewer**(**Local**)>**System Log**. Then select **Properties**. The **System Log Properties** dialog box is displayed.

Figure 3.14: Event Log Settings In Windows 2000
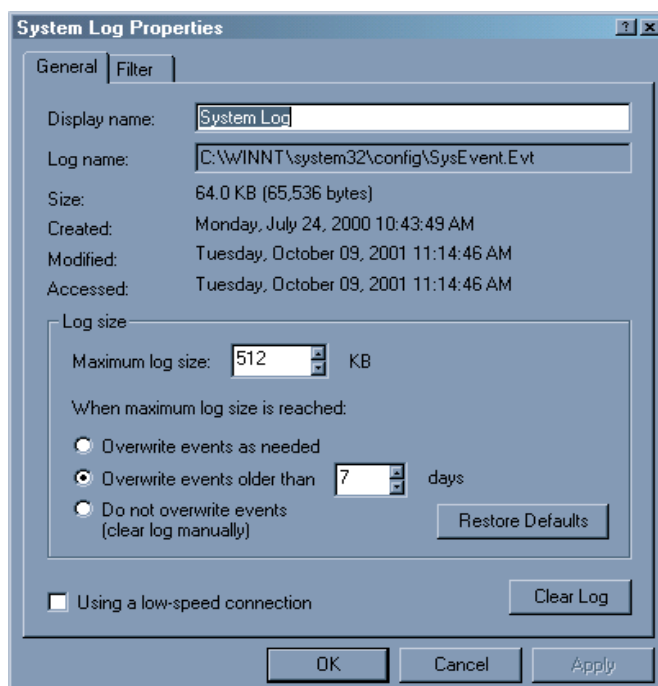
3. Select **Overwrite Events as Needed**.

4. Click **OK**.

Setting Tunable Parameters

You can set tunable parameter values using Configuration Tool or the **tdmfset** command. (For parameter names, descriptions, and default values, see *Tunable Parameter Descriptions* on page 33).

Setting tunable parameters is an optional task. If you do not change the parameter settings, the default settings are used.

Using Configuration Tool

To set tunable parameters using Configuration Tool:

1. On the primary system, start Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

Figure 3.15: Configuration Tool
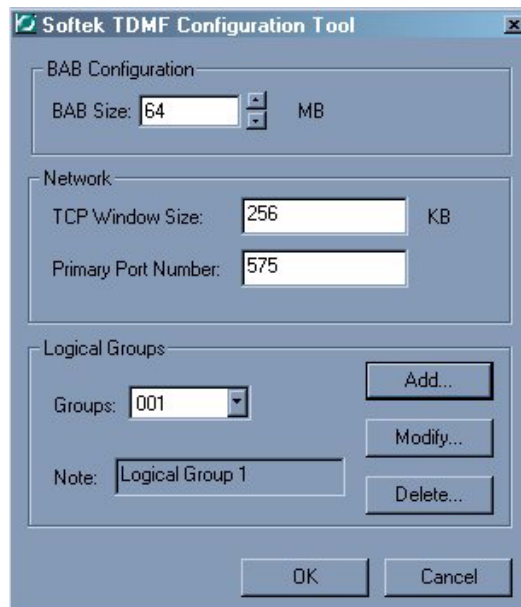
2. In the **Groups** list, select the logical group for which you are setting parameters, and click **Modify**.
   The **Softek TDMF Block Configuration Tool** dialog box appears.

3. Select the **Tunable Parameters** tab.

Figure 3.16: Setting Tunable Parameters
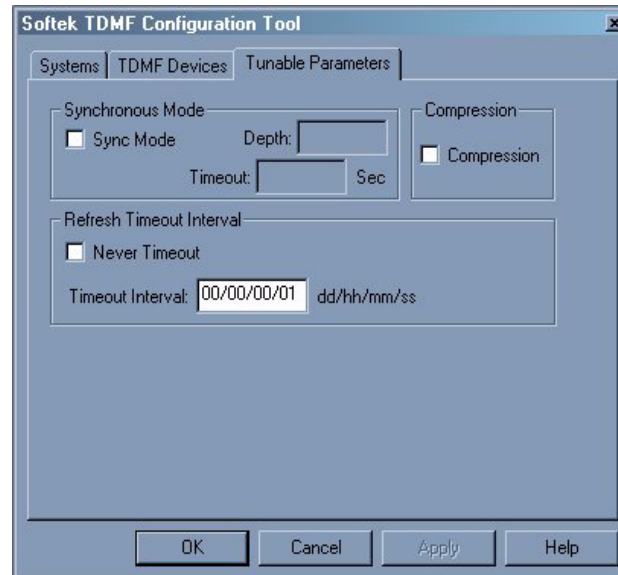
4. Set the parameters as desired.

5. Click **OK**.

6. If this is a new logical group or an existing one that is not running, you see the message, "Would you like to start the logical group?" Click **Yes**.

   This message is not displayed if the group for which you are setting tunable parameters is already running.

7. If you need to launch the PMD, follow the instructions provided in *Launching the PMD* on page 21.

Using tdmfset

To set tunable parameters using the **tdmfset** command:

1. Open a command window and change to the *Softek TDMF Block* installation directory.

2. If logical groups have not been started, use the **tdmfstart** command to start them (see *tdmfstart* on page 80).

3. Enter the following command:

   tdmfset -g *group# parameter_name=value*

   The parameter value becomes effective immediately.

☞ **NOTE**:
The parameter name is case sensitive.

Tunable Parameter Descriptions

The following table lists and describes the tunable parameters.

Tunable Parameter Descriptions

Parameter	Default	Description
CHUNKSIZE=kbytes	256K	The number of kilobytes that the PMD reads from the BAB at a time and sends to the RMD. This parameter can help optimize disk access while Softek TDMF is performing a refresh. You must set this parameter using **tdmfset**. **Important: An I/O operation that reads or writes an amount of data greater than the CHUNKSIZE value may cause the BAB to overflow.**
COMPRESSION=0|1	0 (off)	Turns data compression on or off. By default, data is sent across the network in its original, uncompressed state. When this parameter is enabled, data is compressed before being transferred, then decompressed before being written to the journal or mirror partition on the secondary system.
REFRESHTIMEOUT= *seconds*	1	The number of seconds a refresh operation will attempt to complete. The default setting is 1, which causes Softek TDMF to stop when the BAB overflows. If set to -1, the refresh will continue to try forever.
SYNCMODE=Y|N	N (off)	Determines whether the local partition in a logical group requires a synchronous and acknowledged update from the mirror partition with each I/O update to the local partition. When enabled, SYNCMODE ensures that all data on both local and mirror partitions are synchronized at all times. However, this parameter negatively affects application performance on the primary system due to the round-trip network time required for each I/O.
SYNCMODEDEPTH=*n*	1	The number of I/Os that can accumulate in the BAB before the Synchronous Mode is triggered. If this parameter is set to 1 and SYNCMODE is set to Y, local partitions in the logical group are in full Synchronous Mode.
SYNCMODETIME- OUT=seconds	30	The number of seconds the device driver (Softek TDMF Block) waits for a Synchronous Mode update to complete before returning control to the application. This parameter keeps the application from freezing up if the network suddenly becomes busy.

Working with Logical Groups

A logical group is a defined correlation between local and mirror partitions. It specifies the partitions on the primary system (local partitions) that will be mirrored, and the partitions on the secondary system (mirror partitions) that will be used to mirror them.

Defining New Logical Groups

To define a new logical group:

1. On the primary system, start Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

2. Under **Logical Groups**, click **Add**. The Add Group dialog box is displayed.

Figure 3.17: Adding a logical group
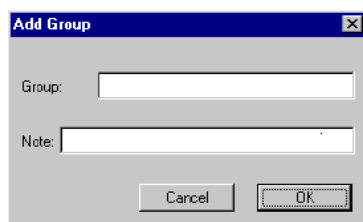
3. Type the group number, 333 for example. Group numbers can range from 0 to 999.

4. Type a note pertaining to the group if desired.

5. Click **OK**.

The **Systems** tab is displayed.

Figure 3.18: Defining primary and secondary systems

6. In the **Primary System** area:

   a. In the **IP Address** box, the primary system's IP address is supplied automatically. The IP address can be determined using a Host Name. To do this, simply click the **Host Name** button

   If you want to configure a local loopback configuration (that is, a configuration in which the same machine acts as both primary and secondary), specify 127.0.0.1 for both primary and secondary systems.

☞ **NOTE:**
The primary and secondary systems must each have at least one static IP address to work with Softek TDMF. Use each system's static IP address in the configuration.

   b. In the **Persistent Store Device** list, select the drive letter of the Persistent Store (pstore) partition. This list contains all raw partitions on the local system. If no partitions are shown, the pstore partition has either been formatted or was never created. In this case, you must create a raw (unformatted) partition and assign it a drive letter.

☞ **NOTE:**
You must use the same pstore partition for every logical group that you define.

7. In the **Secondary System** area:

   a. In the **IP Address** box, specify the secondary system's IP address. The IP address can be determined using a Host Name. To do this, simply click the **Host Name** button

   b. In the **Journal Directory** box, specify the directory on the secondary system where journal files will be written; for example, **f:\jrn**. The journal directory cannot be on a replicated partition, and the journal directory's partition must be formatted as NTFS.

   c. The **Secondary Port** box contains 575, the default TCP/IP port number on the secondary system. You can change this number if needed.

   d. Select **Chaining** if you have a complex configuration and want the second primary partition to be both readable and writable. (For more information, see *Chaining* on page 64.)

