



Telecommunications equipment – Private Branch Exchanges (PBXs) – Signalling requirements in digital interface for ex-change line with direct dialling-in service

Telekommunikationsutrustning – Abonnentväxlar – Signaleringskrav i digitalt gränssnitt för huvudledning med direktval

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0 Introduction

Main changes to this edition are:

- Incorporation of amendments T1 and T2;
- Reduced requirements due to the phase out of all electro-mechanical exchanges;
- “shall”-requirements has been changed to “should”-requirements in subclause 4.2.5 Decadic pulsing;
- Figures has been updated in Annex A;
- CEPT Recommendation T/CS 46-02 has been replaced by ETR 206.

1 Scope

This standard covers the requirements for signalling according to the Swedish national signalling system P8 in a digital interface towards the public switched telephone network for incoming traffic on an exchange line with direct dialling-in service.

2 Normative references

The following standards contain requirements, which constitute requirements of this standard. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

| | |
|-------------|---|
| SS 63 63 29 | Telecommunications equipment – Private Branch Exchanges (PBXs) – Transmission requirements for digital interfaces |
| ETR 206 | Public Switched Telephone Network (PSTN); Multifrequency signalling system to be used for push-button telephones. |

3 Signalling diagram

The signalling diagram is found in Annex A. This signalling diagram provides a description of the performance and characteristics of the public switched telephone network with respect to signalling according to signalling system P8 for different connection cases and call processes, with direct dialling-in service to PBXs.

P8 is the Swedish national signalling system for direct dialling-in with channel-associated signalling with a digital PBX connected via a digital exchange line to a digital public exchange.

The signalling diagram is intended to serve as information on the performance and characteristics of the telephone network. In this context, the parameter values specified in the signalling diagram with respect to the performance of the PBX are to be regarded as typical values. Thus the parameter values etc. specified in the signalling diagram do not constitute any mandatory requirements imposed on the PBX in excess of what is explicitly specified as requirements in section 4 below. The object of those requirements is to secure basic functions of vital importance under normal circumstances and in normal connection cases.

This means that compliance with the requirements set forth in this standard does not provide any guarantee of correct performance of the equipment when connected to the telephone network.

4 Requirements

4.1 General

The line may in most cases only have a one-way configuration, i.e. for calls from the telephone network to the PBX. Direct dialling-in is based on what is referred to as closed numbering, which means that the last two, three, four or five digits of the subscriber number shall correspond to the extension number in the PBX.

4.1.1 Interface

This standard refers to signalling in a digital interface with a frame and multi-frame structure and associated functions in accordance with SS 63 63 29.

The term signalling channel as used here refers to the four signalling bits a, b, c and d contained in time slot 16 in each transmission direction for each circuit concerned. Index f (e.g. a_f) denotes the forward direction (PSTN → PBX) and index b (e.g. a_b) denotes the backward direction (PBX → PSTN). The PBX shall assign the

value of 0 or 1 to the signalling state in signalling channels a_b and b_b as specified in the following clauses. The PBX shall permanently assign the value of 0 to the signalling state in signalling channel c_b and the value of 1 to the signalling state in signalling channel d_b .

The signalling process also includes certain tone messages and, as an option, multi-frequency tone signalling in the voice frequency channel.

4.1.2 Idle state

When in the idle state, the PBX shall send signalling states having the value of 1 in signalling channel a_b and the value of 0 in signalling channel b_b .

4.1.3 Recognition time

It is recommended that switchover to signalling state with the duration of ≤ 10 ms should not be recognized and switchover to a signalling state with a duration of ≥ 15 ms should be recognized.

NOTE – Recognition refers to the detection of signalling channels in the receive direction (a_r and b_r respectively) in the digital interface towards the PBX.

4.2 Set-up and disconnection of calls

4.2.1 Call request

A seizure signal sent from the telephone network shall in the PBX result in a connection being established to a unit which can receive address information.

