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Vmesnik V5 - Naļ rtovanje javnega komutiranega telefonskega omreģja (PSTN)

V5 interface; Public Switched Telephone Network (PSTN) mappings

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Foreword

This ETSI Technical Report (ETR) was produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

This ETR is a re-issue of SPS-TR 002 (1993) to make its contents publicly available.

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1 Scope

This ETSI Technical Report (ETR) provides examples of how national protocols may be mapped onto the common PSTN protocol in the V5 interface as specified in ETS 300 324-1 [1]. These examples are intended for information only and do not create specification requirements for any equipment. It is up to national governing bodies and/or network operators to create official mappings for each of their national analogue protocols onto the PSTN V5 protocol. Without such required mappings, integration among manufacturers will be difficult or impossible in that country.

NOTE: Network operators contributing to the definition of this ETR reserve the right to change procedures in their PSTN protocols without giving notification to the users of this ETR.

For the examples given, not all possible call scenarios or error conditions will be discussed. These have to be specified in the official mappings created by national governing bodies and/or network operators.

Where particular countries or national protocols are mentioned in this ETR, the example given is only one potential mapping; other mappings are also possible. This ETR is not to be considered to constitute requirements for any country or national protocol.

According to the V5 interface specification, a large number of parameters (e.g., timers, cadences, voltages, frequencies, etc.) have to be pre-defined. Default values may also be pre-defined for some provisionable parameters. These may be discussed in this ETR, but it is the responsibility of national governing bodies and/or network operators to specify these values fully. All values discussed in this text are only examples and do not constitute requirements.

2 References

For the purposes of this ETR, the following references apply:

[1] ETS 300 324-1 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".

3 Abbreviations

For the purposes of this ETR, the following abbreviations apply:

AN	Access Network
DDI	Direct Dialling-In
DTMF	Dual Tone Multi-Frequency
FE	Function Element
LE	Local Exchange
PABX	Private Automatic Branch eXchange
PBX	Private Branch eXchange
PSTN	Public Switched Telephone Network

4 General information on the mappings layout

In the following flow diagrams, time is shown running from top to bottom, with no scale. The vertical bars represent the following entity:

user port	=	national PSTN interface between subscriber equipment and Access Network;
V5 AN side	=	V5 AN PSTN protocol entity;
V5 LE side	=	V5 LE PSTN protocol entity;
national PSTN protocol	=	national PSTN protocol implementation in the LE.

Line conditions detected or forwarded on the user line and primitives originated by the National Protocol in the LE have been mapped onto Function Elements (FE) according to tables 1 and 2 of the V5.1 interface specification, ETS 300 324-1 [1].

A brief description of the physical conditions detected or generated on the PSTN line is shown in brackets below the function element, for example:

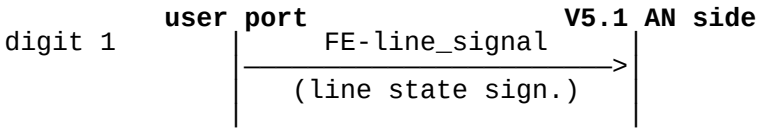

Figure 1

The diagrams do not give information about the timers involved in the V5 PSTN protocol message exchange (refer to table 28 of ETS 300 324-1 [1]).

States of the PSTN protocol are shown on the right side of the vertical bars only when a state transition occurs (for further information refer to tables 29 to 31 of ETS 300 324-1 [1]).

The message types visible on the V5 interface are represented in capital letters and are given along with an indication of their direction in the centre portion of the diagrams. Below the message, a further explanation of the structure of the message itself is given (i.e. information element and line signal). For editorial reasons, some abbreviations have been adopted to represent the information elements. The following rules apply:

Pulse-notification	=	Pn
Autonomous-signalling-sequence	=	Asis
Sequence-response	=	Sr
Cadenced-ringing	=	Cr
Pulsed-signal	=	Ps
Steady-signal	=	Ss
Digit-signal	=	Ds
Resource unavailable	=	Ru

An example is given in figure 2 of how an ESTABLISH message carrying an off hook indication (Steady signal) can be represented.

