Operational Procedures

This chapter describes the Cisco BTS 10200 Softswitch billing operational procedures. The following sections provide detailed information on how to manage and control accounting information generated by the BTS 10200. Actual examples are provided with explanations to illustrate the operational mechanics. These and other commands are documented in the Cisco BTS 10200 Softswitch Release Command Line Interface database, the *Cisco BTS 10200 Softswitch Troubleshooting Guide, Release 6.0.4,* and *Cisco BTS 10200 Softswitch Operations and Maintenance Guide, Release 6.0.4.*

Note This guide deals exclusively with the call detail block (CDB) based billing subsystem. For information on the event message (EM) based billing system used in packet cable environments, please refer to the *Cisco BTS 10200 Softswitch PacketCable Guide, Release 6.0.4.*

Caution Manual manipulation of billing files can cause billing to fail. Contact Cisco for assistance before manually manipulating any billing file, including clean up.

Call Data Transport Management

CDBs are produced from the current information sent from the billing generator in the Call Agent (CA) to the billing manager in the Element Management System (EMS). Each billing event message (BEM) that is issued by a call in progress is stored in a staging area in the billing generator, waiting for call completion. The Billing Generator determines that a call is in a completed state when a signal stop is detected for the call. After that, the system waits for Quality of Service (QoS) metrics, but it does not wait longer than 5 seconds. Once this has occurred, the billing generator is triggered to send all data associated with that call to the Billing manager.

The BTS 10200 stores the raw CDBs in flat ASCII files in the persistent store associated with the Bulk Data Management System (BDMS). The BTS 10200 stores from 10 megabytes to 5 gigabytes of billing records in a flat disk partition that is user-definable with respect to size, with the default set at 1 gigabyte. This data is subsequently sent to the specified remote accounting office or billing server or mediation device by means of the File Transfer Protocol (FTP), as shown in Figure 1-1.

Figure 1-1   *Billing Database Redundancy Configuration*
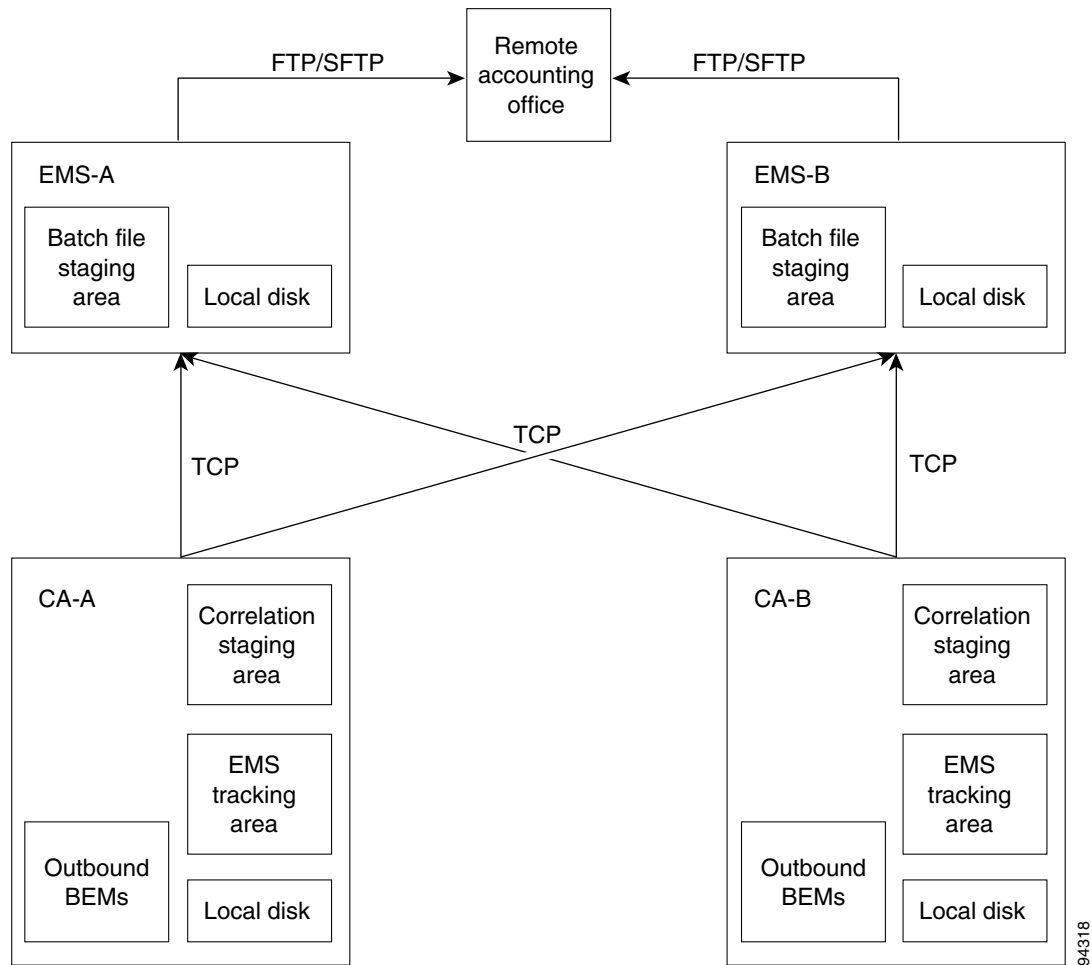
The BTS 10200 provides command line interface (CLI) commands to manage the collection and delivery of the accounting information generated.

The user must first ensure that the call detail block (CDB) based billing subsystem is enabled in the call-agent-profile entry for that call agent. The following command enables CDB-based billing:

```
change call-agent-profile id=CA146; cdb-billing-supp=y; em-billing-supp=n;
```

⚠ **Caution**   The PacketCable event message (EM) report value must be disabled when the CBD-based reports value is enabled, as shown in the above command example. Refer to "File Naming Conventions" for additional information.

