

NTP 297-3601-124

DMS-10 Family

# **600-Series Generics**

Automatic Message Accounting System

08.01

For Generic 602.20 Standard August 2006

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**NORTEL**



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DMS-10 Family

# **600-Series Generics**

## Automatic Message Accounting System

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Nortel Publications: NTP 297-3601-124

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# Section 1: Introduction

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## General description

The DMS-10 Automatic Message Accounting (AMA) system automatically collects and records billing information on calls served by the DMS-10 switch.

The DMS-10 AMA system consists of:

- hardware components for collecting and storing AMA data
- software instructions to control the processing of AMA call information, including call classifying and collecting, formatting, and storing AMA data on tape or other media
- a method of operation using redundant recording systems to ensure reliable capture and security of the raw AMA data which, in turn, is periodically sent to a downstream processing facility for conversion to the operating company's billing format.

## LAMA / CAMA capability

A DMS-10 switch equipped with the AMA system can function as either a Local Automatic Message Accounting (LAMA) office or as a Centralized Automatic Message Accounting (CAMA) office.

### LAMA

As a LAMA office, the DMS-10 switch records locally originated, subscriber-dialed calls only. Call recording is performed on either an Automatic Number Identification (ANI) or an Operator Number Identification (ONI) basis.

### CAMA

As a CAMA office, the DMS-10 switch records locally originated calls and 1+ non-coin toll calls originating in subtending class 5 offices. Call recording is performed on either an ANI or an ONI basis.

## AMA system capacity and reliability

The AMA system can accommodate over 100 simultaneous calls requiring AMA recording. Call-timing resolution is 1 second. The system is designed to provide 99.99% data capture reliability.

### Storage capacities

Each AMA configuration uses a different combination of AMA record storage devices. The storage capacities for some of these different devices are listed in Table 1-A. The storage capacities for Billing Media Converters (BMCs) vary according to user application and BMC model used. Consult the manufacturer for information on call record storage capacities of BMC units.

Media	Maximum AMA Record Capacity	
	DMS-10 Format	Bellcore Format
800-bpi tape (2400 ft.)	440,000	418,000
1600-bpi tape (2400 ft.)	771,000	732,000
J1T91 Disk Drive Assembly (formatted disk)	1,440,000	1,368,000
NT3T51 Disk Drive (formatted disk)	1,440,000	1,368,000
NT4T31 Disk Drive (formatted disk)	1,440,000	1,368,000
NT8T90 System Disk Drive	Not applicable	30,678,000

## Administration and maintenance

Administrative control of the AMA system is provided through data modification order (DMO) overlay programs. The overlays allow the user to manipulate data specifying criteria for AMA call classification, billing treatment for each call type, and AMA system data.

For a more detailed discussion of the DMO overlay programs relating to the AMA system, see the section entitled, “AMA System Administration” in this NTP.

### Routine maintenance and trouble clearing procedures

Trouble clearing procedures and routine preventive maintenance of the AMA system are described in the section entitled, “AMA System Maintenance” in this NTP.

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## Section 2: Hardware description and magnetic media format

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### Available hardware configurations

The DMS-10 AMA system hardware, like other areas of the DMS-10 hardware architecture, can be configured to meet the specific needs of a particular operating company. Equipment configurations using vendor-supplied AMA equipment other than those described in this section, must be approved by the manufacturer. Currently available AMA system hardware configurations are:

- 800-Bytes per Inch (bpi) magnetic tape configuration-two Cook Electric Model 2200 magnetic tape units mounted in a Magnetic Tape Unit bay; two Magnetic Tape Controller packs (NT3T10); associated cabling; and (for CAMA or LAMA-ONI offices) CAMA Position Signaling Circuit packs (NT2T48) installed as part of the DMS-10 peripheral equipment.
- BMC configuration-one Cook Electric Billing Media Converter (BMC), redundant type (two unit), mounted in a Miscellaneous Equipment bay or a BMC bay; two Magnetic Tape Controller packs (NT3T10); two Magnetic Tape Cable Interface packs (NT3T11); associated cabling; and (for CAMA or LAMA-ONI offices) CAMA Position Signaling Circuit packs (NT2T48) installed as part of the DMS-10 peripheral equipment.
- AMATPS configuration-IBM AMATPS equipment mounted in a Miscellaneous Equipment bay, two Magnetic Tape Controller packs (NT3T10), two Magnetic Tape Interface Cable packs (NT3T11), associated cabling, and (for CAMA or LAMA-ONI offices) CAMA Position Signaling Circuit packs (NT2T48) installed as part of the DMS-10 peripheral equipment.
- 800-bpi Simplex BMC configuration-one Cook Electric Billing Media Converter (BMC), simplex type (one unit), and one Cook Electric Model 2200 magnetic tape unit (for back-up) mounted in a Miscellaneous Equipment bay; two Magnetic Tape Controller packs (NT3T10); one Magnetic Tape Cable Interface pack (NT3T11); associated cabling; and (for CAMA or LAMA-ONI offices) CAMA Position Signaling Circuit packs (NT2T48) installed as part of the DMS-10 peripheral equipment.

*Note:* This configuration may be used in the DMS-10 switch, but it is not recommended by Nortel.

- 1600-bpi configuration-two J1T91 Disk Drive Assemblies or two NT3T51 disk drives, one Control Data Keystone II SCSI tape drive or Hewlett Packard HP88781A SCSI tape drive, one J0T97A Power-Cooling Module, two Power Converter packs (NT3T89), one 500VA Inverter mounted in a DMS-10 AMA Bay (J1T85A-1); associated cabling; and two I/O Interface packs (NT3T90).
- Integrated Billing Storage and Retrieval configuration-NT8T90 equipment mounted in a control equipment bay and associated cabling (DMS-10 System hard disks).

Full descriptions of the hardware provisioned in each of these configurations can be found in the NTP entitled *Equipment Identification* (297-3601-150).

### **Message Detail Recording Customer Premise (MDR-CP) configuration**

The Message Detail Recording Customer Premise (MDR-CP) configuration is provided for EBS groups by one, two, or three data collectors. The data collector (a third party manufacturer's device) is interfaced by an RS232 cable to one port of either a Serial Data Interface pack (NT3T09) or a Dual Serial Data Interface pack (NT3T80) in the DMS-10 switch.

## **Magnetic media format**

The magnetic medium used to record either DMS-10 or Bellcore AMA data can be either the nine-track magnetic tapes used by Cook Electric Model 2200 magnetic tape units in 800-bpi AMA systems, the nine track magnetic tape used either by Control Data Keystone II SCSI or Hewlett Packard HP88781A SCSI tape drives in 1600-bpi AMA systems, IBM AMATPS units, the sealed Winchester-type disk drives used by the Cook Electric Billing Media Converter (BMC), or the 1600-bpi AMA disk drives. The BMC and the V185 disk drives used in the DMS-10 switch, emulate nine-track magnetic tape units; thus, references to "tape" or "tape character" apply equally, though not always literally, to the BMC and V185 disk drives.

### **Definitions of terms**

The following terms and definitions are used in this section to describe the physical characteristics of magnetic tapes and the way in which data are recorded on them:

- *tape character (byte)*. The group of bits recorded in a band across the tape. On a nine-track tape, a byte consists of nine bits (eight bits of data and one parity bit). A byte is also called a tape character.
- *bytes per inch (bpi)*. A measure of recording density; that is, the number of bytes (see above) that can be recorded on one inch of magnetic recording tape. Abbreviated as bpi, this unit of measure is synonymous with characters per inch (cpi).

- *Non-Return to Zero Inverted (NRZI)*. A method of recording data on magnetic tapes in which the current through the write-head winding does not return to zero after the write pulse.
- *Expanded Binary-Coded Decimal Interchange Code (EBCDIC)*. A coding format in which eight bits, in various combinations, represent 256 unique letters, numbers, and special characters.

### Description of tape

The DMS-10 AMA recording system accepts magnetic tape with the following characteristics:

- nine tracks
- recording densities for 800- and 1600-bpi recording systems
- Non-Return to Zero Inverted (NRZI) recording technique for 800-bpi system and phase encoded for 1600-bpi systems. All characters are encoded in Expanded Binary-Coded Decimal Interchange Code (EBCDIC).
- maximum of 2048 characters per block. Blocks are arranged in accordance with the American National Standards Institute (ANSI) recording format for magnetic tape. This format is IBM compatible.

Table 1-A provides AMA record storage capacities for some of the different AMA configurations with the DMS-10 switch.

The Cook Electric Billing Media Converter (BMC) emulates the characteristics of a nine-track tape drive. The sealed Winchester-type disk in each BMC unit has the capacity to store call records until the unit begins overwriting at the earliest record.

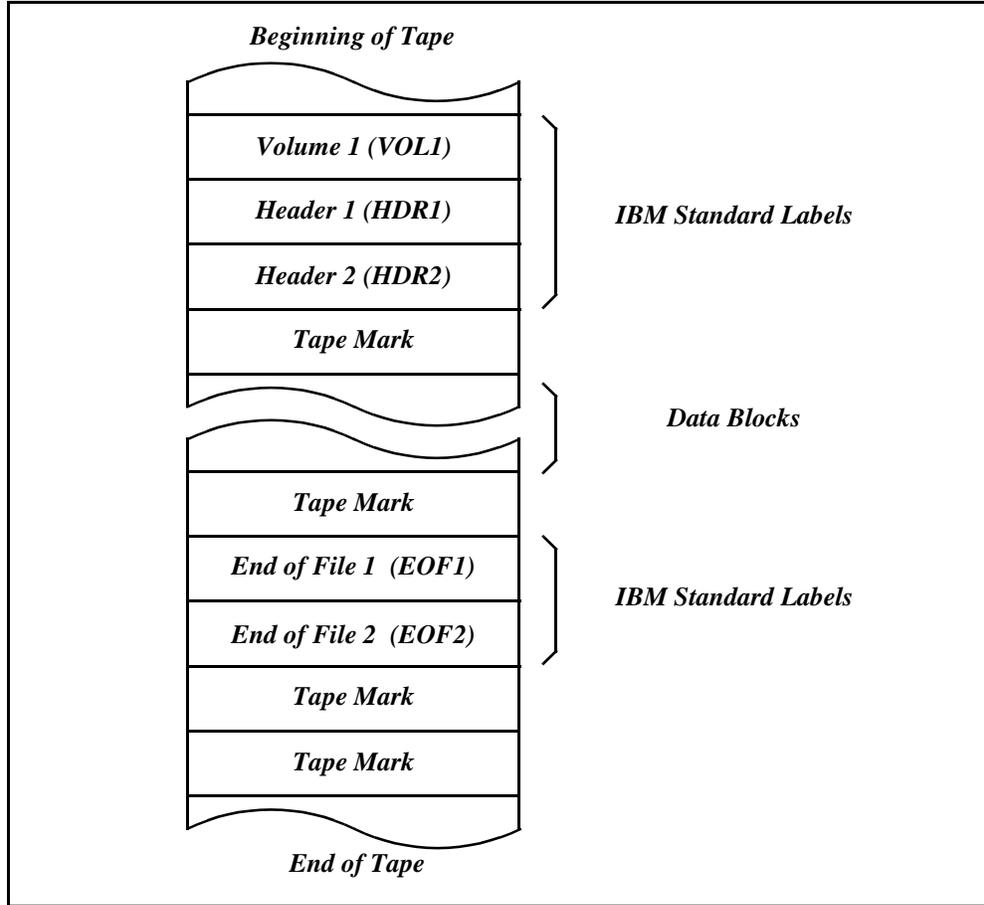
Data are arranged on the magnetic media in accordance with the ANSI recording format for magnetic tape. This format is IBM compatible and consists of:

- beginning-of tape (BOT) marker-indicates the beginning of the area on which data recording is permitted
- IBM standard labels-used to record the volume number of the tape, ownership of the tape, and information about its content. (For a complete description of IBM standard labels, see IBM manual GC 26-3795-2, OS/VS Tape Labels [Third Edition, December 1973.]
- interblock gap (IBG)-separates tape entries
- tape mark-separates the IBM standard labels from the data blocks
- data block-a unit of related data. (For more detail, see the material under the heading “AMA Data Set” in this section.)

- end-of-tape (EOT) marker-indicates the end of the area on which data recording is permitted

The ANSI format of a filled AMA tape is shown in Figure 2-1. For a complete description of the ANSI recording format, see the following manual: ANSI X 3.22 - 1973 American National Standard Recorded Magnetic Tape for Information Exchange.

Figure 2-1: Format of a filled AMA tape



*Note:* The interblock gap (IBG) that separates each tape (data) entry is not shown in Figure 2-1.

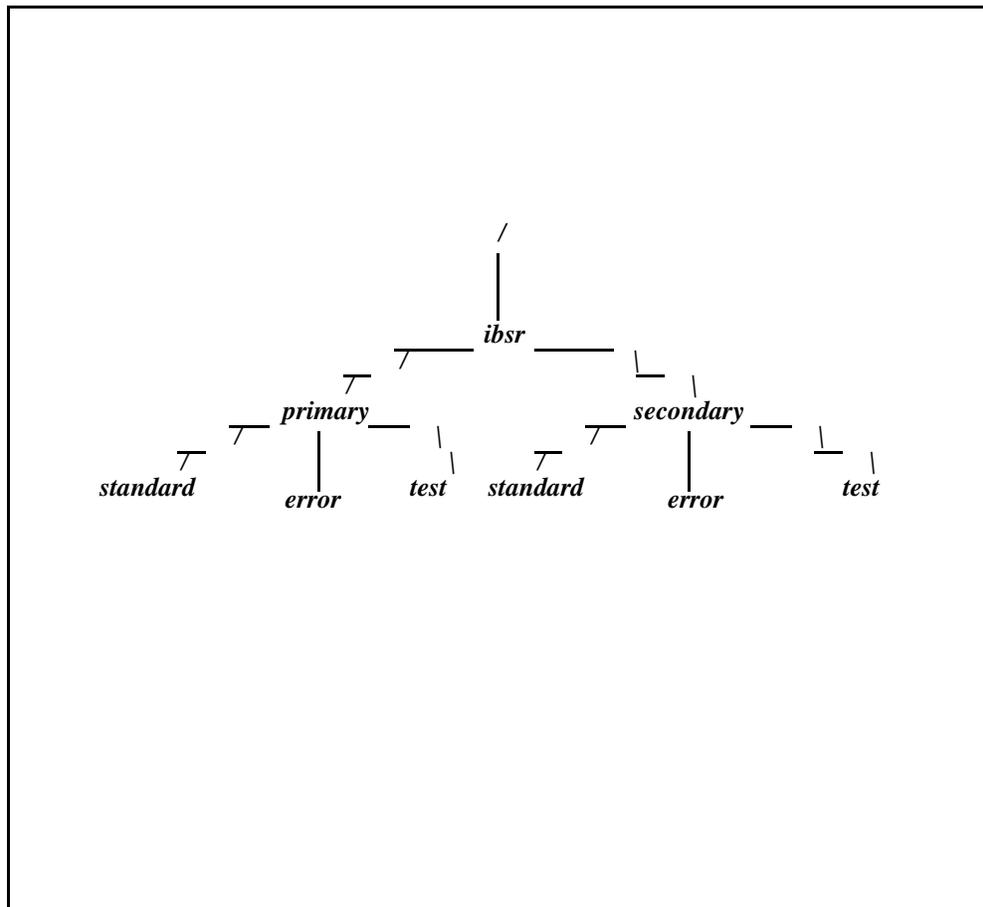
### Volume organization

All DMS-10 AMA recordings record AMA data as a single data set on a single volume. Multiple data set/multiple volume arrangements are not used.

## Integrated Billing Storage and Retrieval (IBSR) format

The medium used to record data in the BAF format is the NT8T90 System Hard Drive. The data is recorded in directories on both HD0 and HD1. All AMA data is located in the *ibsr* directory. Files that have not yet been transmitted to the AMA collector are located in the *primary* subdirectory. Files that have been transmitted are located in the *secondary* subdirectory. Within each *primary* and *secondary* subdirectories the files are further organized into *standard*, *test*, and *error* files. Each file contains header information followed by BAF formatted Billing Records.

Figure 2-2: Directory tree of IBSR files



## **Downstream processing**

### **Facilities (magnetic tape billing)**

The AMA data must be sent to a downstream processing facility that can process the AMA data contained on the magnetic tapes into billing information for the operating company.

This downstream processing facility must include an IBM 2400-series tape drive or any other tape drive compatible with IBM 2400-series tape drives. AMA tapes generated by the DMS-10 switch can be read only by tape drives of this type. Similarly, tapes recorded (that is, initialized) on a tape drive of this type can be read by the nine-track tape drive used by the DMS-10 AMA system.

### **Facilities for IBSR billing**

The AMA data stored on the Data Server must be sent to a downstream processing facility that can process the AMA data contained in the DMS-10 file system into billing information for the operating company.

The downstream processing facility may include the ability to FTP into the DMS-10 when the AMA files are pulled from the DMS-10. The downstream facility may also allow the DMS-10 to FTP the AMA data information to the AMA collector when the DMS-10 is to send the AMA billing data according to its configured schedule. At least one of the above functions must be available to transfer AMA records to the AMA collector.

### **IBM standard label content after tape initialization (magnetic tape billing)**

In addition to processing AMA data, the operating company's downstream processing facility must initialize magnetic tapes for use by the DMS-10 AMA recording system. The DMS-10 switch supports the following two alternate methods of tape initialization:

- The first method utilizes Volume 1 (VOL1), Header 1 (HDR1), and Header 2 (HDR2) IBM standard labels.
- The second method utilizes only Volume 1 (VOL1) and Header 1 (HDR1) IBM standard labels.

All IBM standard labels, which contain the information listed in Table 2-A, are 80 bytes long and are encoded in Expanded Binary-Coded Decimal Interchange Code (EBCDIC).

<b>Table 2-A: Content of IBM standard labels after tape initialization</b>			
<b>Label Name</b>	<b>Field Name</b>	<b>Field Number</b>	<b>Contents</b>
Volume 1	Label Identification	1	VOL
	Label Number	2	1
	Volume Serial Number	3	Any six alphanumeric characters (including blanks)
Header 1	Label Identification	1	HDR
	Label Number	2	1
	Expiration Date	10	(one blank) YYDDD (Must be a date prior to the date the tape is made available for use by the DMS-10 AMA recording system.)
Header 2	Label Identification	1	HDR
	Label Number	2	2

### **IBM standard label content after tape verification**

The contents of the labels placed on the tapes during initialization must be verified as part of the AMA tape-change procedure (see the NTP entitled *Maintenance and Test Manual* [297-3601-511]). If the verification fails, the tape cannot be seized for use by the DMS-10 AMA recording system.

*Note:* All Volume 1, Header 1, and Header 2 fields not listed in Table 2-A are ignored by the verification procedure and, therefore, may contain any information as required by the operating company.

The IBM standard labels after verification and full recording must contain the information listed in Table 2-B, for Bellcore-format AMA tapes, and in Table 2-C, for DMS-10 AMA tapes.

<b>Table 2-B: Content of IBM standard labels after initialization and full recording - Bellcore AMA format</b>			
<b>Label</b>	<b>Field Name</b>	<b>Field Number</b>	<b>Contents</b>
Volume 1	Label Identification	1	VOL
	Label Number	2	1
	Volume Serial Number	3	As recorded by operating company during tape initialization

2-8 Hardware description and magnetic media format

<b>Table 2-B: (Continued)</b>			
<b>Content of IBM standard labels after initialization and full recording - Bellcore AMA format</b>			
<b>Label</b>	<b>Field Name</b>	<b>Field Number</b>	<b>Contents</b>
		4	0
		5	10 blanks
		6	10 blanks
		7	10 blanks
		8	10 blanks
		9	29 blanks
Header 1	Label Identification	1	HDR
	Label Number	2	1
	Data Set Identification	3	DMS10.AMA.TAPE (three blanks)
	Data Set Serial Number	4	Same as the Volume Serial Number in VOL1 label.
	Volume Sequence No.	5	0001
	Data Set Sequence No.	6	0001
	Generation Number	7	4 blanks
	Version Number	8	2 blanks
	Creation Date	9	Set to the date when the tape was seized for use by the DMS-10 system. The first byte is set to a blank.
	Expiration Date	10	The last five bytes are set to the creation date plus the Tape Expiry Time specified in the Configuration Record. The first byte is set to a blank.
	Security	11	0
	Block Count	12	Set to 000000
	System Code	13	00000000000000
		14	7 blanks
Header 2	Label Identification	1	HDR
	Label Number	2	2
	Record Format	3	V
	Block Length	4	02048
	Record Length	5	02044
		6	1 blank

<b>Table 2-B: (Continued)</b>			
<b>Content of IBM standard labels after initialization and full recording - Bellcore AMA format</b>			
<b>Label</b>	<b>Field Name</b>	<b>Field Number</b>	<b>Contents</b>
		7	1 blank
		8	17 blanks
		9	2 blanks
		10	1 blank
		11	1 blank
	Block Attribute	12	B
		13	41 blanks
End-of-File 1	Label Identification	1	EOF
	Label Number	2	1
	Data Set Identification	3	DMS10.AMA.TAPE (three blanks)
	Data Set Serial Number	4	Same as the VOL1 label; is set to blanks if an outage affecting protected Call Store occurs before this label is recorded.
	Volume Sequence No.	5	0001
	Data Set Sequence No.	6	0001
	Generation Number	7	4 blanks
	Version Number	8	2 blanks
	Creation Data	9	6 blanks
	Expiration Date	10	6 blanks
	Security	11	0
	Block Count	12	The number of blocks in the data set (right-adjusted and padded with zeros). An outage affecting protected Call Store resets this count to zero; in such a case, it counts only the number of blocks recorded after the outage.
	System Code	13	0000000000000
		14	7 blanks
End-of-File 2	Label Identification	1	EOF
	Label Number	2	2
	Record Format	3	V
	Block Length	4	02048
	Record Length	5	02044

<b>Table 2-B: (Continued)</b>			
<b>Content of IBM standard labels after initialization and full recording - Bellcore AMA format</b>			
<b>Label</b>	<b>Field Name</b>	<b>Field Number</b>	<b>Contents</b>
		6	1 blank
		7	1 blank
		8	17 blanks
		9	2 blanks
		10	1 blank
		11	1 blank
	Block Attribute	12	B
		13	41 blanks
UHL1/UTL1	Label Identification	1	UHL/UTL
	Label Number	2	1
	Volume Serial Number	3	Same as in VOL1 label; is set to blanks if an outage affecting protected Call Store occurs before the UTL1 label is recorded.
		4	0
	Recorder Type	5	D10
	Generic Identification	6	First three characters are the Version Number; next character is a period; next two characters are the Issue Number; the last nine characters are blank. Version and Issue Numbers are taken from the data in the Configuration Record.
	Present Data	7	Date when the label is recorded.
	Version Number	8	10 blanks
	Creation Data	9	30 blanks

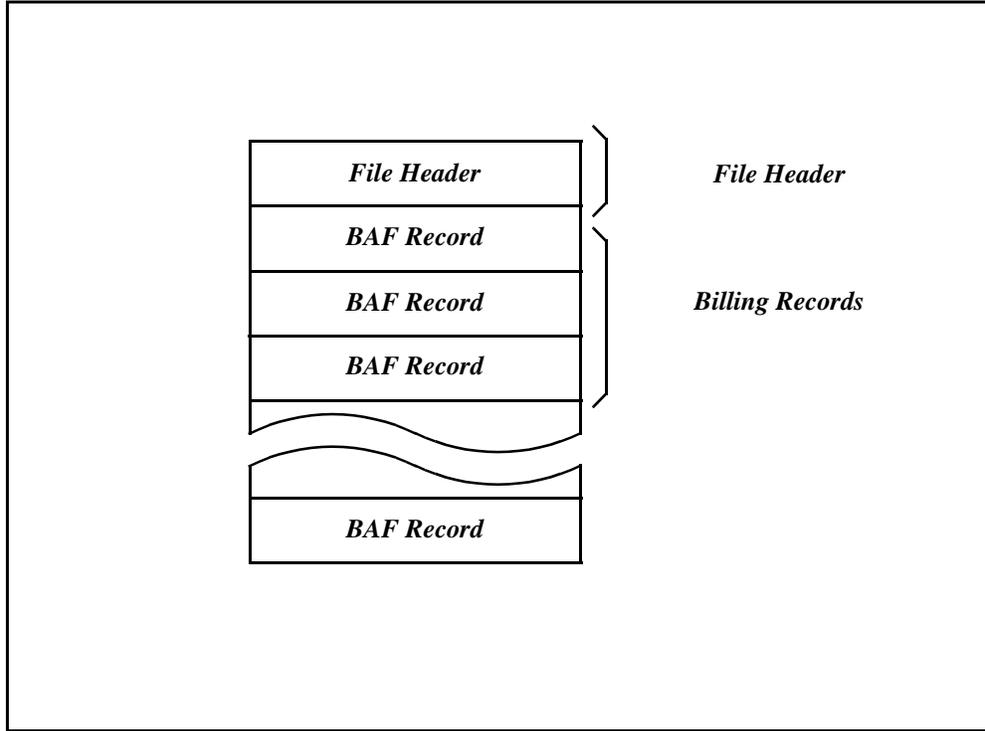
<b>Table 2-C:</b>		
<b>Content of IBM standard labels after initialization and full recording - DMS-10 AMA format</b>		
<b>Label</b>	<b>Field Name</b>	<b>Contents</b>
Volume 1	Label Identification	VOL
	Label Number	1
Header 1	Label Identification	HDR
	Label Number	1
	Data Set Identification	DMS-10 (characters 7 through 10 record the central office identification [COID] mnemonic).

<b>Table 2-C: (Continued)</b>		
<b>Content of IBM standard labels after initialization and full recording - DMS-10 AMA format</b>		
<b>Label</b>	<b>Field Name</b>	<b>Contents</b>
	Creation Date	Set to the date when the tape was seized for use by the DMS-10 system. The first byte is set to a blank.
	Expiration Date	The last five bytes are set to the creation date plus the Tape Expiry Time specified in the Configuration Record. The first byte is set to a blank.
	Block Count	Set to 000000.
Header 2	Label Identification	HDR
	Label Number	2
	Record Format	F
	Block Length	Set to the AMA block length, which is equal to the AMA record length (42) multiplied by the Block Size as specified in the Configuration Record.
	Record Length	42 (This is the AMA record length in characters).
End-of-File 1	Label Identification	EOF
	Label Number	1
	Data Set Identification	DMS-10 (characters 7 through 10 record the central office identification [COID] mnemonic).
	Block Count	The number of blocks in the data set (right-adjusted and padded with zeros). An outage affecting protected Call Store resets this count to zero; in such a case it counts only the number of blocks recorded after the outage.
End-of-File 2	Label Identification	EOF
	Label Number	2
	Record Format	F
	Block Length	Set to the AMA block length, which is equal to the AMA record length (42) multiplied by the Block Size as specified in the Configuration Record.
	Record Length	42 (This is the AMA record length in characters).

### IBSR file content

Each IBSR file has a file header describing the file which is followed by billing records as shown in Figure 2-3.

Figure 2-3: IBSR file



### IBSR file header

The IBSR file header format is shown in Figure 2-4 and described in Table 2-D.

Figure 2-4: IBSR File header format

	High-order Bit				Low-order Bit			
Byte	7	6	5	4	3	2	1	0
1	File Header Length							
2	Source Component Identification Number							
3	Source Component Type				Source Component Identification Number			
4	Destination Component Identification Number							
5	Destination Component Type				Destination Component Identification Number			
6	File Type				Data Format Type			
7	Field Suppression Type		File Priority Level			Restart Status	Pri/Sec Status	Record Source Info Type

High-order Bit	Low-order Bit
8-9	File Sequence Number
10	File Creation Type
11	File Creation Date                      File Creation Time
12-13	File Creation Date
14	File Last Modification Time
15	File Last Modification Date                      File Last Modification Time
16-17	File Last Modification Date
18-21	File Length
22-24	Number of Records in File
25	Record Source Type
26	Record Source Identification Number                      Record Source Type
27-28	Record Source Identification Number

**Table 2-D:  
IBSR File Header definitions**

Header Format Field	Description of Field Names
File Header Length	The size of the file header. This is always set to 28.
Source Component Identification Number	Unique 4-digit identifier of the office generating the AMA data.
Source Component Type	Identifies the type of office generating the AMA data. This is always a Data Server type.
Destination Component Identification Number	Unique 4-digit identifier of the site receiving the AMA data from the DMS-10.
Destination Component Type	Identifies the type of office generating the AMA data. This value is always set to DPMS type.
File Type	Indicates the type of data contained in within the AMA DNS file. The possible types are Standard, Error, and Test data.
Data Format Type	Indicates the format of the data contained in the file. This is always BAF data type.
Field Suppression Type	Indicates the type of BAF record suppression used on the data in the AMADNS file. Possible suppression types are no suppression, two-field suppression, and four-field suppression. Default setting for DMS-10 is no suppression.
File Priority Level	Indicates priority of file. Not currently used. Will always be set to 2 (Default Level).
File Sequence Number Restart Status	Indicates whether the DMS-10 needed to restart the file sequence numbering for some reason.
Primary/Secondary Status	Indicates whether the file is a primary or secondary file.
Record Source Information Type	Indicates the generating system type that created the file. This is always Traditional sensor information.

<b>Table 2-D: (Continued) IBSR File Header definitions</b>	
<b>Header Format Field</b>	<b>Description of Field Names</b>
File Sequence Number	Indicates order in which file was created.
File Creation Time	Indicates the time of day the file was created.
File Creation Date	Indicates the date the file was created.
File Last Modification Time	Indicates the time of day the file was last modified.
File Last Modification Date	Indicates the date the file was last modified.
File Length	Indicates the size of the file (in bytes) not including the file header.
Number of Records in File	Indicates the number of BAF records that are in the file.
Record Source Type	Indicates the type of component that created the AMA records. A 0 indicates that the Record Source Identification Number is traditional sensor information (e.g., from BAF records). A 1 indicates that the information is a AMADNS Source Component ID Number.
Record Source Identification Number	A 6 digit number in the traditional or AMADNS-specific format.

