ATIS-1000674.2002(R2012)

BICC CS1+ : Signaling Transport Converters (STCs)

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ATIS-1000674.2002(R2012), *BICC CS1+ : Signaling Transport Converters (STCs)*

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American National Standard for Telecommunications

BICC CS1+: Signaling Transport Converters (STCs)

Secretariat

Alliance for Telecommunications Industry Solutions

Approved February 13, 2002

American National Standards Institute, Inc.

Abstract

This standard describes the Generic Signaling Transport Service that can be deployed by means of Signaling Transport Converters (STCs) over a range of signaling transport protocol stacks. It also specifies the STC for MTP3, and the STC for SSCOP and SSCOPMCE. It is organized as follows:

- T1.674.0 – Generic Signaling Transport Service
- T1.674.1 – Signalling Transport Converter on MTP3
- T1.674.2 – Signalling Transport Converter on SSCOP and SSCOPMCE
- T1.674.3 – STC on SCTP

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 standard defines the Gereric Signaling Transport Service and Signaling Transport Converters (STCs) for specific protocols. Specifically, STCs are defined for the Message Transfer Part (MTP) and the Service Specific Connection-Oriented Protocol (SSCOP). The Generic Signaling Transport Service together with the STCs allow an application (e.g., BICC) to be deployed over a range of signaling transport protocol stacks.

Suggestions for improvement of this standard are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, 1200 G Street NW, Suite 500, Washington, D.C., 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:

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Generic Signaling Transport Service

1 Scope

This standard describes the Generic Signaling Transport Service. It allows the definition of signaling specifications without consideration of the idiosyncrasies of the underlying signaling transport mechanisms.

This standard also describes the interface states and the definition of the service by a number of primitives. The Generic Signaling Transport Service can be deployed by means of Signaling Transport Converters over a range of signaling transport protocol stacks.

NOTE — Signaling Transport Converters are defined, for example, in Chapters T1.674.1 and T1.674.2.

This standard is based on the requirements defined in T1.TR.69-2000, *Signaling Requirements for the Support of Narrowband Services Via Broadband Transport Technologies*, and T1.TR.71-2001, *Signaling Requirements for the Support of Narrowband Services via Broadband Transport Technologies, CS1+*.

2 Normative References

The following standards and other references contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All Standards and other references are subject to revisions; all users of this standard are therefore encouraged to investigate the possibility of applying the most recent edition of the Standards and other references listed below.

ITU-T Recommendation X.200 (1994), *Information Technology — Open Systems Interconnection - Basic reference model: The basic model*.[1]

ITU-T Recommendation X.210 (1993), *Information Technology — Open Systems Interconnection - Basic reference model: Conventions for the definition of OSI services*.[1]

3 Definitions

This standard is based upon the concepts developed in ITU-T Recommendations X.200 and X.210 and on ITU-T Recommendation Q.2150.0 . In addition, for the purpose of this standard, the following definitions apply:

[1] This document is available from the International Telecommunications Union.
< http://www.itu.int/ITU-T/ >

3.1 Generic Signaling Transport Service: The function that enables a signaling entity to communicate with a peer signaling entity independently of the underlying signaling transport.

3.2 Signaling Transport: A signaling link or network that connects two signaling entities.

3.3 Signaling Transport Converter: A function that converts the services provided by a particular Signaling Transport to the services required by the Generic Signaling Transport Service.

4 Abbreviations & Acronyms

AAL	ATM Adaptation Layer
ANSI	American National Standards Institute
BICC	Bearer Independent Call Control
CIC	Call Instance Code
GST	Generic Signaling Transport
IETF	Internet Engineering Task Force
LM	Layer Management
MTP	Message Transfer Part
MTP3	Message Transfer Part level 3
PDU	Protocol Data Unit
SAAL	ATM Adaptation Layer for Signaling
SAP	Service Access Point
SAR	Segmentation and Reassembly (Sublayer)
SCTP	Stream Control Transmission Protocol
SDU	Service Data Unit
SI	Service Indicator
SIO	Service Information Octet
SSCOP	Service Specific Connection Oriented Protocol
SSCOPMCE	Service Specific Connection Oriented Protocol in a Multilink and Connectionless Environment
SSCS	Service Specific Convergence Sublayer
STC	Signaling Transport Converter
SVC	Switched Virtual Channel
TED	Transmission Error Detection
VCC	Virtual Channel Connection
VPC	Virtual Path Connection

5 Framework of the Generic Signaling Transport Service

5.1 General Framework

A signaling protocol entity makes use of the Generic Signaling Transport service which is provided by the Signaling Transport Converter (for example, see T1.674.1 or T1.674.2,). The Generic Signaling Transport enables a signaling entity to communicate with a peer signaling entity independently of the underlying signaling transports.

This framework is illustrated in Figure 1/T1.674.0.

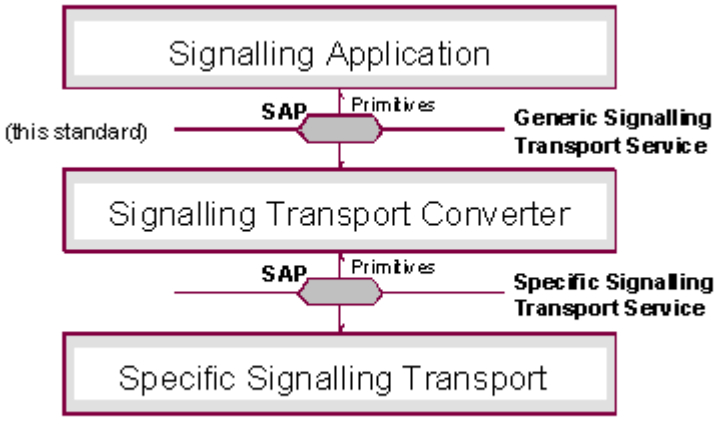

Figure 1/T1.674.0 - Framework of the Generic Signaling Transport Service

Signaling protocols can be deployed over a range of signaling transport protocol stacks. Two peer signaling entities rely on the Generic Signaling Transport service to provide assured data transfer between them and service availability indications (i.e., signaling messages are exchanged between peer protocol entities using the Generic Signaling Transport Service).

Example protocol stacks are shown in Figure 2/T1.674.0.

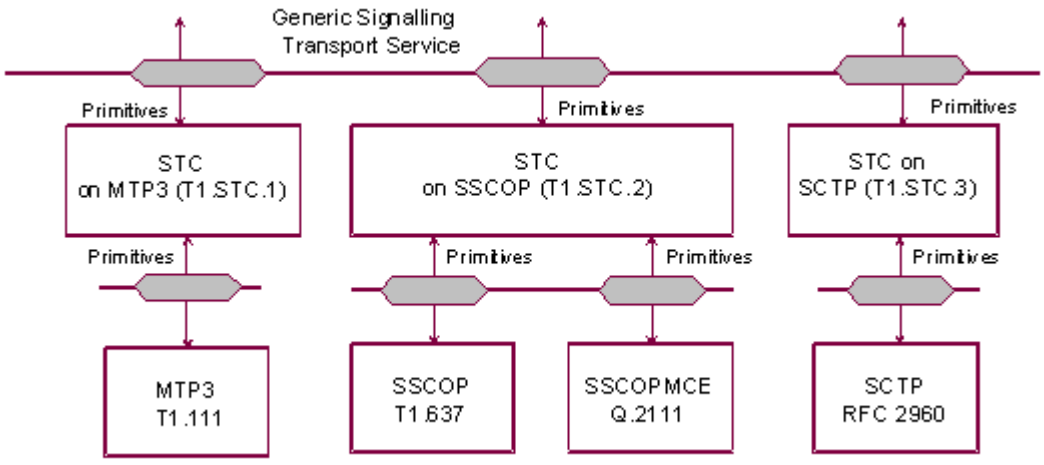

Figure 2/T1.674.0 - Example Protocol Stacks for the Generic Signaling Transport Service

5.2 Conventions

This standard specifies the information flow across the Signaling Transport Converter - signaling entity boundary. Conceptually, there exists one STC entity per signaling association. A signaling entity transfers or receives signaling messages on a particular signaling association by utilizing a particular SAP.

6 Service definition

6.1 Primitives between signaling entities and the Generic Signaling Transport

The services are provided through the transfer of primitives that are summarized in Table 1/T1.674.0, and are defined as follows.

a) *IN-SERVICE.indication*: This primitive indicates that the signaling transport is able to exchange signaling messages with the peer entity. This indication shall be provided without the signaling entity requesting any service across the SAP.

b) *OUT-OF-SERVICE.indication*: This primitive indicates that the signaling transport is unable to exchange signaling messages with the peer entity. This indication shall be provided without the signaling entity requesting any service across the SAP.

c) *TRANSFER.request*: This primitive is used by the signaling entity to convey a signaling message to its peer entity.

d) *TRANSFER.indication*: This primitive provides a signaling message from the peer entity to the signaling entity.

e) *CONGESTION.indication*: This primitive is used to convey information concerning signaling network congestion.

