

# Contents

## 1 Introduction

1.1 Perspective . . . . .	1-1
1.2 Concepts and Definitions . . . . .	1-1
1.3 Relationship to Previous Documentation . . . . .	1-2

## 2 AMAT/Collector Interface Specification

2.1 Introduction . . . . .	2-1
2.1.1 Scope . . . . .	2-1
2.1.2 Overview of the Interface . . . . .	2-1
2.1.3 Collector Functional Description . . . . .	2-5
2.1.4 AMAT Functional Description . . . . .	2-17
2.2 Protocol Layers . . . . .	2-19
2.2.1 Physical Layer . . . . .	2-19
2.2.2 Link Layer . . . . .	2-20
2.2.3 Packet Layer . . . . .	2-21
2.2.3.1 Introduction and General Considerations . . . . .	2-21
2.2.3.2 Logical Channels . . . . .	2-22
2.2.3.3 Differences in DTE/DTE and DTE/DCE Operation . . . . .	2-22
2.2.3.4 Procedures for Data and Interrupt Transfer . . . . .	2-22
2.2.3.5 Maximum User Data Field Length of DATA Packets . . . . .	2-22
2.2.3.6 Delivery Confirmation Bit . . . . .	2-22
2.2.3.7 More Data Mark . . . . .	2-22
2.2.3.8 Qualifier Bit . . . . .	2-22
2.2.3.9 Window Description . . . . .	2-23
2.2.3.10 Throughput Characteristics and Throughput Classes . . . . .	2-23
2.2.3.11 Procedures for Reset . . . . .	2-23
2.2.3.12 The DIAGNOSTIC Packet . . . . .	2-23
2.2.3.13 Recovery from Nonacknowledgement of DATA Packets . . . . .	2-23
2.2.3.14 Recovery from Receipt of Erroneous DATA Packets . . . . .	2-23
2.2.3.15 Procedures for Packet Layer Optional User Facilities . . . . .	2-24
2.2.3.16 DTE Timer Parameters . . . . .	2-24
2.2.3.17 DTE Retransmission Count Parameters . . . . .	2-24
2.2.4 Session Layer . . . . .	2-24
2.2.4.1 BX.25 and AMATPS Session Layer . . . . .	2-25
2.2.4.2 Session Layer Messages . . . . .	2-26
2.2.4.3 AMAT and Collector Session Layer Description . . . . .	2-28
2.2.5 Application Layer . . . . .	2-39
2.2.5.1 Application Layer Messages . . . . .	2-39
2.2.5.2 AMAT File Transfer Description . . . . .	2-42
2.2.5.3 Collector File Transfer Description . . . . .	2-54
2.3 AMATPS Data Structures . . . . .	2-59
2.3.1 AMA Data Files . . . . .	2-59
2.3.1.1 Primary AMA Data File . . . . .	2-59

- 2.3.1.2 Secondary AMA Data File . . . . . 2-60
- 2.3.2 Special Files . . . . . 2-60
  - 2.3.2.1 Secondary Tracer Record File . . . . . 2-60
  - 2.3.2.2 Maintenance File . . . . . 2-61
  - 2.3.2.3 Test File . . . . . 2-61
  - 2.3.2.4 Dump File . . . . . 2-62
  - 2.3.2.5 Program File . . . . . 2-62
  - 2.3.2.6 Operational Data File . . . . . 2-62
  - 2.3.2.7 Time Synchronization Files . . . . . 2-63
  - 2.3.2.8 Translation File . . . . . 2-63
- 2.3.3 Tracer Records . . . . . 2-64
  - 2.3.3.1 Primary Tracer Records . . . . . 2-64
  - 2.3.3.2 Secondary Tracer Record . . . . . 2-65
  - 2.3.3.3 Tracer Count Reconciliation . . . . . 2-66
- 2.4 Future Enhancements . . . . . 2-66

