

Help Desk and Remote Training Terminal Mirroring



By Walter Lipp, Eddie Ho, and Bill Chesky

In a remote support and training environment, system administrators can provide direct assistance by taking control of the end user's terminal and keyboard. The terminal mirroring function of AIX can help shorten the time necessary for problem determination and with less confusion.

Terminal mirroring can assist help desk personnel to provide direct help via remote online coaching. It can also play a key role in new application training for users since the trainer and user have identical screen control and interactions. The administrator can login to the application server and take control of the end user's terminal when assistance is needed. This function, available in AIX 4.2.1., is part of the service aid filesets `bos.sysmgt.servaid`. Figure 1 shows a typical environment for a remote help desk.

Overview

Terminal mirroring is a function of the tty subsystem. The tty subsystem in AIX is a stream-based modular design conforming to the UNIX industry SVR4 standard. Each session represents a tty stream. The modular and layered architecture allows session capabilities to be added or modified without relinking. This allows for the dynamic modification of protocol characteristics when

the session is initialized. Figure 2 shows the structure of the tty system.

The terminal mirroring function is implemented by inserting a special streams module into the streams of two tty sessions, allowing one of the two sessions to monitor the other. A daemon is also spawned that manages certain tasks related to the initialization and termination of the terminal mirroring environment. This function is an extension of the console mirroring capability available for Symmetric Multiprocessing (SMP) Micro Channel[®]-based systems.

Console mirroring is designed to enable the remote system administrator to monitor and/or take control of a console connected to serial port #1 via a modem connected to serial port #2. Figure 3 shows console mirroring.

Terminal mirroring extends this capability to any two logical terminal ports including native serial ports, multiport ttys, low function terminal (lft), and network terminals such as telnet, rlogin, xterm, and so on. The pair of terminal ports include the following:

- ◆ Target station: The tty stream whose data stream/applications are monitored by another user
- ◆ Monitoring station: The tty stream that monitors the data of another users' data stream or application

