NavisXtend Accounting Server Administrator's Guide

Ascend Communications, Inc.

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About This Guide

This guide describes how to configure an accounting system, which consists of one or more NavisXtend™ Accounting Servers, one or more WAN switches, and your billing operations server.

This guide is intended for network administrators who are responsible for the installation, configuration, and administration of wide-area networks that use network accounting. The network administrator who configures the accounting system must understand network accounting and why accounting is required on the network.

What You Need to Know

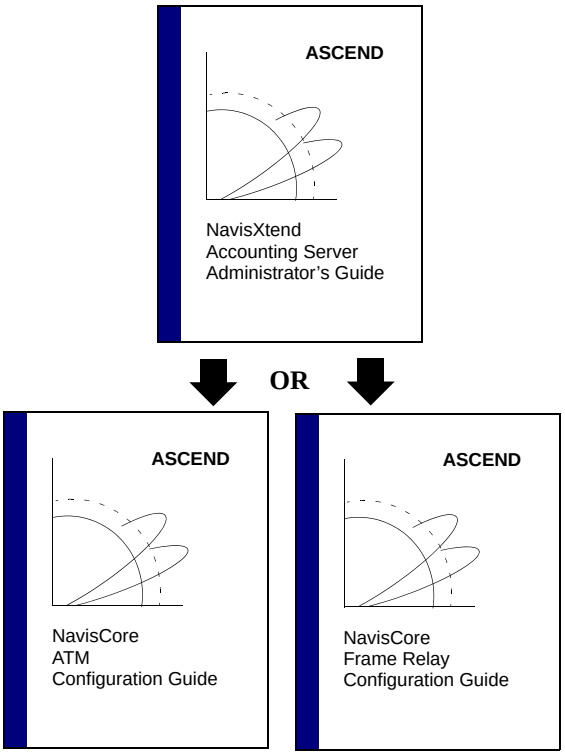
You should be familiar with wide-area networking concepts, and network services such as ATM and Frame Relay. You should be familiar with Bellcore standards and have access to the following Bellcore reference documents:

- Bellcore GR-1100-CORE
- Bellcore GR-1110-CORE
- Bellcore GR-1343-CORE

Be sure to read the software release notice (SRN) that accompanies this product. The SRN contains the most current product information and requirements.

Reading Path

The accounting system document set includes the following manuals:



Describes how to configure a network accounting system, which consists of one or more NavisXtend Accounting Servers, one or more WAN switches, and your billing operations server.

Describes how to use HP OpenView and NavisCore network management software to configure either ATM or Frame Relay services on a switch network.

How to Use This Guide

This guide contains the following information:

Read	To Learn About
Chapter 1	NavisXtend accounting system features, as well as the various types of accounting data that can be collected for each PVC and SVC in the network.
Chapter 2	Requirements for installing and configuring the accounting system on your network, including network design guidelines, hardware requirements, and disk space requirements.
Chapter 3	Installing the NavisXtend Accounting Server software.
Chapter 4	Configuring the Accounting Servers in your network, using either the text-based Accounting Server Configuration main menu or the Web-based graphical configuration tool.
Chapter 5	Configuring the accounting system in your Ascend™ network, which involves enabling and disabling various accounting settings in NavisCore™.
Chapter 6	Using NavisCore to display accounting statistics and settings, as well as force data uploads from a switch to its Accounting Server.
Chapter 7	Using console commands to manage and monitor the Accounting Servers in your network.
Chapter 8	The set of asynchronous events that are generated by each Accounting Server in the accounting system to indicate anomalous conditions or completed tasks.
Chapter 9	The SNMP traps that are generated by the switches in your network and sent to each NMS that is enabled to receive traps.
Appendix A	Information on the contents/layout of the final file formats available for call data: – Standard Bellcore AMA format – Standard Bellcore AMA format with proprietary extensions – ASCII format This appendix also includes a table that lists the cause values for circuit terminations.

Read	To Learn About
Appendix B	Configuring an NMS workstation for Network Timing Protocol, which enables you to specify a reference server to be used as a clock synchronization source for the switches in your network.
Appendix C	Accounting Server integration with the Network Performance Metrics Tool, which is an optional application available from Ascend.

What's New in This Release?

This guide describes the following new product features:

New Features/Functions	Enables you to	Described in Chapter
High availability configuration	Configure reserve Accounting Servers for uninterrupted, backup processing in the event of server failure.	1, 2, and 3
Configuration options	Use two different options for configuring the Accounting Servers in your network: – Text-based Accounting Server Configuration main menu – Web-based graphical Accounting Server configuration tool	4
Frame Relay Accounting	Configure accounting on a Frame Relay network.	5, 6, and Appendix A

Conventions

Ascend Core Switching manuals use the following conventions, when applicable:

Convention	Indicates	Example
[*bold italics*]	Variable parameters to enter.	**[*your IP address*]**
`Courier Regular`	Screen or system output; command names in text.	`Please wait...`
Bold	User input in body text.	Type **cd install** and ...
`Courier Bold`	User input in a command line.	> **`show ospf names`**
Menu => Option	A selection from a menu.	NavisCore => Logon
Italics	Book titles, new terms, and emphasized text.	*Network Management Station Installation Guide*
Boxes around text	Notes, warnings, cautions.	See examples below.

Notes provide additional information or helpful suggestions that may apply to the subject text.

Cautions notify the reader to proceed carefully to avoid possible equipment damage or data loss.

Warnings notify the reader to proceed carefully to avoid possible personal injury.

Related Documents

This section lists the related Ascend and third-party documentation that may be helpful to read.

Ascend

- *NavisCore Frame Relay Configuration Guide* (Product Code: 80071)
- *NavisCore ATM Configuration Guide* (Product Code: 80072)
- *NavisCore Diagnostic and Troubleshooting Guide* (Product Code: 80074)
- *CBX 500 Hardware Installation Guide* (Product Code: 80011)
- *GX 550 Hardware Installation Guide* (Product Code: 80077)
- *Network Management Station Installation Guide* (Product Code: 80014)

Third Party

- Bellcore GR-1100-CORE
- Bellcore GR-1110-CORE
- Bellcore GR-1343-CORE
- ATM Forum ATM UNI Specification
- Bellcore TRW-NWT-000508

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Customer comments are welcome. Please respond in one of the following ways:

- Fill out the Customer Comment Form located at the back of this guide and return it to us.
- E-mail your comments to cspubs@ascend.com
- FAX your comments to 978-692-1510, attention Technical Publications.
- Open a case in CaseView for documentation.

Customer Support

To obtain release notes, technical tips, or support, access the Ascend FTP Server or contact the Technical Assistance Center (TAC) at:

- 1-800-DIAL-WAN or 1-978-952-7299 (U.S. and Canada)
- 0-800-96-2229 (U.K.)
- 1-978-952-7299 (all other areas)

Terminology

The *NavisXtend Accounting Server* is referred to in text using any of the following terms:

- NavisXtend Accounting Server
- Accounting Server
- server

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Overview

The NavisXtend accounting system takes PVC and SVC usage measurements within a switch network and converts the data into formatted call data records. The call data records can be created in any of the following formats:

- Standardized Bellcore AMA Format (BAF) *(ATM circuits only)*
- BAF format with proprietary extensions *(ATM circuits only)*
- Comma-delimited ASCII format

You can use the records for customer billing and invoice processing on your central billing system.

The accounting system consists of the following components:

- An Ascend switch network
- One or more NavisXtend Accounting Servers
- A disk array (either connected directly to the Accounting Servers or installed on a data server connected to the Accounting Servers)
- A network management and control component (NavisCore)
- Configuration tools
- Your billing operations server (BOS)

Accounting data is collected within the switching system, with switch management and control provided via NavisCore running on the Network Management Station (NMS). In addition, the accounting system is configured, managed, and monitored via NavisCore and the Accounting Server. BOS processing is internal to your billing center.

Figure 1-1 shows a typical accounting system.

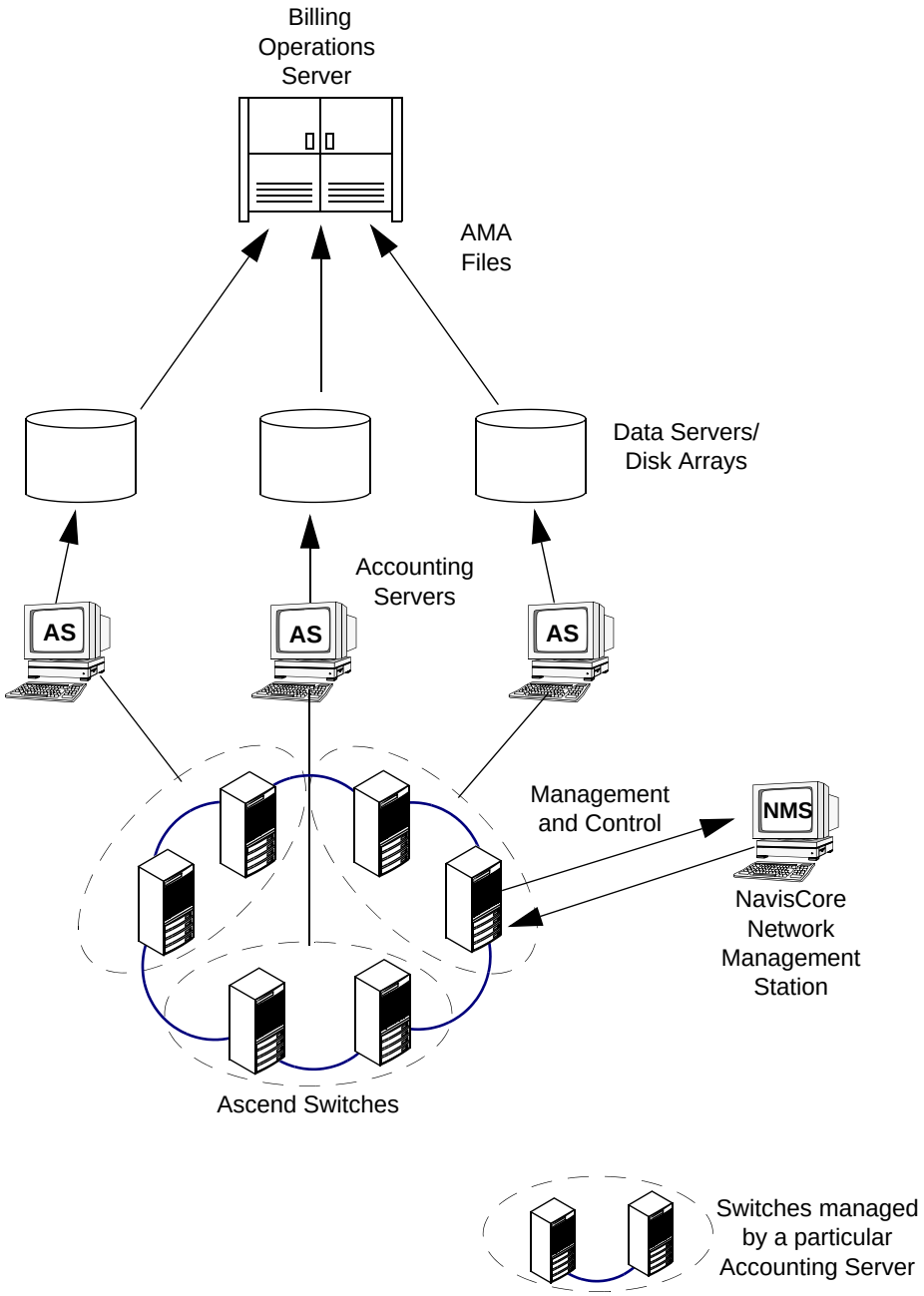


Figure 1-1. NavisXtend Accounting System

Within the switching system, usage records are collected in real time and stored in the switch's heap storage. The types of data collected include call duration and various usage counts for both directions of a circuit (see "Usage Data" on page 1-5 for a complete list and description of usage data collected on a switch). Multiple records for a particular switch and a particular call are transferred to the Accounting Server for correlation and storage. The AMA files, which may be in either BAF or ASCII format, are transferred to the billing operations server every 5 minutes.

You use the NavisCore NMS and the configuration tools to configure, manage, and control the accounting system:

NavisCore — Use to selectively enable and disable usage data collection for PVCs at the circuit, port, switch, and network levels; and for SVCs at the port, switch, and network levels. Use NavisCore to monitor the system, add Accounting Servers to the accounting system, and designate a primary and secondary Accounting Server for each switch in the network.

Configuration tools — Use to configure the behavior of the Accounting Server, such as how long files remain on the system before being purged, where to send SNMP traps generated by the Accounting Server, what to use for Bellcore Standard configuration parameters, and so on.

Features

The NavisXtend accounting system provides or supports the following features:

- Usage measurement of inter- and intranetwork PVCs and SVCs, including point-to-point and point-to-multipoint circuits, with the ability to enable or disable recording of usage counts at:
  - The originating end of a point-to-point circuit
  - The originating end of a point-to-multipoint circuit (*ATM only*)
  - The terminating end of a point-to-point circuit
  - The terminating end of a point-to-multipoint circuit (*ATM only*)
  - Ingress and egress endpoints
- Both time-based and usage-based accounting, with the ability to disable usage-based accounting on CBR circuits (*ATM only*).
- Near-real-time SVC billing, where accounting records are produced within 15 minutes of the end of an SVC call or within 15 minutes of the occurrence of an unsuccessful call.
- Recording of separate cell counts for the CLP=0 (high-priority) and CLP=0+1 (aggregate) cell streams *(ATM circuits only)*.
- Flexible management via NavisCore to control what is billed, when it is billed, and how much information is recorded, including the ability to:

  - Include or exclude OAM cells in cell count totals (on circuits that are enabled for OAM traffic).
  - Record unsuccessful SVC creation attempts (including the failure reason) at both the originating and terminating ends of the SVC.
  - Record end-system subaddresses for both the calling party and called party, regardless of whether the subaddress is in ATM AESA or native E.164 format.
  - Provide a default billing address for the UNI.
  - Enable or disable per-port billing.

- Generation of call data records, in one of the following formats:
  - Standard Bellcore AMA format (BAF) *(ATM circuits only)*
  - Extended BAF (includes proprietary modules) *(ATM circuits only)*
  - Comma-delimited format (ASCII) *(ATM and Frame Relay circuits)*

- Two different options for transporting data from the Accounting Server to your billing operations server:
  - Periodic AMA file transfer via internet-standard FTP.
  - AMA file processing on your own server(s) by customer-specific applications (For example, converting from AMA format to your proprietary format). In this case, you need to design your own process for transferring call data files from the Accounting Server to your application for further conversion, processing, and storage.

- Two different options for configuring the Accounting Servers in your network:
  - Text-based Accounting Server Configuration main menu
  - Web-based graphical Accounting Server configuration tool

- Configuration of reserve Accounting Servers for uninterrupted, backup processing (high availability) in the event of server failure.

For details about new features in this release of the product, see "What's New in This Release?" on page xx.

Usage Data

This section describes the usage data collected for each circuit on an accounting-enabled network. Some data is collected for both PVCs and SVCs, while other data applies to PVCs only or SVCs only.

PVC Usage Data

Table 1-1 describes the key usage data collected for inter- and intranetwork PVCs. For a complete list of items contained in PVC usage data files, see Appendix A, "Record Formats."

Table 1-1. PVC Usage Data

Statistic	Desciption
Connection Type	Specifies whether the PVC is a virtual path connection (VPC) or virtual channel connection (VCC).
Carrier ID, Transit Carrier ID	A 3-digit decimal number that uniquely identifies the carrier on the other end of the network interface. This value applies only to network interfaces for internetwork PVCs. Figure 1-2 illustrates the relationship between the Carrier ID and the Transit Carrier ID.
Chargeable Party ID	The 15-digit decimal number that identifies the address to charge for circuit usage.
Recording Interface ID, Remote Recording Interface ID	Right-justified, 17-digit decimal number that uniquely identifies the local and remote interfaces of the circuit. This value consists of the 12-digit IP address (padded with zeros) and the 4-digit logical port interface (IfIndex) number. For example, if the IP address of the switch is 152.148.40.1, and the logical port interface is 287, the Interface ID would be 1521480400010287. Figure 1-3 illustrates the relationship between the Recording Interface ID and the Remote Recording Interface ID.
VPI/VCI	*ATM only.* The 2-digit virtual path ID and 3-digit virtual connection ID configured for the ATM circuit.
DLCI	*Frame Relay only.* The circuit identifier for a Frame Relay PVC.
Traffic Descriptor	The traffic descriptor parameters for both the ingress and egress directions of the circuit.
Ingress and Egress Cells	*ATM only.* Separate cell counts are taken at ingress and egress points.
Total Cell Counts	*ATM only.* A total cell count is taken at the ingress and egress points of the PVC for both the originating and terminating switch.

Table 1-1. PVC Usage Data (Continued)

Statistic	Desciption
Leg Counts	*ATM only.* Leg counts apply only to originating node point-to-multipoint circuits. This value is dynamically calculated as the number of leaves added to the circuit root minus the number of leaves deleted from the circuit root.
Received Bytes, Received Deletion Eligible Bytes, and Received Frames	*Frame Relay only.* Egress frame counts.

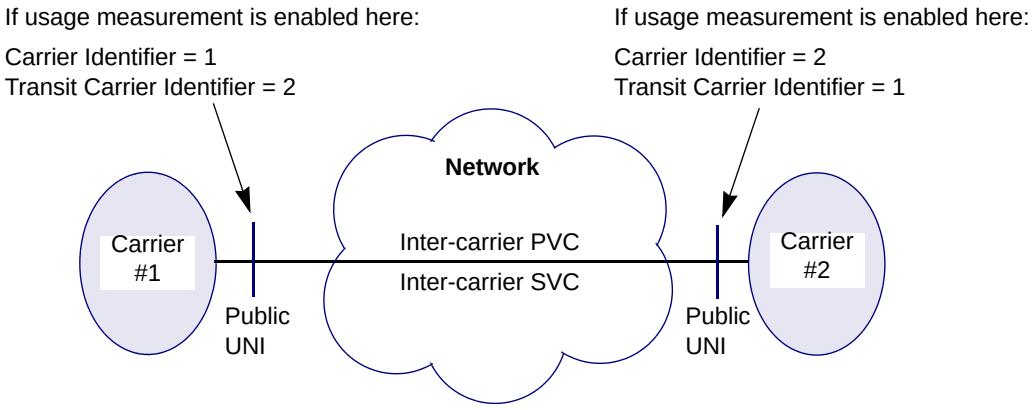


Figure 1-2. Carrier ID/Transit Carrier ID Relationship

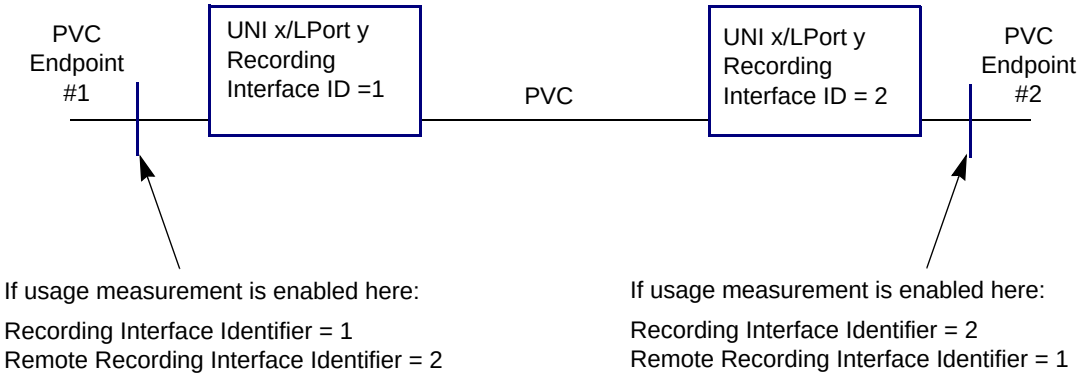


Figure 1-3. Local and Remote Recording Interface ID Relationship

SVC Usage Data

Table 1-2 describes the usage data that is collected for inter- and intranetwork SVCs.

Table 1-2. SVC Usage Data

Statistic	Description
Activation Time	The time at which the SVC was created.
Length of Recording Interval	How long the circuit was active.
Traffic Parameters	The traffic parameters necessary for defining the QoS of the circuit and the traffic service-level agreement.
Calling Party Address	The address of the calling party's local gateway node.
Called Party Address	The address of the called party's local gateway node (which is the remote gateway for the calling party).
Default Accounting Address	Normally, you have to manually specify a default accounting address; otherwise, the accounting system uses the calling party insertion address as the default UNI address (see page 5-23).
Called Party Subaddress	An address that uniquely identifies the called party.
Calling Party Subaddress	An address that uniquely identifies the calling party.
Broadband Capability	*ATM only.* The bearer class of the circuit.
Backward Total Cells	*ATM only.* The total number of cells delivered on the circuit from the terminating node to the originating node. This value includes both high- and low-priority cells.[a] This statistic is collected only for point-to-point circuits.
Backward High Priority Cells	*ATM only.* The total number of high-priority (CLP=0) cells delivered on the circuit from the terminating node to the originating node. This statistic is collected only for point-to-point circuits.
Forward Total Cells	*ATM only.* The total number of cells delivered on the circuit from the originating node to the terminating node. This value includes both high- and low-priority cells.[b]
Forward High Priority Cells	*ATM only.* The number of high-priority (CLP=0) cells delivered on the circuit from the originating node to the terminating node.

Table 1-2. SVC Usage Data (Continued)

Statistic	Description
Received Bytes, Received Deletion Eligible Bytes, and Received Frames	*Frame Relay only.* Traffic counts.

a Backward cell counts taken at the ingress point on the terminating node include OAM cell counts, providing that OAM cell counting is enabled at the network (global) level. See "Forward and Backward Cell Counts" below and the description of OAM cell counting on page 5-39.

b Forward cell counts taken at the ingress point on the originating node include OAM cell counts, providing that the OAM cell counting is enabled at the network (global) level. See "Forward and Backward Cell Counts" below and the description of OAM cell counting on page 5-39.

Forward and Backward Cell Counts

This section describes how the accounting system meausres forward and backward egress and ingress cell counts along the path of a circuit. There are two measurement points each for forward and backward traffic:

Forward cell counts — Are taken at the egress point on the terminating switch, or at the ingress point on the originating switch.

For forward cell counts, OAM cells are added to the user cell counts measured at the ingress point on the originating switch. Depending on the accounting system configuration, OAM cell counts may or may not be added to user cell counts measured at the egress point on the terminating switch (see page 5-39).

Backward cell counts — Are taken at the ingress point on the terminating switch, or at the egress point on the originating switch.

For backward cell counts, OAM cells are added to the user cell counts measured at the ingress point on the terminating switch. Depending on the accounting system configuration, OAM cell counts may or may not be added to the user cell counts measured at the egress point on the originating switch (see page 5-39).

This feature enables an accounting system to count OAM cells independently; for example, on the forward direction of the circuit, the OAM cell count would be the difference between the cell count taken at the ingress point on the originating switch, and the cell count taken at the egress point on the terminating switch.

Figure 1-4 shows an example of a circuit connection, indicating where forward and backward ingress and egress cell counts are taken on the originating and terminating switches.

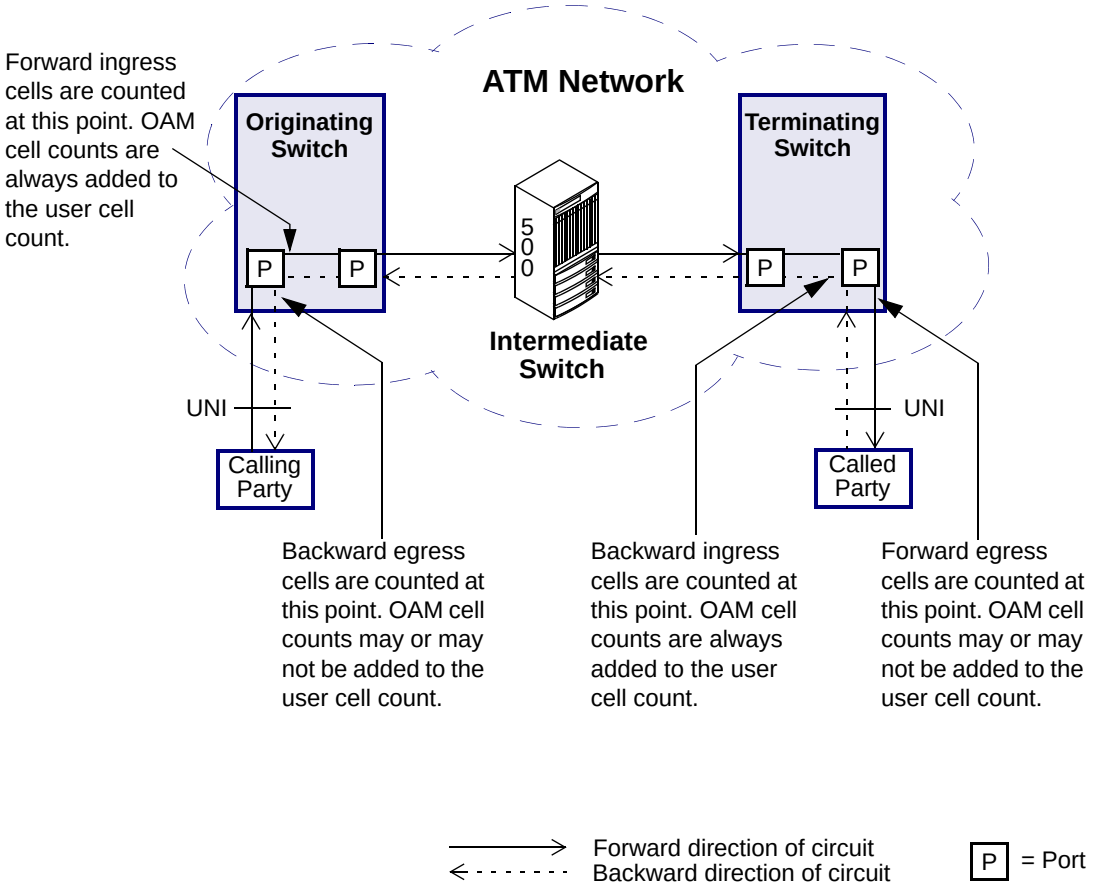


Figure 1-4. Egress and Ingress Cell Measurement Locations

Received Frame Counts

This section describes where frame counts are taken along the path of a Frame Relay circuit. Unlike ATM, which measures both forward and backward traffic, Frame Relay measures traffic only at the egress point of the circuit. Thus, forward traffic from an originating switch is measured at the terminating switch. To quantify the traffic being passed, records are needed from both circuit endpoints.

Figure 1-5 shows an example of a circuit connection, indicating where frame counts are taken on the originating and terminating switches.

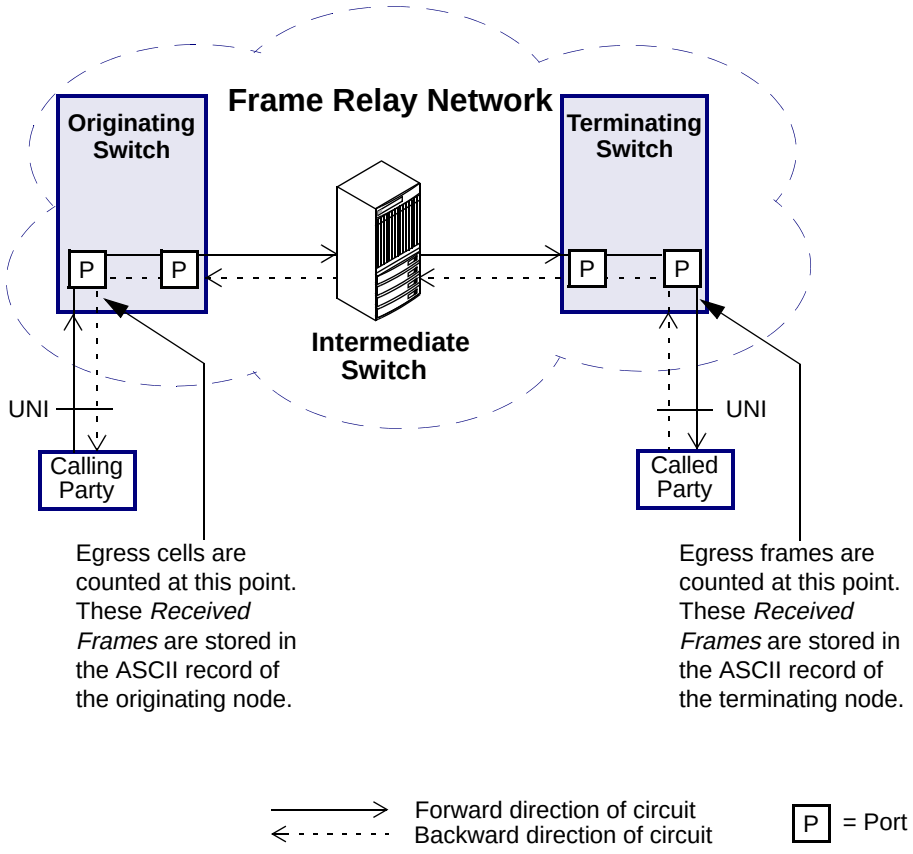


Figure 1-5. Egress Frame Measurement Locations

Accounting System Timing

This section describes:

- How timing is synchronized across the network
- How an SVC call is determined to be normal or long-duration
- How often PVC statistics are uploaded to your billing system

Network Timing Synchronization

Usage-based accounting requires that the switch network and the associated Accounting Servers maintain loosely synchronized and reliable time-of-day clocks. There are two ways to maintain time synchronization in the Ascend switch network:

NavisCore NMS Time-of-day — NavisCore sets the time of each switch once per day via an SNMP set command. The reference time used is the time-of-day on the NavisCore NMS. This features provides a loose time synchronization among the switches, but does not include the Accounting Servers in the network. In addition, the time-of-day clock on a switch is automatically updated when:

– You change a switch-level parameter

– You perform a PRAM sync on the switch's SP

– NavisCore performs its daily update of the time-of-day clock

Also, when a switch boots and detects that it is not configured with a valid time-of-day, an SNMP trap is generated. In this situation, you can use the setclock command to set the time-of-day on the switch to the proper time. Normally, setclock is run automatically as a cron job daily at midnight. However, you can execute setclock manually at any time from the NMS console window.

To execute the setclock command, log into the NMS as the superuser and enter the following command:

```
/opt/CascadeView/bin/setclock
```

This command updates the time on all switches in the network that are reachable by the NMS. The output from this command goes to the BillingClock.log file in /tmp. You can then view the file to see if the switch time was updated.

CBX 500™ Network Time Protocol — The CBX 500 executes the Network Time Protocol to synchronize time-of-day on all I/O modules with the time-of-day on the switch's SP. The time-of-day on each switch's SP is then obtained from the Accounting Server. In order for the switch network to maintain reliable and synchronized time with the Accounting Server, you must configure the server to run Network Time Protocol (NTP) software.

You can use the standard NTP to achieve network timing synchronization. For more information on how to run NTP on a Sun workstation, see Appendix B, "Configuring NTP on the Accounting Server."

SVC Long-Duration and Normal Calls

SVC calls are categorized as long-duration calls and normal calls. At the end of each 24-hour period, which ranges from midnight-to-midnight Greenwich Mean Time (GMT), all SVC call data records for active circuits are aggregated, and the aggregated call data records for these circuits are generated. The Accounting Server retrieves these aggregated call data records for processing.

Long-Duration Calls

Long duration calls see SVCs for which, at midnight GMT, the calling and called parties remain connected, and the elapsed time of the SVC already exceeds 24 hours. In other words, a long duration call is any call that starts in one 24-hour period, and spans at least one more 24-hour period. All other calls are normal duration calls.

For long-duration calls, multiple call data records are generated. One record is created at the end of the second 24-hour period, and subsequent call data records are created at the end of each succeeding 24-hour period, until the call is terminated.

ASCII calls are billed at midnight, regardless of call duration.

Figure 1-6 illustrates when first and continuation records are generated for a long-duration SVC call. In this example, the 24-hour day ends at 3:00 a.m. local time.

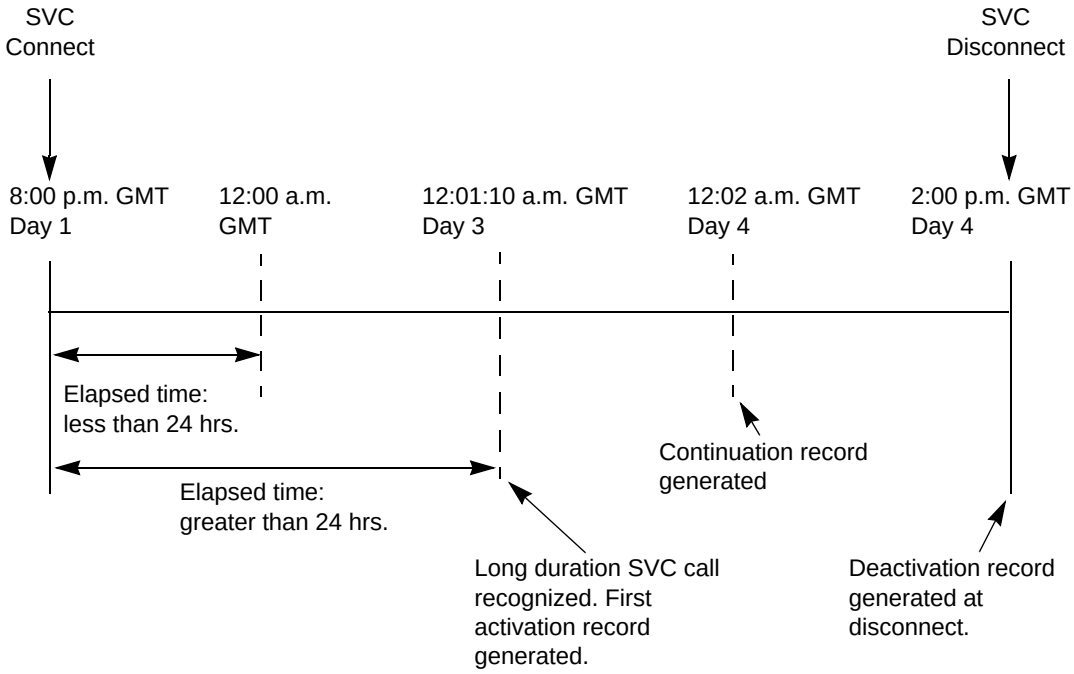


Figure 1-6. Long-duration SVC Call Record Generation

Normal Calls

For normal calls that begin and end in the same 24-hour period, a call data record is generated and sent to your billing operations server within 15 minutes of the end of the call. For normal calls that begin in one 24-hour period and end in the following 24-hour period, the SVC call data records also are created at the end of the call and sent to your billing operations server within 15 minutes of the end of the call.

Figure 1-7 illustrates when call data records are generated in both of these situations. As with the previous example, the 24-hour day ends at 3:00 a.m.

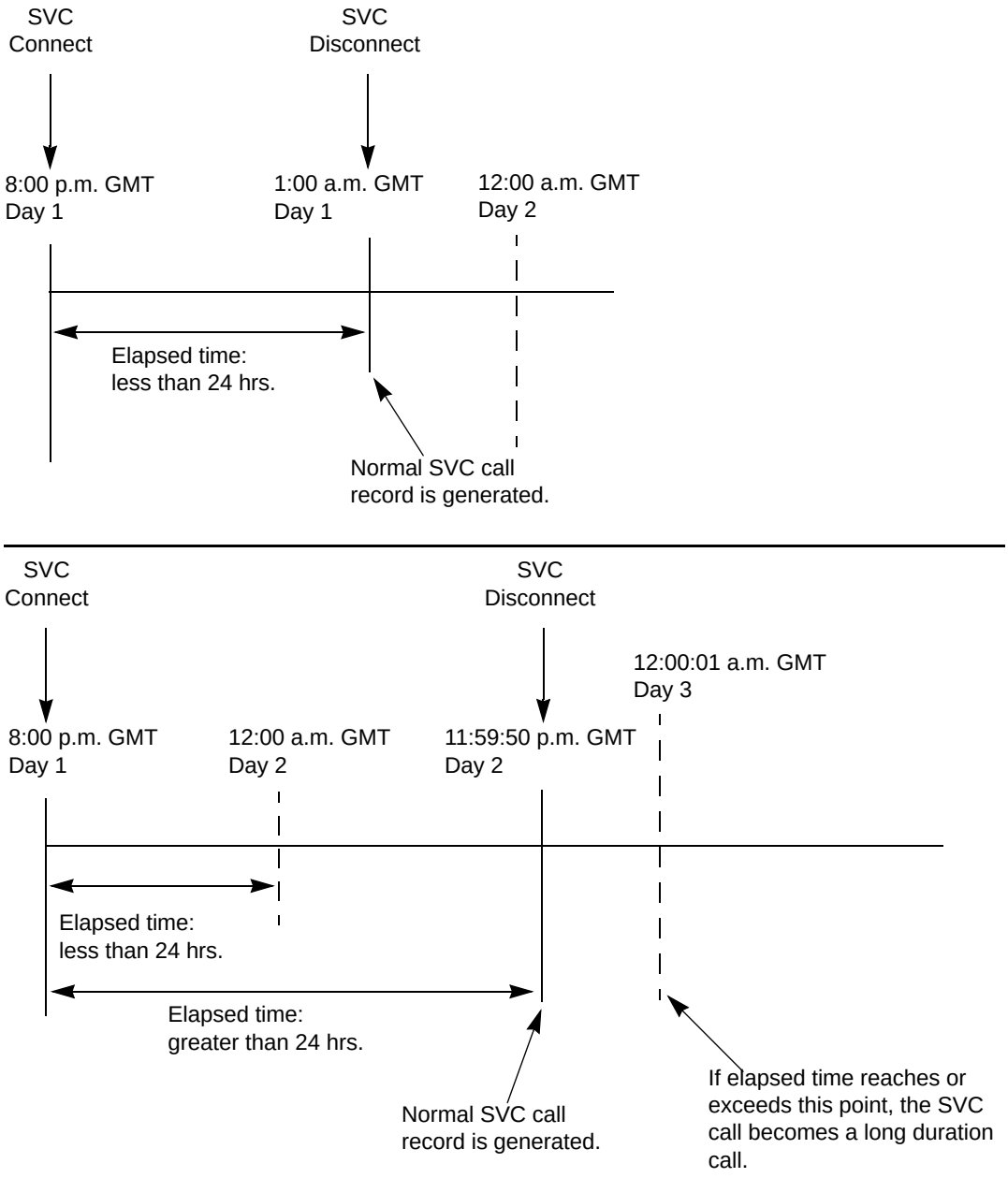


Figure 1-7. Normal SVC Call Record Generation

PVC Recording Intervals

The *PVC Recording Interval* is a configurable value that determines how often PVC call data records are generated and sent to your billing operations server. If this interval is set to 1 hour, then new call data records are created for each PVC on an hourly basis. The PVC Recording Interval can be from 15 minutes to 1440 minutes (24 hours).

Accounting System File Types

Table 1-3 describes the various file types produced by the accounting system. Figure 1-8 on page 1-15 shows the creation sequence for these files.

Table 1-3. File Types Produced by the Accounting System

File Type	Description
BAF files	*ATM only.* These files are created from completed call data files by the BAF generation process. There are two categories of BAF files: • Primary BAF files are created directly by the BAF generation process and are marked as secondary after successful transfer to the billing operations server. • Secondary files are stored on the Accounting Server for a configurable period of days (see "Accounting File Purging" on page 4-8). These files are produced if you select Bellcore AMA format during Accounting Server software installation.
ASCII files	These files are created directly by the data aggregation process and are transferred to your billing operations server without further processing. These files replace the completed call files and BAF files used in standard Bellcore processing. These files are produced if you select ASCII format during Accounting Server software installation.
AMA files	This is a generic term that refers to both BAF and ASCII files.
Active call data files	The system creates these files for collecting and aggregating usage data for each call on an I/O module. There is one active call data file for each I/O module that contains logical ports on which accounting is being performed.
Completed call data files	Once a call is completed or has reached a billable state, the completed record is copied to a completed call data file. The state of the call is marked appropriately in the active call data file. If you selected ASCII as the file format, these files are produced in ASCII; if you selected Bellcore as the file format, these files are eventually converted to BAF format.
Transfer call data files	These files are completed call data files that have been compressed for more efficient storage.

Table 1-3. File Types Produced by the Accounting System (Continued)

File Type	Description
Usage data files	These files are the raw usage data files that contain the raw usage data generated on the switch I/O modules. Records in these files are aggregated into active call records.
Archived AMA files	These files are BAF files that have been transferred successfully and marked as secondary. They serve as a data backup in the event that a BAF file becomes corrupted or unusable. In this situation, the billing operations server can retrieve these files again. If ASCII AMA format is enabled, this directory contains transferred ASCII files. These files are not modified after transfer.
Archived call data files	These files are data records that have been moved to the archive directory for storage. They are completed call data files that have already been processed. If you are using BAF format, these are binary files.
Archived usage data files	These files are usage data files that have already been processed by the data aggregation function and are no longer needed by the system. They prevent loss of data in the event that a completed call file becomes corrupted or unusable, in which case the system uses these files to recreate active call records. If a usage data file becomes corrupted, shut down the accounting system, then move the archived copy of the usage data file from the */CascadeAS/archive/udfiles* directory to the */CascadeAS/data/udfiles* directory for reprocessing.
Audit count files	These files contain a set of audit counts for tracing AMA record activity on the Accounting Server. They ensure acceptable billing services and generate an audit trail of daily record processing.

Figure 1-8 shows the creation sequence for the accounting system-generated files.

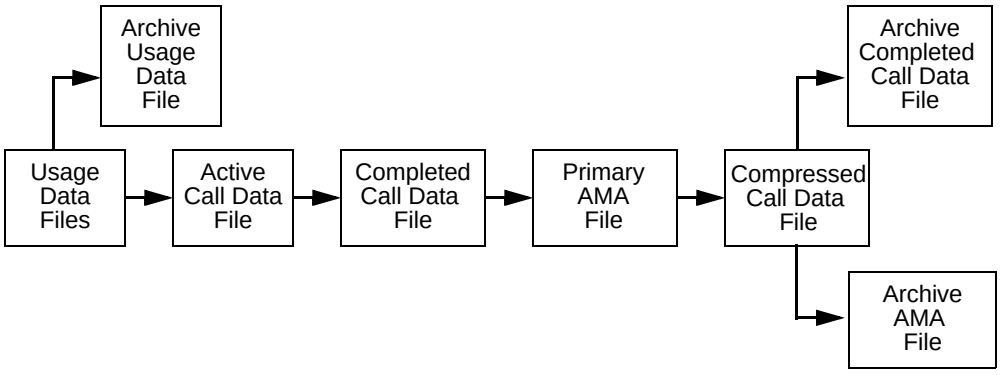


Figure 1-8. Accounting System File Creation Sequence

High Availability Processing

The NavisXtend accounting system shown in Figure 1-1 on page 1-2 shows several Accounting Servers attached to multiple data servers. Each data server contains database files and executable programs specific to the Accounting Server to which it is attached. In this configuration, each Accounting Server has no knowledge of switches being managed by other Accounting Servers on different disk arrays.

By contrast, the NavisXtend accounting system also supports a configuration where multiple Accounting Servers share the same data server (see Figure 1-9). When Accounting Servers share the same data (databases and executable files), the servers can augment processing of accounting data and/or provide uninterrupted, backup processing (*high availability*).

In a configuration involving shared data, an Accounting Server can serve as an *active* server and/or a *reserve* server:

- Active servers process usage data files from a set of assigned switches.
- Reserve servers monitor the processing of usage data files from a set of assigned switches and become the active server in the event of a failure.

The speed and robustness of your accounting system is determined by:

- How many servers you have in the accounting system
- How the switches are assigned to Accounting Servers

To augment processing of accounting data, distribute your switches across several Accounting Servers. To provide high availability support, assign switches to a reserve Accounting Server.

An Accounting Server can serve as an active server for some switches and as a reserve server for others.

In Figure 1-9, accounting data processing is distributed across several active servers. Each switch is assigned an active server and a reserve server. Accounting Server A is the active server for switches 1 and 2; Accounting Server B is the active server for switch 3 and 4; and Accounting Server C is the active server for switch 5 and 6. These servers process usage data files from their switches.

Accounting Servers D and E are configured as reserve Accounting Servers. They actively monitor the processing of the usage data files from switches for which they are on reserve. Should a failure occur in an active server, a reserve Accounting Server notifies other servers in the system of the problem and begins acting as the active Accounting Server for the affected switches.

Thus, if Accounting Server A became unavailable, Accounting Server D automatically takes over processing for switches 1 and 2. It remains the active server for these switches until the system administrator resets Accounting Server A as the active server. Because servers can be both active servers for some switches and reserve servers for others, Accounting Server D remains the reserve server for switch 3.

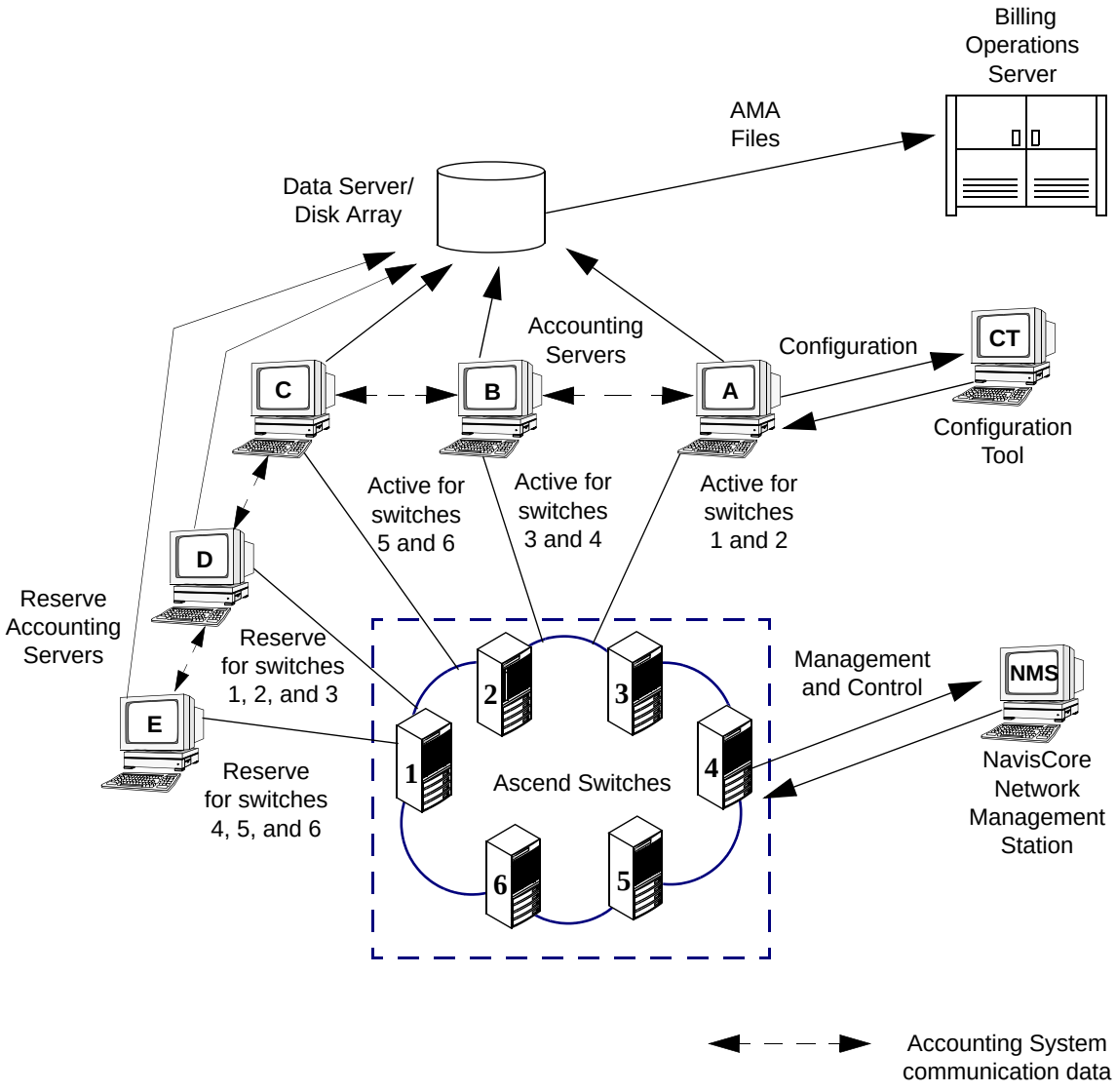


Figure 1-9. High Availability Configuration for the NavisXtend Accounting System

Design Considerations

You need to take into account the following considerations when designing a high availability accounting system.

High Availability Throughput

The high availability accounting system is designed for configuration flexibility. The system administrator can take advantage of multiple Accounting Servers in the system to augment processing. When designing a configuration, keep in mind that some configurations may sacrifice availability. For example, in a logically segmented network with 10 switches and only 2 Accounting Server hosts, each server host can serve as active for 5 switches and reserve for the other 5 switches. This configuration may appear to work well, but if one Accounting Server become unavailable, it leaves the remaining server responsible for all 10 switches. If all 10 switches have a high call rate, this situation can create an overloaded server, resulting in data loss.

The administrator should configure the accounting system so that a single host is not expected to exceed the processing limits of a standard (non-high availability) system (~800 calls/sec maximum). To avoid data loss, the administrator could add a third accounting host, balancing the trade-off between performance and availability.

If a failure does occur on an Accounting Server host, it is best not to allow processing to continue for prolonged periods using a reserve server. If the third (redundant) server takes over for a failed active server, it may not be able to process data if a second active server fails. To avoid overloading the reserve server, rectify the failure as soon as possible.

Availability of the Disk Array

The high availability system is dependent on the availability of the data/disk array. No number of active and reserve Accounting Servers can protect a system from disk array failure. Thus, it is recommended that you use a high availability disk server (such as an Auspex machine) for your configuration.

Not a Fault Tolerant System

The high availability accounting system is intended to provide the user with some protection against loss of data due to planned maintenance and/or unexpected Accounting Server failure. Keep in mind that the system is not a fault tolerant system; it is not intended to protect against power loss or destruction of an entire facility.

2

Preparing for the Installation

This chapter discusses various issues you need to consider before installing and configuring the NavisXtend accounting system software on your Accounting Servers. These issues include:

- Basic tasks you perform for setting up your accounting system
- System requirements, including hardware requirements (such as system type, memory, and processor), and operating system software requirements
- Transport options and bandwidth requirements for sending data to the Accounting Server
- Volume/file system requirements for your disk array
- Accounting Server directory structure and contents

Setup Task Flowchart

Figure 2-1 shows the order in which you perform the necessary high-level tasks for setting up your NavisXtend accounting system. See the related section for more information on each task.

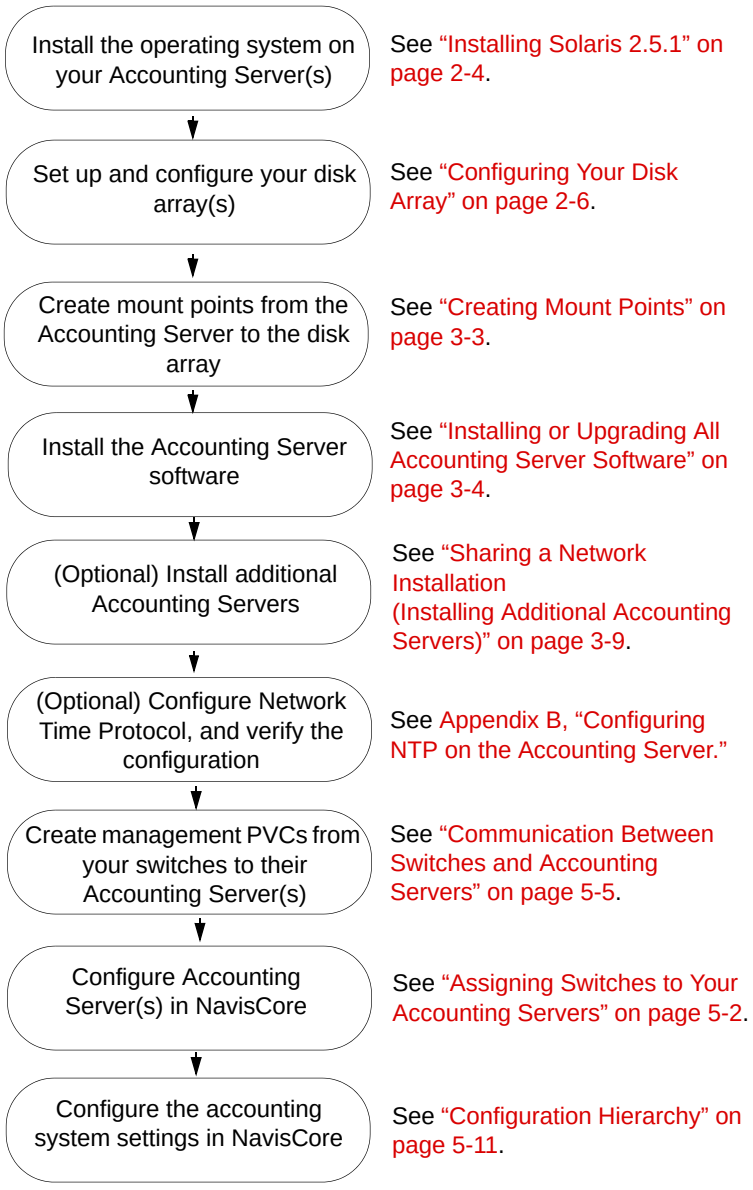


Figure 2-1. Accounting System Setup Task Flowchart

Hardware Requirements

This section describes the hardware requirements for the NavisXtend Accounting Server.

The minimum workstation requirement is a Sun Ultra Enterprise 2 workstation with two processors, configured with:

- 256 MB of onboard RAM.
- Minimum 2.1 GB internal boot drive.
- CD-ROM drive.
- A disk array large enough to store the files produced by each switch from which your Accounting Server(s) will be retrieving accounting data (see "Configuring Your Disk Array" for more information on determining how much storage space you need).

The SPARCstations you use as Accounting Servers should be dedicated solely for that purpose. You should not use these servers for other applications, such as an NMS workstation or Bulk Statistics Collector. To ensure maximum performance, you can configure one disk array to service multiple Accounting Servers via a data server (which is the recommended configuration).

