ATIS-1000118.1992(R2010)

Signalling System Number 7 (SS7) – Intermediate Signalling Network Identification (ISNI)

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' 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). For more information, please visit < 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-1000118.1992(R2010), *Signalling System Number 7 (SS7) – Intermediate Signalling Network Identification (ISNI)*

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

ATIS-1000118.1992 (R2010)
(formerly T1.118-1992)

American National Standard
for Telecommunications –

Signalling System Number 7 (SS7) – Intermediate Signalling Network Identification (ISNI)

Secretariat

Exchange Carriers Standards Association
Approved September 15, 1992

American National Standards Institute, Inc.

Contents

Foreword (This foreword is not part of American National Standard T1.118-1992.)

This document is entitled *American National Standard for Telecommunica-tions – Signalling system number 7 (SS7) – Intermediate signalling network identification (ISNI)*. ISNI is a network capability that allows an application process in an origination network to specify intermediate signalling networks for non-circuit-associated signalling messages, or to notify an application process in the destination network about such intermediate signalling network(s), or to do both. ISNI has been developed for use between U.S. networks to meet the anticipated needs and applications of those entities. This standard is the result of extensive work by members of the T1S1.3 Working Group on U.S. Standards for Common Channel Signalling.

This standard is intended for use in conjunction with *American National Standard for Telecommunications – Signalling system number 7 (SS7) – Signalling connection control part (SCCP)*, ANSI T1.112-1992. It should be noted, however, that the procedures specific to this standard are extensions beyond ANSI T1.112-1992.

Future control of this document will reside with Accredited Standards Committee on Telecommunications, T1. This control of additions to the specification, such as operational requirements, will permit compatibility among U.S. networks. Such additions will be incorporated in an orderly manner with due consideration to the CCITT-layered model principles, conventions, and functional boundaries.

There are two annexes in this standard. Annex A is normative and is considered part of this standard. Annex B is informative and is not considered part of this standard.

Suggestions for improving this standard will be welcome. They should be sent to the Exchange Carriers Standards Association, 1200 G Street, NW, Suite 500, Washington, DC 20005.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Telecommunications, T1. Committee approval of this 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, Secretary

Ray Hapeman, Senior Editor
Lisa Bauer, Technical Editor
Cory Gimourginas, Technical Editor

Organization Represented	*Name of Representative*
EXCHANGE CARRIERS	
Ameritech Services, Inc.	Laurence A. Young
	Peter K. Cencer (Alt.)
Bell Atlantic Corporation	John W. Seazholtz
	Roger Nucho (Alt.)
Bellcore	G. Gary Schlanger
BellSouth Services	Leonard Strickland, Jr.
	William J. McNamara, III (Alt.)
Centel Corporation	Bruce Becker
Cincinnati Bell Telephone	William P. Keidel
	Kevin R. Sullivan (Alt.)
Exchange Carriers Standards Association	Joseph Mendoza
	Gregory L. Theus (Alt.)
GTE SC/Telephone Operations	Gregory L. Theus
	Richard L. Cochran (Alt.)
National Telephone Cooperative Association	Joseph M. Flanigan
NYNEX Service Company	James F. Baskin
	Leo Katz (Alt.)
Pacific Bell	Fred Doell
	Stanley Chum (Alt.)
Puerto Rico Telephone Company	Segundo Ruiz
Southwestern Bell Telephone Company	Joseph Mendoza
	C. C. Bailey (Alt.)
United States Telephone Association	Dennis Byrne
	Paul K. Hart (Alt.)
United Telecommunications, Inc.	Robert P. McCabe
	Harold L. Fuller (Alt.)
US WEST	James L. Eitel
	James Dahl (Alt.)
INTEREXCHANGE CARRIERS	
American Mobile Satellite Corporation	Michael K. Ward
	William Garner (Alt.)
AT&T Communication	Gerald H. Peterson
	Dennis Thovson (Alt.)
Comsat Corporation	Carl A. Sederquist
	Mark T. Niebert (Alt.)
International Telecharge, Inc.	Dennis Garaghty
	Diane Harbaugh (Alt.)
MCI Telecommunications Corporation	Michael Varrassi
	Stephen J. Engelman (Alt.)
Telecom Canada	E. J. Exton
	Douglas I. Hughes (Alt.)
Unitel Communications, Inc.	David H. Whyte
	George Tadros (Alt.)
US Sprint	Peter J. May
	Tom G. Croda (Alt.)
VYVX, Inc.	Howard Meiseles
	Mark Elden (Alt.)
MANUFACTURERS	
ADC Telecommunications, Inc.	Jack P. Reilly
	Steve Grady (Alt.)
AG Communications Systems	Nigel J. E. Reynolds
	J. C. Gibson (Alt.)

Alcatel Network Systems, Inc.	Jean Domalain
	Kevin Pickles (Alt.)
Amdahl Corporation	Paul Lue
AMP, Inc.	George Lawrence
	Jack Bradbery (Alt.)
Apple Computer, Inc.	Karen Higginbottom
Applied Innovation, Inc.	Gerry Moersdorf
Ascom Timeplex, Inc.	D. Protopapas
	L. H. Eberl (Alt.)
AT&T Network Systems	Stanley W. Johnston
	Sigrid K. Llewellyn (Alt.)
Digital Equipment Corporation	Thomas Szczepanski
	Richard Hovey (Alt.)
DSC Communications Corporation	Allen Adams
	Kishan Shenoi (Alt.)
ECI Telecom, Inc.	Ron Murphy
	Charles T. Throop (Alt.)
Ericsson, Inc.	Linda Troy
	Al Way (Alt.)
Fujitsu America, Inc.	Steven A. Minneman
	Rodney Boehm (Alt.)
General DataComm, Inc.	Frederick Cronin
	Frederick Lucas (Alt.)
Harris Corporation	Allen Jackson
	Yogi Mistry (Alt.)
Hekimian Laboratories, Inc.	David R. Gellerman
	Mike F. Toohig (Alt.)
Hewlett-Packard	Don C. Loughry
	Richard van Gelder (Alt.)
IBM Corporation	Robert M. Amy
	Nicholas S. Huslak (Alt.)
Mitel Corporation	Keith Richardson
	John Needham (Alt.)
Mitsubishi Electronics America	Philip Jongeneel
Motorola, Inc.	David Morgan
	Gail Smith (Alt.)
NEC America, Inc.	Art Graham
	Donovan Nak (Alt.)
Northern Telecom, Inc.	Mel N. Woinsky
	Myron Allen (Alt.)
Novatel Communications, Ltd.	Allan Angus
Racal-Datacom, Inc.	Donald O'Connor
	Peter Brackett (Alt.)
Rockwell International Corporation	Thomas P. Jones
	Carl J. Stehman (Alt.)
Siemens Stromberg-Carlson	Michael A. Pierce
	Robert E. Poignant (Alt.)
Superior Teletec, Inc.	M. Farrant
	Brian Cole (Alt.)
Tekelec, Inc.	Willy M. Verbestel
	Ron Riegert (Alt.)
Telecom Solutions	M. J. Narasimha
	Robert Yapp (Alt.)
Telecommunications Techniques	Bernard E. Worne
Teleos Communications, Inc.	Hascall Sharp
	Ken Araujo (Alt.)
Tellabs, Inc.	Charles Rohrs
	Michael J. Birck (Alt.)
Transwitch Corporation	John Wyatt
	Daniel C. Upp (Alt.)
Verilink Corporation	William J. Buckley
	Robert Beebe (Alt.)
Wandel & Goltermann	Glenn C. Dunlap
	Norm Christiansen (Alt.)

