INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

I.366.1

(06/98)

SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – Protocol layer requirements

---

Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL type 2

ITU-T Recommendation I.366.1

(Previously CCITT Recommendation)

ITU-T I-SERIES RECOMMENDATIONS

INTEGRATED SERVICES DIGITAL NETWORK

GENERAL STRUCTURE	
Terminology	I.110–I.119
Description of ISDNs	I.120–I.129
General modelling methods	I.130–I.139
Telecommunication network and service attributes	I.140–I.149
General description of asynchronous transfer mode	I.150–I.199
SERVICE CAPABILITIES	
Scope	I.200–I.209
General aspects of services in ISDN	I.210–I.219
Common aspects of services in the ISDN	I.220–I.229
Bearer services supported by an ISDN	I.230–I.239
Teleservices supported by an ISDN	I.240–I.249
Supplementary services in ISDN	I.250–I.299
OVERALL NETWORK ASPECTS AND FUNCTIONS	
Network functional principles	I.310–I.319
Reference models	I.320–I.329
Numbering, addressing and routing	I.330–I.339
Connection types	I.340–I.349
Performance objectives	I.350–I.359
Protocol layer requirements	**I.360–I.369**
General network requirements and functions	I.370–I.399
ISDN USER-NETWORK INTERFACES	
Application of I-series Recommendations to ISDN user-network interfaces	I.420–I.429
Layer 1 Recommendations	I.430–I.439
Layer 2 Recommendations	I.440–I.449
Layer 3 Recommendations	I.450–I.459
Multiplexing, rate adaption and support of existing interfaces	I.460–I.469
Aspects of ISDN affecting terminal requirements	I.470–I.499
INTERNETWORK INTERFACES	I.500–I.599
MAINTENANCE PRINCIPLES	I.600–I.699
B-ISDN EQUIPMENT ASPECTS	
ATM equipment	I.730–I.739
Transport functions	I.740–I.749
Management of ATM equipment	I.750–I.799

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

ITU-T RECOMMENDATION I.366.1

SEGMENTATION AND REASSEMBLY SERVICE SPECIFIC CONVERGENCE SUBLAYER FOR THE AAL TYPE 2

Summary

This Recommendation specifies the Segmentation and Reassembly Service Specific Convergence sublayer of the ATM Adaptation Layer (AAL) type 2 which provides for the bandwidth-efficient transmission of low-rate, short, and variable length packets in delay sensitive applications. On one or more AAL type 2 user information streams, the Segmentation and Reassembly Service Specific Convergence sublayer may be deployed. In this Recommendation, the sublayer structure and the procedures for the segmentation and reassembly process, as well as the optional transmission error detection and assured data transfer, are defined in depth.

Source

ITU-T Recommendation I.366.1 was prepared by ITU-T Study Group 13 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 1st of June 1998.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Page

SEGMENTATION AND REASSEMBLY SERVICE SPECIFIC CONVERGENCE SUBLAYER FOR THE AAL TYPE 2

(Geneva, 1998)

1 Scope

This Recommendation specifies the Segmentation and Reassembly Service Specific Convergence sublayer for the AAL type 2 which provides for the bandwidth-efficient transmission of low-rate, short, and variable length packets in delay sensitive applications. On one or more AAL type 2 user information streams, the Segmentation and Reassembly Service Specific Convergence sublayer may be deployed. This Recommendation covers the specification of the sublayer structure, the frame structures of the various layered parts of this sublayer, and the mechanisms for the segmentation and reassembly process, as well as the optional transmission error detection and assured data transfer features.

With this Segmentation and Reassembly Service Specific Convergence sublayer applied for a Service Specific Convergence sublayer for the AAL type 2, it is possible to transport a packet size of more than the maximum length specified in the CPS and also to multiplex with low-rate and short length packets in delay sensitive application.

This Recommendation describes the interactions between the Segmentation and Reassembly Service Specific Convergence sublayer for the AAL type 2 and the next higher layer, between this Service Specific Convergence sublayer and the AAL type 2, and between this sublayer and Layer Management, as well as Segmentation and Reassembly Sublayer peer-to-peer operations.

2 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; all 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-Recommendations is regularly published.

[1] ITU-T Recommendation I.361 (1995), *B-ISDN ATM layer specification.*

[2] ITU-T Recommendation I.363.2 (1997), *B-ISDN ATM adaptation layer specification: type 2 AAL.*

[3] ITU-T Recommendation Q.2110 (1994), *B-ISDN ATM adaptation layer – service specific connection oriented Protocol (SSCOP).*

[4] ITU-T Recommendation I.363.5 (1995), *B-ISDN ATM adaptation layer specification: type 5 AAL.*

[5] ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic reference model: The basic model.*

[6] ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic reference model: Conventions for the definition of OSI services.*

3 Definitions

This Recommendation is based upon the concepts developed in Recommendations X.200 [5] and X.210 [6]. Details of the data unit naming convention used in this Recommendation can be found in Annex A.

4 Abbreviations

This Recommendation uses the following abbreviations.

AAL	ATM Adaptation Layer
AAL-SDU	AAL Service Data Unit
ATM	Asynchronous Transfer Mode
CI	Congestion Indication
CPS	Common Part Sublayer
CPS-INFO	CPS Interface Data
CPS-UUI	CPS-User-to-User Indication
LP	Loss Priority
LSB	Least Significant Bit
MSB	Most Significant Bit
PICS	Protocol Implementation Conformance Statement
SAP	Service Access Point
SDL	Specification and Description Language
SDU	Service Data Unit
SEG-SSCS	Segmentation and Reassembly Service Specific Convergence Sublayer
SSADT	Service Specific Assured Data Transfer sublayer
SSADT-SDU	SSADT Service Data Unit
SSCOP	Service Specific Connection Oriented Protocol (see Recommendation Q.2110 [3])
SSCS	Service Specific Convergence Sublayer
SSSAR	Service Specific Segmentation and Reassembly sublayer
SSSAR-INFO	SSSAR Interface Data
SSSAR-PDU	SSSAR Protocol Data Unit
SSSAR-SDU	SSSAR Service Data Unit
SSSAR-UUI	SSSAR User-to-User Indication
SSTED	Service Specific Transmission Error Detection sublayer
SSTED-CI	SSTED Congestion Indication
SSTED-INFO	SSTED Interface Data
SSTED-LP	SSTED Loss Priority
SSTED-PDU	SSTED Protocol Data Unit
SSTED-SDU	SSTED Service Data Unit
SSTED-UU	SSTED User-to-User indication field
SSTED-UUI	SSTED User-to-User Indication

5 General framework of the Segmentation and Reassembly Service Specific Convergence Sublayer

5.1 Structure of the Segmentation and Reassembly Service Specific Convergence sublayer

The Segmentation and Reassembly Service Specific Convergence sublayer is subdivided into the Service Specific Segmentation and Reassembly sublayer (SSSAR), the Service Specific Transmission Error Detection sublayer (SSTED), and the Service Specific Assured Data Transfer sublayer (SSADT) as shown in Figure 1.

The minimum service provided by this sublayer is a segmentation and reassembly function as specified in clause 7. Optionally, a transmission error detection mechanism as specified in clause 8 may be deployed. When transmission errors are detected, the reassembled SDU is not delivered to the user. Also optionally, the user of the transmission error detection mechanism may be a further mechanism for assured data transfer specified in clause 9.

NOTE – A corrupted data delivery option is for further study.

5.2 Primitives provided by AAL type 2 for higher layer

The primitives that cross the AAL type 2 SAP are dependent on the optional mechanisms that are selected. If neither the Service Specific Transmission Error Detection sublayer nor the Service Specific Assured Data Transfer sublayer is selected, the primitives for the AAL are equivalent to the SSSAR primitives (see 7.2) but identified as AAL-UNITDATA.request and AAL-UNITDATA.indication consistent with the primitive naming convention at a SAP.

On the other hand, if the transmission error detection mechanisms are selected but not the assured data transfer mechanism, the primitives for the AAL are equivalent to the SSTED primitives (see 8.2) but identified as AAL-UNITDATA.request and AAL-UNITDATA.indication consistent with the primitive naming convention at a SAP.

If both mechanisms, i.e. the transmission error detection and the assured data transfer mechanism are selected, the primitives defined in clause 9 make the service of the AAL type 2 available to its users.

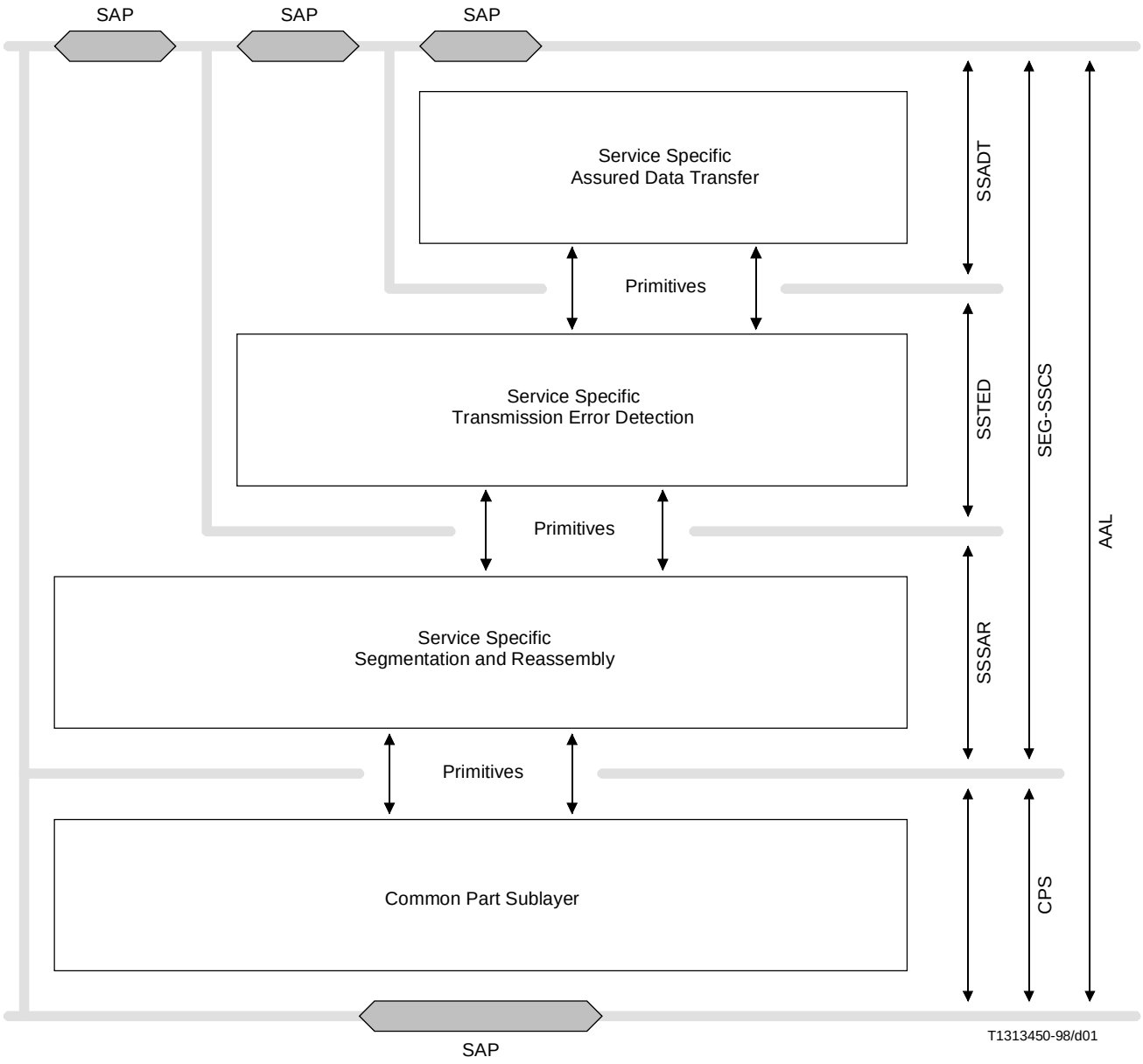
5.3 Information flow across the SEG-SSCS – AAL type 2 CPS boundary

The Segmentation and Reassembly sublayer for the AAL type 2 makes use of the Common Part Sublayer services as defined in Recommendation I.363.2 [2]. The primitives that cross the boundary between the two sublayers are also defined in Recommendation I.363.2 [2]; they are summarized in Table 1. In the event of any difference between the following summary and the definitions in Recommendation I.363.2, the definitions in Recommendation I.363.2 take precedence.