In addition, you have two options for connecting your Accounting Servers to the switch network:

- Using an ATM Network Interface Card (NIC). This type of connection requires the following hardware:
  - An ATM NIC, installed in the Accounting Server (for installation instructions, see the documentation you received with the ATM NIC).
  - An OC3c or OC12c cable for connecting the Accounting Server to a switch in the accounting system.
- Using a router.

For instructions on how to connect switch hardware to an Accounting Server, follow the instructions for connecting an NMS console, as described in either the *CBX 500 Hardware Installation Guide* or the *B-STDX 9000 Hardware Installation Guide*.

Software Requirements

This section describes the software requirements for the NavisXtend Accounting Server and describes how to install the prerequisite software.

Before you can install the Accounting Server software, you must install the following operating system software on the Accounting Server:

- Solaris 2.5.1
- Solaris 2.5.1 cluster patch

See the next two sections for installation instructions.

Installing Solaris 2.5.1

The NavisXtend accounting system requires that the Solaris 2.5.1 operating system be installed on each of your Accounting Servers. For complete installation instructions, see the *Solaris SMCC™ Hardware Platform Guide*. The following instructions relate only to Ascend-specific recommendations for installing the operating system.

To install Solaris 2.5.1:

1. Follow the instructions in the *Solaris SMCC™ Hardware Platform Guide* until the Upgrade System dialog box appears.
2. In the Upgrade System dialog box, choose Initial to repartition the disk.
3. In the System Type dialog box, select Standalone and choose Continue.
4. In the Software dialog box, select Developer System Support and choose Customize.

After selecting a software group, you can add or remove software by selecting Customize. However, this function requires an understanding of software dependencies and how Solaris software is packaged.

5. In the Customize Software dialog box, under the Software Clusters and Packages section, scroll through the list and add the following required new features to the Development System Support (a black square indicates the feature is selected):
   - Automated Security Enhancement Tools (this feature provides options for securing the system)
   - Basic Networking
   - Point-to-Point Protocol
   - System Accounting (this selection does not have any relationship to the accounting system; it merely enables logging features for Solaris)
6. Choose OK.

7. In the Software dialog box, choose Continue.
8. In the Disks dialog box, highlight the line that contains “bootdrive.” Select Add and choose Continue.
9. In the Preserve Data dialog box, choose Continue. This allows the current file systems and un-named slices to be overwritten.
10. In the Automatically Layout File Systems dialog box, select Manual Layout.
11. In the File System and Disk Layout dialog box, select Customize.
12. In the Customize Disks dialog box, enter the values shown in Table 2-1.

Table 2-1. Boot Drive File System Layout

Slice	Mount Point	Size
Slice 0	/	150 MB
Slice 1	swap	768 MB (3*RAM)
Slice 2	DO NOT CHANGE	
Slice 3	DO NOT CHANGE	
Slice 4	DO NOT CHANGE	
Slice 5	/usr	300 MB
Slice 6	/opt	(Remaining unallocated drive space after all other settings have been configured)
Slice 7	DO NOT CHANGE	

13. In the File System and Disk Layout dialog box, choose Continue.
14. In the Profile dialog box, confirm that the displayed information is correct. If you have to change any information, choose Change. Once correct, choose Begin Installation.
15. When prompted to reboot after installing Solaris dialog box, choose Reboot.
16. After the Solaris installation completes and the system reboots, follow the steps in the next section to install the required cluster patch.

Installing the Solaris 2.5.1 Cluster Patch

After installing the Solaris 2.5.1 operating system, you must install the latest cluster patch file on your system. There are several versions of the cluster patch file *2.5.1_Recommended.tar.Z* (*Patch.1*, *Patch.2*, *Patch.3*, etc.). Install the latest numerical version of the file. For more information on obtaining this file, contact Sun Microsystems at 1-800-USA-4SUN.

To install the Solaris 2.5.1 cluster patch:

1. Log in as the root user.
2. Open a command tool window and at the # prompt, enter the following command:

   `zcat /[path to file]/2.5.1_Recommended.tar.z | (cd /tmp; tar -xvpf -)`

   where path to file is the directory path to the cluster file location.

   After executing this command, wait for the # prompt to reappear.
3. When the # prompt reappears, enter the following commands:

   `cd /tmp/2.5.1_Recommended/`

   `./install_cluster`

   After several lines of output, the following message appears:

   ```
   Are you ready to continue with install? [y/n]:
   ```
4. Enter **y** to continue. The installation takes several minutes to complete.
5. When the # prompt reappears, reboot the workstation.

Configuring Your Disk Array

Once Solaris 2.5.1 is installed on all of your Accounting Servers, you can install and configure the disk array on which the accounting data files are to be stored. For instructions, see the configuration manuals you received with your disk array.

Ascend recommends that you connect the disk array to your Accounting Servers via a data server.

See the following sections to determine the volume/file system requirements for the disk array.

Disk Array Storage Requirements

The disk array for your Accounting Server(s) must contain seven volumes/file systems, which you set up when configuring your storage array. Table 2-2 lists these volumes/file systems. To determine the amount of space you need to reserve for each file system, use the formulas described in the following sections, then record the resulting values in the last column of this table. To determine your total disk space requirements, add all seven values.

Table 2-2. Volume/File System Requirements for NFS-Mounted Disk Array

Volume Name[a]	File System	Type	Space Required for Each File System[b]
vol01	/CASC/CascadeAS	Mirrored	100 MB
vol02	/CASC/udfiles	Mirrored	
vol03	/CASC/ama	Mirrored	
vol04	/CASC/calls	Mirrored	
vol05	/CASC/ar_udfiles	Raid5	
vol06	/CASC/ar_calls	Raid5	
vol07	/CASC/ar_ama	Raid5	
Minimum Disk Storage Required —>			

a The volume names shown here are defaults. When configuring your disk array, you can change them to any volume name you want to use.

b Record these values in this column. Add all values to determine your total minimum disk space requirements.

The disk array storage requirements are based primarily on the total number of SVC calls/sec plus the total number of PVCs for all switches in the network whose accounting data is being stored on the disk array. The SVC calls/sec and number of PVCs are a basis for determining how much accounting data is produced by the switches whose usage data you plan to store on the disk array. Other factors include mirroring and Raid5 requirements and, for some file systems, the number of days you plan to store archived data.

Use the following formulas to determine the amount of storage space needed for your accounting data output. When determining the total SVC calls/sec, determine the average number of SVC calls/sec for each switch, then add all averages. Similarly, when determining total PVCs, determine the number of PVCs on each switch, then add all values.

/CASC/CascadeAS File System

You need to reserve 100 MB of space for this file system in all situations, regardless of your network size and other factors. Half of this space is needed for the active file system and half for the mirrored file system. Therefore, reserve half of this space on one physical volume, and the other half on a second physical volume.

/CASC/udfiles File System

Use the following formula to determine disk space requirements for the /CASC/udfiles file system. The formula is the same regardless of whether you are using ASCII or Bellcore format.

$$\left[\begin{array}{l}\text{(total SVC calls/sec for all switches x 18KB)} \\ \text{+ (total PVC circuits x 300 bytes)/(recording interval in minutes)}\end{array}\right] \text{ x 4}$$

The factor of 4 accounts for drive mirroring and the fact that there are two endpoints for each SVC and PVC (and therefore two records for each SVC and PVC).

Example

There are three switches sending data to this disk array:

- Switch 1 averages 800 SVC calls/sec and has 5,000 PVCs
- Switch 2 averages 600 SVC calls/sec and has 7,000 PVCs
- Switch 3 averages 700 SVC calls/sec and has 4,000 PVCs

The switches average a total of 2,100 SVC calls/sec and have a total of 16,000 PVCs.

Also, your PVC recording interval is set to 5 minutes.

The disk storage requirements for /CASC/udfiles are:

[(2,100 x 18 KB) + (16,000 x 60 bytes)] x 4 = 155,040,000 bytes (**155 MB**)

/CASC/ama File System

Bellcore format:

$$\left[\begin{array}{l}\text{(total SVC calls/sec for all switches x 150 KB)} \\ \text{+ [(total PVC circuits x 2.5 KB)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

ASCII format:

$$\left[\begin{array}{l}\text{(total SVC calls/sec for all switches x 162 KB)} \\ \text{+ [(total PVC circuits x 2 KB)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

Example

There are three switches sending data to this disk array:

- Switch 1 averages 600 SVC calls/sec and has 2,000 PVCs
- Switch 2 averages 900 SVC calls/sec and has 1,000 PVCs
- Switch 3 averages 400 SVC calls/sec and has 1,500 PVCs

The switches average a total of 1,900 SVC calls/sec and have a total of 4,500 PVCs.

Also, your PVC recording interval is set to 10 minutes.

Bellcore format:

[(1,900 x 150 KB) + [(4,500 x 2.5 KB)/10]] x 4 = 1,144,000 KB (**1,144 MB**)

ASCII format:

[(1,900 x 162 KB) + [(4,500 x 2 KB)/10]] x 4 = 1,234,800 KB (**1,235 MB**)

/CASC/calls File System

To determine the total file system requirements for /CASC/calls, you need to determine the disk space required for the three subdirectories (active, complete, and transfer) in this file system.

Bellcore format:

Use the following three formulas to determine disk space requirements for the /CASC/calls file system. Then add the three values:

active

total PVC circuits x 296 bytes x 4

complete

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 266,400 bytes)} \\ \text{+ [(total PVC circuits x 4,440 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

transfer

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 266,400 bytes)} \\ \text{+ [(total PVC circuits x 4,440 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

ASCII format:

Use the following three formulas to determine disk space requirements for the /CASC/calls file system. Then add the three values:

active

total PVC circuits x 296 bytes x 4

complete

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 242,100 bytes)} \\ \text{+ [(total PVC circuits x 3,000 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

transfer

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 242,100 bytes)} \\ \text{+ [(total PVC circuits x 3,000 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

Example

There are three switches sending data to this disk array:

- Switch 1 averages 700 SVC calls/sec and has 1,000 PVCs
- Switch 2 averages 600 SVC calls/sec and has 1,000 PVCs
- Switch 3 averages 900 SVC calls/sec and has 1,500 PVCs

The switches average a total of 2,200 SVC calls/sec and have a total of 3,500 PVCs.

Also, the PVC recording interval is set to 5 minutes.

For Bellcore AMA format, the disk storage requirements for /CASC/calls are:

3,500 x 296 bytes x 4 = 4,144 KB (or 4.2 MB)
[(2,200 x 266,400 bytes) + [(3,500 x 4,440 bytes)/5]] x 4 = 2,356,640 KB (2,357 MB)
[(2,200 x 266,400 bytes) + [(3,500 x 4,440 bytes)/5]] x 4 = 2,356,640 KB (2,357 MB)

4.2 MB + 2,357 MB + 2,357 MB = **4,718 MB**

For ASCII format, the disk storage requirements for /CASC/calls are:

3,500 x 296 bytes x 4 = 4,144 KB (or 4.2 MB)
[(2,200 x 242,100 bytes) + [(3,500 x 3,000 bytes)/5]] x 4 = 2,138,880 KB (2,139 MB)
[(2,200 x 242,100 bytes) + [(3,500 x 3,000 bytes)/5]] x 4 = 2,138,880 KB (2,139 MB)

4.2 MB + 2,139 MB + 2,139 MB = **4,282 MB**

/CASC/ar_udfiles File System

Use the following formula to determine disk space requirements for the /CASC/ar_udfiles file system. The formula is the same whether you are using Bellcore format or ASCII format.

$$\left[\begin{array}{l}\text{(total SVC call/sec x 150 bytes)} \\ \text{+ (total PVCs x 2.5 bytes)/(recording interval)}\end{array}\right] \text{ x (\# days before purge x 84,600 sec/day) x 2.4}$$

The factor of 2.4 accounts for Raid5 error correction requirements (1.2) and the fact that there are two endpoints for each SVC and PVC.

Example

There are three switches sending data to this disk array:

- Switch 1 averages 800 SVC calls/sec and has 1,000 PVCs
- Switch 2 averages 900 SVC calls/sec and has 2,000 PVCs
- Switch 3 averages 750 SVC calls/sec and has 2,000 PVCs

The switches average a total of 2,450 SVC calls/sec and have a total of 5,000 PVCs.

Also, the recording interval is set to 10 minutes, and the file purging value for usage data files is set to 5 days.

The disk storage requirements for /CASC/ar_udfiles are:

[(2450 x 150 bytes) + (5000 x 2.5 bytes)/10] x (423,000) x 2.4 = **375,355 MB**

/CASC/ar_calls File System

Bellcore format:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 296 bytes)} \\ \text{+ (total PVCs x 5 bytes)/(recording interval)}\end{array}\right] \text{ x (\# days before purge x 84600 sec/day) x 2.4}$$

ASCII format:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 269 bytes)} \\ \text{+ (total PVCs x 10 bytes)/(3 x recording interval)}\end{array}\right] \text{ x (\# days before purge x 84600 sec/day) x 2.4}$$

Example

There are three switches sending data to this disk array:

- Switch 1 averages 500 SVC calls/sec and has 1,000 PVCs
- Switch 2 averages 900 SVC calls/sec and has 1,000 PVCs
- Switch 3 averages 800 SVC calls/sec and has 1,000 PVCs

The switches averages 2,200 SVC calls/sec and have a total of 3,000 PVCs.

Also, the recording interval is set to 10 minutes, and the file purging value for call data files is set to 4 days.

Bellcore format:

[(2,200 x 296 bytes) + (3,000 x 5 bytes)/4] x (338,400) x 2.4 = **531,925 MB**

ASCII format:

[(2,200 x 269 bytes) + (3,000 x 10 bytes)/12] x (338,400) x 2.4 = **482,667 MB**

/CASC/ar_ama File System

Bellcore format:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 250 bytes)} \\ \text{+ (total PVCs x 250 bytes)/(recording interval x 60)}\end{array}\right] \text{ x (\#days before purge x 84,600 sec/day) x 2.4}$$

ASCII format:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 269 bytes)} \\ \text{+ (total PVCs x 200 bytes)/(recording interval x 60)}\end{array}\right] \text{ x (\#days before purge x 84,600 sec/day) x 2.4}$$

Example

There are three switches sending data to this disk array:

- Switch 1 averages 700 SVC calls/sec and has 3,000 PVCs
- Switch 2 averages 800 SVC calls/sec and has 1,000 PVCs
- Switch 3 averages 900 SVC calls/sec and has 3,000 PVCs

The switches average a total of 2400 SVC calls/sec and have a total of 7,000 PVCs.

Also, the recording interval is set to 5 minutes, and the file purging value for call data files is set to 4 days.

Bellcore format:

[(2,400 x 250) + ((7,000 x 250)/300)] x 338,400 x 2.4 = **492,034 MB**

ASCII format:

[(2,400 x 269) + ((7,000 x 200)/300)] x 338,400 x 2.4 = **530,558 MB**

Minimum Storage Requirements

When determining your disk space requirements, consider the following:

- If you add any PVCs or SVCs to your network (either to existing switches or by adding new switches to the network), you need additional storage space for the usage data produced for these circuits. Therefore, you may want to compute the values based on future expansion of your network, rather than on the current size of your network.
- If you increase the file purging values on any of your Accounting Servers, you affect your storage space requirements. For example, if you increase the file purging value for the /CASC/ar_udfiles file system from 3 to 6 days, you need twice as much storage space for this file system, because you are storing the files twice as long.
- If you disable Accounting Server's file compression (using the ascomp-start script), data files are no longer be compressed, and the amount of storage space required for these files increases by at least a factor of two. For this reason, it is *strongly recommended* that you not disable file compression unless you have configured your disk array with a significant amount of extra storage space. (For information on the ascomp-start script, see Table 7-1 on page 7-2.)

Configuration Tool Requirements

This section describes the hardware and software requirements for the Web-based Accounting Server configuration tool.

Web Server Requirements

The minimum workstation requirement for the Web Server is any Sun SPARCstation.

The minimum software requirements for the Web Server are as follows:

- Ascend Web Server software
- Solaris 2.4 or 2.5.1 and any maintenance release patches

The Web Server is configured to interact with Ascend Web products, including the Accounting Server. You should not use the Web Server to maintain other Web systems, such as a corporate Web site.

Accounting Server Web Client Requirements

The Accounting Server Web-based configuration tool is accessible from a machine running the Java-enabled Web browser, Netscape Navigator. The version of Netscape must support JDK version 1.1. The machine can be a UNIX machine or a Windows machine running Windows NT or Windows 95.

The Accounting Server configuration tool is installed on the Web Server. To access the configuration tool, the Web browser must have access to the Web server. Multiple machines can access the same Web Server.

The following sections describe the requirements for each machine type.

UNIX Workstations

The UNIX machine must be running Solaris 2.4 or 2.5.1 and any maintenance releases. It must use one of the following windowing systems:

- OpenWindows
- Motif
- CDE (Common Desktop Environment)

It is recommended that the machine use a high-resolution monitor (1024 x 768). The minimum memory requirement for the machine is 64 MB.

For best performance, the machine should access the Web Server via an Ethernet connection. Access across a modem connection may be slow.

Windows Workstations

It is recommended that the Windows machine use a high-resolution monitor (1024 x 768). The minimum memory requirement for the machine is 32 MB.

For best performance, use the following recommendations:

- The machine should access the Web Server via an Ethernet connection. Access across a modem connection may be slow.
- From the Netscape Navigator:
  - Unmark the setting Options ⇒ Show Location
  - Unmark the setting Options ⇒ Show Directory Buttons
  - Mark the setting Options ⇒ General Preferences ⇒ Appearance ⇒ Show Main Tool Bar as Text

Accounting Server Directory Structure

This section details the default structure of the NavisXtend Accounting Server directories. If you want, you can change the default directories during the initial stages of the Accounting Server software installation (see page 3-6). If you change the defaults, you should make a list of the new directories. Any directory changes made during installation are symbolically linked to the directory structure shown in Table 2-3.

The Accounting Server directory structure is designed for use with a data server. Many of the directories are intended to be stored in their own file system. For example, the raw usage data files from the switch are stored in a different file system than the archive files for that same data.

Table 2-3. Accounting Server Software Directories

Directory	Description
The following is the high-level Accounting Server directory structure:	
/CascadeAS	Is a link to the Accounting Server file system (for example, /CascadeAS —> /CASC/CascadeAS).
/CascadeAS/archive	Contains directories (or links to directories) used to store data considered by the Accounting Server to be already processed or inactive. Files are removed from the subdirectories in this directory based on the file purging values specified during the Accounting Server configuration (see “Accounting File Purging” on page 4-8).
/CascadeAS/bin	Contains all of the executables required to run the Accounting Server.

Table 2-3. Accounting Server Software Directories (Continued)

Directory	Description
/CascadeAS/data	Contains all of the active data file directories (or links to directories), including directories for AMA files, active and completed call data files, and audit count files.
/CascadeAS/etc	Contains all of the scripts periodically executed by the root crontab.
/CascadeAS/install	Contains the process status scripts, as well as the scripts that start up and shut down processes.
/CascadeAS/lib	Contains the Cygnus gnu libraries needed to run the Accounting Server.
/CascadeAS/tools	Contains the dump utilities and other tools you use to check the processing of data throughout the system.
The /CascadeAS/archive and /CascadeAS/data directories contain subdirectories. The following is a breakdown of subdirectories in each of these high-level directories:	
/CascadeAS/archive/ama	Contains AMA files (in either BAF or ASCII format) that have been successfully transferred from the Accounting Server to the file transfer site specified during the accounting system configuration (see "Accounting AMA File Transfer Configuration" on page 4-9). No data appears in this directory until a completed AMA file has been transferred. If the file transfer option is disabled, or the file transfer configuration is not set up properly, this directory remains empty. ***Note:*** *Data in this directory is not compressed and requires significant storage space.*
/CascadeAS/archive/calls /transfer	Contains completed call data files that have been previously compressed in the /CascadeAS/data/calls/transfer directory.
/CascadeAS/archive/udfiles	Contains the raw usage data files from each of the switches that are configured to use the Accounting Server. The data is actually stored in a subdirectory named "compressed" after the compression function has successfully compressed the data.
/CascadeAS/data/audit	Contains the audit count files for each day. See "Displaying the Contents of Audit Count Files" on page 7-18 for more information on audit count files.
/CascadeAS/data/ama	Contains the files created by the BAF/ASCII generation process, as well as a storage area named primary, which is the subdirectory in which completed AMA files are placed for transfer to your billing operations server. ***Note:*** *If FTP is disabled, AMA files remain here until they are deleted by an administrator.*

Table 2-3. Accounting Server Software Directories (Continued)

Directory	Description
/CascadeAS/data/calls	Contains three subdirectories: active, complete, and transfer. *active* - Contains a single file for each switch-I/O module pair. This file contains all of the call data for calls that are currently active on each I/O module. Filenames consist of the switch's IP address concatenated with the I/O module number (e.g., 193.2.3.4.10 indicates data from I/O module 10 on a switch with IP address 193.2.3.4). *complete* - Contains a pair of files for both SVC and PVC billable calls. Each pair contains a record file and a status file for both PVCs and SVCs. Filenames consist of the prefix SF, SA, PF, or PA, the switch's IP address, the I/O module number, the year, day, hour, and quarter hour of day. If the file is a status file, the letter **s** is concatenated onto the filename. For example, the filename SA.193.2.3.4.10.1997.102.02.01s indicates a status file for an ATM SVC on I/O module 10 on a switch with IP address 193.2.3.4. The file was generated during the second quarter hour of the second hour of the 102nd day of 1997. *transfer* - Contains the completed call data files for the previous quarter hour. These files have been fully processed by the BAF/ASCII generation process.
/CascadeAS/data/config	Contains the Accounting Server configuration file.
/CascadeAS/data/logs	Contains the Accounting Server error log, the time change log, and any intermediate files created by the execution scripts.
/CascadeAS/data/udfiles	Contains raw usage data files. When a switch sends data to the Accounting Server, the data is placed in this directory. Upon execution, these files are moved into their appropriate switch directories based on the switch IP address in the filename. If the Accounting Server is configured to receive data from the switch, the data is stored in a directory named SW.[*ip_address*], where *ip_address* is the IP address of the switch. ***Note:*** *If no switch is configured on the Accounting Server for the file that is received, the file is moved to a suspense subdirectory in this directory.* For information about how the Accounting Server shares these files with the Network Performance Metrics Tool (an optional application available from Ascend), see Appendix C.

Table 2-3. Accounting Server Software Directories (Continued)

Directory	Description
The /CascadeAS/archive and /CascadeAS/data directories contain subdirectories. The following is a breakdown of subdirectories in each of these high-level directories:	
/CascadeAS/archive/ama	Contains AMA files (in either BAF or ASCII format) that have been successfully transferred from the Accounting Server to the file transfer site specified during the accounting system configuration (see "Accounting AMA File Transfer Configuration" on page 4-9). No data appears in this directory until a completed AMA file has been transferred. If the file transfer option is disabled, or the file transfer configuration is not set up properly, this directory remains empty. ***Note:*** *Data in this directory is not compressed and requires significant storage space.*
/CascadeAS/archive/calls /transfer	Contains completed call data files that have been previously compressed in the /CascadeAS/data/calls/transfer directory.
/CascadeAS/archive/udfiles	Contains the raw usage data files from each of the switches that are configured to use the Accounting Server. The data is actually stored in a subdirectory named "compressed" after the compression function has successfully compressed the data.
/CascadeAS/data/audit	Contains the audit count files for each day. See "Displaying the Contents of Audit Count Files" on page 7-18 for more information on audit count files.
/CascadeAS/data/ama	Contains the files created by the BAF/ASCII generation process, as well as a storage area named primary, which is the subdirectory in which completed AMA files are placed for transfer to your billing operations server. ***Note:*** *If FTP is disabled, AMA files remain here until they are deleted by an administrator.*

Table 2-3. Accounting Server Software Directories (Continued)

Directory	Description
/CascadeAS/data/calls	Contains three subdirectories: active, complete, and transfer. *active* - Contains a single file for each switch-I/O module pair. This file contains all of the call data for calls that are currently active on each I/O module. Filenames consist of the switch's IP address concatenated with the I/O module number (e.g., 193.2.3.4.10 indicates data from I/O module 10 on a switch with IP address 193.2.3.4). *complete* - Contains a pair of files for both SVC and PVC billable calls. Each pair contains a record file and a status file for both PVCs and SVCs. Filenames consist of the prefix SF, SA, PF, or PA, the switch's IP address, the I/O module number, the year, day, hour, and quarter hour of day. If the file is a status file, the letter **s** is concatenated onto the filename. For example, the filename SA.193.2.3.4.10.1997.102.02.01s indicates a status file for an ATM SVC on I/O module 10 on a switch with IP address 193.2.3.4. The file was generated during the second quarter hour of the second hour of the 102nd day of 1997. *transfer* - Contains the completed call data files for the previous quarter hour. These files have been fully processed by the BAF/ASCII generation process.
/CascadeAS/data/config	Contains the Accounting Server configuration file.
/CascadeAS/data/logs	Contains the Accounting Server error log, the time change log, and any intermediate files created by the execution scripts.
/CascadeAS/data/udfiles	Contains raw usage data files. When a switch sends data to the Accounting Server, the data is placed in this directory. Upon execution, these files are moved into their appropriate switch directories based on the switch IP address in the filename. If the Accounting Server is configured to receive data from the switch, the data is stored in a directory named SW.[*ip_address*], where *ip_address* is the IP address of the switch. ***Note:*** *If no switch is configured on the Accounting Server for the file that is received, the file is moved to a suspense subdirectory in this directory.*

3

Installing the Accounting Server

This chapter describes how to install the NavisXtend Accounting Server software. As part of the installation process, you can also specify the storage directories for the various types of data files produced by the system.

Before starting the procedures described in this chapter, you should have completed the following tasks, as described in Chapter 2:

- Installed the Solaris 2.5.1 operating system and Solaris 2.5.1 patch release
- Installed and configured your disk array
- Configured the volumes/file systems on your disk array

Before You Begin

Before you begine the installation, read the entire installation instructions thoroughly to determine the information you need for the type of installation you want to perform. Record the information you will need for the installation, especially if you decide to use settings other than the defaults.

See the *Software Release Notice for NavisXtend Accounting Server* for instructions on upgrading your Accounting Server software from a previous version and for any updates to this installation procedure.

Installation Sequence

Figure 3-1shows the general steps for installing the Accounting Server software.

You can install the Web Server and the Accounting Server either on the same machine or on separate machines. The Accounting Server application is installed on the Web Server. The application is accessible from a machine running a Java-enabled Web browser that has access to the Web Server. The application supports Netscape Navigator only. You must obtain and install the browser separately; it does not ship with the Accounting Server system.

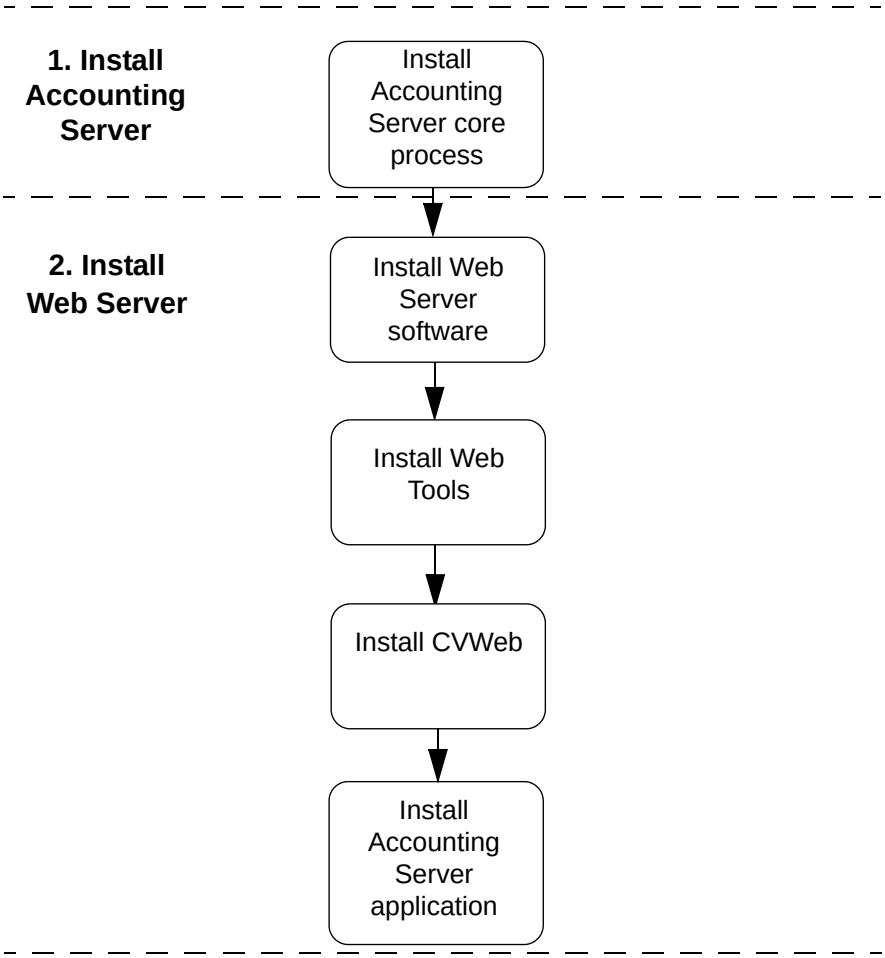


Figure 3-1. Accounting Server System Installation Sequence

Creating Mount Points

Before you can install the Accounting Server software, you must create mount points from the Accounting Server to the seven file systems you created on your disk storage array (see Table 2-2 on page 2-7 for a list of these file systems).

One installation option allows you to install the Accounting Server on one machine and then install additional servers on individual workstations using logical links to the server software on the first machine. If you plan to perform this type of installation, you must mount the Accounting Server file systems onto each workstation before you begin the shared installation.

Once you perform these steps, you can begin the Accounting Server software installation as described in the next section.

Installing Accounting Server Software

To install the Accounting Server software on the servers in your network:

1. Login to the Accounting Server as the root user.
2. Enter the following command to add the software package:

   pkgadd -d [*device_name*]

   where device_name is the device you are installing from (e.g., /cdrom/cdrom0 if you are installing from CD-ROM).

   The following prompt appears:

   ```
   The following packages are available
     1   NAVISaccs     NavisXtend Accounting Server
                         Sparc [version #]

   Select package(s) you wish to process (or 'all' to process
   all packages). (default): all) [?,??,q]:
   ```

3. Enter **1** to select the Accounting Server package. The following prompts appear:

   ```
   Processing package instance <NAVISaccs> from [device_name]

   NavisXtend Accounting Server
   [workstation type]
   ```

   If the directory /CASC/CascadeAS does not exist, the following message appears:

   ```
   The selected base directory </CASC/CascadeAS> must exist
   before the installation is attempted.

   Do you want this directory created now [y,n,?,q] y
   ```

4. When you see this prompt, enter **y** to continue.

The following message and menu appear:

```
Using </CASC/CascadeAS> as the package base directory.

   1) Install all software/overwrite all software
   2) Share a network install
   3) Help
   q) Exit this install

                Selection:
```

5. Select the type of installation you want to perform:

   - Choose option 1 if:
     - You have not yet installed an Accounting Server on your network.
     - You are upgrading your Accounting Server software from a previous revision.
     - You don't want to share data between physical Accounting Servers (for example, if you want a server to output BAF records for some switches and ASCII records for others, you need to perform individual installations on separate data servers).

     Follow the instructions in "Installing or Upgrading All Accounting Server Software" below.

   - Choose option 2 if you have already installed the Accounting Server on another workstation containing a network file system disk array and you want to use that installation's database and binaries. Installing additional servers provides for increased performance or high availability.

     Follow the instructions in "Sharing a Network Installation (Installing Additional Accounting Servers)" on page 3-9.

Installing or Upgrading All Accounting Server Software

When you select option 1 from the installation menu, the following message and menu appear:

```
                -----------
During the installation you will be prompted for information
about the type of installation, the directory structure and
the Accounting Server Configuration. Please refer to the
installation guide for preinstallation instructions and a
further description of the installation process.

What type of installation would you like to perform?
  1 - Bellcore AMA Format
  2 - ASCII AMA Format
```

1. Select the type of installation you want to perform. Select option 1 to use Bellcore's AMA format (BAF) for the final AMA file format. Select option 2 to use the comma-delimited ASCII format for the final AMA file format. For more information on these formats, see Appendix A, "Record Formats."

   Keep in mind that ASCII data is generated for Frame Relay calls, even if you enable BAF files for ATM.

   The system displays the following prompt:

   ```
   Continue with the [installation type] Installation?
   Is this correct (y or n)? <y>
   ```

2. Enter **y** to continue with the installation. If you made the wrong selection, enter **n** to return to the previous menu, then select the correct option to continue.

   The following message and prompt appear:

   ```
   You now have the opportunity to DISABLE the generation of
   AMA records for SVCs and PVCs. If you choose to DISABLE
   record generation, this choice will remain in effect until
   a NEW installation of the Accounting Server is done.

   Would you like to DISABLE SVC record generation at this time?
   Is this correct (y or n)? <y>
   ```

3. If you do not want to generate SVC records on this Accounting Server, enter **y**. If you want to generate SVC records on this Accounting Server, enter **n**.

Keep in mind that if you choose not to generate SVC records, and you later decide you want to generate them, you will have to remove the Accounting Server package and reinstall it.

   The following prompt appears:

   ```
   Would you like to DISABLE PVC record generation at this time?
   Is this correct (y or n)? <y>
   ```

4. If you do not want to generate PVC records on this Accounting Server, enter **y**. If you want to generate PVC records on this Accounting Server, enter **n**.

Keep in mind that if you choose not to generate PVC records, and you later decide you want to generate them, you will have to remove the Accounting Server package and reinstall it.

   The following message and prompt appear:

   ```
   Your current selection for AMA record generation is:
         SVC Records :   [ENABLED | DISABLED]
         PVC Records :   [ENABLED | DISABLED]
   Is this correct(y or n)? <y>
   ```

5. If the selections are as correct, enter **y** to continue. Otherwise, enter **n** and reselect these options.

   If you enter **y**, the following menu appears:

```
Select the directory you would like to configure
1 - Root Directory Structure
2 - Raw (Switch) Usage Data Files
3 - Active Calls Database files
4 - AMA Format files
5 - Archive usage data files
6 - Archive call data files
7 - Archive AMA data files

v-View the current settings
r-Reset the current settings to the defaults
c-Accept the current settings and continue
```

   This menu enables you to configure the Accounting Server directory structure. Table 3-1 provides information on each of these directories. For information on the accounting system directory structure and the file types that are stored in these directories, see Table 1-3 on page 1-14.

Do not choose option **c** until all directories have been configured to point to your disk array file systems. When you choose option **c**, the Accounting Server installation continues and you cannot go back to specify the directories. To view a listing of the current directory settings at any time, select option **v**. To reset all directories to the defaults, select option **r**.

Table 3-1. Directory Structure Defaults

Selection	Default
Root Directory Structure	The base directory under which all other file storage directories will reside. The default is /CascadeAS.
Raw (Switch) Usage Data Files	/CASC/CascadeAS/data/udfiles
Active Calls Database Files	/CASC/CascadeAS/data/calls
AMA Format Files	/CASC/CascadeAS/data/ama
Archive Usage Data Files	/CASC/CascadeAS/archive/udfiles
Archive Call Data Files	/CASC/CascadeAS/archive/calls
Archive AMA Data Files	/CASC/CascadeAS/archive/ama

6. Choose option v to display the current settings. *Do not* accept the defaults. If you do, you will run out of disk space, as the files produced by the accounting system will be stored on the Accounting Server's boot drive instead of on the disk array.

7. Change each directory setting to point to the file systems on the disk array. To do so:

   a. Select the appropriate number for the file system you want to change, and press Return.

      A prompt similar to the following appears:

```
Enter in the directory path for the location
of the Accounting Server [selected file type].
       < [default directory]           -> [current setting]
```

   b. Enter the full path name of the directory you want to use for the selected item.

8. Once you have specified all of the directory locations you want to use, select option c to continue with the installation.

   The following prompt appears:

```
Are you sure these are the settings you wish to use?
Is this correct (y or n)? <y>
```

9. If the settings are correct, enter **y** and press Return to accept the settings and continue. If any settings are incorrect, enter **n** and press Return to go back to the previous menu.

   The following message and prompt appear:

```
The NavisXtend Accounting Server product provides a version
of the Network Time Protocol which can be used to synchronize
the time-of-day clocks of all Ascend switches that perform
usage-based accounting in your network.

Please refer to the installation guide for more information on
the use of the Network Time Protocol in the Accounting System.

Do you wish to install and execute the Network Time Protocol
on this server (y or n)?
```

10. If you want to install the Network Time Protocol on this server, enter **y**. Otherwise, enter **n**. If you enter **y**, the following message and prompt appear:

```
Support for the Network Time Protocol will be installed.

This package contains scripts which will be executed with
super-user permission during the process of installing this
package.

Do you want to continue with the installation of this package
[y,n,?] y
```

11. Enter **y** and press Return to continue.

    The script installs the Accounting Server files. The installation takes less than a minute. Once the files have been installed, the following prompt appears:

```
Do you wish to perform any additional configuration [y,n,?] n
```

12. If you want to configure the Accounting Server, enter **y**. The Accounting Server Configuration main menu appears.

```
Accounting Server Configuration Main Menu

  1 - Bellcore Standard Configuration Parameters
  2 - Accounting File Purging
  3 - Accounting AMA File Transfer Configuration
  4 - Recording Office Configuration
  5 - File System Capacity Monitoring
  6 - Switch Configuration
  7 - SNMP Trap Destinations
  8 - High Availability Configuration
  9 - Accounting Server Location
  q - Exit this program


Select the number of an item :
```

13. You can begin configuring the Accounting Server. For instructions, see "The Accounting Server Configuration Main Menu" on page 4-2.

It is recommended (but not required) that you complete the configuration of the Accounting Server before quitting the installation program. As a minimum, you must define the switches whose usage data records are to be transferred to this Accounting Server (item 6 on the main menu). For instructions, see "Switch Configuration" on page 4-15.

All other items can be configured after you quit the installation program. You can use the character-based Accounting Server Configuration main menu or the graphical-based Accounting Server configuration tool. For instructions on using these tools, see Chapter 4, "Configuring the Accounting Server."

Before you exit:
Once you choose **q** from the main menu, the installation completes and the Accounting Server processes start. If you exit before completing the configuration, the system may not function as you want it to. If you need to, you can access the configuration main menu again by logging in as the superuser and entering the following command:

```
/CascadeAS/bin/configAS
```

The next section describes how to complete the installation.

Completing the Installation

To complete the installation, select **q** from the main menu. The Accounting Server processes automatically start, and a series of messages appear. The following example shows a sample output:

```
Executing postinstall script

Current Accounting Server Status
  Data Aggregation:    RUNNING
  PVC BAF Generation:  RUNNING
  SVC BAF Generation:  RUNNING
  BAF Transfer:        RUNNING
  File Aging:          RUNNING
  File Compression:    RUNNING
  File Transfer:       RUNNING
  AS SNMP Agent:       RUNNING

 Starting NTP daemon
 KERNEL tick = 10000 us
 PRESET tick = 10000 us
 dosynctodr is on
 kernel level printf's: on
 calculated Hz = 100.00 Hz
 zeroing dosynctodr: done!

 Installation of <NAVISaccs> was successful.

 The following packages are available:
   1   NAVISaccs     NavisXtend Accounting Server
                      Sparc [version #]

 Select package(s) you wish to process (or 'all' to process all
 packages). (default): all) [?,??,q]:
```

Select **q** to exit the installation script.

The installation of the Accounting Server software is complete. Proceed to "Installing the Web Server Components" on page 3-13.

Sharing a Network Installation (Installing Additional Accounting Servers)

When you select option 2 from the installation menu, the installation script shares program files and database files on a network file system. It creates a package instance and directory links to file systems mounted via NFS. Thus, the following prerequisites apply for this shared installation:

- You must mount the Accounting Server file systems onto your workstation before you begin the shared installation. Table 2-2 on page 2-7 describes these volumes/file systems.
- The mounted file systems must already contain a complete Accounting Server installation. Follow the instructions in "Installing or Upgrading All Accounting Server Software" on page 3-4.

When you select option 2, the following prompt appears:

```
High Availability Clients require access to the Accounting Server
directory structure via an NFS mount

(All Accounting Server directories must be accessible under this
mount point)

Please enter the location of Root Directory Structure
               ----------
Enter in the directory path to the mount point for the Accounting
Server Root Directory Structure.
       < default: /CASC/CascadeAS >
```

To continue, complete the following steps:

1. Either press Return to accept the default, or enter the directory where the NFS /CASC/CascadeAS file system is located. The following prompt appears:

   ```
   The Root Directory Structure directory structure will be linked as
   follows

      /CascadeAS                 ->        /CASC/CascadeAS (imported
   from [dataserver]:/CASC/CascadeAS)

   Is this correct(y or n)? <y>
   ```

   Enter **y** to continue or press **n** and re-enter the mount point for the Root directory.

   The following message and prompt appear:

   ```
   The NavisXtend Accounting Server product provides a version
   of the Network Time Protocol which can be used to synchronize
   the time-of-day clocks of all Ascend switches that perform
   usage-based accounting in your network.

   Please refer to the installation guide for more information on
   the use of the Network Time Protocol in the Accounting System.

   Do you wish to install and execute the Network Time Protocol
   on this server (y or n)?
   ```

2. If you want to install the Network Time Protocol on this server, enter **y**. Otherwise, enter **n**. If you enter **y**, the following message and prompt appear:

   ```
   Support for the Network Time Protocol will be installed.

   This package contains scripts which will be executed with
   super-user permission during the process of installing this
   package.

   Do you want to continue with the installation of this package
   [y,n,?] y
   ```

3. Enter **y** and press Return to continue.

   The following message appears:

   ```
   Installing NAVISxtend Accounting Server as <NAVISaccs>

   ## Executing preinstall script. Creating link for /CASC/CascadeAS
   ```

```
## Installation of part 1 of 1 is complete. ## Executing
postinstall script.

Do you wish to configure the Accounting Server to process
accounting data on this host (hostname)?

If you select “no” you’ll need to add [hostname] to the Accounting
Server with the /CascadeAS/bin/configAS command before it becomes
available for processing.

Add [hostname] now (y or n)? <y>
```

4. If you enter **y**, the script updates the data server’s configuration files with the hostname and automatically starts the accounting processing.

   If you enter **n**, you need to run the configAS command after installation to configure and manually start processing.

   ```
   Do you wish to perform any additional configuration [y,n,?] n
   ```

5. If you want to configure the Accounting Server, enter **y**. The Accounting Server Configuration main menu appears.

   ```
   Accounting Server Configuration Main Menu

     1 - Bellcore Standard Configuration Parameters
     2 - Accounting File Purging
     3 - Accounting AMA File Transfer Configuration
     4 - Recording Office Configuration
     5 - File System Capacity Monitoring
     6 - Switch Configuration
     7 - SNMP Trap Destinations
     8 - High Availability Configuration
     9 - Accounting Server Location
     q - Exit this program


   Select the number of an item :
   ```

6. You can begin configuring the Accounting Server. For instructions, see “The Accounting Server Configuration Main Menu” on page 4-2.

   It is recommended (but not required) that you complete the configuration of the Accounting Server before quitting the installation program. As a minimum, you must define the switches whose usage data records are to be transferred to this Accounting Server (item 6 on the main menu). For instructions, see “Switch Configuration” on page 4-15.

   All other items can be configured after you quit the installation program. You can use the character-based Accounting Server Configuration main menu or the graphical-based Accounting Server configuration tool. For instructions on using these tools, see Chapter 4, “Configuring the Accounting Server.”

Before you exit:
Once you choose **q** from the main menu, the installation completes and the Accounting Server processes start. If you exit before completing the configuration, the system may not function as you want it to. If you need to, you can access the configuration main menu again by logging in as the superuser and entering the following command:

```
/CascadeAS/bin/configAS
```

The next section describes how to complete the installation.

Completing the Installation

To complete the installation, select **q** from the main menu. The Accounting Server processes automatically start, and a series of messages appear. The following example shows a sample output:

```
Executing postinstall script

Current Accounting Server Status
  Data Aggregation:    RUNNING
  PVC BAF Generation:  RUNNING
  SVC BAF Generation:  RUNNING
  BAF Transfer:        RUNNING
  File Aging:          RUNNING
  File Compression:    RUNNING
  File Transfer:       RUNNING
  AS SNMP Agent:       RUNNING

 Starting NTP daemon
 KERNEL tick = 10000 us
 PRESET tick = 10000 us
 dosynctodr is on
 kernel level printf's: on
 calculated Hz = 100.00 Hz
 zeroing dosynctodr: done!

 Installation of <NAVISaccs> was successful.

 The following packages are available:
   1   NAVISaccs     NavisXtend Accounting Server
                      Sparc [version #]

 Select package(s) you wish to process (or 'all' to process all
 packages). (default): all) [?,??,q]:
```

Select **q** to exit the installation script.

The installation of the Accounting Server software is complete. Proceed to the next section.

Installing the Web Server Components

This section describes how to install the following Web Server components using the pkgadd utility:

- Web Server package (CASCws)
- Web Tools package (CASCwt)
- CVWeb package (CASCwc)
- Accounting Server application package (CASCasc)

To install the Web Server components:

1. Log on to the Web Server workstation. Become root by entering **su - root**. At the prompt, enter the root password.
2. Install each package separately using pkgadd.

   You must install the packages in the order described in the following sections, starting with the Web Server package.

Installing the Web Server Package

1. Install the Web Server using pkgadd.

   If you extracted the files from the Accounting Server media, enter a command to install the Web Server package from a particular device or pathname:

   pkgadd -d [*spool-pathname*] CASCws

   where spool-pathname is the location where the package is stored.

   Or, if you want to install the Web Server package directly from media, enter:

   pkgadd -d [*media device pathname*] CASCws

   where media device pathname is the media device pathname.

   The utility indicates what directory it will use as a package base directory and prompts you to enter the destination directory for the package:

   ```
   Please enter the directory to install <CASCws>
   [default=/opt/cvweb/products]:
   ```

2. Enter the directory where you want the package installed. The disk space requirement for the Web Server component is 712 KB.

   The installation utility performs various verification functions and displays the message:

```
This package contains scripts which will be executed with
super-user permission during the process of installing this
package.

Do you want to continue with the installation of <CASCws> [y,n,?]
```

3. Enter **y** to continue.

   The installation utility executes a preinstallation script and displays the confirmation message:

   ```
   Are you sure you want to install CV Web Server [y/n]?
   ```

4. Enter **y** to continue.

   The utility displays the URL that users should use to access the Accounting Server application on the Web Server. For example:

   ```
   http://machine1:9050/asweb
   ```

   where machine1 is the name of the host name of the Web Server and 9050 is the port number the Web Server uses. Record this information so that you can inform users about which URL to enter from a Web browser.

   The utility completes the installation:

   ```
   Installation of <CASCws> was successful.
   ```

The installation of the Web Server package is complete. Next, you install the Web Tools package.

Installing the Web Tools Package

1. Install the Web Tools using pkgadd.

   If you extracted the files from the Accounting Server media, enter a command to install the Web Tools package from a particular device or pathname:

   pkgadd -d [*spool-pathname*] CASCwt

   where spool-pathname is the location where the package is stored.

   Or, if you want to install the Web Tools package directly from media, enter:

   pkgadd -d [*media device pathname*] CASCwt

   where media device pathname is the name of the media device pathname.

   The installation utility indicates what directory it will use as a package base directory and prompts you to enter the destination directory for the package:

   ```
   Please enter the directory to install <CASCwt>
   [default=/opt/cvweb]:
   ```

2. Enter the directory where you want the package installed. The disk space requirement for the Web Tools component is approximately 7 MB.

The installation utility performs various verification functions and displays the following message:

```
This package contains scripts which will be executed with
super-user permission during the process of installing this
package.

Do you want to continue with the installation of <CASCwt> [y,n,?]
```

3. Enter **y** to continue.

   The utility executes a preinstallation script and completes the installation:

   ```
   Installation of <CASCwt> was successful.
   ```

The installation of the Web Tools package is complete. Next, you install the CVWeb package.

Installing the CVWeb Package

1. Install CVWeb using pkgadd.

   If you extracted the files from the Accounting Server media, enter a command to install the CVWeb package from a particular device or pathname:

   pkgadd -d [*spool-pathname*] CASCwc

   where spool-pathname is the location where the package is stored.

   Or, if you want to install the CVWeb package directly from media, enter:

   pkgadd -d [*media device pathname*] CASCwc

   where media device pathname is the media device pathname.

   The installation utility indicates what directory it will use as a package base directory and prompts you to enter the destination directory for the package:

   ```
   Please enter the directory to install <CASCwc>
   [default=/opt/cvweb/products]:
   ```

2. Enter the directory where you want the package installed. The disk space requirement for the CVWeb component is approximately 416 KB.

   The installation utility performs various verification functions and displays the message:

   ```
   This package contains scripts which will be executed with
   super-user permission during the process of installing this
   package.

   Do you want to continue with the installation of <CASCwc> [y,n,?]
   ```

3. Enter **y** to continue.

   The installation utility executes a preinstallation script and displays the confirmation message:

   ```
   Are you sure you want to install CV Web [y/n]?
   ```

The utility completes the installation:

```
Installation of <CASCwc> was successful.
```

The installation of the CVWeb package is complete. Next, you install the Accounting Server application package.

Installing the Accounting Server Application Package

1. Install the Accounting Server application using pkgadd.

   If you extracted the files from the Accounting Server media, enter a command to install the Accounting Server application package from a particular device or pathname:

   pkgadd -d [*spool-pathname*] CASCasc

   where spool-pathname is the location where the package is stored.

   Or, if you want to install the Accounting Server application package directly from media, enter:

   pkgadd -d [*media device pathname*] CASCasc

   where media device pathname is the media device pathname.

   The installation utility indicates what directory it will use as a package base directory and prompts you to enter the destination directory for the package:

   ```
   Please enter the directory to install <CASCasc>
   [default=/opt/cvweb/products]:
   ```

2. Enter the directory where you want the package installed. The disk space requirement for the Accounting Server application is approximately 58 MB.

   The installation utility performs various verification functions and displays the message:

   ```
   This package contains scripts which will be executed with
   super-user permission during the process of installing this
   package.
   ```

   ```
   Do you want to continue with the installation of <CASCasc> [y,n,?]
   ```

3. Enter **y** to continue.

   The installation utility executes a preinstallation script and displays the confirmation message:

   ```
   Are you sure you want to install Accounting Server Application
   [y/n]?
   ```

4. Enter **y** to continue.

   The utility completes the installation:

   ```
   Install complete.
   ```

   ```
   Installation of <CASCasc> was successful.
   ```

The installation of the Accounting Server application is complete.

4

Configuring the Accounting Server

This chapter describes how to configure each of the Accounting Servers in your network. Configuration tasks include:

- Configuring Bellcore Standard configuration parameters
- Specifying how long files remain on the system before being purged
- Configuring the Accounting Server to transfer AMA files periodically to another host via FTP
- Specifying information that designates the Accounting Server as the Recording Office
- Specifying alarm thresholds, indicating the file systems containing data and archive files are nearing storage capacity
- Specifying switch information required for the AMA generation process
- Specifying where to send SNMP traps generated by the Accounting Server
- Specifying high availability configuration
- Registering Accounting Server location

You must configure each Accounting Server in your network separately, using either of the following tools:

- The text-based Accounting Server Configuration main menu
- The Web-based graphical Accounting Server configuration tool

The following sections describe how to use these configuration tools.

The Accounting Server Configuration Main Menu

The Accounting Server Configuration main menu is a text-based program you can use to configure the Accounting Servers in your network. There are two ways to access it:

- When you complete the software installation, the Accounting Server Configuration main menu appears automatically. In this case, the Accounting Server processes are not running yet.
- When the system is operating, you can enter the following command to access the Configuration main menu:

  `/CascadeAS/bin/configAS`

  In this case, the Accounting Server processes may already be running. Any changes you make to the configuration take effect the next time a process executes. For example, if the file transfer process is currently executing and you change the destination system to which files are being transferred, the change does not take effect until the next time the file transfer process executes.

The Accounting Server Configuration main menu is shown here:

```
Accounting Server Configuration Main Menu

  1 - Bellcore Standard Configuration Parameters
  2 - Accounting File Purging
  3 - Accounting AMA File Transfer Configuration
  4 - Recording Office Configuration
  5 - File System Capacity Monitoring
  6 - Switch Configuration
  7 - SNMP Trap Destinations
  8 - High Availability Configuration
  9 - Accounting Server Location
  q - Exit this program


Select the number of an item :
```

If you chose “ASCII Format” instead of “Bellcore AMA Format” during the installation, the “Bellcore Standard Configuration Parameters” menu choice is not included, as it does not apply to ASCII data files.

To configure each menu item, see the corresponding section and page number shown below:

Menu Selection	See
Bellcore Standard Configuration Parameters	page 4-3
Accounting File Purging	page 4-8
Accounting AMA File Transfer Configuration	page 4-9
Recording Office Configuration	page 4-12
File System Capacity Monitoring	page 4-12
Switch Configuration	page 4-15
SNMP Trap Destinations	page 4-17
High Availability Configuration	page 4-19
Accounting Server Location	page 4-20

Bellcore Standard Configuration Parameters

This option is available only if you selected Bellcore AMA Format on the initial installation menu. Select this option if:

- You want to use BAF file format with proprietary extensions (extended BAF)
- You want to modify any of the default settings for the items shown in this menu

To configure Bellcore Standard configuration parameters:

1. Select Bellcore Standard Configuration Parameters from the Accounting Server Configuration main menu. The following menu appears:

```
Bellcore Standard Configuration Parameters Menu

  1 - Enable inclusion of proprietary BAF modules
  2 - AMA File Size Capacity
  3 - Disable AMA Four-Field Suppression
  4 - AMA Structure Call Types for BAF Records
  5 - AMADNS Source Component Identifier
  6 - AMADNS Destination Component Identifier
  7 - Return to previous menu
```

2. Select the appropriate item for the parameter you want to configure. (The following sections describe the menu items.)
3. Once you have configured all items on this menu as desired, select item 7. You are prompted to confirm any changes you made.
4. Enter **y** to save your changes or **n** to cancel.

   You return to the Accounting Server Configuration main menu.

Inclusion of Ascend-proprietary Modules

Ascend-proprietary modules (Ascend extensions) include usage data that is not included in standard BAF files. For a list and description of each of the proprietary modules, see "Ascend BAF Extensions" on page A-6. If you do not include these modules, the BAF files produced by the system contain only Bellcore standard information. If you include these modules, the BAF files will contain all of the Bellcore standard information, plus the additional information listed on page A-6.

