INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Q.2150.2

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(05/2001)

SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – Signalling ATM adaptation layer (SAAL)

Signalling Transport Converter on SSCOP and SSCOPMCE

ITU-T Recommendation Q.2150.2

(Formerly CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.799
Q3 INTERFACE	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC)	Q.1900–Q.1999
BROADBAND ISDN	Q.2000–Q.2999
General aspects	Q.2000–Q.2099
Signalling ATM adaptation layer (SAAL)	**Q.2100–Q.2199**
Signalling network protocols	Q.2200–Q.2299
Common aspects of B-ISDN application protocols for access signalling and network signalling and interworking	Q.2600–Q.2699
B-ISDN application protocols for the network signalling	Q.2700–Q.2899
B-ISDN application protocols for access signalling	Q.2900–Q.2999

For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation Q.2150.2

Signalling Transport Converter on SSCOP and SSCOPMCE

Summary

This Recommendation specifies the Signalling Transport Converter on SSCOP and SSCOPMCE. This Signalling Transport Converter on SSCOP (see ITU-T Q.2110 [2]) and SSCOPMCE (see ITU-T Q.2111 [3]) utilizes the Service Specific Connection Oriented Protocol for assured data transfer. This Signalling Transport Converter can be deployed on any protocol stack that supports SSCOP (e.g. AAL type 2 or AAL type 5) or SSCOPMCE (e.g. multiple AAL type 5 connections or IP with DIFFSERV). The sublayer structure, the PDU structures of the signalling transport converter sublayer, and the mechanisms for the provision of the generic signalling transport service are defined in depth.

The intent of this Recommendation is to provide a protocol specification that can be used either in the B-ISDN ATM environment or a connectionless environment for the provision of a signalling transport service. In particular, this protocol provides a Generic Signalling Transport Service that is used by AAL type 2 and Bearer Independent Call Control (BICC) signalling protocols.

Source

ITU-T Recommendation Q.2150.2 was revised by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 15 May 2001.

Keywords

ATM Adaptation Layer (AAL), Asynchronous Transfer Mode (ATM), Bearer Independent Call Control (BICC), Broadband Integrated Services Network (B-ISDN), Signalling AAL (SAAL), Service Specific Coordination Function (SSCF), Service Specific Connection Oriented Protocol (SSCOP), Service Specific Convergence Sublayer (SSCS), Signalling Transport Converter (STC).

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CONTENTS

Page

ITU-T Recommendation Q.2150.2

Signalling transport converter on SSCOP and SSCOPMCE

1 Scope

This Recommendation specifies the Signalling 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 ITU-T Q.2110 [2]. In a multi-link or connectionless environment, its operation (SSCOPMCE) is specified in ITU-T Q.2111 [3]. Since the service provided by either of these Recommendations is the same, this Recommendation only describes the actions in terms of ITU-T Q.2110 for clarity of expression. The Signalling Transport Converter on SSCOP can be deployed on any protocol stack that supports SSCOP (see 5.1). This Recommendation covers the specification of the sublayer structure, the PDU structures of the Signalling Transport Converter sublayer, and the mechanisms for the provision of the Generic Signalling Transport Service.

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

This Recommendation describes the interactions between the Signalling Transport Converter (STC) and the next higher layer, e.g. the AAL type 2 or BICC signalling protocol entities, between the STC and the Service Specific Connection Oriented Protocol (SSCOP), and between the STC and layer management.

2 References

2.1 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Q.2150.0 (2001), *Generic signalling transport service*.

[2] ITU-T Q.2110 (1994), *B-ISDN ATM adaptation layer – Service specific connection oriented protocol (SSCOP)*.

[3] ITU-T Q.2111 (1999), *B-ISDN ATM adaption layer – Service specific connection oriented protocol in a multi-link and connectionless environment (SSCOPMCE)*.

[4] ITU-T X.200 (1994), *Information technology – Open Systems Interconnection – Basic reference model: The basic model*.

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

2.2 Bibliography

The following ITU-T Recommendations and other publications contain information that may be useful to understanding the usage of this Recommendation. There are no additional provisions of this Recommendation derived from these publications.

[6] ITU-T Q.2630.1 (1999), *AAL type 2 signalling protocol – Capability Set 1*.

[7] ITU-T Q.2630.2 (2000), *AAL type 2 signalling protocol – Capability Set 2*.

[8] ITU-T Q.1901 (2000), *Bearer independent call control protocol*.

[9] ITU-T Q.1902.1 (2001), *Bearer independent call control protocol (CS2) functional description*.

[10] ITU-T I.363.2 (2000), *B-ISDN ATM Adaptation Layer specification Type 2 AAL*.

[11] ITU-T I.363.5 (1996), *B-ISDN ATM Adaptation Layer specification Type 5 AAL*.

[12] ITU-T I.366.1 (1998), *Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL Type 2*.

[13] ITU-T Q.704 (1996), *Signalling network functions and messages*.

[14] ITU-T Q.2210 (1996), *Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140*.

[15] IETF RFC 791 (1981), *Internet Protocol*.

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

3 Definitions

This Recommendation is based upon the concepts developed in ITU-T X.200 [4], X.210 [5] and in ITU-T Q.2110 [2]; in particular, this Recommendation makes use of the following terms defined in ITU-T Q.2110 [2]:

a) Service Specific Coordination Function;

b) Service Specific Connection Oriented Protocol.

4 Abbreviations

This Recommendation uses the following abbreviations:

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	Signalling AAL
SAP	Service Access Point
SAR	Segmentation and Reassembly Sublayer

SC	Sequence Control
SDL	Specification and Description Language
SDU	Service Data Unit
SN	Sequence Number
SSCF	Service Specific Coordination Function
SSCF-UNI	Service Specific Coordination Function for Support of Signalling at the User Network Interface
SSCOP	Service Specific Connection Oriented Protocol (ITU-T Q.2110 [2])
SSCOPMCE	Service Specific Connection Oriented Protocol in a Multi-link or Connectionless Environment (ITU-T Q.2111 [3])
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
STC	Signalling Transport Converter
SUD	STC User Data
UNI	User Network Interface

