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**Integrated Services Digital Network (ISDN);
User network interface layer 3
Specifications for basic call control
Specification Description Language (SDL) diagrams**

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Foreword

This European Telecommunications Standard (ETS) was produced by the Signalling, Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI), and was adopted, having passed through the ETSI standards approval procedure.

This document is part 2 of a multi-part ETS, comprised as follows:

ETS 300 102-1: ISDN; User-network interface layer 3; Specifications for basic call control.

ETS 300 102-2: ISDN; User-network interface layer 3; Specifications for basic call control; Specification Description Language (SDL) diagrams.

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1 Scope

This ETS specifies, using SDL representation, the circuit-switched call control procedures of the Digital Subscriber Signalling one (DSS1) as specified in clause 5 of ETS 300 102-1 [1].

In order to describe the point-to-multipoint operation of the protocol, the concept of a "global" process running in parallel with a number of "individual" (dynamic) processes in the network side has been introduced. This approach, and the associated definition of internal primitives is intended to provide a coherent description of the protocol and does not constrain implementations. The text description in clause 5 of ETS 300 102-1 [1] is definitive.

2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

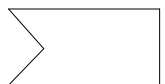
- [1] ETS 300 102-1 (1990): "ISDN User-network interface layer 3; Specification for basic call control".
- [2] CCITT Recommendation Z.100 (1988): "Functional Specification and Description Language (SDL)".
- [3] CCITT Recommendation Q.931 (1988): "ISDN User-network interface layer 3 Specification for basic call control".

3 Explanation of symbols

The symbols and abbreviations shown below are used within this description. A full description of the symbols and their meaning and application is given in CCITT Recommendation Z.100 [2].



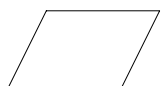
State symbol



Input symbol (event occurrence)



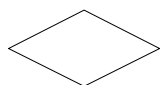
Output symbol (signal generation - which will lead to an associated event occurrence)



Save symbol (save event until compilation of a transition)



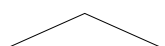
Task symbol



Decision symbol



Procedure call symbol



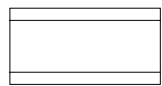
Transition option symbol (implementation option)



Procedure start symbol



Procedure return symbol



Create request symbol (used to initiate an individual network side transaction)



Stop symbol (used to end an individual network side transaction)



Connection symbol



Used to mark an input or output which is local to the Layer 3 entity and which is required as a result of the representation approach adopted.

4 User side and network side call states

This section shows which call states are applicable at the user and network sides during the various phases of a call.

Table 1: Call states

Call phase	Call state	User	Network
IDLE	Null	U0	N0
OUTGOING CALL (from user)	Call initiated	U1	N1
	Overlap Sending	U2	N2
	Outgoing Call Proceeding	U3	N3
	Call Delivered	U4	N4
INCOMING CALL (to user)	Call Present	U6	N6
	Overlap Receiving	U25	N25
	Incoming Call Proceeding	U9	N9
	Call Received	U7	U7
	Connect Request	U8	N8
ACTIVE	Active	U10	N10
CALL CLEARING	Disconnect Request (clearing by the user)	U11	N11
	Disconnect Indication (clearing by the network)	U12	N12
	Release Request	U19	N19
	Call Abort	---	N22
	RESTART PROCEDURE (see NOTE)	Null	REST0
	Restart	REST1	REST1
	Resume Request	U17	N17
NOTE: These states relate to global call references and are applicable when the restart procedures are used. They may exist in both user and network side.			

5 Network side SDLs - Overview

5.1 Network side call states

Table 2

Number	Name
N0	Null
N1	Call Initiated
N2	Overlap Sending
N3	Outgoing Call Proceeding
N4	Call Delivered
N6	Call Present
N7	Call Received
N8	Connect Request
N9	Incoming Call Proceeding
N10	Active
N11	Disconnect Request
N12	Disconnect Indication
N15	Suspend Request
N17	Resume Request
N19	Release Request
N22	Call Abort
N25	Overlap Receiving

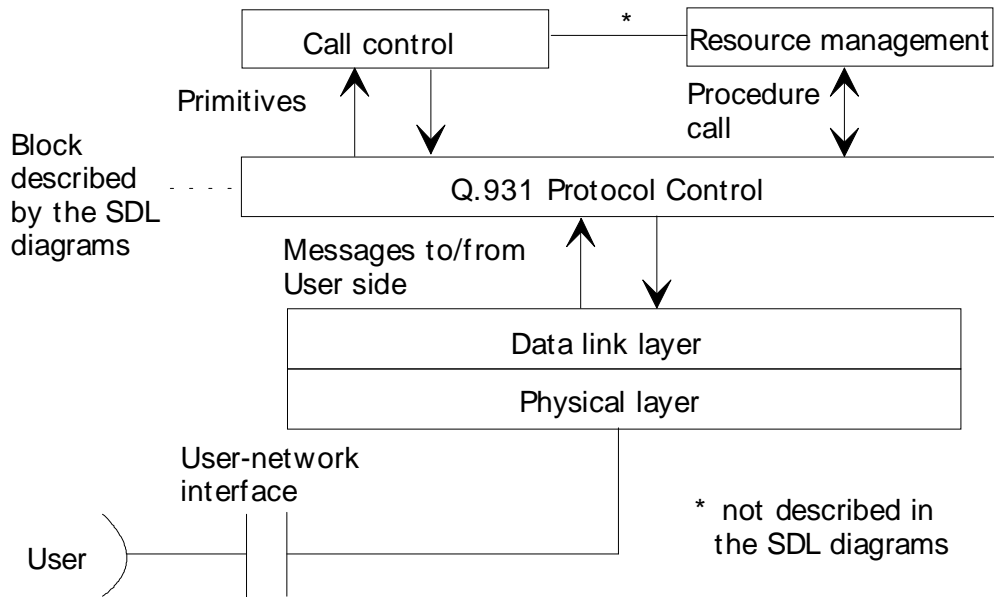
NOTE 1: Network side timers, and the states in which they run, are specified in Clause 9 of ETS 300 102-1 [1].

NOTE 2: Events in each state which lead to normal call establishment and clearing are marked with the "+" symbol.

NOTE 3: The primitives which pass to and from the call control block are shown for guidance only and are not fully specified.

NOTE 4: Internal primitives are marked by "**". These are a result of the representation method that has been adopted.

5.2 Network side SDLs - Block diagram



NOTE: Control of B-channels is described in these SDL diagrams as part of the CCITT Recommendation Q.931 [3] protocol block.

Figure 1

5.3 Network side SDLs - List of primitives

Table 3

From Call Control Block	To Call Control Block
ALERTING REQUEST	ALERTING INDICATION
DISCONNECT REQUEST	DISCONNECT INDICATION
INFO REQUEST	INFO INDICATION
MORE INFO REQUEST	MORE INFO INDICATION
NOTIFY REQUEST	NOTIFY INDICATION
PROCEEDING REQUEST	PROCEEDING INDICATION
PROGRESS REQUEST	PROGRESS INDICATION
REJECT REQUEST	REJECT INDICATION
RELEASE REQUEST	RELEASE CONFIRM
RESUME REJECT REQUEST	RELEASE INDICATION
RESUME RESPONSE	RESUME INDICATION
SETUP COMPLETE REQUEST	SETUP CONFIRM
SETUP REQUEST	SETUP INDICATION
SETUP RESPONSE	STATUS INDICATION
STATUS ENQUIRY REQUEST	SUSPEND INDICATION
SUSPEND REJECT REQUEST	TIMEOUT INDICATION
SUSPEND RESPONSE	

5.4 Network side SDL diagrams - Representation method

In order to describe the point-to-multipoint operation of the protocol, the concept of a "global" process running in parallel with a number of "individual" (dynamic) processes in the network side has been introduced. This approach, and the associated definition of internal primitives, is intended to provide a coherent description of the protocol and does not constrain implementations. The text description in clause 5 of ETS 300 102-1 [1] is definitive.

Individual processes are used to track the responses of each terminal. The global (controlling) process runs in parallel with the (dynamically created/destroyed) individual process.

The global and individual processes communicate by means of internal primitives. These are related to layer 3 message types and are defined in Table 4. The internal primitives represent instantaneous actions. Thus there is no possibility of errors caused by the cross-over of primitives.

The global process maintains a list of recorded Connection Endpoint Suffix (CES) values to enable it to manage the individual processes. In this representation the global process also keeps a record of the state of the individual process associated with each responding terminal. Additionally a "preselected" CES is recorded when one terminal responds with a CONNECT message and this becomes the "selected" CES when the terminal is awarded the call.

This solution is compatible with point-to-point working. In this case the global process never creates any individual processes.

Individual processes may exist in the following states:

- N0 Null (processes are created in this state)
- N7 Call Received
- N8 Connect Request
- N9 Incoming Call Proceeding
- N19 Release Request
- N25 Overlap Receiving

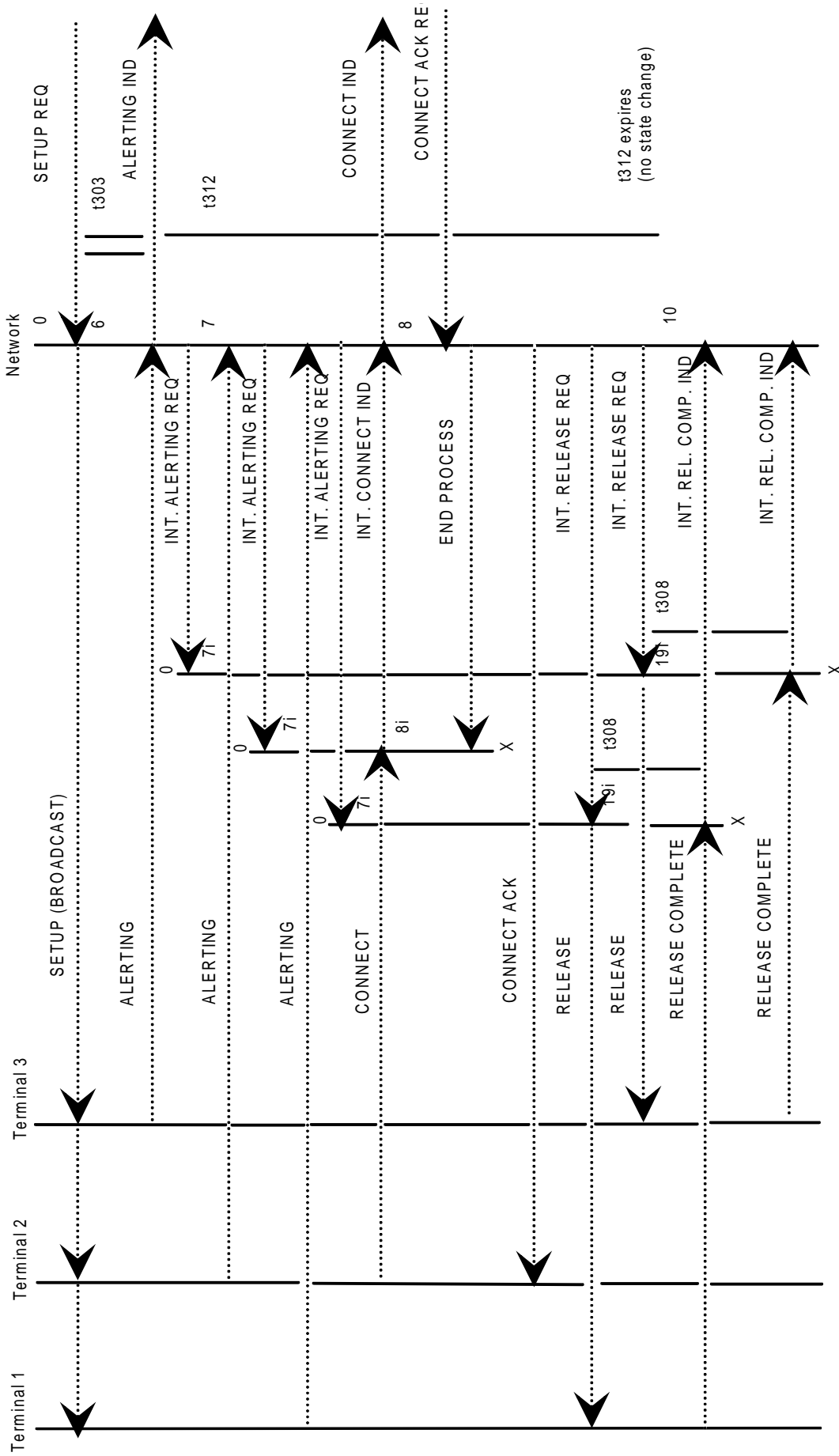
Two sets of SDLs are required for these states to show the global and individual processes.

The global process handles all communications with call control. Messages from individual terminals are sent to the individual process for that terminal if one exists (i.e. if the CES is recognised). Messages with an unrecognised CES are passed to the global process. Messages with the selected CES are also sent to the global process.

Table 4: Network side layer 3 internal primitives

PRIMITIVES NAME	FROM	TO	MEANING
INT.ALERTING REQ INT.CONNECT REQ INT.CALL PROC REQ INT.SETUP ACK REQ	Global	Individual	When global process receives ALERTING it starts an individual process and sends it INT.ALERTING REQ etc
INT.ALERTING IND INT.CONNECT IND INT.CALL PROC IND	Individual	Global	Sent on receipt of ALERTING (etc).
END PROCESS	Global	Individual	Sent when the global process terminates an individual process
INT.RELEASE REQ	Global	Individual	Instructs individual process to release terminal (e.g., for releasing non-selected terminals)
INT.RELEASE IND	Individual	Global	Informal global process that a terminal has begun to release
INT.INFO REQ	Global	Individual	Sent on receipt of INFO REQ
INT.INFO IND	Individual	Global	Sent on receipt of INFO
INT.PROGRESS IND	Individual	Global	Sent on receipt of PROGRESS
INT.REL.COMP.IND	Individual	Global	Sent to indicate that the individual has cleared
NOTE:	The global process should not release the call reference until all individual processes have completed clearing.		

Figure 2 (arrow diagram) shows an example of this representation method



NOTE: 0 = creation of state machine, x = deletion of state machine, numbers indicate states of the state machines shown.

Figure 2: Multipoint call establishment (and clearing of non-selected terminals)

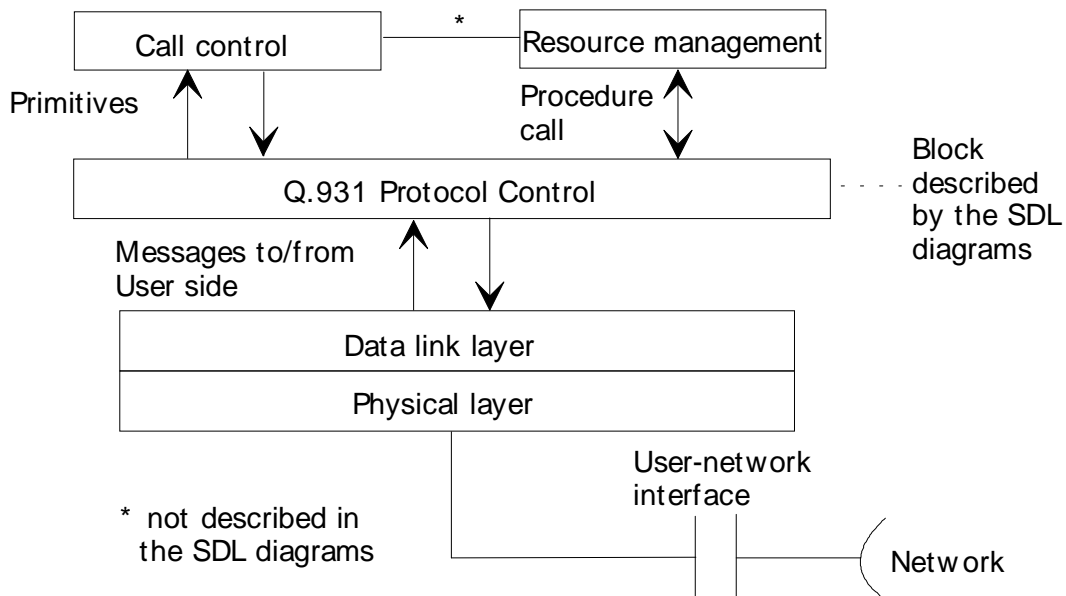
6 User side SDLs - Overview

6.1 User side call states

Table 5

Number	Name
U0	Null
U1	Call Initiated
U2	Overlap Sending
U3	Outgoing Call Proceeding
U4	Call Delivered
U6	Call Present
U7	Call Received
U8	Connect Request
U9	Incoming Call Proceeding
U10	Active
U11	Disconnect Request
U12	Disconnect Indication
U15	Suspend Request
U17	Resume Request
U19	Release Request
U25	Overlap Receiving
NOTE 1:	User side timers, and the states in which they run, are specified in Clause 9 of ETS 300 102-1 [1].
NOTE 2:	Events in each state which lead to normal call establishment/clearing are shown with the "+" symbol.
NOTE 3:	Primitives passed to and from the call control (user application) block are shown for guidance only and are not fully specified.

6.2 User side SDLs - Block diagram



NOTE: Control of B-channels is described in these SDL diagrams as part of the Q.931 [3] protocol block.

Figure 3

6.3 User side SDLs - List of primitives

Table 6

From Call Control Block	To Call Control Block
ALERTING REQUEST	ALERTING INDICATION
DISCONNECT REQUEST	DISCONNECT INDICATION
INFO REQUEST	ERROR INDICATION
MORE INFO REQUEST	INFO INDICATION
NOTIFY REQUEST	MORE INFO INDICATION
PROCEEDING REQUEST	NOTIFY INDICATION
PROGRESS REQUEST	PROCEEDING INDICATION
REJECT REQUEST	PROGRESS INDICATION
RELEASE REQUEST	REJECT INDICATION
RESUME REQUEST	RELEASE CONFIRM
SETUP REQUEST	RELEASE INDICATION
SETUP RESPONSE	RESUME CONFIRM
STATUS ENQUIRY REQUEST	SETUP COMPLETE INDICATION
SUSPEND REQUEST	SETUP CONFIRM
	SETUP INDICATION
	STATUS INDICATION
	SUSPEND CONFIRM

7 Graphical SDL diagrams

This clause is separated into two parts:

7.1 Network side SDL diagrams (figures 4 - 40);

7.2 User side SDL diagrams (figures 41 - 62).

Figures 60 to 62, of subclause 7.2, show detailed SDL diagrams for the global call reference to be applied to both user and network sides. Although these are drawn as user side only, the same diagrams can be applied to the network side by changing the direction of the input and output symbols.

All references in the following diagrams are to ETS 300 102-1 [1].