To configure Ascend-proprietary modules:

1. Select item 1 from the Bellcore Standard Configuration Parameters menu. The following prompt appears:

   ```
   Inclusion of the proprietary modules is now disabled.
   Do you want to include the modules? (y/n):
   ```

2. Enter **y** to enable the proprietary modules.

   Enter **n** if you do not need or want to use these modules.

   You return to the Bellcore Standard Configuration Parameters menu.

AMA File Capacity

By default, an AMA file can be a maximum size of 2000 KB (2 MB) and can contain a maximum of 16,000 records. During installation, you should accept these default values. If you later determine that you need to change these defaults, do so as follows:

1. Select item 2 from the Bellcore Standard Configuration Parameters menu. The following menu appears:

   ```
      AMA File Size Capacity Parameters

   1 - The maximum size of the file in Kbytes (current: 2000).
   2 - The maximum number of records in a file (current: 16000).
   3 - Return to previous menu.

   Select a parameter to change:
   ```

2. To change either of the current values, enter the appropriate parameter number. When prompted, enter the desired value:

   - For maximum file size, enter a value from 512 - 2048.
   - For maximum number of records, enter a value from 500 - 3200.

3. When you finish, select item 3.

   You return to the Bellcore Standard Configuration Parameters menu.

AMA Four-Field Suppression

Standard AMA files contain a common set of fields that contain the same values in each file produced for a given switch-Accounting Server pair. These common fields are:

Sensor type — Uniquely identifies the generating switch

Sensor identification — Uniquely identifies the generating switch

Recording Office type — Not applicable to the Accounting Server; the server sets this value to zero (0)

Recording Office ID — Not applicable to the Accounting Server; the server sets this value to zero (0)

You can suppress these fields to reduce the size (by 12 bytes) of each BAF record that is produced in a given BAF file. The four fields are still contained in the header for the file and can be extracted from the header if needed. By enabling four-field suppression, you can save significant storage space, since you decrease the record size of BAF records by 12 bytes.

To disable (or enable) four-field suppression:

1. Select item 3 from the Bellcore Standard Configuration Parameters menu. The following prompt appears:

   ```
   Four-Field Suppression is currently enabled.
   Do you want to disable it ? (y/n)
   ```

2. To exclude these fields from your final BAF record, enter **n**. If you want to include these four fields in your final BAF records, enter **y**.

   You return to the Bellcore Standard Configuration Parameters menu.

AMA Structure Call Types for BAF Records

You can specify the structure call types for the BAF records produced by the system. For detailed information on call types, see Bellcore GR-1100 and Bellcore GR-1110-CORE, Section 10.

To configure AMA structure call types:

1. Select item 4 from the Bellcore Standard Configuration Parameters menu. The following menu appears (the default settings are shown here):

   ```
   1 - Intranetwork Point to Point Terminating SVC Call Type (current: 619).
   2 - Intranetwork Point to Point Originating SVC Call Type (current: 610).
   3 - Intranetwork Point to Multipoint Terminating Leaf Call Type (current: 913).
   4 - Intranetwork Point to Multipoint Originating Root Call Type (current: 912).
   5 - Intranetwork PVC Call Type (current: 609).
   6 - Internetwork PVC Call Type (current: 608).
   7 - Internetwork SVC Originating UNI Call Type (current: 611).
   ```

```
 8 - Internetwork SVC Originating NNI Call Type (current: 612).
 9 - Internetwork SVC Terminating UNI Call Type (current: 914).
10 - Internetwork SVC Terminating NNI Call Type (current: 613).
11 - Return to Previous Menu.

Select an option :
```

2. Enter the number for the parameter you want to change. A prompt similar to the following appears:

   ```
   Enter <[item] Type> : [value]
   ```

3. Enter the new value.

4. When you have configured all values as desired, select item 11.

   You return to the Bellcore Standard Configuration Parameters menu.

AMADNS Source Component Identifier

The Source Component Identifier uniquely identifies the Accounting Server to your billing operations server. The identifier is a 6-digit value that includes a 2-digit Source Component type code and a 4-digit Source Component Identification Number:

Source Component Type Code — A 2-digit code, as defined in Bellcore GR-1343-CORE, that identifies the type of AMADNS Server (Accounting Server) that sends AMA records to the billing operations server. For example, if the Accounting Server is considered to be an AMADNS data server by your billing operations server, set the Source Component type to 2 (02).

This value is 02 by default, and should remain so in order to be Bellcore compliant. The valid range of values is 00-15.

Source Component Identification Number — A 4-digit code that uniquely identifies the Accounting Server that sends AMA records to the billing operations server. Enter a different value for each of your Accounting Servers. The value can be in the range of 0000 to 4095.

As an example, if you have three Accounting Servers, you may want to assign them Source Component Identifiers 020001, 020002, and 020003. By default, the Source Component Identifier is set to 020000.

To configure a Source Component Identifier:

1. Select item 5 from the Bellcore Standard Configuration Parameters menu. The following messages and menu appear:

   ```
   The Accounting Server must be assigned a Source Component Identifier
   which uniquely identifies the Accounting Server within your
   Accounting System.

   As defined in GR-1343-CORE (AMADNS), the Component Identifier is composed
   of two parts: a Component Type Code and a Component Identification Number.

   The Component Identifier is represented as xxyyyy where xx is the
   Component Type Code and yyyy is the Component Identification Number.
   ```

```
The Component Identifier currently configured is: 020000

 1 - Source Component Type Code (current: 2).
 2 - Source Component Identification Number (current: 0).
 3 - Return to Previous Menu.

Select an option:
```

By default, the Source Component type code is set to 2 (02) and should not be changed. By default, the Source Component Identification Number is set to 0000; you can change this value to any code not currently being used by another Accounting Server.

2. Enter the number for the parameter you want to change.
3. When prompted, enter the new value.
4. When you have configured both values as desired, select item 3.

   You return to the Bellcore Standard Configuration Parameters menu.

AMADNS Destination Component Identifier

The Destination Component Identifier identifies the billing operations server to which you want final AMA data files to be transferred. The identifier is a 6-digit value that includes a 2-digit Destination Component type code and a 4-digit Destination Component Identification Number. These two items are included in BAF filenames (see "BAF Record Filename Format" on page 7-8).

Destination Component Type Code — A 2-digit Component type code (as defined in Bellcore GR-1343-CORE) that identifies the type of billing operations server to which completed AMA files are to be transferred. For example, if the billing operations server is a DPMS, set the Destination Component type to 03. For detailed information, see Bellcore GR-1343-CORE.

The valid range of values is 00-15. Use the Destination Component type that is appropriate for the type of billing operations server you have.

Destination Component Identification Number — A 4-digit code that uniquely identifies the billing operations server to which completed AMA files are to be transferred. Use the 4-digit code that identifies your billing operations server. This value can be in the range of 0000 to 4095.

By default, the Destination Component Identifier is set to 030000.

To configure a Destination Component Identifier:

1. Select item 6 from the Bellcore Standard Configuration Parameters menu. The following messages and menu appear:

```
The Billing Operations Server (e.g., AMADNS DPMS) must be assigned a
Destination Component Identifier which uniquely identifies the BOS
within your Accounting System.

As defined in GR-1343-CORE (AMADNS), the Component Identifier is composed
of two parts: a Component Type Code and a Component Identification Number.

The Component Identifier is represented as xxyyyy where xx is the
Component Type Code and yyyy is the Component Identification Number.

The Component Identifier currently configured is: 000000

1 - Destination Component Type Code (current: 3).
2 - Destination Component Identification Number (current: 0).
3 - Return to Previous Menu.

Select an option :
```

   By default, the Destination Component type code is set to 3, but can be any value from 0-15. Use the code that is appropriate for the type of billing operations server you are using.

   Also by default, the Destination Component ID is set to 0, but can be any value from 0-4095. You can change this value to any value not currently being used by any of your billing operations servers.

2. Enter the number for the parameter you want to change.
3. When prompted, enter the new value.
4. When you have configured both values as desired, select item 3.

   You return to the Bellcore Standard Configuration Parameters menu.

Accounting File Purging

You can specify how many days files remain on the system before being purged. You can specify age limits for the following file types:

Secondary Files — BAF files are either primary or secondary. Primary files are files that have not yet been processed. Secondary files are primary files that have already been processed (at which time the primary files are marked as secondary). Therefore, if a file has secondary status, it can be deleted from the system. You can specify how many days these secondary files remain on the Accounting Server before they are automatically purged (default 7 days).

Usage Data Files — Raw and compressed usage data files are collected from each switch in the accounting system and stored in the directories /CascadeAS/data/udfiles and /CascadeAS/archive/udfiles/compressed. You can specify how many days usage data files remain on the Accounting Server before they are automatically purged (default 7 days).

Call Data Files — Call Data files are archive call data files that the system can use to recreate BAF files in case a BAF file becomes corrupted. You can specify how many days the archive call data files remain on the Accounting Server before they are automatically purged (default 7 days).

To configure file age limits:

1. Select Accounting File Purging from the Accounting Server Configuration main menu. The following menu appears:

```
        Accounting File Purging Parameters


  1 - Secondary File Age Limit in Days (current: 7)
  2 - Usage Data File Age Limit in Days (current: 7)
  3 - Call Data Age Limit in Days (current: 7)
  4 - Return to Previous Menu

Select an option:
```

2. Enter the number for the parameter you want to change.
3. When prompted, enter the new value.

   You are prompted to verify the change.
4. Enter **y** to save the change or **n** to cancel.
5. When you have configured all values as desired, select item 4.

   You return to the Accounting Server Configuration main menu.

Accounting AMA File Transfer Configuration

The Accounting Server can be configured as:

FTP Client — The Accounting Server transfers AMA files periodically (every 5 minutes by default) to another host via FTP.

FTP Server — The Accounting Server responds to requests from external hosts for accounting data. For information on configuring the Accounting Server as an FTP server, see "Configuring Accounting Server as FTP Server" on page 7-4.

To configure the file transfer options:

1. Select Accounting AMA File Transfer Configuration from the Accounting Server Configuration main menu. The following menu appears:

```
        Accounting File Transfer Configuration

  1 - Configure Billing Operations Server Parameters
  2 - Disable Accounting file transfer to Billing Operations Server
  3 - Return to previous menu

Select an option:
```

2. Select the appropriate item for the parameter you want to configure. (The following sections describe the menu options.)
3. Once you have configured all items on this menu as desired, select item 3.

   You return to the Accounting Server Configuration main menu.

Configuring Billing Operations Server Parameters

To configure parameters for the billing operations server to which files are to be transferred:

1. Select item 1 from the Accounting File Transfer Configuration menu. The following list and menu appear:

```
   Server IP Address : (current: 0.0.0.0)
   FTP Destination Directory: (current: /tmp)
   FTP Destination Port: (current: 21)
   FTP Login Name: (current: (null))
   FTP Login Password: (current: (null))

 1 - Modify the Billing Operations Server Parameters
 2 - Return to the previous menu

Select an option:
```

2. Select item 1 to modify the parameters. At each succeeding prompt, enter the value you want to use:

   Server IP Address — Enter the IP address of your billing operations server.

   FTP Destination Directory — Enter the directory path where AMA files are to be stored on the billing operations server for further processing. For secure transfers, enter NULL for the directory name. The system defaults to the login home directory.

   FTP Destination Port — Enter the port number of the port on the billing operations server through which all AMA files are to be transferred. This number represents the port number on which FTP is running (normally, port 21).

   FTP Login Name, FTP Login Password — Enter the login name and password the FTP process should use when connecting to your billing operations server.

The specified login name/password must be configured as a user name/password on the billing operations server.

When you have configured all the values, you are prompted to confirm your changes.

3. Enter **y** to save the settings or **n** to cancel.
4. Select item 2.

   You return to the Accounting File Transfer Configuration menu.

Enabling/Disabling AMA File Transfer to the Accounting Server

You can enable file transfer on an Accounting Server. When file transfer is enabled, all AMA data files produced on the Accounting Server are transferred automatically on a periodic basis to your billing operations server. When file transfer is disabled, all AMA data files remain on the Accounting Server until you manually move them to another location.

You should leave the file transfer process disabled only if either of the following applies:

- You plan to cross-mount or mount the directory to which final data is being written on your billing operations server. For example, you could cross-mount the directory where the files are stored, then access the files via NFS.
- You want to use your own file transfer process to move data to your billing operations server, instead of using the Accounting Server file transfer process. For example, you may want to use your own script to FTP files from the Accounting Server to your billing operations server. For FTP server configuration information, see "Configuring Accounting Server as FTP Server" on page 7-4.

When the file transfer process is disabled, you must remove files from of the Accounting Server to prevent the AMA data file directory from reaching capacity. Further, you should delete these files once they have been processed. Otherwise, the file partition can fill up, resulting in data loss.

To enable the process to transfer AMA files to a billing operations server:

1. Select item 2 from the Accounting File Transfer Configuration menu. The following prompt appears:

   ```
   Are you sure you want to enable accounting file transfer ? (y/n) y
   ```

2. Enter **y** to toggle this setting from enabled to disabled (or disabled to enabled, depending on the current setting).
3. Select item 2.

   You return to the Accounting File Transfer Configuration menu.

Recording Office Configuration

You can specify the following information that designates the Accounting Server as the Recording Office:

Recording Office ID — A 6-digit code that represents the Recording Office that generated the BAF output format.

Recording Office Type — A 3-digit code (administered by Bellcore) that represents the type of office that generated the BAF output format for transport to the down-stream system.

To configure the Recording Office options:

1. Select Recording Office Configuration from the Accounting Server Configuration main menu. The following menu appears:

```
       Recording Office Configuration

  1 - Record Office Id (current: 0)
  2 - Record Office Type (current: 0)
  3 - Return to previous menu

Select an option:
```

2. Enter the number for the item you want to change.
3. When prompted, enter the new value.

   The Recording Office ID is initially set to 0, but can be any value from 0 - 999998. Enter the code that is appropriate for the Accounting Server.

   The Recording Office type is initially set to 0, but can be any value from 0 - 779. Enter the Bellcore code that is appropriate for the Accounting Server.
4. When you have configured both values as desired, select item 3.

   You return to the Accounting Server Configuration main menu.

File System Capacity Monitoring

You can specify alarm thresholds, indicating the file systems containing data and archive files are nearing storage capacity.

To configure file system capacity monitoring:

1. Select File System Capacity Monitoring from the Accounting Server Configuration main menu. The following default file system list appears, followed by the File System Configuration Options menu. In this example, the pathnames and threshold values represent the defaults used by the Accounting Server. The pathnames are either directories or links to directories that reside on one or more file systems.

```
      File System Name              Minor     Major     Critical
      -----------                   --------  --------  --------

 (1)      /CascadeAS/archive/ama     70        80        90
 (2)    /CascadeAS/archive/calls     70        80        90
 (3)  /CascadeAS/archive/udfiles     70        80        90
 (4)         /CascadeAS/data/ama     70        80        90
 (5)       /CascadeAS/data/calls     70        80        90
 (6)     /CascadeAS/data/udfiles     70        80        90

File System Configuration Options :

  1 - Add a File System (directory) to be monitored.
  2 - Delete a File System from the configuration.
  3 - Modify an existing File System.
  4 - Return to previous menu

Select an option:
```

For each file system, a series of threshold percentage values is listed. Each value represents the amount of disk space that must be exceeded before an alarm is generated. When the file system usage exceeds the threshold capacity, the specified alarm is generated. For example, using the default values, when the /CascadeAS/archive/ama file system exceeds 70% of capacity, a Minor alarm is generated. If it exceeds 90% of capacity, a Critical alarm is generated.

The Accounting Server stops accepting data from the switches in the network when the Critical alarm threshold is reached.

From the File System Configuration Options menu, you can add or delete a file system from the list, and you can modify the threshold value for a file system. (The following sections describe the menu options.)

2. Once you have configured all items on this menu as desired, select option 4.

You return to the Accounting Server Configuration main menu.

Adding a File System To Be Monitored

To add a file system monitoring list:

1. Select option 1. The following prompt appears:

```
Enter the name of the disk:
```

2. Enter the name of the new file system (e.g., CascadeAS/ar_ama). You are prompted to confirm the file system addition.

3. Enter **y** to create the file system or **n** to cancel.

Once the new disk is successfully added to the configuration, a confirmation message appears and the file system list is updated with the new information.

All new file systems are added with the default alarm threshold values (90 for Critical, 80 for Major, and 70 for Minor). To change a value, use the procedure described in "Modifying the Disk Configuration" on page 4-14.

Deleting a Disk

To delete a file system from the monitoring list:

1. Select option 2. The following prompt appears:

   ```
   Select a disk configuration index:
   ```

2. Enter the index number of the file system that you want to remove from the list. You are prompted to confirm the removal.
3. Enter **y** to remove the file system or **n** to cancel.

   Once the disk is successfully removed from the configuration, a confirmation message appears and the file system list is updated.

Modifying the Disk Configuration

To modify the settings for a currently listed file system:

1. Select option 3. The following prompt appears:

   ```
   Select a Disk Configuration :
   ```

2. Enter the index number for the file system whose values you want to modify.
3. When prompted, enter the threshold values you want to use for each alarm level.

   Each value you specify represents the disk space usage that must be exceeded in order to generate the given alarm (Critical, Major, or Minor).

   When all values have been specified, you are prompted to confirm the changes.

4. Enter **y** to save your changes or **n** to cancel.

   A confirmation message appears and the file system list is updated with the new information.

Switch Configuration

You need to specify switch information required for the AMA generation process. Specify this information for each switch that may potentially send data to the Accounting Server, including all switches to which the server will be assigned as an active or reserve Accounting Server. For more information about active and reserve servers, see "High Availability Processing" on page 1-16.

To specify the switch configuration:

1. Select Switch Configuration from the Accounting Server Configuration main menu.

   If no switches have been configured, the message "No Switch in the Configuration" appears, followed by the Switch Configuration menu.

   If switches have already been configured, a switch list appears, followed by the Switch Configuration menu:

```
Switch Name Switch ID  ActiveASIndex  ReserveASIndex  Sensor ID Sensor Type
----------- ---------- -------------  --------------  --------- -----------
(1) Number3  193.4.3.2      1              2             1           400
(2) Number4  193.5.3.2      1              2             2           400

  1 - Add a switch to the configuration.
  2 - Delete a switch from the configuration.
  3 - Modify the parameters of a switch in the configuration.
  4 - Return to previous menu.

Select an Option:
```

The Sensor ID and Sensor Type values are not needed for ASCII installations. Therefore, the Sensor ID and Sensor Type columns are not displayed in the switch list for ASCII installations.

   From the Switch Configuration menu, you can add, delete, or modify switch settings. (The following sections describe the menu options.)

2. When you have finished editing the switch configuration, select item 4.

   You return to the Accounting Server Configuration main menu.

Adding a New Switch

To add a switch to the configuration:

1. Select item 1. You are prompted to enter configuration information for the switch.

2. When prompted, enter the NavisCore switch name and the switch's IP address. In addition, if you performed a BAF installation of the Accounting Server software instead of an ASCII installation, you must specify the Sensor ID and Sensor Type for the switch:

   Sensor ID — Enter a unique 6-digit Sensor ID for each switch in the range of 000000 to 999999. Do not use the same value for multiple switches.

   Sensor Type — Enter the Sensor Type for your switch network. This value is the same for all switches you are adding to the configuration. For CBX 500 switches, use Sensor Type 400.

   Configure the active and reserve Accounting Servers:

   Active Index — Enter the index number of the active Accounting Server to process this switch.

   Reserve Index — Enter the index number of the reserve Accounting Server to process the switch if the active server becomes unavailable. If you have only one server configured in your system or do not want to apply a reserve server to this switch, enter the active index number.

   When you have specified all switch settings, the following prompt appears:

   ```
   Do You really want to Create the Switch ? (y/n)
   ```

3. Enter **y** to add the switch to the configuration or **n** to cancel.

   A confirmation message appears and the switch list is updated with the new information.

Deleting a Switch

To delete a switch from the configuration:

1. Select item 2. The following prompt appears:

   ```
   Enter the switch index to delete :
   ```

2. Enter the index number of the switch you want to delete. For example, to delete the switch Number4, enter **2**. You are prompted to confirm the deletion.

3. Enter **y** to confirm the deletion or **n** to cancel.

   Once the switch is successfully removed from the configuration, the switch list is updated.

Modifying a Switch

To modify an existing switch configuration:

1. Select item 3. The following prompt appears:

   ```
   Enter the switch index to modify :
   ```

2. Enter the index number of the switch whose configuration you want to modify. For example, to modify the switch Number3, enter **1**. You are prompted to enter configuration information for the switch.

3. When prompted, enter the NavisCore switch name and the switch's IP address. In addition, if you performed a BAF installation of the Accounting Server software instead of an ASCII installation, you must specify the Sensor ID and Sensor Type for the switch:

   Sensor ID — Enter a unique 6-digit Sensor ID for each switch in the range of 000000 to 999999. Do not use the same value for multiple switches.

   Sensor Type — Enter the Sensor Type for your switch network. This value is the same for all switches you are adding to the configuration. For CBX 500 switches, use Sensor Type 400.

   Configure the active and reserve Accounting Servers:

   Active Index — Enter the index number of the active Accounting Server to process this switch.

   Reserve Index — Enter the index number of the reserve Accounting Server to process the switch if the active server becomes unavailable. If you have only one server configured in your system or do not want to apply a reserve server to this switch, enter the active index number.

4. When you have specified all switch settings, the following prompt appears:

   ```
   Accept the above values ? (y/n)
   ```

5. Enter **y** to save the settings or **n** to cancel.

   A confirmation message appears and the switch list is updated with the new information.

SNMP Trap Destinations

The Accounting Server generates SNMP traps to keep you informed of the state of operations on the Accounting Server and switches. (See Chapter 9 for more information on SNMP traps.) You must specify the destination workstations to which these traps are to be sent. At the very least, you should enter the IP address of the NavisCore NMS workstation. If you have other workstations to which you want to send these traps, enter their IP addresses also.

To configure SNMP trap destinations:

1. Select SNMP Trap Destinations from the Accounting Server Configuration main menu.

   If no SNMP trap destinations have been defined, the message "No SNMP Trap Destinations in the Configuration" appears, followed by the SNMP Trap Destination menu.

If switches have already been configured, a switch list appears, followed by the SNMP Trap Destination menu:

```
SNMP Trap Destinations :

        Destination          Destination
         IP Address          Port Number
       ------------          -----------
(1)  152.148.51.192            162


    1 - Add a Trap Destination to the configuration.
    2 - Delete a Trap Destination from the configuration
    3 - Return to previous menu.

Select an option:
```

From the SNMP Trap Destination menu, you can add or delete trap destinations. (The following sections describe the menu options.)

2. When you finish configuring SNMP trap destinations, select item 3.

   You return to the Accounting Server Configuration main menu.

Adding a New Trap Destination

To add a new SNMP trap destination:

1. Select item 1 from the SNMP Trap Destination menu. The following prompt appears:

   ```
   Enter the IP Address of the management station :
   ```

2. Enter the IP address of the destination to which you want to send SNMP traps. The confirmation prompt appears:

   ```
   Do You really want to create the Trap Destination ? (y/n)
   ```

3. Enter **y** to add the destination to the SNMP Trap Destination list or **n** to cancel.

   A confirmation message appears and the trap destination list is updated with the new information.

The destination port number is always 162 and is not configurable.

Deleting a Trap Destination

To delete an SNMP trap destination:

1. Select item 2 from the SNMP Trap Destination menu. The following prompt appears:

   ```
   Enter the trap destination index to delete :
   ```

2. Enter the index number for the trap destination. The following prompt appears:

   ```
   Are you sure you want to delete trap <[ip_address]> ? y/n
   ```

3. Enter **y** to delete the trap destination from the configuration or **n** to cancel.

   Once the destination is successfully removed from the configuration, the list is updated.

High Availability Configuration

In a high availability configuration, an Accounting Server can serve as an *active* server and/or a *reserve* server. The reserve Accounting Server stands by to take over billing if the active Accounting Server becomes unavailable.

When a switch sends raw usage data files to an Accounting Server, these files are temporarily stored in the directory /CascadeAS/data/udfiles. When an active server is functioning normally, the data files are quickly processed and moved into their appropriate switch directories. If the active server fails, the usage data remains in /CascadeAS/data/udfiles without being processed.

You can specify the file age trigger (in minutes) for the directory /CascadeAS/data/udfiles. If files remain in that directory longer than the specified time, the reserve server assumes that a failure has occurred and takes over processing for the failed active server. If a failure occurs, a trap is generated and an event is logged. Under most conditions, you should not change the file age trigger default value (3 minutes).

To specify high availability configuration:

1. Select High Availability Configuration from the Accounting Server Configuration main menu.

   The High Availability Configuration menu appears:

   ```
   High Availability Configuration

    1 - File Age (in minutes) for fail over (current: 3)

    2 - Return to Previous Menu


   Select an option :
   ```

2. Select item 1. The following prompt appears:

   ```
   Enter <File Age (in minutes) for fail over> Value :
   ```

3. Enter a new file age value (in minutes). You are prompted to confirm the new value.

4. Enter **y** to confirm the change or **n** to cancel.

5. Select item 2.

You return to the Accounting Server Configuration main menu.

Accounting Server Location

The location of each of the Accounting Servers in your accounting system must be registered so that interserver communication and updates can occur. Registration occurs automatically when you install an Accounting Server.

Occasionally, you may need to manually register an Accounting Server or change its registration information. For example, if the IP address changes for a host running the Accounting Server software, you need to update the information so that the server can continue to communicate with other servers in the accounting sSystem.

To configure Accounting Server location:

1. Select Accounting Server Location from the Accounting Server Configuration main menu.

A server location list appears, followed by the Accounting Server Location Configuration menu:

```
Accounting Server Location Configuration Option

            Server Name           Server ID

           ------------        ------------

 ( 1)        Rain              193.148.12.1

 ( 2)        Thunder           193.148.12.2


  1 - Add a server to the configuration.
  2 - Delete a server from the configuration.
  3 - Modify the parameters of a server from the configuration.

  4 - Return to previous menu.

 Select an Option :
```

From the Accounting Server Location Configuration menu, you can add, delete, or modify server locations. (The following sections describe the menu options.)

2. When you finish configuring server locations, select item 4.

You return to the Accounting Server Configuration main menu.

Adding a New Server Location

To manually register a new server:

1. Select item 1 from the Accounting Server Location Configuration menu.

2. When prompted, enter the name of the Accounting Server you want to register. The name is significant only within the accounting system. It does not have to be the actual host name.
3. When prompted, enter the server's IP address.

   When you have specified both settings, you are prompted to confirm the addition.
4. Enter **y** to register the server or **n** to cancel.

   A confirmation message appears and the server location list is updated with the new information.

Deleting a Server Location

Before you delete an Accounting Server location, you need to assign the switches that use that server to another Accounting Server. Otherwise, accounting data may be lost. For instructions, see "Designating Accounting Servers for Your Switches" on page 5-3.

To deregister a server:

1. Select item 2 from the Accounting Server Location Configuration menu. The following prompt appears:

   ```
   Enter the index of the server to delete :
   ```
2. Enter the index number of the server you want to delete. You are prompted to confirm the deletion.
3. Enter **y** to confirm the deletion or **n** to cancel.

   Once the server location is successfully removed from the configuration, the location list is updated.

Changing a Server Location

To modify a server location:

1. Select item 3 from the Accounting Server Location Configuration menu. The following prompt appears:

   ```
   Enter the index of the server to modify :
   ```
2. Enter the index number of the server location you want to modify. The following prompt appears:

   ```
   Server Name  (Rain)    :
   ```
3. Either enter a new Accounting Server name or press Return to accept the default. The following prompt appears:

   ```
   Server IP Address (152.148.35.90)     :
   ```
4. Either enter a new IP address or press Return to accept the default.

You are prompted to confirm the change.

5. Enter **y** to confirm the change or **n** to cancel.

   Once the server location is successfully modified, the location list is updated.

Accessing the Accounting Server Configuration Tool

The Accounting Server configuration tool is a graphical application you can use to configure the Accounting Servers in your network.

To run the tool, you need to run the Java-enabled Web browser, Netscape Navigator. You must obtain and install the Web browser separately; it is not shipped with the Accounting Server system.

The Accounting Server configuration tool is installed on the Web Server. To access the tool, your Web browser must have access to the Web Server. For instructions on installing the Web Server, see Chapter 3.

Before a user can run the configuration tool, the user's account must be added for the tool. Use the Accounting Server administration tool to administer user accounts.

Administering User Accounts

The start the Accounting Server administration tool:

1. From a workstation running Netscape Navigator, start the Java-enabled Web browser.
2. In the location text field of the browser, enter the URL (Uniform Resource Locator) of the Accounting Server Web Interface. For example:

   ```
   http://machine1:9050/asintro
   ```

   where machine1 is the name of the Web Server machine, 9050 is the port number the Web Server uses.

   You are prompted to enter your User ID and password.

You can use the default User ID admin (with password admin) the first time you log in. To maintain security, you should change the password for this default User ID. To do so, follow the instructions in "Modifying User Passwords" on page 4-27.

3. Enter the login name and password you use to run the administration tool.

   The Accounting Server Web Interface page appears (see Figure 4-1).

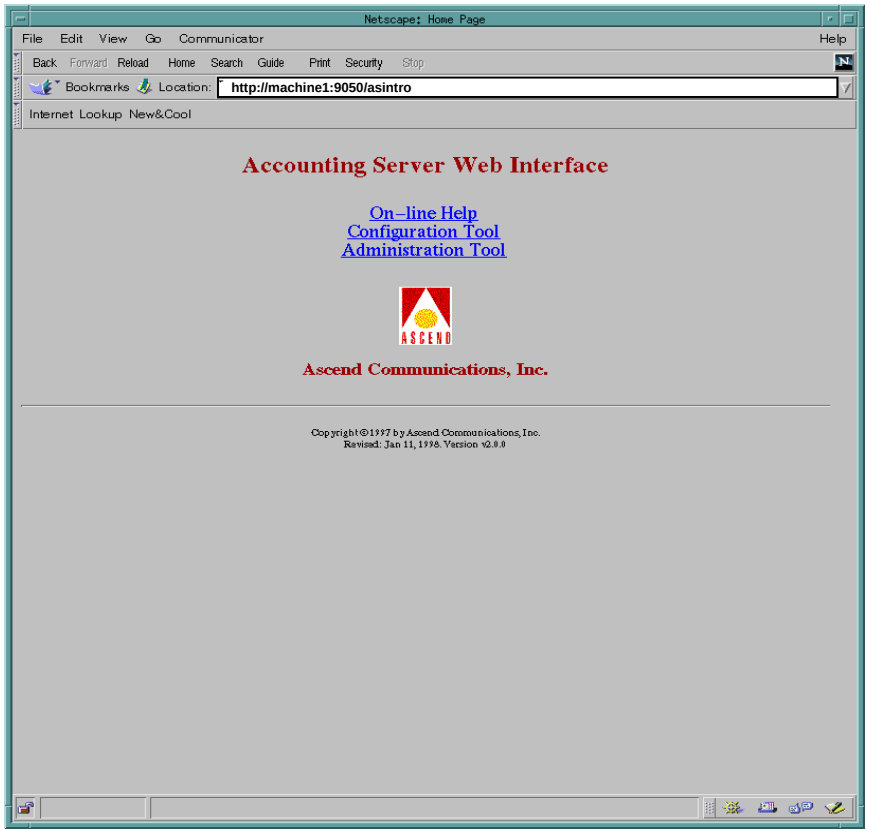


Figure 4-1. Accounting Server Web Interface Page

4. Select Administration Tool.

The Accounting Server administration tool page appears (see Figure 4-2).

5. If necessary, resize the browser window so that the whole page appears in its entirety.

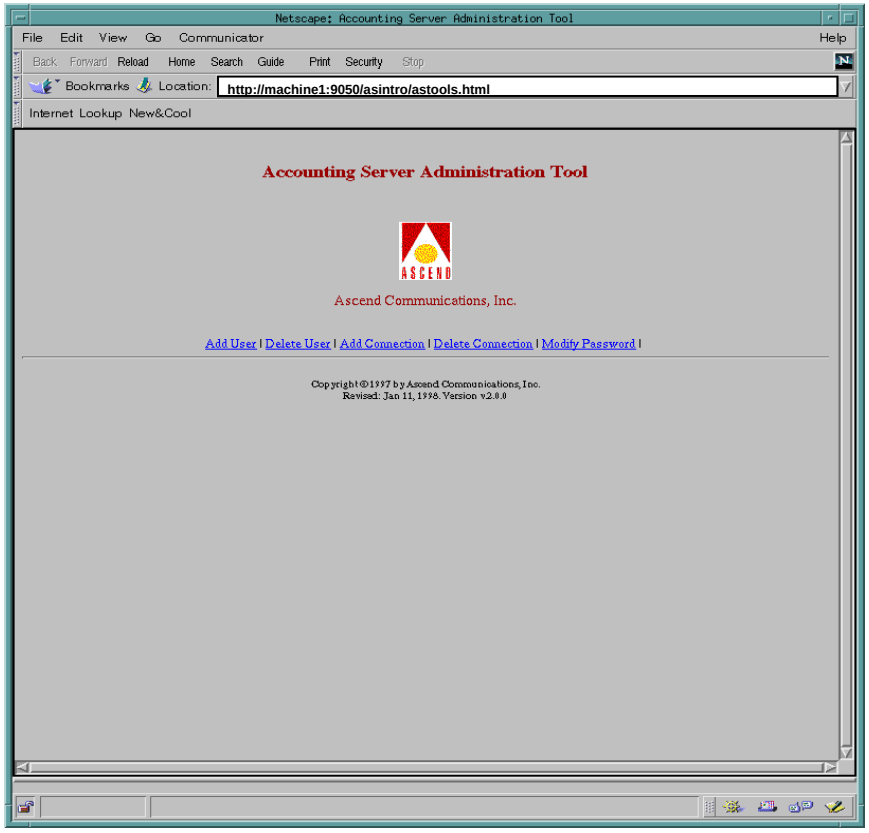


Figure 4-2. Accounting Server Administration Tool Page

Once you are running the administration tool, you can exit at any time. To exit the administration tool, choose Exit.

From the Accounting Server administration tool page, select the option you want to use:

Add User — Registers a user with the configuration tool

Delete User — Removes a user from the account list of the configuration tool

Add Connection — Registers a host with the configuration tool

Delete Connection — Removes a machine from the host list of the configuration tool

Modify Password — Modifies a user password for accessing the configuration tool

These administration options are described in the following sections.

Using On-line Help

On-line Help is available for the administration tool. To obtain Help, choose Help from any screen or dialog box. You can also access Help by selecting On-line Help from the Accounting Server Web Interface page.

To quit Help, choose Close from the Help window. If you choose Exit from the window, you exit the administration tool.

Adding Users

Use this option to register users with the Accounting Server configuration tool.

To add a user:

1. From the Accounting Server administration tool page, select the Add User option. The Add Accounting Server User dialog box appears (see Figure 4-3).

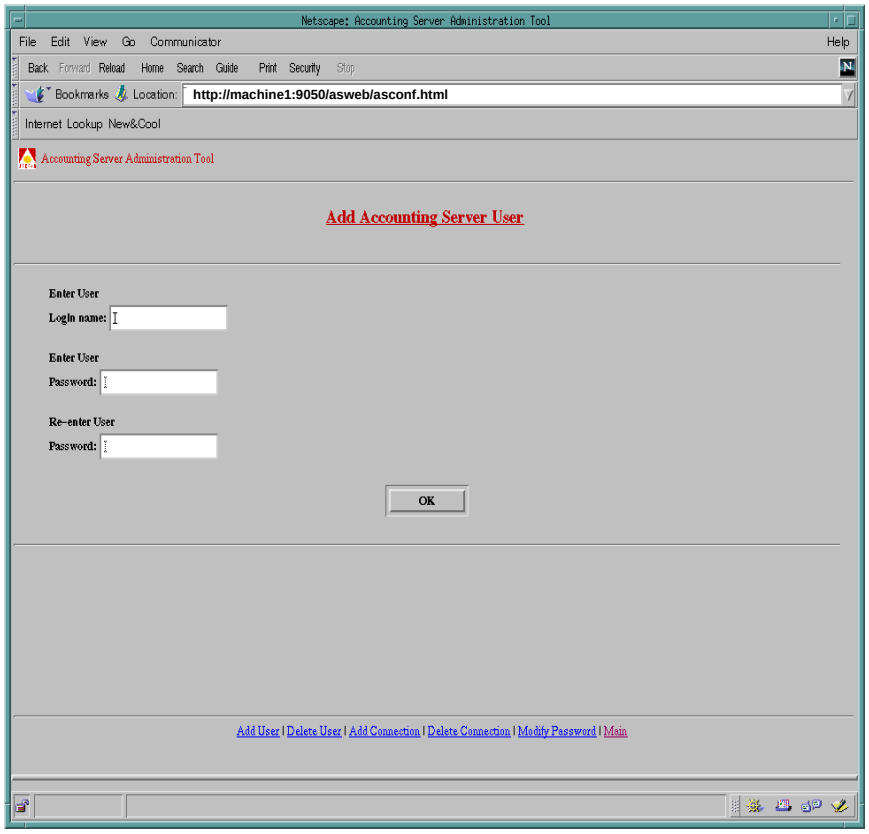


Figure 4-3. Add Accounting Server User Dialog Box

2. Enter the following information in the appropriate fields:

   Login name — Name the user enters into the Login screen of the configuration tool

User password — Password the user enters into the Login screen of the configuration tool

Then, choose OK. You are prompted to confirm the addition.

3. To add the user, choose OK. A message appears indicating that the user was successfully added. If you do not want to add the user, choose Cancel.

The user can now use the configuration tool. For instructions, see "Using the Tool to Configure Your Accounting Servers" on page 4-32.

Deleting Users

Use this option to remove users from the account list of the configuration tool.

To delete a user:

1. From the Accounting Server administration tool page, select the Delete User option. The Delete Accounting Server User dialog box appears (see Figure 4-4).

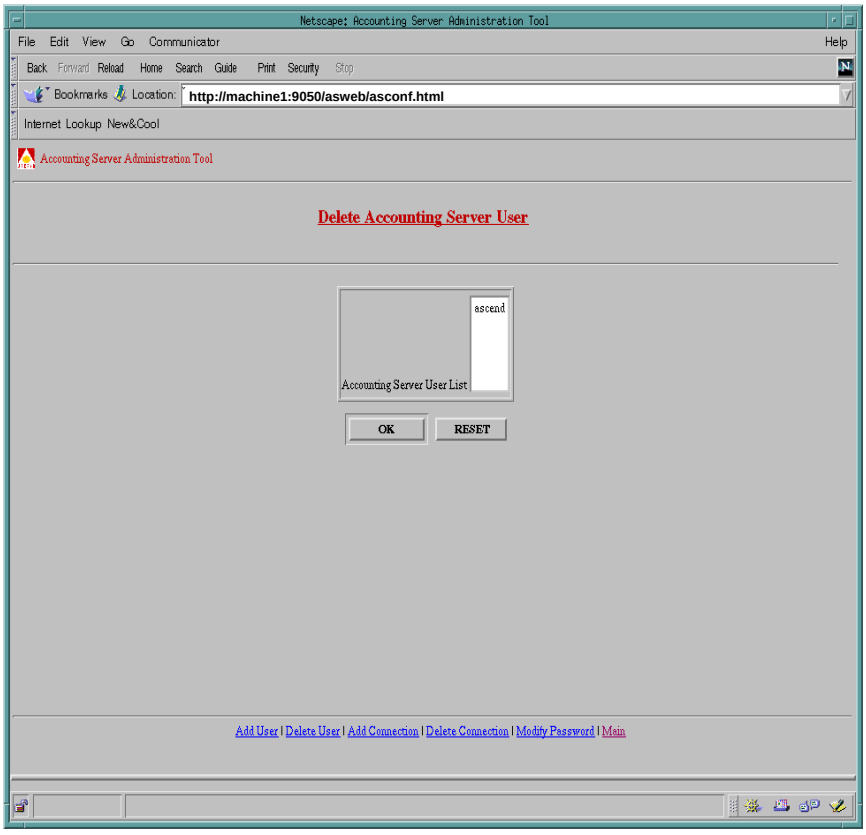


Figure 4-4. Delete Accounting Server User Dialog Box

2. From the Accounting Server User List, select the login name of the user you want to remove.

   If you select the incorrect login name, choose Reset to deselect it.

3. Choose OK. You are prompted to confirm the deletion.
4. To delete the user, choose OK. A message appears indicating that the user was successfully deleted. If you do not want to delete the user, choose Cancel.

The user can no longer use the configuration tool.

Modifying User Passwords

Use this option to modify user passwords for accessing the configuration tool.

To modify a password:

1. From the Accounting Server administration tool page, select the Modify Password option. The Modify Accounting Server User Password dialog box appears (see Figure 4-5).

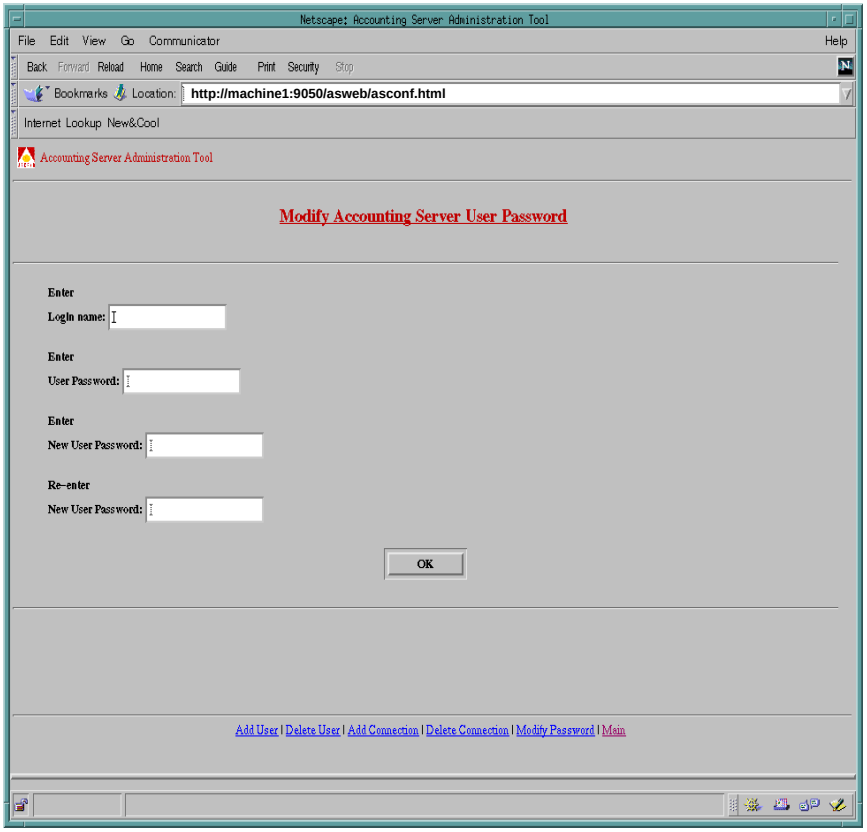


Figure 4-5. Modify Accounting Server User Password Dialog Box

2. Enter the following information in the appropriate fields:

   Login name — Name the user enters into the Login screen of the configuration tool

   User password — Current password the user uses

   New user password — New password the user will use

Then, choose OK. You are prompted to confirm the change.

3. To save your changes, choose Yes. A message appears indicating that the change was successful. If you do not want to save your changes, choose No.

The user must enter the new password to use the configuration tool.

Adding Connections

Use this option to register user hosts with the configuration tool.

To add a connection:

1. From the Accounting Server administration tool page, select the Add Connection option. The following warning message appears:

   ```
   The current configuration accepts connections with all hosts. You
   can delete the "all" selection, if you want to accept connections
   from the hosts in the list only.
   ```

   Choose OK to continue.

   The Add Connection Host dialog box appears, listing the hosts that can run the configuration tool (see Figure 4-6).

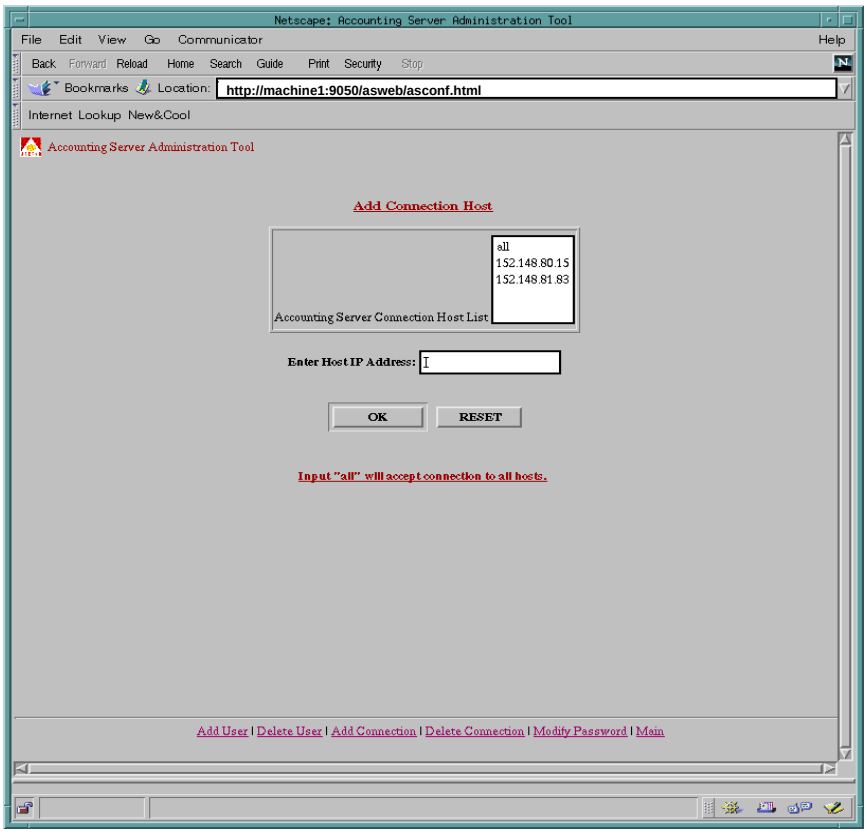


Figure 4-6. Add Connection Host Dialog Box

2. To specify a particular machine that can run the configuration tool, enter the machine's IP address.

   If you enter the incorrect IP address, choose Reset to clear the field.

3. Choose OK. You are prompted to confirm the addition.

4. To add the connection, choose OK. A message appears indicating that the addition was successful. If you do not want to save your changes, choose Cancel.

To limit the connections to the ones that you added, you need to delete the "all" configuration. Proceed to the following section.

Deleting Connections

Use this option to either:

- Remove a particular user host from accessing the configuration tool
- Disallow unlimited hosts from accessing the configuration tool

To delete a connection:

1. From the Accounting Server administration tool page, select the Delete Connection option. The Delete Connection Host dialog box appears, listing the hosts that can run the configuration tool (see Figure 4-7).

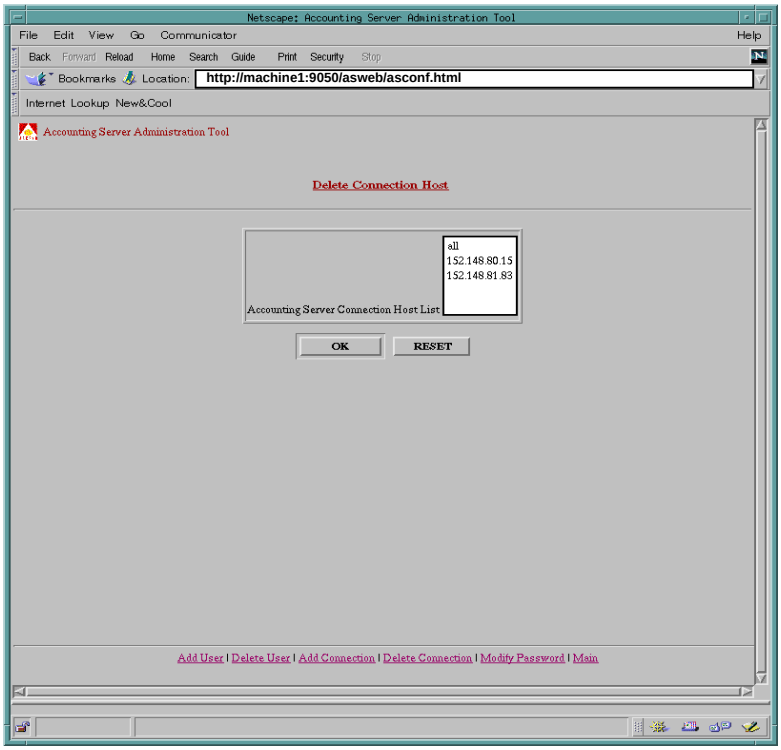


Figure 4-7. Delete Connection Host Dialog Box

2. From the Accounting Server User Host List, select either:
   - The IP address of the machine you want to remove
   - The "all" setting, to disallow unlimited hosts from running the tool

   If you select the incorrect one, choose Reset to deselect it.
3. Choose OK. You are prompted to confirm the deletion.
4. To delete the connection, choose OK. A message appears indicating that the deletion was successful. If you do not want to save your changes, choose Cancel.

If you deleted an individual machine, that host can no longer be used to access the configuration tool. If you disallowed unlimited hosts, only the machines on the host list can access the tool.

Running the Configuration Tool

The start the configuration tool:

1. From a workstation running Netscape Navigator, start the Java-enabled Web browser.
2. In the location text field of the browser, enter the URL (Uniform Resource Locator) of the Accounting Server Web Interface. For example:

   ```
   http://machine1:9050/asintro
   ```

   where machine1 is the name of the Web Server machine and 9050 is the port number the Web Server uses.

   You are prompted to enter your User ID and password.
3. Enter the login name and password you use to run the configuration tool.

You can use the default User ID admin (with password admin) the first time you log in. For maintain security, you should change the password for this default User ID. To do so, follow the instructions in "Modifying User Passwords" on page 4-27.

   The Accounting Server Web Interface page appears (see Figure 4-1 on page 4-23).
4. Select Configuration Tool.

   The Accounting Server configuration tool page appears (see Figure 4-8).
5. If necessary, resize the browser window so that the whole page appears in its entirety.

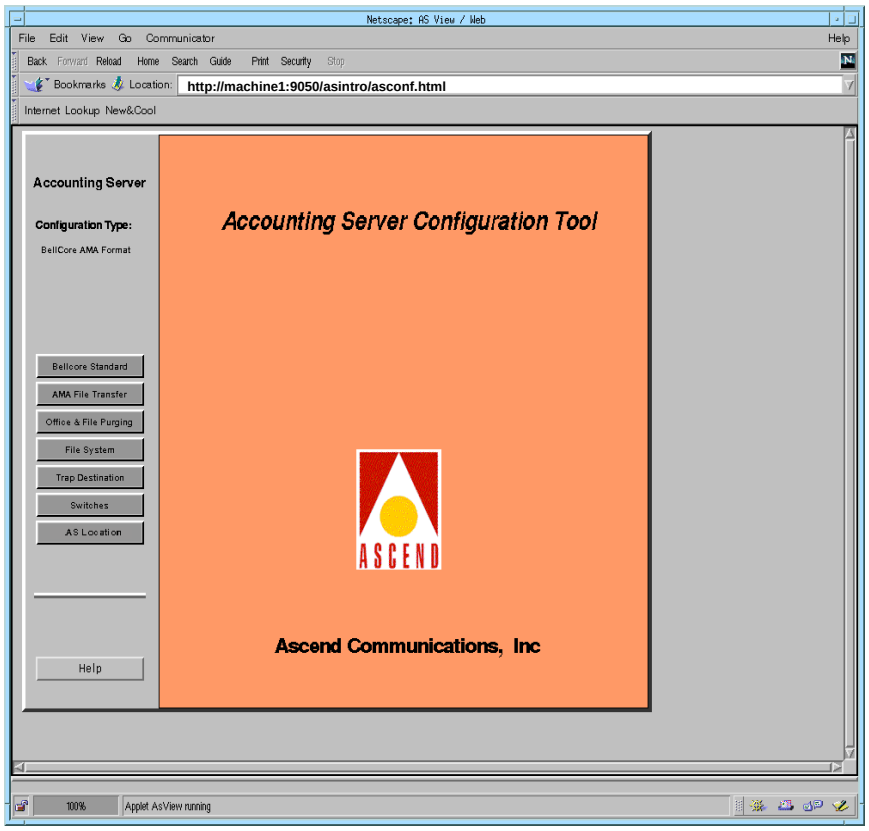


Figure 4-8. Accounting Server Configuration Tool Page

Exiting the Configuration Tool

Once you are running the configuration tool, you can exit at any time. To exit the configuration tool, choose Exit to return to the Accounting Server Web Interface page. Then, perform one of the following actions:

- Select another option from the Accounting Server Web Interface page.
- Exit the Web browser.

Using On-line Help

On-line Help is available for the configuration tool. To obtain Help, choose Help from any screen or dialog box. You can also access Help by selecting On-line Help from the Accounting Server Web Interface page.

To quit Help, choose Close from the Help window. If you choose Exit from the window, you exit the configuration tool.

Using the Tool to Configure Your Accounting Servers

From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the button for the option you want to configure.

The configuration options are described in the following sections. See the listed page number for more information on a given option.

> If you chose “ASCII Format” instead of “Bellcore AMA Format” during the installation, the Bellcore Standard button is not available, since it does not apply to ASCII data files.

Button	See
Bellcore Standard	page 4-32
AMA File Transfer	page 4-37
Office & File Purging	page 4-39
File System	page 4-41
Trap Destination	page 4-45
Switches	page 4-48
AS Location	page 4-51

Bellcore Standard Configuration Parameters

This option is available only if you selected Bellcore AMA Format on the initial installation menu. Select this option if:

- You want to use BAF file format with proprietary extensions (extended BAF)
- You want to modify any of the default settings for the items shown in this menu

To configure Bellcore Standard configuration parameters:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the Bellcore Standard button.

   The Bellcore Standard Configuration dialog box appears (see Figure 4-9).