The **billing-acct-address** command provides the ability to specify how the billing data files are named, where to the send the files to in the network, the directory to place the files into at the destination node, the username and password to use for access to the destination node, and the interval to send the data.

The **show** command displays the current settings for the billing-acct-address table. Notice that the polling_interval indicates the change in the billing interval from 900 to 30 seconds, as shown in the command line: billing_acct_addr polling_interval=30.

```
CLI> show billing-acct-addr

BILLING_DIRECTORY = /opt/bms/ftp/billing
BILLING_FILE_PREFIX = bil
BILLING_SERVER_DIRECTORY = /dev/null
ENABLE_CDB_MARKERS= N
POLLING_INTERVAL = 900
SFTP_SUPP = N
DEPOSIT_CONFIRMATION_FILE = N
BILLING_FILENAME_TYPE= INSTALLED
Reply : Success: at 2007-11-15 14:24:13 by btsadmin
Request was successful.
btsadmin>change billing_acct_addr polling_interval=30
Reply : Success: at 2007-11-15 14:24:37 by btsadmin
Request was successful.


CLI> show billing-acct-addr

BILLING_DIRECTORY = /opt/bms/ftp/billing
BILLING_FILE_PREFIX = bil
BILLING_SERVER_DIRECTORY = /dev/null
ENABLE_CDB_MARKERS= N
POLLING_INTERVAL = 30
SFTP_SUPP = N
DEPOSIT_CONFIRMATION_FILE = N
BILLING_FILENAME_TYPE= INSTALLED
Reply : Success: at 2007-11-15 14:28:04 by btsadmin
Request was successful.
```

The following is an example of the command used to modify the billing-acct-address parameters inorder to setup the FTP transport parameters:

```
change billing-acct-addr billing-file-prefix=CALL_DETAIL_DATA_;
billing-server-addr=rao.customer.com;
billing-server-directory=/export/billing/ftp/inbound; username=customer001; password=test;
polling-interval=900; deposit-confirmation-file=y;
billing-filename-type=default;sftp_supp=N
```

The following is a list of the command line tokens associated with this command and the valid values and purpose of each:

- **billing-directory**—An optional ASCII string from 1 to 64 characters in length.

  This string specifies the directory path on the EMS where the accounting information is stored prior to being sent to the remote mediation system or accounting office by FTP. The default value for this token is /opt/bms/ftp/billing. This option is not available for this release.

- **billing-file-prefix**—An optional ASCII string from 1 to 20 characters in length that defaults to bil.

  This string is appended to the front of each file sent to the remote mediation system or accounting office by FTP. The files are uniquely identified by appending a timestamp to the end of each filename. The actual name of the files is in the following format:
  <billing-file-prefix>_<_yyyymmddhhmmss_pri_element-id_sequence-number.ascii

- **billing-server-directory**—An optional ASCII character string from 1 to 64 characters in length.

  This string specifies the directory path on the remote mediation system or accounting office to which the accounting information is sent by FTP. The default value for this token is /dev/null.

  If a **billing-server-directory** is specified, the following three tokens are mandatory. If not, then they are optional.

- **billing-server-addr**—An ASCII character string from 1 to 64 characters in length.

  This string specifies the IP address or DNS domain name of the remote mediation system or accounting office to which the accounting information is sent by FTP.

- **user-name**—An ASCII character string from 1 to 32 characters in length.

  This string specifies the FTP login name to use to access the remote mediation system or accounting office.

- **password**—An ASCII character string from 1 to 32 characters in length.

  This string specifies the FTP password to use to access the remote mediation system or accounting office.

- **polling-interval**—The time in seconds between file transfers from the BTS 10200 Element Management System and the remote mediation system or accounting office. The valid range is from 30 seconds to 3600 seconds. This is an optional token; its default value is 900 seconds (15 minutes). The token specifies the time, in seconds, between the FTP file transfers from the Cisco BTS 10200 Element Management System and to the remote mediation system or accounting office. The reduction in the lower bound of the polling interval expedites the movement of billing files to the billing management server.

> **Note** In releases prior to BTS 10200 6.0.4, the POLLING-interval was specified in minutes (1–60).

> **Note** The CDR files size take precedence over the polling-interval parameter. If there are not enough records to satisfy the size requirements, then the CDR push is delayed. There is a separate billing alarm configuration for this.

- **deposit-confirmation-file—**This flag denotes whether or not an explicit confirmation file is sent after each CDB file is transferred to the remote billing collection system. If this feature is enabled, an empty file with the same name with a suffix of ".done" is appended to the end of the file. The valid choices are Y and N, with N as the default.

- **billing-filename-type—**This parameter determines which file naming format to use for the CDR files created on the system. Any changes to this value take effect only when the BDMS platform is restarted. The value of INSTALLED indicates that the value established at system installation should be used. The valid choices are INSTALLED, PACKET-CABLE, and NON-PACKET-CABLE. The default is set to INSTALLED.

- **sftp_supp**—This is a boolean flag indicating that the SFTP protocol is supported for the billing file transfer. This flag has either Y for yes or N for no. The default value is N, which means the SFTP transfer is disabled.