7.1 Network side SDL diagrams

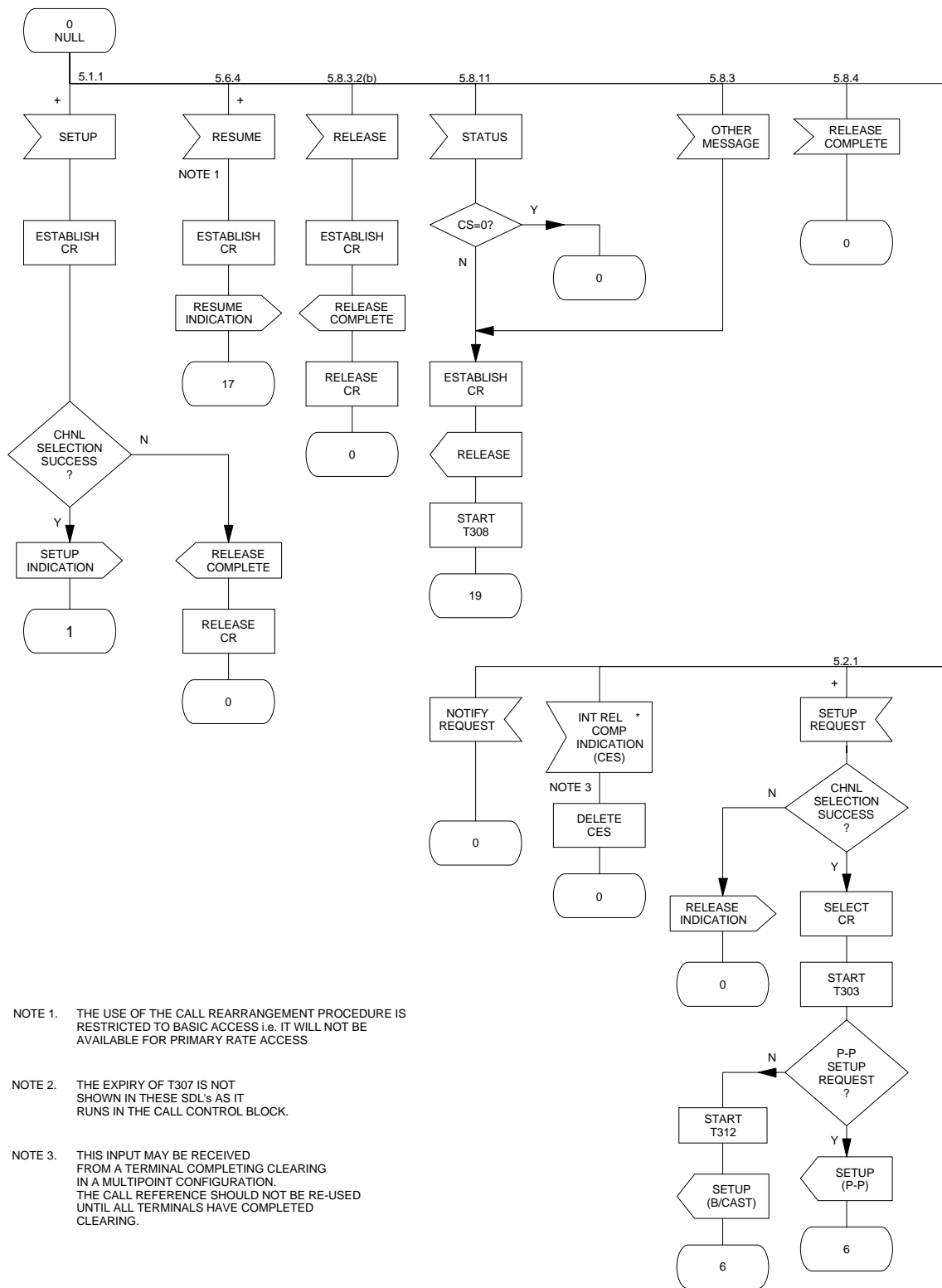


Figure 4: Network Side SDL Diagram

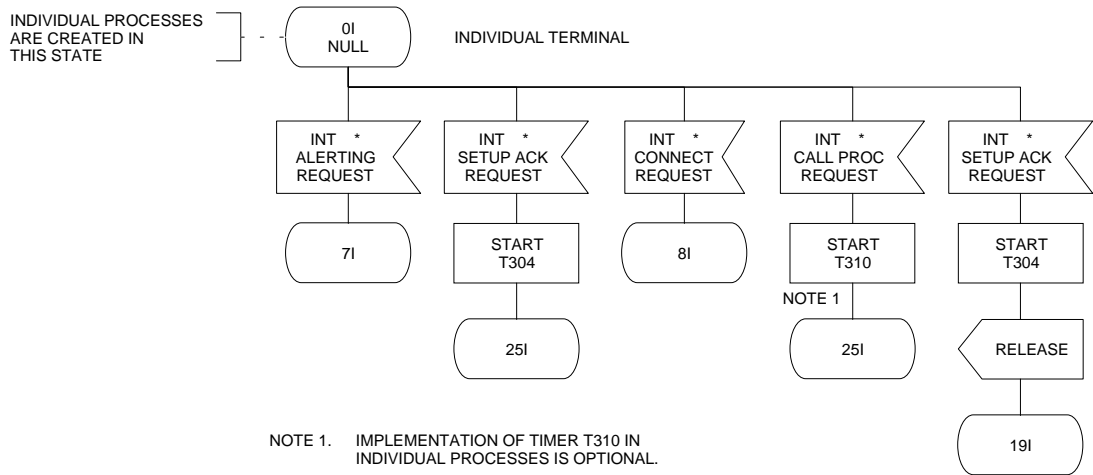


Figure 5: Network side SDL diagram

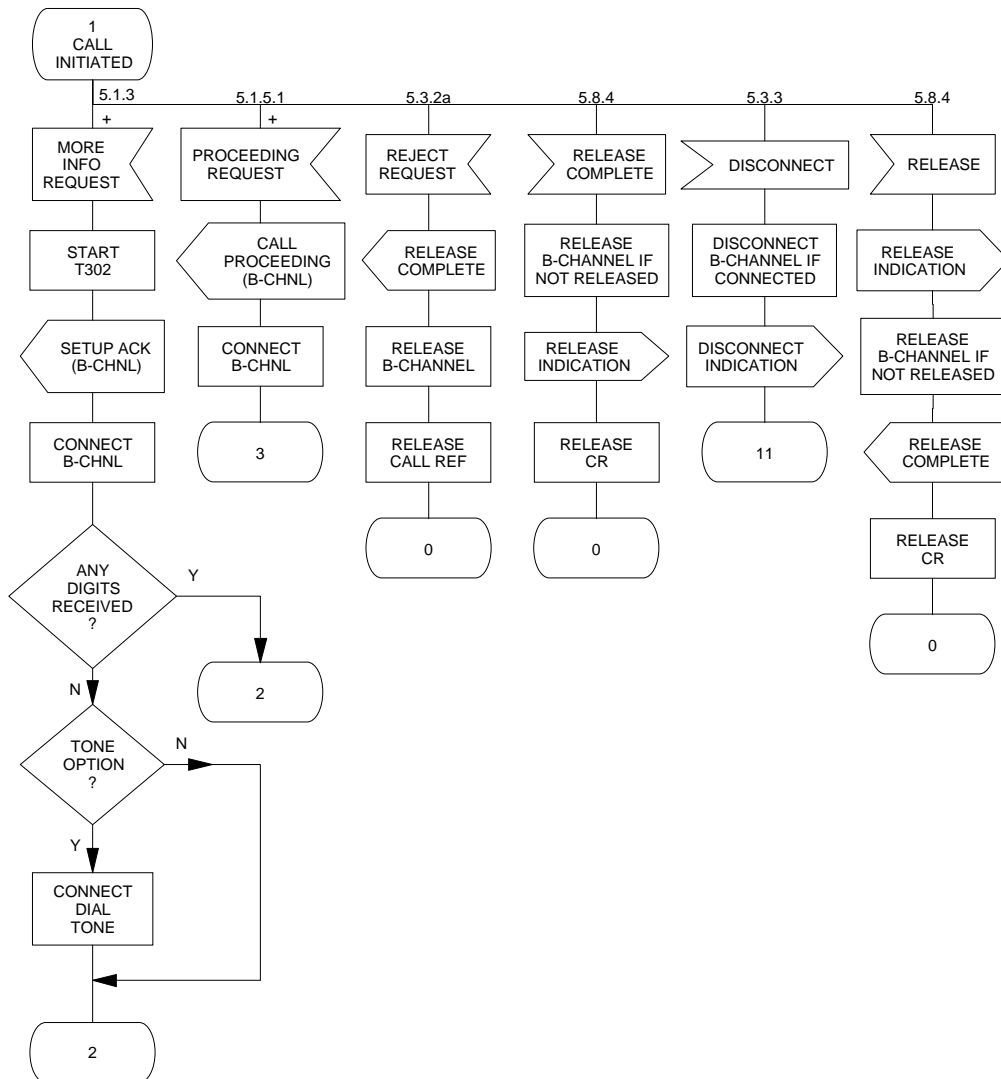


Figure 6: Network side SDL diagram

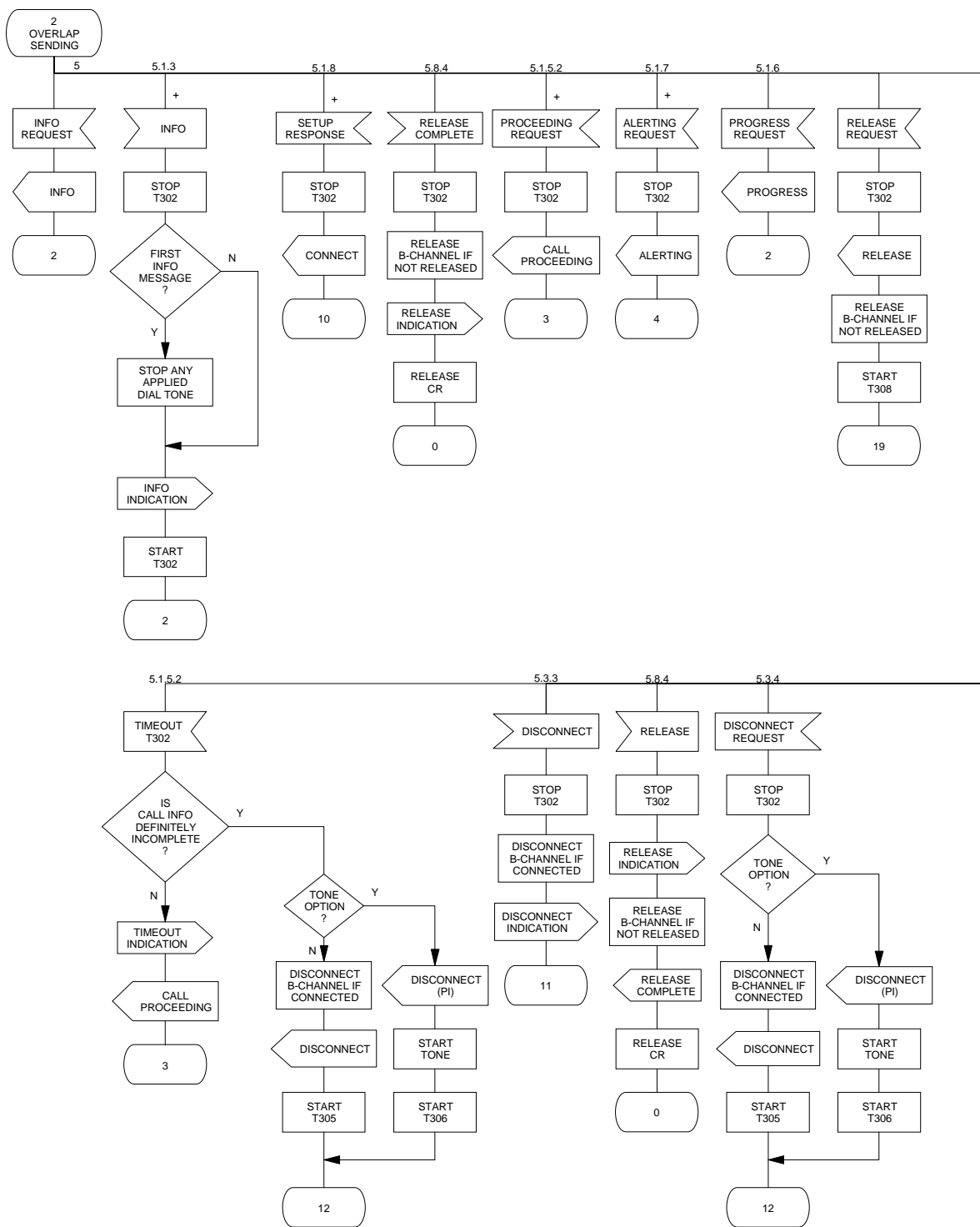


Figure 7: Network side SDL diagram

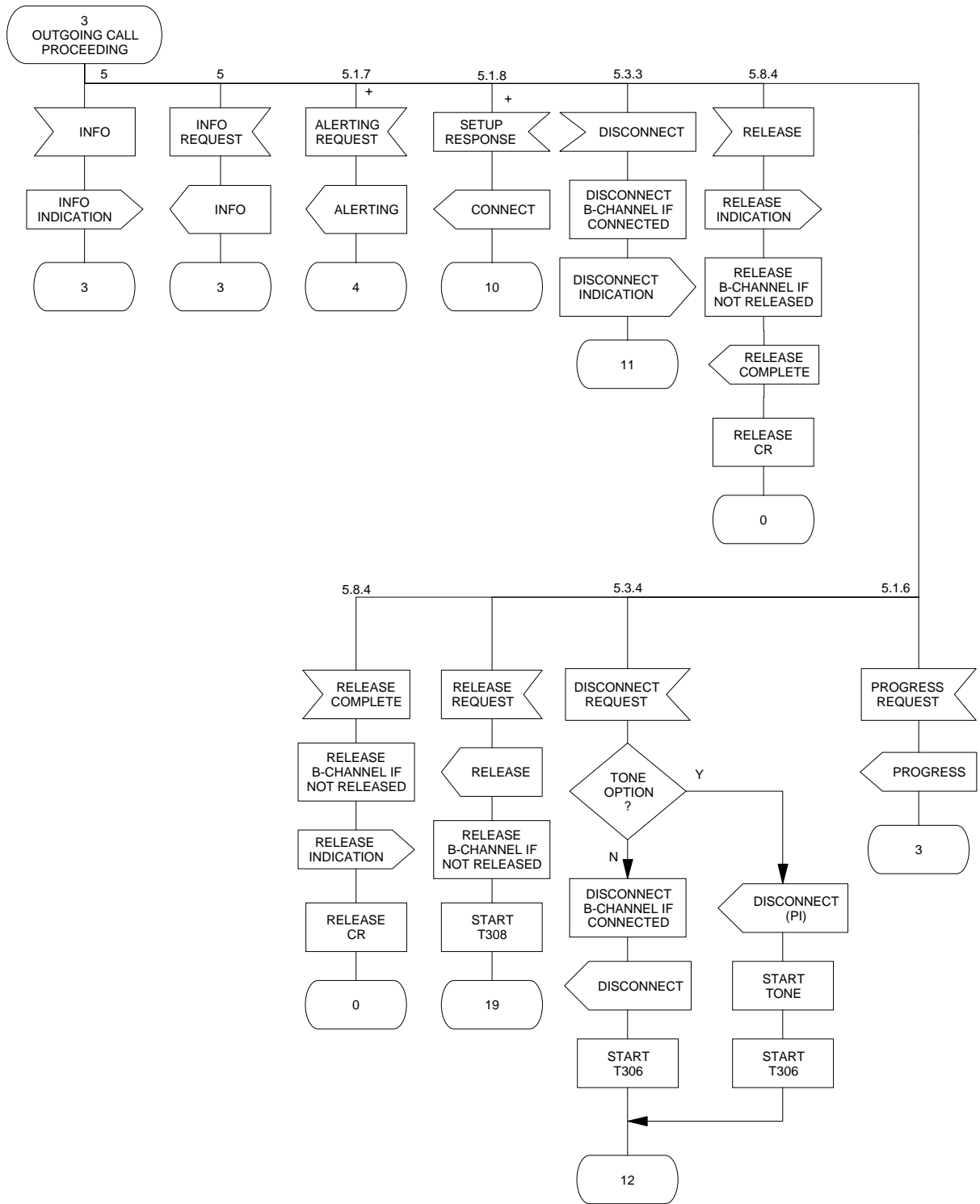


Figure 8: Network side SDL diagram

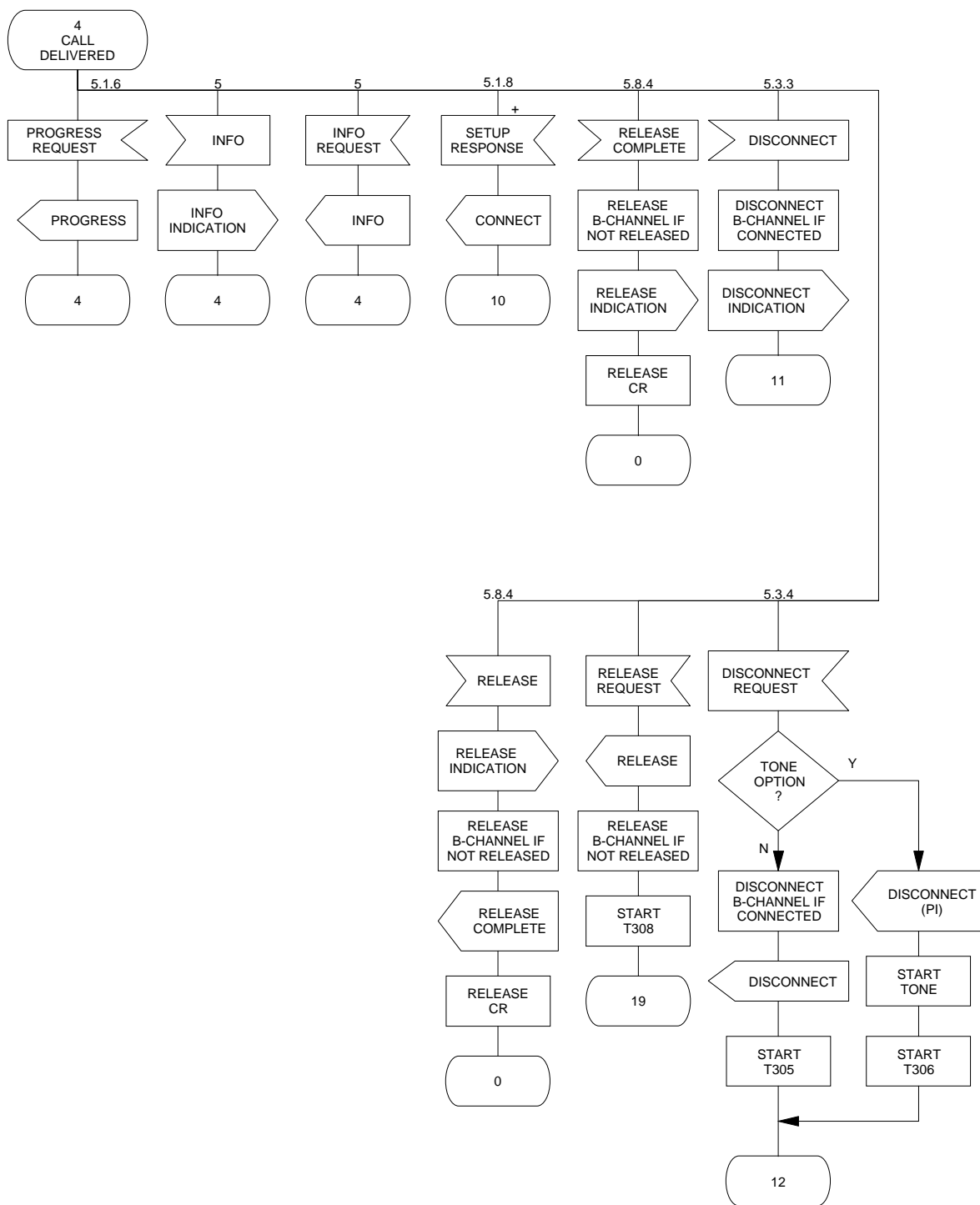


Figure 9: Network side SDL diagram

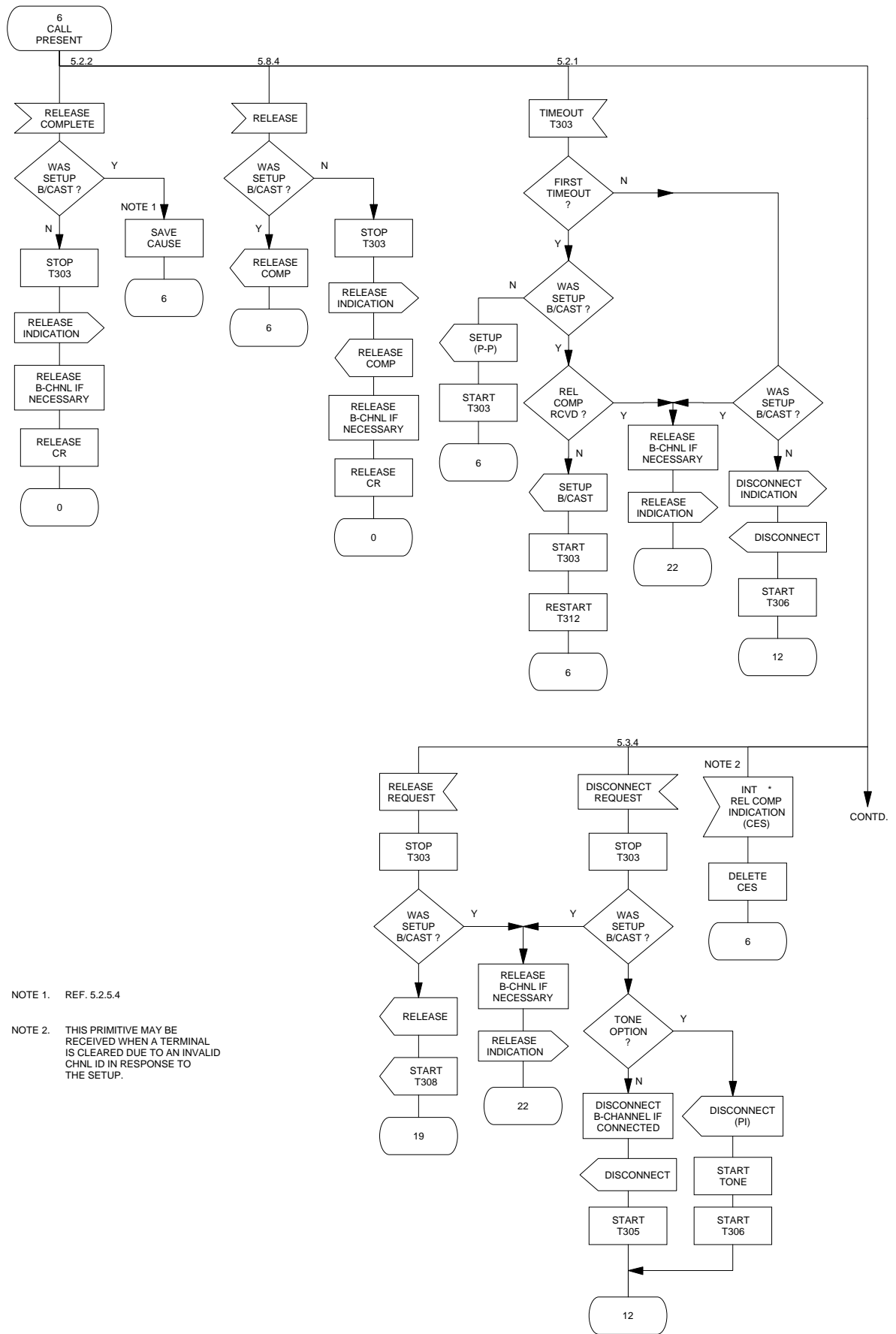


Figure 10: Network side SDL diagram

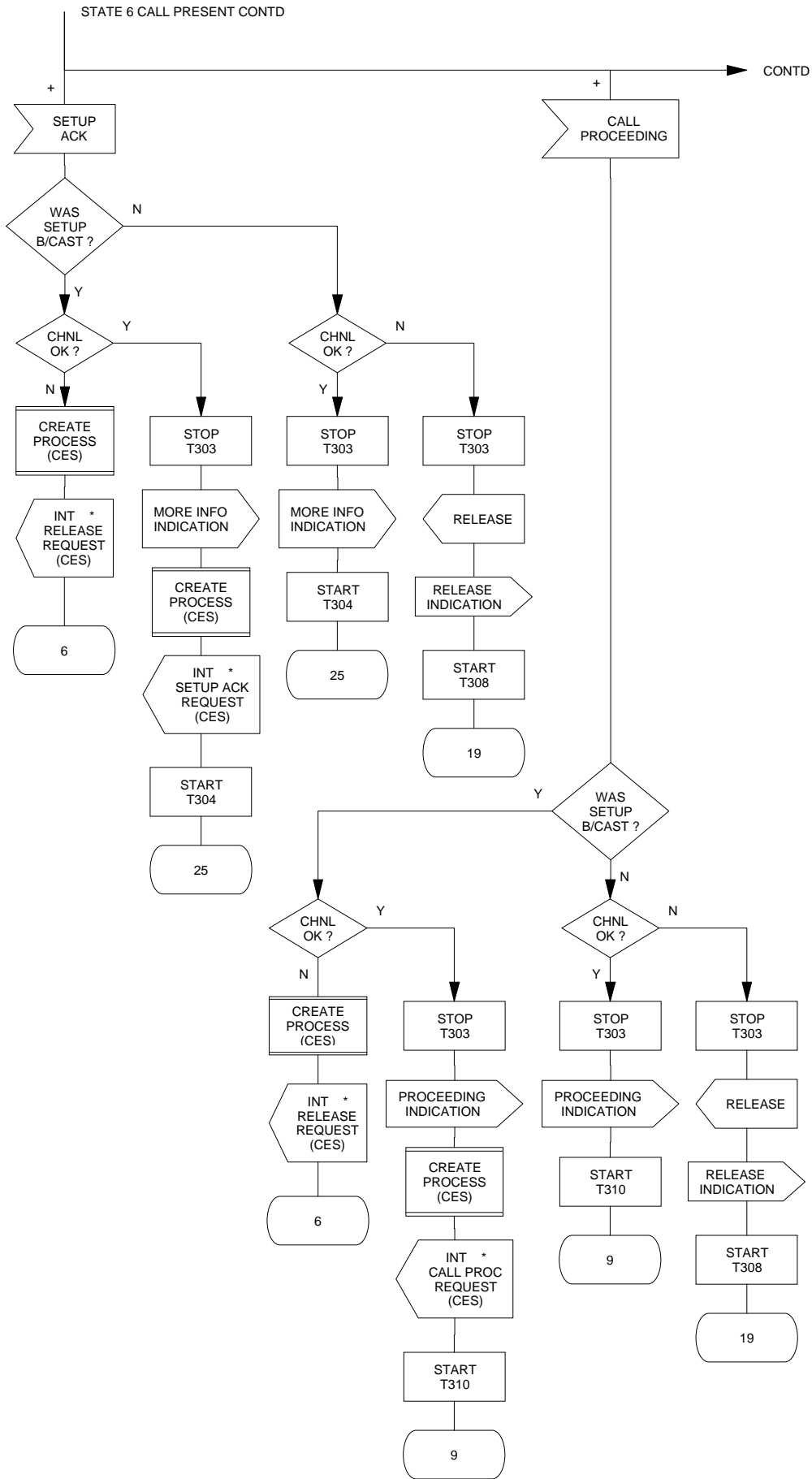


Figure 11: Network side SDL diagram

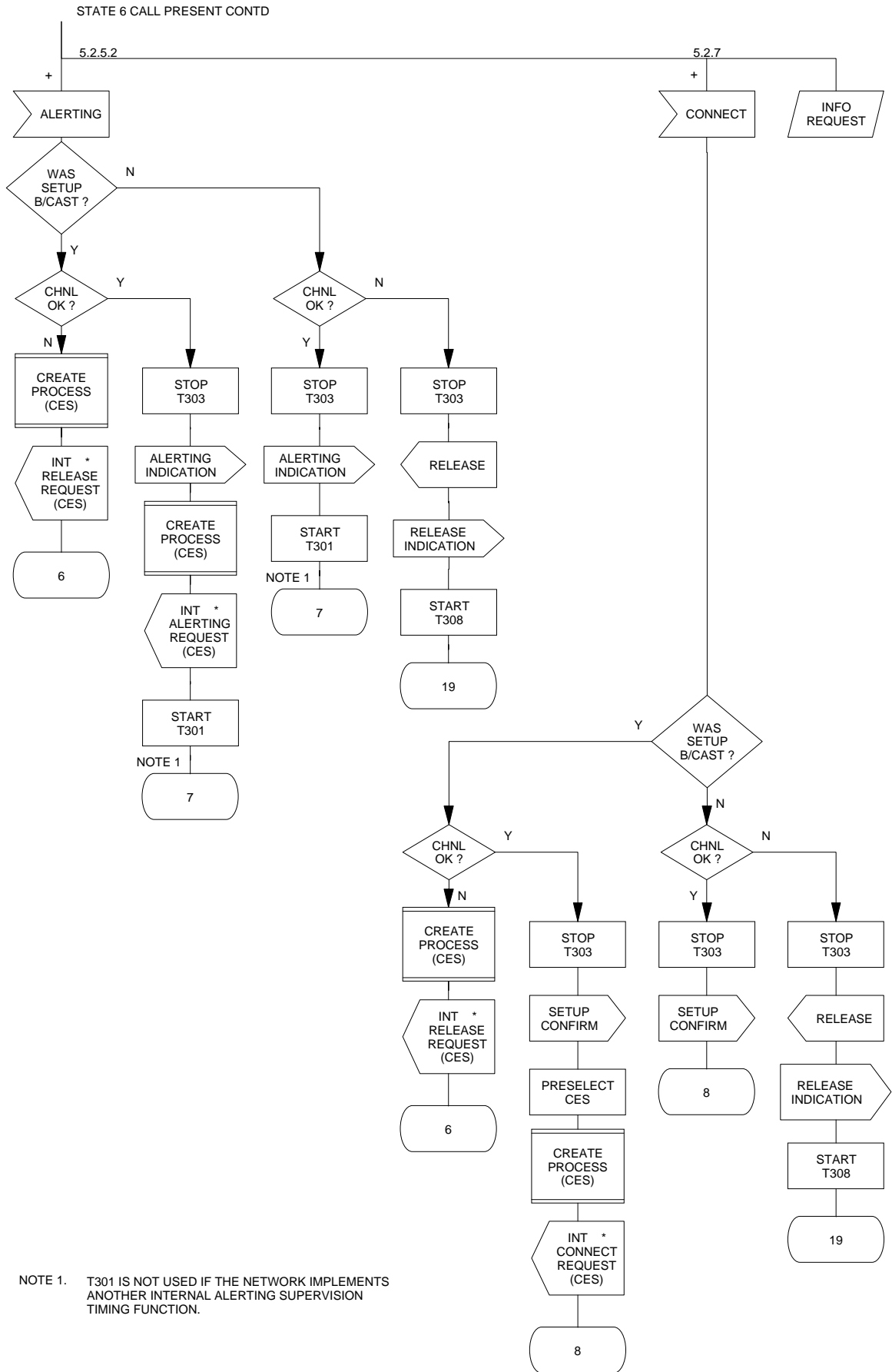


Figure 12: Network side SDL diagram

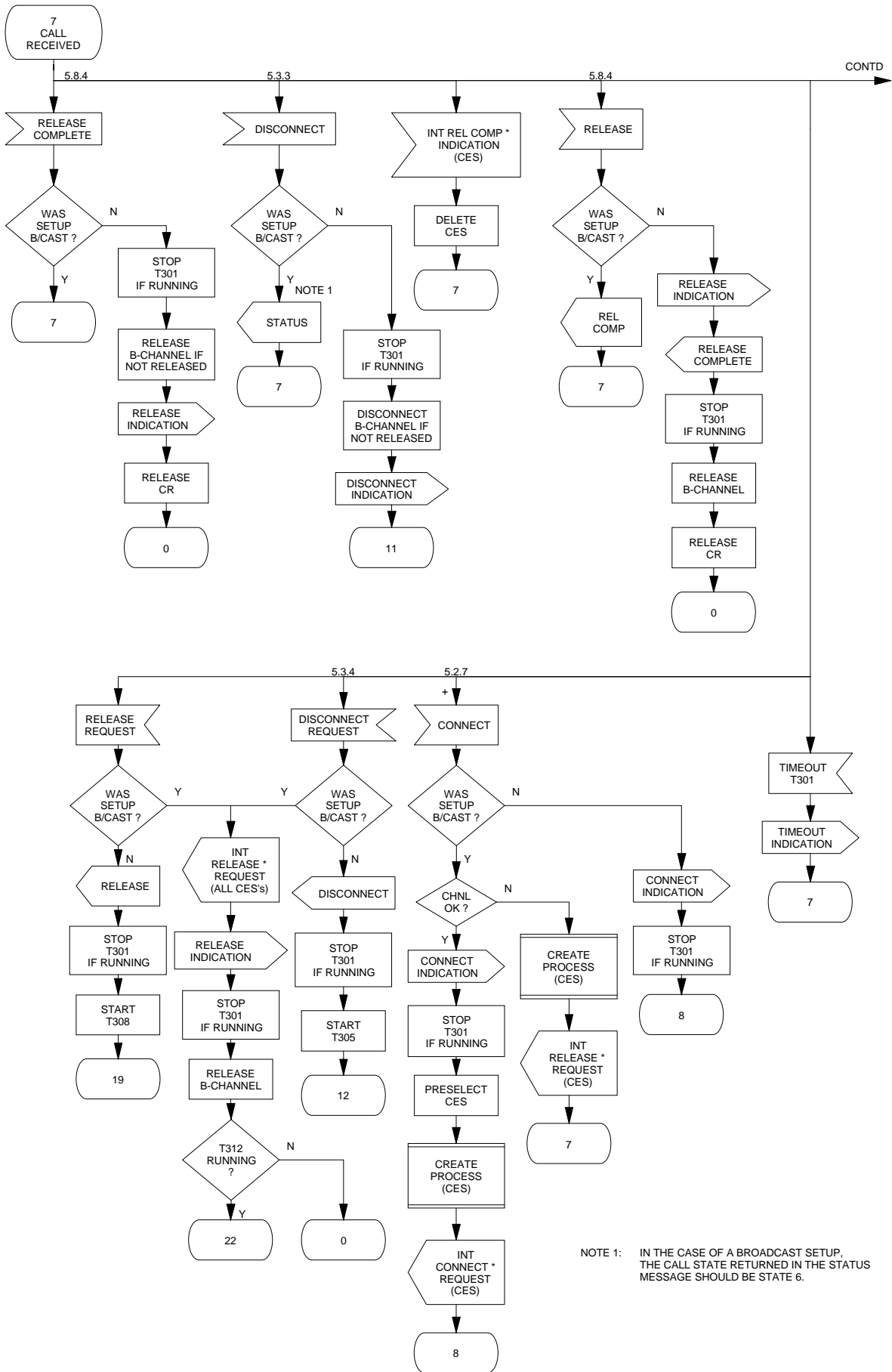


Figure 13: Network side SDL diagram

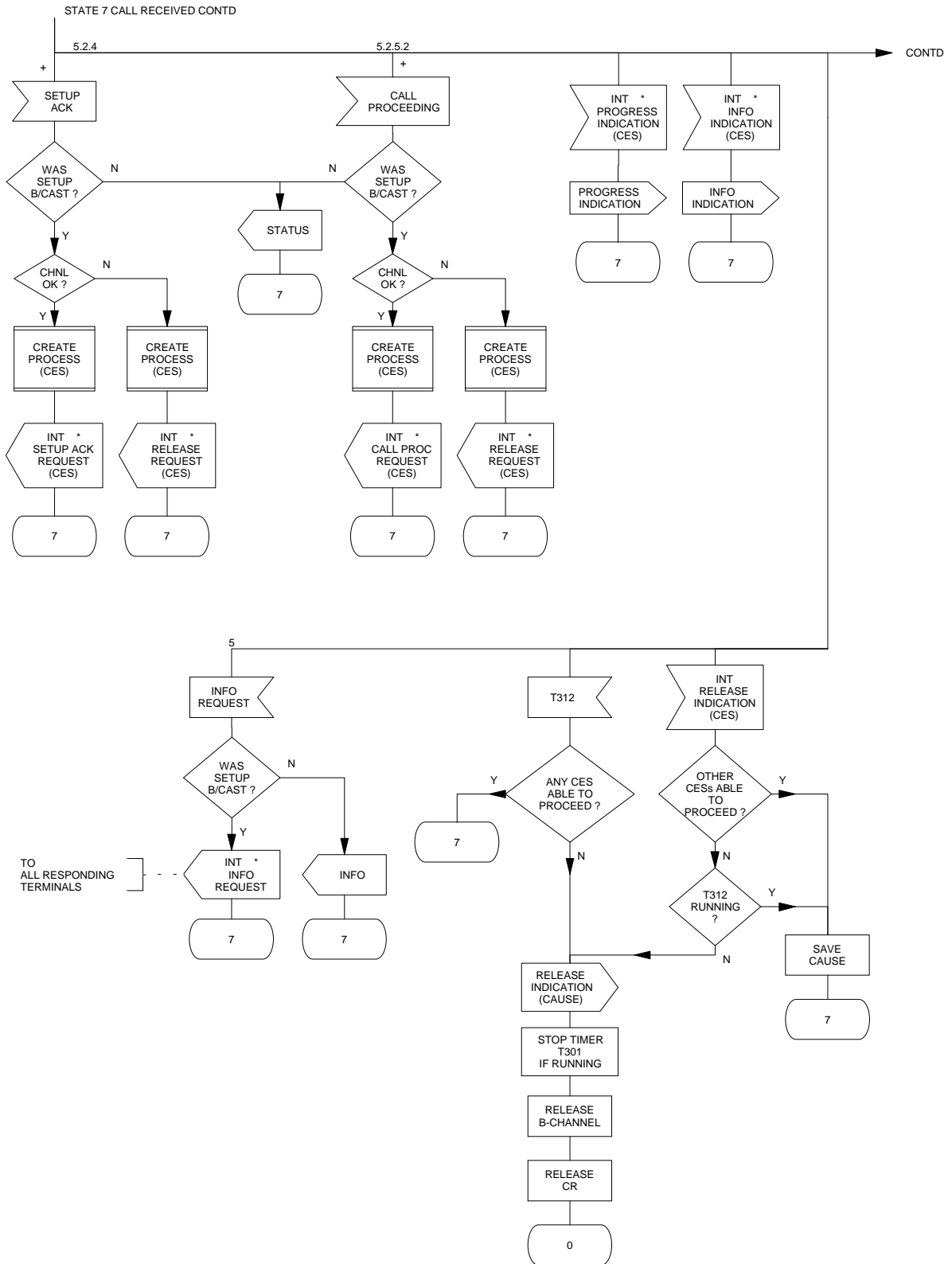
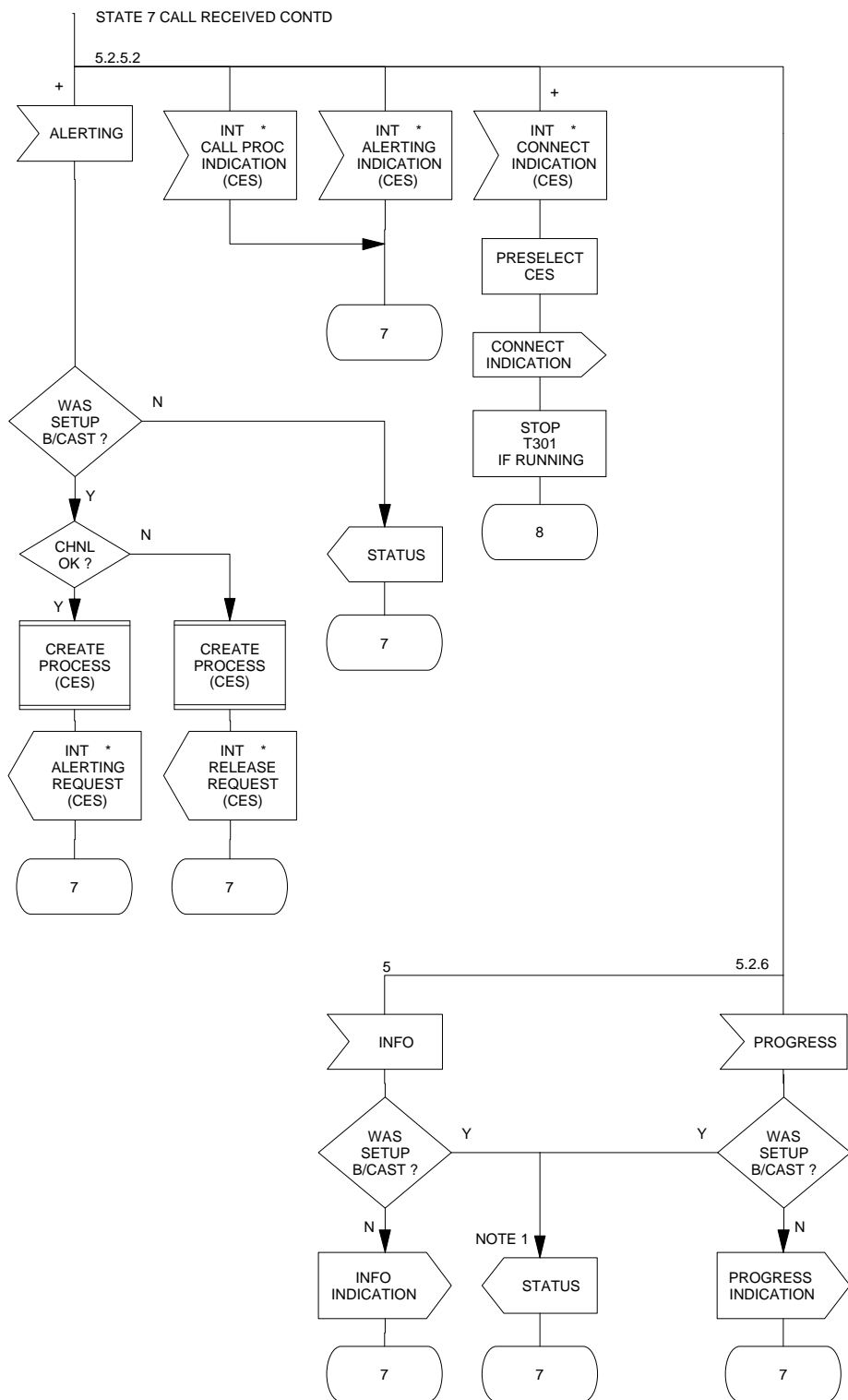


Figure 14: Network side SDL diagram



NOTE 1. IN THE CASE OF A BROADCAST SETUP, THE CALL STATE RETURNED IN THE STATUS MESSAGE SHOULD BE STATE 6.