Table 1/I.366.1 – Primitives and parameters of the Common Part Sublayer

Parameter	CPS-UNITDATA. request	CPS-UNITDATA. indication	Comments
CPS-Interface Data (CPS-INFO)	m	m	1 ... 45 (default) or 1 ... 64 octets of CPS user data
CPS-User-to-User Indication (CPS-UUI)	m	m	5 bits of CPS user information (Note)
m Parameter mandatory – Parameter not present NOTE – Only values "0" ... "27" are permitted.			

NOTE – Further parameters might be needed if the corrupted data delivery option is selected, however, this option is for further study.



AAL ATM Adaptation Layer
CPS Common Part Sublayer (Rec. I.363.2)
SAP Service Access Point
SEG-SSCS Segmentation and Reassembly Service Specific Convergence Sublayer (Rec. I.366.1)
SSADT Service Specific Assured Data Transfer sublayer
SSSAR Service Specific Segmentation and Reassembly sublayer
SSTED Service Specific Transmission Error Detection sublayer

NOTE – The Segmentation and Reassembly Convergence sublayer is one example of a Service Specific Convergence Sublayer (SSCS).

Figure 1/I.366.1 – Structure of the Segmentation and Reassembly Convergence sublayer

5.4 The system and block structure of the Segmentation and Reassembly Service Specific Convergence Sublayer

The SDL system diagram of the Segmentation and Reassembly Service Specific Convergence sublayer is shown in Figure 2 and the SDL block structure in Figure 3. SDL symbol repertoire is given in Figure 4.

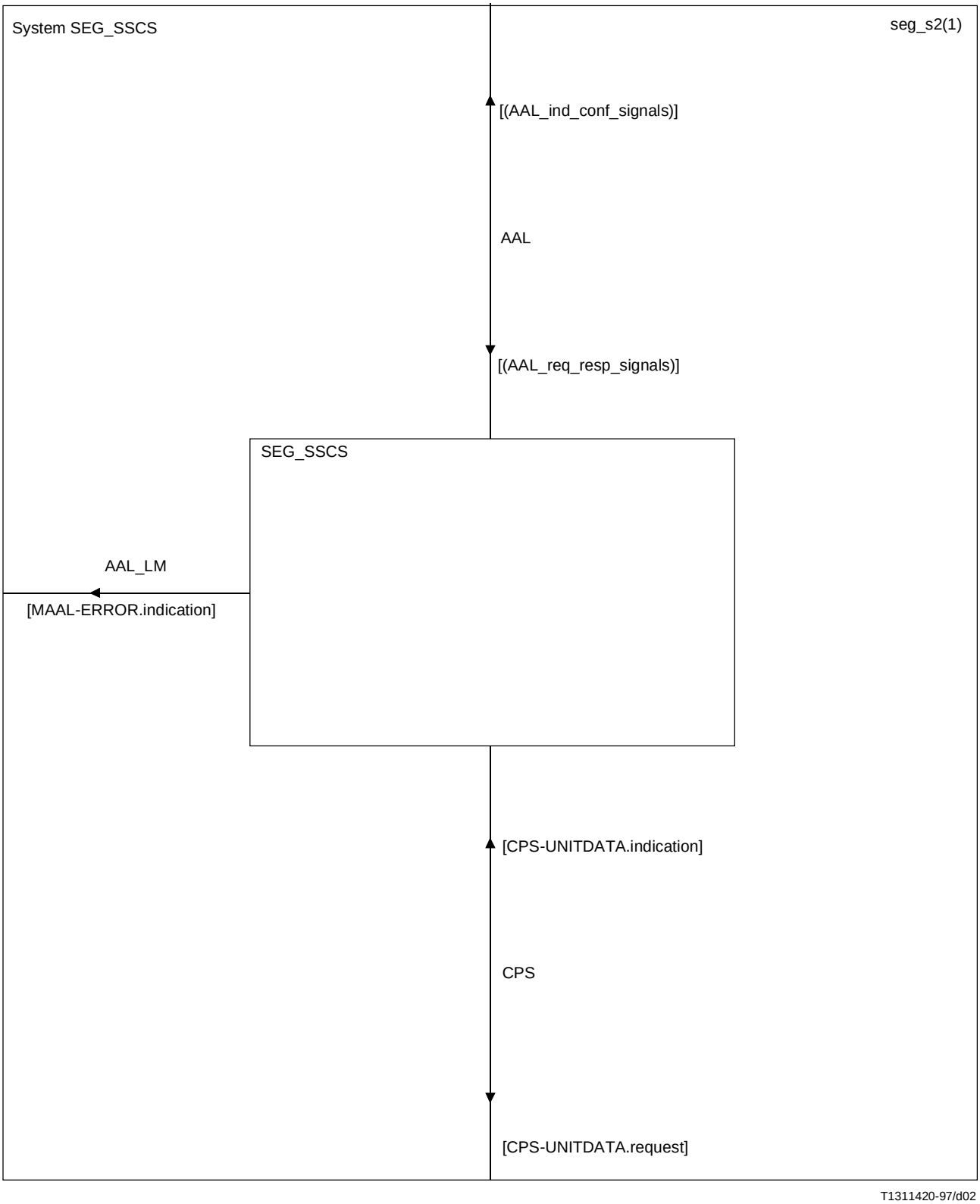


Figure 2/I.366.1 – SDL system of the Segmentation and Reassembly Service Specific Convergence sublayer of the AAL type 2

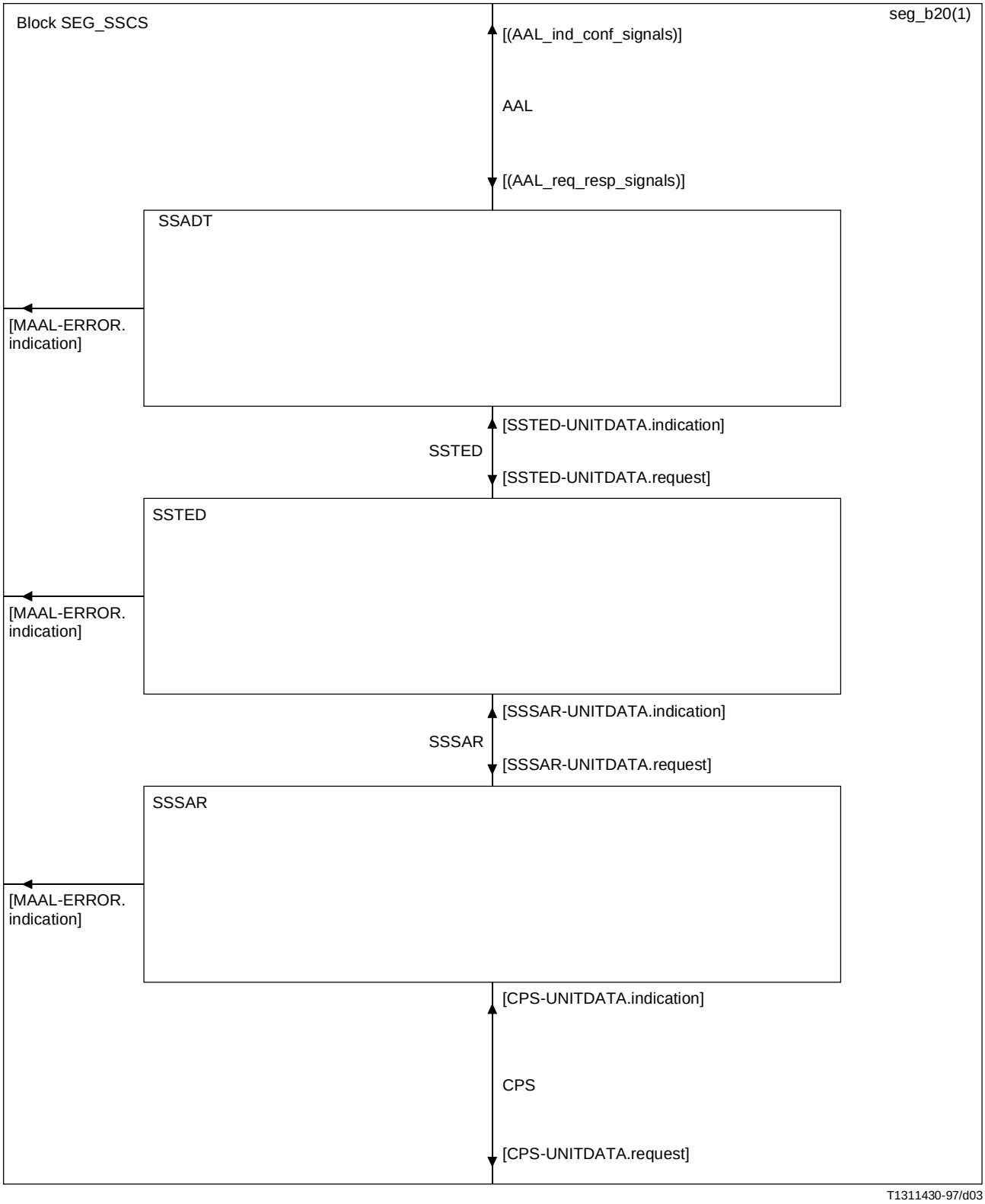


Figure 3/I.366.1 – SDL block structure of the Segmentation and Reassembly Service Specific Convergence sublayer of the AAL type 2