5 General description of the signalling transport converter on SSCOP

5.1 Structure of the signalling transport converter on SSCOP sublayer

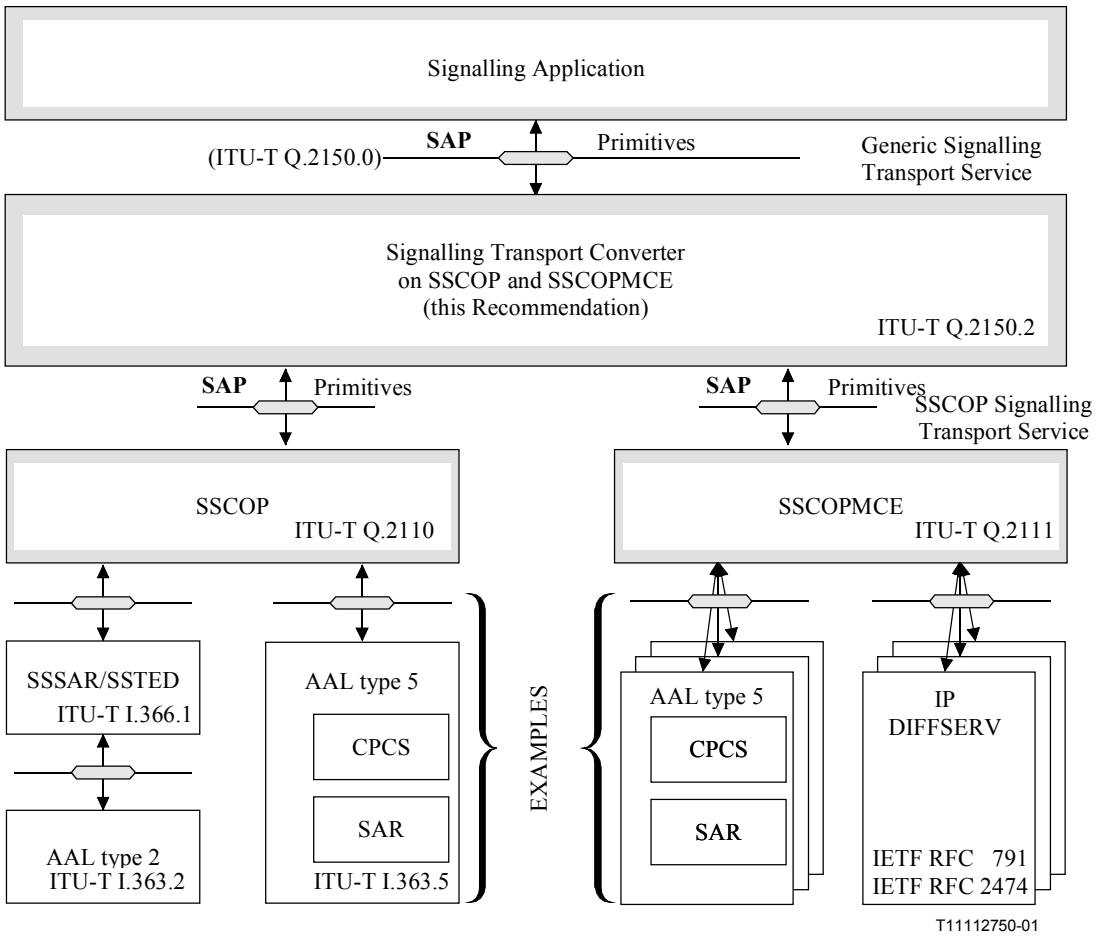
The sublayer providing the Signalling Transport Converter (STC) resides on top of the Service Specific Convergence Sublayer (SSCS) of the ATM Adaptation Layer (AAL). It uses the services provided by the Service Specific Connection-Oriented Protocol (SSCOP) defined in ITU-T Q.2110 [2] and ITU-T Q.2111 [3]. 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 6.2) but identified as AAL-primitives instead of AA-signals consistent with the primitive naming convention at a SAP (see 6.1/Q.2110 [2]).

The STC provides the service that is requested by the Generic Signalling Transport Service defined in ITU-T Q.2150.0 [1], where the signalling 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 5-1.

This Recommendation specifies:

- the interactions between the STC and the signalling 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 modelling 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 5-1/Q.2150.2 – Structure of the signalling 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. signalling application (STC user) data between peer STC users. The supporting communication resources to achieve this transfer stay invisible to the signalling 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 Recommendation.

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 ITU-T Q.2110 [2] and ITU-T Q.2111 [3] 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 of the call association.

In addition, the following SSCOP services are utilized (see ITU-T Q.2110 [2]):

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 signalling transport service

The Generic Signalling Transport Service is specified in ITU-T Q.2150.0 [1]. For convenience, a summary of the primitives for accessing the service is reproduced in Table 6-1. In the event of any difference between this table and the definitions in ITU-T Q.2150.0, the definitions in ITU-T Q.2150.0 take precedence.

Table 6-1/Q.2150.2 – Primitives and parameters of the generic signalling transport sublayer

Primitive Generic Name	Type			
	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.

NOTE 1 – This primitive has no parameters.

NOTE 2 – This parameter is a national option (and the use of this parameter is not supported by this signalling transport).

On the establishment of a Signalling Transport Converter entity and the associated Signalling Transport Converter user entity, for example at power up, the initial conditions are 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 signalling entity.

6.2 The service provided by SSCOP

This clause specifies the information flow across the Signalling Transport Converter-AAL Service Specific Convergence Sublayer (SSCOP) boundary. This boundary is defined in 6.1/Q.2110 [2] and summarized below. In the event of any difference between the following summary and the definitions in ITU-T Q.2110, the definitions in ITU-T Q.2110 take precedence.

The primitives and parameters between STC and SSCOP are defined in Table 6-2.

NOTE – This service corresponds to the "Specific Signalling Transport Service" in Figure 5-1/Q.2150.0.

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 Recommendation; 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 protocol entity specified in this Recommendation.

Table 6-2/Q.2150.2 – SSCOP primitives and parameters

Primitive Generic Name	Type			
	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	–	(Notes 1 and 2)
AAL-DATA	MU OOS (Note 3)	MU OOS (Note 3) SN	–	–
AAL-RESYNC	SSCOP-UU (Note 2)	SSCOP-UU	(Note 1)	(Notes 1 and 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	–	(Notes 1 and 2)	–	–

– This primitive is not defined.

NOTE 1 – This primitive has no parameters.

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

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

6.2.2 Parameter definition

Table 6-2 lists the parameters associated with each SSCOP primitive. The definition of the parameters is as follows:

a) **Buffer Release (BR)**:

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) **Message Unit (MU)**:

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.

c) **Out-of-sequence delivery (OOS)**:

The STC does not make use of the functionality of this optional parameter. In both, the AAL-DATA.request and AAL-DATA.Indication primitives, this parameter is not included in the primitive.

NOTE – This parameter is only defined in SSCOPMCE (ITU-T Q.2111 [3]).

d) **Sequence Number (SN)**:

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 User-to-User Information (SSCOP-UU)**:

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 clause 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 ITU-T Q.2150.0 [1] and shown in the state transition diagram, Figure 6-1, for convenience. The primitives and state transitions are defined in ITU-T Q.2150.0 [1]. If any discrepancy is detected between the representation here and the one in ITU-T Q.2150.0, the definition in Q.2150.0 shall apply. The model assumes that the primitives are serviced immediately and in zero time.