### 3 AMA Transmitter Generic Requirements

- 3.1 Introduction . . . . . 3-1
  - 3.1.1 Scope . . . . . 3-1
  - 3.1.2 Configurations . . . . . 3-1
  - 3.1.3 Definitions . . . . . 3-1
  - 3.1.4 Multi-Switch AMAT . . . . . 3-1
  - 3.1.5 High-Level AMAT Description . . . . . 3-2
- 3.2 User Perspective . . . . . 3-6
  - 3.2.1 Documentation . . . . . 3-7
  - 3.2.2 Input/Output . . . . . 3-9
  - 3.2.3 Operational Activities . . . . . 3-11
  - 3.2.4 Database . . . . . 3-11
- 3.3 AMAT Generic Requirements . . . . . 3-11
  - 3.3.1 Data Handling Requirements . . . . . 3-12
    - 3.3.1.1 Billing AMA Format . . . . . 3-12
    - 3.3.1.2 Mass Storage Capacity . . . . . 3-12
    - 3.3.1.3 Block Structure for Mass Storage and Transmission . . . . . 3-13
    - 3.3.1.4 Block Sequence Numbering . . . . . 3-14
    - 3.3.1.5 Primary Polling . . . . . 3-14
    - 3.3.1.6 Secondary Polling . . . . . 3-15
    - 3.3.1.7 Simultaneous Polling Considerations . . . . . 3-15
    - 3.3.1.8 Tracer Records . . . . . 3-15
    - 3.3.1.9 Transfer In and Transfer Out Flags . . . . . 3-16
    - 3.3.1.10 Input/Output Messages . . . . . 3-17
    - 3.3.1.11 Daily Maintenance Record . . . . . 3-20
    - 3.3.1.12 Test File . . . . . 3-20
    - 3.3.1.13 Call Event Reference Times . . . . . 3-21
    - 3.3.1.14 Validation Flag . . . . . 3-21
  - 3.3.2 Capacity . . . . . 3-21
  - 3.3.3 Interfaces . . . . . 3-22

- 3.3.3.1 Collector Interface . . . . . 3-22
- 3.3.3.2 Switch Interface . . . . . 3-22
- 3.3.3.3 Local Maintenance Interface . . . . . 3-22
- 3.3.3.4 Remote Maintenance Interface . . . . . 3-23
- 3.3.3.5 Alarm Interface . . . . . 3-23
- 3.3.4 Administration . . . . . 3-23
  - 3.3.4.1 Installation . . . . . 3-23
  - 3.3.4.2 Service Changes . . . . . 3-24
  - 3.3.4.3 Capacity Monitor . . . . . 3-24
  - 3.3.4.4 Maintenance Measurements . . . . . 3-24
- 3.3.5 Maintenance . . . . . 3-24
  - 3.3.5.1 Diagnostics . . . . . 3-25
  - 3.3.5.2 Alarms . . . . . 3-25
  - 3.3.5.3 On-Line Functional Test . . . . . 3-26
- 3.3.6 Performance . . . . . 3-26
- 3.3.7 Interactions . . . . . 3-27
- 3.3.8 Environmental Requirements . . . . . 3-27
- 3.3.9 Power Source . . . . . 3-27
- 3.3.10 Internal AMAT Implementation Requirements . . . . . 3-28
- 3.3.11 Adjunct AMAT Implementation Requirements . . . . . 3-28
  - 3.3.11.1 Switch/AMAT Interface . . . . . 3-28
  - 3.3.11.2 Improved AMA Functions . . . . . 3-28
  - 3.3.11.3 Maintenance and Operations . . . . . 3-29
  - 3.3.11.4 Alarms Items . . . . . 3-29
  - 3.3.11.5 Program Loading . . . . . 3-29
  - 3.3.11.6 Interface Replacement Considerations . . . . . 3-30
  - 3.3.11.7 Acceptance Testing Capabilities . . . . . 3-30
- 3.3.12 Multi-Switch AMA Transmitters . . . . . 3-31
- 3.3.13 Optional AMAT Features . . . . . 3-36
  - 3.3.13.1 Use Collector to Monitor AMAT Time . . . . . 3-36
  - 3.3.13.2 Operational Instructions from the Collector . . . . . 3-36
  - 3.3.13.3 Program Dump to Collector . . . . . 3-36
  - 3.3.13.4 Local Tape Capabilities . . . . . 3-36