8. Type a note pertaining to the systems if desired.

9. Select the **TDMF Devices** tab.

Figure 3.19: Defining Local and Mirror Partitions
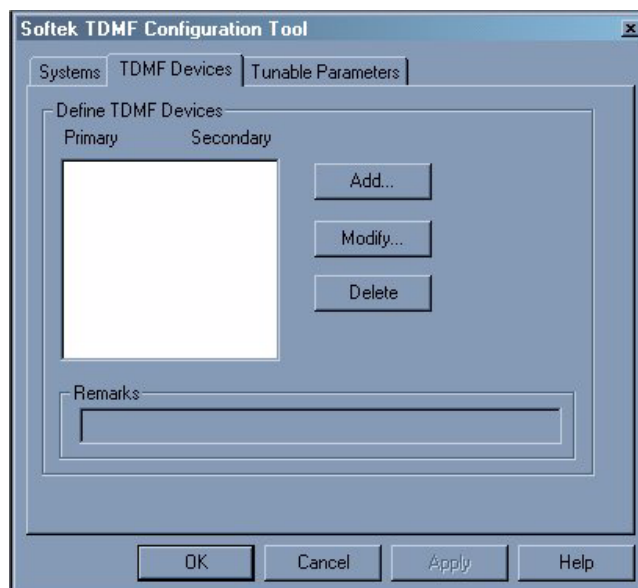
10. Add local/mirror partition pairs as described in *Adding Local/Mirror Pairs* on page 39.

11. When you have finished, click **OK**.

12. You see the message, "Would you like to start the logical group?" Click **Yes**.

13. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

14. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmflaunchrefresh -g *group#* **-f**

Modifying Logical Groups

To modify a logical group:

1. On the primary system, start Configuration Tool (select Start>Programs> Softek_tdmf>ConfigTool).

2. In the **Groups** list, select the logical group you are modifying.

3. Click **Modify**. The **Systems** tab is displayed.

Figure 3.20: Modifying Systems Information

4. Modify the information in the **Systems** and **TDMF Devices** tabs as needed. (See *Working with Local/Mirror Partition Pairs* on page 39 for information on modifying information in the **TDMF Devices** tab.)

5. When you have finished making changes, click **OK**.

6. If the logical group is NOT running, you see the message, "`Would you like to start the logical group?`" Click **Yes**, then do the following:

    a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cf*g.

    b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmflaunchrefresh -g *group#* **-f**

    Otherwise, if the logical group is already running (no message was displayed), do the following:

    a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cf*g.

    b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmfkillpmd -g *group#*

c. Close any applications accessing the local partitions in the logical group.

d. Enter the commands:

tdmfstop -g *group#*

tdmfstart -g *group#*

tdmflaunchrefresh -g *group#* **-f**

e. Restart the applications.

Deleting Logical Groups

To delete a logical group:

1. Open a command window, and change to the *Softek TDMF Block* installation directory.

2. At the prompt, enter the following commands:

tdmfkillpmd -g *group#*

tdmfstop -g *group#*

3. Open Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

4. In the **Groups** list, select the group you want to delete.

5. Click **Delete**.

Working with Local/Mirror Partition Pairs

☞ **NOTE:**
The size of a mirror partition must be equal to or greater than that of the local partition to which it is paired. If the mirror partition is larger than the local partition, the extra space is not used.

This section describes how to add, modify, and delete an existing logical group's local/mirror partition pairs. The following sections are provided:

Adding Local/Mirror Pairs

To add a local/mirror partition pair to a logical group:

1. On the primary system, start Configuration Tool (select Start>Programs> Softek_tdmf>ConfigTool).

2. In the **Groups** list, select the logical group for which you are adding a local/ mirror pair.

3. Click **Modify**.

4. Select the **TDMF Devices** tab.

Figure 3.21: Adding a local/mirror pair
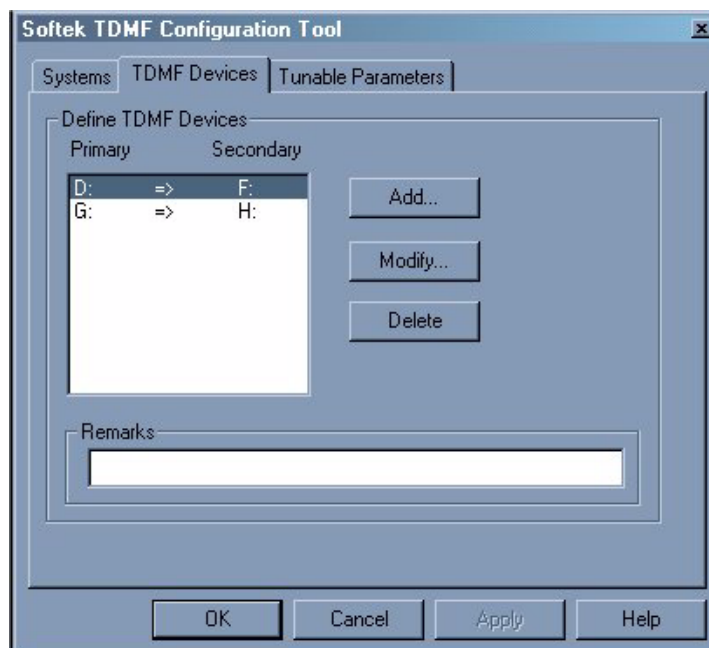
5. Click **Add**. The Add/Modify Mirrors dialog box is displayed.

Figure 3.22: Add/Modify Mirrors
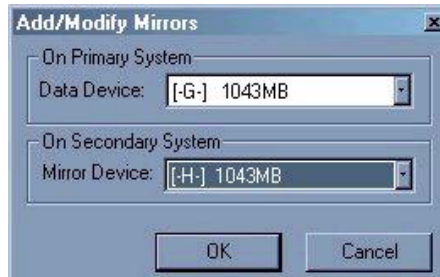
☞ **NOTE:**

As described in the *Installation Guide*, local and mirror partitions must be formatted as NTFS. Furthermore, Softek TDMF does not support the mirroring on the system drive or of any partition that is currently using a paging file *(pagefile.sys)*.

Do the following:

    a.   In the **Data Device** list, select the drive letter of the partition on the primary system that you want to mirror.

    b.   In the **Mirror Device** list, select the drive letter of the partition on the secondary system that will be used to mirror the local partition.

    c.   Click **OK**.

6.   Click **OK** on the **TDMF Devices** tab to apply your changes.

7.   If the logical group is NOT running, you see the message, "Would you like to start the logical group?" Click **Yes**, then do the following:

    a.   Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

    b.   Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:
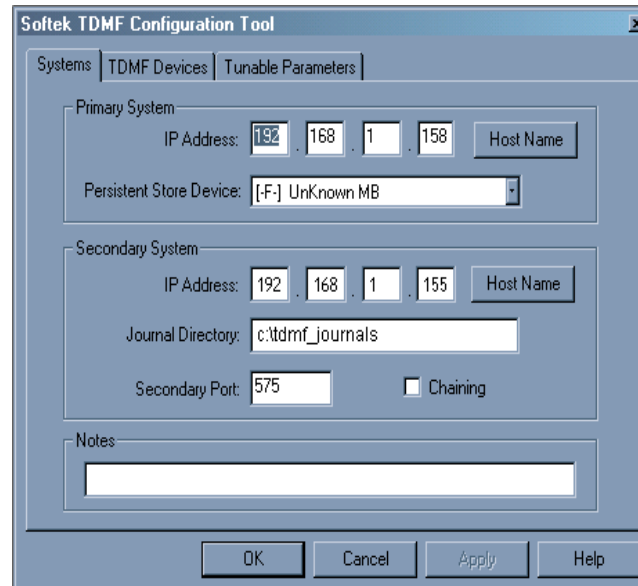
    tdmflaunchrefresh -g *group#* **-f**

Otherwise, if the logical group is already running (no message was displayed), do the following:

    a.   Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

    b.   Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmfkillpmd -g *group#*

c. Close any applications accessing the local partitions in the logical group.

d. Enter the commands:

tdmfstop -g *group#*

tdmfstart -g *group#*

tdmflaunchrefresh -g *group#* **-f**

e. Restart the applications.

Modifying Local/Mirror Pairs

You can modify local/mirror partition pairs while Softek TDMF is running. To modify a local/mirror pair:

1. On the primary system, start Configuration Tool (select Start>Programs> Softek_tdmf>ConfigTool).

2. In the **Groups** list, select the logical group for which you are modifying the local/ mirror pair.

3. Click **Modify**.

4. Select the **TDMF Devices** tab.

Figure 3.23: Modifying a local/mirror pair 1
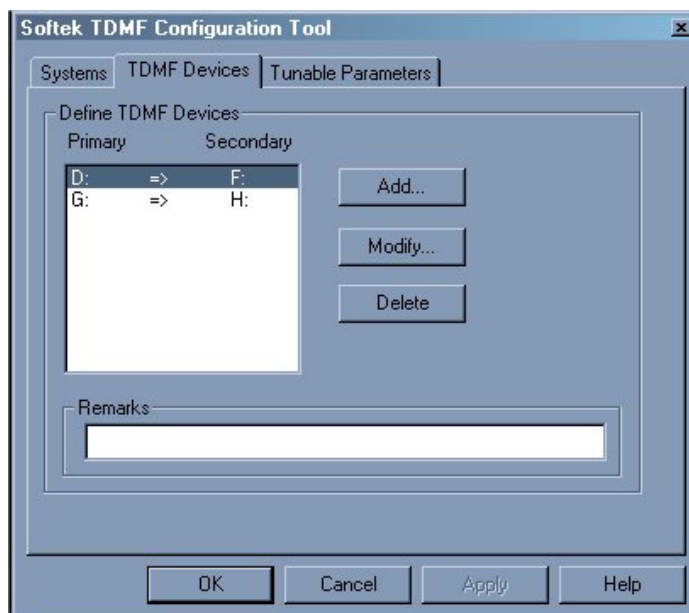
5. Select the pair you want to modify.

