

Contents

Telcordia SR-NOTES-SERIES-08-Documentation Information

Special Report Notice Of Disclaimer	iii
List of Figures	xi
List of Tables	xii
Foreword	xiii
1. Introduction	1-1
1.1 Purpose and Scope	1-1
1.2 Structure and Use of This Document	1-2
1.3 Document Conventions	1-3
2. Billing Overview	2-1
2.1 Background	2-1
2.2 Customer (End User) Billing	2-2
2.2.1 End User Billing Architecture	2-4
2.2.1.1 Front-End Processing	2-4
2.2.1.2 Error Detection and Correction	2-4
2.2.1.3 Rating	2-4
2.2.1.4 Guiding and Posting	2-5
2.2.1.5 Bill Period Processing	2-5
2.2.1.6 Billing and Remittance	2-5
2.2.1.7 Data Exchange	2-6
2.2.2 Carrier Access Billing System (CABS)	2-6
2.2.3 The Role of AMA in Billing	2-9
3. Generating Usage Measurements	3-1
3.1 Automatic Message Accounting (AMA)	3-1
3.1.1 Background	3-1
3.1.2 AMA Process Model	3-2
3.1.2.1 Call-Related Terms	3-3
3.1.3 AMA Data Generation	3-4
3.1.3.1 AMA Translations	3-5
3.1.3.1.1 Line or Trunk Attributes	3-5
3.1.3.1.2 Directory Number and Billing Number	3-5
3.1.3.1.3 Digits Dialed	3-6
3.1.3.1.4 Call Disposition	3-6
3.1.3.1.5 Long Duration Connection	3-6
3.1.3.1.6 Services and Features	3-6
3.1.3.1.7 LEC-Settable Office Parameters	3-7
3.1.3.2 AMA Studies	3-7
3.1.3.2.1 AMA Fundamentals for Studies	3-8
3.1.3.2.2 AMA Data Generated for Specific Studies	3-8
3.1.3.2.3 Complaint Observing	3-8
3.1.3.2.4 Subscriber Line Usage Study (SLUS)	3-9
3.1.3.2.5 Network Completion	3-10
3.2 Billing AMA Format (BAF)	3-11
3.2.1 BAF-Related Terms	3-11

- 3.2.2 Data Fields 3-11
- 3.2.3 Structures 3-13
- 3.2.4 Call Type Codes (CTCs) 3-14
 - 3.2.4.1 Call Type Code Precedence 3-14
- 3.2.5 BAF Tables 3-16
- 3.2.6 Modules 3-17
 - 3.2.6.1 Generic Modules 3-18
 - 3.2.6.2 Flexible Modules 3-18
- 3.2.7 Building a BAF Record 3-19
- 3.2.8 BAF Procedures for Handling Incorrect or Unusual BAF Data 3-20
 - 3.2.8.1 Flag Procedure for Missing Data or Data Fields in Error 3-20
 - 3.2.8.2 Fill Procedure for Unused Data Fields 3-20
 - 3.2.8.3 Pad Procedure 3-21
- 3.3 BAF Administration 3-22
- 4. Call Detail Recording 4-1
 - 4.1 Network Recording Points 4-1
 - 4.1.1 Recording Architecture 4-2
 - 4.1.1.1 Centralized AMA (CAMA) 4-3
 - 4.2 Recording for Local Service 4-4
 - 4.2.1 Flat Rate Service 4-4
 - 4.2.2 Measured Rate Service 4-5
 - 4.2.2.1 Message-Rate Call Types 4-5
 - 4.2.2.1.1 Message-Rate Service with Call Detail 4-5
 - 4.2.2.1.2 Message-Rate Service Without Call Detail 4-6
 - 4.2.3 Toll Calls 4-7
 - 4.2.3.1 Toll Recording - IntraLATA 4-7
 - 4.2.3.2 IntraLATA Toll Presubscription 4-8
 - 4.2.3.3 LEC as Toll Carrier 4-8
 - 4.2.4 Calls to N11 Codes 4-10
 - 4.2.4.1 AMA for Directory Assistance 4-11
 - 4.3 Recording for Local Interconnection Interfaces 4-13
 - 4.3.1 Standard Trunk Connections 4-13
 - 4.3.2 Feature Group D-Like 4-13
 - 4.3.3 Connecting Network Access (CNA) 4-13
 - 4.3.4 Other Interfaces 4-14
 - 4.4 Exchange Access Recording 4-15
 - 4.4.1 Switched Access Service 4-15
 - 4.4.1.1 Types of Switched Access Available 4-15
 - 4.4.2 Feature Group A (FGA) 4-15
 - 4.4.3 Feature Group B (FGB) 4-17
 - 4.4.3.1 FGB AMA 4-18
 - 4.4.3.2 950-XXXX Dialing Over FGD Trunk Groups 4-18
 - 4.4.4 Feature Group D (FGD) 4-19
 - 4.4.4.1 FGD Dialing 4-19
 - 4.4.4.2 FGD Recording 4-20
 - 4.4.4.2.1 Originating FGD AMA Records 4-21
 - 4.4.4.2.2 Terminating Recording 4-22