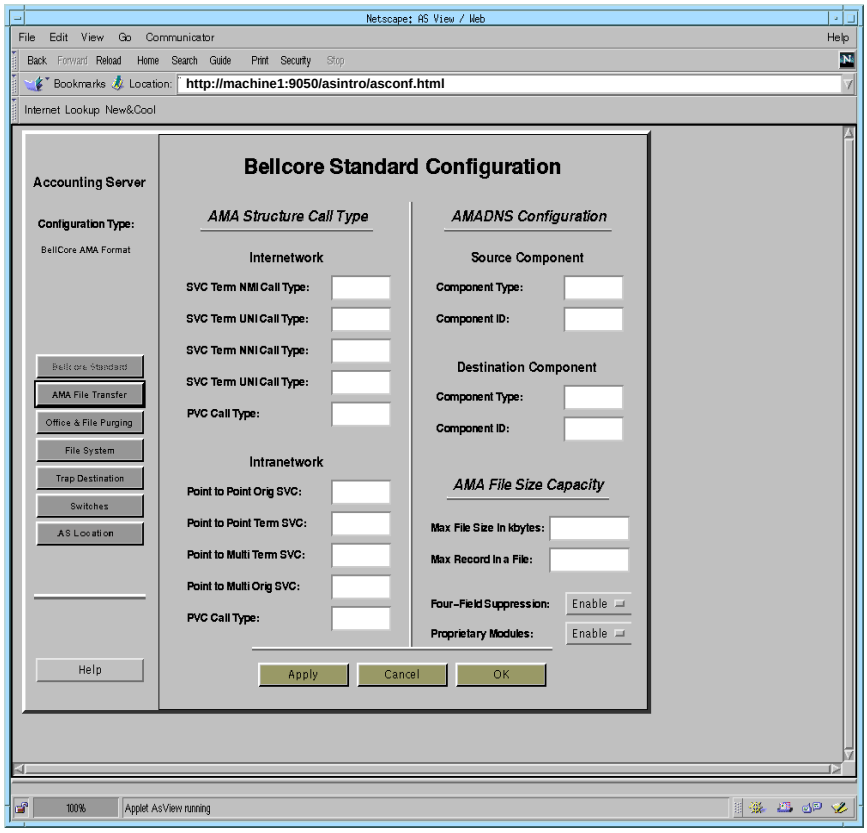


Figure 4-9. Bellcore Standard Configuration Dialog Box

2. Use the fields in the dialog box to specify Bellcore Standard configuration parameters. The following sections describe the configuration parameters.

AMA Structure Call Types

This section of the Bellcore Standard Configuration dialog box enables you to change the structure call types for the BAF records that the system produces. For detailed information on call types, see Bellcore GR-1100 and Bellcore GR-1110-CORE, Section 10.

The fields in this section of the dialog box are shown below:

Field	Default Value
Internetwork	
SVC Terminating NNI Call Type	613
SVC Terminating UNI Call Type	914
SVC Originating NNI Call Type	612
SVC Originating UNI Call Type	611
PVC Call Type	608
Intranetwork	
Point to Point Originating SVC Call Type	610
Point to Point Terminating SVC Call Type	619
Point to Multipoint Terminating Leaf Call Type	913
Point to Multipoint Originating Root Call Type	912
PVC Call Type	609

The change a value:

1. Enter the new value in the appropriate field.
2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

AMADNS Configuration

This section of the Bellcore Standard Configuration dialog box allows you to identify the source component (Accounting Server) and the destination component (billing operations server) for transferring final AMA data files.

The fields in this section of the dialog box are:

Source Component Type — A 2-digit code, as defined in Bellcore GR-1343-CORE, that identifies the type of AMADNS Server (Accounting Server) that sends AMA records to the billing operations server. For example, if the Accounting Server is considered to be an AMADNS data server by your billing operations server, set the Source Component type to 2 (02).

This value is 02 by default, and should remain so in order to be Bellcore compliant. The valid range of values is 00-15.

Source Component ID — A 4-digit code that uniquely identifies the Accounting Server that sends AMA records to the billing operations server. Enter a different value for each of your Accounting Servers. The value can be in the range of 0000 to 4095.

For example, if you have three Accounting Servers, you may want to assign them Source Component Identifiers 020001, 020002, and 020003.

By default, the Source Component Identifier is set to 020000; you can change this value to any code not currently being used by another Accounting Server.

Destination Component Type — A 2-digit Component type code, as defined in Bellcore GR-1343-CORE, that identifies the type of billing operations server to which completed AMA files are to be transferred. This item is included in BAF filenames (see "BAF Record Filename Format" on page 7-8).

For example, if the billing operations server is a DPMS, set the Destination Component type to 03. For detailed information, see Bellcore GR-1343-CORE.

The valid range of values is 00-15. You should use the Destination Component type that is appropriate for the type of billing operations server you have.

Destination Component ID — A 4-digit code that uniquely identifies the billing operations server to which completed AMA files are to be transferred. Enter the 4-digit code that identifies your billing operations server. This value can be in the range of 0000 to 4095. This item is included in BAF filenames (see "BAF Record Filename Format" on page 7-8).

The Destination Component type code is initially set to 3, but can be any value from 0-15. You have to enter the code that is appropriate for the type of billing operations server you are using.

The Destination Component ID is also initially set to 0, but can be any value from 0-4095. You can change this value to any value not currently being used by any of your billing operations servers.

To change either of these values:

1. Enter the new value in the appropriate field.
2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

You are prompted to commit the changes.

AMA File Size Capacity

This section of the Bellcore Standard Configuration dialog box allows you to specify the appearance of the AMA files.

Max File Size — By default, an AMA file can be a maximum size of 2000 KB (2 MB). During installation, you should accept the default value. If you later determine that you need to change the default, you can change the maximum size to any value from 512 - 2048.

Max Record in a File — By default, the maximum number of records that each file can contain is 16,000. During installation, you should accept the default value. If you later determine that you need to change the default, you can change the maximum number to any value 500 - 3200.

To change either of these values:

1. Enter the new value in the appropriate field.
2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

Four-Field Suppression — Standard AMA files contain a common set of fields that contain the same values in each file produced for a given switch-Accounting Server pair. These common fields are:

- Sensor type
- Sensor identification
- Recording Office type
- Recording Office ID

The sensor type and sensor identification fields uniquely identify the generating switch. The Recording Office type and Recording Office ID are not applicable to the Accounting Server; the Accounting Server sets both of these values to zero (0).

You can suppress these fields to reduce the size (by 12 bytes) of each BAF record that is produced in a given BAF file. The four fields are still contained in the header for the file, and can be extracted from the header if needed. By enabling four-field suppression, you can save significant storage space, since you are decreasing the record size of BAF records by 12 bytes.

1. To exclude these fields from your final BAF record, select Enable from the Four-Field Suppression field.

To include these four fields in your final BAF records, select Disable from the Four-Field Suppression field.

2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

Proprietary Modules — Ascend proprietary modules (Ascend extensions) include usage data that is not included in standard BAF files. For a list and description of each of the proprietary modules, see "Ascend BAF Extensions" on page A-6. If you do not include these modules, then the BAF files produced by the system only contain Bellcore standard information. If you include these modules, the BAF files contain all of the Bellcore standard information, plus the additional information listed on page A-6.

1. To include the propriety modules in your final BAF record, select Enable from the Proprietary Modules field.

   If you do not need or do not want to use these modules, select Disable from the Proprietary Modules field.

2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

AMA File Transfer Configuration

The Accounting Server can be configured as:

FTP Client — The Accounting Server transfers AMA files periodically (every 5 minutes by default) to another host via FTP.

FTP Server — The Accounting Server responds to requests from external hosts for accounting data. For information on configuring the Accounting Server as an FTP server, see "Configuring Accounting Server as FTP Server" on page 7-4.

To configure AMA file transfer configuration parameters:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the AMA File Transfer button.

   The AMA File Transfer dialog box appears (see Figure 4-10).

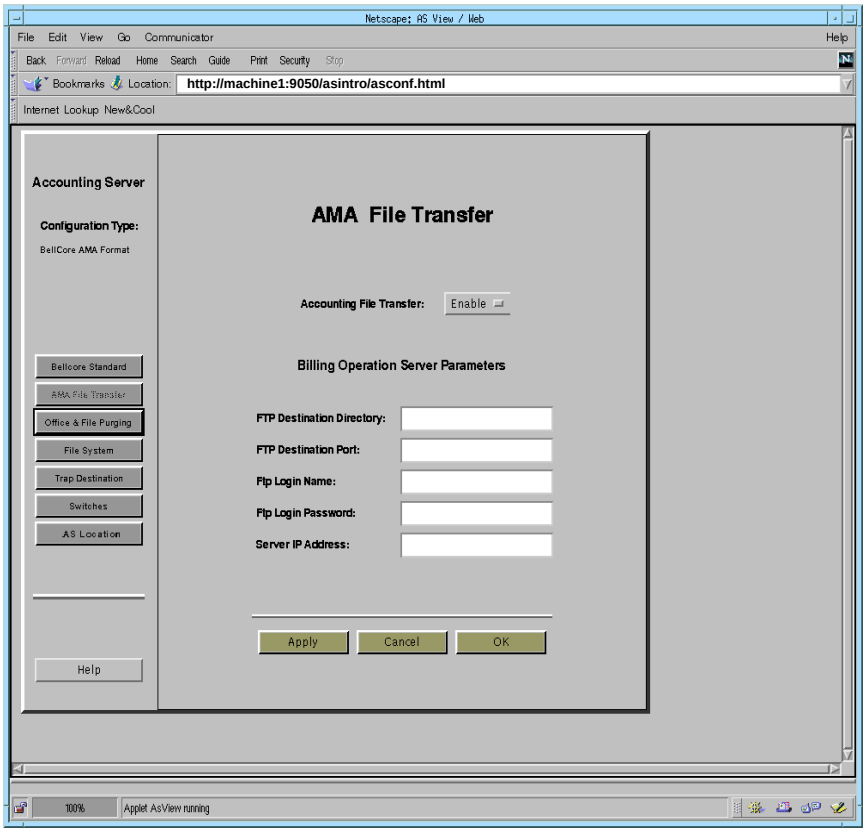


Figure 4-10. AMA File Transfer Dialog Box

2. If you want to transfer AMA files to a billing operations server, select Enable from the Accounting File Transfer field. When file transfer is enabled, all AMA data files produced on the Accounting Server are periodically transferred to your billing operations server. When file transfer is disabled, all AMA data files remain on the Accounting Server until you manually move them to another location.

To disable the file transfer process, select Disable from the Accounting File Transfer field. You should disable file transfer only if either of the following applies:

- You plan to cross-mount or mount the directory to which final data is being written on your billing operations server. For example, you could cross-mount the directory where the files are stored, then access the files via NFS.
- You want to use your own file transfer process to move data to your billing operations server, instead of using the Accounting Server file transfer process. For example, you may want to use your own script to FTP files from the Accounting Server to your billing operations server. For FTP server configuration information, see "Configuring Accounting Server as FTP Server" on page 7-4.

When file transfer is disabled, remove files from the Accounting Server to prevent the AMA data file directory from reaching capacity. Further, you should delete these files once they have been processed. Otherwise, the file partition can fill up, resulting in data loss.

3. Use the Billing Operation Server Parameters fields in the dialog box to configure the billing operations server to which files are to be transferred (if you disable file transfer, you cannot modify these fields):

   FTP Destination Directory — Enter the directory path where AMA files are to be stored on the billing operations server for further processing. For secure transfers, enter NULL for the directory name. The system defaults to the login home directory.

   FTP Destination Port — The port number of the port on the billing operations server through which all AMA files are to be transferred.This is the port number on which FTP is running (normally, port 21).

   FTP Login Name, FTP Login Password — Enter the login name and password the FTP process should use when connecting to your billing operations server.

The specified login name/password must be configured as a user name/password on the billing operations server.

   Server IP Address — Enter the IP address of your billing operations server.

4. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

Office and File Purging

This option enables you to specify:

- Information that designates the Accounting Server as the Recording Office
- How long files remain on the system before being purged

To configure these parameters:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the Office & File Purging button.

   The Record Office & File Purging dialog box appears (see Figure 4-11).

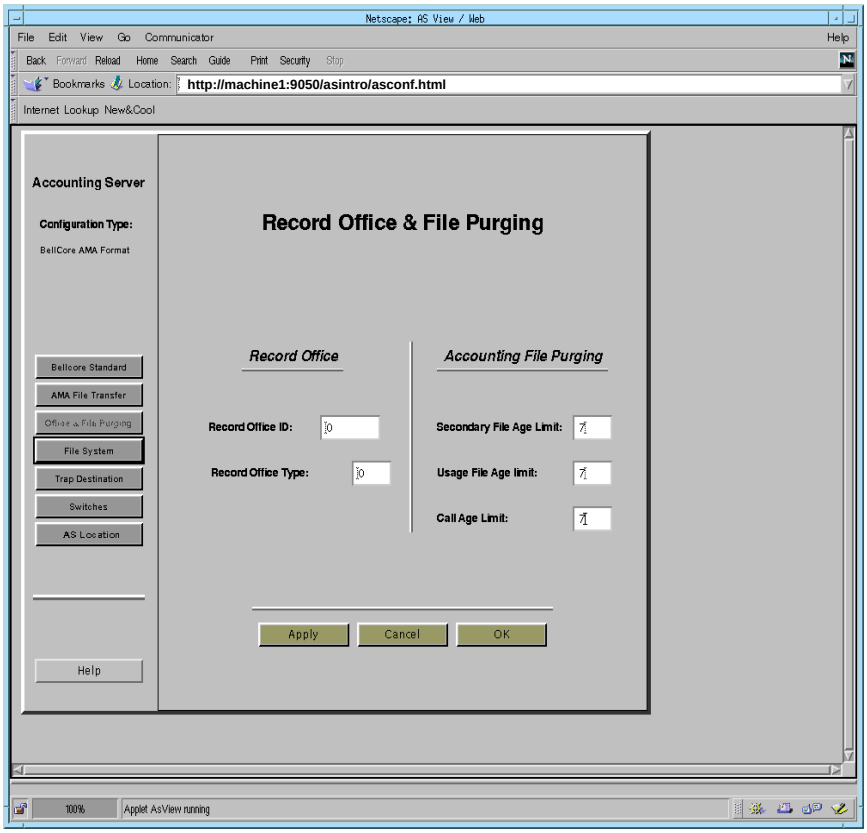


Figure 4-11. Record Office & File Purging Dialog Box

2. Use the fields in the dialog box to specify Recording Office and File Purging parameters. The following sections describe the configuration parameters.
3. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   You are prompted to commit the changes.

Record Office

This section of the Record Office & File Purging dialog box enables you to specify the information that designates the Accounting Server as the Recording Office.

Record Office ID — A 6-digit code that represents the Recording Office that generated the BAF output format.

The Record Office ID is initially set to 0, but can be any value from 0 - 999998. Enter the code that is appropriate for the Accounting Server.

Record Office Type — A 3-digit code (administered by Bellcore) that represents the type of office that generated the BAF output format for transport to the down-stream system.

The Record Office Type is initially set to 0, but can be any value from 0 - 779. Enter the Bellcore code that is appropriate for the Accounting Server.

Accounting File Purging

This section of the Record Office & File Purging dialog box enables you to specify how long files remain on the system before being purged.

The fields in this section of the dialog box are:

Secondary File Age Limit — BAF files are either primary or secondary. Primary files are files that have not yet been processed. Secondary files are primary files that have already been processed (at which time the primary files are marked as secondary). Therefore, if a file has secondary status, it can be deleted from the system. Use this field to specify how many days secondary files remain on the Accounting Server before they are automatically purged (default: 7 days).

Usage File Age Limit — Raw and compressed usage data files are collected from each switch in the accounting system and stored in the directories /CascadeAS/data/udfiles and /CascadeAS/archive/udfiles/compressed. Use this field to specify how many days usage data files remain on the Accounting Server before they are automatically purged (default: 7 days).

Call Age Limit — Call Data files are archive call data files that the system can use to recreate BAF files in case a BAF file becomes corrupted. Use this field to specify how many days Call Data files remain on the Accounting Server before they are automatically purged (default: 7 days).

File System Capacity Monitoring

This option enables you to specify when alarms are generated that indicate the file systems in which data and archive files are stored are nearing their storage capacity.

To configure file system capacity monitoring:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the File System button.

   The File System Capacity Monitoring dialog box appears, listing the Accounting Server directories or links to directories that reside on one or more file systems (see Figure 4-12).

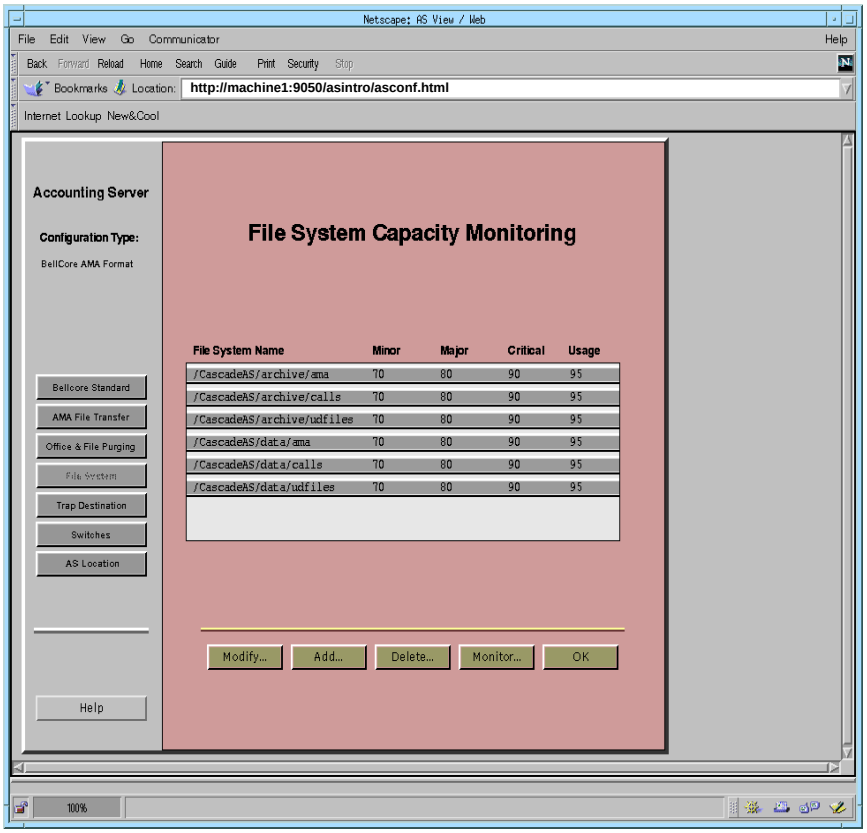


Figure 4-12. File System Capacity Monitoring Dialog Box

For each file system, a series of threshold percentage values is listed. Each value represents the amount of disk space that must be exceeded before an alarm is generated. When the file system usage exceeds the threshold capacity, the specified alarm is generated. For example, using the default values, when the /CascadeAS/archive/ama file system exceeds 70% of capacity, a Minor alarm is generated. If it exceeds 90% of capacity, a Critical alarm is generated.

The last column lists the total disk space usage by that file system (by percentage).

When the file system usage exceeds the threshold capacity, the line changes color:

- Line is red when usage exceeds the Critical value.
- Line is yellow when usage exceeds the Major value.
- Line is green when usage exceeds the Minor value.
- Line is grey when usage does not exceed threshold values.

When the Critical alarm threshold is reached, the Accounting Server stops accepting data from the switches in the network.

Also, the File System button changes color to alert you:

- Button is red when usage exceeds the Critical value for one or more file systems, or exceeds the Major value for three or more file systems.
- Button is yellow when usage exceeds the Major value for one file system.
- Button is green when usage exceeds the Minor value for one or more file system.
- Button is grey when usage does not exceed threshold values.

From the dialog box, you can add or delete a file system from the list, modify the threshold value for a file system and monitor a file system's disk usage. (The following sections describe the menu options.)

2. When you have finished with the dialog box, choose OK.

Adding a File System To Be Monitored

To add a file system to the monitoring list:

1. Choose Add. The File System Creation dialog box appears (see Figure 4-13).

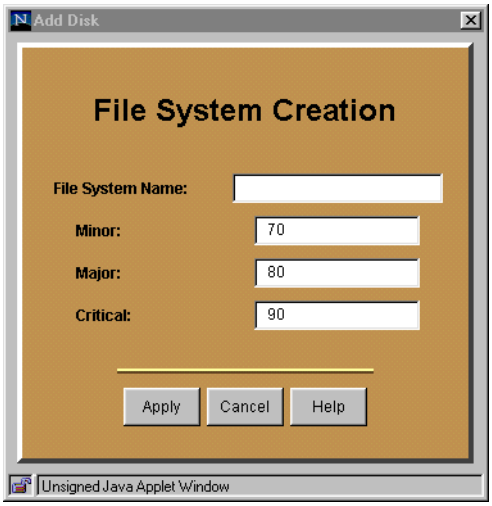


Figure 4-13. File System Creation Dialog Box

2. Enter the name of the new file system (e.g., CascadeAS/ar_ama).
3. Enter the threshold percentage you want to use for the various alarm levels.

   Each value you specify represents the disk space usage that must be exceeded in order to generate the given alarm (Critical, Major, or Minor).
4. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   The configuration tool updates the File System list with the new information.
5. When you have finished making changes in the dialog box, choose OK.

Deleting a Disk

To delete a file system from the monitoring list:

1. Select the file system and choose Delete. You are prompted to confirm the removal.

   The configuration tool updates the File System list.

2. When you have finished making changes in the dialog box, choose OK.

Modifying the Disk Configuration

To modify the settings for a currently listed file system:

1. Select the file system and choose Modify. The File System Update dialog box appears (see Figure 4-14).

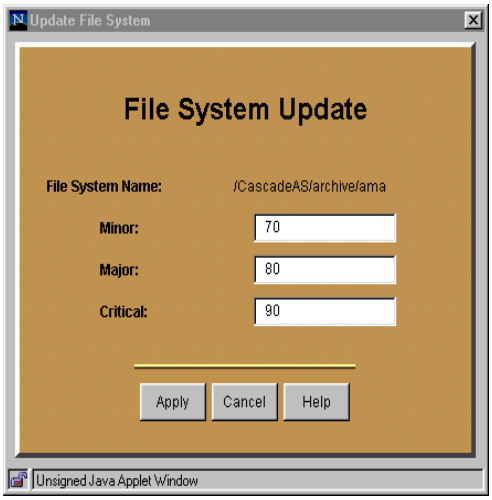


Figure 4-14. File System Update Dialog Box

1. Enter the threshold percentage you want to use for the various alarm levels.

   Each value you specify represents the disk space usage that must be exceeded in order to generate the given alarm (Critical, Major, or Minor).

2. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   The configuration tool updates the File System list with the new information.

3. When you have finished making changes in the dialog box, choose OK.

Monitoring a Disk

To monitor a file system's disk usage:

1. Select the file system and choose Monitor. The Disk Monitoring graph appears, showing real-time disk space usage (by percent) over time (see Figure 4-15).

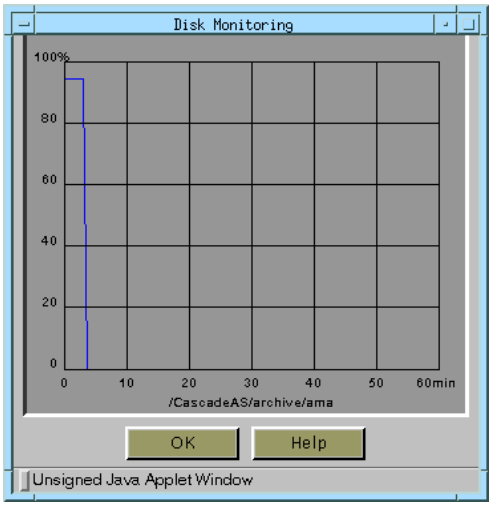


Figure 4-15. Disk Monitoring Graph

2. When you have finished monitoring disk usage, choose OK.

Trap Destinations

The Accounting Server generates SNMP traps to keep you informed of the state of operations on the Accounting Server and switches. (See Chapter 9 for more information on SNMP traps.) Use this option to specify the destination workstations to which these traps are to be sent. At the very least, you should enter the IP address of the NavisCore NMS workstation. If you have other workstations to which you want to send these traps, enter their IP addresses also.

To configure SNMP trap destinations:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the Trap Destination button.

The Trap Destination Configuration dialog box appears, listing the trap destinations configured for the Accounting Server (see Figure 4-16).

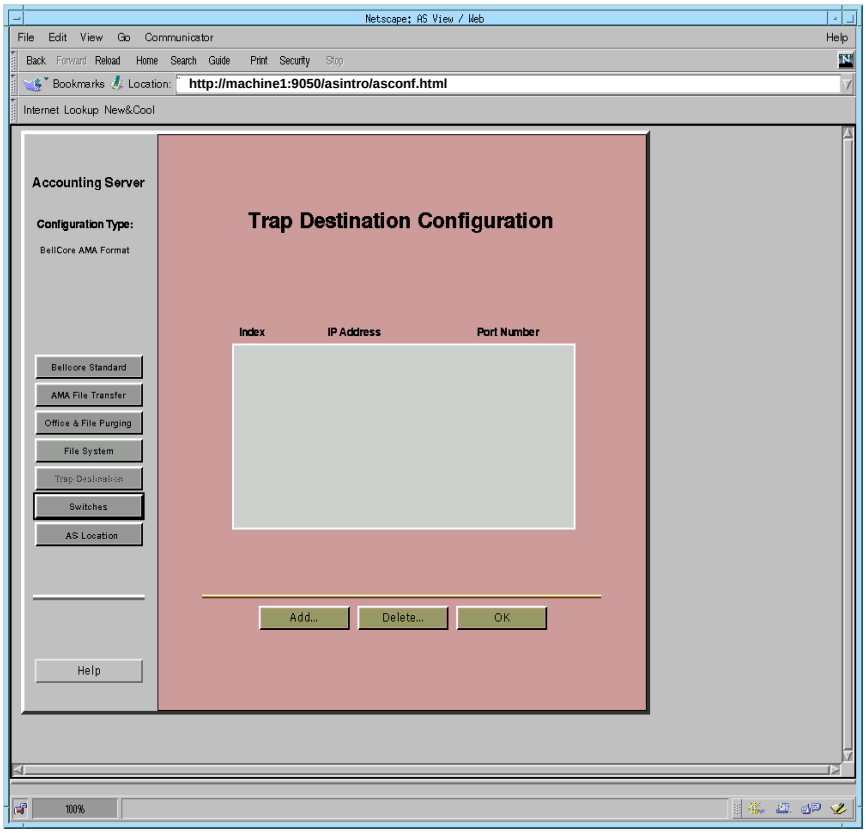


Figure 4-16. Trap Destination Configuration Dialog Box

From the Trap Destination Configuration dialog box, you can add or delete a trap destination. (The following sections describe the menu options.)

2. When you have finished with the dialog box, choose OK.

Adding a New Trap Destination

To add a new SNMP trap destination:

1. Choose Add. The Trap Destination Creation dialog box appears (see Figure 4-13).

Figure 4-17. Trap Destination Creation Dialog Box

2. Enter the IP address of the destination to which you want to send SNMP traps. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

The configuration tool updates the trap destination list. For example, if you added trap destination 152.148.51.192, it now appears in the list:

```
Index    IP Address              Port Number

1         152.148.51.192           162
```

The destination port number is always 162, and is not configurable.

3. When you have finished making changes in the dialog box, choose OK.

Deleting a Trap Destination

To delete an SNMP trap destination:

1. Select the destination and choose Delete. You are prompted to confirm the removal.

The configuration tool updates the trap destination list.

2. When you have finished making changes in the dialog box, choose OK.

Ascend Switch Configuration

The Ascend Switch Configuration option enables you to specify switch information required for the AMA generation process. You need to specify this information for each switch that may potentially send data to the Accounting Server, including all switches to which the server will be assigned as an active or reserve Accounting Server (see "Assigning Switches to Your Accounting Servers" on page 5-2 for information about active or reserve servers).

To configure switches:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the Switches button.

   The Switch Configuration Option dialog box appears, listing the switches configured for the Accounting Server (see Figure 4-18).

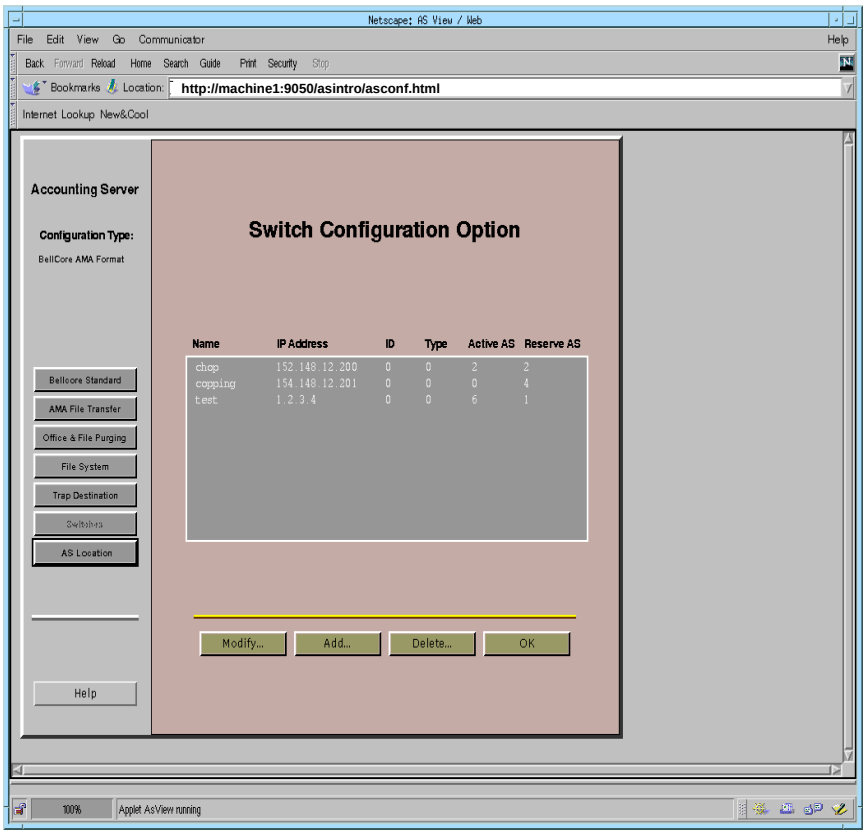


Figure 4-18. Switch Configuration Option Dialog Box

   From the Switch Configuration Option dialog box, you can add, delete, or modify switch settings. (The following sections describe the menu options.)

2. When you have finished with the dialog box, choose OK.

Adding a New Switch

To add a new switch:

1. Choose Add. The Switch Connection Creation dialog box appears (see Figure 4-13).

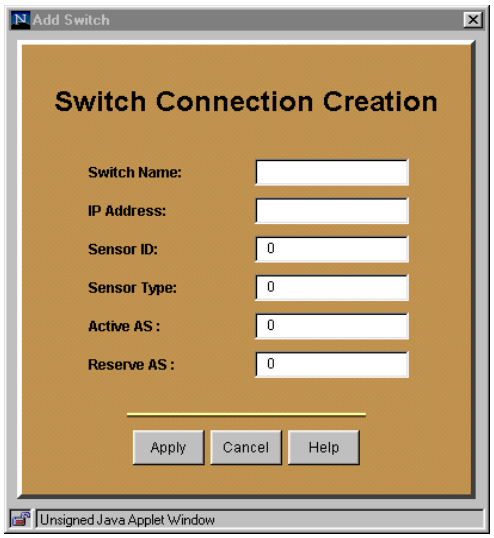


Figure 4-19. Switch Connection Creation Dialog Box

The Sensor Type and Sensor ID values are not needed for ASCII installations. Therefore, the Sensor Type and Sensor ID columns are not displayed in the dialog box for ASCII installations.

2. Enter the NavisCore switch name and the switch's IP address. In addition, if you performed a BAF installation of the Accounting Server software instead of an ASCII installation, you must specify the Sensor Type and Sensor ID for the switch:

   Sensor ID — Enter a unique 6-digit Sensor ID for each switch in the range of 000000 to 999999. Do not use the same value for multiple switches.

   Sensor Type — Enter the Sensor Type for your switch network. This value is the same for all switches you are adding to the configuration. For CBX 500 switches, use Sensor Type 400.

   Configure the active and reserve Accounting Servers:

   Active AS — Enter the index number of the active Accounting Server to process this switch.

Reserve AS — Enter the index number of the reserve Accounting Server to process the switch if the active server becomes unavailable. If you have only one server configured in your system or do not want to apply a reserve server to this switch, enter the active index number.

3. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   The configuration tool updates the switch list.

4. When you have finished making changes in the dialog box, choose OK.

Deleting a Switch

To delete a switch from the configuration:

1. Select the switch and choose Delete. You are prompted to confirm the removal.

   The configuration tool updates the trap destination list.

2. When you have finished making changes in the dialog box, choose OK.

Modifying a Switch

You may need to modify an existing switch configuration. For example, if an active Accounting Server fails, a reserve Accounting Server takes over processing the disabled server's switches. Once you restart the disabled server, you need to reset it to active status for the specific switches.

To modify an existing switch configuration:

1. Select the switch and choose Modify. The Switch Connection Update dialog appears (see Figure 4-20).

Figure 4-20. Switch Connection Update Dialog Box

2. Enter the NavisCore switch name and the switch's IP address.
3. If you performed a BAF installation of the Accounting Server software instead of an ASCII installation, you must specify the Sensor Type and Sensor ID for the switch:

   Sensor ID — Enter a unique 6-digit Sensor ID for each switch in the range of 000000 to 999999. Do not use the same value for multiple switches.

   Sensor Type — Enter the Sensor Type for your switch network. This value is the same for all switches you are adding to the configuration. For CBX 500 switches, use Sensor Type 400.
4. Configure the active and reserve Accounting Servers:

   Active AS — Enter the index number of the active Accounting Server to process this switch.

   Reserve AS — Enter the index number of the reserve Accounting Server to process the switch if the active server becomes unavailable. If you have only one server configured in your system or do not want to apply a reserve server to this switch, enter the active index number.
5. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   The configuration tool updates the trap destination list with the new information.
6. When you have finished making changes in the dialog box, choose OK.

Accounting Server Location

The location of each of the Accounting Servers in your accounting system must be registered so that interserver communication and updates can occur. Registration occurs automatically when you install an Accounting Server.

Occasionally, you may need to manually register an Accounting Server or change its registration information. For example, if the IP address changes for a host running the Accounting Server software, you need to update the information so that the server can continue to communicate with other servers in the accounting system.

The AS Location option allows you to specify Accounting Server location.

In a high availability configuration, an Accounting Server can serve as an *active* server and/or a *reserve* server. The reserve Accounting Server stands by to take over billing if the active Accounting Server becomes unavailable. Use the AS Location option to specify the file age trigger that indicates an active server has failed.

When a switch sends raw usage data files to an Accounting Server, these files are temporarily stored in the directory /CascadeAS/data/udfiles. When an active server is functioning normally, the data files are quickly processed and moved into their appropriate switch directories. If the active server fails, the usage data remains in /CascadeAS/data/udfiles without being processed.

Use this option to specify the file age trigger (in minutes) for the directory /CascadeAS/data/udfiles. If files remain in that directory longer than the specified time, the reserve server assumes that a failure has occurred and takes over processing for the failed active server. Under most conditions, you should not change the default value.

To configure an Accounting Server location:

1. From the Accounting Server configuration tool page (see Figure 4-8 on page 4-31), select the AS Location button.

   The Accounting Server Location dialog box appears, listing the Accounting Servers configured for the accounting system (see Figure 4-21).

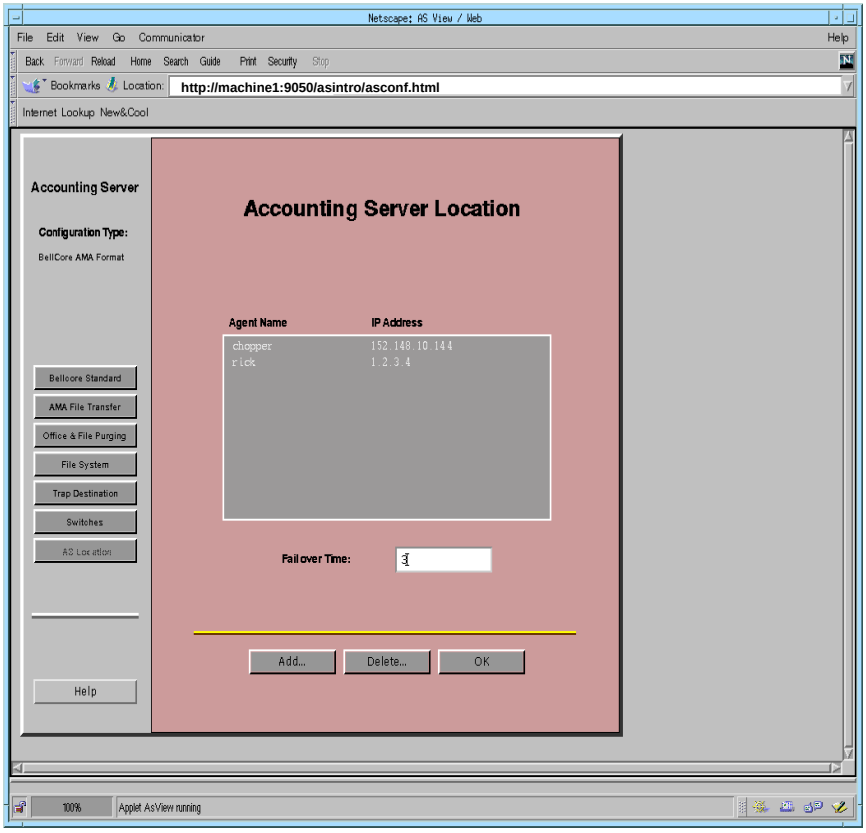


Figure 4-21. AS Location Configuration Dialog Box

From the Accounting Server Location dialog box, you can add, or delete server locations. And, you can specify the file age trigger that indicates an active server has failed. (The following sections describe the menu options.)

2. When you have finished with the dialog box, choose OK.

Modifying the Failover Time (File Age Trigger)

To modify the file age trigger that indicates an active server has failed:

1. In the Failover Time field, enter a new file age value (in minutes). Then, choose OK.

   You are prompted to confirm the change.

2. To change the failover time, choose OK.

   If you do not want to make the change, choose Cancel.

   A message appears indicating that the change was successfully made.

Adding an Accounting Server Location

To register a new server:

1. Choose Add. The AS Location Creation dialog box appears (see Figure 4-22).

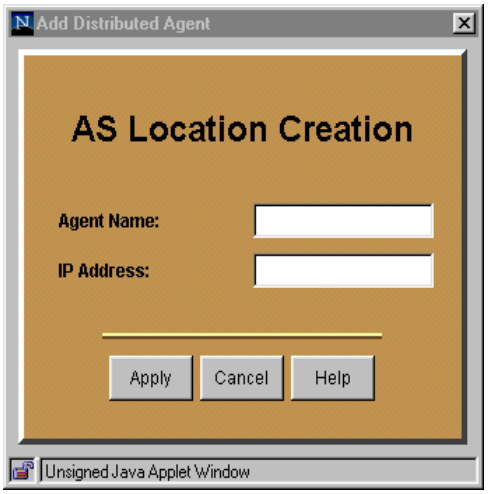


Figure 4-22. Accounting Server Location Creation Dialog Box

2. Enter the name and IP address of the Accounting Server. When you have finished making changes in the dialog box, choose Apply to save the settings or Cancel to cancel them.

   The configuration tool updates the Accounting Server location list.

3. When you have finished making changes in the dialog box, choose OK.

Deleting an Accounting Server Location

To deregister a server:

1. Select the server and choose Delete. You are prompted to confirm the removal.

   The configuration tool updates the Accounting Server location list.

2. When you have finished making changes in the dialog box, choose OK.

5

Configuring Accounting on Switches

This chapter describes how to configure the accounting system on your network. Prior to configuring the circuits, ports, and switches, you need to set up the Accounting Server as described in Chapters 2, 3, and 4.

Task Flowchart

Once you have set up the Accounting Server, you need to perform the configuration tasks as shown in Figure 5-1. See the listed section for more information on a given task.

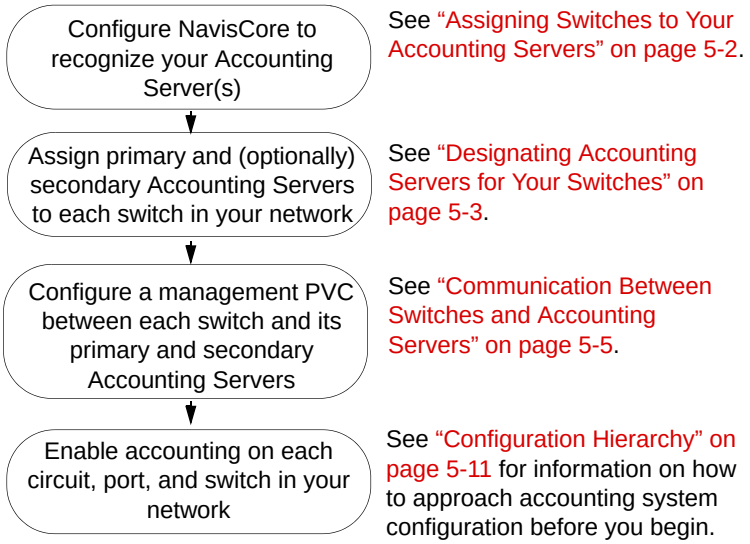


Figure 5-1. Accounting System Configuration Task Flowchart

Assigning Switches to Your Accounting Servers

This section describes how to add Accounting Servers to your network and designate the primary and/or secondary Accounting Servers for each of the switches in your network. Before you begin the accounting system configuration, you should add at least one Accounting Server to your network.

Adding Accounting Servers to the NavisCore Network

To configure NavisCore to recognize an Accounting Server:

1. From the NavisCore network map menu bar, choose Administer=>Ascend Parameters=>Set All Accounting Parameters=>Set Accounting Servers. The Set Accounting Servers dialog box appears (Figure 5-2).

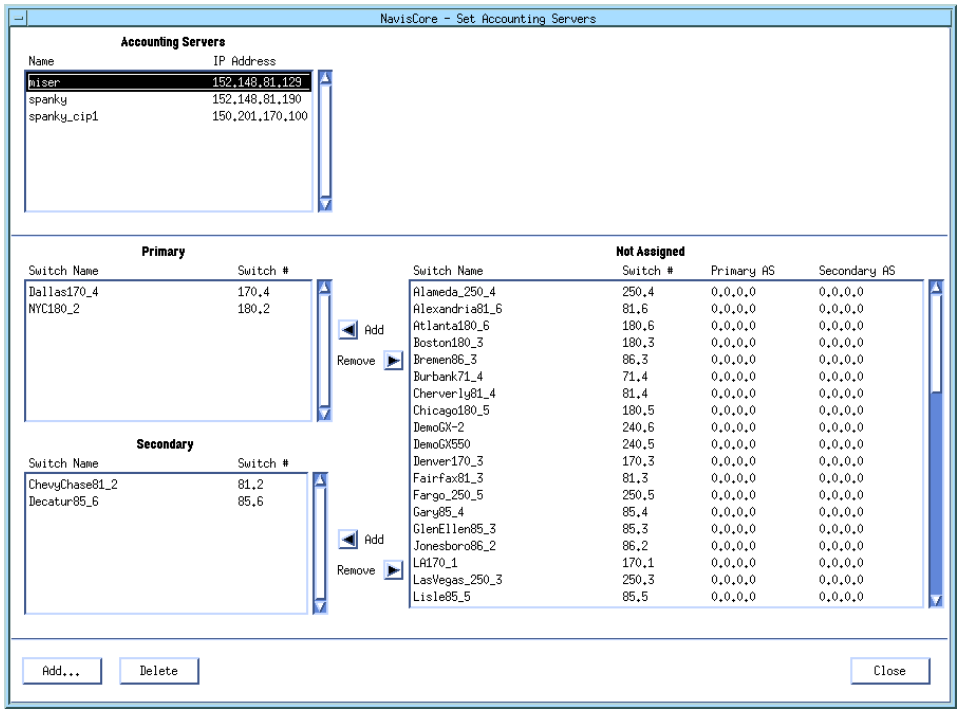
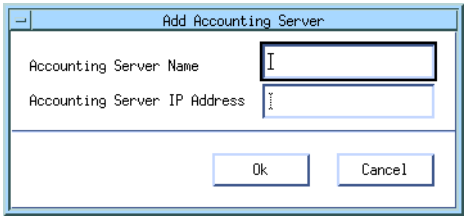


Figure 5-2. Set Accounting Servers Dialog Box

2. Choose Add. The Add Accounting Server dialog box appears.



3. In the Name field, enter a name for the Accounting Server you are adding.
4. In the IP Address field, enter the IP address of the Accounting Server.
5. Choose OK to return to the Set Accounting Server dialog box.
6. Repeat Step 2 through Step 5 for each Accounting Server you want to add. When you finish, choose Close.
7. Proceed to the next section to designate the Accounting Servers for your switches.

Designating Accounting Servers for Your Switches

Each switch in your network must be assigned a primary Accounting Server and, optionally, a secondary Accounting Server. If the primary server is down or the switch(es) cannot communicate with the primary server, the switch automatically starts sending data to the secondary Accounting Server. The timing of this switchover is 1 collection period after the Accounting Server enters a degraded communications state (typically 5 minutes). The switch also generates a trap indicating that the switchover occurred (atmacctASwitchover for ATM and fracctASwitchover for Frame Relay).

Keep in mind that the switch does not automatically revert to sending data to the primary server once that server is back on line. The switch continues to send data to the secondary Accounting Server until the administrator manually assigns it back to a primary server.

As shown in Figure 5-2 on page 5-2, the list boxes in the Accounting Server dialog box are:

Accounting Servers — Lists all Accounting Servers configured on the network.

Primary — Lists all switches that are using the currently selected Accounting Server as their primary server.

Secondary — Lists all switches that are using the currently selected Accounting Server as their secondary server.

Not Assigned — Lists all switches for which the currently selected Accounting Server is not assigned as either the primary or secondary server.

To designate the primary and secondary Accounting Servers for your switches:

1. If the Set Accounting Server dialog box (Figure 5-2 on page 5-2) is not displayed, from the NavisCore network map menu bar, choose Administer=>Ascend Parameters=>Set All Accounting Parameters=>Set Accounting Servers.
2. In the Accounting Servers list box, select an Accounting Server.
3. In the Not Assigned list box, select a switch that you want to assign to the selected Accounting Server.

- If you want the selected Accounting Server to be the primary server for this switch, move the switch into the Primary list box by choosing the Add button to the right of the Primary list box.
- If you want the selected Accounting Server to be the secondary server for this switch, move the switch into the Secondary list box by choosing the Add button to the right of the Secondary list box.

4. Repeat Step 3 for each switch that you want to assign to the Accounting Server selected in Step 2.
5. Repeat Step 2 through Step 4 for each Accounting Server in the Accounting Servers list box, until all switches in your network have been assigned to at least a primary Accounting Server.
6. When you finish, choose Close to return to the NavisCore network map.

Deleting an Accounting Server

To delete an Accounting Server from the list:

1. In the Accounting Servers list box (Figure 5-2 on page 5-2), select the server you want to delete.
2. Verify that the Accounting Server you want to delete is not assigned or currently being used as the primary or secondary Accounting Server for any of your switches. To do so, look in the Primary and Secondary list boxes. These list boxes show any switches that are using the currently selected Accounting Server as their primary or secondary server.
3. If there are switches listed in either the Primary and Secondary list boxes, you need to reassign those switches to another Accounting Server. To do so:
   a. Select the Accounting Server to which you want to reassign the switch.
   b. Add the switch to that Accounting Server. A confirmation dialog box appears.
   c. Confirm that you want to assign this switch to the selected server. The switch is then automatically removed from its original server, and is assigned to the new server.
4. If the Accounting Server has no switches assigned to it, choose Delete. A confirmation dialog box appears.
5. Choose Yes to delete the Accounting Server from the list, or choose Cancel to cancel the delete operation.

Removing a Switch from an Accounting Server

If you no longer want a switch to send its accounting data to a particular Accounting Server, perform the following steps to remove the switch from its current server.

1. From the NavisCore network map menu bar, choose Administer=>Ascend Parameters=>Set All Accounting Parameters=>Set Accounting Servers.

2. In the Accounting Servers list box, select the Accounting Server from which you want to remove a switch. The system displays all switches that are using this server as an primary server in the Primary list box, and switches that are using this server as a secondary server in the Secondary list box.
3. Locate the switch you want to remove; it may be listed in either the Primary or the Secondary list box.
4. Select the switch and choose the Remove button to remove the switch from the Primary (or Secondary) list box. The switch is added to the Not Assigned list box, indicating that it is no longer assigned to the server.

You cannot remove a switch from an Accounting Server that is currently being used as the active server for that switch (whether the active server is the primary and secondary server for the switch). For example, if Accounting Server Control is set to "Primary" for a given switch, and Accounting is currently set to Enabled, you cannot remove that switch from its primary Accounting Server. You must first change Accounting Server Control to "Secondary" for that switch (see "Configuring Accounting at the Switch Level" on page 5-33) or disable all accounting on that switch.

Communication Between Switches and Accounting Servers

The switches in the accounting system transfer usage data files to their Accounting Servers using a TCP/IP-based transport protocol. In order to transfer files at the required rate, you need to configure a management PVC between each switch and the Accounting Server(s) to which it sends its data. Otherwise, you need to configure an Ethernet connection between the switch and the Accounting Server, which may create congestion at your gateway switch (depending on the amount of data that needs to be transferred to your Accounting Server).

The management PVC you configure must be able to support the data generation rate of the SP, which can be as high as 1.5 Mbps on a fully loaded switch accepting 60 calls/sec on each IOM.

To determine your bandwidth requirements in megabits per second (Mbps) for transporting usage data files, use the following formula:

$$bw \approx \left[\left((S \times 204) + \frac{N \times 44}{r \times 60}\right) \times .6 \times 8\right] \div 1{,}048{,}576$$

where:

bw = Bandwidth required (in megabits per second)

S = SVC call rate (average calls/sec/switch)

N = Average number of circuits (PVCs) per switch

r = PVC recording interval (in minutes)

Table 5-1 shows the transport bandwidth that is required from a switch to an Accounting Server as a function of the calls/sec/switch and the average circuit level on the switch. For example, if you have only 10 switches in the network and each switch is configured for 15,000 PVCs and averaging 280 SVCs/sec, you need .26 Mbps (260 Kbps) of transport bandwidth from the switch to its primary Accounting Server. If the switch is also assigned to a secondary Accounting Server, you need an additional .26 Mbps of transport bandwidth from the switch to the secondary Accounting Server.

Table 5-1. Minimum Required Bandwidth (in Mbps) to the Accounting Server[a]

Call Rate (calls/sec)	Circuit Level (# of PVCs per switch)			
	15,000	30,000	60,000	120,000
280	0.28	0.28	0.28	0.28
560	0.55	0.55	0.55	0.55
840	0.83	0.83	0.83	0.83
1120	1.10	1.10	1.10	1.10
1400	1.38	1.38	1.38	1.38

[a] A PVC recording interval of 60 minutes (r=60) was used to compute these values.

The next section describes how to configure the management PVCs required for the accounting system. You cannot set up the management PVCs until you have installed your Accounting Servers.

Configuring a Management PVC

Before you can enable accounting on your network, you need to configure a management PVC from each of your switches to their respective Accounting Server(s). If you do not set up a management PVC, all data collected on the switch is sent to the Accounting Server(s) through your gateway switch via Ethernet, and may create congestion on your gateway switch.

To configure a management PVC from each switch that is configured to report to an Accounting Server, you need to perform the following steps:

1. Connect the appropriate ATM cable (e.g., an OC3-c cable) between the Accounting Server and a physical port on any switch in the accounting system. If you use an ATM NIC card to connect the Accounting Server to the network, the cable must match the speed of the ATM NIC card.
2. From NavisCore, define a logical port on the physical port you used in Step 1. For instructions on configuring a logical port, see either the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*. You can configure this logical port as a UNI-DTE port, a UNI-DCE port, or an NNI port. Also, configure it with the maximum available bandwidth.
3. For each switch that you configured to report to the Accounting Server, define a management PVC in NavisCore from the switch's MPVC port to the logical port you defined in Step 2. For endpoint 1, select the switch's MPVC port (which has the logical port name "MPVCLport.[*switchname*]" in the logical port list). For endpoint 2, select the logical port you configured in Step 2 (the logical port that connects to the Accounting Server). For detailed instructions on configuring a management PVC in NavisCore, see either the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*.
4. For each management PVC you created in Step 3, use the Set All Management Paths function to configure the IP address and access path of the Accounting Server.

When you create the Management path, the switch you select on the NavisCore network map is the source switch for the accounting data, not the switch that is connected to the Accounting Server. However, if the source switch is the same switch that is connected to the Accounting Server, select that switch on the network map. For information on accessing NMS Path dialog box, see either the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*.

On the Add Management Path dialog box:

- For Access Path, choose Management PVC.
- In the Management IP Address box, enter the IP address of the Accounting Server.
- In the Management PVC Name list box, select the management PVC you created in Step 3.

If You Are Using Multiple Accounting Servers

If you use multiple Accounting Servers in your network, configure them the same way. In this situation, you need to configure a second logical port (and cable connection) to connect to the secondary Accounting Server. This logical port can be on the same switch as the first logical port (the port connected to the primary server) or on a different switch.

Figure 5-3, Figure 5-4, and Figure 5-5 show sample configuration paths for your management PVCs in a simple network with three switches and two Accounting Servers (a primary and a secondary server). In the examples, all switches use the same Accounting Server as their primary server. This is not a requirement — you can configure your network so that some switches use Accounting Server 1 as their primary server and Accounting Server 2 as their secondary server, while others use Accounting Server 2 as their primary server and Accounting Server 1 as their secondary server.