4.2.2 Proceed-to-send signal

To indicate readiness to receive address information, the PBX shall send a proceed-to-send signal by assigning the value of 0 to the signalling state in signalling channel a_b .

4.2.3 Address signalling

The following methods of address signalling may be used by the telephone network:

- multifrequency tone signalling (DTMF) in the voice frequency channel in accordance with section 4.2.4 .
- decadic pulsing in signalling channel a_r in accordance with section 4.2.5

NOTE – It is optional whether one or both methods of address signalling are implemented in the PBX.

4.2.4 Multifrequency signalling

For direct dialling-in signalling by means of DTMF, the PBX shall fulfil the requirements set forth in section 1 and 4 of ETSI Technical Report ETR 206 (that is identical to CEPT Recommendation T/CS 46-02). The parameter B specified in section 4.3.3 of ETR 206, with reference to the level limit of the receiver, shall be -28 dBm0.

4.2.5 Decadic pulsing (loop-disconnect signalling)

4.2.5.1 A digit having the value of n should be represented by $n + 1$ pulses.

4.2.5.2 A signalling state having the value of 1 and a duration of >15 ms should be approved as a pulse.

4.2.5.3 A signalling state having the value of 0 and a duration of >15 ms should be approved as a pulse interval.

4.2.5.4 An inter-digit pause < 200 ms should not be approved. An inter-digit pause > 400 ms should be approved.

NOTE – The Swedish requirements for decadic dialling in section 4.2.5 are not mandatory. However, PBX-designers should notice that in order to ensure proper functioning, the reception of decadic pulsing, if provided by the PBX, should be implemented in accordance with 4.2.5.1 – 4.2.5.4.

4.2.6 Address complete signal (number-received signal)

The PBX shall send an address complete signal by assigning the signalling state in signalling channel a_b the value of 1 for at least 300 ms. At the same time, the appropriate tone message shall be sent over the voice frequency channel.

4.2.7 Answer

The PBX shall send an answer by assigning the value of 0 to the signalling state in signalling channel a_b .

4.2.8 Register recall

With signalling system P8, the transmission of register recall signal is possible in conversation state. The register recall signal should, if implemented, consist of a signalling state in signalling channel a_b , having a value of 1 lasting for 90 ± 40 ms. There are, however, no approval requirements for this supplementary service.

4.2.9 Clear-back signal

The PBX shall send the clear-back signal by assigning the value of 1 to the signalling state in signalling channel a_b .

4.2.10 Repeated call request by operator

After transmission of a clear-back signal, the PBX shall detect, provided that disconnection in accordance with section 4.2.11 has not yet occurred, a repeated call request (by an operator in the public telephone network) in the form of a signalling state in signalling channel b_b , having the value of 1 and resulting in an alert signal (ringing signal) to the operator's console, another telephone set or a telephone answering device.

4.2.11 Disconnection before answer

When a signalling state having the value of 1 is detected in signalling channel a_r before the PBX has transmitted an answer signal to the network, the PBX shall disconnect the call and assign the signalling state in signalling channel a_b the value of 1 within 250 ms but not before 150 ms.

4.2.12 Disconnection after clear-back signal

When a signalling state having the value of 1 is detected by the PBX in signalling channel a_r following a clear-back signal, the call shall be disconnected by the PBX.

4.2.13 Forced release in the telephone network

When a signalling state having the value of 1 is detected by the PBX in signalling channel a_r following an answer, the PBX shall disconnect the call and assign the signalling state in signalling channel a_b the value of 1 within 250 ms but not before 150 ms.

4.2.14 Signalling requirements for external call transfer

External call transfer, from an incoming to and outgoing exchange line, may be performed in a PBX or in a PBX network if

- clear-back signals are forwarded by the PBX from the outgoing to the incoming exchange line within 3s, and
- clear-forward (i.e. forced release) signals are forwarded by the PBX from the incoming to the outgoing exchange line within 3s.

4.3 Blocking and unblocking

If a blocking of the line for new calls from the telephone network is desired, the PBX shall send a blocking signal by assigning the value of 1 to the signalling state in signalling channel b_b .

