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TELEMATIC SERVICES

TERMINAL EQUIPMENTS AND PROTOCOLS FOR TELEMATIC SERVICES

PACKET MODE ACCESS FOR SYNTAX-BASED VIDEOTEX VIA PSTN

ITU-T Recommendation T.104

(Previously “CCITT Recommendation”)

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation T.104 was prepared by the ITU-T Study Group VIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

Recommendation T.104

PACKET MODE ACCESS FOR SYNTAX-BASED VIDEOTEX VIA PSTN

(Helsinki, 1993)

1 Scope

This Recommendation aims to meet the requirements of network operators and equipment manufacturers who are designing equipment to operate with an increase speed on Videotex Services over the public switched telephone network (PSTN).

This Recommendation has a close relationship to Annexes B/T.101, C/T.101, D/T.101, E/T.101 and F/T.101 [2] describing the Videotex data syntaxes.

This Recommendation specifies how to use the end-to-end protocols defined by Recommendation T.105 [3] in case of "Packet mode access for Syntax-based Videotex via PSTN".

It

- identifies the parts of Recommendation T.105 [3] which apply;
- defines the protocol pillar ;
- precises the difference of semantic of some parameters
- precises the lower layer elements which are applicable.

It is applicable to devices supporting "Packet mode access for Syntax-based Videotex via PSTN" to be attached at the DTE side of a modem. In this context, a device is either a Videotex Terminal a Videotex Service Center, a Videotex Access point or a Videotex Host and a modem is a device providing an interface according to one of the V Series Recommendations contained in the list given in clause 2.

This Recommendation applies only for modems operating in "Synchronous interface" in both directions.

For Videotex Services using modems operating in "Asynchronous interface", the protocols to be used are those already defined by national Videotex Services.

The following principles apply for the use of Recommendation T.105 [3] in case of "Packet mode access for Syntax-based Videotex via PSTN":

- the term "S/T reference point" shall be read "Modem interface"
- the PSTN network shall be used instead of the ISDN network;
- in case of "Packet mode access for Syntax-based Videotex via PSTN" there is no D-channel and/or B-channel ; the. communication and/or signalling is done via the protocol pillar described in clause 6;
- all parts of Recommendation T.105 [3] related to the use of "ISDN Supplementary Services" do not apply for "Packet mode access for Syntax-based Videotex via PSTN"
- a communication channel is equivalent to a virtual circuit (VC).

2 Normative references

[1] CCITT Recommendation T.90 (1991), *Characteristics and protocols for terminals for telematic services in ISDN*.

[2] CCITT Recommendation T.101, *International Interworking for Videotex Services*.

[3] CCITT Recommendation T.105, *Syntax-based Videotex Application Layer protocol*.

[4] CCITT Recommendation V.22 *bis* (1988), *2400 bit/s duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point to point 2 wire leased telephone type circuits.*

[5] CCITT Recommendation V.26 *bis* (1988), *2400/1200 bit/s modem standardized for use in the general switched telephone network.*

[6] CCITT Recommendation V.26 *ter* (1988), *2400 bit/s duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point to point 2 wire leased telephone type circuits.*

[7] CCITT Recommendation V.27 *ter* (1988), *4800/2400 bit/s modem standardized for use in the general switched telephone network.*

[8] CCITT Recommendation V.29 (1988), *9600 bit/s modem standardized for use on point to point 4 wire leased telephone type circuits.*

[9] CCITT Recommendation V.32 (1988), *A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone type circuits*.

[10] CCITT Recommendation V.17 (1990), *Recommendation for a 2-wire modem for facsimile applications with rates up to 14 400 bit/s.*

[11] CCITT Recommendation V.42 (1988), *Error correction procedures for DCE using asynchronous/synchronous converter*.

[12] CCITT Recommendation X.3, *Packet assembly disassembly facility (PAD) in a public data network*.