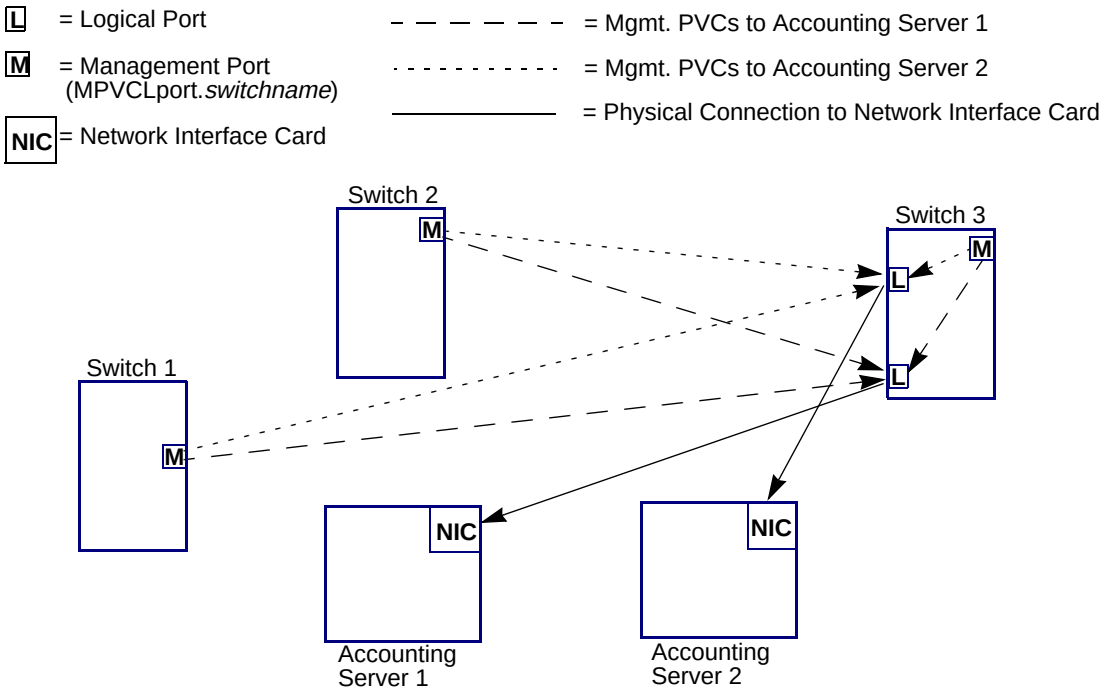


Figure 5-3. Two Accounting Servers Accessed Via Logical Ports on One Switch

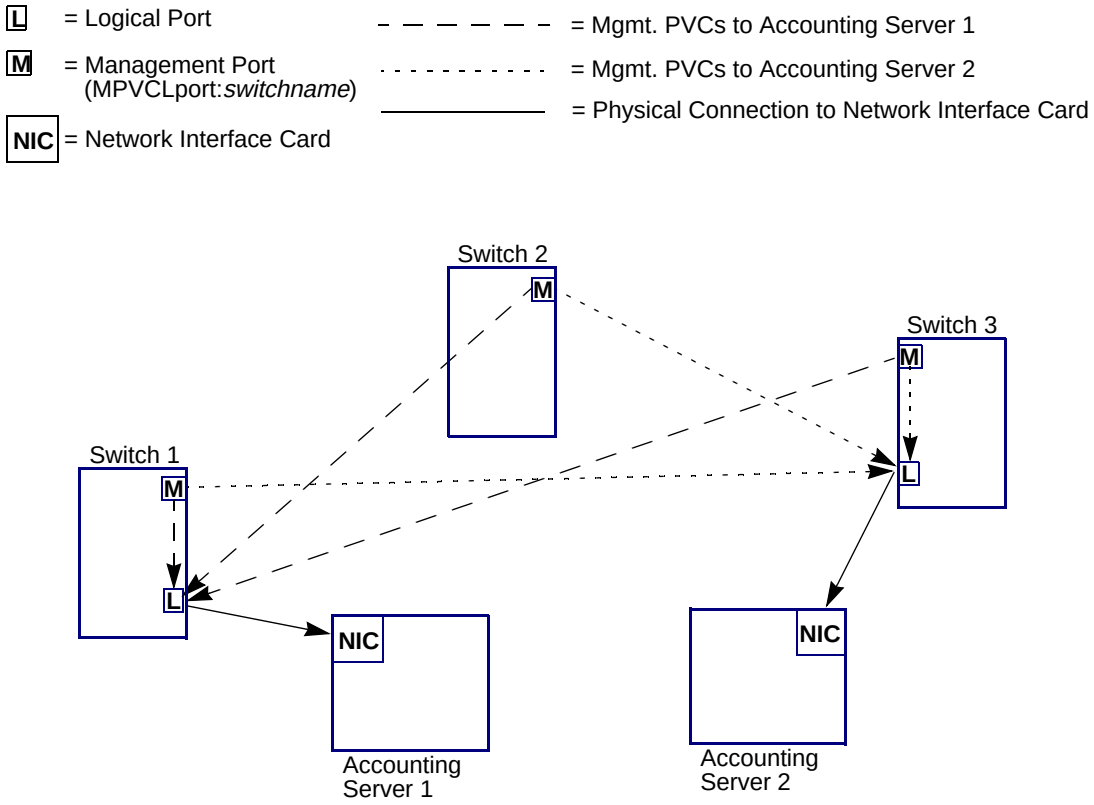


Figure 5-4. Two Accounting Servers Accessed Via Logical Ports on Different Switches

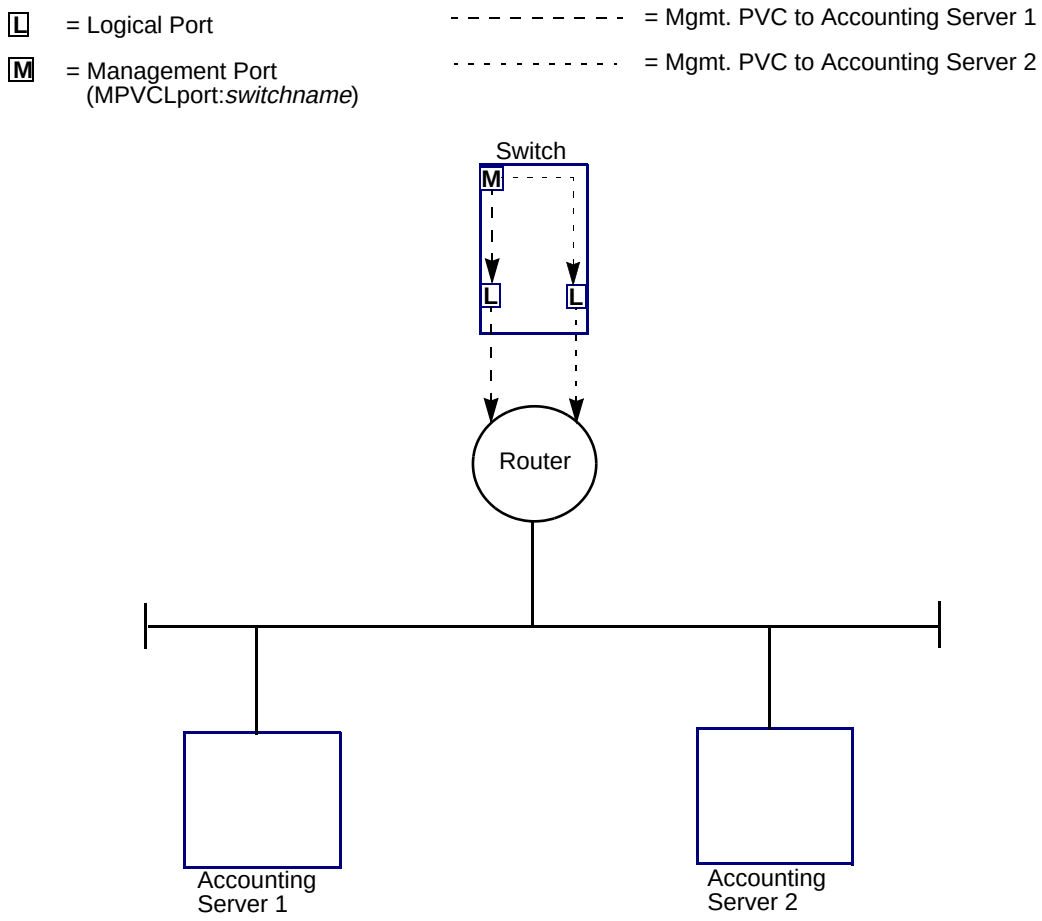


Figure 5-5. Two Accounting Servers Accessed Via a Router

Configuration Hierarchy

This section describes the configuration hierarchy of the accounting system, and provides information on how to approach accounting system configuration on your network.

For PVCs, accounting can be enabled/disabled for various parameters at the switch and circuit levels. In addition, at the port level, you can specify whether or not PVC parameters are included in usage data by enabling/disabling PVC Parameter Recording (see page 5-23 for a list of the parameters that are included).

For SVCs, accounting can be enabled/disabled for various parameters at the switch and logical port levels. To perform a particular type of accounting on a given SVC, the related SVC accounting parameter(s) must be set to Enabled on both the switch and logical port levels. Conversely, if an SVC accounting parameter is set to Disabled at the switch level, setting that parameter to Enabled on individual logical ports on the switch has no effect (that type of accounting will still be inhibited on all logical ports on the switch).

There are also network-level settings that give you the ability to specify accounting settings that apply to all of the switches in your network at once. These settings are the same as the switch-level settings, except that they apply to all switches in a network, whereas the switch-level settings apply only to a given switch. The network settings give you the ability to modify your accounting system settings on all switches at once, without having to configure each switch one at a time.

The following sections describe the general hierarchy in more detail.

Switch Level

When PVC Accounting is set to Enabled at the switch level, you can selectively disable PVC Accounting on individual PVCs on that switch. This allows you to selectively perform PVC accounting on some of the PVCs on the switch, while not performing it on others.

When PVC Accounting is set to Disabled at the switch level, collection of PVC accounting information is inhibited on all PVCs on that switch, even if PVC Accounting is set to Enabled on individual PVCs on the switch.

When an SVC accounting parameter is set to Enabled at the switch level, you can selectively disable that parameter on individual logical ports on that switch. This allows you to selectively perform that type of accounting on some of the logical ports on the switch, while not performing it on others. For example, if you set CBR Recording to Enabled at the switch level, you can still inhibit collection of accounting information on all CBR SVCs on a given logical port by setting CBR Recording to Disabled on that logical port.

When an SVC accounting parameter is set to Disabled at the switch level, that type of accounting is inhibited on all logical ports on that switch, even if the accounting parameter is set to Enabled on individual logical ports on the switch. For example, if CBR Recording is set to Enabled on a given logical port, collection of accounting information on all CBR SVCs on the logical port is still inhibited if CBR Recording is set to Disabled at the switch level.

A given type of accounting does not begin on any circuits or logical ports on a switch until you set that type of accounting to Enabled at the switch level.

Port Level

For ATM PVCs, there are two settings that specify whether or not traffic parameters (PCR, MBS, and SCR) are included in the usage data produced for all PVCs on the port. In order for traffic parameters to be included in usage data, you must set PVC Parameter Recording to Enabled on the port and set PVC Accounting to Enabled on the switch.

When an SVC parameter is set to Enabled at the switch level, you can selectively inhibit the collection of that type of data on a given logical port on that switch by setting the parameter to Disabled on that logical port.

When an SVC parameter is set to Enabled at the port level, collection of that type of data is performed only if the parameter is also set to Enabled at the switch level. If it is set to Disabled at the switch level, but Enabled at the port level, collection of that type of data is still inhibited on the port because of the switch-level setting.

For SVCs, there are five port-level settings in common with the SVC switch-level settings. See Table 5-2 on page 5-14 for more details.

Circuit (PVC) Level

For Frame Relay PVCs, there are two settings that specify whether or not traffic parameters (CIR, BC, and BE) are included in the usage data for a particular PVC. In order to perform usage data collection on a given PVC, you must set PVC Accounting to Enabled at both the switch and circuit levels. If PVC Accounting is set to Disabled at the switch level, collection of PVC accounting data at the circuit level is inhibited (even if you set PVC Accounting to Enabled at the circuit level).

Even with PVC Accounting Enabled at the switch level, you can inhibit collection of PVC data. You can:

- Inhibit all PVC data on a given PVC by setting PVC Accounting to Disabled at the circuit level.
- Inhibit particular data (such as Ingress Cell Counting) by setting that parameter to Disabled at the circuit level.

Only PVC parameters can be set at the circuit level.

QoS Service Classes

The four QoS service class settings (ABR/AFR, CBR/CFR, UBR/UFR, and VBR/VFR for ATM/Frame Relay, respectively) for SVCs are a subset of the SVC Accounting parameter at both the port and switch levels. For example, to perform UBR/UFR SVC Accounting on a logical port, UBR/UFR Accounting must be enabled at the port and switch levels, and SVC Accounting must be enabled at the port and switch levels.

In addition, to perform CBR Cell Counting on an ATM logical port, you need to enable CBR Recording at the logical port level, and also enable both CBR Recording and CBR Cell Counting at the switch level.

Enable/Disable Settings

Table 5-2 on page 5-14 and Table 5-3 on page 5-16 provide more detail on the configuration hierarchy and show the SVC and PVC default enable/disable settings at each level. When configuring the system for the first time, see these charts to determine which settings you need to change in order to configure your system as desired. If the default setting for a particular parameter or group of parameters is adequate for your needs, then you do not have to access the related dialog box to configure those parameters.

SVCs

You can enable/disable the following options for SVCs on the accounting system:

- SVC accounting on a switch
- SVC accounting on individual logical ports
- Accounting for a given service class on a switch
- Accounting for a given service class on individual ports
- CBR cell counting on an ATM switch *(ATM only)*
- Accounting on point-to-point SVCs that originate from or terminate at a given logical port
- Accounting on point-to-multipoint SVCs that originate from or terminate at a given logical port *(ATM only)*

- Counting of unsuccessful SVC creation attempts that originate from or terminate at a given logical port
- Logging of the calling subparty address and/or called subparty address associated with an SVC at the LPort level
- Usage Measurements, including Rcvd. Bytes, Rcvd. Frames, and Rcvd. DE Bytes at the LPort level *(Frame Relay only)*
- Traffic parameter recording (CIR, BC, BE) *(Frame Relay only)*

If the default setting for a given enable/disable parameter is appropriate for the accounting information you need to collect, then you do not have to modify that parameter manually. See Table 5-2 on page 5-14 for the default settings for SVC accounting parameters.

For switches/ports on which SVC accounting parameters have already been configured, any changes made to the accounting parameters do not affect ongoing SVCs. The changes apply to only SVCs created thereafter.

Table 5-2. SVC Configuration Hierarchy and Default Settings

ATM/Frame Relay Parameters	Switch Level Setting	Port Level Setting
SVC Accounting	Disabled	Disabled
ABR/AFR Recording	Enabled[a]	Enabled[b]
UBR/UFR Recording	Enabled[b]	Enabled[b]
VBR/VFR Recording	Enabled[b]	Enabled[b]
CBR/CFR Recording	Enabled[b]	Enabled[c]
CBR Cell Counting	Enabled[c]	—
SVC Parameter Recording (*Frame Relay only*)	—	Disabled
Rcvd Bytes	—	Enabled[d]
Rcvd Frames	—	Disabled
Rcvd DE Bytes	—	Disabled
SVC Point-to-Point Originating	—	Enabled[e]
SVC Point-to-Point Terminating	—	Enabled[d]
SVC Point-to-MultiPoint Originating	—	Enabled[d]

Table 5-2. SVC Configuration Hierarchy and Default Settings (Continued)

ATM/Frame Relay Parameters	Switch Level Setting	Port Level Setting
SVC Point-to-MultiPoint Terminating	—	Enabled[d]
Unsuccessful SVC Creation Originating	—	Enabled (UNI)[d], Enabled (NNI)
Unsuccessful SVC Creation Terminating	—	Enabled[d]
SubParty Calling Address	—	Disabled[d]
SubParty Called Address	—	Disabled[d]

[a] SVC Accounting must be enabled at the switch level for usage data to be generated.

[b] SVC Accounting must be enabled at the switch and port levels for usage data to be generated. Also, the service class setting must be enabled at the switch level for usage data to be collected on circuits of that service class type.

[c] SVC Accounting and CBR Recording must be enabled at the switch level for usage data to be generated.

[d] SVC Accounting must be enabled at the switch and port levels for usage data to be generated. Also, the service class setting must be enabled at the switch and port levels.

[e] SVC Accounting must be enabled at the switch and port levels for usage data to be generated. Also, the service class setting must be enabled at the switch and port levels.

ATM PVCs

You can enable/disable the following options for ATM PVCs on the accounting system:

- PVC accounting at the switch level.
- PVC Parameter Recording on individual ports (when set to Enabled, traffic parameters such as PCR, MBS, MCR, and SCR are included in the PVC usage data that is produced).
- PVC accounting on individual PVCs.
- Ingress cell counting on individual PVCs.
- Egress cell counting on individual PVCs.

In addition, you can assign a Chargeable Party ID to each end of a PVC.

Table 5-3. ATM PVC Configuration Hierarchy and Default Settings

Enable/Disable Parameter	Switch Level	Port Level	Circuit Level
PVC Accounting	Disabled	—	Enabled
PVC Parameter Recording	—	Disabled[a]	—
Ingress Cell Counting	—	—	Enabled[b]
Egress Cell Counting	—	—	Enabled[b]

[a] PVC Accounting must be enabled at the switch level for traffic parameter usage data to be generated.

[b] PVC Accounting must be enabled at the switch level for this type of usage data to be generated.

Table 5-4 provides examples of how to configure ATM PVC Accounting for the type of usage data you need to record. Default settings are shown in bold; if the default setting is appropriate for what you want, you do not have to manually modify the setting.

Table 5-4. Sample PVC Configuration Possibilities (for a given circuit)[a]

Enable/Disable Parameter	PVC Acct. (Switch)	PVC Params (Port)	PVC Acct. (Circuit)	Ingress Cell Counts (Circuit)	Egress Cell Counts (Circuit)
Enable PVC Accounting, record all PVC data including PVC parameters	Enabled	Enabled	**Enabled**	**Enabled**	**Enabled**
Enable PVC Accounting, record all PVC data except PVC parameters	Enabled	**Disabled**	Enabled	Enabled	Enabled
Enable PVC Accounting, record all PVC data except ingress and egress cell counts	Enabled	Enabled	**Enabled**	Disabled	Disabled
Enable PVC Accounting, record all PVC data except ingress cell counts	Enabled	Enabled	**Enabled**	Disabled	**Enabled**

Table 5-4. Sample PVC Configuration Possibilities (for a given circuit)[a] (Continued)

Enable/Disable Parameter	PVC Acct. (Switch)	PVC Params (Port)	PVC Acct. (Circuit)	Ingress Cell Counts (Circuit)	Egress Cell Counts (Circuit)
Enable PVC Accounting, record all PVC data except egress cell counts and PVC parameters	Enabled	**Disabled**	**Enabled**	**Enabled**	Disabled
Disable PVC Accounting on a circuit	—	—	Disabled	—	—

[a] Default settings are shown in bold.

For example, if you want to enable PVC accounting on a PVC and record all PVC parameters on that PVC, you do not have to modify the accounting settings at the circuit level for that PVC, since these are the default settings for all PVCs. You simply have to enable PVC accounting on the PVC port and switch.

Frame Relay PVCs

You can enable/disable the following options for Frame Relay PVCs on the accounting system:

- PVC accounting at the switch level.
- PVC Parameter Recording on individual ports and PVCs (when set to Enabled, traffic parameters such as CIR, BE, and BC are included in the PVC usage data that is produced).
- PVC accounting on individual PVCs.
- Received byte counting on logical ports and individual PVCs.
- Received frame counting on logical ports and individual PVCs.
- Received delete eligible byte counting on logical ports and individual PVCs.

In addition, you can assign a Chargeable Party ID to each end of a PVC.

Table 5-5. Frame Relay PVC Configuration Hierarchy and Default Settings

Enable/Disable Parameter	Switch Level	Port Level	Circuit Level
PVC Accounting	Disabled	—	Enabled
PVC Parameter Recording	—	Disabled[a]	Disabled[a]
Rcvd Bytes	—	—	Enabled[b]
Rcvd Frames	—	—	Enabled[b]
Rcvd DE Bytes	—	—	Enabled[b]

[a] PVC Accounting must be enabled at the switch level for traffic parameter usage data to be generated.

[b] PVC Accounting must be enabled at the switch level for this type of usage data to be generated.

Recommended Configuration Sequence

Use the following general sequence of steps to set up your accounting system:

1. On each of the switches in your accounting system, set up a data transit channel between each switch and its Accounting Servers. See "Communication Between Switches and Accounting Servers" on page 5-5 for more information.
2. Set up each of your Accounting Servers in the NavisCore network, and designate the Accounting Server(s) that you want each of your switches to use. See "Assigning Switches to Your Accounting Servers" on page 5-2 for instructions.
3. Configure the accounting settings for each PVC, logical port, and switch on which you want to collect accounting data.

   For instructions on how to configure port-level settings, see "Configuring Accounting at the Port Level" on page 5-19.

   For instructions on how to configure circuit-level settings for PVCs, see "Configuring PVC Accounting at the Circuit Level" on page 5-27.

   For instructions on how to configure switch-level settings, see "Configuring Accounting at the Switch Level" on page 5-33.

If you want to begin collecting usage data simultaneously on all circuits, ports, and switches in the network, configure accounting on all of your PVCs and logical ports, then use the network-level settings instead of the switch-level settings to enable accounting. You can only use this method if the switch-level settings will be the same on all or most of your switches.

4. As you add more logical ports and circuits to your network, you can configure the accounting settings for those ports and circuits.

Configuring Accounting at the Port Level

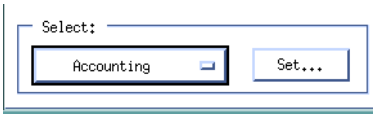
This section describes how to configure accounting at the logical port level. These settings apply to all SVCs on the logical port. Also, the PVC Parameter Recording setting applies to all of the logical port's ATM PVCs for which PVC Accounting is set to Enabled at the circuit level.

This section applies only to UNI/NNI ports. If the logical port is a non-UNI/NNI port, the Set Accounting function is disabled, and you cannot access the Set Accounting LPort Attributes dialog box.

For information on dialog boxes not shown or described here, see the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*.

To configure accounting system settings at the port level:

1. From the NavisCore network map, select the appropriate switch icon.
2. From the menu bar, select Administer=>Ascend Parameters=>Set Parameters to access the Switch Back Panel dialog box.
3. Double-click the physical port you want to modify to display the Set Physical Port Attributes dialog box.
4. Choose the Logical Port command to access the Set All Logical Ports in PPort dialog box.
5. In the Logical Port dialog box:
   - If you are modifying an existing logical port, select the logical port on which you want to configure accounting settings, then choose Modify. The Modify Logical Port Type dialog box appears. Choose OK to continue to the Modify Logical Port dialog box, then go to Step 6.
   - If you are adding the logical port, choose Add. The Add Logical Port Type dialog box appears. Select the port type, then choose OK to continue to the Modify Logical Port dialog box. Configure the port as desired, then go to Step 6.
6. In the lower left corner of this dialog box, select Accounting from the Options list button, then choose Set.



For ATM user ports, the Set ATM LPort Accounting Attributes dialog box appears (see Figure 5-6).

For Frame Relay user ports, the Set FR LPort Accounting Attributes dialog box appears (see Figure 5-7).

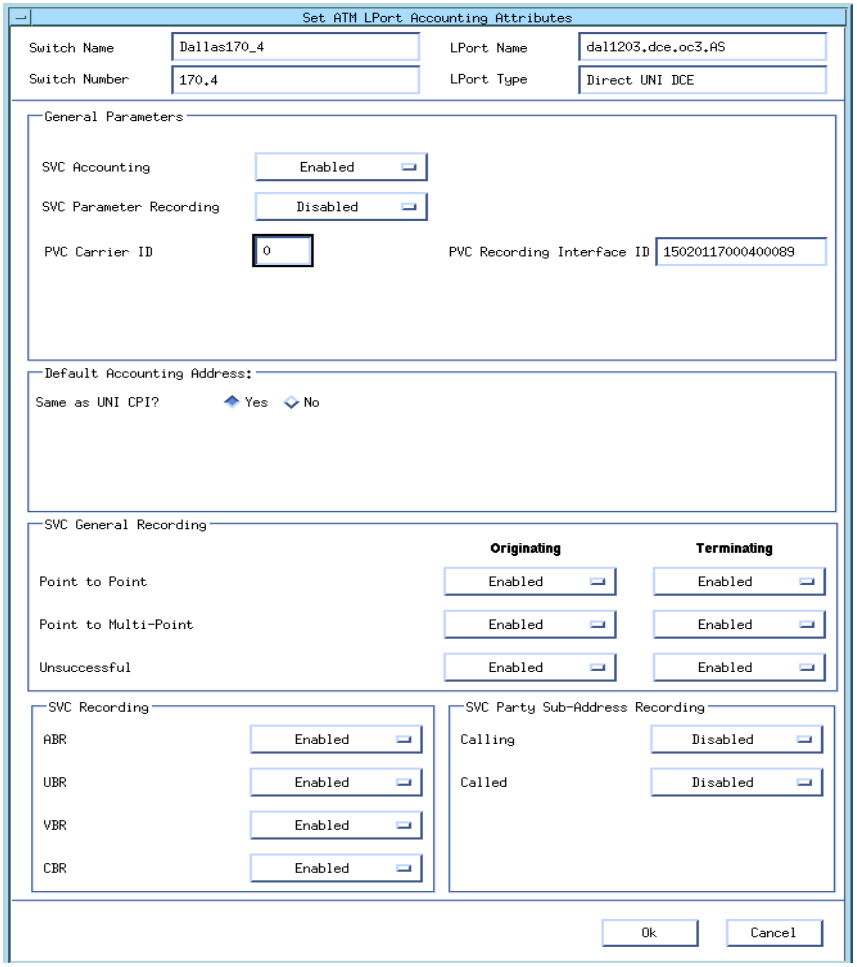


Figure 5-6. Set ATM LPort Accounting Attributes Dialog Box

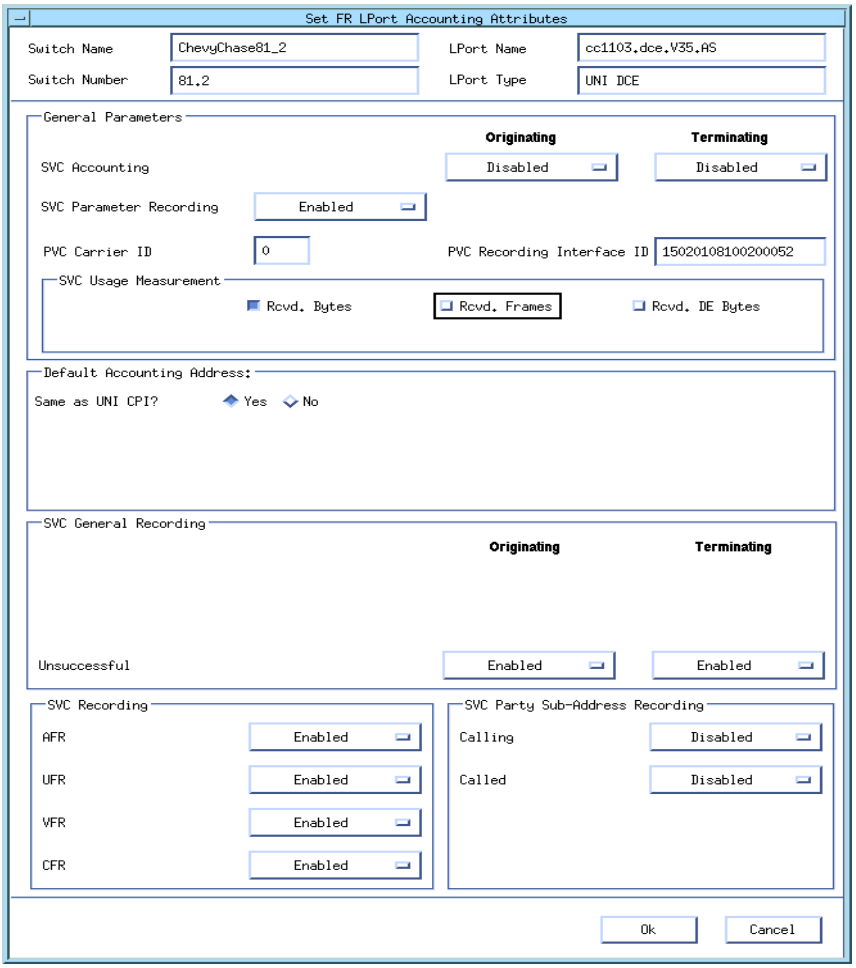


Figure 5-7. Set FR LPort Accounting Attributes Dialog Box

7. See Table 5-6 for information on each of the fields on this screen.
8. When you have finished configuring the accounting settings for the port, choose OK to apply the configuration to the logical port. Then choose OK from the Add (Modify) Logical Port dialog box to apply the new settings.
9. Repeat Step 5 through Step 8 to add/modify any other logical ports on which you want to configure accounting. When finished, choose Close to return to the Physical Port Attributes dialog box, then choose Apply to return to the Switch Back Panel dialog box.
10. Repeat Step 3 through Step 9 for each of this switch's physical ports on which you want to perform accounting.

Table 5-6. Logical Port Accounting System Settings

Field	Description
Switch Name/ Switch Number	Read-only fields that display the name and number of the switch whose logical ports you are modifying. If the logical port configuration has not been saved yet, these fields are blank.
LPort Name/ LPort Type	Read-only fields that display the name and type for the logical port you are modifying. If the logical port configuration has not been saved yet, these fields are blank.
General Parameters	
SVC Accounting	*Enabled* — SVC usage data is collected on this logical port, providing that SVC Accounting is set to Enabled at the switch level. If SVC Accounting is set to Disabled at the switch level, setting this field to Enabled has no effect; SVC Accounting will still be inhibited on the logical port. *Disabled* — (Default) SVC usage data is not collected on this logical port, even if SVC Accounting is set to Enabled at the switch level. Also, if you select Disabled, usage data collection for different traffic types (UBR, VBR, ABR, CBR) is inhibited on this port, even if the related SVC Recording parameter is set to Enabled. *Perf. Study* — SVC usage data is collected on this logical port for performance analysis only. No Bill will occur for this data.
PVC Parameter Recording *(ATM only)*	*Enabled* – In addition to the PVC usage data listed in Table 1-1 on page 1-5, the following ingress and egress traffic descriptor parameters are included in the usage data collected for all of the logical port's PVCs for which PVC Accounting is set to Enabled at the circuit level: **ATM:** QoS class PCR SCR MCR MBS Tagging *Disabled* – (Default) The parameters listed above are not included in any usage data collected for PVCs on the logical port.

Table 5-6. Logical Port Accounting System Settings (Continued)

Field	Description
SVC Parameter Recording *(Frame Relay only)*	*Enabled* – In addition to the SVC usage data listed in Table 1-2 on page 1-7, the following ingress and egress traffic descriptor parameters are included in the usage data collected for all of the logical port's SVCs for which SVC Accounting is set to Enabled at the circuit level: **Frame Relay:** QoS class CIR BE BC *Disabled* – (Default) The parameters listed above are not included in any usage data collected for SVCs on the logical port.
PVC Carrier ID	Applies only if the port is a network interface port (a B-ICI or PNNI port, or an NNI port running UNI 3.0/3.1). Otherwise, this field is grayed out. The PVC Carrier ID is a 5-digit decimal number that uniquely identifies the carrier on the other end of a network interface. The default value is 0. ***Note:*** *In order for changes to the PVC Carrier ID field to take effect on existing PVCs that terminate on a given logical port, you need to PRAM sync the IOM on which that logical port resides. For information on how to PRAM sync an IOM, see the NavisCore ATM Configuration Guide or the NavisCore Frame Relay Configuration Guide.*
PVC Recording Interface ID	Read-only field that displays the 17-digit PVC Recording Interface ID, which is made up of the 12-digit IP address (no dots, and padded with zeros to fill all 12 digits) and the logical port interface number. For example, if the IP address is 123.45.67.8 and the interface ID for the port is 37, the PVC Recording Interface ID is 1230450670080037.
Usage Measurement (Rcvd Bytes, Rcvd Frames, and Rcvd DE Bytes) *(Frame Relay only)*	The received counts selected are included in the billing record.
Default Accounting Address	
Default Accounting Address, Same as UNI	*Yes* – (Default) The accounting address is the same as the Calling Party Insertion Address. *No* – If you select No, you need to type a Default Accounting Address in the field that appears in this section of the dialog box. Then choose Set to apply the address you entered.

Table 5-6. Logical Port Accounting System Settings (Continued)

Field	Description
SVC General Recording	
Point to Point (Originating and Terminating) *(ATM only)*	*Enabled* – (Default) Usage data is collected on all point-to-point SVCs that originate/terminate on the logical port, providing that SVC Accounting is set to Enabled at both the port and switch levels. If SVC Accounting is set to Disabled at the switch or port level, setting this field to Enabled has no effect (usage data collection on originating/terminating point-to-point SVCs will still be inhibited). *Disabled* – Usage data is not collected on any point-to-point SVCs that originate/terminate on the logical port. You can perform usage data collection either for SVCs originating on the port, SVCs terminating on the port, neither, or both.
Point-to-Multipoint (Originating and Terminating) *(ATM only)*	*Enabled* – (Default) Usage data is collected on all point-to-multipoint SVCs that originate/terminate on the logical port, providing that SVC Accounting is set to Enabled at the port and switch levels. If SVC Accounting is set to Disabled at the switch or port level, setting this field to Enabled has no effect (usage data collection on originating/terminating point-to-multiple-point SVCs will still be inhibited). *Disabled* – Usage data is not collected on any point-to-multipoint SVCs that originate/terminate on the logical port. You can perform or inhibit usage data collection either for SVCs originating on the port, SVCs terminating on the port, neither, or both.

Table 5-6. Logical Port Accounting System Settings (Continued)

Field	Description
Unsuccessful (Originating and Terminating)	*Enabled* – (Default) Unsuccessful creation of SVCs that originate/terminate on the logical port are included in usage data, providing that SVC Accounting is set to Enabled at the port and switch levels. If SVC Accounting is set to Disabled at the switch or port level, setting these fields to Enabled has no effect; this type of accounting will still be inhibited. *Disabled* – Unsuccessful creation of SVCs that originate/terminate on the logical port are not included in usage data. You can include or exclude unsuccessful SVC creation counts either on SVCs originating on the port, SVCs terminating on the port, or both. ***Note:*** *The Unsuccessful Terminating setting is unavailable on non-UNI ports.* ***Note:*** *Call attempts may fail for the following reasons:* • *The call fails address screening* • *There are insufficient network resources available* • *The called party refuses the call* *In general, an originating call is unsuccessful if the SVC is cleared before the calling party receives a CONNECT message from the originating switch. A terminating call is unsuccessful if the SVC is cleared before the calling party receives a CONNECT message from the called party terminating switch.* *When an SVC creation attempt is unsuccessful, the cause is recorded in the record for the SVC. Valid cause values are provided in Annex E of the ATM Forum's UNI Specification, as well as in the description of the BAF Release Cause in Bellcore GR-1100-CORE. Cause values are also listed in* *Table A-35 on page A-41**.*

Table 5-6. Logical Port Accounting System Settings (Continued)

Field	Description
SVC Recording *If the logical port is not a UNI/NNI port, all accounting logical port fields are grayed out, and cannot be configured. If the logical port is a UNI/NNI port, you can selectively perform or inhibit usage data collection for any or all of the four service classes (ABR/AFR, UBR/UFR, CBR/CFR, or VBR/VFR for ATM/Frame Relay, respectively). And, you can collect usage data for research only.*	
ABR/AFR UBR/UFR CBR/CFR VBR/VFR	*Enabled* – (Default) Usage data is collected on all circuits of the service class type that are created on the port, providing that SVC Accounting is set to Enabled at the switch and port levels, and SVC Recording for that service class is set to Enabled at the switch level. Otherwise, enabling SVC Recording for that service class at the port level has no effect (recording for that service class will still be inhibited). *Disabled* – Usage data is not collected on any circuits of the service class type that are created on this port, even if SVC Recording is set to Enabled for that service class at the switch level. *Study* – Functions the same as the Enabled setting, except that the resulting records are marked as "study" to differentiate them from normal accounting records. This feature enables you to collect usage data for research.
SVC Party Sub-Address Recording *If the logical port is not a user port, these fields are grayed out, and cannot be configured.*	
Calling	*Enabled* – The Calling Party Sub-Address, which may be either an AESA private address or a native E.164 address (for ATM), or an x.121 or native E.164 address (for Frame Relay). The subaddress is included in usage data collection for all SVCs created on this port, providing that SVC Accounting is set to Enabled at the switch and port levels. *Disabled* – (Default) The Calling Party Sub-Address is not included in usage data collection on this port, even if SVC Accounting is set to Enabled at the switch and port levels.
Called	*Enabled* – The Called Party Sub-Address, which may be either an AESA private address or native E.164 address (for ATM), or an x.121 or native E.164 address (for Frame Relay). The subaddress is included in usage data collection for all SVCs created on this port, providing that SVC Accounting is set to Enabled at the switch and port levels. *Disabled* – (Default) The Called Party Sub-Address is not included in usage data collection on this port, even if SVC Accounting is set to Enabled at the switch and port levels.

Configuring PVC Accounting at the Circuit Level

Usage data collection can be fine-tuned down to the circuit level for PVC circuits. The circuit-level settings you define may or may not override the switch-level settings, depending on the settings at those levels (see "Configuration Hierarchy" on page 5-11 for more information on the configuration hierarchy).

For example, if PVC Accounting is set to Enabled at the switch level, setting it to Disabled at the circuit level inhibits PVC accounting only on that circuit. However, if PVC Accounting is set to Disabled at the switch level, setting it to Enabled at the circuit level for a given PVC has no effect (that is, PVC accounting is still inhibited on that PVC, and no usage data is collected on the PVC).

PVC accounting can be configured on both point-to-point and point-to-multipoint PVCs. PVCs can be configured for Frame Relay on the B-STDX™ 9000 or ATM on the CBX 500. Point-to-point PVC configuration is described in the next section. For instructions on how to configure accounting on point-to-multipoint PVCs, see "Configuring Accounting on ATM Point-to-Multipoint PVCs" on page 5-30.

Configuring Accounting on Point-to-Point PVCs

To configure circuit-level accounting system settings for a point-to-point PVC:

1. From the NavisCore network map menu bar, select Administer=>Ascend Parameters=>Set All Circuits=>Point-to-Point. The Set All PVCs on Map dialog box appears. For information on this dialog box, see the chapter on configuring PVCs in the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*.
2. If you are adding a new PVC, select Add. Follow the instructions in the *NavisCore ATM Configuration Guide* or the *NavisCore Frame Relay Configuration Guide*. for adding a PVC to your map. When you finish configuring the circuit, go to Step 3.

   If you are setting up accounting on an existing PVC, select the PVC from the Defined Circuit Name list box, then choose Modify. Then go to Step 3.
3. From the Add (or Modify) PVC dialog box, choose Accounting.

   For ATM, The Set ATM PVC Accounting Attributes dialog box appears (see Figure 5-8).

   For Frame Relay, The Set PVC Accounting Attributes dialog box appears (see Figure 5-9).

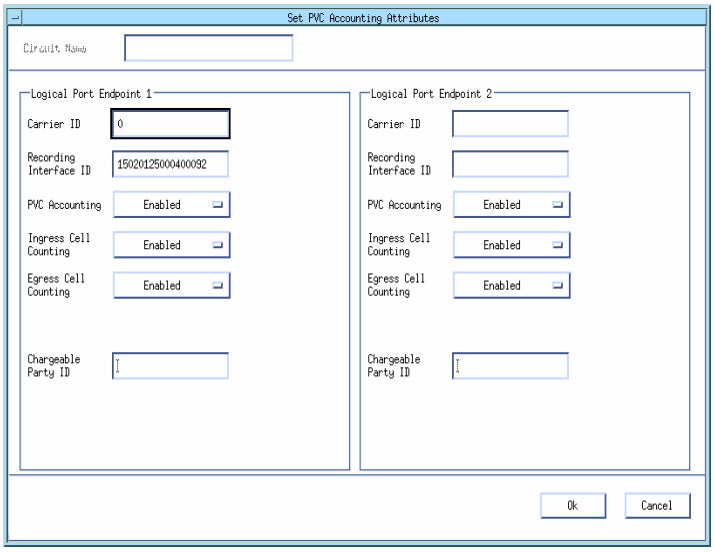


Figure 5-8. Set ATM PVC Accounting Attributes Dialog Box

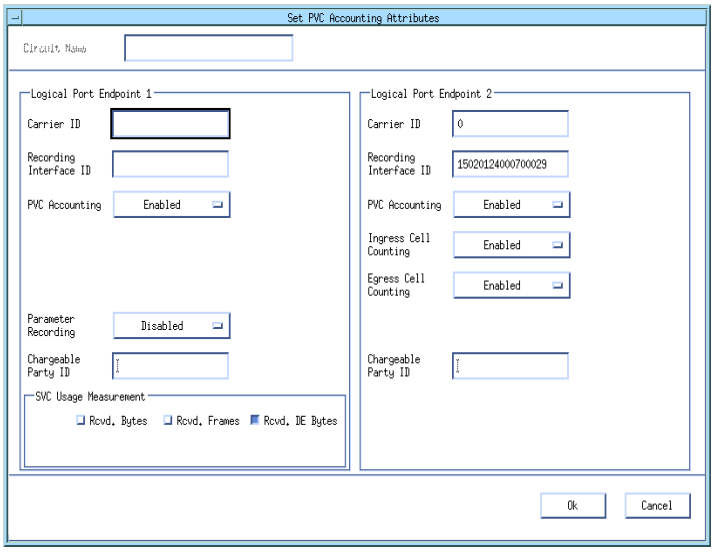


Figure 5-9. Set PVC Accounting Attributes Dialog Box

4. See Table 5-7 for information on each of the fields on this screen. you need to configure the settings for both logical port endpoints.

If you change any of the circuit parameters in this dialog box from their current settings, the recording interval for the circuit automatically terminates and a new recording interval begins as soon as you choose OK from this dialog box.

5. When you are finished configuring the fields in this dialog box, choose OK to return to the Add (or Modify) PVC dialog box.

Table 5-7. Circuit-Level PVC Accounting Fields

Field	Description
Circuit Name	Read-only field that displays the name of the PVC you are adding or modifying.
Carrier ID	Read-only field that contains the 5-digit Carrier ID specified on the Set ATM Logical Port Accounting Attributes dialog box. This number uniquely identifies the carrier at each end of the network interface. If you have not yet configured accounting at the logical port level, this field is zero. This field applies only to PVCs; otherwise, it is zero. For more information on Carrier ID, see page 5-23.
Recording Interface ID	Read-only field that contains the 16-digit PVC Recording Interface ID, which is made up of the 12-digit IP address (no dots, and padded with zeros to fill all 12 digits) and the logical port interface number. For example, if the IP address is 123.45.67.8 and the interface ID for the port is 37, the Recording Interface ID is 1230450670080037.
PVC Accounting	*Enabled* – (Default) PVC usage data is collected on the PVC, providing that PVC Accounting is set to Enabled at the switch level. If PVC Accounting is set to Disabled at the switch level, setting this field to Enabled has no effect (accounting will still be inhibited on the PVC). *Disabled* – PVC usage data is not collected on the PVC, even if PVC Accounting is set to Enabled at the switch level. *Study* – Functions the same as the Enabled setting, except that the resulting records are marked as "study" to differentiate them from normal accounting records. This feature enables you to collect information for research.
Ingress Cell Counting, Egress Cell Counting *(ATM only)*	*Enabled* – (Default) Ingress/egress cell counts from this circuit are included in PVC usage data collection, providing that PVC Accounting is set to Enabled at the switch and port levels. If you set either or both cell counting fields to Enabled, the resulting accounting records contain both time-based and usage-based measurements. *Disabled* – Ingress/egress cell counts from this circuit are not included in PVC usage data collection. If you set both cell counting fields to Disabled, the resulting usage data records contain only time-based measurements.
Parameter Recording *(Frame Relay only)*	*Enabled* – (Default) Circuit parameter information (QoS, Cir, BC, and BE) are included in the billing record. *Disabled* – Circuit parameter information is not reported in the billing record.

Table 5-7. Circuit-Level PVC Accounting Fields (Continued)

Field	Description
Usage Measurement (Rcvd Bytes, Rcvd Frames, and Rcvd DE Bytes) *(Frame Relay only)*	The received counts selected are included in the billing record.
Chargeable Party ID	Enter the 1- to 15-digit chargeable party ID (in decimal format) for this PVC.

Configuring Accounting on ATM Point-to-Multipoint PVCs

Within the accounting system, each leg of a point-to-multipoint (PmP) circuit is treated as an individual point-to-point circuit, each with independent cell counts. However, you only get one root record for the circuit. Also, as long as at least one party is attached to the circuit, the circuit is considered active, and cell counts/elapsed time accumulate.

To configure circuit-level accounting system settings for a point-to-multipoint PVC:

1. From the NavisCore network map menu bar, select Administer=>Ascend Parameters=>Set All Circuits=>Point-to-Multipoint. The Set All Point-to-Multipoint Circuit Roots dialog box appears. For more information on this dialog box, see the chapter on configuring PVCs in the *NavisCore ATM Configuration Guide*.
2. If you are adding a new point-to-multipoint PVC, see the next section. If you are modifying an existing point-to-multipoint PVC, see "Modifying an Existing PMP PVC" on page 5-32.

Adding a New PMP PVC

To add a new point-to-multipoint PVC, perform the following steps:

1. Choose Add to access the Add Circuit Root dialog box.
2. Select the logical port on which you are adding the PVC root.
3. Choose OK to access the Add Point-to-Multiple-Point Circuit Root dialog box.
4. Configure the circuit root as described in the *NavisCore ATM Configuration Guide*.
5. When finished, choose Set ATM Accounting from the Add Point-to-Multipoint Circuit Root dialog box. The Set PMP Root Accounting Attributes dialog box appears (Figure 5-10).

6. See Table 5-7 on page 5-29 for information about the fields in this dialog box.

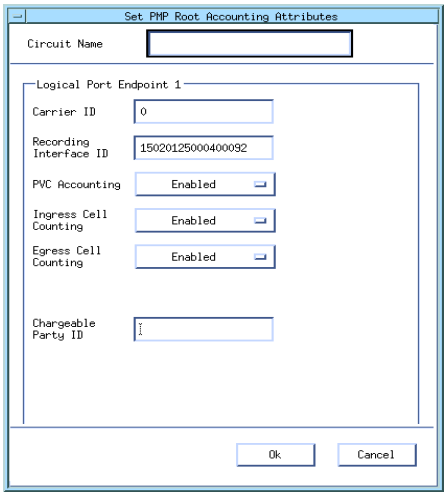


Figure 5-10. Set PMP Root Accounting Attributes Dialog Box

7. When you have finished configuring the settings in this dialog box, choose OK to return to the Set All Point-to-Multiple-Point Circuit Roots dialog box. You can now begin adding leaves to the circuit.
8. Make sure that the root you just added is selected in the Defined Point-to-Multiple-Point Circuit Root Records list box, then choose Modify. The Modify Point-to-Multipoint Circuit Leaf dialog box appears.
9. Select the switch and logical port for the circuit leaf, and enter the VPI/VCI for the leaf. For more information on configuring circuit leaves, see the *NavisCore ATM Configuration Guide*.
10. In the Defined Point-to-Multiple-Point Circuit Leafs section of the dialog box, choose ATM Accounting. The Set PMP Leaf Accounting Attributes dialog box (Figure 5-11) appears. See Table 5-7 on page 5-29 for information about the fields in this dialog box.

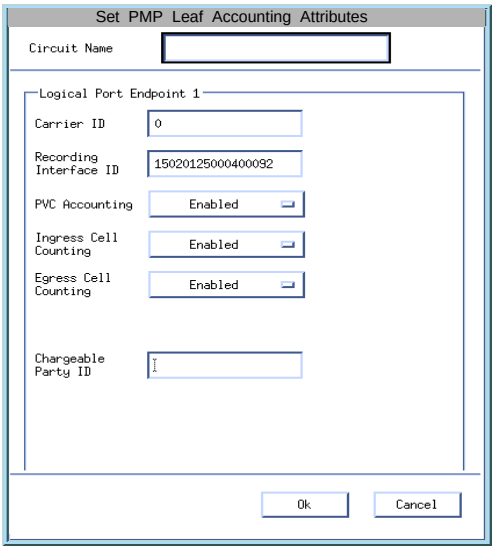


Figure 5-11. Set PMP Leaf Accounting Attributes

11. Once you have configured all fields, choose OK to return to the Modify Point-to-Multipoint Circuit Leaf dialog box.

12. Choose Add to add the circuit leaf. It is now displayed in the Defined Point-to-Multiple-Point Circuit Leafs list on the right.

13. Repeat Step 9 through Step 12 for any additional leaves you want to add to this root.

14. When all leaves have been added, choose Apply, then choose Close to return to the Set All Point-to-Multiple-Point Circuit Roots dialog box.

15. Repeat these steps for any additional PMP circuits you want to add.

Modifying an Existing PMP PVC

If you want to modify the Accounting settings for an existing PMP PVC, perform the procedure in this section. You cannot modify the Accounting settings for the root record of an existing PMP PVC. You can only modify the Accounting settings for the leaves of the circuit. If you need to modify the Accounting settings for the root record, you must delete the PMP circuit, then add it again using the procedure in the previous section.

This procedure assumes that the circuit leaves have already been added to the PMP PVC. If you are adding new circuit leaves to the PMP PVC, follow Step 8 through Step 12 (starting on page 5-31) to configure accounting on those leaves.

To modify the Accounting settings for a PMP PVC circuit leaf:

1. Select the circuit root from the Defined Point-to-Multiple-Point Circuit Root Records list box, then choose Modify. Any leaves that are configured off of the selected root are displayed in the Corresponding Point-to-Multiple-Point Circuit Leafs list box.
2. Select the leaf on which you want to configure accounting and choose Modify. The Modify Point-to-Multiple-Point Circuit Leaf dialog box appears.
3. From the Defined Point-to-Multiple-Point Circuit Leafs list box, select the circuit leaf on which you want to configure accounting.
4. Choose ATM Accounting. The Set PMP Leaf Accounting Attributes dialog box (Figure 5-11 on page 5-32) appears.
5. See Table 5-7 on page 5-29 for information on each of the fields in this dialog box. Values can be configured only for the currently selected leaf.
6. When finished, choose OK.
7. From the Modify Point-to-Multiple-Point Circuit Leaf dialog box, choose Apply to apply the accounting settings to the circuit leaf.
8. Repeat Step 3 through Step 7 for each additional leaf on this root. When all leaves have been configured, choose Close to return to the Set All Point-to-Multiple-Point Circuit Roots dialog box.
9. Repeat Step 1 through Step 8 for each PMP PVC which contains circuit leaves on which you want to configure accounting. When finished, choose Close to return to the network map.

Configuring Accounting at the Switch Level

This section describes how to configure accounting at the switch level. There are two methods you can use:

- You can configure switch-level accounting on a switch-by-switch basis.
- You can use the network settings to configure accounting on all switches at once.

The second method is useful only if all or most of the switches in your network are using the same accounting system settings at the switch level. Also, if you do not want to use the default settings for the Server Control field on each switch, then you must configure your switches individually, as this field is not available at the network level. Similarly, the Administrative Action field applies only to individual switches, and is not available at the network level.

If you use the network-wide settings, you should be aware that if any of your switches require unique settings, you must edit the switch-level settings for that switch after applying the network-wide settings. For example, if you want to perform PVC accounting on 98 of your 100 switches, and you enable it from the Network Settings dialog box, PVC Accounting is enabled on all 100 switches. Then, you need to edit the accounting settings for the two switches on which you want to inhibit PVC accounting.

To configure the accounting system at the switch level:

1. If you need to configure accounting on a switch-by-switch basis, perform the following steps (if you can configure all switches at once, go to Step 2).
   a. From the NavisCore network map, select the appropriate switch.
   b. From the menu bar, select Administer=>Ascend Parameters=>Set Parameters to display the Switch Back Panel dialog box.
   c. Select Set Switch Attributes from the Actions list button, then choose Go.
   d. Select Accounting from the Options list button, then choose Set.

      The Set Accounting Attributes dialog box appears (for ATM, see Figure 5-12, for Frame Relay, see Figure 5-13).

      Proceed to Step 3.

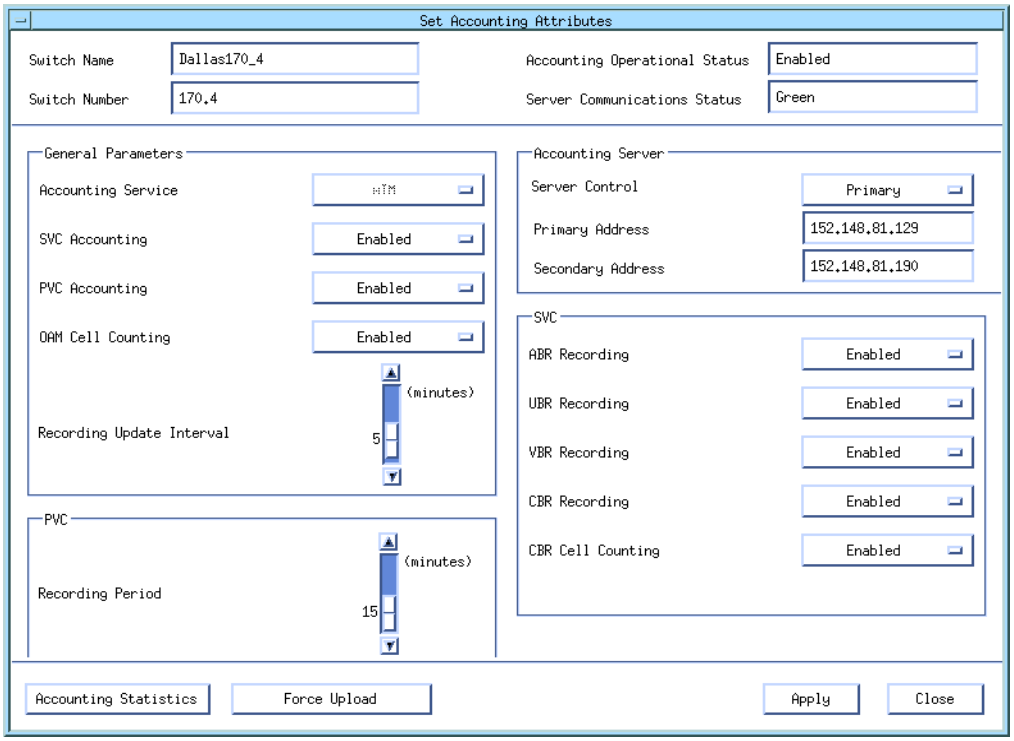


Figure 5-12. Set Accounting Attributes Dialog Box (ATM)

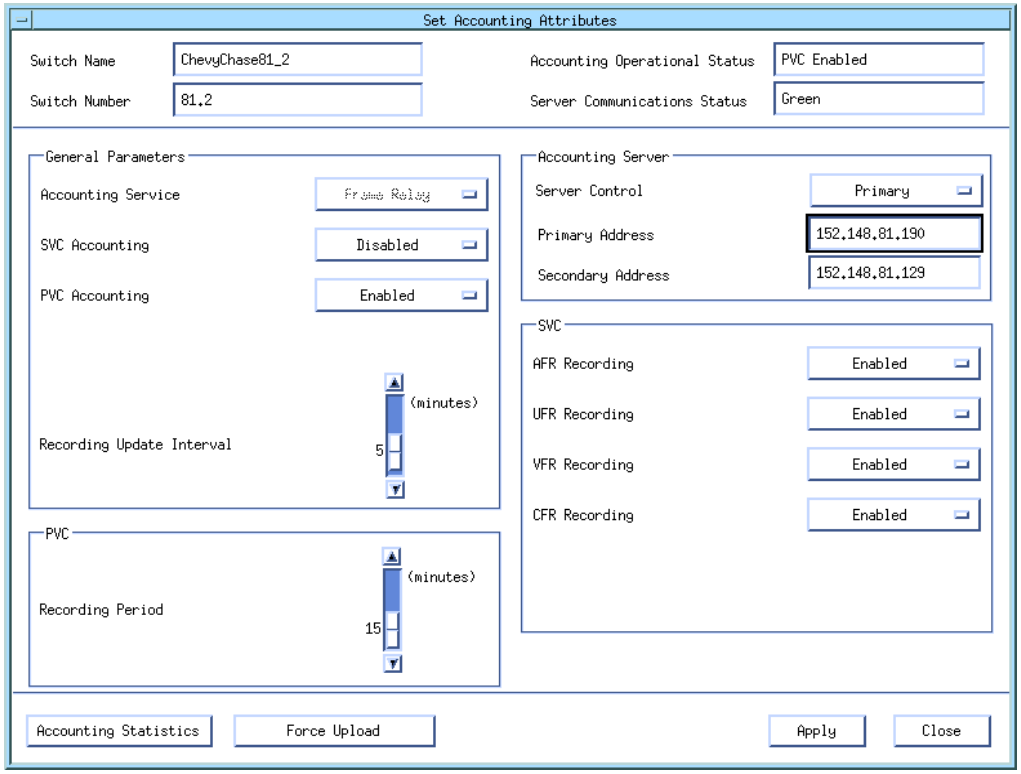


Figure 5-13. Set Accounting Attributes Dialog Box (Frame Relay)

2. If your network configuration is such that you can configure accounting on all switches at once, from the NavisCore menu bar, select Administer=>Ascend Parameters=>Set All Accounting Parameters=>Set Network Parameters.