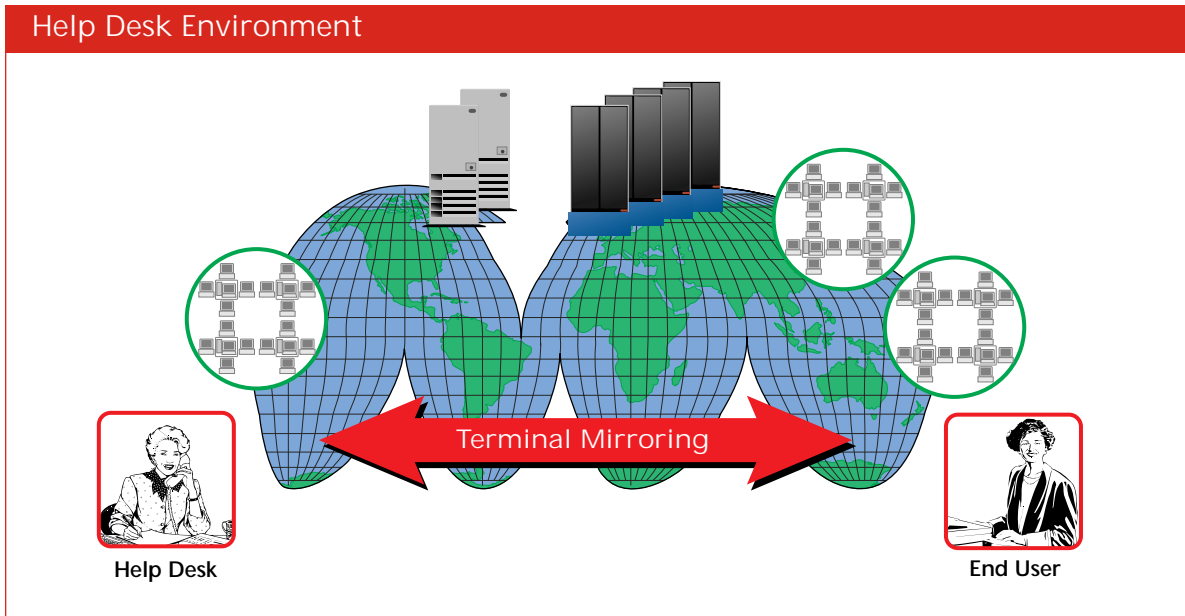


Figure 1. Typical remote help desk environment

Terminal Mirroring Environment

Once terminal mirroring is invoked, the monitoring station takes on the ID of the target station. Any keystrokes entered in the monitoring station's session are no longer seen by the device that was originally associated with that session. Instead, they are redirected to the device associated with the target station's session. Also, any output directed to the target station is routed to the monitoring station as well. Thus, users in both sessions see the keystrokes issued by either keyboard.

This rerouting of data is also true for non-keyboard I/O as well, such as `ioctl()` requests and escape sequences. For this reason, the terminal types of the two devices must be identical; otherwise, escape sequences will be misinterpreted. Both the target and monitoring station's sessions will be notified when terminal mirroring is invoked.

This function is part of the service aid file-sets `bos.sysmgmt.servaid`. The following summary describes the operating characteristics:

- ◆ Provides full access to the monitored station
- ◆ Works with any terminal style, including multiport adapters, modem, or network

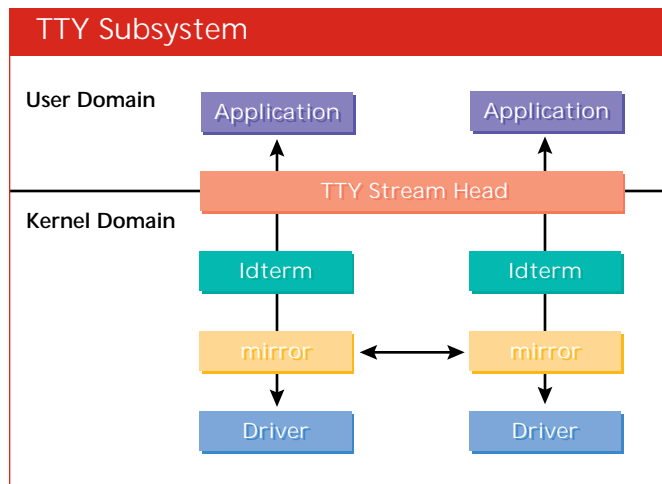


Figure 2. TTY system structure

- ◆ Requires the `TERM` environment variable to be the same in both stations; if not, the data and control sequence will not be translated properly
- ◆ Does not require the two stations to have the same baud rate and flow control characteristics to operate properly
- ◆ Compromises your administrative capabilities if the system console is used as the monitoring device, because console messages will be lost

- ◆ Use the `chdev -l ttyx-a fastcook=disable` command to disable the intelligence processing option `fastcook` of the session attribute when using the 128 port tty as a monitoring station

- ◆ Allows the maximum of one pair of station mapping per system

- ◆ For privacy, the monitored station will be notified with the following message:

```
portmir: Remote user connected,
mirroring active
```

- ◆ The session must have either an active `getty` process or a user logged in before the terminal can be mirrored

- ◆ A slight data loss may occur at the targeted station if there is outbound data from the host during the enable and disable of mirror function

- ◆ Only a character terminal can be mirrored; X-windows with graphics is not supported

Security Access

Root user has unlimited authority to monitor all stations—one at a time—with no special setup required.

Non-root users can also monitor other user stations. However, this requires the user to be logged into the target station to define a file in their home directory called `.mir`. This directory contains a list of all users who are allowed to monitor that user's sessions.

Configuration and Setup

Configuration and setup is handled by System Management Interface Tool (SMIT). The following shows the path:

```
smit -> Device -> Console -> Port Mirror
```

The fastpath is `smit portmir`.

Figure 4 shows the main panel for terminal mirroring.

