NavisXtend Accounting Server Administrator's Guide

Ascend Communications, Inc.

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About This Guide

This guide is a task-oriented guide that 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. The network administrator who configures the Accounting System must also understand network accounting and why accounting should be enabled on the network.

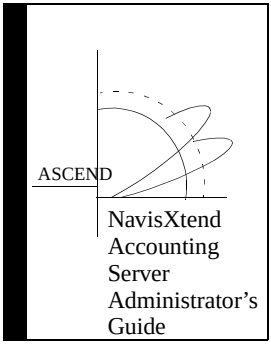
What You Need to Know

You should be familiar with concepts relating to wide-area networking, as well as network services such as ATM and Frame Relay. You should have a working knowledge of Bellcore standards, and have access to the following Bellcore documents for reference purposes:

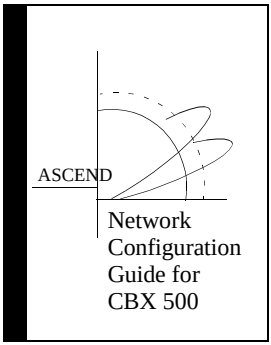
- Bellcore GR-1100-CORE
- Bellcore GR-1110-CORE
- Bellcore GR-1343-CORE

Documentation Reading Path

The complete document set for the Accounting System includes the following manuals:



Describes how to configure a network the Accounting System, which consists of one or more NavisXtend Accounting Servers, one or more WAN switches, and your Billing Operations Server.



Explains how to use HP OpenView and CascadeView/UX to configure a CBX 500 network.

How to Use This Guide

The *NavisXtend Accounting Server Administrator's Guide* is organized as follows:

Read	To Learn About
Chapter 1	The Accounting System and 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	Various issues you need to consider before installing and configuring the Accounting System on your network, including network design guidelines, hardware requirements, and disk space requirements.
Chapter 3	Installing the Accounting Server software and configuring the Accounting Servers in your network.
Chapter 4	Configuring the Accounting System in your CascadeView network, which involves enabling and disabling various Accounting System settings in CascadeView.
Chapter 5	Using CascadeView to display Accounting System statistics and settings, as well as force data uploads from a switch to its Accounting Server.
Chapter 6	Using console commands to manage and monitor the Accounting Servers in your network.
Chapter 7	The set of asynchronous events that are generated by each Accounting Server in the Accounting System to indicate anomalous conditions or task completions that have occurred.
Chapter 8	The SNMP traps that are generated by the switches in your network and sent to each NMS that is enabled to receive traps.

Read	To Learn About
Appendix A	Information on the contents/layout of the three final file formats that are available: standard Bellcore AMA format, standard Bellcore AMA format with proprietary extensions, and ASCII format. This appendix also includes a table that lists the cause values for circuit terminations.
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.

Customer Comments

Customer comments are welcome! Please fill out the Customer Comment Form located at the back of this guide and return it to us.

Related Documents

This section lists the related Ascend switching system and third-party documentation that may be useful to reference.

Ascend

- *Network Configuration Guide for CBX 500* (Product Code: 80049)
- *Diagnostic and Troubleshooting Guide for CBX 500* (Product Code: 80050)
- *CBX 500 Hardware Installation Guide* (Product Code: 80011)
- *Network Management Station Installation Guide* (Product Code: 80014)
- *Networking Services Technology Overview* (Product Code: 80001)

Third Party

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

Conventions

This guide uses the following conventions to emphasize certain information, such as user input, screen options and output, and menu selections. For example:

Convention	Indicates	Example
`Courier Bold`	User input on a separate line.	**`eject cdrom`**
[*bold italics*]	Variable parameters to enter.	**[*your IP address*]**
`Courier Regular`	Output from a program.	`Please wait...`
Boldface	User input in text.	Type **cd install** and ...
Menu ->Option	Select an option from the menu.	CascadeView->Logon
Border surrounding text	Notes and warnings.	See examples below.
Italics	Book titles, new terms, and emphasized text.	*Network Management Station Installation Guide*

Provides helpful suggestions or reference to materials not contained in this manual.

Warns the reader to proceed carefully in order to avoid equipment damage or personal harm.

1

Overview

CBX 500 Accounting System

The CBX 500 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 either standardized Bellcore AMA Format (BAF), BAF format with proprietary extensions, or a comma-delimited ASCII format. The records can then be used for customer billing and invoice processing on your central billing system.

The Accounting System is composed of the following components:

- A switching system (which consists of CBX 500 switches)
- One or more NavisXtend Accounting Servers
- A disk array (either connected directly to the Accounting Servers, or installed in a data server connected to the Accounting Servers)
- A management and control component (CascadeView)
- Your Billing Operations Server (BOS)

Accounting data is collected within the switching system, with switch management and control provided via CascadeView running on the Network Management Station (NMS). In addition, the Accounting System is configured, managed, and monitored via CascadeView and the Accounting Server. BOS processing is internal to your billing center. The Accounting System is shown in Figure 1-1.

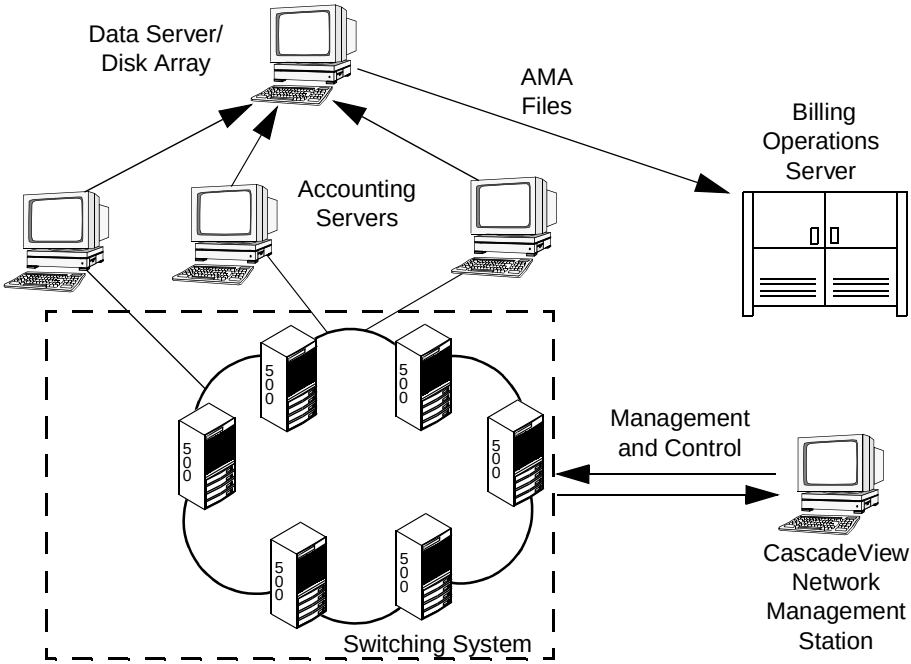


Figure 1-1. CBX 500 Accounting System

Within the switching system, usage records are collected and stored in the switch's heap storage. All usage data is collected in real time. The types of data that are collected include call duration and various cell counts for both directions of a circuit (see "Usage Data" on page 1-5 for a complete list and description of usage data that is collected on a switch). Multiple records from the same switch pertaining to the same 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 five minutes.

The CascadeView NMS is used to configure, manage, and control the Accounting System. Using CascadeView, you can 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. You can also use CascadeView to monitor the system, add your Accounting Servers to the Accounting System, and designate a primary and secondary Accounting Server for each switch in the network.

Features

The Accounting System provides or supports the following features:

- Usage measurement of inter-network SVCs, intra-network SVCs, intra-network PVCs, and inter-network PVCs, including point-to-point and point-to-multipoint circuits, with the ability to enable or disable recording of cell counts at:
  - The originating end of a point-to-point circuit
  - The originating end of a point-to-multipoint circuit
  - The terminating end of a point-to-point circuit
  - The terminating end of a point-to-multipoint circuit
  - Ingress and egress endpoints
- Both time-based and usage-based accounting, with the ability to disable usage-based accounting on CBR circuits.
- Near-realtime SVC billing, in which 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.

- Flexible management via CascadeView 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)
  - Extended BAF (includes proprietary modules)
  - Comma-delimited format (ASCII)
- 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 (e.g., conversion from AMA format to your proprietary format). In this scenario, you have to design your own process for transferring call data files from the Accounting Server for further conversion, processing, and storage.

Usage Data

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

PVC Usage Data

Table 1-1 describes the key usage data that is collected for inter- and intra-network 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	Definition
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 inter-network 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 ATM 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 is comprised 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 Remote Recording Interface ID.
VPI/VCI	The 2-digit Virtual Path ID and 3-digit Virtual Connection ID that is configured for the circuit.

Table 1-1. PVC Usage Data

Statistic	Definition
Traffic Descriptor	The ATM traffic descriptor parameters for both the ingress and egress directions of the circuit. For more information on traffic descriptors, see the *Network Configuration Guide for CBX 500*.
Ingress and Egress Cells	Separate cell counts are taken at ingress and egress points.
Total Cell Counts	A total cell count is taken at the ingress and egress points of the PVC for both the originating and terminating switch.
Leg Counts	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.

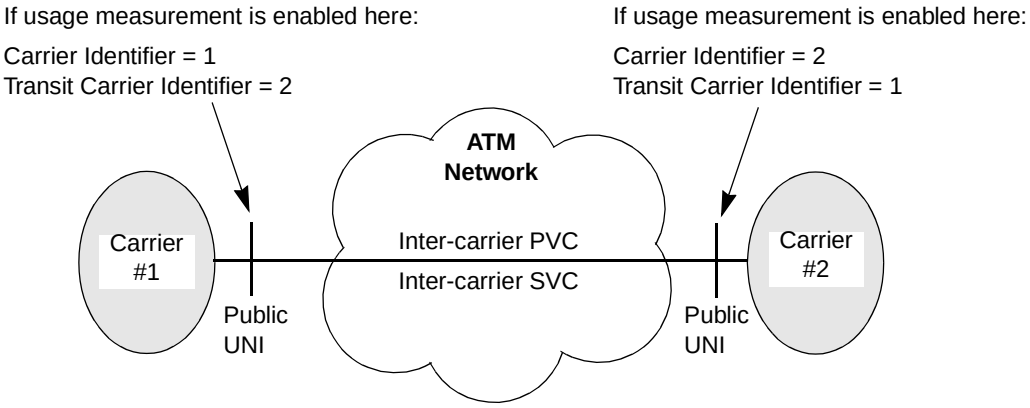


Figure 1-2. Carrier ID/Transit Carrier ID Relationship

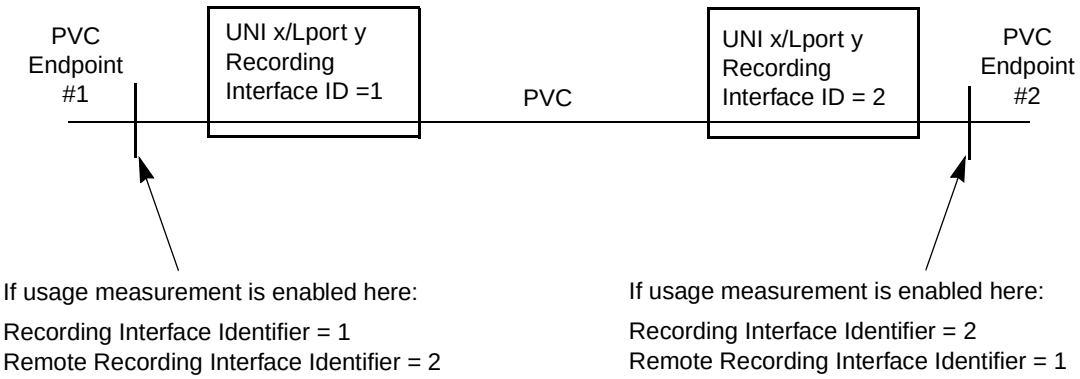


Figure 1-3. Local and Remote Recording Interface ID Relationship

SVC Usage Data

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

Table 1-2. SVC Usage Data

Statistic	Definition
Activation Time	The time at which the SVC was created.
Length of Recording Interval	Indicates how long the circuit was active.
Traffic Parameters	The Traffic Parameters necessary for defining the QoS of the circuit, including whether or not Tagging and Best Effort are enabled on the circuit. For more information on traffic parameters, see the *Network Configuration Guide for CBX 500*.
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 4-25).
Called Party Subaddress	An ATM address that uniquely identifies the called party.
Calling Party Subaddress	An ATM address that uniquely identifies the calling party.
Traffic Descriptors	The ATM traffic descriptor parameters for both the forward and backward directions of the circuit. For more information on traffic descriptors, see the *Network Configuration Guide for CBX 500*.

Table 1-2. SVC Usage Data (Continued)

Statistic	Definition
QoS Class	The QoS class of the circuit, in both the forward and backward directions of the circuit. QoS class may be CBR, UBR, ABR, or VBR. No differentiation is made between VBR-RT and VBR-NRT circuits. For more information on QoS classes, see the *Network Configuration Guide for CBX 500*.
Broadband Capability	The Bearer Class of the circuit.
Backward Total Cells	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	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	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	The number of high-priority (CLP=0) cells delivered on the circuit from the originating node to the terminating node.

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" on page 1-10 and the description of OAM Cell Counting on page 4-41.

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" on page 1-10 and the description of OAM Cell Counting on page 4-41.

Forward and Backward Cell Counts

This section describes where forward and backward egress and ingress cell counts are taken 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. Backward cell counts are taken at the ingress point on the terminating switch, or at the egress 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, while OAM cell counts, depending on the Accounting System configuration, may or may not be added to user cell counts measured at the egress point on the terminating switch (see page 4-41).

For backward cell counts, OAM cells are added to the user cell counts measured at the ingress point on the terminating switch, while OAM cell counts, depending on the Accounting System configuration, may or may not be added to the user cell counts measured at the egress point on the originating switch (see page 4-41).

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.

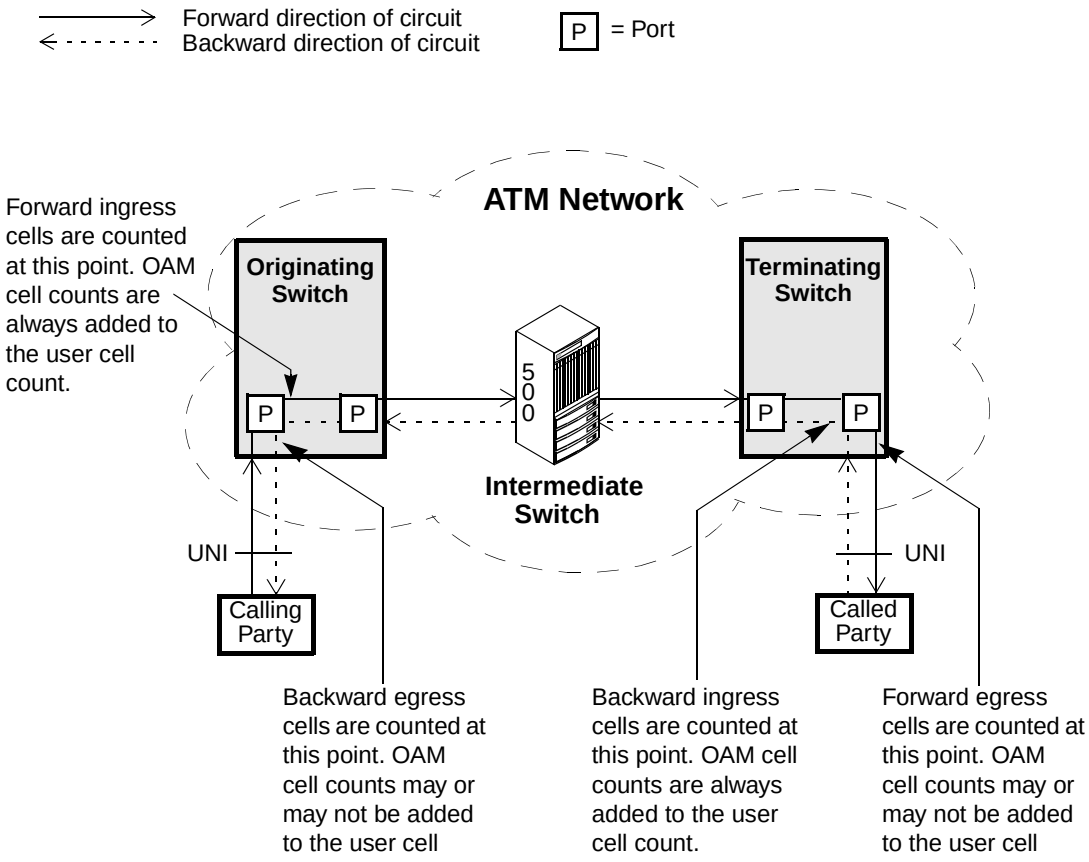


Figure 1-4. Egress and Ingress Cell Measurement Locations

Accounting System Timing

This section describes subjects relating to Accounting System timing, including:

- How timing is synchronized across the network
- How an SVC call is determined to be short-duration or long-duration
- The frequency with which 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:

- The CascadeView NMS sets the time of each switch once per day via an SNMP set. The reference time used is the time of day on the CascadeView NMS. This results in loose synchronization of time 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:
  - A switch-level parameter is changed
  - You perform a PRAM sync on the switch's SP
  - CascadeView 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 **set clock** command to set the time of day on the switch to the proper time. Normally, set clock is run automatically as a cron job at midnight every day. However, you can execute set clock manually at any time from the NMS console window.