The Set Network Parameters dialog box appears (for ATM, see Figure 5-14, for Frame Relay, see Figure 5-15).

This dialog box is similar to the Set (ATM) Accounting Attributes dialog box, except that it does not contain switch-specific fields.

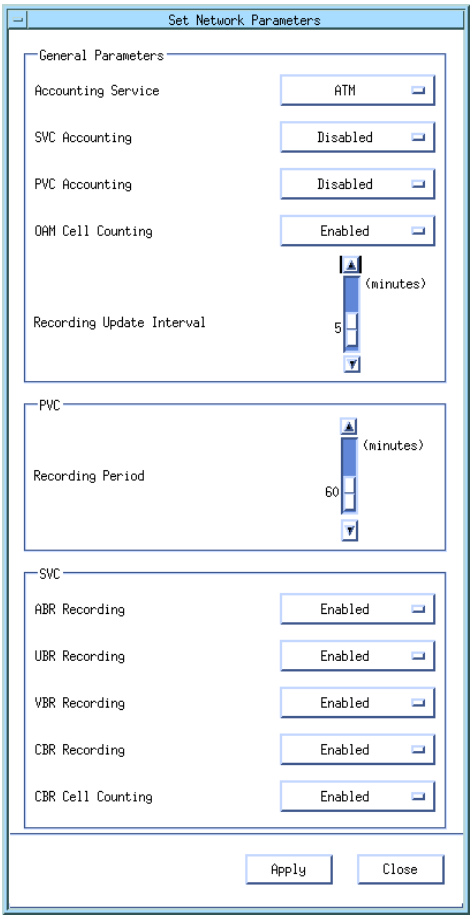


Figure 5-14. Set Network Parameters Dialog Box (ATM)

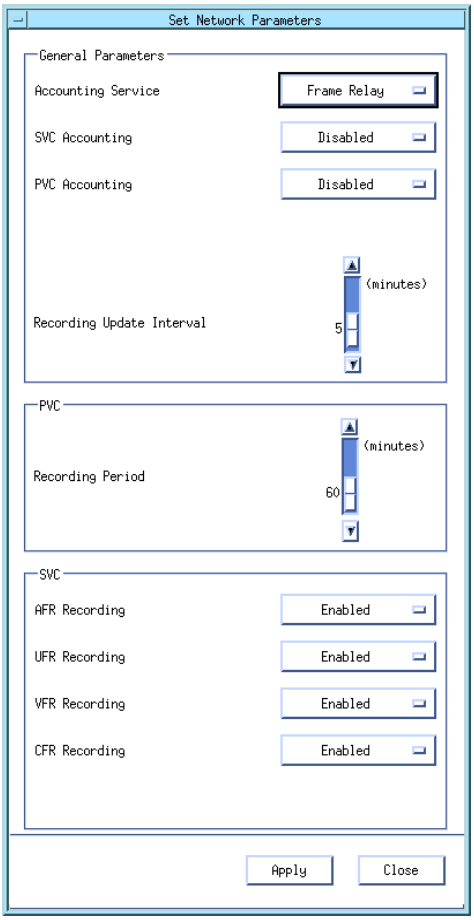


Figure 5-15. Set Network Parameters Dialog Box (Frame Relay)

3. See Table 5-8 for information on each of the fields.
4. When you finish configuring all values, choose Apply.
5. At the confirmation prompt, choose OK.

   Keep in mind that when you choose OK, the defined configuration is downloaded and applied to all of the switches in the network. ATM settings are applied to CBX 500 switches and Frame Relay settings are applied to B-STDX switches. If any switches require unique settings, you then need to configure those settings from the Switch Settings screen.

   If you are on the Switch Settings screen, you return to the Switch Back Panel screen. If you are on the Network Parameters screen, you return to the network map.

Do not set SVC Accounting and PVC Accounting to Enabled at the switch level until you have configured accounting as desired on all of the PVCs and logical ports on the switch. Also, make sure you have defined an Update Interval that is appropriate for your needs on all of your switches. By default, the update interval is 5 minutes. As soon as you choose OK with these fields set to Enabled, the usage data collection period begins, and usage data is collected on all circuits and ports on which accounting is being performed.

Table 5-8. Switch-Level Accounting System Settings

Field	Description
Switch Name Switch Number	Read-only fields that display the name and switch ID of the current switch. These fields are switch-specific, and are not displayed on the Network Settings dialog box.
Accounting Operational Status	Read-only field that displays the operational status of the accounting system on this switch. This field is switch-specific, and is not displayed on the Network Settings dialog box. Operational status may be one of the following: *Disabled* – The accounting system is disabled on this switch. No usage data is being collected on this switch. *PVC Enabled* – Only PVC usage data is being collected on this switch. No SVC usage data is being collected. *SVC Enabled* – Only SVC usage data is being collected on this switch. No PVC usage data is being collected. *Enabled* – Both PVC and SVC usage data is being collected on this switch.
Server Communications Status	Read-only field that displays the server communications status of the accounting system on this switch. This field is switch-specific, and is not displayed on the Network Settings dialog box. Communications status may be one of the following: *Green* – Communications to the Accounting Server is fine. *Yellow* – Communications to the Accounting Server is questionable. *Red* – Communications to the Accounting Server is severed.

Table 5-8. Switch-Level Accounting System Settings (Continued)

Field	Description
General Parameters	
SVC Accounting	*Enabled* – SVC usage data is collected on all of the switch's logical ports for which SVC Accounting is set to Enabled. If SVC Accounting is set to Enabled at the switch level, you can still inhibit it on individual logical ports (see "Configuring Accounting at the Port Level" on page 5-19). *Disabled* – (Default) SVC usage data is not collected on any logical ports on the switch. If you select Disabled, setting SVC Accounting to Enabled on individual logical ports has no effect (it will still be inhibited on the logical port). Similarly, enabling usage data collection for the various traffic types (CBR, UBR, ABR, or VBR) at the switch or port levels has no effect.
PVC Accounting	*Enabled* – PVC usage data is collected on all of the switch's PVCs for which PVC Accounting is set to Enabled at the circuit level. You can still inhibit PVC Accounting on individual PVCs on the switch by setting this field to Disabled at the circuit level (see "Configuring PVC Accounting at the Circuit Level" on page 5-27). *Disabled* – (Default) PVC usage data is not collected on any of the switch's PVCs. If you select Disabled, setting PVC Accounting to Enabled on an individual PVC has no effect (it will still be inhibited on the PVC).
OAM Cell Counting *(ATM only)*	*Enabled* – OAM cell counts are added to total cell counts taken at the ingress and egress points for both forward and backward traffic, on both the originating and terminating switches. *Disabled* – OAM cell counts are added to the total cell counts taken at the ingress point for forward traffic on the originating switch, and at the egress point for backward traffic on the terminating switch. OAM cell counts *are not* added to total cell counts taken at the egress point for forward traffic on the originating switch, nor at the ingress point for backward traffic on the terminating switch. For more information, see "Forward and Backward Cell Counts" on page 1-8.
Recording Update Interval	Specifies how often a snapshot is taken of the state of all PVCs and SVCs. The snapshot data is then uploaded to the Accounting Server. Snapshot data is needed only if an IOM fails. When an IOM fails, the snapshot data is used to complete usage data for all circuits on the IOM. If no IOMs on the switch fail during the update interval, then the snapshot data is not needed, and is overwritten by data from the next snapshot. When set to 0, no snapshots are taken on the switch. Therefore, if an IOM fails, you risk losing some usage data from the circuits on that IOM. If you define this value from the network-wide level, and later define it as something different at the switch level, then the switch-level setting takes precedence. If you define this setting on the switch level, and later define it as something different at the network-wide level, the switch-level setting changes to the specified network-wide setting. If you do not configure this value on a given switch, the switch uses the value specified for the network.

Table 5-8. Switch-Level Accounting System Settings (Continued)

Field	Description
PVC Network	
PVC Recording Period	This value specifies how long PVC usage measurements are collected before being uploaded from the switch to the Accounting Server. The shorter the recording period is, the more bandwidth you need to transport PVC usage data to the Accounting Server. The range of values is 15 to 1440 minutes (24 hours), in 15-minute increments. The default setting is 60 minutes. You can use the arrows on the top and bottom of the scroll bar to fine-tune this value. If you define this value at the network-wide level, and the switch-level setting is different than the network-wide setting, then the switch-level setting takes precedence. If you do not configure this value on a given switch, the switch uses the value specified at the network-wide level. If neither is defined, the default setting (60 minutes) applies.
Accounting Server – *These are switch-specific fields, and are not displayed on the Network Settings screen*.	
Server Control	*Primary* – Usage data is uploaded from the switch to the server designated in the Primary Address field. *Secondary* – Usage data is uploaded from the switch to the server designated in the Secondary Address field.
Primary Address	Read-only field that contains the IP address of the primary Accounting Server for this switch. For information on how to configure the Accounting Servers, see "Assigning Switches to Your Accounting Servers" on page 5-2.
Secondary Address	Read-only field that contains the IP address of the secondary Accounting Server for this switch.
SVC	
ABR/AFR Recording	*Enabled* – (Default) ABR/AFR cell traffic is included in usage data collection, providing that SVC Accounting is also set to Enabled on the switch. You can still inhibit ABR/AFR usage data collection on individual user ports by setting ABR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 5-19). *Disabled* – No ABR/AFR cell traffic is included in usage data collection. If you select Disabled, setting ABR/AFR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.

Table 5-8. Switch-Level Accounting System Settings (Continued)

Field	Description
UBR/UFR Recording	*Enabled* – (Default) UBR/UFR cell traffic is included in usage data collection, providing that SVC Accounting is also set to Enabled on the switch. You can still inhibit UBR/UFR usage data collection on individual user ports by setting UBR/UFR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 5-19). *Disabled* – No UBR/UFR cell traffic is included in usage data collection. If you select Disabled, setting UBR/UFR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
VBR/VFR Recording	*Enabled* – (Default) VBR/VFR cell traffic is included in usage data collection, providing that SVC Accounting is also set to Enabled on the switch. You can still inhibit VBR/VFR usage data collection on individual user ports by setting VBR/VFR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 5-19). *Disabled* – No VBR/VFR cell traffic is included in usage data collection. If you select Disabled, setting VBR/VFR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
CBR/CFR Recording	*Enabled* – (Default) CBR/CFR cell traffic is included in usage data collection, providing that SVC Accounting is also set to Enabled on the switch. You can still disable CBR/CFR usage data collection on individual user ports by setting CBR/CFR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 5-19). *Disabled* – No CBR/CFR cell traffic is included in usage data collection. If you select Disabled, setting CBR/CFR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
CBR Cell Counting *(ATM only)*	*Enabled* – (Default) Both time-based and usage-based data is collected on all CBR circuits. *Disabled* – Only time-based data is collected for CBR circuits.

6

Managing Accounting on the Switch

This chapter describes how to use NavisCore to:

- Display the accounting system settings for each of the logical ports and PVCs in your network.
- Display daily accounting system statistics for each of the switches in your network.
- Force an upload of usage data from a switch to its Accounting Server before the end of the Recording Update Interval.

Displaying Accounting System Settings

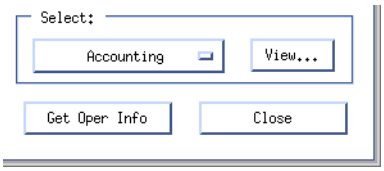
This section describes how to use NavisCore to view the current accounting system settings on the various logical ports and PVCs in your network.

Viewing Logical Port Settings

To view the current accounting system settings for a particular logical port:

1. From the NavisCore network map, double-click the switch on which the logical port resides.

   You access the Switch Back Panel dialog box.
2. Double-click the physical port to display the Physical Port Attributes dialog box.
3. Choose Logical Port to display the Show All Logical Ports in PPort dialog box.
4. Select the logical port in the Logical Port list box.
5. In the lower right area of this dialog box, select Accounting from the Options list button, then choose View.



For ATM, the Show ATM Logical Port Accounting Attributes dialog box appears (see Figure 6-1).

For Frame Relay, the Show FR Logical Port Accounting Attributes dialog box appears (see Figure 6-2).

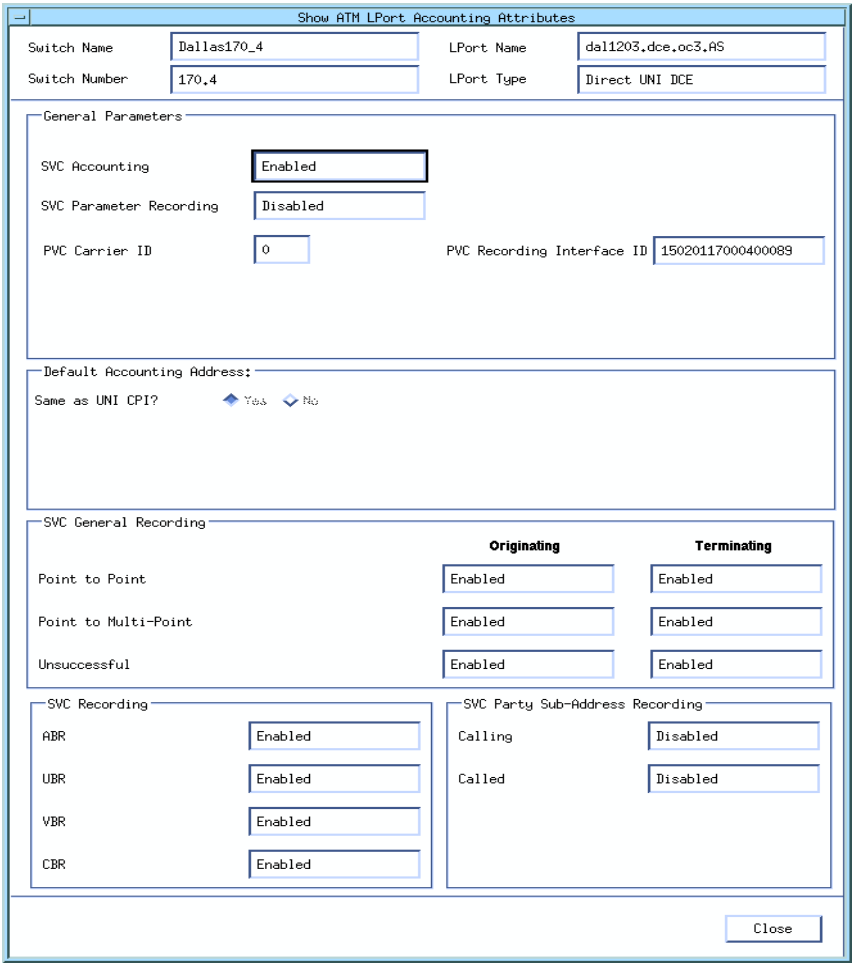


Figure 6-1. Show ATM LPort Accounting Attributes Dialog Box

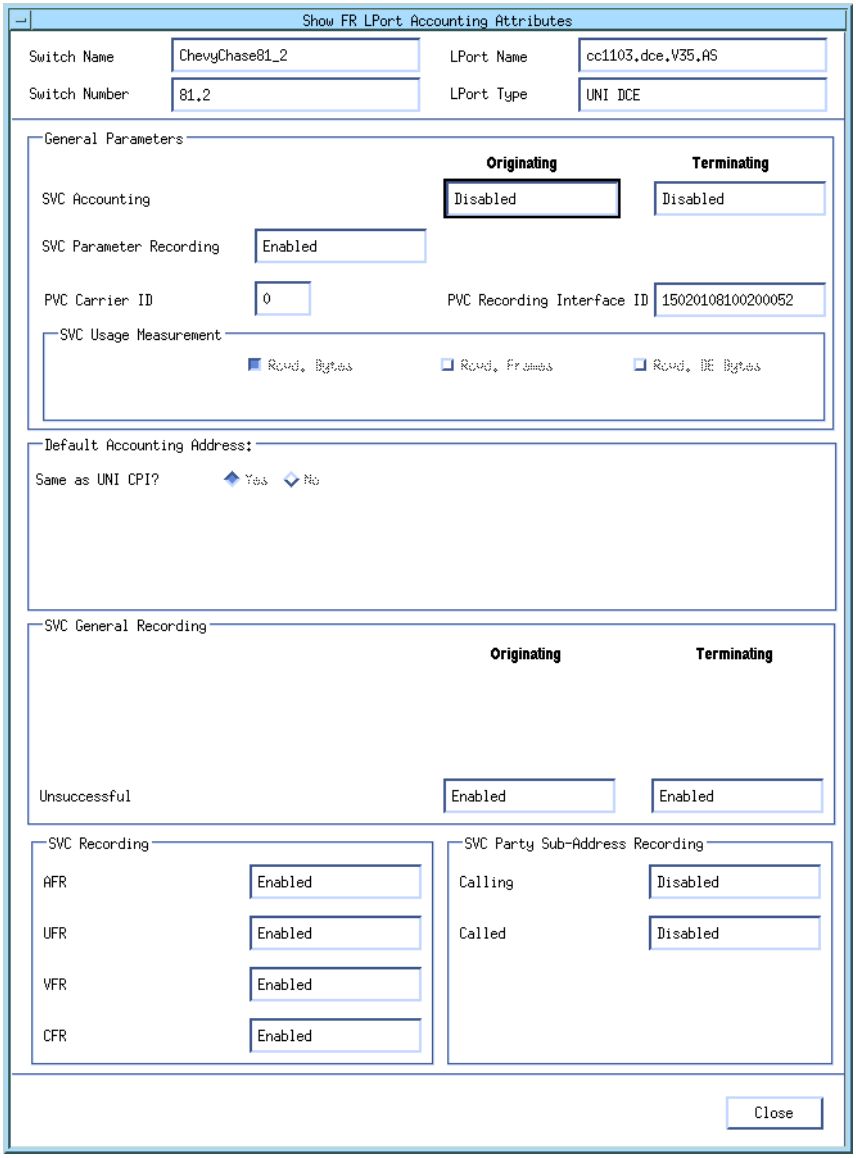


Figure 6-2. Show FR LPort Accounting Attributes Dialog Box

For information on the fields in this dialog box, see Table 5-6 on page 5-22.

6. Choose Close to exit.

Viewing Point-to-Point PVC Settings

To view the accounting system settings for a particular point-to-point PVC:

1. From the NavisCore network map, select the appropriate switch.
2. From the menu bar, select Monitor=>Ascend Objects=>Show Circuits=>All on Switch to display the Show All PVCs on Switch dialog box.
3. Select the PVC from the Defined Circuit Name list box, then choose Accounting.

   The Show ATM PVC Accounting Attributes dialog box appears (For ATM, see Figure 6-3, for Frame Relay, see Figure 6-4).

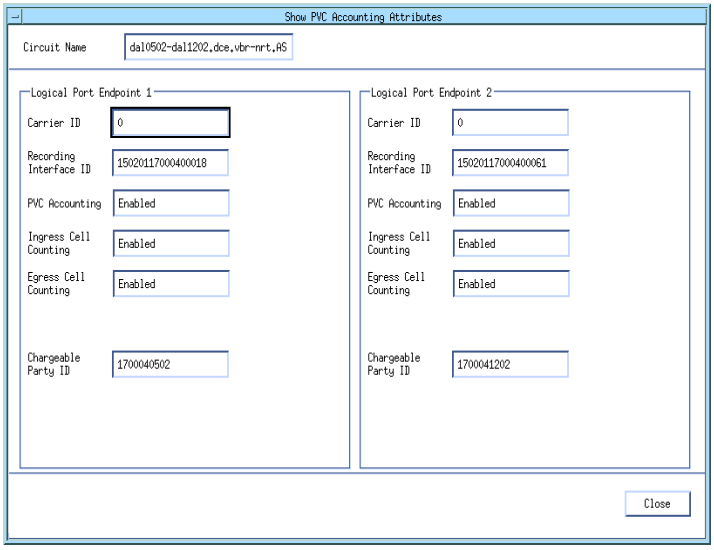


Figure 6-3. Show PVC Accounting Attributes Dialog Box (ATM)

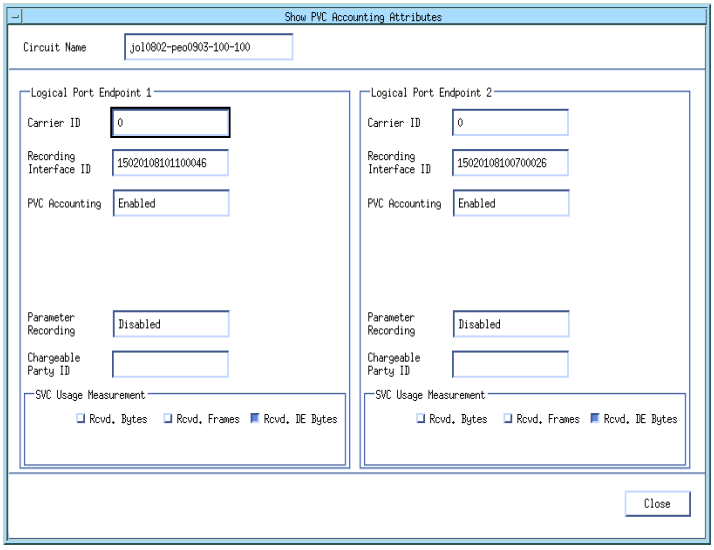


Figure 6-4. Show PVC Accounting Attributes Dialog Box (Frame Relay)

For information on the fields in this dialog box, see Table 5-7 on page 5-29.

4. Choose Close to exit.

Viewing Point-to-Multipoint PVC Settings

From NavisCore, you can view the accounting system settings for individual circuit roots and circuit leaves. For a description of the fields in these dialog boxes, see Table 5-7 on page 5-29.

To view the accounting system settings for a PVC root or leaf:

From the NavisCore network map menu bar, select Administer=>Ascend Parameters=>Set All Circuits=>Point-to-Multipoint to display the Set All Point-to-Multiple-Point Circuit Roots dialog box.

To display the settings for a PVC root:

1. Select the circuit root in the Defined Point-to-Multiple-Point Circuit Root Records list box.
2. Choose Accounting to display the Show PMP Root Accounting Attributes dialog box.

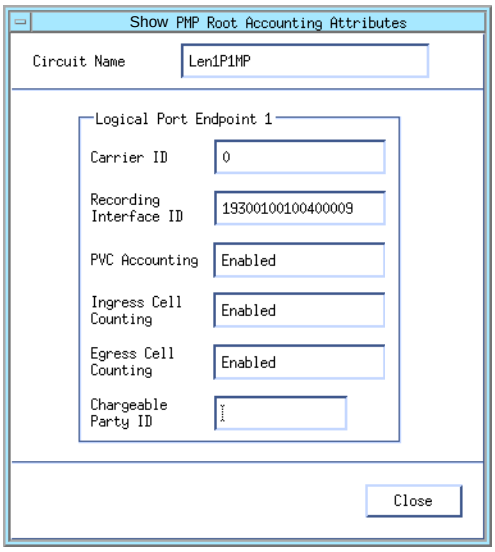


Figure 6-5. Show PMP Root Accounting Attributes Dialog Box

For information on these fields, see Table 5-7 on page 5-29.

3. Choose Close to exit.

To view the settings for a PVC leaf:

1. Select the circuit root in the Defined Point-to-Multiple-Point Circuit Root Records list box.
2. Choose Modify.

3. In the Defined Point-to-Multiple-Point Circuit Leafs list box, select the circuit leaf for which you want to display settings.
4. In the Defined Point-to-Multiple-Point Circuit Leafs list box, choose ATM Accounting to display the Show PMP Leaf Accounting Attributes dialog box.

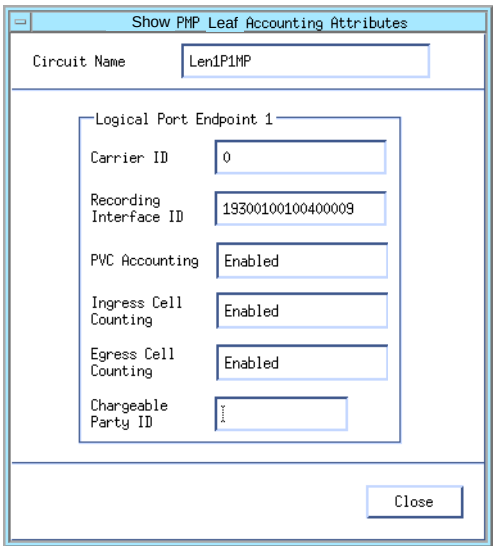


Figure 6-6. Show PMP Leaf Accounting Attributes Dialog Box

For information on these fields, see Table 5-7 on page 5-29.

5. Choose Close to exit.

Viewing Switch Settings

To view the accounting system settings for a given switch:

1. From the NavisCore network map, double-click the switch.

   You access the Switch Back Panel dialog box.

2. Select View Switch Attributes from the Actions list button, then choose Go.
3. Select Accounting from the Options list button, then choose View. The Show Accounting Attributes dialog box appears (for ATM, see Figure 6-7, for Frame Relay, see Figure 6-8). For information on the fields in this dialog box, see Table 5-8 on page 5-38.

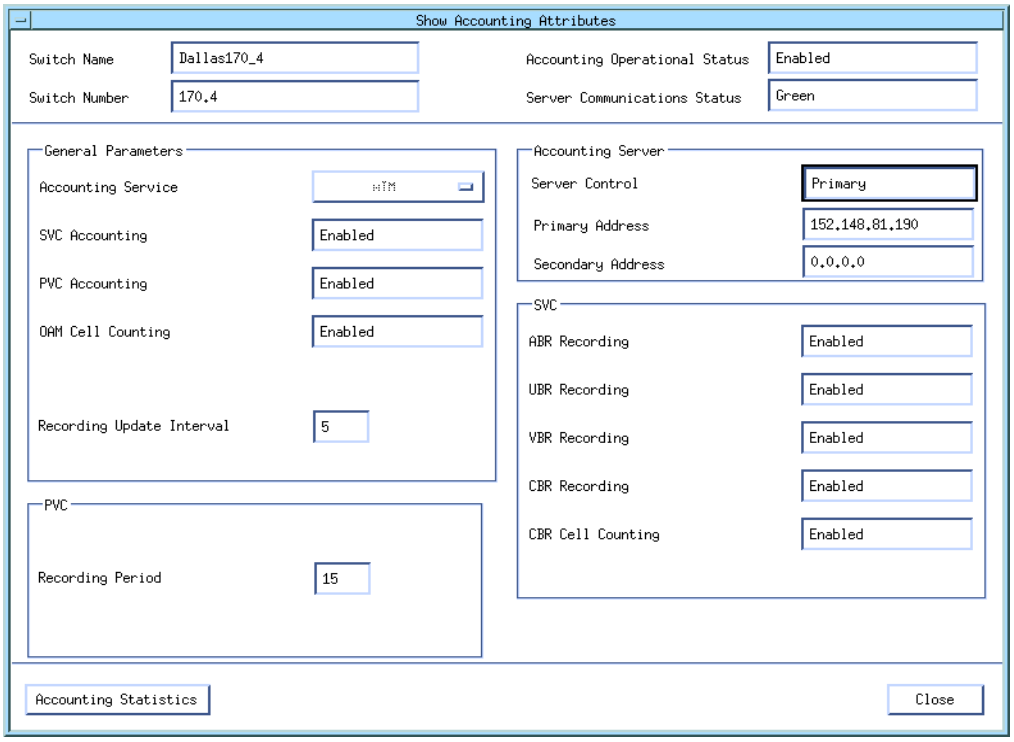


Figure 6-7. Show Accounting Attributes Dialog Box (ATM)

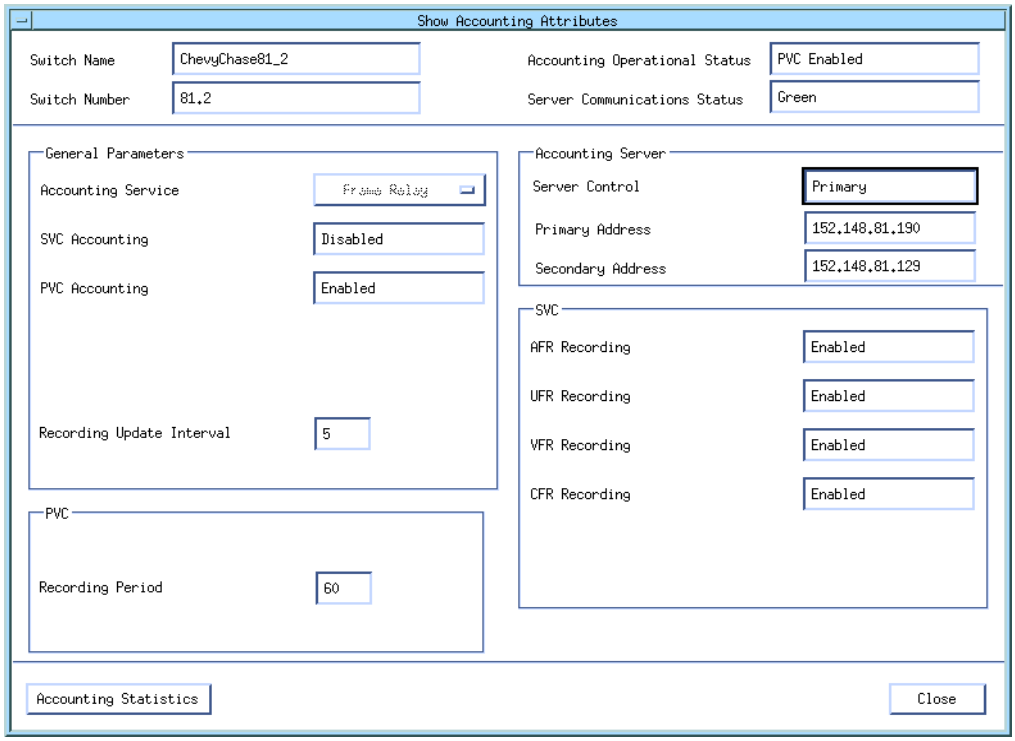


Figure 6-8. Show Accounting Attributes Dialog Box (Frame Relay)

4. Choose Close to exit.

Displaying Switch Statistics

Use NavisCore to view accounting statistics for any switch. You can view your current PVC Recording Interval setting, bandwidth usage, and file creation and transfer statistics for the selected switch.

The following switch statistics can be viewed:

- Number of AS file transfer failures for the current day
- Start and end time of the current recording interval
- Various usage record statistics, including:
  - Number of usage record creation failures during the current day
  - Number of usage records transferred to the AS during the current day
  - Number of SVC records created during the current day
  - Number of SVC records created during the current recording interval
  - Number of PVC records created during the current recording interval
- Transport bandwidth statistics, including:
  - Average burst and average total burst
  - Minimum and maximum bursts

To display the accounting statistics for a switch:

1. From the NavisCore network map, double-click the switch.

   You access the Switch Back Panel dialog box.

2. Select View Switch Attributes from the Actions list button, then choose Go.
3. Choose Accounting from the Options list button, then choose View. The Show Accounting Attributes dialog box appears.
4. Choose the Accounting Statistics button.

   The Accounting Statistics window appears. (see Figure 6-9).

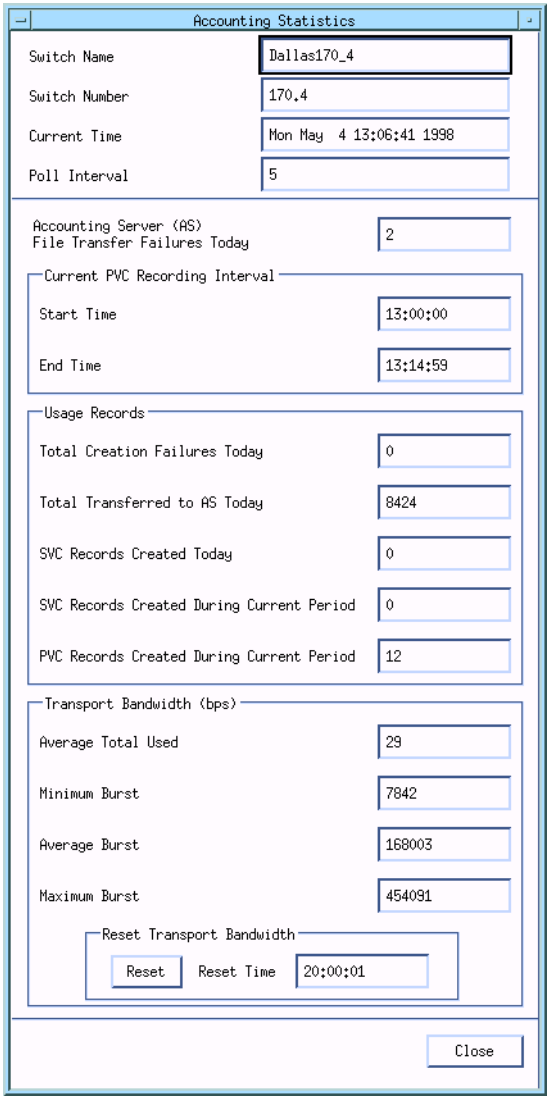


Figure 6-9. Accounting Statistics Window

5. See Table 6-1 for information on each of the fields in this dialog box. All fields are read-only.

All field values, with the exception of time-related fields and Poll Interval, are automatically reset to zero at the end of the 24-hour recording period, which runs from midnight to midnight, based on local time for the switch's Accounting Server. You can also use the Reset button to reset the Transport Bandwidth Counter fields to zero at any time (see "Resetting the Transport Bandwidth Counters" on page 6-11).

Table 6-1. Accounting Statistics

Field	Description
Switch Name/ Switch Number	Switch name and switch number for the selected switch.
Reset Time	Time at which that the Reset button was last pressed, resetting the Transport Bandwidth values to zero (see "Resetting the Transport Bandwidth Counters" on page 6-11).
Current Time	Current local time.
Poll Interval	Current polling interval in minutes. The poll interval represents how often the Accounting Server polls this switch for usage data that is ready to be uploaded to the Accounting Server.
Accounting Server File Transfer Failures Today	Number of failed attempts to upload the statistics file from the switch to the Accounting Server failed during the current 24-hour period. The 24-hour period runs from midnight to midnight, based on local time for the Accounting Server.
Current PVC Recording Interval	
Start Time	Time at which the current PVC recording interval started, in HH:MM:SS format. For information on the PVC recording interval, see page 5-40.
End Time	Time at which the current PVC recording period is scheduled to end, in HH:MM:SS format.
Usage Records	
Total Creation Failures Today	Number of failed attempts to create a usage data record on the switch during the current 24-hour period.
Total Transferred to AS Today	Total number of usage data records transferred to the switch's Accounting Server (including those transferred to either the active or reserve server) during the current 24-hour period.
SVC Records Created Today	Total number of SVC usage data records created on the switch during the current 24-hour period. This total does not include PVC usage data records that were created.
SVC Records Created During Current Period	Total number of SVC records created during the current 24-hour SVC rate period.
PVC Records Created During Current Period	Total number of PVC records created during the current recording interval.

Table 6-1. Accounting Statistics (Continued)

Field	Description
Transport Bandwidth (bps) *The values in these fields are in bits per second (bps). All values are for the current 24-hour period (which runs from midnight to midnight GMT), or since the last reset of these values during the current 24-hour period.*	
Average Total Used	Current running average of bandwidth used to transfer usage data between this switch and its Accounting Server.
Average Burst	Current running average channel burst bandwidth between this switch and its Accounting Server. For example, with three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field is 13Kbps.
Minimum Burst	Smallest channel burst bandwidth between this switch and its Accounting Server. For example, with three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field is 10Kbps.
Maximum Burst	Largest channel burst bandwidth between this switch and its Accounting Server. For example, with three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field is 15Kbps.

Resetting the Transport Bandwidth Counters

To reset (zero out) the Transport Bandwidth counters, choose the Reset button. Any subsequent values listed in these fields after you press Reset apply only to the current 24-hour period, from the time you pressed the Reset button until the end of the 24-hour period. When the current 24-hour period expires, the counters automatically reset to zero. The Reset Time field displays the last time the Reset button was pressed.

Pressing Reset does not start a new 24-hour collection period. It merely resets all counters for the current 24-hour period.

Forcing a Data Upload to the Accounting Server

In the event that you need to do an immediate upload of usage data from a switch to the Accounting Server before the end of the current recording interval, you can do so from the Set ATM Accounting Attributes dialog box. Normally, you should do this only when troubleshooting the system.

To force an upload of usage data to the Accounting Server:

1. From the NavisCore network map, select the appropriate switch.
2. From the network map menu bar, select Administer=>Ascend Parameters=>Set Parameters to display the Switch Back Panel dialog box.
3. Select Set Switch Attributes from the Actions list button, then choose Go.
4. Select Accounting from the Options list button, then choose Set. The Set Accounting Attributes dialog box appears.

The settings in this dialog box can be changed. Be careful not to accidentally change them.

5. Choose the Force Upload button.
6. Once the upload completes, choose Close.

7

Managing the Accounting Server

This chapter describes how to manage and monitor each of the Accounting Servers in your accounting system, including:

- Starting and stopping Accounting Server processes
- Configuring the Accounting Server for FTP transferal of accounting data
- Viewing the status of Accounting Server processes
- Viewing the contents of files produced by the system, including BAF files, ASCII files, usage data files, and audit count files
- Recovering from an Accounting Server failure

Starting and Stopping Accounting Server Processes

This section describes the commands used to start and stop the different Accounting Server processes. For information on how to display the current status of the Accounting Server processes, see "Viewing the Status of Accounting Server Processes" on page 7-7.

Starting All Accounting Server Processes

To start all Accounting Server processes, log in as the root user, then enter the following command:

```
cd /CascadeAS/install
./as-start start
```

Stopping All Accounting Server Processes

To stop all Accounting Server processes, log in as the root user, then enter the following command:

```
cd /CascadeAS/install
./as-start stop
```

If stopping the Accounting Server will cause some switches to be left unserviced, you are prompted to specify an alternate Accounting Server for those switches.

Starting and Stopping Individual Processes

There are several scripts available that enable you to start and stop individual Accounting Server processes. These scripts can be useful when you are trying to troubleshoot problems in your accounting system network.

To start a given process, type the command followed by *start*. To stop a given process, type the command followed by *stop*. For example, to start the process that transfers usage data from the switches to your Accounting Server, enter **./asfts-start start**. To stop the File Transfer process, enter **./asfts-start stop**.

Table 7-1 lists and describes the available scripts.

Table 7-1. Accounting Server Process Scripts

Script	Purpose
asda-start	Starts and stops the Data Aggregation process. This process aggregates multiple usage data records from a single call into a single record for the call in the Calls Database. Stopping this process will stop the generation of information required by all of the other processes for the creation AMA files.
asbg-start	Starts and stops the BAF Generation process, which converts raw usage data files for PVCs and SVCs into BAF format.
asbt-start	Starts and stops the AMA file transfer process. This process transfers AMA records to your billing operations server.

Table 7-1. Accounting Server Process Scripts (Continued)

Script	Purpose
asage-start	Starts and stops the automatic data file deletion process, which deletes old usage data files, unformatted call data files, and successfully transferred AMA files. AMA files that have been transferred to your billing operations server remain on the Accounting Server until they have aged for the period of time specified in the Accounting Server configuration (see "Accounting File Purging" on page 4-8 or "Office and File Purging" on page 4-39). After the specified time period has passed, this process automatically deletes the files. If you stop this process, already-transferred AMA files remain in the archive directories on the Accounting Server until you manually delete or remove them, or until you restart this process.
ascomp-start	Starts and stops automatic file compression. The file compression process automatically compresses all data files (including raw usage data files and call data files) stored on the Accounting Server. If you stop this process, files are not compressed, which requires more storage space for the files.
asfts-start	Starts and stops the transfer of files from your switches to the Accounting Server. If you stop this process, the Accounting Server does not receive usage data files from switches that use this server, and the files remain on their respective switches until either this process is restarted or the communications state of the accounting system goes to a Red state (see "Anomalous Events" on page 9-7). If you stop this process, it is recommended that you change all affected switches to their reserve Accounting Server. Otherwise, communications between the switch and its Accounting Server enters a Yellow state when the next five-minute transfer time arrives, and enters a Red state when the switch's hard disk fills to capacity (due to usage data being stored there instead of being transferred to the accounting system).
assnmp-start	Starts and stops the Accounting Server SNMP agent. This process provides SNMP access to the Accounting Server for remote configuration. It also provides error logging. ***Note:*** *Do not stop this process. If you do, system events are not logged. Also, data may back up on the switches in your accounting system, causing valuable data to be lost when storage space on the switch is depleted.*

Configuring Accounting Server as FTP Server

In some accounting systems, it is necessary for external hosts (FTP clients) to access accounting data directly from the Accounting Server (FTP server). The script /CascadeAS/etc/asftpconf_Exec.sh facilitates administration of the FTP service on the Accounting Server host. It allows you to create, modify, and delete FTP users as well as configure which TCP port the FTP daemon listens to for client connections.

Executing this script does not affect the execution of AMA File Transfer Functions described in "Accounting AMA File Transfer Configuration" on page 4-9.

To begin processing in the server mode:

1. Log into the Accounting Server as root.
2. Execute the /CascadeAS/etc/asftpconf_Exec.sh script.

   The Accounting Server FTP Server Configuration menu appears (Figure 7-1).

```
Accounting Server FTP Server Configuration

----------------------------------------
|             Main Menu                |
----------------------------------------


1)     Users
2)     FTP Port
3)     Exit

Enter Choice:
```

Figure 7-1. asftpconf_Exec.sh (Main Menu)

3. To access user administration functions, select option 1.
   To modify which service port the FTP server uses, select option 2.

Administering FTP Users

When you select option 1 (Users), the User Menu appears (Figure 7-2).

```
-----------------------------------------
|             User Menu                 |
-----------------------------------------


The following users are currently configured on
this AS:

User            Directory

mrtest          /CascadeAS/archive/ama


1)     Add a user
2)     Modify a user
3)     Delete a user
4)     Return to previous menu

Enter Choice:
```

Figure 7-2. asftpconf_Exec.sh (User Menu)

Select an option. The script prompts you with a series of questions.

For example, to add a user, select option 1. The script prompts you to specify the user name, user's home directory, and password (Figure 7-3). This information will be added to the password file.

To accept the default value (displayed in parentheses) press <RETURN>.

The default home directory is /CascadeAS/archive/ama, which is the directory where the completed AMA files are stored.

The password values are not echoed to the screen.

```
Enter user name (none)

mrstest

Enter users home directory
(/CascadeAS/archive/ama)

<Return>

User attributes are as follows:
User            Directory
mrstest         /CascadeAS/archive/ama

Are you sure you want to commit this modification?
(y/n)

y

New password:

Re-enter new password:
```

Figure 7-3. Creating a new FTP user

The processes for deleting or modifying users are similar.

Modifying FTP Port

When you select option 2 (FTP Port), the script displays the current FTP service port and allows you to change it (Figure 7-4).

```
-----------------------------------------
|          FTP Server Port Menu          |
-----------------------------------------

The following Port is configured as an FTP server:

5003

1)     Change FTP Port
2)     Return to previous menu

Enter Choice:
```

Figure 7-4. asftpconf_Exec.sh (FTP Server Port Menu)

To change the FTP port, select option 1. The script prompts you to specify the port.

Changing the FTP port necessitates changes to both the /etc/services and /etc/inetd.conf files on the Accounting Server. Before any changes are made, the script stores copies of each of these files in the /tmp directory of the Accounting Server. It is recommended that you save these copies of the original files in case you ever want to return the Accounting Server OS to its default state.

Removing the Accounting Server package will automatically remove the user-configured FTP port and FTP users.

Accounting Server Utilities

This section describes the Accounting Server utilities that are available for monitoring and managing the Accounting Server. In order to use any of these tools, you have to log in as the root user.

The following utilities are described in this section:

Table 7-2. Accounting Server Utilities

Utility	Function
as-status	Displays the current state of all Accounting Server processes.
bafdump	Displays the contents of completed BAF record files. See page 7-8.
auditdump	Displays the audit data contained in the specified file. See page 7-18.
asciidump	Displays the contents of the specified ASCII file. See page 7-17.
udfdump	Displays the contents of usage data files. See page 7-22.

Viewing the Status of Accounting Server Processes

The as-status utility enables you to view the current state of the Accounting Server processes. For a complete list and description of the Accounting Server processes, see Table 7-1 on page 7-2.

To view the status of AS processes, log in as root, then enter the following commands:

```
cd /CascadeAS/install
./as-status
```

Shown below is a sample process status listing for a Bellcore installation of the Accounting Server. In this example, every process is running.

```
Current Accounting Server Status
  Data Aggregation:    RUNNING
  PVC BAF Generation:  RUNNING
  SVC BAF Generation:  RUNNING
  AMA Transfer:        RUNNING
  File Aging:          RUNNING
  File Compression:    RUNNING
  File Transfer:       RUNNING
  AS SNMP Agent:       RUNNING
```

Shown below is a sample process status listing for an ASCII installation of the Accounting Server. Again, every process is running.

```
Current Accounting Server Status
  Data Aggregation:    RUNNING
  AMA Transfer:        RUNNING
  File Aging:          RUNNING
  File Compression:    RUNNING
  File Transfer:       RUNNING
  AS SNMP Agent:       RUNNING
```

Displaying BAF Record Files

You can use the bafdump utility to display the contents of BAF files. BAF files are stored in a directory that you specify during the installation (see page 3-6). By default, these files are stored in /CascadeAS/data/ama.

BAF Record Filename Format

BAF filenames are in the Bellcore-standard format shown in Figure 7-5.

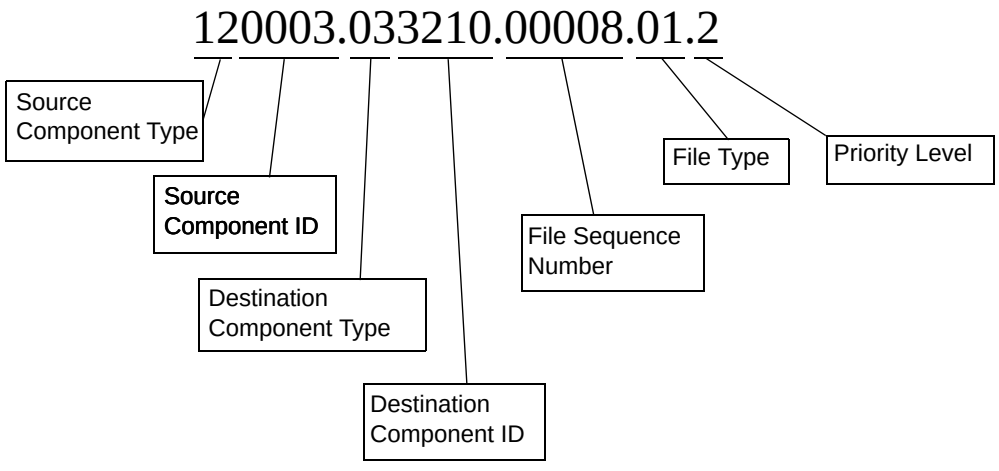


Figure 7-5. BAF Filename Format

Source Component ID Code — Specifies the Accounting Server on which the BAF file was generated. The first two digits are the Source Component Type you defined for the Accounting Server during the installation of the Accounting Server software. The next four digits are the Source Component ID assigned to the Accounting Server by the system administrator. This is the value you specified as the AMADNS Source Component ID during the installation of the Accounting Server software (see "AMADNS Source Component Identifier" on page 4-6 or "AMADNS Configuration" on page 4-34).

Destination Component ID Code — Specifies the billing operations server to which the BAF file is to be transferred. It consists of the following two parts:

- The first two digits are a code that identifies the component type for your billing operations server. This is the value you specified as the Destination Component Type during your billing operations server software installation.
- The next four digits identify the billing operations server. This is the AMADNS Destination Component Identifier that you specified for the billing operations server during your billing operations server software installation.

See "AMADNS Destination Component Identifier" on page 4-7 or "AMADNS Configuration" on page 4-34 for more information on these values.

For more information on Component Identification codes, see Bellcore GR-1343-CORE. If the value of either the Source Component ID or the Destination Component ID is less than four digits, then the actual value is padded with zeros. For example, if the AMADNS Destination Component Identifier for a billing operations server is 17, then the value in the filename is represented as 0017, since this part of the filename has to be four digits.

File Sequence Number — This number is automatically generated by the system as each BAF file is created, and increments by one with each new file created in a given file category (that is, files with the same file type priority level and destination component). This value distinguishes files of the same file category. When the file sequence number reaches 65535, the next file sequence number cycles back to 00001.

File Type — A two-digit code used in the file header to indicate the type of data contained in the file. Table 7-3 shows the valid file type codes. For standard BAF AMA files, this value is always 01 in the filename.

Table 7-3. AMA File Type Codes

Code	File Type
00	Tape Format AMA File
01	Standard AMA File

Table 7-3. AMA File Type Codes

Code	File Type
02	Error File
03	Program File
04	Test File

Priority Level — This value is always 2.

Displaying a BAF Record File

To display the contents of a BAF record file, log in as root, then enter the following commands:

```
cd /CascadeAS/tools
./bafdump [directory_path]/[filename] | more
```

For example, if your BAF files are in /CascadeAS/data/ama/primary:

```
./bafdump /CascadeAS/data/ama/primary/130003.073210.00008.01.2 | more
```

A listing similar to the following example (Figure 7-6) appears. There is one Record grouping for each BAF record in the file. Only the header record and one BAF record are shown in Figure 7-6 as an example. All BAF records display in the same format. If you are using the Ascend BAF extensions, additional information is included in the listing.

Due to the length of the BAF file output, it is recommended that you redirect the output from this command to a file or printer.