4.4.4.3 Local Number Portability (LNP) Interaction	4-23
4.5 Wireless Services Providers (WSP) Interfaces	4-24
4.5.1 Originating WSP Calls	4-26
4.5.2 Terminating WSP Calls	4-26
4.5.3 Type 1 - Line-Side Interconnection	4-27
4.5.3.1 Originating Type 1	4-27
4.5.3.2 Terminating Type 1	4-27
4.5.4 Type 2B - Trunk-Side Direct Interconnection	4-27
4.5.4.1 Originating Type 2B	4-27
4.5.4.2 Terminating Type 2B	4-28
4.5.5 Type 2A - Trunk-Side Tandem Interconnection	4-28
4.5.5.1 Originating Type 2A	4-28
4.5.5.2 Terminating Type 2A	4-28
4.5.5.3 WSP Interaction with Local Number Portability	4-29
5. AMA Recording for Special Services	5-1
5.1 Recording at Operator Services Systems (OSSs)	5-2
5.1.1 Population Rules for OSS AMA	5-2
5.1.1.1 BAF Modules	5-3
5.1.2 OSS Originating AMA	5-3
5.1.2.1 Originating Calls, No OLNS Query Launched	5-4
5.1.2.1.1 Additional Modules Used with SC 0752	5-5
5.1.2.2 Originating Calls, OLNS Query Launched	5-5
5.1.2.2.1 Additional Modules Used with SC 0772 for OLNS Queries	5-5
5.1.3 OSS Terminating AMA	5-6
5.1.3.1 Additional Modules Used with SC 0751	5-7
5.1.4 LEC-Settable OSS Call Type Codes (CTCs)	5-7
5.1.5 OSS AMA Examples	5-8
5.2 Line Information Database (LIDB) AMA Recording	5-11
5.2.1 Aggregate Records	5-11
5.2.2 LIDB Detailed AMA	5-13
5.3 Toll-Free Recording	5-14
5.3.1 Background	5-15
5.3.2 Toll-Free Recording for IN Architecture	5-15
5.3.2.1 AMA Record Generation	5-16
5.3.2.1.1 Information Returned from SCP	5-16
5.3.2.2 Generation of Structure Codes	5-17
5.3.3 Toll-Free Recording for AIN Architecture	5-17
5.3.3.1 The Pre-Query SDS Record for Toll-Free AIN Architecture	5-18
5.3.3.2 The Post-Query SDS Record for Toll-Free AIN Architecture	5-18
5.4 Service Access Code (SAC) Recordings	5-19
5.4.1 700 SAC	5-19
5.4.2 500 SAC	5-19
5.4.3 900 SAC	5-20
5.5 Recording for CLASS SM Services	5-21
5.5.1 Background	5-21
5.5.2 Privacy	5-22
5.5.3 Local Area Signaling Services (LASS) Recording	5-23