  To execute the set clock command, you must log in to the NMS as the superuser and type 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.

- The CBX 500 executes the Network Time Protocol to synchronize time of day on all IOMs with the time of day on the switch's SP. The time of day on each switch's SP is then acquired from the Accounting Server. In order for the switch network to maintain reliable and synchronized time with the Accounting Server, NTP software must be configured to run on the Accounting Servers.

  You can use the standard Network Time Protocol (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 then generated. The aggregated call data records are then retrieved by the Accounting Server 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 short 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.

Figure 1-5 illustrates when first and continuation records for a long-duration SVC are generated. In this example, the 24-hour day ends at 3 a.m. local time.

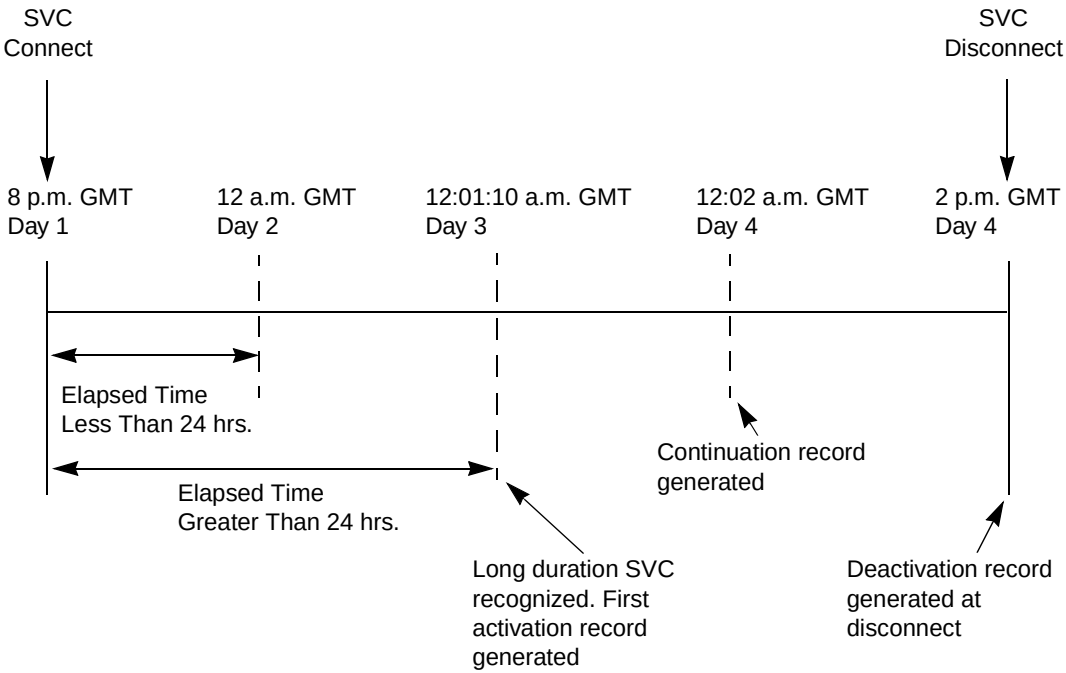


Figure 1-5. Long-duration SVC Record Generation

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 1-6 illustrates when call data records are generated in both of these situations. As with the previous example, the 24-hour day ends at 3 a.m.

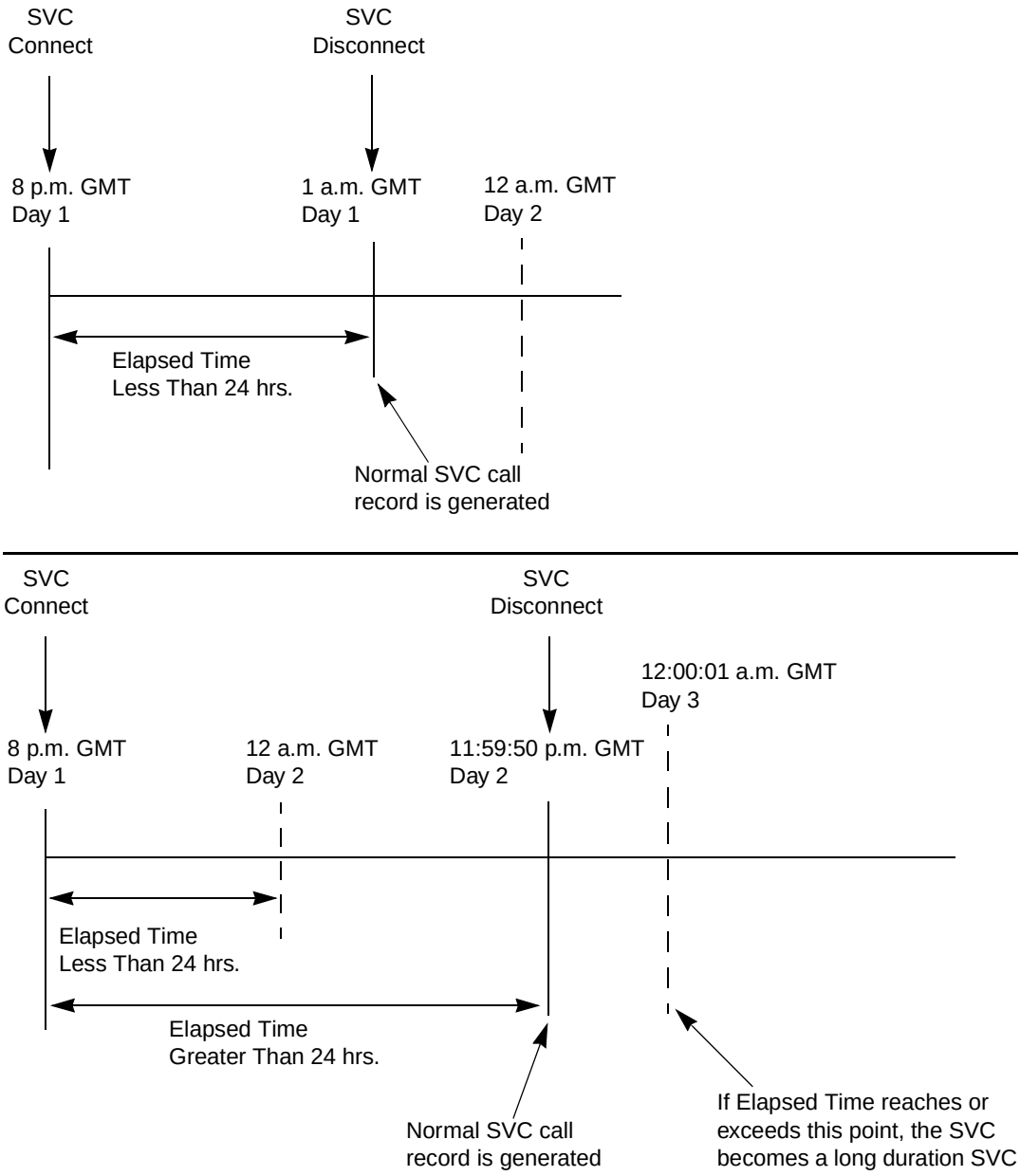


Figure 1-6. Normal SVC Call Record Generation

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 one 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 Terminology

This section describes some of the Accounting System terms used to see the various types of files produced by the system throughout the accounting process. A file creation flow chart is also included to illustrate the various stages at which each type of file is created (see Figure 1-7 on page 1-18).

Table 1-3 describes the various file types produced by the system. Figure 1-7 shows the creation sequence for these files.

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

File Type	Description
BAF files	These files are created from completed call data files by the BAF generation process. There are two categories: primary and secondary. Primary BAF files are created directly by the BAF generation process and are marked as secondary after successful transfer to the Billing Operations Server. All secondary files are stored on the Accounting Server for a configurable period of days (see “Accounting File Purging” on page 3-18). These files are produced if you select Bellcore AMA Format during the installation of the Accounting Server software.
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 that are used in standard Bellcore processing. These files are produced if you select ASCII Format during the installation of the Accounting Server software.

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

File Type	Description
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 IOM. There is one active call data file for each IOM 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 are completed call data files that have been compressed for more efficient storage.
Usage data files	These are the raw usage data files that contain the raw usage data generated on the switch IOMs. Records in these files are aggregated into active call records.
Archived AMA files	BAF files that have been transferred successfully and marked as secondary. They prevent loss of data in the event that a BAF file becomes corrupted or unusable. In this scenario, the Billing Operations Server can retrieve these files again. If ASCII AMA generation is enabled, this directory contains transferred ASCII files. These files are not modified after transfer.
Archived call data files	These 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.

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

File Type	Description
Archived usage data files	These 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, you have to 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.

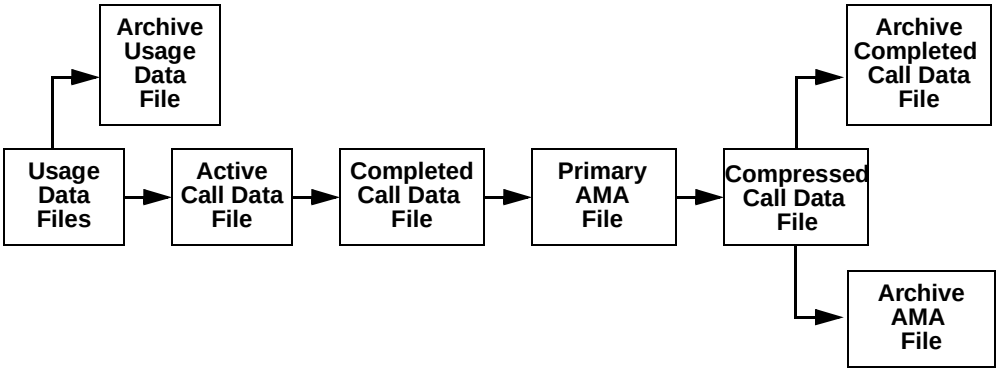


Figure 1-7. Accounting System File Creation Sequence

2

Preparing for the Installation

This chapter discusses various issues you need to consider before installing and configuring the Accounting System software on your NavisXtend Accounting Servers. The following subjects are discussed:

- Accounting Server requirements, including hardware requirements (such as system type, memory, and processor), and operating system software requirements
- The transport options and bandwidth requirements for sending data to the Accounting Server
- Volume/file system requirements for your disk array
- Accounting Server directory structure

Task Flowchart

Figure 2-1 shows the order in which you have to perform the necessary high-level tasks for setting up your Accounting System. References to the sections describing these tasks are included on the right.

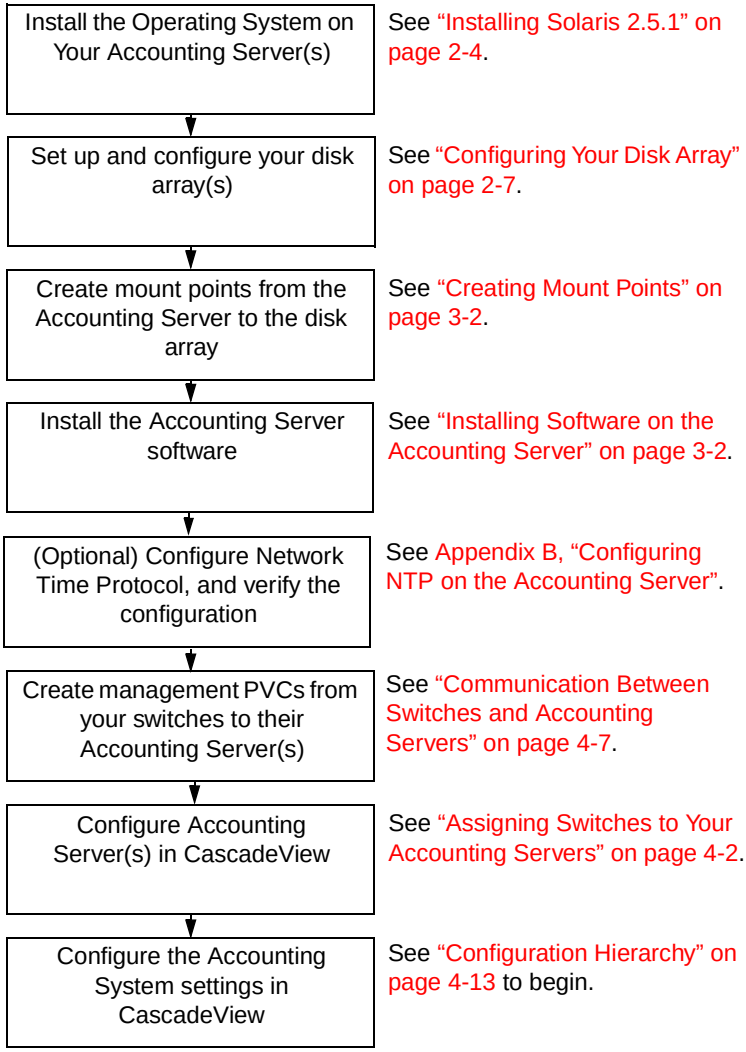


Figure 2-1. Accounting System Setup Task Flowchart

Hardware Requirements

This section describes the hardware requirements for the Accounting Server.

Sun Ultra Enterprise 2 workstation with two processors, configured with:

- 256 MB of onboard RAM and a 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 in the array).

The SPARCStations you are using as Accounting Servers should be dedicated solely for that purpose. You should not use these servers for any other purpose, 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:

- Via an ATM Network Interface Card. In this situation, you need the following hardware:
  - An ATM Network Interface Card (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.
- Via a router.

For instructions on how to connect switch hardware to an Accounting Server, follow the instructions for connecting an NMS console in the *CBX 500 Hardware Installation Guide*.

Software Requirements

Before you can install the Accounting Server software, you have to 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 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 instructions contained in this section relate only to Ascend-specific recommendations for installing the operating system.

1. Follow the instructions in the *Solaris SMCC™ Hardware Platform Guide* until the Upgrade System dialog box appears.
2. When the Upgrade System dialog box appears, 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 has “bootdrive” on it. Select Add and choose Continue.
9. In the Preserve Data dialog box, choose Continue. This allows the current file systems and unnamed 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 it is correct, choose Begin Installation. If you have to change any information, choose Change.
15. At the reboot after installing Solaris dialog box, choose Reboot.
16. After the Solaris installation completes and the system reboots, see the next section for instructions on how to install the required cluster patch.

Installing the Solaris 2.5.1 Cluster Patch

After installing the Solaris 2.5.1 operating system, you need to 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.). Select the latest numerical version. For more information on obtaining this file, contact Sun at 1-800-USA-4SUN.

Perform the following steps 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’s 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.

We recommend 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 have to set up when configuring your storage array. These volumes/file systems are listed in Table 2-2. To determine the amount of space you need to reserve for each file system, use the formulas in the following sections, then record the resulting values in the right-most 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 as you determine them in the following sections. Add all values to determine your total disk storage requirements.