Figure 15: Network side SDL diagram

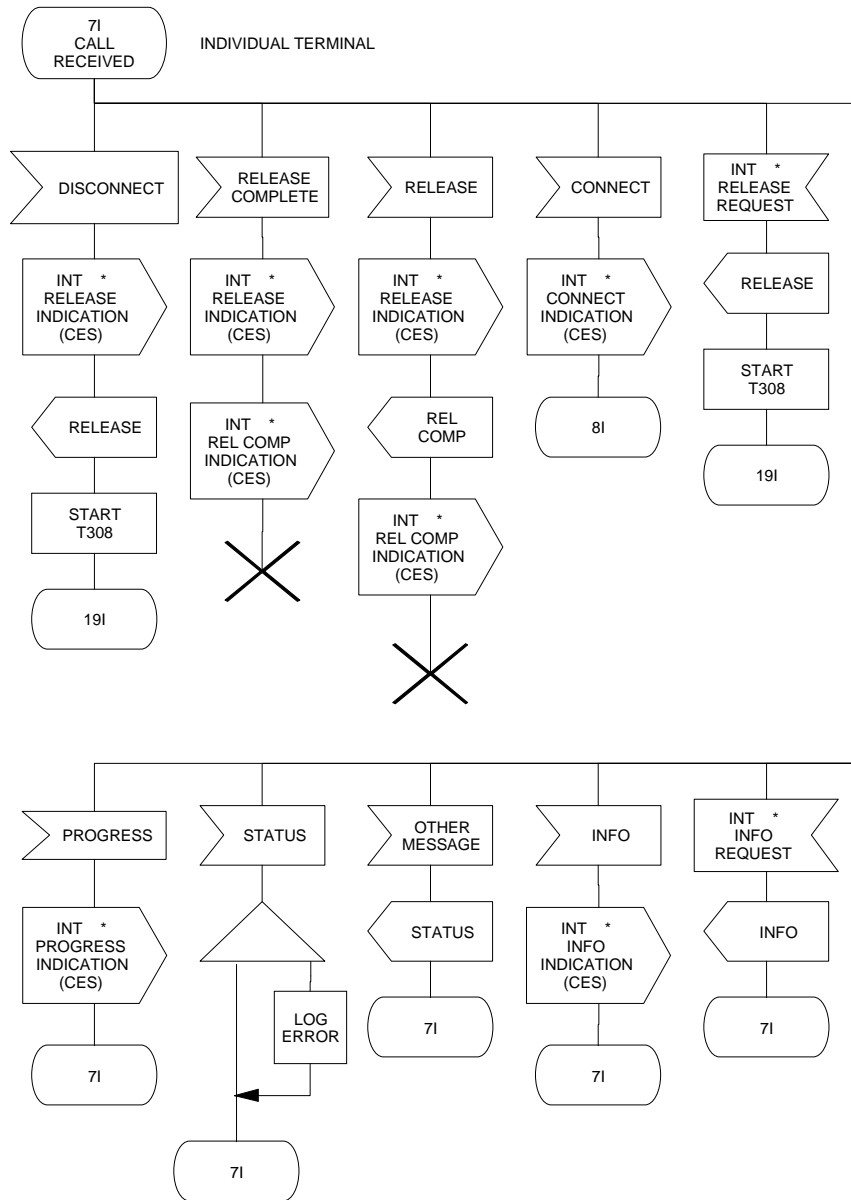
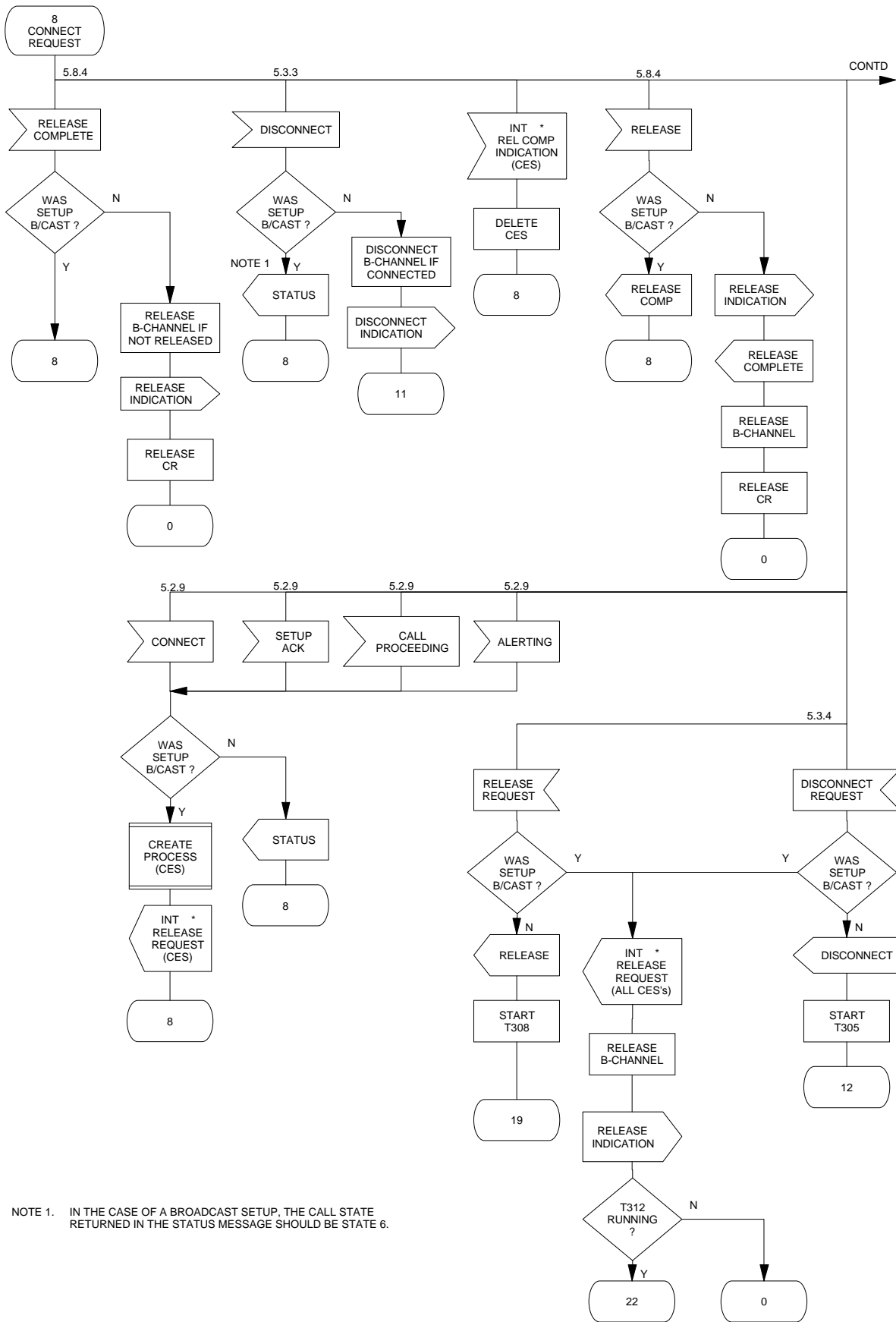


Figure 16: Network side SDL diagram



NOTE 1. IN THE CASE OF A BROADCAST SETUP, THE CALL STATE RETURNED IN THE STATUS MESSAGE SHOULD BE STATE 6.

Figure 17: Network side SDL diagram

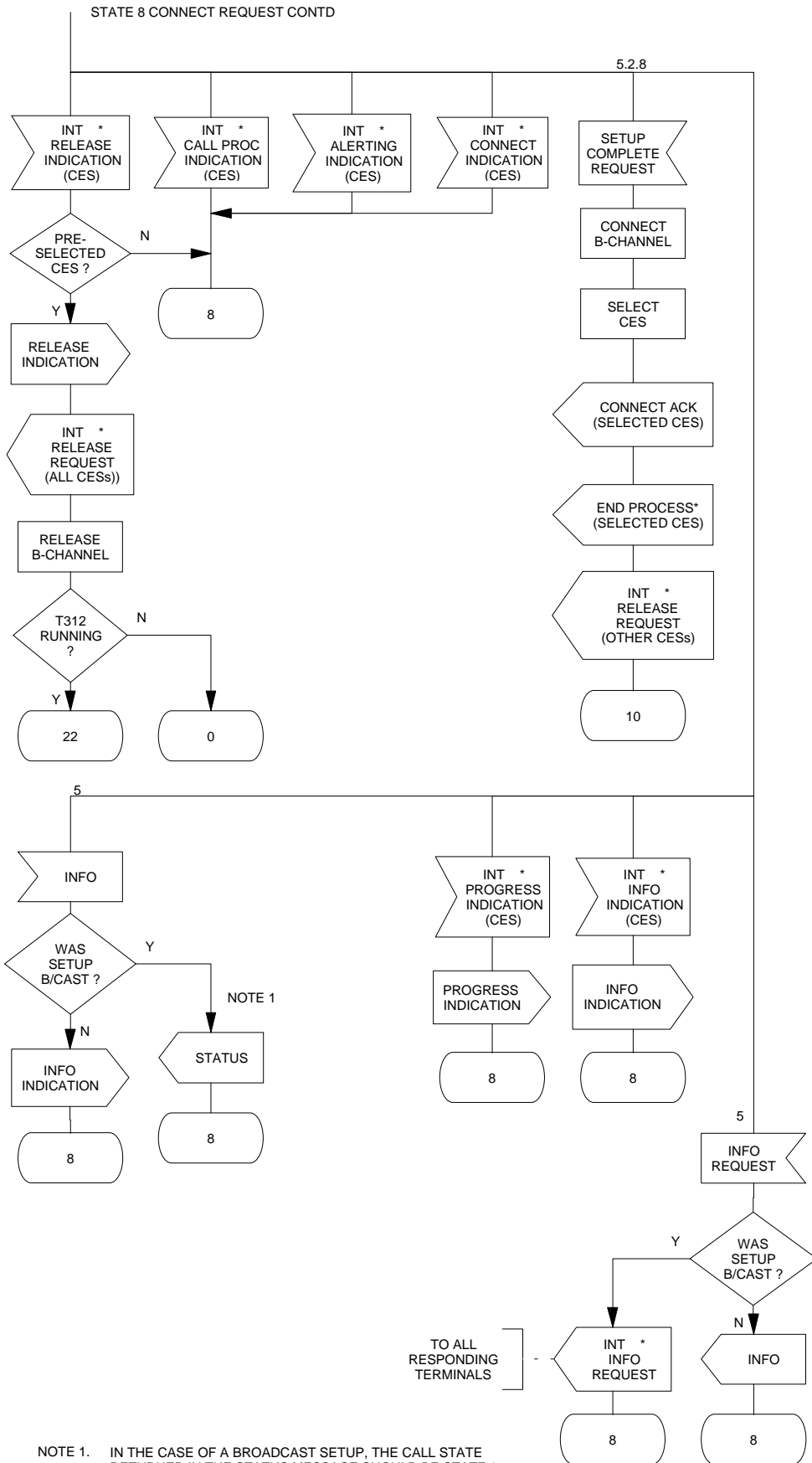


Figure 18: Network side SDL diagram

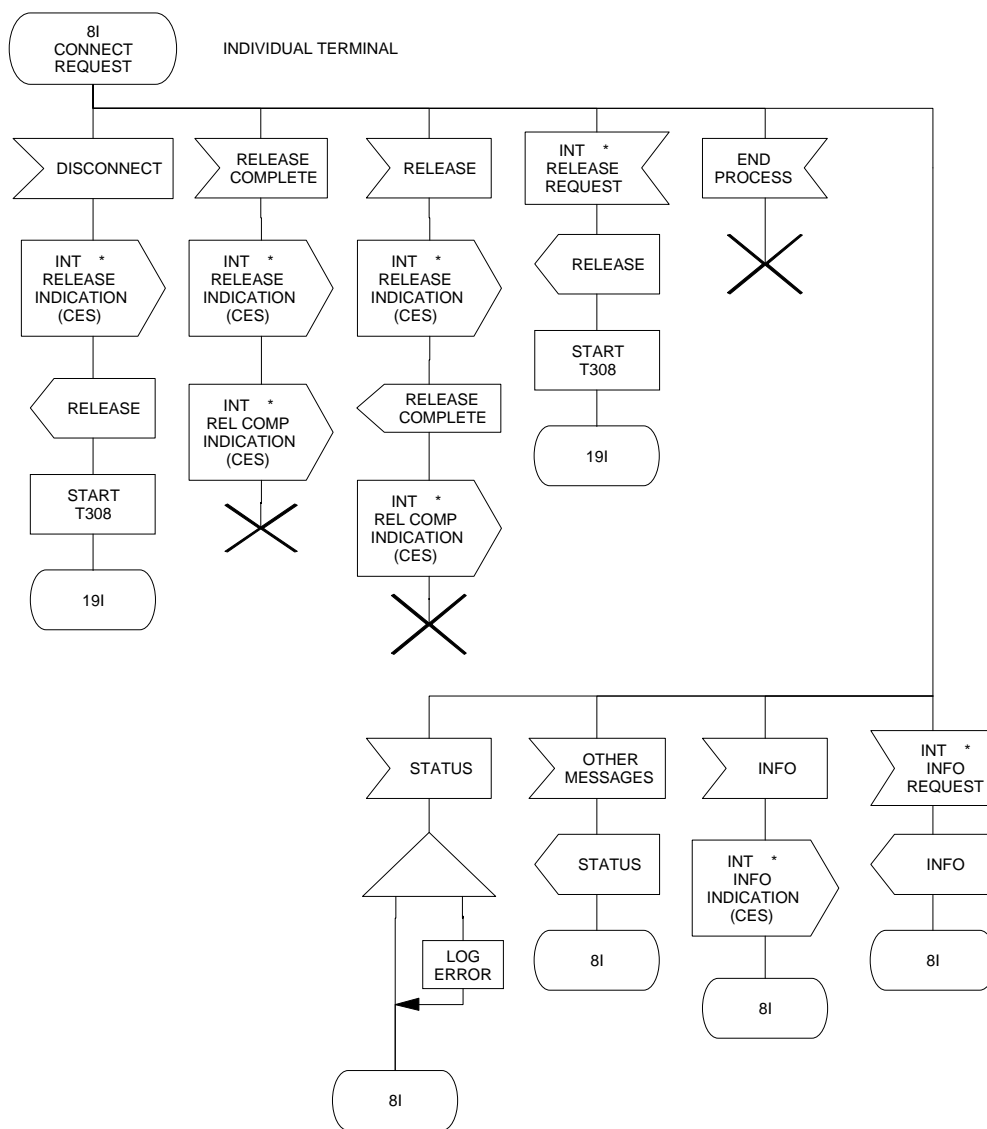


Figure 19: Network side SDL diagram

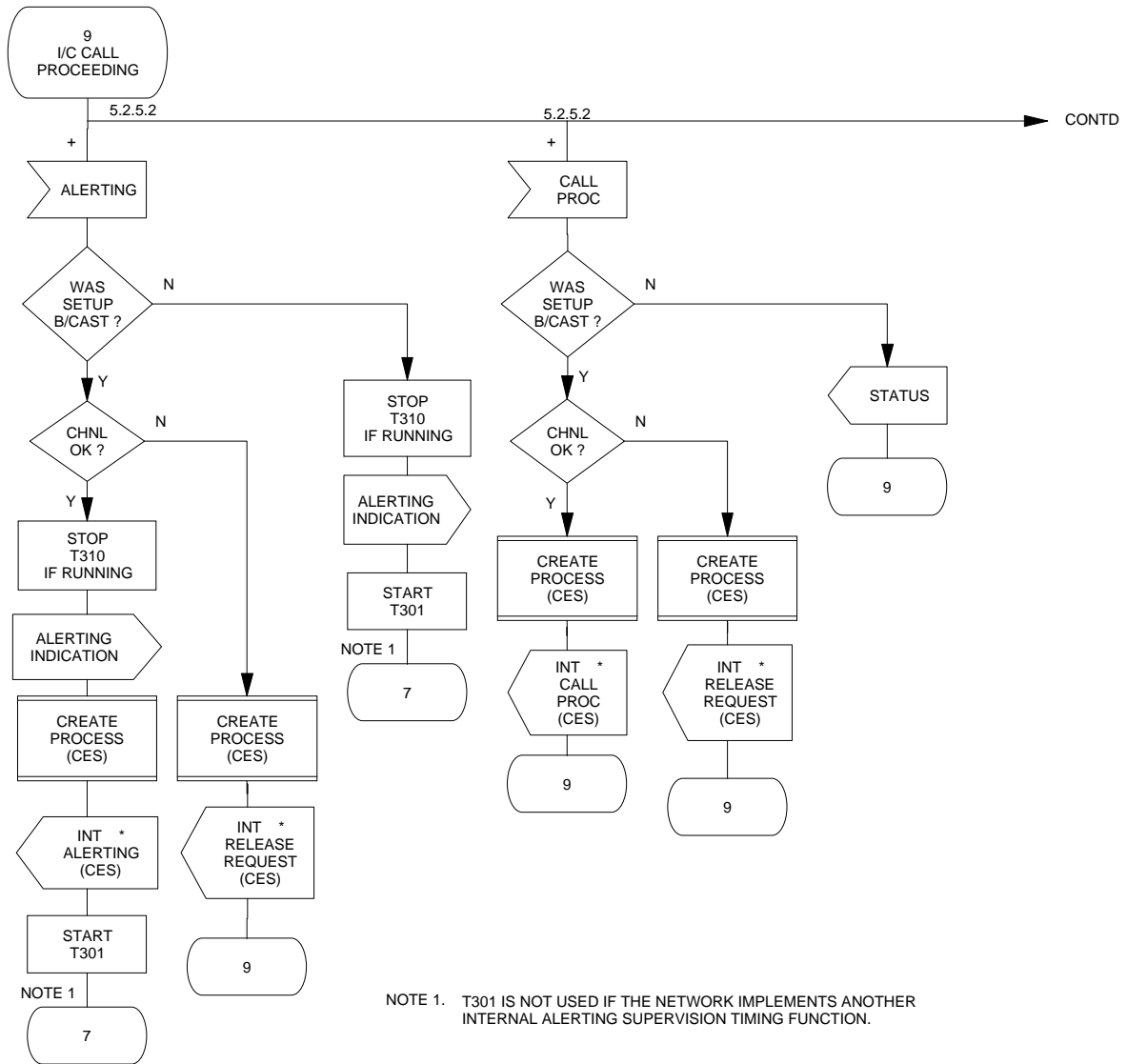
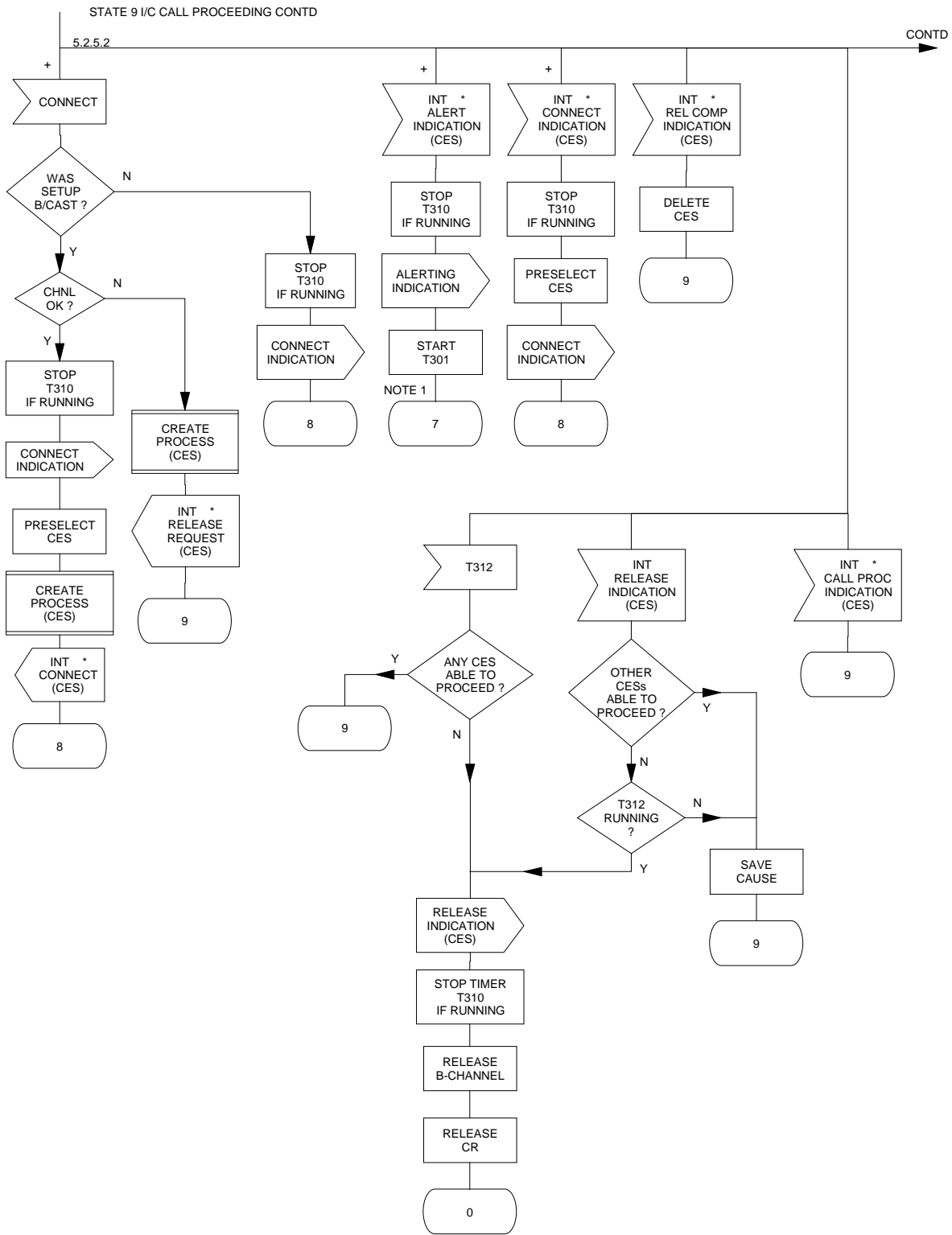


Figure 20: Network side SDL diagram



NOTE 1. T301 IS NOT USED IF THE NETWORK IMPLEMENTS ANOTHER INTERNAL ALERTING SUPERVISION TIMING FUNCTION.