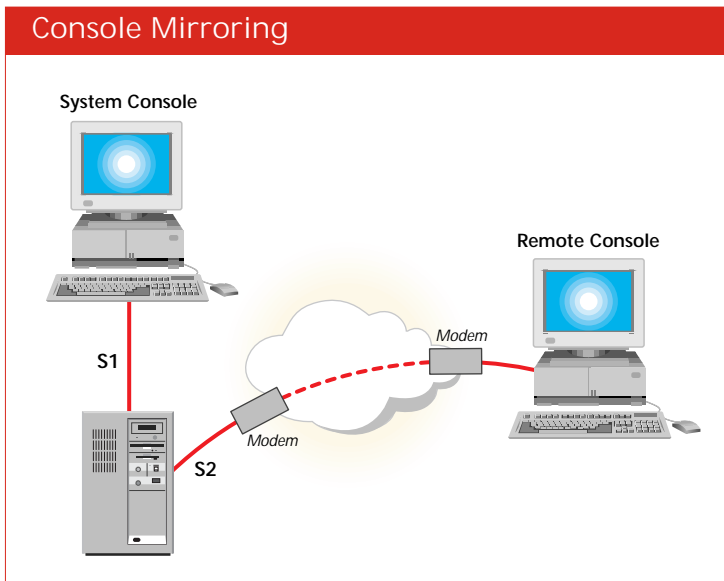


Figure 3. Console mirroring

Terminal Mirroring Components

The mirroring function has two major components:

- ◆ Port monitoring module: Responsible for data passthrough to the companion port monitoring module. It is pushed and initialized by the mirror daemon residing on the monitoring station
 - Setup of the port to be monitored by pushing the stream monitoring module in the targeted stream
 - Special I/O controls that are unique to the streams monitor
 - Session cleanup when mirror function is disabled
- ◆ Mirror daemon: Runs on the monitoring station and handles the following:
 - Setup of the port to be monitored by pushing the stream monitoring module in the targeted stream
 - Special I/O controls that are unique to the streams monitor
 - Session cleanup when mirror function is disabled

Command Descriptions

The `portmir` command allows the administrator to set up the mirror function instead of the SMIT interface.

Figure 5 shows flags associated with the `portmir` command.