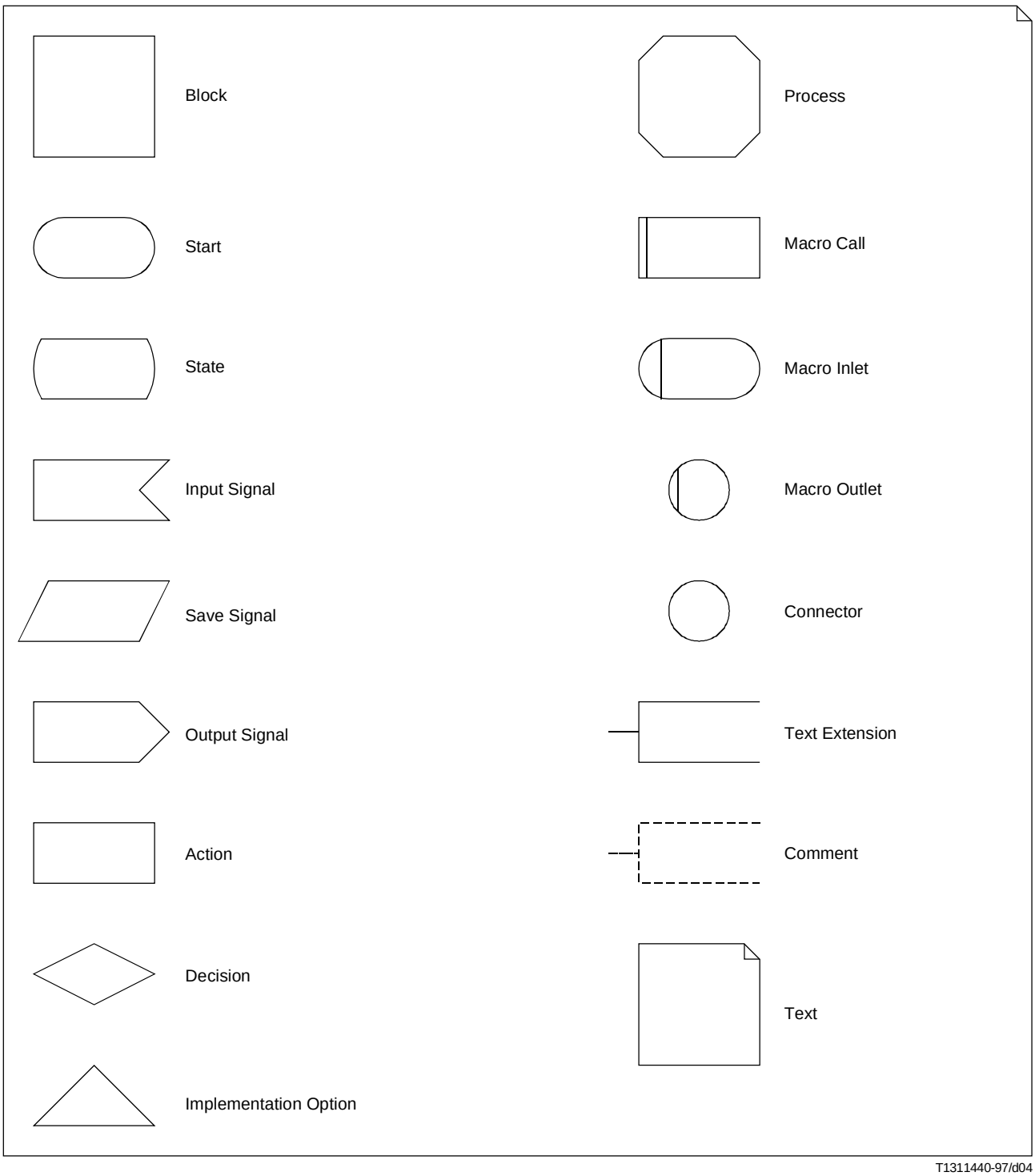


Figure 4/I.366.1 – SDL symbol repertoire

6 Interaction with Management and Control Plane

6.1 Management plane

6.1.1 Management plane interaction with AAL type 2 CPS user plane

The AAL type 2 Segmentation and Reassembly Sublayer reports detected errors to Layer Management by means of the MAAL-ERROR.indication primitive that has a single parameter indicating the error number (type of error, see Tables 3 and 5).

The service of the Service Specific Segmentation and Reassembly sublayer may be made available to Layer Management; in such a case, the following specifications apply:

- the CPS channel is entirely dedicated to communication between the Layer Management entities;
- the primitives of the Service Specific Segmentation and Reassembly sublayer are renamed to "MSAR-UNITDATA.request" and "MSAR-UNITDATA.indication"; and
- the Service Specific Transmission Error Detection sublayer and the Service Specific Assured Data Transfer sublayer is not used.

The service of the Service Specific Transmission Error Detection sublayer may be made available to Layer Management; in such a case, the following specifications apply:

- the CPS channel is entirely dedicated to communication between the Layer Management entities;
- the primitives of the Service Specific Transmission Error Detection sublayer are renamed to "MTED-UNITDATA.request" and "MTED-UNITDATA.indication"; and
- the Service Specific Assured Data Transfer sublayer is not used.

The service of the Service Specific Assured Data Transfer sublayer may be made available to Layer Management; in such a case, the specifications in clause 9 apply.

Other interactions with the Management Plane are for further study.

6.2 Control Plane

Interaction between the AAL type 2 and the Control Plane (C-plane) is outside the scope of this Recommendation.

7 Service Specific Segmentation and Reassembly Sublayer (SSSAR)

7.1 Service provided by the SSSAR

The AAL type 2 SSSAR provides the capabilities to transfer SSSAR-SDUs from one SSSAR user to one other SSSAR user through the Common Part Sublayer (CPS). The service offers peer-to-peer operation:

- Data transfer of SSSAR-SDUs of up to 65 568 octets.
- SSSAR-SDU sequence integrity is inherited from the Common Part Sublayer of the AAL type 2.

The above service is non-assured:

- SSSAR-SDUs are delivered as submitted to the Segmentation and Reassembly sublayer; on the other hand, the following situations can occur:
  a) the SSSAR may detect errors during reassembly of an SSSAR-SDU and discard the complete SDU; or
  b) the SSSAR does not detect the partial or complete loss of an SSSAR-SDU, does not detect bit errors, and does not detect data merged together from separate SDUs; hence, it may deliver corrupted data to its user.
- Lost or corrupted SSSAR-SDUs will not be corrected by retransmission.

NOTE – A corrupted data delivery option is for further study.

The AAL type 2 SSSAR connection utilizes the connections of the AAL type 2 CPS; therefore, they inherit their characteristics; in particular, the AAL type 2 SSSAR connection is a bi-directional virtual channel.

7.2 Primitives between the SSSAR and SSSAR user entities

The primitives provided by the AAL type 2 SSSAR for communication with SSSAR user entities are SSSAR-UNITDATA.request and SSSAR-UNITDATA.indication. They are used for the data transfer.

NOTE – Due to the possibility of loss and/or merging of SSSAR-SDUs, the relationship between SSSAR-UNITDATA.requests and SSSAR-UNITDATA.indications is not necessarily one-to-one.

The following parameters are defined:

- *SSSAR Interface Data (SSSAR-INFO)*

  This parameter specifies the interface data unit exchanged between the SSSAR and the SSSAR user entity. The interface data is an integral multiple of one octet. The SSSAR Interface Data represents a complete SSSAR-SDU.

- *SSSAR User-to-User Indication (SSSAR-UUI)*

  This parameter is transparently transported by the SSSAR between peer SSSAR users.

The usage of parameters is summarized in Table 2.

Table 2/I.366.1 – Primitives and parameters between the SSSAR and the SSSAR user

Parameter	SSSAR-UNITDATA. request	SSSAR-UNITDATA. indication	Comments
SSSAR Interface Data (SSSAR-INFO)	m	m	1 ... 65 568 octets of SSSAR user data
SSSAR User-to-User Indication (SSSAR-UUI)	m	m	5 bits of SSSAR user information (Note)
m Parameter mandatory – Parameter not present NOTE – Only values "0" ... "26" are permitted.			

7.3 Format and coding of the SSSAR

The format of the SSSAR-PDU is shown in Figure 5. The CPS-User-to-User Indication (CPS-UUI) is used to implement a "More Data" bit (M). A CPS-UUI value of "27" indicates that more data is required to complete the reassembly of an SSSAR-SDU. Any other value, i.e. between "0" and "26", indicates the receipt of the final data of an SSSAR-SDU.

NOTE – If a user of the SSSAR does not need multiple SSSAR-UUI code points, the value "26" should be chosen for compatibility with other SSCS specifications (see for example 8.4.1).

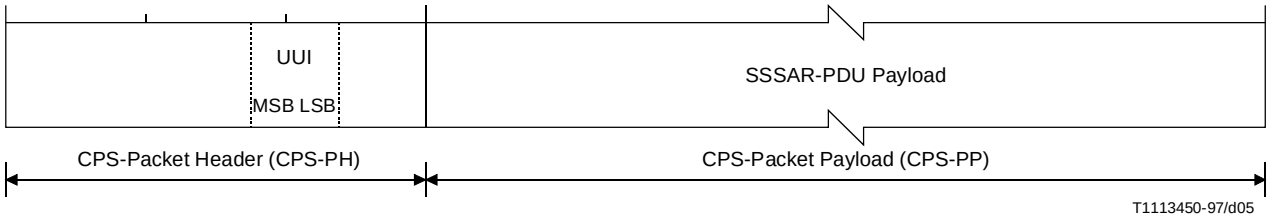


Figure 5/I.366.1 – Format of the SSSAR-PDU

The maximum size of an SSSAR-SDU may be restricted on a per SSSAR-connection basis with the parameter "Max_SDU_Length". This parameter is negotiated by signalling or management procedures.

7.4 Procedure of the SSSAR

The SDL block structure of the procedure of the Service Specific Segmentation and Reassembly sublayer is shown in Figure 6.

The Service Specific Segmentation and Reassembly sublayer receives SSSAR-SDUs from one-SSSAR user transmitter processes. If necessary, it segments these SDUs into a number of SSSAR-PDUs (i.e. CPS-SDUs) and submits them to the Common Part of the AAL type 2 for transmission. At the SSSAR receiver, the SSSAR-PDUs are reassembled into an SSSAR-SDU before being passed to the SSSAR user.

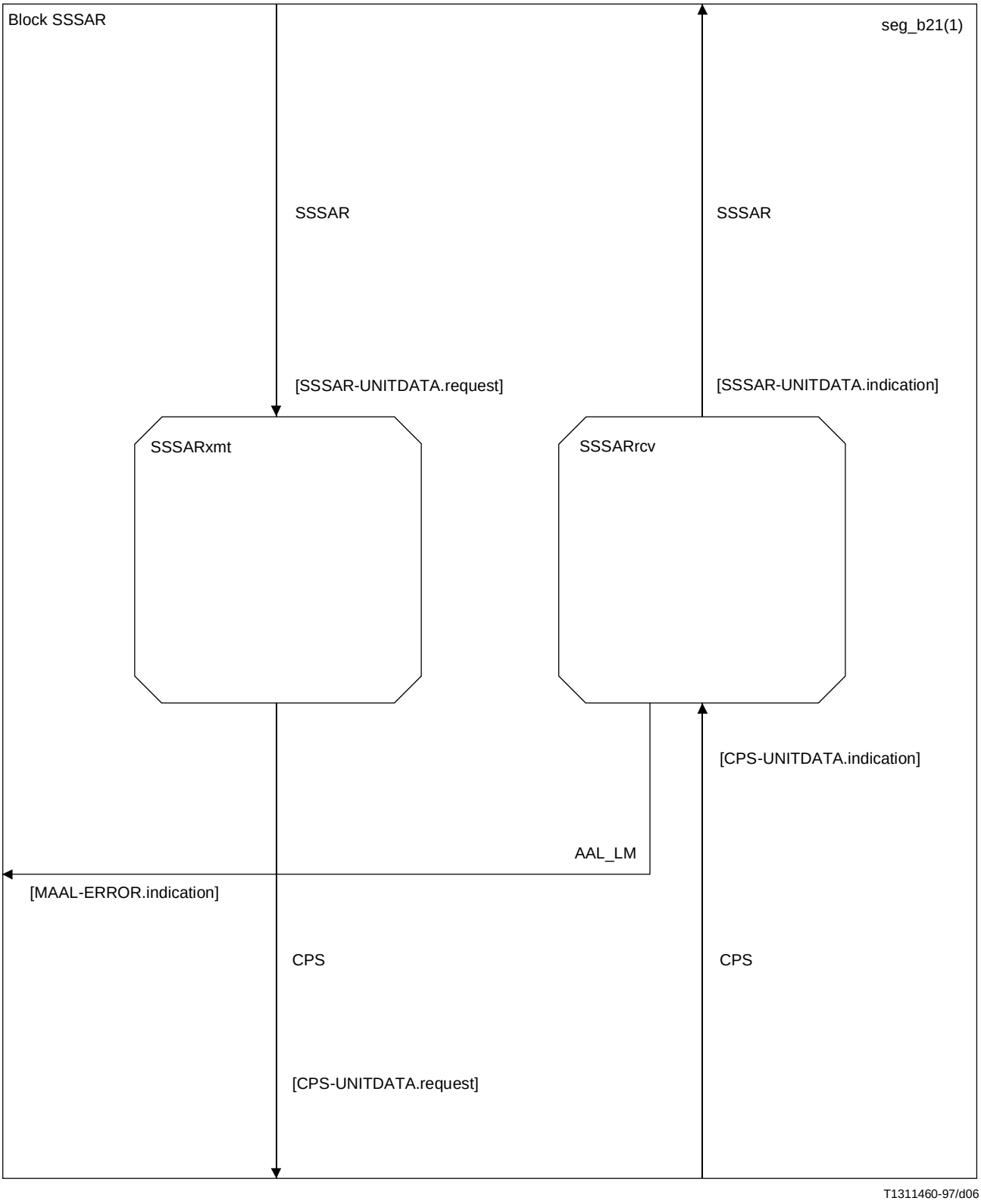


Figure 6/I.366.1 – SDL block structure of the Service Specific Segmentation and Reassembly sublayer

If an SSSAR-SDU needs to be segmented, all SSSAR-PDUs except the last are usually of the same length that is determined on a per CPS-connection basis. Other schemes that segment a SSSAR-SDU into SSSAR-PDUs of various sizes (e.g. for purposes of dynamic bandwidth management) are permitted albeit not specified in this Recommendation. This length may be between "1" and the maximum length supported by the CPS-connection.

