JTC 1

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AMENDMENT 1
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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit mode bearer services — Inter-exchange signalling procedures and protocol

AMENDMENT 1: Segmentation and reassembly

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé avec intégration de services — Services porteurs en mode circuit — Procédures et protocoles de signalisation d'interéchange

AMENDEMENT 1: Segmentation et réassemblage

Reference number
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Foreword

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Amendment 1 to International Standard ISO/IEC 11572:1997 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems.*

Introduction

This Amendment defines the changes required to ISO/IEC 11572 (2nd edition, 1997) to provide a segmentation and reassembly function for long messages.

The contents are expressed as amendments to be made to the base standard. Only those clauses for which amendments are specified are to be changed.

Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit mode bearer services — Inter-exchange signalling procedures and protocol

AMENDMENT 1: Segmentation and reassembly

Subclause 4.12

Replace the text "clauses 9.3 and 10" by "clauses 9.3 and 10, and annex ZA".

Subclause 9.1.1

Replace the text "general procedures in 9.2 and 9.3" by "general procedures in 9.2, 9.3 and annex ZA".

Clause 14

Replace the second paragraph by:

> "Whenever a message is sent, according to the procedures of clauses 9, 10 and 11, it shall be coded as specified in this clause, except where the message is segmented according to the procedures of annex ZA, in which case each message segment shall be coded as specified in that annex."

Subclause 14.4, table 21

Replace table 21 (continued) by the following:

Table 21 — Message type (Continued)

Bits 8 7 6 5 4 3 2 1		
0 1 1 0 1	RELEASE	
1 1 0 1 0	RELEASE COMPLETE	
0 0 1 1 0	RESTART	
0 1 1 1 0	RESTART ACKNOWLEDGE	
0 1 1	*Miscellaneous messages*	
0 0 0 0 0	SEGMENT	(NOTE 2)
1 1 0 1 1	INFORMATION	
1 1 1 0 1	STATUS	
1 0 1 0 1	STATUS ENQUIRY	

NOTE 2: This message type is only used in conjunction with the message segmentation and reassembly procedures defined in annex ZA.

Subclause 14.5.1, table 22

Modify table 22 by inserting a new row before the row for bearer capability, as follows:

0 0 0 0 0 0 0 0	Segmented message	annex ZA	NOTE 1

Annex A

Insert the following new subclause at the end of annex A:

A.3.14 Message segmentation / reassembly procedures

Item	Question/feature	Reference	Status	N/A	Support
K1	Maximum message size generated	ZA.3	m		Size [ ]
K2	Maximum message size received	ZA.3	m		Size [ ]
K3	Is length of signalling carriage mechanism information field < max. generated message size	ZA.3	o		Yes [ ] No [ ]
K4	Is length of signalling carriage mechanism information field < max. received message size	ZA.3	o		Yes [ ] No [ ]
K5	Procedures for messages segmentation	ZA.3.1	c.12		Yes [ ]
K6	Procedures for messages reassembly	ZA.3.2	c.13	[ ]	Yes [ ]
K7	Message formats and codings for segmented messages and information elements supported	ZA.4, ZA.5	c.14	[ ]	Yes [ ]
K8	Implementation of T314	ZA.6	c.13	[ ]	Yes [ ]

c.12 If K3, then mandatory else, prohibited
c.13 If K4, then mandatory else, not applicable
c.14 If K3 or K4, then mandatory else, not applicable

New annex ZA.

Add the following new annex ZA:

Annex ZA

(normative)

Segmentation and reassembly procedures

ZA.1 Message segmentation and reassembly functions

Message segmentation and reassembly functions shall be employed where the size of a message exceeds the maximum size of the SCM information field.

The architectural relationship of segmentation and reassembly functions to other PSS1 Protocol Control functions is shown in figure ZA.1.

