ATIS-1000651.1996(R2011)

Mobility Management Application Protocol (MMAP)

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 250 companies actively formulate standards in ATIS' 18 Committees, covering issues including: IPTV, Service Oriented Networks, Energy Efficiency, IP-Based and Wireless Technologies, Quality of Service, and 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). For more information please vis
< 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 FEES 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-1000651.1996(R2011), *Mobility Management Application Protocol (MMAP)*

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

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

ANSI®
T1.651-1996 (R2011)

American National Standard
for Telecommunications –

Mobility Management Application Protocol (MMAP)

Secretariat

Alliance for Telecommunications Industry Solutions

Approved March 8, 1996

American National Standards Institute, Inc.

Abstract

This standard provides an application layer protocol for the exchange of information between peer applications running in a radio system and other network elements (e.g., mobility management platforms, switching systems, and other radio systems). The basic provisions of the protocol provide the semantics and syntax for operations necessary to support the mobility aspects of telecommunication services and call control in a wireless environment.

American National Standard

Approval of an American National Standard requires verification 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 toward 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.

Published by

American National Standards Institute
11 West 42nd Street, New York, New York 10036

Printed in the United States of America

insert code here

Contents

Foreword (This foreword is not part of American National Standard T1.651-1996.)

T1S1 began addressing PCS requirements in ad-hoc committees in 1993. In response to the industry's desire to have a standard solution for support of PCS mobility, T1S1 established the Mobility Management Application Protocol subworking group in 1994 with a charter to create a stage 3 protocol for supporting the mobility management requirements of the radio systems defined by T1P1 and TR46 over the T1P1 'C' and 'D' interface and the TR46 'A' interface.

This document is the first issue of the MMAP to address the immediate industry needs. Future issues are planned to support aspects such as additional radio systems, alternate functional distributions, additional interfaces, convergence function definitions, and additional services.

This standard contains two annexes, which are for information only and are not considered part of this standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the T1 Secretariat, c/o Alliance for Telecommunications Industry Solutions, 1200 G Street, NW, Suite 500, Washington, DC 20005.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Telecommunications, T1. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the T1 Committee had the following members:

A. K. Reilly, Chairman
G. H. Peterson, Vice-Chairman
O. J. Gusella, Jr., Secretary

W. Zeuch, Senior Editor
R. McNealy, Technical Editor

Organization Represented	*Name of Representative*
EXCHANGE CARRIERS	
Ameritech Services, Inc.	Laurence A. Young Richard Wood (Alt.)
Bell Atlantic Corporation	John W. Seazholtz Roger Nucho (Alt.)
Bellcore	James C. Staats E. R. Hapeman (Alt.)
BellSouth Telecommunications, Inc.	William J. McNamara, III Malcolm Threlkeld, Jr. (Alt.)
Cincinnati Bell Telephone	Andy McIntyre Linda Price (Alt.)
GTE Telephone Operations	Bernard J. Harris Richard L. Cochran (Alt.)
McCaw Cellular Communications	David Holmes Leo Nikkari (Alt.)
National Telephone Cooperative Association	Joseph M. Flanigan
NYNEX	James F. Baskin Michael Brusca (Alt.)
Pacific Bell	Sal R. Tesoro
Puerto Rico Telephone Company	Segundo Ruiz Alberto E. Morales (Alt.)
SBC Communications, Inc.	C. C. Bailey Joseph Mendoza
Sprint – Local Telecommunications Division	Robert P. McCabe Harold L. Fuller (Alt.)