6. Click **Modify**. The Add/Modify Mirrors dialog box is displayed.

Figure 3.24: Modifying a local/mirror pair 2
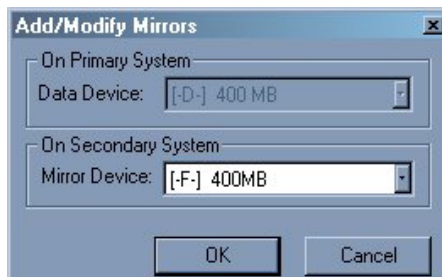
Note that you can only modify the mirror device. If you want to modify the data device, you must delete this local/mirror pair and define a new one.

7. In the **Mirror Device** list, select the new drive letter of the partition on the secondary system that will be used to mirror the local partition, then click **OK**.

8. Click **OK** on the **TDMF Devices** tab to apply your changes.

9. If the logical group is NOT running, you see the message, "Would you like to start the logical group?" Click **Yes**, then do the following:

    a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

    b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmflaunchrefresh -g *group#* **-f**

    Otherwise, if the logical group is already running (no message was displayed), do the following:

    a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

    b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

    tdmfkillpmd -g *group#*

    c. Close any applications accessing the local partitions in the logical group.

    d. Enter the commands:

    tdmfstop -g *group#*

    tdmfstart -g *group#*

    tdmflaunchrefresh -g *group#* **-f**

    e. Restart the applications.

Deleting Local/Mirror Pairs

To delete a local/mirror partition pair:

1. On the primary system, start Configuration Tool (select Start>Programs> Softek_tdmf>ConfigTool).

2. In the **Groups** list, select the logical group for which you are deleting the local/ mirror pair.

3. Click **Modify**.

4. Select the **TDMF Devices** tab.

Figure 3.25: Deleting a local/mirror pair
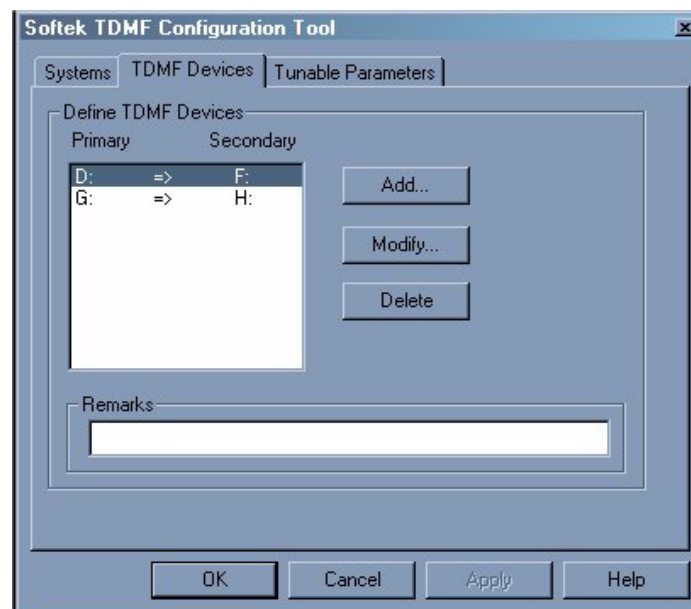
5. Select the local/mirror pair that you want to delete.

6. Click **Delet**e.

7. Click **OK**.

8. If the logical group is NOT running, you see the message, "Would you like to start the logical group?" Click **Yes**, then do the following:

   a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

   b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

   tdmflaunchrefresh -g *group#* **-f**

Otherwise, if the logical group is already running (no message was displayed), do the following:

a. Copy the logical group's configuration file to the secondary system and rename it from *p###.cfg* to *s###.cfg*.

b. Open a command window, change to the *Softek TDMF Block* installation directory, and enter the following command at the prompt:

   tdmfkillpmd -g *group#*

c. Close any applications accessing the local partitions in the logical group.

d. Enter the commands:

   tdmfstop -g *group#*

   tdmfstart -g *group#*

   tdmflaunchrefresh -g *group#* **-f**

e. Restart the applications.

Using the Checkpoint Feature

The checkpoint feature allows you to perform backups and data mining on the secondary system. A checkpoint is a snapshot of data on the primary system at a coherent point in time, and it ensures that the data on the mirror partition is in a known, usable state.

When checkpoint is on, Softek TDMF takes a snapshot of the data and allows other applications to access the snapshot in read/write mode. All transactions targeted at the mirror partitions are written to the journal on the secondary system. When checkpoint is turned off, the accumulated transactions in the journal are applied to the mirror partitions, bringing them up to date with the local partitions.

☞ **NOTE:**
After a checkpoint operation, use the **tdmflaunchrefresh -c** command to perform a checksum refresh to ensure that the primary and secondary systems are synchronized.

Creating Checkpoint Batch Files

Before you turn checkpoint on, you must close all applications on the primary system that are accessing the partitions you plan to checkpoint. When the checkpoint operation has completed, you can restart applications on the primary system, and start then shut down applications on the secondary one. You can automate this process by creating four specific batch files for each logical group: two files on the primary system, and two on the secondary system.

The following section provides an overview of what happens when you use checkpoint batch files to automate the checkpoint operation. The two sections provide example batch files: *Primary System Batch Files* on page 45 and *Secondary System Batch File* on page 46.

Checkpoint Batch File Functional Overview

When you enter the **tdmfcheckpoint** -**on** command:

1. The *cp_pre_on_###.bat* file executes on the primary system, closing the applications that are accessing the drive.

2. The **tdmfcheckpoint** -**on** command executes and begins journal changes, and makes the drive(s) available on the mirrored server.

3. The *cp_post_on_###.bat* file executes on the primary system, restarting the applications or services that were accessing the drive prior to executing the **tdmfcheckpoint** -**on** command.

4. The *cp_post_on_###.bat* file executes on the secondary system, starting applications that you want to run on this system during the checkpoint operation.

When you enter the **tdmfcheckpoint** -**off** command:

1. The *cp_pre_off_###.bat* file executes on the secondary system, freeing up the drives so that the link can be re-established between the primary and secondary systems.

2. The **tdmfcheckpoint** -**off** command executes, processing the journal files and re-establishing mirroring between the primary and secondary systems.

Primary System Batch Files

On the primary system, create two batch files for each logical group using the names *cp_pre_on_###.bat* and *cp_post_on_###.bat* (### is the logical group number). Save the files in the *Softek TDMF Block* installation directory on the primary system.

*   *cp_pre_on_###.bat* executes when the **tdmfcheckpoint** -**on** command has been entered. It prepares the specified logical group(s) for checkpointing, and should contain commands to close the applications that are accessing the checkpointed partitions.

    The following example shows a *cp_pre_on_###.bat* file that shuts down the SQL service:

```
REM Shutdown the SQL service
@Echo Attempting to shut down SQL SERVER.
net stop mssqlserver

REM Kill the SQLMangager process by name
REM Requires the kill command from the Windows NT resource kit.
```

```
@ECHO Stopping the SQL process.
cd \Windows_NT_Resource_Kit_Install_Dir
REM -f to force the kill
kill -f sqlmangr.exe
```

- *cp_post_on_###.bat* executes after the **tdmfcheckpoint** -**on** command has been entered. It is used to start the applications or services that were accessing the drive prior to executing the command.

  The following example shows a *cp_post_on_###.bat* file that re-starts the SQL service on the primary system:

  ```
  REM Start the SQL service back up.
  @ECHO Restarting the SQL Server.
  net start mssqlserver
  @ECHO Starting the SQL Manager.
  start sqlmangr.exe
  ```

Secondary System Batch File

On the secondary system, create two batch files for each logical group using the names *cp_post_on_###.bat* and *cp_pre_off_###.bat* (### is the logical group number). Save the files in the *Softek TDMF Block* installation directory on the secondary system.

- *cp_post_on_###.bat* executes after the **tdmfcheckpoint** -**on** command has been entered. You can put commands in this file to start database applications or to run backup software on the secondary system during the checkpoint operation.

  The following example shows a *cp_post_on_###.bat* file that starts the SQL service on the secondary system.

  ```
  REM Start the SQL service.
  @ECHO Starting the SQL Server.
  net start mssqlserver
  @ECHO Starting the SQL Manager.
  start sqlmangr.exe
  ```

- *cp_pre_off_###.bat* executes when the **tdmfcheckpoint** -**off** command has been entered. You can put commands in this file to stop database applications for report generation or decision support applications, or to terminate applications on the secondary system so that the RMDs can regain control of the mirror partitions.

