The drawings contained in this Recommendation have been done in Autocad

ANNEX B

(to Recommendation T.70)

B.1   *State tables*

The state tables:

B–1/T.70:

B–2/T.70:

B–3/T.70:

present the transitions of the transport protocol in a table form in contrast to the diagram form to be seen in Annex A. While the diagrams are useful to overview the protocol mechanism the appropriate tables give clear information of which event is possible in which state and which actions are to be performed. Moreover each of the events and conditions is combined with a shortening in brackets (e.g.: E 5) which is a pointer to the 2nd part of this annex, so that the reader of these tables can easily come to know which meaning a certain event, action or condition has.

An impossible event related to a certain state can be recognized by an empty field in the crossing–point of the state and the event.

B.2   *Lists of events, actions and conditions*

The lists of events (Table B–4/T.70), actions (Table B–5/T.70) and conditions (Table B–6/T.70) intend to care for detailed explanations and clarification related to the protocol components (events, actions and conditions) found in the diagrams and tables.

All the components in the tables are accompanied by a list number (e.g. E 1, A 10, C 3, etc.) which can be interpreted as a pointer to the corresponding additional information in the lists. The letters E, A, C of the list numbers stand for Event, Action, Condition.

The following abbreviations are used:

EM

LI

loc.

NC

NS

NSDU

PLI

TC

TP

TPDU

TS

TSDU

AND, OR and NOT (used mainly in E 5) shall be considered as the known Boolean operators.

TABLE B–1/T.70 = 25 cm

TABLE B–2/T.70 = 25 cm

TABLE B–3/T.70

Data phase (symmetrical protocol)

State

Data phase

Event

2.1

Local

Protocol event

Service primitive

Local

Protocol action

Service primitive

Final state

3.1

Mont.

2.1

3.2

Mont.

T–DATA ind. (A 18)

2.1

3.3

Mont.

T–EXCEPT. ind. (A 19)

2.1

3.4

Mont.

T–DISC. ind. (A 5) N–DISC. req. (A 4)

0.1

3.5

Mont.

S–TBR (A 3)

T–EXCEPT. ind. (A 19)

2.1

3.6

Mont.

START T0.3 (A 2)

S–TBR (A 3)

0.3

3.7

Mont.

S–TDT (EM = 0) (A 20)

2.1

3.8

Mont.

S–TDT (EM = 1) (A 21)

2.1

3.9

TSDU part(s)

Mont.

S–TDT (EM = 0) (A 20)

2.1

3.10

outsand
(E 16)

Mont.

S–TDT (EM = 1) (A 21)

2.1

3.11

Mont.

T–EXCEPT. ind. (A 19)

2.1

3.12

Mont.

T–DISC. ind. (A 5) N–DISC. req. (A 4)

0.1

3.13

N–DISC. ind. (E 8)

T–DISC. ind. (A 5)

0.1

3.14

T–DISC. ind. (E 10)

N–DISC. ind. (A 4)

0.1

Ind.
Indication

DISCO.
DISCONNECTION

EXCEP.
EXCEPTION

TABLE B–4/T.70

List of events

No.	Name	Type	Description
E 1	R–TCR	TP	Layer 4 receives via the NS N–DATA indication a TPDU including the transport block TCR.
E 2	R–TCC	TP	Layer 4 receives via the NS N–DATA indication a TPDU including the transport block TCC.
E 3	R–TCA	TP	Layer 4 receives via the NS N–DATA indication a TPDU including the transport block TCA.
E 4	R–TBR	TP	Layer 4 receives via the NS N–DATA indication a TPDU including the transport block TBR.
E 5	R–invalid TPDU	TP	Layer 4 receives via the NS N–DATA indication a TPDU whose validity check fails due to following reasons: – syntactical errors – procedure errors

