



Introduction to Cisco BAMS

The Cisco Billing and Measurements Server (BAMS) collects, formats, and stores billing and measurements data from the Cisco Media Gateway Controller (MGC), either a Cisco VSC3000 virtual switch controller or a Cisco SC2200 application (see [Figure 1-1](#)). BAMS-formatted data can then be processed by a billing system and other measurement collection and reporting systems. BAMS also reports error information using the *bamstrap* utility. This error information is collected and displayed by the Cisco MGC Node Management System.

Figure 1-1 Cisco PGW 2200 PSTN Gateway Components

Collecting Data

Cisco BAMS collects data from the Cisco MGC through File Transfer Protocol (FTP). BAMS is configured with a login ID and password for the Cisco MGC hosts. BAMS can collect data from the Cisco MGC in simplex or redundant mode of operation.

Data Collection

Cisco BAMS can collect data from up to eight MGC nodes with BAMS software Release 3.0 and above. Data collected from the first MGC node is stored in the /opt/CiscoBAMS/data/s01 directory, data collected from the second MGC pair is stored in the /opt/CiscoBAMS/data/s02 directory, and so forth. Cisco BAMS collects data from the Cisco MGC through the File Transfer Protocol (FTP).

Each BAMS node can collect from a single MGC node. The polling function of each BAMS node is configured with a login ID and password for the Cisco MGC hosts. BAMS can collect data from the Cisco MGC in simplex or redundant mode of operation. In a simplex mode of operation, the single BAMS unit performs the data collection across all eight nodes. In redundant mode, for each node, one BAMS unit actively collects from the MGC while the other unit is in standby mode. The active/standby polling status is independent for each BAMS node. On a single BAMS unit in a redundant system, some nodes may be in the active collection state, while other nodes are in the standby state. The corresponding nodes on the other BAMS unit will have the opposite polling status.

For each node, the data collection can be manually rotated from the active to the standby BAMS unit. Such a rotation is referred to as a data switchover and can be carried out routinely for preventive maintenance purposes. The fail-safe mode of operation invokes an automatic rotation from the active BAMS unit to the standby unit in the event of a system failure on the active unit.

Cisco BAMS Terminology

Cisco has changed some of the names for its products. Not all of these name changes have yet been made within the Cisco BAMS software. Note the following terms used in the Cisco BAMS software and configurations and their more recent Cisco MGC software equivalent.

Cisco BAMS Software Term	Cisco MGC Software Term
Nailed	Signaling mode
Switched	Call Control mode
Cisco MGC node	Cisco PGW node
Cisco MGC software	Cisco PGW software
Cisco SC2200 Signalling Controller	Cisco PGW 2200 PSTN Gateway
Cisco VSC3000 Virtual Switch Controller	Cisco PGW 2200 PSTN Gateway

Formatting Data

The raw data collected from the Cisco MGC units is in the form of binary files. This data must be converted into a format that the billing system can recognize. In addition to formatting the data files, BAMS also augments the billing data, adding data required by the billing system but not automatically provided by the Cisco MGC. BAMS validates the records and flags exceptions.

Finally, BAMS provides the data in a uniform format to the billing system, which permits record comparisons. Because the records are normalized, they are in a format suitable for statistical analysis. In addition to standardized billing data, BAMS generates measurements data. Measurements can be taken in a specified time interval and for a variety of data objects. This data is suitable for traffic studies on network usage.

**Note**

Depending on the error flagged during validation, the record can be written to an error file and dropped, or it can flow through the system with default values. In either case, alarms are generated and written to the system log file (syslog). In general, structure or record-format errors result in the record being dropped. Lookup errors result in the record acquiring default values.

Storing Data

BAMS stores the formatted data on disk in a data directory where it can be collected or polled by the billing system. In addition to billing data, BAMS stores exception and measurements data, and writes system messages to a log file. The data collected by the billing system is renamed and is deleted from BAMS after archival, if desired, by the Mass Storage Control (MSC) task.

Files collected by BAMS from the Cisco MGC are time-stamped and sequence-numbered. Successfully formatted files are renamed with special prefix and suffix symbols. The MSC task must be set up with this file pattern information. The MSC can also be configured to generate alarms when specified data thresholds are passed. Alarm notification can also be set up for aged files. Alarms flag polling problems and prevent available disk space from filling up completely and halting or otherwise impeding system operation.

**Note**

Billing files contain Bellcore AMA (Automatic Message Accounting) Format (BAF) records. BAF records do not contain an indexing field, such as a record count or sequence number. The billing file name, however, can be traced back to the original input file from the Cisco MGC.

Trapping Errors

Each BAMS software task generates its own set of error messages. A Simple Network Management Protocol (SNMP) task, *bamstrap*, is used to manage the trap messages. All messages are written to the system log by the Alarm task (ALM), converted into traps by *bamstrap*, and forwarded to the Cisco MGC Node Manager for response. The operator can then determine appropriate action based on the reported alarm or event.

System Backup and Recovery

Backup of data on BAMS can be accomplished in either of two ways:

- By backing up the data from the Sun Netra to a mass storage device, in which case the storage device must be supported by the Sun Netra platform
- By collecting the data from BAMS over a TCP/IP network connection when backup is required and storing it on a backup server

The procedures for backing up and restoring data on Sun Solaris client/server systems are well established and documented, and several related tools are available to the UNIX system administrator. In addition to Sun Solaris documentation, third-party vendor documentation (for example, by Veritas) and general reference information are provided by UNIX software publishers, including O'Reilly and Wiley.