  The following example shows a *cp_pre_off_###.bat* file that shuts down the SQL service on the secondary system:

  ```
  REM Shutdown the SQL service
  @Echo Attempting to shut down SQL SERVER.
  net stop mssqlserver
  REM Kill the SQLManager process by name
  ```

```
REM Requires the kill command from the Windows NT resource
kit.
@ECHO Stopping the SQL process.
cd \Windows_NT_Resource_Kit_Install_Dir
REM -f to force the kill
kill -f sqlmangr.exe
```

Turning Checkpoint On

To turn checkpoint on:

1. Close all applications accessing the partitions to be checkpointed. (This function can be automated using the *cp_pre_on_###.bat* file on the primary system.)

2. On either the primary or the secondary system, enter the following command (for other options, see *tdmfcheckpoint* on page 71):

    tdmfcheckpoint -g *group#* **-on**

Applications are restarted on the primary system, and all subsequent updates on the primary are now written to the journal on the secondary system. The mirror partitions can also be accessed by applications in read/write mode.

Turning Checkpoint Off

To turn checkpoint off:

1. On either the primary or secondary system, enter:

    tdmfcheckpoint -g *group#* **-off**

    The journal entries that have been accumulating on the secondary system are now applied to the mirror partitions.

2. On the primary system, enter **tdmflaunchrefresh** -c.

☞ **NOTE:**
A mirror partition is in an incoherent but recoverable state while the journal entries are being applied.

Considerations and Limitations

- Checkpoint operations are not immediate. When the amount of data in the BAB awaiting transfer is large, there may be a noticeable delay before checkpoint takes effect.

- A checkpoint operation is cancelled if a failure occurs on the primary system or the **tdmfstop** command is used to stop a logical group.

- Checkpointing can be turned on and off only if the affected logical groups are in NORMAL mode.

- Softek TDMF examines the secondary journal area for the logical group to determine whether the secondary system is in a checkpoint state. The presence of any files with a .p file extension indicates that checkpoint is active.

- If an application modifies the mirror partitions while in checkpoint mode, a checksum or full refresh is required.

Running Softek TDMF Commands from Both Systems

Many of the Softek TDMF commands must be run on the primary system; a few must be run on the secondary. If your primary and secondary systems are in different locations (for example, in different buildings), you may want to consider installing the Windows NT 4 or Windows 2000 Resource Kit, which will allow you to run any Softek TDMF command from either system.

This section provides instructions for installing the Resource Kit, and an example batch file that can be run on the secondary system after installation to execute a number of Softek TDMF commands.

☞ **NOTE:**
See the Windows NT 4 or Windows 2000 Resource Kit documentation for more detailed information about installing the kit and executing commands remotely.

Installing the Windows NT or Windows 2000 Resource Kit

To install the Windows NT or Windows 2000 Resource Kit, do the following:

1. On both primary and secondary systems, install the Windows NT 4 or Windows 2000 Resource Kit with addendum 4.

2. On both systems, install "Remote Console Server" using the **rsetup** command in the Windows NT or Windows 2000 Resource Kit installation directory.

3. On the primary system, install Remote Command Server.

4. On the primary system, add the Softek TDMF Block installation path to the Path variable (this is done through the **Environment** tab in System Properties).

5. Reboot both systems.

After installing the Windows NT 4 or Windows 2000 Resource Kit, you can run commands remotely from a command window, or you can execute commands through batch files, such as the one shown in the following example.

Batch File Example

The following batch file is run on the secondary system to execute a number of commands on the primary system. The file stops the MS SQL services and the SQL Manager process on the primary system, starts the group specified as an argument to the batch file, runs **tdmflaunchrefresh** **-g** *group#* **-f** to fully mirror the drives, and then restarts the MS SQL Server.

```
REM Check for a parameter.
Echo Off
If "%1"=="" GOTO ERROR

REM Shutdown the SQL Server
@Echo Attempting to shut down the SQL Server.
netsvc mssqlserver \\Primary /stop

REM Kill the SQL Manager process by name
REM This requires the KILL command from the NT 4.0 (or 2000)
resource kit.
@Echo Stopping the SQL process.

REM Installs the rkill service on the other server (if not there).
@ECHO Killing the SQL Manager.
rkill /install \\Primary
REM Do the kill
rkill /nkill \\Primary sqlmangr.exe

REM Run this line if you want to uninstall the rkill service
on the other server.
REM rkill /deinstall \\servername

REM Start Softek TDMF for the group
@Echo Starting the group.
REM Make sure the service is running on the Primary.
netsvc RemoteCMD \\Primary /start
Rcmd \\Primary tdmfstart.exe %1
@Echo Running a full backfresh
Rcmd \\Primary tdmflaunchrefresh %1 -f

REM Start the SQL Server back up.
```

```
@Echo Attempting to Start SQL Server.
netsvc mssqlserver \\Primary /start
Rcmd \\Primary sqlmangr.exe /n

@Echo SQL Sever started successfully
cd c:\program files\Softek_tdmf
GOTO END

:ERROR
@Echo You forgot to enter a parameter for the group number
@Echo Please try again.
GOTO END
:END
```

Re-synchronizing the Primary and Secondary Systems

Systems in the Softek TDMF configuration may get out of sync—that is, the data on a secondary system ceases to match data on the primary system. When this happens, you must manually synchronize the systems or perform a refresh process.

Systems in a Softek TDMF configuration may lose synchronization when the following occur:

- The BAB overflows on the primary system, placing the primary system into TRACKING mode.

- Manual operations are performed, such as:

    - Using the **tdmfoverride -g** *group#* - **state passthru** command;

    - Modifying the mirror partition contents;

    - Modifying local partitions without going through the device interface.

Loss of Synchronization when the BAB Overflows

If the loss of synchronization was caused by a BAB overflow and the primary system has continued to operate as primary, you can synchronize the systems by using the REFRESH mode. Make sure the network connection is up, and enter the following command:

tdmflaunchrefresh -g *group#*

Loss of Synchronization when Manual Operations are Performed

☞ **NOTE:**

If changes were made to the local partitions without going through Configuration Tool (for example, if you removed Softek TDMF or the device driver (Softek TDMF Block) on the primary system and continued to access the local partitions), you must perform a *full refresh* with **tdmflaunchrefresh -f** to synchronize the systems.

If loss of synchronization was caused by changes to data on the mirror partition, and these changes are considered to be more relevant than data on the local partition, you can run the **tdmflaunchbackfresh** command on the primary system to synchronize the systems. This method moves blocks that have changed on the mirror partitions back to the local partitions.

☞ **NOTE:**

The **tdmflaunchbackfresh** command must be run on the primary system.

To perform a backrefresh operation:

1. On the secondary system, enter:

    tdmfreco -g *group#* **-d**

    This command deactivates recovery mode and gives exclusive control of the mirror partition back to Softek TDMF (see *tdmfreco* on page 79).

2. On the primary system, run the **tdmflaunchbackfresh** command to place logical groups in BACKFRESH mode (see *tdmflaunchbackfresh* on page 76).

    The **tdmflaunchbackfresh** command is the recommended method for starting a backfresh. It confirms the availability of local partitions for exclusive use before moving into BACKFRESH mode. All backfresh operations are smart, meaning that only blocks that have been updated are transferred back to the primary system.

    When the backfresh operation is complete, the primary system goes into NORMAL mode. Once the applications are started on the local partitions, updates are effectively mirrored to the secondary system again.

☞ **NOTE:**

Backfresh is a maintenance-mode-only operation. Applications that are external to Softek TDMF cannot access local or mirror partitions until the backfresh process is complete.

Working with the pstore

The pstore is a raw partition on the primary system that stores state information and tunable parameter definitions.

Re-initializing the pstore

You may need to re-initialize the pstore if it is has become corrupt or if you want to reclaim space that it is currently using.

To re-initialize the pstore:

1. Close any applications accessing the local partitions in the logical groups affected by the pstore.

2. Open a command window and change to the *Softek TDMF Block* installation directory.

3. At the prompt, enter the following commands for each group:

   tdmfkillpmd -g *group#*

   tdmfstop -g *group#*

4. Open Disk Administrator and do the following:

   a. Format the pstore partition as FAT.

   b. Delete the partition.

   c. Commit changes.

   d. Recreate the partition, and re-assign it the old drive letter.

   e. Save your changes.

5. Enter the following commands for each logical group affected by the re-initialization.

   tdmfstart -g *group#*

   tdmflaunchpmd -g *group#*

6. Restart the applications.

Relocating the pstore

You can relocate the pstore if needed. You can do this by editing the appropriate *.cfg* file(s), or you can use the following procedure.

To relocate the pstore partition:

1. Close any applications accessing the local partitions in the affected logical groups.

2. Open a command window and change to the *Softek TDMF Block* installation directory.

3. At the prompt, enter the following commands for each group affected by the pstore relocation:

     tdmfkillpmd -g *group#*

     tdmfstop -g *group#*

4. Open Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

5. In the **Groups** list, select the logical group for which you are relocating the pstore.

6. Click **Modify**.

7. In the **Systems** tab, select a new drive letter from the **Persistent Store Device** list.

8. Click **OK**.

9. Enter the following commands for each logical group affected by the relocation.

     tdmfstart -g *group#*

     tdmflaunchpmd -g *group#*

10. Restart the applications.

Resizing the BAB

If the BAB routinely overflows, you may want to resize it.