1. *Invalid TPDUs due to syntactical errors*

1.1   TCR:

1.1.1 The value of octet 1 (LI):

1.1.1.1
    the number of the TCR block octets minus 1

    OR

1.1.1.2
    is greater than 127

    OR

1.1.1.3
    is smaller than 6

    OR

1.1.2 see 1.6

1.2 TCA:

1.2.1 The value of octet 1 (LI):

1.2.1.1
     the number of the TCA block octets minus 1

     OR

1.2.1.2
     is greater than 127

     OR

1.2.1.3
     is smaller than 6

     OR

1.2.2 see 1.6

OR

1.2.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the

appropriate TCR block

OR

1.2.4 The value of octet 7 0

OR

1.2.5 The parameter "Transport Data Block Size" is present:

1.2.5.1

AND its value 07 (hexadecimal), in response to a TCR

block without the transport data block size parameter

OR

1.2.5.2

AND its value does not respond to the rules according to

§ 5.2.3.2 of Recommendation T.70

OR

1.2.5.3

AND its value is different from the values

(hexadecimal): 07, 08, 09, 0A, 0B

OR

1.2.5.4
    AND the PLI > 1

    OR

1.2.6 LI 6 + 2N + Ni=1 PLI

    where N is the number of parameters

1.3   TCC:

1.3.1 The value of the LI (octet 1):

1.3.1.1
     the number of the TCC block octets minus 1

    OR

1.3.1.2
 is greater than 127

 OR

1.3.1.3
 is smaller than 6

 OR

1.3.2 see 1.6

 OR

1.3.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the

appropriate TCR block

OR

1.3.4 LI 6 + 2N + Ni=1 PLI

where N is the number of parameters

1.4   TBR: (also see § 5.4.1, Note 1)

1.4.1 The value of the LI:

1.4.1.1
 the number of the TBR block octets minus 1

OR

1.4.1.2
   is greater than 127

   OR

1.4.1.3
   is smaller than 7

   OR

1.4.2 see 1.6

   OR

(continued)

No.

Name

Type

Description

E 5
R–invalid TPDU *(cont.)*
TP

1.4.3 The value of octet 3 (4 resp.) octet 5 (6 resp.) of the
appropriate TC establishment block (TCR resp. TCA) received
from the peer entityOR

1.4.4 The value of LI minus 6 value of the PLIOR

1.4.5 The Rejected block parameter is not present

1.5   TDT:

1.5.1 The value of the LI 2OR

1.5.2 The TSDU end mark is 0 AND the information field is emptyOR

1.5.3 The TDT block size is larger than negotiated in the establishment phase

1.6   No identified block:
       The value of the TPDU octet 2 is not equal to one of the following values (hexadecimal):
       EX, DO, 80, 70, FO.

2. *Invalid TPDUs due to procedure errors*

       ailure cases:

2.1   After S–TCR:

2.1.1 NOT R–TCAOR

2.1.2 NOT R–TCCOR

2.1.3 NOT R–TBROR

2.2   After S–TCA:

2.2.1 NOT R–TDTOR

2.2.2 NOT R–TBROR

2.3   After S–TDT:

2.3.1 Not R–TDTOR

2.3.2 Not R–TBROR

2.4   After S–TCC: NOT R–TCROR

2.5   After S–TBR: NOT R–TDT (in state 2.1)OR

2.6   After R–TDT (EM = 1): R–empty TDT (EM = 1)OR

2.7   After R–empty (EM = 1): R–empty TDT (EM = 1)OR

2.8   After N–CONNECT response: NOT R–TCR

<div align="center">

E 6

T–CONNECT request

TS

Layer 5 requests a TC from layer 4.

E 7

N–CONNECT confirm

NS

Affirmative answer to N–CONNECT request (A 10); a NC is existing now.

E 8

N–DISCONNECT indication

NS

Report from layer 3 to layer 4 that the NC is not existing (any more).

E 9

N–RESET indication

NS

</div>

Indication to layer 4 that an error has occurred in layer 1, 2 or 3, possibly with data loss. The NC is kept existing.

E 10

T–DISCONNECT request

TS

Layer 5 requests a TC clearing from layer 4.

E 11

TIMEOUT

loc.

The timer presently surveying a state reached its limit. Following value ranges are defined:

Values

States
Calling side
Called side

0.2
not applicable

45 s ± 30 s

0.3
6 s ± 4 s
6 s ± 4 s

1.1
45 s ± 30 s
not applicable

TABLE B–4/T.70 *(end)*

No.

Name

Type

Description

E 12

N–CONNECT indication

NS

Indication to layer 4 by the layer 3 that an NC is being established; the answer to this is N–CONNECT response (A 22) or N–DISCONNECT request (A 4).

E 13

T–CONNECT response

TS

Affirmative answer by the layer 5 to T–CONNECT indication (A 15).

E 14

R–TDT

TP

Layer 4 receives via the NS N–DATA indication, an NSDU including the transport block TDT.

E 15

T–DATA request

TS

Layer 5 requests the transmission of data. Whether this is a complete TSDU or not, is a local matter, and not subject of this definition.

E 16

TSDU part(s) outstanding

loc.

Layer 4 is ready to send the next TDT block.

TABLE B–5/T.70

List of actions

No.
Name
Type
Description

A 1
STOP Timer T1.1
loc.
Timer T1.1 surveying the state 1.1 is stopped.

A 2
START Timer T0.3
loc.
Timer T0.3 surveying the state 0.3 is started after having been reset.

A 3
S–TBR
TP
Via the NS N–DATA request a NSDU including the transport block TBR is sent to the peer entity.

A 4
N–DISCONNECT request

NS

Layer 4 requests the layer 3 to release the offered or existing NC.