NOTE - Some Signaling Transport services may not issue the CONGESTION.indication primitive.

f) *START-INFO.indication*: This primitive indicates at start-up to the signaling entity the maximum length of an SDU that the STC can transfer, and whether this signaling entity is the controlling node of the call association.

Table 1/T1.674.0 - Primitives and parameters of the Generic Signaling Transport Sublayer

Primitive	Type			
Generic Name	**Request**	**Indication**	**Response**	**Confirm**
START-INFO	-	Max_Length CIC_Control	-	-
IN-SERVICE	-	Level	-	-
OUT-OF-SERVICE	-	(Note 1)	-	-
CONGESTION	-	Level	-	-
TRANSFER	Sequence Control STC User Data Priority (Note 2)	STC User Data Priority (Note 2)	-	-

- : This primitive is not defined

NOTES

1 This primitive has no parameters

2 The use of this parameter is not supported by all signaling transports

6.2 Parameters

a) *CIC_Control:* This parameter indicates to the signaling entity whether it serves as the controlling entity for either the odd or even CIC values on this call association.

b) *Level:* This parameter indicates the level of congestion.

c) *Max_Length:* This parameter indicates the maximum length of signaling messages that can be transported on this signaling association.

NOTE 1 - The length indicated is a characterization of the underlying signaling transport's length limitations and -- in case of MTP transport -- includes the MTP header (see T1.111.4-2001). In particular:

– The value "272" is used to indicate interworking with MTP3 signaling transports using a MTP2 link level protocol (see T1.111.1-2001),

– The value "4096" is used to indicate interworking with MTP3 signaling transports using a link level protocol other than MTP2 (e.g., SAAL, see T1.111.1-2001), and

– The value "65'328" is used to indicate interworking with SSCOP signaling transports (see T1.637-1999 and ITU-T Q.2111).

d) *Priority:* This parameter indicates the priority of the signaling message.

e) *Sequence Control:* This parameter indicates to the STC a value that can be used by the underlying signaling transport for load sharing and/or in-sequence delivery. Signaling messages accompanied by the same Sequence Control value shall be delivered in-sequence.

f) *STC User Data:* This parameter contains a complete signaling message; it represents the STC SDU.

6.3 Establishment

On the establishment of a signaling transport and the associated signaling transport converter entity (for example, at power up), the initial conditions are the same as if an OUT-OF-SERVICE.indication had been conveyed across this SAP. Also, at this time the START-INFO.indication is sent to the signaling entity.

6.4 State transition diagram for sequences of primitives of the Generic Signaling Transport Service

This subclause defines the constraints on the sequences in which the primitives may occur at the layer boundaries of the Generic Signaling Transport service. The sequences are related to the states at one Generic Signaling Transport endpoint between the Generic Signaling Transport service provider and its user. The possible overall sequences of primitives are shown in the state transition diagram, Figure 3/T1.674.0.

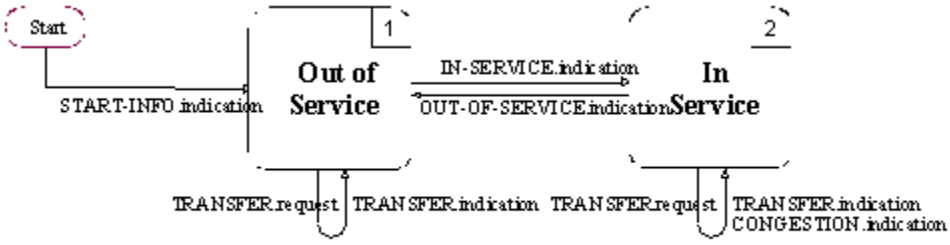

Figure 3/T1.674.0 - State transition diagram for sequences of primitives

Annex A/T1.674.0

(informative)

A Bibliography

The following documents contain information that may be useful to understanding the usage of this Recommendation. There are no additional provisions of this Standard derived from these documents.

T1.TR.69-2000, *Signaling Requirements for the Support of Narrowband Services Via Broadband Transport Technologies*.[2]

T1.TR.71-2001, *Signaling Requirements for the Support of Narrowband Services via Broadband Transport Technologies, CS1+*.[2]

T1.674.1-2002, *Signaling Transport Converter on MTP3*.[2]

T1.674.2-2002, *Signaling Transport Converter on SSCOP and SSCOPMCE*.[2]

T1.111-2001, *Signaling System Number 7 (SS7) – Message Transfer Part*.[2]

T1.637-1999, *B-ISDN ATM Adaptation Layer – Service Specific Connection Oriented Protocol (SSCOP)*.[2]

ITU-T Recommendation Q.2111, *Service Specific Connection Oriented Protocol in a Multi-link and Connectionless Environment (SSCOPMCE)*.[1]

ITU-T Recommendation Q.2150.0, *Generic Signaling Transport Service*.[1]

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Signaling Transport Converter on MTP3

1 Scope

This standard specifies the signaling transport converter sublayer on top of the Message Transfer Part (MTP) specified in T1.111.4-2001, *MTP3*. T1.111.4-2001 specifies the peer-to-peer protocol for the transfer of information and control between any pair of MTP level 3 entities. This standard allows for both MTP2 and SAAL as the underlying link layer below MTP3. This standard covers the specification of the sublayer structure, the PDU structures of the signaling transport converter sublayer, and the mechanisms for the provision of the Generic Signaling Transport Service.

When this Signaling Transport Converter on MTP is applied for a signaling protocol entity, that entity is liberated from considering peculiarities of the underlying signaling transport service. This is achieved by relying on a Generic Signaling Transport Service that is provided, for example, by the sublayer specified in this standard.

This standard describes the interactions between the Signaling Transport Converter (STC) and the next higher layer, i.e., the BICC signaling protocol entity, between the STC and the Message Transfer Part, and between the STC and layer management.

2 Normative References

The following standards and other references contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All Standards and other references are subject to revisions; all users of this standard are therefore encouraged to investigate the possibility of applying the most recent edition of the Standards and other references listed below.

ITU-T Recommendation X.200, *Information Technology — Open Systems Interconnection — Basic reference model: The basic model*.[1]

ITU-T Recommendation X.210, *Information Technology — Open Systems Interconnection — Basic reference model: Conventions for the definition of OSI services*.[1]

T1.674.0-2002, *Generic Signalling Transport Service*.[2]

T1.111-2001, *Signalling System No.7 (SS7) Message Transfer Part (MTP)*.[2]

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1 This document is available from the International Telecommunications Union.
< http://www.itu.int/ITU-T/ >

2 This document is available from the Alliance for Telecommunications Industry Solutions, 1200 G Street N.W., Suite 500, Washington, DC 20005. <http://www.atis.org>

T1.113.4-2000, Signalling System No.7 (SS7) - *ISDN User Part Signalling Procedures*.[2]

3 Definitions

This standard is based upon the concepts developed in ITU-T Recommendations X.200 and X.210.and Q.2150.1, and terminology used in this document is intended to be consistent with the definitions in the ITU-T Recommendations.

4 Abbreviations& Acronyms

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
CIC	Call Instance Code
CL	Congestion Level
DPC	Destination Point Code
MTP	Message Transfer Part
NI	Network Indicator
NNI	Network Node Interface
OPC	Originating Point Code
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
SAP	Service Access Point
SDL	System Definition Language
SDU	Service Data Unit
SI	Service Indicator
SIO	Service Information Octet
SLS	Signaling Link Selection Code
STC	Signaling Transport Converter

5 General Description of the Signaling Transport Converter on MTP3

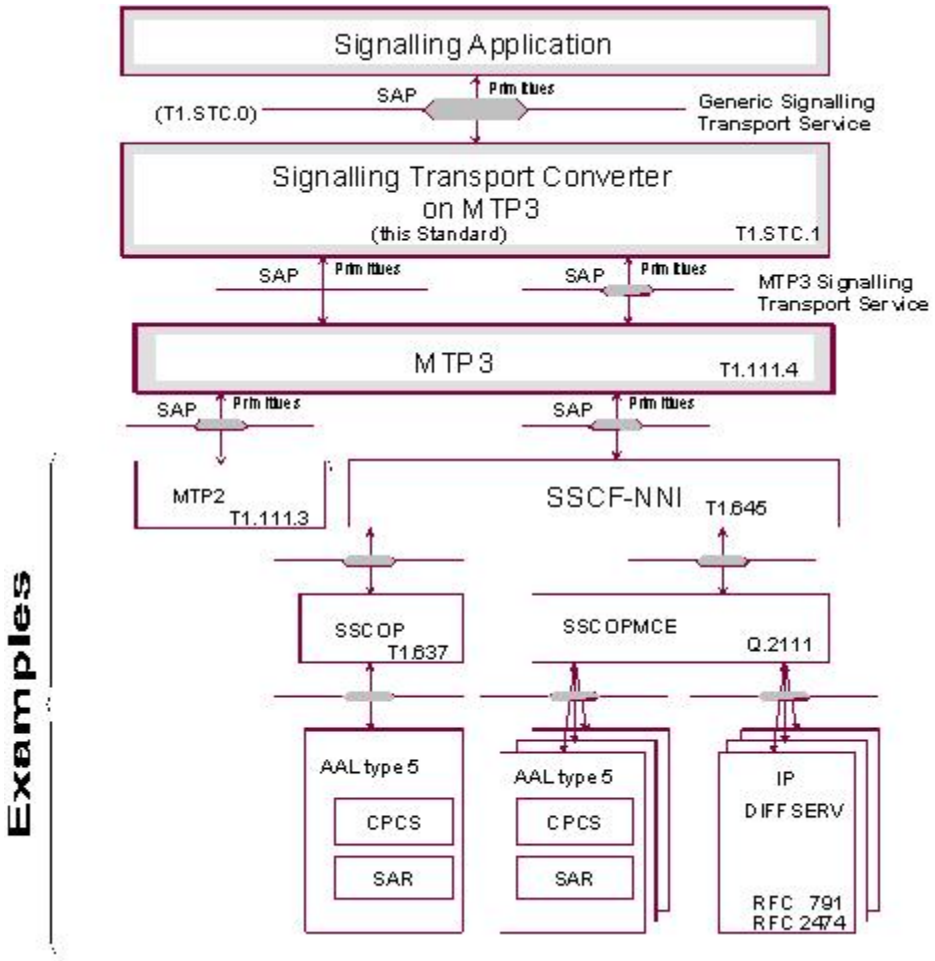
5.1 Structure of the Signaling Transport Converter on MTP3