The best backup strategy depends on the user's network configuration and available resources. In general, users should collect files in an FTP session as often as necessary and store them as required. Each file recommended for backup is indicated in [Table 1-1](#) by an asterisk following the description. See the Sun Netra j20 (or later) *Answerbook (Administrator's Guide)* for system backup instructions. BAMS features built-in recovery processes for system interrupt or crash. If the unit crashes in the middle of a provisioning session, restart the session using the dstver that the system crashed with as your srcevr, and use a new dstver (see "[prov-sta—Provision Start](#)" section on page 4-14 for details).

**Note**

Contact the Cisco Technical Assistance Center for assistance with performing a BAMS system backup or restoring BAMS from a previous backup.

Installing the Sun Solaris 8 Operating System

Cisco BAMS 3.x requires the Sun Solaris 8 operating system. In addition, Cisco BAMS requires that you follow specific guidelines in the partitioning of the BAMS hard disks.

Before you install Cisco BAMS Release 3.x software, you must make sure that Sun Solaris 8 is installed and that the Cisco BAMS server disks are properly partitioned. For information on installing Solaris 8 installation and disk partitioning, see the *Cisco Media Gateway Controller Software Release 9 Installation and Configuration Guide* located at:

<http://www.cisco.com/univercd/cc/td/doc/product/access/sc/re19/swinstl/index.htm>

Creating Directory Structures

Data directories are created for you during BAMS installation. [Table 1-1](#) describes the Cisco BAMS directories.

Table 1-1 Cisco BAMS Directories

Directory	Description
opt/CiscoBAMS/bin	Contains executable processes and shell scripts.
opt/CiscoBAMS/CDR	Contains the call record data. ¹
opt/CiscoBAMS/CDR/archive	Contains archived call record data.
opt/CiscoBAMS/contrib	Contains system utilities.
opt/CiscoBAMS/data	Contains data subdirectories. ¹
opt/CiscoBAMS/data/error	Contains error files.
opt/CiscoBAMS/data/logs	Contains daily MML session logs.
opt/CiscoBAMS/data/s0x	Contains node data files.
opt/CiscoBAMS/data/nodename0x	When a node name is assigned to node0x, a directory link with that name is created for s0x.
opt/CiscoBAMS/data/s0x/ASCII	Contains generated Cisco MGC End of Call 1110 files.

Table 1-1 Cisco BAMS Directories (continued)

Directory	Description
opt/CiscoBAMS/data/s0x/ASCIIBAF	Contains generated ASCII BAF files.
opt/CiscoBAMS/data/s0x/BAF	Contains generated BAF files.
opt/CiscoBAMS/data/s0x/BIN1110	Contains generated 1110 Binary files.
opt/CiscoBAMS/data/s0x/error	Contains node-specific error files.
opt/CiscoBAMS/data/s0x/EXTASCII	Contains generated extendable ASCII files.
opt/CiscoBAMS/data/s0x/input	Contains input files.
opt/CiscoBAMS/data/s0x/Measurements	Contains measurements data.
opt/CiscoBAMS/data/s0x/NICS	Contains generated NICS files.
opt/CiscoBAMS/data/s0x/output	Contains output files. This directory contains files that are currently being processed. Note Any files in this directory that are older than a few weeks can be manually removed as a preventive maintenance procedure.
opt/CiscoBAMS/data/s0x/p001	Contains generated P01 records.
opt/CiscoBAMS/data/s0x/TLV	Contains raw billing files from the Cisco MGC that are in TLV format.
opt/CiscoBAMS/data/s0x/xfr	This directory contains temporary, raw CDR files to be transferred to the redundant BAMS unit for redundant processing.
opt/CiscoBAMS/defaults	Contains default configuration files. ¹
opt/CiscoBAMS/files	Contains system configuration files and log files. ¹
opt/CiscoBAMS/files/mml	Contains configurations created by the user in provisioning sessions.
opt/CiscoBAMS/files/s0x	Contains configuration files and log files for node0x. ¹
opt/CiscoBAMS/testdata	Contains test files.
opt/CiscoBAMS/files/snmpmibs	Contains SNMP MIB definitions in ASCII formatted files.

1. Indicates files recommended for backup.

Cisco BAMS 3.13 (NICS Phase 2) Information

Cisco BAMS release 3.13 (NICS Phase 2) introduces mapping changes for several fields in NICS output. The fields are: 19, 40, 42, 43, 62, 64, and 65.

CDE tags 4205 to 4210 may be present in both 1010 and 1040 CDBS for completed calls. BAMS uses the value from the 1040 CDB, if the source CDE is present in this CDB.

BAMS fills the fields 42 and 64 with IP addresses. The source CDE 4205 and 4206 may be in the form of either numeric-dot-separated addresses or fully-qualifying Domain Names (DN). If the fully-qualifying Domain Name is used instead of the dot address by the PGW, BAMS fills the field with up to the first 15 characters of the Domain Name for this field.

To define how the NICS output changes differ from the preceding release of Cisco BAMS 3.13, [Table 9-1](#) includes a second column for PGW 2200 CDB, CDE Tag Numbers and Derivation (NICS Phase 2), which shows how the CDE tags changed from Phase 1 to Phase 2.