GENERAL INTEREST

American Broadcasting Company	Ken Michel
Ashford Associates	Donald A. Ashford

Base-2 Systems, Inc.	Douglas M. Brady
BT North America, Inc.	Richard A. Rawson
	Michael J. Darnaud (Alt.)
Cable Television Labs, Inc.	Stephen D. Dukes
	James S. Meditch (Alt.)
Creative Communications Consulting	Richard T. Bobilin
	James Boe (Alt.)
Defense Information Systems Agency	C. Joseph Pasquariello
	Granger Kelley (Alt.)
GTE Mobile Communications	John C. Chiang
	Steve Pankow (Alt.)
International Communications Association	Edward F. Bonkowski
	Robert M. Eilers (Alt.)
National Communications System	Dennis Bodson
	Frank M. McClelland (Alt.)
National Institute of Standards and Technology	Robert Rountree, Jr.
	Michael D. Hogan (Alt.)
National Telecommunications and Information Administration/Institute for Telecommunication Sciences (NTIA/ITS)	William F. Utlaut
	Neal B. Seitz (Alt.)
NTT America, Inc.	Hideo Yamamoto
	Naobumi Kanemaki (Alt.)
OMNICOM, Inc.	Harold C. Folts
Rural Electrification Administration	Donald M. van Bellinger
	George J. Bagnall (Alt.)
U.S. General Services Administration	Douglas K. Arai
	Larry L. Jackson (Alt.)

At the time it approved this standard, the Technical Subcommittee T1S1 on Services, Architecture, and Signaling had the following members:

W. F. Utlaut, Chairman
R. M. Amy, Vice-Chairman
M. Geissinger, Secretary

Organization Represented	*Name of Representative*
AG Communication Systems	T. E. McAndrew
	S. O. Goldman (Alt.)
Alcatel Network Systems, Inc.	Albert Azzam
	Mike Roach (Alt.)
Ameritech Services, Inc.	James E. Bendel
	Steve Murphy (Alt.)
AT&T Communications	Vito P. Jokubaitis
	Doris S. Lebovits (Alt.)
AT&T Network Systems	R. B. Waller
	Alex S. Wu (Alt.)
Bell Atlantic	Harry A. Hetz
	Dana Shillingburg (Alt.)
Bellcore	R. G. Spusta
	E. R. Hapeman (Alt.)
BellSouth Services	R. C. McNealy
	K. L. Milton (Alt.)
BT North America, Inc.	Richard A. Rawson
	Michel J. Darnaud (Alt.)
Cable Television Labs, Inc.	Stephen D. Dukes
	James S. Meditch (Alt.)
Computer Consoles, Inc.	Kenneth P. Sympson
Comsat Corporation	Larry White
	Anousheh Raissyan (Alt.)
Creative Communications Consulting	Richard Bobilin
	James Boe (Alt.)
Defense Information Systems Agency	Michael Defrancesco
	Don Choi (Alt.)
Digital Equipment Corporation	Fred R. Goldstein
DSC Communications Corporation	Mo Shabana

	Benny Vermeersch (Alt.)
EDS Corporation	Douglas Zolnick
Ericsson, Inc.	David Breeding
	Safwat Farag (Alt.)
Fujitsu America, Inc.	Priscilla Lau
	Amalendu Chatterjee (Alt.)
General Datacomm, Inc.	William Dattisman
	Mike McLoughlin (Alt.)
GTE Mobile Communications	Steve Pankow
	Dale Baldwin (Alt.)
GTE Spacenet	Alan Briancon
	W. Nakamine (Alt.)
GTE Telephone Operations	D. J. Kostas
	Jay R. Hilton (Alt.)
Harris Corporation	Virginia Lacker
	Martha Haywood (Alt.)
Hekimian Laboratories	Mike F. Toohig
	David R. Gellerman (Alt.)
Hewlett-Packard	Richard van Gelder
IBM Corporation	Robert M. Amy
	Nicholas S. Huslak (Alt.)
International Communications Association	Edward F. Bonkowski
MCI Telecommunications Corporation	Robert Traylor
	Yatendra Pathak (Alt.)
Mitel Corporation	Brian Nickerson
	Roland Michaud (Alt.)
Mitre Corporation	Joseph Podvojsky
	Steve Silverman (Alt.)
Mitsubishi Electronics America	Philip Jongeneel
Motorola, Inc.	Dan Grossman
	Ken Felix (Alt.)
National Communications System	Nicholas Andre
	Frank M. McClelland (Alt.)
National Institute of Standards and Technology	David Su
	David Cypher (Alt.)
National Telecommunications and Information Administration/Institute for Telecommunication Sciences (NTIA/ITS)	William F. Utlaut
NEC America, Inc.	Steven Agard
	T. K. Lala (Alt.)
Netrix Corporation	Kenneth J. Rehbehn
	Nick Whelan (Alt.)
Newbridge Networks Corporation	Dan Roy
	Sab Ventola (Alt.)
Northern Telecom, Inc.	Mel N. Woinsky
	Hans Appenzeller (Alt.)
Novatel Communications, Ltd.	Allan Angus
NTT America, Inc.	Hideo Yamamoto
	Naobumi Kanemaki (Alt.)
NYNEX	Jim Papadopoulos
	Andrew Flatley (Alt.)
Pacific Bell	R. S. Schwab
	Fred Doell (Alt.)
Racal-Datacom, Inc.	Donald O'Connor
	Kang-Sen Lu (Alt.)
Rockwell International	Richard S. Surma
	C. Fred Shu (Alt.)
Siemens Stromberg-Carlson	Michael A. Pierce
	Karl Lewis (Alt.)
Southwestern Bell Corporation	Robert J. Hall
	John E. Roquet (Alt.)
Stratacom, Inc.	Charles M. Corbalis
	Lionel A. Bustini (Alt.)
Tandem Telecommunications Systems, Inc.	John L. Schantz
	Robert J. Brooks (Alt.)
Tekelec, Inc.	Willy M. Verbestel
	Ron Riegert (Alt.)
Telecom Canada	D. J. Maywood

	R. K. Yam (Alt.)
Telecom Solutions	M. J. Narasimha
	Richard T. Bobilin (Alt.)
Teleglobe, Inc.	J. P. Ducharme
	Jean Martel (Alt.)
Teleos Communications, Inc.	Rod Randall
	Hascall Sharp (Alt.)
Tellabs, Inc.	Vivek Telang
	Mark Erlenborn (Alt.)
Timeplex, Inc.	D. Protopapas
	R. Karim (Alt.)
United States Telephone Association (USTA)	Dennis Byrne
Unitel Communications, Inc.	George Tadros
	D. L. Milloy (Alt.)
US Sprint	Joe Christie
	James Lord (Alt.)
US WEST	Jesse Smith
	Darryl Debault (Alt.)
VYVX National Video Network	Steve Tabaska
	Joseph M. Ott (Alt.)
Wandel & Goltermann	Glenn C. Dunlap
	Norm Christiansen (Alt.)

