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Digitalno omrežje z integriranimi storitvami (ISDN) – Protokol digitalne naročniške signalizacije št. 1 (DSS1) – Signalizacijska omrežna plast za krmiljenje vodovnega osnovnega klica – 2. del: Diagrami v specifikacijskem in opisnem jeziku SDL

Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 2: Specification and Description Language (SDL) diagrams

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Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 2: Specification and Description Language (SDL) diagrams

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document which is based on ITU-T Recommendation Q.931 (1993) [7] is an extended and updated version of ETS 300 102-2 (1990) which was based on ITU-T Recommendation Q.931 (1988). Annex A identifies the relevant differences between the present document and ETS 300 102-2.

The present document is part 2 of a multi-part standard covering the Digital Subscriber Signalling System No. one (DSS1) protocol specification for the Integrated Services Digital Network (ISDN) signalling network layer for circuit-mode basic call control, as described below:

Part 1:   "Protocol specification [ITU-T Recommendation Q.931 (1993), modified]";

Part 2:   "Specification and Description Language (SDL) diagrams";

Part 3:   "Protocol Implementation Conformance Statement (PICS) proforma specification";

Part 4:   "Test Suite Structure and Test Purposes (TSS&TP) specification for the user";

Part 5:   "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user";

Part 6:   "Test Suite Structure and Test Purposes (TSS&TP) specification for the network";

Part 7:   "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

National transposition dates	
Date of adoption of this EN:	27 October 2000
Date of latest announcement of this EN (doa):	31 January 2001
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1   Scope

The present document specifies the stage three of circuit-mode on-demand basic telecommunication services for the pan-European Integrated Services Digital Network (ISDN) as provided by European telecommunications operators at the T reference point or coincident S and T reference point (as defined in ITU-T Recommendation I.411 [3]) by means of the Digital Subscriber Signalling System No. one (DSS1). Stage three identifies the protocol procedures and switching functions needed to support a telecommunication service (see ITU-T Recommendation I.130 [2]).

In addition, the present document specifies the protocol requirements at the T reference point where the service is provided to the user via a private ISDN.

NOTE 1:   Procedures at the T reference point, to support the access of a private ISDN to the public ISDN, are not explicitly identified in the present document, however some procedures are applicable only to the T reference point.

The present document does not specify the additional protocol requirements where the service is provided to the user via a telecommunication network that is not an ISDN.

The present document is specified using the Specification and Description Language (SDL) as specified in ITU-T Recommendation Z.100 [4].

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 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 SDL diagrams in this part, and the text of clause 5 of ETS 300 403-1 [1], together provide a complete specification of the protocol within the scope of the present document.

A basic telecommunication service is a fundamental type of service. It forms the basis on which supplementary services may be added.

NOTE 2:   Specific requirements of individual circuit-mode basic telecommunication services are not covered in the present document. However, ETR 018 [5] gives guidance on the use of service specific information elements to implement individual basic telecommunication services.

The method of testing of the present document is common with that for ETS 300 403-1 [1]. Further parts of the present document specify the method of testing and detailed application specific requirements to determine conformance based on the present document.

The present document is applicable to equipment supporting circuit-mode on-demand basic telecommunication services, to be attached at either side of a T reference point or coincident S and T reference point when used as an access to the public ISDN.

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1]   ETSI ETS 300 403-1 (1995): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[2]   ITU-T Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[3]   ITU-T Recommendation I.411 (1993): "ISDN user-network interfaces - Reference configurations".

[4]   ITU-T Recommendation Z.100 (1988): "Specification and description language (SDL)".

[5]   ETSI ETR 018: "Integrated Services Digital Network (ISDN); Application of the Bearer Capability (BC), High Layer Compatibility (HLC) and Low Layer Compatibility (LLC) information elements by terminals supporting ISDN services".

[6]   ETSI ETS 300 102-2: "Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control; Specification Description Language (SDL) diagrams".