A 5

T–DISCONNECT indication

TS

Layer 5 is informed by the layer 4 that the TC being established or existing is cleared.

A 6

RESTART T1.1

loc.

Timer T1.1 surveying the state 1.1 is reset and started again.

Moreover, it is necessary either to limit the number of T1.1–restarts or to limit the sum of all the times of T1.1; otherwise, an infinite loop S–TCR – R–TCC – S–TCR – etc., would be allowed.

A 7

S–TCR

TP

Via the NS N–DATA request a NSDU including the transport block TCR is sent to the peer entity.

A 8

T–CONNECT confirm

TS

Affirmative answer to the event T–CONNECT request (E 6) indicating that the data phase of the TC has been entered.

A 9

START T0.2

loc.

Timer T0.2 surveying the state 0.2 is started after having been reset.

A 10

N–CONNECT request

NS

Layer 4 requests the layer 3 for an NC to be established.

A 11

STOP T0.2

loc.

Timer T0.2 surveying the state 0.2 is stopped.

A 12

START T1.1

loc.

Timer T1.1 surveying the state 1.1 is started after having been reset.

A 13

STOP T0.3

loc.

Timer T0.3 surveying the state 0.3 is stopped.

A 14

DISCARD any R–TPDU

TS

Any data received by N–DATA indication are discared. The transmission of further data is stopped.

A 15

T–CONNECT indication

TS

Layer 4 indicates a request for a TC–establishment to the layer 5.

A 16

RESTART T0.2

loc.

Timer T0.2 surveying the state 0.2 is reset and started again.

A 17

S–TCC

TP

Via the NS N–DATA request, an NSDU including the transport block TCC is sent to the peer entity.

A 18

T–DATA indication

TS

Layer 4 indicates the receipt of a complete TSDU to the layer 5. How and when the contents are transferred is a local matter, and therefore, not shown here.

A 19

T–EXCEPTION indication

TS

Layer 5 is informed of an error which occurred between the layer 1 and layer 4, possibly with data loss; the TC is kept existing. Due to this error it is possible that the following TSDU transferred to the layer 5 contains errors or deficiencies.

A 20

S–TDT (EM=0)

TP

A TPDU with TSDU end mark set to 0 is sent to the peer entity and further parts of the TSDU will follow (i.e., segmenting occurs).

A 21

S–TDT (EM=1)

TP

See A 20, but the TSDU end mark is set to 1 (i.e., this TPDU contains a complete TSDU or the last part of a TSDU).

A 22

N–CONNECT response

NS

Affirmative answer to N–CONNECT indication (E 12).

A 23

S–TBR

TP

The called side sends a TBR block to the calling side in order to point to a received failured TPDU. In this case the destination reference can be set to 0.

A 24

S–TCA

TP

Via the NS N–DATA request an NSDU including the transport block TCA is sent to the peer entity.

TABLE B–6/T.70

List of conditions

No.	Name	Description
C 1	Retry	The TC establishment is tried once more.
C 2	No retry	NOT C 1
C 3	TC acceptable	The TC offered by the peer entity is accepted by the layer 4 due to local circumstances.
C 4	TC not acceptable	NOT C 3
C 5	NC acceptable	The NC offered by the layer 3 is accepted by the layer 4 due to local circumstances.

<center>C 6</center>

<center>NC not acceptable</center>

NOT C 5

<center>C 7</center>

<center>EM = 0</center>

TSDU end mark of the TDT block is 0

<center>C 8</center>

<center>EM = 1</center>

TSDU end mark of the TDT block is 1

<center>C 9</center>

<center>Recovery</center>

The terminal provides the TS T–EXCEPTION indication

<center>C 10</center>

<center>No recovery</center>

NOT C 9

<center>C 11</center>

<center>Segmentation</center>

The TSDU received from layer 5 is longer than the negotiated TDT block size and has, therefore, to be segmented and consequently, to be reassembled on the receiver side.

<center>C 12</center>

<center>No segmentation</center>

NOT C 11

ANNEX C

(to Recommendation T.70)
Recommendations for implementation of Recommendation X.21

C.1

This Annex deals with recommended actions to be taken by a telematic DTE in relation to the receipt of call progress (CP) signals from the network and in relation to the handling of optional user facilities. The adherence to these recommendations is not mandatory in order to conform to Recommendation T.70 but may be of importance for the performance of the DTE.

Telematic terminals are in general assumed to make automatic repeated call attempts and sequential automatic calls to a number of addresses for which the following actions apply.

C.2

When one of the CPS 01 or 04 is received the DTE should use the timer T3B and wait up to 60s for the completion of the call.