**AMA data set**

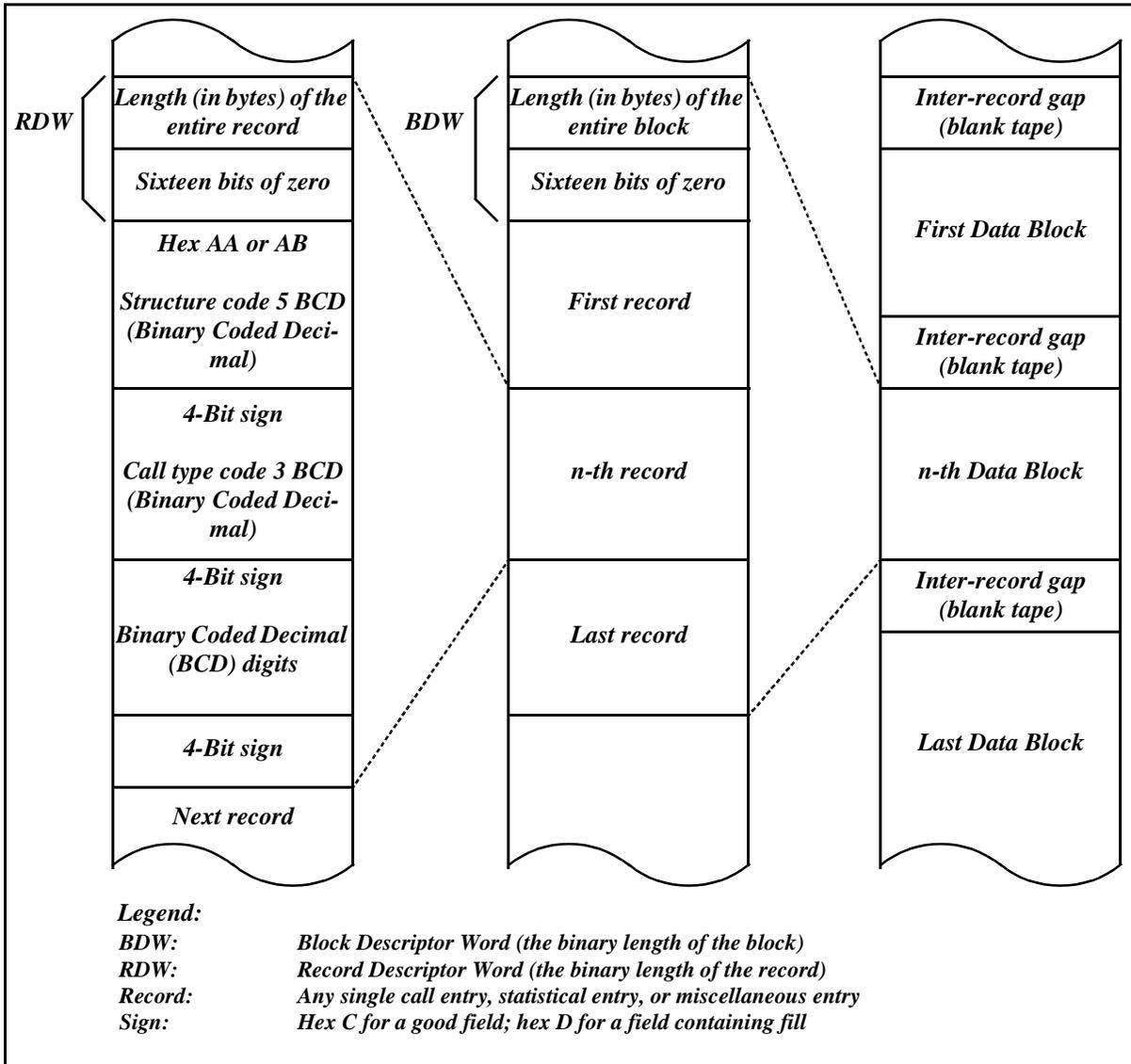
The AMA data set includes call entries, statistical entries, and miscellaneous entries (such as Media-Change records and End-of-Recording records). These entries are grouped and recorded as data blocks. Each block and each record has a definite structure.

**Block structure (magnetic tape billing only)**

Each data block has a maximum length of 2048 bytes and contains a number of records that vary individually in length. No record may be divided between two blocks. Blocks can also vary in length.

The first four bytes of each block contain a *block descriptor word* (BDW), which is followed by the records (see Figure 2-5). The first two bytes of the BDW contain (in binary) the length of the block (the first byte is the most-significant byte). This length includes the length of the BDW itself. The second two bytes of the BDW are zeros.

Figure 2-5: AMA data set



### **Record structure (for all billing methods)**

Each record consists of the following elements:

- record descriptor word-The first two bytes contain (in binary) the length of the record; the second two bytes are zeros.
- hexadecimal identifier-One byte long, its value is Hex AA if there is no fill character in the rest of the record; its value is Hex AB if there is any fill character.
- structure code-This defines the structure of the rest of the record data. For each structure code, there is a unique sequence of data fields. The data fields always appear in a defined order; that is, if field A precedes field B in one structure code, then it will precede field B in all structure codes.
- the remainder of the record data-encoded as Packed Signed Decimal Numbers

### **Packed signed decimal encoding (for all billing records)**

Each piece of record data (except the record descriptor word and the hexadecimal identifier) is recorded as a packed signed decimal number. A given piece of record data corresponds to an individual data field, such as a structure code, call-type code, and so on. A packed signed decimal number consists of *binary coded decimals* (BCDs) followed by a four-bit sign character. Each data field, therefore, fills up entire eight-bit bytes. For each data field, the most-significant BCD appears in the left half of the first byte, and the sign character appears as the right half of the last byte.

There are two sign characters: a positive sign and a negative sign. The positive sign is coded as Hex C and is appended to a field that contains no fill character (Hex F). The negative sign is coded as hex D and is appended to a field that contains incomplete or incorrect data and at least one fill character. A field that is intentionally not used has a fill character in every position, including the field's sign position.

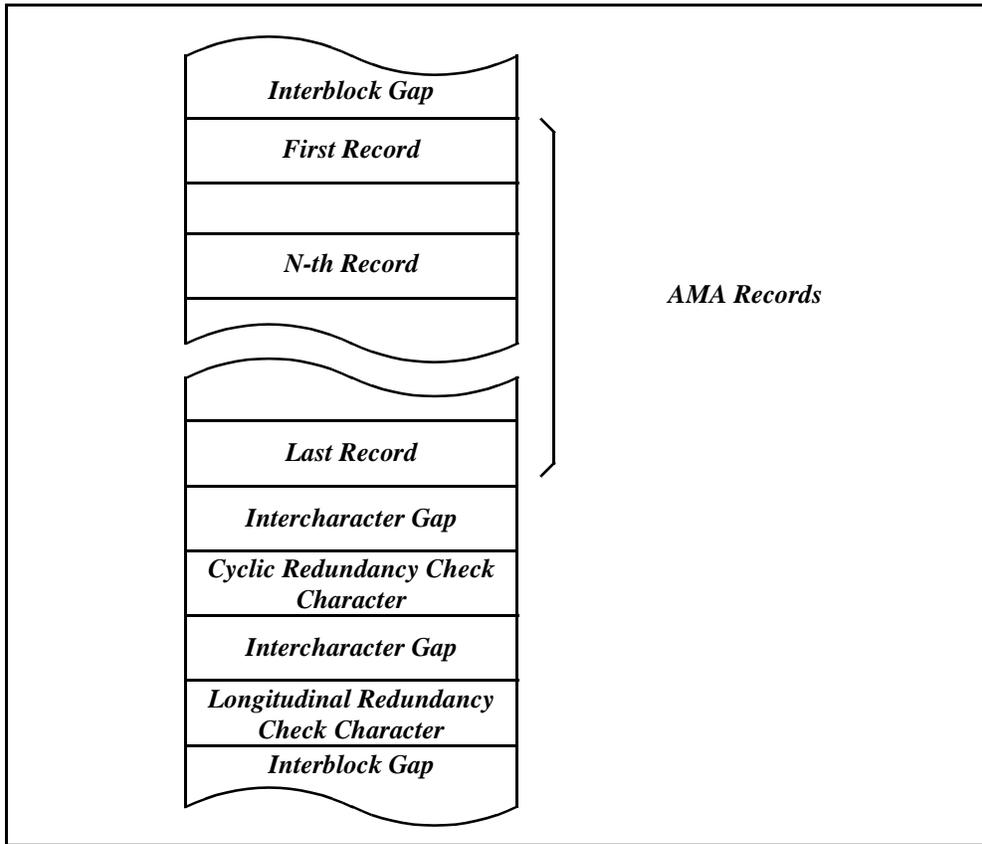
For the complete list of BCD codes, see Table 2-E.

<b>Table 2-E: BCD encoding</b>	
<b>Data</b>	<b>Code in hexadecimal</b>
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
Positive sign	C
Negative sign	D
Fill character	F

### AMA data blocks (for magnetic tape billing methods)

Data collected by the DMS-10 AMA system are recorded on tape as fixed-length records of 42 characters (unused characters within a record are filled with space characters). A variable number of such AMA records are grouped together to form an AMA data block (see Figure 2-6). There may be 12, 24, or 48 records in a data block; this parameter is specified for the particular office in the AMA prompting sequence of the Configuration Record (see NTP 297-3601-311, *Data Modification Manual*). No AMA record is split between two blocks.

Figure 2-6: AMA data block



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## Section 3: AMA system characteristics and operation

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### Processing of AMA Call Data

The AMA system provides automatic recording of AMA information in detailed format. Detailed AMA and administrative information is provided through call detail recording (CDR), which uses call processing software and billing registers to record the data. CDR charging data is always written to the active AMA tape drive for magnetic tape billing. For IBSR systems CDR data is written to both NT8T90 System Disk Drives.

If the DMS-10 switch is configured for charging, local call detail recording (LCDR) may be used to record detailed information for local calls only.

### Charge determination

When a subscriber goes off-hook at a station, the switching system examines the data associated with that station's directory number to determine its class of service (COS) (flat rate, message rate, or coin rate) and thousands group (THGP). The THGP data are used to determine the Rate Center (RC) in which the call is originating. The RC data will be used to determine if the call is toll or local.

As the subscriber dials, the DMS-10 switch begins digit translation of the called-address information. During the translations process, the switching system determines the THGP of the called party (for intra-exchange calls) or the Destination (DEST) of the call (for inter-exchange calls). The Toll Region (TR) associated with the THGP of the called party or the DEST is then used to select the appropriate Message Rate Treatment Index (MRTI). On the basis of this information, the system determines whether the call is chargeable or free of charge.

If the call is free of charge, it is completed to the destination without further involvement of the AMA system.

### **Call classification**

Call classification occurs at the end of digit translation and is based on one or more of the following:

- type of prefix digit(s) dialed-DDD access digits, etc.
- translation through a *call type* action statement in prefix translation-used with the *digit substitution* (DSUB) action statement to specify a call as an Emergency Service Bureau (EMR), directory assistance (DA), AMA test (TEST), or OUTWATS (OWAT) call
- the results of a *toll test* in screening-The test uses the call originator's local calling area and the call terminator's toll region to determine whether a call is toll or toll-free.
- the call type specified for routes-At the end of translation, any call not terminating on a line within the office terminates on a route. Where applicable, the route data specify what type(s) of AMA call are carried by the route.

### **Billing control**

After a call is marked as an AMA call of a particular type, call processing consults a billing-control table to determine whether the call is:

- billable and, if so, the billing treatment to be given that call type
- Local Call Detail Recording (LCDR) and, if so, the billing treatment to be given the call (DMS format only)
- message rate and whether it is timed or untimed (Bellcore format only)
- a special study call and, if so, what type (Traffic Sampled Study, Subscriber Line Usage Study, etc.) (Bellcore format only)
- MDR and, if so, the type of MDR required

There is a separate AMA billing-control table entry maintained in data store for each AMA call type.

### **Calling number identification**

After call-processing determines a call is billable, the DMS-10 switch prepares to receive the calling directory number using either Automatic Number Identification (ANI) or Operator Number Identification (ONI).

#### **ANI (LAMA and CAMA)**

The ANI sequence is initiated for incoming (CAMA) calls when the incoming trunk group data indicates an ANI spill. For locally originated (LAMA) calls from non-ONI subscribers, the calling number is obtained directly from the subscriber's station data.

A billing register is seized and linked to the call-register/device-register list for the call. The billing register stores the calling number and other data required to make a record of an AMA call. For LAMA calls, the calling number is obtained directly from the calling party's station data. For CAMA calls, the DMS-10 switch sends an ANI-request signal over the incoming CAMA trunk to the subtending office. The signal may be either a wink or a continuous off-hook. After receiving the calling digits, the call is routed or terminated according to the called digits. The billing register remains linked to the register list for the duration of the call.

*Note:* If the call is an untimed message-rate call (Bellcore format only), the DMS-10 switch completes the AMA entry on answer and releases the billing register.

### **ONI (LAMA)**

The ONI sequence is initiated for LAMA calls if the originator's station data marks the call as ONI or if the two-party ANI test fails.

### **ONI (CAMA)**

The ONI sequence is initiated for CAMA calls if the trunk group data indicates no ANI spill or if the call is marked as an ANI-fail call, which describes one of the following conditions:

- the identity digit in the ANI spill is not a 0 or a 3
- the DMS-10 switch times out before the ANI spill is complete
- the first digit in the ANI spill is not a KP
- an invalid digit is received
- more or fewer than seven digits are received
- the calling number validation check against allowable office codes for the trunk group fails

<b>Table 3-A: Number format of an incoming CAMA call</b>	
<b>Format</b>	<b>Call Type</b>
KP ID NXX-XXXX ST	ANI
KP ID (ST)	ONI or ANI-failure

*Note 1:* Either KP or KP2 signals and any ST signal (for example, ST, STP, ST2P, ST3P) may be used.

*Note 2:* The identity (ID) digit can be any of the following:

- 0 -Calling number identified
- 1 -ONI (includes special billing service)
- 2 -ANI failure

**Note 3:** If the (ST) signal is sent, the corresponding prefix and coin/non-coin status will be set in the call register.

The (ST) signals are as follows:

ST	-“1+” type coin calls
ST2P	-“0” and “0+” type coin calls
ST2P	-“1+” type non-coin calls
ST3P	-“0” and “0+” type non-coin calls

**Note 4:** When the ID digit is 1, 2, 4, or 5, an ST signal may be received.

For other than ANI-fail calls, a billing register is seized and linked to the call-register/device-register list for the call. (For ANI-fail calls, a billing register is seized before initiation of the ANI-spill sequence). A currently staffed and idle CAMA Position Signaling Circuit is seized and a Multifrequency Receiver is attached. A single (ANI-fail) or double (ONI) order tone is sent to the operator. Upon answer, the operator is connected through the CAMA Position Signaling Circuit pack to the calling party, and obtains the calling party's directory number (DN). The operator keys the calling number into the Multifrequency Receiver. The digits are collected and stored in the billing register, which remains linked to the register list for the duration of the call.

*Note: If the call is an untimed message-rate call (Bellcore format only), the DMS-10 switch completes the AMA entry on answer and releases the billing register.*

After receipt of the calling number, the DMS-10 switch performs a validation check to ensure the calling office code is valid and the calling number obtained by the operator is different from the called number. For CAMA calls, there is a list of allowable central office (CO) codes for each incoming trunk group. For LAMA ONI calls, there is a list of allowable CO codes included in the switching plan data for the particular DMS-10 switch.

If the validation check fails, the DMS-10 switch gives the operator a reorder signal. The operator may clear the digits received and the reorder signal by depressing the reset key, and ask the calling party for his DN. The operator then rekeys the calling number into the Multifrequency Receiver. The validation check is repeated and, if a valid number is received, the connection between the calling party and the operator is dropped and the call is routed or terminated according to the called digits. If a valid number cannot be obtained, the operator may terminate the call by depressing the position-disconnect key.

### **AMA data recording**

After the call duration, when the off-hook signal of the called party is received by the DMS-10 switch, the answer time and date and associated charging data are recorded in the billing register associated with the call.

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## Call detail recording

Call detail recording (CDR) uses the call processing software to provide detailed charging and administrative information. The type of information supplied depends on the recording medium format (DMS or Bellcore). CDR may be used in a Local or Transit Exchange to record information for coin or non-coin billable calls.

### Call detail recording operation

CDR operates as described in this section under the heading “AMA system operation.” During initial call processing, the called party's TR or DEST is used to select the appropriate MRTI. A maximum of 64 TRs may be defined in an exchange, and one or more TRs may be assigned to an MRTI. The MRTI specifies call treatment, that is, the Message Billing Index (MBI) to be used and whether the call is untimed (fixed charge) or timed. A maximum of 62 MRTIs may be assigned to an exchange. The TR is used to determine if a timed call will be charged the local or toll rate.

The charge for a specific call is determined by the information that the operating company has configured in the DMS-10 switch (see the TARE and PULS prompting sequences in Overlay AMA in the “Administration” section). The charge varies, depending on the day and time of the call. A Tariff Table is assigned to every day of the week. Within each Tariff Table (day) one to three rate periods, defined in 1-hour or 30-minute intervals, may be scheduled. The number of charge units applied during a specific rate period is determined by the exchange configuration and the length of the call.

Call treatment is different for untimed (fixed charge) calls and for local or toll timed calls. For untimed calls, before the called party answers, the switching system determines the current day of the week in order to select the appropriate Tariff Table (TARE). The system also determines the current time of day in order to select the Pulse Table (PULS) associated with the current rate period in the Tariff Table. The MRTI entry in the Pulse Table is examined to determine the appropriate number of charge units for the call.

At the beginning of a timed call, the MRTI is used to determine which Message Billing Index (MBI) is associated with the call. The Tariff Table and Pulse Table are selected in the same way that they are selected for an untimed call. However, at the end of the call, the MRTI entry in the Pulse Table is examined to determine the appropriate pulse rate and period for the call.

### Data storage

As indicated in the description of charging operation, charging data are stored in a billing register. When a billable AMA call disconnects, the contents of the billing register are transferred to a data buffer in protected Call Store which holds up to 48 AMA data entries. The data contained in the buffer are reformatted into either an 800-bpi system data entry, a 1600-bpi AMA, system data entry, or IBSR data entry.

When the buffer is full of 800-bpi AMA data, the data block is transferred to a buffer in the Magnetic Tape Controller pack, which writes it onto the recording medium (tape or BMC). This completes the processing of 800-bpi AMA call data for a call.

When the buffer is full of 1600-bpi AMA data, the data block is transferred to a buffer in the secondary I/O Interface packs. The active secondary I/O Interface pack writes the data to both AMA disk drives. When 16K (approximately 300 AMA records) of new AMA data accumulates in the disk drives, it is copied to the 1600-bpi tape drive. Additionally, each hour, on the hour, the disk is checked for the presence of a new block, or blocks, of AMA data since the last disk-to-tape copy. If new blocks exist, they are copied to the tape. The AMA RLSE command of overlay MTD is used to copy to the tape any AMA data not already on it.

When the buffer is full of IBSR AMA data, the data block is transferred to the Data Server within the DMS-10. The Data Server will then write the AMA data to the NT8T90 System Disk Drives for storage until they are transferred via FTP to the AMA collector.

Offices may be configured to record the billing data on both IBSR and either 800-bpi or 1600-bpi AMA systems. When this is the case, the AMA data is first transferred to the Data Server and then the data is transferred to either the 800-bpi or 1600-bpi system as described above.

## AMA recording system

The 800-bpi and 1600-bpi and IBSR Data Server AMA systems provide full redundancy to ensure the capture and preservation of billing data.

### 800-bpi redundancy

The duplicated 800-bpi AMA recording systems operate independently. At any given time, one system is in the active mode and the other system is in the *hot standby* mode. Switching the *hot standby* system to the active mode and the active system to the standby mode may be initiated automatically by the DMS-10 switch or manually by operating company personnel, using overlay MTD. This switching occurs automatically if the system detects an error in its own operation. Manual switching is used to perform tape-change, maintenance, or system trouble-clearing procedures.

### 1600-bpi redundancy

The 1600-bpi AMA system is controlled by two redundant I/O Interface (IOI) packs. Each IOI pack has two Small Computer Systems Interface (SCSI) I/O ports, one connected to bus A and one to bus B. Bus A accesses one disk drive, while bus B accesses the other disk drive and the 1600-bpi tape drive. In normal operating mode, one IOI pack writes an AMA block to one disk drive, switches SCSI buses and writes the block to the second disk drive. The second IOI pack is in an inactive standby mode and will be placed in operation should the first IOI pack or its SCSI ports fail. If an error is detected in an IOI pack, a disk drive, a SCSI bus or port, or a disk drive power converter, a major alarm is raised.

### **IBSR redundancy**

The Data Server on the DMS-10 will write the billing data to both NT8T90s. If one of the NT8T90s is unavailable, the data will be written to the other NT8T90 and copied to the unavailable disk when it becomes available. If both NT8T90s are unavailable, the Data Server will buffer the data until one or both of the NT8T90s becomes available. The Data Server can buffer up to 8 MB of billing data.

It is possible to have IBSR and the 800-bpi or 1600-bpi billing running concurrently on the DMS-10. Under these circumstances the redundancy of both systems will be utilized to store AMA data on the billing device. When formatted AMA data has filled its buffer, the data will be written to the 800-bpi or 1600-bpi AMA system as well as the IBSR Data Server on the DMS-10. Billing will continue as long as one of the two systems is capable of accepting AMA data. Data redundancy is lost between systems should one recording system become unavailable. Alarms are raised independently for each AMA recording system. Only if both systems fail will AMA processing be halted.

### **Pulse rate determination**

The pulse rate that is applied by the AMA system to a given call is a function of:

- The attributes of the originating line (that is, location of originating line [RC] and rate treatment package [RTP])
- The day(s) of the week during which the call occurs
- The hour(s) of day during which the call occurs
- The call type (that is, free of charge, fixed charge rate, local charge rate, or toll charge rate)
- The attributes of the destination of the call (that is, location [TR] and Message Rate Treatment Index [MRTI])

The data related to these determining factors are stored in the memory of the switching system. These data and their use in determining the pulse rate that is applied to a given call are discussed under the subheadings that follow. For general information about the administration of these data by means of Data Modification Order (DMO) overlays, see the section entitled "AMA system administration" in this NTP.

### **Rate center (RC)**

The Rate Center (RC) is an attribute of the originating line or incoming trunk. It is used by the switching system to determine the originator's location. A maximum of 32 RCs can be defined. Each thousands group (THGP) and each incoming trunk group (INC) in the system is assigned to an RC.

### **Toll region (TR)**

The Toll Region (TR) is an attribute of the destination of the call. It is used by the switching system to determine whether a call should be given local or toll treatment. A maximum of 256 TRs can be defined. Each thousands group (THGP) in the system and each destination (DEST) outside the system are assigned to a TR.

### **Message rate treatment index (MRTI)**

The Message Rate Treatment Index (MRTI) associated with the Treatment Index (MRTI) called number is used to indicate call treatment. The MRTI defines the Message Billing Index (MBI) code to be used for Regional Accounting Office accounting, allows message rate treatment for calls without MBI, and indicates whether the call is timed or untimed (fixed-charge). A maximum of 62 MRTIs can be defined in the switching system. Each TR (see above) is associated with an MRTI. Each MRTI contains one to three rate periods.

### **Rate treatment package (RTP)**

The Rate Treatment Package (RTP) is an attribute of the originating line or incoming trunk. The RTP defines the originator's rate treatment for calls to destinations in any of the TRs. The originator's RTP is checked to determine the call class of service (flat rate, business message rate, residential message rate, or coin). For flat rate calls, TRs that can receive toll-free calls are specified. For message rate and coin calls, the MRTI and applicable TRs are specified.

### **Tariff table (TARE)**

The Tariff Table (TARE) is used to select the appropriate Pulse Table (PULS) (see below) for a call. This selection is made on the basis of the day(s) of the week and the hour(s) of the day during which the call occurs. There are seven Tariff Tables defined in the switching system, one for each day of the week.

Within each Tariff Table, there can be one to three rate periods, each of which corresponds to a Pulse Table. Definition of the beginning and ending times for each rate period varies, depending on the software generic. Each Tariff Table has 24 or 48 entries, one for each hour or half-hour period during the day of the week with which the Tariff Table is associated. Each entry contains a value that indicates which of the one to three rate tables, and thus which Pulse Table (PULS), is to be applied during that hour or half-hour period.

### **Pulse table (PULS)**

The Pulse Table (PULS) is used to indicate either the number of PPM charge units applied to fixed-charge-rate calls or the PPM pulse rate for timed calls. Three different Pulse Tables (one for each rate period) may be defined for each MRTI in the switching system. In each PULS, there are 62 entries, one for each of the Message Billing Indexes (MBIs). For fixed charge calls, the initial pulse treatment, charging interval, and time resolution must be defined. For a timed call, the pulse treatment, charging interval, and time resolution must be defined for the initial period and the overtime period.

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## No-charge state

During the following abnormal conditions, the system enters a no-charge state:

- SYSLOAD (system software reload)
- Initialization
- Time-of-Day (TOD) clock faults (i.e., AMA system down)
- No billing registers available

When the system is in a no-charge state, special treatment is required for chargeable calls. The paragraphs that follow describe the various special treatments that are given to subscriber and coin line calls that originate before or during a no-charge state initiated by each of the abnormal conditions listed above.

### SYSLOAD

Most calls that are connected through the Network before the SYSLOAD retain their speech paths, but all other call information, including billing registers, is lost. The special treatments for calls that originated before the SYSLOAD are:

- **Subscriber Call.** Because of the loss of the billing register associated with the call, the entire call is free of charge. The only exception is a Long-Duration Call (LDC) originated by a subscriber. Because the charging record of a subscriber line involved in an LDC is updated daily at midnight, any portion of an LDC up to the midnight immediately preceding the SYSLOAD is billed normally. The portion of an LDC from the last midnight update to disconnect is free of charge
- **Coin Line Call.** Because the appropriate billing register associated with a coin line is updated upon the collection of credit, all periods up to and including the period during which the SYSLOAD occurs are charged normally. The loss of the call's billing register, however, requires that the rest of the call be free of charge

The system automatically exits the no-charge state upon completion of the SYSLOAD, except under the following conditions:

- **First SYSLOAD.** After the SYSLOAD that occurs when the system is first placed in service, the system will remain in a no-charge state until the TOD clocks are set via the appropriate Resident Commands. For these commands, see the “Resident Commands” section in the NTP entitled *Maintenance Diagnostic Input Manual (297-3601-506)*
- **Double TOD Clock Faults.** If both TOD clocks are faulty upon completion of the SYSLOAD, the system will remain in a no-charge state until at least one of the TOD clocks is manually cleared of faults, tested, and reset. For more information, see below under the subheading “TOD Clock Faults”

## Initialization

An Initialization lasts approximately 10 to 30 seconds. During this time, no calls can be originated and routed, but any signals sent to the switching system (such as on-hooks and off-hooks) are detected and then processed after the Initialization.

Initialization normally does not result in a loss of billing registers. Billing registers are reattached to the established chargeable calls after Initialization. For charging on a given call to continue after Initialization, that call must have had a billing register before Initialization.

The special treatments for established calls that have billing registers attached at the time of an Initialization are:

- **Subscriber Call.** The portion of a subscriber call that occurs during Initialization is free of charge, including that portion of a call that is disconnected by the subscriber during Initialization. Normal charging continues immediately after Initialization. A subscriber can be undercharged by up to 2 seconds for the complete call. This can occur because every 2 seconds the system saves the value of the clocks that are used to calculate conversation time. These clocks are tested and zeroed during Initialization.
- **Coin Line Call.** The portion of a coin line call that occurs during Initialization is free of charge, including that portion of a call that is disconnected by the subscriber during Initialization.

In some rare instances, Initialization is triggered either by a special type of memory fault or by a Data Modification Order (DMO) change that requires reallocation of system memory. In these instances, billing registers are lost. Should this type of loss occur, the treatments given to subscriber and coin line calls are the same as those given to calls affected by a SYSLOAD (see above).

The system automatically exits the no-charge state upon completion of the Initialization, except when both TOD clocks are faulty. If this occurs, the system will remain in a no-charge state until at least one of the TOD clocks is manually cleared of faults, tested, and reset. For more information, see below under the subheading "TOD Clock Faults."

## TOD clock faults

The system has three clock sources: one calendar-clock source (the software clock) and two calendar/time-counter clock sources, which are called the Time-of-Day (TOD) clocks. The system periodically checks to ensure that the software-clock calendar and the two TOD-clock calendars agree and that the two TOD-clock time counters agree. The TOD-clock time counters are used in determining conversation time for subscriber calls.

In order to charge subscriber calls, the system must have at least one correctly functioning TOD clock. If the system determines that one TOD clock is faulty, a minor alarm message is displayed at the maintenance terminal(s), and the system uses the other TOD clock for subscriber charging. If the system finds that the other TOD clock is faulty before the first TOD clock is repaired and returned to service, then a major alarm message is displayed at the maintenance terminal(s), and the system enters a no-charge state. Such a double TOD-clock fault is extremely rare, since it requires that double hardware, software, or hardware/software faults occur within a very short period of time.

A double TOD-clock fault does not, in itself, prevent subscribers from originating calls. Thus, the special treatments differ for calls that originated before the no-charge state and those that originate during the no-charge state. The special treatments are:

- **Subscriber Call Originated Before No-Charge State.** A subscriber call that originated before the system entered the no-charge state is completely free of charge. The only exception is a Long Duration Call (LDC) originated by a subscriber. Because the billing register of a subscriber line involved in an LDC is updated daily at midnight, any portion of an LDC up to the midnight immediately preceding the second TOD clock fault is billed normally. The portion of an LDC from the last midnight update to disconnect is free of charge
- **Subscriber Call Originating During No-Charge State.** The operating company can specify the charging treatment to be given to each type of subscriber call that originates during a no-charge state. The options that can be specified via DMO are:
  - Allow the call to proceed completely free of charge. (If a call is allowed to begin free of charge, then no billing register is attached to the call; thus, charging cannot begin after restoral of a TOD clock)
    - Specify a route (for example, Busy Tone) to be taken by such calls
    - Specify that the call be routed on the same route used for ANI-fail (ANIF) calls
- **Coin Line Call Originated Before No-Charge State.** The portion of this type of call that occurred before the system entered the no-charge state is charged normally. Because a different timing source is used for coin collection pulsing, the system can continue coin line charging during this type of no-charge state. However, loss of the TOD clocks means that the accuracy of the calendar time that is used to determine the applicable tariff rate cannot be guaranteed. Thus, the portion that occurred during the no-charge state and up to disconnect is charged at the minimum tariff rate
- **Coin Line Call Originating During No-Charge State.** For the reasons stated above, the entire call is charged at the minimum tariff rate

The system automatically exits a no-charge state caused by a double TOD clock fault when operating company personnel have:

- Loaded Overlay Control Equipment Diagnostic (CED) and successfully busied, tested, and returned to service one of the TOD clocks
- Set the correct date and time on the repaired TOD clock via the appropriate Resident Commands
- Loaded the Alarm Overlay (ALO) and cleared the major alarm condition

The commands necessary to perform these actions are explained in the NTP entitled *Maintenance Diagnostic Input Manual* (297-3601-506). A step-by-step procedure for repairing TOD clock faults is contained in the NTP entitled *Maintenance and Test Manual* (297-3601-511).

#### **No billing registers available**

If a billing register cannot be attached to a chargeable call because all available billing registers are being used by active calls, the system enters a no-charge state. Such an occurrence is extremely rare, since there should be at least as many billing registers as there are available call registers. However, because chargeable calls using various calling features (Call Forwarding, AIN, usage-sensitive billing features) require more than one billing register, a no-charge state caused by the unavailability of billing registers is theoretically possible.

An impending no-charge state caused by the unavailability of billing registers is indicated by a message displayed at the maintenance terminal(s) reporting that the low percentage threshold for billing register availability has been passed. (This threshold is specified in Overlay CNFG, prompting sequence BUFF; see the NTP entitled *Data Modification Manual* [297-3601-311].)

Repeated no-charge states caused by the unavailability of billing registers indicate that more billing registers should be allocated in the system. This operation is performed in Overlay CNFG, prompting sequence AMA (see the NTP entitled *Data Modification Manual* [297-3601-311]). The number of billing registers allocated in the system should be a function of the percentage of the number of chargeable calls expected in the traffic load at a given time.

The unavailability of billing registers does not, in itself, affect call originations. Thus, the special treatments differ for calls that originated before the no-charge state and those that originate during the no-charge state. The special treatments are:

- Subscriber Call Originated Before No-Charge State. Charged normally
- Subscriber Call Originating During No-Charge State. The operating company can specify the charging treatment to be given to each type of subscriber call that originates during a no-charge state. The options that can be specified via DMO are:

- Allow the call to proceed completely free of charge. (If a call is allowed to begin free of charge, then no billing register is attached to the call, and one cannot be added to an established call; thus, normal charging for such a call cannot begin after a billing register becomes available)
- Specify a route (for example, Busy Tone) to be taken by such calls
- Specify that the call be routed on the same route used for ANI-fail (ANIF) calls
- Coin Line Call Originated Before No-Charge State. Charged normally
- Coin Line Call Originating During No-Charge State. Charged normally, but no billing register is attached

The system automatically exits the no-charge state when one or more billing registers become available to service a chargeable call origination.