Working Group T1S1.3 (formerly T1X1.1), which developed this standard, had the following active participants:

A. Wu, Chairman
B. Foster,Vice-Chairman
C. Addison, Convenor
C. P. Musgrove, Convenor
R. Piplani, Convenor
J. Schantz, Convenor
L. Hargraves, Editor

Jim Aldrich
Joe Alfred
Vas Anandagoda
Hans Appenzeller
Victor Arabagian
Ronald Bell
Mike Boeckman
Lawrence J. Bowen
Feza Buyukdura
Diana Carter
A. Chatterjee
Janey M. Y. Cheu
Jeff Copley
Carol Defazio
Christine Douglas
Wesley Downum
F. Ebrahami-Ghajer
Wolfgang Elsner
Ken Evans
Ken Felix
Joseph Fergus
Gobin Ganguly
Reza Gholami
Rick Goldberg
Stuart Goldman
Rakesh Gupta
Tom Hartnett
Ulf Henell
Tom Hess
Peter Hill
Jay Hilton
Michael Hynes
Gopal Iyenger
Jim Joerger
Chuck Johnson
Peter Kelleher
Patrick J. Kelly
Jia-Shu Kuo
Jim LaFave
Priscilla Lau
Ben Levitan
Karl M. Lewis
A. M. Livingstone
Jim Lord
Marcus Maranhao
Robin Marks
L. Matsuda
Mike Matz
Tom McAndrew
Mike McGrew
Charlene Meins
Ann Merell
Dick Milne
Nilo Mitra
Urbashi Mitra
James Murphy
Fatemeh Naraghi
V. G. Nikanorov
Sadik Okar
Lyndon Ong
R. Pandurangan
Ystendra Pathak
Joe Questore
Mark Ratcliffe
Ed Reid
Walt Roehr
Kenneth J. Scharff
Tom Schwalb
Charles Scott
Yi-Shang Shen
Dana Shillingburg
Greg Sidebottom
Steve Sposato
Russell Steinke
Gerry Theret
Robert Traylor
Stan Wainberg
William L. Wiley
Robert Williams
Roger Wilmot
David Wilson
Steve Wilson
James Yu
Mike Zeng

Jim Aldrich
Joe Alfred
Vas Anandagoda
Hans Appenzeller
Victor Arabagian
Ronald Bell
Mike Boeckman
Lawrence J. Bowen
Feza Buyukdura
Diana Carter
A. Chatterjee
Janey M. Y. Cheu
Jeff Copley
Carol Defazio

Christine Douglas
Wesley Downum
F. Ebrahami-Ghajer
Wolfgang Elsner
Ken Evans
Ken Felix
Joseph Fergus
Gobin Ganguly
Reza Gholami
Rick Goldberg
Stuart Goldman
Rakesh Gupta
Tom Hartnett
Ulf Henell
Tom Hess
Peter Hill
Jay Hilton
Michael Hynes
Gopal Iyenger
Jim Joerger
Chuck Johnson
Peter Kelleher
Patrick J. Kelly
Jia-Shu Kuo
Jim LaFave
Priscilla Lau
Ben Levitan
Karl M. Lewis
A. M. Livingstone
Jim Lord
Marcus Maranhao
Robin Marks
L. Matsuda
Mike Matz
Tom McAndrew
Mike McGrew
Charlene Meins
Ann Merell
Dick Milne
Nilo Mitra
Urbashi Mitra
James Murphy
Fatemeh Naraghi
V. G. Nikanorov
Sadik Okar
Lyndon Ong
R. Pandurangan
Ystendra Pathak
Joe Questore
Mark Ratcliffe
Ed Reid
Walt Roehr
Kenneth J. Scharff
Tom Schwalb
Charles Scott
Yi-Shang Shen
Dana Shillingburg
Greg Sidebottom
Steve Sposato
Russell Steinke
Gerry Theret
Robert Traylor
Stan Wainberg
William L. Wiley
Robert Williams
Roger Wilmot
David Wilson
Steve Wilson
James Yu
Mike Zeng

AMERICAN NATIONAL STANDARD **ATIS-1000118.1992** (R2010)

American National Standard
for Telecommunications –

Signalling System Number 7 (SS7) – Intermediate Signalling Network Identification (ISNI)

1 Scope, purpose, and application

The Intermediate Signalling Network Identification (ISNI) capability allows an application process in the origination network to specify intermediate signalling network(s) for non-circuit-associated signalling messages, or to notify an application process in the destination network about such intermediate signalling network(s), or to do both. ISNI may be invoked by a variety of services.

The end user can interact with an end user service that may invoke the ISNI capability. The specific end user service that invokes ISNI is not within the scope of this capability description. The ISNI capability is therefore not visible to the end user, but allows an end user service to take place. Thus, there is a "layering" of services and capabilities, and the visible end user services may need the ISNI capability to complete. The specification of the intermediate signalling networks or the decision to request that the application process in the destination network be notified about the intermediate networks may be determined by end users or networks.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below.

ANSI T1.112-1992, *Telecommunications – Signalling System number 7 (SS7) – Signalling Connection Control Part (SCCP)*

3 Definitions

3.1 end user: The end user is the subscriber to one or more services that utilize the ISNI capability.

3.2 origination network: This network is the signalling network that initiates a non-circuit-related message using the ISNI capability.

3.3 destination network: This network is the signalling network that receives a non-circuit-related message containing ISNI information. This network may send subsequent messages based on the received ISNI information.

3.4 intermediate network: This network is a signalling network, between the origination and destination networks, traversed by a non-circuit-related message.[1)]

3.5 constrained routing information: If a message arriving at an ISNI-capable STP includes constrained routing information, the constrained routing information indicates one or more networks that the message will traverse. The constrained routing information may or may not indicate every network in the message path. It may or may not also indicate

the origination network (if the message is still in the origination network) or the destination network. The ISNI-capable STP receiving the message uses the constrained routing information to select and direct the message toward the explicitly indicated network. This instruction will be followed; hence the term “constrained.” If this instruction is not followed, the message fails. As a message traverses a network indicated in the constrained routing information, this information is altered to indicate the network has now been traversed.

3.6 suggested routing information:[2] If a message entering an intermediate network includes suggested routing information, the suggested routing information recommends the next network in the message path. This instruction may or may not be followed.

3.7 notification information: The ISNI notification function delivers information about the network(s) transited by a message to the signalling node that terminates the signalling message. It allows the terminating Signalling End Point (SEP) to send any desired reply message(s) through the same (sequence of) intermediate network(s). The notification information consists of a list of network codes. This list could consist of a logged record of the actual networks transited by a signalling message (identification information) or it could be a list of networks that a particular network entity requests be traversed by the message (anticipation information). The list of network codes may or may not include every network in the path, but will include enough information to fully determine the path. Notification information consists only of network codes as opposed to point codes for particular network nodes.

3.8 identification information: Identification information is a form of notification information that consists of the documentation of the actual sequence of intermediate networks traversed by a signalling message. The documentation of the sequence of networks traversed may also include the origination and destination networks. The documentation that the message traversed a given network is performed by that network itself. Intermediate networks that are not ISNI-capable are not identified. ISNI identification information can be used to force a return error message, destined for the originating SEP, to transit the same intermediate network(s) as the original message.

3.9 anticipation information: Anticipation information is a form of notification information that consists of the documentation of the sequence of networks requested by some network entity. It is delivered to the destination SEP. Anticipation information differs from identification information in three ways:

a) it is placed in the message, in its entirety, by the origination network;

b) it may or may not include information about all intermediate networks in the path that have the ISNI capability;

c) it may include information about non-ISNI capable networks.

3.10 branch point: A branch point is a network point where two or more possible routes through different intermediate networks from the origination network to destination network physically diverge. A branch point may occur in any network except the destination network.

3.11 convergence point: A convergence point is a network point at which two or more possible routes through different intermediate networks from the origination network to destination network converge. A convergence point may occur in any network except the origination network. A convergence point for a message transiting in one direction is a branch point for a message transiting in the opposite direction.

3.12 specification: Specification of a network occurs at the originating node when the application inserts the code(s) of the desired network(s) into the ISNI routing information in a message. This information will normally include the code of at least one selected network.

3.13 specification point: The specification point is the node in the originating network where specification occurs.

3.14 selected network: For a particular message path, any intermediate network between a branch point and a subsequent branch point or convergence point is a selected network.