## 4 AMATPS Collector Generic Requirements

- 4.1 Introduction . . . . . 4-1
  - 4.1.1 Scope . . . . . 4-1
  - 4.1.2 High-Level Collector Description . . . . . 4-1
- 4.2 User Perspective . . . . . 4-2
  - 4.2.1 Personnel Interaction . . . . . 4-2
  - 4.2.2 Documentation . . . . . 4-3
- 4.3 Collector Generic Requirements . . . . . 4-5
  - 4.3.1 Main Collector Operations . . . . . 4-5
    - 4.3.1.1 Collecting AMA Data . . . . . 4-6
    - 4.3.1.2 Auditing and Administering AMA Data . . . . . 4-8
    - 4.3.1.3 Outputting AMA Data . . . . . 4-11

4.3.2 Other Collector Operations . . . . .	4-14
4.3.2.1 Secondary Polling . . . . .	4-14
4.3.2.2 Non-AMA Data . . . . .	4-16
4.3.2.3 Database . . . . .	4-17
4.3.2.4 Printout From Tape . . . . .	4-19
4.3.2.5 Input/Output Messages . . . . .	4-19
4.3.2.6 Program Loading . . . . .	4-22
4.3.2.7 Operations Reports . . . . .	4-22
4.3.3 Capacity and Overload Control . . . . .	4-24
4.3.4 Administration . . . . .	4-24
4.3.4.1 Installation . . . . .	4-24
4.3.4.2 Service Changes . . . . .	4-24
4.3.4.3 Person/System Interface . . . . .	4-25
4.3.4.4 Quantities . . . . .	4-26
4.3.5 Maintenance . . . . .	4-26
4.3.5.1 Diagnostics . . . . .	4-26
4.3.5.2 Exercisers . . . . .	4-26
4.3.5.3 Alarms . . . . .	4-27
4.3.5.4 Maintenance Reports . . . . .	4-28
4.3.6 Performance . . . . .	4-30
4.3.7 Environmental Requirements . . . . .	4-30
4.3.8 Power . . . . .	4-30