To resize the BAB:

1. On the primary system, close any applications accessing the local partitions.

2. If the PMD is running, enter:

     tdmfkillpmd -a

3. Stop all logical groups by entering:

     tdmfstop -a

4. Open Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

5. In the **BAB Size** list, use the arrows to change the BAB size. By default, the BAB size is set to 64 megabytes of memory. Its size cannot exceed 192 megabytes.

6. Click **OK**.

7. Reboot the system.

Disaster Recovery

This section provides disaster recovery procedures that you can follow in case either the primary or the secondary system becomes unavailable.

Recovering on the Primary System

If the secondary system or the network becomes unavailable for a prolonged period of time, you can recover your data on the primary system.

Use either of the following methods:

- Go to TRACKING mode. When the secondary system comes back into service, enter **tdmflaunchrefresh -a** to perform a smart refresh to synchronize the systems.

- Create a new secondary system and network connection to receive the mirrored data as follows:

1. Open Configuration Tool (select Start>Programs>Softek_tdmf>ConfigTool).

2. Set up a new secondary system using the instructions provided in *Defining Logical Groups* on page 16.

3. On the secondary system, open a command window and change to the *Softek TDMF Block* installation directory.

4. At the prompt, enter the following commands:

    tdmfstop -a

    tdmfstart -a

5. Follow the instructions in *Creating the Initial Mirror* on page 22 to synchronize the new secondary system with the primary one.

Recovering on the Secondary System

If a failure occurs on the primary system, data can be accessed from the secondary system. Do the following:

1. On the secondary system, open a command window and change to the *Softek TDMF Block* installation directory.

2. At the prompt, enter **tdmfkillrmd -a** to stop the remote mirroring service threads.

3. Enter **tdmfreco -a** to commit any buffered updates to the mirror partitions.

4. Start application(s) on the secondary system.

☞ **NOTE:**

Using the **tdmfreco** command is an essential step since it assures data integrity on the mirror partitions, and relinquishes the exclusive hold that Softek TDMF has on them.

What to do After a Recovery

Assume that you had a disaster and relocated operations to a secondary system using the mirrored data. Now your environment is back in order, and you want to move operations back to the primary system.

To synchronize the primary system with the more recent data on the mirror partitions:

1. Close any applications updating the mirror partitions on the secondary system.

2. On the secondary system, reactivate mirroring by entering:

   tdmfreco -g *group#* **-d**

3. On the primary system, enter:

   tdmflaunchbackfresh -**a**

   No data can be accessed on the local or mirror partitions until after the backfresh operation has completed.

4. On the secondary system, reactivate mirroring by entering:

   tdmfreco -**d**

Alternately, you can bring the primary system back into synchronization with the more recent data on the secondary system, by switching the primary and secondary systems' roles, and performing a refresh operation from the original secondary system back to the original primary system. One advantage of this approach is that applications can continue to update the data on the original secondary system during the refresh operation. For more information, refer to *Complex Configurations* on page 57.

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4

Complex Configurations

This chapter explains the processes involved with configuring Softek TDMF in environments that are slightly more complex than a single primary to a secondary configuration.

Symmetric Configuration

A symmetric configuration is appropriate for the enterprise in which an automated switchover is desired for load-balancing or other planned events. Two-way mirroring is not achieved in this manner. Rather, data is being mirrored from the primary system (A) to the secondary one (B). The difference is that the secondary is symmetrically configured and ready to assume control of operations if application focus is deliberately moved to the secondary system. After this type of switchover, the secondary system assumes the role of primary, and the previous primary becomes the new secondary.

When creating this type of configuration, it is best to plan out the logical groups and local partitions for both systems prior to initiating the installation. Of course, there is a mirror partition for each local partition on the primary, and each of these mirror partitions should be a local partition on the B system. Basically, this means establishing a BAB and pstore on both systems in a symmetric configuration.

You also want to establish B's mirror partition to be the same as A's local partition. This is so that when a switchover occurs, B is mirroring to the appropriate partition, and the data on both systems remains coherent and up to date. The following figure clarifies the relationship between partitions in a symmetric configuration.

Figure 4.26: Example of a Symmetric configuration
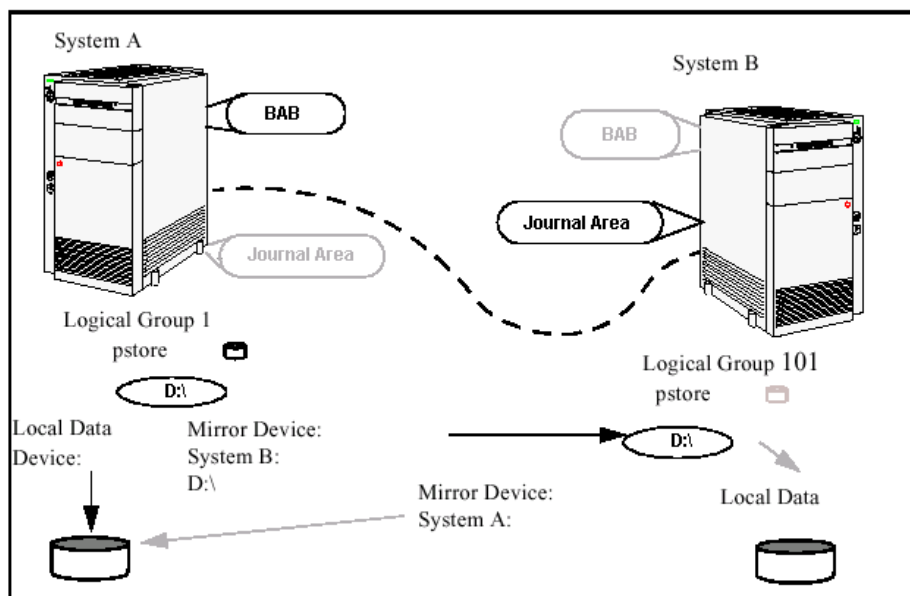
The black arrows indicate A to B mirroring, and the gray arrows indicate B to A mirroring.

On System B

1. Determine the system configuration.

2. Establish the logical group(s) and local partitions for each system. An effective methodology for defining this kind of symmetric configuration is to bias the logical group numbering by 100. An example configuration is illustrated below.

Primary System (A)	**Secondary System (B)**
Logical group 1	Logical Group 101
Local partition D:\	Local partition D:\
Mirror partition D:\ (on B)	Mirror partition D:\ (on A)

3. Run Configuration Tool on system B.

4. Set up the logical group(s).

5. Define a local/mirror partition pair, matching drive D on system B to drive D on system A.

6. Copy the *p101.cfg* file to System A and rename it *s101.cf*g.

7. Enter **tdmfstart** -**g 101** to start the group.

8. Enter **tdmfinfo** -**g 101** to verify that the device is in PASSTHRU mode.

☞ **NOTE:**
The logical group(s) on System B *must* be running in PASSTHRU mode to allow A-to-B mirroring. If the system is in any other mode, enter **tdmfoverride** -**a state passthru**.

---

9. Enter **tdmfkillpmd** -**a** on System B to halt all PMDs.

On System A

1. Open Configuration Tool.

2. Define logical groups and local partitions for the primary system on A as defined in the previous section.

3. Copy the configuration files to System B and rename them.

4. Enter **tdmfstart** -**g 1** on the primary system.
   Softek TDMF is operating in PASSTHRU mode at this point. A refresh operation or a manual operation is required to transition into NORMAL mode.

Running B Stand-alone

1. On System B, enter **tdmfreco** -**g 1**.

☞ **NOTE:**
This step is imperative in preparing the mirror partitions to be accessed as data devices. The **tdmfreco** command flushes all out standing entries to disk and prohibits further mirroring to these partitions.

2. Place Logical Group 101 into TRACKING mode by entering:

   tdmfoverride -**g 101 state tracking**

3. Start applications on System B's local partitions.

☞ **NOTE:**
Placing B into TRACKING mode reduces the length of time required for a refresh operation when A is returned to service.

Inverting the A-B Topology to B-A

On System A

When System A boots, Logical Group 1 (and any other logical group defined on this system) is started in PASSTHRU mode. Enter **tdmfstop** -**a** to stop all logical groups on System A. The -a option inhibits these logical groups from being restarted on System A after each reboot.

On System B

1. On System B, enter **tdmflaunchrefresh** -**a**. If System B was put into TRACKING mode, this refresh transfers only the changed data to System A.

2. Continue running the applications on System B until it is desirable to make System A the primary once again.

☞ **NOTE:**
Applications may continue to update the local partitions in Logical Group 101 during the refresh.

Switching back to A to B

On System B

1. 1. Halt the applications and force all pending updates to disk (for example, with the **tdmfsync** command). Stop applications accessing the local partitions in Logical Group 101.

2. Use Monitor Tool or the Windows NT Performance Monitor to determine when all updates have been mirrored to System A.

3. Enter **tdmfoverride** -**g 101** state passthru.

4. Enter **tdmfreco** -**g 1** -**d** on System B to enable mirroring to the local partitions in Logical Group 101 on System B in an A-B topology.

☞ **NOTE:**

Mirroring to the mirror partitions is prohibited until the **tdmfreco** -**d** command is run. This command option removes the *.off* file placed in the *Softek TDMF Block* installation directory, and allows Softek TDMF exclusive access to the mirror partitions.