If there is any problem transferring the accounting data to the remote mediation system or accounting office, the Element Management System (EMS) issues a BILLING 6 or BILLING 33 event report. This is an indication that billing data is available for transfer, but transport is unable to FTP the data to the proper destination. Use of the above commands is the correct place to start diagnosis of this situation. Figure 1-2 shows the CDB process

Figure 1-2   The CDB Process
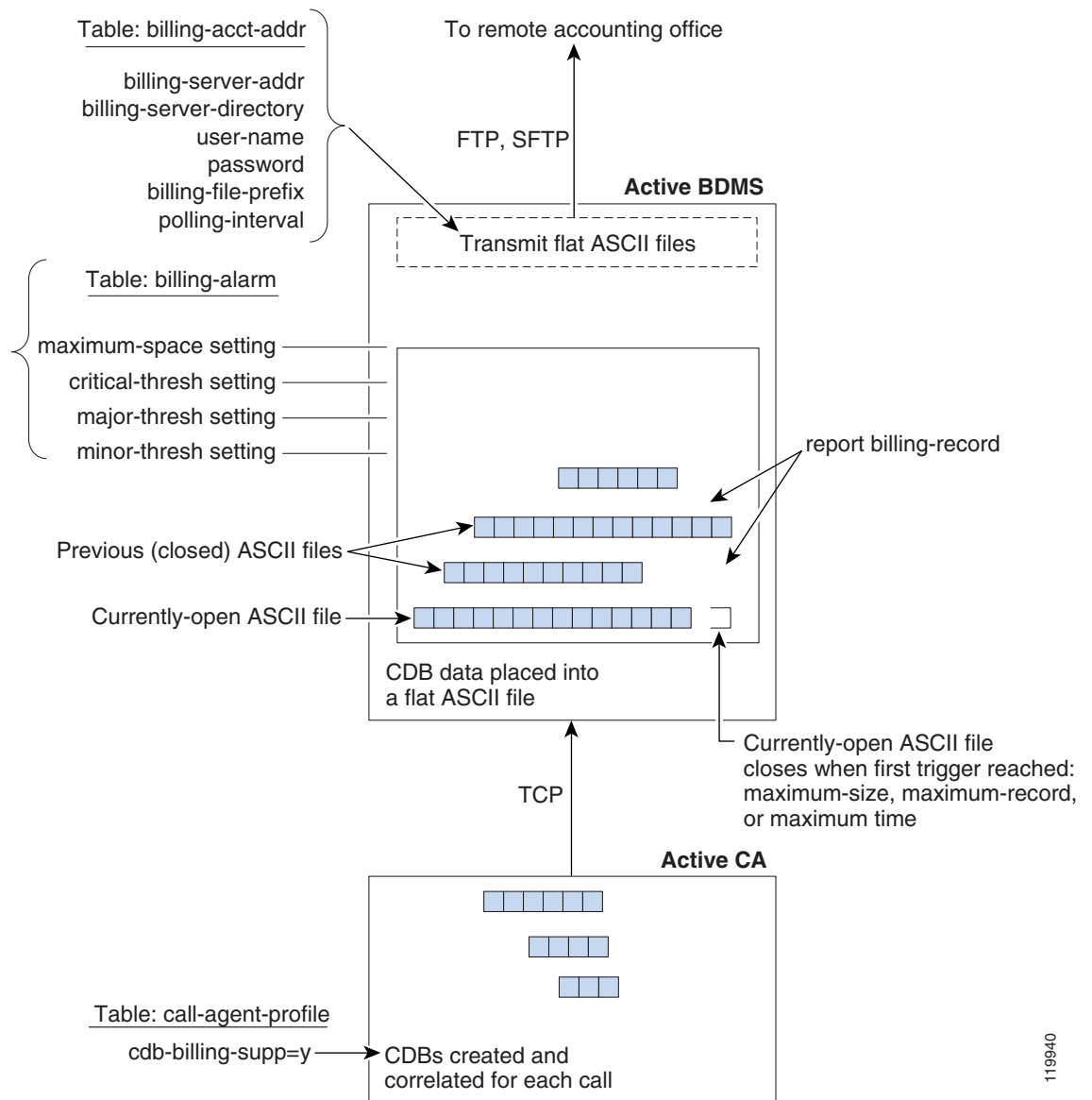
The following CLI command supports the ability to add a marker to the CDB file header and trailer:

```
change billing-acct-addr enable_cdb_markers=Y;
cdb_header_marker=ABC; cdb_trailer_marker=123
```

- **enable_cdb_markers**—Adds markers to billing files. If this token is set to Y, markers are added, if the tokens cdb_header_marker or cdb_trailer_marker have non-null values.

- **cdb_header_marker**—Specifies the contents of the marker added to the billing file header. The marker is added to the billing file only if enable_cdb_marker is set to Y. The marker is 0 to 3 characters in length and each character is in the range [a-z, A-Z, 0-90].

- **cdb_trailer_marker**—Specifies the contents of the marker added to the billing file trailer. The marker is added to the billing file only if enable_cdb_marker is set to Y. The marker is 0 to 3 characters in length and each character is in the range [a-z, A-Z, 0-90].

Secured FTP Support for Billing Interface

The Cisco BTS 10200 supports secured FTP (SFTP) in billing traffic, and has a new flag, sftp-supp=n. Before you can enable SFTP, the Cisco BTS 10200 and BMS must be configured to allow non-interactive SSH login as described below; however, once non-interactive SSH login has been set up, you must enable SFTP (thereby disabling FTP) by executing the CLI command **change** billing-acct-addr sftp-supp=y.

The BILLING 6 and Billing 33 alarms changed in Release 4.4.x. The BILLING 6 (Failed to make ftp transfer) and BILLING 33 (Billing FTP Parameters Invalid) alarm definitions have been modified to read *Failed to make FTP/SFTP transfer* and *Billing FTP/SFTP parameters invalid*, respectively.

The security keys must be manually built in during the installation setup. The following procedure describes:

- Generating a Public/Private Key Pair on EMS
- Setting Up a Public Key on the BMS
- Verifying Public Key Authentication

Note For SFTP to work, manually configure Cisco BTS 10200 and BMS to allow non-interactive SSH login.