5.5.3.1 Background	5-23
5.5.3.2 LASS AMA	5-23
5.6 Advanced Intelligent Network (AIN) Recording	5-25
5.6.1 Background	5-25
5.6.2 AIN Conventions	5-25
5.6.3 Originating Call Model	5-26
5.6.3.1 Originating Call Model Triggers/Events	5-28
5.6.3.2 Specific_Digit_String AMA	5-29
5.6.3.3 AIN Event Processing	5-30
5.6.4 Terminating Call Model	5-30
5.6.4.1 Terminating Call Model Triggers/Events	5-32
5.7 Message Detail Recording (MDR)	5-34
5.7.1 MDR via the RAO	5-34
5.7.2 MDR to Customer Premises	5-35
5.8 Unified Messaging	5-36
6. AMA Recording for Advanced Digital Services	6-1
6.1 Recording for Integrated Services Digital Network (ISDN) Calls	6-1
6.1.1 Background	6-1
6.1.2 ISDN Bearer Capability	6-2
6.1.3 ISDN Signaling Capability	6-3
6.1.4 ISDN Capabilities Having No AMA	6-4
6.1.5 ISDN Record Types	6-4
6.1.6 ISDN Core Module	6-5
6.1.7 Application of ISDN Modules	6-6
6.1.7.1 Recording of Supplementary Services	6-6
6.1.8 ISDN Basic Call Recording	6-7
6.1.8.1 Originating ISDN Calls	6-8
6.1.8.2 Terminating ISDN Calls	6-8
6.1.8.2.1 Terminating Recording at the User Line Termination	6-8
6.1.8.2.2 ISDN Terminating Exchange Access AMA Recording	6-9
6.1.9 ISDN Aggregate Records	6-9
6.1.9.1 The Service Event Module	6-10
6.1.9.2 Summary	6-10
6.1.10 ISDN Inverse Multiplexing	6-12
6.2 Broadband Services Recording	6-14
6.2.1 Background	6-14
6.2.1.1 Usage Measurement Functions	6-16
6.3 Recording for Asynchronous Transfer Mode (ATM) Calls	6-17
6.3.1 Permanent Virtual Connection (PVC) Services	6-17
6.3.2 Data Generation	6-18
6.3.3 AMA Recording for Intranetwork Switched Virtual Connections (SVCs)	6-19
6.3.3.1 Short Duration ATM Calls	6-19
6.3.4 AMA Recording for Internetwork SVCs	6-20
6.3.5 AMA for PVCs	6-20
6.3.5.1 Modules Associated with ATM	6-20
6.4 Recording for SMDS	6-22
6.4.1 Intranetwork SMDS Recording	6-23