3.15 explicit selection: Explicit selection of a network is an ISNI routing function. The explicit selection of a network is driven by the appearance of that network’s code in the constrained routing information.[3]

3.16 selection point: The ISNI selection process occurs at a selection point. The selection process provides the routing function that directs the message into a selected network. A selection point may or may not be a branch point. A branch point may not be required to be a selection point.

3.17 single selection scenario: The single selection scenario is defined by its physical topology, which has exactly one branch point in the message path. An example is shown in figure 1. Note that one path from SEP X to SEP Y contains more than one intermediate network. However, once any one of the selected intermediate networks is chosen toward which the signalling message will be forwarded (in an effort to send a signalling message from SEP X to SEP Y), the entire sequence of networks to be traversed is determined. If SEP X routes a signalling message to intermediate network C, the message *must* traverse intermediate network D to reach SEP Y. In accordance with the definition of selection, the selection could be either implicit or explicit. The choice is to route the message to either:

– intermediate network A;

– intermediate network B, or;

– intermediate networks C and D.

3.18 multiple selection scenario:[4)] The multiple selection scenario is defined by its physical topology, which has more than one branch point in the message path.

4 Description of network capability

4.1 General description

The ISNI capability provides the functionality to route non-circuit-related signalling messages through selected intermediate networks and the independent functionality to inform an application of the intermediate networks traversed by the message. The end user will interact with an end user service that may invoke the ISNI capability. The specific end user service that invokes ISNI is not within the scope of this capability description.

4.2 Procedures

4.2.1 Provision/withdrawal

From an end user's viewpoint, services requiring specific intermediate network routing or notification, or both, can be realized through the use of ISNI. An end user cannot directly subscribe to ISNI, but may subscribe to an end user service that uses the ISNI capability.

4.2.2 Normal procedures

4.2.2.1 Activation/deactivation

Activation/deactivation may be done either on a service-by-service basis or on a network basis in the origination and destination networks. Activation/deactivation is on a network basis in the intermediate network.

4.2.2.2 Invocation and operation

Invocation and operation of this network capability will be handled by the application process.

4.2.3 Exceptional procedures

4.2.3.1 Activation/deactivation

None identified.

4.2.3.2 Invocation and operation

None identified.

4.2.4 Alternate procedures

4.2.4.1 Activation/deactivation

None identified.

4.2.4.2 Invocation and operation

None identified.

4.3 Interworking considerations

None identified.

4.4 Network capabilities for charging

Not applicable.

4.5 Interactions with supplementary services

Not applicable.

4.6 SDLs

The SDL diagram for the user is shown in figure 2.

5 Functional capabilities and information flows

5.1 Functional entity model

The Intermediate Signalling Network Identification (ISNI) capability allows an application process in the origination network to specify a (sequence of) intermediate signalling network(s) for the purpose of routing a non-circuit-related signalling message and independently to request that networks in the message path identify themselves to an application in the destination network. ISNI also allows the application process to send a list of intermediate signalling networks anticipated to be transited by the message to an application in the destination network. The ISNI capability may be invoked by specific services.

The specification of the (sequence of) intermediate network(s) will be determined by the origination network. If ISNI routing is used, the route is “constrained.” At each branch point in the end-to-end message path, where two or more possible routes between the origination and destination network diverge, ISNI-constrained routing provides the capability to direct the message along one particular path.[5)]

Constrained routing information, if present, will include the network(s) specified by the originating application and will allow ISNI-capable STPs in the message path to progress the message through the desired (sequence of) intermediate network(s).

Notification information, if present, will carry the identity of one or more networks in the message path to the application receiving the message. This will allow the terminating application, if required, to return response messages along the same sequence of intermediate network(s), but in reverse order.

The ISNI capability allows the transfer of non-circuit-related messages in the forward and backward directions through the same (sequence of) intermediate network(s). Referring to figure 1, if specification or anticipation information relating an intermediate network to a particular service exists, it must exist at signalling point X. In the single selection scenario, the originating application chooses among intermediate networks A or B or (C and D). If network C is chosen, then the choice of D is determined. In this case, the ISNI notification information, if present, will convey the identity of network C or networks C and D. Similarly, if network D is chosen, then the choice of C is determined. In this case, the ISNI notification information, if present, will convey the identity of network D or networks C and D.

If the originating application has set an option that requests “return of undelivered messages,” then, in the event of a routing failure, message return procedures shall be initiated. If constrained routing had been invoked, the message return shall be constrained through the same (sequence of) network(s) in the reverse direction as used in the forward direction.

5.1.1 Description of origination network functional entity

The origination network is a network that will invoke the ISNI capability. The origination network is the source of any constrained routing information and any anticipation information. Should both pieces of ISNI information be included by the origination network, each will contain the network code of at least one selected network. Therefore, there may be some duplication in the information carried for the independent purposes of ISNI-constrained routing and anticipation.

The origination network requires the use of a Signalling End Point (SEP) and may also require the use of Signal Transfer Points (STPs).

5.1.2 Description of destination network functional entity

The destination network is a network that will terminate incoming messages from an intermediate network and may route response messages based on the ISNI notification information received in the incoming message if the application requires it.

The destination network includes an SEP and may also include STPs.

5.1.3 Description of intermediate network functional entity

The intermediate network is a network used while routing non-circuit-related messages between origination and destination networks. For ISNI-constrained routing, the originating application specifies one or more intermediate networks. The selection process is the routing function that directs the message through the branch point, toward the next specified network. If the constrained routing information specifies more than one intermediate network, ISNI-constrained routing will be used by ISNI-capable nodes to progress the message. Additional intermediate networks (not in the list) may also be determined as the result of implicit relationships between networks to eventually reach the destination network. If an intermediate network recognizes that identification is requested, it should insert its own network code in the message.

An intermediate network only requires the use of STPs.

5.2 Information flow model

When the query-originating node in an origination network receives an ISNI invocation from an application process, the ISNI function shall (a) incorporate the constrained routing information if it is requested, (b) add anticipation information if the anticipation function is requested, and (c) mark for identification if identification is requested. Finally the ISNI function shall route the message toward the network whose code is first in the constrained routing information, if constrained routing is invoked. If an ISNI-capable node in the routing path receives the message with constrained routing information specifying a further network(s), that node will route the message toward the (next) specified network using ISNI procedures. If the identification function is requested, and the code of the current network is not already present, it shall be inserted by the node.

If anticipation information is provided, it is carried unchanged to the destination application. When the destination network receives the message, it should use the ISNI notification information to route the response messages through the specified (sequence of) intermediate network(s), if required.

5.2.1 Invoking the routing function

The originating application invokes the optional ISNI routing capability at the SEP and provides the constrained routing information for the message. The message is routed from the SEP through the origination network and via the selected intermediate network(s) to the destination network.

5.2.2 Invoking the notification function

When the origination network application invokes the optional ISNI notification capability at the SEP, it provides anticipation information about the chosen intermediate network(s) for the non-circuit-related signalling message, or it indicates the message should be marked for identification, or it does both. If the message is marked for identification, each ISNI-capable network in the message path adds its network code to the identification (notification) information. Notification information is delivered to the destination application.

5.2.3 Activating and deactivating the ISNI capability

The ISNI functions are network based. Therefore, activation and deactivation of the ISNI functions are network implementation and provisioning activities that are done in each network.

5.2.4 Exceptional procedures

If an ISNI-capable node cannot deliver a message to its proper destination through the specified (sequence of) intermediate network(s), or if the constrained routing information is found to be incorrect, and a negative acknowledgment needs to be returned, then the negative acknowledgment should be sent through the (reverse sequence of) intermediate network(s) received in the ISNI identification information in the original message. In other instances of message discard, normal SS7 exceptional procedures for non-circuit-related messages apply.