Generating a Public/Private Key Pair on EMS

Step 1 Log in to the Cisco BTS 10200 primary EMS as root.

Step 2 Create the ssh directory to store the keys:

a. Execute **cd /**.

b. Execute **mkdir .ssh**.

c. Execute **chmod 700 .ssh**.

Step 3 Generate public/private key pair.

a. Execute **cd /.ssh**.

b. Execute **/opt/BTSossh/bin/ssh-keygen -t rsa**.

c. Press **Enter** to accept the default file name for the key (/.ssh/id_rsa).

d. Enter **y** if prompted to choose whether to overwrite the existing file.

e. Press **Enter** when prompted to enter a passphrase (no passphrase).

Step 4 Transfer the resulting file /.ssh/id_rsa.pub to a temporary location on the BMS.

/opt/BTSossh/bin/sftp <username><bms_server_ip>

Step 5 Repeat steps 1 through 4 to create a public/private key pair on the secondary EMS.

Setting Up a Public Key on the BMS

Step 1   Log in to the BMS.

ssh <username>@<bms_server_ip>

Step 2   Move the public key to a unique name.

Execute **mv id_rsa.pub id_rsa.PRIEMS.pub**.

Step 3   Create the ssh directory to store the public key.

a.   Execute **mkdir .ssh**.

b.   Execute **chmod 700 .ssh**.

c.   Execute **cat id_rsa.PRIEMS.pub>>.ssh/authorized_keys**.

d.   Execute **chmod 600 .ssh/authorized_keys**.

e.   Execute **rm id_rsa.PRIEMS.pub**. This command is optional.

Step 4   Log out of the BMS.

Execute **exit**.

Step 5   Repeat steps 1 through 4 to set up a public key for the secondary BMS.

Verifying Public Key Authentication

Step 1   Log on to the primary EMS.

Step 2   Execute **ssh <username>@abcd**, where abcd is the IP address or fully qualified domain name of the BMS.

Step 3   Verify that the login to the BMS is successful and that the system issues no prompts for username or password.

The BILLING 6 and Billing 33 alarms changed in Release 4.4.x. The BILLING 6 (Failed to make ftp transfer) and BILLING 33 (Billing FTP Parameters Invalid) alarm definitions have been modified to read *Failed to make FTP/SFTP transfer* and *Billing FTP/SFTP parameters invalid*, respectively.

Release 4.5.x allowed for using secured FTP (sFTP) in billing traffic, and included a new flag, sftp-supp=n. Before you can enable SFTP, the Cisco BTS 10200 and BMS must be configured to allow non-interactive SSH login as described below; however, once non-interactive SSH login has been set up, you must enable SFTP (thereby disabling FTP) by executing the CLI command change billing-acct-addr sftp-supp=y.

In Release 4.5, during initial setup, the security keys must be manually built in. To set up the public and private keys for the connection between the Cisco BTS 10200 Softswitch and a mediation device, complete the following steps.

For sFTP to work, manually configure Cisco BTS 10200 and BMS to allow non-interactive SSH login.

SFTP Troubleshooting Information

When SFTP is configured for billing file transfer by setting <CmdArg>SFTP_SUPP<noCmdArg> to Y, billing files cannot be sent to an external SFTP server. The BDMS log shows the following message: "Error reading from SFTP server: Broken pipe."

The impact is that the billing file delivery to an external SFTP server does not work.

This is due to a bug in OpenSSH 3.9p1 that causes SSH connection failure if the user /root initiates the connection with a group ID other than what is defined in the /etc/passwd file.

This seems to happen if:

1. SSH client is OpenSSH_3.9p1, and

2. BDMS platform is started for first time with a fresh load.

The workaround is to:

1. Upgrade OpenSSH to version 4.1p1 or above, or

2. Try performing **platform stop -i BDMS01** and **platform start -i BDMS01** to restart BDMS. If file transferring over sftp still fails after BDMS restart, use FTP instead of SFTP for billing file transfer.

File Naming Conventions

Cisco BTS 10200 supports two different billing record file naming conventions: **PacketCable** and **Non-PacketCable** (**NPC**). The user can specify the format by setting the BILLING_FILE_NAME token in the BILLING-ACCT-ADDR table. The default format is NPC.

> **Note** Beginning with Release 5.0, the opticall.cfg Billing_File_Name parameter is not considered and is marked for obsolescence.

Default Setting Files

NPC is the default naming convention and generates files in the following format:

<billing-file-prefix>-<call-agent-id>-(0/1){+/-}HHMMSSyyyymmddhhmmss-<sequence-number>-<state>

where:

- <billing-file-prefix> is the billing file prefix from the billing-acct-addr table.

- <call-agent-id> is the call agent ID from the call-agent table.

- (0/1): daylight saving time, on = 1, off = 0.

- {+/-}HHMMSS is the UTC offset time.

- yyyymmddhhmmss is the local time the file was created.

- <sequence-number> is a monotonically increasing 6-digit number from 000001 to 999999 that will roll over to 000001 after the maximum 999999 is reached.

- <state> is a letter indicating the state of the file where P indicates primary data (complete file but un-transferred), S indicates secondary data (complete file and transferred), and O indicates open (current open file that is incomplete and un-transferred).