6.4.1.1	Intranetwork SMDS Audit Records	6-23
6.4.2	Exchange Access and Internetwork SMDS Recording	6-23
6.4.2.1	BAF Tables for Internetwork SMDS Recording	6-24
6.5	Frame Relay	6-25
6.5.1	Background	6-25
6.5.2	Usage Measurements	6-25
6.5.3	AMA Recording for Frame Relay	6-27
6.5.3.1	Module Associated with Frame Relay	6-27
7.	AMA Teleprocessing and Data Networking	7-1
7.1	AMA Teleprocessing	7-1
7.1.1	Transmitter Functional Description	7-2
7.1.1.1	AMA File Structure	7-3
7.1.1.2	Transport Capabilities	7-4
7.1.2	Collector Functional Description	7-5
7.1.3	Data Handling	7-6
7.1.4	Administration	7-6
7.2	AMA Data Networking System (AMADNS)	7-7
7.2.1	Background	7-7
7.2.2	System Overview	7-7
7.2.3	AMADNS Data Architecture	7-9
7.2.4	Dual Data Server-Collector	7-10
7.2.5	Data Communications Interface	7-11
7.2.6	System Manager	7-12
7.2.7	File Structures	7-13
7.2.7.1	Standard AMA Files	7-13
7.2.7.2	Error Files	7-13
7.2.7.3	Test Files	7-14
7.2.8	AMA Record Flows	7-14
7.2.9	AMA Record Flows	7-15
7.2.10	Generating System/Data Server Interface (GDI)	7-15
7.2.11	Specialized Processing Modules (SPMs)	7-16
7.2.11.1	Format Conversion	7-17
7.2.11.2	Surveillance	7-17
7.2.11.3	Aggregation	7-17
7.2.11.4	Correlation	7-17
7.2.11.5	Validation	7-18
7.2.11.6	Formatting	7-18
7.2.11.7	Error Correction	7-18
7.2.11.8	Expansion	7-18
7.2.11.9	Reduction	7-18
8.	Developments and Future Trends	8-1
8.1	Alternative Recording Capabilities	8-1
8.2	Recording Capabilities of a Link Monitoring System (LMS)	8-1
8.2.1	Generating Aggregate AMA Records	8-3
8.2.2	Generating Call Detail Records (CDRs)	8-5
8.2.3	Connecting Network Access (CNA) AMA	8-6

8.2.4 Exchange Access Feature Group D (FGD) Interconnection	8-8
8.2.5 Wireless Service Provider (WSP) Type 2A and 2B Interconnection . . .	8-10
8.2.6 Tandem Transit Traffic Interconnection	8-11
8.3 Next Generation Network (NGN) Recording	8-14
8.3.1 Background	8-14
8.3.2 NGN Accounting Management Architecture	8-16
8.3.3 NGN Usage Data Generation for Voice Calls	8-18
8.3.4 Distributed Processing in Telecommunications Networks	8-21
8.3.5 Call Detail Recording for Global Solutions	8-22
8.3.6 Convergence of Voice and Data Services	8-23
8.4 Alternative Recording Formats	8-24
8.4.1 Internet Protocol Data Record (IPDR)	8-24
8.4.2 Other CDR Formats	8-25
8.4.2.1 BAF Limitations	8-26
8.4.3 Next Steps in Usage Format Evolution	8-27
8.4.3.1 Encapsulation	8-28
8.4.3.2 Redefinition	8-28
8.4.3.3 Coexistence	8-28
8.4.4 Conclusion	8-29
Appendix A: Bibliography and References	A-1
Ref.1 Generic Requirements Documents (GRs)	A-1
Ref.2 Special Reports (SRs)	A-4
Ref.3 Technical References (TRs)	A-5
Ref.4 Other References	A-6
Appendix B: Glossary	B-1
Appendix C: Acronyms	C-1