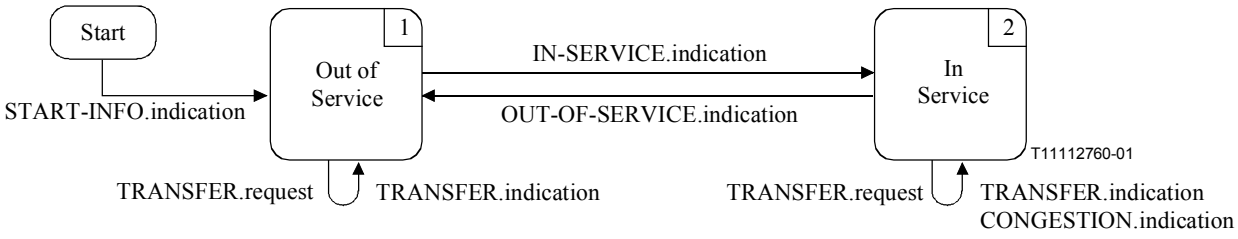


Figure 6-1/Q.2150.2 – State transition diagram for sequences of primitives between the STC and its user

The possible overall sequences of primitives at a point-to-point SSCOP endpoint are shown in the state transition diagram, Figure 6-2. These primitives and state transitions are defined in ITU-T Q.2110 [2]. If any discrepancy is detected between the representation here and the one in ITU-T Q.2110, the definition in ITU-T Q.2110 shall apply.

NOTE – The primitives and state transitions are defined in ITU-T Q.2111 [3] are the same as in ITU-T Q.2110 [2].

The model illustrates the behaviour of the STC as seen by the STC or the subset of behaviour 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 6-2 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 6-1 reflects the non-availability of an STC-connection. It is the initial state of any sequence.

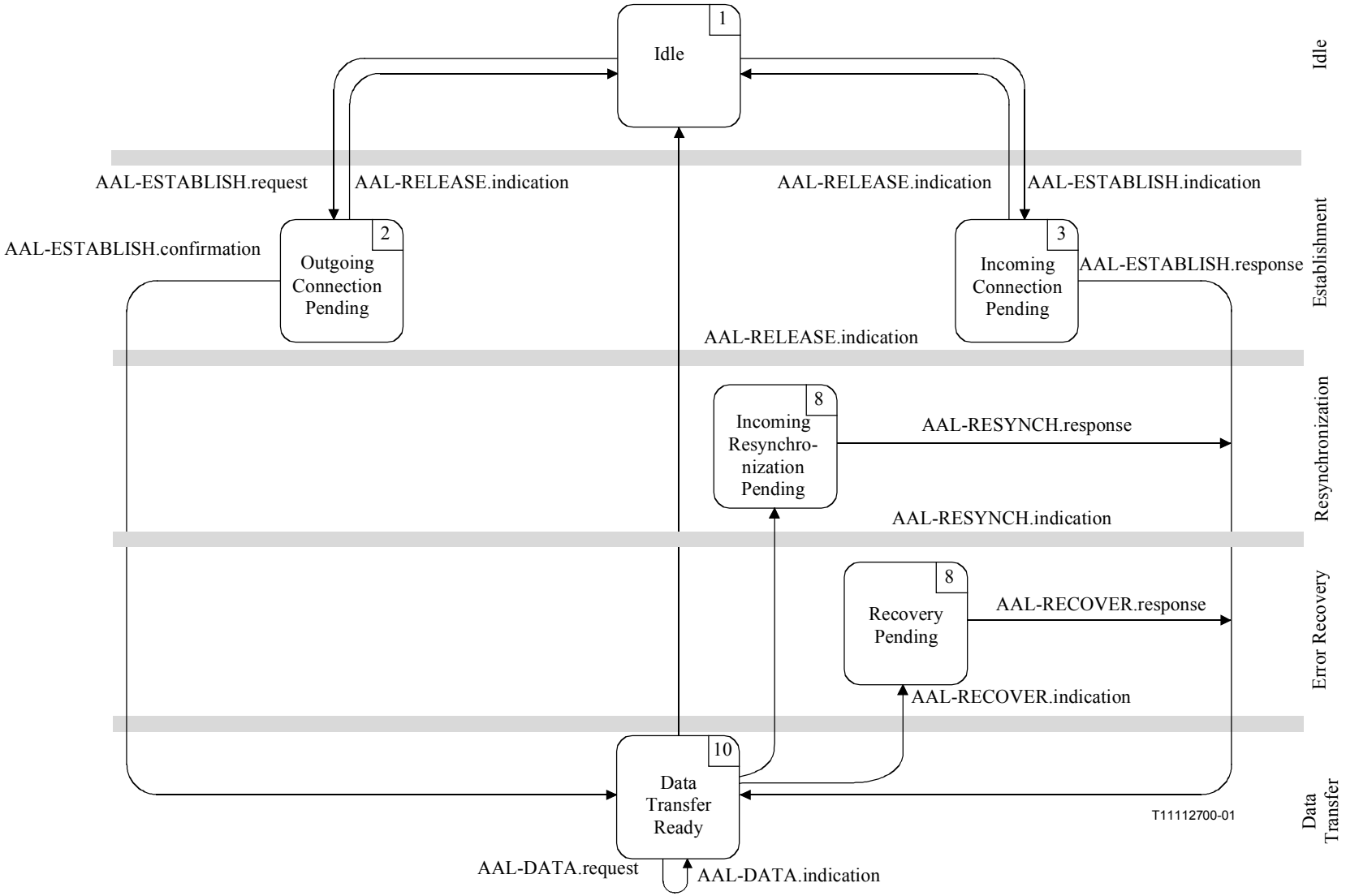


Figure 6-2/Q.2150.2 – State transition diagram for sequences of primitives between the STC and SSCOP

7 Protocol elements for peer-to-peer communication

The peer-to-peer STC protocol utilizes the mechanisms provided by the underlying sublayer (SSCOP, ITU-T Q.2110 [2] and ITU-T Q.2111 [3]). 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-UNIT-DATA.request and ignores received AAL-UNIT-DATA.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.

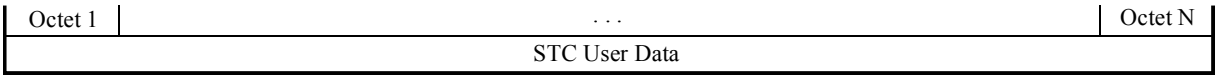
7.1 STC PDUs

7.1.1 STC PDU formats

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

STC signalling message

This PDU is used for carrying STC signalling messages to a peer STC entity via an SSCOP connection. The length of such a signalling 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 7-1 illustrates the format of the STC PDU.



NOTE – Transmission starts with Octet 1 and continues towards the increasing octet numbers.