5.3 Allocation of functions to equipment

Table 1 illustrates the ISNI functions performed by the origination SEP, STPs, and the destination SEP.

Figure 3 is the SDL diagram for the SEP at the origination or destination network. Figure 4 is the SDL diagram for the STP.

5.4 Limiting assumptions

– The ISNI routing and notification functions may be independently invoked by the originating application on a per-message basis;

– The procedures and data described here are for the single selection scenario (using ISNI-constrained routing or notification, or both) and are extensible to the multiple selection scenario;

– Suggested routing and multiple selection are for further study.

6 Protocol and procedures

The SDLs for the protocol and procedures are described in annex A. Annex B provides some examples of the ISNI protocol and procedures.

6.1 Protocol and procedural assumptions

– No changes are needed to the interface between the SCCP and the MTP;

– The ISNI identification information is carried in the optional SCCP ISNI parameter in an Extended Unitdata (XUDT) message;

– ISNI information in the optional SCCP ISNI parameter serves the dual purpose of “identifying” networks as well as providing information that may help in the routing process. Thus, while the *data* is contained in one parameter, the *functions* of “identification” and “routing” are kept separate;

– The procedures at an SCCP relay node are consistent for all networks (i.e., origination, intermediate, and destination) and for all messages;

– The ISNI identification information, if present in the original message, may be used to route the XUDTS message through the same (series of) intermediate network(s), in reverse order;

– The identification function should not be performed on the XUDTS message. Therefore, the Mark for Identification Indicator in the XUDTS message should be ignored.

6.2 Formats of the ISNI parameters

6.2.1 Format of the optional TCAP signalling networks identifier parameter

The use of the optional TCAP Signalling Networks Identifier Parameter (SNIP) is described in 6.4.

Each network ID, as shown in figure 5, consists of two binary octets. For a small network, the network ID consists of the one-octet network identifier and the one-octet cluster identifier that are common to all SS7 point codes in the small network. For a large network, the network ID consists of the one-octet network identifier that is common to all SS7 point codes in the large network. The second octet (cluster identifier) is coded all zeros.[6)]

The network and cluster identifiers of each network should be inserted into the parameter in the order the originating SEP anticipates the networks will be traversed. A maximum of five network IDs can be included in the SNIP.

6.2.2 Format of the SCCP ISNI parameter

The ISNI parameter format is given in the following two figures. Figure 6 shows the Type 0 format (indicated by bit 5 of the routing control Indicator, octet 1). Figure 7 shows the Type 1 format. For the Type 0 format, the list of network IDs begins with the second octet. For the Type 1 format, the routing control extension octet is added and the list of network IDs begins with the

third octet. Bits 1 and 2 in the routing control extension octet are reserved for network-specific routing control. The format of the ISNI routing control indicator is given in figure 8.

The Network ID is fixed at two octets. For large networks, the first octet is the NID in the SS7 Point Code and the second octet is coded with all zeros.[6)] For small networks, two octets are required to identify the network.

6.3 Procedures for ISNI-constrained routing

6.3.1 Actions at the origination SEP

When the SCCP at the originating node receives an N-UNITDATA request primitive from the application containing the following ISNI information elements, the SCCP understands this as a request to format an XUDT message that includes the optional SCCP ISNI parameter with the specified information.

– *Type of routing indicator:* These indicators may take the values “constrained,” “suggested,” or “neither.” (Suggested routing is for further study.)

– *Identification indicator:* These indicators may take the values “identify networks” or “do not identify networks.”

– *Type of ISNI indicator:* These indicators may be set to “Type 0 ISNI” or “Type 1 ISNI.”

– *Counter:* This value may be set to zero or one by the originating application as it provides an imaginary “pointer” that is used to locate routing and identification information. If the originating application provides the identification for its own network, then the counter should be set to one. Otherwise, the counter should be set to zero.

– *List of NIDs:* This is a list of network IDs. The list may be empty when the message leaves the origination node if constrained routing is not requested. If the message route is to be constrained, then the originating application will include the NID(s) of the “specified” intermediate network(s) in the constrained routing information of the message.

All of the information above must be provided if the originating application requests ISNI constrained routing, or ISNI identification, or both. The detailed format of the ISNI parameter is shown in 6.2.2.

If return on error is set in the XUDT message and if ISNI routing is desired by the originator for the XUDTS message, then the calling party address of the XUDT message must indicate routing on global title.

The message is then sent to a SCCP relay node for global title translation (GTT).[7)]

6.3.2 Actions at an ISNI-capable SCCP relay node

6.3.2.1 Invocation of the ISNI routing function

When the SCCP XUDT message containing the ISNI parameter is received at an ISNI-capable SCCP relay node, the routing control indicator of the ISNI parameter is examined to determine if the “type of routing indicator” is set to “constrained routing.”

If the “type of routing indicator” is set to “constrained routing” and if the Type 1 format is used, routing may be network-specific.

In the following, octet numbers in curly brackets ({ }) refer to the Type 0 format. Numbers in square brackets ([ ]) refer to the Type 1 format.

Since each NID is fixed at 2 octets, the counter in the routing control indicator aids the SCCP relay node in locating an imaginary “pointer” at the beginning of the{2 + 2*P*}th [3 + 2*P*]th octet of the ISNI parameter, where *P* is the value of the counter. The “pointer” is used to determine which NIDs should be used for routing and which NIDs should be considered identification information. The information below the “pointer” (i.e., the {2 + 2*P*}th [3 + 2*P*]th octet through the end of the parameter) is used for routing purposes while the information above the “pointer” (i.e., up to, but not including the {2 + 2*P*}th [3 + 2*P*]th octets) is identification information. Note that, if *P* = 0, there is no identification information in the message.

The following decision-making process is used by the SCCP relay node to perform ISNI routing:

a) The SCCP relay node checks the first NID after the “pointer,” i.e., octets {2 + 2*P*}th [3 + 2*P*] and {3 + 2*P*} [4 + 2*P*], where *P* is the value in the counter field. If this NID is the same as the NID in the PC of this node, then the “pointer” is advanced by incrementing the value in the counter field by one;

b) Step 1 is repeated. If this NID is also the same as the NID in the PC of this node, then error handling procedures are initiated;

c) If the first NID after the pointer is *not* the same as the NID in the PC of this node, then this NID will be used as a "key" to "select" a DPC that will forward the message to another node along the path toward (or in) the specified network.[8)]

ISNI-constrained routing results in the "selection" of a PC that is used as the DPC in the routing label of the transmitted message;

d) If there is no NID present after the "pointer," then routing will be performed based on the called party address, as described in chapter T1.112.4 in ANSI T1.112.

If the "type of routing indicator" in the ISNI parameter is set to "neither" (indicated by the C/S/N bits of the routing control indicator), then ISNI routing will not be performed. Therefore, routing will be performed based on the called party address, as described in chapter T1.112.4 of T1.112.

6.3.3 Actions at a not-ISNI-capable SCCP relay node

When a not-ISNI-capable node[9)] receives an SCCP XUDT message with a "pointer to an optional part," it performs routing based on the SCCP called party address, as described in chapter T1.112.4 of ANSI T1.112. There may be an "implicit relationship" between this network and some succeeding network in the message path. In this case, the GTT tables are configured to derive the DPC of a node in that particular succeeding network from the particular global title in the message.

The node shall, at least, be able to recognize the XUDT message type and transmit another XUDT message with the ISNI optional parameter(s) unchanged. Otherwise, the XUDT message will be discarded.

6.3.4 Actions at the destination SEP

The destination SEP does not perform any ISNI-routing functions. When the destination node receives a SCCP XUDT message containing the ISNI parameter, the received ISNI parameter carried there is sent up to the SCCP user as parameters in the N-UNITDATA indication primitive.