The following is an example from a billing file with the state value at the end of the line.

```
-rw-r--r--1 root other 59 Dec 6 06:14 tb101-CA146-0-060000-20061206051420-000167-S
-rw-r--r--1 root other 59 Dec 6 07:14 tb101-CA146-0-060000-20061206061420-000168-S
-rw-r--r--1 root other 59 Dec 6 08:14 tb101-CA146-0-060000-20061206071420-000169-S
-rw-r--r--1 root other 59 Dec 6 09:14 tb101-CA146-0-060000-20061206081420-000170-P
-rw-r--r--1 root other 36 Dec 6 09:14 tb101-CA146-0-060000-20061206091420-000171-O
```

PacketCable Setting Files

The PacketCable setting generates files in the following format:

<billing-file-prefix>_yyyymmddhhmmss_<priority>_<record-type>_<cms-id>_<sequence-number>.a scii[.tmp]

where:

- **<billing-file-prefix>** is the billing file prefix from the billing-acct-addr table.
- **yyyymmddhhmmss** is the time the file was created.
- **<priority>** is the default priority of the file—this value is hard coded to 3 for Release 4.5.
- **<record-type>** is a binary flag indicating the state of the file where:
  - 0 indicates the file has not been transferred.
  - 1 indicates that the file has been transferred off board.
- **<cms-id>** is the cms ID from the call-agent-profile table.
- **<sequence-number>** is a monotonically increasing 6 digit number from 000001 to 999999 that rolls over to 000001 after the maximum number of 999999 is reached.
- **[.tmp]** is an optional, temporary extension of .tmp that indicates the file is the currently open file for writing. Files ending in .tmp are not transferred to the off board billing collection system.

Call Data Alarm Management

The BTS 10200 billing manager (BMG) process in the EMS tracks the total number of records the billing database can store, the number of unacknowledged records, and the current percentage of the database that is occupied by unacknowledged records. This information is then compared against the threshold levels set in the billing alarm database. If the current amount of billing data in the database exceeds thresholds, then the billing manager issues alarms. The billing manager resets the alarms when the storage levels drop below the specified thresholds.

Note In Release 4.5.0, the billing requires a minimum file size of 32 bytes. At system startup, billing goes through the list of existing billing files. If any has a size less than 32 bytes, billing fails to start. You will see the errors similar to the following:

ERROR 21:48:33.858 BMG MainThr ------------|Billing file size is too small: /opt/bms/ftp/billing/tb71-CA146-20050915-1723300-P|bmginit.c:660

ERROR 21:48:33.858 BMG MainThr ------------|Minimum file size is 32 bytes|bmginit.c:661

ERROR 21:48:33.858 BMG MainThr ------------|Bad files need to be removed before

restart|bmginit.c:662

The corrective action is to remove this bad filling file and restart.

However, this is not the case with Releases 4.5.1 and 4.5.13. In those releases, the BMG succeeds, and deletes those files less than 32 bytes.

The BTS 10200 provides CLI user commands to manage the thresholds at which alarms are issued pertaining to billing data overwrite scenarios. These commands provide the ability to specify to what levels the billing partition is filled before an alarm of the appropriate level is issued.

The following is an example of the **show billing-alarm** command and the response that displays the current settings for billing alarms:

```
CLI>show billing-alarm

MINOR_THRESH = 70
MAJOR_THRESH = 80
CRITICAL_THRESH = 90
MAXIMUM_SPACE = 1000
MAXIMUM_SIZE = 2
MAXIMUM_RECORD = 1000
MAXIMUM_TIME = 3600
REGULAR_SPACE = 60

Reply : Success: Request was successful.
```

The following is an example of the **change billing-alarm** command used to set the threshold levels at which billing alarms are issued:

```
change billing-alarm minor-thresh=75; major-thresh=85; critical-thresh=95;
maximum-space=2000; maximum-size=2; maximum-record=3000; maximum-time=30;
regular-space=70;
```

The following is a list of the command line tokens associated with this command and the valid values and purpose of each:

- **minor-thresh**—An optional percentage, from 2 percent to 97 percent, with a default value of 70 percent that represents an initial billing database usage threshold. When this specified percentage of the billing database is consumed by billing records that have not been written into ASCII batch files, a minor alarm is issued. The value of this token must be less than that of the **major-thresh** token.

- **major-thresh**—An optional percentage, from 3 percent to 98 percent, with a default value of 80 percent that represents an intermediate billing database usage threshold. When this specified percentage of the billing database is consumed by billing records that have not been written into ASCII batch files, a major alarm is issued. The value of this token must be less than that of the **critical-thresh** token.

- **critical-thresh**—An optional token with a percentage from 4 percent to 99 percent, with a default value of 90 percent that represents a final billing database usage threshold. When this specified percentage of the billing database is consumed by billing records that have not been written into ASCII batch files, a critical alarm is issued.

- **maximum-space**—An optional token that specifies the allocated storage capacity for billing data in megabytes. This token's value can range from 10 MB to 5 GB and has a default value of 1 GB.

- **maximum-size**—An optional token that specifies the maximum size of a CDB flat file in megabytes. This token's value can range from 1 MB to 10 MB and has a default value of 2 MB.

- **maximum-record**—An optional token that specifies the maximum number of records to be stored in a given flat file. This token's value can range from 500 records to 10,000 records and has a default value of 1,000 records.

- **maximum-time**—An optional token that specifies the maximum number of seconds a given flat file can remain open for addition of new records. This token's value can range from 10 seconds to 3600 seconds and has a default value of 3,600 seconds (1 hour).

- **regular-space**—An optional token that specifies the real time capacity used, as a percentage of the available capacity, before secondary files are deleted. This token's value can range from 1 percent to 90 percent and has a default value of 60 percent. The value of this token must be less than the value for **minor-thresh**.

If there is a problem creating the ASCII accounting information files, the EMS will issue BILLING 14, BILLING 15, or BILLING 52 event reports. This is an indication that ASCII accounting data files cannot be created and stored on disk in the EMS. In these cases, verify that the alarm threshold levels are not set too low and that there is sufficient storage area available on the EMS to hold the FTP files. Use of the above commands is the appropriate place to start diagnosis of this situation.