Figure 7-1/Q.2150.2 – STC signalling message PDU

7.1.2 STC signalling message PDU fields

The STC signalling message PDU contains the following field:

- **STC User Data** field:

  This field in the STC signalling 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 creation of a new STC entity and they are unchanged during the lifetime of the STC entity. The following parameters are defined:

a) **Value of Timer_DELAY**:

The value of Timer_DELAY can be in the range of 800 to 1500 ms.

b) **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.

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

NOTE 2 – The Max_Length parameter is a characterization of the underlying signalling transport length limitation; this value may include the MTP header. For precise information see ITU-T Q.704 [13] and ITU-T Q.2210 [14].

NOTE 3 – The Max_Length parameter is set as follows:

- If the STC is used in an MTP3 signalling relation, the Max_Length parameter is set to "272".
- If the STC is used in an MTP3b signalling relation, 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 signalling relation.

c) **CIC_Control**:

This value is used in the CIC_Control parameter of the START-INFO primitive; it indicates to the STC user which behaviour to choose when assigning resources.

NOTE 4 – One STC of the signalling 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.

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

8 Specification of the STC

This clause provides a set of SDL diagrams defining the procedures of the Signalling Transport Converter (STC). These SDL diagrams are the definitive description of the procedures and in case of conflict with the text, the SDL diagrams take precedence.

8.1 Overview

Figure 8-1 gives an overview over the states of STC and the major transitions between them. These states are grouped into communication control services.

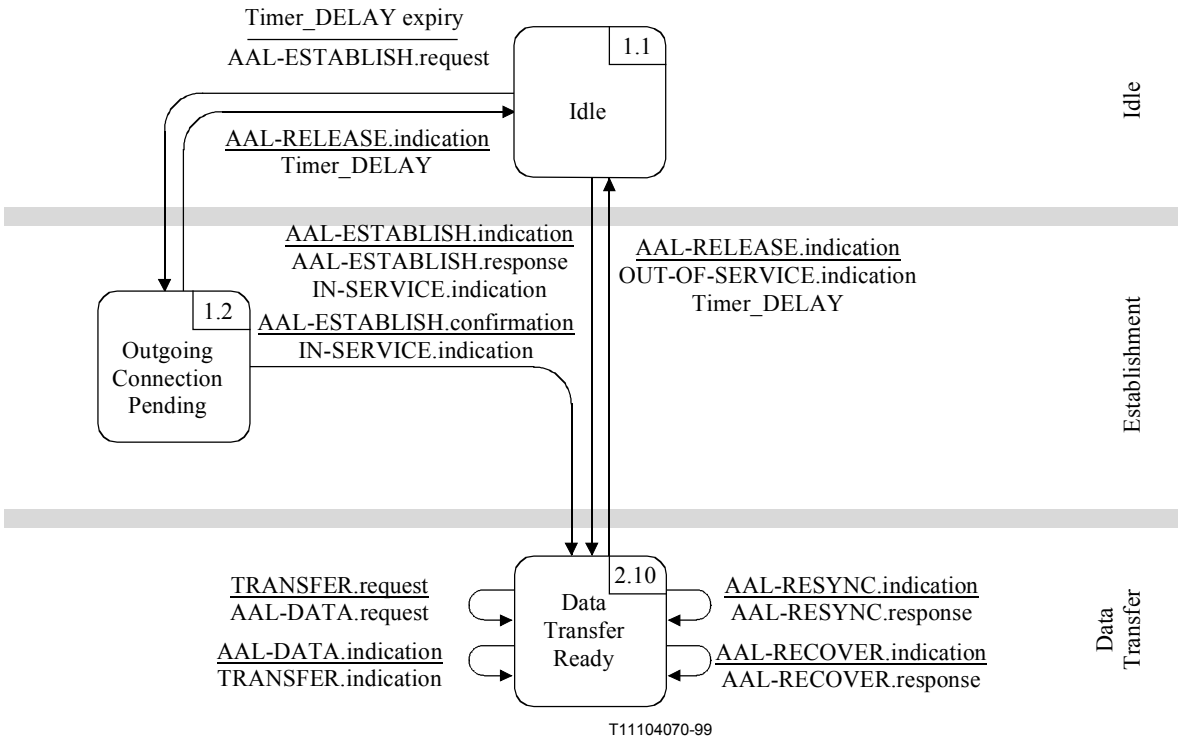


Figure 8-1/Q.2150.2 – Overview of STC states and major transitions between them

These states are used in the specification of this Signalling Transport Converter (STC). The states are conceptual and reflect general conditions of the STC entity in the sequences of primitives with its user and the underlying sublayer.

The state numbers reflect the state of the interfaces at the two layer boundaries of the STC. They are of the form "U.L" where "U" represents the state of the interface at the upper layer boundary (see Figure 6-1) and "L" the one at the lower layer boundary (see Figure 6-2).

8.1.1 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.

8.1.2 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.

8.1.3 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 8-1) for STC describes the primitives and primitives that lead to state transitions. The table only shows the major transition paths; the SDL diagrams in 8.3 show the full transitions.

Table 8-1/Q.2150.2 – State transition table *(part 1 of 2)*

Event	State		
	1.1	**1.2**	**2.10**
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 8-1/Q.2150.2 – State transition table *(part 2 of 2)*

Event	State **start**		
Power-up		START-INFO.indication AAL-ESTABLISH. request → 1.2	

8.3 SDL Diagrams

The SDL diagrams are represented in Figures 8-2 to 8-4.