Figure 21: Network side SDL diagram

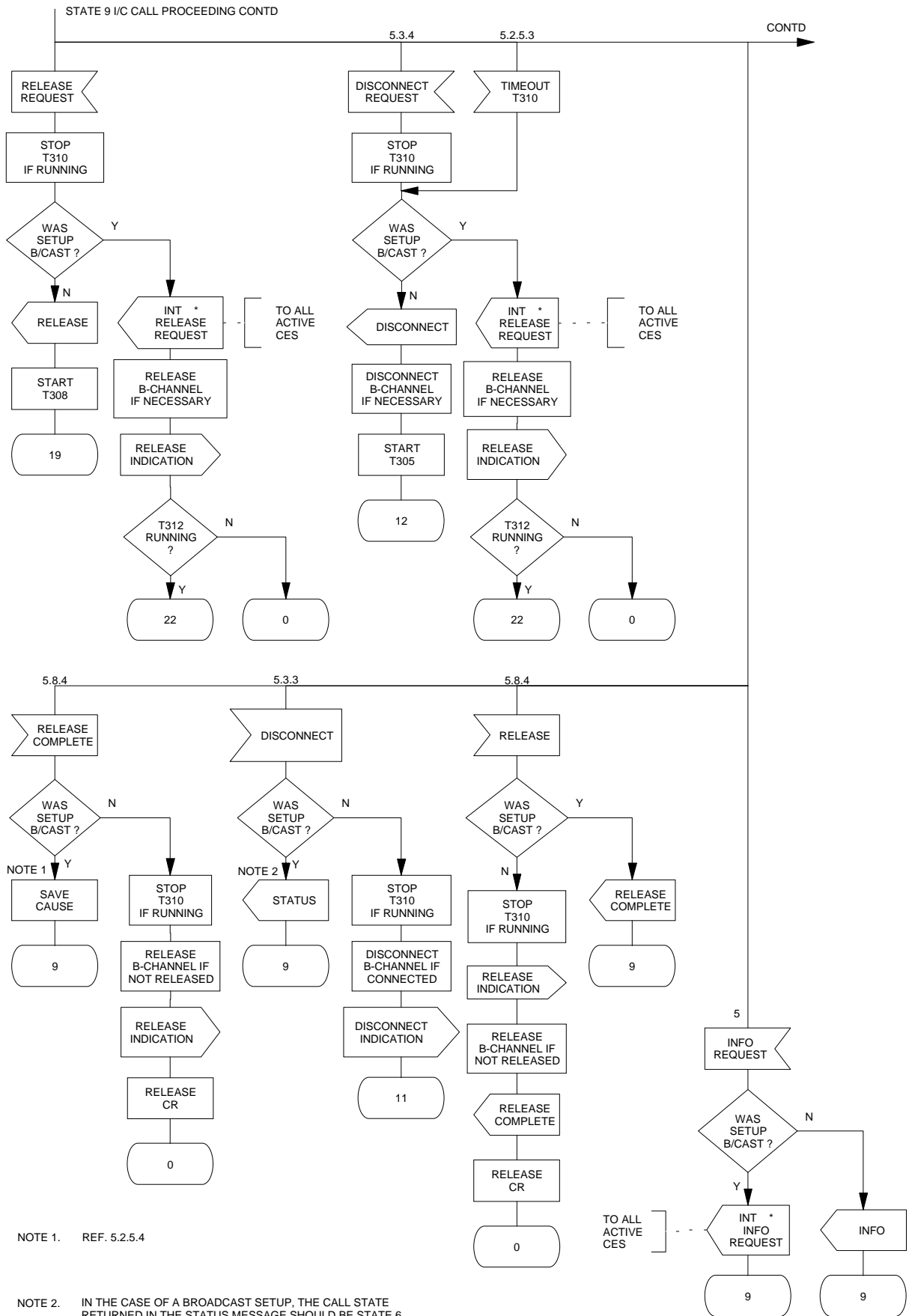


Figure 22: Network side SDL diagram

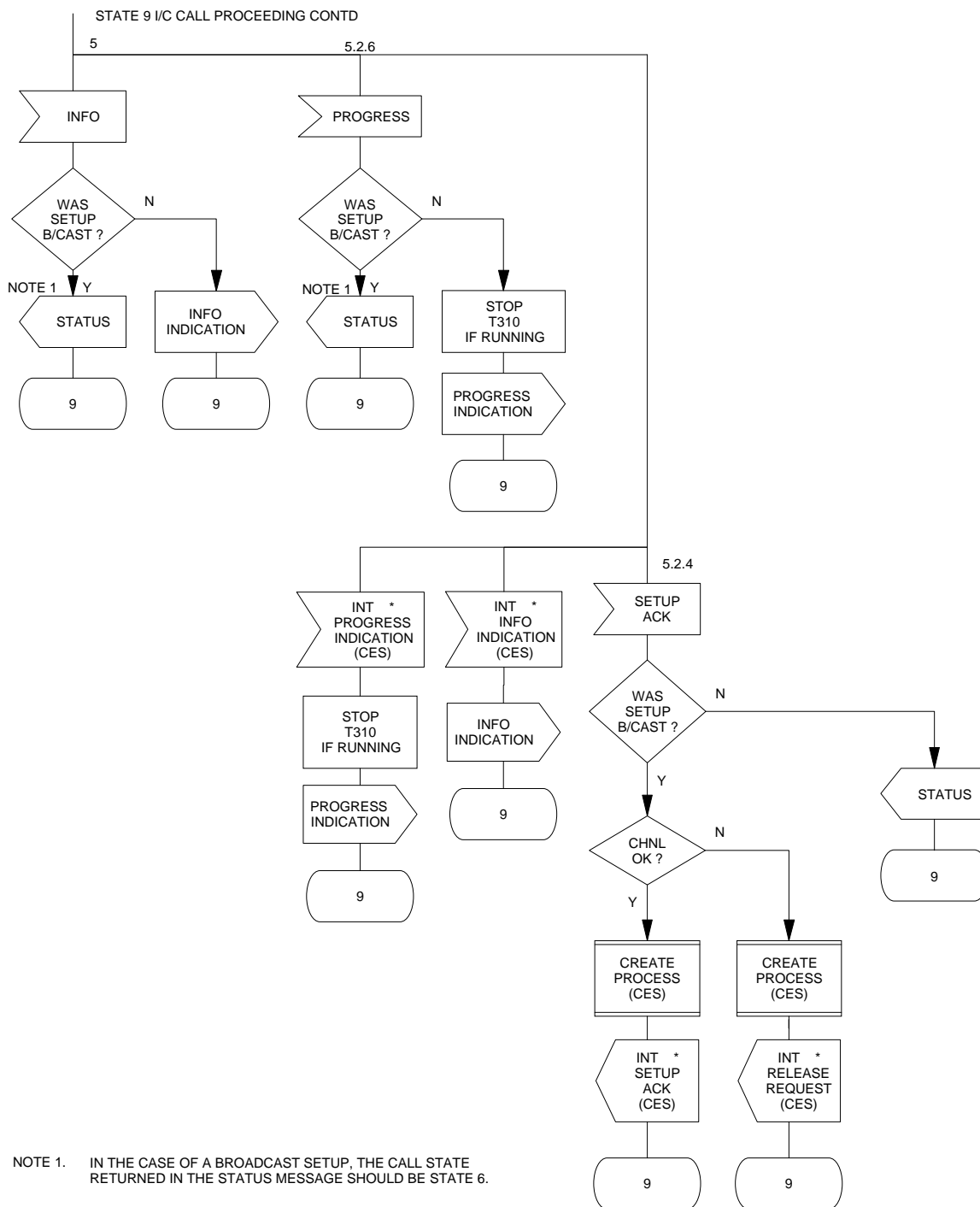
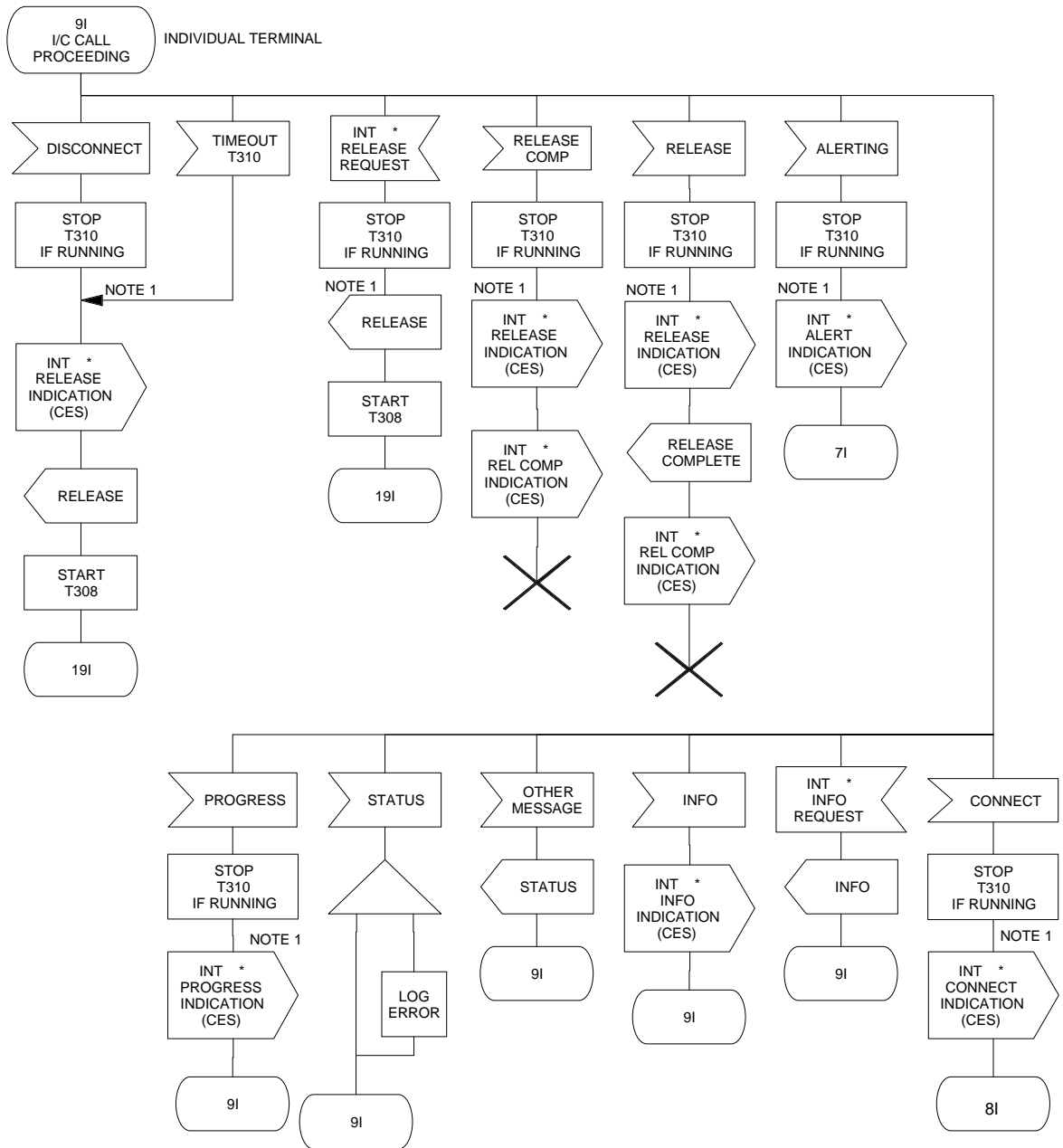
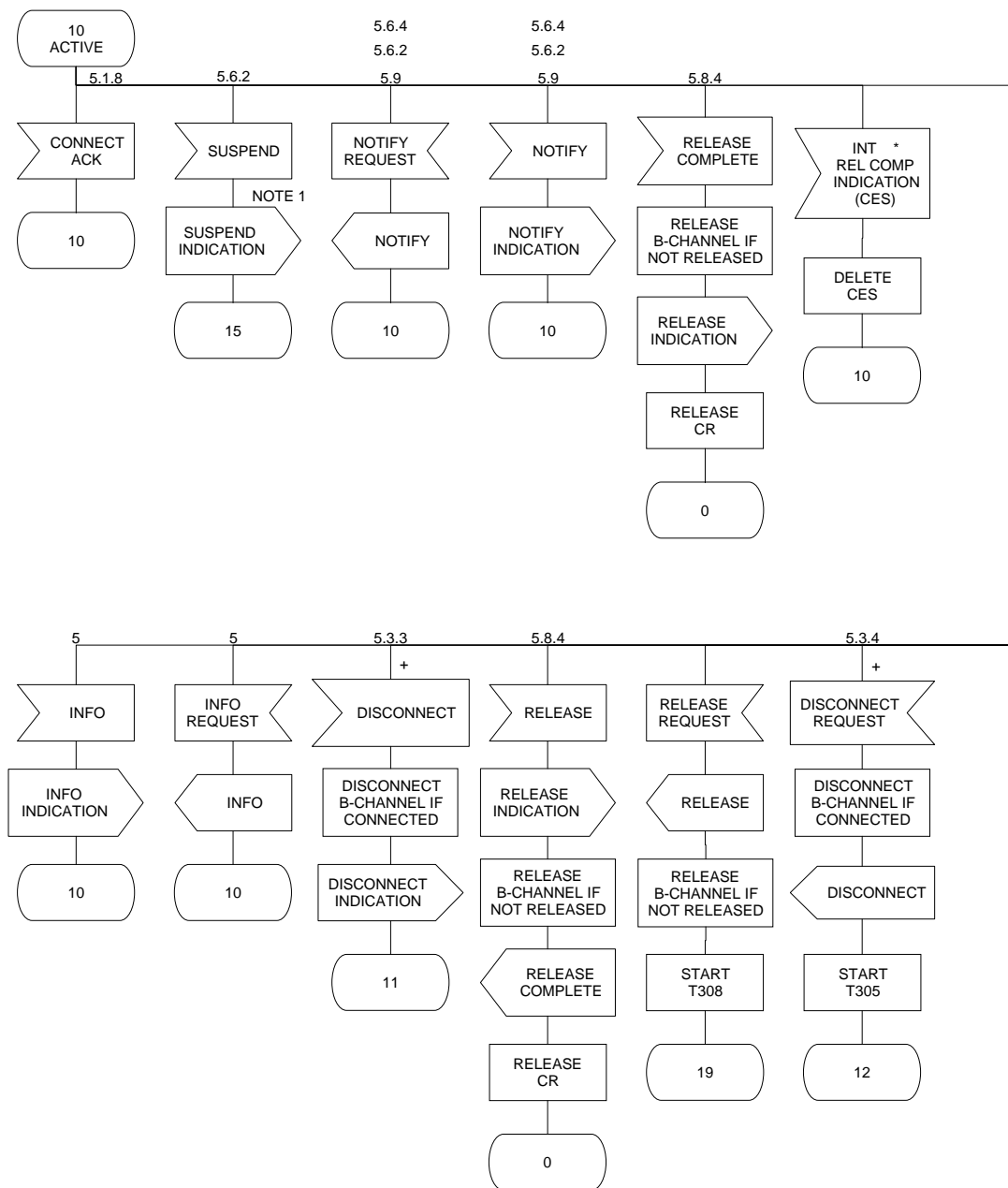


Figure 23: Network side SDL diagram



NOTE 1. IMPLEMENTATION OF TIMER T310 IN INDIVIDUAL PROCESSES IS OPTIONAL.

Figure 24: Network side SDL diagram



NOTE 1. THE USE OF THE CALL REARRANGEMENT PROCEDURE IS RESTRICTED TO BASIC ACCESS i.e. IT WILL NOT BE AVAILABLE FOR PRIMARY RATE ACCESS.