The sublayer providing the STC resides on top of the MTP. It uses the services provided by level 3 of the Message Transfer Part defined in T1.111-2001.

The STC provides for the service that is requested by the Generic Signaling Transport Service defined in T1.674.0, where the signaling protocol makes use of this service. The complete protocol stack is illustrated in Figure 1/T1.674.1

This standard specifies:

– The interactions between the STC and the signaling protocol entity,
– The interactions between the STC and the MTP level 3 sublayer, and
– The interactions between the STC and layer management.



NOTE - The Service Access Points shown in this diagram are for modeling purposes only. They are not necessarily visible or accessible from outside.

Figure 1/T1.674.1 - Structure of the Signaling Transport Converter on MTP3

5.2 Services provided by the STC

The STC provides for the transparent transfer of data -- i.e., signaling application (STC User) data between peer STC users. The supporting communication resources to achieve this transfer stay invisible to the signaling application.

In particular, the STC service provides for:

a) *Independence from the underlying transmission media*: The STC service relieves its users from all concerns of the manner in which the STC service is provided. Except for possible influences of the quality of service, the transfer of data over different underlying networks is, thus, invisible.

b) *Transparency of the information transferred*: The STC service provides for the transparent transfer of octet-aligned STC User data. It does not restrict the content, format, or coding of the information, nor is there ever a need to interpret its structure or meaning.

c) *Service Availability Reporting*: As the underlying service (MTP) reports about availability/unavailability of the data transfer service, after the necessary translation, these notifications are forwarded to the STC User.

5.3 Functions of the STC

The STC performs the following functions:

a) *Data transfer service availability reporting to the STC User*: This function reports the availability or unavailability of the MTP message transfer service to the user of the STC.

b) *Congestion reporting to BICC*: This function translates and forwards the congestion indications provided by the MTP to the BICC.

c) *Maximum length indication to the STC user*: This function indicates to the STC user the maximum length of the PDU that the STC can transfer; it is indicated at creation of the STC entity.

d) *CIC control indication to the STC user*: This function indicates to the STC user, at creation of the STC entity, whether it serves as the controlling node for either the odd or even CIC values of the call association.

6 Elements for layer-to-layer communication

6.1 The Generic Signaling Transport Service

The Generic Signaling Transport Service is specified in T1.674.0. For convenience, a summary of the primitives for accessing the service is reproduced in Table 1/T1.674.1. In the event of any difference between this table and the definitions in T1.674.0, the definitions in T1.674.0 take precedence.

Table 1/T1.674.1 - Primitives and parameters of the Generic Signaling Transport Sublayer

Primitive	Type			
Generic Name	Request	Indication	Response	Confirm
START-INFO	-	Max_Length CIC_Control	-	-
IN-SERVICE	-	Level	-	-
OUT-OF-SERVICE	-	(Note 1)	-	-
CONGESTION	-	Level	-	-
TRANSFER	Sequence Control STC User Data Priority	STC User Data Priority	-	-

- : This primitive is not defined

NOTE

1 This primitive has no parameters

On the establishment of a STC entity and the associated STC user entity (for example, at power up), the initial condition is the same as if an OUT-OF-SERVICE.indication primitive had been conveyed across this SAP. Also, at this time the START-INFO.indication is sent to the signaling entity.

6.2 The Service provided by MTP

This subclause specifies the information flow across the Signaling Transport Converter - Message Transfer Part Level 3 (MTP3) boundary. This boundary is defined in T1.111.1 and is summarized below. In the event of any difference between the following summary and the definitions in T1.111.1, the definitions in T1.111.1 take precedence.

The primitives and parameters between the STC and MTP3 are shown in Table 2/T1.674.1.

NOTE -- This service corresponds to the “Specific Signaling Transport Service” in Figure 1/T1.674.0 in T1.674.0.

Table 2/T1.674.1 - Message Transfer Part service primitives

Primitive	Type			
Generic Name	Request	Indication	Response	Confirm
MTP-TRANSFER	OPC (see 2.2/T1.111.4) DPC (see 2.2/T1.111.4) SLS (see 2.2/T1.111.4) (Note 1) SIO (see 14.2/T1.111.4) User Data (see 2.3.8/T1.111.3)	OPC (see 2.2/T1.111.4) DPC (see 2.2/T1.111.4) SLS (see 2.2/T1.111.4) (Note 1) SIO (see 14.2/T1.111.4) User Data (see 2.3.8/T1.111.3)	-	-
MTP-PAUSE (Stop)	-	Affected DPC[a)]	-	-
MTP-RESUME (Start)	-	Affected DPC[a)]	-	-
MTP-STATUS	-	Affected DPC Cause (Note 2)	-	-

- : This primitive is not defined
a) See 7.2.6 of T1.111.1.

NOTES

1 The MTP users should take into account that this parameter is used for load sharing by the MTP, therefore, the SLS values should be distributed as equally as possible. The MTP guarantees (to a high degree of probability) an in-sequence delivery of messages which contain the same SLS code.

2 The Cause parameter has, at present, four values:

i) Signaling network congested (plus congestion level)

ii) User Part Unavailability: unknown.

iii) User Part Unavailability: unequipped remote user.

iv) User Part Unavailability: inaccessible remote user.

6.2.1 Primitive definition

a) *MTP-TRANSFER*: The primitive “MTP-TRANSFER” is used between level 4 and level 3 (SMH) to provide the MTP message transfer service (i.e., to transfer STC PDUs from one STC peer entity to the other).

b) *MTP-PAUSE*: The primitive “MTP-PAUSE” indicates to the “Users” the total inability of providing the MTP service to the specified destination (see T1.111.1, clause 5).

The signaling point is inaccessible via the MTP. The MTP will determine when the signaling point is again accessible and send MTP-RESUME indication. The user should wait for such an indication and meanwhile should not send normal messages to that signaling point. If the remote peer user is thought to be unavailable, that condition may be maintained or cancelled at the local user’s discretion.

c) *MTP-RESUME*: The primitive “MTP-RESUME indicates to the “User” the ability of providing the MTP service to the specified destination (see T1.111.1, clause 5).

This primitive corresponds to the destination accessible state as defined in T1.111.4.

When the MTP-RESUME indication is given to each user, the MTP does not know whether the remote peer user is available. This is the responsibility of each user.

d) *MTP-STATUS*: The primitive “MTP-STATUS” indicates to the “Users” the partial inability of providing the MTP service to the specified destination.

In the case of signaling link congestion with multiple priorities, the “MTP-STATUS” primitive is used to indicate a change of congestion level.

In the case of remote user unavailability, the user is responsible for determining the availability of this peer user. The user is cautioned not to send normal traffic to the peer user, because while such peer is unavailable, each message will be delivered but will result in a repeated MTP-STATUS indication. The MTP will not send any further indications about the unavailability or availability of this peer user unless interrupted by an MTP-PAUSE indication, or unless the local user continues to send messages to the peer user.

6.2.2 Parameter definition

Table 2/T1.674.1 lists the parameters associated with each MTP primitive. The definition of the parameters is as follows:

a) *Originating Point Code (OPC)*: The OPC parameter indicates the originating point of the message (see T1.111.4, clause 2.2).

NOTE -- This parameter is a fixed value per STC entity.

b) *Destination Point Code (DPC)*: The DPC parameter indicates the destination point of the message (see T1.111.4, clause 2.2).

NOTE -- This parameter is a fixed value per STC entity.

c) *Signaling Link Selection Code (SLS)*: Selection of the SLS parameter is based on the Sequence Control parameter received in the TRANSFER.request primitive (see T1.111.4, clause 2.2).