The SDL diagrams of the procedures of the Service Specific Segmentation and Reassembly sublayer are given in this subclause. If there exists any difference between the prose description also given in this subclause and the SDL diagrams, the SDL diagrams take precedence.

NOTE – In the SDL diagrams of this subclause, the octets in all PDUs and SDUs, i.e. the SSSAR-SDU, are numbered from "0" to at most "65 567".

7.4.1 SSSAR transmitter

The operation of the SSSAR transmitter is modelled as a state machine consisting of the following single state:

IDLE — There exists only one state; the process returns here after each transition.

The description of the operations of the SSSAR transmitter makes use of the following state variables:

len — This state variable indicates the (remaining) length of a SSSAR-SDU (i.e. the SSSAR-INFO parameter) to be processed.

ptrSEG — This state variable points to the next octet in the SSSAR-SDU (i.e. the SSSAR-INFO parameter) to be processed. The payload of the next SSSAR-PDU is copied from here.

The SSSAR transmitter maintains the following parameter:

Segment_Length — This parameter indicates the maximum size SSSAR-PDU in octets. This parameter is determined by the implementation of the SSSAR transmitter.

NOTE – The Segment_Length should be chosen such that the following objectives are met:

- high utilization efficiency of payload;
- low jitter for delay-sensitive applications; and
- simple interworking with AAL type 5 [4].

The SDL definition of the SSSAR transmitter process is shown in Figure 7.

1) When a SSSAR-SDU is passed from a SSSAR user with the SSSAR-UNITDATA.request primitive, the variable "len" is set to the length of the SSSAR-INFO parameter.

2) If this length or the length of the information still unprocessed in the SSSAR-INFO parameter (variable "len") exceeds the maximum permissible length of the SSSAR-PDU, "Segment_Length" octets are copied from the SSSAR-INFO parameter into the CPS-INFO parameter. This information is passed to the CPS for transmission with the CPS-UNITDATA.request primitive where the SSSAR-UUI parameter is set to "27". The variable "len" is then reduced by "Segment_Length" and the variable "ptrSEG" incremented by the same amount.

3) If the remaining length of the information still unprocessed in the SSSAR-INFO parameter (variable "len") still exceeds the maximum permissible length of the SSSAR-PDU, the process continues with item 2).

4) If the length of the information still unprocessed in the SSSAR-INFO parameter (variable "len") does not exceed the maximum permissible length of the SSSAR-PDU, the remaining "len" octets from the SSSAR-INFO parameter are copied into the CPS-INFO parameter. This information is passed to the CPS for transmission with the CPS-UNITDATA.request primitive where the CPS-UUI parameter is set to the value of the SSSAR-UUI parameter.

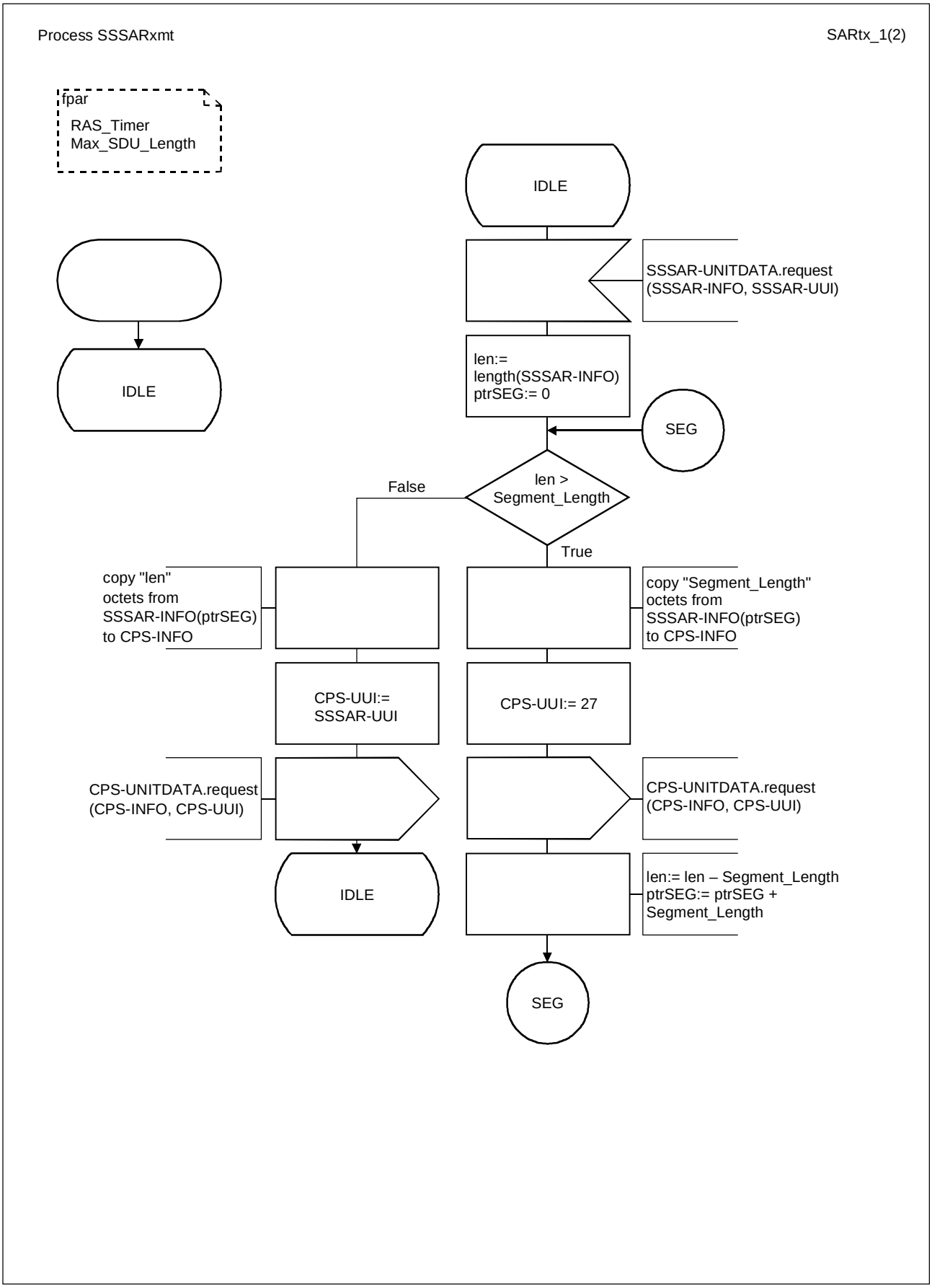


Figure 7/I.366.1 – SDL diagram for the SSSAR transmitter

7.4.2 SSSAR receiver

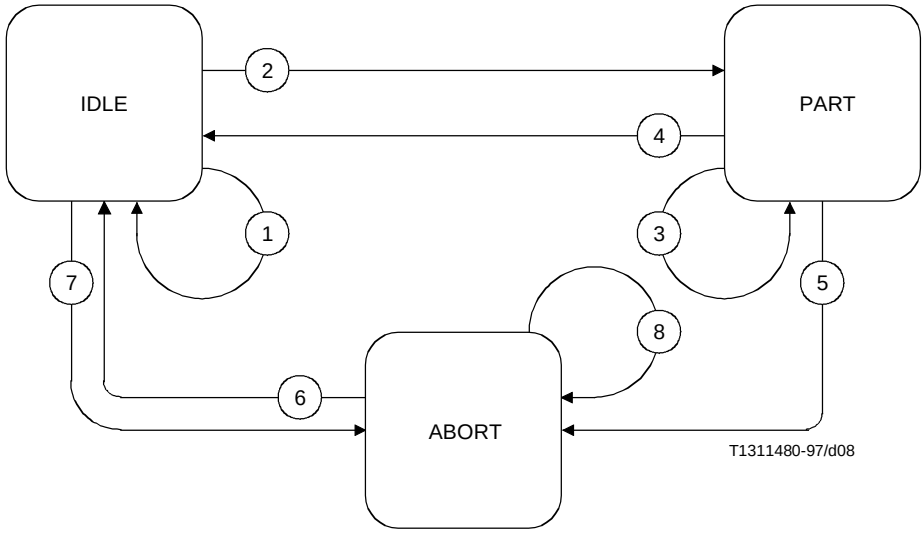
The operation of the SSSAR receiver is modelled as a state machine consisting of the following states:

IDLE — No SSSAR-SDU is currently reassembled; the reassembly timer "RAS_Timer" is not running.

PART — Some but not all information for an SSSAR-SDU currently being reassembled has arrived and is being buffered; the reassembly timer "RAS_Timer" is running.

ABORT — The maximum permissible length of an SSSAR-SDU has been exceeded during reassembly. If data known to be corrupted is not delivered, the SSSAR receiver remains in this state until an end of an SSSAR-SDU is received; the reassembly timer "RAS_Timer" is running.

The state transition diagram for the SSSAR receiver is shown in Figure 8.



① CPS-UNITDATA.indication received and end of SSSAR-SDU detected.
② CPS-UNITDATA.indication received and no end of SSSAR-SDU detected.
③ CPS-UNITDATA.indication received and no end of SSSAR-SDU detected.
④ {CPS-UNITDATA.indication received and end of SSSAR-SDU detected} or {RAS_Timer expiry}.
⑤ Max_SDU_Length exceeded.
⑥ {CPS-UNITDATA.indication received and end of SSSAR-SDU detected} or {RAS_Timer expiry}.
⑦ Max_SDU_Length exceeded.
⑧ CPS-UNITDATA.indication received and no end of SSSAR-SDU detected.

Figure 8/I.366.1 – State transition diagram for the SSSAR receiver

The description of the operations of the SSSAR receiver makes use of the following state variables:

len — This state variable indicates the length of a SSSAR-PDU received.

ptrRAS — This state variable points to the next free octet in the reassembly buffer. The next SSSAR-PDU payload is copied to here.

INFO_buffer — The buffer is used to temporarily store or reassemble SSSAR-SDU.

The description of the operations of the CPS transmitter makes use of the following timer:

RAS_Timer — The reassembly timer RAS_Timer assures that the reassembly of an SSSAR-SDU does not exceed a certain time; if such timer supervision is not required, the timer is set to an infinite value.

NOTE 1 – Such timer expiry could happen if the last SSSAR-PDU of an SSSAR-SDU has been lost.