Figure 25: Network side SDL diagram

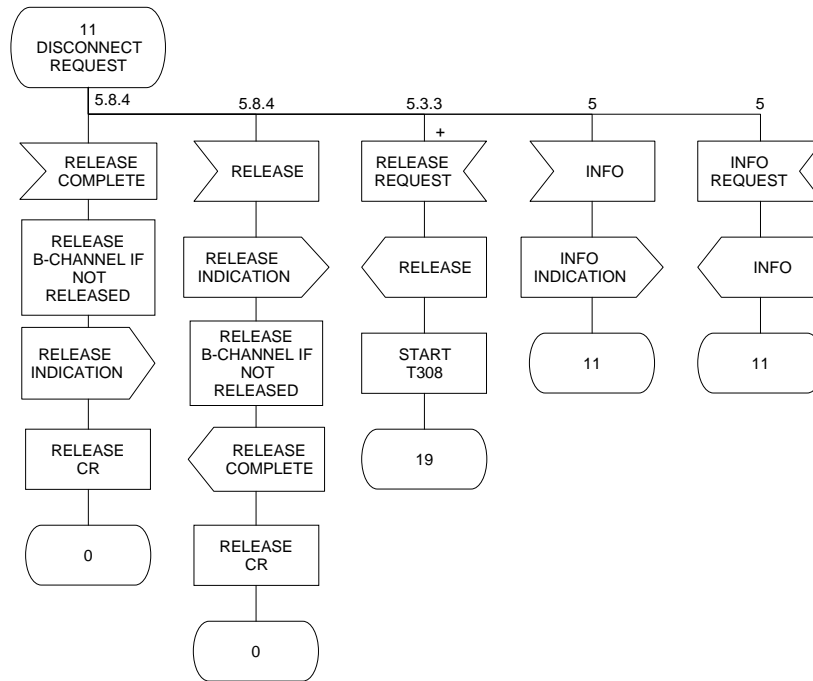


Figure 26: Network side SDL diagram

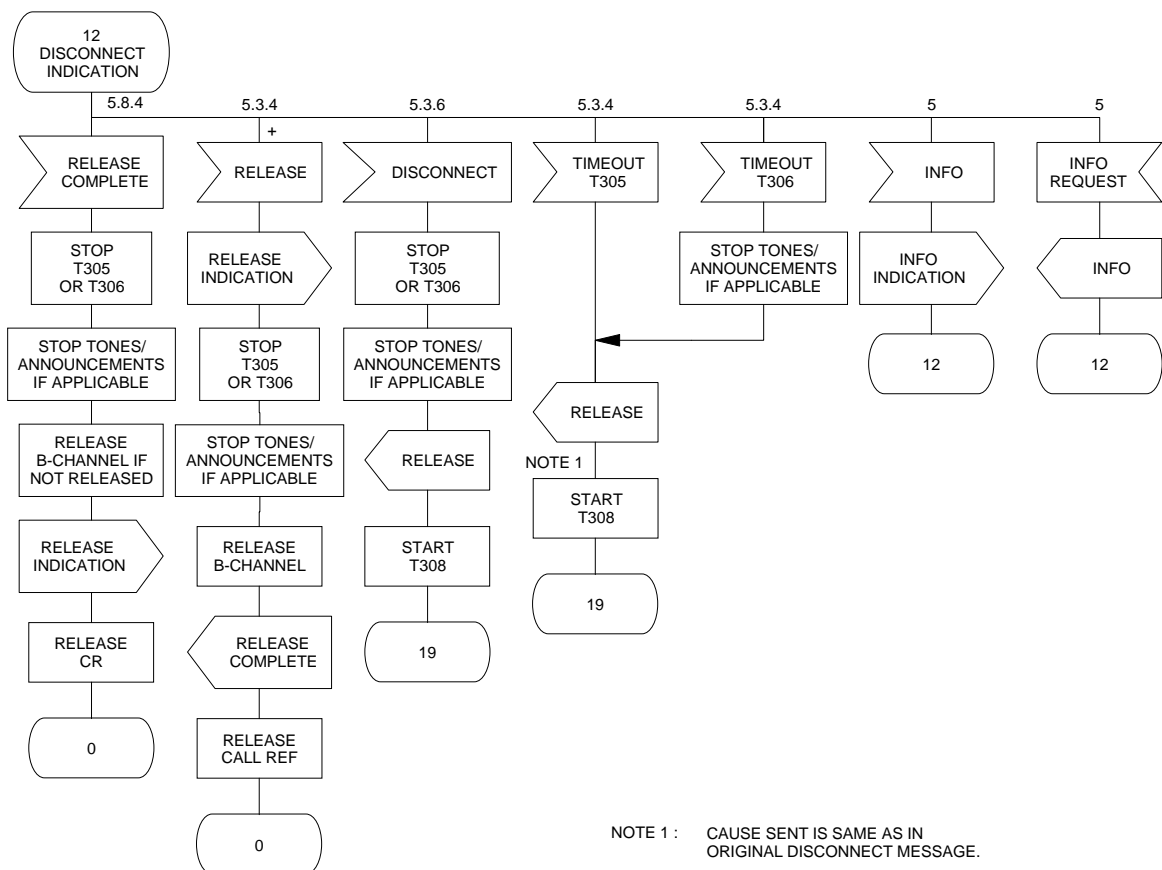


Figure 27: Network side SDL diagram

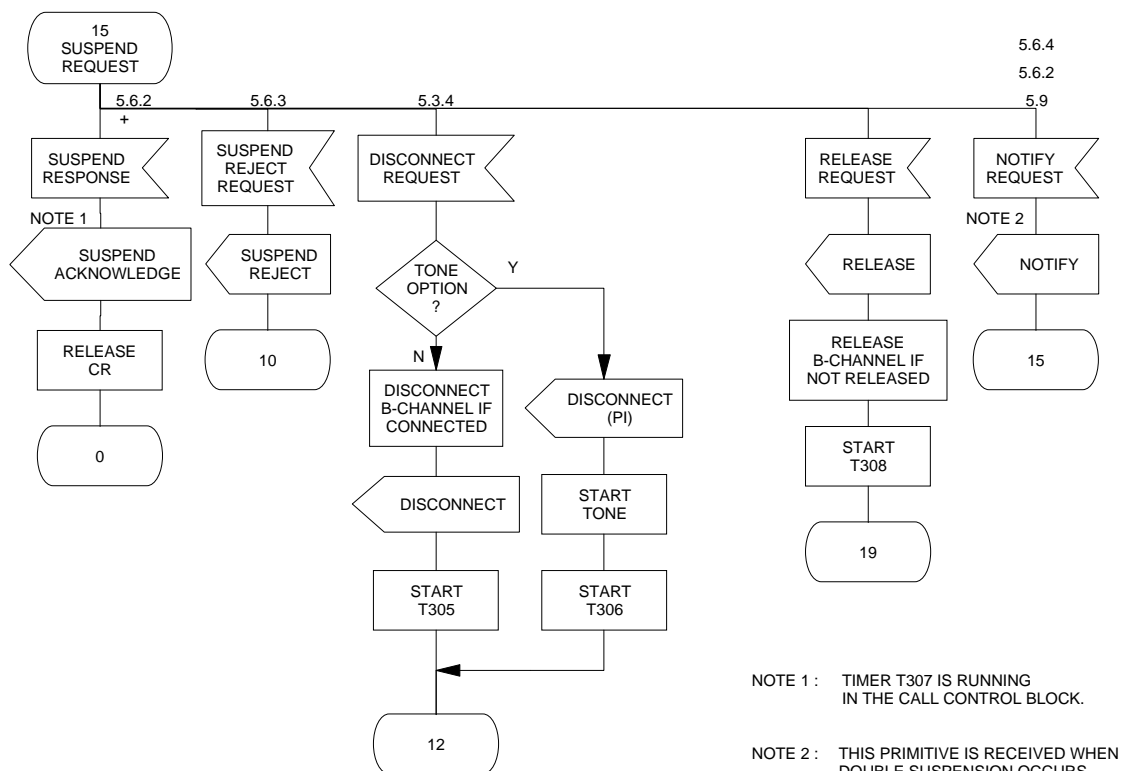


Figure 28: Network side SDL diagram

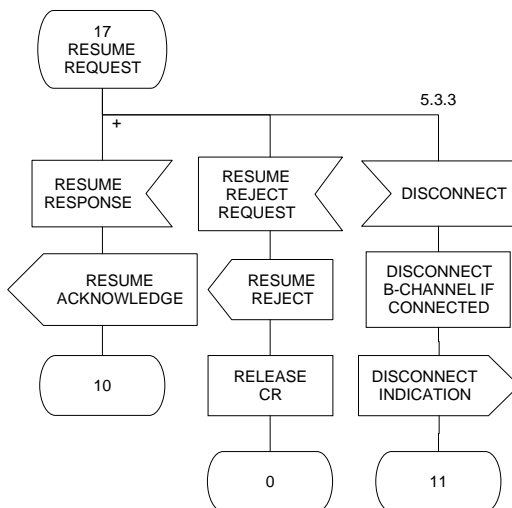


Figure 29: Network side SDL diagram

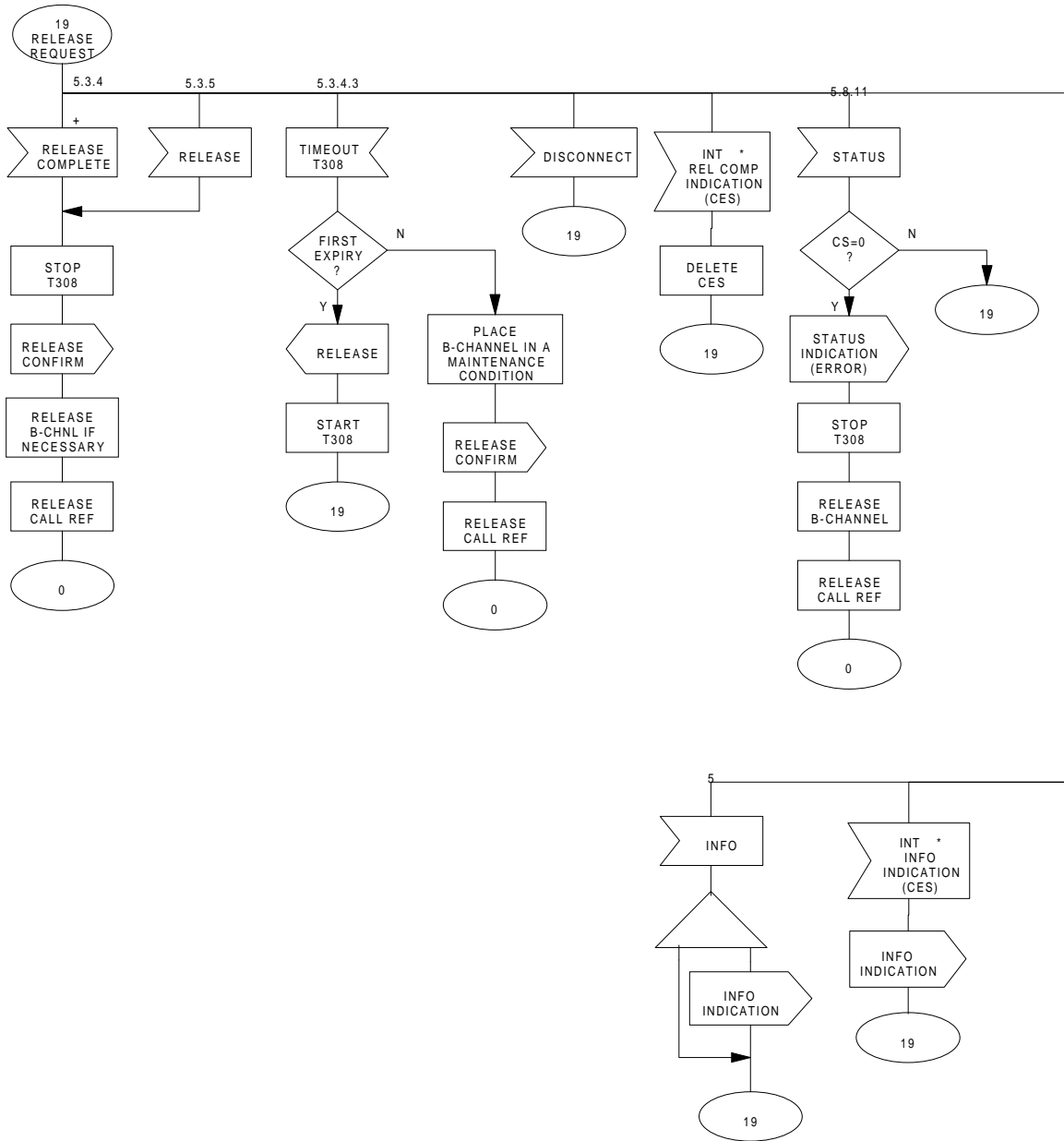


Figure 30: Network side SDL diagram

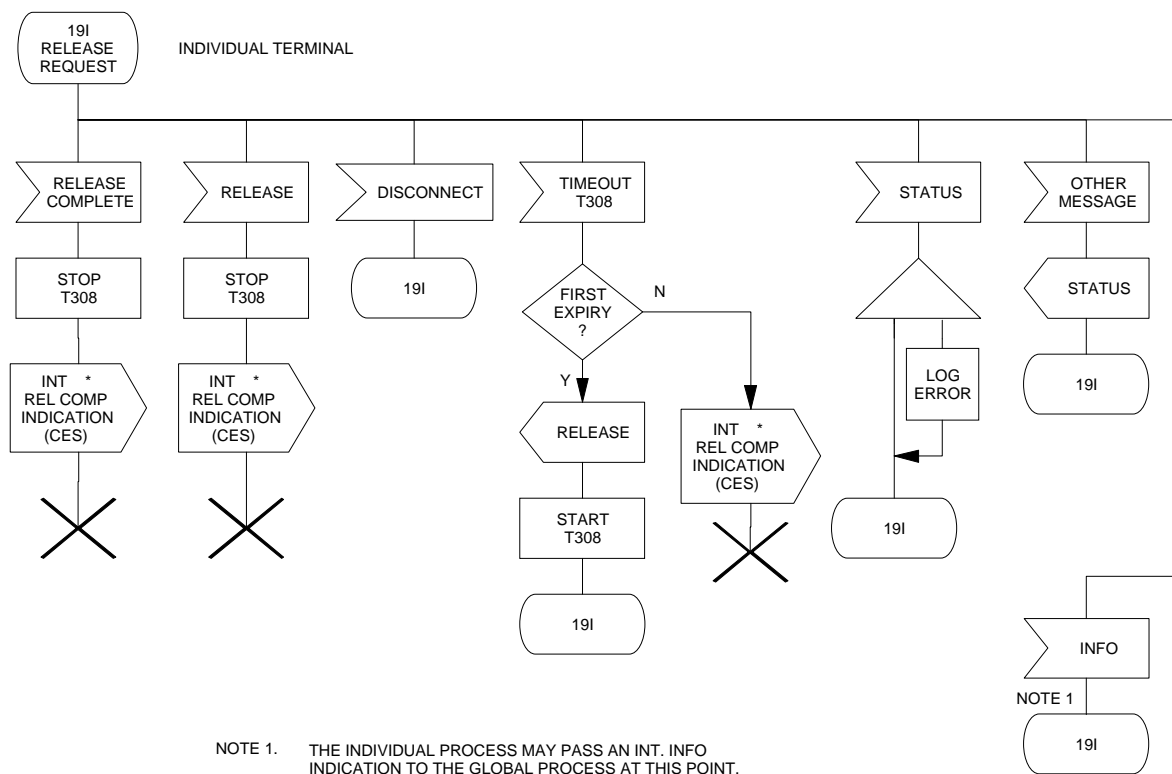


Figure 31: Network side SDL diagram

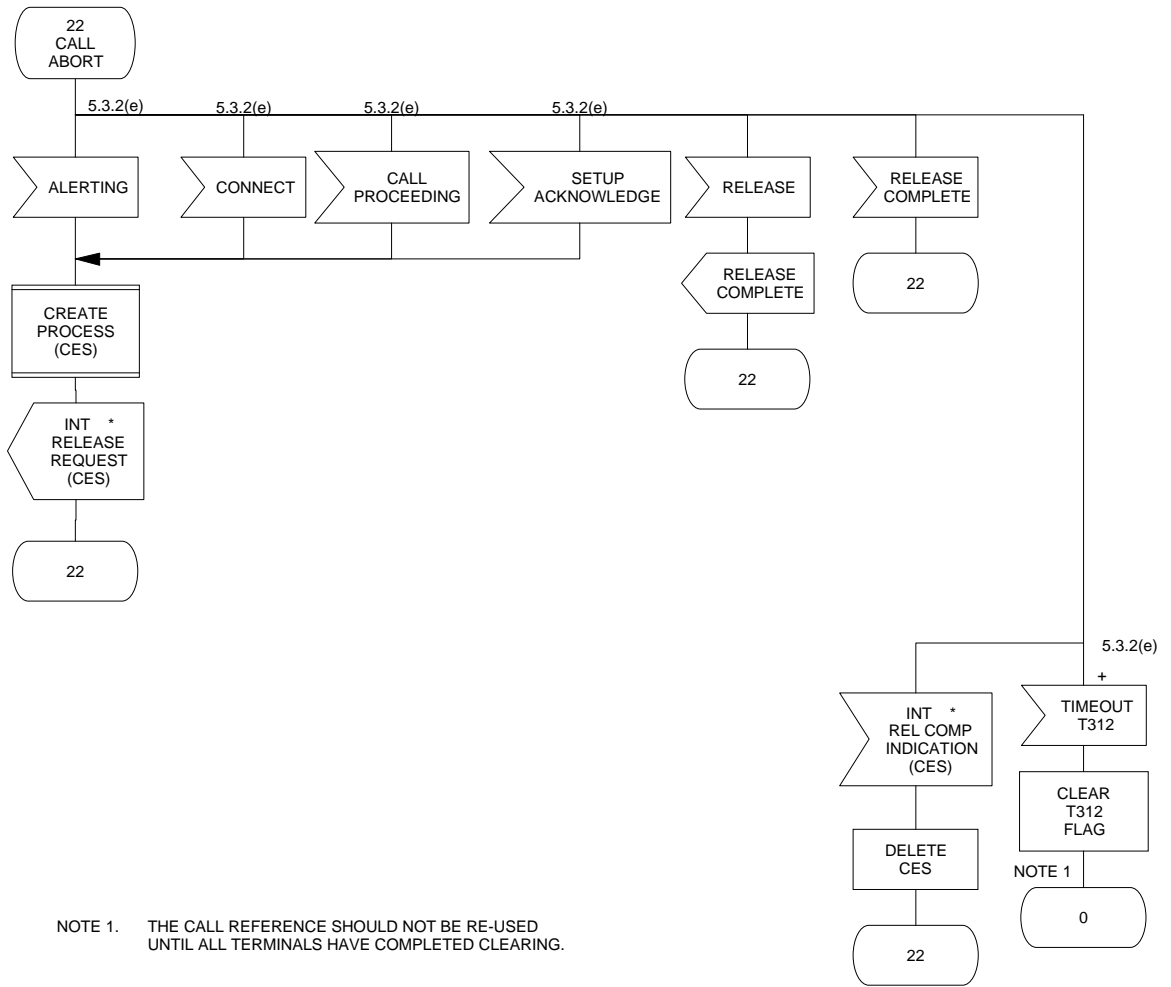


Figure 32: Network side SDL diagram

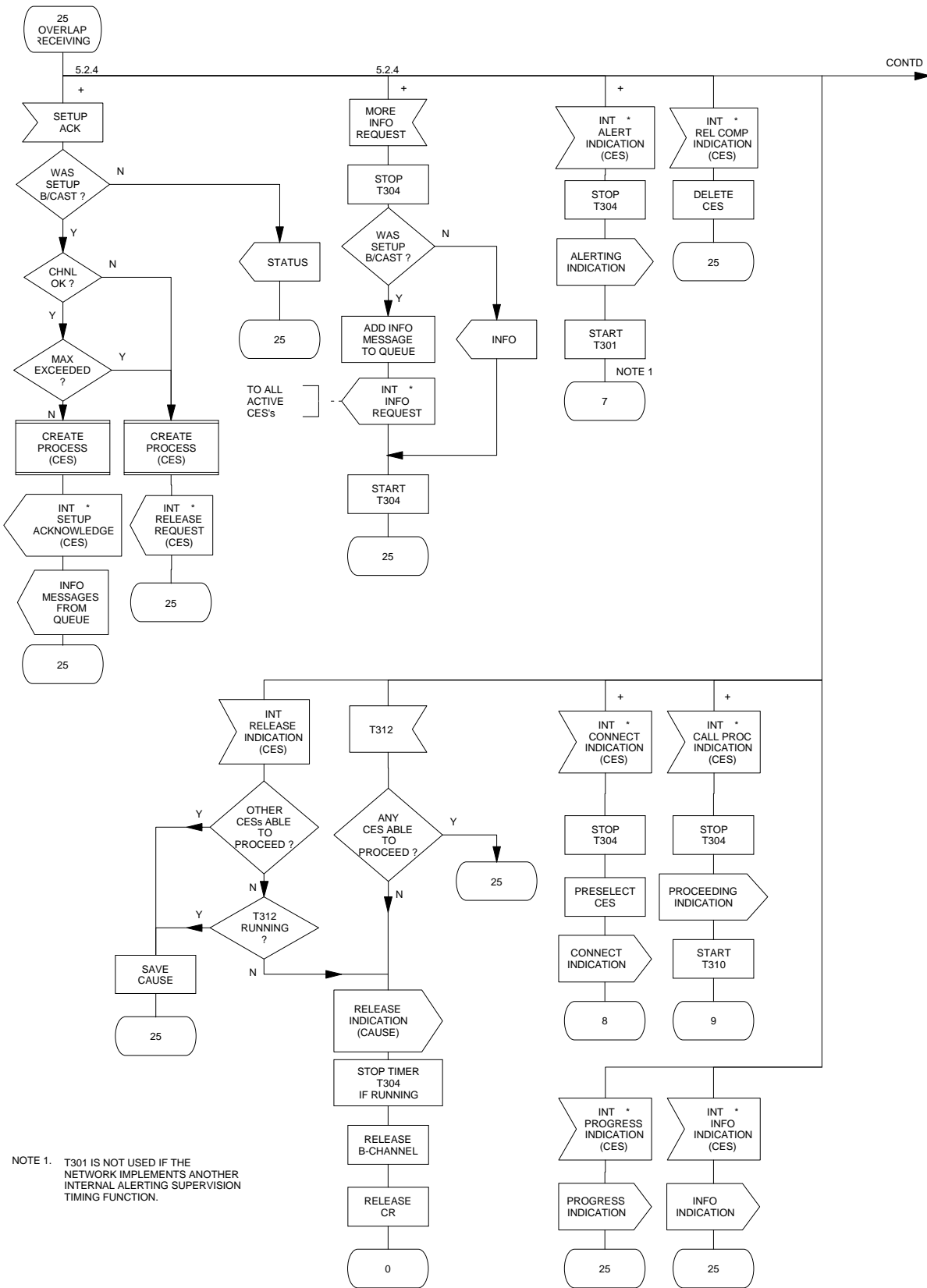


Figure 33: Network side SDL diagram

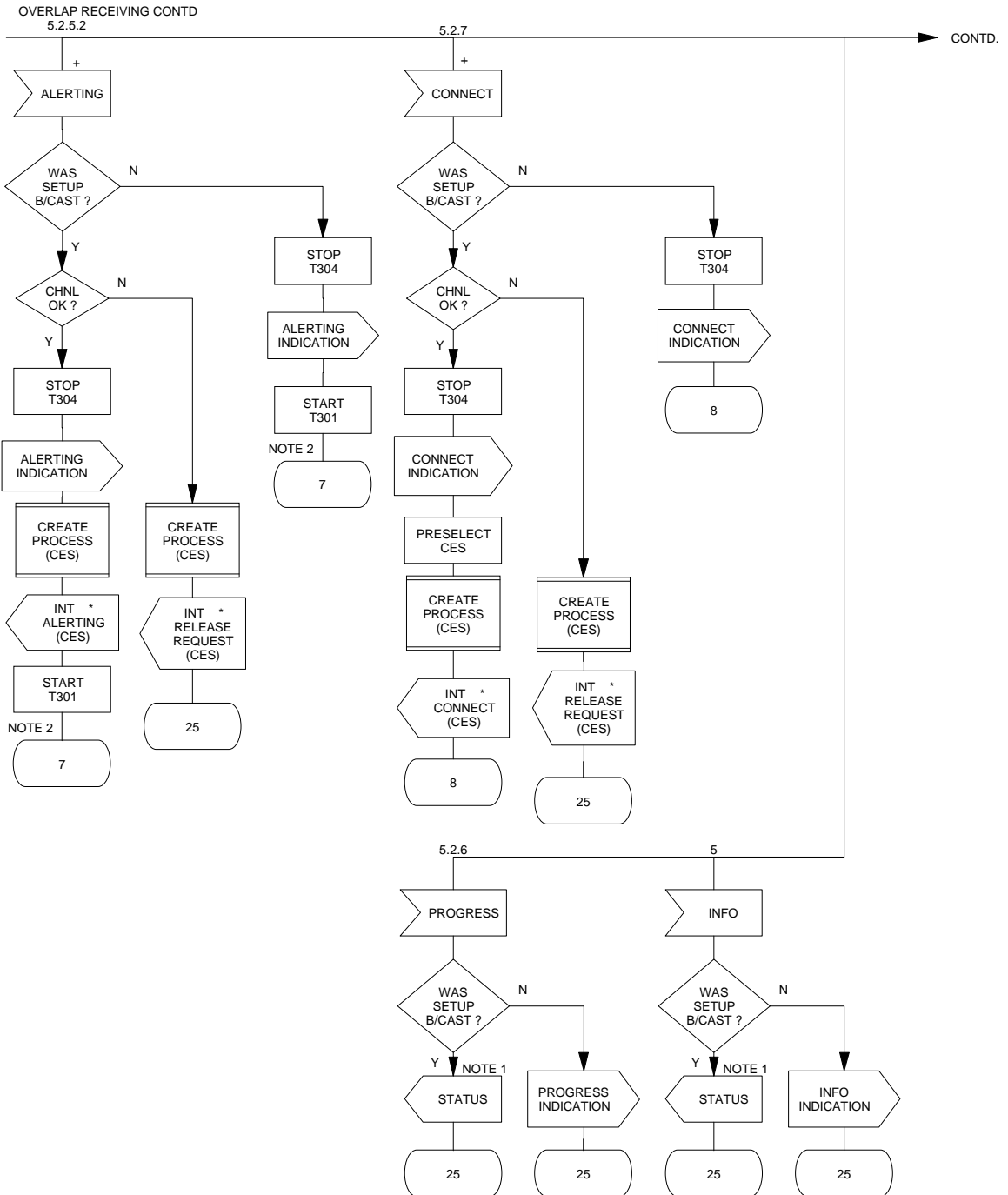


Figure 34: Network side SDL diagram

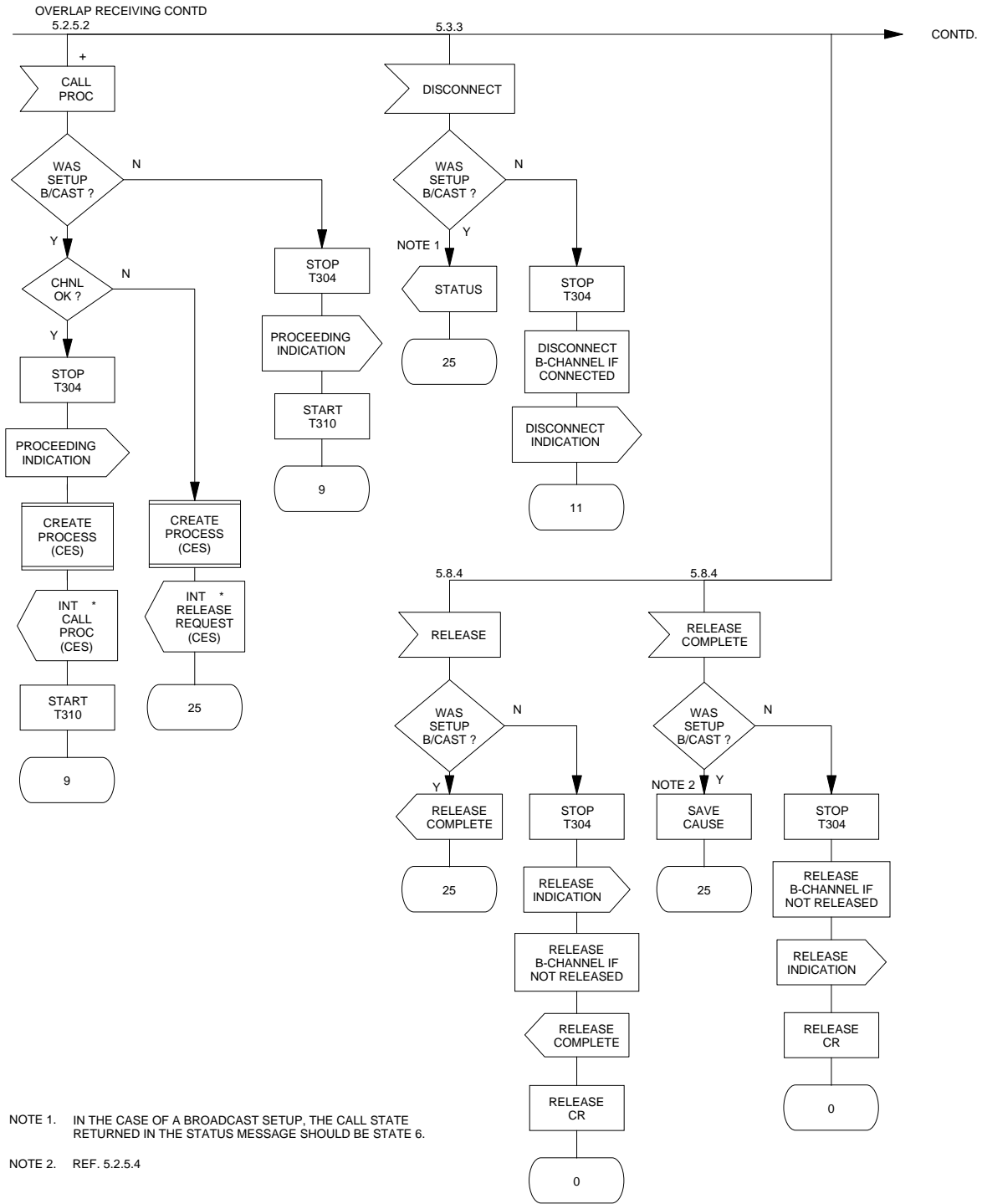
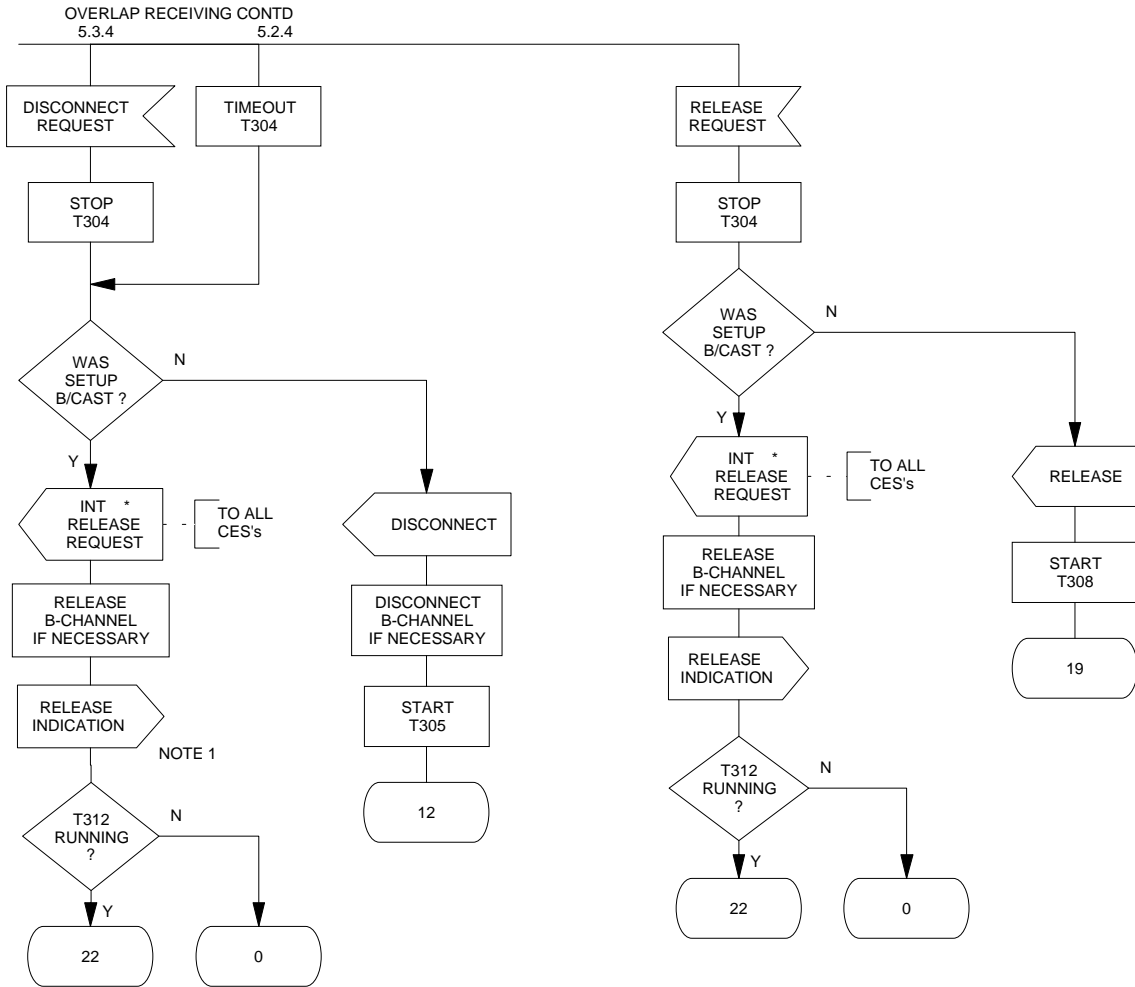


Figure 35: Network side SDL diagram



NOTE 1. IF T304 EXPIRED
 SEND SAVED CAUSE
 IN RELEASE INDICATION.

Figure 36: Network side SDL diagram

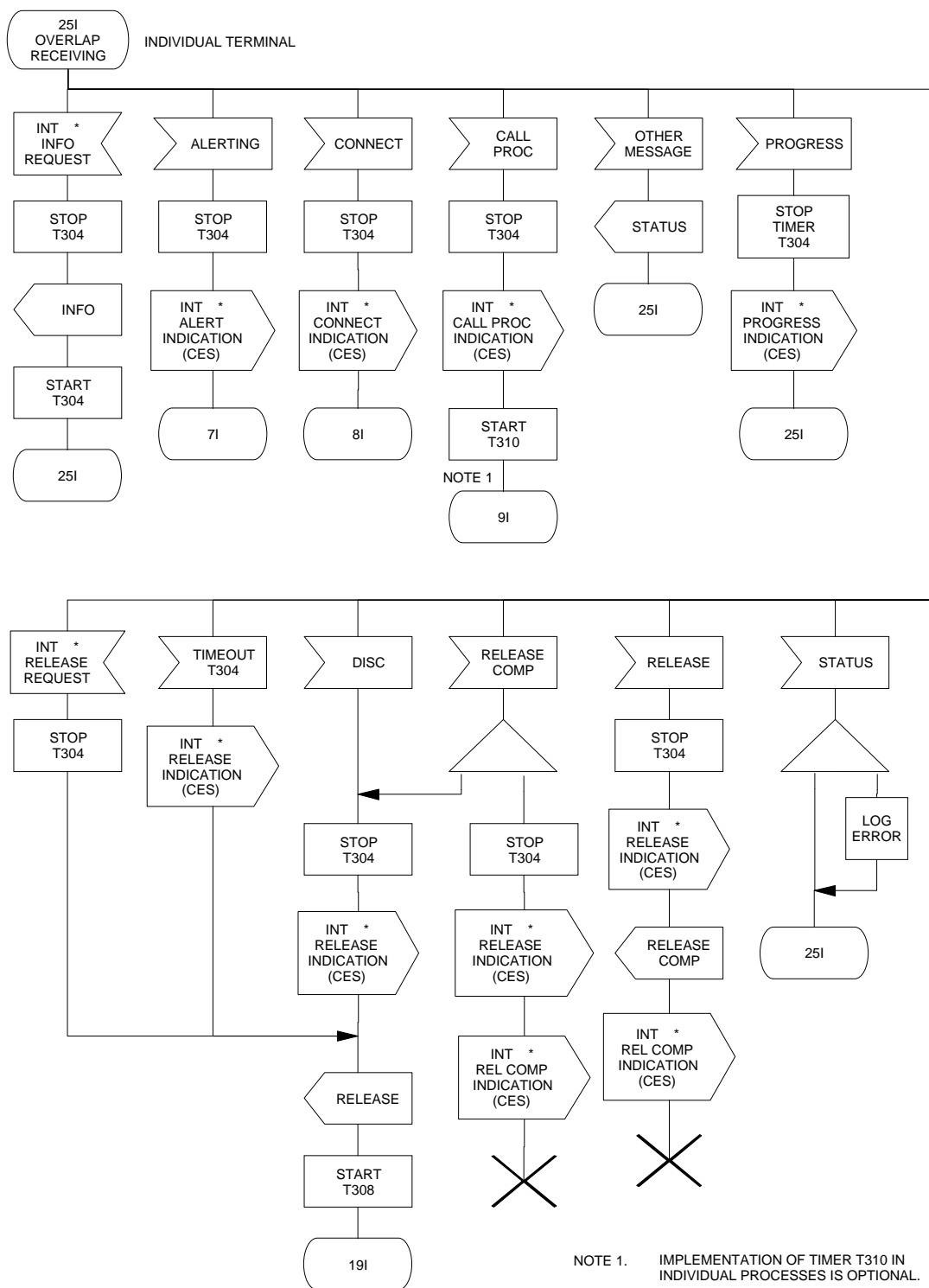
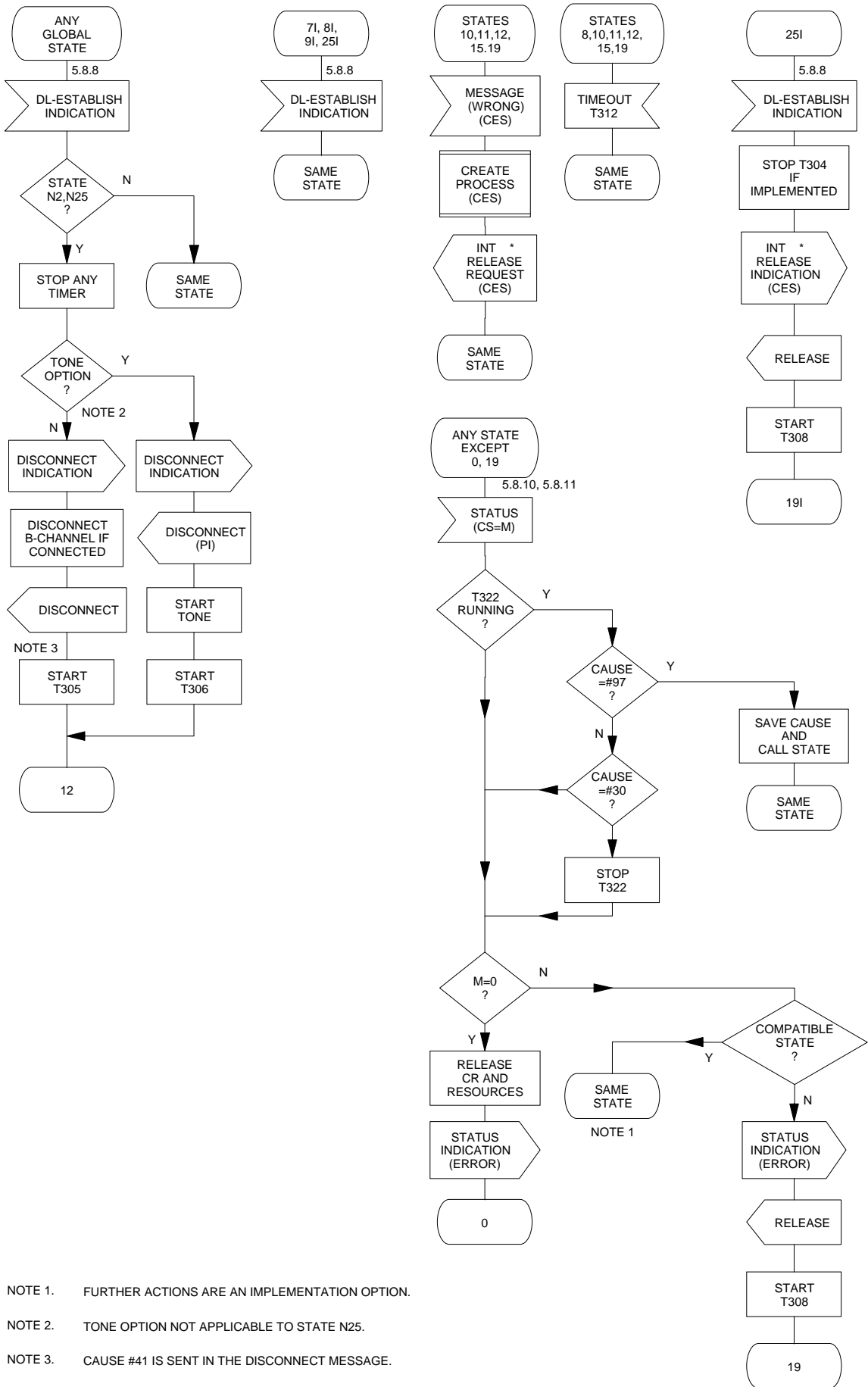


Figure 37: Network side SDL diagram



- NOTE 1. FURTHER ACTIONS ARE AN IMPLEMENTATION OPTION.
 NOTE 2. TONE OPTION NOT APPLICABLE TO STATE N25.
 NOTE 3. CAUSE #41 IS SENT IN THE DISCONNECT MESSAGE.