For more information on BAF record format, see Appendix A, “Record Formats”. For information on the items contained in BAF records, see Bellcore GR-1110-CORE.

```
Billing Record File: 130003.073210.00008.01.2

Header Record
       File Header :
       File Header Length         = 24
       Source Component Id        = 0
       Source Component Type      = 2
       Destination Component Id   = 0
       Destination Component Type = 3
       File Type                  = 1
       Data Format                = 0
       Field Suppression Type     = 0
       File Priority Level        = 2
```

```
      Restart Procedure          = 0
      File Status                = 1
      Unspecified                = 0
      File Sequence Number       = 3660
      Time File Created          = 1823
      Date File Created          = 010798
      Time File Modified         = 1830
      Date File Modified         = 010798
      File Length                = 215
      Number Of Records In File  = 1


Record Number : 0

    Record Descriptor Word :
      Record Size               = 215 bytes
      Unused                    = 00

    Hexadecimal Identifier :
      Constant                  = a
      Record Error Indicator    = a (No chars missing or in error)

    Structure Code :
      Module Indicator          = 4 (Modules are attached)
      Structure Code            = 0216
      Sign                      = 0xC

    Call Type :
      Call Type Code            = 609
      Sign                      = 0xC



    Sensor Type :
      Sensor Type Code          = 400
      Sign                      = 0xC

    Sensor Identification :
      Previously Output Ind     = 0 (Not previously output)
      Sensor ID Code            = 000002
      Sign                      = 0xC

    Recording Office Type :
      Recording Office Type     = 123
      Sign                      = 0xC

    Recording Office Identification :
      Validation Indicator      = 0
```

```
   Recording Office ID       = 000000
   Sign                      = 0xC

Start Date :
   Last Digit of Year        = 8
   Month of Year             = 01
   Day of Month              = 07
   Sign                      = 0xC

Study Indicator :
   Study Type A              = 0
   Study Type B              = 0
   Unnamed                   = 0
   Test Call Indicator       = 0
   BCC-settable              = 0
   Orig/term Number Ind      = 0
   Operator Services         = 0
   Sign                      = 0xC

Connect Time :
   Hours                     = 18
   Minutes                   = 13
   Seconds                   = 11
   Tenths of Seconds         = 1
   Sign                      = 0xC

Elapsed Time :
   Unused                    = 0
   Minutes                   = 00000
   Seconds                   = 41
   Tenths of Seconds         = 2
   Sign                      = 0xC



Aggregation Period Information :
   Aggregation Period        = 1 (Scheduled aggregation period)
   Sign                      = 0xC

Service and Interface Type :
   Unused                         = 000
   Point to Multipoint Indicator = 0   (Does not apply)
   Type of Service                = 001 (PVC CRS)
   Recording Interface Type       = 01  (ATM UNI)
   Remote Interface Type          = 01  (ATM UNI)
   Sign                      = 0xC

Significant Digits in Next Field :
```

```
      Significant Digits        = 010
      Sign                      = 0xC

   Recording Interface :
      Digits                    = 000004194435081
      Sign                      = 0xC

   Recording Connection :
      Unused                    = 0
      Connection Type           = 2 (Virtual Channel)
      VPI                       = 0015
      VCI                       = 00912
      Sign                      = 0xC

   Significant Digits in Next Field :
      Significant Digits        = 010
      Sign                      = 0xC

   Remote Interface :
      Digits                    = 000004194369560
      Sign                      = 0xC

   Remote Connection :
      Unused                    = 0
      Connection Type           = 2 (Virtual Channel)
      VPI                       = 0015
      VCI                       = 00912
      Sign                      = 0xC

   Cell Count Validity Check :
      Validity Check            = 0 (No trouble)
      Sign                      = 0xC

   Cell Count :
      Count Identifier          = 01 (Ingress total cells)
      Cell Count                = 0000001362137
      Sign                      = 0xC

   Cell Count :
      Count Identifier          = 02 (Ingress high priority cells)
      Cell Count                = 0000001362137
      Sign                      = 0xC

Module: Cell Count
   Module Code Identification :
      Module Code               = 145
      Sign                      = 0xC
```

```
    Measurement Unit :
       Unit Type                = 4 (Cell)
       Unit Size                = 05 (48 Octets)
       Sign                     = 0xC

    Cell Count Validity Check :
       Validity Check           = 0 (No trouble)
       Sign                     = 0xC

    Cell Count :
       Count Identifier         = 03 (Egress total cells)n
       Cell Count               = 0000001362135
       Sign                     = 0xC

    Cell Count :
       Count Identifier         = 04 (Egress high priority cells)
       Cell Count               = 0000001362135
       Sign                     = 0xC

Module: ATM Carrier Identifier
    Module Code Identification :
       Module Code              = 146
       Sign                     = 0xC

    ATM Carrier Identifier :
       ATM Carrier Interface    = 1 (Recording Interface)
       Sign                     = 0xC

    Carrier/Network Identifier :
       Administrative Domain    = 1
       Network Number           = 000000
       Sign                     = 0xC

Module: ATM Carrier Identifier
    Module Code Identification :
       Module Code              = 146
       Sign                     = 0xC


    ATM Carrier Identifier :
       ATM Carrier Interface    = 2 (Remote Interface)
       Sign                     = 0xC

    Carrier/Network Identifier :
       Administrative Domain    = 1
       Network Number           = 000000
```

```
       Sign                      = 0xC

Module: Three ATM Traffic Parameters
    Module Code Identification :

       Module Code               = 148
       Sign                      = 0xC

    Traffic Indicators :
       Direction                 = 3 (Ingress)
       Cell Flow                 = 1 (CLP=0+1)
       Tagging                   = 1 (Not requested)
       Sign                      = 0xC

    Traffic Parameter :
       Parameter Type            = 1 (PCR)
       Value                     = 00001002
       Sign                      = 0xC

    Traffic Parameter :
       Parameter Type            = 0 (MCR)
       Value                     = 00000502
       Sign                      = 0xC

    Traffic Parameter :
       Parameter Type            = 4 (Qos Class)
       Value                     = 00000004 (UBR/ABR)
       Sign                      = 0xC

Module: Three ATM Traffic Parameters
    Module Code Identification :
       Module Code               = 148
       Sign                      = 0xC

    Traffic Indicators :
       Direction                 = 4 (Egress)
       Cell Flow                 = 1 (CLP=0+1)
       Tagging                   = 1 (Not requested)
       Sign                      = 0xC




    Traffic Parameter :
       Parameter Type            = 1 (PCR)
       Value                     = 00001001
       Sign                      = 0xC

    Traffic Parameter :
```

```
        Parameter Type            = 0 (MCR)
        Value                     = 00000501
        Sign                      = 0xC

    Traffic Parameter :
        Parameter Type            = 4 (Qos Class)
        Value                     = 00000004 (UBR/ABR)
        Sign                      = 0xC

Module: One Digit String
    Module Code Identification :
        Module Code               = 611
        Sign                      = 0xC

    Generic Context Identifier :
        Parse Rules               = 00002
        Significant Digits        = 04
        Sign                      = 0xC

    Digit String :
        Digits                    = 000000000005678
        Sign                      = 0xC

Module: Cascade Call Correlation Identifier
    Module Code Identification :
        Module Code               = 898
        Sign                      = 0xC

    Reference Switch Id :
        Number                    = 64002
        Sign                      = 0xC

    Reference Logical Port :
        Number                    = 00009
        Sign                      = 0xC

    Reference Connection Id :
        Number                    = 00000983952
        Sign                      = 0xC

    Circuit Correlation Identifier :
        Number                    = 00882459069
        Sign                      = 0xC

Module: Cascade Interface Identifier
    Module Code Identification :
        Module Code               = 899
        Sign                      = 0xC
```

```
        Local Slot Number :
           Number                    = 008
           Sign                      = 0xC

        Local Physical Port :
           Number                    = 002
           Sign                      = 0xC

        Local Logical Port :
           Number                    = 00009
           Sign                      = 0xC

        Remote Logical Port :
           Number                    = 00024
           Sign                      = 0xC

    Module: Final
        Module Code Identification :
           Module Code               = 000
           Sign                      = 0xC
```

Figure 7-6. Sample BAF Record File (One Record Shown)

Displaying the Contents of ASCII Files

You can use the asciidump utility to display the contents of ASCII AMA files. ASCII AMA files are stored in a directory that you specify during the installation (see page 3-6). By default, ASCII files are stored in /CascadAS/data/ama/primary.

ASCII filenames are in the format shown in Figure 7-7.

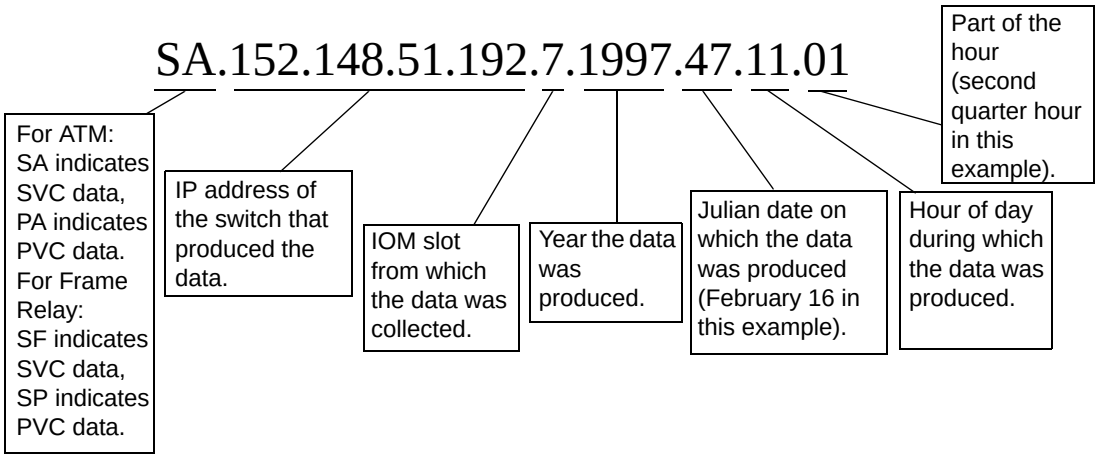


Figure 7-7. ASCII Filename Format

To display the contents of an ASCII record file, log in as root, then enter the following commands:

```
cd /CascadeAS/tools
./asciidump  [-p pportID] [-l lportID] [-c circuitID]
[directory_path]/[filename] | more
```

where directory_path is the pathname to the directory that contains the ASCII record files you want to display. If you omit a filename, all record files in the specified directory are displayed. If you include a filename, the single file is displayed.

You can also use the following optional command line switches to limit information from a file:

-p Limits information to the specified PPort.

-l Limits information to the specified LPort.

-c Limits information to the specified circuit.

For example, if the ASCII files are stored in /CascadeAS/data/ama, and you want to display the SVC records generated from 10-11 a.m. on April 1, 1997, on IOM 9 on a switch with IP address 152.7.8.19, enter the following command:

```
./asciidump
/CascadeAS/data/ama/primary/SA.152.7.8.19.9.1997.91.10.00 | more
```

A listing of the ASCII file appears. For information on the layout of the ASCII file, and how to interpret the data in the file, see Appendix A.

Displaying the Contents of Audit Count Files

Audit count files reflect the state of accounting operations on the Accounting Server. By default, these files are stored in the /CascadeAS/data/audit directory.

There are two categories of audit files:

- **Switch audit statistics files**, which report on the reception of usage records from each switch. These files contain information on a specific switch.
- **Server statistics files**, which report on Bellcore BAF generations. These statistics report on the translation of usage records into Bellcore BAF records. In addition, these audit files contain statistics that report on AMA file transfers to one or more billing operations servers.

Statistics are recorded in hourly increments in ASCII format. A single file is created each day for a particular set of audit counts (e.g., one file per switch per day).

To display the contents of an audit count file, log in as root, then enter the following commands:

```
cd /CascadeAS/tools
./auditdump [directory_path]/[filename] | more
```

where directory_path is the pathname to the directory that contains the audit count files you want to display. If you omit a filename, all audit count files in the specified directory are displayed. If you include a filename, the single file is displayed.

A listing of the audit count file appears. For information on the filename format and layout of the audit count files, see the next two sections.

All audit files are closed at midnight on a daily basis. In the audit count file, counts are aggregated over an hourly period. There is one section per hour in the audit file, and one audit file per day.

Switch Audit Statistics Files

Switch audit statistics files contain the following audit statistics:

SVC call attempts — Number of new SVC call attempts for a switch on a given day, including call failures.

SVC call completions — Number of SVC call completions for a switch on a given day, including call failures.

PVCs enabled — Number of PVCs reported to have become operationally enabled on a switch on a given day.

PVCs disabled — Number of PVCs reported to have become operationally disabled on a switch on a given day.

Switch audit statistics files use the filename convention shown in Figure 7-8.

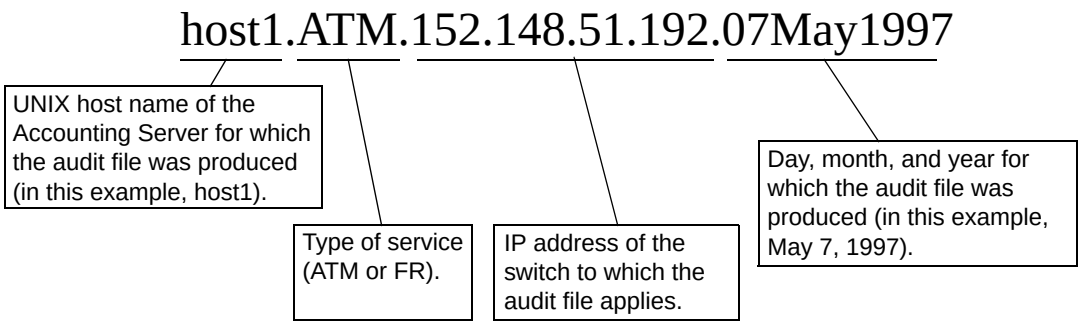


Figure 7-8. Switch Audit Statistics File Naming Format

For example, if the switch audit statistics are stored in /CascadeAS/data/audit, and you want to display the audit file produced on June 17, 1997, for a switch with IP address 152.14.5.192 reporting to an Accounting Server named “account” that is collecting ATM usage data, enter the following command:

```
./auditdump /CascadeAS/data/audit/account.ATM.152.14.5.192.17Jun1997 | more
```

Accounting Server statistics files are in comma-delimited ASCII format, and contain the fields listed here:

```
Hostname,
Switch IP address,
Year,
Month,
Day,
Hour,
SVC call attempts,
SVC call completions,
PVCs enabled,
PVCs disabled
<end line>
```

The following sample shows an audit dump produced for April 1, 1997, from 8pm-9pm for a switch with IP address 201.201.250.2 on an Accounting Server named account1. (The file contains one audit record for each hour of the day; only one record in the file is shown here.)

```
USAGE FILE
   HOSTNAME       = account1
   FILE TYPE      = ATM
   SWITCH ADDRESS = 201.201.250.2
   DATE           = 19May1997

   HOUR                      = 21
   SVC CALL ATTEMPTS         =  16000
   SVC CALL COMPLETIONS      =  16000
   PVCs ENABLED              =  0
   PVCs DISABLED             =  0
```

Accounting Server Statistics Audit Files

Accounting Server statistics audit files contain the following information:

SVC records created — Number of SVC records created and written to a primary AMA file (including call completions and call failures).

PVC records created — Number of PVC records created and written to a primary AMA file.

AMA files created — Number of primary AMA files created.

AMA files transferred — Number of AMA files successfully transferred to the billing operations server.

AMA file transfer failures — Number of failed attempts to transfer AMA files to the billing operations server.

AMA records sent — Total number of SVC and PVC records sent from the switches in the accounting system to this Accounting Server.

Accounting Server statistics audit files use the filename convention shown in Figure 7-9, and are stored in the directory /CascadeAS/data/audit by default.

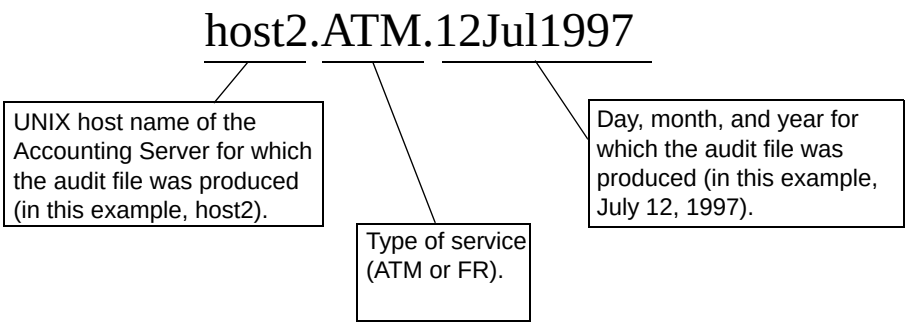


Figure 7-9. Server Statistics Filename Format

For example, if the audit files are stored in /CascadeAS/data/audit, and you want to display the audit file for June 4, 1997, for an Accounting Server named “accountant” that is collecting ATM usage data, enter the following command:

```
./auditdump /CascadeAS/data/audit/accountant.ATM.04Jun1997 | more
```

Switch audit statistics files are in comma-delimited ASCII format, and contain the fields listed here:

```
Hostname,
Year,
Month,
Day,
Hour,
SVC records created,
PVC records created,
AMA files created,
AMA files transferred,
AMA file transfer failures,
AMA records sent
<end line>
```

The following sample shows an audit dump produced for an Accounting Server named “accountant” on May 18, 1997. Audit files contain one audit record for each hour of the day. Only one audit record (for 12am-1am) is shown here.

```
SERVER FILE
   HOSTNAME        = accountant
   FILE TYPE       = ATM
   DATE            = 18May1997

   HOUR                        =  00
   SVC RECORDS CREATED         =  37653
   PVC RECORDS CREATED         =  4135
```

```
PRIM FILES CREATED        =  8674
PRIM FILES TRANS COMPLETE =  8674
PRIM FILES TRANS FAILURE  =  0
RECORDS SENT                =  41788
```

Displaying the Contents of Usage Data Files

You can use the udfdump utility to display the contents of usage data files in a specified directory. Usage data files store usage data prior to being converted to BAF or ASCII format, and are stored in the /CascadeAS/data/udfiles directory by default. You can display the contents of a particular file or group of files:

- For a single file, execute the udfdump, specifying the file pathname.
- For a group of files, move the file(s) to a separate directory, then execute the udfdump command, specifying the directory pathname.

The udfdump utility is a debugging tool intended to help Ascend Technical Assistance Center staff determine the cause of an anomaly. Do not use this tool to validate your AMA file output; these values are interpreted during processing.

To display the contents of one or more usage data file, log in as root, then enter the following commands:

```
cd /CascadeAS/tools
./udfdump [-f] [-b] [-iIOM][directory_path]/[filename] |
more
```

where directory_path is the pathname to the directory that contains the usage data files you want to display. If you omit a filename, all usage data files in the specified directory are displayed. If you include a filename, the single file is displayed.

You can also use the following optional command line switches to display additional information about a file:

-f Includes file header information in the output.

-b Includes usage data buffer header information in the output.

-i Limits information to the specified IOM.

The following sample shows a usage data file dump which includes both file header and data buffer header information. Only one data record is shown. In a running network, usage data files contain numerous data records (the number of records is indicated in the numrecs field of the buffer header; in this example, there are 398 records in the file).

```
UDB Header Types:
   service      2
   UDB Type     129
   IOM          4

ATM Type UDB Header:

   time ref   Tue May 20 17:05:27 1997
                    (864147927)
   time stamp 0
   rleSize    7577
   level      15920
   num recs   398
   seq num    5341

UDR Type = 9

   SwitchId          = 3385457153
   IomNum            = 4
   inClp0            = 1
   inClp1            = 1
   outClp0           = 1
   outClp1           = 1
   outClp0Overflow   = 0
   outClp1Overflow   = 0
   inTaggedOverflow  = 0
   legsAdded         = 0
   legsDeleted       = 0
   legsFailed        = 0
   LPort             = 112
   ConnId            = 983072
   bcci              = 0
   timestamp         = 864148198(27101)
   timestamp100      = 1
   cause             = 1
   inClp0            = 0
   inClp1            = 0
   outClp0           = 0
   outClp1           = 0
```

Usage Data Filename Format

The format of usage data filenames is shown in Figure 7-10. All usage data filenames start with the characters “bs” to indicate they were produced by the accounting system (the billing system). Critical files contain critical usage data records. Snapshot files contain cell count snapshots that are useful only in the case of a card or switch failure (to limit the date loss to no more than 5 minutes of data).

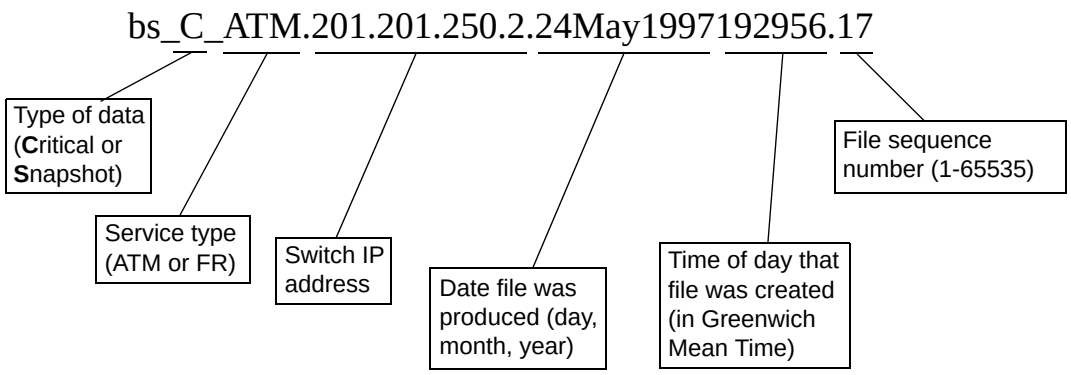


Figure 7-10. Usage Data Filename Format

Recovering from Primary Server Failure

If you configure your switches with both active and reserve servers (see "High Availability Configuration" on page 4-19 and "Ascend Switch Configuration" on page 4-48) you can continue to receive accounting data if a server fails or becomes administratively unavailable.

If the active server for a group of switches fails, the reserve server takes over processing for the failed active server. It also generates an SNMP trap and places a message in the log file. Keep in mind that the accounting system is not designed to process in this state for an extended period of time. Once the reserve server takes over for an active server, the affected switches no longer have a backup server. To avoid overloading the reserve server, rectify the failure as soon as possible.

The following scenarios illustrate the steps that you need to take to recover from a primary server becoming unavailable. These scenarios use the system configuration illustrated in Figure 7-11.

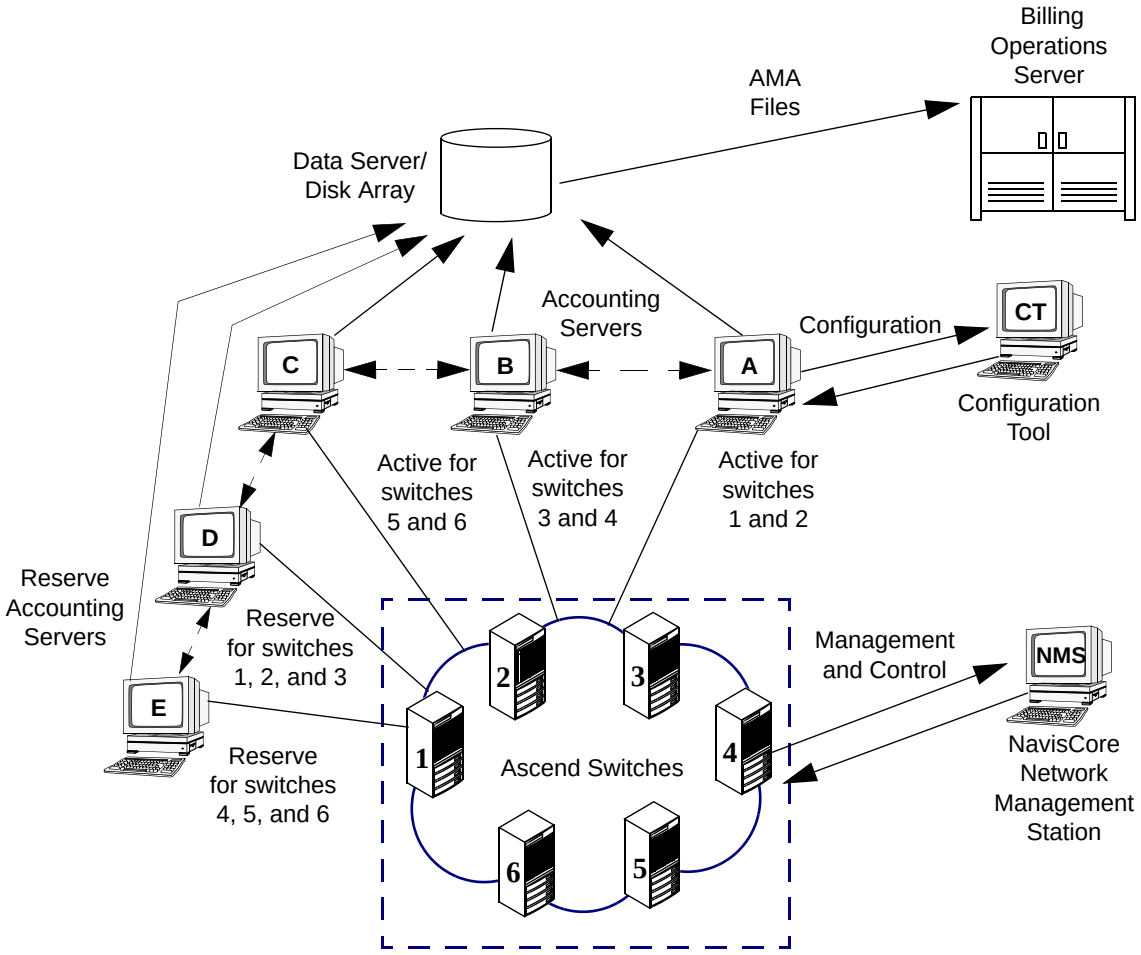


Figure 7-11. High Availability Accounting System Configuration

The following output from the configAS utility documents the system configuration:

```
 AS Location Configuration Option

           Server Name           Server ID
          ------------         ------------
( 1)              AS-A             7.7.7.1
( 2)              AS-B             7.7.7.2
( 3)              AS-C             7.7.7.3
( 4)              AS-D             7.7.7.4
( 5)              AS-E             7.7.7.5


Switch Configuration Option
      Switch Name     Switch ID  Active AS Index  Reserve AS Index
     ------------    ----------  ---------------  ----------------
( 1)     Switch_1       1.2.3.1              1                 4
( 2)     Switch_2       1.2.3.2              1                 4
( 3)     Switch_3       1.2.3.4              2                 4
( 4)     Switch_4       1.2.3.5              2                 5
( 5)     Switch_5       1.2.3.6              3                 5
( 6)     Switch_6       1.2.3.7              3                 5
```

Scenario 1: Unexpected Primary Server Failure

In this scenario, an unexpected condition causes a primary accounting system to fail.

1. During non-business hours, a maintenance worker accidentally drops a ladder on Accounting Server AS-A. The impact causes all accounting processes to stop on the server.
2. Three minutes later, Accounting Server AS-D recognizes that server AS-A is no longer processing accounting data. Server AS-D takes over processing and sends out a trap alerting the administrator that the accounting system is processing in a weakened state.

   The following output from the configAS utility documents that Switch_1 and Switch_2 are now processed by server AS-D:

```
Switch Configuration Option
      Switch Name     Switch ID  Active AS Index  Reserve AS Index
     ------------    ----------  ---------------  ----------------
( 1)     Switch_1       1.2.3.1              4                 4
( 2)     Switch_2       1.2.3.2              4                 4
( 3)     Switch_3       1.2.3.4              2                 4
( 4)     Switch_4       1.2.3.5              2                 5
( 5)     Switch_5       1.2.3.6              3                 5
( 6)     Switch_6       1.2.3.7              3                 5
```

   The following message displayed at the NMS indicates that server AS-D has taken over processing for the failed server:

```
Apr  2 6:03:02  CODE=7  SEVERITY=MAJOR  OWNER=apda
EVENT=(Accounting Server at 7.7.7.4 taking over processing for
Switch_1 because AS at 7.7.7.1 has failed)
```

3. While Accounting processing continues, the administrator takes steps to rectify the failure, because usage data from Switch_1 and Switch_2 will not be processed if a failure occurs in server AS-D.

4. Fortunately, the damage to AS-A is easily repaired. Once server AS-A is back up, the administrator runs the configAS command to modifies the Switch settings back to their original state:

```
# /CascadeAS/bin/configAS

 Accounting Server Configuration Main Menu

   1 - Accounting File Purging
   2 - Accounting AMA File Transfer Configuration
   3 - Recording Office Configuration
   4 - File System Capacity Monitoring
   5 - Switch Configuration
   6 - SNMP Trap Destinations
   7 - High Availability Configuration
   8 - Accounting Server Locations
   q - Exit this program

Select the number of an item :
```

5. The administrator selects option 5:

```
Switch Configuration Option

      Switch Name     Switch ID  Active AS Index  Reserve AS Index
     ------------    ----------  ---------------  ----------------
( 1)     Switch_1       1.2.3.1              1              4
( 2)     Switch_2       1.2.3.2              1              4
( 3)     Switch_3       1.2.3.4              2              4
( 4)     Switch_4       1.2.3.5              2              5
( 5)     Switch_5       1.2.3.6              3              5
( 6)     Switch_6       1.2.3.7              3              5


  1 - Add a switch to the configuration.
  2 - Delete a switch from the configuration.
  3 - Modify the parameters of a switch from the configuration.
  4 - Return to previous menu.

Select an Option :
```

6. The administrator selects option 3. When prompted, the administrator resets server AS-A as the active server for Switch_1:

```
Enter the index of the switch to modify : 1

Switch Name  (Switch_1)     <RETURN>    :
Switch IP Address (1.2.3.1) <RETURN>    :
Active AS Index (4)     :    1
Reserve AS Index (4)     :  <RETURN>

Accept the above values ? (y/n) y
```

7. The administrator repeats Step 6 to reset server AS-A as the active server for Switch_2.

Scenario 2: Planned Maintenance on a Server

In this scenario, a system administrator plans to upgrade to the operating system of Accounting Server AS-B. Because the situation is planned, the administrator can use a more graceful method of transferring accounting processing before making the server unavailable.

1. The administrator logs onto server AS-B and shuts down accounting processing:

```
/CascadeAS/install/as-start stop

********************     WARNING      ****************************

The following switches still have this host configured as their
ACTIVE Accounting server:

1.2.3.4
1.2.3.5


********************     WARNING     ****************************

Do you want to:

1) Assign the entire list of switches a new active server?
2) Run configAS to assign each switch a new server individually
3) Ignore the condition and continue

Enter choice:
```

2. The administrator selects option 1. When prompted, the administrator chooses a new server (AS-E) to process accounting for Switch_4 and Switch_5.

```
Enter choice: 1

Please choose one of the following:

1) AS-A at 7.7.7.1
2) AS-B at 7.7.7.2 (this host)
3) AS-C at 7.7.7.3
4) AS-D at 7.7.7.4
5) AS-E at 7.7.7.5

Enter choice: 5

Are you sure you want to replace server: 1 with 5 (y/n)? <n> y
```

Unfortunately, this solution leaves Switch_4 unprotected in the event of a failure. Because AS-E is already configured as the backup for Switch_4, the switch would be left unprotected if server AS-E were to fail or be brought down for maintenance. A better solution may be to assign Switch_3 to server AS-E and Switch_4 to server AS-D.

To avoid a situation where switches are left without a backup server, you can maintain an Accounting Server whose sole purpose is to processes switches during other servers' maintenance. This special server is not routinely assigned as active or reserve to any switches on your network. Prior to maintenance on an active server, you "hot-swap" the switches over to the special server. This approach, although expensive, does serve to protect data during maintenance down time.

Recreating Accounting Files

In the event that any of your accounting files become corrupted or otherwise unusable, you can recreate the files in their entirety by reprocessing the raw usage data that was originally collected from the switches in your network. The files containing this data are stored in /CascadeAS/archive/udfiles/compressed directory in compressed format.

Before performing the procedure in this section, you should remove all files in the /CascadeAS/data/calls/active directory. If you do not, it may cause the system to bill twice for the same circuit or call, since you are reprocessing raw data files as if the system were receiving them for the first time. However, be aware that if you do remove the files from this directory, it may cause you to lose all data for circuits or calls that span multiple days.

To recreate your accounting files:

1. Create a storage directory on the Accounting Server, using any name you want (e.g., /CascadeAS/restore).
2. Shut down the file transfer process by entering the following commands:

```
cd /CascadeAS/install
./asfts-start stop
```

3. Move all files in the /CascadeAS/data/udfiles/compressed directory into the directory you created in Step 1.
4. Change to the directory you created in Step 1.
5. Uncompress the files in the directory by entering the following command:

```
uncompress *.*
```

6. Once all files in the directory have been uncompressed, move the files into the /CascadeAS/data/udfiles directory.
7. Restart the file transfer process by entering the following commands:

```
cd /CascadeAS/install
./asfts-start start
```

8. Once you restart the file transfer process, the system processes the files you placed in the /CascadAS/data/udfiles directory as if they have just been received for the first time. All subsequent files normally created by the Accounting Server processes are then recreated from the uncompressed raw data files.

8

Event Logging

This chapter describes the set of asynchronous events that are generated by each Accounting Server in the accounting system. These events indicate anomalous conditions or task completions that have occurred within the accounting system.

Some of the events are simply informational. Other events indicate that a problem or potential problem may exist in the accounting system (either a hardware problem or a configuration problem).

These events are logged in the file /CascadeAS/data/logs/ASerror.log. If you are experiencing problems with the accounting system, or if you want to monitor accounting system activity, you can display the list of accounting system events that have been logged to this file. Also, check the SNMP trap events that are listed in NavisCore for each switch (see Chapter 9).

In addition, time changes are logged in /CascadeAS/data/logs/time_change.log. This file contains a listing of all time changes made on all switches in the network.

Resetting the Event Log File

The /CascadeAS/data/logs/ASerror.log file is automatically archived and reset at the end of the each day (midnight local time). Archived files are numbered 0 through 6 (representing Sunday through Saturday) and are overwritten every week. If you want to save the contents of the log file, you can set up a script to copy it to another file before it is reset. If you do so, make sure you manually delete the copy of the log file when you no longer need it.

Event Log Messages

This section lists the event messages that are logged in AServer.log, as well as the condition that generated the message, possible causes, and suggested resolutions.

All event log (and time log) messages appear in the following format:

[*date*] [*time*] [*error_code*] [*severity*] [*process*] [*message*]

These items are described as follows:

date — Date on which the error was generated, in mm/dd/yy format (GMT).

time — Time of which the error was generated, in hh:mm:ss format (GMT).

error_code — Error code associated with the error message.

severity — Severity level of the message. Severity may be any of the following:

MAJOR	A non-fatal major error has occurred
MINOR	A non-fatal minor error has occurred
FATAL	A fatal error has occurred
WARNING	A non-fatal condition exists
NORMAL	The message is informational

process — Accounting Server process associated with the error.

Error Messages

This section lists the error and event messages that are generated by the accounting system.

Connection to [*switch_ip_address***] terminated unexpectedly**

Meaning:
The file transfer protocol between the Accounting Server and the indicated switch has failed.

Possible Cause:
Network congestion or a communication failure is disrupting the file transfer process.

Corrective Action:
Check NavisCore to determine if the indicated switch is reachable. Then ping the switch from the Accounting Server to determine if the switch is reachable from the Accounting Server.

Could not create file [*filename*]

Meaning:
The file transfer protocol between the Accounting Server and the indicated switch has failed.

Possible Cause:
Network congestion or a communication failure is disrupting the file transfer process.

Corrective Action:
Check NavisCore to determine if the indicated switch is reachable. Then ping the switch from the Accounting Server to determine if the switch is reachable from the Accounting Server.

Error writing file [*filename*] from switch [*switch_ip_address*] to disk

Meaning:
The asfts process could not create the indicated usage data file, preventing the transfer of the usage data file from the indicated switch to the Accounting Server.

Possible Cause:
The disk on which you are storing the usage data files may be full.

Corrective Action:
Check the integrity and capacity of the disk on which you are storing usage data files.

Failed to receive file from switch [*switch_ip_address*]

Meaning:
The file transfer protocol between the Accounting Server and the indicated switch is failing.

Possible Cause:
Network congestion or a communications failure is disrupting the file transfer process.

Corrective Action:
Check NavisCore to determine if the indicated switch is still reachable. Then ping the switch from the Accounting Server to determine if the switch is reachable from the Accounting Server.

Failed to send acknowledgment to switch [*switch_ip_address*]

Meaning:
The file transfer protocol between the Accounting Server and the indicated switch has failed.

Possible Cause:
Network congestion or a communication failure is disrupting the file transfer process.

Corrective Action:
Check NavisCore to determine if the indicated switch is reachable. Then ping the switch from the Accounting Server to determine if the switch is reachable from the Accounting Server.

Invalid directory [*snapshot directory_path***]**

Meaning:
The Data Aggregator received a Card Down UDR and could not process snapshot files for the card that is down.

Possible Cause:
The snapshot directory for the switch being processed does not exist.

Corrective Action:
Check the directory path and permissions for the indicated directory.

Unable to Open File [*filename***]**

Meaning:
The indicated file is not available for processing by the indicated process name.

Possible Cause:
The indicated process does not have the necessary directory permissions, or the directory is full.

Corrective Action:
Check the directory capacity.

Verify that the directory path name is correct.

Check the file permissions on the directory.

Unable to Read File [*filename***]**

Meaning:
The indicated file is not available for reading by the indicated process name.

Possible Cause:
The indicated process does not have the necessary directory permissions.

Corrective Action:
Verify that the directory path name is correct.

Check the file permissions on the directory.

Unable to Write File [*filename***] not configured**

Meaning:
The indicated file is not available for writing by the indicated process name.

Possible Cause:
The indicated process does not have the necessary directory permissions, or the directory is full.

Corrective Action:
Check the directory capacity.

Verify that the directory path name is correct.

Check the file permissions on the directory.

Switch [*switch_ip_addr***]**

Meaning:
The Accounting Server received a UDF from a switch that it is not configured to recognize.

Possible Cause:
The switch was configured to send data to the Accounting Server before the server was configured to process the switch.

Corrective Action:
Run /CascadeAS/bin/configAS and configure the Accounting Server to process data from the switch (for instructions, see "Switch Configuration" on page 4-15 or "Ascend Switch Configuration" on page 4-48).

Accounting Server at [*ip_addr***] is taking over processing for [***switch_ip_addr***]**

Meaning:
An Accounting Server has failed. A reserve Accounting Server is performing accounting for the failed server.

Possible Cause:
The active Accounting Server has either failed or become unavailable.

Corrective Action:

1. Rectify the failure as soon as possible to avoid overloading the reserve server.
2. Restart the active Accounting Server (for instructions, see "Starting All Accounting Server Processes" on page 7-1).
3. Reset the Accounting Server to active status for the specific switches (for instructions, see "Switch Configuration" on page 4-15 or "Ascend Switch Configuration" on page 4-48).

Time Change Log

All time changes made to any switch in the network are logged to the file /CascadeAS/data/logs/time_change.log. Unlike the event log, this file is not reset automatically, and entries are continually added to it.

A sample time change log message is shown below. In this example, the time on the switch with IP address 201.201.205.1 was adjusted by two seconds at 12:36:09 on May 21.

```
May 21 12:36:09 CODE=0 SEVERITY=NORMAL OWNER=TIME
EVENT=(Time on the SP for switch 201.201.250.1 changed 2
seconds)
```

9

SNMP Traps

This chapter describes the accounting-related SNMP traps generated by the Accounting Server and Ascend switches. Traps generated by the Accounting Server are sent to each NMS in the accounting system's trap destination list (see "SNMP Trap Destinations" on page 4-17 or "Trap Destinations" on page 4-45). Traps generated by switches are sent to each NMS in the switch system (see the *NavisCore Diagnostic and Troubleshooting Guide*).

When NavisCore receives an accounting system trap, the trap is mapped into an easily-understandable event and displayed in the Event List. Some events are simply informational, while other events indicate a problem or potential problem within the accounting system or the switching system on which it is running. Events are categorized by NavisCore as: *Normal*, *Minor*, *Major*, and *Critical*.

If you are using a third-party NMS, you receive only SNMP traps. You do not receive Accounting events.

All SNMP trap messages are preceded by the timestamp (in mm/dd/yy hh:mm:ss format) and the type of trap (e.g., LPort Status, Node Status). The timestamp indicates when the trap message was generated. The trap type indicates the network component that generated the trap event; for example, Node Status traps are generated by switches, and LPort Status traps are generated by logical ports on a switch.

Normal Traps/Events

This section describes the Normal SNMP trap events that are generated by the accounting system. These traps/events are simply informational. They do not indicate a problem or potential problem within the billing system.

In the following tables, the Event text in bold lists the message as it appears in the NavisCore event list. The Description provide more details about the event. The Syntax lists the ASN1 syntax for the SNMP trap that causes the event. The SNMP information is taken from the Accounting MIB definition. This information may be of interest if you use a third-party NMS to service traps.

Event	**The Accounting Server is operational**
Description	A node type trap indicating that the Accounting Server is operating normally.
Syntax	acctServerStartup TRAP-TYPE ENTERPRISE acctserver DESCRIPTION “This trap indicates that the Accounting Server is now operational.” ::= 1

Event	**The Accounting Server has been shut down**
Description	A node type trap indicating that the Accounting Server operations have been stopped.
Syntax	acctServerShutdown TRAP-TYPE ENTERPRISE acctserver DESCRIPTION “This trap indicates that the Accounting Server operations have been shut-down.” ::= 2

Event	**The ATM Accounting Control has been changed to [enabled|disabled]**
Description	A node type trap signifying that the accounting system state on a switch has been changed, either from enabled to disabled, or from disabled to enabled. The accounting state is changed when a switch boots (accounting becomes enabled), or when the state is changed manually via NavisCore.
Syntax	atmacctStateChange TRAP-TYPE ENTERPRISE cascatm VARIABLES { atmacctControl, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that ATM accounting has been enabled or disabled on the switch. This trap is generated at switch boot or when the value of the atmacctControl object is modified." ::= 103

Event	**The Frame Relay Accounting Control has been changed for Switch [IP] to [enabled|disabled]**
Description	A node type trap signifying that the accounting system state on a switch has been changed, either from enabled to disabled, or from disabled to enabled. The accounting state is changed when a switch boots (accounting becomes enabled), or when the state is changed manually via NavisCore.
Syntax	fracctStateChange TRAP-TYPE ENTERPRISE cascfr VARIABLES { fracctControl, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that FR accounting has been enabled or disabled on the switch. This trap is generated at switch boot or when the value of the fracctControl object is modified." ::= 132

Event	**ATM Accounting Control at the Logical Port (LP) level has been changed. (LP Accounting Control=[enabled|disabled], LP Interface Index=[Lport Index])**
Description	A LPort-type trap signifying that the accounting system state on the indicated logical port has been changed, either from enabled to disabled, or from disabled to enabled. The accounting state is changed on a logical port when the switch boots (accounting becomes enabled), or when the state is changed manually via NavisCore.
Syntax	atmacctLportStateChange TRAP-TYPE ENTERPRISE cascatm VARIABLES { atmacctLportSvcControl, atmacctLportIfIndex, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that accounting has been enabled or disabled on a particular logical port. This trap is generated when the value of the atmacctLportControl is modified for a particular port; this trap IS NOT generated when the global atmacctControl is modified or at switch boot." ::= 106

Event	**FR Accounting Control at the Logical Port (LP) level has been changed. (LP Accounting Control = [enabled | disabled], LP Interface Index=[Lport Index])**
Description	A LPort-type trap signifying that the accounting system state on the indicated logical port has been changed, either from enabled to disabled, or from disabled to enabled. The accounting state is changed on a logical port when the switch boots (accounting becomes enabled), or when the state is changed manually via NavisCore."
Syntax	fracctLportStateChange TRAP-TYPE ENTERPRISE cascfr VARIABLES { fracctLportSvcOrigControl, fracctLportSvcTermControl, fracctLportIfIndex, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that SVC accounting has been enabled or disabled on a particular logical port. This trap is generated when the value of the fracctLportControl is modified for a particular port; this trap IS NOT generated when the global fracctControl is modified or at switch boot." ::= 135

Event	**The state of communications to the ATM accounting system has changed to [Green/Yellow/Red]. The current Switch Level Accounting Server Control is [Primary/Seconday] (Primary Accounting Server=IPAddr, Secondary Accounting Server=IPAddr)**
Description	This Accounting Server communication state trap is generated when the Accounting Server Control is changed between active and reserve. When the Accounting Server control has changed, the server state indicated in the trap represents the current state of the accounting system (Green/Yellow/Red) and does not reflect the communications status with the new Accounting Server. The communications status with the new Accounting Server will be reflected in subsequent traps, if a state change occurs.
Syntax	atmacctASCommsStateChange TRAP-TYPE ENTERPRISE cascatm VARIABLES { atmacctASControl, atmacctASAddressPri, atmacctASAddressSec, atmacctASCommsState, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION “This trap indicates that the state of communications to the ATM Accounting Server has changed.” ::= 115

Event	**The state of communications to the FR accounting system has changed to [Green/Yellow/Red]. The current Switch Level Accounting Server Control is [Primary/Seconday] (Primary Accounting Server=IPAddr, Secondary Accounting Server=IPAddr)**
Description	This Accounting Server communication state trap is generated when the Accounting Server Control is changed between active and reserve. When the Accounting Server control has changed, the server state indicated in the trap represents the current state of the accounting system (Green/Yellow/Red) and does not reflect the communications status with the new Accounting Server. The communications status with the new Accounting Server will be reflected in subsequent traps, if a state change occurs.
Syntax	fracctASCommsStateChange TRAP-TYPE ENTERPRISE cascfr VARIABLES { fracctASControl, fracctASAddressPri, fracctASAddressSec, fracctASCommsState, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "This trap indicates that the state of communications to the FR Accounting Server has changed." ::= 137

Anomalous Events

This section lists the trap event messages that signify an anomalous event has occurred within the accounting system. Preventative measures or resolutions to these events are also provided. If any of these events appear on the NavisCore Events screen, you should also display the /CascadeAS/data/logs/ASerror.log file on the Accounting Server, as this file contains information that will be helpful in diagnosing the cause of the anomalous event.

Event	**Switch to ATM Accounting Server (AS) communication has failed (Primary AS Address = [ip addr], Secondary AS Address = [ip addr], Accounting Switch Control = [ip addr]) A usage file transfer has failed to complete. [number of comm failures] AS communication failures have occurred during the day.**
Description	A node-type trap issued by the switch when the switch cannot communicate with the indicated Accounting Server (either a connection cannot be made to the Accounting Server, or an existing connection fails). It indicates that the switch is unable to upload its current accounting data to the Accounting Server.
Possible Cause	If a switch cannot send its data to the Accounting Server when the transfer time arrives (every 5 minutes), the state of communications with the Accounting Server enters a Yellow state. When this occurs, the data must be stored on the switch's hard disk. If the hard disk fills, and communication with the Accounting Server has not been re-established, the communications state enter a Red state.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	atmacctSwAPCommsFailure TRAP-TYPE ENTERPRISE cascatm VARIABLES { atmacctASAddressPri, atmacctASAddressSec, atmacctASControl, atmacctSwASCommsFailures, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that switch to ATM Accounting Server communication has failed and that a usage file transfer has failed to complete." ::= 104

Event	**Switch to Frame Relay Accounting Server (AS) communication has failed (Primary AS Address = [ip addr], Secondary AS Address = [ip addr], Accounting Switch Control = [ip addr]). A usage file transfer has failed to complete. [number of comm failures] AS communication failures have occurred during the day.**
Description	A node-type trap issued by the switch when the switch cannot communicate with the indicated Accounting Server (either a connection cannot be made to the Accounting Server, or an existing connection fails). It indicates that the switch is unable to upload its current accounting data to the Accounting Server.
Possible Cause	If a switch cannot send its data to the Accounting Server when the transfer time arrives (every 5 minutes), the state of communications with the Accounting Server enters a Yellow state. When this occurs, the data must be stored on the switch's hard disk. If the hard disk fill, and communication with the Accounting Server has not been re-established, the communications state enter a Red state.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	fracctSwASCommsFailure TRAP-TYPE ENTERPRISE cascfr VARIABLES {fracctASAddressPri, fracctASAddressSec, fracctASControl, fracctSwASCommsFailures, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that switch to FR Accounting Server communication has failed and that a usage file transfer has failed to complete." ::= 133

Event	**An ATM usage record could not be created. [number of] usage records could not be created during current day.**
Description	A node-type trap signifying that the switch could not create one or more call records, and the accounting information is being discarded. The generation rate of this message is controlled such that only one of these traps is generated per Update Interval.
Possible Cause	This should occur only when the secondary store has reached capacity, and the primary store has not been transferred to the Accounting Server (possibly due to a communication failure with the Accounting Server). This trap is not generated when the system is in a “normal” state.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	atmacctUsageRecCrFailed TRAP-TYPE ENTERPRISE cascatm VARIABLES {atmacctUsageRecCrFailures, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION “Notification that an ATM usage record could not be created.” ::= 105

Event	**An Frame Relay usage record could not be created. [number of] usage records could not be created during current day.**
Description	A node-type trap signifying that the switch could not create one or more call records, and the accounting information is being discarded. The generation rate of this message is controlled such that only one of these traps is generated per Update Interval.
Possible Cause	This should occur only when the secondary store has reached capacity, and the primary store has not been transferred to the Accounting Server (possibly due to a communication failure with the Accounting Server). This trap is not generated when the system is in a “normal” state.

Event	**An Frame Relay usage record could not be created. [number of] usage records could not be created during current day.**
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	fracctUsageRecCrFailed TRAP-TYPE ENTERPRISE cascfr VARIABLES {fracctUsageRecCrFailures, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that a FR usage record could not be created." ::= 134

Event	**The operational state of the ATM accounting system has changed to [active|inactive]. The current Switch Level Accounting Control is [enabled|disabled].**
Description	A node-type trap signifying that the switch has changed its operational status for Accounting.
Possible Cause	This should occur only if the switch has failed to communicate with the accounting server. This trap is not generated when the system is in a "normal" state.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.

Event	**The operational state of the ATM accounting system has changed to [active|inactive]. The current Switch Level Accounting Control is [enabled|disabled].**
Syntax	atmacctOperStateChange TRAP-TYPE ENTERPRISE cascatm VARIABLES {atmacctControl, atmacctOperState, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that the operational state of the ATM accounting system on the switch has changed. This trap is generated upon entering the non-operational state due to critical failure of communications to the ATM Accounting Server. It is also generated upon recovery of this critical condition. This trap is not generated upon change of the atmacctOperState object in conjunction with an operator change of the atmacctControl object." ::= 112

Event	**The operational state of the Frame Relay accounting system has changed to [active|inactive]. The current Switch Level Accounting Control is [enabled|disabled].**
Description	A node-type trap signifying that the switch has changed its operational status for Accounting.
Possible Cause	This should occur only if the switch has failed to communicate with the accounting server. This trap is not generated when the system is in a "normal" state.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.

Event	**The operational state of the Frame Relay accounting system has changed to [active|inactive]. The current Switch Level Accounting Control is [enabled|disabled].**
Syntax	fracctOperStateChange TRAP-TYPE ENTERPRISE cascfr VARIABLES {fracctControl, fracctOperState, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "Notification that the operational state of the FR accounting system on the switch has changed. This trap is generated upon entering the non-operational state due to critical failure of communications to the FR Accounting Server. It is also generated upon recovery of this critical condition. This trap is not generated upon change of the fracctOperState object in conjunction with an operator change of the fracctControl object." ::= 136

Event	**ATM Accounting Server [Switch IP] has had a switchover.**
Description	The Accounting Server has changed its communications path to another server.
Possible Cause	This will occur when there was a communications failure with the active Accounting server. It indicates that the switch has automatically corrected the problem by transferring billing data to the alternate Accounting Server.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	atmacctASwitchOver TRAP-TYPE ENTERPRISE cascatm VARIABLES {atmacctASAddress, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "This trap is generated when the switch automatically changes the Accounting Server it is sending ATM billing data as a result of a communication failure with the current Accounting Server." ::= 154

Event	**Frame Relay Accounting Server [Switch IP] has had a switchover.**
Description	The Accounting Server has changed its communications path to another server.
Possible Cause	This will occur when there was a communications failure with the active Accounting server. It indicates that the switch has automatically corrected the problem by transferring billing data to the alternate Accounting Server.
Corrective Action	Check the Accounting Server to see if it is on-line; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.
Syntax	fracctASwitchOver TRAP-TYPE ENTERPRISE cascfr VARIABLES {fracctASAddress, nodeTrapSeverity, nodeTrapSequenceNumber } DESCRIPTION "This trap is generated when the switch automatically changes the Accounting Server it is sending Frame Relay billing data as a result of a communication failure with the current Accounting Server." ::= 155

Event	**Accounting Server disk space for [AS IP] has exceeded [1-100%] percent of capacity (Severity: [CRITICAL|MAJOR|MINOR]). The disk percentage used on this filesystem is [1-100%].**
Description	A major node-type trap indicating that a configured disk space threshold for the indicated file system or directory has been exceeded. See "File System Capacity Monitoring" on page 4-12 or page 4-41 for more information on file system thresholds.
Possible Cause	This will occur when there was a communications failure with the active Accounting server. It indicates that the switch has automatically corrected the problem by transferring billing data to the alternate Accounting Server.
Corrective Action	Examine the capacity of the indicated file system and the rate of accounting data being generated to determine if the capacity of the files system should be increased. If so, allocate more disk space for the indicated file system.

Event	**Accounting Server disk space for [AS IP] has exceeded [1-100%] percent of capacity (Severity: [CRITICAL|MAJOR|MINOR]). The disk percentage used on this filesystem is [1-100%].**
Syntax	diskSpaceThresholdExceeded TRAP-TYPE ENTERPRISE acctserver VARIABLES {diskDirectory, diskPercentageUsed, thresholdValue, thresholdSeverity } DESCRIPTION "This trap indicates the disk space threshold of the indicated file system has been surpassed." ::= 3

Event	**Accounting Server disk space for [disk] has been reduced to [0-100] percent of capacity (Severity: MAJOR|MINOR).**
Description	A major node-type trap indicating that the disk space percentage in use for the specified directory or file system is no longer over the threshold value.
Corrective Action	None.
Syntax	diskSpaceChanged TRAP-TYPE ENTERPRISE acctserver VARIABLES {diskDirectory, diskSeverity, diskPercentageUsed } DESCRIPTION "This trap is sent when the disk space percentage used on a disk is no longer over the threshold value. The severity level reported in the trap corresponds to the threshold level that was exited." ::= 4

Event	**The Accounting Server failed to transfer one or more AMA files to the BOS.**
Description	A major node-type trap that is sent when the Accounting Server has failed to transfer one or more accounting (AMA) files to the billing operations server, which is the upstream system to which formatted accounting data (e.g. Bellcore BAF records) is transferred.

Event	**The Accounting Server failed to transfer one or more AMA files to the BOS.**
Corrective Action	Verify that the Accounting Server AMA File Transfer Configuration parameters are set correctly on the Accounting Server (See "Accounting AMA File Transfer Configuration" on page 4-9 or page 4-37 for information on file transfer configuration). Also, verify that the Accounting Server is able to communicate with the Billing Operations Sever.
Syntax	amaFileTransferFailure TRAP-TYPE ENTERPRISE acctserver VARIABLES {diskDirectory, diskSeverity, diskPercentageUsed } DESCRIPTION "This trap is sent when the Accounting Server has failed to transfer one or more accounting files to the billing operations server (BOS), i.e., the upstream system to which formatted accounting data (e.g., Bellcore BAF records) is transferred." ::= 6

Event	**Accounting Server switch over has occurred. Accounting Server at [IP] has taken over processing for [switch].**
Description	A reserve Accounting Server has taken over processing for switches because of a general failure in an active Accounting Server.
Corrective Action	Follow the procedure in "Scenario 1: Unexpected Primary Server Failure" on page 7-26.
Syntax	acctServerTakeover TRAP-TYPE ENTERPRISE acctserver VARIABLES {diskDirectory, diskSeverity, diskPercentageUsed } DESCRIPTION "This trap is sent when the Accounting Server takes over for a failed Accounting Server." ::= 7

Event	**Unconfigured Accounting Server. [IP]**
Description	An Accounting Server that doesn't exist in the configuration is trying to run.
Corrective Action	Use configAS to add the accounting server to the accounting system.
Syntax	acctServerNotConfigured TRAP-TYPE ENTERPRISE acctserver DESCRIPTION "This trap is sent when an unconfigured Accounting Server is trying to use the accounting system's agent." ::= 8

A

Record Formats

The Data Formatting component of the accounting system formats usage records into one of three different formats, as determined by your configuration of the system during the Accounting Server installation:

Standard Bellcore AMA Format (BAF) — Usage data is formatted according to the Bellcore standard defined in GR-1110-CORE, then stored in one or more standard AMA files, according to the Bellcore standard AMA file format defined in TR-NWT-000508 and Appendix C of GR-1343-CORE (AMADNS). A standard AMA file contains BAF records from a single switch.