## Usage sensitive billing

Usage sensitive billing (USB) provides the ability to charge subscribers for specific actions related to custom calling features and CLASS features. The office must first be configured with usage sensitive features. Usage sensitive features are assigned to stations, MADNs, and ISDN DNCTs through, respectively, the STN, MADN, and DNCT prompting sequences in Overlay DN. Each time that a usage sensitive feature is invoked, except for the UCND, UNAM, and UACR features (refer to the TIME prompt in the AMA prompting sequence of Overlay AMA), a billing record is generated.

## Data transmittal to downstream processing center

Detailed or bulk charging data must be sent to the downstream processing center for conversion into the actual bills that are sent to subscribers. For this purpose, the data are written to the reel-to-reel magnetic tape used by the Magnetic Tape Unit (MTU) or to the magnetic disk used by the Billing Media Converter. For IBSR billing the data is transferred via FTP to the downstream processing center.

The content of the charging data varies, depending on the billing record format (DMS or Bellcore). For information on downstream processing and the format used to record charging data on the magnetic tape or disk, see the section entitled "Hardware description and magnetic media format."

## Processing of Trunk Group Member Usage Data

Trunk Group Member Usage (TGMU) utilizes the call processing software to generate detailed information about calls occurring on trunk groups marked for study. TGMU records are non-AMA data records and are collected in addition to any other AMA billing that would normally be collected for a call. TGMU data records contain information similar to AMA records and operate as described in this section under the heading "AMA system operation".

### 3-14 AMA system characteristics and operation

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Collection of TGMU data is dependent upon the DMS-10 being configured for IBSR. TGMU data is segregated into separate files and directories as described in the "System Features" section of NTP 297-3401-105. The TGMU data is transmitted for analysis via FTP to a specified TGMU data processor.

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## Section 4: AMA system administration

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### Introduction

This section describes the DMS-10 AMA system operation and corresponding Data Modification Order (DMO) overlay programs used for administrative control of the AMA system.

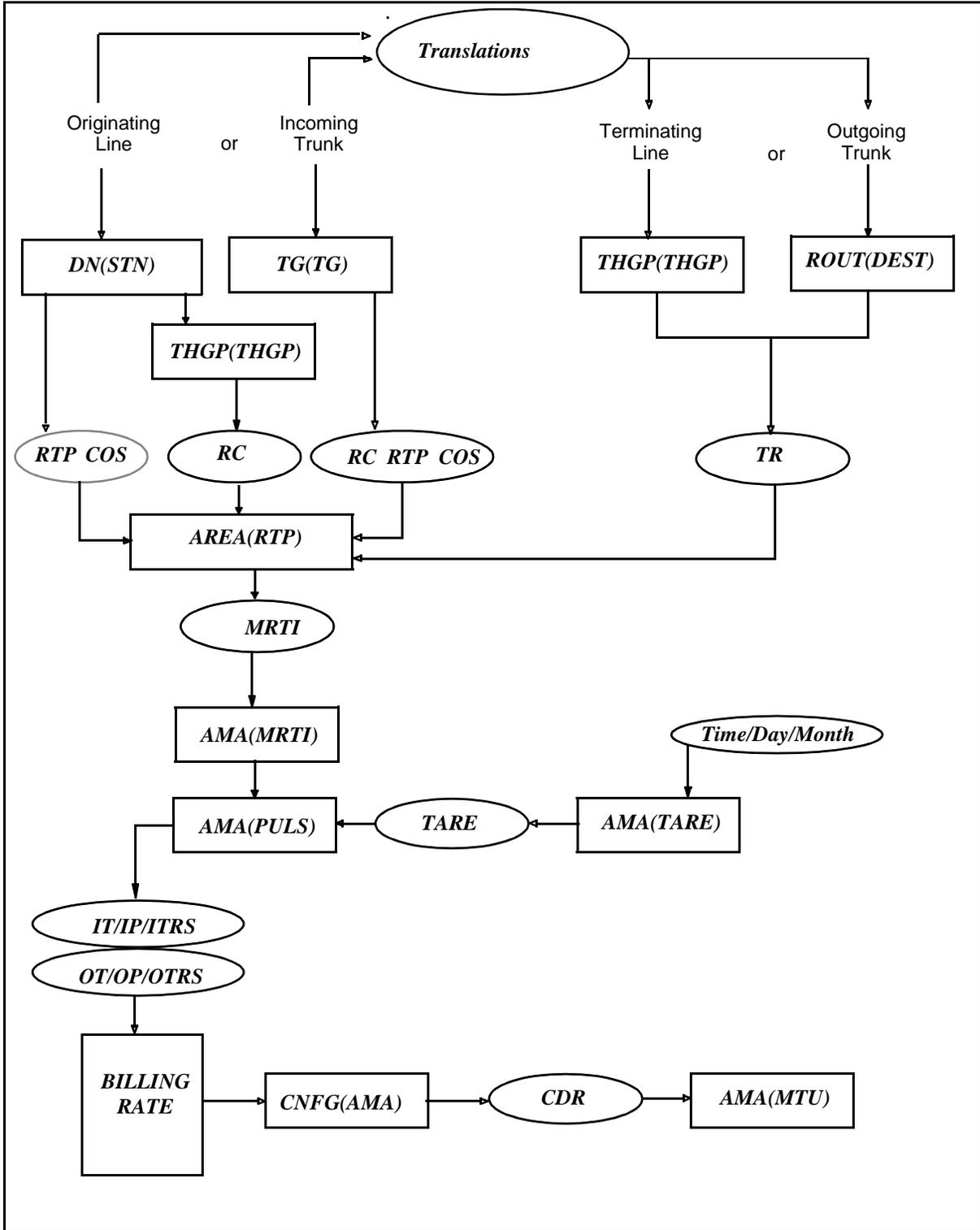
### Data modification order overlay programs

The paragraphs that follow describe the various Data Modification Order (DMO) overlay programs that provide administrative control of the operational parameters of the AMA system. These overlay programs allow the user to manipulate data that specify:

- Criteria for chargeable call classification
- AMA treatment for each call type
- Other data related to the AMA system

For the actual prompting sequences used to modify the parameters of the AMA system operation that are discussed in this section, see the NTP entitled *Data Modification Manual* (297-3601-311).

Figure 4-1: AMA system administration



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## AMA system summary

This summary follows, in greater detail, the AMA system operation summarized in figure 4-1.

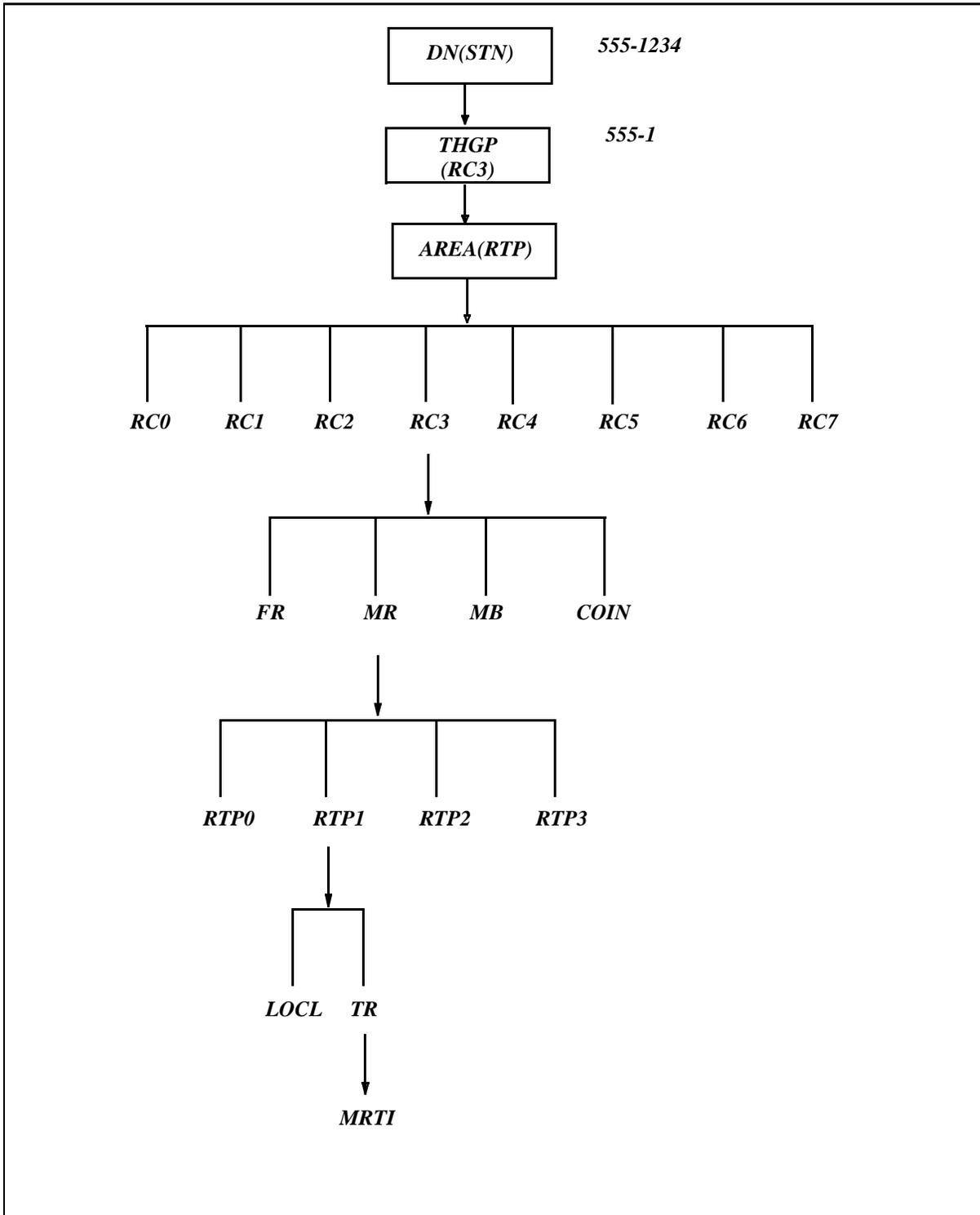
### Charge determination

As the subscriber dials, the DMS-10 switch begins digit translation of the called party. During the translations process, the switching system determines the THGP of the called party (for intra-exchange calls) or the Destination (DEST) of the call (for inter-exchange calls). The Toll Region (TR) associated with the THGP or the DEST is then used to select the appropriate Message Rate Treatment Index (MRTI). A call's charge rate is determined after the subscriber dials a sufficient number of digits to allow call translations to identify the termination.

After call translation, the switching system examines the data associated with a calling station's directory number to determine its class of service (COS) (flat rate, message rate, or coin rate) and thousands group (THGP). The THGP data are used to determine the Rate Center (RC) in which the call is originating.

Figure 4-2 shows the AMA charge determination structure of overlays DN, THGP and AREA. In this example originating subscriber DN 555-1234, is assigned Rate Center 3, with measured residential service and Rate Treatment Package 1.

Figure 4-2: Charge Determination



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## Call classification

If the call is chargeable, the called number must be classified, based on one or more of the following:

- Type of prefix digit(s) dialed: DDD access digits, etc.
- Translation through a “call type” action statement in prefix translation: used with the “digit substitution” (DSUB) action statement to specify the type of call.
- The results of a “toll test” in screening: the test uses the call originator's local calling area and the call terminator's toll region to determine whether a call is toll or toll-free.
- The call type specified for routes: at the end of translation, any call that does not terminate on a line within the exchange terminates on a route. Where applicable, the route data specify what type(s) of chargeable call are carried by the route.

After call processing determines that a call is chargeable, the DMS-10 switch prepares to receive the calling directory number using either Automatic Number Identification (ANI) or Operator Number Identification (ONI).

### **ANI (locally originated and subtending local exchange calls)**

ANI is a method used to identify a calling station for billing purposes and is used for locally originated calls from non-ONI subscribers. The ANI sequence is initiated for calls from a subtending Local Exchange when the incoming trunk group data indicates an ANI spill. ANI automatically forwards the billing number to AMA equipment.

A billing register is seized and linked to the call register for the call. The billing register stores the calling number and other data required to make a record of a chargeable call. For locally originated calls, the calling number is obtained directly from the calling party's station data. For subtending Local Exchange calls, the DMS-10 switch sends an ANI request signal over the incoming trunk to the subtending exchange. The signal may be either a wink or a continuous off-hook. For ISUP trunks, this information may be included in the IAM message or requested by an INR. After receiving the calling digits, the call is routed or terminated according to the called digits. The billing register remains linked to the call register for the duration of the call.

*Note: If the call is an untimed message-rate call, the DMS-10 switch bills the call on answer and releases the billing register.*

### **ONI (locally originated calls only)**

The ONI sequence is initiated for locally originated calls if the originator's station data marks the call as ONI or if the two-party ANI test fails.

## Recording AMA data

After the call is answered, (when the off-hook signal of the called party is received by the DMS-10 switch), the answer time and date and associated AMA data are recorded in the billing register associated with the call. The method used for calculating AMA data is Call Detail Recording (CDR).

### Call detail recording operation

Call detail recording (CDR) uses the call processing software to provide detailed AMA and administrative information. The type of information supplied depends on the Billing Record format (DMS or Bellcore). CDR may be used in a Local or Transit Exchange to record information for coin or non-coin billable calls.

A terminating party's TR (toll region) is used to determine if a timed call placed from the originating party should be charged local or toll rate. During initial call processing, the called party's TR is determined differently for inter-exchange calls and for intra-exchange calls. For inter-exchange calls, the TR is determined from the DEST defined for a terminator routing out of the DMS-10 switch. For intra-exchange calls, the TR is determined from the terminating line's THGP. A maximum of 256 TRs may be defined. One or more TRs may be assigned to a MRTI. The MRTI specifies call treatment, that is, the Message Billing Index (MBI) to be used and whether the call is untimed (fixed charge) or timed. A maximum of 62 MRTIs may be assigned to an exchange.

The charge for a specific call is determined by the information that the operating company has configured in the DMS-10 switch (see the TARE and PULS prompting sequences in Overlay AMA in the "AMA System Administration" section). The charge varies, depending on the day and time of the call. A Tariff Table is assigned to every day of the week. Within each Tariff Table (day) one to three rate periods, defined in 1-hour or 30-minute intervals, may be scheduled. The number of charge units applied during a specific rate period is determined by the exchange configuration and the length of the call.

Call treatment is different for untimed (fixed charge) calls and for local or toll timed calls. For untimed calls, before the called party answers, the switching system determines the current day of the week in order to select the appropriate Tariff Table (TARE). The system also determines the current time of day in order to select the Pulse Table (PULS) associated with the current rate period in the Tariff Table. The MRTI entry in the Pulse Table is examined to determine the appropriate number of charge units for the call.

At the beginning of a timed call, the MRTI is used to determine which Message Billing Index (MBI) is associated with the call. The Tariff Table and Pulse Table are selected in the same way that they are selected for an untimed call. However, at the end of the call, the MRTI entry in the Pulse Table is examined to determine the appropriate pulse rate and period for the call.

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## AMA System Data Modification Orders

The data modification orders (DMO) listed in this section are also referenced in figure 4-1.

### Directory number (DN)

Line origination billing administration starts at the originating subscriber's station. Billing information is first derived from data located in Overlay Directory Number (DN), prompting sequence Station (STN). This overlay points to the originating subscriber's rate treatment package (RTP) number and class of service (COS). An RTP contains data regarding the caller's local calling area, COS and message billing index. RTPs are contained in Rate Centers (RC). Both are defined in Overlay AREA.

### Thousands group (THGP)

Overlay THGP is the second overlay accessed during line origination AMA administration. A thousands group is the first four digits of the subscriber's five- to seven-digit directory number. This overlay points to the originating subscriber's RC and the terminating subscriber's Toll Region (TOLL). RCs are defined in Overlay AREA. An RC is an attribute of the originating line or incoming trunk. The switching system uses the RC to determine the originator's location and contains the RTP used to define the originator's billing characteristics. Each thousands group (THGP) and each incoming trunk group (INC) in the system is assigned to an RC. It is used by the switching system to determine whether a call should be given local or toll treatment. The terminating TOLL is an attribute of the destination of the call. The switching system uses TOLL to determine whether a call should be given local or extended local treatment.

A maximum of 256 TRs can be defined. Each thousands group (THGP) in the system and each destination (DEST) outside the system are assigned to a toll region.

### Area (AREA)

Overlay Area contains call originator and call terminator characteristics. These characteristics include the subscriber's rate center (RC), rate treatment package (RTP), and toll region (TR). Each DMS-10 system can service up to 32 RCs. Each RC can support up to four RTPs for each of the following class of service types: Coin, Flat rate, Measured residential, and Measured business. This permits up to 16 RTPs to be defined for each RC.

An RTP is an attribute of the originating line or incoming trunk. The RTP defines the originator's rate treatment for calls to destinations in any of the Toll Regions (TRs) (see *note*). The originator's RTP is checked to determine the call class of service (flat rate, business message rate, residential message rate, or coin). For flat rate calls, TRs that can receive toll-free calls are specified. For message rate and coin calls, the MRTI and applicable TRs are specified.

For incoming trunk groups, the class of service (MR, FR) is derived by the traffic class setting. Combined toll/local and CAMA trunk groups are treated as message rate and all other trunk groups are treated as flat rate.

The message rate treatment index (MRTI) is used by the AMA system to determine billing. Multiple TRs can be assigned to each MRTI. The MRTI defines the Message Billing Index (MBI) code to be used for Regional Accounting Office accounting, allows message rate treatment for calls without MBI, and indicates whether the call is timed or untimed (fixed-charge). A maximum of 62 MRTIs can be defined in the switching system. Each TR is associated with an MRTI. Each MRTI contains one to three rate periods. In Overlay Area, a TR assignment to a flat rate (FR) COS prevents AMA from billing the flat rate call made to that TR. If no TR assignment exists in Overlay AREA, AMA bills FR calls made to all TRs.

*Note: Overlay THGP abbreviates Toll Region as TOLL, while Overlay AREA abbreviates Toll Region as TR.*

### **Translations (TRNS)**

Overlay Translations (TRNS) is used to define the tests and resulting actions that are in the address, prefix, and screening translators. The information in these translators is used to determine the path of a call. Prefix and screening translators have tests and actions that pertain to the AMA system.

#### **Prefix translator (PRFX) prompting sequence**

This prompting sequence contains a test to determine the originator's Rate Center and an action that will direct the call based on the AMA call type.

#### **Screening translator (SCRN) prompting sequence**

This prompting sequence contains tests to determine the originator's call type (coin or message rate) and Rate Center, whether the originator's station has the toll denial feature, and if the call is a toll call.

### **Automatic message accounting (AMA)**

Overlay Automatic Message Accounting (AMA) contains system data that are used in the processing of chargeable calls. These data are initially entered or changed at a later time using the prompting sequences in Overlay AMA, which are described in the paragraphs that follow.

#### **Message rate treatment index (MRTI) prompting sequence**

This prompting sequence is used to configure the Message Rate Treatment Index that was specified earlier in the billing cycle through AREA(RTP) . For each MRTI, the call treatment is defined to indicate whether a Message Billing Index (MBI) should be associated with the call. An MRTI must be defined to provide an index into the Message Billing Indices; that is, to assign the appropriate MBI code to be used for Regional Accounting Office (RAO) accounting. An MRTI also defines whether the call is to be timed (charge units may be calculated continuously for the duration of the

call) or untimed (a fixed charge is associated with the call); and allows for message-rate treatment of calls if the RAO does not have MBI.

### **Tariff tables (TARE) prompting sequence**

This prompting sequence is used in the billing cycle to determine daily call tariff rates, by day of the week on a permanent basis, and the start and stop time that those rates are in effect. Two rate scheduling modes exist, PERM (permanent) and TEMP (temporary). Days that were defined earlier as holidays use the TEMP mode to schedule the day of week and the PERM mode to set the rate for that day. This temporary reschedules a tariff profile so that one to six days, a holiday for example, may be assigned the tariff profile usually used for another day of the week. All other days use the PERM scheduling mode for day and rate.

TARE is used to select the appropriate Pulse Table (PULS) for a call based on the day(s) of the week and the hour(s) of the day during which the call occurs. There are seven Tariff Tables defined in the switching system, one for each day of the week. Within each Tariff Table, there can be one to three rate periods, each of which corresponds to a Pulse Table. Each Tariff Table has 24 or 48 entries, one for each hour or half-hour period during the day of the week with which the Tariff Table is associated. Each entry contains a value that indicates which of the one to three rate tables, and thus which Pulse Table (PULS), is to be applied during that hour or half-hour period.

### **Pulse tables (PULS) prompting sequence**

The Pulse Table (PULS) is used to indicate charge units applied to fixed-charge-rate calls or the pulse rate (tariff rate) for timed calls. Three different Pulse Tables (one for each rate period) may be defined for each MRTI in the switching system. For fixed charge calls, the initial pulse treatment, AMA interval, and time resolution must be defined. For a timed call, the pulse treatment, AMA interval, and time resolution must be defined for the initial period and the overtime period.

## **Configuration record (CNFG)**

The Configuration Record (CNFG) contains data that pertain to AMA system equipment, as well as system data that are used in the processing of chargeable calls. These data are initially entered or changed at a later time through the Configuration Record prompting sequences that are described in the following paragraphs.

### **Automatic message accounting (AMA) prompting sequence**

This prompting sequence is used to specify the following parameters:

- Whether or not the switching system is to record AMA data and, if so, the billing method or methods and the types of calls for which they will be used
- The type of exchange (local or transit)
- The number of billing registers that are to be allocated to handle chargeable calls originated by all subscribers

- The recording format (DMS or Bellcore)
- The Sensor Identification number (Bellcore format only)
- The number of AMA records per tape (data) block
- A determination if bulk billing is required for message-rate business billing
- The surcharge applied to hotel/motel PBX users
- The type of recording equipment used
- The tape expiry time
- For transit (CAMA) office, the code used by the CAMA operator to report trouble
- A schedule permitting automatic transfers of data from disk to tape (1600-BPI only)
- Billing system (AMAT, IBSR, Both)
- Suppression Method when saving records to disk (IBSR only)

**Call processing (CP) prompting sequence**

This prompting sequence specifies the following information that is used in call processing and affects the AMA system configuration:

- The total number of Rate Centers served by the switching system

**Generic condition (GCON) prompting sequence**

This prompting sequence specifies the treatment given to chargeable calls when the call-processing logic detects one of the following conditions (listed in alphabetical order):

- AMA Down (AMAD) - A record of the call cannot be made because the charge recording system is malfunctioning
- Automatic Number Identification Failure (ANIF) - The ANI test has failed to identify the calling number
- No Billing Register (NBR) - A record of the call cannot be made because no billing register is available

**Integrated Billing Storage and Retrieval (IBSR) system prompting sequence**

This prompting sequence is used to specify the following parameters that are used when the billing method is IBSR or BOTH:

- The Data Server Component ID Code
- Data Processing Management System Component ID code
- The maximum file size in bytes

- The maximum file size in records
- Minor alarm time age limit
- Major alarm time age limit
- FTP minor alarm authentication threshold
- FTP major alarm authentication threshold
- Error record minor alarm threshold
- Error record major alarm threshold
- File transfer mode (PUSH/PULL)
- The primary IP address to use when AMA files are transferred to the AMA collector via a schedule
- The TCP port for the FTP control session in the AMA collector when using the primary IP address
- The directory path to where the AMA files should be located when they are transferred using the primary IP address to the AMA collector via a schedule
- The User ID to use when FTPing AMA files to the primary IP address
- The password to use when logging into the AMA collector when FTPing AMA files to the primary IP address
- The secondary IP address to use when AMA files are transferred to the AMA collector via a schedule
- The TCP port for the FTP control session in the AMA collector when using the secondary IP address
- The directory path to where the AMA files should be located when they are transferred using the secondary IP address to the AMA collector via a schedule
- The User ID to use when FTPing AMA files to the secondary IP address
- The password to use when logging into the AMA collector when FTPing AMA files to the secondary IP address
- The number of times the DMS-10 will attempt to transfer an AMA file to the AMA collector
- The amount of time that should be waited between attempts to transfer an AMA file to the AMA collector
- The level of alarm (catastrophic, major, minor, none) that should be raised if an AMA file cannot be transferred to the AMA collector
- Up to 24 schedule times for the DMS-10 Data Server to transfer AMA data to the AMA collector

**Local call detail recording (LCDR) prompting sequence**

This prompting sequence is used to specify if Local Call Detail Recording will be configured in the DMS-10 switch and, if so, if it will be applied to the entire exchange or to specific directory numbers as a station option.

**Magnetic tape unit (MTU) prompting sequence**

This prompting sequence is used to specify the following 800-BPI AMA system parameters:

- The logical unit number assigned to the MTU or BMC
- The purpose for which the MTU or BMC is to be used
- The physical location of the Magnetic Tape Controller pack that is associated with the MTU or BMC

**Office data query (ODQ)**

Overlay Office (Exchange) Data Query (ODQ) is used to obtain a list of specific types of exchange data.

**Counts (CNTS) prompting sequence**

This prompting sequence is used to list the number of stations with one or more specified options.

**Directory number (DN) prompting sequence**

This prompting sequence is used to list the directory numbers and associated data for those directory numbers that have one or more specified options.

**Storage (STOR) prompting sequence**

This prompting sequence is used to list the amount of disk storage used and available to the system for storing billing data for the IBSR and TGMU configured systems.

**Route (ROUT)**

Overlay ROUT is used to define call routing in the DMS-10 switch.

**Connection (CONN) prompting sequence**

This prompting sequence is used to establish and maintain dedicated, semipermanent connections in the DMS-10 switch.

**Destination (DEST) prompting sequence**

This prompting sequence is used to define the called number's Toll Region (TR).

**Route (ROUT) prompting sequence**

This prompting sequence is used to define individual routes in the DMS-10 switch.

**Trunk group (TG)**

The Trunk Group (TG) prompting sequence within Overlay TG is used to define the characteristics of incoming, outgoing, and two-way trunk groups. The following AMA system parameters are defined for incoming and two-way trunk groups:

- The Rate Center (RC) and Rate Treatment Package (RTP) that are associated with the trunk group (these are used to indicate to the AMA system which AMA table is to be applied to calls over the trunk)
- The trunk group traffic class, which pertains to the distance between the two exchanges
- The Local Exchange codes that can be used for incoming AMA traffic

For outgoing trunk groups, the trunk group traffic class, which pertains to the distance between the two exchanges, is the only AMA parameter defined by prompting sequence TG.

The Trunk Group (TG) prompting sequence is also used to define whether the Trunk Group Member Usage (TGMU) data records should be generated for the trunk group. This parameter is defined for incoming, outgoing, and two-way trunk groups.



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## Section 5: AMA system maintenance

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### Introduction

This section describes the maintenance-related features and activities associated with the AMA system. These features and activities include:

- Routine preventive maintenance
- Alarms
- Trouble clearing

### Routine preventive maintenance

Routine preventive maintenance of the AMA system is limited to cleaning the recording head and capstan of the AMA magnetic tape transport each time that the tape is changed. Weekly cleaning and tape changing are recommended. The tape change procedure and cleaning operations are detailed in the NTP entitled *Maintenance and Test Manual (297-3601-511)*.

### Elimination of possible duplicate AMA tape blocks when switching tapes

To eliminate possible duplication of full or partial AMA tape blocks in exchanges (Bellcore format only), incompletely written tape blocks will not be copied to the new tape after tapes are switched. Any part of a block not written to tape before the tape switch will be lost.

### Alarms

The system activates alarms and displays alarm messages for the following AMA system conditions:

- A memory fault that affects Protected Store
- A magnetic tape unit (MTU) has lost billing capacity (800-, 1600-BPI AMA systems).
- The system detects a fault in one or both of the Time-of-Day clocks
- A disk drive in a 1600-BPI AMA system is faulty.
- An IOI disk in a 1600-BPI AMA system is faulty.

- IBSR file age exceeds limit.
- Number of IBSR error records exceeds limit.
- Space used by primary IBSR file exceeds limit.
- DMS-10 Data Server not available.

## Trouble clearing

The primary aids to operating company personnel in analyzing and clearing troubles in the charge recording system are two diagnostic programs: Magnetic Tape Diagnostic (MTD) and Magnetic Tape Unit (MTU).

### Magnetic tape diagnostic (MTD)

The Magnetic Tape Diagnostic (MTD) overlay program can be used manually by operating company personnel to perform system tests on tape drives. (For the available manual mode commands, see the “MTD” section in the NTP entitled *Maintenance Diagnostic Input Manual* [297-3601-506].) In 800-BPI AMA systems the program can also be scheduled to run automatically at selected hours of the day through the Maintenance Diagnostic Overlay Scheduler (OVLY) prompting sequence in the Configuration Record (CNFG). (For this prompting sequence, see the OVLY prompting sequence in the CNFG section of the NTP entitled *Data Modification Manual* [297-3601-311].)

### Magnetic tape unit (MTU)

The Magnetic Tape Unit (MTU) diagnostic program is resident (that is, constantly present) in the system and aids in trouble analysis. MTU is a free-running program that monitors the operation of the magnetic tape unit(s). It is not available for interactive use by operating company personnel.

### Common equipment diagnostic (CED)

The Common Equipment Diagnostic (CED) overlay program is used to test and enable the Time-of-Day (TOD) clocks, and to check the status of the system memory packs.

### Trouble messages

Troubles detected by MTD, MTU, CED, or by DMS-10 data server are indicated by messages printed out at a maintenance terminal in the form MTD<sub>xxx</sub>, MTU<sub>xxx</sub>, CED<sub>xxx</sub>, or IBSR<sub>xxx</sub> respectively, where xxx is a variable representing any one of a series of unique numeric codes and the specific trouble-clearing procedures associated with each code, each of which indicates a specific trouble in the system. For the meanings of these codes, and the specific trouble-clearing procedures associated with each code, see the Output Message Manual.

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## Section 6: AMA record types

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### Processing of AMA call data

In a DMS-10 switch equipped with the AMA recording system, call-processing software examines each call and determines whether it is an AMA call and, if so, which of the types of AMA call it is.

### Call types

During call processing, a call is identified by its call type. After a chargeable call is disconnected, the data in the associated billing register are reformatted into an AMA billing entry. The reformatted call information contains a call-type code, which identifies the call.

### AMA record types

AMA records include miscellaneous and statistical entries (used for administrative purposes) and AMA call entries (used to record details of billable calls).

#### Long-duration call AMA records

For each call in progress beyond a second midnight, at the second midnight and at each subsequent midnight until the call is taken down, a Long-Duration Call (LDC) record is generated. If an LDC disconnects after the second midnight but before it has been recorded as the start of an LDC, the call is recorded as a single record, indicating it is an LDC record.

The LDC record is not generated promptly at midnight but is generated within the hour after midnight (that is, between midnight and 1:00 AM). The possibility of up to a one-hour delay is due to the length of time required by the system to audit all in-progress calls in order to determine which, if any, are LDCs.

Each LDC record has a structure code indicating it is for an LDC. An LDC record contains all the information found in a normal AMA call record, with the following differences:

- The record includes the present-date and present-time fields, which contain the date and time at midnight.

- The connect-date and connect-time fields always contain the original connect date and time at which the call was first put up.
- For the first LDC record of a call, the elapsed-time field contains the elapsed time between the connect time and the second midnight. For each subsequent LDC record, the elapsed-time field contains the elapsed time between two successive midnights. The occurrence of midnight is determined by the DMS-10 switch through its time-of-day clock.
- The time-indicator field identifies a particular LDC record as the start, the continuation, or the end of an LDC.

An LDC record is written onto the recording medium immediately after it is created.

A final LDC record is created when the LDC disconnects; the present date and time are the disconnect date and time, the elapsed time is time between the generation of the previous LDC record and the disconnect, and the timing indicator signals the end of an LDC.