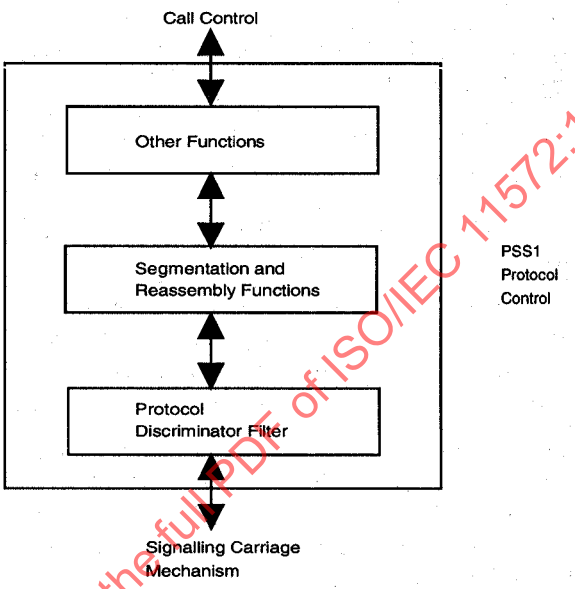

Figure ZA.1 — Logical architecture of Protocol Control showing segmentation and reassembly functions

Segmentation and reassembly, where provided, effectively constitute a lower sublayer of PSS1 Protocol Control.

NOTE 1 — The only function of PSS1 Protocol Control below the segmentation and reassembly functions is protocol discriminator filtering. This function filters out messages containing a protocol discriminator that does not match the one specified in this International Standard.

The primitives across the boundary between segmentation and reassembly functions and other functions are the same as those between the Signalling Carriage Mechanism and PSS1 Protocol Control (see 6.3). The segmentation functions act upon DL-DATA-REQUEST primitives by converting, where necessary, a single primitive into two or more primitives before passing to the Signalling Carriage Mechanism. The reassembly functions act upon DL-DATA-INDICATION primitives from the Signalling Carriage Mechanism by converting, where necessary, two or more primitives into a single primitive for passing up to the other functions of PSS1 Protocol Control. Other primitives to and from the Signalling Carriage Mechanism are not affected by the segmentation and reassembly functions.

ZA.2 States for message segmentation / reassembly

Message segmentation and reassembly procedures are each specified in terms of a state machine. Message segmentation uses a single state, Null (0). Message reassembly uses two states, as listed below.

ZA.2.1 Null (0)

No message is being reassembled.

ZA.2.2 Receiving segmented message (1)

One or more segments of a segmented message have been received and one or more further segments are awaited.

ZA.3 Segmentation and reassembly procedures

This clause specifies message segmentation and reassembly procedures for messages the length of which exceeds the maximum size of the Signalling Carriage Mechanism information field. The Signalling Carriage Mechanism information field size is dependent on the PINX interconnection scenario.

A PINX shall conform to the segmentation procedures specified in subclause ZA.3.1 if, for a given PINX interconnection scenario supported by the PINX, it is capable of transmitting a message that exceeds the maximum size of the Signalling Carriage Mechanism information field for that scenario. Segmentation procedures shall not be applied to messages that do not exceed the maximum size of the Signalling Carriage Mechanism information field.

A PINX that claims conformance to this International Standard shall declare the maximum size of message that it is able to receive. The declared maximum size shall not be less than 260 octets. If, for a given PINX interconnection scenario supported by the PINX, the maximum size of Signalling Carriage Mechanism information field is less than the declared maximum size of message the PINX can receive, the PINX shall conform to the reassembly procedures specified in subclause ZA.3.2.

NOTE 2 — If a segmented message is received by a PINX that does not support reassembly procedures, the procedures specified in subclause 9.2.4 for message type errors will apply to each received segment.

ZA.3.1 Procedures for segmentation

The following rules apply when a message for transmission exceeds the maximum size of the SCM information field:

a) The maximum number of message segments is 8. If the message is too long to be segmented, the action taken shall be an implementation option.

b) The first message segment shall begin with the Protocol discriminator information element immediately followed by the Call reference information element, the SEGMENT message type, the Segmented message information element, and octets starting with the first octet following the message type of the message being segmented, subject to the maximum length of the segment not exceeding the maximum size of the SCM information field.

c) Each subsequent message segment shall begin with the Protocol discriminator information element, immediately followed by the Call reference information element, the SEGMENT message type, the Segmented message information element, and one or more octets of the message being segmented, starting with the first octet following the last octet transmitted in the previous segment and subject to the maximum length of the segment not exceeding the maximum size of the SCM information field.

d) The first segment indicator field of the Segmented message information element shall be set to ONE (first segment of a segmented message) in the first segment of a segmented message and set to ZERO (subsequent segment to first segment) in each subsequent segment of that message.

e) The number of segments remaining field of the Segmented message information element shall be set to indicate how many more segments are to be sent.

f) The segmented message type field of the Segmented message information element shall indicate the message type of the original message.

g) Once the first segment has been transmitted on a particular SCM connection, then all remaining segments of that message shall be sent (in order) before any other message (segmented or not) for any other call reference is sent on that SCM connection. Only failure conditions (e.g. SCM failure) shall cause the transmission of a segmented message to be aborted.

h) The octet order of the segmented message shall be preserved regardless of segment boundary.