The SSSAR receiver maintains the following parameter:

Max_SDU_Length This parameter indicates the maximum size SSSAR-SDU, in octets, that is allowed to be reassembled.

The SDL definition of the SSSAR receiver process is shown in Figure 9.

1) When the SSSAR receiver is in the state IDLE and a CPS-UNITDATA.indication primitive is received, the SSSAR receiver sets the variable "ptrRAS" to "0" and starts the reassembly timer "RAS_Timer". The variable "len" is set to the length of the CPS-INFO parameter. The CPS-INFO is copied to the variable "INFO_buffer" and the variable "ptrRAS" is incremented by "len".

   NOTE 2 – The length of the CPS-INFO parameter may vary from one CPS-UNITDATA.indication primitive to the other within the same SSSAR-SDU.

2) If the CPS-UUI parameter is set to "27", the SSSAR receiver enters or remains in state PART. Otherwise, an SSSAR-UNITDATA.indication is issued with the following parameters:

   - the information in the variable "INFO_buffer" is copied to the SSSAR-INFO parameter; and
   - the value of the last received CPS-UUI parameter is copied into the SSSAR-UUI parameter.

   The reassembly timer "RAS_Timer" is reset and the process enters (or remains) in state IDLE.

3) When the SSSAR receiver is in the state PART and a CPS-UNITDATA.indication primitive is received, the SSSAR receiver sets the variable "len" to the length of the CPS-INFO parameter. If the information already in the variable "INFO_buffer" and the newly-arrived information exceed the maximum permissible amount (parameter "Max_SDU_Length"), the procedure continues at item 4). Otherwise, the CPS-INFO is appended to the variable "INFO_buffer" and the variable "ptrRAS" is incremented by "len". The process then continues at item 2).

4) If the information already in the variable "INFO_buffer" and the newly-arrived information exceed the maximum permissible amount (parameter "Max_SDU_Length"), and data known to be corrupted are not delivered, Layer Management is informed about the event and the process enters state ABORT.

5) When the SSSAR receiver is in the state PART and timer "RAS_Timer" expires, Layer Management is informed about the event and the process enters state IDLE.

6) When the SSSAR receiver is in the state ABORT and a CPS-UNITDATA.indication primitive is received, the SSSAR receiver checks the CPS-UUI parameter. If it is set to "27", the process remains in state ABORT without any further actions; otherwise, the process enters state IDLE also without any further actions.

7) When the SSSAR receiver is in the state ABORT and timer "RAS_Timer" expires, the process enters state IDLE without any further actions.

7.4.3 Summary of error indications to Layer Management by the SSSAR

The error indications to Layer Management are summarized in Table 3.

Table 3/I.366.1 – Error indications to Layer Management

(errnum)	Error indicated
10	The maximum permissible size for a reassembled SSSAR-SDU ("Max_SDU_Length") has been exceeded.
11	The reassembly timer RAS_Timer has expired.

8 Service Specific Transmission Error Detection sublayer (SSTED)

8.1 Service provided by the SSTED

The AAL type 2 SSTED provides the capabilities to transfer SSTED-SDUs from one SSTED user to one other SSTED user through the Common Part Sublayer (CPS). The service offers peer-to-peer operation:

- Data transfer of SSTED-SDUs of up to 65 535 octets.
- SSTED-SDU sequence integrity is inherited from the Service Specific Segmentation and Reassembly sublayer (SSSAR).

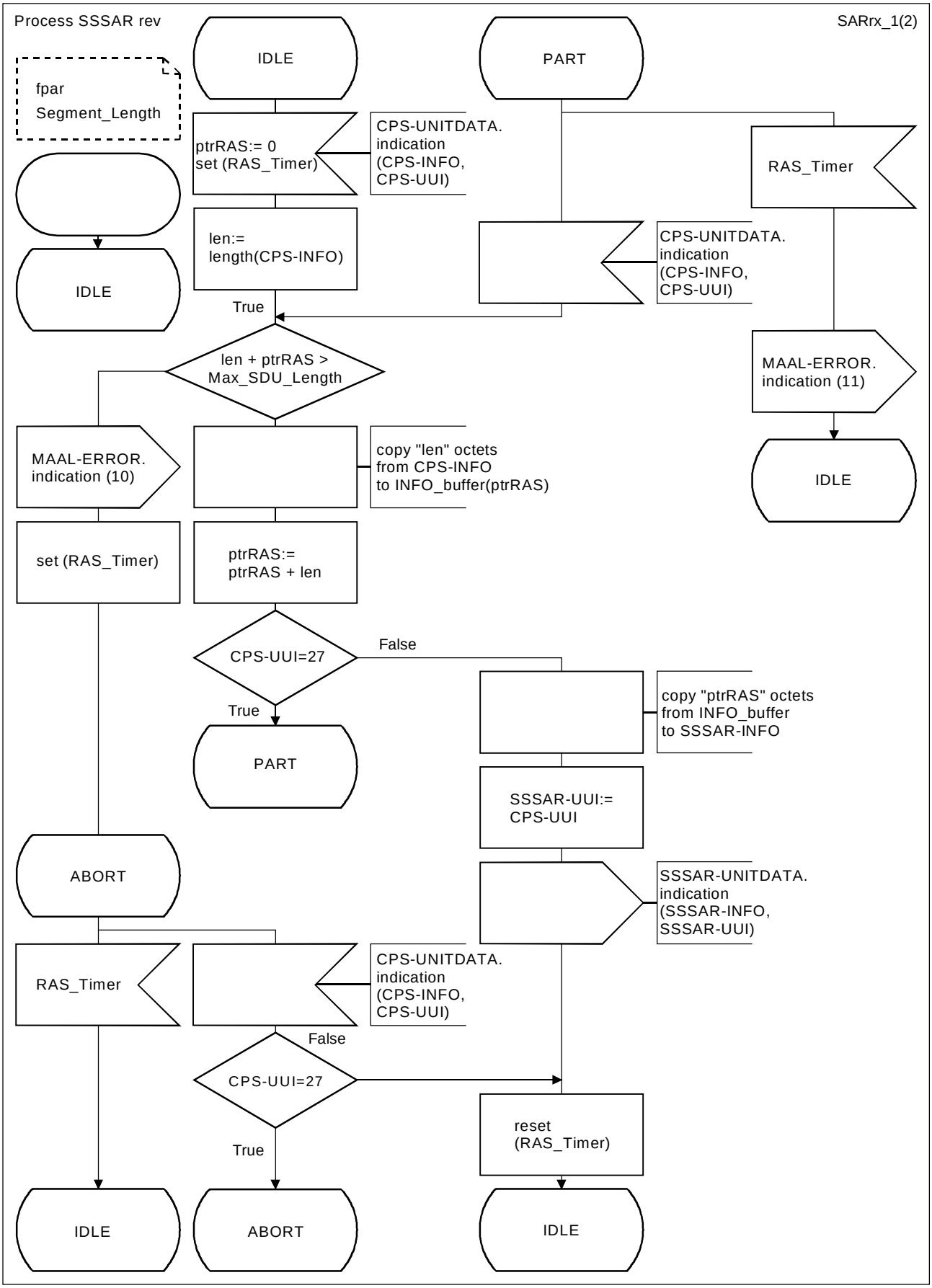


Figure 9/I.366.1 – SDL diagram for the SSSAR receiver

The above service is non-assured:

- integral SSTED-SDU may be delivered, lost or corrupted;
- corrupted SSTED-SDUs are detected and not delivered to the SSTED user; and
- the corrupted or lost SSTED-SDUs will not be corrected by retransmission.

NOTE 1 – Examples of detected errors would include: received length and SSTED-PDU Length field mismatch, improperly formatted SSTED-PDU, and SSTED CRC errors (buffer overflow is handled by the SSSAR).

NOTE 2 – A corrupted data delivery option is for further study.

The AAL type 2 SSTED connections utilize the connection of the AAL type 2 CPS; therefore, they inherit their characteristics; in particular, the AAL type 2 SSSAR connection is a bi-directional virtual channel.

8.2 Primitives between the SSTED and SSTED user entities

The primitives provided by the AAL type 2 SSTED for communication with SSTED user entities are SSTED-UNITDATA.request and SSTED-UNITDATA.indication. They are used for the data transfer.

The following parameters are defined.

- *SSTED Interface Data (SSTED-INFO)*

  This parameter specifies the interface data unit exchanged between the SSTED and the SSTED user entity. The interface data is an integral multiple of one octet. The SSTED Interface Data represents a complete SSTED-SDU.

- *SSTED Loss Priority (SSTED-LP)*

  This parameter is provided for compatibility with the service of the CPCS of the AAL type 5 [4]; it is transported transparently by the SSTED between peer SSTED users.

- *SSTED Congestion Indication (SSTED-CI)*

  This parameter is provided for compatibility with the service of the CPCS of the AAL type 5 [4]; it is transported transparently by the SSTED between peer SSTED users.

- *SSTED User-to-User Indication (SSTED-UUI)*

  This parameter is transparently transported by the SSTED between peer SSTED users.

The usage of parameters is summarized in Table 4.

Table 4/I.366.1 – Primitives and parameters between the SSTED and the SSTED user

Parameter	SSTED-UNITDATA.request	SSTED-UNITDATA.indication	Comments
SSTED Interface Data (SSTED-INFO)	m	m	1 ... 65 535 octets of SSTED user data
SSTED Loss Priority (SSTED-LP)	m	m	SSTED-LP = 1: Low Priority (Note) SSTED-LP = 0: High Priority
SSTED Congestion Indication (SSTED-CI)	m	m	SSTED-CI = 1: congestion experienced (Note) SSTED-CI = 0: no congestion experienced
SSTED User-to-User Indication (SSTED-UUI)	m	m	8 bits of SSTED user information
m Parameter mandatory – Parameter not present NOTE – These parameters are provided for compatibility with the service of the AAL type 5 [4]; they are transported transparently by the SSTED.			

8.3 Format and coding of the SSTED

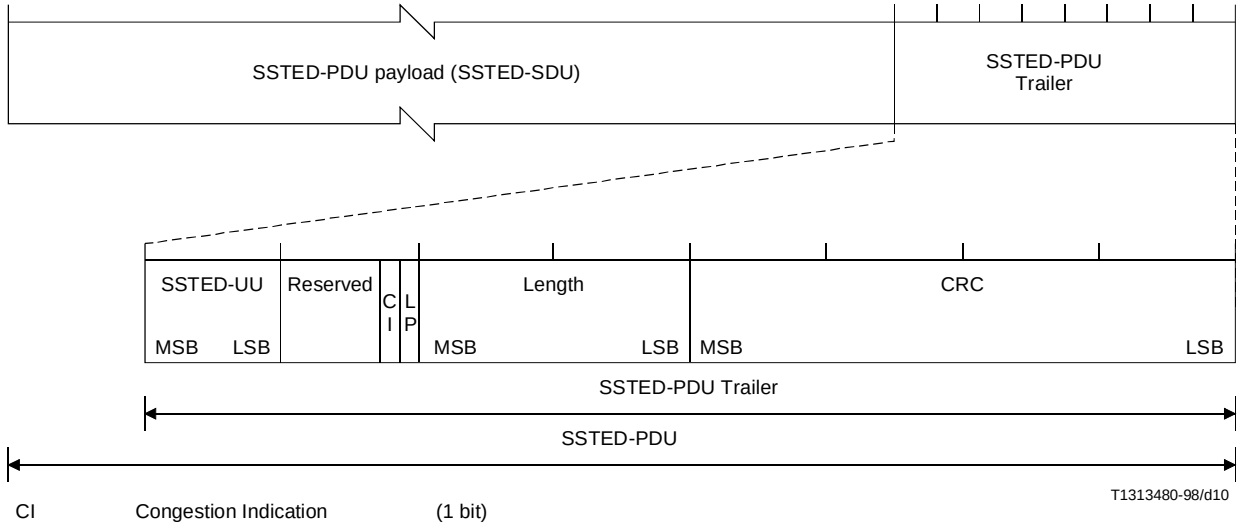
The coding of the SSTED-PDU conforms to the coding conventions specified in 2.1/I.361 [1].