The disk array storage requirements are primarily based 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 the accounting data that your switches will produce. As you determine each value, record the value in the right-most column of Table 2-2 on page 2-8. When determining the total SVC calls/sec, you have to determine the average # of SVC calls/sec for each switch, then total all averages. Similarly, when determining total PVCs, you have to determine the number of PVCs on each switch, then total 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 you need to 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

You have three switches sending data to this disk array. Switch1 averages 800 SVC calls/sec, Switch2 averages 600 calls/sec, and Switch3 averages 700 calls/sec. These three switches average a total of 2100 SVC calls/sec. Switch1 has 5,000 PVCs, Switch2 has 7,000 PVCs, and Switch3 has 4,000 PVCs. These switches have a total of 16,000 PVCs.

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

The disk storage requirements for /CASC/udfiles in this network would be:

[(2100 x 18 KB) + (16,000 x 60 bytes)] x 4 = 155,040,000 bytes (**155 MB**)

/CASC/ama File System

If you are using Bellcore format, use the following formula to determine disk space requirements for the /CASC/ama file system:

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

If you are using ASCII format, use the following formula to determine disk space requirements for the /CASC/ama file system:

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

Example

You have three switches sending data to this disk array. Switch1 averages 600 calls/sec, Switch2 averages 900 calls/sec, and Switch3 averages 400 calls/sec. These three switches average a total of 1900 calls/sec. Switch1 has 2,000 PVCs, Switch2 has 1,000 PVCs, and Switch3 has 1,500 PVCs. These three switches have a total of 4,500 PVCs.

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

If you plan to use Bellcore format, the disk storage requirements for /CASC/ama in this network would be:

[(1900 x 150KB) + [(4500 x 2.5KB)/10]] x 4 = 1,144,000 KB (**1,144 MB**)

If you plan to use ASCII format, the disk storage requirements for /CASC/ama in this simple network would be:

[(1900 x 162KB) + [(4500 x 2KB)/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.

If you are using 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

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 266,400 bytes)} \\ \text{+ [(total PVC circuits x 4440 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

transfer

$$\left[\begin{array}{l}\text{(total SVC calls/sec x 266,400 bytes)} \\ \text{+ [(total PVC circuits x 4440 bytes)/(recording interval in minutes)]}\end{array}\right] \text{ x 4}$$

If you are using 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

You have three switches sending data to this disk array. Switch1 averages 700 calls/sec, Switch2 averages 600 calls/sec, and Switch3 averages 900 calls/sec. These switches average a total of 2200 calls/sec. Switch1 has 1,000 PVCs, Switch2 has 1,000 PVCs, and Switch3 has 1,500 PVCs. These three switches have a total of 3,500 PVCs.

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

If you plan to use Bellcore AMA format, the disk storage requirements for /CASC/calls in this network would be:

3500 x 296 bytes x 4 = 4144KB (or 4.2 MB)
[(2200 x 266,400 bytes) + [(3500 x 4440 bytes)/5]] x 4 = 2,356,640 KB (2,357 MB)
[(2200 x 266,400 bytes) + [(3500 x 4440 bytes)/5]] x 4 = 2,356,640 KB (2,357 MB)

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

If you plan to use ASCII format, the disk storage requirements for /CASC/calls in this network would be:

3500 x 296 bytes x 4 = 4144KB (or 4.2 MB)
[(2200 x 242,100 bytes) + [(3500 x 3000 bytes)/5]] x 4 = 2,138,880 KB (2,139 MB)
[(2200 x 242,100 bytes) + [(3500 x 3000 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.

$$\left[\begin{array}{l}\text{(total SVC call/sec x 150bytes)} \\ \text{+ (total PVCs x 2.5bytes)/(recording interval)}\end{array}\right] \text{ x (\#days before purge x 84600sec/day) x 2.4}$$

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

You have three switches sending data to this disk array. Switch1 averages 800 calls/sec, Switch2 averages 900 calls/sec, and Switch3 averages 750 calls/sec. These switches average a total of 2450 calls/sec. Switch1 has 1,000 PVCs, Switch2 has 2,000 PVCs, and Switch3 has 2,000 PVCs. These three switches 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 in this network would be:

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

/CASC/ar_calls File System

If you are using Bellcore format, use the following formula to determine disk space requirements for the /CASC/ar_calls file system:

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

If you are using ASCII format, use the following formula to determine disk space requirements for the /CASC/ar_calls file system:

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

Example

You have three switches sending data to this disk array. Switch1 averages 500 calls/sec, Switch2 averages 900 calls/sec, and Switch3 averages 800 calls/sec. This means your network averages 2200 calls/sec. Switch1 has 1,000 PVCs, Switch2 has 1,000 PVCs, and Switch3 has 1,000 PVCs. These three switches 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.

If you plan to use Bellcore AMA format, the disk storage requirements for /CASC/ar_calls in this network would be:

[(2200 x 296 bytes) + (3000 x 5 bytes)/4] x (338,400) x 2.4 = **531,925 MB**

If you plan to use ASCII format, the disk storage requirements for /CASC/ar_calls in this network would be:

[(2200 x 269 bytes) + (3000 x 10 bytes)/12] x (338,400) x 2.4 = **482,667 MB**

/CASC/ar_ama File System

If you are using Bellcore format, use the following formula to determine disk space requirements for the /CASC/ar_ama file system:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 250 bytes)} \\ \text{+ (total PVCs x 250 bytes)/(recording interval x 60)}\end{array}\right] \text{ x (\#days before purge x 84600sec/day) x 2.4}$$

If you are using ASCII format, use the following formula to determine disk space requirements for the /CASC/ar_ama file system:

$$\left[\begin{array}{l}\text{(total SVC call/sec x 269 bytes)} \\ \text{+ (total PVCs x 200 bytes)/(recording interval x 60)}\end{array}\right] \text{ x (\#days before purge x 84600sec/day) x 2.4}$$

Example

You have three switches sending data to this disk array. Switch1 averages 700 calls/sec, Switch2 averages 800 calls/sec, and Switch3 averages 900 calls/sec. These switches average a total of 2400 calls/sec. Switch1 has 3,000 PVCs, Switch2 has 1,000 PVCs, and Switch3 has 3,000 PVCs. These three switches 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.

If you plan to use Bellcore AMA format, the disk storage requirements for /CASC/ar_ama in this network would be:

[(2400 x 250) + ((7000 x 250)/300)] x 338,400 x 2.4 = **492,034 MB**

If you plan to use ASCII format, the disk storage requirements for /CASC/ar_ama in this network would be:

[(2400 x 269) + ((7000 x 200)/300)] x 338,400 x 2.4 = **530,558 MB**

Minimum Storage Requirements

To determine the minimum disk space requirements for your storage array, add each of the values you entered in the right-most column of Table 2-2 on page 2-8.

When determining your disk space requirements, keep the following points in mind:

- If you add any PVCs or SVCs to your network (either on existing switches or by adding new switches to the network), you will 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, instead of computing them based on the current state of your network.
- If you change the file purging values on any of your Accounting Servers, it will affect your storage space requirements. For example, if you increase the file purging value for the /CASC/ar_udfiles file system from 3 days to 6 days, you will need twice as much storage space for this file system than you originally computed, because you are retaining the files for twice as long.
- If you turn off the Accounting Server's file compression process (using the ascomp-start script), data files will no longer be compressed, and the amount of storage space required for these files will increase by at least a factor of two. For this reason, it is *strongly recommended* that you not turn off 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 6-1 on page 6-3.)

Accounting Server Directory Structure

This section details the default structure of the Accounting Server directories. If you want, you can change the default directories during the initial stages of the Accounting Server software installation (see page 3-5). If you changed the defaults, you should make a list of the directories you are using. Any directory changes made during installation are symbolically linked to the directory structure shown in Table 2-3.

The Accounting Server directory structure layout 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 Directory Structure

Directory	Description
The following is the high-level Accounting Server directory structure.	
/CascadeAS	This is a link to the Accounting Server file system (for example, /CascadeAS —> /CASC/CascadeAS).
/CascadeAS/archive	Contains directories (or links to directories) that are 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 3-18).
/CascadeAS/bin	Contains all of the executables required to run the Accounting Server.
/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 that are 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.

Table 2-3. Accounting Server Directory Structure (Continued)

Directory	Description
/CascadeAS/lib	Contains the Cygnus gnu libraries that are needed to run the Accounting Server.
/CascadeAS/tools	Contains the dump utilities and other tools that you can 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 3-19). 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, then 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 called "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 6-22 for more information on audit count files.

Table 2-3. Accounting Server Directory Structure (Continued)

Directory	Description
/CascadeAS/data/ama	Contains the files created by the BAF/ASCII generation process, as well as a storage area called 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 will remain here until another process is executed to retrieve this data or the secondary file age limit is met.*
/CascadeAS/data/calls	Contains three subdirectories: active, complete, and transfer. *active* — Contains a single file for each switch/IOM pair. This file contains all of the call data for calls that are currently active on each IOM. Filenames consist of the switch's IP address concatenated with the IOM number (e.g., 193.2.3.4.10 indicates data from IOM 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 SA or PA, the switch's IP address, the IOM number, the year, day, and 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 IOM 10 on a switch with IP address 193.2.3.4, and that the file was generated during the second quarter of the second hour of the 102nd day of 1997. *transfer* — Contains the completed call data files for the previous 1/4 hour. These files have been fully processed by the BAF/ASCII generation process.
/CascadeAS/data/config	Contains the Accounting Server configuration file.

Table 2-3. Accounting Server Directory Structure (Continued)

Directory	Description
/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 there is no switch configured on the Accounting Server for the file that is received, the file is moved to a suspense subdirectory in this directory.*

3

Accounting Server Setup

This chapter describes how to install the Accounting Server software and configure the Accounting Servers in your network. As part of the installation process, you can also specify the storage directories for the various stages of data files produced by the system.

Before following the instructions in this chapter, you should have performed 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 the Installation

Prior to beginning the installation, we recommend that you read the following 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 that differ from the defaults.

Creating Mount Points

Before you can install the Accounting Server software, you must create mount points from the Accounting Server boot drive to the seven file systems you created on your disk storage array (see Table 2-2 on page 2-8 for a listing of these file systems).

After creating the mount points, you can begin the Accounting Server software installation as described in the next section.

Installing Software on the Accounting Server

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

1. Log in 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   CASCaccsv     NavisXtend Accounting Server
                         Sparc [version #]

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

3. Type **1** and press Return to select the Accounting Server package. The following prompts appear:

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

   NavisXtend Accounting Server
   [workstation type]
   ```

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

```
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. If you see this prompt, type **y** and press Return to continue. The following message and menu appear:

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

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

   The system displays the following prompt:

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

6. Type **y** to continue with the installation. If you made the wrong selection, type **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>
```

7. If you do not want to generate SVC records on this Accounting Server, type **y**. If you want to generate SVC records on this Accounting Server, type **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 re-install it.

   The following prompt appears:

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

8. If you do not want to generate PVC records on this Accounting Server, type **y**. If you want to generate PVC records on this Accounting Server, type **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 re-install 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>
```

9. If the selections are as desired, type **y** to continue. Otherwise, type **n** and reselect these options.

   If you type **y**, the following menu appears next. 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 1-16.

```
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
```

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.

You can view a listing of the current directory settings at any time by selecting option v.

While this menu is displayed, you can reset all directories to the defaults by selecting 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

10. Choose option v to display the current settings. If you accept the defaults, you will run out of disk space because the files produced by the Accounting System will be stored on the Accounting Server's boot drive instead of on the disk array. Therefore, you have to change each directory setting to point to the file systems on the disk array. To do so, 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]
    ```

11. Type the full path name of the directory you want to use for the selected item.

12. 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>
    ```

If the settings are correct, type **y** and press Return to accept the settings and continue. If any settings are incorrect, type **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)?
```

13. If you want to install the Network Time Protocol on this server, enter **y**. Otherwise, type **n** and continue to Step 14. If you type **y**, the following message appears:

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

14. The following message and prompt appear:

    ```
    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
    ```

    Type **y** and press Return to continue.

    At this point, the Accounting Server files are installed. The installation takes less than a minute.

Once the Accounting Server files have been installed, the Accounting Server Configuration Main Menu (shown here) appears. At this point, you can begin configuring the Accounting Server as described in "Configuring Your Accounting Servers" on page 3-10.

```
Accounting Server Configuration Main Menu

  1 - Bellcore Standard Configuration Parameters
  2 - Accounting File Purging
  3 - Accounting AMA File Transfer Configuration
  4 - File System Capacity Monitoring
  5 - Switch Configuration
  6 - SNMP Trap Destinations
  q - Exit this program

Select the number of an item :
```

At a minimum, you must define the switches whose usage data records are to be transferred to this Accounting Server (see "Ascend Switch Configuration" on page 3-26). If you prefer to do so, you can configure all other items after completing the installation. See "Configuring Your Accounting Servers" on page 3-10 for instructions on how to configure your servers after the software has been installed.

*Once you choose **q** from the main menu, the installation completes and the Accounting Server processes start. If you choose **q** before completing the configuration, the system may not function as you want it to.*

*If you choose **q** before completing the Accounting Server configuration, you can access the Accounting Server Configuration Main Menu by logging in as the superuser and entering the following command:*

/CascadeAS/bin/configAS

For instructions on how to complete the installation, see the next section. It is recommended (but not required) that you complete the configuration of the Accounting Server before quitting the installation program.

Completing the Installation

To complete the installation, select option q from the Configuration Main Menu. Once you do so, the Accounting Server processes are started automatically, and the following sequence of messages is displayed. This example shows the output if you elected to install the Network Time Protocol; if you did not, the second group of messages relating to NTP are not displayed when you quit the installation.

```
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 <CASCaccsv> was successful.

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

Type **q** and press Return to exit the installation script.

Configuring Your Accounting Servers

This section describes how to use the Accounting Server Configuration Main Menu to configure each of the Accounting Servers in your network. Each server must be configured separately; you must perform the instructions in this section for each Accounting Server in your network.

There are two ways to display the Accounting Server Configuration Main Menu:

- When you complete the software installation, the Accounting Server Configuration Main Menu displays automatically. In this scenario, 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 scenario, 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
  q - Exit this program

Select the number of an item :
```

Select the item you want to configure. Each of the configuration options is described in the following sections. See the listed page number for more information on a given menu choice.

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

Menu Selection	See
Bellcore Standard Configuration Parameters	page 3-12
Accounting File Purging	page 3-18
Accounting AMA File Transfer Configuration	page 3-19
Recording Office Configuration	page 3-22
File System Capacity Monitoring	page 3-23
Switch Configuration	page 3-26
SNMP Trap Destinations	page 3-29

Bellcore Standard Configuration Parameters

This option is available only if you selected Bellcore AMA Format on the initial installation menu. You need to 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

When you select Bellcore Standard Configuration Parameters from the Configuration Main Menu, the following menu is displayed:

```
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
```

Once all items on this menu are configured as desired, select “Return to previous menu” to return to the Configuration Main Menu. You are then prompted to confirm any changes you made. Type **y** and press Return to commit your changes, or type **n** and press Return to cancel any changes you made. In either case, the Accounting Server Configuration Main Menu reappears.

For information on each of the items on this menu, see the associated page number shown here:

Menu Selection	See
Inclusion of Ascend-proprietary modules	page 3-13
AMA File Size Capacity	page 3-13
AMA Four-Field Suppression	page 3-14
AMA Structure Call Types for BAF Records	page 3-15
AMADNS Source Component Identifier	page 3-15
AMADNS Destination Component Identifier	page 3-17

Inclusion of Ascend-proprietary Modules

Ascend proprietary modules (Ascend extensions) include usage data that is not included in standard BAF files. “Ascend BAF Extensions” on page A-9 lists and describes each of the proprietary modules. 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-9.

When you select option 1, the following prompt appears:

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

Type **y** and press Return to enable the following proprietary modules. If you do not need or do not want to use these modules, type **n** and press Return to 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 the maximum number of records that each file can contain is 16,000. During installation, you should accept these default values. If you later determine that you need to change these defaults, you can do so by running the Accounting Server configuration program (see “Configuring Your Accounting Servers” on page 3-10).

If you want to change these values, select option 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:
```

To change either of the current values, type in the appropriate menu number, then enter the desired value at the prompt that appears. When you finish, select option 3 to 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 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.

To disable (or enabled) four-field suppression, select option 3 from the Bellcore Standard Configuration Parameters menu. The following prompt is displayed:

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

If you want to include these four fields in your final BAF records, type **y** and press Return. Otherwise, type **n** and press Return to exclude these fields from your final BAF record.