ZA.3.2 Procedures for reassembly

The following rules apply to the receipt and reassembly of segmented messages:

a) A reassembly function, on receiving a message of type SEGMENT containing the Segmented message information element as the first information element after the message type, shall treat that message as a segment.

b) A reassembly function in the Null state, on receiving a segment in which the first segment indicator field of the Segmented message information element is set to ONE (first segment of segmented message) and the number of segments remaining field of the Segmented message information element is set to a value greater than 0 and not exceeding 7, shall enter the Receiving segmented message state and save the segment contents. Timer T314 shall

be initialised. Timer T314 is used to prevent the reassembly function waiting indefinitely to receive the next message segment.

c) A reassembly function in the Receiving segmented message state, on receiving a segment in which the call reference is equal to the call reference of the first segment received, the first segment indicator field of the Segmented message information element is set to ZERO (subsequent segment to first segment), the number of segments remaining field of the Segmented message information element is set to a value one less than the value in the previously received segment, and the segmented message type field has a value equal to the value of that field in the first segment received, shall treat the segment as a valid next segment.

d) A reassembly function in the Receiving segmented message state, on receiving a valid next segment in which the number of segments remaining field has a value greater than zero, shall save the segment contents along with the saved contents of the previous segment or segments, restart timer T314, and remain in the Receiving segmented message state.

e) A reassembly function in the Receiving segmented message state, on receiving a valid next segment in which the number of segments remaining field has a value equal to zero, shall stop timer T314, deliver the accumulated segments, including the last segment, as a single message for further PSS1 Protocol Control processing, and enter the Null state. The message delivered shall have a call reference equal to that in each received segment and a message type equal to that in the segmented message type field of the Segmented message information element of each received segment. Octets following the Segmented message information element in each received segment shall be included in the delivered message in the order received.

f) A reassembly function in the Null state shall deliver for further PSS1 Protocol Control processing any received message of type other than SEGMENT or that is too short to contain a message type.

g) A reassembly function in the Null state shall discard any received message of type SEGMENT that is not a valid first segment. Any other action taken shall be an implementation option. This applies to the following:

- messages of type SEGMENT without a valid Segmented message information element following the message type;
- segments in which the first segment indicator field of the Segmented message information element is set to ZERO (subsequent segment to first segment);
- segments in which the number of segments remaining field of the Segmented message information element has a value 0 or a value exceeding 7.

h) A reassembly function in the Receiving segmented message state shall discard any saved segments, stop timer T314 and enter the Null state on receipt of any message which is not a valid next segment. This applies to the following:

- Messages with a different call reference from that in the first received segment;
- Messages of type other than SEGMENT;
- Messages of type SEGMENT without a valid Segmented message information element following the message type;
- Segments in which the first segment indicator field of the Segmented message information element is set to ONE (first segment of segmented message);
- Segments in which the number of segments remaining field of the Segmented message information element has a value which is not one less than the value in the previously received segment;
- Segments in which the segmented message type field of the Segmented message information element has a value which is not equal to the value in the first received segment.

In the case of a message with a different call reference from that in the first received segment or a message with a message type other than SEGMENT, the received message shall be processed as if it had been received while in the Null state. In all other cases the received message shall be discarded. Any other action taken shall be an implementation option.

i) On expiry of timer T314, the reassembly function shall discard any saved segments and enter the Null state. Any other action taken shall be an implementation option.

j) If a DL-RELEASE-INDICATION or DL-ESTABLISH-INDICATION is received while the reassembly function is in the Receiving segmented message state, the reassembly function shall discard any saved segments, stop timer T314, and enter the Null state. The DL-RELEASE-INDICATION or DL-ESTABLISH-INDICATION shall be delivered for further PSS1 Protocol Control processing.