### **Originating Feature Group A calls**

When a subscriber originates a Feature Group A (FGA) call, a standard AMA call record is or is not generated, depending on local practices applying to the called number and the billing treatment required by the call. Whether or not a standard AMA call record is generated, the DMS-10 switch must generate an Originating Feature Group A (OFGA) AMA record for every OFGA call answered or (optionally) unanswered by the called party.

### **Terminating Feature Group A calls**

When a subscriber with Feature Group A (FGA) service (from the operating company using the DMS-10 switch) places an intra-office call, a standard AMA call record is or is not generated, depending on local practices applying to the called number and the billing treatment required by the call. Whether or not a standard AMA call record is generated, the DMS-10 switch must generate an Terminating Feature Group A (TFGA) AMA record for every TFGA call answered or (optionally) unanswered by the called party.

### **Usage-sensitive custom calling feature AMA records**

Usage-sensitive features are billed on a per-use basis. If a billing register is not available when a usage-sensitive feature is requested, the request can be processed normally (with no AMA record of its use) or denied, depending upon the generic configuration and the operating company's option.

### **Equal Access (feature group D) AMA records**

The Feature Group D (FGD) portion of the Equal Access feature requires two special types of AMA record, Originating-LATA records and Terminating-LATA records, which are described in the following paragraphs.

**Originating-LATA records**

An originating-LATA call is any call originating in the DMS-10 office and routed to a destination in another Local Access and Transport Area (LATA).

In an inband signaling environment, an originating-LATA AMA access record is made for all calls progressing to the stage at which the first wink is received from an inter-LATA carrier (IC) or an international carrier (INC). The time the IC/INC first wink is received is called the carrier-connect time (CCT) for the originating-LATA office.

In an ISUP signaling environment, an originating-LATA AMA access record is made for all calls progressing to the stage at which a backward EXM (exit message), ACM (address complete message), or ANM (answer message) is received, whichever arrives first. The carrier-connect time (CCT) from an office with a direct circuit to the IC/INC is the time at which the initial address message (IAM) is launched to the carrier. The CCT from offices not directly connected to the IC/INC is the time at which either an EXM, ACM, or ANM is received at the EAEO, whichever occurs first.

Both the CCT and the call-answer time are included in the originating-LATA AMA record.

The elapsed time from call-answer to disconnect may be used by the IC/INC to bill the subscriber. The elapsed time from CCT to disconnect is used by the operating company of the originating-LATA office to bill carriers for access charges.

An originating-LATA call generates one of three types of originating-LATA AMA record:

- Inter-LATA Station Paid (ILSP) (the standard Originating-LATA Access Record)
- Inter-LATA OUTWATS (ILOW)
- Improved Public Telephone Service (IPTS)

**Terminating-LATA records**

A Terminating-LATA AMA access record is generated by the office at which an inter-LATA call enters the LATA (Local Access and Transport Area) of the called party.

In an inband signaling environment, a terminating-LATA access record is made for each call progressing to the stage at which the terminating-LATA office returns an acknowledgement wink to the inter-LATA carrier (IC) or to the international carrier (INC). The time at which the IC/INC first wink is returned is called the carrier-connect time (CCT) for the terminating-LATA office.

In an ISUP signaling environment, a terminating-LATA access record is made for each call progressing to the stage at which an initial address message (IAM) is received at the terminating-LATA office. The CCT is the time at which the IAM is received.

Both the CCT and the call-answer time are included in the terminating-LATA AMA record.

The terminating-access charge is based on the elapsed time from call answer to disconnect. The CCT may be used for cost studies of the total usage of the facilities for inter-LATA calls.

Terminating-access AMA recording may be initiated or stopped, as required, by a message input at a maintenance terminal.

A terminating-LATA call generates one of two types of terminating-LATA AMA record:

- Terminating-LATA Access (TLAT)
- INWATS (IWAT)

### **Enhanced 800 Services (E800) AMA records**

E800 provides the use of database queries to obtain routing and billing information for 800 calls. An AMA record is generated for each type of E800 call.

Two call types exist for the E800 feature:

- 141, for calls completing to an IC/INC
- 142, for calls completed by the telephone company

The call type is assigned to the call by the database query response. E800 calls terminating to a carrier generate an AMA record if the trunk is seized and a wink is returned. Calls completed through the telephone company generate an AMA record if they are answered.

### **Miscellaneous and statistical AMA records**

The miscellaneous and statistical records made by the DMS-10 AMA system include the following:

- Time-Change Record-Records a manual time or date change
- Date Record-Written on the recording medium (tape or disk) every day at midnight to record the new date

- Identification Record-Records the occurrence of one of the following:
  - emergency recording-medium (tape or disk) transfer-The record is written on the recording medium (BMC or 800-bpi tape or disk only) activated by the transfer.
  - manual recording-medium (BMC or 800-bpi tape or disk only) transfer-One record is written on the deactivated recording medium and one on the activated recording medium.
  - system software reload (SYSLOAD)-SYSLOAD is a program providing automatic recovery from severe system faults. It effects recovery by loading all resident programs and office data from the primary system tape into system memory. The occurrence of a SYSLOAD may result in a partial loss of AMA data insofar as the billing information for any AMA calls in progress is lost. A SYSLOAD also causes the loss of any AMA records for completed calls not written on the recording medium (tape or disk): that is, the data collected is at the billing register or the call store buffer state. The record for a SYSLOAD is written on the currently active recording medium.
  - system initialization (INI)-INI is a resident program providing recovery from system software faults. The program reconfigures the system around the fault and rebuilds transient call data. AMA data are not affected by the occurrence of a system initialization. The record for an INI is written on the currently active recording medium (tape or disk).
- INWATS Overflow Count -This record is written on the recording medium (tape or disk) every night at 11:50 PM from a billing register incremented each time a call to an INWATS hunt group is overflowed to busy tone or recorded announcement. If LAMA goes down before or during the generation of INWATS overflow count records, the process will be aborted, no more counters will be reset (thus, counts will continue to accumulate), and a maintenance terminal message will be printed to report the condition. When this occurs, LAMA record generation will be delayed, but no information will be lost. The DN reported to LAMA for the hunt group is that of the first DN assigned to the hunt group, unless the DN has Special Party Billing, in which case that number is used. If an INWATS hunt group has not been assigned any DNs, no overflow record will be generated for the group.
- Originating Feature Group A Overflow Count -This record is written on the recording medium (tape or disk) every night at 11:50 PM from a billing register incremented each time an Originating Feature Group A call is overflowed to busy tone or recorded announcement
- Originating-LATA Overflow Count -This record is written on the recording medium (tape or disk) hourly from a billing register incremented each time an inter-LATA call to an inter-LATA carrier or to an international carrier with a direct connection to an Equal Access End Office (the DMS-10 switch) cannot be completed because all trunks are busy.

- MDR Modules-These modules are appended to the AMA record created by the DMS-10 switch. At the Revenue Accounting Office (RAO), the AMA record is processed for billing and then processed for MDR. The extra data contained in the MDR modules is used to produce the MDR record.

### **Message Detail Recording (MDR) records**

MDR provides call detail information for calls originated or terminated at stations in EBS groups. An MDR record is generated for these calls.

The DMS-10 switch uses two methods for treating MDR data: MDR by way of Customer Provided Equipment (CPE), thus providing the Bellcore CP format, and modular MDR, thus providing the Bellcore modular format.

The MDR feature ensures that the DMS-10 switch processes MDR records in the manner prescribed by Bellcore practice. This enhancement does not redefine which calls are charged or how these calls are charged, but does change the format of MDR billing records and provides operating company personnel with more flexibility in MDR administration. For complete information about this enhancement, see Section 3 of NTP 297-3601-105, *Features and Services Description*.

The MDR feature also provides fixed-length MDR Bellcore AMA Format (BAF) Customer Premise records for operating companies that could before only process fixed-length DMS-10 MDR CP records. For complete information about this enhancement, see Section 3 of NTP 297-3601-105, *Features and Services Description*.

### **Special studies**

Four special studies are available as an optional feature package for AMA recording in the Bellcore format. If the feature is enabled, any or all of the four studies may be specified as a station option through overlay DN, prompting sequence DN (see NTP 297-3601-311, *Data Modification Manual*).

In addition to the special studies provided by AMA recording in the Bellcore format there is a non-AMA data collection provided for Trunk Group Member Usage (TGMU). This study is also provided in the Bellcore format only when the AMA Integrated Billing Storage and Retrieval (IBSR) feature is configured.

### **Service observed study (SOBS)**

The Service Observed Study (SOBS) is a study making an end-to-end check of billing accuracy through samples of office lines. If the station option for the study is marked on the originating line and a billable call is made from that line, the previously created billing register is study marked and the resulting AMA record is uniquely marked as a SOBS record. These records are only marked on answered billable calls.

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### **Complaint observed study (COPL)**

The Complaint Observed Study (COPL) is used for message-rate subscribers who question their bills and wish to obtain detailed records of their service. If the station is marked for this study, all recordable originating calls, answered or unanswered, produce AMA records with this special study indicator uniquely marked. The original call type is retained for AMA processing.

### **Traffic sampled study (TRAF)**

The Traffic Sampled Study (TRAF) is used by division of revenue for coin lines, to provide data for billing and usage reports and other special applications. Originating answered and unanswered calls from stations marked for this study require billing registers and create AMA records with the TRAF indicator marked. They contain, as do the other studies, normal toll-like billing details. The “study only” indicator on the record is marked and the specified call type (TRAF) is inserted.

### **Subscriber Line Usage Study (SLUS)**

The Subscriber Line Usage Study (SLUS) determines measured service tariffs and evaluates tariff effects. Originating calls from stations marked with this study create AMA records, whether the calls are billable or nonbillable, answered or unanswered. These AMA records are uniquely marked for SLUS. Nonbillable, but recordable, calls (such as free and local calls) generate AMA records with “study only” indicator marked. MDR, ISUS, and ISTS call type have priority over SLUS and TSLs call types. The “study only” indicator is marked in each record.

The following types of nonanswer-supervision calls maybe included in SLUS:

- calls reaching a busy tone
- calls reaching an overflow tone
- intercepted calls
- calls reaching a recorded announcement
- calls to free numbers (free-terminating calls)

### **Trunk Group Member Usage (TGMU)**

The Trunk Group Member Usage (TGMU) feature is used to record, in a special file, all incoming and outgoing calls, both answered and unanswered processed by specific trunk groups with the TGMU feature activated. The TGMU data records will have no impact or effect on the normal AMA billing records created by the DMS-10. These data records may be used for many purposes including the following: CABS verification, trunk maintenance, trunk engineering, special studies, and cellular usage.

## Feature-usage studies

Feature usage studies automatically provide indicators in Bellcore-format AMA records that show the use of the features described in the following paragraphs.

### Remote call forwarding

All billable forwarded calls using the Remote Call Forwarding feature generate an AMA record for the base station. The existing billing register and resulting AMA record are marked by an indicator identifying the use of the Remote Call Forwarding feature. The indicator is marked in addition to any other studies previously marked on the record.

### Prepay coin

All answered calls from prepay coin lines with the Traffic Sampled Study (TRAF) station option marked generate AMA records with the Prepay coin feature indicator marked. The “study-only” indicator is marked when generated for the purposes of a Traffic Sampled Study.

### Postpay coin

All answered calls from postpay coin lines with the Traffic Sampled Study (TRAF) station option marked generate AMA records with the Postpay coin feature indicator marked. The “study-only” indicator is marked when generated for the purposes of a Traffic Sampled Study.

### Hotel/motel

All answered calls using the Hotel/Motel feature generate AMA records with the Hotel/Motel indicator marked.

### Hotel/motel remote register

All answered calls using the Hotel/Motel Remote Register feature generate AMA records with the Hotel/Motel Remote Register indicator marked.

### INWATS

All answered calls terminating to stations with the INWATS feature generate AMA records with the INWATS feature marked.

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## Section 7: AIN and LNP AMA

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### DMS-10 Advanced Intelligent Network (AIN) AMA

The AIN billing process is activated when a call encounters one or more of the following AIN triggers: off-hook immediate, off-hook delay, shared interoffice trunk, public office dialing plan (PODP) 3 through 10-digit (DIG), PODP feature code, customized dialing plan, and PODP N11 in the originating basic call model (OCM), and termination attempt in the terminating basic call model (TCM).

AIN call processing software receives and examines the parameters in TCAP responses sent by the SCP/Adjunct to the DMS-10 SSP. The SSP uses switch-based data, collects the AIN billing data from AIN TCAP call processing, and generates AIN AMA records.

The SSP generates both SCP-based and switch-based billing structures and modules. The SCP-based structure code 0220 is used in the AIN originating call model, while structure codes 0220 and 0221 are used in the terminating call model. If the AMA Service Logic Program Identification (AMAslpID) parameter is present in an SCP response, an AIN record is generated; if the AMAslpID parameter is not present, an AMA AIN record is not generated and, instead (if the call is billable), a switch-based record is generated.

#### AIN originating call module (OCM) AMA record generation

When the SSP encounters an active PODP 3 through 10-digit (DIG) trigger in the OCM and an AMAslpID parameter is received from the SCP, one billing record per trigger (in addition to conventional switch-based records) is generated using an AIN 0220 structure record. If the trigger is not PODP DIG, only one record is generated.

#### AIN calls with no PODP DIG trigger encountered

When the AMAslpID is received in a response from the SCP, the DMS-10 SSP generates a single structure 0220, with appended modules, for a single instance of the originating call model. When the SSP receives an AMAslpID, switch-based AMA recording is suspended. The switch-based call type codes and service feature codes are mapped into the AIN AMA structure. If the switch-based values cannot be determined, a default call type field value (047) and a default service feature code field value (027) are recorded in structures 0220 and 0221.

**AIN calls with PODP DIG trigger encountered**

When the PODP DIG trigger is encountered by an AIN call, the SSP generates an AIN AMA record for each SCP routing message containing an AMAslpID received, and a conventional switch-based AMA record that captures originating party to dialed number (if billable) call data.

When the first PODP DIG trigger is encountered, the SSP generates either a conventional switch-based record or a structure 0220. The requirements for record generation are as follows:

- Generate a switch-based record if no trigger has been encountered prior to the PODP DIG trigger and the call is billable.
- Generate an AIN record if a trigger has been encountered and an AMAslpID parameter is received in the TCAP response message prior to the PODP DIG trigger.

The following requirements determine second and subsequent record generation.

- Generate one AIN record for each additional PODP DIG trigger that the call encounters if the AMAslpID parameter is received in the response message from the SCP.
- Generate a new switch-based record when a PODP DIG trigger is encountered by the call but no AMAslpID parameter is received in the routing message from the SCP.

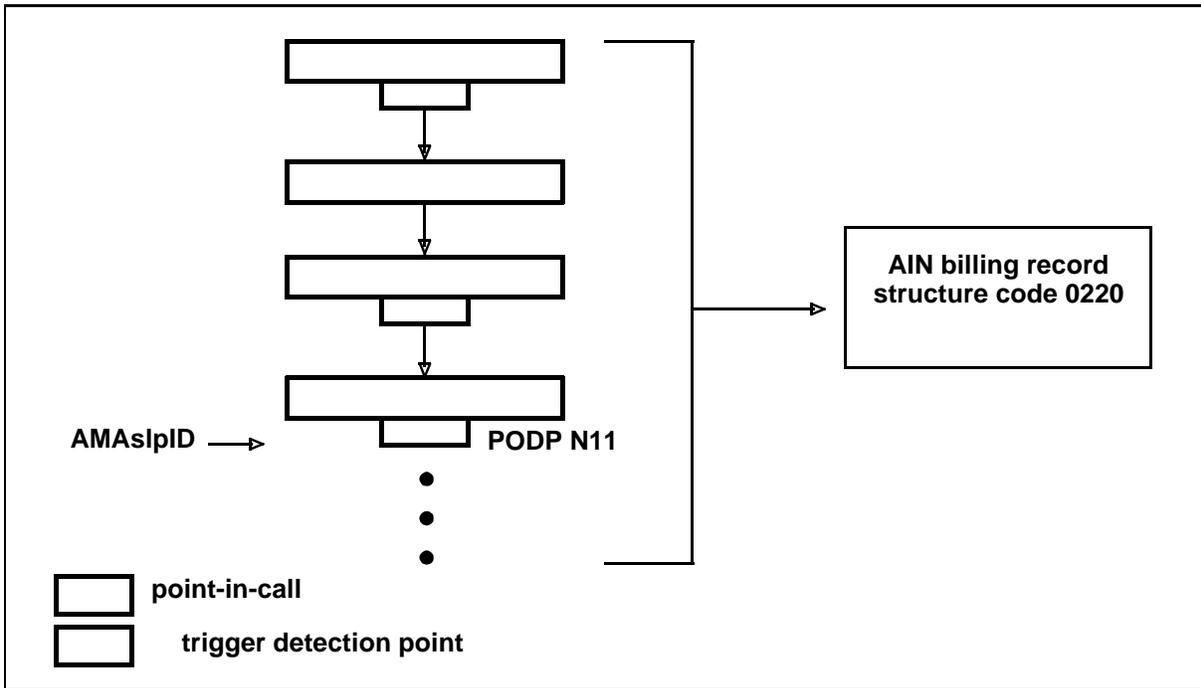
**AIN AMA record generation in the OCM call model**

The following examples illustrate generation of single and multiple records in the originating call model.

**Single trigger (not PODP DIG) with AMAsIpID, and no switch-based billing**

In this example, shown in Figure 7-1, a single trigger other than the PODP DIG trigger is encountered during the call. Since the trigger is not the PODP DIG, and since there is no switch-based billing, one AIN record (structure 0220) is generated.

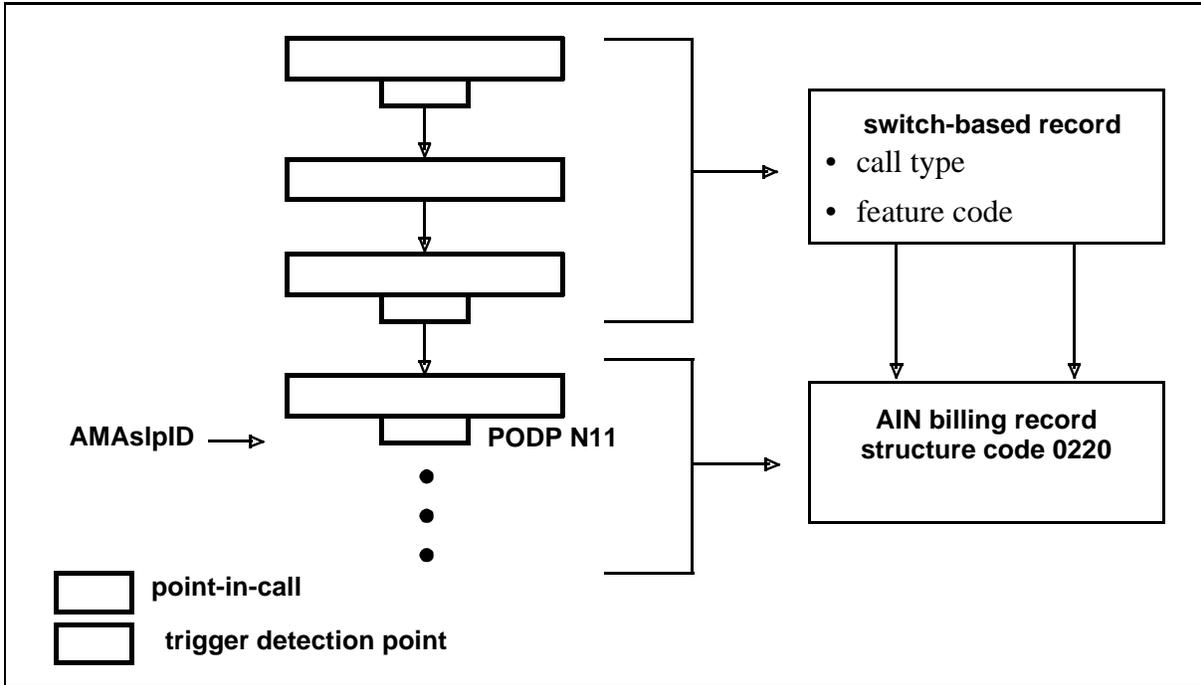
**Figure 7-1: AIN AMA record for single trigger (not PODP DIG), no switch-based billing**



**Single trigger (not PODP DIG) with AMAsIpID, and switch-based billing**

In this example, shown in Figure 7-2, a single trigger other than the PODP DIG trigger is encountered during the call. Since the trigger is not the PODP DIG, and since there is switch-based billing, one AIN record (structure 0220) is generated and switch-based AMA data is mapped into the AIN structure.

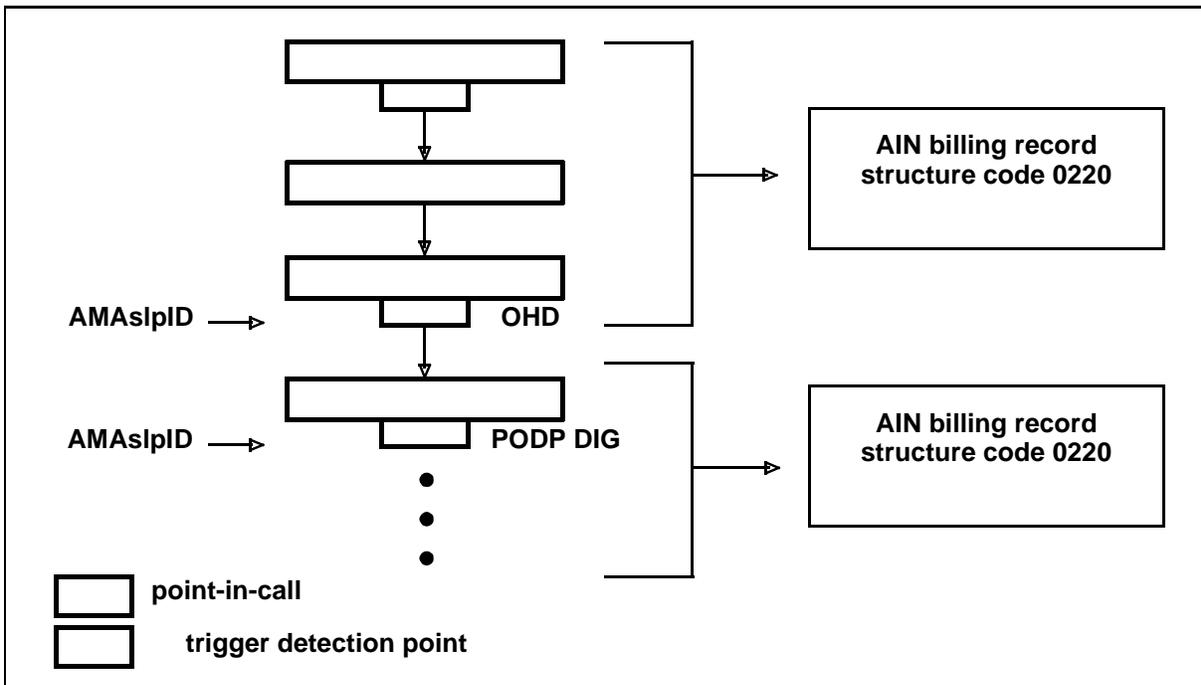
**Figure 7-2: AIN AMA record for single trigger (not PODP DIG), with switch-based billing**



**Trigger (not PODP DIG) with AMAslpID, and PODP DIG trigger with AMAslpID**

In this example, shown in Figure 7-3, multiple triggers are encountered during the call. Since the PODP DIG is one of the triggers encountered, multiple records are generated. For the first trigger, OHD (prior to PODP DIG), an AMAslpID parameter is present; thus, the first record is an AIN record. For the PODP DIG trigger, an AMAslpID parameter is also present; thus, the second record is also an AIN record.

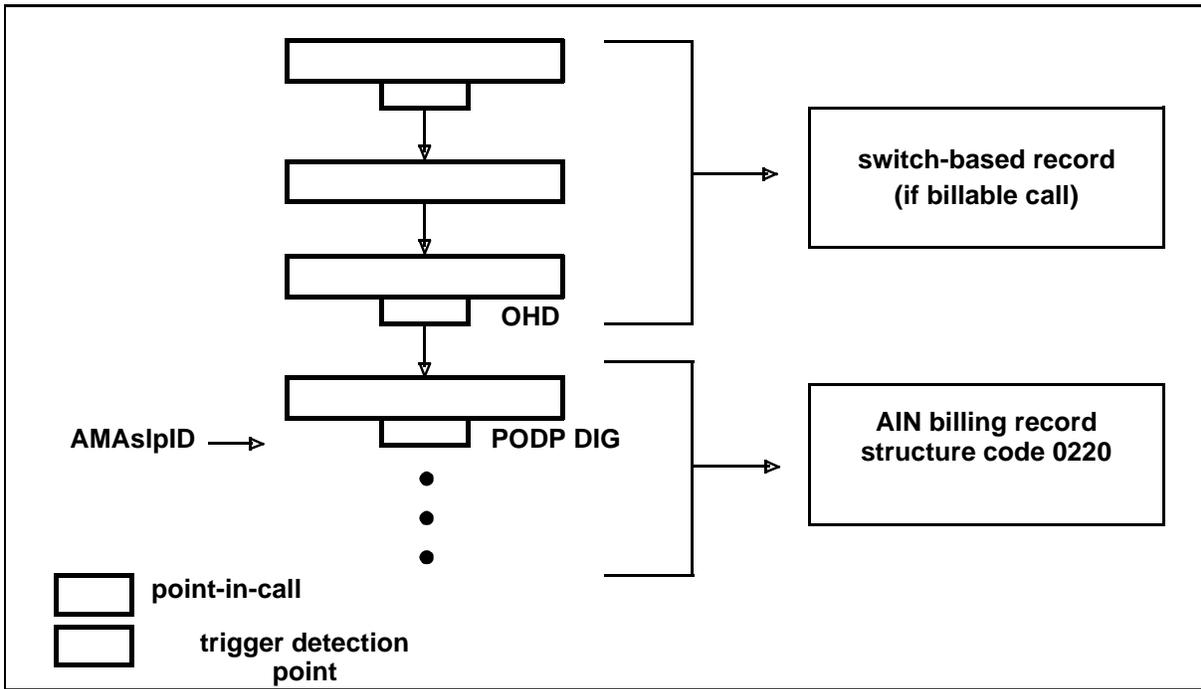
**Figure 7-3: AIN AMA record for multiple triggers with AMAslpID (one not PODP-DIG, one PODP-DIG)**



**Trigger (not PODP DIG) with no AMAsIpID, and PODP DIG trigger with AMAsIpID, and switch-based billing**

In this example, shown in Figure 7-4, multiple triggers are encountered during the call. Since the PODP DIG is one of the triggers encountered, multiple records are generated. For the first trigger (prior to PODP DIG), an AMAsIpID parameter is not present; thus, the first record is a conventional switch-based AMA record. For the PODP DIG trigger, an AMAsIpID parameter is also present; thus, the second record is an AIN record. Data that is accumulated for a switch-based record is mapped into the AIN record (that is, only one billing record will be produced).

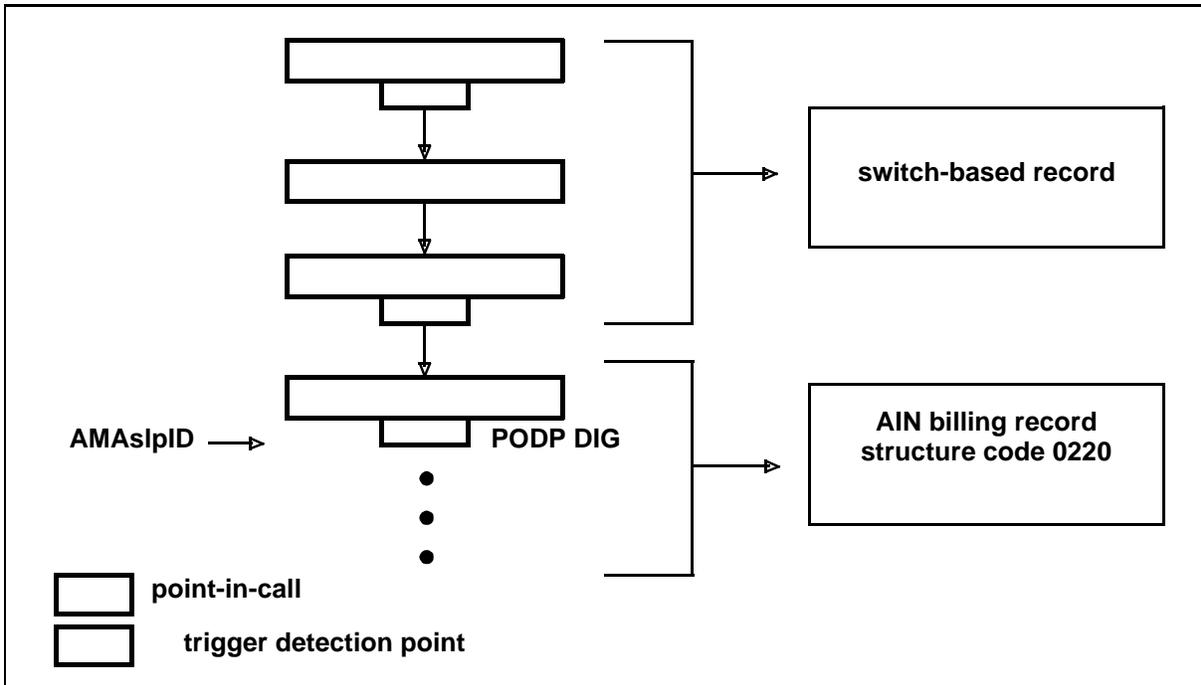
**Figure 7-4: AIN AMA Record for Multiple Triggers (one not PODP-DIG, one PODP-DIG), only one with AMAsIpID, and switch-based billing**



**PODP DIG trigger with AMAsIpID, and switch-based billing**

Since the PODP DIG is one of the triggers encountered, in the example shown in Figure 7-5, multiple records are generated. Since no trigger has been encountered prior to the PODP DIG trigger, and if it is assumed that the call is billable, a conventional switch-based AMA record is generated. An AMAsIpID parameter is present for the PODP DIG trigger; thus, the second record is an AIN record.

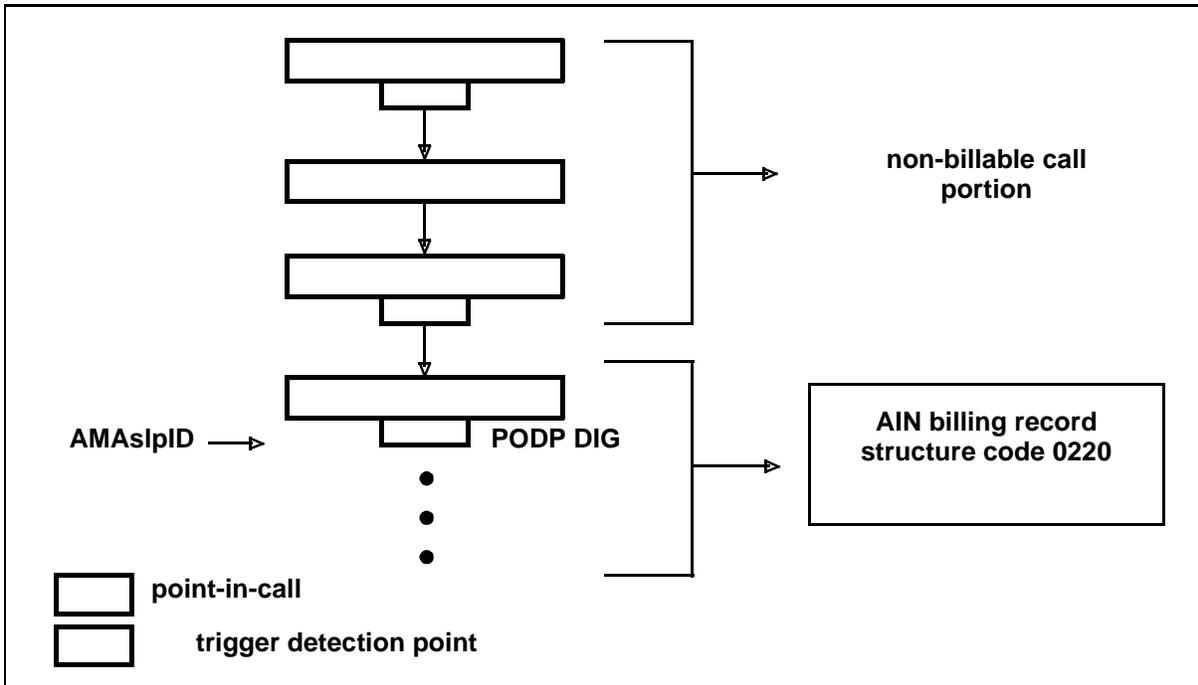
**Figure 7-5: AIN AMA record for PODP-DIG with AMAsIpID, and switch-based billing**



**PODP DIG trigger with AMAsIpID, and no switch-based billing**

Since the PODP DIG trigger is encountered in this example, shown in Figure 7-6, multiple records could be generated. Since no trigger has been encountered prior to the PODP DIG trigger, and the call prior to trigger activation is not billable, no switch-based AMA record is generated. An AMAsIpID parameter is present with the PODP DIG trigger, so an AIN record is generated.