Extended BAF — Extended BAF files are formatted in the same way as standard BAF, but contain additional information relating to Ascend's proprietary extensions. An extended AMA file contains extended BAF records from a single switch.

Comma-delimited ASCII format — Usage data is formatted into ASCII, then stored in one or more ASCII files. A comma-delimited ASCII file contains usage data records from a single switch.

Each of these file formats is defined in this appendix. There are two file layouts for each format: one for SVC usage data files, and one for PVC usage data files.

PVC Standard BAF Structure for ATM

PVC usage records are formatted into BAF Structure 0216, with the appropriate Call Type as provisioned for the PVC. BAF Structure 0216 is shown in Table A-1. The modules associated with the structure are shown in Table A-2. See GR-1110-CORE for more information on the Structure 0216 tables and modules.

PVC Call Types are as follows, providing you did not change them during the Accounting Server installation:

- Intranetwork PVC usage data is recorded as Call Type 609
- Internetwork PVC usage data is recorded as Call Type 608

Table A-1. BAF Structure 0216

Table Name	Table Number	Number of BCD Characters	Byte Offset
Record Descriptor Word	000	-	-
Hexadecimal Identifier	00	2	0
Structure Code	0	6	1
Call Type	1	4	4
Sensor Type[ab]	2	4	6
Sensor Identification[ab]	3	8	8
Recording Office Type[bc]	4	4	12
Recording Office Identification[bc]	5	8	14
Interval Start Date	6	6	18
Study Indicator	8	8	21
Interval Start Time	18	8	25
Interval Elapsed Time	19	10	29
Recording Interval Information	446	2	34
Service and Interface Types	469	12	35
Significant Digits in Next Field	55	4	41
Recording Interface Identifier	126	16	43
Recording Connection Identifier	468	12	51
Significant Digits in Next Field	55	4	57
Remote Interface Identifier	126	16	59
Remote Connection Identifier	468	12	67

Table A-1. BAF Structure 0216 (Continued)

Table Name	Table Number	Number of BCD Characters	Byte Offset
Count Validity Check	467	2	73
Ingress Cell Count	479	16	74
Egress Cell Count	479	16	82
Total Characters:		180	
Total Length of Record in Bytes (without modules)			90

a. These items uniquely identify the switch that generated the data.

b. These fields can be suppressed (excluded) by enabling four-field suppression (see "AMA Four-Field Suppression" on page 4-5).

c. These items uniquely identify the Accounting Server that processed the data.

Table A-2. Structure 0216 Modules

Module Name	Module Number
Egress Cell Counts	145
Carrier Identifier	146
Transit Carrier Identifier	146
One ATM Traffic Parameter	141
Two ATM Traffic Parameters	142
Three ATM Traffic Parameters	148
Chargeable Party Identifier	611
Point-to-Multipoint Information	897
Circuit Correlation Identifier	898
Interface Identifier Module	899

SVC Standard BAF Structure

SVC usage records are formatted into BAF Structure 0214 with the appropriate Call Type. BAF Structure 0214 is shown in Table A-3. The modules associated with the structure are shown in Table A-4. See GR-1110-CORE for more information on the Structure 0214 tables and modules.

Default SVC Call Types are as follows, providing you did not change them during the Accounting Server installation:

- Intranetwork point-to-point terminating SVC usage data is recorded as Call Type 619
- Intranetwork point-to-point originating SVC usage data is recorded as Call Type 610
- Intranetwork point-to-multipoint terminating leaf SVC usage data is recorded as Call Type 913
- Intranetwork point-to-multipoint originating root SVC usage data is recorded as Call Type 912
- Internetwork originating UNI SVC usage data is recorded as Call Type 611
- Internetwork originating NNI SVC usage data is recorded as Call Type 612
- Internetwork terminating UNI SVC usage data is recorded as Call Type 914
- Internetwork terminating NNI SVC usage data is recorded as Call Type 613

Table A-3. BAF Structure 0214

Table Name	Table No.	Number of BCD Chars.	Byte Offset
Record Descriptor Word	000	-	-
Hexadecimal Identifier	00	2	0
Structure Code	0	6	1
Call Type	1	4	4
Sensor Type[ab]	2	4	6
Sensor Identification[ab]	3	8	8
Recording Office Type[bc]	4	4	12
Recording Office Identification[bc]	5	8	14

Table A-3. BAF Structure 0214 (Continued)

Table Name	Table No.	Number of BCD Chars.	Byte Offset
Connect Date	6	6	18
Timing Indicator	7	6	21
Study Indicator	8	8	24
Calling Party Off-Hook Indicator	9	2	28
Calling Party Number Country Code or DNIC	165	6	29
Calling Party Number Significant Digits in Next Field	55	4	32
Calling Party E.164 Number	126	16	34
Terminating Party Number Country Code or DNIC	165	6	42
Terminating Party Number Significant Digits in Next Field	55	4	45
Terminating Party E.164 Number	126	16	47
Connect Time	18	8	55
Elapsed Time	19	10	59
Time Zone	166	4	64
Release Cause Indicator	411	6	66
Broadband Bearer Capabilities	167	16	69
Quality of Service	224	8	77
Forward Peak Cell Rate (CLP=0+1)	225	10	81
Backward Peak Cell Rate (CLP=0+1)	225	10	86
Total Characters:		182	
Total Length of Record in Bytes (without modules):			91

a. These items uniquely identify the switch that generated the data.

b. These fields can be suppressed (excluded) by enabling four-field suppression (see "AMA Four-Field Suppression" on page 4-5).

c. These items uniquely identify the Accounting Server that processed the data.

Table A-4. Structure 0214 Modules

Module Name	Module Number
Long Duration Connection	022
One ATM Traffic Parameter	141
Two ATM Traffic Parameters	142
ATM Address Format	143
ATM Rate Periods	144
Calling Party Subaddress	611
Called Party Subaddress	611
Point-to-Multipoint Information	897
Circuit Correlation Identifier	898
Interface Identifier Module	899

Ascend BAF Extensions

Ascend has defined a set of AMA modules that are used to extend the information provided in PVC and SVC BAF records. The extensions are proprietary to Ascend, and have been assembled from standard BAF tables.

When included in the BAF records:

- The modules will always be the last modules in the record, followed by the Final Module (000).
- For SVC records, the order of the modules will always be the Call Correlation Identifier, followed by the Interface Identifier module.

The Circuit Correlation Identifier Module

The Call Correlation Identifier module is included in PVC and SVC BAF records. The module provides a network-wide unique identifier which can be used to correlate the two ends of a PVC circuit or SVC call. Ascend has defined this module in response to the lack of a standard Circuit Correlation Identifier in the Bellcore GR-1110-CORE requirements.

The Circuit Correlation Identifier is an unsigned 32-bit integer that is generated at the originating node of an SVC call. When the call is first set up, the originating node propagates the CCI to the terminating node, at which point both the originating and terminating node maintain the CCI for the life of the call.

The Circuit Correlation Identifier module has been assigned Module Code 898.

Table A-5. Module 898 Circuit Correlation Identifier Module

Information	Table Number	Number of BCD Characters	Byte Offset
Module Code Identification	88	4	0
Reference Switch Identifier	803	6	2
Reference Logical Port Identifier	803	6	5
Reference Connection Identifier	806	12	8
Circuit Correlation Number	806	12	14
Total Characters:		40	
Total Number of Bytes:			20

Table A-6. Table 88 Module Code

Chars.	Meaning	Value
1-3	Module Code	The 3-digit module code that identifies this module (898)
4	SIGN	0xC

Table A-7. Table 803 Reference Switch Identifier

Chars.	Meaning	Value
1-5	Reference Switch Identifier	The lower two bytes of the IP address (c.d of a.b.c.d) that has been identified as the originating switch (for SVCs) or the root of the PVC (as assigned by NavisCore).
6	SIGN	0xC

Table A-8. Table 803 Reference Logical Port Number

Chars.	Meaning	Value
1-5	Reference Lport	The logical port number (lportIfIndex) on which the circuit terminates at the originating switch (for SVCs) or the root of the PVC (as assigned by NavisCore).
6	SIGN	0xC

Table A-9. Table 806 Reference Connection Identifier

Chars.	Meaning	Value
1-11	Reference Connection ID	The VPI/VCI, reported as an unsigned integer, for the end of the circuit that terminates at the originating switch (for SVCs) or the root of the PVC (as assigned by NavisCore).
12	SIGN	0xC

Table A-10. Table 806 Reference Connection Identifier

Chars.	Meaning	Value
1-11	CCN	The Circuit Correlation Identifier (unsigned 32-bit integer) assigned to the circuit. For SVCs, this is a monotonically-increasing number generated at the originating IOM. For PVCs, this is the time (in seconds since January 1, 1970) that the circuit was provisioned.
12	SIGN	0xC

The Interface Identifier Module

The Interface Identifier Module is included in PVC and SVC BAF records. This module provides port- and slot-identifying information specific to Ascend switches, which is not defined in the Bellcore standards. Standard Bellcore BAF Structure 0214 does not include information that can be used to identify the port on each switch where the circuit terminates. The information provided by the module, which includes the logical port numbers where the circuit terminates, is used to simplify correlation to the configuration information stored in the NavisCore database and to identify the ports where the circuit terminates.

The Interface Identifier Module has been assigned Module Code 899.

Table A-11. Module 899 Interface Identifier Module

Information	Table Number	Number of BCD Characters	Byte Offset
Module Code Identification	88	4	0
Local Slot Number	802	4	2
Local Physical Slot Number	802	4	4
Local Logical Port Identifier	803	6	6
Remote Logical Port Identifier	803	6	9
Total BCD Characters:		24	
Total Number of Bytes:			12

Table A-12. Table 88 Module Code

Chars.	Meaning	Value
1-3	Module Code	The 3-digit module code that identifies this module (899)
4	SIGN	0xC

Table A-13. Table 802 Local Slot Number

Chars.	Meaning	Value
1-3	Slot Number	The slot number containing the port where the SVC terminates.
4	SIGN	0xC

Table A-14. Table 802 Local Physical Port Number

Chars.	Meaning	Value
1-3	Pport Number	The physical port number (ifIndex) where the SVC terminates on the local switch.
4	SIGN	0xC

Table A-15. Table 803 Local Logical Port Number

Chars.	Meaning	Value
1-5	Local Lport	The logical port number (lportIfIndex) where the SVC terminates on the local switch.
6	SIGN	0xC

Table A-16. Table 803 Remote Logical Port Number

Chars.	Meaning	Value
1-5	Digits	The logical port number (lportIfIndex) of the remote switch's logical port on which the other end of the SVC terminates.
6	SIGN	0xC

The Point-to-Multipoint Information Module

The Point-to-Multipoint Information Module is appended to the end of Point-to-Multipoint SVC and PVC records. This module is currently proposed in GR-1110-CORE (Section 10.4.2.1, Requirements 10-257 and 10-258). A count of the number of leaves dropped has been added to this module.

The Module Identification Code 897 has been assigned to this module.

Table A-17. Module 897 Point-to-Multipoint Information Module

Information	Table Number	Number of BCD Characters	Byte Offset
Module Code Identification	88	4	0
Carrier Network Identifier	488	8	2
Leaves Attempted	803	6	6
Leaves Added	803	6	9
Leaves Dropped (Deleted)	803	6	12
Total BCD Characters:		30	
Total Number of Bytes:			15

Table A-18. Table 88 Module Code

Chars.	Meaning	Value
1-3	Module Code	The 3-digit module code that identifies this module (897)
4	SIGN	0xC

Table A-19. Table 488 Carrier/Network Identifier

Chars.	Meaning	Value
1	Administrative Domain	1 = Locally defined
2-7	Network Number	The 5-digit Carrier Identifier that has been provisioned for the UNI.
8	SIGN	0xC

Table A-20. Table 803 Leaves Attempted

Chars.	Meaning	Value
1-5	Leaves Attempted	The number of attempts made to add a leaf to the connection since the start of the connection. Range of values is 0-99999.
6	SIGN	0xC

Table A-21. Table 803 Leaves Added

Chars.	Meaning	Value
1-5	Leaves Added	The number of leaves added to the connection since the start of the connection. Range of values is 0-99999.
6	SIGN	0xC

Table A-22. Table 803 Leaves Dropped

Chars.	Meaning	Value
1-5	Leaves Dropped	The number of leaves dropped from the connection since the start of the connection. Range of values is 0-99999.
6	SIGN	0xC

Ascend Additions to Bellcore Tables

This section contains information on Ascend-specific exceptions to Bellcore's standard tables and modules. The following Bellcore tables and modules have been modified to support Ascend features:

- Table 485 – ATM Number Identify
- Table 166 – Time Zone
- Table 7 – Timing Indicator
- Table 9 – Called Party Off-Hook Indicator
- Table 411 – Release Cause Indicator
- Table 240 – Traffic Indicators

- Module 144 – ATM Rate Periods (related: Table 487 – Rate Period Indicator)

Table 485 ATM Number Identify

This table identifies the type of ATM End System Address that is being reported in the module. Ascend has added values 5 and 6 to support private ATM addresses.

Table A-23. Table 485 ATM Number Identify

Chars.	Meaning	Value
1	Number Identify	1 = Calling Party 2 = Called Party 3 = Calling Party Subaddress 4 = Called Party Subaddress 5 = Default Address[a] 6 = Invalid Calling Party[a]
2-3	Authority and Format Identifier	This is the AFI field from the address.
4	SIGN	0xC

a. Non-standard Ascend addition; used only when the address is a private ATM address.

Table 166 Time Zone

This table identifies the time zone source and the time zone for ATM SVCs.

Ascend switches are not configured with time zone information. The time-of-day on all Ascend switches reports Universal Coordinated Time (UTC/GMT). The Accounting Server reports the following values:

- The value of 1 is always reported in the Timezone Source field.
- The value of 1, corresponding to the timezone of UTC, is always reported in the Timezone field.

Table A-24. Table 166 Time Zone

Chars.	Meaning	Value
1	Timezone Source	1 = The time zone of the BSS switch is reported 2 = The subscriber's time zone is reported, i.e., the time zone of the ATM UNI port

Table A-24. Table 166 Time Zone (Continued)

Chars.	Meaning	Value
2-3	Timezone	1 = Universal Coordinated Time (UTC/GMT) 4 = Atlantic 5 = Eastern 6 = Central 7 = Mountain 8 = Pacific 9 = Alaska 10 = Hawaiian-Aleutian
4	SIGN	0xC

Table 7 Timing Indicator

This table contains three flags and indicators related to special timing and service capability conditions that can occur for circuit-switched calls. If none of the special conditions applies to a call, Characters 1-5 are zero.

The Accounting Server uses this table to mark the state of long-duration SVC calls and to indicate if the Connect Time of the call is in doubt.

Table A-25. Table 7 Timing Indicator

Chars.	Meaning	Value
1	Timing Guard Flag	0 = Default Value 2 = Timing guard condition exists (a timing guard condition exists when the connect time or disconnect time of the SVC being reported is in doubt)
2	Short Called Party Off-Hook Indicator[a]	0 = Default Value 1 = Short called party off-hook detected
3	Long Duration/Service Party Capability Indicator	0 = Default Value 1 = Start of long duration call (Activation) 2 = Continuation of long duration call (Continuation) 3 = Service capability status of Deactivation
4	–	0
5	–	0
6	SIGN	0xC

a. This value is always reported as zero.

Timing Indicator

The Timing Indicator is populated as indicated by the usage measurement functionality according to Bellcore GR-1100-CORE with the restriction that Character 2 is always zero.

Timing Guard Flag

The Timing Guard Flag is populated with a value of 2 in the BAF record for an ATM SVC if the connect time, disconnect time, or elapsed time is questionable. Zero is reported if the values are not in doubt. See Bellcore GR-1110-CORE R10-299 and R10-300 for guidance on how to determine the connect time or disconnect time when this condition exists.

Recording of Long Duration Indicator

By default, the Accounting Server sets the Long Duration Indicator as defined in Bellcore GR-1110-CORE:

- The LD/SPC indicator is set to 1 in the first record of a long duration call (see R10-230 in GR-1110-CORE).
- The LD/SPC indicator is set to 2 in the second and succeeding records of a long duration call (that is, in all records after the first continuation record was generated).
- The LD/SPC indicator is set to 3 when a long duration call completes after a continuation record has been generated.

Table 9 Called Party Off-Hook Indicator

The Accounting Server always sets the value of Called Party Off-Hook Indicator to 1 (Called Party off-hook not detected).

Table 411 Release Cause Indicator

This field indicates the termination cause value of the SVC call being reported.

The Accounting Server always reports standard Cause Indications, as defined in the ITU/ATM Forum UNI Signalling specifications. Therefore, the Accounting Server always records a value of zero in the Cause Category field.

Table A-26. Table 411 Release Cause Indicator

Chars.	Meaning	Value
1		Always 0
2	Cause Category	0 = ITU Standard 1 = National 2 = Network Specific
3-5	Cause Indication	ITU Standard Release Cause Value (see Table A-35 on page A-41)
6	SIGN	0xC

Table 241 Traffic Parameter

Ascend has added Parameter Type 9 to this table to account for the Minimum Cell Rate (MCR) traffic parameter.

Table A-27. Table 241 Traffic Parameter

Chars.	Meaning	Value
1	Parameter Type	1 = Peak Cell Rate 2 = Sustainable Cell Rate 3 = Maximum Burst Size 4 = QoS Class 9 = Minimum Cell Rate (MCR)[a]
2-9	Traffic Parameter Value	The decimal representation of the specified ATM Traffic Parameter value. The traffic parameter value is right-justified and unused characters are populated with zeros. Possible values are in the range 0-16,777,216 cells.
10	SIGN	0xC

a. The value for MCR is not defined in GR-1100-CORE. This is a non-standard value.

Module 144 ATM Rate Periods

This module is used for one or more ATM Rate Periods being reported for the SVC. The rate period corresponding to the cell counts is identified by the Rate Period Indicator table (Table 487).

The accounting system currently supports only a single Rate Period.

Table 487 identifies the Rate Period corresponding to the cell counts for ATM SVCs. Until the accounting system supports more than one Rate Period, the value of the Rate Period field is always 1.

Table A-28. Table 487 Rate Period Indicator

Chars.	Meaning	Value
1	Rate Period	1 = Rate Period 1 2 = Rate Period 2 3 = Rate Period 3 4 = Rate Period 4 5 = Rate Period 5 6 = Rate Period 6
2	SIGN	0xC

ATM SVC ASCII File Structure

The ASCII file structure for ATM SVC usage records is listed below. A description of each of the fields in this file follows in Table A-29.

Each ATM SVC ASCII record terminates with a carriage return followed by a NULL ("\0") character.

```
VerNum,
Type,
SwitchID,
IomNum,
Lport,
Pport,
RecordingConnectionVPI,
RecordingConnectionVCI,
Bcci,
Timestamp,
Timestamp100,
CauseValue,
StudyInd,
SPvcInd,
OriginatingNodeInd,
FwdBEInd,
BwdBEInd,
DefaultAddrUsage,
CgSubAddrInd,
CdSubAddressInd,
ConnectTimeValidInd,
ConnectTime,
ConnectTime100,
```

```
IntervalTime,
IntervalTime100,
BearerClass,
TrafficType,
Timing,
ClippingInd,
PointToMultiPointInd,
FwdQos,
FwdTaggingInd,
FwdTDBaseInd,
FwdTrafficParam1,
FwdTrafficParam2,
FwdTrafficParam3,
BwdQos,
BwdTaggingInd,
BwdTDBaseType,
BwdTrafficParam1,
BwdTrafficParam2,
BwdTrafficParam3,
PrimOrigAddrNumPlan,
PrimOrigAddNumDigits,
PrimOrigAddrType,
PrimOrigAddr,
SecOrigAddrNumPlan,
SecOrigAddNumDigits,
SecOrigAddrType,
SecOrigAddr,
RecordingIFType,
RemoteIFType,
RemoteNodeId,
RemoteLPort,
RemoteConnectionVPI,
RemoteConnectionVCI,
TermAddrNumPlan,
TermAddNumDigits,
TermAddrType,
TermAddr,
CgSubAddrNumPlan,
CgSubAddNumDigits,
CgSubAddrType,
CgSubAddr,
CdSubAddrNumPlan,
CdSubAddNumDigits,
CdSubAddrType,
CdSubAddr,
LegsAdded,
LegsDeleted,
LegsFailed,
```

```
FwdTotalCLP01,
FwdTotalCLP0,
BwdTotalCLP01,
BwdTotalCLP0
```

Table A-29. SVC ASCII Call File Field Descriptions

Field Name	Description
VerNum	The version number of the record format.
Type	Call record type: 0 = Not used 1 = ATM PVC 2 = ATM SVC 3 = FR PVC 4 = FR SVC
SwitchID	The IP address of the switch from which this data was received.
IomNum	The slot number of the IOM from which this data was retrieved.
Lport	The logical port to which this data applies.
Pport	The physical port to which this data applies.
RecordingConnectionVPI, Recording ConnectionVCI	The VPI/VCI for the recording end of the circuit.
Bcci	The Billing Call Correlation Identifier (unsigned 32-bit integer) assigned to the circuit. For SVCs, the identifier is a monotonically-increasing number generated at the originating IOM. For PVCs, the identifier is the time (in seconds since January 1, 1970) at which the circuit was provisioned.
Timestamp	Represents the time (in seconds since January 1, 1970) at which the current set of counts were generated by the switch. To determine the elapsed time of a call, subtract the Connect Time value from the Timestamp value.
Timestamp100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
CauseValue	Indicates why the circuit was terminated. See Table A-35 for information on possible values and their meaning.
StudyInd	Indicates whether or not this record is for study: 0 = Not marked for study 1 = Marked for study

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
SPvcInd	Indicates whether this is a normal SVC, or an SVC connected to a PVC: 0 = Normal SVC 1 = SVC connected to PVC
OriginatingNodeInd	Indicates whether or not this record applies to the originating node: 0 = Not Originating Node 1 = Originating Node
FwdBEInd	Indicates whether or not the Best Effort traffic parameter has been requested for forward traffic on this circuit: 0 = Not Requested 1 = Requested
BwdBEInd	Indicates whether or not the Best Effort traffic parameter has been requested for backward traffic on this circuit: 0 = Not Requested 1 = Requested
DefaultAddrUsage	Indicates whether or not the Default Accounting Address is the same as the Calling Party Address: 0 = Not used 1 = Same 2 = Different 3 = Failed call screening 4 = No address provided 5 = No call screening performed
CgSubAddrInd	Indicates whether or not the Calling Party Subaddress is being requested: 0 = Not requested 1 = Requested
CdSubAddressInd	Indicates whether or not the Called Party Subaddress is being requested: 0 = Not requested 1 = Requested
ConnectTimeValidInd	Indicates whether or not the Connect Time specified in the next two fields is valid: 0 = Valid 1 = Not valid
ConnectTime	Represents the time (in seconds since January 1, 1970) at which the current record was established on the switch.
ConnectTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
IntervalTime	Represents the time (in seconds since January 1, 1970) at which the previous record generated on the switch. To determine the elapsed time of a call, subtract the IntervalTime value from the Timestamp value.
IntervalTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
BearerClass	The Broadband Bearer Class: 0 = Bearer Class unknown 1 = BCOB-A 2 = BCOB-C 3 = BCOB-X
TrafficType	The traffic type for the circuit: 0 = Not specified 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate (VBR) 3 = Unknown traffic type
Timing	Indicates whether or not end-to-end timing was required for the circuit: 0 = Not specified 1 = End-to-end timing required 2 = End-to-end timing not required 3 = Unknown
ClippingInd	Indicates whether or not traffic on this circuit was susceptible to clipping: 1 = Not susceptible to clipping 2 = Susceptible to clipping
PointToMultiPointInd	Indicates whether the circuit is point-to-point or point-to-multipoint: 1 = Point-to-point 2 = Point-to-multipoint
FwdQos	The Quality of Service setting for forward traffic on this circuit: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
FwdTaggingInd	Indicates whether or not Tagging was requested for forward traffic on this circuit: 1 = Not requested 2 = Requested

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
FwdTDBaseInd	The traffic descriptor base type for forward traffic on this circuit: 0 = Unknown 1 = CLPNOSCR 2 = CLPSCR 3 = NOCLPNOSCR 4 = NOCLPSCR 5 = NOCLPNOSCRMCR
FwdTrafficParam1	The total cell count for Forward Traffic Parameter 1. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies is always PCR=0+1 regardless of the setting for traffic descriptor base type.
FwdTrafficParam2	The total cell count for Forward Traffic Parameter 2. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-30 on page A-25).
FwdTrafficParam3	The total cell count for Forward Traffic Parameter 3. This value may be in the range of 0 to 16,277,216 cells.The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-30 on page A-25).
BwdQos	The Quality of Service setting for backward traffic on this circuit: 0 = Unknown 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
BwdTaggingInd	Indicates whether or not Tagging was requested for backward traffic on this circuit: 1 = Not requested 2 = Requested
BwdTDBaseType	The traffic descriptor base type for backward traffic on this circuit: 0 = Unknown 1 = CLPNOSCR 2 = CLPSCR 3 = NOCLPNOSCR 4 = NOCLPSCR 5 = NOCLPNOSCRMCR
BwdTrafficParam1	The total cell count for Backward Traffic Parameter 1. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies is always PCR=0+1 regardless of the setting for traffic descriptor base type.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
BwdTrafficParam2	The total cell count for Backward Traffic Parameter 2. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-30 on page A-25).
BwdTrafficParam3	The total cell count for Backward Traffic Parameter 3. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-30 on page A-25).
PrimOrigAddrNumPlan	The numbering plan for the primary originating address: 0 = Unknown 1 = Native E.164 2 = AESA
PrimOrigAddNumDigits	The number of digits in the primary originating address.
PrimOrigAddrType	The address type of the primary originating address: 0 = Unknown 1 = International
PrimOrigAddr	The primary originating address for this circuit.
SecOrigAddrNumPlan	The numbering plan for the secondary originating address: 0 = Unknown 1 = Native E.164 2 = AESA
SecOrigAddNumDigits	The number of digits in the secondary originating address.
SecOrigAddrType	The address type of the secondary originating address: 0 = Unknown 1 = International
SecOrigAddr	The secondary originating address for this circuit.
RecordingIFType	The recording interface type: 1 = Network-to-End User 2 = Network-to-Network
RemoteIFType	The remote interface type: 1 = Network-to-End User 2 = Network-to-Network
RemoteNodeId	The last two bytes of the IP address of the remote node.
RemoteLPort	The logical port number for the logical port at the remote end of the circuit.
RemoteConnectionVPI	The VPI for the remote end of the circuit.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
RemoteConnectionVCI	The VCI for the remote end of the circuit.
TermAddrNumPlan	The numbering plan for the terminating address: 0 = Unknown 1 = Native E.164 2 = AESA
TermAddNumDigits	The number of digits in the terminating address.
TermAddrType	The address type of the terminating address: 0 = Unknown 1 = International
TermAddr	The terminating address for this circuit.
CgSubAddrNumPlan	The numbering plan for the calling party subaddress: 0 = Unknown 1 = Native E.164 2 = AESA
CgSubAddNumDigits	The number of digits in the calling party subaddress.
CgSubAddrType	The address type of the calling party subaddress: 0 = Unknown 1 = NSAP 2 = AESA
CgSubAddr	The calling party subaddress for this circuit.
CdSubAddrNumPlan	The numbering plan for the called party subaddress: 0 = Unknown 1 = Native E.164 2 = AESA
CdSubAddNumDigits	The number of digits in the called party subaddress.
CdSubAddrType	The address type of the called party subaddress: 0 = Unknown 1 = NSAP 2 = AESA
CdSubAddr	The called party subaddress for this circuit.
LegsAdded[a]	The number of legs added to the circuit.
LegsDeleted[a]	The number of legs deleted from the circuit.
LegsFailed[a]	The number of leg creation failures.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
FwdTotalCLP01	The total number of CLP=0+1 cells sent by the originating node of the circuit. Value can be in the range of 0-9,999,999,999.
FwdTotalCLP0	The total number of CLP=0 cells sent by the originating node of the circuit. Value can be in the range of 0-9,999,999,999.
BwdTotalCLP01	The total number of CLP=0+1 cells sent to the originating node of the circuit. Value can be in the range of 0-9,999,999,999.
BwdTotalCLP0	The total number of CLP=0 cells sent to the originating node of the circuit. Value can be in the range of 0-9,999,999,999.

a. These values are non-zero only for point-to-multipoint root records.

Table A-30. Settings for SVC Traffic Parameters

Traffic Descriptor Base Type	TrafficParam1	TrafficParam2	TrafficParam3
Unknown	*Not Applicable*	*Not Applicable*	*Not Applicable*
CLPNOSCR	PCR=0+1	PCR=0	*Not Applicable*
CLPSCR	PCR=0+1	SCR=0	MBS=0
NOCLPNOSCR	PCR=0+1	*Not Applicable*	*Not Applicable*
NOCLPSCR	PCR=0+1	SCR=0+1	MBS=0+1
NOCLPNOSCRMCR	PCR=0+1	MCR=0+1	*Not Applicable*

ATM PVC ASCII File Structure

The ASCII file structure for ATM PVC usage records is listed below. A description of each of the fields in this file follows in Table A-31.

Each ATM PVC ASCII record terminates with a carriage return followed by a NULL ("\0") character.

```
VerNum,
Type,
SwitchID,
IomNum,
Lport,
Pport,
Bcci,
```

```
Timestamp,
Timestamp100,
ConnectionType,
StudyInd,
PointToMultiPointInd,
ParamRecInd,
InTaggingInd,
EgTaggingInd,
SPvcInd,
OriginatingNodeInd,
ConnectTimeValidInd,
ConnectTime,
ConnectTime100,
IntervalTime,
IntervalTime100,
RemoteIFType,
RemoteNodeId,
RemotePort,
RemoteConnectionVPI,
RemoteConnectionVCI,
RecordingIFType,
RecordingConnectionVPI,
RecordingConnectionVCI,
RecordingIFId,
InQos,
InTDBaseType,
InTrafficParam1,
InTrafficParam2,
InTrafficParam3,
EgQos,
EgTDBaseType,
EgTrafficParam1,
EgTrafficParam2,
EgTrafficParam3,
CarrierDomain,
CarrierDomainNetId,
TransitDomain,
TransitDomainNetId,
ChargeablePartyId,
LegsAdded,
LegsDeleted,
LegsFailed,
InTotalCLP01,
InTotalCLP0,
EgTotalCLP01,
EgTotalCLP0
```

Table A-31. ATM PVC ASCII Call File Field Descriptions

Field Name	Description
VerNum	Version number of the record format.
Type	Call record type: 0 = Not used 1 = ATM PVC 2 = ATM SVC 3 = FR PVC 4 = FR SVC
SwitchID	The IP address of the switch from which this data was received.
IomNum	The slot number of the IOM from which this data was retrieved.
Lport	The logical port to which this data applies.
Pport	The physical port to which this data applies.
Bcci	The Billing Call Correlation Identifier (unsigned 32-bit integer) assigned to the circuit. For SVCs, the identifier is a monotonically-increasing number generated at the originating IOM. For PVCs, the identifier is the time (in seconds since January 1, 1970) at which the circuit was provisioned.
Timestamp	Represents the time (in seconds since January 1, 1970) at which the current set of counts were generated by the switch. To determine the elapsed time of a call, subtract the Connect Time value from the Timestamp value.
Timestamp100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
ConnectionType	The type of connection: 1 = VPC 2 = VCC
StudyInd	Indicates whether or not this record is for study: 0 = Not marked for study 1 = Marked for study
PointToMultiPointInd	Indicates whether the PVC is point-to-point or point-to-multipoint: 0 = Point-to-point 1 = Point-to-multipoint root 2 = Point-to-multipoint leaf
ParamRecInd	Indicates whether or not PVC parameters (PCR, MBS, SCR) were recorded for this circuit: 0 = Not recorded 1 = Recorded

Table A-31. ATM PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
InTaggingInd	Indicates whether or not tagging is enabled for ingress traffic: 1 = Tagging not enabled 2 = Tagging enabled
EgTaggingInd	Indicates whether or not tagging is enabled for egress traffic: 1 = Tagging not enabled 2 = Tagging enabled
SPvcInd	Indicates whether this is a normal SVC, or an SVC connected to a PVC: 0 = Normal SVC 1 = SVC connected to PVC
OriginatingNodeInd	Indicates whether or not this record is for the originating node for the circuit: 0 = Not originating node 1 = Originating node
ConnectTimeValidInd	Indicates whether or not the Connect Time specified in the next two fields is valid: 0 = Valid 1 = Not valid
ConnectTime	Represents the time (in seconds since January 1, 1970) at which the current record was generated on the switch.
ConnectTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
IntervalTime	Represents the time (in seconds since January 1, 1970) at which the previous record generated on the switch. To determine the elapsed time of a call, subtract the IntervalTime value from the Timestamp value.
IntervalTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
RemoteIFType	The remote interface type: 1 = Network-to-End User 2 = Network-to-Network
RemoteNodeId	The last two digits of the remote node's IP address.
RemotePort	The logical port number for the logical port at the remote end of the circuit.
RemoteConnectionVPI	The VPI for the remote end of the circuit.
RemoteConnectionVCI	The VCI for the remote end of the circuit.

Table A-31. ATM PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
RecordingIFType	The recording interface type: 1 = Network-to-End User 2 = Network-to-Network
RecordingConnectionVPI, Recording ConnectionVCI	The VPI/VCI for the recording end of the circuit.
RecordingIFId	The interface ID for the recording end of the circuit.
InQos	The Quality of Service setting for ingress traffic: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
InTDBaseType	The traffic descriptor base type for ingress traffic: 0 = Unknown 1 = CLPNOSCR 2 = CLPSCR 3 = NOCLPNOSCR 4 = NOCLPSCR 5 = NOCLPNOSCRMCR
InTrafficParam1	The total cell count for Ingress Traffic Parameter 1. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies is always PCR=0+1 regardless of the setting for traffic descriptor base type.
InTrafficParam2	The total cell count for Ingress Traffic Parameter 2. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-32 on page A-31).
InTrafficParam3	The total cell count for Ingress Traffic Parameter 3. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-32 on page A-31).
EgQos	The Quality of Service setting for egress traffic: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)

Table A-31. ATM PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
EgTDBaseType	The traffic descriptor base type for egress traffic: 0 = Unknown 1 = CLPNOSCR 2 = CLPSCR 3 = NOCLPNOSCR 4 = NOCLPSCR 5 = NOCLPNOSCRMCR
EgTrafficParam1	The total cell count for Egress Traffic Parameter 1. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies is always PCR=0+1 regardless of the setting for traffic descriptor base type.
EgTrafficParam2	The total cell count for Egress Traffic Parameter 2. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-32 on page A-31).
EgTrafficParam3	The total cell count for Egress Traffic Parameter 3. This value may be in the range of 0 to 16,277,216 cells. The traffic parameter to which this value applies depends on the setting for traffic descriptor base type (see Table A-32 on page A-31).
CarrierDomain	The Carrier Domain: 1 = Locally defined
CarrierDomainNetId	The network ID for the Carrier Domain on which the circuit resides.
TransitDomain	The Transit Domain: 1 = Locally defined
TransitDomainNetId	The network ID for the Transit Domain on which the circuit resides.
ChargeablePartyId	The chargeable party ID for the circuit.
LegsAdded	The number of legs added to the circuit.
LegsDeleted	The number of legs deleted from the circuit.
LegsFailed	The number of leg creation failures.
InTotalCLP01	The total number of inbound CLP=0+1 cells.
InTotalCLP0	The total number of inbound CLP=0 cells.
EgTotalCLP01	The total number of outbound CLP=0+1 cells.
EgTotalCLP0	The total number of outbound CLP=0 cells.

Table A-32. Settings for PVC Traffic Parameters

Traffic Descriptor Base Type	TrafficParam1	TrafficParam2	TrafficParam3
Unknown	*Not Applicable*	*Not Applicable*	*Not Applicable*
CLPNOSCR	PCR=0+1	PCR=0	*Not Applicable*
CLPSCR	PCR=0+1	SCR=0	MBS=0
NOCLPNOSCR	PCR=0+1	*Not Applicable*	*Not Applicable*
NOCLPSCR	PCR=0+1	SCR=0+1	MBS=0+1
NOCLPNOSCRMCR	PCR=0+1	MCR=0+1	*Not Applicable*

Frame Relay SVC ASCII File Structure

The ASCII file structure for Frame Relay SVC usage records is listed below. A description of each of the fields in this file follows in Table A-33.

Each Frame Relay SVC ASCII record terminates with a carriage return followed by a NULL ("\0") character.

```
VERSION_NUM,
CALL RECORD TYPE,
SwitchId,
IomNum,
Lport,
Pport,
ConnId,
Bcci,
Timestamp,
Timestamp100,
CauseValue,
StudyInd,
OriginatingNodeInd,
DefaultAddrUsage,
CgSubAddressInd,
CdSubAddressInd,
ConnectTimeValidInd,
ConnectTime,
ConnectTime100,
IntervalTime,
IntervalTime100,
FwdQos,
FwdCir,
```

```
FwdBe,
FwdBc,
BwdQos,
BwdCir,
BwdBe,
BwdBc,
PrimOrigAddrNumPlan,
PrimOrigAddrNumDigits,
PrimOrigAddrType,
OrigAddr,
SecOrigAddrNumPlan,
SecOrigAddrNumDigits,
SecOrigAddrType,
SecAddr,
RecordingIFType,
RemoteIFType,
RemoteNodeId,
RemoteLPort,
RemoteConnectionID,
TermAddrNumPlan,
TermAddrNumDigits,
TermAddrType,
TermAddr,
CgSubAddrNumPlan,
CgSubAddrNumDigits,
CgSubAddrType,
CgSubAddr,
CdSubAddrNumPlan,
CdSubAddrNumDigits,
CdSubAddrType,
CdSubAddr,
RcvdBytes,
RcvdDEBytes,
RcvdFrames,
```

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions

Field Name	Description
VERSION_NUM	Version number of the record format.
CALL RECORD TYPE	Call record type: 0 = Not used 1 = ATM PVC 2 = ATM SVC 3 = FR PVC 4 = FR SVC
SwitchId	The IP Address of the switch from which this data was received.

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
IomNum	The slot number of the IOM from which this data was retrieved.
Lport	The logical port (as an interface number) to which this data applies.
Pport	The physical port to which this data applies.
ConnId	The DLCI of the circuit to which this data applies.
Bcci	The Billing Call Correlation Identifier (unsigned 32-bit integer) assigned to the circuit. For SVCs, the identifier is a monotonically-increasing number generated at the originating IOM. For PVCs, the identifier is the time (in seconds since January 1, 1970) at which the circuit was provisioned.
Timestamp	Represents the time (in seconds since January 1, 1970) at which the current set of counts were generated by the switch. To determine the elapsed time of a call, subtract the Connect Time value from the Timestamp value.
Timestamp100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
CauseValue	Indicates why the circuit was terminated. See Table A-35 for information on possible values and their meanings.
StudyInd	Indicates whether or not this record is for study: 0 = Not marked for study 1 = Marked for study
OriginatingNodeInd	Indicates whether or not this record applies to the originating node: 0 = Not Originating Node 1 = Originating Node
DefaultAddrUsage	Indicates whether or not the Default Accounting Address is the same as the Calling Party Address: 0 = Not used 1 = Same 2 = Different 3 = Failed call screening 4 = No address provided 5 = No call screening performed
CgSubAddressInd	Indicates whether or not the Calling Party Subaddress is being requested: 0 = Not requested 1 = Requested

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
CdSubAddressInd	Indicates whether or not the Called Party Subaddress is being requested: 0 = Not requested 1 = Requested
ConnectTimeValidInd	Indicates whether or not the Connect Time specified in the next two fields is valid: 0 = Valid 1 = Not Valid
ConnectTime	Represents the time (in seconds since January 1, 1970) at which the current record was generated on the switch.
ConnectTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
IntervalTime	Represents the time (in seconds since January 1, 1970) at which the previous record generated on the switch. To determine the elapsed time of a call, subtract the IntervalTime value from the Timestamp value.
IntervalTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
FwdQos	The Quality of Service setting for forward traffic on this circuit: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
FwdCir	The committed information rate, in bits/sec, for forward traffic on this circuit.
FwdBe	The forward excess burst size in bits/sec.
FwdBc	The forward committed burst in bits/sec.
BwdQos	The Quality of Service setting for backward traffic on this circuit: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
BwdCir	The committed information rate, in bits/sec, for backward traffic on this circuit.

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
BwdBe	The backward excess burst size in bits/sec.
BwdBc	The backward committed burst in bits/sec.
PrimOrigAddrNumPlan	The numbering plan for the primary originating address: 0 = Unknown 1 = ISDN 2 = X121
PrimOrigAddrNumDigits	The number of digits in the primary originating address.
PrimOrigAddrType	The address type of the primary originating address: 0 = Unknown 1 = International
PrimOrigAddr	The primary originating address for this circuit.
SecOrigAddrNumPlan	The numbering plan for the secondary originating address: 0 = Unknown 1 = ISDN 2 = X121
SecOrigAddrNumDigits	The number of digits in the secondary originating address.
SecOrigAddrType	The address type of the secondary originating address: 0 = Unknown 1 = International
SecAddr	The secondary originating address for this circuit.
RecordingIFType	The recording interface type: 1 = ATM Network-to-End User 2 = Network-to-Network 3 = FR Network-to-End-User 98 = None Indicated 99 = Unknown
RemoteIFType	The remote interface type: 1 = ATM Network-to-End User 2 = Network-to-Network 3 = FR Network-to-End-User 98 = None Indicated 99 = Unknown
RemoteNodeId	The last two bytes of the IP Address of the remote node.

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
RemoteLPort	The logical port (as an interface number) for the remote end of the circuit.
RemoteConnectionID	The DLCI for the remote end of the circuit.
TermAddrNumPlan	The numbering plan for the terminating address: 0 = Unknown 1 = ISDN 2 = X121
TermAddrNumDigits	The number of digits in the terminating address.
TermAddrType	The address type of the terminating address: 0 = Unknown 1 = International
TermAddr	The terminating address for this circuit.
CgSubAddrNumPlan	The numbering plan for the calling party subaddress: 0 = Unknown 1 = ISDN 2 = X121
CgSubAddrNumDigits	The number of digits in the calling party subaddress.
CgSubAddrType	The address type of the calling party subaddress: 0 = Unknown 1 = International
CgSubAddr	The calling party subaddress for this circuit.
CdSubAddrNumPlan	The numbering plan for the called party subaddress: 0 = Unknown 1 = ISDN 2 = X121
CdSubAddrNumDigits	The number of digits in the called party subaddress.
CdSubAddrType	The address type of the called party subaddress: 0 = Unknown 1 = International
CdSubAddr	The called party subaddress for this circuit.
RcvdBytes	The number of bytes received by this end of the circuit.
RcvdDEBytes	The number of bytes received by this end of the circuit that were marked deletion eligible by the network.

Table A-33. Frame Relay SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
RcvdFrames	The number of frames received by this end of the circuit.

FR PVC ASCII File Structure

The ASCII file structure for PVC usage records is listed below. A description of each of the fields in this file follows in Table A-34.

Each Frame Relay PVC ASCII record terminates with a carriage return followed by a NULL ("\0") character.

```
VERSION_NUM,
CALL RECORD TYPE,
SwitchId,
IomNum,
LPort,
PPort,
ConnId,
Bcci,
Timestamp,
Timestamp100,
StudyInd,
ParamRecInd,
OriginatingNodeInd,
ConnectTimeValidInd,
ConnectTime,
ConnectTime100,
IntervalTime,
IntervalTime100,
RemoteIFType,
RemoteNode,
RemotePort,
RemoteConnectionID,
RecordingIFType,
InQos,
InCir,
InBe,
InBc,
EgQos,
EgCir,
EgBe,
EgBc,
CarrierIdType,
CarrierId,
TransitIdType,
```

```
TransitId,
ChargeId,
RcvdBytes,
RcvdDEBytes,
RcvdFrames,
```

Table A-34. Frame Relay PVC ASCII Call File Field Descriptions

Field Name	Description
VERSION_NUM	Version number of the record format.
CALL RECORD TYPE	Call record type: 0 = Not used 1 = ATM PVC 2 = ATM SVC 3 = FR PVC 4 = FR SVC
SwitchId	The IP Address of the switch from which this data was received.
IomNum	The slot number of the IOM from which this data was retrieved.
Lport	The logical port to which this data applies.
Pport	The physical port to which this data applies.
ConnId	The DLCI of the circuit to which this data applies.
Bcci	The Billing Call Correlation Identifier (unsigned 32-bit integer) assigned to the circuit. For SVCs, the identifier is a monotonically-increasing number generated at the originating IOM. For PVCs, the identifier is the time (in seconds since January 1, 1970) at which the circuit was provisioned.
Timestamp	Represents the time (in seconds since January 1, 1970) at which the current set of counts were generated by the switch. To determine the elapsed time of a call, subtract the Connect Time value from the Timestamp value.
Timestamp100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
StudyInd	Indicates whether or not this record is for study: 0 = Not marked for study 1 = Marked for study
ParamRecInd	Indicates whether or not PVC parameters (PCR, MBS, SCR) were recorded for this circuit: 0 = Not recorded 1 = Recorded

Table A-34. Frame Relay PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
OriginatingNodeInd	Indicates whether or not this record applies to the originating node: 0 = Not Originating Node 1 = Originating Node
ConnectTimeValidInd	Indicates whether or not the Connect Time specified in the next two fields is valid: 0 = Valid 1 = Not Valid
ConnectTime	Represents the time (in seconds since January 1, 1970) at which the current record was generated on the switch.
ConnectTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
IntervalTime	Represents the time (in seconds since January 1, 1970) at which the previous record generated on the switch. To determine the elapsed time of a call, subtract the IntervalTime value from the Timestamp value.
IntervalTime100	Two-digit value, representing the 1/100ths of a second to be added to the Timestamp field.
RemoteIFType	The remote interface type: 1 = ATM Network-to-End User 2 = Network-to-Network 3 = FR Network-to-End-User 98 = None Indicated 99 = Unknown
RemoteNode	The last two bytes of the IP Address of the remote node.
RemoteLPort	The logical port number for the logical port at the remote end of the circuit.
RemoteConnectionID	The DLCI for the remote end of the circuit.
RecordingIFType	The recording interface type: 1 = ATM Network-to-End User 2 = Network-to-Network 3 = FR Network-to-End-User 98 = None Indicated 99 = Unknown

Table A-34. Frame Relay PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
InQos	The Quality of Service setting for ingress traffic on this circuit: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
InCir	The committed information rate, in bits/sec, for ingress traffic on this circuit.
InBe	The ingress excess burst size in bits/sec.
InBc	The ingress committed burst in bits/sec.
EgQos	The Quality of Service setting for egress traffic on this circuit: 0 = Unspecified Bit Rate (UBR) 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Available Bit Rate (ABR)
EgCir	The committed information rate, in bits/sec, for egress traffic on this circuit.
EgBe	The egress excess burst size in bits/sec.
EgBc	The egress committed burst in bits/sec.
CarrierIdType	The type of Carrier: 1 = CIC 2 = DNIC
CarrierId	The network ID for the Carrier Domain on which the circuit resides.
TransitIdType	The type of transit: 1 = CIC 2 = DNIC
TransitId	The network ID for the Transit Domain on which the circuit resides.
ChargeId	The ID of the chargeable party.
RcvdBytes	The number of bytes received by this end of the circuit.
RcvdDEBytes	The number of bytes received by this end of the circuit that were marked deletion eligible by the network.

Table A-34. Frame Relay PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
RcvdFrames	The number of frames received by this end of the circuit.

Circuit Termination Cause Values

Table A-35 lists and describes the cause values that indicate why a circuit or circuit creation attempt has been terminated.

Table A-35. Circuit Termination Cause Values

Value	Meaning (ITU Standard)
001	Unallocated (unassigned) number
002	No route to specified transit network
003	No route to destination
006	Channel unacceptable
007	Call awarded and being delivered in an established channel
016	Normal call clearing
017	User busy
018	No user responding
019	User alerting; no answer
021	Call rejected
022	Number changed
027	Destination out of order
028	Invalid number format (incomplete address)
029	Facility rejected
031	Normal, unspecified
034	Circuit/channel congestion

Table A-35. Circuit Termination Cause Values (Continued)

Value	Meaning (ITU Standard)
035	Requested VPI/VCI is unavailable
036	VPI/VCI assignment failed
037	User cell rate unavailable
041	Temporary failure
042	Switching equipment congestion
043	Access information discarded
044	Requested channel not available
045	No VPI/VCI available
047	Resource unavailable, unspecified reason
049	Quality of Service unavailable
050	Requested facility not subscribed
057	Bearer capability not authorized
058	Bearer capability not currently available
063	Service or option not available, unspecified reason
065	Bearer capability not implemented
069	Requested facility not implemented
073	Unsupported combination of traffic parameters
078	AAL parameter cannot be supported
079	Service or option not implemented, unspecified reason
081	Invalid call reference value
082	Identified channel does not exist
088	Incompatible destination

Table A-35. Circuit Termination Cause Values (Continued)

Value	Meaning (ITU Standard)
089	Invalid end point referenced
091	Invalid transit network selection
092	Too many pending add party requests
096	Mandatory information element missing
099	Information element nonexistent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry
104	Incorrect message length
111	Unspecified protocol error
127	Unspecified interworking

B

Configuring NTP on the Accounting Server

This appendix describes how to configure your Accounting Server for Network Time Protocol (NTP). NTP enables you to specify a reference server to be used as a clock synchronization source for the switches in your network.

The Accounting Server includes a public domain version of the Network Time Protocol from the University of Delaware. Time synchronization of the switch network and network management servers via NTP is accomplished by configuring the Accounting Server to execute the NTP software.

The Accounting Servers, via the NTP protocol, synchronize their time-of-day clocks to one or more external time references. The default configuration provided by the Accounting Server references three publicly available time servers running in the Internet. If your site already maintains an NTP time server, then this time server should be included in the set of servers referenced by the Accounting Server.

Supporting documentation in HTML format is available in the /CascadeAS/ntp/html directory on the Accounting Server. For a list of the supporting documentation that is stored there, see the following HTML document on the Accounting Server:

```
CascadeAS/ntp/html/index.html
```

For more information on the NTP protocol, see http://www.eecis.udel.edu/~ntp.

Copyright Notice

The following copyright notice applies to all files collectively called the Network Time Protocol Version 4 Distribution. Unless specifically declared otherwise in an individual file, this notice applies as if the text was explicitly included in the file.

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NTP Overview

When installing the Accounting Server software, the installation script prompts whether you want to install NTP. If you opt to install NTP, the installation script places the NTP software in the /usr/ntp directory, and configures the Accounting Server to execute NTP. (If you do not install NTP, the switch network acquires its time-of-day from the NavisCore NMS.)

If you installed NTP, please verify the following:

- In the /etc/services files, verify that the following lines are present and not commented out. If these lines are not present, or if they are commented out, NTP cannot function properly.

  ```
  ntp 123/tcp# Network Time Protocol
  ntp 123/udp# Network Time Protocol
  ```

- If you are referencing external time servers in the Internet, your gateway to the Internet must allow TCP and UDP traffic to and from the NTP port (123).

The NTP daemon, xntp, starts automatically each time the workstation/server is reset. The file /etc/rc3.d/S99xntpd is executed at system startup and restarts the NTP daemon.

At startup time, the xntp daemon reads the initial configuration from the file /etc/ntp.conf. This file should contain a list of servers that the xntpd daemon can poll for time synchronization. Several sample external time servers (servers outside your organization) are included in the file, but they are disabled by default. For the most secure installation, you should reference an internal time server (if one is available in your organization).

If you decide to use an external server, Ascend recommends that you contact the noted contact person for each time server, and notify them that you are referencing their clocks, in the event that the time server support is changed in the future.

A list of additional reference servers can be obtained from the following web site:

```
http://www.eecis.udel.edu/~ntp/
```

Running NTP

To run NTP, you need to execute the xntpd daemon. You can execute this daemon via a startup file that is run every time the NMS comes up.

Using ntpq to Verify NTP

To verify that the xntpd daemon is running correctly, you need to run the ntpq routine. This routine is able to read the time from the configured reference server, and check the status information regarding a system's references.

The following commands are available in ntpq for a quick verification of xntpd:

host [*IP address of server*]	Sets ntp to reference a particular reference server
rv	Reads variables from the selected host
pe	Reads information regarding a host's references

The rv Command

The rv command displays the variable associated with a reference time server. It takes approximately 8 time requests or 8 minutes for a time server to become synchronized, before which time the leap field is set to leap=11 to indicate an unsynchronized state.

Once the server becomes synchronized, leap is set to leap=00, and the refid field is set to the ID of the reference server being used as the synchronization source.

If a server fails to become synchronized to a server other than its own local UNIX clock, then either the references configured in the ntp.conf file are not responding or a network problem exists. To resolve this, make sure that the host machine's /etc/services file is set up for NTP using udp on port 123. Also verify that port 123 is not being blocked by a firewall in either direction.

For more information, reference /CascadeAS/ntp/html/debug.html.

The pe Command

The pe command displays information pertaining to the server's references under the following columns:

```
remote     refid     st    t    when    poll    reach   delay    offset   disp
```

The reach column is non-zero for references from which the server has received data. For more information on the columns in this display, see the NTP documentation stored in the /CascadeAS/ntp/html directory on the Accounting Server.

C

Accounting Server Integration with Network Performance Metrics Tool

When the Accounting Server runs in BAF mode, it shares its usage data files with the Network Performance Metrics Tool (an optional application available from Ascend). For details on the Network Performance Metrics Tool, see the *User's Guide and Release Notes for Custom Software Application Network Performance Metrics Tool*.

To eliminate redundant data and prevent disruption of accounting processes, the Network Performance Metrics Tool is granted access to usage files through a series of symbolic links location in the /CascadeAS/data/perf/SW.[*ip_address*] directories. The Accounting Server creates links to usage data files after they are moved into the /CascadeAS/data/archive/udfiles directory on the Accounting Server.

The Network Performance Metrics Tool normally deletes the file links when it finishes processing. And, in case the application is unavailable, the Accounting Server deletes any links older than 1 hour. Keep in mind that only the links are deleted, not the actual usage files. The usage files remain in archive until they are purged by the Accounting Server (for details on file purging, see "Accounting File Purging" on page 4-8).

Non-critical snapshot files (bs_S*) are not archived. However, because these files may be needed by the Network Performance Metrics Tool, they are stored in the /CascadeAS/data/archive/udfiles directory and linked to the /CascadeAS/data/perf directory. The Accounting Server deletes both these files and their links after 1 hour.

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