NOTE -- The MTP users should take into account that this parameter is used for load sharing by the MTP; therefore, the SLS values should be distributed as equally as possible. The MTP guarantees (to a high degree of probability) an in-sequence delivery of messages that contain the same SLS code.

d) *Service Information Octet (SIO)*: The service information octet of message signal units contains the Service Indicator (SI) and the sub-service field. The service indicator indicates an STC user entity, e.g., BICC, (see T1.111.4, § 14.2).

e) *User Data*: The User Data parameter carries the PDUs constructed before transmission and interpreted upon receipt by the STC (see T1.111.3, clause 2.3.8).

f) *Cause*: The cause parameter has, at present, four values:

1) Signaling network congestion (plus congestion level).

2) User part unavailability – unknown.

3) User part unavailability – unequipped remote user.

4) User part unavailability – inaccessible remote user.

g) *Affected DPC*: Destination Point Code identifying the node, the state of which is reported by the corresponding primitive (see T1.111.4).

6.2.3 Restart

When the MTP restart procedure is terminated, the MTP indicates the end of MTP restart to all local MTP Users by sending MTP-RESUME primitives for all accessible destinations (see T1.111.4, clause 9).

6.3 Primitives between the STC and layer management

This subclause specifies the information flow across the STC - Layer Management boundary.

The repertoire of primitives between STC and layer management is listed in Table 3/T1.674.1.

Table 3 - /T1.674.1 - Primitives and parameters between the STC and layer management

Primitive	Type			
Generic Name	Request	Indication	Response	Confirm
MSTC-ERROR	-	Cause	-	-
- : This primitive is not defined				

6.3.1 Primitive definition

– *MSTC-ERROR*: MSTC-ERROR primitives are used to inform layer management about errors.

6.3.2 Parameters

– *Cause*: The cause parameter can indicate the following errors:

a) User part unavailable (unknown);

b) User part unavailable (inaccessible); and

c) User part unequipped.

6.4 State transition diagram for sequences of primitives at the layer boundaries of the STC

This subclause defines the constraints on the sequences in which the primitives may occur at the layer boundaries of the STC. The sequences are related to the states at one STC endpoint between the STC and the STC user and between the STC and MTP.

The possible overall sequences of primitives at an STC connection endpoint are defined in T1.674.0 and shown in the state transition diagram, Figure 2/T1.674.1, for convenience. The primitives and state transitions are defined in T1.674.0. If any discrepancy is detected between the representation here and the one in T1.674.0, the definition in T1.674.0 shall apply. The model assumes that the primitives are serviced immediately and in zero time.

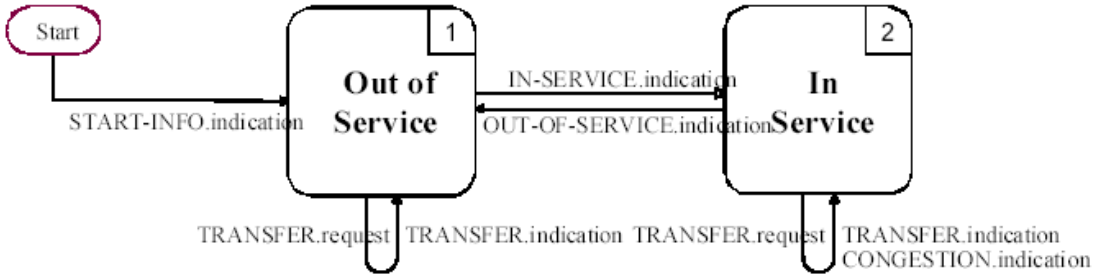


Figure 2/T1.674.1 - State transition diagram for sequences of primitives between the STC and its user

The possible overall sequences of primitives at a MTP endpoint are shown in the state transition diagram in Figure 3/T1.674.1. These primitives and state transitions are defined in T1.111.4. If any discrepancy is detected between the representation here and the one in T1.111.4, the definition in T1.111.4 shall apply.

The model in Figure 3/T1.674.1 illustrates the behavior of the MTP as seen by the STC. This model assumes that a request or response primitive is never issued at the same time as an indication or confirm primitive. The model also assumes that the primitives are serviced immediately and in zero time. In the diagram:

a) Any primitive that is not shown to result in a transition (from one state to the same state, or from one state to a different state) is not permitted in that state.

b) It is assumed that the primitives passed between STC and the STC user as well as the primitives passed between the STC and MTP are coordinated such that collisions do not occur.

NOTE - The MTP-STATUS.indication can indicate either the unavailability for a remote MTP user or MTP congestion.

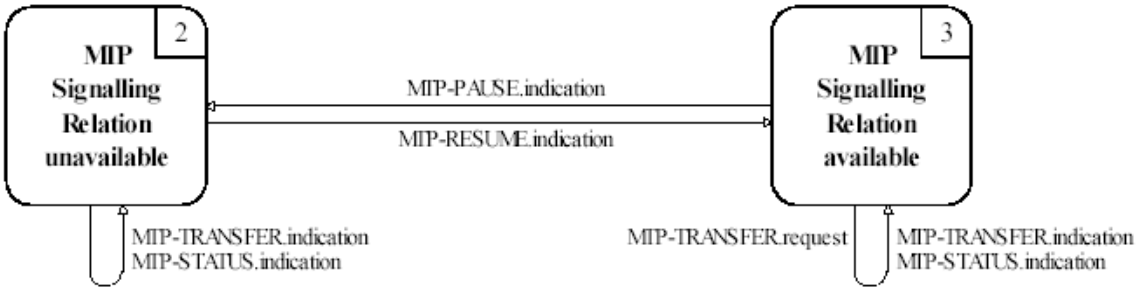


Figure 3/T1.674.1 - State transition diagram for sequences of primitives between MTP and STC

7 Protocol Elements for Peer-to-Peer Communication

The peer-to-peer STC protocol utilizes the mechanisms provided by the underlying sublayer (MTP3 - T1.111.4). In particular:

– In order to provide service availability information it uses the information received in MTP-PAUSE.indication and MTP-RESUME.indication primitives.

– In order to provide congestion indication, it relies on the information received in MTP-STATUS.indication primitives.

– STC PDU transfer utilizes the MTP-TRANSFER.request and MTP-TRANSFER.indication primitives. MTP-TRANSFER.request is used for sending PDUs while MTP-TRANSFER.indication is used for receiving PDUs.

7.1 STC PDUs

7.1.1 STC PDU formats

The following STC messages (PDUs) are used for exchanging information between peer STC entities:

– *STC Signaling Message*: This PDU is used for carrying STC signaling messages to a peer STC entity via the MTP network. The length of such a signaling message may not exceed the maximum length indicated in the Max_Length parameter. The STC is not adding any Protocol Control Information to the message. Figure 4/T1.674.1 illustrates the format of the STC PDU.

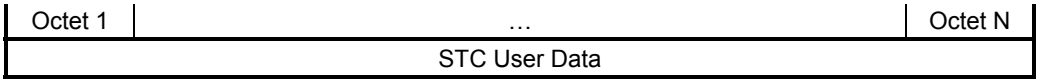


Figure 4/T1.674.1 - STC Signaling Message PDU

7.1.2 STC Signaling Message PDU fields

An STC Signaling Message PDU contains the following field:

– *STC User Data field*: This field in the STC Signaling Message PDU contains a complete STC-SDU.

7.2 STC state variable

The STC maintains the following state variable:

– *Congestion Level (CL)*: This variable can hold values for level of congestion.

7.3 STC timers

(Not specified for U S networks.)

7.4 Provisioned STC parameters

STC parameters are specified at creation of a new STC entity and remain unchanged during the lifetime of the STC entity. The following parameters are defined:

a) *STC_DPC*: Point Code corresponding to the destination point served by the STC entity.

b) *STC_OPC*: Point Code corresponding to the originating point served by the STC entity.

c) *STC_SIO*: The service information octet contains the service indicator and the subservice field. The subservice field carries the network indicator bits and spare bits; the spare bits are used to indicate message priority. The network indicator must indicate to which network the signaling relation belongs. The service indicator must indicate the STC user (e.g., BICC signaling).

NOTE -The value of the Service Indicator for the Bearer Independent Call Control is decimal “13” (see T1.111.4, clause 14.2).

d) *Value of Timer_Long*: (Not applicable for US networks.)

e) *Value of Timer_Short*: (Not applicable for US networks.)

f) *Value of Max_Length*: The value of Max_Length can be set to either “272” or “4096.”

NOTES

The value of the Max_Length parameter is chosen by network operators.

The Max_Length parameter is a characterization of the underlying MTP length limitation; this value includes the MTP header. For precise information see T1.111-2001.

The Max_Length parameter is set as follows:

- If the STC is deployed in an MTP3 signaling relation using MTP2 links, the Max_Length parameter is set to “272.”
- If the STC is deployed in an MTP3 signaling relation using SAAL links, the Max_Length parameter is set to “272”or “4096.” The value to be provisioned is chosen by network operators.

NOTE - The value of the CIC_Control parameter of the START-INFO primitive may be determined at power-up from the values of the STC parameters STC_DPC and STC_OPC, i.e., it need not be provisioned.