Organization Represented	*Name of Representative*
US Telephone Association (USTA)	Dennis Byrne
	Paul K. Hart (Alt.)
US West	James L. Eitel
	Darryl Debault (Alt.)
INTEREXCHANGE CARRIERS	
AT&T Communications	Charles A. Dvorak
	Dennis Thovson (Alt.)
Comsat Corporation	Mark T. Neibert
	Prakash Chitre (Alt.)
MCI Telecommunications Corporation	Laszlo Szerenyi
	Peter Guggina (Alt.)
Sprint – Long Distance Division	Tom G. Croda
	Peter J. May (Alt.)
Stentor Resource Centre, Inc.	B. Sambasivan
	Al M. Yam (Alt.)
Unitel Communications, Inc.	David H. Whyte
	George Tadros (Alt.)
Wiltel, Inc.	Robert Bentley
	Howard Meiseles (Alt.)
MANUFACTURERS	
ADC Telecommunications, Inc.	Ron Waithaler
	Don Beaumar (Alt.)
Alcatel Network Systems (ANS)	Jack Royeruk
	Paul Krisher (Alt.)
AMP, Inc.	George Lawrence
	Jack Bradbery (Alt.)
Apple Computer, Inc.	David Michael
Ascom Enterprise Networks	L. H. Eberl
	Richard Koepper (Alt.)
AT&T Network Systems	John H. Bobsin
	Dave R. Andersen (Alt.)
DSC Communications Corporation	Peter Waal
	Allen Adams (Alt.)
ECI Telecom, Inc.	Ron Murphy
	Danny Etz-Hadar (Alt.)
Ericsson, Inc.	Linda Troy
	Joel Sanders (Alt.)
Fujitsu America, Inc.	Kenneth T. Coit
	Hirohiko Yamamoto (Alt.)
General DataComm, Inc.	Frederick Lucas
	Frederick Cronin (Alt.)
Harris Corporation	Allen Jackson
	Yogi Mistry (Alt.)
Hekimian Laboratories	William H. Duncan
Hewlett-Packard	Don C. Loughry
	Richard van Gelder (Alt.)
Hitachi Telecom (USA), Inc.	Bryan Hall
	Pat Kunza (Alt.)
IBM Corporation	William C. Bergman
	Rao J. Cherukuri (Alt.)
Mitel Corporation	John Needham
	F. Audet (Alt.)
Motorola, Inc.	Edmund J. Downey
	Dan Grossman (Alt.)
NEC America, Inc.	Donovan Nak
	Masaki Omura (Alt.)
Nokia Telecommunications Inc.	Chris Wallace
	Juhani Murto (Alt.)
Northern Telecom, Inc.	Mel N. Woinsky
	John Pugh (Alt.)
Picturetel Corporation	Marshall Schachtman
	David Lindbergh (Alt.)
Qualcomm Incorporated	Mark Epstein
	Allen Salmasi (Alt.)
Reliance Comm/Tec	Mark Scott
	Leroy Baker (Alt.)

Organization Represented	*Name of Representative*
Rockwell International Corporation	Quent C. Cassen
	Carl J. Stehman (Alt.)
Siemens Stromberg-Carlson	Michael A. Pierce
	Robert Poignant (Alt.)
Telecom Solutions	M. J. Narasimha
	Don Chislow (Alt.)
Telecommunications Techniques Corporation	Bernard E. Worne
Tellabs Operations, Inc.	R. Michael Schafer
	Michael J. Birck (Alt.)
Transwitch Corporation	Daniel C. Upp
	Praveen Goli (Alt.)
GENERAL INTEREST	
Brooktree Associates	Douglas M. Brady
	Rick Hall (Alt.)
C.S.I. Telecommunications	Michael S. Newman
	William J. Buckley (Alt.)
Capital Cities/ABC, Inc.	Warner W. Johnston
Defense Information Systems Agency	C. Joseph Pasquariello
	Gary L. Koerner (Alt.)
EDS Corporation	Dell Schipper
GTE Mobile Communications	Lynn Carlson
	Steve Pankow (Alt.)
National Communications System	Dennis Bodson
	Marshall Cain (Alt.)
National Institute of Standards and Technology	David Cyphers
	Leslie A. Collica (Alt.)
National Telecommunications and Information Administration/Institute for Telecommunication Sciences (NTIA/ITS)	William F. Utlaut
	Neal B. Seitz (Alt.)
Rural Utilities Service	Orlan E. Cameron III
	George J. Bagnall (Alt.)
U. S. General Services Administration	Keith Thurston
	Patrick Plunkett (Alt.)