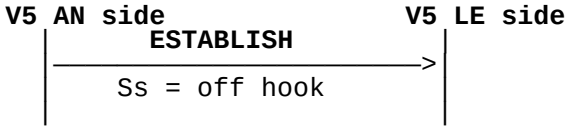

Figure 2

The SIGNAL ACK messages, used to acknowledge SIGNAL messages, may occur at any time during the PATH ACTIVE state and their position within the protocol is arbitrary.

The occurrence of the SIGNAL ACK message is independent from the mappings and is therefore not shown in the following drawings.

5 Mappings

This Clause contains mappings supplied by European national governing bodies and/or network operators. The mappings have been grouped according to the nation which has supplied them.

5.1 V5 PSTN signal flows for a BT network

Notes on case A: A direct exchange line

Subscriber A calling and subscriber A clearing.

NOTE 1: It has been assumed that only one dialled digit is sent for this example.

NOTE 2: The exchange release signal is a 100 ms reduction in line current to less than 1 mA, and has been mapped onto a reduced battery information element. This should be allocated to a pulse type and should be designed as uninterruptable. As shown in the example, the acknowledgement-request option has been used.

NOTE 3: For the example shown, it was decided that the AN should acknowledge the end of exchange release signal and that the LE should not send the DISCONNECT message until that acknowledgement had been received. This makes sure that the 100 ms pulse is correctly transported to the customer's equipment.

Notes on case B: A direct exchange line

Subscriber B called and subsequently cleared.

NOTE 1: It is assumed that the cadenced-ring information element would point to a pre-provisioned type of ringing which reverses the polarity of the line whilst ringing takes place.

NOTE 2: It is assumed that the ringing is stopped by the telephone being taken off hook and that no specific message is required from the exchange.

NOTE 3: The end of call signal shown is a 100 ms reduction in line current to less than 1 mA. This should be allocated to a pulse type and should be designated uninterruptable. As shown in the example, the acknowledgement-request option has been used.

NOTE 4: The exchange release signal is a 100 ms reduction in line current to less than 1 mA, and has been mapped onto a reduced battery information element. This should be allocated to a pulse type and should be designated uninterruptable. As shown in the example, the acknowledgement-request option has been used.

Notes on case C: An earth-calling PBX

Subscriber A calling and subscriber A clearing.

NOTE 1: It has been assumed that only one digit is sent for this example.

NOTE 2: The seize acknowledgement is handled autonomously as there is not enough time for the acknowledgement to be sent from the exchange.

NOTE 3: The exchange release acknowledgement signal is a timed disconnection of both a- and b-wires and has been mapped onto a pulsed no-battery information element. This should be an uninterruptable pulse and the signal sent after it (normal battery) should be the state to which the line defaults after the pulse has been sent.

Notes on case D: An earth-calling PBX

Subscriber B called and subsequently cleared.

NOTE 1: It is assumed that the cadenced-ring information element would point to a pre-provisioned type of ringing which reverses the polarity whilst ringing takes place. The line should remain at reverse polarity in-between the bursts.

NOTE 2: It is assumed that the ringing is stopped by the telephone being taken off hook and that no specific message is required from the exchange.

NOTE 3: The exchange release acknowledgement message is a timed disconnection of both a- and b-wires and has been mapped onto a pulsed no-battery information element. This should be an uninterruptable pulse and the signal sent after it (normal battery) should be the state to which the line defaults after the pulse has been sent.