C.3

The DTE should use either timer T3A or T3B in this case, depending on the time the DTE is prepared to wait for the completion of the call. Observe that the queuing time is charged as communication time in some networks.

C.4

See Table C–1/T.70.

TABLE C–1/T.70

Code group/Code

Delay for reattempts (s)

Number of reattempts

Delay between series of reattempts (s)

2, 6

³ 5

£ 7

³ 60

41, 42, 43, 48
5, 8

³ 5

£ 1

Reattempts are not recommended

44, 45, 46, 47, 49
7

³ 5

£ 1

³ 600

Note – Some networks charge for call attempts, when the call is unsuccessful due to the condition of the called DTE. Examples of such situations are the receipt of the call progress signals 21 (busy) and 45 (controlled not ready).

ANNEX D

(to Recommendation T.70)
**Service definitions and state transition diagrams
for the HDLC procedure
and the network layer defined for CSPDN**

D.1

D.1.1
Fig. D–1/T.70 /T0801310-87 = 5 cm

D.1.2

D.1.2.1
Figs. D–2/T.70 and D–3 /T0801320-87 and T0801330-87

D.1.2.2
Fig. D–4/T.70 /T0801340-87 = 5 cm

D.1.2.3
Figs. D–5/T.70 and D–36 /T0801350-87 and T0801360-87

D.1.2.4 *Data link resetting*
Figs. D–7/T.70 and D–8 /T0801370-87 and T0801380-87

Figs. D–9/T.70 and D–10 /T0801390-87 and T0801400-87

D.2

D.2.1

The following diagrams describe the HDLC procedure as one functional unit. The first page comprises the whole protocol and the following page gives the details to specific states.

D.2.2

ABM

ADM

R:xxx

R:Cxxx

R:Rxxx

S:xxx

F   Final bit

P   Poll bit

XXX

RC Redrive counter

RCB

IC I–Frame counter

Vuu

Fig. D–11/T.70 /T0801410-87 = 25 cm

Fig. D–12/T.70 /T0801430-87 = 25 cm

Fig. D–13/T.70 /T0801420-87 = 25 cm

Fig. D–14/T.70 /T0801440-87 = 25 cm

Fig. D–15/T.70 /T0801450-87 = 25 cm

Fig. D–16/T.70 /T0801460-87 = 25 cm

D.3   *Summary of frame definitions*

D.3.1   *Invalid frame*

–   frames not properly bounded by flags;

–   frames containing addresses other than A or B;

–   frames with frame check sequence (FCS) error;

–   frames containing less than 32 bits between blags.

D.3.2   *Valid frames*

D.3.2.1 *Not expected frames*

NEF, not expected frames (for the receiver) which lead to a frame reject condition (excluding frames with a FRMR control field):

–   a command or response control field that is undefined or not implemented;

- a frame with an information field which is not permitted or

  Type X

  supervisory or unnumbered frame with incorrect length;
- an I–frame with an information field which exceeds the maximum

  Type Y

  established length;
- a frame with an invalid N (R).

  Type Z

D.3.2.2 *Expected frames*

- frames which must lead to a reaction (in accordance to the Recommendation) by the receiving station;

- frames which must be ignored only in determined states by the receiving station.

D.4   *X.21 service, controlled by the network layer*

D.4.1   *X.21 connection establishment*

Figs. D–17/T.70 /T0801470-87 and D–18/T.70 /T0801480-87 = 11 cm

D.4.2   *X.21 connection release*

Figs. D–19/T.70 /T0801490-87 = 5 cm

D–20/T.70 /T0801500-87 = 5 cm

Figs. D–21/T.70 /T0801510-87 = 25 cm

D–22/T.70 /T0801520-87 = 25 cm

TABLE D–1/T.70

Application rules regarding the network protocol data unit (NPDU)

Conditions

Combination of conditions

a

b

c

d

e

f

g

h

i

C1

Transmit/receive

T

T

T

T

T

R

R

R

R

C2

NPDU length (octet)

> 2

> 2

> 2

> 2

< 3

> 2

> 2

> 2

< 3

C3

1st octet 01/<>

01

01

01

<>

*

01

01

<>

*

C4

2nd octet bits 1 to 7

0

0

<>

*

*

*

*

*

*

C5

2nd octet bit 8 (M–bit)

0

1

*

*

*

0

1

*

*

Actions/applications rules

A1

Correct/acceptable

X

X (Note)

A2

N–DISC ind., DL–DISC req.

X

X

A3

Not allowed

X

X

X

X

A4

Error case

X

                    X

Note – The Teletex system has to accept as many NPDUs, that at least, the same number of octets can be received as contained in the maximum negotiable transport block size.

C   Condition
A   Action/application rule
T   Transmit
R   Receive
<>   Not equal
*   Not relevant
X   Valid/applicable