A SSTED-PDU consists of an SSTED payload and of an SSTED trailer. The size and position of the fields of the SSTED-PDU are shown in Figure 10.

The SSTED-PDU consists of 7 fields:

a) *SSTED-PDU payload*

This field carries the SSTED-SDU and is copied by the SSTED transmitter from the SSTED-INFO parameter of the SSTED-UNITDATA.request primitive and copied by the SSTED receiver to the SSTED-INFO parameter of the SSTED-UNITDATA.indication primitive.



CI	Congestion Indication	(1 bit)
CRC	Cyclic Redundancy Check	(4 octets)
Length	Length of SSTED-SDU	(2 octets)
LP	Loss Priority	(1 bit)
Reserved	Reserved Field (set to zero)	(6 bits)
SSTED-UU	SSTED User-to-User indication	(1 octet)

Figure 10/I.366.1 – Format of the SSTED-PDU

b) *Reserved*

This field is reserved for future standardization. It is set to "0" by the transmitter but ignored by the receiver.

c) *Congestion Indication (CI)*

This field is provided for compatibility with the service of the CPCS of the AAL type 5. It is transported transparently from the user of the transmitter to the user of receiver.

d) *Loss Priority (LP)*

This field is provided for compatibility with the service of the CPCS of the AAL type 5. It is transported transparently from the user of the transmitter to the user of receiver.

e) *SSTED User-to-User indication (SSTED-UU) field*

The CPCS-UU field is used to transparently transfer CPCS user-to-user information.

f) *Length field*

The Length field is used to encode the length of the SSTED-PDU payload field. The Length field value is also used by the receiver to detect the loss or gain of information. The length is binary encoded as number of octets. The Length field value of "0" is used to indicate that the received SSTED-PDU is to be aborted.

g) *CRC field*

The CRC-32 is used to detect bit errors in the SSTED-PDU.

The CRC field is filled with the value of a CRC calculation which is performed over the entire contents of the SSTED-PDU, excluding the CRC in the SSTED-PDU trailer. The CRC field shall contain the ones complement of the sum (modulo 2) of:

1) the remainder of $x^k \times (x^{31} + x^{30} + ... + x + 1)$ divided (modulo 2) by the generator polynomial, where k is the number of bits of the information over which the CRC is calculated; and

2) the remainder of the division (modulo 2) by the generator polynomial of the product of x^{32} by the information over which the CRC is calculated.

The CRC-32 generator polynomial is:

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

The result of the CRC calculation is placed with the least significant bit right justified in the CRC field.

As a typical implementation at the transmitter, the initial content of the register of the device computing the remainder of the division is preset to all "1s" and is then modified by division by the generator polynomial (as described above) on the information over which the CRC is to be calculated; the ones complement of the resulting remainder is put into the CRC field.

As a typical implementation at the receiver, the initial content of the register of the device computing the remainder of the division is preset to all "1s". The final remainder, after multiplication by x^{32} and then division (modulo 2) by the generator polynomial of the serial incoming CPCS-PDU, will be (in the absence of errors): $C(x) = x^{31} + x^{30} + x^{26} + x^{25} + x^{24} + x^{18} + x^{15} + x^{14} + x^{12} + x^{11} + x^{10} + x^8 + x^6 + x^5 + x^4 + x^3 + x + 1$.

8.4 Procedure of the SSTED

The SDL block structure of the procedure of the Service Specific Transmission Error Detection sublayer is shown in Figure 11.

The Service Specific Transmission Error Detection sublayer receives SSTED-SDUs from one-SSTED-user transmitter processes. It places the SSTED-PDU into the SSTED-PDU payload, sets the Length field, and calculates the CRC. The SSTED-PDU is submitted to the Service Specific Segmentation and Reassembly sublayer for transmission. At the SSTED receiver, the length of the SSTED-PDU is compared to the value in the Length field and the CRC is verified. If either check fails, the received SSTED-PDU is discarded; otherwise, the uncorrupted SSTED-SDU is passed to the SSTED user.

The SDL diagrams of the procedures of the Service Specific Transmission Error Detection sublayer are given in this subclause. If there exists any difference between the prose description also given in this subclause and the SDL diagrams, the SDL diagrams take precedence.

NOTE – In the SDL diagrams of this subclause, the octets in all PDUs and SDUs, i.e. the SSTED-SDU, are numbered from "0" to at most "65 534".

8.4.1 SSTED transmitter

The operation of the SSTED transmitter is modelled as a state machine consisting of the following single state:

IDLE There exists only one state; the process returns here after each transition.

The description of the operations of the SSTED transmitter makes no use of any state variables:

The SDL definition of the SSTED transmitter process is shown in Figure 12.

1) When a SSTED-SDU is passed from a SSTED user with the SSTED-UNITDATA.request primitive, the SSTED-PDU is constructed. The SSTED-PDU payload is set to the SSTED-SDU received in the SSTED-INFO parameter, the Length field is set to the length (in octets) of the SSTED-INFO parameter, the SSTED-UU field is set to the SSTED-UUI parameter, the reserved field is set to "0", the CI field is set to the value of the SSTED-CI parameter, the LP field is set to the value of the SSTED-LP parameter, and the CRC field is computed.

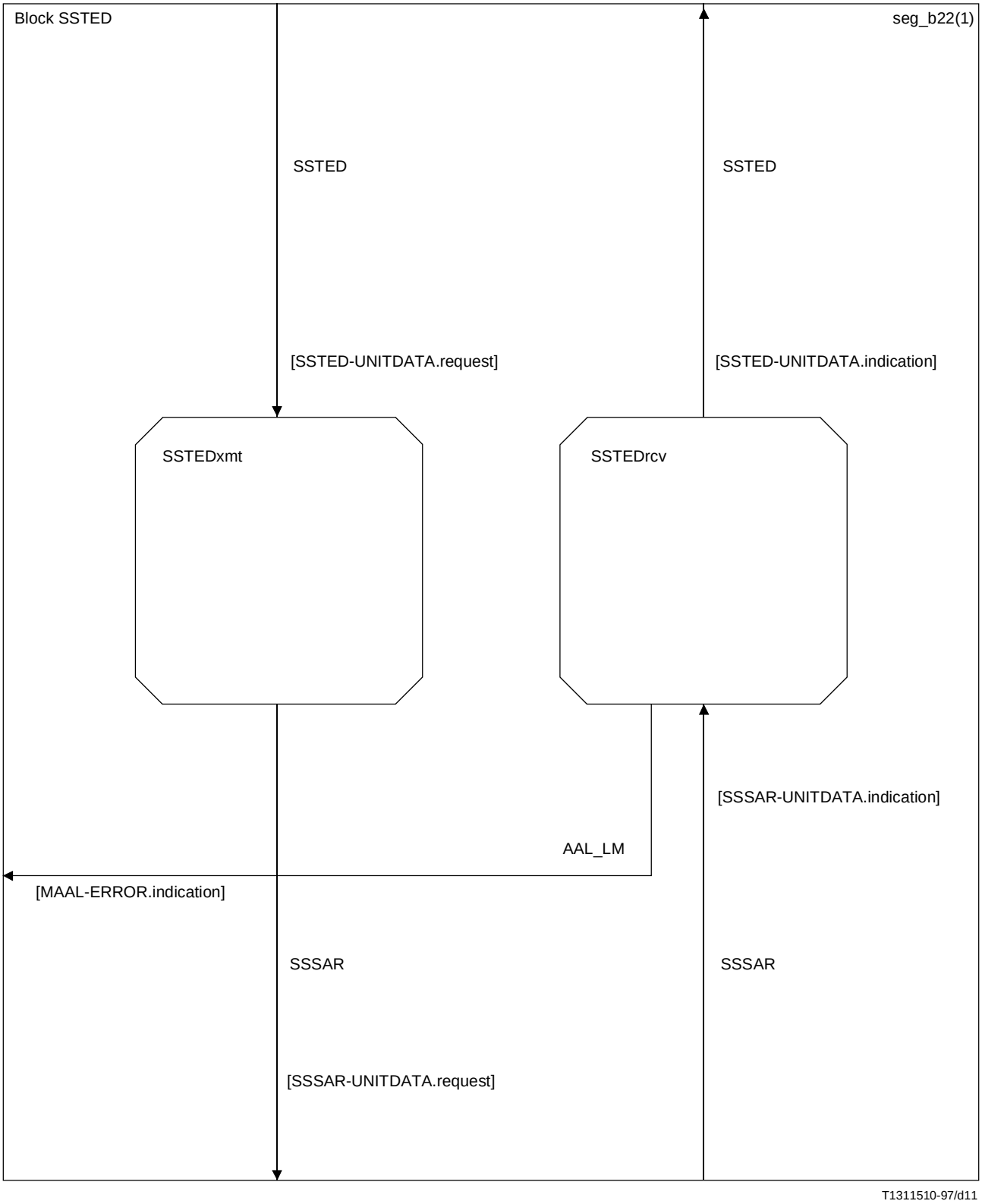


Figure 11/I.366.1 – SDL block structure of the Service Specific Transmission Error Detection sublayer

2) The constructed SSTED-PDU is submitted for transmission to the SSSAR with the SSTED-UNITDATA.request primitive; the parameters are set as follows:

- the SSSAR-INFO is set to the SSTED-PDU just constructed; and
- the SSSAR-UUI is set to "26".

The process remains in state IDLE.

8.4.2 SSTED receiver

The operation of the SSTED receiver is modelled as a state machine consisting of the following single state:

IDLE There exists only one state; the process returns here after each transition.

The description of the operations of the SSTED receiver makes use of the following state variables:

len This state variable indicates the length of the received SSTED-PDU (i.e. the SSSAR-INFO parameter) to be processed.

The SDL definition of the SSTED receiver process is shown in Figure 13.

1) When a SSTED-PDU is received from an SSSAR with the SSSAR-UNITDATA.indication primitive, the variable "len" is set to the length of the SSTED-PDU, i.e. the SSSAR-INFO parameter. If "len" is less than "9", the PDU is improperly formatted; Layer Management is informed about this event, the information is discarded and the process remains in state IDLE.
2) If the variable "len" is not equal to the value in the Length field of the SSTED-PDU increased by 8, the information is discarded and the process remains in state IDLE. In addition, if the value in the Length field of the SSTED-PDU is not equal to "0", Layer Management is informed about this event.
3) The CRC is computed and verified [see 8.3 g)]. If the verification fails, Layer Management is informed about this event, the information is discarded and the process remains in state IDLE.
4) If the CPI field is not "0", Layer Management is informed about this event, the information is discarded and the process remains in state IDLE.
5) The information is considered uncorrupted and is passed to the SSTED user with the SSTED-UNITDATA.indication primitive; the parameter SSTED-INFO is set to the SSTED-SDU (from the SSTED-PDU payload), SSTED-UUI is set to the value of the SSTED-UU field, the parameter SSTED-CI is set to the value of the CI field, and the parameter SSTED-LP is set to the value of the LP field.

NOTE – A corrupted data delivery option is for further study.

8.4.3 Summary of error indications to Layer Management by the SSTED

The error indications to Layer Management are summarized in Table 5.

Table 5/I.366.1 – Error indications to Layer Management

(errnum)	Error indicated
20	An SSTED-PDU of length 8 or less has been received.
21	The value of the Length field in the SSTED-PDU does not match the length of the received SSTED-PDU.
22	The value of the CRC field is not equal to the CRC calculated over the received information.