AMA Structure Call Types for BAF Records

This option 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.

To change any of the default values, select option 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: 801).
 4 - Intranetwork Point to Multipoint Originating Root Call Type (current: 800).
 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: 802).
10 - Internetwork SVC Terminating NNI Call Type (current: 613).
11 - Return to Previous Menu.

Select an option :
```

Type the number for the item you want to change. A prompt similar to the following appears:

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

Enter the new value. When all values are set as desired, select option 11 to 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. It is a 6-digit value that is comprised of a 2-digit Source Component Type Code and a 4-digit Source Component Identification Number. These items are defined as follows:

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 is sending 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 is sending 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 change the Source Component Type Code or Identifier Number, select option 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:
```

To change either of these values, enter the number for the item, then at the prompt, enter the new value. Initially the Source Component Type Code is set to 2 (02) and should not be changed. The Source Component Identification Number is initially set to 0000; you can change this value to any code not currently being used by another Accounting Server.

When both values are configured as desired, choose option 3 to return to the Bellcore Standard Configuration Parameters menu.

AMADNS Destination Component Identifier

The following two items identify the Billing Operations Server to which you want final AMA data files to be transferred. These two items are included in BAF filenames (see page 6-11).

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. You should 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. Enter 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 change the Destination Component Type or Identification Number, select option 6 from the Bellcore Standard Configuration Parameters menu. The following menu appears:

```
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 :
```

To change either of the current values, enter the number for the item, then at the prompt, enter the new value.

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.

When both values are configured as desired, choose option 3 to return to the Bellcore Standard Configuration Parameters menu.

Accounting File Purging

The Accounting File Purging values enable you to specify how long files remain on the system before being purged. You can specify values 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. The Secondary File Age Limit selection enables you to specify how long these secondary files remain on the Accounting Server before they are automatically purged.

Usage Data Files — These are the raw and compressed usage data files that are collected from each of the switches in the Accounting System, and stored in the directories /CascadeAS/data/udfiles and /CascadeAS/archive/udfiles/compressed.

Call Data Files — These are the archive call data files that the system can use to recreate BAF files in the event that a BAF file becomes corrupted. The Call Data File Age Limit selection enables you to specify how long the archive call data files remain on the Accounting Server before they are automatically purged.

By default, the Accounting Server is configured to delete each of these file types after seven days. If you would like to retain these files for a longer or shorter period of time, enter the appropriate number of days.

To change any of the values for these items, select Accounting File Purging from the 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:
```

Select the number of the item you want to change, then at the prompt, enter the new value. You are then prompted to verify that you want to make the change. Type **y** to commit the change, or type **n** to cancel the change.

When all values have been configured as desired, select option 4 to return to the Configuration Main Menu.

Accounting AMA File Transfer Configuration

The Accounting Server can be configured as:

FTP Client — The Accounting Server periodically transfers AMA files to another host via FTP.

FTP Server — The Accounting Server responds to requests from external hosts for accounting data.

The Accounting AMA File Transfer Configuration option enables you to configure the Accounting Server as an FTP client. When configured as an FTP client, the Accounting Server transfers AMA files periodically (every 5 minutes by default) to another host via FTP.

For information on configuring the Accounting Server as an FTP server, see “Accounting Server as FTP Server” on page 6-5.

To configure the file transfer options, select Accounting AMA File Transfer Configuration from the 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:
```

When have finished configuring these options, select option 3 to return to the Configuration Main Menu.

Configuring Billing Operations Server Parameters

To configure parameters for the Billing Operations Server to which files are to be transferred:

1. From the Accounting File Transfer Configuration menu, select option 1. 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 option 1 to modify the parameters. At each succeeding prompt, type in the value you want to use, then press Return to display the next prompt.

   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 — 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.

When all values have been configured, the following prompt appears:

```
Accept the above value? (y/n)
Type y to continue, n to cancel
```

3. Type **y** and press Return to save the settings, or type **n** and press Return to cancel them. When finished, select option 2 to return to the Configuration Main Menu.

Enabling/Disabling AMA File Transfer to the Accounting Server

If you want to transfer AMA files to a Billing Operations Server, select option 2 from the Accounting File Transfer Configuration menu so that you can enable the file transfer process. 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 “Accounting Server as FTP Server” on page 6-5.

When you select option 2, the following prompt appears:

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

Type **y** and press Return to toggle this setting from enabled to disabled (or disabled to enabled, depending on the current setting). When the file transfer process is disabled, it is your responsibility to transfer files off of the Accounting Server to prevent the AMA data file directory from filling to capacity.

Recording Office Configuration

This selection on the Configuration Main Menu enables you to specify the 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 change the Recording Office Id or Type, select Recording Office Configuration from the 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:
```

The change either of the values, select the number of the item you want to change, then at the prompt, 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.

When both values have been configured as desired, select option 3 to return to the Configuration Main Menu.

File System Capacity Monitoring

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

To do so, select File System Capacity Monitoring from the Configuration Main Menu. The following default file system list appears, followed by the File System Configuration menu. The path names you see represent the defaults that are used by the Accounting Server. They are either directories or links to directories that reside on one or more file systems. The threshold values shown here are the default values.

```
        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:
```

Each value represents a percentage of disk space. When the file system usage exceeds the specified percentage, an alarm is generated to notify you. For example, if you keep 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 threshold is reached.

When you have finished editing the disk configuration, select option 4 to return to the 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), then press Return. You are prompted to confirm the file system addition.

3. Type **y** and press Return to create the file system. If the new disk is successfully added to the configuration, the message “The entry has been added to the configuration.” is displayed, and the list reappears, with the newly added file system included in the list.

All new file systems are added with the default alarm threshold values (90 for Critical, 80 for Major, and 70 for Minor).

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. Type the index number of the file system that you want to remove from the list, then press Return. You are prompted to confirm the removal.

3. Type **y** and press Return to remove the file system, or type **n** and press Return to cancel the operation. In either case, the file system list reappears. If you removed a file system, it should no longer appear in the list.

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. You are then prompted to enter the threshold values you want to use for the various alarm levels, in a series of successive prompts.

   To specify the point at which a given alarm (Critical, Major, or Minor) is generated for a file system, simply specify the percentage of disk space usage that must be exceeded in order to generate that alarm.

3. At each prompt, enter the value you want to use, then press Return to display the next prompt. When all values have been specified, the following prompt appears:

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

4. Type **y** and press Return to commit the changes you made, or type **n** and press Return to cancel your changes. In either case, the Disk Configuration menu reappears. Any changes you made and applied should be displayed in the list.

Ascend Switch Configuration

The Ascend Switch Configuration selection on the main menu 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 you are currently configuring. This includes all switches to which this Accounting Server will be assigned as a primary or secondary Accounting Server (see "Assigning Switches to Your Accounting Servers" on page 4-2 for information about primary and secondary servers).

To edit the switch configuration, select Ascend Switch Configuration from the Configuration Main Menu. During the initial installation, the message "No Switch in the Configuration" is displayed, followed by the Switch Configuration menu. If switches have already been added to the configuration, a listing similar to the following is displayed, followed by the Switch Configuration menu:

```
        Switch Name     Switch ID       Sensor ID      Sensor Type
        -----------     ----------      -----------      ---------
(1)         Turmel3     193.4.3.2               1             400
(2)         Turmel4     193.5.3.2               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 Type and Sensor ID values are not needed for ASCII installations. Therefore, if you are performing an ASCII installation, you are not prompted to enter these values. Also, the Sensor Type and Sensor ID columns are not displayed on the Switch Configuration menu for ASCII installations.

To configure a switch, you need to enter the CascadeView 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 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.

Sensor ID — Enter a unique 6-digit Sensor ID for each switch. You can use any 6-digit value, as long as you do not use the same value for multiple switches. This value can be in the range of 000000 to 999999.

When you have finished editing the switch configuration, select option 4 to return to the Configuration Main Menu.

Adding a Switch to the Configuration

To add a switch to the configuration:

1. Select option 1 and press Return. The following sequence of prompts appear:

```
Enter the switch name (as defined in your CascadeView map):
Enter the Switch IP address :
Enter the Switch Sensor ID :
Enter the Switch Sensor Type :
```

2. At each prompt, enter the configuration information for the new switch and press Return to proceed to the next prompt. For Switch ID, enter the switch IP address. When all four values have been reconfigured, the following prompt appears:

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

3. Type **y** and press Return to add the switch to the configuration, or type **n** and press Return to cancel the add operation. If you select y, a message appears to indicate the switch configuration was successful, followed by the Switch Configuration list/menu, with the new switch displayed in the list.

Deleting a Switch from the Configuration

To delete a switch from the configuration:

1. Select option 2 and press Return. The following prompt appears:

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

2. Type in the index number of the switch you want to delete, then press Return. For example, to delete the switch Turmel4, type 2 and press Return. You are then prompted to confirm the deletion.

3. Type **y** and press Return to complete the deletion, or type **n** and press Return to cancel the deletion. In either case, the Switch Configuration list/menu reappears. If you deleted the switch, it is no longer displayed in the list.

Modifying an Existing Switch Configuration

To modify an existing switch configuration:

1. Select option 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 disk Turmel3, type 1 and press Return. The following sequence of prompts is displayed:

   ```
   Switch Name ([switch_name]) :
   Switch IP Address ([ip_address]) :
   Bellcore Sensor Identifier ([value]) :
   Bellcore Sensor Type ([value]) :
   ```

   At each prompt, enter the new configuration information and press Return to proceed to the next prompt. When all four values have been reconfigured, the following prompt appears:

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

3. Type **y** and press Return to accept the values, or type **n** and press Return to cancel your changes. In either case, you return to the Switch Configuration list/menu.

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 8 for more information on SNMP traps.) During the installation, 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 CascadeView NMS workstation. If you have other workstations to which you want to send these traps, enter their IP addresses also.

To specify the destination system to which you want SNMP traps sent, select SNMP Trap Destinations from the Configuration Main Menu. If you have not yet defined an SNMP trap destination, the following message is displayed, followed by the SNMP Trap Destination menu:

```
No SNMP Trap Destination in the Configuration

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

Select an option:
```

Each of these options is defined in the following sections. When you finish configuring SNMP trap destinations, select option 3 to return to the Configuration Main Menu.

Adding a New Trap Destination

To add a new SNMP trap destination:

1. Select option 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, then press Return. The following prompt appears:

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

3. Type **y** and press Return to add this destination to the SNMP Trap Destination list, or type **n** and press Return to cancel. In both cases, the SNMP Trap Destination list/menu reappears. If you added a trap destination, it should now be displayed in the list, similar to the following example:

```
SNMP Trap Destinations :

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

The Destination Port Number is always 162, and is not configurable.

Deleting a Trap Destination

To delete an SNMP trap destination:

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

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

2. Type the index number for the trap destination and press Return. The following prompt appears:

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

3. Type **y** and press Return to delete the trap destination from the configuration, or type **n** and press Return to cancel the delete operation. In either case, the SNMP Trap Destination list/menu reappears. If you deleted a trap destination, it is no longer displayed in the list.

4

Configuring Accounting on Switches

Overview

This chapter describes how to configure the Accounting System on your network. Prior to configuring the circuits, ports, and switches, you have to set up the NavisXtend Accounting Server as described in Chapter 2 and Chapter 3.

Once you have set up the Accounting Server, you have to perform the following tasks as described in this chapter. These tasks must be performed in the order listed here:

- Configure CascadeView to recognize your Accounting Servers. See “Assigning Switches to Your Accounting Servers” on page 4-2.
- Assign a primary Accounting Server, and optionally a secondary Accounting server, to each of the switches in your network. See “Designating Accounting Servers for Your Switches” on page 4-4.
- Configure a management PVC between each switch and its primary and secondary Accounting Servers. See “Communication Between Switches and Accounting Servers” on page 4-7.

- Enable accounting on each of the circuits, ports, and switches in your network. See “Configuration Hierarchy” on page 4-13 for information on how to approach Accounting System configuration before you begin.

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 CascadeView Network

To configure CascadeView to recognize an Accounting Server:

1. From the CascadeView network map, choose Administer=>Cascade Parameters=>Set All ATM Accounting Parameters=>Set Accounting Servers. The Set Accounting Servers for ATM Accounting dialog box appears (Figure 4-1).

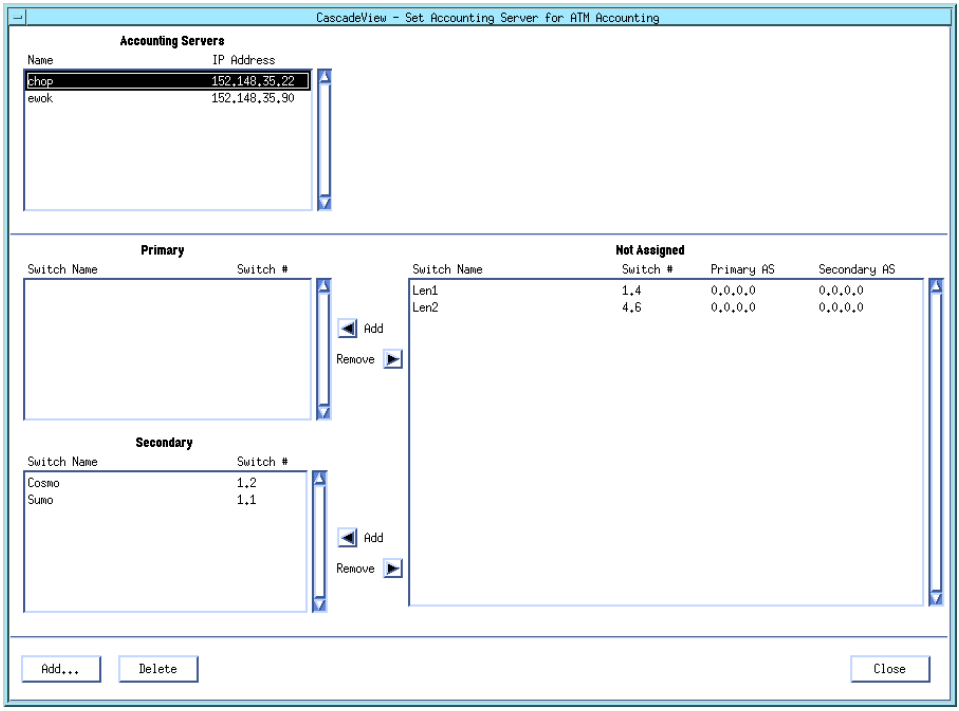
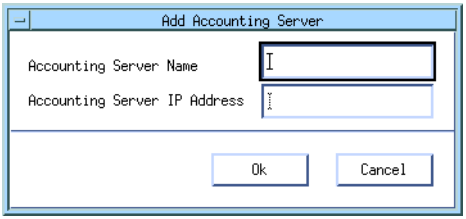


Figure 4-1. Set Accounting Servers for ATM Accounting Dialog Box

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 for ATM Accounting 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 has to 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, you have to perform a manual switchover to the secondary server from the Set CBX 500 Accounting dialog box. See Server Control in Table 4-7 on page 4-42. Also, see page 4-37 for instructions on how to access this dialog box.

As shown in Figure 4-1 on page 4-3, there are four list boxes in the Accounting Server dialog box:

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 for ATM Accounting dialog box (Figure 4-1 on page 4-3) is not displayed, from the CascadeView network map, choose Set Parameters=>Set All ATM Acct Params=>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 CascadeView network map.

Deleting an Accounting Server

To delete an Accounting Server from the list:

1. In the Accounting Servers list box (Figure 4-1 on page 4-3), 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 or Secondary list boxes, you have 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 No 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 CascadeView network map, choose Set Parameters=>Set All ATM Acct Params=>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 a 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; depending on whether the selected server is the primary or secondary server, the switch may be listed in either the Primary or the Secondary list box.
4. Select the switch and choose the appropriate Remove button to remove the switch from the Primary (or Secondary) list box. The Not Assigned list box is then updated to show that the switch is no longer assigned to the server from which it was removed.

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 or 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 4-36) 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 have 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 4-1 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 4-1. 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.

For information on how to configure the management PVCs required for the Accounting System, see the next section. 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 have 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 are using 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 CascadeView, define a logical port on the physical port you used in Step 1. For instructions on configuring a logical port, see the *Network Configuration Guide for CBX 500*. 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 CascadeView 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 CascadeView, see the *Network Configuration Guide for CBX 500*.

4. For each management PVC you created in Step 3, use the Set NMS Path function to configure the IP address and access path of the Accounting Server.

When you create the NMS path, the switch you select on the 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, then select that switch on the network map.

For information on accessing NMS Path dialog box, see the Network Configuration Guide for CBX 500*.*

On the Add NMS Path dialog box:

- For Access Path, choose Management VPI/VCI.
- In the NMS 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 are using multiple Accounting Servers in your network, configure them the same way. In this situation, you have 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 4-2, Figure 4-3, and Figure 4-4 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 are using the same Accounting Server as their primary server. However, this is not a restriction. You can configure your network so that some switches report to Accounting Server 1 as their primary server and Accounting Server 2 as their secondary server, while other switches use Accounting Server 2 as their primary server and Accounting Server 1 as their secondary server.

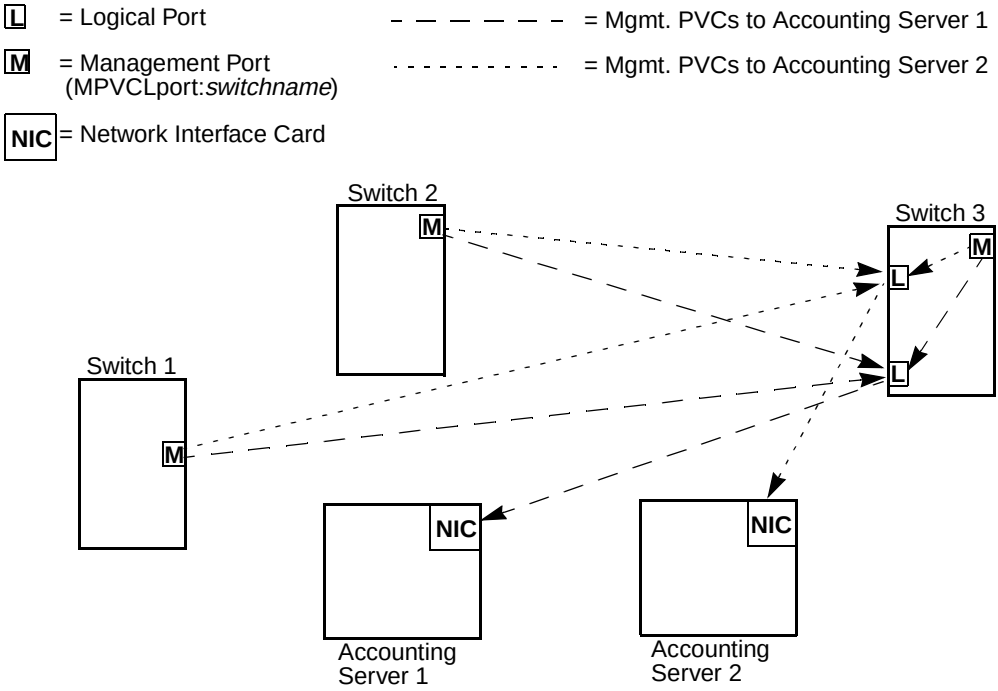


Figure 4-2. Two Accounting Servers Accessed Via Logical Ports on One Switch

L = Logical Port

M = Management Port (MPVCLport:*switchname*)

NIC = Network Interface Card

= Mgmt. PVCs to Accounting Server 1

= Mgmt. PVCs to Accounting Server 2

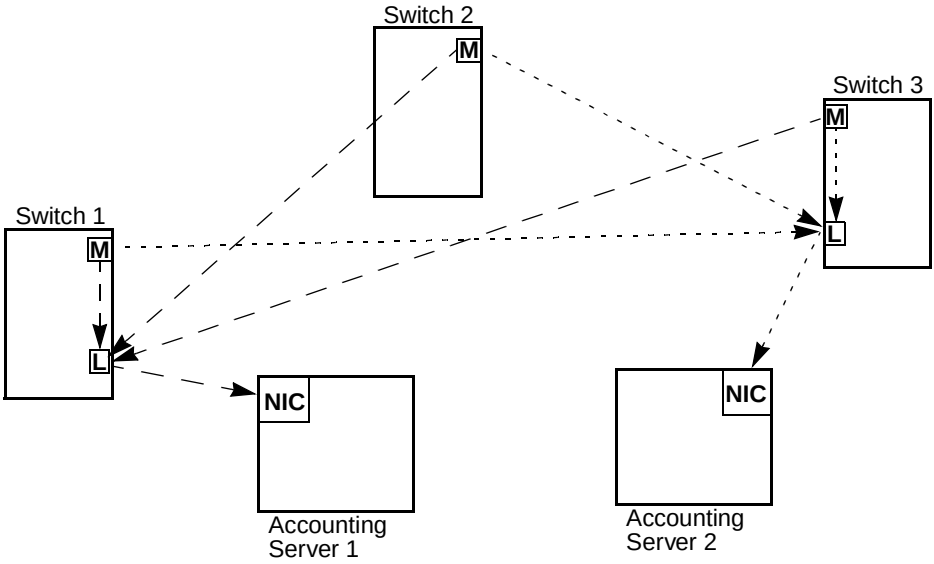


Figure 4-3. Two Accounting Servers Accessed Via Logical Ports on Different Switches

L = Logical Port

M = Management Port (MPVCLport:*switchname*)

= Mgmt. PVC to Accounting Server 1

= Mgmt. PVC to Accounting Server 2

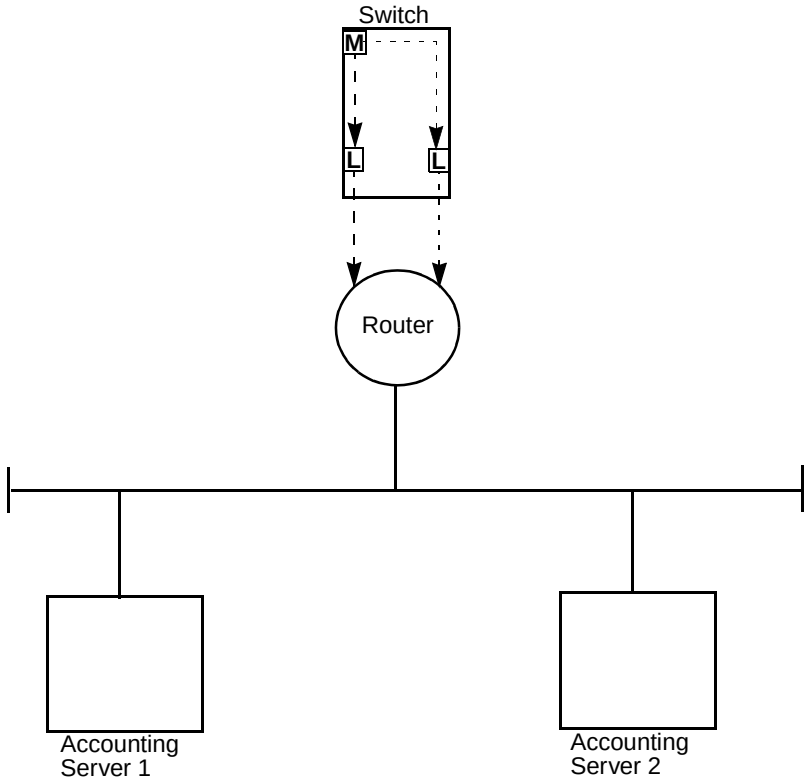


Figure 4-4. Two Accounting Servers Accessed Via a Router

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 4-24 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 are applied 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 PVCs, there is one port-level setting that allows you to 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, PVC Parameter Recording must be set to Enabled on the port, and PVC Accounting must be set 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 4-2 on page 4-17 for more details.

Circuit (PVC) Level

To perform usage data collection on a given PVC, PVC Accounting must be set to Enabled at 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).

When PVC Accounting is Enabled at the switch level, you can still inhibit collection of all PVC data on a given PVC by setting PVC Accounting to Disabled at the circuit level, or you can inhibit collection of a particular type of PVC accounting 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, CBR, UBR, and VBR) for SVCs are a subset of the SVC Accounting parameter at both the port and switch levels. For example, in order to perform UBR SVC Accounting on a logical port, UBR Accounting must be enabled at the port and switch levels, and SVC Accounting must be enabled at the port and switch levels.

In addition, in order to perform CBR Cell Counting on a logical port, you have 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 4-2 on page 4-17 and Table 4-3 on page 4-18 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 have 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 a switch
- 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
- 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

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 4-2 on page 4-17 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. They apply only to SVCs that are created after you apply your changes.

Table 4-2. SVC Configuration Hierarchy and Default Settings

Enable/Disable Parameters	Switch Level	Port Level
SVC Accounting	Disabled	Disabled
ABR Recording	Enabled[a]	Enabled[b]
UBR Recording	Enabled[b]	Enabled[b]
VBR Recording	Enabled[b]	Enabled[b]
CBR Recording	Enabled[b]	Enabled[c]
CBR Cell Counting	Enabled[c]	—
SVC Point-to-Point Originating	—	Enabled[d]
SVC Point-to-Point Terminating	—	Enabled[d]
SVC Point-to-MultiPoint Originating	—	Enabled[d]
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.

PVCs

You can enable/disable the following options for 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, 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 4-3. 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 4-4 provides examples of how to configure 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 4-4. 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**
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.

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 4-7 for more information.

2. Set up each of your Accounting Servers in the CascadeView 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 4-2 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 4-21.

   For instructions on how to configure circuit-level settings for PVCs, see "Configuring PVC Accounting at the Circuit Level" on page 4-28.

   For instructions on how to configure switch-level settings, see "Configuring Accounting at the Switch Level" on page 4-36.

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 PVCs for which PVC Accounting is set to Enabled at the circuit level.

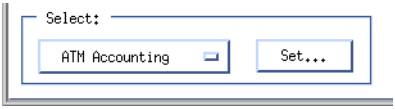
This section applies only to UNI/NNI ports. If the logical port is a non-UNI/NNI port, the Set ATM Accounting function is disabled, and you cannot access the Set ATM Accounting LPort Attributes dialog box.

See the *Network Configuration Guide for CBX 500* for information on dialog boxes not shown or described here.

To configure Accounting System settings at the port level:

1. From the network map, select the appropriate switch icon.
2. From the menu bar, select Administer=>Cascade Parameters=>Set Parameters to access the Switch Back Panel dialog box.
3. Select the physical port you want to modify, then choose Set Attr to display the Set ATM 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 ATM Accounting from the Options list button, then choose Set.



The Set ATM LPort Accounting Attributes dialog box appears.

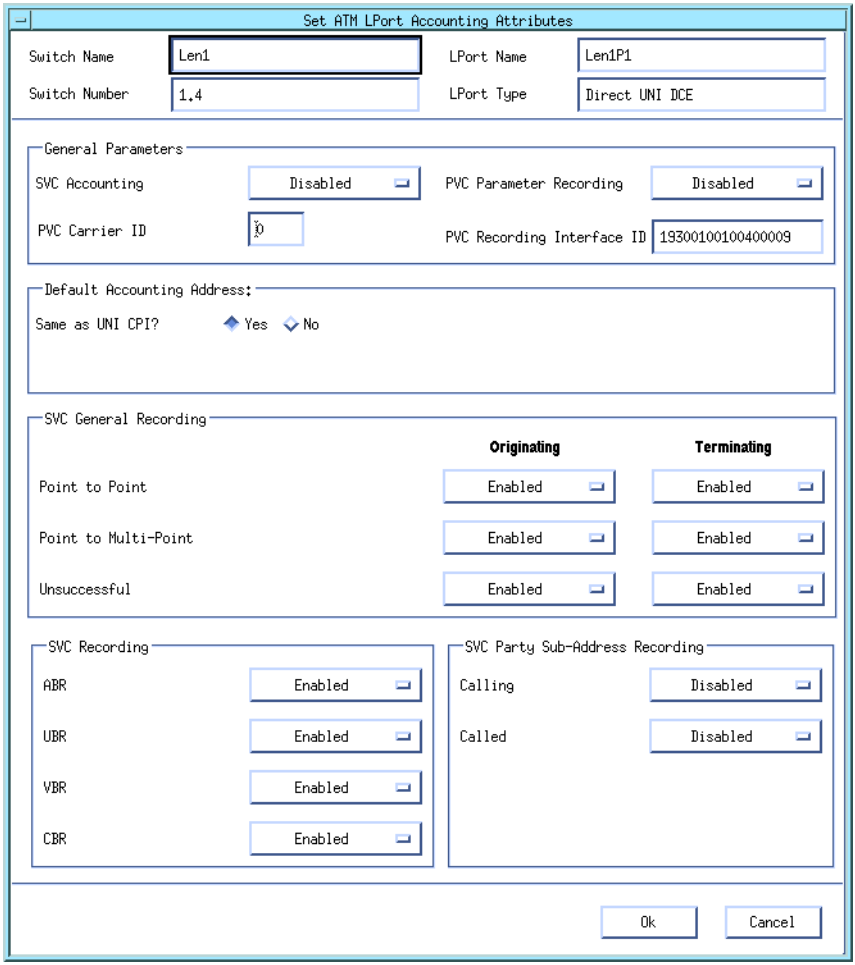


Figure 4-5. Set ATM LPort Accounting Attributes Dialog Box

7. See Table 4-5 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 4-5. 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.

Table 4-5. Logical Port Accounting System Settings (Continued)

Field	Description
PVC Parameter Recording	*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: • 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.
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 have to PRAM sync the IOM on which that logical port resides. For information on how to PRAM sync an IOM, see the* Network Configuration Guide for CBX 500.
PVC Recording Interface ID	A read-only field that displays the 17-digit PVC Recording Interface ID, which is comprised 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.

Table 4-5. Logical Port Accounting System Settings (Continued)

Field	Description
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 have 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.
SVC General Recording	
Point to Point (Originating and Terminating)	*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)	*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 4-5. 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-33 on page A-40**.*

Table 4-5. Logical Port Accounting System Settings (Continued)

Field	Description
SVC Recording *If the logical port is not a UNI/NNI port, all ATM 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, UBR, CBR, or VBR), as well as collect usage data for research only.*	
ABR UBR CBR VBR	*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 ATM AESA private address or a native E.164 address, 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.

Table 4-5. Logical Port Accounting System Settings (Continued)

Field	Description
Called	*Enabled* – The Called Party Sub-Address, which may be either an ATM AESA private address or native E.164 address, 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 4-13 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. 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 Point-to-Multipoint PVCs" on page 4-32.

Configuring Accounting on Point-to-Point PVCs

To configure circuit-level Accounting System settings for a point-to-point PVC:

1. From the network map menu bar, select Administer=>Cascade 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 *Network Configuration Guide for CBX 500*.

2. If you are adding a new PVC, select Add, then see the *Network Configuration Guide for CBX 500* for instructions on how to add 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 ATM Accounting. The Set ATM PVC Accounting Attributes dialog box appears.

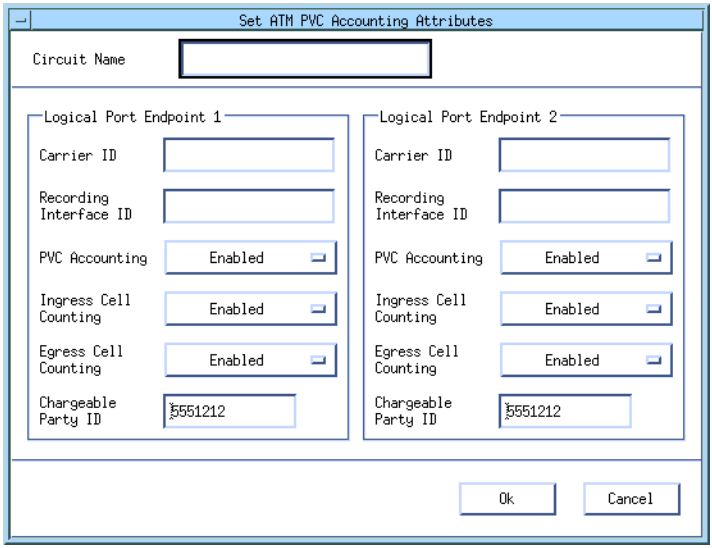


Figure 4-6. Set ATM PVC Accounting Attributes Dialog Box

4. See Table 4-6 for information on each of the fields on this screen. You have 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 4-6. Circuit-Level PVC Accounting Fields

Field	Description
Circuit Name	A read-only field that displays the name of the PVC you are adding or modifying.
Carrier ID	A 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 4-24.
Recording Interface ID	A read-only field that contains the 16-digit PVC Recording Interface ID, which is comprised 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.

Table 4-6. Circuit-Level PVC Accounting Fields (Continued)