A line blocked by the PBX will be unblocked if the PBX assigns the value of 0 to the signalling state in signalling channel b_b .

Annex A
 (Informative)

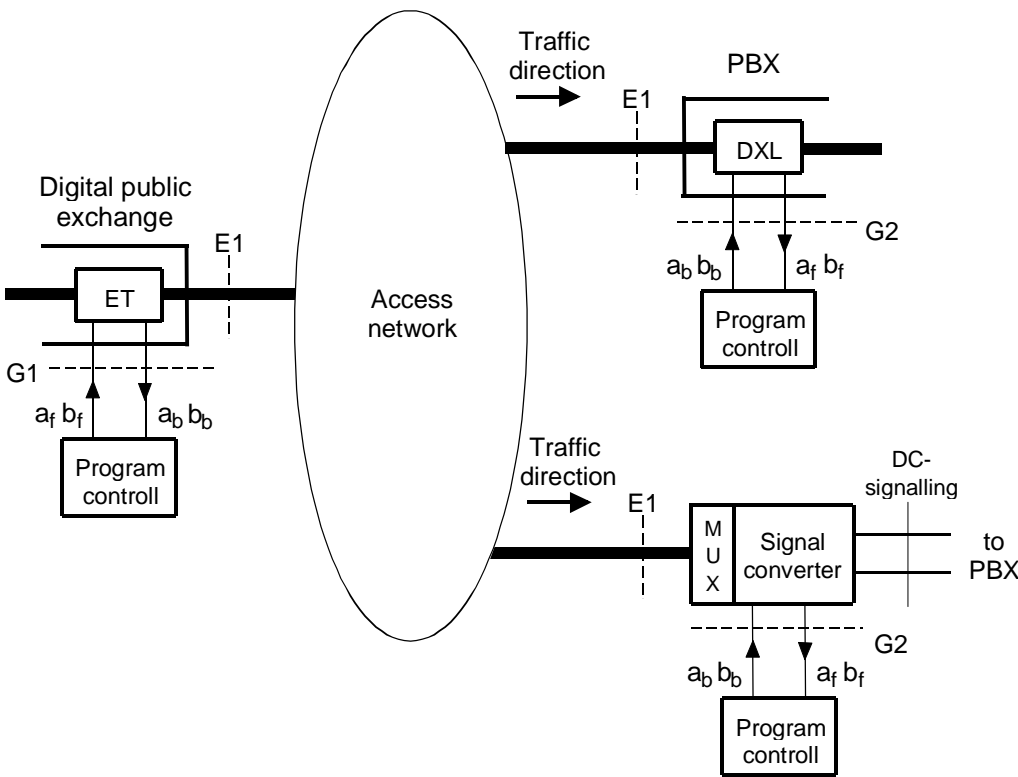
Description of signalling system P8

Signalling system P8 is the Swedish national signalling system for direct dialling-in signalling in a digital interface from a digital public exchange.

Signalling system P8 is used with digital PBXs connected to a digital public exchange.

With a signal converter, the signalling system may also be used for connection of a digital exchange line to an analogue exchange line interface of a PBX.

The figure below shows the signalling interfaces and following pages show the signalling diagram including time limits and sequence chart.



Legend

- a_f, b_f Signalling bits in the forward direction in T16
- a_b, b_b Signalling bits in the backward direction in T16
- G1, G2 Signalling interface designations
- ET Public Exchange Terminal
- DXL PBX Digital Exchange Line equipment
- T16 Time slot 16
- E1 Physical/electrical interface according to ITU-T Recommendation G.703