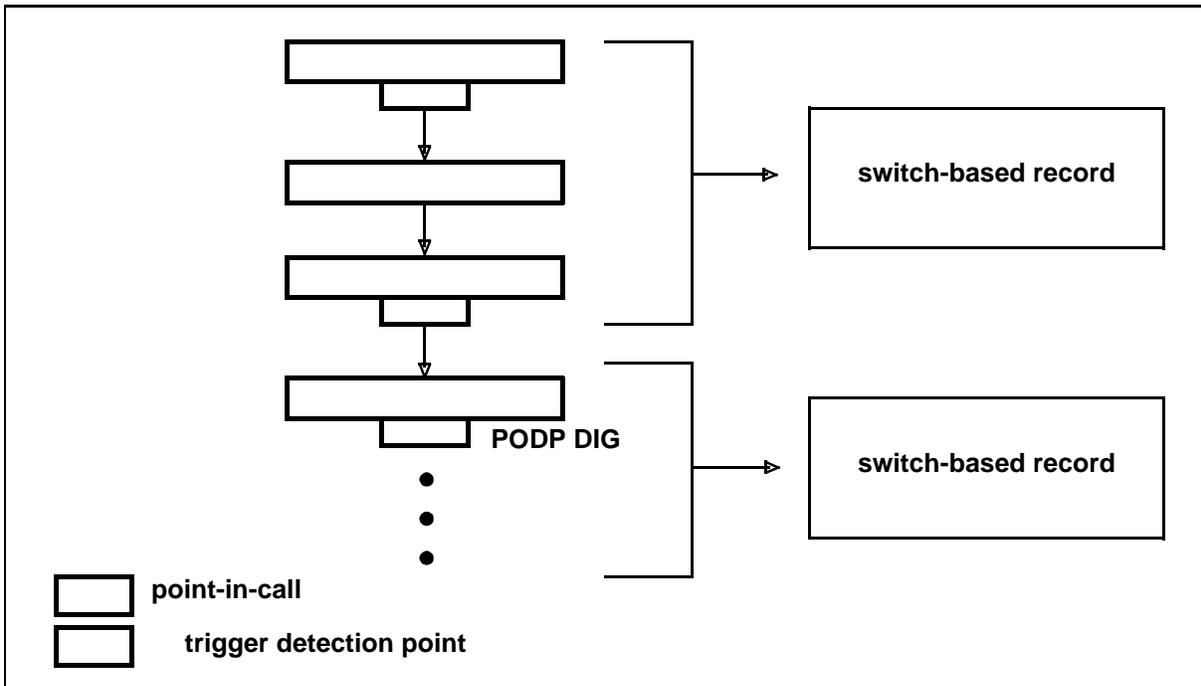
**Figure 7-6: AIN AMA record for PODP-DIG with AMAsIpID, and no switch-based billing**



**PODP DIG trigger with no AMAsIpID received, and switch-based billing**

Since the PODP DIG is encountered, in the example shown in Figure 7-7, multiple records could be generated. Since no trigger has been encountered prior to the PODP DIG trigger, and if it is assumed that the call is billable, a conventional switch-based AMA record is generated. Since an AMAsIpID parameter is not present for the PODP DIG trigger, a second conventional switch-based AMA record is generated (if the call is billable).

**Figure 7-7: AIN AMA record for PODP-DIG with AMAsIpID, and switch-based billing**



### **AIN terminating call module (TCM) AMA record generation**

When the SSP encounters an active termination attempt trigger in the TCM, one billing record per trigger is generated using an AIN 0220 structure record (AIN call completion) or structure 0221 (AIN call termination) if an AMAslpID parameter is also received from the SCP for that trigger.

For an activated termination attempt trigger, the SSP generates structure 0220 if the SCP response contains both a forward\_call message and an AMAslpID parameter; otherwise (the SCP contains an authorize\_termination message and an AMAslpID parameter), the SSP generates structure 0221.

When an OCM record already exists and a termination attempt trigger is encountered in the TCM for the same call, a new AIN AMA record (either structure 0220 or 0221) is created if an AMAslpID is received in response to the terminating trigger.

The following call types are recorded, in separate non-AIN records appropriate for each call type, in addition to any AIN AMA records (structures 0220 and 0221) that are generated for a call:

- 119 - terminating access record
- 132 - Feature Group A - terminating
- 135 - Feature Group B - terminating

The following call types are recorded in the AIN AMA record (structure 0221) when an AMAslpID is received from the SCP. This implies that a single AIN record is to be produced, with switch-based billing data mapped into the AIN record, for the terminating AMA recording. The call types include:

- 008 - INWATS terminating entry
- 047 - AIN default call type code
- 065 - terminating Cellular Mobile Carrier - Type 1 or 2B
- 131 - Feature Group A - originating

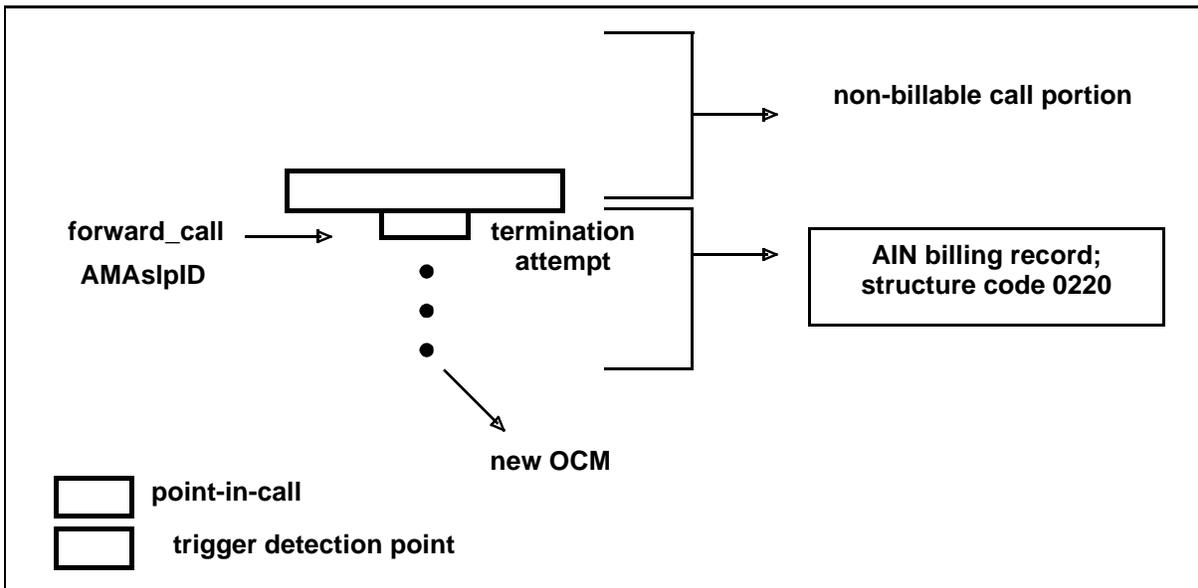
If the call encounters a trigger in the TCM and the call type is 008, 065, or 131, then the SSP generates a switch-based record when either no AMAslpID and no forward\_call message, or only a forward\_call message, is received from the SCP.

**AIN AMA record generation in the TCM call model**

The following examples illustrate generation of single and multiple records in the terminating call model.

Figures 7-8 and 7-9 illustrate AIN AMA record generation when the termination attempt trigger is encountered, with forward\_call message and AMAslpID parameter provided by the SCP, and preceded by non-billable and billable call portions, respectively.

**Figure 7-8: AIN AMA record for termination attempt trigger, with forward\_call message and AMAslpID**



**Figure 7-9: AIN AMA record for termination attempt trigger, with forward\_call message and AMAsIpID**

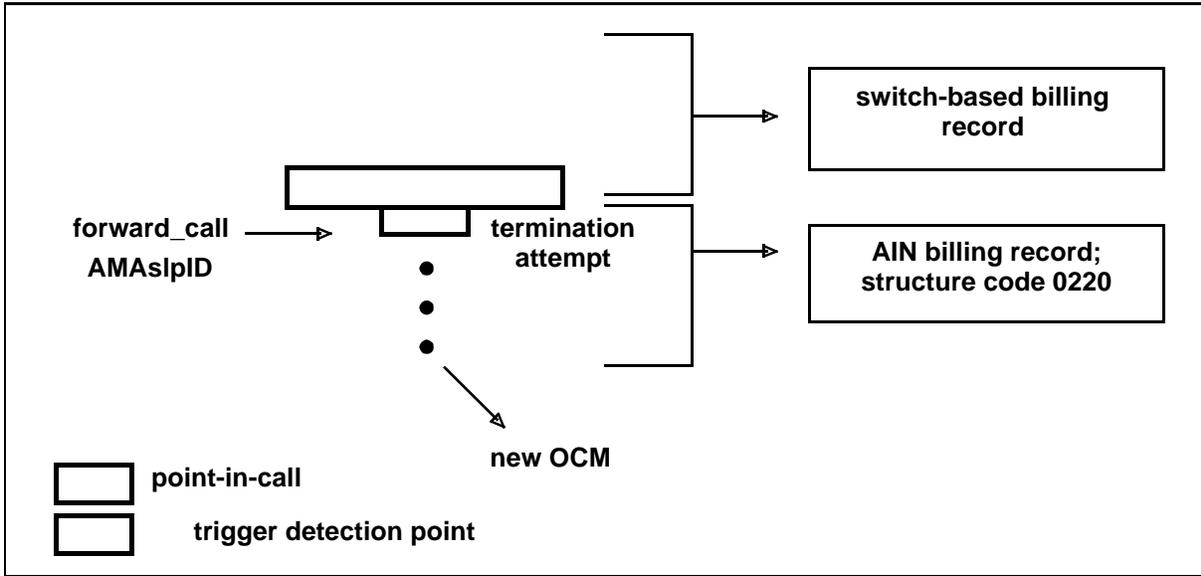


Figure 7-10 illustrates AIN AMA record generation when the termination attempt trigger is encountered, with forward\_call message and AMAsIpID parameter provided by the SCP, and preceded by a billable call portion for call types 119, 132, or 135.

**Figure 7-10: AIN AMA record for termination attempt trigger, with forward\_call message and AMAsIpID, for call types 119, 132, and 135**

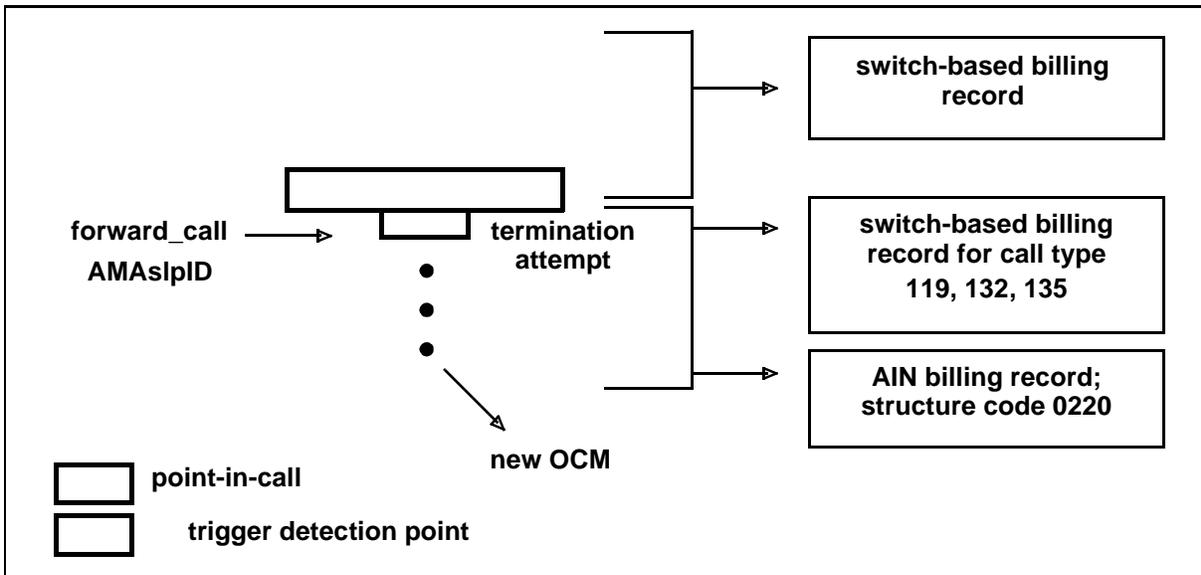


Figure 7-11 illustrates AIN AMA record generation when the termination attempt trigger is encountered, with authorize\_termination message and AMAslpID parameter provided by the SCP, and the call type is one of 008, 047, 065, or 131.

**Figure 7-11: AIN AMA record for termination attempt trigger, with AMAslpID, with no forward\_call message for call types 008, 047, 065, 131,**

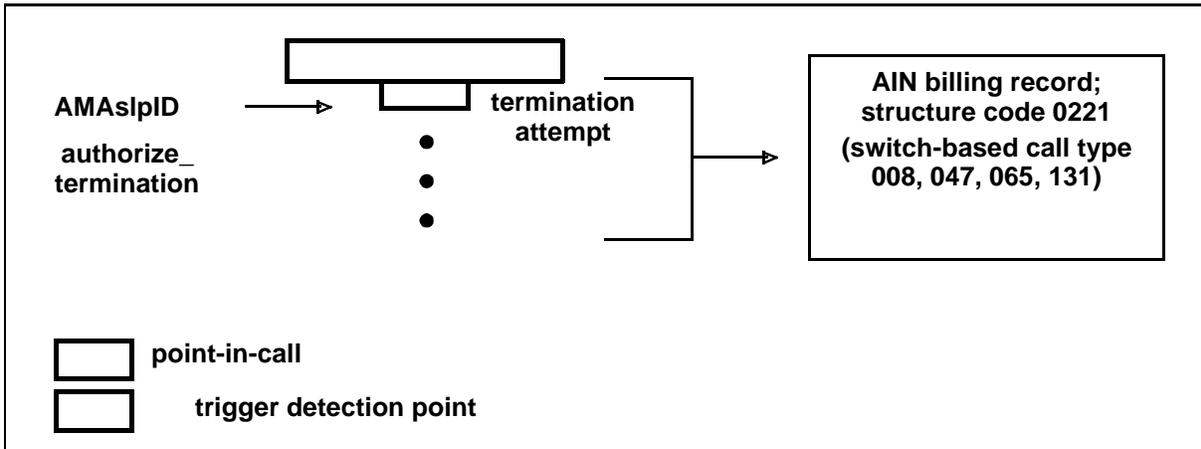


Figure 7-12 illustrates AIN AMA record generation when the termination attempt trigger is encountered, with forward\_call message provided by the SCP, with no AMAslpID parameter present, and the call type is one of 008, 065, or 131.

**Figure 7-12: AIN AMA record for termination attempt trigger, with forward\_call, for call types 008, 065, 131**

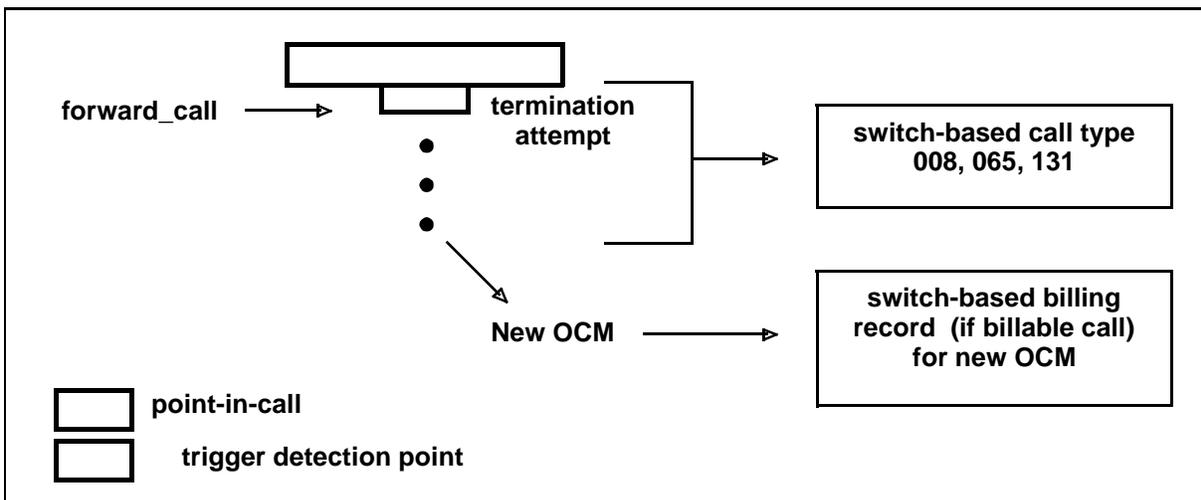
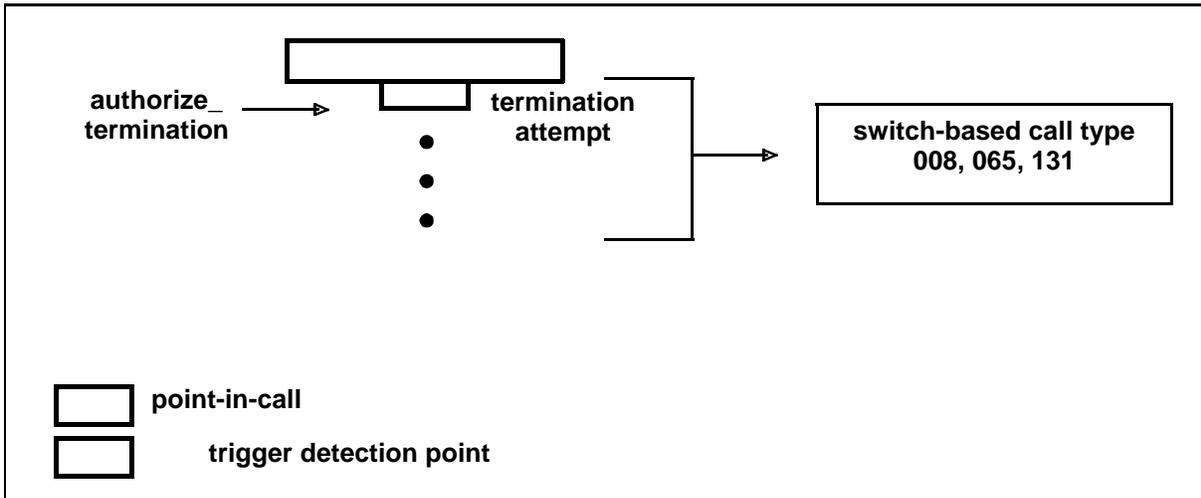


Figure 7-13 illustrates AIN AMA record generation when the termination attempt trigger is encountered, with authorize\_termination message, with no AMAslpID parameter present, for call types 008, 065, or 131.

**Figure 7-13: AIN AMA record for termination attempt trigger, with no AMAslpID and no forward\_call message, for call types 008, 065, 131**



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## AMA TCAP Parameters

The following AMA TCAP parameters may appear in SCP/Adjunct response messages received by the SSP. The following paragraphs describe the impact that the parameters have on AIN AMA processing.

### AMA alternate Billing Number

This parameter contains an alternate billing number that identifies the party that should be billed for the AIN feature or service. When the SSP receives this parameter along with the AMAslpID parameter, an Alternate Billing Number module (module code 029) is generated.

### AMA Business Customer ID

This parameter contains a 10-digit number that identifies the business customer and a one-digit context identifier of the type of customer (for example, “originating” or “terminating”). When the SSP receives this parameter along with the AMAslpID parameter, a Business Customer ID module (module code 027) is generated.

### AMA Digits Dialed WC

This parameter contains a digit string and a context identifier that indicates the kind of digit string (for example, “access code”). When the SSP receives this parameter along with the AMAslpID parameter, a Digits module (module code 040) is generated.

### AMA Line Number

This parameter contains a line number (for example, incoming terminating number) to be recorded in the AMA record. When the SSP receives this parameter along with an AMAslpID parameter, a Line Number module (module code 307) is generated.

For originating and terminating Wireless calls, the AMA Line Number contains the Mobile Identity Number (MIN) used for billing.

### AMAslpID

This parameter indicates that AIN AMA recording is to be performed.

### Billing Indicator

Although some messages may have more than one billing indicator parameter, only one, reflecting the route the SSP chooses, is recorded. If a call encounters multiple triggers, the billing indicator received in the final response message is recorded. If the final response message does not contain a billing indicator parameter, no module 030 is appended to the AMA record.

### **Non-AMA TCAP Parameters**

The following TCAP parameters may appear in SCP/Adjunct response messages received by the SSP. The following paragraphs describe the impact that the parameters have on AIN AMA processing.

#### **Answer Indicator**

When the SSP receives this parameter, answer supervision is returned to the originating switch if the call is an interoffice call. If the parameter is received in a response or conversation message, the SSP starts timing the call if the call is an interoffice call.

#### **Primary Carrier, Alternate Carrier, Second Alternate Carrier**

When a call requested by either the Primary Carrier, Alternate Carrier, or Second Alternate Carrier is handed to an inter-LATA carrier (IC), the SSP generates the carrier access - originating module (module code 021) and appends the module to the record generated for the call.

When the SSP encounters AIN triggers and routes a call over a carrier, and no SCP response contains an AMAslpID parameter, the SSP generates the appropriate carrier access record, even if the CIC used to route the call was provided in an SCP response.

#### **Primary Trunk Group, Alternate Trunk Group, Second Alternate Trunk Group**

When a call is routed over a trunk group specified in one of these parameters, the SSP generates a trunk identification module (module code 104) and appends the module to the record generated for the call.

#### **Called Party ID**

This parameter is used to populate the terminating NPA and terminating number fields of an AIN AMA record.

## **DMS-10 Local Number Portability (LNP) AMA**

AMA recording for the LNP feature is based on AIN AMA billing processing. In a switching environment that doesn't support LNP, billing is based on a DN that identifies both the location of a subscriber and the service provider for the subscriber. In a switching environment that supports LNP, however, this information must be retrieved from the SCP.

### **LNP AMA module**

LNP AMA modules are appended to records for an originating ported DN at intermediate or serving switches when the LRN is obtained either from an incoming ISUP IAM message that contains a jurisdiction information parameter (JIP) or from switch data for a dedicated trunk group directly connected to another service provider.

LNP AMA modules are not appended to records for an originating ported DN at an originating switch because there is no incoming ISUP signaling message.

An LNP AMA module (module code 719 or 720) is appended to records for calls that require an SCP query and contains the location routing number (LRN) associated with a ported terminating (called party) DN supplied by the SCP. An LNP AMA module is also appended to records for calls placed to non-portable DNs that require an SCP query.

When an originating switch performs an LNP query for a call placed to a ported DN, the LNP AMA module containing the number portability information for the terminating DN is appended to the LNP AMA record for any call type.

When an LNP query is performed at a donor switch and the switch records a terminating access record for a call received from another network (for example, Feature Group A, Feature Group B, Feature Group D, or connecting network access), the LNP module containing the number portability information for the terminating party is appended to the terminating access record. If more than one AMA record is created at the donor switch for a call, the LNP module is appended only to the terminating access record.

When an LNP query is performed at an intermediate switch and the switch records a terminating access record for a call received from another network (for example, Feature Group A, Feature Group B, Feature Group D, or connecting network access), the LNP module containing the number portability information for the terminating party is appended to the terminating access record. If more than one AMA record is created at the intermediate switch for a call, the LNP module is appended only to the terminating access record.

When an LNP query is performed at a CAMA switch, and if the switch creates an originating access AMA record for the call, the LNP module containing the SCP-supplied number portability information for the terminating party is appended to the AMA record.

For a given call, a CAMA switch is capable of appending up to two LNP modules to an originating AMA structure code: one module for an originating DN and another module for a terminating ported DN. The number portability information for the originating DN is obtained from ISUP signaling (JIP), from incoming CAMA trunk group data (that is, per-trunk group LRN), or from an SCP response. The terminating DN number portability information is available only when an SCP query is performed at the CAMA switch.

An LNP AMA module is appended to the AMA record created for a call that encounters an LNP trigger, under the following circumstances:

- an LNP query is performed, whether successful or not
- an LRN is received in the response message from the SCP
- no message is received in response to a query placed to the SCP

- the switch receives an AIN CONTINUE message from the SCP in response to the LNP query
- a *return error* component is received in the response message from the SCP
- a *reject* component is received in the response message from the SCP
- a protocol error is indicated in the response message received from the SCP

The LRN for the ported DN is included in the LNP module. If the response message from the SCP contains the original dialed number, the LRN field of the module is populated with fill characters (hexadecimal F). The module also indicates that an SCP query has failed.

### **Connecting network access (CNA) AMA record**

The AMA call type code, 720, supports “connecting network access” charge recording for calls that cross local network boundaries, but for which existing access charge recording doesn't apply. The new call type code uses structure code 0625; a “connecting network access” AMA record, containing the call type code, is generated for calls that arrive over inter-office trunk groups specifically marked for such recording. The service provider information (or, the LRN) associated with a DN is used to bill other service providers for network access charges for calls that cross service provider network boundaries.

If the call comes in on an ISUP trunk on which CNA AMA recording is being performed, the originating number in the AMA record will be one of the following, in the order shown: the charge number parameter; the original called number parameter; the redirecting number parameter; or the calling party number parameter. If the RCBN prompt is set to YES in Overlay TG (INC or 2WAY), the TGBN will be used as the originating number in the CNA AMA record regardless of any ISUP parameters received.

Module 164 (Chargeable Account Number) is appended to a CNA AMA record if prompts RCBN and CCAN are set to YES in Overlay TG (INC or 2WAY) and if one of the following parameters is received for the call: ChN (charge number); OCN (original called number); RN (redirecting number); CPN (calling party number). Module 164 (CPN) is appended to a CNA AMA record if prompt CCPN is set to YES in Overlay TG (INC or 2WAY) and if the CPN (calling party number) parameter is received for the call. Potentially, two Module 164s can be appended to a CNA AMA record.

### **LNP AMA impact on ISUP**

Originating and intermediate switches include the first six digits of the LRN associated with an originating DN in the JIP. The JIP is included in an outgoing IAM for all line and private trunk call originations. The JIP is passed from an incoming IAM to the outgoing IAM without modification at an intermediate switch. The JIP is generated at an intermediate switch if the incoming trunk is provisioned with a default JIP.

### **LNP AMA impact on trunk groups**

There is a per-trunk group option for incoming or two-way trunks that controls whether connecting network access AMA records are generated for calls that are received over the trunk group. The option does not apply to Feature Group B or D trunks between a local exchange carrier and an inter-LATA carrier, nor does it apply to type 1 trunks between a local exchange carrier and a cellular mobile carrier. A per-trunk group billing number is assigned to any trunk group for which the connecting network access recording option is active. The trunk group billing number is used in the AMA record only if no ANI information is received for the call.

A per-trunk group LRN is assignable to an incoming trunk group for switches that are directly connected to another service provider over a dedicated trunk group. The assigned LRN specifies the LRN of the connected switch and is used to identify the service provider of an originating ported DN.

### **LNP AMA impact on other AMA features**

The following paragraphs describe the interaction of LNP AMA with other AMA features.

#### **Originating access records**

An LNP AMA module is appended to the originating access record for a call that originates from a ported-in DN, even when an LNP query is not performed.

If the Number Pooling feature is configured and a call is originated from a DN in a pooled thousands group which is not configured as a code holder, an LNP AMA module is appended to the originating access record. If a call is originated from a DN in a pooled thousands group which is configured as a code holder, an LNP AMA module is not appended to the originating access record.

#### **Terminating access records**

When an intermediate switch receives an ISUP IAM that contains a forward call indicator (FCI) parameter showing that an LNP query was performed previously by another switch and a GAP specifying the original dialed DN, the GAP information is used in any terminating access record recorded by the switch. The LRN in the called party number parameter of the IAM is not used in the AMA record.

An LNP AMA module is appended to the terminating access record for a call that terminates to a ported-in DN, even when an LNP query is not performed.

If the Number Pooling feature is configured and a call terminates to a DN in a pooled thousands group which is not configured as a code holder, an LNP AMA module is appended to the terminating access record. If a call terminates to a DN in a pooled thousands group which is configured as a code holder, an LNP AMA module is not appended to the terminating access record.

**Flat rate billing**

If flat rate billing is in effect for a call, no AMA record is generated, even if a ported DN is one of the parties. The information that would normally be included in an LNP module will not be recorded, even if an LNP query is performed. An empty LNP module will not be appended to a call record.

**AIN triggers**

When an LNP trigger is encountered after an AIN trigger is encountered in the same switch, an LNP module is appended to the AMA record, assuming that the AIN trigger response includes a ported called DN. If no AMA record is generated, the LNP module is also not generated.

**MDR**

The LNP module is not present in MDR records that are sent to customer premises equipment.

**E800 AMA**

The LNP module is appended to E800 toll free AMA records when an LNP query follows an E800 query in the same switch, because the number returned from the E800 number database is a ported DN.

**Long duration calls**

On a long duration call involving a ported DN, an LNP module is appended to the first record, and any subsequent records, generated for the call.

**CAMA**

Switches performing CAMA recording screen NPA-NXXs on CAMA trunk groups that are connected to subtending switches. If a subtending switch is LNP-capable, any new NPA-NXX that ports into a subtending switch must be added to the screening list for the corresponding trunk group that connects it to the CAMA switch.

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## Section 8: ISDN AMA

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### ISDN AMA recording (Bellcore format only)

ISDN AMA recording requires Bellcore AMA format. ISDN records must account for the following:

- multiple bearer capabilities
- both the directory number and the bearer call type
- signaling delivery
- interworking (determining if the call is end-to-end ISDN)
- the cause for disconnected calls

This section describes modules associated with ISDN AMA recording and forced detail recording.

### ISDN AMA modules

The following paragraphs describe significant Bellcore AMA Format (BAF) structure code modules that are used for originating (call type 045) and terminating (call type 184) user service records. Each module is identified, followed by a brief functional description.

Module 070, the ISDN core module, identifies ISDN bearer capability, bearer call type, interworking information, release cause, and signaling and supplementary service usage information. It is appended to non-ISDN record structures for originating detailed billed calls where signaling services have been transferred and delivered. Module 70 is also appended to ISUS records (call types 45 and 184) in instances where signaling services have been transferred and delivered.