Field	Description
Ingress Cell Counting, Egress Cell Counting	*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.
Chargeable Party ID	Enter the 1- to 15-digit chargeable party ID (in decimal format) for this PVC.

Configuring Accounting on 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 CascadeView/UX network map menu bar, select Administer=>Cascade Parameters=>Set All Circuits=>Point-to-Multipoints. 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 *Network Configuration Guide for CBX 500*.
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 4-35.

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-Multipoint Circuit Root dialog box.
4. Configure the circuit root as described in the *Network Configuration Guide for CBX 500*.
5. When finished, choose Set ATM Accounting from the Add Point-to-Multipoint Circuit Root dialog box. The Set ATM PMP Root Accounting Attributes dialog box appears (Figure 4-7).
6. See Table 4-6 on page 4-30 for information about the fields in this dialog box.

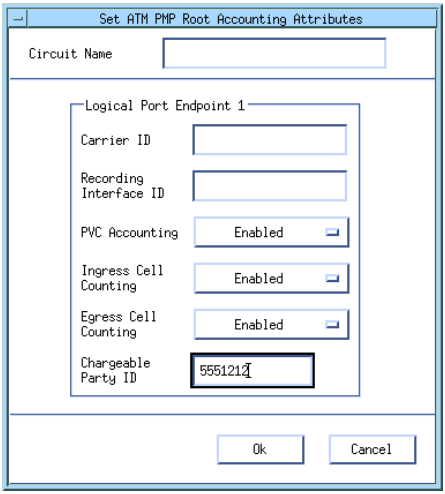


Figure 4-7. Set ATM PMP Root Accounting Attributes Dialog Box

7. When you have finished configuring the settings in this dialog box, choose OK to return to the Set All Point-to-Multipoint 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 *Network Configuration Guide for CBX 500*.

10. In the Defined Point-to-Multi-Point Circuit Leafs section of the dialog box, choose ATM Accounting. The Set ATM PMP Leaf Accounting Attributes dialog box (Figure 4-8) appears. See Table 4-6 on page 4-30 for information about the fields in this dialog box.

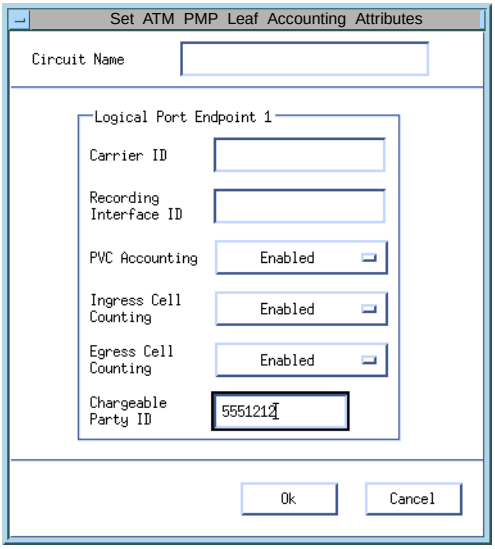


Figure 4-8. Set ATM PMP Leaf Accounting Attributes

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 following steps. 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 have to delete the PMP circuit, then add it again using the procedure in the previous section.

The procedure in this section 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 4-33) to configure accounting on those leaves.

To modify the Accounting settings for a PMP PVC circuit leaf:

1. Select the circuit root from the Define All 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. From the Defined Point-to-Multiple-Point Circuit Leafs list box, choose ATM Accounting. The Set ATM PMP Leaf Accounting Attributes dialog box (Figure 4-8 on page 4-34) appears.
5. See Table 4-6 on page 4-30 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 PMP 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 one-by-one, 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. Therefore, you have 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 CascadeView network map, select the switch. Then, from the menu bar, select Administer=>Cascade Parameters=>Set Parameters to display the Switch Back Panel dialog box.

   b. Select the Set Sw Attr button to display the Set Switch Attributes dialog box.

   c. Select the Accounting button to display the Set ATM Accounting Attributes dialog box (see Figure 4-9). Then go to Step 3.

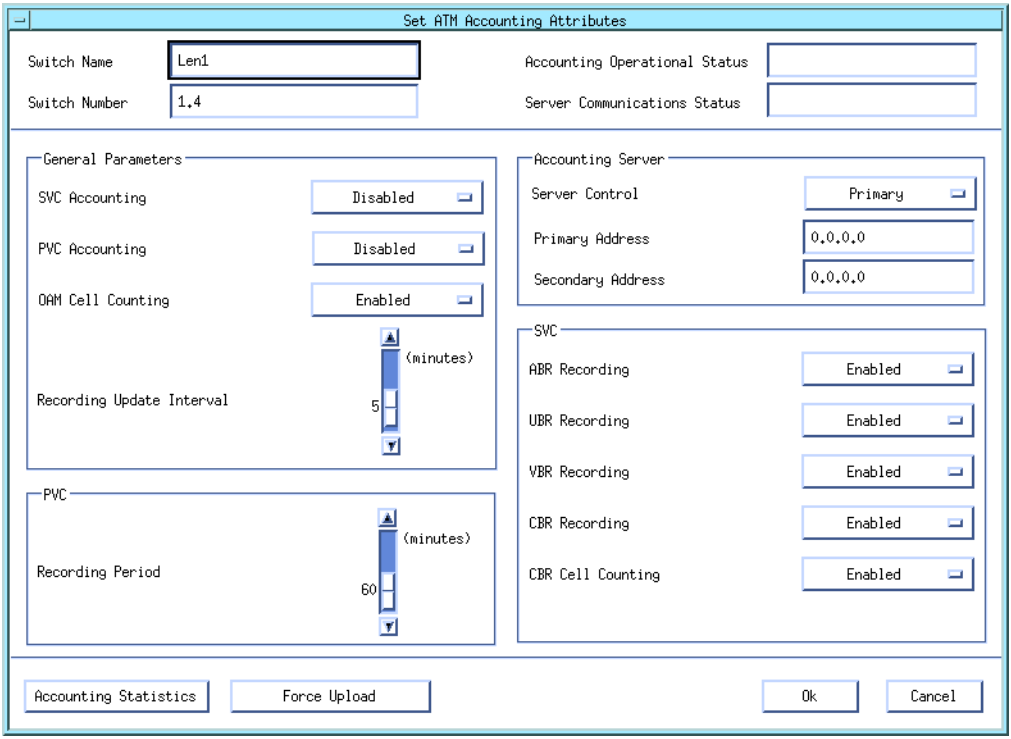


Figure 4-9. Set ATM Accounting Attributes Dialog Box

2. If your network configuration is such that you can configure accounting on all switches at once, from the CascadeView menu bar, select Administer=>Cascade Parameters=>Set All ATM Accounting Parameters=>Set Network Parameters. The ATM Accounting Network Settings dialog box (shown below) appears. This dialog box is similar to the Set ATM Accounting Attributes dialog box, except that it does not contain switch-specific fields.

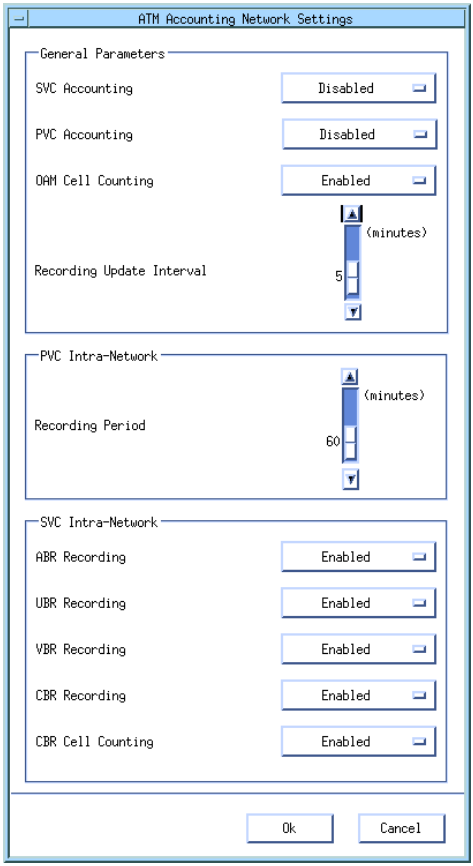


Figure 4-10. ATM Accounting Network Settings Dialog Box

3. See Table 4-7 for information on each of the fields.

4. When you finish configuring all values, choose OK. If you are on the Switch Settings screen, you return to the Switch Back Panel screen. If you are on the Network Settings screen, you return to the network map.

Keep in mind that when you choose OK from the Network Settings screen, the defined configuration is downloaded and applied to all of the switches in the network. If any switches require unique settings, you then need to configure those settings from the Switch Settings screen.

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 five 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 4-7. 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	A 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.

Table 4-7. Switch-Level Accounting System Settings (Continued)

Field	Description
Server Communications Status	A 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.
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 4-21). *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 4-28). *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).

Table 4-7. Switch-Level Accounting System Settings (Continued)

Field	Description
OAM Cell Counting	*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 1-10.
Recording Update Interval	Specifies how often a snapshot is taken of the state of all ATM 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 4-7. 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	A 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 4-2.
Secondary Address	A read-only field that contains the IP address of the secondary Accounting Server for this switch.

Table 4-7. Switch-Level Accounting System Settings (Continued)

Field	Description
SVC	
ABR Recording	*Enabled* – (Default) ABR (Available Bit Rate) 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 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 4-21). *Disabled* – No ABR cell traffic is included in usage data collection. If you select Disabled, setting ABR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
UBR Recording	*Enabled* – (Default) UBR (Unspecified Bit Rate) 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 usage data collection on individual user ports by setting UBR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 4-21). *Disabled* – No UBR cell traffic is included in usage data collection. If you select Disabled, setting UBR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
VBR Recording	*Enabled* – (Default) VBR (Variable Bit Rate) 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 usage data collection on individual user ports by setting VBR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 4-21). *Disabled* – No VBR cell traffic is included in usage data collection. If you select Disabled, setting VBR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.

Table 4-7. Switch-Level Accounting System Settings (Continued)

Field	Description
CBR Recording	*Enabled* – (Default) CBR (Constant Bit Rate) 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 usage data collection on individual user ports by setting CBR Recording to Disabled at the port level (see "Configuring Accounting at the Port Level" on page 4-21). *Disabled* – No CBR cell traffic is included in usage data collection. If you select Disabled, setting CBR Recording to Enabled at the port level has no effect; it will still be inhibited on the logical port.
CBR Cell Counting	*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.

5

Managing Accounting on the Switch

This chapter describes how to use CascadeView 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 CascadeView 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 CascadeView network map, double-click the switch on which the logical port resides.

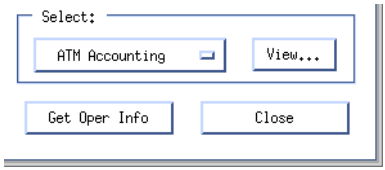
   You access the Switch Back Panel dialog box.

2. Select the physical port, then choose *Get Attr* to display the Physical Port Attributes dialog box.

3. Choose *Logical Port* to display the Set 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 ATM Accounting from the Options list button.



6. Choose View to display the Show ATM Logical Port Accounting Attributes dialog box.

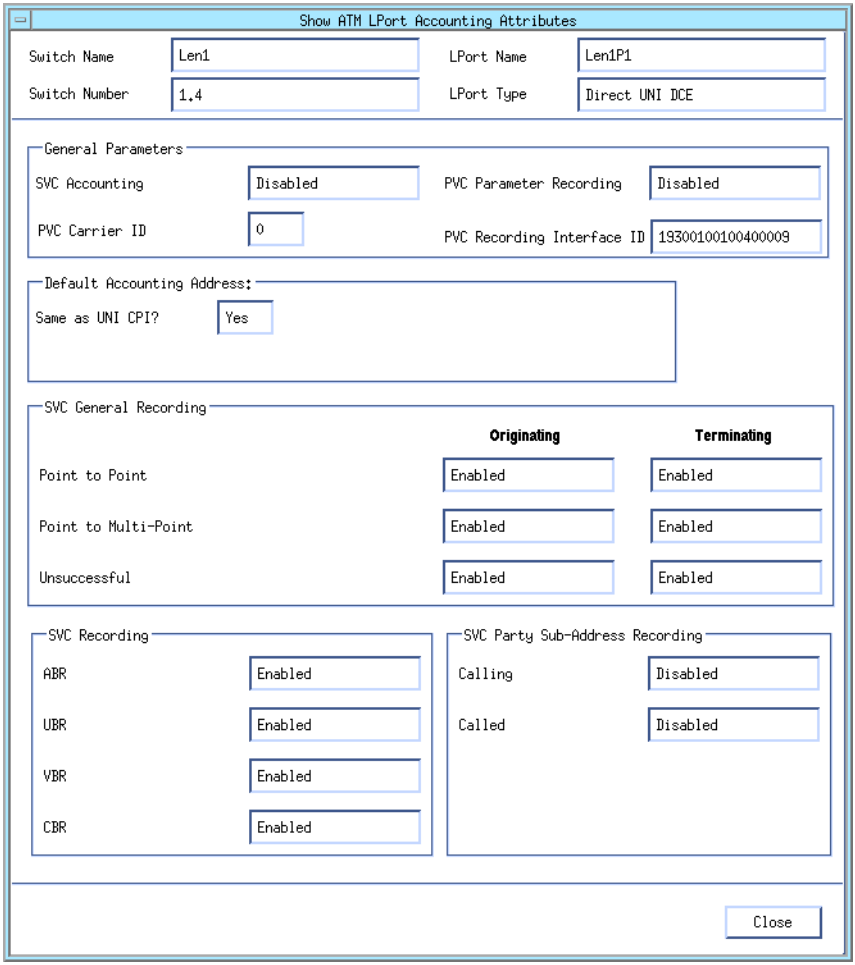


Figure 5-1. Show ATM LPort Accounting Attributes Dialog Box

For information on the fields in this dialog box, see Table 4-5 on page 4-23.

7. 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 network map menu bar, select Monitor=>Cascade Objects=>Show Circuits=>All on Switch to display the Show All PVCs on Switch dialog box.

2. Select the PVC from the Defined Circuit Name list box, then choose ATM Accounting to display the Show ATM PVC Accounting Attributes dialog box.

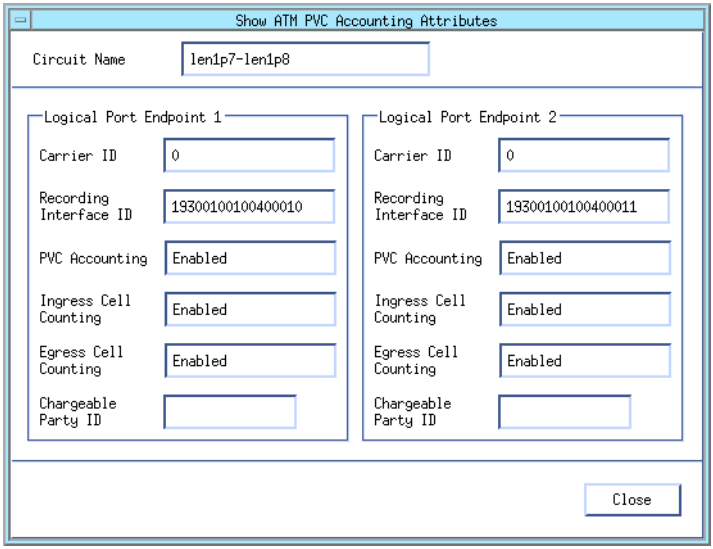


Figure 5-2. Show ATM PVC Accounting Attributes Dialog Box

For information on the fields in this dialog box, see Table 4-6 on page 4-30.

3. Choose Close to exit.

Viewing Point-to-Multipoint PVC Settings

From CascadeView, 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 4-6 on page 4-30.

To view the Accounting System settings for a PVC root or leaf:

From the network map menu bar, select Administer=>Cascade 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 ATM Accounting to display the Show ATM PMP Root Accounting Attributes dialog box.

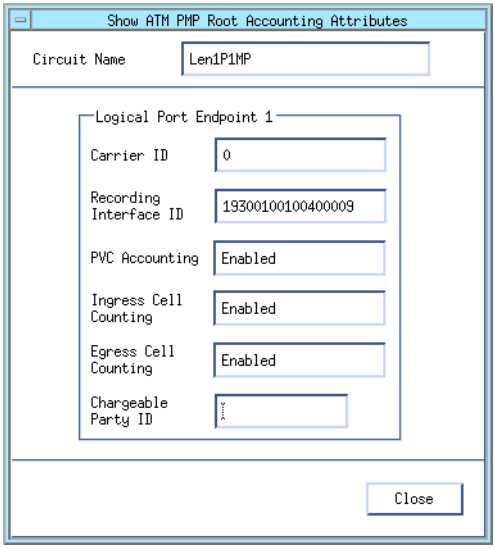


Figure 5-3. Show ATM PMP Root Accounting Attributes Dialog Box

For information on these fields, see Table 4-6 on page 4-30.

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 ATM PMP Leaf Accounting Attributes dialog box.

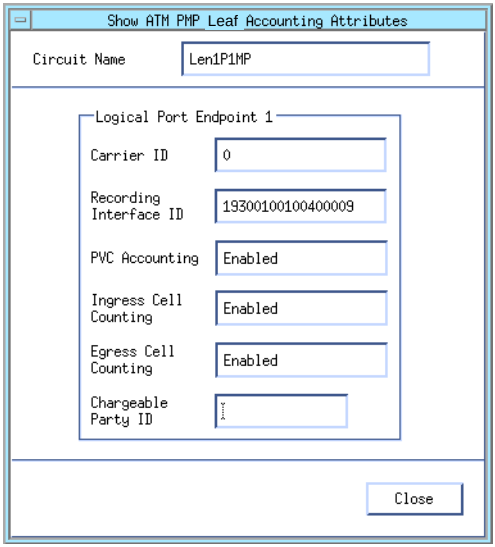


Figure 5-4. Show ATM PMP Leaf Accounting Attributes Dialog Box

For information on these fields, see Table 4-6 on page 4-30.

5. Choose Close to exit.

Viewing Switch Settings

To view the Accounting System settings for a given switch:

1. From the CascadeView network map, double-click the switch.

   You access the Switch Back Panel dialog box.

2. Choose the Get Sw Attr button to display the Get Switch Attributes dialog box.

3. Choose Accounting to display the Show ATM Accounting Attributes dialog box. For information on the fields in this dialog box, see Table 4-7 on page 4-39.

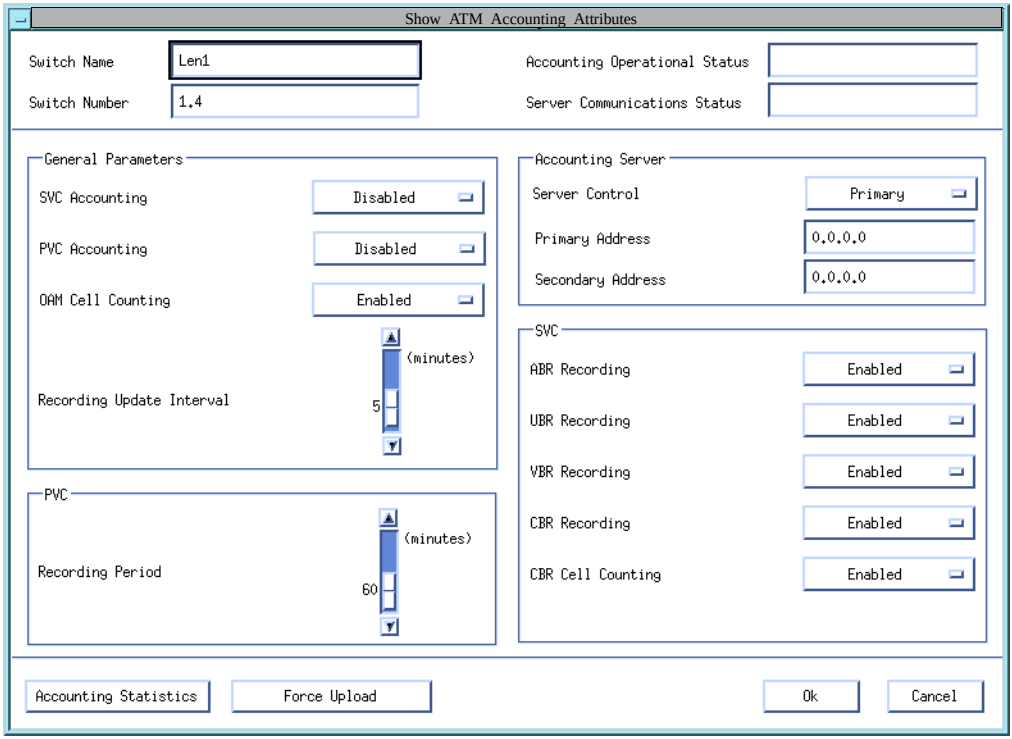


Figure 5-5. Show ATM Accounting Attributes Dialog Box

4. Choose Close to exit.

Displaying Switch Statistics

Accounting statistics for any switch can be displayed via CascadeView. 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 displayed:

- The number of AP file transfer failures for the current day
- The start and end time of the current recording interval
- Various usage record statistics, including:
  - The number of usage record creation failures during the current day
  - The number of usage records transferred to the AS during the current day
  - The number of SVC records created during the current day
  - The number of SVC records created during the current recording interval
  - The 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 CascadeView network map, double-click the switch.

   You access the Switch Back Panel dialog box.

2. Choose the Get Sw Attr button to display the Show Switch Attributes dialog box.
3. Choose the Accounting button to display the Set ATM Accounting Attributes dialog box.
4. Choose the Accounting Statistics button to display the CBX 500 Accounting Statistics window (Figure 5-6).

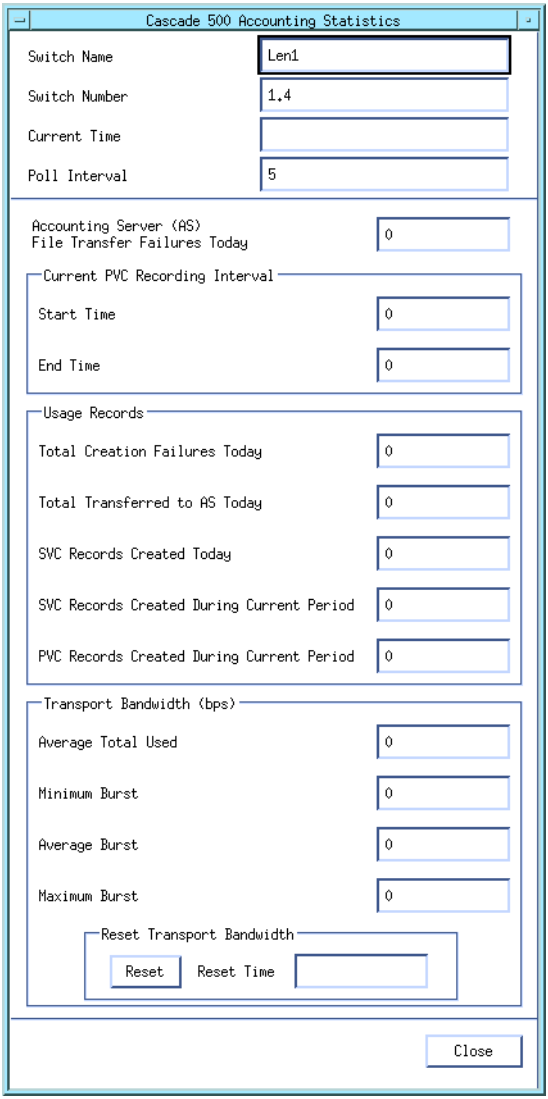


Figure 5-6. CBX 500 Accounting Statistics Window

5. See Table 5-1 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 5-12).

Table 5-1. Accounting Statistics

Field	Description
Switch Name/ Switch Number	Displays the switch name and switch number for the selected switch.
Reset Time	Displays the last time that the Reset button was pressed to reset the Transport Bandwidth values to zero (see "Resetting the Transport Bandwidth Counters" on page 5-12).
Current Time	Displays the current local time.
Poll Interval	Displays the current polling interval in minutes. The poll interval refers to 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	Displays the number of times that statistics file uploads 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	Displays the time of day at which the current PVC recording interval started, in HH:MM:SS format. For information on the PVC recording interval, see page 4-42.
End Time	Displays the time of day at which the current PVC recording period is scheduled to end, in HH:MM:SS format.

Table 5-1. Accounting Statistics (Continued)

Field	Description
Usage Records	
Total Creation Failures Today	Displays the number of times that a usage data record could not be created on the switch during the current 24-hour period.
Total Transferred to AS Today	Displays the total number of usage data records that were transferred to the switch's Accounting Server (including those transferred to either the primary or secondary server) during the current 24-hour period.
SVC Records Created Today	Displays the total number of SVC usage data records that were 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	Displays the total number of SVC records that were created during the current 24-hour SVC rate period.
PVC Records Created During Current Period	Displays the total number of PVC records that were created during the current recording interval.
Transport Bandwidth (bps) *The values in these fields are all shown 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	Displays the current running average of bandwidth that is being used to transfer usage data between this switch and its Accounting Server.
Average Burst	Displays the current running average channel burst bandwidth between this switch and its Accounting Server. For example, if there were three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field would be 13Kbps.
Minimum Burst	Displays the smallest channel burst bandwidth between this switch and its Accounting Server. For example, if there were three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field would be 10Kbps.

Table 5-1. Accounting Statistics (Continued)

Field	Description
Maximum Burst	Displays the largest channel burst bandwidth between this switch and its Accounting Server. For example, if there were three bursts of 10Kbps, 15Kbps, and 14Kbps, the value in this field would be 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 pressing 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 network map, select the switch.
2. From the network map menu bar, select Administer=>Cascade Parameters=>Set Parameters to display the Switch Back Panel dialog box.
3. Choose the Set Sw Attr button to display the Set Switch Attributes dialog box.
4. Choose ATM Accounting to display the Set ATM Accounting Attributes dialog box.

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.

6

Managing the Accounting Server

This chapter describes how to manage and monitor each of the Accounting Servers in your Accounting System, including:

- How to start and stop Accounting Server processes
- How to configure the Accounting Server for secure FTP transferal of accounting data
- How to view the status of Accounting Server processes
- How to view the contents of files produced by the system, including BAF files, ASCII files, usage data files, and audit count files

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 6-10.

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
```