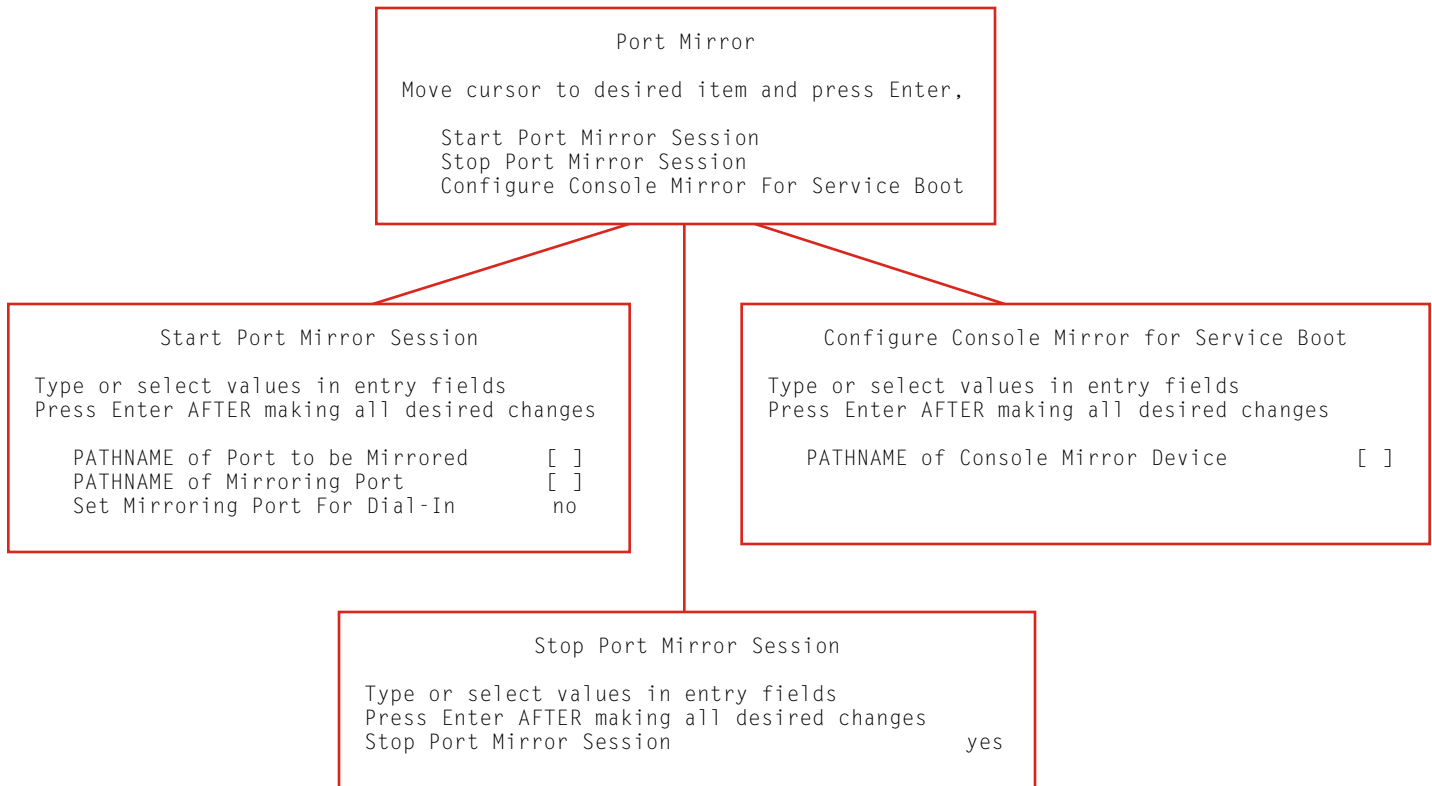


Figure 4. SMIT panels for terminal mirroring configuration

-t <target port name>	The station to be monitored
-m <monitoring port name>	Optional parameter; the default device is the current tty where the portmir command is issued
-o	Disable the terminal mirroring function
-s mir_modem	Service boot only. Requires mir_modem script to be setup for remote console mirroring. It is only used for compatibility mode with the SMP MCA system. This option can only be used when the machine is in the service mode
-c	Set default mirroring station for service-mode terminal mirroring
-q	Query current set by -c option
-d mir_modem	Set monitoring port for dial-in; requires the mir_modem script and is used for compatibility mode with the SMP MCA system

Figure 5. portmir command description

Examples

The following examples illustrate the use of the commands in Figure 5.

To mirror user 1 on tty1 (target) from user 2 on tty2 (monitor):

- ◆ User 1 must place user 2's login ID into `/u/user1/.mir`

- ◆ Issue this command from tty2:

```
>portmir -t tty1 -m tty2
```

Note: `-m` is optional because the default monitor is where the command is run.

To mirror tty1 (target) from user on tty2 (monitor) who is dialing in:

- ◆ Ensure that `/usr/share/modems/mir_modem` is linked to the correct modem communications script file

- ◆ Issue the `portmir` command with the `-d` option only from root user

- ◆ Issue this command:

```
>portmir -t tty1 -m tty2 -d mir_modem
```

To disable mirroring during the service boot, enter this command:

```
>portmir -c off
```

Remote Terminal Mirroring Using a Modem

It is also possible to invoke terminal mirroring using a modem. This feature facilitates true remote support by allowing help desk personnel to monitor the commands entered from an off-site system console as well as enter commands on the console directly while a customer observes.

Remote terminal mirroring is accomplished using a special chat script (designated as `mir_modem` in the usage statement), which initializes a modem connected to the monitoring station port for dial-in access.

On a newly installed AIX system, examples of these chat scripts for specific types of modems can be found in the directory `/usr/share/modems`. This is also

the directory that the `portmir` command searches by default if the user does not specify the full path name for the chat script file and it cannot be found in the current directory. If it still is not found in `/usr/share/modems`, then the `portmir` command exits with an error.