[7]   ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

3   Definitions, symbols and abbreviations

3.1   Definitions

For the purposes of the present document, the following terms and definitions apply in addition to those given in ETS 300 403-1 [1]:

point-to-multipoint configuration; multipoint terminal configuration; multipoint configuration: terminal configuration in which there is more than one signalling entity
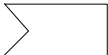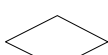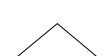
point-to-multipoint data link; broadcast data link: data link connection with the capability to support more than two connection endpoints

point-to-point configuration; single-point terminal configuration; single-point configuration: terminal configuration in which there is one signalling entity

point-to-point data link: data link on which a frame is directed to a single endpoint

3.2   Symbols

For the purposes of the present document, the following symbols apply. A full description of the symbols and their meaning and application is given in ITU-T Recommendation Z.100 [4].

State symbol

Input symbol (event occurrence)

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

Save symbol (save event until completion 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 mark (an input which is local to the layer 3 entity and which is required as a result of the representation approach adopted)

3.3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

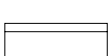|	
CES	Connection Endpoint Suffix
DSS1	Digital Subscriber Signalling System No. one
ISDN	Integrated Services Digital Network
SDL	Specification and Description Language

4   User side and network side call states

Table 1 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	N7
	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
CALL SUSPEND/ RESUME	Suspend request	U15	N15
	Resume request	U17	N17
RESTART PROCEDURE (note)	Restart null	REST0	REST0
	Restart request	REST1	REST1
	Restart	REST2	REST2
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 sides.		

5   Network side SDL diagrams - overview

5.1   Call states

Table 2: Network side call states

Call state	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 300 403-1 [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.
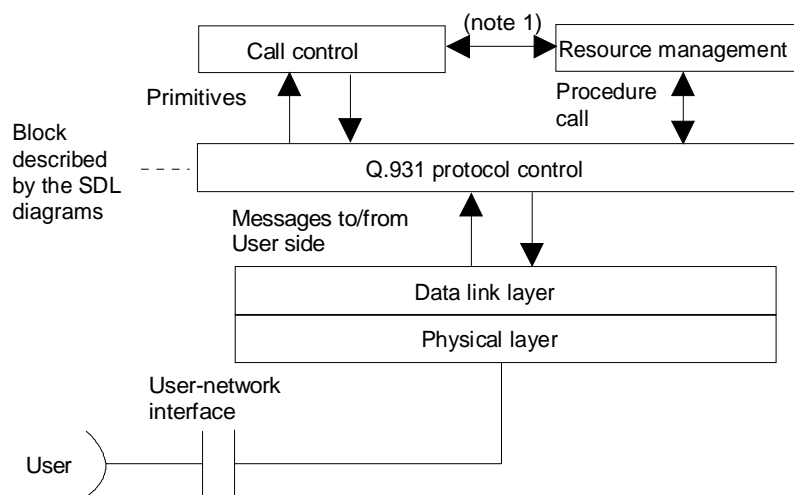
5.2   Block diagram

NOTE 1:   Interface not described in the SDL diagrams.
NOTE 2:   Control of B-channels is described in these SDL diagrams as part of the Q.931 protocol block.

Figure 1: Block diagram for the network side

5.3   List of primitives

Table 3: List of primitives

From call control block	To call control block
ALERTING REQUEST	ALERTING INDICATION
DISCONNECT REQUEST	CONNECT INDICATION
INFO REQUEST	DISCONNECT 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	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	RESTART CONFIRM (note 2)
RESTART REQUEST (note 1)	
NOTE 1: This primitive may be received from global call reference control.	
NOTE 2: This primitive is sent to global call reference control.	

5.4   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 implementation. The textual description in clause 5 of ETS 300 403-1 [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 messages types and are defined in table 4. The internal primitives represent instantaneous actions. Thus, there is no possibility of errors caused by the crossover 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 configurations. In this case the global process never creates any individual processes, and the timers defined in ETS 300 403-1 [1] for the relevant states are handled by the global process, including timer T322 which may run in any state except the Null state. Also, ever since a transition to the Null state occurs, the stopping of this timer (if running) should be regarded as an implicit statement, as it is not shown in order not to extend the SDL representation.

In a point-to-multipoint configuration, 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 SDL diagrams are required for these states to show the global and individual processes.

