ATIS-1000111.2005(S2020)

SIGNALLING SYSTEM NUMBER 7 (SS7) – MESSAGE TRANSFER PART (MTP)

AMERICAN NATIONAL STANDARD FOR TELECOMMUNICATIONS

ATIS is the leading technical planning and standards development organization committed to the rapid development of global, market-driven standards for the information, entertainment and communications industry. More than 300 companies actively formulate standards in ATIS' 20 Committees, covering issues including: IPTV, Service Oriented Networks, Home Networking, Energy Efficiency, IP-Based and Wireless Technologies, Quality of Service, Billing and Operational Support. In addition, numerous Incubators, Focus and Exploratory Groups address emerging industry priorities including "Green", IP Downloadable Security, Next Generation Carrier Interconnect, IPv6 and Convergence.

ATIS is the North American Organizational Partner for the 3rd Generation Partnership Project (3GPP), a member and major U.S. contributor to the International Telecommunication Union (ITU) Radio and Telecommunications' Sectors, and a member of the Inter-American Telecommunication Commission (CITEL).

< http://www.atis.org/ >

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Notice of Disclaimer & Limitation of Liability

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER, NO REPRESENTATION OR WARRANTY IS MADE OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. ATIS SHALL NOT BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY ATIS FOR THIS DOCUMENT, WITH RESPECT TO ANY CLAIM, AND IN NO EVENT SHALL ATIS BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. ATIS EXPRESSLY ADVISES ANY AND ALL USE OF OR RELIANCE UPON THIS INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

NOTE - The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to whether use of an invention covered by patent rights will be required, and if any such use is required no position is taken regarding the validity of this claim or any patent rights in connection therewith.

ATIS-1000111.2005(S2020) *Signalling System Number 7 (SS7) – Message Transfer Part (MTP)*

Is an American National Standard developed by the **Interoperability (IOP)** Subcommittee under the **ATIS Packet Technologies and Systems Committee (PTSC)**.

Published by
Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

ATIS-1000111.2005(S2020)
(Revision of T1.111-2001)

American National Standard for Telecommunications

SIGNALLING SYSTEM NUMBER 7 (SS7) – MESSAGE TRANSFER PART (MTP)

Secretariat

Alliance for Telecommunications Industry Solutions

Approved July 15, 2005

American National Standards Institute, Inc.

Abstract

This standard is made up of eight chapters. Chapter T1.111.1 provides the functional description of the Message Transfer Part of Signalling System Number 7 (SS7). Chapter T1.111.2 describes signalling data link to be used for SS7 networks in the United States. Chapter T1.111.3 describes the functions and procedures for, and relating to, the transfer of signalling messages over one signalling data link; in this section, "signal units" of variable lengths are transferred, including control information for proper operation. Chapter T1.111.4 describes the functions and procedures for, and relating to, the transfer of messages between signalling points; these signalling network management functions ensure a reliable transfer of signalling messages, according to the requirements specified in chapter T1.111.6. Chapter T1.111.5 describes aspects that are pertinent to, and should be considered in, the design of national and international signalling networks. Chapter T1.111.6 describes the signalling performance requirements of the Message Transfer Part; the signalling performance is the capability of the Message Transfer Part to transfer messages of variable lengths for different users in a defined manner. Chapter T1.111.7 describes means and procedures for the testing and maintenance of the signalling network in order to realize the performance requirements for the Message Transfer Part, as identified in Chapter T1.111.6. Chapter T1.111.8 describes aspects that are pertinent to the numbering scheme of signalling codes for SS7 networks in the United States.

FOREWORD

The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.

This document is entitled *Signalling System Number 7 (SS7) – Message Transfer Part (MTP)*. It is based on ANSI T1.111-2001, and is intended to be compatible with ITU-T Recommendations Q.701 through Q.708, issued by the ITU-T Study Group XI (Vol. VI Fascicle VI.8) for international use.

A change bar on the right margin indicates a change from the 2001 issue of this American National Standard. These change bars are advisory only, and reflect the editors' views of which textual changes constitute significant technical changes. Because of the differences in style and content between this standard and the ITU-T Recommendations, it is not possible to indicate differences using margin marks.

This standard contains the following eight chapters:

- T1.111.1, *Functional Description of the Message Transfer Part (MTP).*
- T1.111.2, *Signalling Data Link.*
- T1.111.3, *Signalling Link.*
- T1.111.4, *Signalling Network Functions and Messages.*
- T1.111.5, *Signalling Network Structure.*
- T1.111.6, *Message Transfer Part Signalling Performance.*
- T1.111.7, *Testing and Maintenance.*
- T1.111.8, *Numbering of Signalling Point Codes.* (See below Note.)

This standard is intended for use in conjunction with T1.110-1999,*Signalling system number 7 (SS7) – General information*, , which includes an overview of SS7, a glossary, and a chapter on abbreviations.

The following are the key differences between T1.111-2001 and T1.111-2005:

- Addition of an extension mechanism for the Service Indicator (SI) field; and
- Update to the signalling point code assignment guidelines to assign point codes for internal CCS network/group use by any carrier.

Information contained in a normative annex in these specifications is considered part of this standard. Information contained in an informative annex in these specifications is *not* considered part of this standard but is rather auxiliary to the standard. Similarly, footnotes are not officially part of this standard.

Caution should be exercised in using the Specification and Description Language (SDL) diagrams to interpret the standard since they may not fully align with the text. Please note that in case of any conflict between the text and the SDL diagrams, the text always takes precedence.