The example chat scripts that can be found in this directory at installation time are as follows:

```
mir_modem.7851
mir_modem.usrobotics
```

In addition, another file `mir_modem.without.modem` is included. Since it will be discussed in more detail later, this file would most commonly come into play when using the `-s mir_modem` option.

Also contained in the `/usr/share/modems` directory is a file simply called `mir_modem`, which is a link to one of the other files (`mir_modem.usrobotics` at installation) mentioned above. This file may be used in place of the full path name to a chat script by changing the link to point to the appropriate file, then invoking the `portmir` command with `mir_modem` as the chat script file argument. Again, this would most commonly come into play when using the `-s mir_modem` option.

A user initiates a remote terminal mirroring session using the `-d` option. For example:

```
portmir -d mir_modem -t /dev/tty0
-m /dev/tty1
```

This command causes the `portmir` command to parse the chat script contained in the file `mir_modem` and initialize the modem attached to the device `/dev/tty1` for dial-in access. At this point, a remote user would then dial into the modem, which would answer, establish connection, and begin the terminal mirroring session on the device `/dev/tty0`.

Service-mode Terminal Mirroring

Finally, terminal mirroring is also possible when booting a system in service mode, allowing help desk personnel to perform

service-mode diagnostics on a system remotely. In this mode, the target station is always the system console and the monitoring station is a device previously specified by the user.

Service-mode terminal mirroring is invoked using the following command:

```
portmir -s mir_modem
```

Normally, a user would never invoke the `portmir` command in this manner. Rather, this invocation takes place behind the scenes when the system is booted in service mode. If the user were to attempt to execute the `portmir` command as above while in normal mode, the `portmir` command would exit with an error.

The user must take two steps while the system is running in normal mode in order to properly activate service-mode terminal mirroring for the next time that the system is booted in service mode:

1. Set the service-mode default monitoring station using the `-c` device option. For example, the command `portmir -c /dev/tty1` establishes `/dev/tty1` as the default monitoring station during service-mode terminal mirroring.

If the default monitoring station has not been established, then service-mode terminal mirroring will not occur when booting in service mode.

The value of this parameter can be checked using the command `portmir -q`.

The value of this parameter can be set to `NULL`, which disables service-mode terminal mirroring, using the command `portmir -c off`.

2. Symbolically link the file `/usr/share/modems/mir_modem` to the correct `mir_modem` chat script file.

If the monitoring station is local, the above file must be linked to

`/usr/share/modems/mir_modem.without.modem`. If the monitoring station is remote, then the above file must be linked to the appropriate `mir_modem` chat script for the type of modem connected to the monitoring station.

Once these two tasks have been completed, the user simply reboots in service mode and terminal mirroring should begin automatically. In the case of remote terminal mirroring, just as with normal-mode terminal mirroring, the remote party must dial into the system and make a connection to the monitoring station's modem before the terminal mirroring session begins.

Conclusion

Terminal mirroring or port mirroring enhances the ability of system administrators to determine problems. It also provides application-level contact between the end user and help desk personnel. The result is less confusion and more immediate and direct support for users.



Eddie Ho, IBM Corporation, 11400 Burnet Road, Austin, TX 78758. E-mail: eddieho@vnet.ibm.com. Mr. Ho is a programming consultant in the RS/6000 Executive Briefing Center. He has a BS in Computer Science from the University of Wisconsin and an MS in Computer Science from North Dakota State University.

Walter Lipp, IBM Corporation, 11400, Burnet Road, Austin, TX 78758. Mr. Lipp is a staff programmer in AIX Communications Development. He has a BS in Electronics Engineering Technology from DeVry Institute of Technology in Chicago.

Bill Chesky, EASE Software, 4108 Lewis Lane, Austin, TX 78756. Mr. Chesky is a computer consultant specializing in kernel design and development. He has a BA in Mathematics and Computer Science from Kalamazoo College.