6.3.5 Error conditions

The following error conditions, which are specific to ISNI routing, would cause the error handling procedures to be invoked.

– The same NID appears two consecutive times in the list of NIDs;

– The message cannot be routed toward the network(s) specified in the constrained routing information;

– An invalid ISNI routing request (e.g., suggested routing requested or network specific routing error) is received.

Other non-ISNI-specific problems (such as a hop counter violation, unauthorized message, or message incompatibility) would also invoke SCCP error handling procedures.

6.4 Procedures for anticipation

This subclause specifies procedures for using the Transaction Capabilities Application Part (TCAP) to provide ISNI anticipation information. Invocation of ISNI, selection of which intermediate networks will be traversed, and the determination of which network identities should be included in the anticipation information are beyond the scope of these procedures.

6.4.1 Actions at the origination SEP

The service providing application invoking ISNI determines one or more intermediate network identities and inserts these as Network IDs in the SNIP shown in 6.2.1.

The application at the SEP inserts the SNIP into at least one component of the message to be sent. The number of components in a message that contain the SNIP is determined by the sending application.

6.4.2 Actions at an ISNI-capable SCCP relay node

There are no actions specific to the ISNI anticipation notification function at an ISNI-capable SCCP relay node. The TCAP portion of the message, with the ISNI anticipation information in it, is passed unchanged by a relay node.

6.4.3 Actions at a not-ISNI-capable SCCP relay node

There are no actions specific to the ISNI anticipation notification function at a not-ISNI-capable SCCP relay node. The TCAP portion of the message, with the ISNI anticipation information in it, is passed unchanged by a relay node.

6.4.4 Actions at the destination SEP

The contents of the TCAP SNIP parameter are passed to the destination application.

6.4.5 Error conditions

The detection of and reaction to erroneous anticipation notification information is specific to the application receiving that information and is outside the scope of this description.

6.5 Procedures for identification

6.5.1 Actions at the origination SEP

See 6.3.1.

6.5.2 Actions at an ISNI-capable SCCP relay node

6.5.2.1 Invocation of identification function

Conceptually, this identification function follows the ISNI routing process. In the following, octet numbers in curly brackets ({ }) refer to the Type 0 format. Numbers in square brackets ([ ]) refer to the Type 1 format.

The “mark for identification” indicator in the routing control indicator is examined to determine if the identification function is requested. If identification is requested, indicated by the value of bit 1 in octet 1, the following decision-making process is followed to identify a network.

a) If the value of the counter is 0, then any NIDs below the pointer are shifted down two octets and the resulting two empty octets below the pointer are filled with the NID of this node. Finally, the counter is incremented by one, indicating that the added NID is identification information. If the parameter length is greater than 14 before the NIDs are shifted, then error handling procedures are initiated;

or:

a) If the value of the counter is non-zero, the SCCP relay node examines the first NID above the “pointer” (octets {2*P*} [1 + 2*P*] and {1 + 2*P*} [2 + 2*P*], where *P* is the value in the counter field). If this NID is the same as the NID in the PC of this node, then no further identification is required and the ISNI parameter is unchanged;

b) If this NID is not the NID of this node’s PC, then any NIDs below the pointer are shifted down two octets and the resulting two empty octets below the pointer are filled with the NID of this node. Finally, the counter is incremented by one, indicating that the added NID is identification information. If the parameter length is greater than 14 before the NIDs are shifted, then error handling procedures are initiated.

If the “mark for identification” indicator in the ISNI parameter is set to “do not identify networks,” then the ISNI parameter is transmitted without any change by the identification function.

6.5.3 Actions at a not-ISNI-capable SCCP relay node

The identification function cannot be performed at a not-ISNI-capable SCCP relay node. The node shall, at least, be able to recognize the XUDT message type and transmit another XUDT message with the ISNI optional parameter unchanged. Otherwise, the XUDT message will be discarded.

6.5.4 Actions at the destination SEP

When the destination node receives a SCCP XUDT message containing the ISNI parameter, the received ISNI parameter carried there is sent up to the SCCP user as parameters in the N-UNITDATA indication primitive.

6.5.5 Error condition

The following error condition, which is specific to ISNI notification, would cause the error handling procedures to be invoked: There are no available fields in the ISNI parameter to add another NID to the list of NIDs when the identification function has been requested and another NID is to be added to the list.

6.6 Error handling procedures (message return)

When an XUDT message containing the ISNI parameter cannot be transferred to its destination, the message return function will be initiated, if requested. The purpose of the message return function is to return an Extended Unitdata Service (XUDTS) message indicating that a message has encountered routing failure and cannot be delivered to its final destination. The procedure may be initiated, for example, as a result of insufficient translation information or the inaccessibility of a subsystem or point code.

a) If the undeliverable message is a XUDT message; and

1) the option field is set to “return message on error,” then a XUDTS message is transferred to the Calling Party Address. (If the message is originated locally, an N-NOTICE indication primitive is invoked.);

2) the option field is *not* set to “return message on error,” then the message is discarded.

b) If the undeliverable message is an XUDTS message, then the message is discarded.

6.6.1 Procedures for deriving the XUDTS message

The node initiating the message return function should code the XUDTS message with the following information:

– The message type indicates an XUDTS message;

– The return cause field contains the reason for the message return. The possible cause values are:

  – no translation for an address of such nature;

  – no translation for this specific address;

  – subsystem congestion;

  – subsystem failure;

  – unequipped user;

  – network failure;

  – network congestion;

  – unqualified;

  – hop counter violation;

  – unable to perform ISNI identification [11111110 (decimal 254)]; ŧ

  – redundant ISNI-constrained routing information [11111101 (decimal 253)]; ŧ

  – cannot perform ISNI-constrained routing [11111100 (decimal 252)]; ŧ

  – message incompatibility [11111011 (decimal 251)];

  – unauthorized request [11111010 (decimal 250)];

  – invalid ISNI routing request [11111001 (decimal 249)]; ŧ

NOTE – ŧ = ISNI-specific return causes.

– Pointers to the following parameters should be provided:

  – called party address;

  – calling party address;

  – data;

– optional parameter(s);

– The SCCP called party address is based on the calling party address in the XUDT message;

– The SCCP calling party address is based on the called party address in the XUDT message;

– The data field in the XUDTS message should be identical to that contained in the XUDT message;

– The XUDTS message should contain the ISNI parameter as possibly modified in this node by the ISNI-constrained routing information, or the ISNI identification functions, or both. The value of the Mark for Identification bit is ignored since the identification function is not performed on an XUDTS message;

– The XUDTS message should be sent with the hop counter value reset to 15.

6.6.2 Procedures at SCCP relay nodes

6.6.2.1 Actions at an ISNI-capable SCCP relay node

6.6.2.1.1 Invocation of the ISNI routing function

When the SCCP XUDTS message containing the ISNI parameter is received at an ISNI-capable SCCP relay node, the routing control indicator is examined to determine the setting of the type of routing indicator. If the indicator is set to "Neither," then ISNI routing will not be performed. In this case, routing is performed based on the called party address, as described in chapter T1.112.4 of ANSI T1.112.

If the indicator is set to "constrained," then ISNI routing will be performed. Since the length of the NID field is fixed (i.e., at 2 octets), the counter in the routing control indicator aids the SCCP relay node in locating an imaginary pointer at the beginning of the {2 + 2*P*}th [3 + 2*P*]th octet of the ISNI parameter, where *P* is the value of the counter. The pointer is used to determine which NIDs should be used for routing. The information in the {second} [third] through {1 + 2*P*}th [2 + 2*P*]th octets is used for routing. Note that if *P* = 0, there is no routing information in the message. In this case, routing is performed based on the called party address as described in chapter T1.112.4 of ANSI T1.112.