No Visible Billing Records

The BTS 10200 EMS stops generating billing records when a certain limit is reached. One limit is for the maximum-space parameter described in the previous section. When the total size of the billing files exceeds the disk space specified in maximum-space, no new billing records are created on the EMS.

Another hard limit is a maximum of 10,000 billing files on EMS. To continue receiving billing records, users can reduce the disk space occupied by the billing files, or reduce the number of billing files. The disk space and/or the number of billing files may be increasing because the billing files were not properly transferred to the mediation server. The SFTP or FTP connection failure (for example, the server IP address not correct or SFTP not configured correctly) results in billing files being backed up on the EMS, where they will either eventually reach either the maximum-space limit, or the 10,000 files limit. In this scenario, check the billing transport set up by using the "change billing-acct-addr" command.

Removing Billing Files

Billing files are system files, and should not be modified, such as renaming or removing files, except by the system administrator. The system administrator should set up proper permission on the billing storage directory and billing files to avoid billing info being compromised.

If for some reason the billing files must be moved or removed (due to disk space alarms, for example), follow these steps:

1. Perform a switchover of the BDMS.

2. Platform stop the newly-standby BDMS.

3. Move the billing files in question.

4. Platform start the BDMS.

5. Repeat Steps 1 through 4 on the pair node if necessary.

Call File Management

The BTS 10200 provides a command line interface that allows you to view lists of billing files on the Bulk Data Management System (BDMS) platform at any given time. The names of the available files and their operational status can be queried using the commands described.

The following **report billing-file** command examples allow you to query the BDMS for billing files and their associated information:

- **report billing-file filename=%**—Displays all file names stored in /opt/bms/ftp/billing. Depending on the number of files stored, this command might take a while to complete.

- **report billing-file filename=xxx**—Displays the filename specified as well as the current state of the file.

- **report billing-file state=xxx**—Displays all filenames that are in the state entered by the user.

The following is a list of the command line tokens associated with this command and the valid values and purpose of each:

- **filename**—Name of the billing file to report.

  If the file name entered does not exist, the user is notified that the file does not exist currently.

- **state**—Current state of a given file. The valid states are:

  – OPEN—file is currently being written to

  – PRIMARY—file has not been sent to or acknowledged by the external billing mediation system

  – SECONDARY—file has been sent to and acknowledged by the external billing mediation system.

- **start-row**—Row to start displaying from in the returned result set. The default value is 1.

- **limit**—Maximum number of rows to display from the returned result set. The default value is 50.

- **display**—Data columns to display from the ones supported by this command. The default is to display all available columns.

- **order**—Column that the display is to be ordered by from the returned result set.

- **auto-refresh**—Specifies whether a new result set is to be created or the existing result set is to be used (if one is available). The default value is Y (use the existing result set).

Call Detail Data Queries

The BTS 10200 provides a command line interface to query CDB records from the ASCII flat files stored in /opt/bms/ftp/billing on the EMS. This mechanism provides the ability to specify record(s) to display based on the supplied information.

The following is an example of the command line for searching based on a time interval:

```
report billing-record start-time=2004-03-27 12:00:00:000; end-time=2004-03-27
12:05:00:000; orig-number=9726712355;term-number=9726712359;
```

The example shown above scans the ASCII flat files on the EMS for any call detail records that match the supplied criteria. Each record written between 12:00:00 and 12:05:00 on the 27th of March 2004 with a originating number field containing 972-671-2355 would be displayed to the user.

The following is an example of the command line for searching based on a specified file:

```
report billing-record filename=bil-ca1-20000327-120000; orig-number=9726712355;
```

The example shown above scans the ASCII flat files on the EMS for any call detail records that match the supplied criteria. Each record written to the file *bil-ca1-20000327-120000* with a `originating number` field containing 972-671-2355 would be displayed to the user.

The user can also use this command with no filename or time interval specified. In this case, the system displays the most recently written call record. The following is an example of the command line syntax to request that the most recently written record be displayed (effectively a tail=1 command):

```
report billing-record
```

If a query is entered and no filename or time interval is specified, but a search qualifier is entered (such as call type), the query is performed over the most recently written filename.

There are several types of searches that can be performed using this query. The billing files can be searched based on filename, start and stop times, or the most recently written file. These searches can be further refined by specifying the call type, orig number, term number, service type, termination cause, or tail parameter. Only one of these refinement parameters can be used at a time.

The following is a list of the search types that can be performed:

- **Filename**—Specifying the actual file name of a group of records, those records can be searched based on the other search qualifiers supplied.

- **Time Interval**—The start and stop times can be specified and all records written within that time period are displayed. This query can be further qualified by combining it with the Call Type or Term Number or Orig Number or Service Type or Termination Cause queries.

- **Call Type**—The type of call is specified so that all records within the database that match this type are displayed to the user.

- **Service Type**—The type of service to search for within a call record(s) is specified and all records within the database that match this service type are displayed to the user.

- **Termination Cause**—The type of call termination cause is specified and all records within the database that match this termination cause are displayed to the user.

- **Term Number**—Each record that contains an exact match with the called number field in the database to the specified directory number is displayed to the user.

Note BTS 10200 releases prior to Release 6.0.1 allowed searches on the orig-number or the term-number, but not both. BTS 10200 Release 6.0.1 allows searches in which both orig-number and term-number are specified.

- **Orig Number**—Each record that contains an exact match with the calling number field in the database to the specified directory number is displayed to the user.

- **Tail**—This query type displays the specified number of records most recently written to the billing database. The valid values range from 1 to 50. When this token is used, the most recently written record is searched. Any CDB files that do not contain actual CDB records are skipped.

The following section describes the command line tokens associated with the **report billing-record** command and their valid values and purpose.

> **Note**   The time in the command **report billing_record start_time=xxxx;end_time=xxxx** is "GMT" time.