Subcommittee T1S1 on ISDN Services, Architectures, and Signaling, which developed this standard, had the following members:

E. R. Hapeman, Chairman
W. R. Zeuch, Vice-Chairman
M. Geissinger, Secretary

Organization Represented	*Name of Representative*
Alcatel Network Systems (ANS)	Albert Azzam
	Sadik Okar (Alt.)
Ameritech Services, Inc.	Michael R. Zeug
Ascom Timeplex, Inc.	Doug Hunt
	R. MacDonald (Alt.)
AT&T Communications	Vito P. Jokubaitis
	Doris S. Lebovits (Alt.)
AT&T Network Systems	Robert B. Waller
	Wayne Zeuch (Alt.)
Bell Atlantic Corporation	Harry A. Hetz
	Dana Shillingburg (Alt.)
Bellcore	E. R. Hapeman
	Robin Rossow (Alt.)
BellSouth Telecommunications, Inc.	R. C. McNealy
	R. V. Epley (Alt.)
Brooktree Associates	Trey Malpass
	Douglas M. Brady (Alt.)

Organization Represented	*Name of Representative*
C.S.I. Telecommunications	Michael S. Newman
Cisco Systems, Inc.	George Swallow
	Morgan Littlewood (Alt.)
Comsat Corporation	Tom Henderson
	Prakash Chitre (Alt.)
Defense Information Systems Agency	Don Choi
	Paul Morris (Alt.)
Digital Equipment Corporation	Cuneyt Ozveren
	Bob Simcoe (Alt.)
DSC Communications Corporation	Jeff Copley
	Tom Hess (Alt.)
Ericsson, Inc.	Curtis Libey
	Christine Collie (Alt.)
Fujitsu America, Inc.	Karen McCourt
	Amalendu Chatterjee (Alt.)
General DataComm, Inc.	Mike McLoughlin
	Jack O'Neil (Alt.)
GTE Mobile Communications	Steve Pankow
	Dale Baldwin (Alt.)
GTE Telephone Operations	Jay R. Hilton
	D. J. Kostas (Alt.)
Harris Corporation	Virginia Lawler
	Sherry Chen (Alt.)
Hekimian Laboratories	William H. Duncan
Hewlett-Packard	Richard van Gelder
Hitachi Telecom (USA), Inc.	Jerry Faubert
	David Foote (Alt.)
IBM Corporation	William C. Bergman
	Rao J. Cherukuri (Alt.)
MCI Telecommunications Corporation	Yatendra Pathak
	Jim Joerger (Alt.)
Microsoft Corporation	Richard Machin
Mitel Corporation	F. Audet
	P. Chase (Alt.)
Mitre Corporation	Joseph Padvojsky
Motorola, Inc.	Dan Grossman
	Ken Felix (Alt.)
National Communications System	Nicholas Andre
	Richard Savoye (Alt.)
National Institute of Standards and Technology	Dr. David Su
	David Cypher (Alt.)
National Telecommunications and Information Administration/Institute for Telecommunication Sciences (NTIA/ITS)	Randall S. Bloomfield
	William F. Utlaut (Alt.)
NEC America, Inc.	Kuei Y. Kou
	Donovan Nak (Alt.)
Nokia Telecommunications Inc.	Juhani Murto
	Chris Wallace (Alt.)
Northern Telecom, Inc.	Mel N. Woinsky
	Rakesh Gupta (Alt.)
NPB Partners, LP	Sunil Hans
	Jay Garde (Alt.)
NYNEX	Michael Brusca
	Henry Hodor (Alt.)
Pacific Bell	Steve Sposato
	Sal R. Tesoro (Alt.)
Qualcomm Incorporated	Mark Epstein
	Allen Salmasi (Alt.)
Rockwell International Corporation	Dan Greene
	Dennis Doyle (Alt.)
SBC Communications, Inc.	Robert J. Hall
	John E. Roquet (Alt.)
Siemens Stromberg-Carlson	Michael A. Pierce
Sprint – Long Distance Division	Joe Christie
	James Lord (Alt.)