On System A

1. Start Logical Group 1 by entering **tdmfstart** -**g 1**.

2. Enter **tdmfoverride** -**g 1 state normal**.

3. Start applications.

One-to-many

A one-to-many configuration allows the mirroring of the same data set to two or more secondary systems. In this configuration, System A can mirror to System B while simultaneously mirroring the same data to system C.

Set up this type of configuration as follows:

1. Plan the partitions to be used on all systems.

2. Open Configuration Tool.

3. Allocate the BAB on the primary (System A).

4. Create Logical Group 0, which specifies A as the primary and B as the secondary.

5. Define the local/mirror partition pair between systems A and B.

6. Copy the *p000.cfg* file from A to B and rename it *s000.cfg*.

7. Start Logical Group 0 on machine A by entering **tdmfstart -g 0**.

8. Use Configuration Tool to create a new Logical Group 1 (with A as the primary and C as the secondary).

9. Define the local/mirror partition pair, using the same local partition you used for Logical Group 0.

10. Copy the *p001.cfg* file from A to C and rename it *s001.cfg*.

11. Enter **tdmfstart -g 1**.

12. On System A, enter **tdmflaunchrefresh -af**.

13. Have applications interact only with local partitions defined in Logical Group 1. This provides mirroring to both B and C.

Chaining

Chaining is a term used to describe a configuration where systems appear to be connected in a sequential manner, such as A, B, and C, where Systems A and C have no connection or awareness of each other.

Set up the B to C component of the chained configuration first.

B to C Setup

1. Open Configuration Tool and define Logical Group 100 (instead of defaulting to Logical Group 0) with System B as primary and System C as secondary.

2. Define local/mirror partition pairs.

3. Copy the configuration file *p100.cfg* from System B to *s100.cfg* on System C.

4. Enter **tdmfstart -g 100** to start Logical Group 100.

5. Enter **tdmfoverride -g 100 state normal** to bypass the refresh operation and place Logical Group 100 into NORMAL mode.

6. Enter **tdmflaunchpmd -g 100** to establish a network connection between systems B and C.

☞ **NOTE:**
Do not let applications interact with the local partitions defined in Logical Group 100 on System B!

A to B Setup

1. Use Configuration Tool to create a configuration for Logical Group 0 that defines System A as the primary system and System B as the secondary system.

2. In the **Secondary** area, select the **Chaining** option to turn chaining on. (The default is off.)

3. Define the local/mirror partition pairs, but, select the mirror partition as defined for Logical Group 100 on System B.

   Repeat these steps for each partition pair in the logical group.

4. Copy the configuration file *p000.cfg* from System A to *s000.cfg* on System B.

5. Enter **tdmfstart -g 0** on System A to start the group.

6. Enter **tdmflaunchrefresh -g 0 -f** on System A.

At this point the chaining topology is active and in effect. To verify this, run Monitor Tool on System B during the refresh operation, to watch the refresh updates from System A arrive as input to the local partitions defined in Logical Group 100.

Loopback Configuration

Softek TDMF supports a loopback configuration, in which both primary and secondary systems are on the same machine.

This can be useful for a variety of needs, such as testing or employing checkpoint to create point-in-time snapshots of data sets. To define a loopback configuration:

1. Start Configuration Tool.

2. Click **Add** to add a logical group.

3. In the **Systems** tab, specify 127.0.0.1 for both primary and secondary systems' IP addresses.

4. Define local partitions as usual.

■   ■

5

Commands

SOFTEK

This chapter describes the Softek TDMF commands. These commands must be entered at the prompt in a command window.

☞ **NOTE:** To see feedback from the commands that you run, start Monitor Tool (select Start>Programs>Softek_tdmf>MonitorTool).

The following table lists all commands and briefly describes their functionality. The third column contains the page numbers for the detailed descriptions, which include syntax, options, and examples.

Summary of Softek TDMF Commands

Command	Description	Page
tdmfcheckpoint	Initiates or terminates a checkpoint snapshot on the secondary.	71
tdmfconfigtool	Graphical configuration tool	72
tdmfdebugcapture	Captures debugging information for use in case of problems.	72
tdmfhostinfo	Returns the network host names and IP addresses.	72
tdmfinfo	Prints complete state information for one or more logical groups.	73
tdmfinit	Initializes or resizes the BAB and the pstore.	73
tdmfkillbackfresh	Terminates backfresh operations.	74
tdmfkillpmd	Terminates PMD threads.	74
tdmfkillrefresh	Terminates refresh operations.	75
tdmfkillrmd	Terminates RMD threads.	75
tdmflaunchbackfresh	Initiate a backfresh operation for one or more logical groups.	76
tdmflaunchpmd	Starts the PMD thread.	76
tdmflaunchrefresh	Brings mirror partitions on the secondary system in sync with local partitions on primary system.	77
tdmflicinfo	Reports the status of Softek TDMF licenses on this system.	78

Command	Description	Page
tdmfmonitortool	Monitors current values of a variety of parameters.	78
tdmfoverride	Forces a transition between operating modes and re-initializes the BAB.	78
tdmfreco	Inhibits further mirroring on the secondary and commits pending updates.	79
tdmfset	Sets or reports the value of a tunable parameter.	80
tdmfstart	Activates logical groups and local partitions found in *.cfg* files.	80
tdmfstop	Deactivates specified logical groups with state and log info written.	82

tdmfcheckpoint

The **tdmfcheckpoint** command turns checkpoint on and off for mirrored partitions. Checkpointing allows you to perform backup and data mining on the secondary system. A checkpoint is a snapshot of the data on the primary system at a coherent point in time, and ensures that the data on the mirror partition is in a known, usable state.

When checkpoint is on, Softek TDMF takes a snapshot of the data and allows other applications to access the snapshot in read/write mode. All transactions targeted at the mirror partitions are written to the journal on the secondary system. When checkpoint is turned off, the accumulated transactions in the journal are applied to the mirror partitions, bringing them up to date with the local partitions. For more information on checkpointing, see *Using the Checkpoint Feature* on page 44 .

The **tdmfcheckpoint** command can be run on either the primary or the secondary system.

☞ **NOTE:**

Before using the **tdmfcheckpoint** -**on** command, stop all applications accessing the partitions being checkpointed. You can automate this and other processes by creating batch files that run on the primary and secondary systems (see *Creating Checkpoint Batch Files* on page 44).

Also, to ensure that the primary and secondary systems are in sync after a checkpoint operation, use the **tdmflaunchrefresh** -**c** command to perform a checksum refresh.

Options

  -**on**

    Turns checkpointing on.

  -**off**

    Turns checkpointing off.

  -**a**

    Selects all logical groups.

  -**g** *group#*

    Selects one or more logical groups.

☞ **NOTE:**

The -**p** and -**s** options are valid only in complex configurations where the system on which the command is being used is set up to act as both primary and secondary (see *Loopback Configuration* on page 65).

-p

Causes the system on which **tdmfcheckpoint** is used to act as a primary system.

-s

Causes the system on which **tdmfcheckpoint** is used to act as a secondary system.

Example

tdmfcheckpoint -g 101 -on

tdmfconfigtool

The **tdmfconfigtool** command opens Configuration tool, a graphical user interface utility used for viewing, editing, or defining logical group configuration files, including primary and secondary systems, tunable parameters, and local and mirror partitions.

You can also open Configuration tool by selecting start>Programs> Softek_tdmf>ConfigTool.

Options

None.

tdmfdebugcapture

The **tdmfdebugcapture** command attempts to collect system and software information that can be used for diagnosing problems with your Softek TDMF environment.

The information is saved in a file called *debug capture.txt* in the *Softek TDMF Block* installation directory. You can send this file to engineering support in the event of a severe failure that first-level support cannot diagnose.

Options

None.

tdmfhostinfo

The **tdmfhostinfo** utility returns the network host names and IP addresses for a system, and the host id if executed on the system in question (this information is used by **tdmfconfigtool**).

Option

hostname

Optional host name. The current host name is the default.

tdmfinfo

The **tdmfinfo** command displays state information for one or more logical groups and their local partitions. The state information that can be displayed is divided into three categories:

- BAB memory size requested and BAB memory actually allocated
- Logical Group state
- Local partition information

Options

-g *group#*

Displays information for all partitions within one or more specified logical groups. You can repeat this option to include more than one logical group.

-a

Displays information for all local partitions.

-v

Displays the Softek TDMF software version number.

Example

tdmfinfo -**g 0**

tdmfinit

The **tdmfinit** command initializes or resizes the BAB.

☞ **NOTE:**
You must reboot your system before the change in BAB size takes effect.

Option

-b *BAB_size_MB*

Resizes the BAB and changes the *.cfg* file to reflect the specified size.

Example

tdmfinit -**b 512**

tdmfkillbackfresh

The **tdmfkillbackfresh** command terminates the BACKFRESH mode for one or more logical groups.

This command takes the specified logical groups out of BACKFRESH mode and puts them back into NORMAL mode. This action takes place whether the PMD is currently running or not. If the PMD target is not running but is in BACKFRESH mode (that is, if the PMD was in BACKFRESH mode and the **tdmfkillpmd** command was used), it is restarted in NORMAL mode when run with the **tdmflaunchpmd** command.

Options

-g *group#*

Terminates backfresh operations for one or more specified logical groups. You can repeat this option to include more than one logical group.

-**a**

Terminates all backfresh threads.

-**h**

Displays help for the command.