Module 071, the ISDN core module (abbreviated) contains the same information as Module 070, without the signaling and supplementary service usage. This module is used for ISDN calls where no signaling services were delivered. Module 071 identifies the bearer call type, bearer capability, interworking information, and release cause. Module 071 is appended to any originating record created for an ISDN call including DDD, MDR and SLUS. Module 071 is not appended to ISUS records.

Module 073, the terminating user service module, records the usage of supplementary services delivered to the called ISDN subscriber. It is used with call type code 036 (Terminating Study Record - TSLS), with call type code 184 (ISDN Terminating User Service), INWATS, Terminating MDR and other terminating records. Module 073 also records bearer capability, bearer call type, and interexchange carriers, when they are used.

Module 087, the directory number description module, indicates Calling DN Private and is added to terminating call records with a presentation restricted calling DN.

Module 180, the ISDN channel identifier module, identifies the B-channel used for an originating call. It is appended to all originating ISDN calls. For intra-Stored Program Controlled Switching System (SPCS) calls, this module is appended to the AMA record associated with the forwarded portion of the call. Module 180 is also appended to a terminating record for intraoffice calls to non-ISDN lines, if the originating line is an ISDN line. When an AIN call originates from an ISDN line, Module 180 is appended to all detailed records (AIN and non-AIN) generated for the call.

Module 181, the incoming trunk identification module, for inter-SPCS calls terminating to an ISDN station, identifies the incoming trunk group and the specific trunk within the trunk group. It is appended for all terminating ISDN calls that originate from an ISUP trunk. This module is appended to the AMA record associated with the forwarded portion of the call if call forwarding is applied to an incoming call that has a destination within the same SPCS. When an AIN call terminates to an ISDN line that originated from an ISUP trunk, Module 181 is appended to all detailed records (AIN and non-AIN) generated for the call.

### **Forced Detail Recording**

For end-to-end ISDN calls, several ISDN subscription parameters enable signaling information transmission from calling subscribers to called subscribers. These parameters also apply to TLATA calls, if the originating access is ISDN and the terminating access accepts the transport parameters. Signaling information can be any one, or combination, of the following categories:

- lower-layer compatibility information
- higher-layer compatibility information
- calling party subaddress information
- called party subaddress information
- user-to-user information

If the calling party has the corresponding subscription indicators, the signaling information is accepted from the calling party and passed to the terminating ISDN line or trunk. Calling party subaddress information transmission requires calling party subscription to delivery of that information and that the called party subscribes to Calling Number Delivery (CND).

Forced detail recording enables the DMS-10 to record an AMA record for flat-rate or unanswered calls, which normally do not generate records, in instances where signaling information has been transmitted and accepted. In DMO AMA, an office must assign forced detail recording as call types ISUS (for originating ISDN calls, call type 45) and ISTS (for terminating ISDN calls, call type 184). Forced detail recording for originating and terminating calls is enabled through DMO CNFG, prompting sequence ISDN, prompts FDRO and FDRT. In order to determine a signaling service exchange, signaling information must be enabled at the subscriber line level, through DMO DN, prompting sequence DNCT. Tables 8-A through 8-C list the parameters required to enable forced detail recording for specific call situations.

With forced detail recording configured, ISDN end-to-end unanswered calls that generate AMA records are determined by release cause indicators. Through DMO AMA, operating company personnel can determine which release cause indicators should generate AMA records for unanswered originating (IORG) and terminating (ITRM) ISDN calls. ITRM release cause indicators apply only to a terminating access SPCS used for terminating access calls. Forced billing for unanswered calls applies only to ISDN end-to-end calls and ISDN originating TLATA calls.

Message Detail Recording (MDR) call types have priority over the ISUS and ISTS call types. Likewise, the ISUS and ISTS call types have priority over the subscriber and terminating line usage study (SLUS and TSLS) call types. Network interworking conditions for originating interoffice ISDN calls are determined based on Backward Call Indicator parameters received in ISUP messages. Backward Call Indicator parameters, however, are not required to determine intraoffice ISDN end-to-end signaling.

<b>Table 8-A: ISDN Forced Detail Recording - Originating calls, detailed record not required</b>			
<b>AMA(AMA)</b>	<b>CNFG (ISDN)</b>	<b>DN (DNCT)</b>	<b>AMA (IORG)</b>
CTYP=ISUS	FDRO=YES	UCD1 (CDST)	RCOD=<preference>
BTYP≠NONE		UCD2 (CDST)	
		UHL1 (HLCT)	
		UHL2 (HLCT)	
		ULL1 (LLCT)	
		ULL2 (LLCT)	
		UUS1 (UUT)	
		UUS2 (UUT)	

*Note: Requires an ISDN originating party and a line source.*

One, or more DNCT options must be assigned. The DNCT options in parentheses are automatically assigned to the DNCT after the adjacent option is assigned.

Applies to unanswered calls only,

8-4 ISDN AMA

UXX1 format billing parameters are used with the options in parentheses for calls originated from an ISUP source that is not from an interexchange carrier (IC). UXX2 format billing parameters are used with the options in parentheses for calls originated from an ISUP source that is from an IC.

<b>Table 8-B: ISDN Forced Detail Recording - Terminating ISDN calls, detailed record not required</b>			
<b>AMA(AMA)</b>	<b>CNFG (ISDN)</b>	<b>DN (DNCT)</b>	<b>AMA (IORG)</b>
CTYP=ISTS	FDRT=YES	CND	RCOD=<preference>
BTYP≠NONE		UCG1 (CGST)	
		UCG2 (CGST)	

*Note: Requires an ISDN line destination and an ISUP trunk source, or an ISDN line source. The DN options in parentheses are automatically assigned to the DNCT after the first option is assigned.*

The DNCT options in parentheses are automatically assigned to the DNCT after the adjacent option is assigned. CND is used for a called party, Calling party subaddress requires that the originating ISDN line receives option CGST and that the terminating party receives options CND and UCG1 or UCG2. UCG1 is the billing parameter used with CGST for a call originated from an ISUP source that is not from an interexchange carrier (IC). UCG2 is the billing parameter used with CGST for a call originated from an ISUP source that is from an IC.

Applies to unanswered calls only

<b>Table 8-C: ISDN Forced Detail Recording - TLATA answered and unanswered calls</b>				
<b>AMA(AMA)</b>	<b>CNFG (ISDN)</b>	<b>TG (INC)</b>	<b>DN(DNCT)</b>	<b>AMA(IORG)</b>
CTYP=TLATA	FDRT=YES	AUUS=YES	CDST	RCOD=<preference>
BTYP≠NONE		AATP=YES	CGST	
			HLCT	
			LLCT	
			UUT	

*Note: Requires an ISUP trunk source and ISDN line origination.*

Applies to unanswered calls only,

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## ISDN PRI AMA recording (Bellcore format only)

Billing for PRI functions in a manner similar to billing for line trunks - on a station, rather than trunk group, basis. Unlike normal trunk originations, for which the trunk group number is stored in the AMA record, line trunk originations are treated as line originations for billing purposes.

### Determination of billing numbers

Billing numbers in an AMA record made for a call from the PRI to the public network are determined as follows, according to the setting of the per-interface Billing Number Selection (BNS) parameter:

- calling party number (CPN) preferred as billing number. If the user-provided number passed screening, this number is recorded. Otherwise, if only a network-provided number is given, or if the user-provided number failed screening or was not screened, then the network-provided number (default DN) is recorded.
- user-provided not-screened (UPNS) CPN preferred as billing number. If a UPNS number is sent in the calling party number information element, this number is recorded. The default DN is also indicated and recorded in module 164, which is appended to the AMA record. If only a network-provided number is given, then the default DN is recorded.
- special billing number. For a call with a special billing number, the special billing number is recorded. If the CPN is available, it is indicated and recorded in Module 164 (E.164/X.121 Number module), which is appended to the AMA record.

### B-channel and DS-1 facility number

For calls originating from an ISDN interface, the ISDN channel identifier module is appended to all originating ISDN records to identify the B-channel used. In those cases in which calls terminate to an ISDN interface, the ISDN Channel Identifier module (Module 180), which contains the identity of the B-channel (DS-1 facility number and DS-0 channel within that facility), is also appended.

### Incoming trunk group and trunk member

For calls originating from an ISUP trunk and terminating on an ISDN interface, the Incoming Trunk Identification module (Module 181), containing the trunk group number and trunk member number, is appended to all terminating ISDN records.

### Bearer call type / Bearer capability

The Bearer call type (voice or circuit-mode data) and the Bearer capability (speech, 3.1kHz audio, 56 kbps data, or 64 kbps data) are recorded in AMA records made for calls originating from the PRI interface. They are normally not recorded in AMA records for calls terminating to the PRI except for INWATS AMA records and for terminating call records that record the usage of calling party subaddress.

### **Signaling services per interface**

Usage of the following signaling capabilities can be recorded in an AMA record:

- called party subaddress
- calling party subaddress
- high-layer compatibility
- low-layer compatibility

When accepted by the DMS-10 switch, called party subaddress, high-layer compatibility, and low-layer compatibility are billed to the calling party upon delivery of this information to the terminating interface; calling party subaddress is billed to the called party upon delivery of this information to the terminating interface. The signaling capabilities that are normally billable to the calling party are also potentially billable to INWATS users and are recorded at the terminating switching system.

### **Interworking conditions**

Interworking situations encountered by the call are indicated in the AMA records for ISDN calls. For PRI to BRI calls, BRI to PRI calls, and PRI to PRI calls when no interworking in the private network occurs, “no interworking” is indicated in the AMA record. For PRI to POTS calls, PRI to ISUP calls with non-ISDN backward call indicators, and INWATS calls (using forward call indicators) terminating at the PRI, and for PRI to PRI calls when interworking occurs in the private network (for example, in the Class II equipment), interworking is indicated in the AMA record.

### **Calling Number Identification Services**

#### **Number provision and number screening**

Billing for number provision and number screening features is on a flat-rate basis.

#### **Number privacy feature**

Detailed AMA records are generated on a per-call basis for calls originating from a PRI if the PRI subscribes to the usage-sensitive calling number delivery blocking (UCNB) parameter, if the DMS-10 office AMA call type parameter in the AMA billing control table indicates that billing information for the CNB feature is to be recorded, and under either of the following conditions:

- the class II equipment signals a privacy indicator value of “presentation allowed” when the interface is subscribed to “calling party presentation not allowed”
- the class II equipment signals a privacy indicator value of “presentation prohibited” when the interface is subscribed to “calling party presentation allowed”

The detailed record generated for the UCNB feature contains the date and time of the call, bearer call type, billing number, and an indication that the calling PRI interface's calling party presentation subscription has been changed on that call.

**Name and number privacy feature**

Detailed AMA records are generated on a per-call basis for calls originating from a PRI if the PRI subscribes to the usage-sensitive calling identity delivery and suppression (UCID) feature, if the DMS-10 office AMA call type parameter in the AMA billing control table indicates that billing information for the CIDS feature is to be recorded, and under either of the following conditions:

- the class II equipment signals a privacy indicator value of “presentation allowed” when the interface is subscribed to “calling party presentation not allowed”
- the class II equipment signals a privacy indicator value of “presentation prohibited” when the interface is subscribed to “calling party presentation allowed”

The detailed record generated for the UCID feature contains the date and time of the call, bearer call type, billing number, and an indication that the calling PRI interface's calling party presentation subscription has been changed on that call.

**Calling Number Delivery**

Each CND record contains the called directory number and bearer call type, and separate daily counts of the calling party number availability, unavailability, or privacy indication.

**Early cut-through (ECT)**

For calls terminating at the PRI, the called user subscribing to the ECT feature is charged for the interval of usage from early cut-through to answer or disconnect. This charge, along with the reason for the cut-through, is indicated in Module 079 (Early Cut-through module), appended to INWATS or ISDN Terminating User Services (ISTS) records. The interexchange carrier is recorded for those calls in which the terminating Stored Program Controlled Switching System (SPCS) also functions as the terminating access SPCS.

If a terminating call is offered to a PRI interface and the called user subscribes to ECT, the AMA record for this call may contain the calling DN. If the calling number is available and has a status of “presentation restricted,” the privacy indication is included in the AMA record.

**Call-by-call service selection****Public network service**

AMA records generated for public network SFGs are the same as those for public network calls that are not part of a Simulated Facility Group (SFG). The following items are recorded for public network calls originating from a PRI interface:

- originating signaling capabilities
- calling number privacy events

- originating INWATS calls (E800 calls)
- station-paid calls
- flat-rate calls

### **OUTWATS service**

AMA records are created for IntraLATA or InterLATA OUTWATS Simulated Facility Group (SFG) calls. The originating number recorded in the AMA record can be either the billing number associated with the OUTWATS SFG, or the user-provided calling number that passes screening. If the user-provided number is selected for recording and it fails screening, the default number is used. If the billing number is selected for recording and the call overflows from one SFG to another, the billing number associated with the new SFG is recorded. The AMA record OUTWATS may record usage of originating signaling capabilities, such as called party subaddress. Calling number privacy events may also be recorded.

### **INWATS service**

AMA records are created for INWATS SFG calls. The SFG is identified in the AMA record. Signaling capabilities normally subscribed to by the calling party and that are usually billable to the calling party (called party subaddress, low-layer compatibility, high-layer compatibility) are billable to the INWATS user. The usage of the terminating signaling capability calling party subaddress may also be indicated in the INWATS AMA record. The INWATS use is also billed for ECT (interval from ECT to answer or disconnect). Aggregate records for Calling Number Delivery (CND) are recorded for INWATS SFG calls.

### **Foreign Exchange and Tie Trunk service**

Local records may be created at the Class II equipment for Foreign Exchange and Tie Trunk usage. Flat-rate billing occurs at the DMS-10 office. Billing records may be produced for Tie Trunk usage by specifying an AMA call type for the route on which the Tie Trunk call is routed.

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## Section 9: AMA billing backup and system monitoring

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### Standard cluster AMA system

Host Switching Offices (HSOs) and Large Cluster Controllers (LCCs) of DMS-10 clusters can serve as central AMA-data collection and recording locations for the SSOs in the cluster and, in the case of the HSO/SSO cluster, for the HSO itself. (For a detailed description of DMS-10 cluster configurations, see NTP 297-3601-100, *General Description*). The centralized cluster architecture eliminates the need for dedicated AMA recording devices at the SSO(s).

Like a stand-alone DMS-10 switch, the host and each SSO in a cluster can be configured for either LAMA or CAMA collection of billing data. Cluster configurations, however, allow each SSO to transmit its formatted AMA records, by way of digital or analog data links, to the host for recording on magnetic media. The HSO will provide the link to the AMA collector when configured for IBSR.

*Note 1:* Trunk Group Member Usage (TGMU) data records are non-AMA data records that are processed along with the AMA data. As such they are handled the same as AMA records in a Cluster configuration. TGMU data records are sent from the SSOs to the HSO/LCC for recording to the TGMU data files and may be backed up and retrieved with other AMA data when needed.

### Hardware requirement

For cluster AMA recording, the host must be equipped with AMA recording devices, even if the host is an LCC or a non-billing HSO office.

## Operation

Collection and recording of a host's own AMA data are essentially identical to the collection and recording functions of a stand-alone DMS-10 switch. Unlike a stand-alone DMS-10 switch, however, a host configured for AMA recording allocates a special pool of buffers from protected Call Store during initialization; these buffers are used for temporary storage of formatted AMA records received from the SSO(s) until they can be recorded on the magnetic medium. The host/SSO Identification Number field (which is part of each Identification Record, Time-Change Record, Date Record, and CAMA Suspension Record) indicates which office in the cluster originated that record.

Up to the point at which AMA data are passed to a recording device, collection of AMA data in an SSO is also essentially identical to that in a stand-alone DMS-10 switch. Because an SSO is not equipped with recording devices, it is not configured with Magnetic Tape Unit (MTU) buffers secondary IOI packs or IBSR buffers. Thus, at the point at which, in a stand-alone system, the formatted AMA record is placed in an MTU buffer in a secondary IOI buffer (in the case of 1600-bpi AMA systems) or IBSR buffer to await recording on the magnetic medium, the formatted SSO AMA record is placed in a Data Link Controller pack output queue for transmission to the host.

If both of the data links between a given SSO and its host are faulty, billable calls through the SSO are routed to a generic-condition route defined by the operating company.

## AMA Billing Backup System (Bellcore format only)

The AMA Billing Backup System feature allows AMA data to be recorded on a primary IOI device when the AMA system is out-of-service. When the AMA system returns to service, the AMA data is retrieved off of the IOI device and is recorded by the AMA system. The feature can be configured either on a Host Satellite Office (HSO) or on a stand-alone DMS-10 switch.

The AMA backup feature is not compatible with the IBSR feature because IBSR uses the IOI device as its primary storage device. If the IOI is not available to accept records for IBSR, then AMA backup will not be able to write the IOI either to back up AMA records. Because of this, backup is also not available when the DMS-10 is configured for dual stream billing (the AMA method is set to BOTH).

### Activating the AMA Billing Backup System

AMA Billing Backup System is invoked by the system only when the following conditions exist:

- the AMA system is out-of-service
- the IOI device is enabled
- 75% of billing registers are in use

The final condition, 75 percent of billing registers in use, is included to prevent the system from invoking the AMA Billing Backup System because of an intermittent, short-term failure experienced by the AMA system. Once the AMA Billing Backup System has been activated, however, the 75-percent use threshold is disregarded and billing data can be recorded on the primary IOI device.

*Note 1:* The LCC/SSO or HSO/SSO cluster configuration can operate with simplex or duplex data links. With simplex links, AMA billing backup is invoked when the single link goes out of service. An output message will inform operating company personnel when billing backup is complete.

*Note 2:* Billing backup can be activated when the AMA system at the host site is disabled.

### **Deactivating the AMA Billing Backup System and retrieving AMA backup data**

AMA Billing Backup System is deactivated when the AMA system is in service. Retrieval of the AMA backup data is invoked when the following conditions are met:

- the AMA system is in service
- the IOI device is enabled
- 90% of billing registers are available
- for SSOs, data links are in service

The condition, 90 percent of billing registers available, is included because the retrieval process requires that back-up data be placed into a billing register in order for it to be used in normal billing processing.

### **Conditions affecting AMA Billing Backup System operation**

Although the AMA Billing Backup System feature is designed to allow continued processing of billable calls when the AMA system is out-of-service, the following conditions can prevent the system from backing up AMA data. A generic condition, shown in parentheses, can be assigned to each of these conditions by the operating company.

- the real-time clock is inhibited (AMAD)
- the IOI backup tape file is full (BUFL)
- the IOI is disabled (NIOI)

The following conditions can result in lost AMA data:

- **SYSLOAD.** When a SYSLOAD occurs, all AMA records being stored in preparation for placement on an IOI device are lost.
- **Initialization.** A protected call store Initialization can cause the loss of AMA records being stored in preparation for placement on an IOI device.

- billing register depletion. When the supply of billing registers is depleted, billing data cannot be created.
- lack of IOI device availability. When the IOI device used for recording AMA billing data is under control by another application, the AMA Billing Backup System cannot record the AMA data. While the device remains unavailable, the supply of available billing registers can become depleted.

### **AMA Audit Trail and Tracer Records (Bellcore format only)**

As a result of the Modification of Final Judgement, each operating company must distribute toll revenues on a fixed-rate basis to a variety of toll-service suppliers (AT&T, Sprint, MCI, etc.). These fixed rates are based on information gathered by the operating company about the average daily amount of revenue generated by its toll traffic. Because the fixed rates must be paid to the toll-service suppliers regardless of the number of billing records lost or destroyed, the operating company needs an accurate estimate of the number of billable calls not recorded. Such an estimate allows the operating company to set more accurate fixed rates.

The AMA Audit Trail and Tracer Records feature enables the operating company to make an accurate estimate of unrecorded billable calls by allowing the billing system of the host and each SSO in a cluster to be monitored.

This monitoring function is used to generate the following tracer records, which are recorded on the magnetic medium of the AMA recording system at the host:

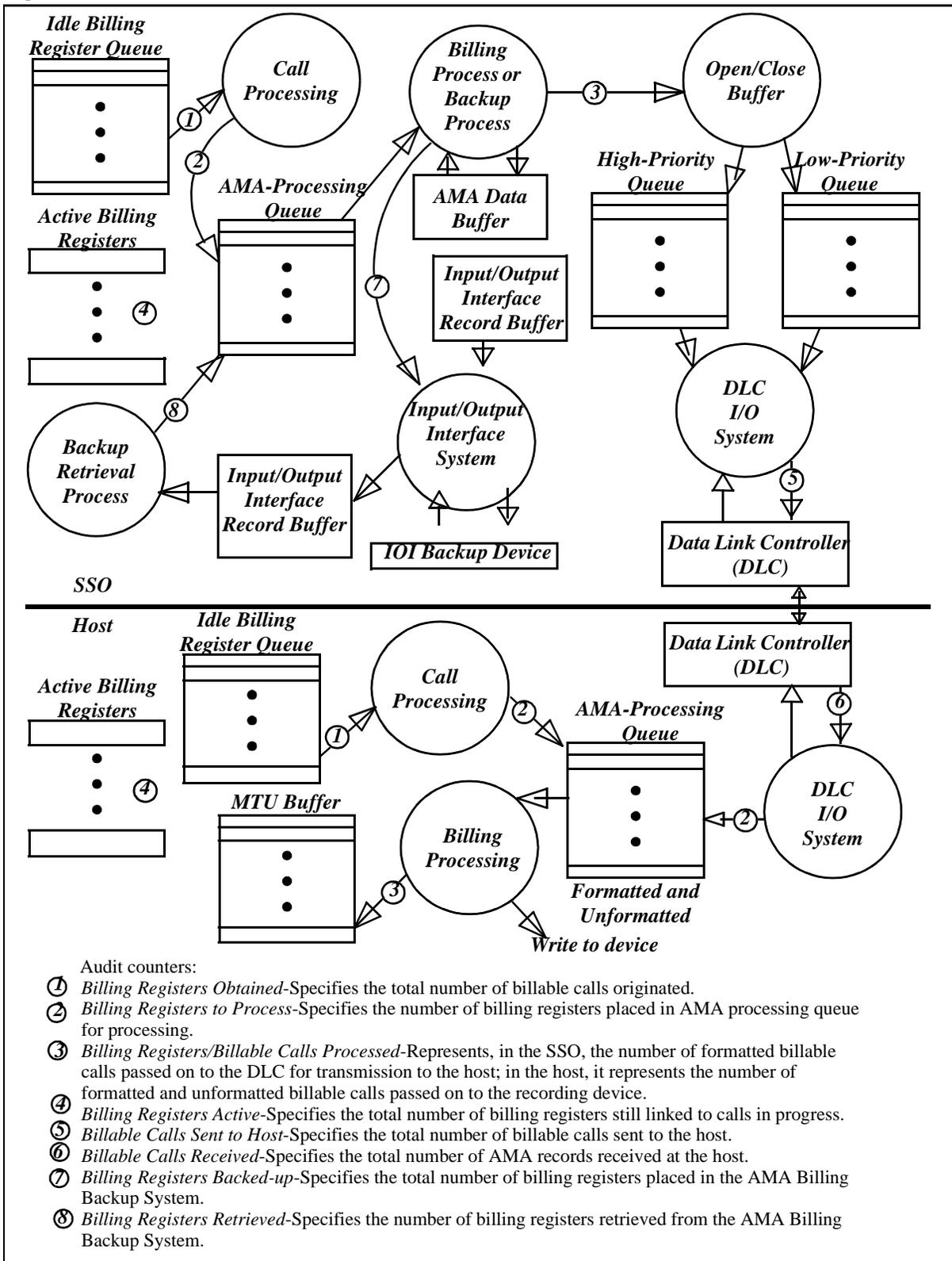
- Hourly SSO Tracer record
- Back-up Tracer record
- Hourly Host Tracer record
- AMA 24-Hour Tracer record

*Note: The backup tracer record can be generated either by a host satellite office or by a stand-alone DMS-10 switch configured with the AMA Billing Backup System feature.*

### **AMA audit counters**

To monitor DMS-10 switches in a cluster, audit counters are placed at various locations in the software system of each switch (see Figure 9-1). Each of these audit counters is designed to record the occurrence of a specific event in the gathering and processing of AMA data within a cluster office.

Figure 9-1: AMA audit trail



### **SSO audit counters**

The audit counters in each SSO and the event recorded by each are:

- **Billing Registers Obtained Counter.** This counter is incremented each time a billing register is selected from the idle billing register queue and is linked to a billable call. The counter is initialized to zero when the Hourly SSO AMA Tracer record is created.
- **Billing Registers to Process Counter.** This counter is incremented each time a billing register associated with a terminated billable call is placed in the AMA-processing queue for processing
- **Billing Registers Processed Counter.** This counter is incremented each time a billing register is dequeued from the AMA-processing queue. Each time this counter is incremented, the billing registers to process counter is reduced accordingly. The count generated here is an hourly count (Hourly SSO AMA Tracer record) and does not include any of the miscellaneous and statistical records (Time-Change records, Identification records, CAMA-Suspension records, etc.). This counter is initialized to zero when the Hourly SSO AMA Tracer record is created.
- **Billing Registers Active Counter.** Just before an Hourly SSO AMA Tracer record is generated, the system scans all billing registers in a single timeslice to determine how many of the billing registers are currently associated with calls in process. The counter is initialized to zero when the record has been generated.
- **Total 24-Hour Processed Counter.** This counter is incremented by the current value in the billing registers processed counter each time the Hourly SSO AMA Tracer record is generated; the record of this counter is generated and output daily (at midnight) to the host, at which time the counter is initialized to zero.
- **Billable Calls Sent to Host Counter.** This counter is incremented each time an AMA Call record is sent over the data link to the host for recording. The counter is not incremented if the record must be retransmitted to the host due to an error in, or failure of, the active data link. This counter is initialized to zero when the Hourly SSO Tracer record is actually output to the Data Link Controller pack for transmission to the host.

Two counters in each SSO record the activity of the AMA Billing Back-up System for output in the Hourly SSO AMA Tracer record:

- **Billing Registers Backed-up Hourly Counter.** This counter is incremented each time a billing register is backed up. The counter is initialized to zero when the Hourly SSO AMA Tracer record is generated.

- **Billing Registers Retrieved Hourly Counter.** This counter is incremented each time a billing register is retrieved from the AMA Billing Backup System for transmission to the host after one or both data links are returned to service following a double failure. The counter is initialized to zero when the Hourly SSO AMA Tracer record is generated.

**Hourly SSO AMA Tracer record**

The audit counters (with the exception of the Total 24-Hour Processing Counter) and the Billable Calls Received Counter (see the subheading “Host Audit Counters”) are used to generate the Hourly SSO AMA Tracer record. This record, which is output as Structure Code 09053, contains the fields listed in Table 9-A. The field, Total Number of Lost Calls, is calculated using the following formula:

$$\text{Total Number of Lost Calls} = (\text{Billing Registers Obtained Counter} + \text{Billing Registers Retrieved Hourly Counter}) - (\text{Billing Registers to Process Counter} + \text{Active Billing Registers Counter} + \text{Billing Registers Processed Counter} + \text{Billing Registers Backed-up Hourly Counter}).$$

<b>Table 9-A: Hourly SSO AMA tracer record-contents</b>		
<b>Formatted Record Field</b>	<b>Maximum Value</b>	<b>Number of Bytes</b>
Number of billing registers obtained	20,000	4
Number of billing registers to process	2,000	4
Number of billing registers processed	20,000	4
Number of active billing registers	2,000	4
Total number of lost calls	20,000	4
Number of AMA call records sent to host	20,000	4
Number of AMA call records received	Value in this field should be ignored	4

**AMA Billing Back-up System Audit Counters**

Two additional counters in each SSO record the activity of the AMA Billing Backup System for output in the AMA Back-up Tracer record:

- **Billing Registers Backed-up Counter.** This counter is incremented each time a billing register is backed up. (The AMA Billing Backup System is activated when both data links to the host fail.) The counter is initialized to zero when the AMA Back-up Tracer record is created.

- **Billing Registers Retrieved Counter.** This counter is incremented each time a billing register is retrieved from the AMA Billing Backup System for transmission to the host after one or both data links are returned to service following a double failure. The counter is initialized to zero when the AMA Back-up Tracer record is created.

### AMA Back-up Tracer record

The AMA Back-up Tracer record is generated upon completion of the retrieval of all records temporarily stored in the AMA Billing Backup System. This tracer record, which is output as Structure Code 09056, contains the fields listed in Table 9-B.

<b>Table 9-B: AMA Back-up Tracer record-contents</b>		
<b>Formatted Record Field</b>	<b>Maximum Value</b>	<b>Number of Bytes</b>
Number of billing registers backed-up	2,400,000	4
Number of billing registers retrieved	2,400,000	4
Total number of lost back-up calls	2,400,000	4

### Host audit counters

The audit counters in the host and the event recorded by each are:

- **Billing Registers Obtained Counter.** This counter is incremented each time a billing register is selected from the Idle Billing Register Queue and is linked to a billable call. The counter is initialized to zero when the Hourly Host AMA Tracer record is created.
- **Billing Registers to Process Counter.** This counter is incremented each time a formatted AMA call record (from an SSO) or an unformatted billing register associated with a terminated billable call through the host is placed in the AMA-processing queue for processing. The counter is reduced each time a formatted AMA Call record or an unformatted billing register is dequeued from the AMA-processing queue.
- **Billing Registers Active Counter.** Just before an Hourly Host AMA Tracer record is generated, the system scans all billing registers in a single timeslice to determine how many of the billing registers are currently associated with calls in process. The counter is initialized to zero when the record has been generated.

- **Billable Calls Received Counter.** This counter is incremented each time an AMA Call record is received from an SSO for recording. This 16-item array is indexed by SSO number in order to keep a separate count of the number of billable calls received from each SSO. If the Billable Calls Received Count (at the host) is greater than the sum of the Billable Calls Sent to Host Counts in the cluster, the operational records of the switches in the cluster should be checked to see whether an initialization or data-link failure occurred during the hour for which the totals disagree. The counter associated with a given SSO is initialized to zero when the count is formatted and included in the SSO Hourly AMA Tracer record received from that SSO.
- **Total Billable Calls Received Counter.** This counter is incremented each time an AMA Call record is received from an SSO for recording. The counter records the total number of AMA Call records received from all SSOs in the cluster. The counter is initialized to zero when the Hourly Host AMA Tracer record is created.
- **Billable Calls Processed Counter.** This counter is incremented each time a formatted AMA Call record (from an SSO) or an unformatted billing register (from the host) is dequeued from the AMA-processing queue. The counter is not incremented for miscellaneous and statistical AMA records (Time-Change records, Identification records, CAMA-Suspension records, etc.). Each time the counter is incremented, the Billing Registers to Process Counter is reduced accordingly. The counter is initialized to zero when the Hourly Host AMA Tracer record is created.
- **Total 24-Hour Processing Counter.** This counter is incremented by the current value in the Billable Calls Processed Counter each time an Hourly Host AMA Tracer record is generated. The counter is initialized to zero when the AMA 24-Hour Tracer record is generated (at midnight).

### Hourly Host AMA Tracer record

The above audit counters (with the exception of the Total 24-Hour Processing Counter) are used to generate the Hourly Host AMA Tracer record. This record, which is output as Structure Code 09054, contains the fields listed in Table 9-C. The final field, Total Number of Lost Calls, is calculated using the following formula:

$$\text{Total Number of Lost Calls} = (\text{Billing Registers Obtained Counter} + \text{Total Billable Calls Received Counter} + \text{Billing Registers Retrieved Hourly Counter}) - (\text{Billing Registers to Process Counter} + \text{Active Billing Registers Counter} + \text{Billing Registers Processed Counter} + \text{Billing Registers Backed-up Hourly Counter}).$$

<b>Table 9-C: Hourly HSO AMA Tracer record-contents</b>		
<b>Formatted Record Field</b>	<b>Maximum Value</b>	<b>Number of Bytes</b>
Number of billing registers obtained	20,000	4
Number of billing registers to process	2,500	4
Number of billing registers processed	20,000 X 8=160,000	4
Number of active billing registers	2,000	4
Total number of AMA call records received	20,000 X 7=140,000	4
Total number of lost calls	20,000 X 8=160,000	4

**AMA 24-Hour Tracer record**

A separate AMA 24-Hour Tracer record is generated at midnight for the host and for each SSO in the cluster. Each of these records, which are output as Structure Code 9055, contains the data fields listed in Table 9-D.