8 Procedures of the STC

8.1 Initial Conditions

This clause specifies how the STC operates at power up.

When the STC is initialized, it determines the CIC_Control parameter and indicates it, together with the parameter Max-Length, to the STC user in the START-INFO.indication primitive.

The CIC_Control parameter is computed the following way:

- If the value of the STC_OPC parameter is greater than the value of the STC_DPC parameter, then the CIC_Control shall be set to EVEN.
- If the value of the STC_DPC parameter is greater than the value of the STC_OPC parameter, then the CIC_Control shall be set to ODD.

NOTE — If BICC receives a CIC_Control parameter set to **EVEN**, then it is the controlling node for **EVEN** CIC values of the call association; if it receives a CIC_Control parameter set to **ODD**, then it is the controlling node for **ODD** CIC values of the call association.

If an MTP-RESUME.indication primitive is received by the STC, the MTP service is successfully initialized towards its peer MTP. STC then sends an IN-SERVICE.indication primitive to the STC user signaling entity. The IN-SERVICE.indication primitive carries a Level parameter; the value of the Level parameter is mapped to the congestion level in the MTP network. If the Level indicates congestion then the congestion indication procedure (specified in clause 8.4.) is started.

8.2 STC signaling message transfer procedure

8.2.1 Sending a signaling message

Upon receipt of a TRANSFER.request primitive from the STC user, the STC shall place the signaling message unaltered into an STC Signaling Message PDU and derive the Signaling Link Selection Value (SLS) from the received Sequence Control parameter. It shall then transfer the PDU to the MTP using the MTP-TRANSFER.request primitive. The primitive carries the parameters shown in Table 3/T1.674.1.

Table 4/T1.674.1 - Parameters in the MTP-TRANSFER.request primitive

Parameter	Content
MTP User Data	unaltered STC Signaling Message as received in the STC User Data parameter
Point code of the originating exchange	value of STC_OPC provisioned parameter
Point code of the destination exchange	value of STC_DPC provisioned parameter
Service Information Octet	value of STC_SIO provisioned parameter (Note)
Signaling Link Selection Value (SLS)	derived from received Sequence Control parameter
NOTE - The SIO is augmented, with message priority based on the value received in the Priority parameter for each message.	

8.2.2. Receiving a signaling message

Upon receipt of an MTP-TRANSFER.indication primitive containing an STC Signaling Message PDU, the STC shall pass the MTP User Data unaltered to the STC user in a TRANSFER.indication primitive. The TRANSFER.indication primitive conveys priority information extracted from the Service Information Octet.

All the other parameters (OPC, DPC, and SLS) are ignored.

8.3. Destination availability procedure

On the reception of an MTP-PAUSE.indication primitive by the STC, an OUT-OF-SERVICE.indication primitive is transmitted to the STC user. Layer management is informed.

On the reception of an MTP-RESUME.indication primitive by the STC, an IN-SERVICE.indication primitive is transmitted to the STC user. The IN-SERVICE.indication primitive carries a Level parameter; the value of the Level parameter is mapped to the congestion level in the MTP network. If the Level indicates congestion then the congestion indication procedure (specified in clause 8.4.) is started.

> NOTE - With the concept of one STC entity per «DPC OPC SI NI» quadruplet, the primitives MTP-PAUSE.indication and MTP-RESUME.indication are always routed to the STC entity whose provisioned parameter “STC_DPC” is identical to the parameter “Affected DPC” in the primitives.

8.4. Congestion Indication procedure

On receipt of a MTP-STATUS.indication primitive with the cause set to “signaling network congestion”, the STC acts as follows:

– A CONGESTION.indication primitive with the parameter Level indicating congestion shall be issued towards the STC user. The value of the Level parameter shall be mapped to the congestion level in the MTP network.

NOTE - With the concept of one STC entity per «DPC OPC SI NI» quadruplet, the primitive MTP-STATUS.indication is always routed to the STC entity whose provisioned parameter “STC_DPC” is identical to the parameter “Affected DPC” in the primitive.

8.5. User Part availability

On receipt of an MTP-STATUS.indication primitive with the cause parameter set to “user part unavailability - unknown”, “user part unavailability - inaccessible remote user” or “user part unavailability - unequipped remote user”, the STC user shall be informed via an OUT-OF-SERVICE.indication primitive, and an MSTC-ERROR.indication primitive with the cause parameter set to the value indicated in Table 5/T1.674.1 shall be issued. If the STC receives an MTP-TRANSFER.indication primitive, it will issue an IN-SERVICE.indication primitive prior to performing the procedure specified in 8.2.2. The IN-SERVICE.indication primitive carries a Level parameter; the value of the parameter is mapped to the congestion level in the MTP network. If the Level indicates congestion then the congestion indication procedure (specified in subclause 8.3.) is started.

Table 5/T1.674.1 - Cause parameter mapping

Cause parameter in MTP-STATUS.indication	**Cause parameter in MSTC-ERROR.indication**
user part unavailability - unknown	user part unavailable (unknown)
user part unavailability - inaccessible remote user	user part unavailable (inaccessible)
user part unavailability - unequipped remote user	user part unequipped

NOTE - With the concept of one STC entity per «DPC OPC SI NI» quadruplet, the primitive MTP-STATUS.indication is always routed to the STC entity whose provisioned parameter “STC_DPC” is identical to the parameter “Affected DPC” in the primitive.

Annex A/T1.674.1

(informative)

A Bibliography

The following documents contain information that may be useful to understanding the usage of this standard. There are no additional provisions of this standard derived from these documents.

ITU-T Recommendation T1.645, *B-ISDN Signaling ATM Adaptation Layer — Service Specific Coordination Function for Support of Signaling at the Network Node Interface (SSCF at NNI)*.[1]

T1.672-2000, *Bearer Independent Call Control Protocol*.[2]

T1.673-2002, *Bearer Independent Call Control Protocol (Capability Set 1+)*.[2]

IETF RFC 791, *Internet Protocol*, September 1981.[3]

IETF RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers,* 1998.[3]

ITU-T Recommendation Q.2150.1, *Signaling Transport Converter on MTP3 and MTP3b*.[1]

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[3] This document is available from the Internet Engineering Task Force (IETF).
< http://www.ietf.org >

American National Standard
for Telecommunications –

Signaling Transport Converter on SSCOP and on SSCOPMCE

1 Scope

This standard specifies the signaling transport converter sublayer directly on top of SSCOP (which specifies the peer-to-peer protocol for the transfer of information and control between any pair of SSCOP entities). Operation of SSCOP in a point-to-point environment is specified in T1.637-1999. In a multi-link or connectionless environment, its operation (SSCOPMCE) is specified in ITU-T Recommendation Q.2111. Since the service provided by either of these standards is the same, this standard only describes the actions in terms of T1.637-1999 for clarity of expression. The signaling transport converter on SSCOP can be deployed on any protocol stack that supports SSCOP. This standard covers the specification of the sublayer structure, the PDU structures of the signaling transport converter sublayer, and the mechanisms for the provision of the Generic Signaling Transport Service.

When this Signaling Transport Converter on SSCOP is applied for a signaling protocol entity, that entity is liberated from considering peculiarities of the underlying signaling transport service. This is achieved by relying on a Generic Signaling Transport Service that is provided, for example, by the sublayer specified in this standard.

This standard describes the interactions between the STC and the next higher layer, e.g., the BICC signaling protocol entity, between the STC and the Service Specific Connection Oriented Protocol (SSCOP), and between the STC and layer management.

> NOTE - This STC option does not use a network level transport protocol (e.g., MTP3) and therefore only allows point-to-point SSCOP or SSCOPMCE connections network designs. Also, this STC option (SSCOP or SSCOPMCE) does not enforce the use of SS7 message priorities for congestion control.

2 Normative References

The following standards and other references contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All Standards and other references are subject to revisions; all users of this standard are therefore encouraged to investigate the possibility of applying the most recent edition of the Standards and other references listed below.

ITU-T Recommendation Q.2111, *Service Specific Connection Oriented Protocol in a Multi-link and Connectionless Environment (SSCOPMCE)*.[1]

1 This document is available from the International Telecommunications Union.
< http://www.itu.int/ITU-T/ >

ITU-T Recommendation X.200, *Information Technology - Open Systems Interconnection - Basic reference model: The basic model*.[1]

ITU-T Recommendation X.210, *Information Technology - Open Systems Interconnection - Basic reference model: Conventions for the definition of OSI services*.[1]

T1.674.0-2002, *Generic Signaling Transport Service*.[2]

T1.637-1999, *B-ISDN ATM Adaptation Layer - Service Specific Connection Oriented Protocol (SSCOP)*.[2]

3 Definitions

This standard is based upon the concepts developed in ITU-T X.200 and X.210 and T1.637-1999, in particular, this standard makes use of the following terms defined in T1.637-1999:

a) Service Specific Coordination Function;

b) Service Specific Connection Oriented Protocol.