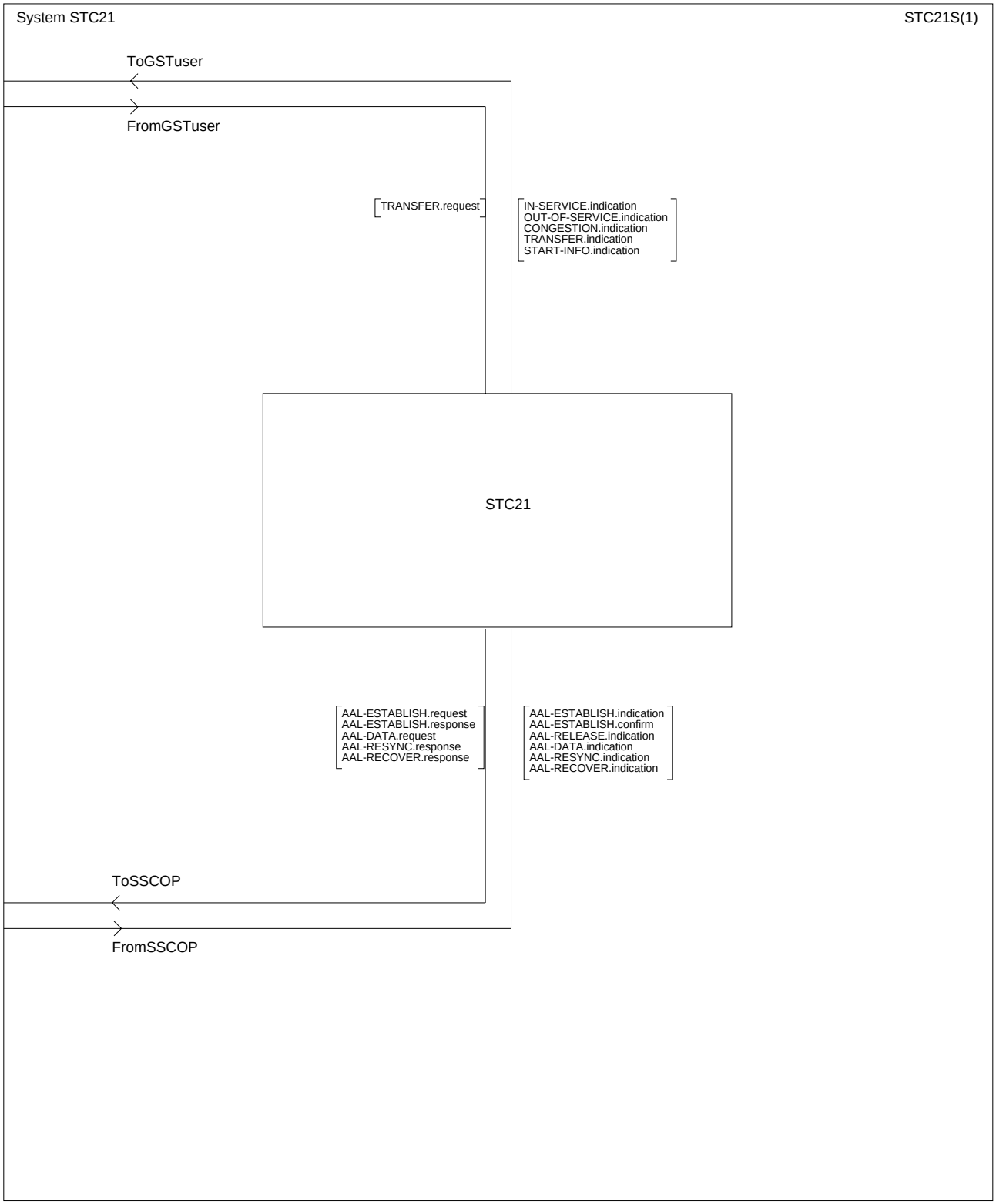


Figure 8-2/Q.2150.2 – SDL system of the Signalling Transport Converter

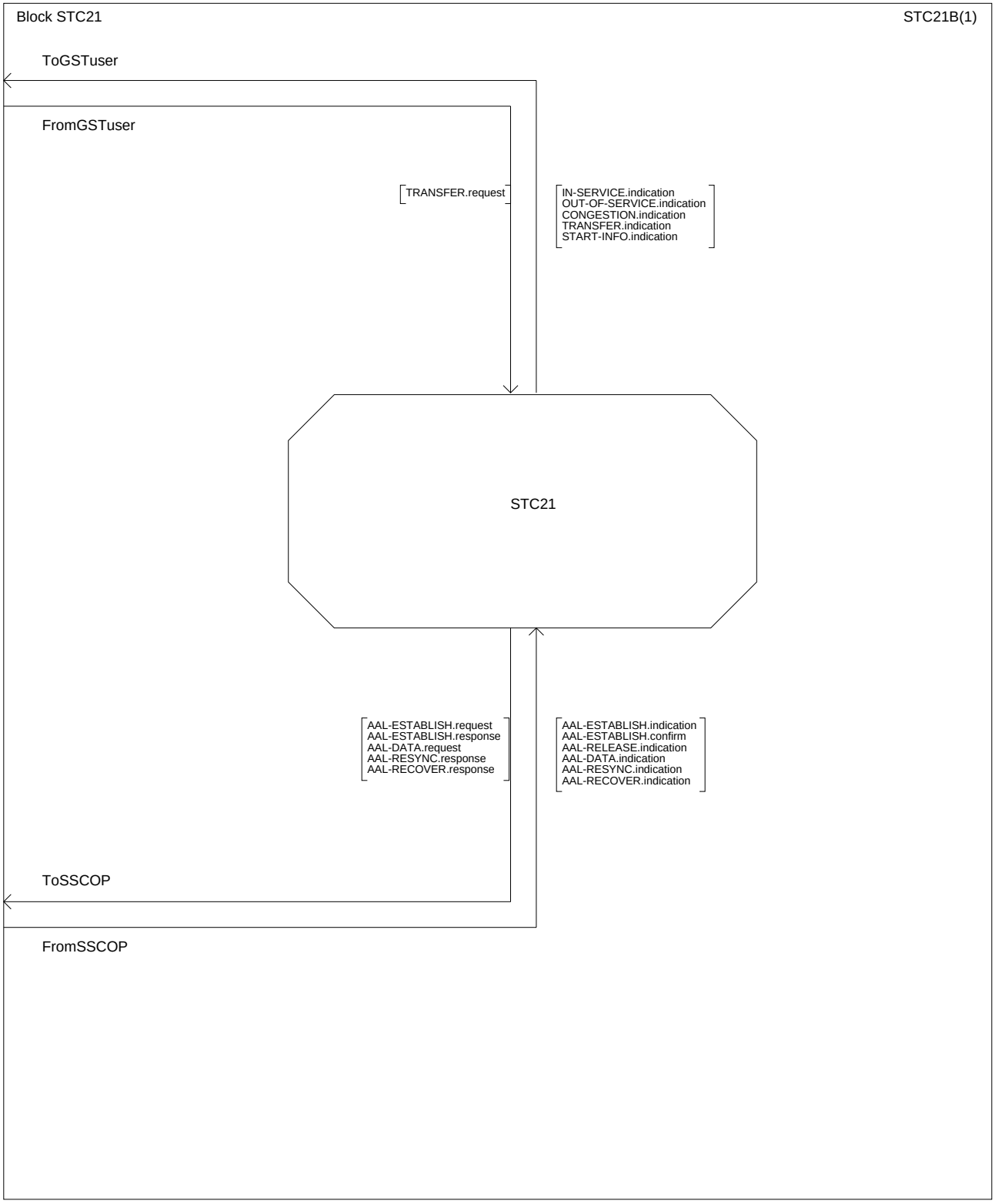


Figure 8-3/Q.2150.2 – SDL block structure of the Signalling Transport Converter

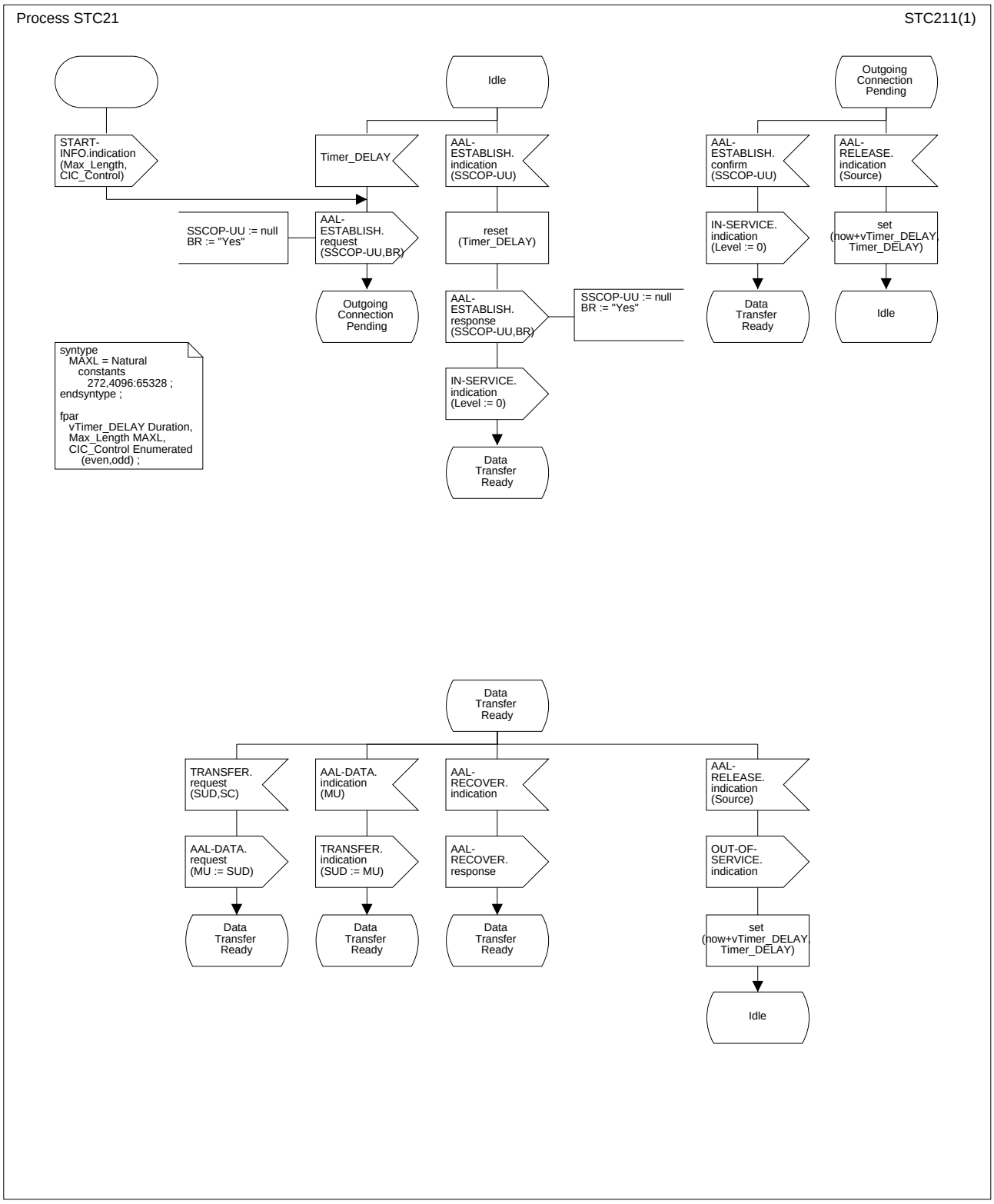


Figure 8-4/Q.2150.2 – SDL diagram for the Signalling Transport Converter

APPENDIX I

Signalling Transport Converter on SSCF-UNI for AAL type 2 signalling

I.1 Scope

This appendix illustrates the Signalling Transport Converter sublayer on top of the signalling AAL specified in ITU-T Q.2130 "SSCF-UNI" (which specifies the peer-to-peer protocol for the transfer of information and control between any pair of SSCF-UNI entities). This Signalling Transport Converter on SSCF-UNI for AAL type 2 signalling can be deployed on any protocol stack that supports SSCOP (see 5.1). This appendix covers the specification of the sublayer structure, the PDU structures of the Signalling Transport Converter sublayer, and the mechanisms for the provision of the Generic Signalling Transport Service when applied to AAL type 2 signalling.

I.2 Additional informative references

The following ITU-T Recommendation contains information that may be useful to understanding the usage of this Recommendation. There are no additional provisions of this Recommendation derived from this publication.

[17] ITU-T Q.2130 (1994), *B-ISDN ATM adaptation layer – Service specific coordination function for support of signalling at the user network interface (SSCF at UNI)*.

I.3 Structure of the signalling transport converter on SSCF-UNI

The sublayer providing the Signalling Transport Converter (STC) resides on top of the Service Specific Convergence Sublayer (SSCS) of the ATM Adaptation Layer (AAL). It deploys the services provided by Service Specific Coordination Function for Support of Signalling at the User Network Interface (SSCF-UNI) defined in ITU-T Q.2130 [17]. The Service Specific Connection Oriented Protocol (SSCOP, ITU-T Q.2110 [2]) also resides in the SSCS.

The STC provides for the service that is requested by the Generic Signalling Transport Service defined in ITU-T Q.2150.0 [1]. The STC relying on the assured data transfer service of SSCF-UNI and SSCOP may utilize any protocol stack that supports SSCOP, i.e. provides the AAL type 5 CPCS service; this is illustrated in Figure I.1.