The following decision-making process is used by the SCCP relay node to perform ISNI routing:

a) The SCCP relay node checks the NID in octets {2*P*} and {1 + 2*P*} [1 + 2*P*] and [2 + 2*P*], where *P* is the value of the counter field. If this NID is the same as the NID in the PC of this node, then the pointer is changed by decrementing the value in the counter field by one;

b) If the value in the counter field is now zero, routing is performed based on the called party address, as described in chapter T1.112.4 of ANSI T1.112;

c) If the counter field is non-zero and the NID in octets {2*P*} and {1 + 2*P*} [1 + 2*P*] and [2 + 2*P*] is not the same as the NID in the PC of this node, then this NID will be used as a "key" to select a DPC that will forward the message along the path toward (or in) the specified network.

The GTT results in the selection of a PC that is used as the DPC in the routing label of the transmitted message.

6.6.2.1.2 Invocation of the ISNI identification function

A SCCP relay node should not perform the ISNI Identification function on an XUDTS message. The mark for identification bit in the ISNI parameter is ignored.

6.6.2.2 Actions at a not-ISNI-capable SCCP relay node

When a not-ISNI-capable node receives an SCCP XUDTS message with a "pointer to an optional part," it performs routing based on the SCCP called party address, as described in chapter T1.112.4 of ANSI T1.112. There may be an "implicit relationship" between this network and some succeeding network in the message path. In this case, the GTT tables are configured to derive the DPC of a node in that particular succeeding network from the particular global title in the message. If the XUDTS message cannot be routed, then it should be discarded.

The not-ISNI-capable node shall, at least, be able to recognize the XUDTS message type and transmit another XUDTS message with the ISNI optional parameter unchanged. Otherwise, the XUDTS message shall be discarded.

6.6.3 Actions at the destination node

When an XUDTS message is received at the destination node, an N-NOTICE indication primitive is invoked.

Annex A
(normative)

ISNI SDL

Annex B
(informative)

Examples of ISNI message content

Figure B.1 shows a message path from origination network A, through a branch point STP (2) in the origination network, passing through two intermediate networks (B and C) to reach destination network D. Tables B.1–B.12 show the pertinent message content as the messages traverse the networks and are modified by the translating STPs.

In Figure B.1, the digits under each symbol denote the SS7 point code of their respective nodes. The letters denote the ISNI NIDs corresponding to their respective networks.
In the tables, GT(*x*) denotes a global title that will eventually be translated to the point code of node *x* and the appropriate SSN at that node (denoted SSN = *x*). For ease of reading, the point code and SSN at a node are assigned the same digit. In addition, the following abbreviations are used:

CdPA	SCCP called party address
CgPA	SCCP calling party address
Counter	Counter in the ISNI Parameter (range 0 to 7)
List	The list of NIDs in the ISNI Parameter

B.1 Constrained routing only

In this example, the originating application constrains the message to traverse networks B and C to reach network D. Including the NID of network D in the constrained routing list is not necessary to deliver the message to node 9.

B.2 Identification only

In this example, the originating application does not constrain the message route, but the message traverses networks B and C to reach network D. The originating application requests identification and an ISNI-capable STP in each network inserts its NID into the list.

B.3 Unconstrained query with anticipation, Unconstrained reply

In this example, the notification information is carried from signalling end point 1 to signalling end point 9 as anticipation information in the TCAP portion of the query message. No notification information is needed in the reply message. Table B.3 shows the message content as the query message leaves each node.

The queried application receives the anticipation notification information. This information could notify the queried application that network C was to be transited, that network B was to be transited, or that both networks were to be transited. Assuming the anticipation information includes the network code of network C, table B.4 shows the message content as the reply message leaves each node.

B.4 Unconstrained query with anticipation, Constrained reply

In this example, the notification information is carried from signalling end point 1 to signalling end point 9 in the TCAP portion of the query message. No notification information is needed in the reply message. Table B.5 shows the message content as the query message leaves each node.

The queried application receives the anticipation notification information. This information could notify the queried application that network C was to be transited, that network B was to be transited, or that both networks were to be transited. This example assumes that, since network A used MTP routing to force the query into network B, network A may not be aware of the existence of network C and has not included network C in the anticipation information in the query. Table B.6 shows the message content as the reply message leaves each node.

B.5 Unconstrained query with identification, Constrained reply

In this example, the querying application does not include any anticipation notification information in the query. Instead, the query is marked for identification. Table B.7 shows the message content as the query message leaves each node.

The queried application receives the identification notification information. This information notifies the queried application that networks B, C, and D were transited. The queried application could recognize that it is part of network D and exclude this code from the constrained routing information in the reply message. This example illustrates that there is no harm in including this network code. If the querying application requires notification information, this may be carried as anticipation information. Table B.8 shows the message content as the reply message leaves each node.

Note that if identification is requested on the reply message, STP 2 would insert its network code in the message. If network D is not included in the message as sent from node 9 and identification is requested, STP 7 would insert its network code in the message.

B.6 Constrained query with identification, Constrained reply

In this example, the querying application constrains the query to transit networks B and C and marks the query for identification. Figure B.1 shows a message path from origination network A, through a branch point STP (2) in the origination network, passing through two intermediate networks (B and C) to reach destination network D. Table B.9 shows the message content as the query message leaves each node.

Note that STP 2 identifies itself, as any other STP in the message path does. To do this, it right-shifts the other network codes in the parameter to make room for its code. Similarly, STP 7 identifies itself.

The queried application receives the identification notification information. This information notifies the queried application that networks A, B, C, and D were transited. The queried application recognizes that it is part of network D and may optionally exclude this code from the constrained routing information in the reply message, as shown in this example. Similarly, if the queried application recognizes that network A is the destination network for the reply message, it may exclude the code of destination network A. Table B.10 shows the message content as the reply message leaves each node.

Note that if identification is requested on the reply message, STP 2 would insert its network code in the message. If network D is not included in the message as sent from node 9 and identification is requested, STP 7 would insert its network code in the message.

---

1) This does not preclude the intermediate network from being an end user service provider. However, this type of end user service is beyond the scope of this capability description.

2) Suggested routing is for further study.

---

3) Implicit selection is a non-ISNI function resulting from a signalling relationship between networks such that only the chosen network can be used to progress the message.

4) Multiple selection is for further study.

---

5) The ISNI function involves invocation of ISNI-constrained routing and/or ISNI notification (anticipation or identification).

6) The option to code the second octet with a cluster value is for further study.

7) The message is assumed to be addressed to an intermediate node (where GTT occurs), since ISNI is invoked to assure that constrained routing, identification, or both will occur at one or more intermediate nodes in the message path. At this point, the next network that is required to be in the message path may be known only through its NID. The GTT process yields either: (a) a full Point Code (PC) in that network, or (b) the PC of a node between the present node and that network. In the response message, the global title contains a point code and only one internetwork translation type value may be needed for response messages of this type, regardless of their service type.

8) The presence of the ISNI parameter does not, by itself, imply that the routing will be based on ISNI information. The *data* in this parameter serves the dual purpose of containing ISNI routing information as well as identification information if the application has requested “mark for identification."

---

9) In what follows, not-ISNI-capable refers to the *inability* to parse and interpret the information in the ISNI parameter. It is assumed that the not-ISNI-capable SCCP relay node is capable of recognizing the XUDT message.