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, type **./asfts-start start** and press Return. To stop the File Transfer process, type **./asfts-start stop** and press Return.

Table 6-1 lists and describes the available scripts.

Table 6-1. Accounting Server Process Scripts

Script	Purpose
asda-start	Use this script to start and stop 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	Use this script to start and stop the BAF Generation process, which converts raw usage data files for PVCs and SVCs into BAF format.
asbt-start	Use this script to start and stop the AMA file transfer process. This process transfers AMA records to your Billing Operations Server.
asage-start	Use this script to start and stop 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 3-18). After the specified time period has passed, this process automatically deletes the files. If you stop this process, AMA files that have already been transferred remain in the archive directories on the Accounting Server until you manually delete or remove them, or until you restart this process.
ascomp-start	Use this script to start and stop 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.

Table 6-1. Accounting Server Process Scripts (Continued)

Script	Purpose
asfts-start	Use this script to start and stop 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 such time as this process is restarted or the communications state of the Accounting System goes to a Red state (see "Anomalous Events" on page 8-3). If you stop this process, it is recommended that you change all affected switches to their secondary 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	Use this script to start and stop 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.*

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 3-19.

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 6-1).

```
Accounting Server FTP Server Configuration

-----------------------------------------
|             Main Menu                 |
-----------------------------------------


1)     Users
2)     FTP Port
3)     Exit

Enter Choice:
```

Figure 6-1. 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 6-2).

```
-----------------------------------------
|             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 6-2. 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 6-3). 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:
```

Figure 6-3. 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 6-4).

```
-----------------------------------------
|          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 6-4. 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 6-2. 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 6-11.
auditdump	Displays the audit data contained in the specified file. See page 6-22.
asciidump	Displays the contents of the specified ASCII file. See page 6-21.
udfdump	Displays the contents of usage data files. See page 6-27.

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 6-1 on page 6-3.

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 3-5). 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 6-5.

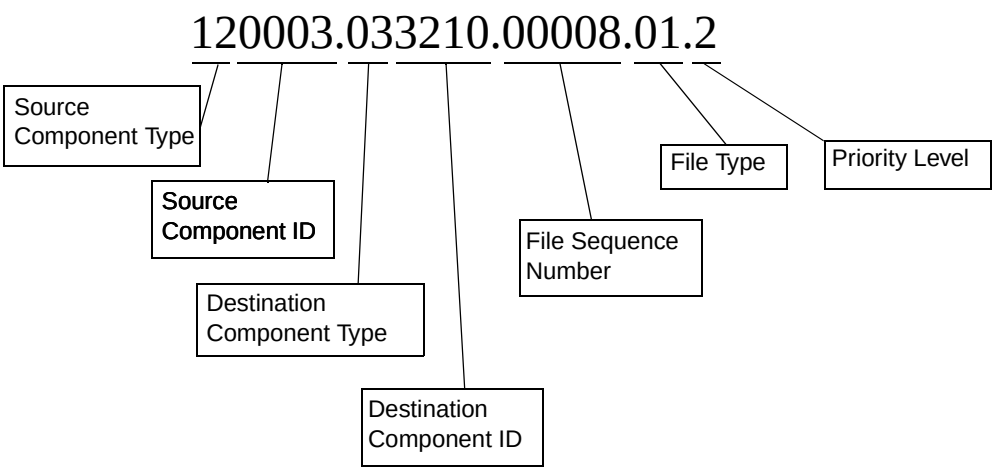


Figure 6-5. BAF Filename Format

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 3-15).

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 second 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 3-17 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 AMA 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 6-3 shows the valid file type codes. For standard BAF AMA files, this value is always 01 in the filename.

Table 6-3. AMA File Type Codes

Code	File Type
00	Tape Format AMA File
01	Standard AMA File
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:

```
./bafdump /CascadeAS/data/ama/130003.073210.00008.01.2 | more
```

A listing similar to the following example (Figure 6-6) 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 6-6 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 6-6. 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 3-5). By default, ASCII files are stored in /CascadAS/data/ama/primary.

ASCII filenames are in the format shown in Figure 6-7.

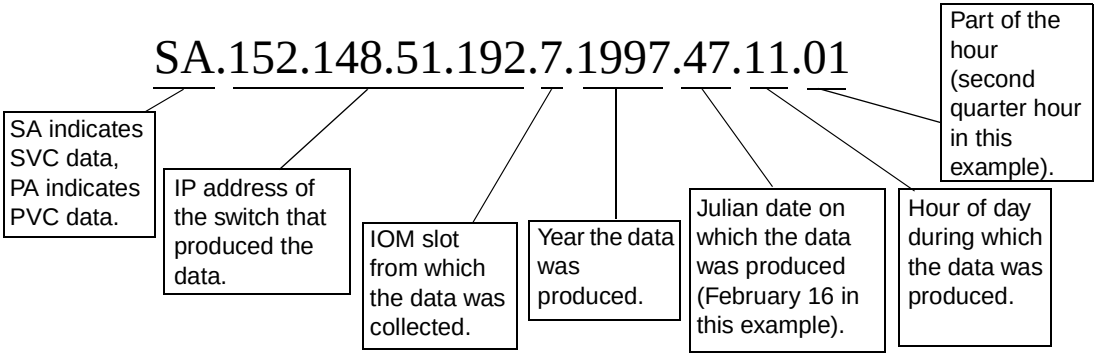


Figure 6-7. ASCII Filename Format

To display the contents of an ASCII record file, log in as root, then enter the following commands:

```
cd /CascadeAS/tools
./asciidump [directory_path]/[filename] | more
```

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/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 either "SVC ASCII File Structure" on page A-22 or "PVC ASCII File Structure" on page A-33.

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
```

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 — The number of new SVC call attempts for a switch on a given day, including call failures.

SVC call completions — The number of SVC call completions for a switch on a given day, including call failures.