**Appendix A: Protocol Layer Data and Layouts**

**Appendix B: Application Layer Messages**

**Appendix C: Session Layer Messages**

**Appendix D: AMATPS File Names**

**Appendix E: Maintenance Record**

**Appendix F: Fixed Data Test Pattern**

**Appendix G: Structure for Translation Files**

**Appendix H: Block Header Format**

**Appendix I: SDL Key**

**References**

**Glossary**

## List of Figures

Figure 1-1	AMA Teleprocessing System (AMATPS) . . . . .	1-4
Figure 1-2	AMA Transmitter . . . . .	1-4
Figure 1-3	AMATPS Collector . . . . .	1-5
Figure 2-1	AMA Teleprocessing System Protocol Structure . . . . .	2-4
Figure 2-2	Internal Control Flows . . . . .	2-5
Figure 2-3	Collector Overview . . . . .	2-7
Figure 2-4	Collector Overview — Primary AMA File Reception . . . . .	2-11
Figure 2-5	Collector Overview — Secondary AMA File Reception . . . . .	2-13
Figure 2-6	Collector Overview — Test File Procedures . . . . .	2-15
Figure 2-7	Collector Overview — Translation File Reception . . . . .	2-16
Figure 2-8	AMAT Overview . . . . .	2-18
Figure 2-9	Collector Session Layer Protocol Environment . . . . .	2-29
Figure 2-10	AMAT Session Layer Protocol Environment . . . . .	2-30
Figure 2-11	Collector Session Establishment . . . . .	2-32
Figure 2-12	AMAT Session Establishment . . . . .	2-34
Figure 2-13	Session Layer Data Transmission . . . . .	2-36
Figure 2-14	Session Layer Data Reception . . . . .	2-38
Figure 2-15	AMAT Application Layer Protocol Environment . . . . .	2-43
Figure 2-16	AMAT File Transfer — Specific Poll for Primary File . . . . .	2-45
Figure 2-17	AMAT File Transfer — Receiving Non-AMA Type Files . . . . .	2-47
Figure 2-18	AMAT File Transfer — Specific File Poll for Non-AMA Type Files . . . . .	2-49
Figure 2-19	AMAT File Transfer — Repoll for Secondary File . . . . .	2-51
Figure 2-20	AMAT File Transfer — Next File Poll . . . . .	2-53
Figure 2-21	Collector Application Layer Protocol Environment . . . . .	2-54
Figure 2-22	Collector File Transfer — File Sending Procedures . . . . .	2-56
Figure 2-23	Collector File Transfer — File Poll Procedures . . . . .	2-58
Figure 3-1	AMA Transmitter . . . . .	3-4
Figure 3-2	Multi-Switch AMAT Arrangement . . . . .	3-5
Figure 3-3	SUN Configurations . . . . .	3-6
Figure 3-4	General Layout of an AMA Tape Recorded with AMAT Local Tape Option . . . . .	3-35
Figure 4-1	AMATPS Collector . . . . .	4-2
Figure 4-2	General Layout of an AMA Tape Recorded by an AMATPS Collector . . . . .	4-15
Figure B-1	File Header for Primary AMA Files . . . . .	B-1
Figure B-2	File Header for Translation Files . . . . .	B-2
Figure B-3	File Header for Secondary AMA Files . . . . .	B-3
Figure B-4	File Header for Maintenance, Secondary Tracer, Time Change, Test, Program, Operational Data, Time, and Time Verify Files . . .	B-4
Figure B-5	File Header for Dump File . . . . .	B-5
Figure B-6	Specific File Poll Message for Primary AMA Files . . . . .	B-6
Figure B-7	Specific File Poll Message for Translation Files . . . . .	B-7

Figure B-8	Specific File Poll Message for Time Change, Maintenance, and Test Files . . . . .	B-8
Figure B-9	Specific File Poll Message for Dump File . . . . .	B-9
Figure B-10	Next File Poll Message . . . . .	B-9
Figure B-11	Specific File Repoll Message for Secondary AMA Files . . . . .	B-10
Figure B-12	Specific File Repoll Message for Secondary Tracer Files . . . . .	B-11
Figure B-13	File Confirm Message . . . . .	B-11
Figure B-14	File Reject Message for AMA File Starting Block Sequence Mismatches. . . . .	B-12
Figure B-15	File Reject Message for All Other Reasons . . . . .	B-13
Figure C-1	Session Connect Message . . . . .	C-1
Figure C-2	Session Accept Message . . . . .	C-4
Figure C-3	Session Reject Message . . . . .	C-6
Figure C-4	Session Disconnect Message . . . . .	C-7
Figure C-5	Session Message Confirm Message . . . . .	C-7
Figure C-6	Session Message Header Format . . . . .	C-8
Figure I-1	SDL Overview . . . . .	I-2

## List of Tables

Table 1-1	AMATPS Allocation of Billing Error Standards . . . . .	1-3
Table 2-1	AMATPS Link Layer Protocol Parameters . . . . .	2-21
Table 2-2	Packet Layer Timer Values . . . . .	2-24
Table 2-3	Packet Layer Counter Values . . . . .	2-24
Table 3-1	AMA Teleprocessing System - AMA Data Accuracy and Reliability Requirements . . . . .	3-27
Table 4-1	AMATPS AMA Data Accuracy and Reliability Requirements . . . .	4-30
Table B-1	File Reject Reasons . . . . .	B-15
Table C-1	Session Reject Reasons . . . . .	C-9
Table C-2	Session Disconnect Reasons . . . . .	C-10
Table C-3	Session Timers . . . . .	C-11
Table C-4	Session Attempt Counters . . . . .	C-11
Table D-1	Files Polled by Collector And Sent by AMAT . . . . .	D-1
Table D-2	Files Sent by Collector . . . . .	D-1
Table E-1	Maintenance Record . . . . .	E-1
Table F-1	Fixed Data Test Pattern . . . . .	F-1
Table H-1	Block Header Format . . . . .	H-1