Example

tdmfkillbackfresh -g 25 -g 30 -g 35

tdmfkillpmd

The **tdmfkillpmd** command terminates one or more active PMD threads.

☞ **NOTE:**
When the PMD is restarted, if any PMD target is in BACKFRESH mode when **tdmfkillpmd** is entered, Softek TDMF restarts it in BACKFRESH mode where it left off. The only way to take the PMD out of BACKFRESH mode is with the **tdmfkillbackfresh** command.

Options

-g *group#*

Terminates PMD threads for one or more specified logical group. This option can be repeated to affect multiple groups.

-**a**

Terminates all PMD threads.

-**h**

Displays help for the command.

Example

tdmfkillpmd -a

tdmfkillrefresh

The **tdmfkillrefresh** command terminates the REFRESH mode in one or more logical groups.

Options

-g *group#*

Terminates the REFRESH mode for the specified logical group. You can repeat this option to include more than one logical group.

-a

Terminates the REFRESH mode for all logical groups.

-h

Displays help for the command.

Example

tdmfkillrefresh -g 0 -g 1 -g 2

tdmfkillrmd

The **tdmfkillrmd** command terminates all currently running RMD threads. Once RMDs have been terminated, you can restart them by terminating **(tdmfkillpmd)** and restarting **(tdmflaunchpmd)** the associated PMD.

☞ **NOTE:**
The **tdmfkillrmd** command must be run on the secondary system.

Options

-g *group#*

Terminates RMDs for specified logical groups. You can repeat this option for more than one logical group.

-a

Terminates RMDs for all logical groups on the secondary system.

Example

tdmfkillrmd -g 2 -g 10

tdmflaunchbackfresh

The **tdmflaunchbackfresh** command initiates a backfresh operation to synchronize data on the primary system with more up-to-date data on the secondary.

The BACKFRESH mode is a maintenance-only mode. Data on the primary and secondary systems cannot be updated or accessed while a backfresh operation is in progress.

☞ **NOTE:**

The **tdmflaunchbackfresh** command must be run on the primary system. Before running it, you must run the **tdmfreco** -**d** -**a** command on the secondary system.

Options

-**a**

Places all logical groups in BACKFRESH mode.

-**g** *group#*

Selects one or more logical groups to place into BACKFRESH mode.

Example

tdmflaunchbackfresh -**g 101**

tdmflaunchpmd

The **tdmflaunchpmd** command starts the PMDs for a single group or for all groups.

Options

-**g** *group#*

Starts the PMD for the specified group.

-**a**

Starts the PMDs for all groups.

Example

tdmflaunchpmd -**g 150**

tdmflaunchrefresh

The **tdmflaunchrefresh** command puts one or more logical groups into REFRESH mode to synchronize the primary and secondary systems. If you run the command without any options, it performs a smart refresh that mirrors only those blocks on the local partition that have changed.

You can use this command to:

- Establish an initial remote mirror during a new Softek TDMF installation (see *Creating the Initial Mirror* on page 22).

- Re-establish a remote mirror if the BAB fills and automatically moves the logical groups into TRACKING mode on the primary system by transferring only the changed data (smart refresh).

- Re-establish the mirror after a remote mirror partition has been replaced because of hardware failure.

☞ **NOTE:**

If you know that the mirror partition is out of sync, use either the **-c** or the **-f** option in combination with the **-g** or the **-a** option.

Syntax

> **tdmflaunchrefresh** -g *group#* (-g *group# ...*) (-f|-c)

or

> **tdmflaunchrefresh** -a (-f|-c)

Options

-g *group#*

Puts all local partitions in the specified logical group into REFRESH mode. You can repeat this option to specify more than one logical group.

-a

Puts all local partitions into REFRESH mode.

-f

Performs a full, sector by sector synchronization of all data blocks from the local partitions to the mirror partitions. You must use this option when you create the initial mirror of the data on your primary system (see *Creating the Initial Mirror* on page 22).

-c

Initiates a checksum refresh that compares data blocks.

Example

tdmflaunchrefresh -g 100 -f

tdmflicinfo

The **tdmflicinfo** command reports the state of Softek TDMF licenses on the system. It alerts you if the license is missing, expired, or for another system.

Options

None.

tdmfmonitortool

The **tdmfmonitortool** command opens Monitor Tool, which displays a range of Softek TDMF performance statistics in real time. This command must be run on the primary system and only monitors logical groups that have been started. Monitor Tool displays current values for a variety of parameters, and error messages from both primary and secondary systems.

You can also open Monitor Tool by selecting Start>Programs> Softek_tdmf>MonitorTool.

Options

None.

tdmfoverride

The **tdmfoverride** command is used to clear the BAB or to force a transition between operating modes. (For more information about operating modes, see *Operating Modes* on page 9.)

☞ **NOTE:**

The **tdmfoverride** command forces Softek TDMF to perform an immediate state transition, which may cause a loss of synchronization between the primary and secondary systems.

Using the **tdmfoverride** command to put Softek TDMF into NORMAL mode does not initiate data replication. You must use the **tdmflaunchpmd** command after **tdmfoverride** to initiate data replication.

Options

-**a**

Validates all logical groups to be affected by the **state** forced change in operating mode.

-**g** *group#*

Selects one or more logical groups to be affected by the **state** forced state change.

clear BAB

state *mode*

> Forces a change in operating mode for the specified logical groups. Possible modes include:
>
> **passthru normal**
>
> **tracking refresh**
>
> **backfresh**
>
> If a PMD is already started for the logical group you wish to override, you must first kill that PMD using tdmfkillpmd before executing the tdmfoverride command.

Example

> **tdmfoverride -g 101 state normal**

tdmfreco

The **tdmfreco** command flushes data from the journal files to the corresponding mirror partitions, ensuring that the mirror partitions are in a coherent and recoverable state. Use this command only when you are switching data ownership to the secondary system.

☞ **NOTE:** The **tdmfreco** command must be run on the secondary system.

The Softek TDMF **reco** command creates an *s###.off* file in the *Softek TDMF Block* installation directory for each logical group. When the primary system comes back online, or when a new system is added to the configuration, the logical group's RMD detects the presence of the *s###.off* file and does not start mirroring operations. This prevents corruption of the mirror partitions before you have a chance to perform a backfresh/refresh operation.

Before you perform a backfresh/refresh operation, enter the following command on the secondary system:

> **tdmfreco -d -a**

This command deletes the *s###.off* files and allows mirroring to take place.

Options

-g *group#*

> Recovers data for the specified logical group.

-a

> Recovers data from all logical groups.

-d

> Deactivates recovery mode.

Examples

> **tdmfreco -g 125 -d**

tdmfset

The **tdmfset** command sets tunable parameters in the pstore for each logical group specified. You can also use the command to view the current setting of a specific tunable parameter, or all tunable parameters, for a logical group. When you change values for tunable parameters using the **tdmfset** command, the changes take effect immediately. (Descriptions of tunable parameters are provided in *Tunable Parameter Descriptions* on page 33.)

☞ **NOTE**:

Remember that the parameter names are case sensitive.

Options

-g *group# parameter_name=value*

    Sets the value of a tunable parameter for the specified logical group.

Example

    tdmfset -g 10 SYNCMODE=1

tdmfstart

The **tdmfstart** command processes the *.cfg* files for the specified logical groups and activates the local partitions defined within each group. As the command processes each file, it creates a copy that it renames with a *.cur* extension. The *.cur* file is an exact copy of the configuration file for the group upon startup and is referenced by all Softek TDMF commands during operations.

The *.cfg* files are processed only by **tdmfstart**, so when a group is stopped and restarted, a new *.cur* file is created. This allows you to modify and control the *.cfg* files when those changes are implemented. Also, the *.cur* file assures that all components of Softek TDMF have a consistent view of the configuration. When you start a logical group, its local partitions become available for selection in the drop-down menus in Configuration Tool.

☞ **NOTE:**

The **tdmfstart** command will not work unless it can obtain an exclusive lock on the partition. It cannot do this if Microsoft SQL Server is installed and running on the local partition. See *Sample tdmfstart Batch File* on page 81 for an example batch file that you can run to overcome this problem.

Options

-g *group#*

    Starts (creates or activates) the specified logical group and its local parameters.

-a

Starts (creates or activates) all logical groups and their local partitions.

-b

Restarts previously started logical groups and their local partitions that were active prior to a system crash or that were stopped with **tdmfstop -s**.

Example

tdmfstart -**a**

Sample tdmfstart Batch File

The following batch file stops the SQL service and manager, runs the **tdmfstart** command, then re-starts the service and manager.

```
Echo Off
If "%1"=="" GOTO ERROR

REM Shutdown the SQL service
@Echo Attempting to shut down SQL SERVER.
net stop mssqlserver

REM Kill the SQLManager process by name
REM This requires the kill command from the resource kit.
@ECHO Stopping the SQL process.
cd \cleancli
REM -f to force the kill
kill -f sqlmangr.exe

REM Start Softek TDMF Block
@Echo Starting the group
cd c:\program files\Softek_tdmf\
tdmfstart.exe %1
@ECHO Running a full backfresh
tdmflaunchrefresh %1 -f

Echo.
REM Start the SQL service back up.
@ECHO Restarting the SQL Server.
net start mssqlserver
@ECHO Starting the SQL Manager.
start sqlmangr.exe
REM get out.
GOTO END
```

```
:ERROR
@ECHO You forgot to enter a parameter to the group number.
@ECHO Please try again.
GOTO END

:ERROR1
@ECHO The error was ERRORLEVEL
pause
:END
```

tdmfstop

The **tdmfstop** command stops one or more logical groups and their corresponding local partition definitions. The local partition definitions associated with the logical group(s) are no longer available for active use.