List of Figures

Figure 2-1	General Billing Architecture	2-1
Figure 2-2	Sample Architecture for an End User Billing System	2-3
Figure 2-3	Sample Architecture for an Access Billing System	2-7
Figure 3-1	AMA Process Model	3-2
Figure 4-1	Typical LEC Recording Architecture for Toll Calls	4-1
Figure 4-2	LEC IntraLATA Toll Network	4-9
Figure 4-3	CNA Recording Example	4-14
Figure 4-4	Feature Group A – Line-side Access Service	4-16
Figure 4-5	Feature Group B – Trunk-side Access Service	4-17
Figure 4-6	Feature Group D – Trunk-side Equal Access Service	4-20
Figure 4-7	Wireless Service Provider Interfaces	4-25
Figure 5-1	Network Architecture for Special Services	5-1
Figure 5-2	AIN Originating Basic Call Model	5-27
Figure 5-3	AIN Terminating Basic Call Model	5-31
Figure 6-1	Broadband Switching System	6-14
Figure 6-2	BSS Functional Reference Model	6-16
Figure 6-3	SMDS Usage Information	6-22
Figure 6-4	PVC Frame Relay Service (FRS) Usage Information	6-26
Figure 7-1	AMATPS Logical Architecture	7-2
Figure 7-2	AMA File Structure - Category A	7-3
Figure 7-3	AMA File Structure - Category B	7-4
Figure 7-4	AMADNS Logical Architecture	7-9
Figure 7-5	Dual Data Server-Collector Architecture	7-11
Figure 7-6	Potential System Interface Configurations	7-12
Figure 7-7	AMADNS AMA Record Flows	7-15
Figure 8-1	Stand-Alone Adjunct LMS Implementation	8-2
Figure 8-2	CCS Usage Measurement Process Model	8-3
Figure 8-3	LMS Recording Overview	8-6
Figure 8-4	LMS Recording for CNA Interconnection	8-7
Figure 8-5	LMS Recording for Exchange Access Interconnection	8-9
Figure 8-6	LMS Recording for WSP Interface	8-11
Figure 8-7	LMS Transiting Network Architecture	8-12
Figure 8-8	NGN Architecture	8-15
Figure 8-9	NGN Accounting Management Components	8-17

List of Tables

Table 2-1	End User vs. Access Billing Comparison	2-9
Table 3-1	Characteristics of BAF Data Fields	3-12
Table 3-2	Call Type Code Precedence List	3-15
Table 3-3	Module 195 -- Flexible Length Module - Repetitive Field	3-18
Table 3-4	Layouts of BAF Records	3-19
Table 3-5	Flag, Fill, and Pad Procedures for BAF Data Fields	3-21
Table 3-6	LEC-Assignable Ranges for BAF Elements	3-22
Table 4-1	Typical Recording Architecture - Call Types and Structures	4-2
Table 4-2	Common AMA Call Type Codes for Telephony Services	4-4
Table 4-3	N11 Codes in the North American Numbering Plan	4-10
Table 4-4	End Office AMA for Calls to Directory Assistance	4-11
Table 4-5	FGA and FGB Call Type Codes and Structure Codes	4-19
Table 4-6	FGD Call Type Codes and Structure Codes	4-22
Table 4-7	WSP Call Type Codes	4-26
Table 5-1	Originating OSS Calls - No OLNS Query	5-4
Table 5-2	Additional Modules Appended to Structure Code 0752	5-5
Table 5-3	Additional Modules Used with SC 0772	5-6
Table 5-4	Terminating OSS Calls	5-6
Table 5-5	Additional Modules Used with SC 0751	5-7
Table 5-6	LIDB Aggregate Records	5-12
Table 5-7	AMA Recording for Usage Sensitive CLASS SM Features	5-21
Table 5-8	LASS Features	5-24
Table 5-9	MDR Billable Events -- BAF Structures and Modules	5-38
Table 6-1	ISDN Signaling or Supplementary Service Usage Capabilities	6-3
Table 6-2	ISDN Core Module	6-5
Table 6-3	Recording for Supplementary Services	6-6
Table 6-4	ISDN Terminating User Service Module	6-8
Table 6-5	ISDN Daily Aggregate Service Event (DASE) Module	6-10
Table 6-6	Recording for ISDN Signaling Capabilities	6-10
Table 6-7	Recording for ISDN Supplementary Services	6-11
Table 6-8	Module Codes Appended to ATM Records.	6-21
Table 6-9	Frame Relay Count Module	6-27
Table 8-1	Applicable Data Items for SCCP and ISUP Messages	8-4
Table 8-2	LMS Call Type Codes	8-8
Table 8-3	LMS AMA Generation for Tandem Trunk Groups	8-12
Table 8-4	Population of Originating Access Record Based on CCA Input	8-20
Table 8-5	NGN Voice over Packet Structure and Call Type Codes	8-21