Message leaving node number	**MTP**		**SCCP**					
	OPC	**DPC**	**CdPA**	**CgPA**	**Counter**	**List**		
1	1	2	GT(9)	PC=1, SSN=1	0	B	C	D
2	2	3	GT(9)	PC=1, SSN=1	0	B	C	D
3	3	5	GT(9)	PC=1, SSN=1	1	B	C	D
4	3	5	GT(9)	PC=1, SSN=1	1	B	C	D
5	5	7	GT(9)	PC=1, SSN=1	2	B	C	D
6	5	7	GT(9)	PC=1, SSN=1	2	B	C	D
7	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D
8	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D

Message leaving node number	MTP		SCCP					
	OPC	DPC	CdPA	CgPA	Counter	List		
1	1	3	GT(9)	PC=1, SSN=1	0			
2	1	3	GT(9)	PC=1, SSN=1	0			
3	3	5	GT(9)	PC=1, SSN=1	1	B		
4	3	5	GT(9)	PC=1, SSN=1	1	B		
5	5	7	GT(9)	PC=1, SSN=1	2	B	C	
6	5	7	GT(9)	PC=1, SSN=1	2	B	C	
7	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D
8	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D

Message leaving node number	MTP		SCCP			
	OPC	DPC	CdPA	CgPA	Counter	List
1	1	3	GT(9)	PC=1, SSN=1	0	
2	1	3	GT(9)	PC=1, SSN=1	0	
3	3	7	GT(9)	PC=1, SSN=1	0	
4	3	7	GT(9)	PC=1, SSN=1	0	
5	3	7	GT(9)	PC=1, SSN=1	0	
6	3	7	GT(9)	PC=1, SSN=1	0	
7	7	9	PC=9, SSN=9	PC=1, SSN=1	0	
8	7	9	PC=9, SSN=9	PC=1, SSN=1	0	

Message leaving node number	MTP		SCCP			
	OPC	DPC	CdPA	CgPA	Counter	List
9	9	6	GT(1)	PC=9, SSN=9	0	
8	9	6	GT(1)	PC=9, SSN=9	0	
7	9	6	GT(1)	PC=9, SSN=9	0	
6	6	2	GT(1)	PC=9, SSN=9	0	
5	6	2	GT(1)	PC=9, SSN=9	0	
4	6	2	GT(1)	PC=9, SSN=9	0	
3	6	2	GT(1)	PC=9, SSN=9	0	
2	2	1	PC=1, SSN=1	PC=9, SSN=9	0	

Message leaving node number	MTP		SCCP			
	OPC	DPC	CdPA	CgPA	Counter	List
1	1	3	GT(9)	PC=1, SSN=1	0	
2	1	3	GT(9)	PC=1, SSN=1	0	
3	3	7	GT(9)	PC=1, SSN=1	0	

4	3	7	GT(9)	PC=1, SSN=1	0			
5	3	7	GT(9)	PC=1, SSN=1	0			
6	3	7	GT(9)	PC=1, SSN=1	0			
7	7	9	PC=9, SSN=9	PC=1, SSN=1	0			
8	7	9	PC=9, SSN=9	PC=1, SSN=1	0			

Message leaving node number	MTP		SCCP					
	OPC	DPC	CdPA	CgPA	Counter		List	
9	9	7	GT(PC=1)	PC=9, SSN=9	0	B		
8	9	7	GT(PC=1)	PC=9, SSN=9	0	B		
7	7	4	GT(PC=1)	PC=9, SSN=9	0	B		
6	7	4	GT(PC=1)	PC=9, SSN=9	0	B		
5	7	4	GT(PC=1)	PC=9, SSN=9	0	B		
4	4	2	GT(PC=1)	PC=9, SSN=9	1	B		
3	4	2	GT(PC=1)	PC=9, SSN=9	1	B		
2	2	1	PC=1, SSN=1	PC=9, SSN=9	1	B		

Message leaving node number	MTP		SCCP					
	OPC	DPC	CdPA	CgPA	Counter		List	
1	1	3	GT(9)	PC=1, SSN=1	0			
2	1	3	GT(9)	PC=1, SSN=1	0			
3	3	5	GT(9)	PC=1, SSN=1	1	B		
4	3	5	GT(9)	PC=1, SSN=1	1	B		
5	5	7	GT(9)	PC=1, SSN=1	2	B	C	
6	5	7	GT(9)	PC=1, SSN=1	2	B	C	
7	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D
8	7	9	PC=9, SSN=9	PC=1, SSN=1	3	B	C	D

Message leaving node number	MTP		SCCP					
	OPC	DPC	CdPA	CgPA	Counter		List	
9	9	7	GT(1)	PC=9, SSN=9	0	D	C	B
8	9	7	GT(1)	PC=9, SSN=9	0	D	C	B
7	7	6	GT(1)	PC=9, SSN=9	1	D	C	B
6	6	4	GT(1)	PC=9, SSN=9	2	D	C	B
5	6	4	GT(1)	PC=9, SSN=9	2	D	C	B
4	4	2	GT(1)	PC=9, SSN=9	3	D	C	B
3	4	2	GT(1)	PC=9, SSN=9	3	D	C	B
2	2	1	PC=1, SSN=1	PC=9, SSN=9	3	D	C	B

Message leaving node number	MTP		SCCP						
	OPC	DPC	CdPA	CgPA	Counter	List			
1	1	2	GT(9)	PC=1, SSN=1	0	B	C		
2	2	3	GT(9)	PC=1, SSN=1	1	A	B	C	
3	3	5	GT(9)	PC=1, SSN=1	2	A	B	C	
4	3	5	GT(9)	PC=1, SSN=1	2	A	B	C	
5	5	7	GT(9)	PC=1, SSN=1	3	A	B	C	
6	5	7	GT(9)	PC=1, SSN=1	3	A	B	C	
7	7	9	PC=9, SSN=9	PC=1, SSN=1	4	A	B	C	D
8	7	9	PC=9, SSN=9	PC=1, SSN=1	4	A	B	C	D

Message leaving node number	MTP		SCCP						
	OPC	DPC	CdPA	CgPA	Counter	List			
9	9	7	GT(1)	PC=9, SSN=9	0	C	B		
8	9	7	GT(1)	PC=9, SSN=9	0	C	B		
7	7	6	GT(1)	PC=9, SSN=9	0	C	B		
6	6	4	GT(1)	PC=9, SSN=9	1	C	B		
5	6	4	GT(1)	PC=9, SSN=9	1	C	B		
4	4	2	GT(1)	PC=9, SSN=9	2	C	B		
3	4	2	GT(1)	PC=9, SSN=9	2	C	B		
2	2	1	PC=1, SSN=1	PC=9, SSN=9	2	C	B		

Message leaving node number	MTP		SCCP						
	OPC	DPC	CdPA	CgPA	Counter	List			
1	1	2	GT(9)	GT(PC=1)	0	B	C		
2	2	3	GT(9)	GT(PC=1)	1	A	B	C	
3	3	5	GT(9)	GT(PC=1)	2	A	B	C	
4	3	5	GT(9)	GT(PC=1)	2	A	B	C	
5	5	7	GT(9)	GT(PC=1)	3	A	B	C	
6	5	7	GT(9)	GT(PC=1)	3	A	B	C	

Message leaving node number	MTP		SCCP						
	OPC	DPC	CdPA	CgPA	Counter	List			
7	7	6	GT(PC=1)	GT(9)	3	A	B	C	
6	6	4	GT(PC=1)	GT(9)	2	A	B	C	
5	6	4	GT(PC=1)	GT(9)	2	A	B	C	
4	4	2	GT(PC=1)	GT(9)	1	A	B	C	
3	4	2	GT(PC=1)	GT(9)	1	A	B	C	

2	2	1	PC=1, SSN=1	GT(9)	0	A	B	C