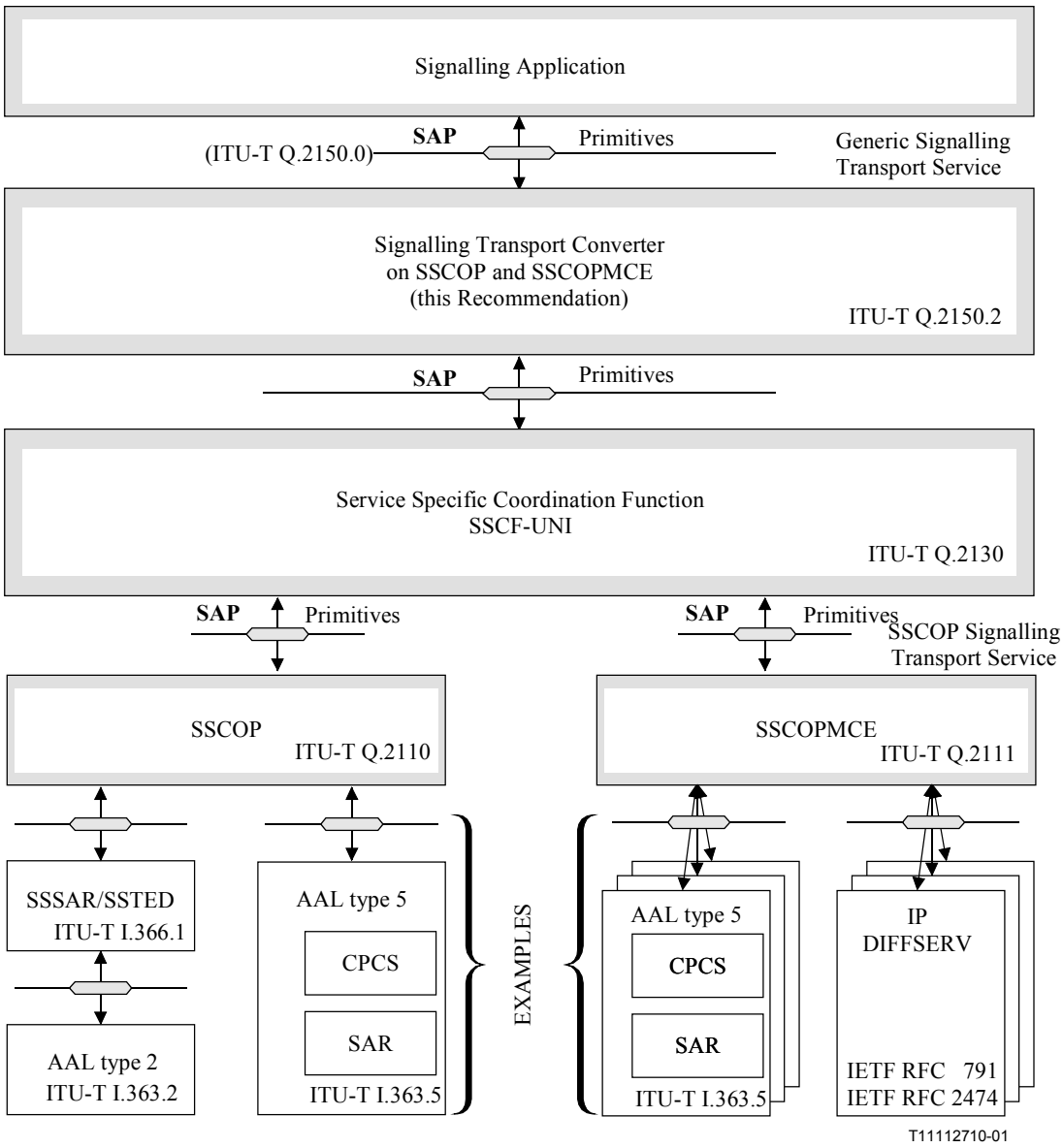


Figure I.1/Q.2150.2 – Structure of the Signalling Transport Converter on SSCOP deploying different protocol stacks

I.4 The Service provided by SSCF-UNI

This clause specifies the information flow across the Signalling Transport Converter on SSCF-UNI-AAL Service Specific Convergence Sublayer (SSCF-UNI) boundary. This boundary is defined in 7.1/Q.2130 [17] and summarized below. In the event of any difference between the following summary and the definitions in ITU-T Q.2110, the definitions in ITU-T Q.2110 take precedence.

The repertoire of AAL-primitives between STC and SSCOP is defined in Table I.1.

Table I.1/Q.2150.2 – SSCF-UNI primitives and parameters

Primitive Generic Name	Type			
	Request	**Indication**	**Response**	**Confirm**
AAL-ESTABLISH	SSCF-UU	SSCF-UU	–	SSCF-UU
AAL-RELEASE	SSCF-UU (Note 2)	SSCF-UU	–	(Notes 1 and 2)
AAL-DATA	Data	Data	–	–
AAL-UNITDATA	Data (Note 2)	Data (Note 2)	–	–
– This primitive is not defined. NOTE 1 – This primitive has no parameters. NOTE 2 – This primitive is not used by the STC.				

I.4.1 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 at the UNI.

b) **AAL-RELEASE**:

The AAL-RELEASE primitives are used to terminate a point-to-point connection for assured information transfer between peer user entities at the UNI.

c) **AAL-DATA**:

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

NOTE – The AAL-UNITDATA primitives are not used by the protocol entity specified in this Recommendation.

I.4.2 Parameter definition

Table I.1 lists the parameters associated with each SSCF-UNI primitive. The definition of the parameters is as follows:

a) **Data**:

The Data 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 SSCF PDU. For AAL-DATA.indication primitives, this parameter contains the contents of the information field of the received SSCF PDU.

b) **SSCF User-to-User Information (SSCF-UU)**:

The SSCF 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.

NOTE – In ITU-T Q.2130 it is specified that this parameter is not specifically required by applications, however, its use by future signalling applications is not excluded.

The possible overall sequences of primitives at a point-to-point SSCF-UNI endpoint are shown in the state transition diagram, Figure I.2. These primitives and state transitions are defined in ITU-T Q.2130 [17]. If any discrepancy is detected between the representation here and the one in ITU-T Q.2130, the definition in ITU-T Q.2130 shall apply.