Figure 38: Network side SDL diagram

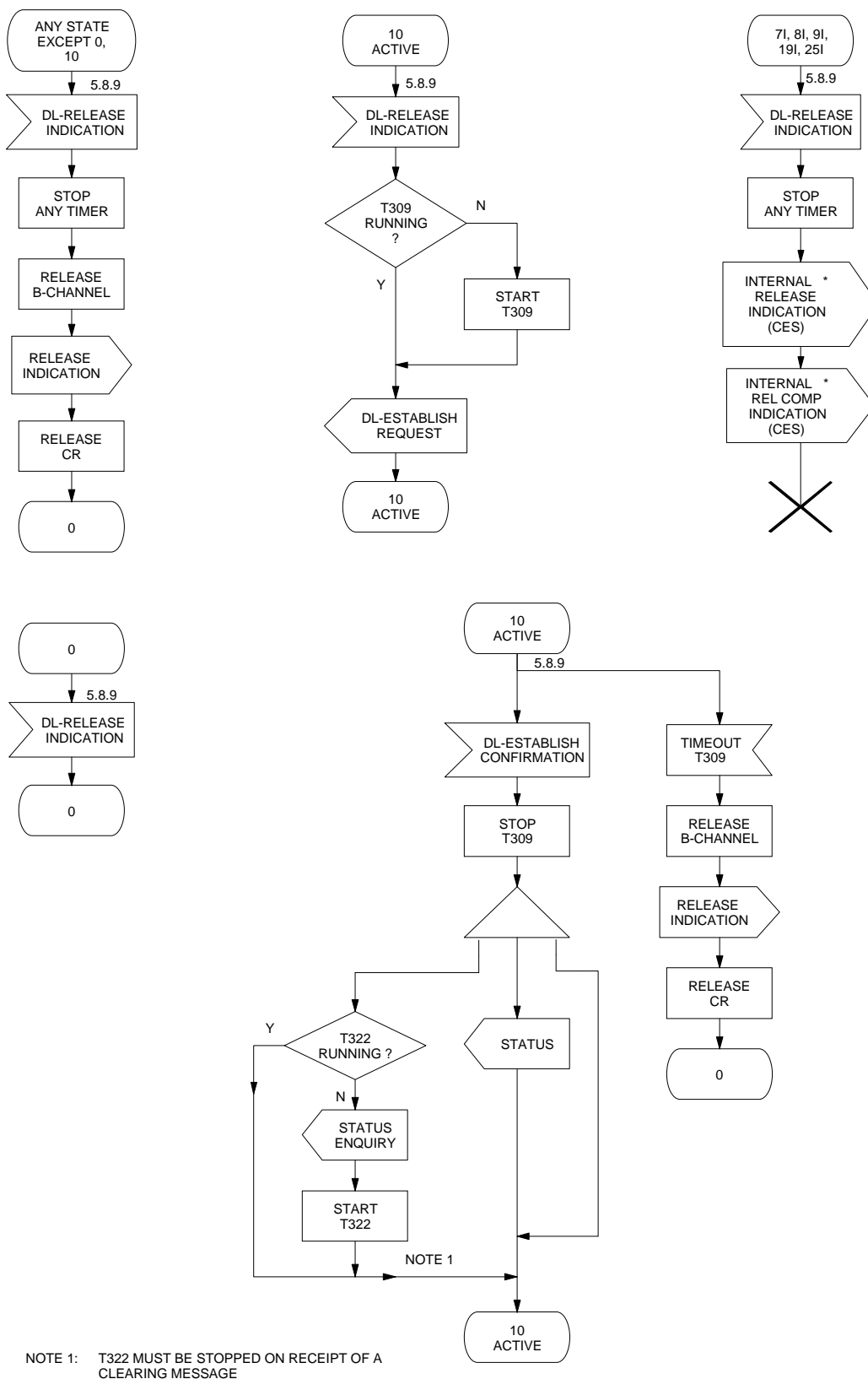


Figure 39: Network side SDL diagram

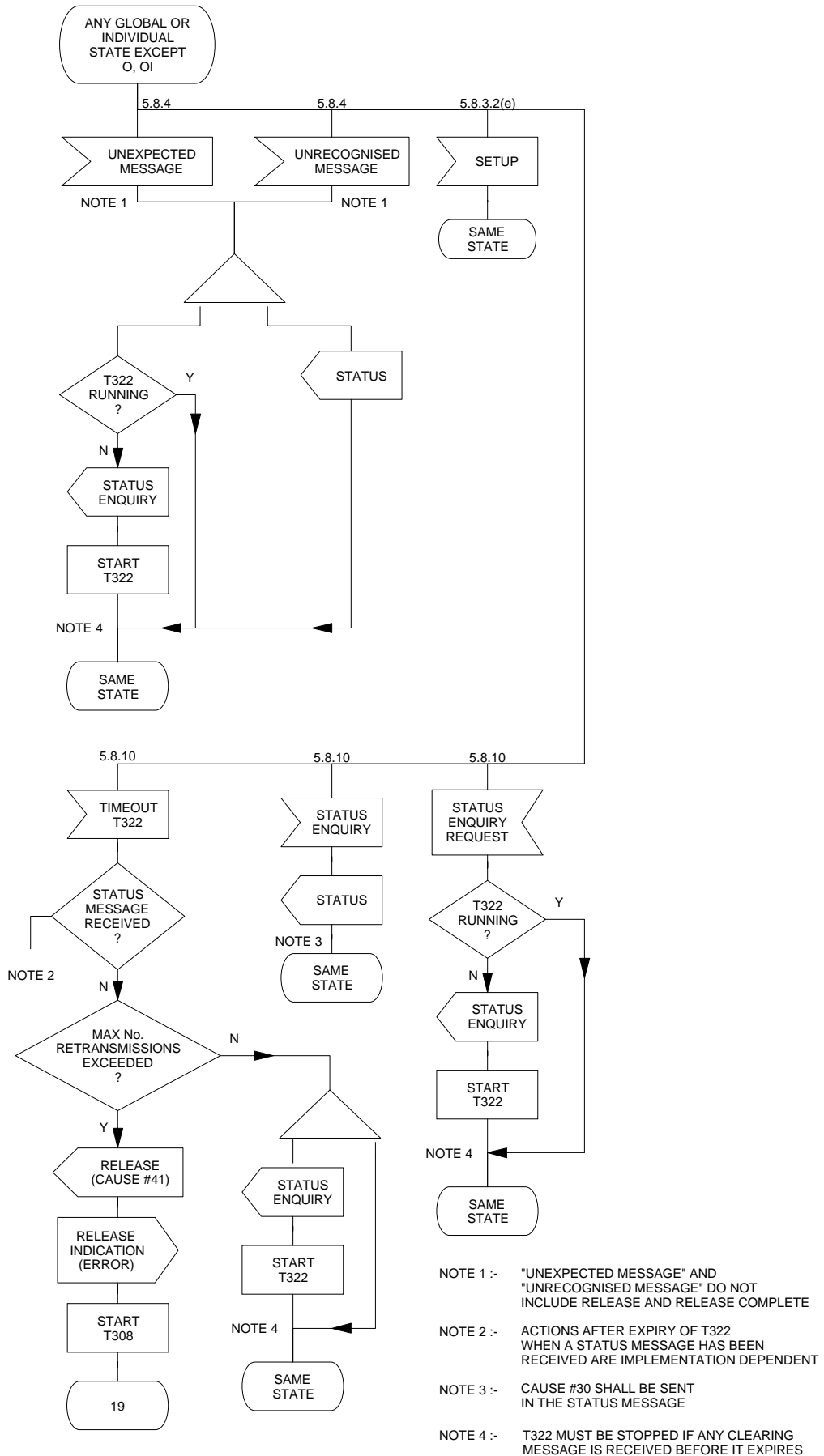
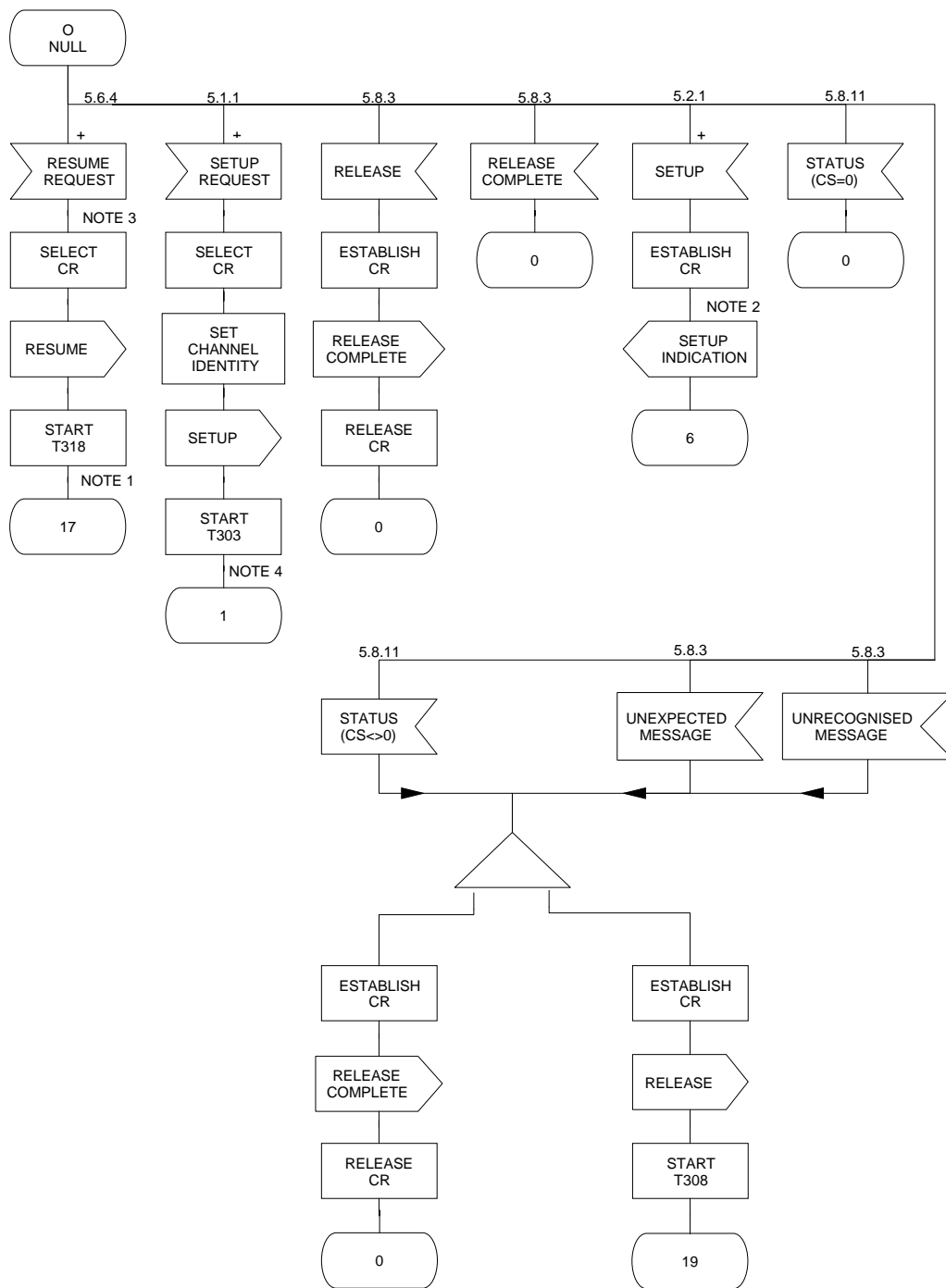


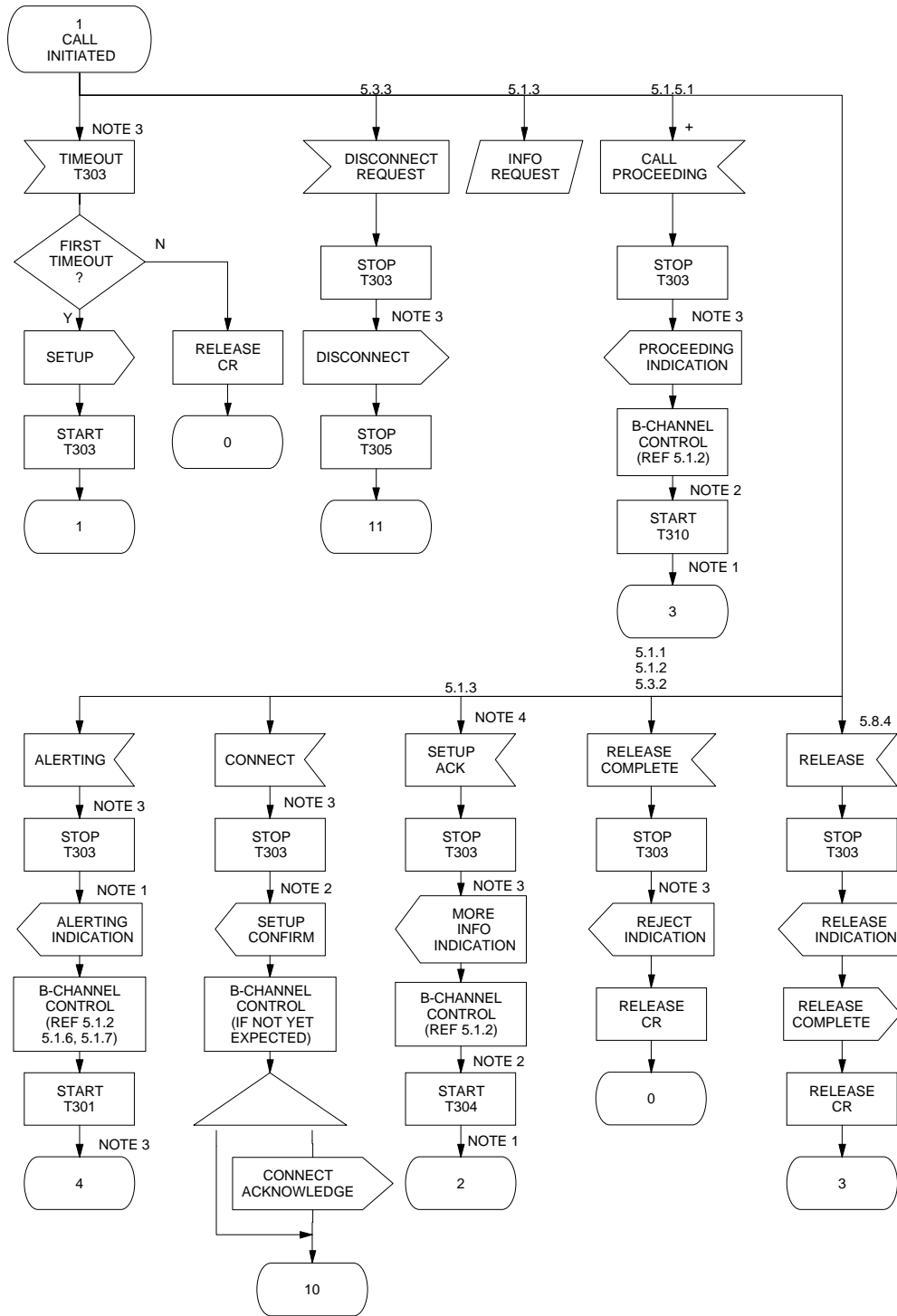
Figure 40: Network side SDL diagram

7.2 User side SDL diagrams



- NOTE 1 : T318 IS OPTIONAL
- NOTE 2 : IF THE USER IS UNABLE TO PROCEED WITH THE CALL DUE TO THE CHANNEL IDENTITY BEING UNACCEPTABLE, A RELEASE COMPLETE MESSAGE MAY BE RETURNED AT THIS POINT (REF. SECTION 5.2.3)
- NOTE 3 : THE USE OF THE CALL REARRANGEMENT PROCEDURE IS RESTRICTED TO BASIC ACCESS, i.e. IT WILL NOT BE AVAILABLE FOR PRIMARY RATE ACCESS
- NOTE 4 : T303 IS ONLY APPLICABLE FOR THE PROCEDURES DEFINED IN ANNEX D

Figure 41: User side SDL diagram



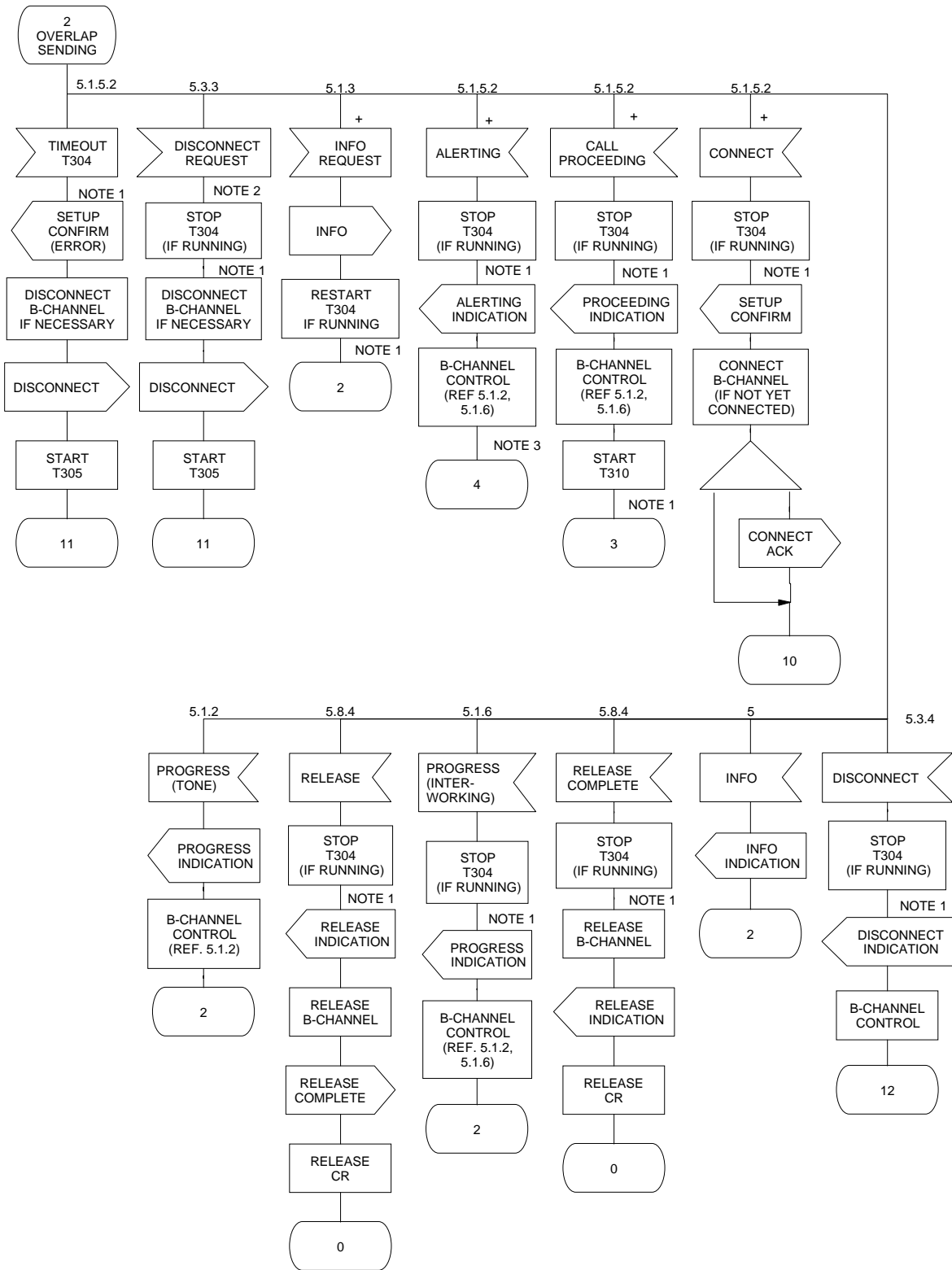
NOTE 1: T304 & T310 ARE OPTIONAL

NOTE 2: THE USER MAY CLEAR THE CALL AT THIS POINT IF THE CHANNEL IDENTITY RETURNED BY THE NETWORK IS UNACCEPTABLE.

NOTE 3: ONLY APPLICABLE FOR THE PROCEDURES DEFINED IN ANNEX D.

NOTE 4: THE SETUP ACKNOWLEDGE MESSAGE WILL NOT BE RECEIVED IF THE SENDING COMPLETE INFORMATION ELEMENT IS INCLUDED IN THE ORIGINATING SETUP MESSAGE.

Figure 42: User side SDL diagram



NOTE 1 : TIMERS T304 & T310 ARE OPTIONAL
 T304 MAY BE IMPLEMENTED BUT STOPPED DUE TO
 RECEIPT OF PROGRESS (INTERWORKING)

NOTE 2 : IN THE CASE OF UNSUCCESSFUL TERMINATION OF THE B-CANNEL
 SELECTION PROCEDURE (REF. 5.3.2d) A RELEASE MESSAGE IS
 RETURNED BEFORE ENTERING STATE 2.