The global process handles all communications with call control. Messages from individuals terminals are sent to the individual process for that terminal if one exists (i.e. if the CES is recognized). Messages with an unrecognized CES are passed to the global process. Messages with the selected CES are also sent to the global process.
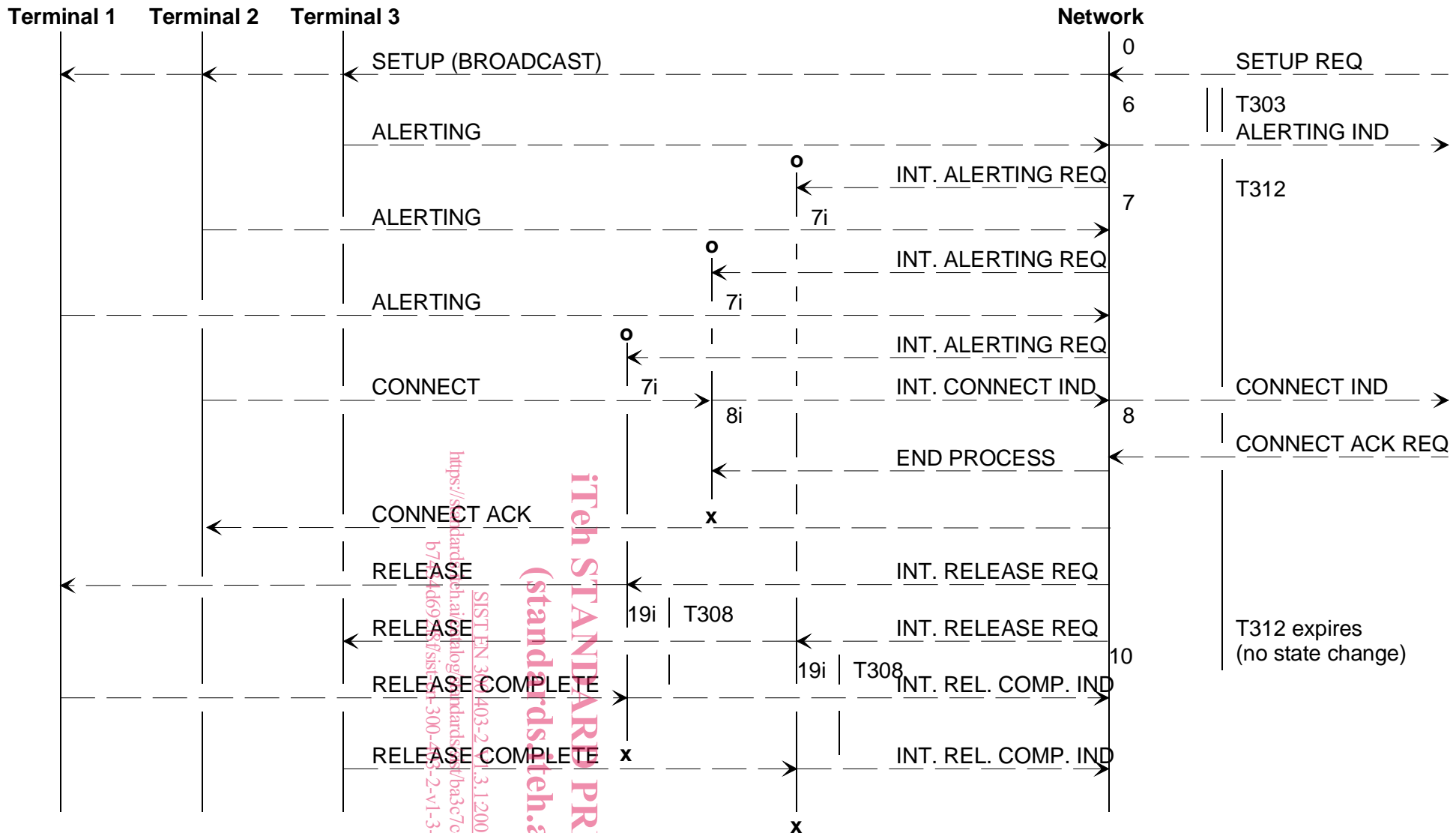
In a point-to-multipoint configuration, the handling of the timers defined in ETS 300 403-1 [1] has been done according to the following principles:

a)   timers T301 and T310 only run in the global process when an incoming call is being offered;

b)   timers T304, T308 and T322 only run in the individual processes when an incoming call is being offered. The stopping of timer T322 (if running) when an individual process is destroyed should be regarded as an implicit statement as it is not shown in order not to extend the SDL representation;

c)   in the other phases of a call, the timers associated with each state, as well as timer T322 which may run in any state except the Null state, are all handled by the global process. Once again, the stopping of this timer (if running) should be regarded as an implicit statement because it extends the SDL representation.

Table 4: Network side layer 3 internal primitives

Primitive 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 INT. ALERTING REQ to it (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	Informs 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. STAT. ENQ. REQ	Global	Individual	Sent on receipt of STATUS ENQUIRY REQ
INT. PROGRESS IND	Individual	Global	Sent on receipt of PROGRESS
INT. REL. COMP. IND	Individual	Global	Sent to indicate that the individual process has been cleared
NOTE: The global process should not release the call reference until all individual processes have completed clearing.			

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

Terminal 1   **Terminal 2**   **Terminal 3**   **Network**

SETUP (BROADCAST)   0   SETUP REQ

6   T303

ALERTING   ALERTING IND

o   INT. ALERTING REQ

7   T312

ALERTING   7i

o   INT. ALERTING REQ

ALERTING   7i

o   INT. ALERTING REQ

CONNECT   7i   INT. CONNECT IND   CONNECT IND

8i   8

END PROCESS   CONNECT ACK REQ

CONNECT ACK   **x**

RELEASE   INT. RELEASE REQ

19i T308

RELEASE   INT. RELEASE REQ   T312 expires

10   (no state change)

19i T308

RELEASE COMPLETE   INT. REL. COMP. IND

RELEASE COMPLETE **x**   INT. REL. COMP. IND

x

NOTE: o = 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 SDL diagrams - overview

6.1   Call states

Table 5: User side call states

Call state	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 300 403-1 [1].	
NOTE 2: Events in each state which lead to normal call establishment/clearing are shown by 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.	
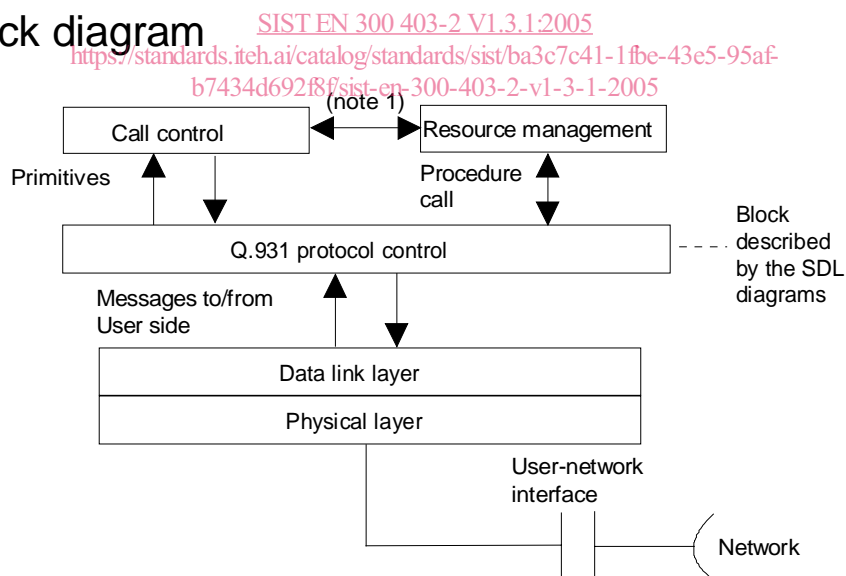
6.2   Block diagram

NOTE 1:   Interface not described in the SDL diagrams.
NOTE 2:   Control of B-channels is described in these SDL diagrams as part of the Q.931 protocol block.

Figure 3: Block diagram for the user side