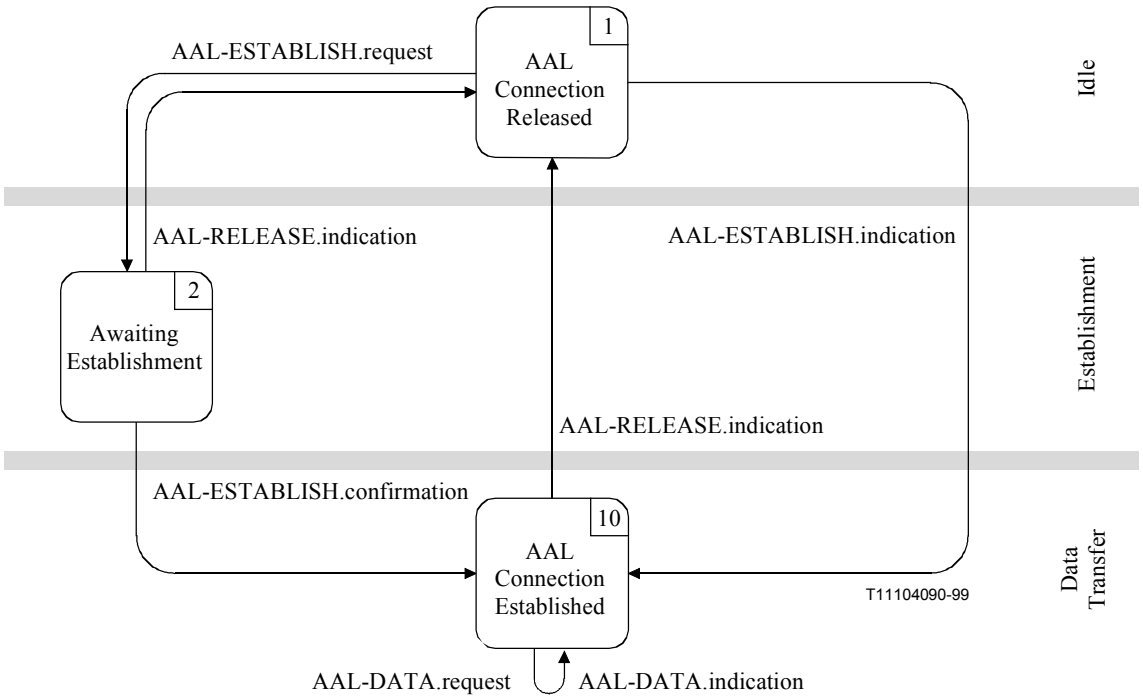


Figure I.2/Q.2150.2 – State transition diagram for sequences of primitives between the STC and SSCF-UNI

I.5 State Transition Table

The State Transition Table (Table I.2) for STC describes the primitives and primitives that lead to state transitions. The table only shows the major transition paths; the SDL diagrams in 8.3 show the full transitions.

Table I.2/Q.2150.2 – State transition table *(part 1 of 2)*

Event	State		
	1.1	**1.2**	**2.4**
AAL-ESTABLISH.indication	reset Timer_DELAY IN-SERVICE. indication (Level := 0) → 2.4	–	→ 2.4
AAL-ESTABLISH.confirm	–	IN-SERVICE. indication (Level := 0) → 2.4	–
AAL-RELEASE.indication	–	set Timer_DELAY → 1.1	OUT-OF-SERVICE. indication set Timer_DELAY → 1.1
AAL-DATA.indication	–	–	TRANSFER.indication → 2.4

Table I.2/Q.2150.2 – State transition table *(part 1 of 2) (concluded)*

Event	State		
	1.1	**1.2**	**2.4**
TRANSFER.request	–	–	AAL-DATA.request → 2.4
Timer_DELAY expiry	AAL-ESTABLISH. request → 1.2	–	–

Table I.2/Q.2150.2 – State transition table *(part 2 of 2)*

Event	State **start**		
Power-up		START- INFO.indication AAL-ESTABLISH. request → 1.2	

I.6 SDL Diagrams for the STC on SSCF-UNI

The SDL diagrams for the procedure are represented in Figure I.3.

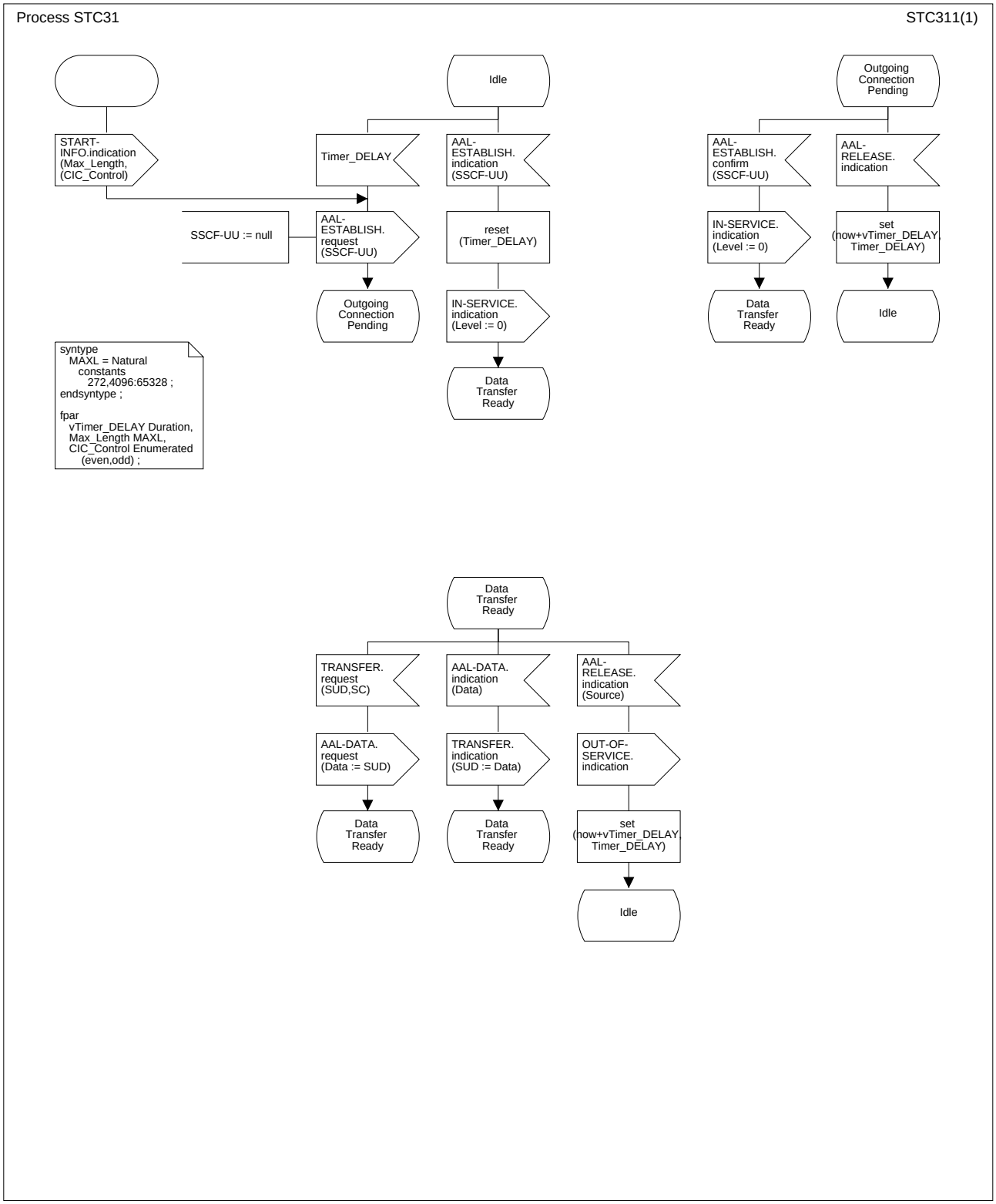


Figure I.3/Q.2150.2 – SDL diagram for the Signalling Transport Converter on SSCF-UNI

APPENDIX II

Protocol Implementation Conformance Statement (PICS) Proforma

There exists no actions of the Signalling Transport Converter that are visible from outside the system; therefore, a Protocol Implementation Conformance Statement is not possible. If the Generic Signalling Transport Service is based on SSCOP or SSCOPMCE, all of clauses 7 and 8 of this Recommendation apply.

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