<b>Table 9-D: AMA 24-Hour Tracer record-contents</b>		
<b>Formatted Record Field</b>	<b>Maximum Value</b>	<b>Number of Bytes</b>
Hourly number of lost billing registers (This is an array of 24 fields, one for each hour in a 24-hour period.)	160,000 per hour (maximum output value is 99)	2
Total 24-hour processing	3,840,000	4

The maximum number of lost billing registers per hour (160,000) is a worst-case total, which assumes that none of the host's are recorded. Because of Data Link Controller output-buffer limitations, 24 one-hour totals of this size will not fit in an unformatted billing register at the SSO. In order to allow 24 one-hour totals to fit into a single record, each hourly total is allotted one byte in the unformatted billing record. Thus, the maximum value output in each of the 24 one-hour fields is 99. If an hourly total of lost billing registers reaches 99, operating company personnel must look back to the Hourly SSO AMA Tracer record for the hour in question in order to obtain an accurate accounting of the number of lost billing registers.

## Section 10: Bellcore AMA record format

### Introduction

This section describes the Bellcore Automatic Message Accounting (AMA) format, that complies with the technical requirements set forth in the Bellcore documents, *Bellcore Automatic Message Accounting Format (BAF) Requirements* (NWT-001100) and *Automatic Message Accounting* (TR-TSY-000508), as used to record AMA data on magnetic media in the DMS-10 switch.

### Data tables

The following tables summarize the contents of the Data Tables.

<b>Data Table 000</b>		
<b>Record descriptor word</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-2		16-bit binary number (number of contiguous bytes in record, including all fields and modules)
3-4		16 binary zeros

<b>Data Table 00</b>		
<b>Hexadecimal identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1		hex-A (constant)
2		Record error indicator:  hex-A - Record contains no characters known or suspected to be missing or in error  hex-B - Record contains one or more characters known or suspected to be missing or in error

<b>Data Table 0 Structure code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0 4	Module indicator: No modules are appended to structure Two or more modules are appended to structure
2-5		Structure code
6		Sign (hex-C)

<b>Data Table 1 Call types (DMS-10)</b>		
<b>Number of BCD Character</b>	<b>Call Type Code</b>	<b>Meaning / Contents</b>
1-3	001	Detailed Message Rate, Timed, Message Billing Index (MBI)
1-3	002	Message Rate, Timed, Message Billing Index (MBI)
1-3	003	Detailed Message Rate, Untimed, Message Billing Index (MBI)
1-3	004	Message Rate, Untimed, Message Billing Index (MBI)
1-3	005	Detailed Message Rate, Timed, No Message Billing Index (MBI)
1-3	006	Station Paid, DDD
1-3	008	INWATS, Terminating Entry
1-3	009	411 Directory Assistance
1-3	021	CCSA Sampling
1-3	031	Call Forwarding (CFW)
1-3	033	555 Directory Assistance
1-3	036	Terminating Study Record
1-3	037	Terminating SLUS Overflow Counts
1-3	041	Local Coin
1-3	042	Time Change
1-3	045	ISDN User Service
1-3	047	Default AIN
1-3	048	Usage Sensitive Feature - Three-way call
1-3	049	Usage Sensitive Feature - Activation Record
1-3	063	Cellular Mobile Carrier - Type 1 or 2B (originating)

<b>Data Table 1 (Continued) Call types (DMS-10)</b>		
<b>Number of BCD Character</b>	<b>Call Type Code</b>	<b>Meaning / Contents</b>
1-3	065	Cellular Mobile Carrier - Type 1 or 2B (terminating)
1-3	067	Originating Study Record
1-3	068	WATS Billing Number
1-3	071	INWATS Overflow Counts - Daily
1-3	072	Public Switched Digital Service
1-3	092	End of Recording, Media Change, or Data Initialization
1-3	110	Inter-LATA Station Paid
1-3	114	Inter-LATA WATS Billing Number
1-3	117	Inter-LATA PSDS
1-3	119	Terminating-LATA Access Record
1-3	120	Originating LATA Overflow Counts
1-3	121	PSDS Terminating Access Record
1-3	131	Originating Feature Group A
1-3	132	Terminating Feature Group A
1-3	133	Feature Group A Overflow Counts
1-3	134	Originating Feature Group B
1-3	135	Terminating Feature Group B
1-3	136	Improved Public Telephone Service
1-3	137	INWATS Overflow Counts - Hourly
1-3	141	IC Number Services
1-3	142	BCC Number Services
1-3	159	Message Detail Recording (MDR) data
1-3	184	ISDN Terminating User Service Record
1-3	264	Calling Identity Delivery Record
1-3	330	CLASS Feature (ACB, AR, CIDS, CNAB, CNB, CND, COT, SLE) SLE does not include SRNG.
1-3	720	Connecting Network Access
4	NA	SIGN (hex C)

<b>Data Table 2 Sensor type (DMS-10)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	029	DMS-10
4	hex C	SIGN

<b>Data Table 3 Sensor identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Default value
2-7		Identification Code
8	hex C	SIGN

<b>Data Table 4 Recording office type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	029	DMS-10
4	hex C	SIGN

<b>Data Table 5 Recording office identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Default value
2-7		Identification Code
8	hex C	SIGN

<b>Data Table 6</b>		
<b>Date</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0-9	Last digit of current year
2-3	01-12	Month
4-5	01-31	Day
6	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 7</b>		
<b>Timing indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Default value
	2	Timing guard condition exists
2	0	Default value
	1	Short called party off-hook detected
3	0	Default value
	1	start of a Long Duration Call (or for service capability status: activation
	2	continuation and deactivation of a Long Duration Call.
	3	service capability status: deactivation.
4	0	Default value
5	0	Default value
6	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 8</b>		
<b>Study indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Default value
	2	Subscriber Line Usage Study (SLUS)
2	0	Default value
	1	Complaint observed

<b>Data Table 8 Study indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
3	0	Default value
4	0	Default value
	1	Test call
5	0	Default value
	2	Call setup to a derived number not marked anonymous using ACB or AR
	3	Call setup to an anonymous number using ACB or AR
6	0	Default value
	1	No originating number
	3	No terminating number
	4	No originating number and no terminating number
	5	No terminating NANP station number
	6	No originating NANP station number
7	0	Default value
8	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 9 Called party off-hook indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Called party off-hook detected
	1	Called party off-hook not detected
2	hex C	SIGN

<b>Data Table 10 Service observed, traffic sampled</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Not Service Observed, not Traffic Sampled
	1	Service Observed, not Traffic Sampled
	2	Not Service Observed, Traffic Sampled

<b>Data Table 10</b> <b>Service observed, traffic sampled</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
2	hex C	SIGN

*Note: In MDR BAF/FXD CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 11</b> <b>Operator action</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Automatically identified, customer-dialed call
2	hex C	SIGN

<b>Data Table 12</b> <b>Service features</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000	None of the following values apply
	001	Coin
	002	Hotel/Motel, no tax
	008	INWATS
	010	Three-Way (Conference) Calling
	012	Call Forwarding (terminating leg or flat rate)
	014	Call Forwarding busy line or Call Forwarding Don't Answer
	015	Public Switched Digital Service with 800 Service
	017	Remote Call Forwarding (terminating leg)
	018	Usage-sensitive three-way calling
	027	AIN-default
	050	Usage Sensitive Call Waiting
4	052	SCF
	hex C	SIGN

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The IBS features entitled Busy Transfer All and Don't Answer Transfer are recorded as Call Forwarding. The EBS feature entitled User Transfer is recorded as Three-Way Calling.

<b>Data Table 13</b>		
<b>Originating numbering plan area (NPA)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0-9	Numbering Plan Area (NPA)
4	hex C	SIGN

<b>Data Table 14</b>		
<b>Originating number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0-9	<i>NXX</i> digits (ABC digits)
4-7	0-9	Four-digit number (DEFG digits)
8	hex C	SIGN

<b>Data Table 15</b>		
<b>Overseas indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Not an overseas call (Numbering Plan Area [NPA] dialed)
	1	Not an overseas call (Numbering Plan Area [NPA] not dialed, but derived by DMS-10)
	2	Less than seven-digit overseas number
	3	Seven-digit overseas number
	4	Eight-digit overseas number
	5	Nine-digit overseas number
	6	10-digit overseas number
	7	11-digit overseas number
8	12 or more digits overseas number	
2	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore Rules.*

<b>Data Table 16</b>		
<b>Terminating numbering plan area (NPA)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-2	0-9	Overseas expander positions
3-5	0-9	Terminating Numbering Plan Area (NPA)
6	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values that are suppressed in accordance with Bellcore rules.*

<b>Data Table 17</b>		
<b>Terminating number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0-9	NX digits (ABC digits)
4-7	0-9	Four-digit number (DEFG digits)
8	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 18</b>		
<b>Time</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-2	00-23	Hours
3-4	00-59	Minutes
5-6	00-59	Seconds
7	0-9	Tenths of a second
8	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 19 Elapsed time</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Padding
2-6	00000-99999	Minutes
7-8	00-59	Seconds
9	0-9	Tenths of a second
10	hex C	SIGN

*Note 1:* On attempts, zeros are recorded for minutes, seconds, and tenths of a second.

*Note 2:* In MDR BAF CP format, “F” characters are output in this table in place of any values, in accordance with Bellcore rules.

<b>Data Table 28 WATS indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Default
	1	Full Business Day
	2	Measured Time
2	hex C	SIGN

<b>Data Table 29 WATS band or type indicator (MBI)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3		WATS band or type Indicator (Message Billing Index [MBI])
4	hex C	SIGN

<b>Data Table 30 WATS administration</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-5	0000 - 9999	Pseudo-trunk number
6	hex C	SIGN

<b>Data Table 32 Digits Dialed 1</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-11		Digits dialed (right justified)
12	hex C	SIGN

*Note 1:* When the dialed digits contain an asterisk (\*), the asterisk is replaced with the letter B. When the dialed digits contain an octothorp (#), the octothorp is replaced with the letter C.

*Note 2:* In MDR FXD CP format, unused digits are each represented by the letter A.

<b>Data Table 33 Digits Dialed 2</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-13		Digits dialed (right justified)
14	hex C	SIGN

*Note 1:* This table is used when all of the digits dialed do not fit in Data Table 32.

*Note 2:* In MDR FXD CP format, unused digits are each represented by the letter A.

<b>Data Table 40 Type of tracer</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	007	Media-Change record (applies only to structure code 9013)
	008	End-of-Recording record

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<b>Data Table 40 Type of tracer</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	009	Data-Initialization record
	027	Beginning of Recording (applies to structure code 9036)
	046	Hourly SSO AMA Tracer record
	047	Hourly HSO AMA Tracer record
	048	24-Hour AMA Tracer record
	049	AMA Billing Back-up Tracer record
4	hex C	SIGN

<b>Data Table 41 Data capabilities indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	003	Data only
4	hex C	SIGN

<b>Data Table 42 Data rate indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000	Unknown
4	hex C	SIGN

<b>Data Table 46 RAO number (DMS-10)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	FFF	Three-digit RAO Number
4	F	SIGN

<b>Data Table 55</b> <b>Significant digits in next field(s)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0 - 9	Number of significant digits in next field(s)
4	hex C	SIGN

<b>Data Table 56</b> <b>Terminating company</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000	Not used
4	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values when the telco's data is proprietary.*

<b>Data Table 57</b> <b>Inter-LATA carrier / international carrier prefix</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-4		Inter-LATA Carrier/International Carrier identification
5	0	The Carrier Identification Code (CIC) is Feature Group D (FGD) identity, and an IC/INC operator system is involved.
	1	The CIC is an FGD identity, the call is dialed direct, and no IC/INC operator system is involved.
	2	The CIC is an FGD identity, and IC/INC operator system involvement cannot be determined.
	3	The CIC is a Feature Group B (FGB) identity, and an IC/INC operator system is involved.
	4	The CIC is an FGB identity, the call is dialed direct, and no IC/INC operator system is involved.
	5	The CIC is an FGB identity, and IC/INC operator system involvement cannot be determined.
	7	The CIC is unknown, and an IC/INC operator system is involved
	8	The CIC is unknown, the call is dialed direct, and no IC/INC operator system is involved.

<b>Data Table 57 Inter-LATA carrier / international carrier prefix</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	9 or hex F	The CIC is unknown, and IC/INC operator system involvement cannot be determined.  Not used
6	hex C	SIGN

*Note: "F" characters are displayed in a field when it is either not applicable or unused.*

<b>Data Table 58 Inter-LATA carrier / international carrier call event status</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Padding
2-3	00	First wink from IC/INC not received
	01	First wink from IC/INC (Originating-LATA record); terminating trunk seized (Terminating-LATA record)
	02	Abandoned or timed out before dialing completed (Originating-LATA record)
	03	Second start-dial wink from international carrier (Originating-LATA record)
	04	Timed out while waiting for acknowledgement wink (Originating-LATA record)
	05	Operator Services or CAMA signaling off-hook from inter-LATA carrier/international carrier after receipt of called number (Originating-LATA record)
	07	Acknowledgement wink received
	08	Invalid called number (Terminating-LATA record)
	09	All failures (except invalid called number) that do not allow the call to be set up to the terminating office (for example, all trunks to the terminating end office are busy, the called number is incomplete; or there was a time-out while waiting for the wink from the terminating end office) (Terminating-LATA record)
	10	Called party off-hook indication received (Originating- or Terminating-LATA record)
	11	Timed out while waiting for the second start-dial wink on a call that used international carrier signaling (originating LATA record)

<b>Data Table 58 (Continued)</b> <b>Inter-LATA carrier / international carrier call event status</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	12	Timed out waiting for off-hook from Operator Services or CAMA signaling (Originating-LATA record)
	13	Received off-hook rather than the second start-dial wink on a call that used international carrier signaling (Originating-LATA record)
4	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 59</b> <b>Routing indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Direct
	1	Tandem
2	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 60</b> <b>Automatic number identification (ANI) / calling party number (CPN) indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	No ANI, no CPN
	1	ANI, no CPN
	2	CPN, no ANI
	3	Both ANI and CPN provided
2	hex C	SIGN

*Note: In MDR BAF CP or MDR FXD CP format, "F" characters are output in this table in place of any values, in accordance with Bellcore rules.*

<b>Data Table 76 Number identity</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1 2 3 4 5 6 7	Originating ANI (source) Terminating (destination) Originating CPN (Calling Party Number) Private Originating ANI Private Originating CPN Redirecting Number (RN) Original Called Number (OCN)
2	hex C	SIGN

<b>Data Table 77 Service logic identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-9	000000000 through 899999999 900000000 999999999	BCC-assigned  AIN default routing invoked Unknown
10	hex C	SIGN

<b>Data Table 78 Digits identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 002 003 004 005 006 011 012 300-998 999	Authorization code Account code Access code Digits dialed Outpulse number International calling party identification Non-international calling party ID greater than 12 digits Incoming terminating number greater than 12 digits BCC-assigned Unknown

<b>Data Table 78</b> <b>Digits identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
4	hex C	SIGN

<b>Data Table 83</b> <b>Trunk group number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1	Non-SS7 direct TGN (originating and terminating LATA)
	2	Non-SS7 from Interexchange Carrier (IXC) to Access Tandem (AT); non-SS7 from AT to End Office (EO) (terminating LATA); non-SS7 from EO to AT (originating LATA)
	3	SS7 direct TGN (originating and terminating LATA)
	4	SS7 from IXC to AT, SS7 from AT to EO; SS7 from EO to AT, EXM received with TG# (originating LATA)
	5	Non-SS7 from IXC to AT and SS7 from AT to EO; SS7 from EO to AT, no EXM received (originating LATA)
	6	SS7 from IXC to AT, non-SS7 from AT to EO (terminating LATA)
2-5		Trunk Group Number
6	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values when the telco's data is proprietary.*

<b>Data Table 85</b> <b>Dialing indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1	10XXX not dialed, customer presubscribed, no presubscription indication arrangement with IC/INC
	2	10XXX dialed, customer not presubscribed to dialed carrier, no presubscription indication arrangement with IC/INC
	3	950-XXXX dialed

<b>Data Table 85 (Continued)</b>		
<b>Dialing indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	4	10XXX not dialed, customer presubscribed, presubscription indication arrangement with IC/INC
	5	10XXX dialed, customer not presubscribed, presubscription indication arrangement with IC/INC. (Customer not presubscribed indication provided to IC/INC.)
	6	10XXX dialed, customer presubscribed, presubscription indication arrangement with IC/INC
	7	10XXX dialed, customer presubscribed to dialed carrier, no presubscription indication arrangement with IC/INC
	8	10XXX not dialed, customer not presubscribed, no presubscription indication arrangement with IC/INC
2	hex C	SIGN

<b>Data Table 87</b>		
<b>Business customer identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1	Originating customer's ID
	2	Terminating customer's ID
	3	Originating and Terminating customer's ID (intragroup calls)
2-11		10-digit Business Customer ID
12	hex C	SIGN

<b>Data Table 88</b>		
<b>Module code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000-999	3-digit Module Code
4	hex C	SIGN

<b>Data Table 89</b>		
<b>Translation-settable field</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000-999	Translation-settable field
4	hex C	SIGN

<b>Data Table 120</b>		
<b>Software release identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5	00000 -99999	Software release identification
6	hex C	SIGN

<b>Data Table 126</b>		
<b>Digits</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-15	0 - 9	Digits
16	hex C	SIGN

<b>Data Table 128</b>		
<b>Overflow peg count</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5		Overflow count
6	hex C	SIGN

<b>Data Table 130 Usage count</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5		Usage count
6	hex C	SIGN

<b>Data Table 138 Alternate billing number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Padding
2-11	0-9	Alternate billing number
12	hex C	SIGN

<b>Data Table 140 AMA format sequence number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1		Overflow count
2-5	0000- 9999	Vintage number used by an AMA Transmitter. Its use is determined by the transmitter's manufacturer. It may identify only the transmitter's software release or the total set of switching system and transmitter hardware and software currently in use.
6	hex C	SIGN

<b>Data Table 152 Context identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 002 003 004 005 006 007 008 800-998	Call type code Service feature code Message billing index Call type code in SCP response Service feature in SCP response RAO number LATA number Additional originating billing/services indicator BCC-assigned
4	hex C	SIGN

<b>Data Table 158 Coins collected</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000- 999	Number of collected 5-cent deposits monitored by the local office during the period associated with a particular call record
4	hex C	SIGN

<b>Data Table 159 Coin deposit trouble indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0-1	0 = No coin-tone detection errors 1 = Coin tone detection errors present
2-3	00- 99	Number of coin-deposit intervals in which the local office was unable to monitor and record collected sent-paid deposits
4	hex C	SIGN

<b>Data Table 165 Country code or data network identification code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1 2 3	Numbering plane indicator: E.164 number with 1-digit country code E.164 number with 2-digit country code E.164 number with 3-digit country code
2 - 5	0 - 9	Country code (CC) or data network identification code (DNIC)
6	hex C	SIGN

<b>Data Table 195 ISDN Channel Identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-3	00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19	BRI PRI, first DS1 interface PRI, second DS1 interface PRI, third DS1 interface PRI, fourth DS1 interface PRI, fifth DS1 interface PRI, sixth DS1 interface PRI, seventh DS1 interface PRI, eighth DS1 interface PRI, ninth DS1 interface PRI, tenth DS1 interface PRI, eleventh DS1 interface PRI, twelfth DS1 interface PRI, thirteenth DS1 interface PRI, fourteenth DS1 interface PRI, fifteenth DS1 interface PRI, sixteenth DS1 interface PRI, seventeenth DS1 interface PRI, eighteenth DS1 interface PRI, nineteenth DS1 interface

<b>Data Table 195 (Continued)</b>		
<b>ISDN Channel Identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	20	PRI, last DS1 interface
4-5	00	BRI or PRI D-channel
	01	BRI or PRI, first B-channel
	02	BRI or PRI, second B-channel
	03	PRI, third B-channel
	04	PRI, fourth B-channel
	05	PRI, fifth B-channel
	06	PRI, sixth B-channel
	07	PRI, seventh B-channel
	08	PRI, eighth B-channel
	09	PRI, ninth B-channel
	10	PRI, tenth B-channel
	11	PRI, eleventh B-channel
	12	PRI, twelfth B-channel
	13	PRI, thirteenth B-channel
	14	PRI, fourteenth B-channel
	15	PRI, fifteenth B-channel
	16	PRI, sixteenth B-channel
	17	PRI, seventeenth B-channel
	18	PRI, eighteenth B-channel
	19	PRI, nineteenth B-channel
	20	PRI, twentieth B-channel
	21	PRI, twenty-first B-channel
	22	PRI, twenty-second B-channel
	23	PRI, twenty-third B-channel
	24	PRI, twenty-fourth B-channel
6	hex C	SIGN

**Note 1:** For PRI Facility Associated Signaling (FAS), characters 2-3 may have the value 01; for PRI non-FAS, characters 2-3 may have the values 01 - 20.

**Note 2:** For PRI Facility Associated Signaling (FAS), characters 4-5 may have the values 01 - 23; for PRI non-FAS, characters 4-5 may have the values 01 - 24.

<b>Data Table 196 Administrative Processor System Identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-7		6-digit number uniquely identifying the network element
8	hex C	SIGN

<b>Data Table 197 Local access transport area (DMS-10)</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3		LATA designation
4	hex C	SIGN

<b>Data Table 206 Directory number description</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 002 003 004 005	Calling directory number private Calling directory number not private Called directory number private Number private in AIN module Number not private in AIN module
6	hex C	SIGN

*Note:* Indicates the privacy status of a number recorded elsewhere in the same Bellcore AMA format record. The first three values indicate the privacy of the calling, or called, directory number. For ISDN BRI, only the 001 value is used when the calling number is available and private. In an AIN environment, the first three values typically only refer to directory numbers recorded in the base AIN structure. Values 004 and 005 are used to describe the privacy status of a number recorded in an AIN module, when the module has fields for only one DN.

<b>Data Table 235</b>		
<b>Call completion code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Completed-Call completed without having been queued for a trunk at the originating Electronic Tandem Switch (ETS) node
	8	Incomplete-Non-queued call either abandoned after a trunk or line was seized or call failure
	hex C	SIGN

<b>Data Table 236</b>		
<b>Business feature code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Unassigned
	1	Attendant Handled (not currently supported by the DMS-10 switch)
	2	Call Forwarded
	3	Toll Diverted
	4-9	Unassigned
2	hex C	SIGN

<b>Data Table 244</b>		
<b>Outgoing trunk facility identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Padding
2-5		Facility Group ID
6-9		Facility Member Number
10	hex C	SIGN

*Note: In MDR BAF CP format, "F" characters are output in this table in place of any values when the telco's data is proprietary.*

<b>Data Table 246 Originating and Terminating Facility Type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-3	01 04 05 06 07	Originating Facility Type On-network colocated line On-network trunk (VFG) Off-network colocated line Off-network trunk On-network foreign exchange
4-5	01 04 05 06 07	Terminating Facility Type On-network colocated line On-network trunk (VFG) Off-network colocated line Off-network trunk On-network foreign exchange
6	hex C	SIGN

<b>Data Table 247 Facility/Trunk Identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1 2 3 4	Context Identifier Originating facility (other than trunk) Terminating facility (other than trunk) Originating trunk (VFG) Terminating trunk (VFG)
2-5		VFG Group identification (when BCD character 1 is "3" or "4")
6-9		VFG Member identification (when BCD character 1 is "3" or "4")
10	hex C	SIGN

<b>Data Table 248 Automatic Route Selector Pattern Group</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Context Identifier
2-3	00-99	Automatic Route Selector Pattern Group Identifier
4	hex C	SIGN

*Note: The DMS-10 switch does not utilize this table; "FFFF" is output instead.*

<b>Data Table 249 Facility Restriction Level</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Context Identifier
2-3	00-99	Facility Restriction Level used to determine call handling
4	hex C	SIGN

*Note: The DMS-10 switch does not utilize this table; "FFFF" is output instead.*

<b>Data Table 280 Completion indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 009 010 011 013 999	Completed: connected AIN re-final route record - final call disposition completed AIN pre-final route record - final call disposition not completed AIN SCP-requested release time (disconnect message received) Not completed: Caller Aborted Unknown
4	hex C	SIGN

<b>Data Table 330 CLASS functions</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000 001 002 003 004 005 006	N/A Active Inactive Delete Create Active Create Inactive Session Abort
4	hex C	SIGN

<b>Data Table 331 CLASS status</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000	N/A
4	hex C	SIGN

<b>Data Table 403 Short-Interval Elapsed Time</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-2	00-99	Minutes
3-4	00-59	Seconds
5	0-9	Tenths-of-seconds
6	hex C	SIGN

*Note: The DMS-10 switch does not utilize this table; "00000C" is output instead.*

<b>Data Table 409</b>		
<b>Terminating Signaling or Supplementary Service Usage</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2	0	Constant
3	1 2	Calling Party Subaddress Delivery Feature not used or not recorded Feature used
4	1 2 3 4 5	Multiline Hunt Group Features Feature not used or not recorded Activation of stop hunt Deactivation of stop hunt Activation of make busy Deactivation of make busy
5	1 2 3	Additional Call Offering Feature not used or not recorded Feature used, offered Feature used, accepted
6	1 2 3	Redirecting Party Subaddress Delivery Indicator Feature not used or not recorded Feature used, one event Feature used, two events
7-15	0	Constant
16	hex C	SIGN

*Note:* Records the set of possible supplementary services delivered to the called user.

Not recorded in DMS-10.

<b>Data Table 410 Network Interworking</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Interworking Conditions No interworking encountered (in the network or at the terminating access interface for alerting or for the connection)
	1	Interworking, unspecified
	2	Network interworking encountered (call is not end-to end ISDN, that is originating SPCS to terminating SPCS)
	3	Terminating access interworking encountered for alerting and for the connection, (answering equipment is non-ISDN)
	4	Terminating access interworking encountered for the connection, but not for alerting, (answering equipment is non-ISDN)
	9	Unknown
2	hex C	SIGN

*Note 1:* Identifies the different interworking situations encountered by the users call.

*Note 2:* "F" characters may be output in place of any values in this table when the table is part of a module 071 record generated for certain types of calls such as CLID, AC CLASS, U3WC, and CFW.

<b>Data Table 411 Release Cause Indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2	0	ITU standard
	2	National
	3	Network specific

<b>Data Table 411 (Continued) Release Cause Indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
3-5	001	Cause Indication (ITU Standard)
	002	Unallocated (unassigned) number
	003	No route specified transit network
	006	No route to destination
	007	Channel unacceptable
	016	Call awarded and being delivered in an established channel
	017	Normal call clearing
	018	User busy
	019	No user responding
	021	User alerting: No answer 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 VPCI/VCI not available
	036	VCPI/VCI assignment failure
	037	User cell rate unavailable
	041	Temporary failure
	042	Switching equipment congestion
	043	Access information discarded
	044	Requested channel not available
045	No VCPI/VCI available	
047	Resource unavailable, unspecified	

<b>Data Table 411 (Continued) Release Cause Indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	049	Quality of service unavailable
	050	Requested facility not subscribed
	057	Bearer capability not authorized
	058	Bearer capability not presently available
	063	Service or option not available
	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
	081	Invalid call reference value
	082	Identified channel does not exist
	088	Incompatible destination
	089	Invalid end point reference
	091	Invalid transport network selection
	092	Too many pending add party requests
	096	Mandatory information element missing
	097	Message type nonexistent or not implemented
	099	Information element nonexistent or not implemented
	100	Invalid information element contents
	101	Message not compatible with call state
	102	Recovery on timer expire
	104	Incorrect message length
	111	Protocol error: Unspecified
	127	Interworking: Unspecified
3-5	004	Cause Indication (National)
	008	Vacant code
	009	Prefix 0 dialed in error
	010	Prefix 1 dialed in error
	011	Prefix 1 not dialed
	051	Excessive digits received: Call is proceeding
	053	Bearer capability incompatible with service request
		Service operation violated

<b>Data Table 411 (Continued) Release Cause Indicator</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
3-5	008 013 023 028 029 030 031 101	Cause Indication (Network specific) Call is proceeding Service denied User rejects all calls with Calling Line Identification Restriction Special intercept announcement Special intercept announcement: Undefined code Special intercept announcement: Number unassigned Special intercept announcement: Call blocked due to a group restriction Protocol error: Threshold exceeded
6	hex C	SIGN

*Note 1:* Indicates the reason for the termination of a call.

*Note 2:* If the data for this table is not available (such as for the first and middle records of a long duration call) "F" characters are output in place of any values. "F" characters may also be output in place of any values in this table when the table is part of a module 071 record generated for certain types of calls such as CLID, AC CLASS, U3WC, and CFW/CFWDA.

<b>Data Table 412 Bearer Capability/Call Type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1 2 3	Bearer Call Type Voice/voiceband data Circuit mode data Packet mode data

<b>Data Table 412 (Continued) Bearer Capability/Call Type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
2-3	01 02 03 04 05 06 07 99	Bearer Capability Circuit mode: Speech Circuit mode: 3.1 kHz audio Circuit mode: Unrestricted 64 kbps digital information transfer Circuit mode: Unrestricted 64 kbps digital information transfer rate adapted from 56 kbps Packet mode: Unrestricted digital information transfer Circuit mode: Unrestricted digital information transfer at a rate greater than 64 kbps Bearer capability not recorded
4	hex C	SIGN

*Note:* Records the bearer call type and bearer capabilities delivered to the user.

<b>Data Table 413 Signaling or Supplementary Service Capabilities Usage</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2	1 2	Calling Party Subaddress Delivery Feature not used or not recorded Feature used
3	1 2	Called Party Subaddress Delivery Feature not used or not recorded Feature used
4	1 2	Low-Layer Compatibility Information Delivery Feature not used or not recorded Feature used
5	1 2	High-Layer Compatibility Information Delivery Feature not used or not recorded Feature used
6	1 2 3	User-to-User Information/Fast Select Feature not used or not recorded Feature used, presumed delivered Feature used, but not delivered

<b>Data Table 413 (Continued)</b> <b>Signaling or Supplementary Service Capabilities Usage</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
7	0	Constant
8	0	Constant
9Note:	1 2	ISDN Flexible Calling Feature not used or not recorded Feature used
10Note:	1 2	Call Waiting Originating Feature not used or not recorded Feature used
11Note:	1 2	Dial Call Waiting Feature not used or not recorded Feature used
12-15	0	Constant
16	hex C	SIGN

*Note: Records the use of signaling or supplementary service capabilities on a yes/no or other outcome basis. It is designed to record one, all, or any combination of these capabilities in a single record.*

Not recorded in DMS-10.