NOTE 3 : TIMER T301 IS STARTED AT THIS POINT IF THE PROCEDURES
 DEFINED IN ANNEX D ARE IMPLEMENTED

Figure 43: User side SDL diagram

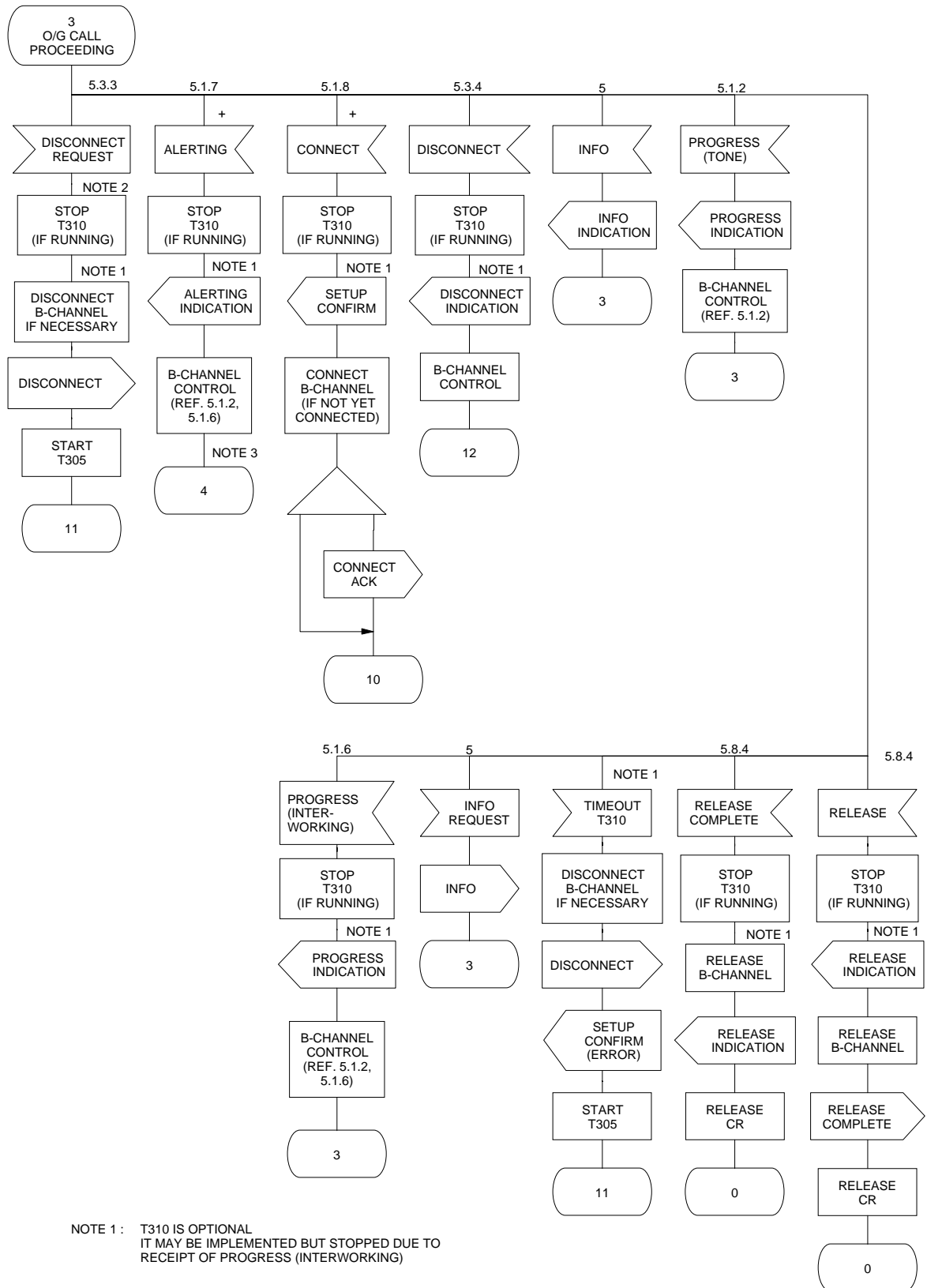


Figure 44: User side SDL diagram

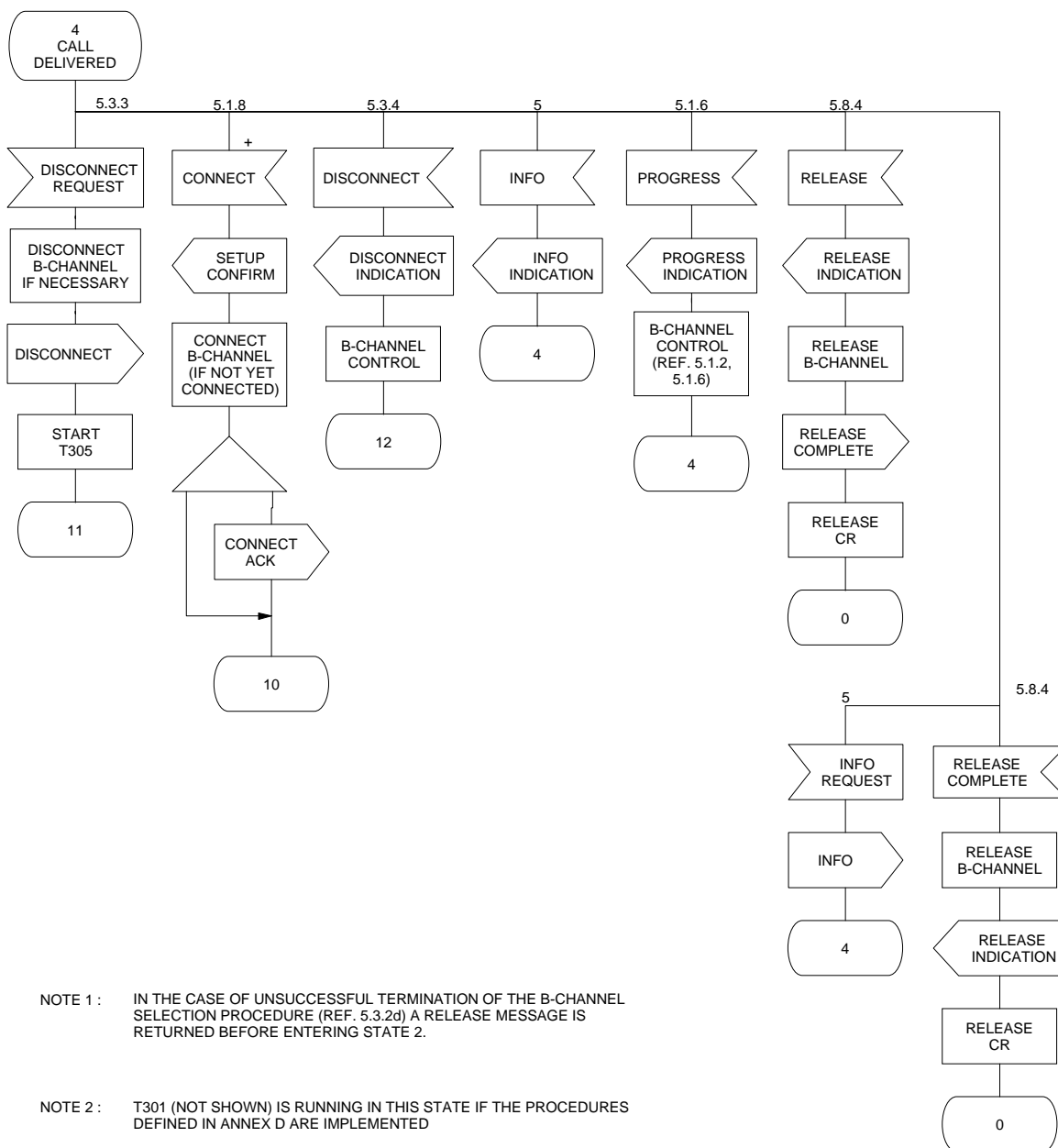


Figure 45: User side SDL diagram

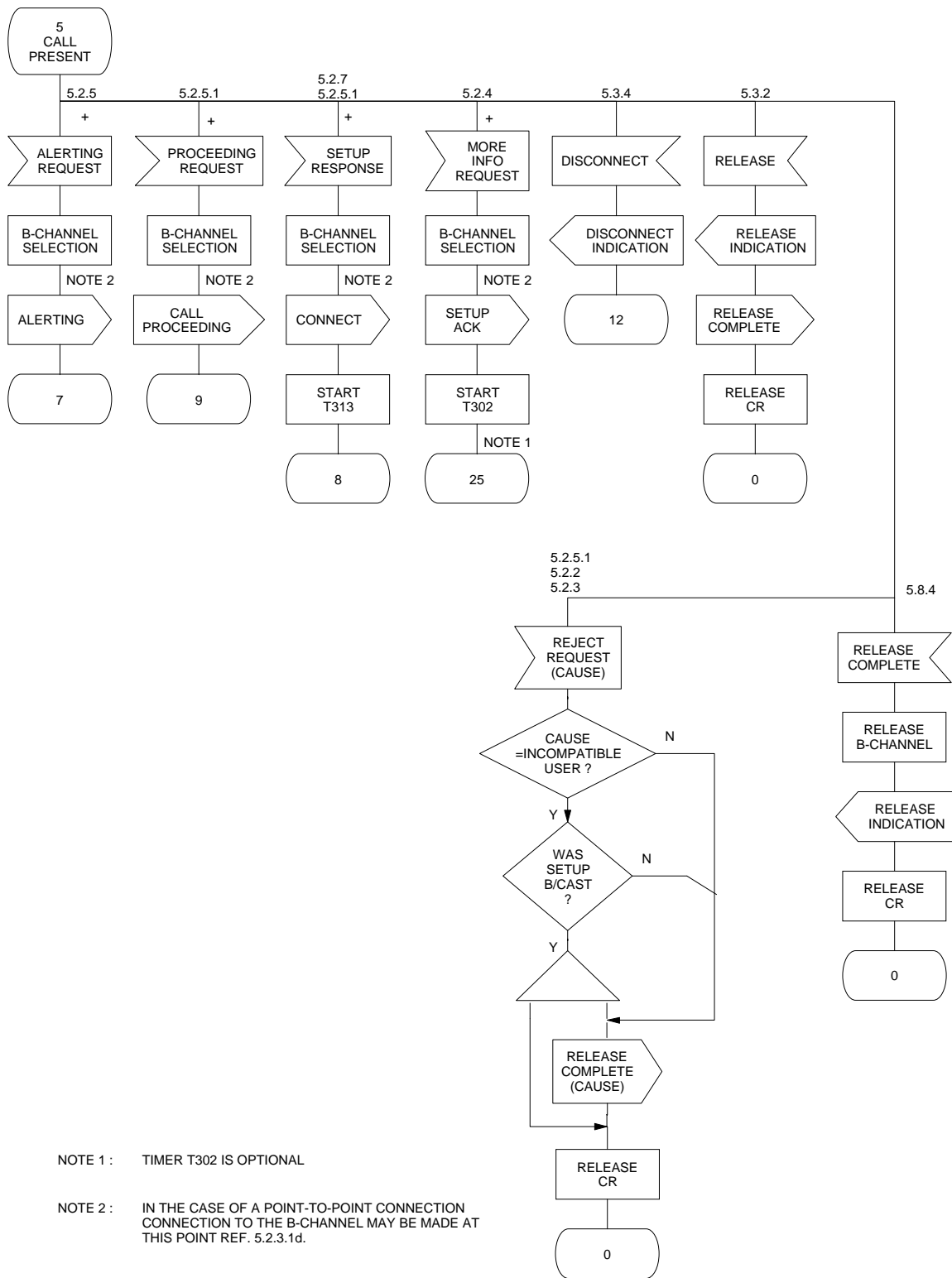


Figure 46: User side SDL diagram

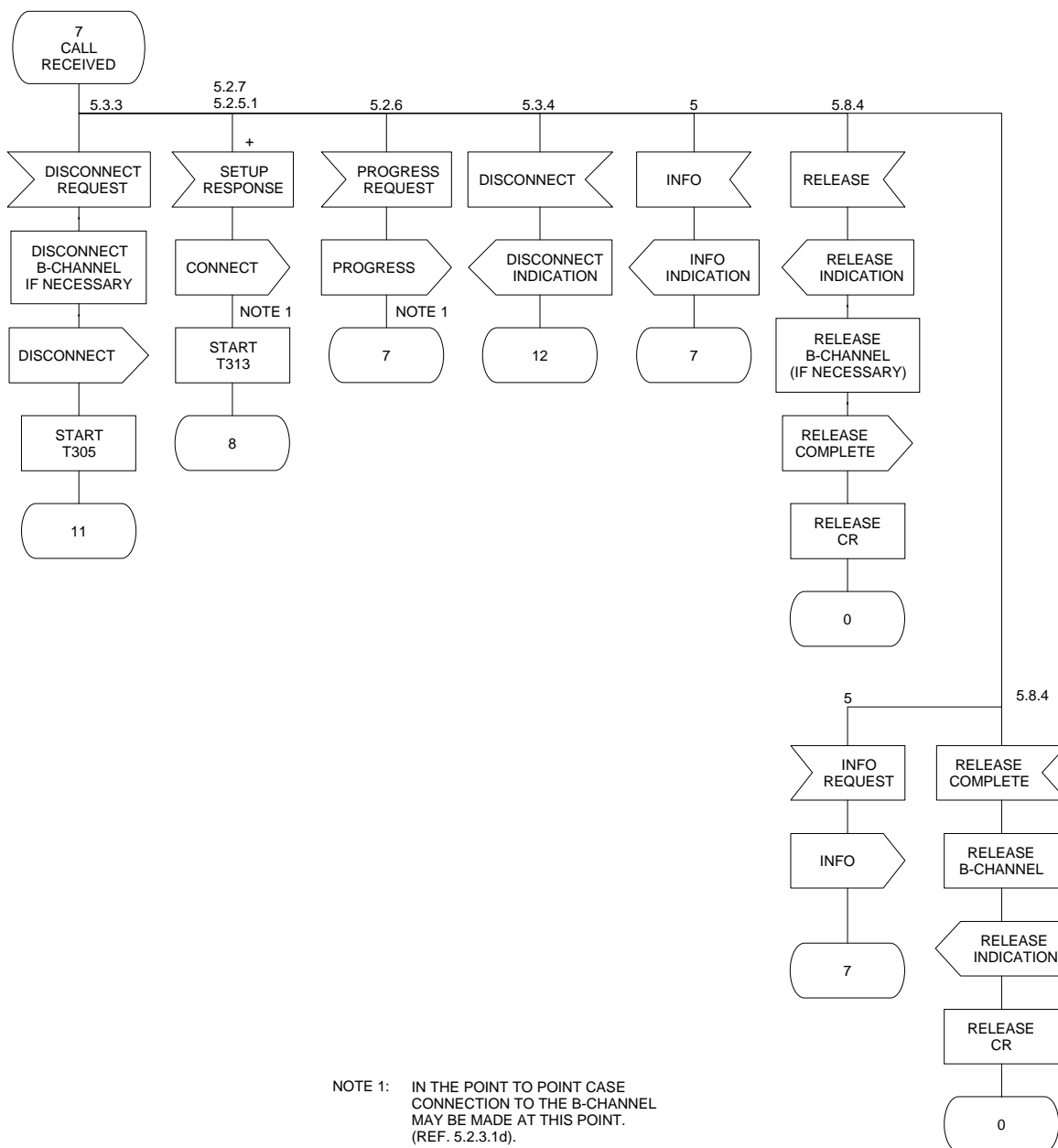
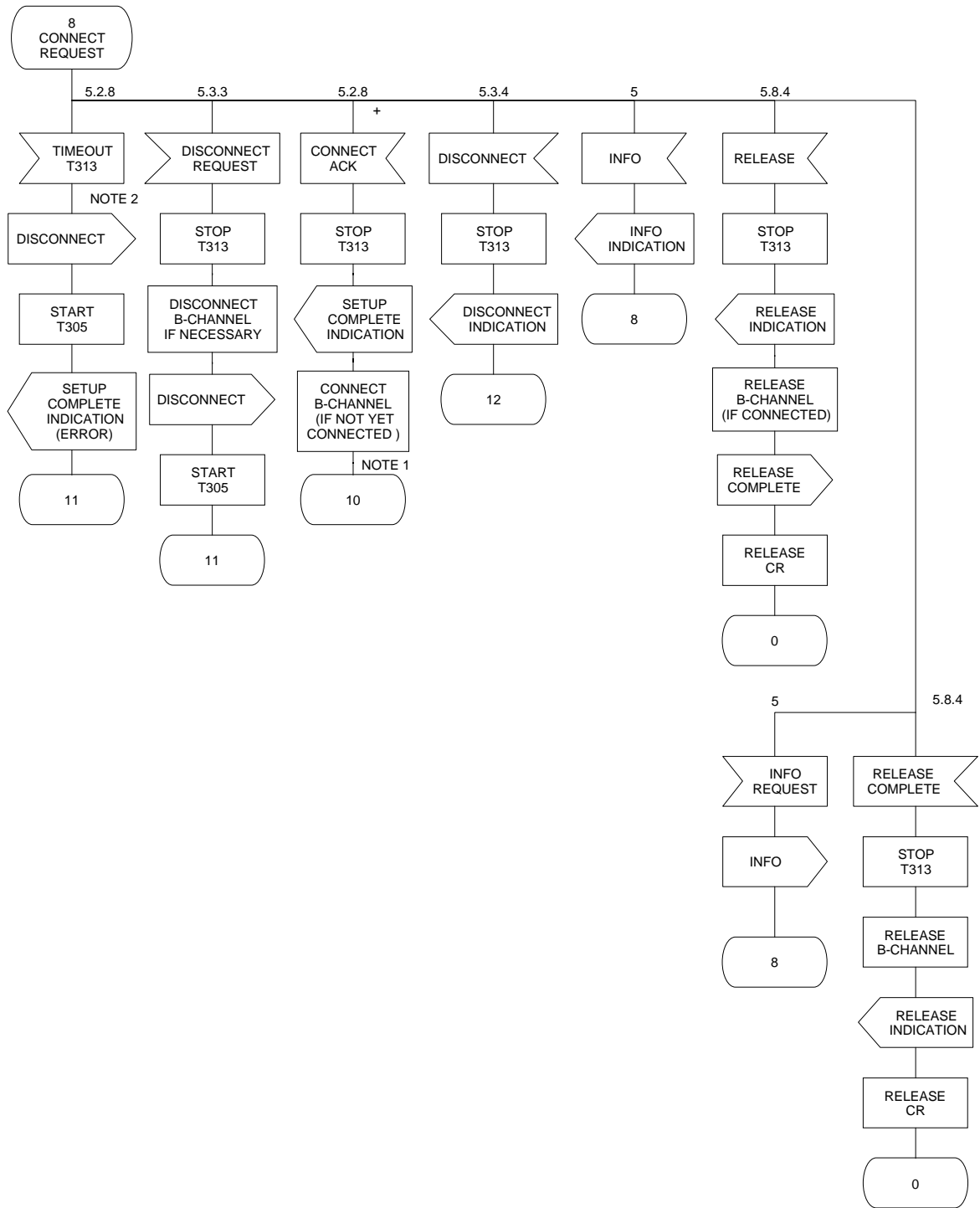


Figure 47: User side SDL diagram



NOTE 1 : REF. SECTION 5.2.8

Figure 48: User side SDL diagram

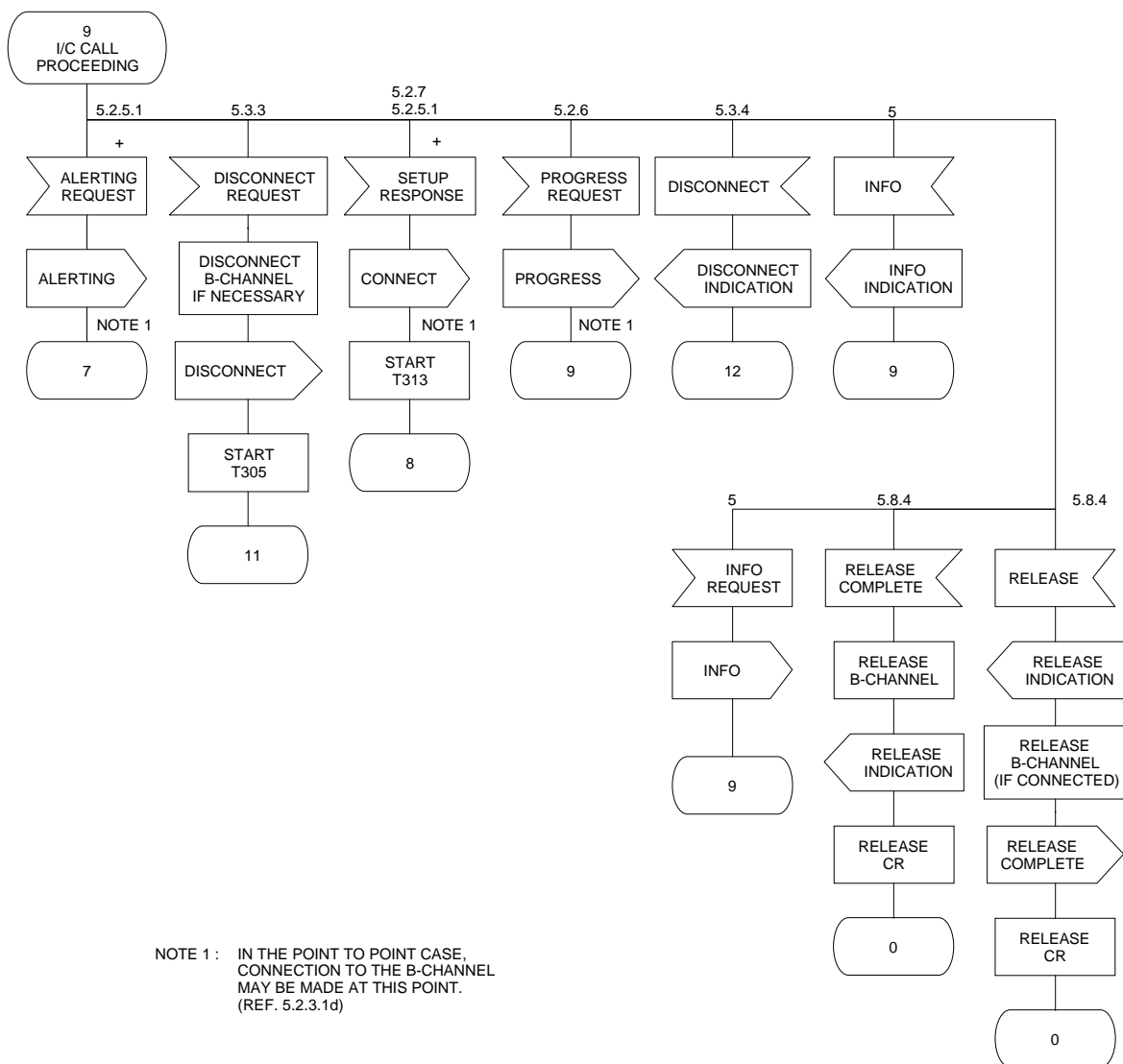


Figure 49: User side SDL diagram

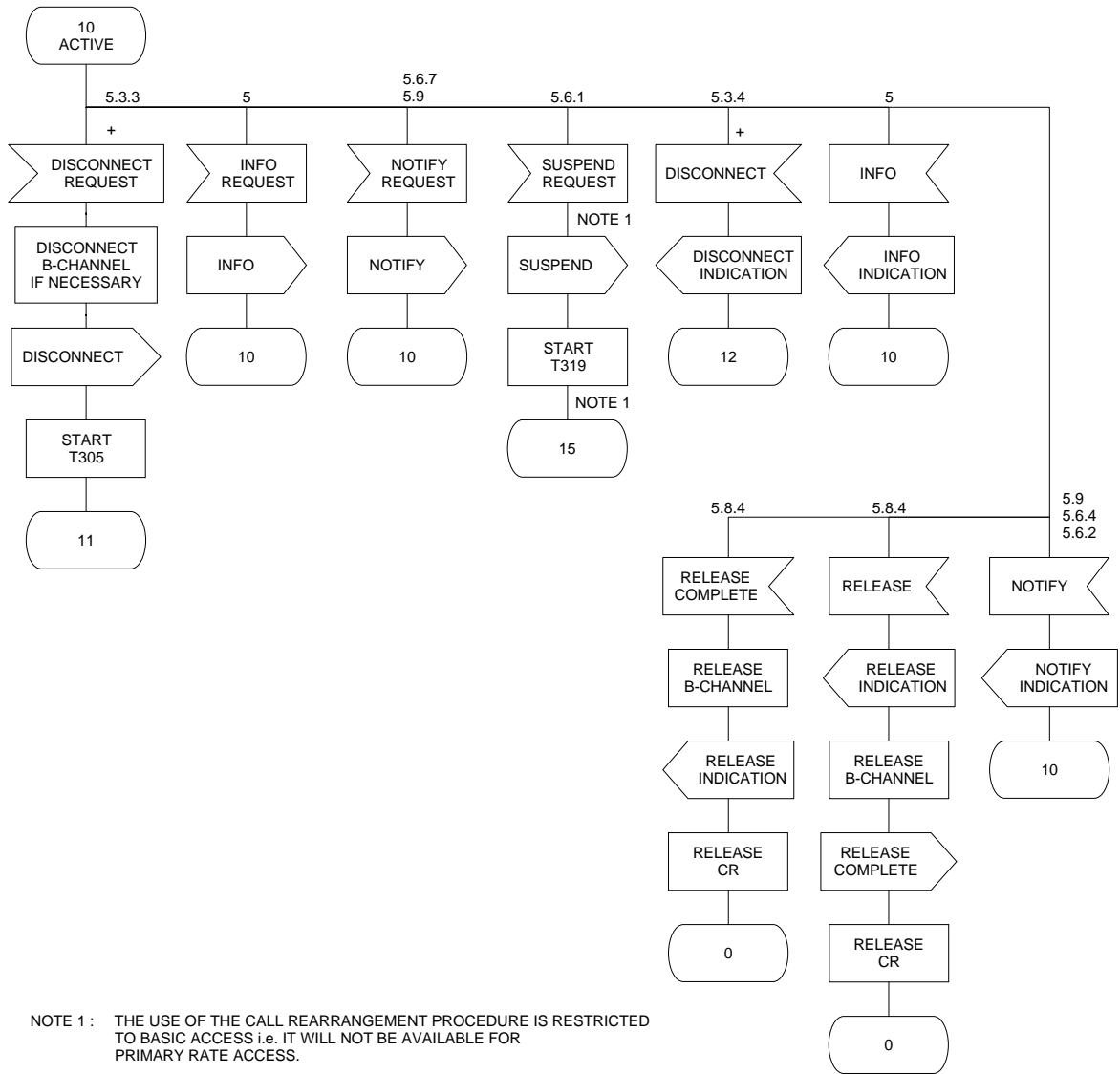
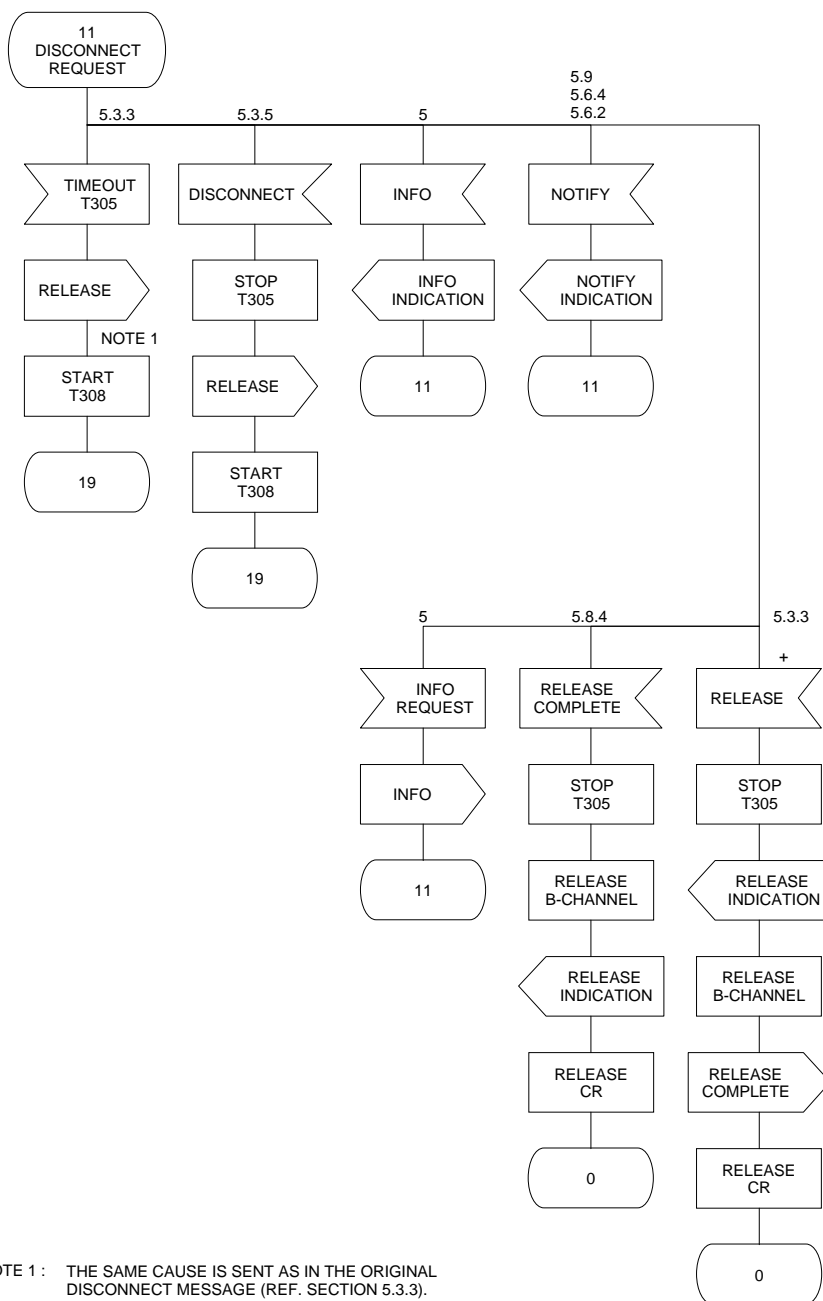


Figure 50: User side SDL diagram



NOTE 1 : THE SAME CAUSE IS SENT AS IN THE ORIGINAL DISCONNECT MESSAGE (REF. SECTION 5.3.3).

Figure 51: User side SDL diagram

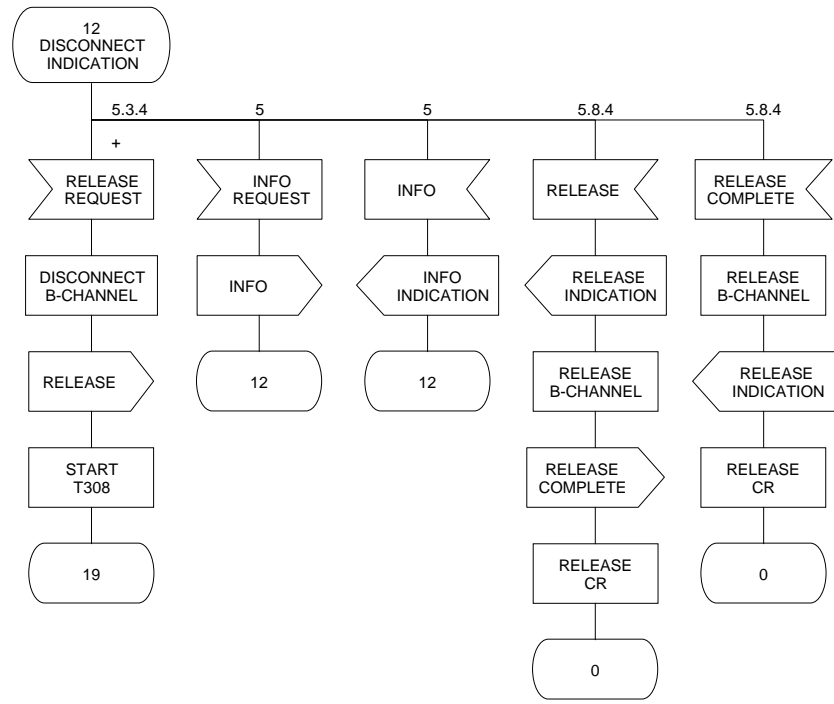


Figure 52: User side SDL diagram

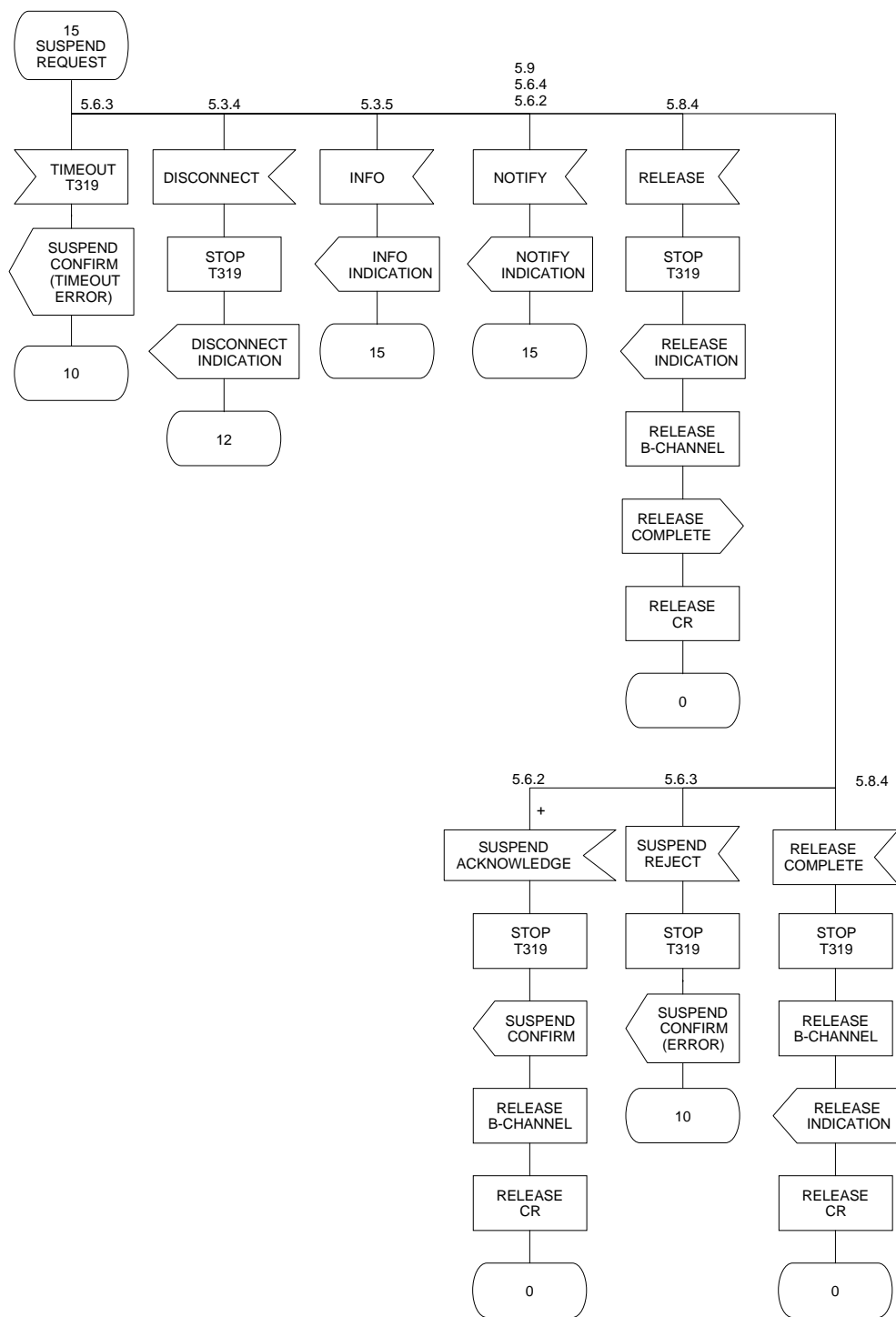
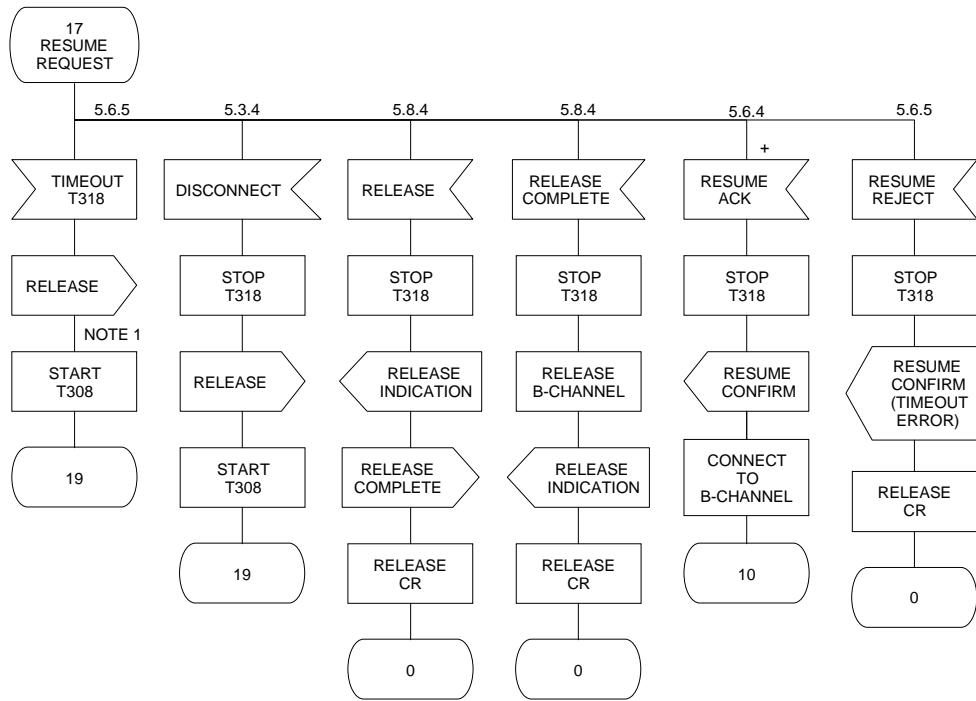


Figure 53: User side SDL diagram



NOTE 1: CAUSE #102 "RECOVERY ON TIMER EXPIRY"
 SENT IN THE RELEASE MESSAGE
 (REF. 5.3.2f)