- **start-time**—A time stamp value in the format of YYYY-MM-DD HH:MM:SS.mmm.

  This value indicates the starting time to filter against in the search for when billing records were written to the database. This is an optional token that has no default value. If the milliseconds portion of the time stamp is omitted, a value of 000 is implied.

- **end-time**—A time stamp value in the format of YYYY-MM-DD HH:MM:SS.mmm. If the milliseconds portion of the time stamp is omitted, a value of 000 is implied.

  This value indicates the stopping time to filter against in the search for when billing records were written to the database. This is an optional token that has no default value.

- **term-cause**—An ASCII character string specifying the call termination cause to filter against in the billing database.

  The valid values for this token are:

  > AAL_PARAM_NOT_SUPPORTED
  >
  > ACCESS_INFO_DISCARDED
  >
  > ACCOUNT_LIMIT_EXCEEDED
  >
  > AUDIT_RELEASE
  >
  > BEARER_CAPAB_INCOMPAT_WITH_SERVICE
  >
  > BEARER_CAPABILITY_NOT_IMPLEMENTED
  >
  > BEARER_CAPABILITY_UNAVAILABLE
  >
  > CALL_AWARDED
  >
  > CALL_PROCEEDING
  >
  > CALL_REJECTED
  >
  > CALL_RESTRICTED_WITH_CLIR
  >
  > CALLED_NUMBER_PORTED_OUT
  >
  > CHANNEL_DOES_NOT_EXISIT
  >
  > CHANNEL_UNACCEPTABLE
  >
  > CHANNEL_UNAVAILABLE
  >
  > CIRCUIT_CHANNEL_CONGESTED
  >
  > DESTINATION_OUT_OF_ORDER
  >
  > EXCESS_DIGIT_RECD
  >
  > FACILITY_NOT_IMPLEMENTED
  >
  > FACILITY_NOT_SUBSCRIBED
  >
  > FACILITY_REJECTED
  >
  > INCOMPATIBLE_DESTINATION
  >
  > INCORRECT_MESSAGE_LENGTH
  >
  > INFOELEMENT_NONEXISTENT

INTERNETWORKING_ERROR_UNSPECIFIED

INVALID_CALL_REFERENCE

INVALID_ENDPOINT_REFERENCE

INVALID_INFOELEMENT

INVALID_NUMBER_FORMAT

INVALID_TRANSIT_NETW_SELECTION

MANDATORY_INFOELEMENT_MISSING

MESSAGE_INCOMPAT_WITH_CALL_STATE

MESSAGE_TYPE_NONEXISTENT

MISROUTED_PORTED

NE_CAUSE_AUDIT_RELEASE

NETWORK_OUT_OF_ORDER

NO_ROUTE_DESTINATION

NO_ROUTE_TRANSIT_NETWORK

NO_VPCI_VCI_AVAILABLE

NORMAL_CALL_CLEARING

NORMAL_UNSPECIFIED

NUMBER_CHANGED

ONE_DIALED_IN_ERROR

ONE_NOT_DIALED

PROTOCOL_ERROR_THRESHOLD_XCEEDED

PROTOCOL_ERROR_UNSPECIFIED

QOS_UNAVAILABLE

RESOURCE_UNAVAILABLE

RESPONSE_STATIC_ENQ_MSG

SERVICE_DENIED

SERVICE_NOT_IMPLEMENTED

SERVICE_OPERATION_VIOLATED

SERVICE_UNSPECIFIED

SESSION_TIMER_REFRESH_TIMEOUT

SWITCH_EQUIP_CONGESTED

TEMPORARY_FAILURE

TIMER_EXPIRY_RECOVERY

TOO_MANY_PENDING_ADD_PARTY_REQ

UNAUTHORIZED_BEARER_CAPABILITY

UNASSIGNED_NUMBER

UNSUPPORTED_TRAFFIC_PARAMS

USER_ALERTED_NO_ANSWER

USER_BUSY

USER_CELLRATE_UNAVAILABLE

USER_NOT_RESPONDING

VACANT_CODE

VPCI_VCI_ASSIGNMENT_FAIL

VPCI_VCI_NOT_AVAILABLE

ZERO_DIALED_IN_ERROR

The **report billing_record** command is used to verify the system functionality. If the report times out, then the error stating: "Operation timed out. See the BTS 10200 documentation for more details" appears. The error could arise if:

– The start_time and end_time entered is the local time instead of GMT time.

– The search operation has too many files to conduct the search operation.

To correct the error, do the following:

– Verify that the start_time and end_time specified is GMT time.

– Use a smaller time range or use other search tokens to limit the search.

- **call-type**—An ASCII character string specifying the type of call record to filter against in the billing database. The valid values for this token are the same as those listed for the **billing-cdb** command.

In Release 4.5, it is possible to provision the Destination table with any one of the following:

- call-type=EMG
- call-type=AMBULANCE
- call-type=FIRE
- call-type=POLICE

Alternatively, it is possible to provision the following (one pair per DEST-ID):

- call-type=EMG; call-subtype=AMBULANCE
- call-type=EMG; call-subtype=FIRE
- call-type=EMG; call-subtype=POLICE
- call-type=EMG; call-subtype=NONE (default)

For service providers in the United States, it is typical to provision the Destination table with call-type=EMG for the digit string 911, and call-subtype=NONE (default), because 911 is a central dispatch point for all emergency, ambulance, fire, and police calls.

⚠️

Caution   On the BTS 10200, to consider a call an emergency, it must be provisioned as call-type EMG. If using separate DNs for ambulance, fire, and police service (typically applies to networks outside the United States.), Cisco strongly recommends that you provision these as call-type EMG and call-subtype <AMBULANCE or FIRE or POLICE> in the Destination table. This is the only way to be sure they are given all the treatment of the EMG call-type.