Signalling Diagram

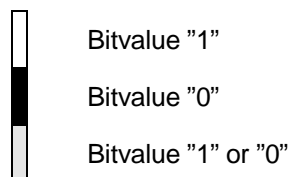
| No | Signal or state | G1 at ET | | G2 at DXL | |
|----|--|----------------|----------------|----------------|----------------|
| | | a _f | b _f | a _b | b _b |
| 1 | Idle | t ↓ | | t ↓ | |
| 2 | DDI seizure | 00 | | | 50 |
| 3 | Proceed-to-send signal | 01 | | | 51 |
| 4 | Decadic pulse ¹⁾ 1 st digit "1" | 02 | | | 52 |
| | | 03 | | | 53 |
| | | 04 | | | 54 |
| | | 05 | | | 55 |
| 5 | Decadic pulse ¹⁾ 2 nd digit "0" | 06 | | | 56 |
| | | 07 | | | 57 |
| 6 | Address complete ²⁾ | 08 | | | 58 |
| 7a | Answer | 09 | | | 59 |
| 7b | Convers. state | | | | |
| 8 | Clear-back | 10 | | | 60 |
| 9 | Clear-forward | 11 | | | 61 |
| 10 | Clear-forward after No.7b | 12 | | | |
| 11 | Clear-back | | | | 62 |
| | | 13 | | | 63 |
| 12 | New A off-hook after No.10 | | | | |
| 13 | Forced release after No.10 | 14 | | | 64 |
| | | 15 | | | 65 |
| 14 | Withdrawn | | | | |
| 15 | Repeat call request from public operator after No.8 | 18 | | | 68 |
| 16 | Answer | 19 | | | 69 |
| 17 | Through connection | 20 | | | 70 |

| No | Signal or state | G1 at ET | | G2 at DXL | |
|------------|---|----------------|----------------|----------------|----------------|
| | | a _f | b _f | a _b | b _b |
| 18 | Operator call request after No.1 and No.6 | t ↓ | | | t ↓ |
| | | 21 | | | 71 |
| 19 | Clear-forward after No.3-No.6 | 22 | | | 72 |
| | | 23 | | | 73 |
| 20 | Blocking from PBX | 24 | | | 74 |
| 21 | Unblocking from PBX | 25 | | | 75 |
| 22a 22b | Periodic repeat call request after No.2 | 26 | | | 76 |
| | | 27 | | | 77 |
| | | 28 | | | 78 |
| | | 29 | | | 79 |
| 23 | Register recall signal after No.7b | 30 | | | 80 |
| | | 31 | | | 81 |
| 24 | Clear-forward after No.15 and No.18 | 32 | | | 82 |
| | | | | | |

- 1) Digit transmission by DTMF is also possible.
- 2) Ringing tone is sent from PBX

LEGEND

- t_{xx} Time limits specified on next page
- a_f, b_f Signalling bits in the forward direction
- a_b, b_b Signalling bits in the backward direction
- G1, G2 Interface designations
- ET Public Exchange Terminal
- DXL PBX Digital Exchange Line equipment



Time limits

Time of recognition of approved bit modification at reception in the interface:

G1 = 10–15ms

G2 = 8 ms alt. 16 ms

t00 → t01 < 3,5 ± 0,1 s

t00 → t26 = 3,5 ± 0,1 s

t01 → t02 = 200–250 ms

t02 → t03 = 60 ± 5 ms

t03 → t04 = 40 ± 5 ms

t04 → t05 = 60 ± 5 ms

t05 → t06 = 520 ± 20 ms

t07 → t08 < 500 ms

t10 → t11 = nom 90 s

t12 → t14 = 2–3 s

t11 → t00 > 1s

t13 → t00 > 1s

t15 → t00 > 1s

t23 → t00 > 1s

t14 → t65 = Line lockout pending clear-back signal

t19 → t20 = 15–150 ms

t26 → t27 = 60 ± 1 s

t27 → t28 = 3,5 ± 0,1 s

t28 → t29 = 60 ± 1 s

t50 → t51 < 150 ms

t57 → t58 = 200–500 ms ¹⁾

t58 → t59 = 300 ms

t64 → t65 = 150–250 ms

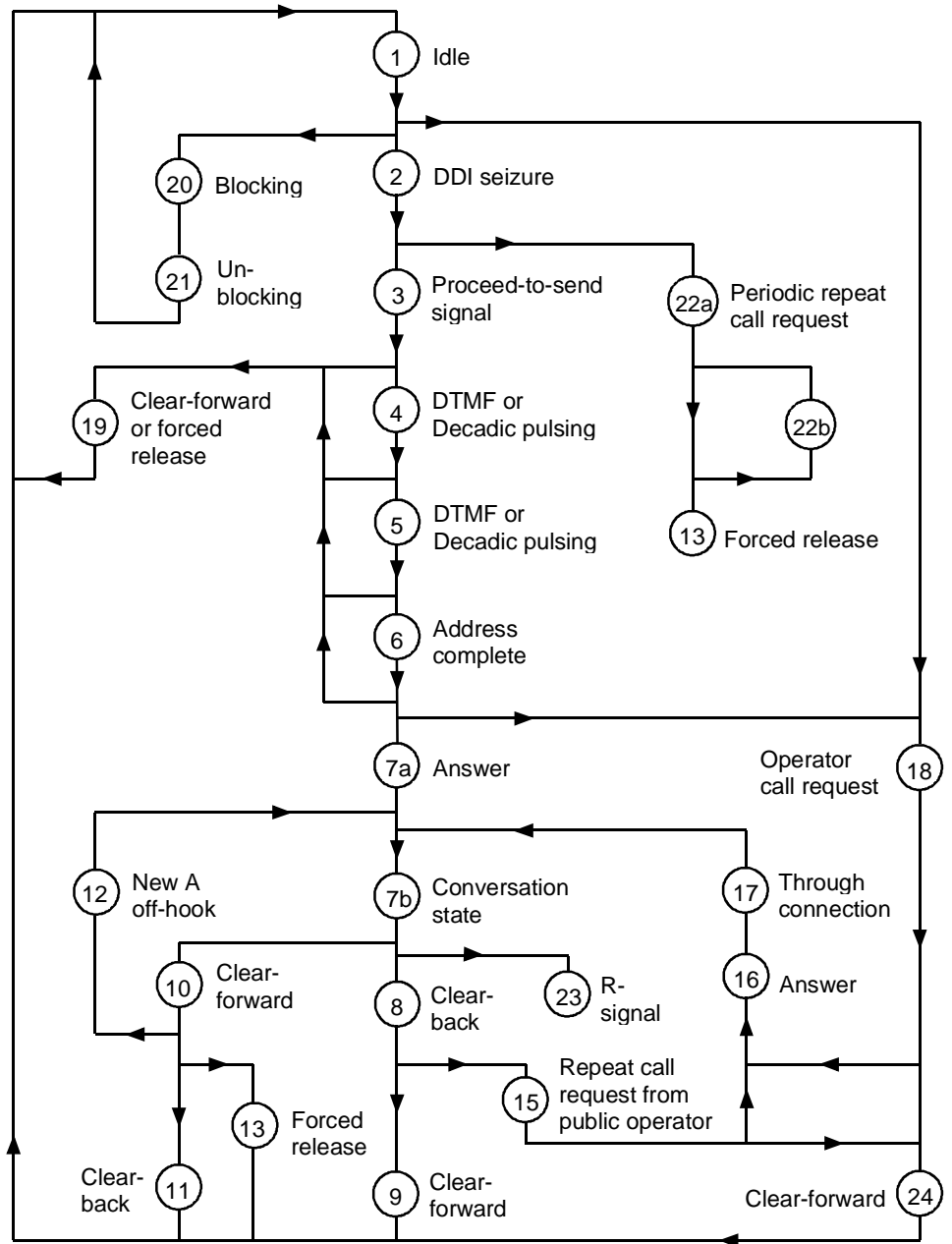
t72 → t73 = 150–250 ms

t80 → t81 = 90 ± 40 ms

1) For transmission of digits using DTMF signalling the time interval shall be 100–500 ms relative to the end of the last DTMF signal

NOTE: Time limits and parameter values indicated are values typical of PBX equipment.

Sequence chart



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