Figure 54: User side SDL diagram

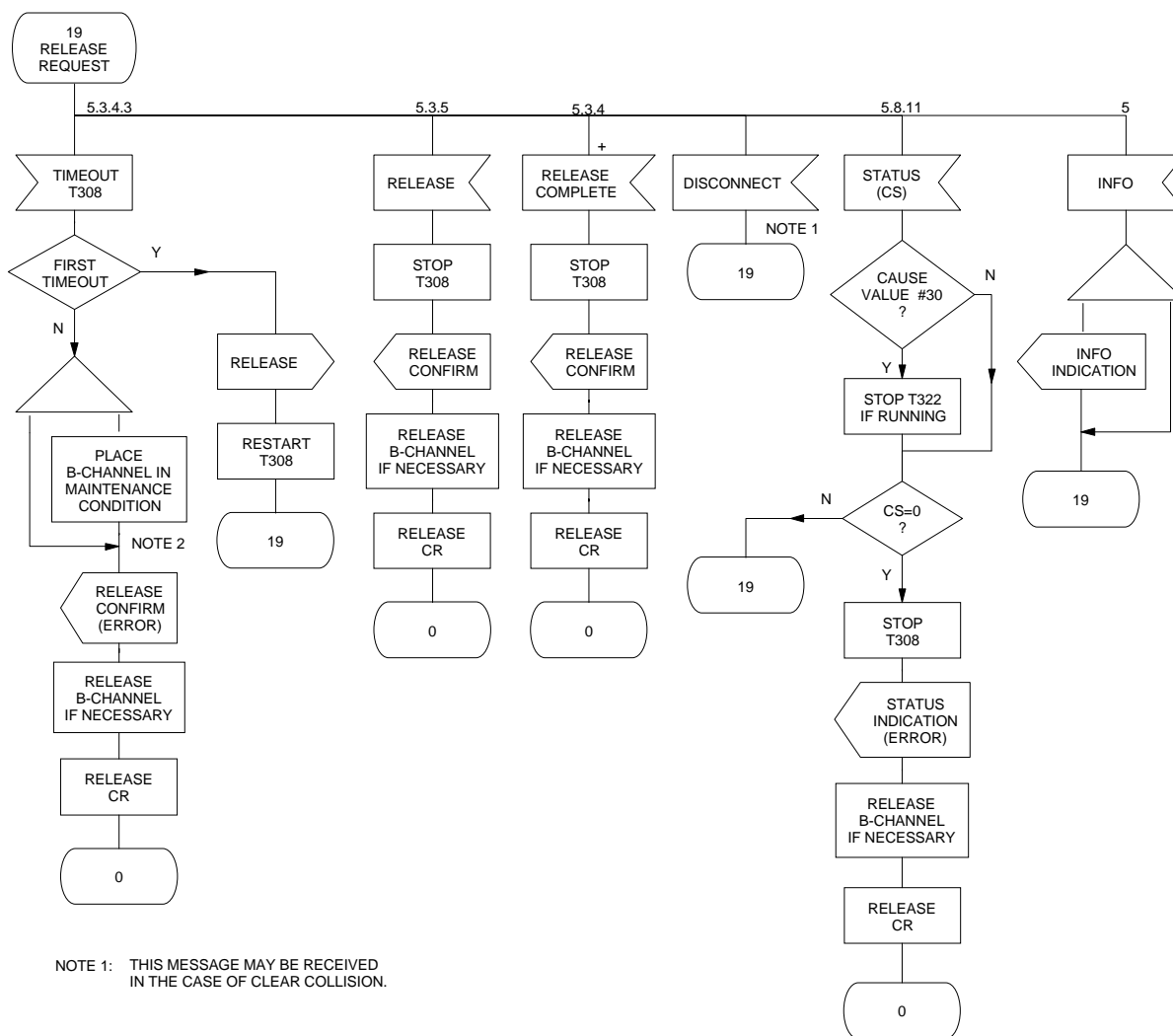


Figure 55: User side SDL diagram

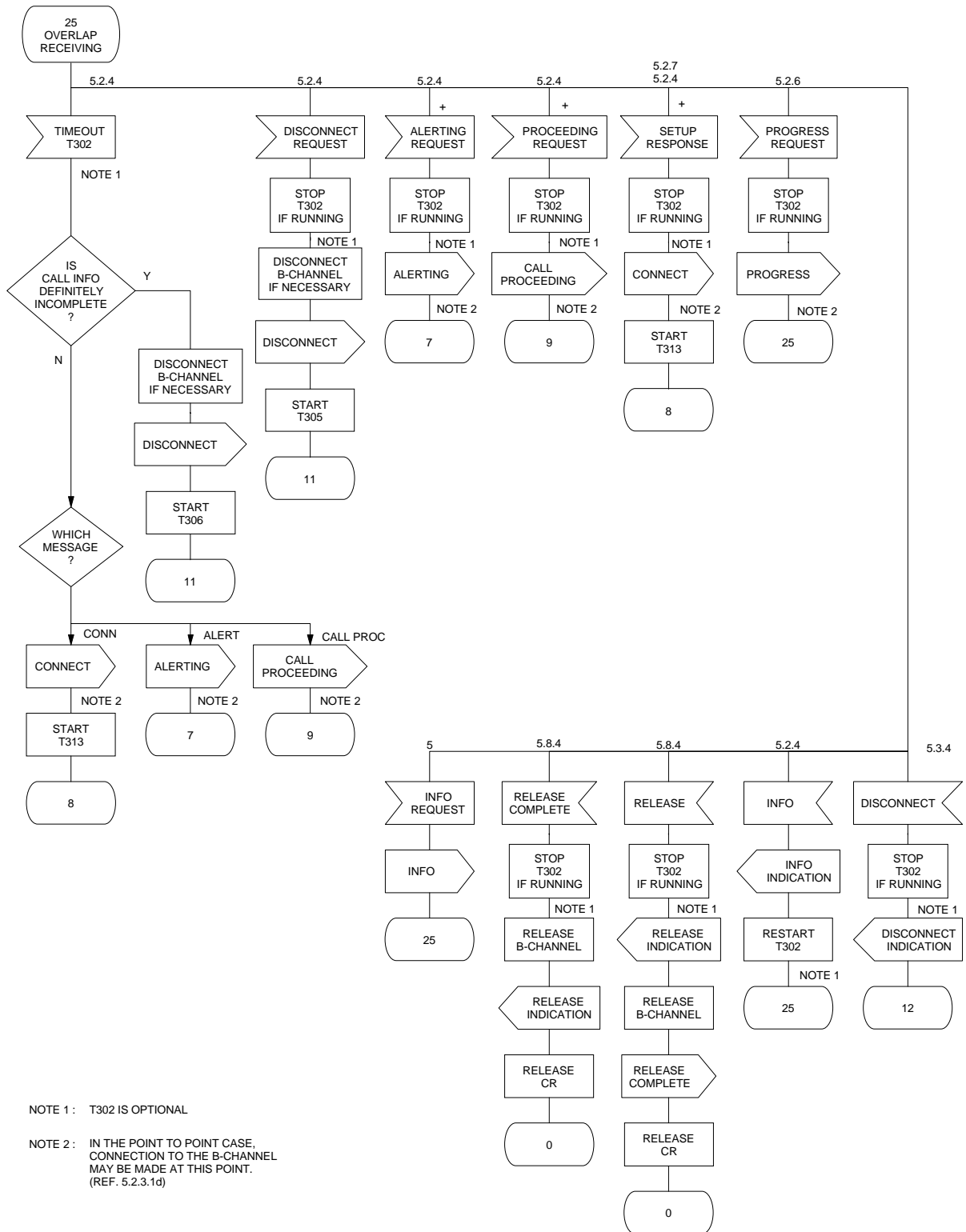
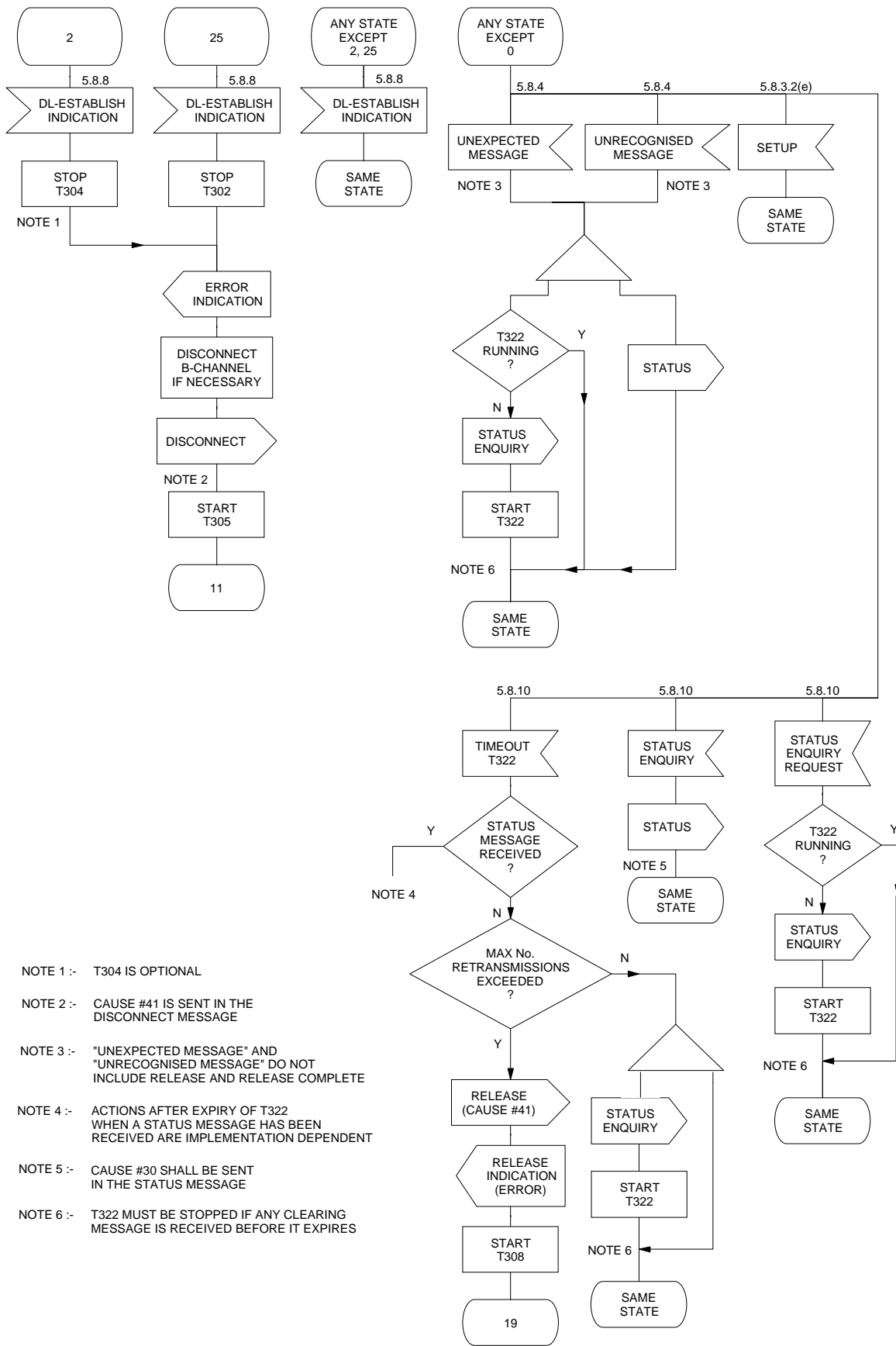


Figure 56: User side SDL diagram



- NOTE 1 :- T304 IS OPTIONAL
- NOTE 2 :- CAUSE #41 IS SENT IN THE DISCONNECT MESSAGE
- NOTE 3 :- "UNEXPECTED MESSAGE" AND "UNRECOGNISED MESSAGE" DO NOT INCLUDE RELEASE AND RELEASE COMPLETE
- NOTE 4 :- ACTIONS AFTER EXPIRY OF T322 WHEN A STATUS MESSAGE HAS BEEN RECEIVED ARE IMPLEMENTATION DEPENDENT
- NOTE 5 :- CAUSE #30 SHALL BE SENT IN THE STATUS MESSAGE
- NOTE 6 :- T322 MUST BE STOPPED IF ANY CLEARING MESSAGE IS RECEIVED BEFORE IT EXPIRES

Figure 57: User side SDL diagram

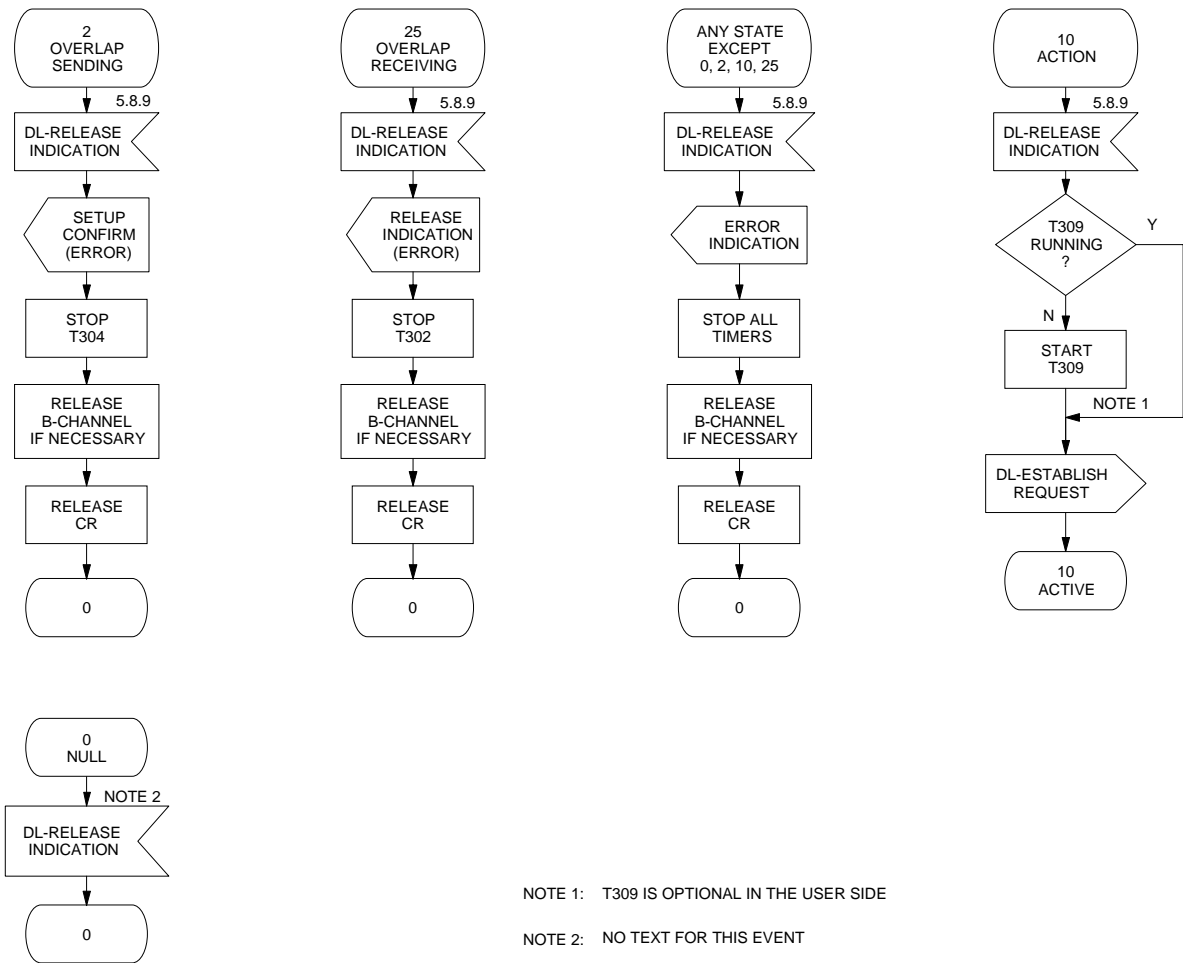


Figure 58: User side SDL diagram

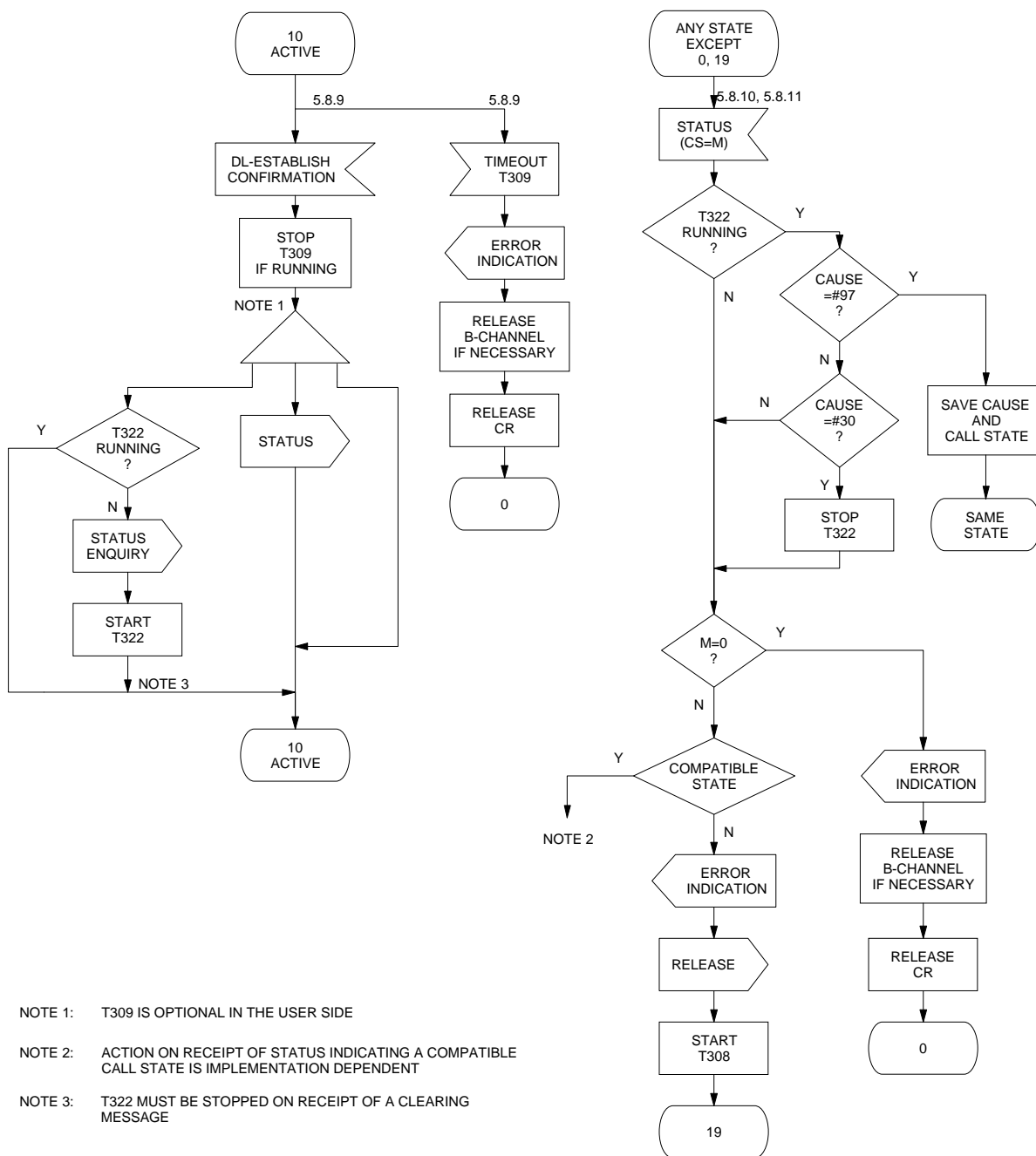


Figure 59: User side SDL diagram

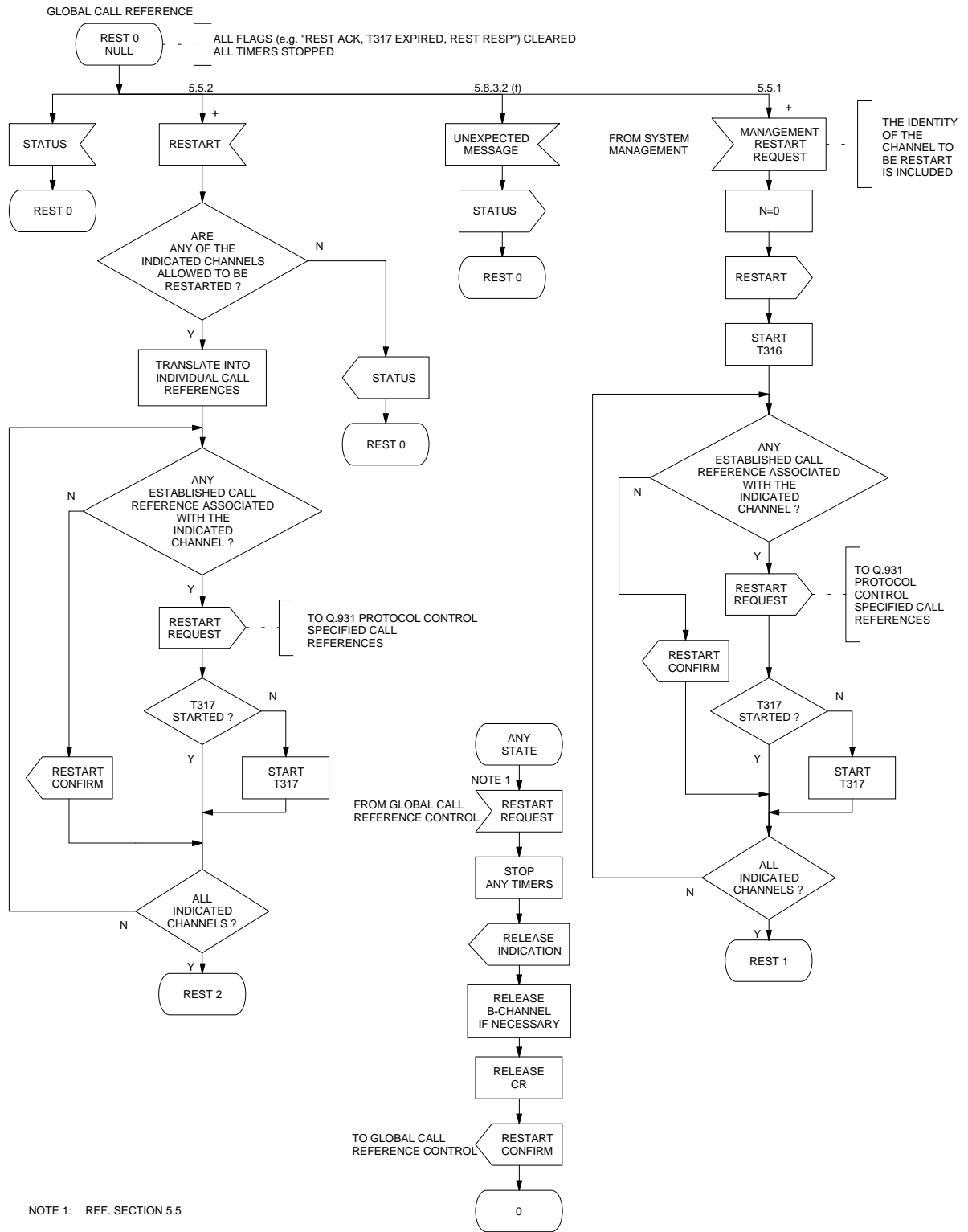


Figure 60: User side SDL diagram

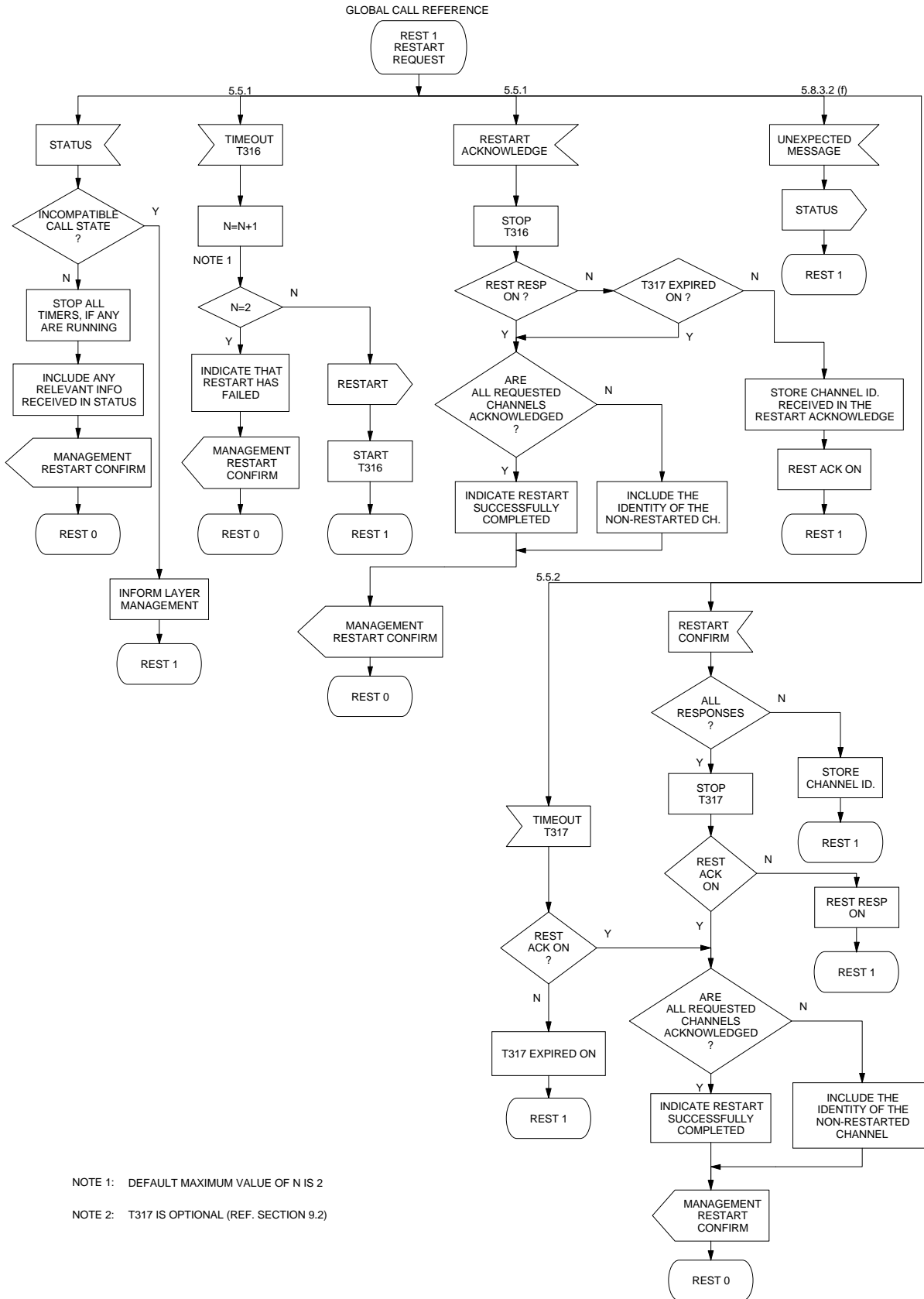


Figure 61: User side SDL diagram

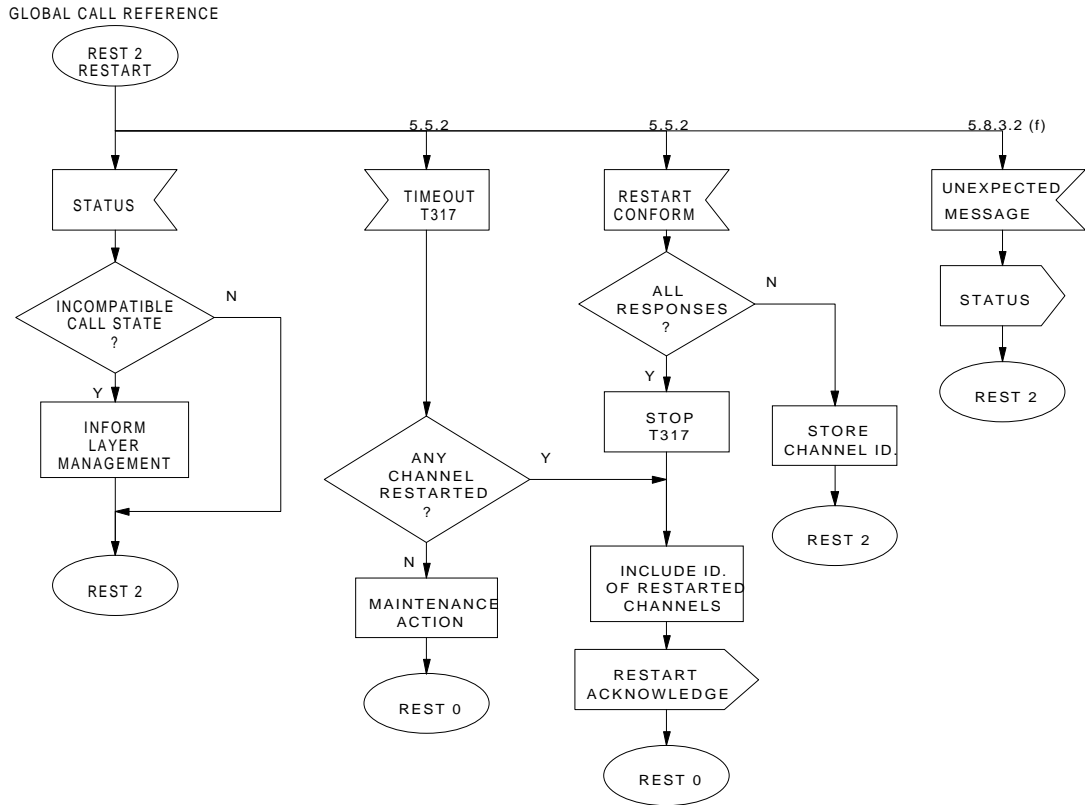


Figure 62: User Side SDL Diagram

History

Document history	
December 1990	First Edition
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)