5.1.1 Case A: Subscriber A calling and subscriber A clearing

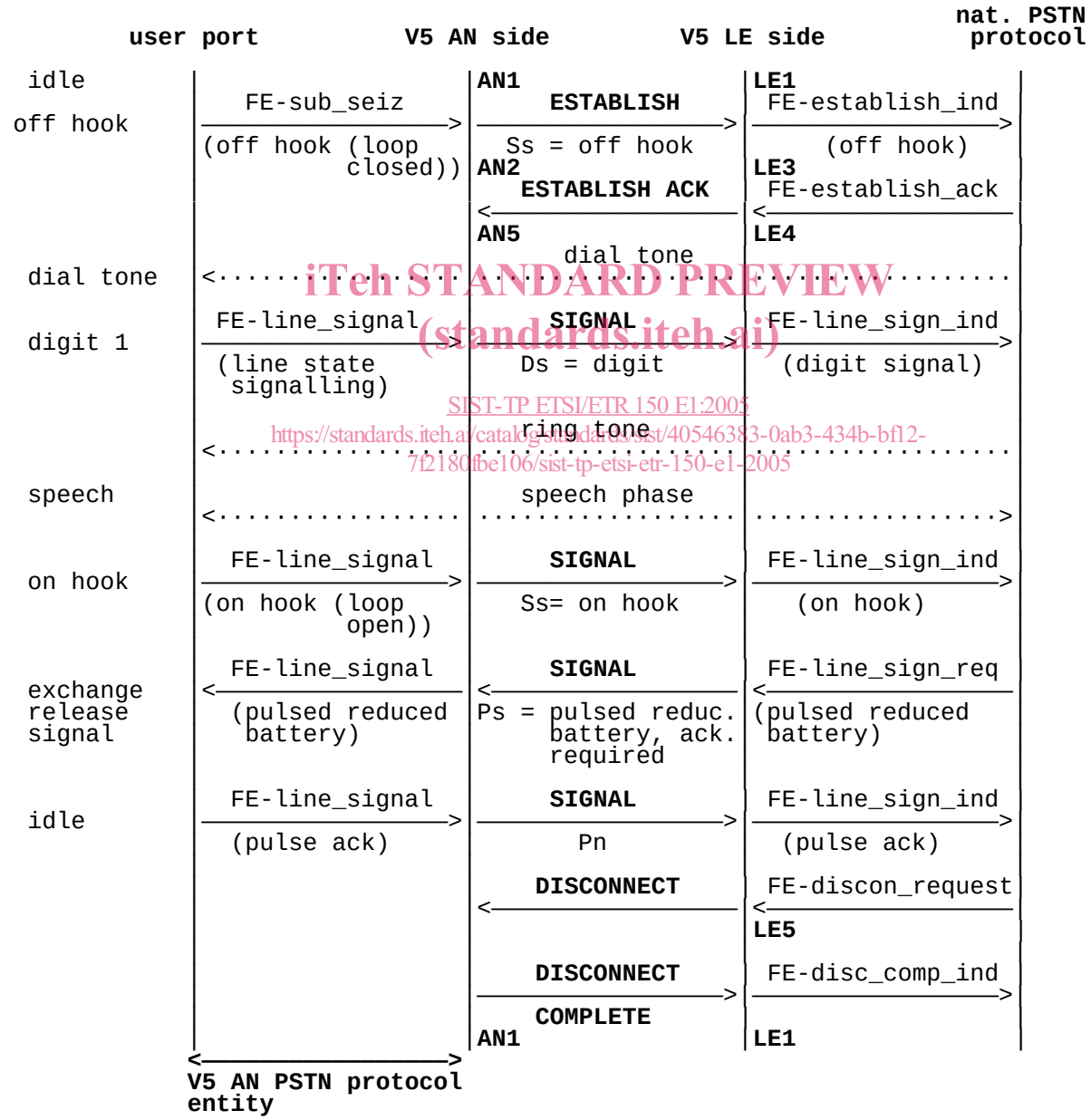

Figure 3

5.1.2 Case B: Subscriber B called and subsequently cleared

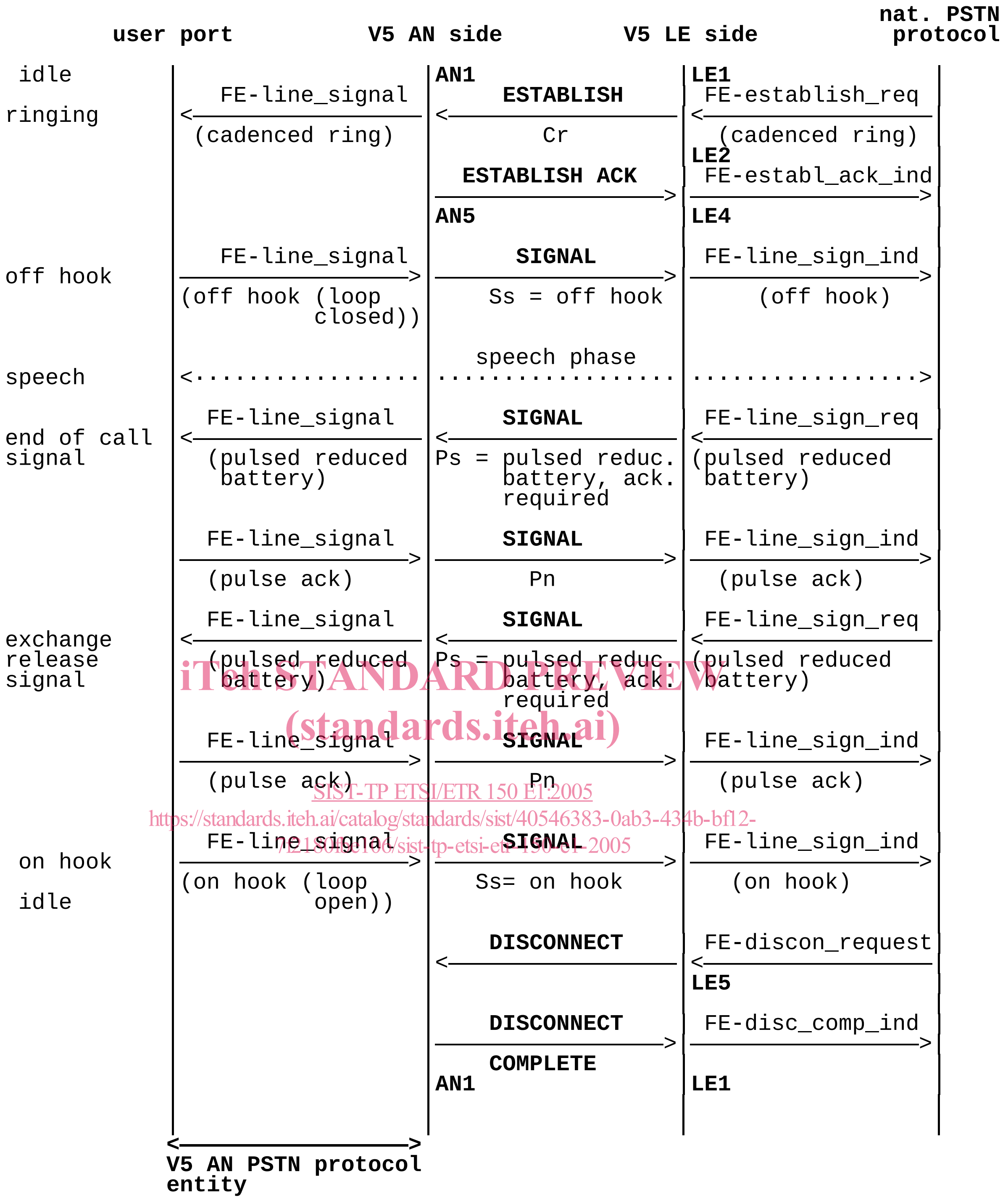
user port
V5 AN side
V5 LE side
nat. PSTN protocol
idle
ringing
AN1
LE1
FE-line_signal
ESTABLISH
FE-establish_req
(cadenced ring)
Cr
(cadenced ring)
LE2
ESTABLISH ACK
FE-establ_ack_ind
AN5
LE4
off hook
FE-line_signal
SIGNAL
FE-line_sign_ind
(off hook (loop closed))
Ss = off hook
(off hook)
speech
speech phase
end of call signal
FE-line_signal
SIGNAL
FE-line_sign_req
(pulsed reduced battery)
Ps = pulsed reduc. battery, ack. required
(pulsed reduced battery)
FE-line_signal
SIGNAL
FE-line_sign_ind
(pulse ack)
Pn
(pulse ack)
exchange release signal
FE-line_signal
SIGNAL
FE-line_sign_req
(pulsed reduced battery)
Ps = pulsed reduc. battery, ack. required
(pulsed reduced battery)
FE-line_signal
SIGNAL
FE-line_sign_ind
(pulse ack)
Pn
(pulse ack)
on hook
idle
FE-line_signal
SIGNAL
FE-line_sign_ind
(on hook (loop open))
Ss= on hook
(on hook)
DISCONNECT
FE-discon_request
LE5
DISCONNECT COMPLETE
FE-disc_comp_ind
AN1
LE1
V5 AN PSTN protocol entity

Figure 4