Organization Represented	*Name of Representative*
Stentor Resource Centre, Inc.	B. Sambasivan E. Norman (Alt.)
Tandem Telecommunications Systems Communications, Inc.	John L. Schantz Anantha Ramu (Alt.)
Telecom Solutions	Brad Hurte Gary Hamann (Alt.)
Transwitch Corporation	Daniel C. Upp Praveen Goli (Alt.)
Unitel Communications, Inc.	George Tadros D. L. Milloy (Alt.)
US Telephone Association (USTA)	Larry Drake
US West	Darryl Debault James L. Eitel (Alt.)
Work Shirt Consulting, Inc.	J. Greg Miller Mary Lou Miller (Alt.)
Xerox corporation	J. Bryan Lyles

Working Group T1S1.1 on ISDN Services and Architectures developed this standard. Over the course of its development, the following individuals participated in the Working Group's discussions and made significant contributions to the standard:

Robin Rossow, Working Group Chairman T1S1.1
Ronald D. Ryan, MMAP SWG Chairman
Rick McNealy, Editor

MMAP SWG members:

Murat Bilgic	Gary Jones	Juha[illegible]rto
Ed Campbell	Bill Krehl	Fr[illegible]O'Brien
Brian Daly	Alicia Kwok	P[illegible]rakash Panjwani
Mike Dolan	Jari Lehmusvuori	J[illegible]apadopoulos
Mahi Dontamsetti	Adrian Matthews	George Rykowski
Ross Fraser	Don McClarren	Neal Smith
Vijay Garg	Linda Melvin	[illegible]smail Sola
Arkady Grinberg	Bill Miniscalco	Tom Towle
Dwight Hakim	Ed Moore	Marty Wienshienk
Mark Hansen	Tim M[illegible]	Dan Wood
Tung-Hai Hsiao	David M[illegible]	

American National Standard
for Telecommunications –

Mobility Management Application Protocol (MMAP)

1 Scope, purpose, and application

1.1 Scope

The Mobility Management Application Protocol (MMAP) is a communication protocol between a radio system and other network elements (e.g., mobility management platforms, switching systems, and other radio systems). The scope of the radio systems supported are the wireless Personal Communications Services (PCS) radio systems defined by T1 and TIA. The scope of the information and operations is the support of personal and terminal mobility in a wireless environment and includes functionality such as registration, location updating, authentication, roaming, and handover.

In addition the scope of the protocol includes the exchange of information and invocation of operations as necessary to support the mobility aspects of telecommunication services (e.g., call waiting) and call control (e.g., call origination, call termination, call clearing) in a wireless environment. The scope of the protocol is limited to complementary call management functions (e.g., call setup, call manipulation, call clearing, call progress indication).

1.2 Purpose

The purpose of MMAP is to provide a mechanism for the exchange of information between radio systems and other network elements to support personal and terminal mobility in a wireless environment.

1.3 Application

The MMAP is applicable to the interfaces between PCS radio systems and other network elements such as the interfaces defined by the ISDN “A” Interface in TIA and the “C” and “D” interface in T1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI J-STD-007-1996, *Air Interface Specification for 1.8 to 2.0 GHz Frequency Hopping Time Division Multiple Access (TDMA) for Personal Communication Services*

ANSI J-STD-008-1996, *Personal Station-Base Station Compatibility Requirements for 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Communications Systems*

ANSI J-STD-011-1996, *PCS IS-136 Based Air Interface Compatibility 1900 MHz Standard*

ANSI J-STD-014-1996, *Personal Access Communications System Air Interface Standard*

ANSI J-STD-018-1996, *Recommended Minimum Performance Requirements for 1.8 to 2.0 GHz Code Division Multiple Access (CDMA) Personal Stations*