9 Service Specific Assured Data Transfer sublayer (SSADT)

The service of the Service Specific Assured Data Transfer sublayer is identical to the one defined in Recommendation Q.2110 [3] (SSCOP – Service Specific Connection Oriented Protocol).

This clause primarily contains information about the SSCOP service but also specifies the necessary adaptation to the SSTED sublayer.

NOTE – The specification of other procedures to provide the assured data transfer mechanism (e.g. Recommendation Q.921 – ISDN User-Network Interface – Data Link Layer Specification) is for further study.

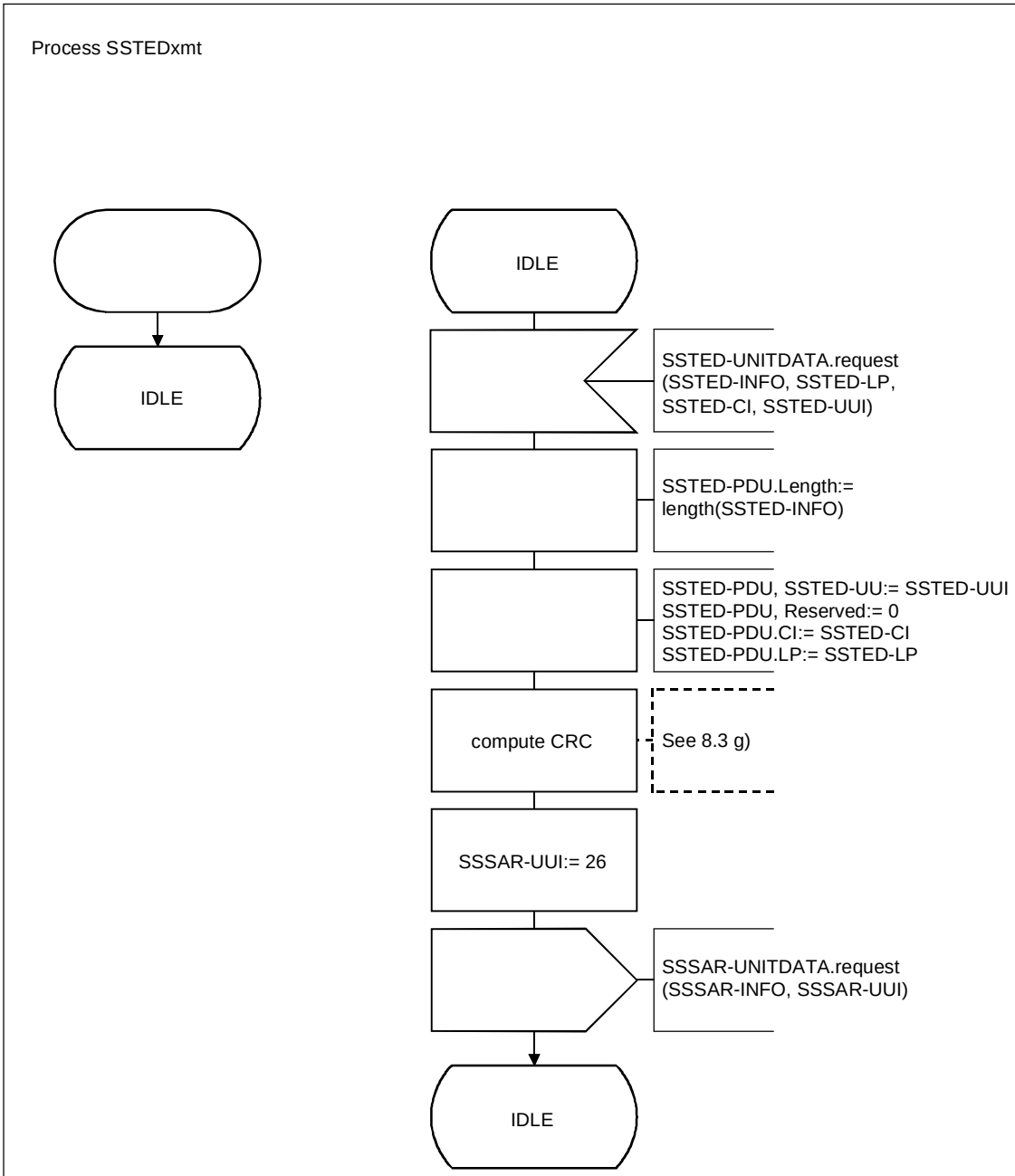


Figure 12/I.366.1 – SDL diagram for the SSTED transmitter

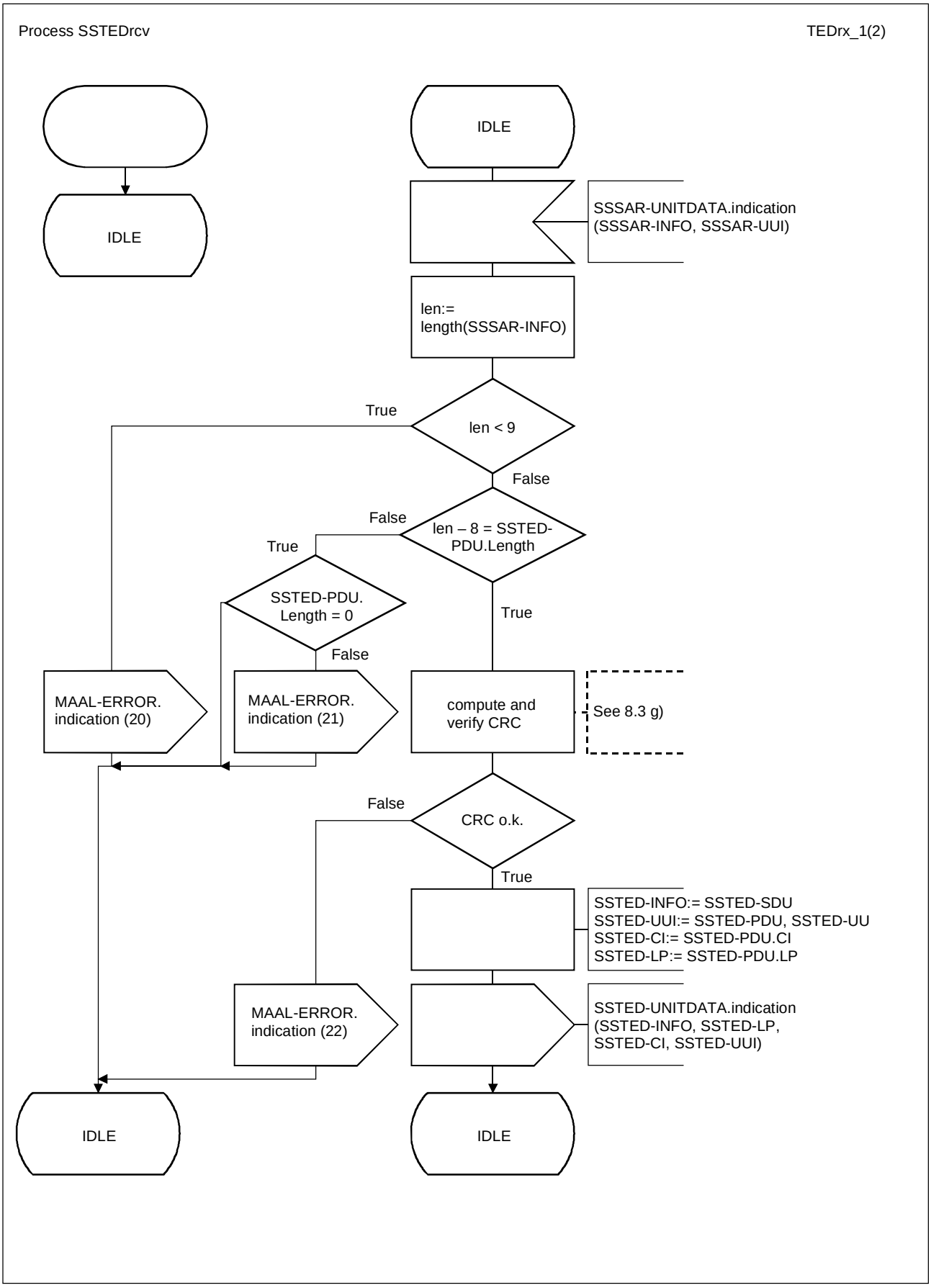


Figure 13/I.366.1 – SDL diagram for the SSTED receiver

9.1 Information about the service provided by the SSADT

The AAL type 2 SSADT provides the capabilities to transfer SSADT-SDUs from one SSADT user to one other SSADT user through the Common Part Sublayer (CPS). The service offers peer-to-peer operation:

- Data transfer of SSADT-SDUs of up to 65 531 octets.
- SSADT-SDU sequence integrity is inherited from the Service Specific Transmission Error Detection sublayer (SSTED).

The above service has an assured and a non-assured mode.

In the assured mode:

- SSADT-SDUs are delivered as submitted to the Assured Data Transfer sublayer;
- corrupted SSADT-SDUs are detected and are not delivered to the SSADT user, on the other hand;
- through a sequencing mechanism, the receiving SSADT entity can detect missing SSADT-SDUs; lost or corrupted SSADT-SDUs are corrected by selective retransmission;
- a flow control mechanism allows an SSADT receiver to control the rate at which the peer SSADT transmitter entity may send information; and
- a keep alive mechanism verifies that the two peer SSADT entities participating in a connection are remaining in a link connection established state even in the case of a prolonged absence of data transfer.

NOTE 1 – Examples of detected errors would include missing SSADT-PDUs (corrupted PDUs are detected and discarded by the SSTED).

NOTE 2 – The corrupted data delivery option for the SSTED which is for further study is not utilized.

The AAL type 2 SSADT connection utilizes the connection of the AAL type 2 CPS; therefore, they inherit their characteristics; in particular, the AAL type 2 SSADT connection is a bi-directional virtual channel;

9.2 Primitives between the SSADT and SSADT user entities

The primitives defined in Recommendation Q.2110 shall also apply for the SSADT sublayer. If needed, the Recommendation Q.2110 can be complemented by a Service Specific Coordination Function (SSCF) to provide the service at the AAL Service Access Point (SAP). The following is a (non-exhaustive) list of definitions for SSCFs on top of Recommendation Q.2110:

[A] ITU-T Recommendation Q.2130 (1994), *B-ISDN signalling ATM adaptation layer – Service Specific Coordination Function for support of Signalling at the User-Network Interface (SSCF at UNI).*

[B] ITU-T Recommendation Q.2140 (1995), *B-ISDN ATM adaptation layer – Service Specific Coordination Function for support of signalling at the Network Node Interface (SSCF at NNI).*

[C] ITU-T Recommendation I.365.2 (1995), *B-ISDN ATM adaptation layer sublayers – Service Specific Coordination Function to provide the Connection-Oriented Network Service (SSCF-CONS).*

[D] ITU-T Recommendation I.365.3 (1995), *B-ISDN ATM adaptation layer sublayers – Service Specific Coordination Function to provide the Connection-Oriented Transport Service (SSCF-COTS).*

9.3 Format, coding, and procedure of the SSADT

The formats, coding and procedures as defined in Recommendation Q.2110 apply without any restrictions.

9.4 Interaction with management plane

The service of the Service Specific Assured Data Transfer sublayer may be made available to Layer Management; in such a case, the CPS channel is entirely dedicated to communication between the Layer Management entities.

10 Summary of parameters and values for the Segmentation and Reassembly Service Specific Convergence sublayer

Determination of the values for system resources listed in Table 6 must be made before individual AAL type 2 channels deploying the segmentation and Reassembly Service Specific Convergence sublayer can be established. Such determination may be made via provisioning or signalling in a manner outside the scope of this Recommendation. In the absence of provisioning or signalling (ATM level control), the default values apply. The values of these AAL type 2 system parameters may differ from one CPS channel to another.