- **term-number**—An ASCII character string that is 1 to 15 characters long.

  This value indicates the actual called party directory number to filter against in the billing database. This is an optional token that has no default value.

- **orig-number**—An ASCII character string that is 4 to 15 characters long.

  This value indicates the actual calling party directory number to filter against in the billing database. This is an optional token that has no default value.

- **tail**—A decimal value from 1 to 50.

  This value indicates the number of most recently written records to query. This is an optional token that has no default value

- **service-type**—An ASCII character string specifying the type of service to filter against in the billing database.

  The valid values for this token are:

  911 HANDLING

  ACCOUNT CODE

  AIN HANDLING

  ANONYMOUS CALL REJECTION

  AUTHORIZATION CODE

  AUTO RECALL

  AUTOMATIC CALLBACK

  BUSY LINE VERIFICATION

  CALLBLOCK

  CALL FORWARD BUSY

  CALL FORWARD COMBINATION

  CALL FORWARD NO ANSWER

  CALL FORWARD REDIRECT

  CALL FORWARD UNCONDITIONAL

  CALL HOLD

  CALL PARK

  CALL PARK REOFFERED

  CALL PARK RETRIEVAL

  CALL TRANSFER

  CALL WAITING

  CALL WAITING DELUXE

  CALL WAITING WITH CALLER IDENTITY

  CALLING ID DELIVERY BLOCK PERMANENT

  CALLING IDENTITY DELIVERY SUPPRESSION

  CALLING NAME DELIVERY

  CALLING NAME DELIVERY BLOCKING

  CALLING NUMBER DELIVERY

  CALLING NUMBER DELIVERY BLOCK

CANCELLED CALL WAITING

CLASS OF SERVICE

CNAM SCP QUERY

CUSTOM DIALING PLAN

CUSTOMER ORIGINATED TRACE

DIRECTED CALL PICKUP WITH BARGE IN

DIRECTED CALL PICKUP WITHOUT BARGE IN

DO NOT DISTURB

DRCW

HOTLINE

HOTLINE VARIABLE

LCD PREPAID

LCD POSTPAID

LIMITED CALL DURATION—PREPAID

LIMITED CALL DURATION—POSTPAID

LNP

MULTIPLE DIRECTORY NUMBER

NO SOLICITATION ANNOUNCEMENT

OFF HOOK TRIGGER

OUTGOING CALL BARRING

PRIVACY SCREENING

REJECT CALLER

REMOTE ACTIVATION OF CALL FORWARDING

REMOTE ACTIVATION OF CALL FORWARDING PIN

REPEAT CALL

RETURN CALL

SCREENING LIST EDIT DRCW

SCREENING LIST EDIT SCA

SCREENING LIST EDIT SCF

SCREENING LIST EDIT SCR

SELECTIVE CALL ACCEPTANCE

SELECTIVE CALL FORWARDING

SELECTIVE CALL REJECTION

SERIVCE FEATURE GROUP INCOMING

SERVICE FEAURE GROUP OUTGOING

SIP OFF-HOOK TRIGGER

SIP REFER

SIP REPLACE

SIP TERMINATION ATTEMPT TRIGGER

SPEED CALLING

TERMINATION ATTEMPT TRIGGER

THREE WAY CALL

THREE WAY CALL DELUXE

TOLL FREE

USER SENSITIVE THREE WAY CALL

VOICE MAIL

VOICE MAIL ACCESS

WAKEUP CALL (Release 4.5.1)

WARMLINE

Call Data Provisioning

The BTS 10200 provides a command line interface to manage the types of call detail records generated. This mechanism provides the ability to specify which call detail block types are generated by the system on a per-call-type basis. When the system is installed, all CDB types are enabled by default.

The following is an example of the **show billing-cdb** command being used to display the current enable/disable setting for billing CDBs for a specific call type:

```
CLI>show billing-cdb type=LRN

TYPE=LRN
ENABLE=Y

Reply : Success: Request was successful.
```

The following is an example of the **change billing-cdb** command being used to enable local billing:

change billing-cdb type=LOCAL; enable=y;

The command line tokens associated with the **show billing-cdb** command and their valid values and purpose are as follows:

- **type**—An ASCII character string specifying the type of call record to provision.

  This is a mandatory token with no default value. The valid values for this token are the same as those listed in the previous section for the **report billing-record** command.

- **enable**—An ASCII character (Y or N).

  This string specifies whether the specified CDB type should be enabled or disabled for generation. This is an optional token with a default value of Y.

Caution for USE-PAI-HDR-FOR-ANI Token

The USE-PAI-HDR-FOR-ANI token in the softswitch trunk group profile controls the P-Asserted-ID (PAID) header used to send and receive calling party information.

With the USE-PAI-HDR-FOR-ANI token set to Y, the calling party information is derived exclusively from the PAID header on inbound calls, so when a SIP INVITE arrives at the BTS 10200 without PAID header, the Cisco BTS 10200 treats the call as though it did not have a calling party number.

For the billing record, the following is recorded for such a call:

ORIGNUMBER   -> Null (empty)

CHARGENUMBER   -> Null (empty)

ORIGCALLINGNAME -> OUT OF AREA

The BTS 10200 records the user part of the From header in ORIGINATINGSIPUSERNAME field of the billing record.

Note Customer Originated Trace (COT, *57) does not work with USE-PAI-HDR-FOR-ANI=Y, and the incoming SIP INVITE does not have the PAID header.

For more information about using USE-PAI-HDR-FOR-ANI=Y or about which other features/functions might not work properly because of USE-PAI-HDR-FOR-ANI=Y and the incoming SIP INVITE not having the PAID header, contact your Cisco representative.