4 Abbreviations & Acronymns

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Network
BR	Buffer release
CPCS	Common Part Convergence Sublayer
MU	Message Unit
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
SAAL	Signaling AAL
SSCOP-UU	SSCOP user-to-user information
SAP	Service Access Point
SAR	Segmentation and Reassembly Sublayer
STC	Signaling Transport Converter
SC	Sequence Control
SDL	System Definition Language
SDU	Service Data Unit
SN	Sequence number
SSCF	Service Specific Coordination Function
SSCF-UNI	Service Specific Coordination Function for Support of Signaling at the User Network Interface
SSCOP	Service Specific Connection Oriented Protocol (T1.637-1999)

[2] This document is available from the Alliance for Telecommunications Industry Solutions, 1200 G Street N.W., Suite 500, Washington, DC 20005. <http://www.atis.org>

SSCOPMCE	Service Specific Connection Oriented Protocol in a multi-link or Connectionless Environment (Q.2111)
SSCOP-UU	SSCOP user-to-user information
SSCS	Service Specific Convergence Sublayer
SSSAR	Service Specific Segmentation and Reassembly Sublayer
SSTED	Service Specific Transmission Error Detection Sublayer
SUD	STC User Data
UNI	User Network Interface

5 General Description of the Signaling Transport Converter on SSCOP

5.1 Structure of the signaling transport converter on SSCOP sublayer

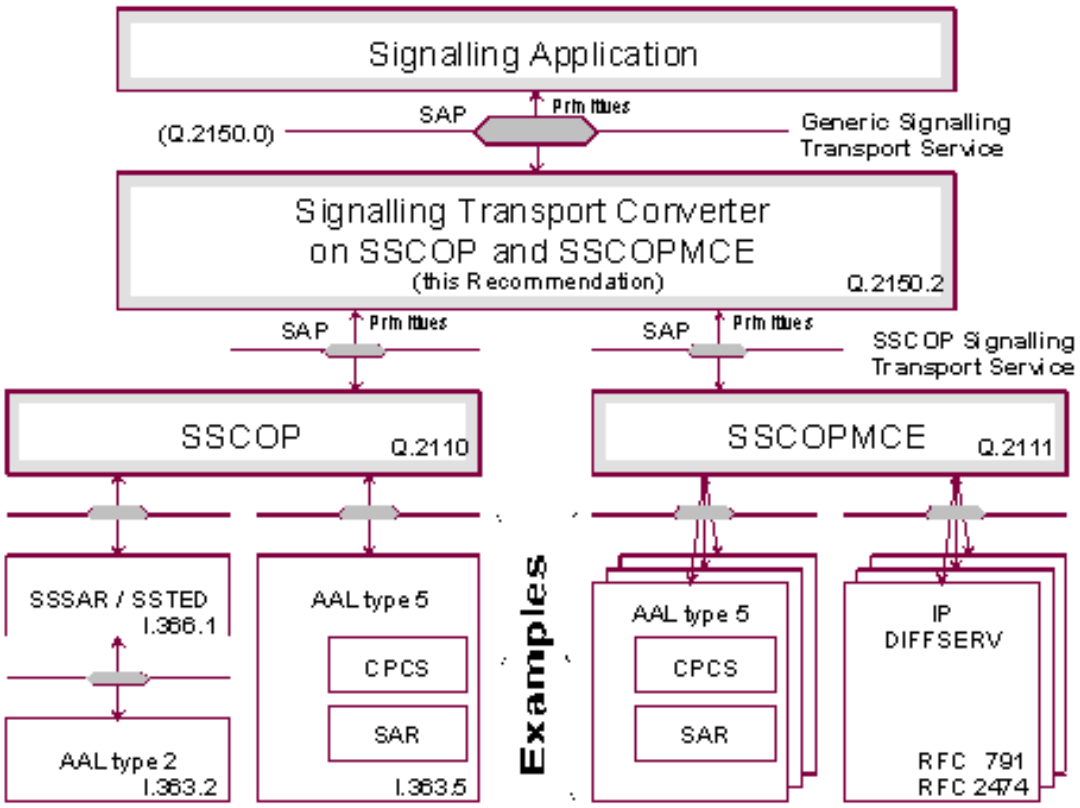
The sublayer providing the signaling transport converter (STC) resides on top of the Service Specific Convergence Sublayer (SSCS) of the ATM Adaptation Layer (AAL). It uses the services provided by the Service Specific Connection-Oriented Protocol (SSCOP) defined in T1.637-1999. SSCOP also resides in the SSCS.

In the SSCS, the Service Specific Coordination Function is "Null" in the sense that the primitives for the AAL are equivalent to the SSCOP primitives (see clause.7.2) but identified as AAL-primitives instead of AA-signals consistent with the primitive naming convention at a SAP (see clause 6.1 of T1.637-1999).

The STC provides the service that is requested by the Generic Signaling Transport Service defined in T1.674.0, where the signaling protocol makes use of this service. The STC is relying on the assured data transfer service of SSCOP; it may utilize any protocol stack that provides the SSCOP service; this is illustrated in Figure 1/T1.674.2.

This standard specifies:

- The interactions between the STC and the signaling protocol entity;
- The interactions between the STC and the SSCOP sublayer; and
- The interactions between the STC and layer management.



NOTE 1 - The Service Access Points shown in this diagram are for modeling purposes only. They are not necessarily visible or accessible from outside.

NOTE 2 - There may exist more protocol stacks providing the AAL type 5 CPCS service than shown.

Figure 1/T1.674.2 - Structure of the Signaling Transport Converter on SSCOP deploying different protocol stacks

5.2 Services provided by the STC

The STC provides for the transparent transfer of data -- i.e., signaling application (STC user) data between peer STC users. The supporting communication resources to achieve this transfer stay invisible to the signaling application.

In particular, the STC service provides for:

a) *Independence from the underlying transmission media*: The STC service relieves its users from all concerns of the manner in which the STC service is provided. Except for possible influences of the quality of service, the transfer of data over different underlying networks is, thus, invisible.

b) *Transparency of the information transferred*: The STC service provides for the transparent transfer of octet-aligned STC user data. It does not restrict the content, format, or coding of the information nor is there ever a need to interpret its structure or meaning.

c) *Connection establishment and release*: The STC service provides for a permanent connection service. As the underlying service (SSCOP) needs to have a connection established, the STC establishes and maintains this connection on behalf of its user; the user is informed about the availability of the assured data transfer service.

NOTE - The establishment of any connection below the SSCOP is outside the scope of this standard.

5.3 Functions of the STC

The STC performs the following functions:

a) *Connection establishment and maintenance*: This function provides for the establishment and maintenance of an SSCOP-connection. Upon a connection release by SSCOP, a connection re-establishment is attempted.

NOTE - The connection below the sublayer specified in T1.637-1999 may be established either on demand or permanently.

b) *Connection availability reporting to the STC user*: This function reports the availability or unavailability of the SSCOP-connection to the user of the STC.

c) *Maximum length indication to the STC user*: This function indicates to the STC user the maximum length of the PDU that the STC can transfer; it is indicated at creation of the STC entity.

d) *CIC control indication to the STC user*: This function indicates to the STC user, at creation of the STC entity, whether it serves as the controlling node for either the odd or even CIC values of the call association.

In addition, the following SSCOP services are utilized (see T1.637-1999):

e) Sequence Integrity of STC-SDUs.

f) Error Correction of STC-SDUs.

g) Flow Control of STC-SDUs.

h) Keep alive.

6 Elements for layer-to-layer communication

6.1 The Generic Signaling Transport Service

The Generic Signaling Transport Service is specified in T1.674.0. For convenience, a summary of the primitives for accessing the service is reproduced in Table 1/T1.674.2. In the event of any difference between this table and the definitions in T1.674.0, the definitions in T1.674.0 take precedence.

Table 1/T1.674.2 - Primitives and parameters of the Generic Signaling Transport Sublayer

Primitive	Type			
Generic Name	Request	Indication	Response	Confirm
START-INFO	-	Max_Length CIC_Control	-	-
IN-SERVICE	-	Level	-	-
OUT-OF-SERVICE	-	(Note 1)	-	-
CONGESTION	-	Level	-	-
TRANSFER	Sequence Control STC User Data Priority (Note 2)	STC User Data Priority (Note 2)	-	-

- : This primitive is not defined

NOTES

1 This primitive has no parameters

2 The use of this parameter is not supported by this signaling transport

On the establishment of a Signaling Transport Converter entity and the associated Signaling Transport Converter user entity (for example, at power up), the initial condition is the same as if an OUT-OF-SERVICE.indication primitive had been conveyed across this SAP. Also, at this time the START-INFO.indication is sent to the signaling entity.

6.2 The Service provided by SSCOP

This subclause specifies the information flow across the Signaling Transport Converter - AAL Service Specific Convergence Sublayer (SSCOP) boundary. This boundary is defined in T1.637-1999, clause 6.1, and summarized below. In the event of any difference between the following summary and the definitions in T1.637-1999, the definitions in T1.637-1999 take precedence.

The primitives and parameters between STC and SSCOP are defined in Table 2/T1.674.2.

NOTE - This service corresponds to the “Specific Signaling Transport Service” in Figure 1/T1.674.0.