ZA.3.3 SDL for segmentation and reassembly (informative)

In the figures that follow, input signals from the left (except those indicating timer expiry) and output signals to the left are from and to the Other Functions of PSS1 Protocol Control, and input signals from the right and output signals to the right are from and to the Signalling Carriage Mechanism, via the Protocol Discriminator Filter.

Figure ZA.2 shows the procedures for message segmentation in SDL form. The SDL process forms part of the Segmentation and Reassembly Functions of PSS1 Protocol Control (see ZA.1) and intercepts all primitives sent from Other Functions of PSS1 Protocol Control towards the Signalling Carriage Mechanism.

Figures ZA.3, ZA.4 and ZA.5 show the procedures for message reassembly in SDL form. The SDL process forms part of the Segmentation and Reassembly Functions of PSS1 Protocol Control (see ZA.1) and intercepts all primitives received from the Signalling Carriage Mechanism via the Protocol Discriminator Filter.

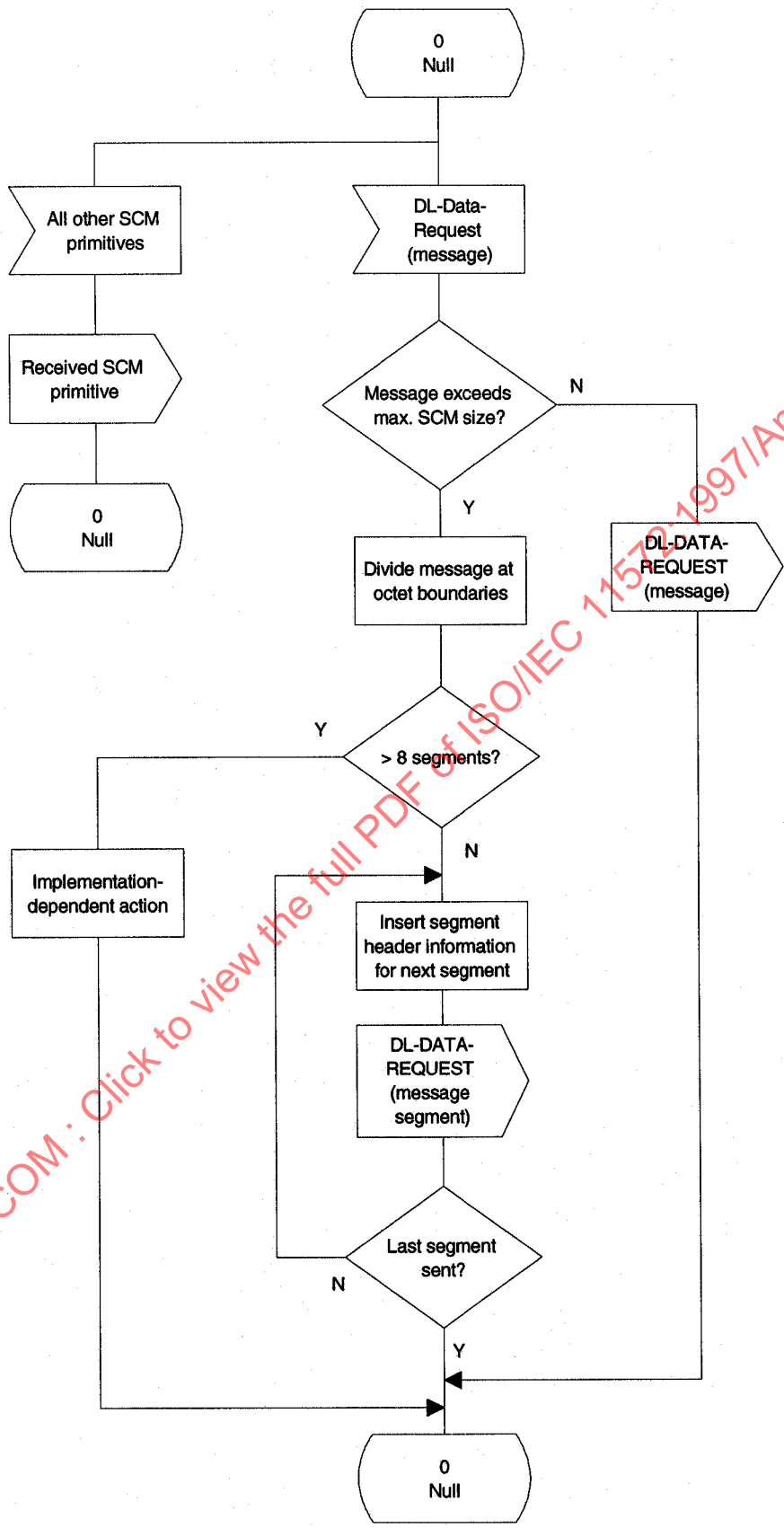

Figure ZA.2 — Segmentation Process SDL

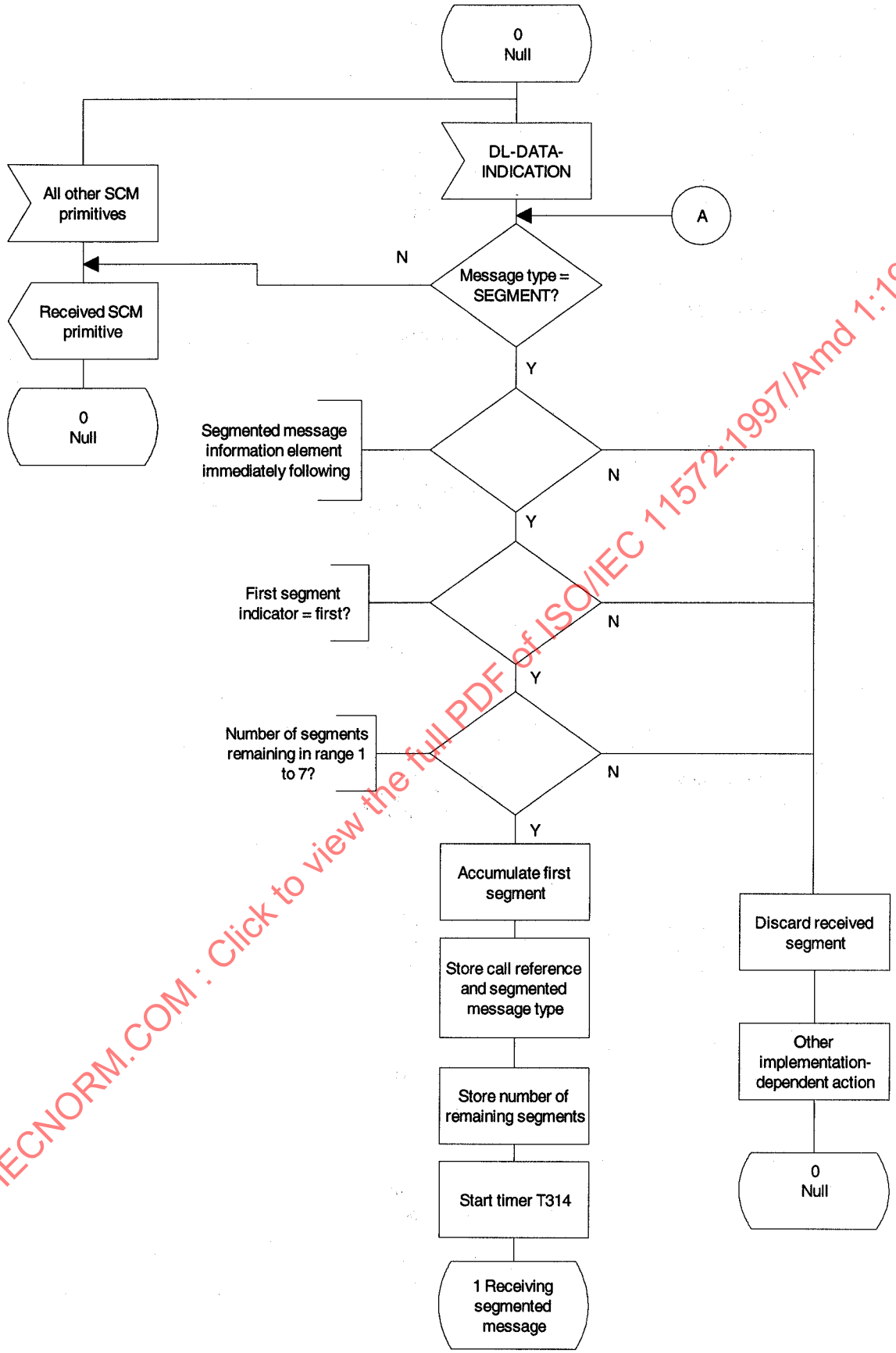

Figure ZA.3 — Reassembly Process SDL (Part 1)