Table 6/I.366.1 – Parameters for Segmentation and Reassembly Service Specific Convergence sublayer

Significance	Parameter	Permitted values	Default value
Transmitter	Segment_Length	"1" to Max_CPS_ Deliver_Length (Note 1)	Not applicable
Receiver	Reassembly timer (RAS_Timer)	For further study	For further study
Peer-to-peer	Maximum length of an SSSAR-SDU (Max_SDU_Length)	"1" to "65 568"	For further study
	Selection of the transmission error detection mechanisms (SSTED)	"not selected" or "selected"	Not applicable
	Selection of the assured data transfer mechanism (SSADT) (Notes 2 and 3)	"not selected" or "selected"	Not applicable
NOTE 1 – This parameter is specified in the Common Part of the AAL type 2. NOTE 2 – The assured data transfer mechanism can only been selected if the transmission error detection mechanisms is also selected. NOTE 3 – The parameters for the SSADT are specified in Recommendation Q.2110 [3].			

Annex A

Data unit naming convention

Details of the data unit naming convention are given in Figure A.1.

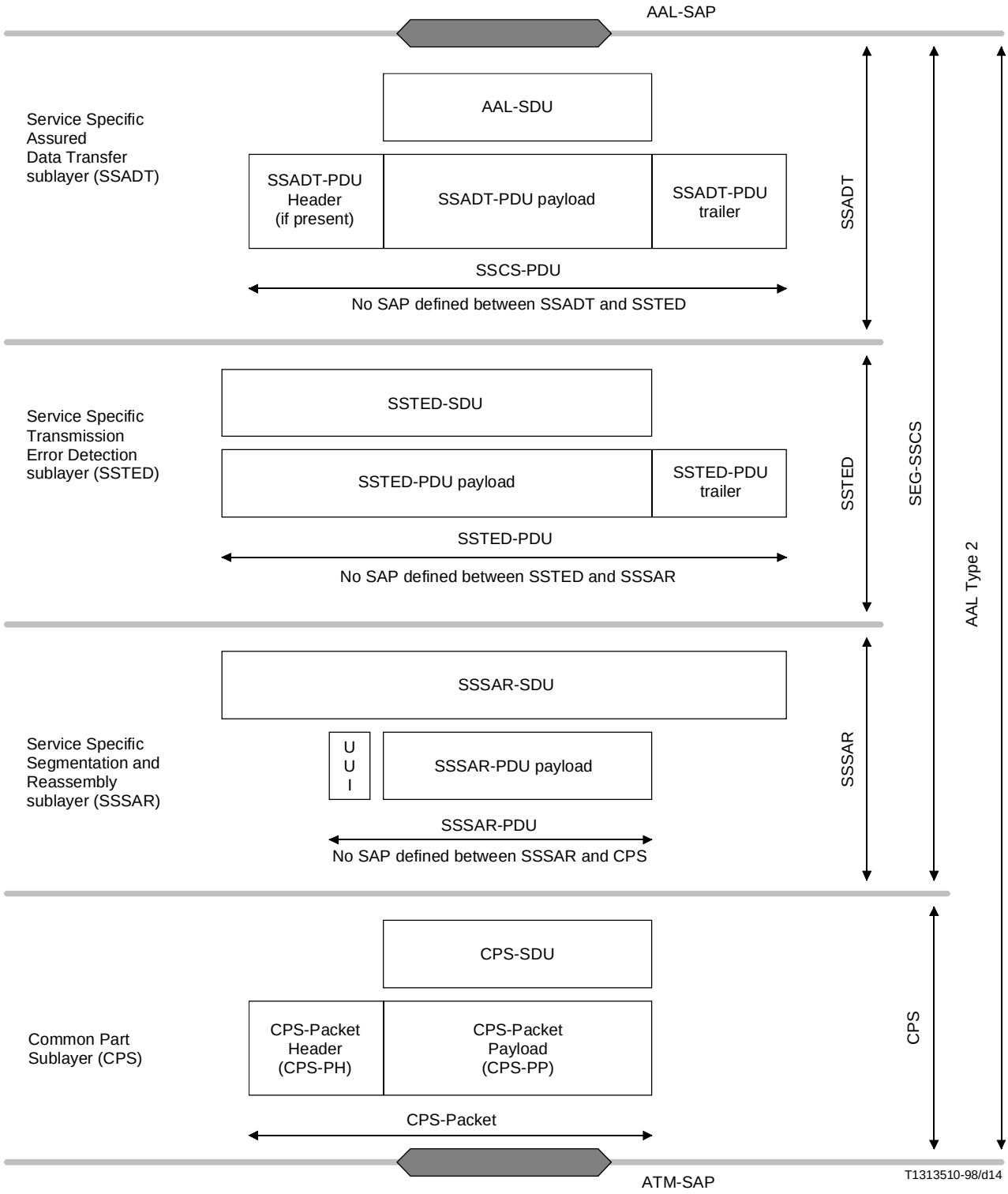


Figure A.1/I.366.1 – Data unit naming conventions for the Segmentation and Reassembly Service Specific Convergence sublayer

Appendix I

Protocol Implementation Conformance Statement (PICS) proforma

(This Appendix does not form an integral part of this Recommendation. It is only normative in the sense that if a Protocol Implementation Conformance Statement is made, this proforma shall be used. For the purpose of making such a statement, this Appendix may be copied without further permission.)

I.1 Introduction

Prior to the conformance testing and the interoperability testing of Implementations Under Test (IUTs), it is necessary to have the PICS (Protocol Implementation Conformance Statement) document for an implementation.

This particular PICS deals with the implementation of the Segmentation and Reassembly Service Specific Convergence sublayer for the AAL type 2.

I.1.1 Scope

This Appendix provides the PICS proforma for the Segmentation and Reassembly Service Specific Convergence sublayer for the AAL type 2 [1], in compliance with the relevant requirements, and in accordance with the relevant guidelines, given in Recommendation X.296 [3].

I.1.2 Normative References

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

[2] ITU-T Recommendation X.290 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts.*

[3] ITU-T Recommendation X.296 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements.*

I.1.3 Abbreviations

CI	Congestion Indication
CPS-UUI	CPS-User-to-User Indication
IUT	Implementation Under Test
LP	Loss Priority
M	Mandatory
N/A	Not applicable
NOT	item not supported; absence of item
O	Optional
O.<n>	Optional, but, if chosen, support is required for either at least one or only one of the options in the group labelled by the same numeral <n>
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
S.<i>	Supplementary information number i
SDU	Service Data Unit
SSCOP	Service Specific Connection Oriented Protocol (see Recommendation Q.2110 [3])
SSSAR	Service Specific Segmentation and Reassembly sublayer
SSSAR-PDU	SSSAR Protocol Data Unit
SSSAR-SDU	SSSAR Service Data Unit

SSTED	Service Specific Transmission Error Detection sublayer
SSTED-SDU	SSTED Service Data Unit
SUT	System Under Test
X.<i>	Exceptional information number i

I.1.4 Conformance statement

The supplier of a protocol implementation which is claimed to conform to the B-ISDN ATM Adaptation Layer Type 2 Specification is required to complete a copy of the PICS proforma provided in I.2 and is required to provide the information necessary to identify both the supplier and the implementation.

I.2 PICS proforma

I.2.1 Identification of the PICS proforma corrigenda

Identification of corrigenda applied to this PICS proforma	Rec. I.366.1 (1998) Corr.: Corr.:

I.2.2 Instructions for completing the PICS proforma

The PICS Proforma is a fixed-format questionnaire. Answers to the questionnaire should be provided in the rightmost columns, either by simply indicating a restricted choice (such as Yes or No), or by entering a value or a set of range of values.

A supplier may also provide additional information, categorized as exceptional or supplementary information. This additional information should be provided as items labelled X.<i> for exceptional information, or S.<i> for supplemental information, respectively, for cross-reference purposes, where <i> is any unambiguous identification for the item. An exception item should contain the appropriate rational.

The supplementary information is not mandatory and the PICS is complete without such information. The presence of optional supplementary or exception information should not affect test execution, and will in no way affect interoperability verification.

NOTE – Where an implementation is capable of being configured in more than one way, a single PICS may be able to describe all such configurations. However, the supplier has the choice of providing more than one PICS, each covering some subset of the implementation's configuration capabilities, in case this makes for easier or clearer presentation of the information.

I.2.3 Identification of the implementation

Implementation Under Test (IUT)

Identification

IUT Name: _____

IUT Version: _____

_____

System Under Test

SUT Name: _____

_____

Hardware Configuration: _____

_____

_____

Operating System: _____

Product Supplier

Name: _____

Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

Email Address (optional): _____

Additional Information: _____

Client

Name: _____

Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

Email Address (optional): _____

Additional Information: _____

PICS Contact Person

Name: _____

Address: _____

_____

Telephone Number: _____

Facsimile Number: _____

Email Address (optional): _____

Additional Information: _____

Identification of the protocol

This PICS proforma applies to the following Recommendation:

– ITU-T Recommendation I.366.1 (1998), *Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL type 2.*

I.2.4 Global statement of conformance

The implementation described in this PICS meets all of the mandatory requirements of the reference protocol.

___Yes

___No

NOTE – Answering "No" indicates non-conformance to the specified protocol. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.

I.2.4.1 Roles

Item number	Item description	Ref.	Status	Support
R1	Transmitter and Receiver	7.1	M	

I.2.4.2 Major capabilities

Item number	Item description	Ref.	Status	Support
MC1	Support segmentation and reassembly function	5.1	M	
MC1.1	Support data transfer of SSSAR-SDUs of up to 65 568 octets	7.1	M	
MC1.2	Support AAL type 2 CPS	7.1	M	
MC1.3	Support an AAL type 2 SSSAR connection as bi-directional	7.1	M	
MC1.4	Are SSSAR detected errors reported to layer management?	6.1.1, Table 3	M	
MC2	Support transmission error detection	1, 5.1, 8	O	
MC2.1	When a transmission error is detected, is the SDU not delivered?	5.1, 8.1, Table 5	MC2 M NOT MC2 N/A	
MC2.2	Are SSTED detected errors reported to layer management?	6.1.1, Table 5	MC2 M NOT MC2 N/A	

Item number	Item description	Ref.	Status	Support
MC2.3	Support data transfer of SSTED-SDUs of up to 65 535 octets	8.1	MC2 M NOT MC2 N/A	
MC2.4	Support an AAL type 2 SSTED connection as bi-directional	8.1	MC2 M NOT MC2 N/A	
MC2.5	Support of transfer of the Loss Priority (LP)	8.2	MC2 M NOT MC2 N/A	
MC2.6	Support of transfer of the Congestion Indication (CI)	8.2	MC2 M NOT MC2 N/A	
MC3	Support assured data transfer	1, 5.1, 9	MC2 O NOT MC2 N/A	
MC3.1	Support data transfer of SSADT-SDU of up to 65 531 octets	9.1	MC3 M NOT MC3 N/A	

I.2.4.3 SSSAR-PDU

Item number	Format and coding	Ref.	Status	Support
FC1	As shown in Figure 5	7.3	M	
FC1.1	Are all the values ("0" ... "27") of the CPS-UUI supported	7.3	M	

I.2.4.4 SSTED-PDU

Item number	Format and coding	Ref.	Status	Support
FC1	As shown in Figure 10	8.3	MC2 M NOT MC2 N/A	

I.2.5 Timers

Item number	Item description	Ref.	Status	Support	Values	
					Allowed	Supported
T1	RAS_timer	7.4.2, 10, Table 6	M			

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	**Integrated services digital network**
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure
Series Z	Programming languages