6.2.1 Primitive definition

The definition of these primitives is as follows:

a) *AAL-ESTABLISH*: The AAL-ESTABLISH primitives are used to establish a point-to-point connection for assured information transfer between peer user entities.

b) *AAL-RELEASE*: The AAL-RELEASE primitives are used to terminate a point-to-point connection for assured information transfer between peer user entities.

c) *AAL-DATA*: The AAL-DATA primitives are used for the assured point-to-point transfer of SDUs between peer user entities.

d) *AAL-RESYNC*: The AAL-RESYNC primitives are used to resynchronize the SSCOP connection.

NOTE 1 - The AAL-RESYNC primitives are not used actively by the protocol specified in this standard; however, to provide robustness, the indication and response primitives are specified nevertheless.

e) *AAL-RECOVER*: The AAL-RECOVER primitives are used during recovery from protocol errors.

NOTE 2 - In the absence of protocol errors, the AAL-RECOVER primitives will not be used; however, to provide robustness, the indication and response primitives are specified nevertheless.

NOTE 3 - The AAL-UNITDATA, AAL-RETRIEVE, and AAL-RETRIEVE-COMPLETE primitives are not used by the STC entity specified in this standard.

Table 2/T1.674.2 - SSCOP primitives and parameters

Primitive	Type			
Generic Name	Request	Indication	Response	Confirm
AAL-ESTABLISH	SSCOP-UU BR	SSCOP-UU	SSCOP-UU BR	SSCOP-UU
AAL-RELEASE	SSCOP-UU (Note 2)	SSCOP-UU Source	-	(Note 1) (Note 2)
AAL-DATA	MU OOS (Note 3)	MU OOS (Note 3) SN	-	-
AAL-RESYNC	SSCOP-UU (Note 2)	SSCOP-UU	(Note 1)	(Note 1) (Note 2)
AAL-RECOVER	-	(Note 1)	(Note 1)	-
AAL-UNITDATA	MU (Note 2)	MU (Note 2)	-	-
AAL-RETRIEVE	RN (Note 2)	MU (Note 2)	-	-
AAL-RETRIEVE COMPLETE	-	(Note 1) (Note 2)	-	-

- : This primitive is not defined

NOTES

1 This primitive has no parameters.

2 This primitive is not used by the STC and is included here for completeness

3 This optional parameter is defined only in ITU-T Recommendation Q.2111; and it is not used by this STC, it is not present in the primitives.

6.2.2 Parameter definition

Table 2/T1.674.2 lists the parameters associated with each SSCOP primitive. The definition of the parameters is as follows:

a) *BR (buffer release)*: The STC does not make use of the functionality of this parameter. In both, the AAL-ESTABLISH.request and AAL-ESTABLISH.response primitives, this parameter is set to "Yes".

b) *MU (Message Unit)*: The Message Unit parameter is used during information transfer to convey a variable-length message. In AAL-DATA.request primitives, this parameter is mapped transparently into the Information field of an SSCOP PDU. For AAL-DATA.indication primitives, this parameter contains the contents of the information field of the received SSCOP PDU.SSCOP-UU (SSCOP user-to-user information):

The STC does not make use of this parameter. When issuing "request" or "response" primitives, this parameter has length zero; on receiving it in "indication" or "confirm" primitives, this parameter is ignored.

c) *OSS (out-of-sequence delivery)*: The STC does not make use of the functionality of this optional parameter. In both, the AAL-DATA.request and AAI-DATA.Indication primitives, this parameter is not included in the primitive.

NOTE - This parameter is only defined in SSCOPMCE (ITU-T Recommendation Q.2111).

d) *SN (sequence number)*: The STC does not make use of this parameter. When receiving it in the DATA.indication primitive, this parameter is ignored.

e) *Source*: The source parameter indicates to the SSCOP user whether the SSCOP layer or the peer SSCOP user originated the connection release. This parameter assumes one of two values: "SSCOP" or "User." If "SSCOP" is indicated, the user should disregard the SSCOP-UU parameter, if present.

f) *SSCOP-UU (SSCOP user-to-user information)*: The STC does not make use of this parameter. When issuing “request” or “response” primitives, this parameter has length zero; on receiving it in “indication” or “confirm” primitives, this parameter is ignored.

6.3 Primitives between the STC and layer management

Error indications to layer management are performed by the lower layers, and no additional error indications are required from the STC. No primitives between the STC and layer management need to be defined.

6.4 State transition diagram for sequences of primitives at the layer boundaries of the STC

This subclause defines the constraints on the sequences in which the primitives may occur at the layer boundaries of the STC. The sequences are related to the states at one STC endpoint between the STC and the STC user and between the STC and SSCOP.

The possible overall sequences of primitives at an STC connection endpoint are defined in T1.674.0 and shown in the state transition diagram, Figure 2/T1.674.2, for convenience. The primitives and state transitions are defined in T1.674.0. If any discrepancy is detected between the representation here and the one in T1.674.0, the definition in T1.674.0 shall apply. The model assumes that the primitives are serviced immediately and in zero time.

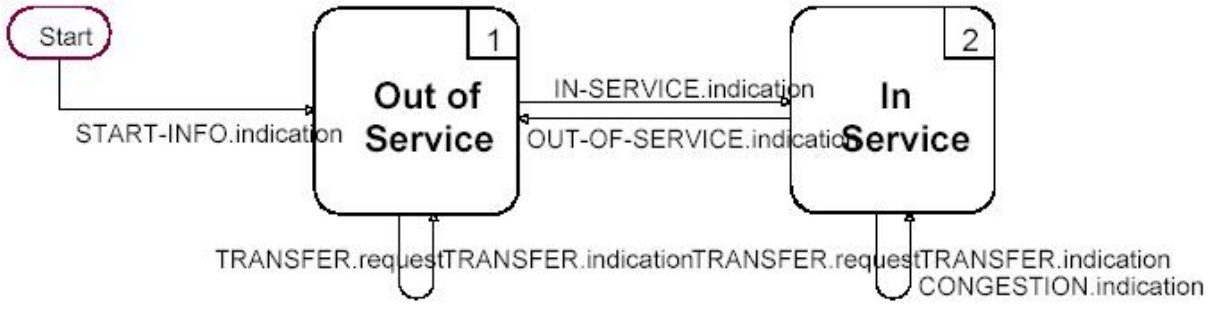


Figure 2/T1.674.2 - State transition diagram for sequences of primitives between the STC and its user

The possible overall sequences of primitives at a point-to-point SSCOP endpoint are shown in the state transition diagram, Figure 3/T1.674.2. These primitives and state transitions are defined in T1.637-1999. If any discrepancy is detected between the representation here and the one in T1.637-1999, the definition in T1.637-1999 shall apply.

> NOTE - The primitives and state transitions defined in ITU-T Recommendation Q.2111 are the same as in T1.637-1999.

The model illustrates the behavior of the STC, as seen by the STC or the subset of behavior of the SSCOP as deployed by the STC. This model assumes that a request or response primitive is never issued at the same time as an indication or confirm primitive. The model also assumes that the primitives are serviced immediately and in zero time. In the diagram:

a) Any primitive that is not shown in a transition (from one state to the same state, or from one state to a different state) is not permitted in that state.

b) It is assumed that the primitives passed between STC and the STC user, as well as the primitives passed between the STC and SSCOP, are coordinated such that collisions do not occur.

c) The IDLE state (state 1) in Figure 3/T1.674.2 reflects the absence of an SSCOP-connection. It is the initial state of any sequence; once it is re-entered, the connection is released.

d) The OUT-OF-SEQUENCE state (state 1) in Figure 3/T1.674.2 reflects the non-availability of an STC-connection. It is the initial state of any sequence.