PVCs enabled — The number of PVCs reported to have become operationally enabled on a switch on a given day.

PVCs disabled — The 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 6-8.

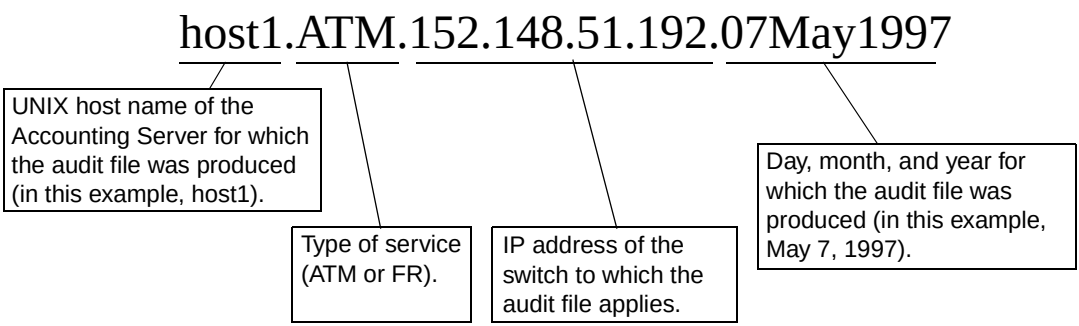


Figure 6-8. Switch Audit Statistics File Naming Format

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 called 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 — The number of SVC records created and written to a primary AMA file (including call completions and call failures).

PVC records created — The number of PVC records created and written to a primary AMA file.

AMA files created — The number of primary AMA files created.

AMA files transferred — The number of AMA files successfully transferred to the Billing Operations Server.

AMA file transfer failures — The number of AMA files that were not transferred to the Billing Operations Server.

AMA records sent — The 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 6-9, and are stored in the directory /CascadeAS/data/audit by default.

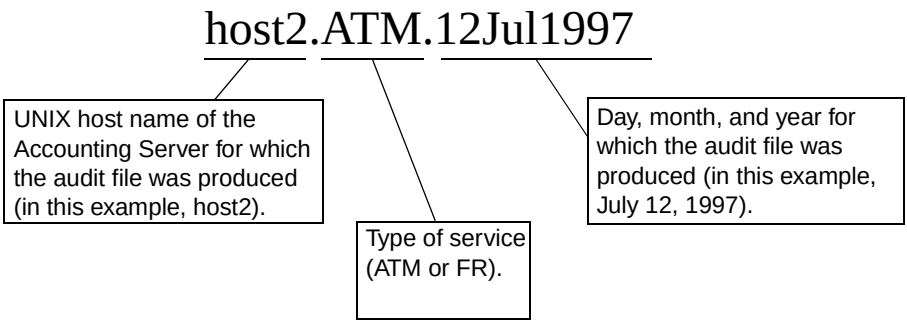


Figure 6-9. Server Statistics Filename Format

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 name “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 called “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                        =  02
   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 anomoly. 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] [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.

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 6-10. 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).

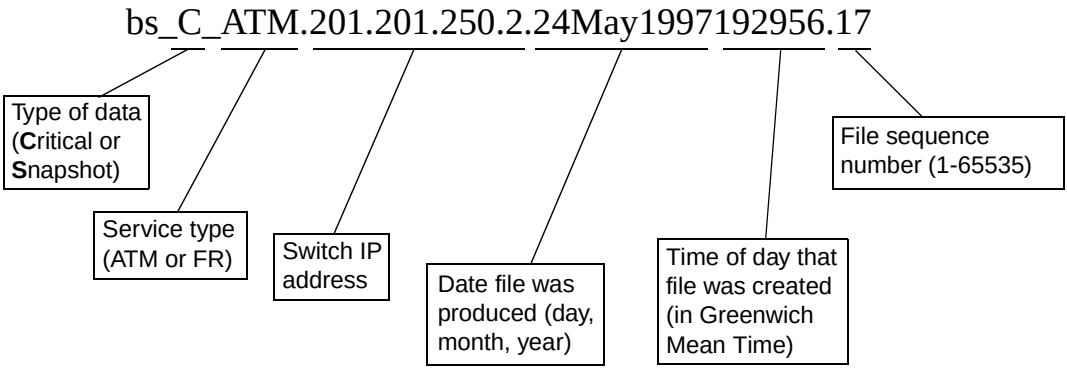


Figure 6-10. Usage Data Filename Format

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.

7

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 that are generated 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 CascadeView for each switch (see Chapter 8, “SNMP Traps”).

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 ASerror.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 — Indicates the day on which the error was generated, in mm/dd/yy format (GMT).

time — Indicates the time of day that the error was generated, in hh:mm:ss format (GMT).

error_code — The error code associated with the error message.

severity — The severity level of the message. If no severity level is displayed in the message, then the message is simply informational. 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	Indicates the existence of a non-fatal condition

process — The 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 CascadeView 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 CascadeView 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 CascadeView 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 CascadeView 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 “Ascend Switch Configuration” on page 3-26).

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)
```

8

SNMP Traps

This chapter describes the SNMP trap events generated by the Accounting Server and CBX 500 switches. Trap events are sent to each NMS in the switching system that is enabled to receive traps.

A list of currently logged SNMP trap events can be displayed at any time on any NMS connected to the switching system using CascadeView. 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 as: *Normal*, *Minor*, *Major*, and *Critical*.

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 CBX 500 switches, and LPort Status traps are generated by logical ports on a CBX 500 switch.

Normal Events

This section describes the Normal SNMP trap events that are generated by the Accounting System. These events are simply informational. They do not indicate a problem or potential problem within the billing system.

The Accounting Server is operational

This is a node-type trap indicating that the Accounting Server is operating normally.

The Accounting Server has been shutdown

This is a node-type trap indicating that Accounting Server operations have been stopped.

Accounting has been [*enabled/disabled*] for service ATM

This is 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 CascadeView.

Accounting has been [*enabled/disabled*] for service ATM on [*LPort ID*]

This is an 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 CascadeView.

The state of communications to the ATM accounting system on the switch has changed to [*Green/Yellow/Red*]. The current switch Level Accounting Server Control is [*Primary/Secondary*] (Primary Accounting Server = IPAddr, Secondary Accounting Server = IPAddr)

The Accounting Server communications state trap is generated when the Accounting Server Control is changed between Primary and Secondary. 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.

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 CascadeView Events screen for a switch, 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.

The state of communications to the ATM accounting system on the switch has changed to [*Green/Yellow/Red*]. The current switch Level Accounting Server Control is [*Primary/Secondary*] (Primary Accounting Server = IPAddr, Secondary Accounting Server = IPAddr)

Meaning
This is a node-type trap issued by the CBX 500 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 five 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 enters a Red state.

Corrective Action
To resolve this situation, configure the switch to use the Secondary Accounting Server (if one is configured) while investigating the cause of the communication failure to the Primary Accounting Server. Check the Accounting Server to see if it is online; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.

A usage record could not be created for service ATM

Meaning
This is a node-type trap signifying that the CBX 500 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
If this message appears on the Trap Event screen, check the Accounting Server to see if it is online; if it is, check to see if the Accounting Server is connected to and communicating with the switching system.

Accounting Server disk space for [*directory_name*] has exceeded [*threshold_value*] percent of capacity ([*threshold_type*])

Meaning
This is a Major node-type trap indicating that a configured disk space threshold for the indicated file system or directory has been exceeded, where [*threshold_value*] is the percentage that has been exceeded and [*threshold_type*] is either Minor, Major, or Critical. See "Accounting File Purging" on page 3-18 for more information on file system thresholds.

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 file system should be increased. If so, allocate more disk space for the indicated file system.

Example
Accounting Server disk space for /CascadeAS/data/ama/primary has exceeded 95 percent of capacity (critical).

Accounting Server disk space for [*directory_name*] has been reduced to [*disk_percentage_used*] of capacity

Meaning
This is 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
No action needed.

Example
Accounting Server disk space for /CascadeAS/data/ama/primary has been reduced to 80% of capacity.

The Accounting Server has received data from a switch that is not in the configuration. Please update the Accounting Server configuration.

Meaning
This is a Major node-type trap that is sent when the Accounting Server receives data from a switch which the Accounting Server has not been configured to process.

Corrective Action
Determine which switch is sending the data, then add the switch to the Accounting Server configuration by running the configAS utility. See "Ascend Switch Configuration" on page 3-26 for instructions on how to add a switch to the Accounting Server configuration.

The Accounting Server failed to transfer one or more AMA files to the BOS.

Meaning
This is 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.

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 3-19 for information on file transfer configuration). Also, verify that the Accounting Server is able to communicate with the Billing Operations Server.

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

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

Table A-1. BAF Structure 0216 (Continued)

Table Name	Table Number	Number of BCD Characters	Byte Offset
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
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 3-14).
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
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

Table A-3. BAF Structure 0214 (Continued)

Table Name	Table No.	Number of BCD Chars.	Byte Offset
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 3-14).

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 CascadeView).
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 CascadeView).
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 CascadeView).
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 CascadeView 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 NavisXtend 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
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 NavisXtend 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

Table A-25. Table 7 Timing Indicator (Continued)

Chars.	Meaning	Value
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 NavisXtend 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 NavisXtend 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 NavisXtend Accounting Server always reports standard Cause Indications, as defined in the ITU/ATM Forum UNI Signalling specifications. Therefore, the NavisXtend 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-33 on page A-40)
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

SVC ASCII File Structure

The ASCII file structure for SVC usage records is listed below. A description of each of the fields in this file follows in Table A-29.

```
VerNum,
Type,
SwitchID,
IomNum,
Lport,
Pport,
ConnID,
Bcci,
Timestamp,
Timestamp100,
CauseValue,
StudyInd,
SPvcInd,
OriginatingNodeInd,
FwdBEInd,
BwdBEInd,
DefaultAddrUsage,
CgSubAddrInd,
CdSubAddressInd,
ConnectTimeValidInd,
ConnectTime,
```

```
ConnectTime100,
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,
RemoteConnId,
TermAddrNumPlan,
TermAddNumDigits,
TermAddrType,
TermAddr,
CgSubAddrNumPlan,
CgSubAddNumDigits,
CgSubAddrType,
CgSubAddr,
CdSubAddrNumPlan,
CdSubAddNumDigits,
CdSubAddrType,
```

```
CdSubAddr,
LegsAdded,
LegsDeleted,
LegsFailed,
InTotalCLP01,
InTotalCLP0,
OutTotalCLP01,
OutTotalCLP0
```

Table A-29. SVC 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.
ConnID	The VPI/VCI of the circuit to which this data applies.
Bcci	The Billing Call Correlation ID for the circuit.
Timestamp	When combined, these two values indicate the last time the record was updated. The first 10 digits indicate the time expressed in seconds, and the last two digits define the time down to 1/100ths of a second. You can determine the elapsed time of a call by subtracting the Connect Time value from the Timestamp value.
Timestamp100	

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
CauseValue	Indicates why the circuit was terminated. See Table A-33 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
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

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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 ConnectTime100	When combined, these two values indicate the length of time the circuit was active (connected). The first 10 digits indicate the time expressed in seconds, and the last two digits define the time down to 1/100ths of a second. You can determine the elapsed time of a call by subtracting the Connect Time value from the Timestamp value.
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

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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 = Unknown 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Unspecified Bit Rate (UBR) 5 = Unspecified
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-32).
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-32).
BwdQos	The Quality of Service setting for backward traffic on this circuit: 0 = Unknown 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Unspecified Bit Rate (UBR) 5 = Unspecified

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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.
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-32).
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-32).
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.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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.
RemoteConnId	The VPI/VCI for the remote end of the circuit.
TermAddrNumPlan	The numbering plan for the terminating address: 0 = Unknown 1 = Native E.164 2 = AESA

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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.

Table A-29. SVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
LegsFailed[a]	The number of leg creation failures.
InTotalCLP01	The total number of inbound CLP=0+1 cells. Value can be in the range of 0-9,999,999,999.
InTotalCLP0	The total number of inbound CLP=0 cells. Value can be in the range of 0-9,999,999,999.
OutTotalCLP01	The total number of outbound CLP=0+1 cells. Value can be in the range of 0-9,999,999,999.
OutTotalCLP0	The total number of outbound CLP=0 cells. 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	n/a[a]	n/a	n/a
CLPNOSCR	PCR=0+1	PCR=0	n/a
CLPSCR	PCR=0+1	SCR=0	MBS=0
NOCLPNOSCR	PCR=0+1	n/a	n/a
NOCLPSCR	PCR=0+1	SCR=0+1	MBS=0+1
NOCLPNOSCRMCR	PCR=0+1	MCR=0+1	n/a

a. n/a=Not applicable

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-31.

```
VerNum,
Type,
SwitchID,
IomNum,
Lport,
Pport,
ConnID,
Bcci,
Timestamp,
Timestamp100,
CauseValue,
ConnectionType,
StudyInd,
PointToMultiPointInd,
ParamRecInd,
SPvcInd,
InTaggingInd,
EgTaggingInd,
OriginatingNodeInd,
ConnectTimeValidInd,
ConnectTime,
ConnectTime100,
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. 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.

Table A-31. PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
ConnID	The VPI/VCI of the circuit to which this data applies.
Bcci	The Billing Call Correlation ID for the circuit.
Timestamp Timestamp100	When combined, these two values indicate the last time the file was updated. The first 10 digits indicate the time expressed in seconds, and the last two digits define the time down to 1/100ths of a second. You can determine the elapsed time of a call by subtracting the Connection Time value from the Timestamp value.
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
SPvcInd	Indicates whether this is a normal SVC, or an SVC connected to a PVC: 0 = Normal SVC 1 = SVC connected to PVC

Table A-31. 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
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	When combined, these two values indicate the length of time the circuit was active (connected). The first 10 digits indicate the time expressed in seconds, and the last two digits define the time down to 1/100ths of a second. You can determine the elapsed time of a call by subtracting the Connect Time value from the Timestamp value.
ConnectTime100	
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. 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 Connection VCI	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 = Unknown 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Unspecified Bit Rate (UBR) 5 = Unspecified
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-40).

Table A-31. PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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-40).
EgQos	The Quality of Service setting for egress traffic: 0 = Unknown 1 = Constant Bit Rate (CBR) 2 = Variable Bit Rate-Real Time (VBR-RT) 3 = Variable Bit Rate-NonReal Time (VBR-NRT) 4 = Unspecified Bit Rate (UBR) 5 = Unspecified
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-40).

Table A-31. PVC ASCII Call File Field Descriptions (Continued)

Field Name	Description
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-40).
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.
OutTotalCLP01	The total number of outbound CLP=0+1 cells.
OutTotalCLP0	The total number of outbound CLP=0 cells.

Table A-32. Settings for PVC Traffic Parameters

Traffic Descriptor Base Type	TrafficParam1	TrafficParam2	TrafficParam3
Unknown	n/a[a]	n/a	n/a
CLPNOSCR	PCR=0+1	PCR=0	n/a
CLPSCR	PCR=0+1	SCR=0	MBS=0
NOCLPNOSCR	PCR=0+1	n/a	n/a
NOCLPSCR	PCR=0+1	SCR=0+1	MBS=0+1
NOCLPNOSCRMCR	PCR=0+1	MCR=0+1	n/a

a. n/a=Not applicable

Circuit Termination Cause Values

Table A-33 lists and describes the cause values that indicate why a circuit or circuit creation attempt has been terminated.

Table A-33. 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

Table A-33. Circuit Termination Cause Values (Continued)

Value	Meaning (ITU Standard)
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
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

Table A-33. Circuit Termination Cause Values (Continued)

Value	Meaning (ITU Standard)
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
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 NavisXtend Accounting Server for CBX 500 networks 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 you as to whether or not 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 CascadeView 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 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 contains a list of servers that the xntpd daemon can poll for time synchronization. By default, three time servers in the United States are referenced:

- tick.usno.navy.mil
- clock.llnl.gov
- bitsy.mit.edu

Other time servers are included in the configuration, but are disabled.

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.

Ascend provides three reference servers by default. You should edit the reference server entries in the ntp.conf file only if the reference servers entered by default are not adequate for your needs. A list of reference servers can be obtained from the following web site:

```
http://www.eecis.udel.edu/~ntp/
```

Running NTP

To run NTP, you have 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 have 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 eight time requests or eight 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.

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