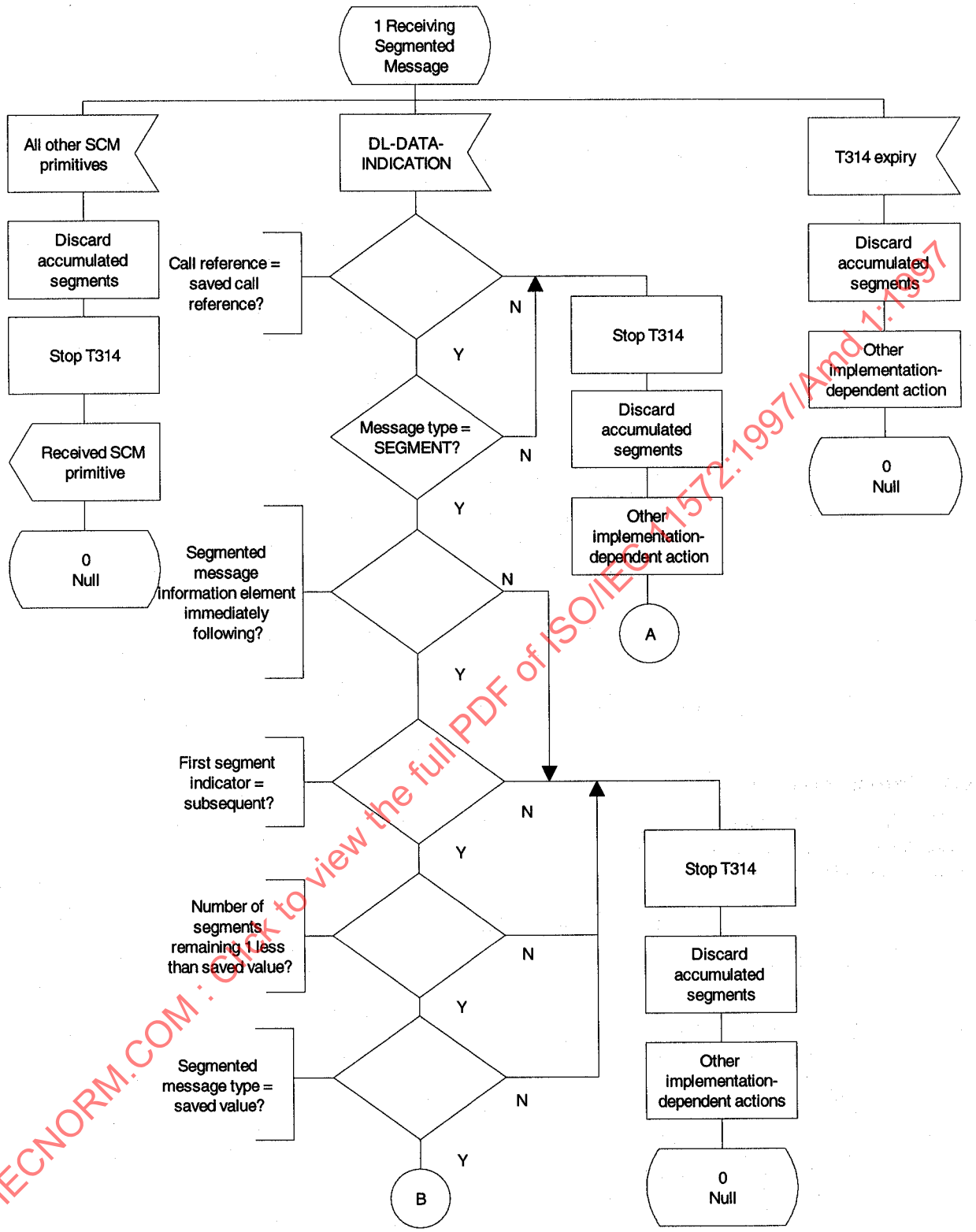

Figure ZA.4 — Reassembly Process SDL (Part 2)