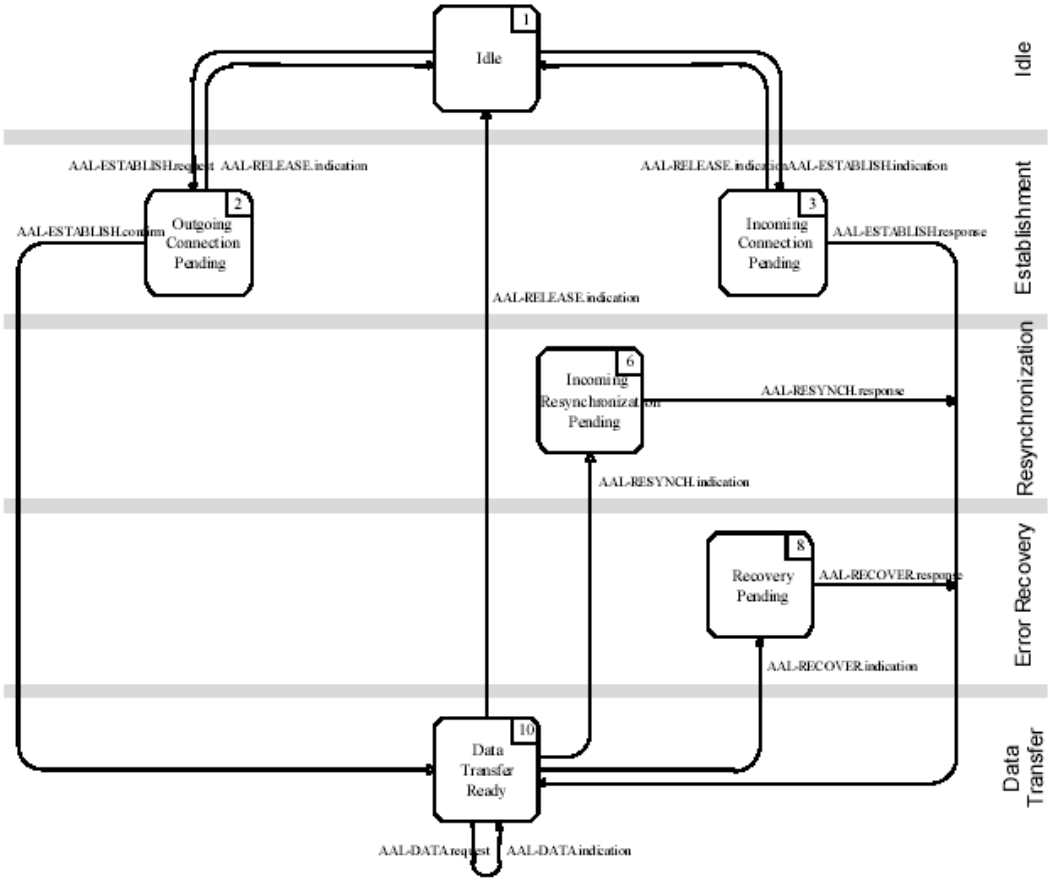


Figure 3/T1.674.2 - State transition diagram for sequences of primitives between the STC and SSCOP

7 Protocol Elements for Peer-to-Peer Communication

The peer-to-peer STC protocol utilizes the mechanisms provided by the underlying sublayer (SSCOP, T1.637-1999). In particular:

- In order to provide the assured data transfer service and report the availability of this transport to its user, the STC uses the connection establishment and release service of SSCOP (i.e., the primitives AAL-ESTABLISH and AAL-RELEASE). No additional information is conveyed via the SSCOP-UU parameter.
- Data transfer utilizes SSCOP's assured data transfer service, including the imbedded flow control mechanism.
- The use of SSCOP's resynchronization service by the peer STC entity is an error and is ignored (i.e., the Data Transfer Ready state is re-entered immediately).
- SSCOP's error recovery service is ignored (i.e., the Data Transfer Ready state is re-entered immediately).
- SSCOP's unassured data transfer service is not used (i.e., the STC never issues the primitives AAL-UNITDATA.request and ignores received AAL-UNITDATA.indication primitives).

– SSCOP's data retrieval service is not used (i.e., the STC never issues the primitives AAL-RETRIEVE-request and, hence, never receives the primitives AAL-RETRIEVE.indication and AAL-RETRIEVE-COMPLETE.indication).

7.1 STC PDUs

7.1.1 STC PDU formats

The following STC messages (PDUs) are used for exchanging information between peer STC entities:

– *STC Signaling Message*: This PDU is used for carrying STC signaling messages to a peer STC entity via an SSCOP connection. The length of such a signaling message may not exceed the maximum length indicated in the Max_Length parameter. The STC is not adding any Protocol Control Information to the message. Figure 4/T1.674.2 illustrates the format of the STC PDU.

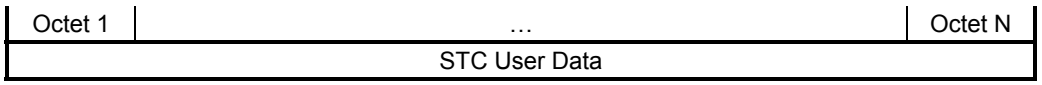


Figure 4/T1.674.2 - STC Signaling Message PDU

7.1.2 STC Signaling Message PDU fields

The STC Signaling Message PDU contains the following field:

– *STC User Data field*: This field in the STC Signaling Message PDU contains a complete STC-SDU.

7.2 STC state variables

The STC maintains no state variables.

7.3 STC timers

The STC entity requires the following timer:

– *Timer_DELAY*: If the STC procedure is in state "1.1" (Idle), the Timer_DELAY is running. It protects the unnecessary consumption of resources if an SSCOP connection could not be established or has been released. During the time when Timer_DELAY is running, the STC service is unavailable. Expiry of this timer leads to a re-establishment attempt of the SSCOP connection. This timer should be considerably greater than Timer_CC times MaxCC.

7.4 Provisioned STC parameters

STC parameters are specified at the creation of a new STC entity and remain unchanged during the lifetime of the STC entity. The following parameters are defined:

a) *Value of Max_Length*: The value of Max_Length can be set to either “272,” “4096,” or “65,328.” The value to be provisioned is chosen by network operators.

NOTES:

1 The value of the Max_Length parameter is chosen by network operators.

2 The Max_Length parameter is a characterization of the underlying signaling transport length limitation; this value may include the MTP header. For precise information see T1.111-2001.

3 The Max_Length parameter is set as follows:

– If the STC is used in an MTP3 signaling relation (using MTP2), the Max_Length parameter is set to “272”.

– If the STC is used in an MTP3 signaling relation (using SAAL links), the Max_Length parameter is set to “272”or “4096.” The value to be provisioned is chosen by network operators.

– The value “65,328” represents the maximum size of an SDU that can be transported on an SSCOP signaling relation.

b) *CIC_Control*: This value is used in the CIC_Control parameter of the START-INFO primitive; it indicates to the STC user whether it controls the **EVEN** or **ODD** CIC values of the call association.

NOTES

4 One STC of the signaling association must have this value set to “**ODD**,” the other to “**EVEN**.” Inconsistent provisioning will result in faulty operation of the STC user dual seizure procedure.

5 For example, this parameter indicates whether BICC controls the even or odd CIC values of the call association.

c) *Value of Timer_DELAY*: The value of Timer_DELAY can be in the range of 800 to 1500 ms.

8 Specification of the STC

8.1 State Transition Table

The following states are used in this specification. The states are conceptual and reflect general conditions of the STC entity in the sequences of primitives and PDU exchanges with its user, underlying sublayer.

– *State 1.1 Idle*: In this state, no service is available. No data is received; if the STC user submits data for transfer with the TRANSFER.request primitive, the primitive is ignored.

– *State 1.2 Outgoing Connection Pending*: In this state, no service is available. The STC instructed SSCOP to establish a new connection with its peer and awaits the peer's response. No data is received; if the STC user submits data for transfer with the TRANSFER.request primitive, the primitive is ignored.

– *State 2.10 Data Transfer Ready*: In this state, service is available and data transfer takes place.

8.2 State Transition Table

The State Transition Table (Table 3/T1.674.2) for STC describes the primitives and primitives that lead to state transitions.

Table 3/T1.674.2 - State transition table (Part 1 of 2)

Event	State		
	1.1 Idle	**1.2 Outgoing Connection Pending**	**2.10 Data Transfer Ready**
AAL-ESTABLISH.indication	reset Timer_DELAY AAL-ESTABLISH. response IN-SERVICE. indication (Level := 0) → 2.10	—	—
AAL-ESTABLISH.confirm	—	IN-SERVICE. indication (Level := 0) → 2.10	—
AAL-RELEASE.indication	—	set Timer_DELAY → 1.1	OUT-OF-SERVICE. indication set Timer_DELAY → 1.1
AAL-DATA.indication	—	—	TRANSFER.indication → 2.10
AAL-RECOVER.indication	—	—	AAL-RECOVER. response → 2.10
TRANSFER.request	—	—	AAL-DATA.request → 2.10
Timer_DELAY expiry	AAL-ESTABLISH. request → 1.2	—	—

Table 3/T1.674.2 - State transition table (Part 2 of 2)

Event	State start
Power-up	Start-Info.indication AAL-ESTABLISH. request → 1.2

Annex A/T1.674.2

(informative)

A Bibliography

The following other documents contain information that may be useful to understanding the usage of this standard. There are no additional provisions of this standard derived from these documents.

T1.672-2000, Bearer Independent Call Control Protocol.[2]

T1.673-2002, Bearer Independent Call Control Protocol (Capability Set 1+).[2]

ITU-T Recommendation I.363.2 - B-ISDN ATM Adaptation Layer Type 2 Specification.[1]

ITU-T Recommendation I.363.5 - B-ISDN ATM Adaptation Layer Type 5 Specification.[1]

ITU-T Recommendation I.366.1 - Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL Type 2.[1]

IETF RFC 791, *Internet Protocol*, September 1981.[3]

IETF RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers, 1998.[3]

[3] This document is available from the Internet Engineering Task Force (IETF).
< http://www.ietf.org >

American National Standard
for Telecommunications –

Signaling Transport Converter on SCTP

NOTE - A supplement is expected to be added to this standard that defines an STC for the Stream Control Transmission Protocol (SCTP), after the issue regarding the SCTP error check mechanism (Adler-32 checksum) is resolved in the IETF.