☞ **NOTE:**

Before you use the **tdmfstop** command, you must use the **tdmfkillpmd** command to stop the PMD threads.

The **tdmfstop** command will not work if any application is accessing the partition on which you are stopping logical groups. You must close all applications accessing a partition before you use this command. The *Sample tdmfstop Batch File* on page 83 provides an example batch file that stops the Microsoft SQL Server, runs the **tdmfstop** command, then restarts the server.

Options

-g *group#*

Stops a specified logical group and removes its local partition definitions. This option can be repeated to include multiple groups.

-a

Stops all logical groups and removes their local partition definitions.

-s

For boot scripts only—stops the previously started logical groups but marks them "enabled for restart" when the system is next booted.

Example

tdmfstop -a

Sample tdmfstop Batch File

The following batch file stops the SQL service and manager, runs the **tdmfstop** command, then re-starts the service and manager.

```
Echo Off
If "%1"=="" GOTO ERROR

REM Shutdown the SQL service
@Echo Attempting to shut down SQL SERVER.
net stop mssqlserver

REM Kill the SQLManager process by name
REM This requires the kill command from the resource kit.
@ECHO Stopping the SQL process.
cd \cleancli
REM -f to force the kill
kill -f sqlmangr.exe

REM Start Softek TDMF Block
@Echo Stopping the group
cd c:\program files\Softek_tdmf\
tdmfkillpmd %1
tdmfstop.exe %1

Echo.
REM Start the SQL service back up.
@ECHO Restarting the SQL Server.
net start mssqlserver
@ECHO Starting the SQL Manager.
start sqlmangr.exe
REM get out.
GOTO END

:ERROR
@ECHO You forgot to enter a parameter to the group number.
@ECHO Please try again.
GOTO END
:END
```

■ ■

Glossary

This glossary contains definitions of terms found in this manual.

Accumulate - The Softek TDMF mode in which the PMD and the RMD are not operating for the logical group, and in which the updates to local partitions are accumulating in the BAB.

Actual KBps - The actual amount of data in KBps sent over the network reported by the Windows NT or Windows 2000 Performance Monitor.

Aggregated Throughput - A group of network connections whose throughput is considered as a whole.

Automatic Recovery - Softek TDMF action of going into Tracking mode and then launching a smart refresh when the BAB exceeds its limits.

BAB (Big Asynchronous Buffer) - The buffer cache in the primary system's physical memory, used to store transactions waiting to be mirrored to the secondary system.

BACKFRESH Mode - The maintenance mode in which data is being copied from the current secondary system to the current primary system.

.cfg files - Logical group configuration files that are created by Configuration Tool during configuration. These files include *p###.cfg* and *s###.cfg* files *(### is the logical group number)*.

Chaining - A configuration option in which systems appear to be connected in a sequential manner, such as A to B to C.

Checkpoint Batch Files - Optional batch files that automate pre- and post-checkpoint tasks.

Checkpoint - The act of taking a snapshot image of data on the mirror partitions and making this data accessible to applications other than Softek TDMF.

CHUNKDELAY - A parameter defining the length of time, in milliseconds, during which the PMD is idle between data transfers.

CHUNKSIZE - A parameter that defines the amount of data, in KBytes, that is sent across the network during a transfer.

.cur files - Copies of the *.cfg* (logical group configuration) files that the **tdmfstart** command creates when it processes a *.cfg* file. These files are accessed and referenced by all other Softek TDMF commands during operations. The **tdmfstop** command deletes the *.cur* file for specified logical groups.

Data Coherence - A term indicating the integrity of information written to local partitions.

Data Incoherence - A term indicating the data is lacking continuity or is in an inconsistent state. This is a temporary state from which data can be recovered.

Data Migration - The periodic passing of data between primary and secondary systems.

Dynamic allocation - The *as needed* method of distribution of the memory assigned to the BAB between logical groups.

Effective KBps - The amount of data being transferred across the network without compression.

Full Refresh - The process in which each block of data on the local partition is copied to the mirror partition.

Initial Mirror - The untouched copy of the original data set on the secondary system.

Journal File Area Directory - The directory on the secondary system where journal files are written.

Journaling - The act of recording current updates in a log file (journal) on the secondary system rather than writing the data directly to the mirror partition.

Softek TDMF Block - The Softek TDMF device driver, which allows the kernel to transfer data directly to or from the underlying local partition, independent of the file system or buffer cache.

Softek TDMF Block Server - The master Softek TDMF service running on all primary and secondary systems in the enterprise. This service is responsible for launching and managing all other processes.

Local Partition - A disk partition or managed volume on the primary system that stores all or a portion of the original data set.

Logical Group - A virtual grouping of local partitions into a cohesive unit across which data coherence is maintained.

Mirror Partition - A partition configured on the secondary system, on which an exact replica of the original data set is stored.

NORMAL Mode - A healthy operational state in which all typical network data mirroring elements are functional.

.off file - A file placed in the *Softek TDMF Block* install directory by the **tdmfreco** command that prohibits mirroring to the mirror partitions. Entering **tdmfreco -d** deletes this file.

Original Data Set - The data set residing on the primary system.

p###.cfg files - Logical group configuration files created on the primary system by Configuration Tool during configuration. Each *p###.cfg* file must be copied to the secondary system and renamed to *s###.cfg* using the same logical group number. These files are processed by the **tdmfstart** command.

p###.cur files - Copies of the *.cfg* files created by the **tdmfstart** command. These files are referenced by all Softek TDMF commands during normal operations.

PASSTHRU Mode - A transitional mode of operation in which data is not being mirrored to the secondary system. Softek TDMF operates in this mode initially after installation.

PMD - The service thread on the primary system responsible for establishing a connection with the secondary system and transferring data from the BAB to the appropriate mirror partition.

Primary System - A system in the Softek TDMF enterprise on which the original data set resides, local partitions are configured, and applications are active.

Pstore - The persistent store partition that is identified during configuration. It must be unformatted, and is used to contain state information and tunable parameter definitions.

Recoverable State - The condition of data at a point in time when it cannot be accessed and used without re-establishing the usability of the data. For example, data on the mirror partitions is in a *recoverable state* during a refresh operation or while entries are being copied from the journal files to the mirror partitions.

REFRESH Mode - An operational mode in which the data on the mirror partitions is being renewed from the local partitions.

RMD - The service thread on the secondary system that handles the writing of data to the mirror partitions or to the journals.

Secondary System - A system in the Softek TDMF enterprise that stores a mirror copy of the original (primary) data set. The mirror copy can be accessed during planned or unplanned outages for the purpose of disaster recovery or maintenance.

Smart Refresh - The process of transferring only blocks of data that have recently changed from the local partition to the mirror partition.

s###.cfg **files** - Renamed *p###.cfg* files that are copied to the secondary system. These files contain configuration information for each logical group. Each *p###.cfg* file must be copied to the secondary system and renamed to *s###.cf*g.

s###.off **files** - Files placed in the *Softek TDMF Block* install directory by the **tdmfreco** command, that prohibit mirroring to the mirror partitions on the secondary system.

Synchronization - The process that ensures all systems in the enterprise are loaded with identical sets of contemporary data.

SYNCMODE - A tunable parameter that governs whether a synchronous and acknowledged update is required from each secondary system with every I/O.

SYNCMODEDEPTH - A tunable parameter that determines the number of entries allowed to accumulate asynchronously in the BAB before being transferred and acknowledged by the secondary system. If this value is set to a number greater than 1, the local partitions are asynchronous and the mirror partitions are no more than the specified number of updates behind the primary system.

SYNCMODETIMEOUT - A tunable parameter that defines the amount of time in seconds that the device driver (Softek TDMF Block) waits for a synchronous update to complete before returning control to the application.

Time Sequenced Transfers - A method through which Softek TDMF ensures data coherence by preserving the order of consecutive updates to the local partition as they are written to the BAB and later transferred to the mirror partition.

TRACKING Mode - The operational mode in which updates to the local data partition are not written to the BAB but rather are recorded in a disk map.

Tunable Parameters - Optional, user-defined variables stored in the pstore, that allow fine-tuning of certain Softek TDMF components.

Typical Operations - Tasks representative of Softek TDMF network data mirroring, such as writing simultaneously to the BAB and the local data partition, reading entries from the BAB and sending them to the appropriate mirror partition.

Unplanned Outage - An inadvertent loss of one or more components in the data mirroring enterprise that disrupt normal activity.

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Index

Revision History

This revision history lists all revisions of this publication and their effective dates.

Revision Level	Change Summary
Revision Level	**Change Summary**
ML-144XXX-001 October 2001	First release of the Softek TDMF, Open Systems Edition, Administrator's Guide for Windows NT™ and Windows 2000™.

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Publication No.   **ML-144XXX-001**   Publication Date   **October 2001**

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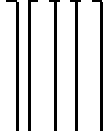
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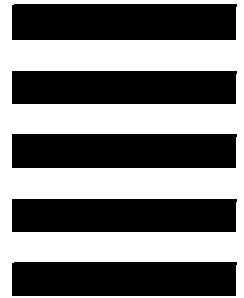
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