NOTE - Chapter T1.111.8, *Numbering of Signalling Points Codes:* The document entitled *Numbering of Signalling Points Codes* -- approved by the American National Standard Institute (ANSI) as T1.111a-2002 -- is superseded by this document, T1.111-2005, *Signalling System Number 7 (SS7) – Message Transfer Part (MTP)*. This standard is intended for use in conjunction with *American National Standard for Telecommunications – Signalling System Number 7 (SS7) – General information*, T1.110-1999, which includes an overview of SS7, a glossary, and a chapter on abbreviations.

Future control of this document will reside with PTSC. This control of additions to the specification, such as protocol evolution, new applications, and operational requirements, will permit compatibility among U.S. networks. Such additions will be incorporated in an orderly manner with due consideration to the ITU-T layered model principles, conventions, and functional boundaries.

Suggestions for improvement of this standard will be welcome. These should be sent to the Alliance for Telecommunications Industry Solutions, PTSC Secretariat, 1200 G Street, NW, Suite 500, Washington DC 20005.

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between carriers, customers, and manufacturers. The Packet Technologies and Systems Committee (PTSC) -- formerly T1S1 -- develops and recommends standards and technical reports related to services, architectures, and signaling, in addition to related subjects under consideration in other North American and international standards bodies. PTSC coordinates and develops standards and technical reports relevant to telecommunications networks in the U.S., reviews and prepares contributions on such matters for submission to U.S. ITU-T and U.S. ITU-R Study Groups or other standards organizations, and reviews for acceptability or per contra the positions of other countries in related standards development and takes or recommends appropriate actions.

B. Hall, PTSC Chair
J. Zebarth, PTSC Vice-Chair
S. Carioti, ATIS Disciplines
S. Barclay, ATIS Secretariat
C. Underkoffler, ATIS Chief Editor
R. Singh, PTSC Technical Editor

Organization Represented	Name of Representative
AcmePacket	Kevin Klett
Alcatel USA Inc.	Ken Biholar
AT&T	Martin Dolly George Stanek (Alt)
BellSouth	Rick McNealy
BellSouth Telecommunications	David M. Brady
C.S.I Telecommunications	Michael S. Newman Thomas G Croda (Alt)
Cingular Wireless LLC	Don Zelmer Marc Grant (Alt)
Cisco Systems	Rajiv Kapoor Chip Sharp (Alt)
Defense Info. Systems Agency	Chris Fitzgerald Ryan Kozbial (Alt)
Ericsson Incorporated	Susanna Cambater-Maroto Stephen Hayes (Alt)
FBI ESTS	Gregory Milonovich Eric Mason (Alt)
Harris Corporation	Marlis Humphrey
Hewlett-Packard	Steve Mills
Intelsat	Mark T. Neibert
Lucent Technologies	Stuart O. Goldman

Organization Represented	Name of Representative
MCI	J. Martin Carroll Robert Schafer (Alt)
National Communications Systems	Nicholas Andre Jean Trakinat (Alt)
Nokia Telecommunications Inc.	Joyabrata Mukherjee Ed Ehrlich (Alt)
Nortel	Joseph A. Zebarth
Qwest	Steve Showell Michael Fargano (Alt)
SBC Communications, Inc.	B.S. Sambasivan Bob Hall (Alt)
Siemens Communications, Inc.	Ron Franks David E. Francisco (Alt)
Sprint Corporation	Mark L. Jones
Telcordia Technologies	Wesley Downum Cliff Halevi (Alt)
Tellabs Operations, Inc.	William A. Walker
Tridea Works	Greg Ratta
Verizon Communications	Dave Morris Wendy Pugh (Alt)

The Interoperability (IOP) Subcommittee was responsible for the development of this document.

Chapter 11.111.1

Functional Description of the Signalling System Message Transfer Part (MTP)

EDITORIAL NOTE – In this Chapter, all page numbers are in the format **T1.111.1-#**.

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

Signalling System Number 7 (SS7) – Functional Description of the Signalling System Message Transfer Part (MTP)

1 SCOPE, PURPOSE, & APPLICATION

The overall objective of the SS7 Message Transfer Part (MTP) is to provide an internationally standardized general purpose common channel signalling system that provides a reliable means of transfer of information in correct sequence and without loss or duplication.

The signalling system is optimized for operation over 56 or 64 kbit/s digital channels. The signalling system is also optimized for 1.536 Mbit/s data rate links to accommodate the growth of SS7 traffic. For Asynchronous Transfer Mode (ATM) based transmission, the signalling system is optimized for operation at 64 kilobits/s and higher. The system is suitable for use on point-to-point terrestrial and satellite links.

It does not include the special features required for use in point-to-multipoint operation but can , if required, be extended to cover such an application.

The signalling system uses signalling links for transfer of signalling messages between exchanges or other nodes in the telecommunication network served by the system. Arrangements are provided to ensure reliable transfer of signalling information in the presence of transmission disturbances or network failures. These include error detection and correction on each signalling link. The system is normally applied with redundancy of signalling links, and it includes functions for automatic diversion of signalling traffic to alternative paths in case of link failures. The capacity and reliability for signalling may thus be dimensioned by provision of a multiplicity of signalling links according to the requirements of each application.

2 SIGNALLING SYSTEM STRUCTURE

2.1 Basic Functional Division

The fundamental principle of the signalling system structure is the division of functions into separate modules or entities. These consist of a common Message Transfer Part (MTP) and users of the MTP. This is illustrated in Figure 1/T1.111.1.

The overall function of the Message Transfer Part is to serve as a transport system providing reliable transfer of signalling messages between the locations of communicating user or application functions.