<b>Data Table 415</b> <b>CLASS feature code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	032 033 034 035 036 037 038 039 052 057 058 059 060	AR Reactivation - Delayed Processing AC Reactivation - Delayed Processing AR Reactivation - Busy Ringback AC Reactivation - Busy Ringback AR Reactivation - Timeout AC Reactivation - Timeout AR Reactivation - Deactivation AC Reactivation - Deactivation SCF ACR Activation ACR Deactivation ACR Continuation AR Immediate Processing

<b>Data Table 415 (Continued)</b>		
<b>CLASS feature code</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	061	AC Immediate Processing
	062	AR Delayed Processing
	063	AC Delayed Processing
	064	AR Busy Ringback
	065	AC Busy Ringback
	066	AR Timeout
	067	AC Timeout
	068	AR Deactivation
	069	AC Deactivation
	070	COT Activation
	072	SCR
	073	SDR
	074	SLE Daily Continuation
	075	CNB Activation
	076	Single Activation SCF
	079	SCA
	080	Calling Number Delivery
	081	Dialable Digits Delivery
	082	Name Display
	083	Name Display Blocking
	084	Bulk Calling Line ID
	085	Calling Identity Services Delivery and Blocking Activation
	086	Calling Name Blocking Activation
	087	Calling Number Delivery and/or Calling Name Delivery Activation
1-3	095	AR Two-stage Activation, 1st Stage
4	hex C	SIGN

<b>Data Table 416</b>		
<b>Early cut-through type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1	Terminating condition - User-generated audible ring
	2	Terminating condition - Remote interworking
2	hex C	SIGN

<b>Data Table 423</b>		
<b>Line number type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	004	Incoming terminating number
	005	Calling party identification
	006	Automatic number identification delivered
	007	Alternate, third-party, or bill-to number (vendor specific)
	008	SSP or MSC point code on query message (vendor specific)
	009	AIN 0 or 0.1 telephone number affected by DTMF update (vendor specific)
	010	Wireless ID number of MSC on initial query (vendor specific)
	011	Wireless ID number of MSC in last conversation (vendor specific)
	012	Wireless anchor MSC ID provided by customer (vendor specific)
	013	Wireless anchor ID number (vendor specific)
	014	Wireless mobile ID number (vendor specific)
	015	Wireless point code of MSC receiving routing request message (vendor specific)
	016	AIN 0 ANI provided in AIN query (vendor specific)
	017	AIN 0 routing number (vendor specific)
	018	AIN 0 output pulse number (vendor specific)
	019	AIN 0 primary carrier (vendor specific)
	020	AIN 0 alternate carrier (vendor specific)
	021	AIN 0 secondary carrier (vendor specific)
	022	AIN 0 originating station DN (vendor specific)

<b>Data Table 423 (Continued)</b>		
<b>Line number type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	023	AIN 0 dialed number provided in AIN query (vendor specific)
	024	AIN 0 service key - ANI (vendor specific)
	025	AIN 0 service key - dialed number (vendor specific)
	026	AIN 0.1 calling number (vendor specific)
	027	AIN 0.1 charge number (vendor specific)
	028	AIN 0.1 called number (vendor specific)
	029	AIN 0.1 service key - user ID DN (vendor specific)
	030	AIN 0.1 service key - SPID + DN (vendor specific)
	031	AIN 0.1 service key - private facility (vendor specific)
	032	AIN 0.1 service key - trunk group (vendor specific)
	033	AIN 0.1 service key - vertical service code (vendor specific)
	034	AIN 0.1 service key - CalledPartyID - 3/6/10/N11 (vendor specific)
	035	AIN 0.1 service ID - user ID DN (vendor specific)
	036	AIN 0.1 service ID - SPID + DN (vendor specific)
	037	AIN 0.1 service ID - private facility (vendor specific)
	038	AIN 0.1 service ID - trunk group (vendor specific)
	039	AIN 0.1 routing number (vendor specific)
	040	AIN 0.1 outpulse number (vendor specific)
	041	AIN 0.1 primary carrier (vendor specific)
	042	AIN 0.1 alternate carrier (vendor specific)
	043	AIN 0.1 secondary carrier (vendor specific)
	044	AIN 0.1 digits collected from information analyzed/information collected query (vendor specific)
	045	AIN 0.1 address information from information analyzed/information collected query (vendor specific)
	046	AIN 0.1 vertical service code from information analyzed/information collected query (vendor specific)
	107	Calling Mobile Identification Number (MIN)
	108	Called MIN
	109	Forwarding MIN
	110	Release-To-Pivot (vendor-specific)

<b>Data Table 423 (Continued)</b>		
<b>Line number type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
	800-998 999	BCC-assigned Unknown
4	hex C	SIGN

<b>Data Table 608</b>		
<b>Resource type</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	000 through 255	AIN switch or Intelligent Peripheral resource used
4	hex C	SIGN

<b>Data Table 610</b>		
<b>Indicator identification</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001	Not final route (AIN query encountered on structure's terminating number)
4	hex C	SIGN

<b>Data Table 730</b>		
<b>Party Identifier</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 002	Originating Party data Terminating Party data
4	hex C	SIGN

<b>Data Table 731 Location Routing Number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-11	NPA-NXX-XXXX or hex F	Location Routing Number  if not used
12	hex C	SIGN

*Note: If the data for this table is not available, "F" characters are output in place of any values.*

<b>Data Table 732 Service Provider Identity</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	Constant
2-9	00000001 through 99999999 or hex F	Service Provider identity  if not used
10	hex C	SIGN

*Note: If the data for this table is not available, "F" characters are output in place of any values.*

<b>Data Table 733 Location</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	001 002 003 004 005 999	Location type:  V & H coordinates 5-digit U.S. Zip code 9-digit U.S. Zip code Canadian post code Longitude and latitude Unknown

<b>Data Table 733</b>		
<b>Location</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
4-15	000000000001 through 999999999999 or hex F	Location  or not used
16	hex C	SIGN

*Note: If the data for this table is not available, "F" characters are output in place of any values.*

<b>Data Table 734</b>		
<b>Supporting Information</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	1 2 3 9	LRN Source indicator:  LNP database Switching system data Incoming signaling Unknown
2-3	01 02 03  04 05 06 09 99	Query Status Indicator:  No query failure No query response message received AIN Continue or Authorize_Termination message received as response Protocol error in received response message Error detected in response data Query rejected No query performed Query unsuccessful, reason unknown
4	0	Constant - Reserved for future use
5	0	Constant - Reserved for future use
6	0	Constant - Reserved for future use
7	0	Constant - Reserved for LNP Service Provider use
8	hex C	SIGN

<b>Data Table 801 One-digit number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0-9	One-digit number
2	hex C	SIGN

<b>Data Table 802 Three-digit number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0-999	Three-digit number
4	hex C	SIGN

<b>Data Table 803 Five-digit number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5	0-99999	Five-digit number
6	hex C	SIGN

*Note: The DMS-10 switch does not utilize this table; "FFFFFF" is output instead. Access codes provided for Module 101 are located in Data Table 32.*

<b>Data Table 804 Seven-digit number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-7	0-9999999	Seven-digit number
8	hex C	SIGN

<b>Data Table 805 Nine-digit number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-9	0-999999999	Nine-digit number
10	hex C	SIGN

<b>Data Table 998 Originating Line Information</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-2	00000000 to 01100011  01100100 to 11111111	Binary equivalent of the II digits  Reserved
3	0	Fill character
4	hex C	SIGN

*Note: This module is used only with the Trunk Group Member Usage (TGMU) feature data records.*

<b>Data Table 999 Jurisdiction Information Parameter</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-6	000000 through FFFFFF	Jurisdiction Information Parameter digits
7	0	Fill character
8	hex C	SIGN

*Note: This module is used only with the Trunk Group Member Usage (TGMU) feature data records.*

<b>Data Table C.1 Tape sequence number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-3	0-999	Three-digit sequence number
4	hex C	SIGN

<b>Data Table C.2 Count of data blocks</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5	0-99999	The number of data blocks recorded
6	hex C	SIGN

<b>Data Table C.3 Count of records</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-7	0-9999999	The number of records recorded
8	hex C	SIGN

<b>Data Table C.71 Tape transport number</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0-9	One-digit number
2	hex C	SIGN

<b>Data Table C.146</b>		
<b>Count of logical data sets</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1-5	0-99999	Five-digit number
6	hex C	SIGN

<b>Data Table C.147</b>		
<b>Audit flag</b>		
<b>Number of BCD Character</b>	<b>Possible Value(s)</b>	<b>Meaning</b>
1	0	All data are valid for audit.
	1	Some SPCS data are not valid for audit.
	2	Some transmitter data are not valid for audit.
	3	Some SPCS and transmitter data are not valid for audit.
	4	Some recording-office data are not valid for audit.
	5	Some recording-office and SPCS data are not valid for audit.
	6	Some recording-office and transmitter data are not valid for audit.
	7	Some recording-office, SPCS, and transmitter data are not valid for audit.
2	hex C	SIGN



# Section 11: Bellcore structure codes

## Introduction

This section describes the Bellcore Automatic Message Accounting (AMA) format, that complies the technical requirements set forth in the Bellcore documents, *Bellcore Automatic Message Accounting Format (BAF) Requirements* (NWT-001100) and *Automatic Message Accounting* (TR-TSY-000508), as used to record AMA data on magnetic media in the DMS-10 switch.

*Note: The information contained in this section is subject to change without notice, since Nortel reserves the right to make changes in equipment design or components as progress in engineering or manufacturing methods may warrant.*

<b>Call Type Codes</b>	<b>Call Type</b>	<b>Condition</b>	<b>Structure Codes</b>
001	Detailed Message Rate, Timed, MBI	Connected or unconnected	0020
002	Message Rate, Timed, MBI	Connected or unconnected	0015
003	Detailed Message Rate, Untimed, MBI	Connected or unconnected	0024
004	Message Rate, Untimed, MBI	Connected or unconnected	0019
005	Detailed Message Rate, Timed, No MBI	Connected or unconnected	0001
006	Station Paid, DDD	Connected or unconnected	0001
008	INWATS, Terminating Entry	Connected or unconnected	0079
009	411 Directory Assistance (Local)	Connected	0028
031	Call Forwarding	Continuation or deactivation Activation	0096 0614
033	555 Directory Assistance	Connected	0028
036	Terminating Study Record	Connected or unconnected	0079
037	Terminating SLUS Overflow Counts	Recorded once per day	9003
041	Local Coin	Connected or unconnected	0001

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<b>Table 11-A: (Continued) Structure codes per call type</b>			
<b>Call Type Codes</b>	<b>Call Type</b>	<b>Condition</b>	<b>Structure Codes</b>
042	Time Change	Time change occurrence without Administrative Processor System (APS) identification	9000
045	ISDN User Service	Forced detailed records	0001
047	Default AIN Call Type Code	Switch-based call type code cannot be determined for AIN AMA 0220 or 0221 structure codes	0220 0221
048	Usage Sensitive Feature	Activation	0001
049	Usage Sensitive Feature	Consultation hold	0028
063	Cellular Mobile Carrier - Type 1 or 2B (originating)	Connected or unconnected	0653
065	Cellular Mobile Carrier - Type 1 or 2B (terminating)	Connected or unconnected	0625
067	Originating Study Record	Connected or unconnected	0001
068	WATS Billing Number	Connected or unconnected	0035
071	INWATS Overflow Counts - Daily	Recorded once per day	9003
072	Public Switched Digital Service	Connected or unconnected	0190
090	Sensor Tracer		9053 9054 9055 9056
092	End of Recording, Media Change, or Data Initialization		9013 9014 9036 9037
110	Inter-LATA Station Paid	Interexchange	0625
114	Inter-LATA WATS Billing Number	InterLATA	0631
117	Inter-LATA PSDS	InterLATA	0645
119	Terminating Access Record	InterLATA with ANI/CPN InterLATA	0625 0653
120	Originating LATA Overflow Counts	Output Hourly	0655
121	PSDS Terminating Access Record	InterLATA	0656
131	Originating Feature Group A	Connected or unconnected	0079
132	Terminating Feature Group A	Connected or unconnected InterLATA	0001 0625

<b>Table 11-A: (Continued) Structure codes per call type</b>			
<b>Call Type Codes</b>	<b>Call Type</b>	<b>Condition</b>	<b>Structure Codes</b>
133	Feature Group A Overflow Counts	Recorded once per day	9003
134	Originating Feature Group B	InterLATA	0625
135	Terminating Feature Group B	InterLATA	0653
136	Improved Public Telephone Service	IC calls with coin deposit data	0140
137	INWATS Overflow Counts - Hourly	Recorded Hourly	9003
141	IC/INC Number Services	IC number services	0360
		Alternate billing number	0361
142	BCC Number Services	Connected or unconnected	0364
		Connected or unconnected, alternate billing number	0365
159	Message Detail Recording (MDR) data	Originating MDR data record	0001
		Terminating MDR data record	0079
184	ISDN Terminating User Service Record	Forced detailed records	0001
264	Calling Identity Delivery Record	Recorded once per day	0110
330	CLASS Feature	ACB, AR, CIDS, CNAB, CNB, COT, SLE (SLE does not include SRNG.)	1030
		ACR	0110
720	Connecting Network Access	LNP	0625
951	Trunk Group Member Usage	Connected or unconnected	0001

There is a single record per call, except for Usage sensitive Three-way Calling calls: two billing records may be generated when a three-way call is made, call type 048 and call type 049. This is true only when U3CH = YES in Overlay CNFG (CCS) (see 297-3601-311, *Data Modification Manual*).

<b>Table 11-B: Structure code 0001</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6

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<b>Table 11-B: (Continued) Structure code 0001</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed time	19	10

<b>Table 11-C: Structure code 0015</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4

<b>Table 11-C: (Continued)</b> <b>Structure code 0015</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Originating Number	14	8
Connect Time	18	8
Elapsed Time	19	10
WATS Indicator	28	2
WATS Band or Type Indicator	29	4

<b>Table 11-D:</b> <b>Structure code 0019</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Connect Time	18	8
WATS Indicator	28	2
WATS Band or Type Indicator	29	4

<b>Table 11-E: Structure code 0020</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
WATS Indicator	28	2
WATS Band or Type Indicator	29	4

<b>Table 11-F: Structure code 0024</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4

<b>Table 11-F: (Continued) Structure code 0024</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
WATS Indicator	28	2
WATS Band or Type Indicator	29	4

<b>Table 11-G: Structure code 0027</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8

<b>Table 11-G: (Continued) Structure code 0027</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Connect Time	18	8
Elapsed Time	19	10
WATS Administration	30	6

<b>Table 11-H: Structure code 0028</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Connect Time	18	8

<b>Table 11-I: Structure code 0035</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas (International Call) Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
WATS Indicator	28	2
WATS Band or Type Indicator	29	4
WATS Administration	30	6

<b>Table 11-J: Structure code 0079</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4

<b>Table 11-J: (Continued) Structure code 0079</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Connect Time	18	8
Elapsed Time	19	10

<b>Table 11-K: Structure code 0096</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Activation date	6	6
Timing indicator	7	6
Study indicator	8	8
Service feature	12	4
Activation NPA	13	4
Activation number	14	8

<b>Table 11-K: (Continued)</b>		
<b>Structure code 0096</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Forward to overseas indicator	15	2
Forward to NPA	16	6
Forward to number	17	8
Activation time	18	8
Elapsed time	19	10
Present or deactivation date	6	6
Present or deactivation time	18	8

<b>Table 11-L:</b>		
<b>Structure code 0110</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
CLASS Feature Code	415	4
Date	6	6
Time	18	8
HNPA Number	13	4
Directory Number	14	8
Call Count - Information Delivered	803	6
Call Count - Information Anonymous/Unavailable	803	6

*Note:* When UNAM and UCND are both assigned to a station, Modules 049 and 000 are appended to Structure Code 00110 and "4" is added to the structure code number output to the AMA tape (that is, 40110).

<b>Table 11-M: Structure code 0140</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor type	2	4
Sensor identification	3	8
Recording office type	4	4
Recording office identification	5	8
Date of answer	6	6
Timing indicator	7	6
Study indicator	8	8
Called party off-hook indicator	9	2
Service observed, traffic sampled	10	2
Operator action	11	2
Service feature	12	4
Originating NPA	13	4
Originating number	14	8
Overseas indicator	15	2
Terminating NPA	16	6
Terminating number	17	8
Answer time	18	8
Elapsed time	19	10
IC / INC prefix	57	6
Carrier connect date	6	6
Carrier connect time	18	8
Carrier elapsed time	19	10
IC / INC call event status	58	4
Trunk group number	83	6
Routing indicator	59	2
Dialing indicator	85	2
IC / INC ANI indicator	60	2
Coins collected	158	4
Coin deposit trouble indicator	159	4

<b>Table 11-N: Structure code 0190</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
Service Indicator	41	4
Data Rate Indicator	42	4
Terminating Company	56	4

<b>Table 11-O: Structure code 0220</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4

<b>Table 11-O: (Continued) Structure code 0220</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Completion Indicator	280	4
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas (International Call) Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
Service Logic Identification	77	10

<b>Table 11-P: Structure code 0221</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8

<b>Table 11-P: (Continued)</b> <b>Structure code 0221</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Completion Indicator	280	4
Service Feature	12	4
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
Service Logic Identification	77	10

<b>Table 11-Q:</b> <b>Structure code 0360</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8

<b>Table 11-Q: (Continued) Structure code 0360</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Answer Time	18	8
Elapsed Time	19	10
IC/INC Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time From Carrier Connect	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing Indicator	85	2
ANI Indicator	60	2
Customer's RAO Number	46	4
Originating LATA	197	4

<b>Table 11-R: Structure code 0361</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4

<b>Table 11-R: (Continued)</b>		
<b>Structure code 0361</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
IC/INC Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time From Carrier Connect	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing Indicator	85	2
ANI Indicator	60	2
Customer's RAO Number	46	4
Originating LATA	197	4
Alternate Billing Number	138	12

<b>Table 11-S:</b>		
<b>Structure code 0364</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6

<b>Table 11-S: (Continued) Structure code 0364</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4

<b>Table 11-T: Structure code 0365</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2

<b>Table 11-T: (Continued)</b>		
<b>Structure code 0365</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Dialed NPA	13	4
Dialed Number	14	8
Destination Overseas Indicator	15	2
Destination NPA	16	6
Destination Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Customer's RAO Number	46	4
Originating LATA	197	4
Alternate Billing Number	138	12

<b>Table 11-U: Structure code 0614</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8

<b>Table 11-V: Structure code 0625</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8

<b>Table 11-V: (Continued)</b> <b>Structure code 0625</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Inter-LATA Carrier/International Carrier Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time From Carrier Connect	19	10
Inter-LATA Carrier/International Carrier Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing Indicator	85	2
ANI / CPN Indicator	60	2

<b>Table 11-W:</b> <b>Structure code 0631</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6

<b>Table 11-W: (Continued) Structure code 0631</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Inter-LATA Carrier/International Carrier Prefix	57	6
Carrier-Connect Date	6	6
Carrier-Connect Time	18	8
Elapsed Time From Carrier Connect	19	10
Inter-LATA Carrier/International Carrier Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing and Presubscription Indicator	85	2
ANI/CPN Indicator	60	2
WATS Indicator	28	2
WATS Band or Type Indicator	29	4
WATS Administration	30	6

<b>Table 11-X: Structure code 0645</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4

<b>Table 11-X: (Continued)</b>		
<b>Structure code 0645</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Originating NPA	13	4
Originating Number	14	8
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
IC/INC Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time from Carrier Connect	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing Indicator	85	2
ANI Indicator	60	2
Service Indicator	41	4
Data Rate Indicator	42	4
Terminating Company	56	4

<b>Table 11-Y: Structure code 0653</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date of Answer	6	6
Timing Indicator	7	6
Study Indicator	8	8
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Answer Time	18	8
Elapsed Time	19	10
Inter-LATA Carrier/International Carrier Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time From Carrier Connect	19	10
Inter-LATA Carrier/International Carrier Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2

<b>Table 11-Z: Structure code 0655</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
Inter-LATA Carrier/International Carrier Prefix	57	6
Overflow Peg Count	128	6
Inter-LATA Carrier/International Carrier Prefix	57	6
Overflow Prefix	128	6
Inter-LATA Carrier/International Carrier Prefix	57	6
Overflow Peg Count	128	6
Inter-LATA Carrier/International Carrier Prefix	57	6
Overflow Peg Count	128	6

<b>Table 11-AA: Structure code 0656</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Timing Indicator	7	6
Study Indicator	8	8

<b>Table 11-AA: (Continued) Structure code 0656</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Called party off-hook indicator	9	2
Service Observed, Traffic Sampled	10	2
Operator Action	11	2
Service Feature	12	4
Overseas Indicator	15	2
Terminating NPA	16	6
Terminating Number	17	8
Connect Time	18	8
Elapsed Time	19	10
IC/INC Prefix	57	6
Carrier Connect Date	6	6
Carrier Connect Time	18	8
Elapsed Time from Carrier Connect	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Service Indicator	41	4
Data Rate Indicator	42	4

<b>Table 11-AB: Structure code 1030</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
CLASS Feature Code	415	4
Activating NPA	13	4

<b>Table 11-AB: (Continued)</b> <b>Structure code 1030</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Activating Number	14	8
Far-end Overseas Indicator	15	2
Far-end NPA	16	6
Far-end Number	17	8
Time	18	8
Elapsed Time	19	10
CLASS Functions	330	4
CLASS Status	331	4
Screen List Size for SCF/SCA	802	4
Screen List Size for SCR	802	4
Screen List Size for SDR	802	4

<b>Table 11-AC:</b> <b>Structure code 9000</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Time Before Change	18	8
Time After Change	18	8
Date Before Change	6	6
Date After Change	6	6

<b>Table 11-AD: Structure code 9003</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
HNPA Number	13	4
Originating Number	14	8
Usage Count	803	6
HNPA Number	13	4
Originating Number	14	8
Usage Count	803	6
HNPA Number	13	4
Originating Number	14	8
Usage Count	803	6
HNPA Number	13	4
Originating Number	14	8
Usage Count	803	6
HNPA Number	13	4
Originating Number	14	8
Usage Count	803	6

<b>Table 11-AE: Structure code 9013</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4

<b>Table 11-AE: (Continued)</b> <b>Structure code 9013</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
Generic Issue	803	6
Type of Tracer	40	4
Sequence Number	802	4

<b>Table 11-AF:</b> <b>Structure code 9014</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
Generic Issue	803	6
Type of Tracer	40	4
Sequence Number	802	4
Record Count	804	8
Block Count	803	6

<b>Table 11-AG: Structure code 9036</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Recording Office Type	4	4
Recording Office Identification	5	8
Date BOR Recorded to Tape	6	6
Time BOR Recorded to Tape	18	8
Generic Issue	120	6
Type of Audit Record	40	4
Sequence Number	802	4
Tape Transport Number	801	2

<b>Table 11-AH: Structure code 9037</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Recording Office Type	4	4
Recording Office Identification	5	8
Date EOR Recorded to Tape	6	6
Time EOR Recorded to Tape	18	8
Generic Issue	120	6
Type of Audit Record	40	4
Sequence Number	802	4
Tape Transport Number	801	2
Record Count	804	8
Block Count	803	6
Collector Logical Data Set Count	803	6

<b>Table 11-AI: Structure code 9053</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
AMA Sequence Number	140	6
Type of Tracer	40	4
Audibility Flag	C.147	2
Number of Billing Registers Obtained	804	8
Number of Billing Registers to Process	804	8
Number of Billing Registers Processed	804	8
Number of Billing Registers Active	804	8
Total Number of Lost Billing Registers	804	8
Number of AMA Call Records sent to HSO	804	8
Number of AMA Call Records Received	804	8

<b>Table 11-AJ: Structure code 9054</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6

<b>Table 11-AJ: (Continued) Structure code 9054</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Time	18	8
AMA Sequence Number	140	6
Type of Tracer	40	4
Audibility Flag	C.147	2
Number of Billing Registers Obtained	804	8
Number of Billing Registers to Process	804	8
Number of Billing Registers Processed	804	8
Number of Billing Registers Active	804	8
Total Number of Lost Billing Registers	804	8
Number of AMA Call Records Received	804	8

<b>Table 11-AK: Structure code 9055</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8
AMA Sequence Number	140	6
Type of Tracer	40	4
Audibility Flag	C.147	2
1st Hour Lost Calls	802	4
2nd Hour Lost Calls	802	4
3rd Hour Lost Calls	802	4
4th Hour Lost Calls	802	4
5th Hour Lost Calls	802	4
6th Hour Lost Calls	802	4

<b>Table 11-AK: (Continued)</b> <b>Structure code 9055</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
7th Hour Lost Calls	802	4
8th Hour Lost Calls	802	4
9th Hour Lost Calls	802	4
10th Hour Lost Calls	802	4
11th Hour Lost Calls	802	4
12th Hour Lost Calls	802	4
13th Hour Lost Calls	802	4
14th Hour Lost Calls	802	4
15th Hour Lost Calls	802	4
16th Hour Lost Calls	802	4
17th Hour Lost Calls	802	4
18th Hour Lost Calls	802	4
19th Hour Lost Calls	802	4
20th Hour Lost Calls	802	4
21st Hour Lost Calls	802	4
22nd Hour Lost Calls	802	4
23rd Hour Lost Calls	802	4
24th Hour Lost Calls	802	4
Total Processed in Last 24-Hour Period	804	8

<b>Table 11-AL:</b> <b>Structure code 9056</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Record Descriptor Word	000	8
Hexadecimal Identifier	00	2
Structure Code	0	6
Call Type	1	4
Sensor Type	2	4
Sensor Identification	3	8
Recording Office Type	4	4
Recording Office Identification	5	8
Date	6	6
Time	18	8

<b>Table 11-AL: (Continued) Structure code 9056</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
AMA Sequence Number	140	6
Type of Tracer	40	4
Audibility Flag	C.147	2
Number of Billing Registers Backed-up	804	8
Number of Billing Registers Retrieved	804	8
Total Number of Lost Backed-up Calls	804	8

<b>Table 11-AM: Module code 000 - Final Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4

*Note:* This is a final module in any set of modules in a bellcore AMA format record.

<b>Table 11-AN: Module code 020 - Carrier Access - Terminating Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
IC/INC Prefix	57	6
Carrier Access Date	6	6
Carrier Access Time	18	8
Elapsed Time	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2

*Note:* The 020 module is only used with the Trunk Group Member Usage (TGMU) feature.

<b>Table 11-AO: Module code 021 - Carrier Access - Originating Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
IC/INC Prefix	57	6

<b>Table 11-AO: (Continued)</b>		
<b>Module code 021 - Carrier Access - Originating Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Carrier Access Date	6	6
Carrier Access Time	18	8
Elapsed Time	19	10
IC/INC Call Event Status	58	4
Trunk Group Number	83	6
Routing Indicator	59	2
Dialing and Presubscription Indicator	85	2
ANI/CPN Indicator	60	2

<b>Table 11-AP:</b>		
<b>Module code 022 - Long Duration Connection</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Present date	6	6
Present time	18	8

<b>Table 11-AQ:</b>		
<b>Module code 025 - Circuit Release Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Circuit Date	6	6
Circuit Time	18	8

<b>Table 11-AR:</b>		
<b>Module code 027 - Business Customer ID Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Business Customer Identification	87	12

<b>Table 11-AS: Module code 029 - Alternate Billing Number Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Alternate Billing Number	138	12

<b>Table 11-AT: Module code 030 - Translation Settable Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Context Identifier	152	4
Translation-Settable Field	89	4

<b>Table 11-AU: Module code 039 - Service Logic Identification Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Context Identifier	77	10

<b>Table 11-AV: Module code 040 - Digits Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Digits Identifier	78	4
Significant Digits in Next Field(s)	55	4
Digits 1	32	12
Digits 2	33	14

<b>Table 11-AW: Module code 049 - Calling Name/Number Delivery Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Count of name-only deliveries	803	6
Count of number-only deliveries	803	6

<b>Table 11-AX: Module code 070 - ISDN Core Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Bearer Capability/Call Type	412	4
Network Interworking	410	2
Signaling or Supplementary Service Capabilities Usage	413	16
Release Cause Indicator	411	6

<b>Table 11-AY: Module code 071 - ISDN Core Module (Abbreviated)</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Bearer Capability/Call Type	412	4
Network Interworking	410	2
Release Cause Indicator	411	6

<b>Table 11-AZ: Module code 073 - Terminating User Service Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Signaling or Supplementary Service Capabilities Usage	409	16
Interexchange Carrier	57	6
Bearer Capability/Call Type	412	4

<b>Table 11-BA: Module code 079 - Early Cut-through Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Elapsed Time from Early Cut-through to Connect to Disconnect	19	10
Interexchange Carrier	57	6
Early Cut-through Type	416	2

<b>Table 11-BB: Module code 087 - Directory Number Descriptor Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Directory Number Description	206	4

<b>Table 11-BC: Module code 101 - Digits Dialed Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Significant Digits in Next Fields	55	4
Digits Dialed 1	32	12
Digits Dialed 2	33	14
Access Code	803	6

*Note:* In MDR FXD CP format, unused digits in Data Tables 32 and 33 are each represented by the letter A.

<b>Table 11-BD: Module code 104 - Trunk Identification Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Trunk Identification	244	10

<b>Table 11-BE: Module code 105 - Message Detail Recording (MDR)</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
MDR Customer Identification	87	12
Originating and Terminating Facility Type	246	6

<b>Table 11-BF: Module code 106 - Facility/Trunk Identification Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Facility or VFG Identification	247	10

<b>Table 11-BG: Module code 107 - Business Features Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Call Completion Code	235	2
Business Feature Code	236	2
Automatic Route Selection Pattern Group	248	4
Facility Restriction Level	249	4
End of Dialing Time	18	8
Queue Elapsed Time	403	6

<b>Table 11-BH: Module code 164 - E.164/X.121 Number Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Number Identity	76	2
Country Code or Data Network Identification Code	165	6
Significant Digits in Next Field(s)	55	4
Number	126	16

<b>Table 11-BI: Module code 180 - Directory Number Descriptor Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
ISDN Channel Identifier	195	6

<b>Table 11-BJ: Module code 181 - Incoming Trunk Identification Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Trunk Identification	244	10

<b>Table 11-BK: Module code 204 - Indicator Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Indicator Identification	610	4

<b>Table 11-BL: Module code 241 - Automatic link transfer (ALT) Timing Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
ALT Sequence Number	802	4
ALT Type	702	4
ALT Start Date	6	6
ALT Start Time	18	8
ALT Elapsed Time	19	10
Timing Indicator	7	6
Old NPA	13	4
Old Number	14	8
ALT NPA	16	6
ALT Number	17	8
Interexchange carrier / International (IC/INC) Identification	57	6

<b>Table 11-BL: (Continued)</b>		
<b>Module code 241 - Automatic link transfer (ALT) Timing Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Trunk Group Number	83	6

<b>Table 11-BM:</b>		
<b>Module code 242 - Call Setup Timing Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Call Setup Start Date	6	6
Call Setup Start Time	18	8
Call Setup Elapsed Time	19	10
Timing Indicator	7	6

<b>Table 11-BN:</b>		
<b>Module code 290 - Resource Timing Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Service Logic Identifier	77	10
Trigger Sequence Number	802	4
Start Date	6	6
Timing Indicator	7	6
Start Time	18	8
Elapsed Time	19	10
Resource Type	608	4
Destination Address NPA	13	4
Destination Address	14	8

<b>Table 11-BO:</b>		
<b>Module code 307 - Line Number Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Line Number Type	423	4
Numbering Plan Area	16	6

<b>Table 11-BO: Module code 307 - Line Number Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Line Number	17	8

<b>Table 11-BP: Module code 719 - Local Number Portability Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Party Identifier	730	4
Location Routing Number (LRN)	731	12
Supporting Information	734	8

<b>Table 11-BQ: Module code 720 - Local Number Portability Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Party Identifier	730	4
Location Routing Number (LRN)	731	12
Service Provider Identity	732	10
Location	733	16
Supporting Information	734	8

<b>Table 11-BR: Module code 900 - Trunk Group Member Usage Module</b>		
<b>Information</b>	<b>Data Table</b>	<b>Number of Characters</b>
Module Code	88	4
Originating Line Information	998	4
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DMS-10 Family

## **600-Series Generics**

Automatic Message Accounting System

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