[13] CCITT Recommendation X.32, (1988), *Interface between data terminal equipment (DTE) and data-circuit terminating equipment (DCE) for terminals operating in the packet mode and accessing a packet switched public data network through a public switched telephone network or an integrated service digital network or a circuit switched public data network.*

[14] CCITT Recommendation X.75, *Packet-switched signalling system between public networks providing data transmission services*.

[15] ISO 8208 standard (1990), *Information processing systems – Data communications – X.25 Packet Level Protocol for Data Terminal Equipment.*

NOTE – The above list of modem Recommendations (V Series) might be extended if other types of modem will be standardized.

3 Definitions and abbreviations

The definitions and abbreviations of Recommendation T.105 [3] apply. Those related to ISDN are not used in this Recommendation.

4 Overview

Clause 4/T.105 [3] applies except 4.5/T.105 [3].

5 Configurations

Clause 5/T.105 [3] applies but examples of configurations are given in Annex A of this Recommendation.

6 General Model

Clause 6/T.105 [3] applies with the following exceptions:

- the Access Network shall be the PSTN (see Figure 1) ;
- there are no “Channel-Management” and “Coordination Function” for “Packet mode access for Syntax-based Videotex via PSTN”;

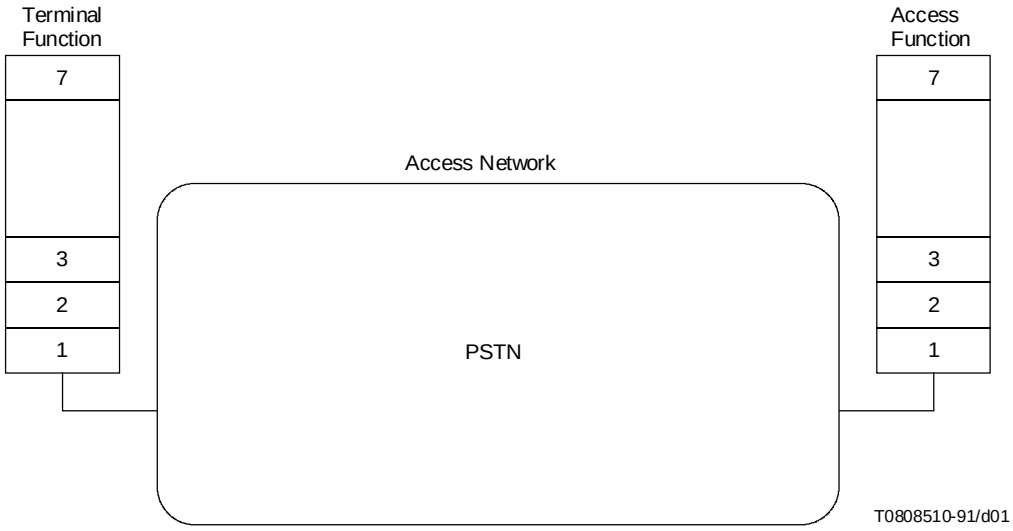

FIGURE 1/T.104

Access Network scenario

– the protocol pillar is defined as follows

3	ISO 8208 [15]	
2	X.75 [14], X.32 [13] (LAPX)	X.75 [14]
1	V-Series Modem Recommendations	
Layer	Half Duplex	Full Duplex

FIGURE 2/T.104

Protocol Pillar

NOTE – Layers 4 and 5 are not used by "Packet mode access for Syntax-based Videotex via PSTN" Moreover, Note 2 of 6.3/T.105 [3], does not apply.

7 Service Definition

7.1 Introduction

Subclause 7.1/T.105 [3] applies.

7.2 Kernel services

Subclause 7.2/T.105 [3] applies with the following exceptions:

7.2.1 SBV_Establish

The following parameters are not used by “Packet mode access for Syntax-based Videotex via PSTN”:

- OB_Called_Address;
- OB_Called_Subaddress;
- OB_Application_Address;
- OB_Application_Selection;
- OB_Application_Data;
- OB_User_Data;

7.2.2 SBV_Release

The following parameter is not used by “Packet mode access for Syntax-based Videotex via PSTN”:

- OB_Cause.

7.3 Optional services

Subclause 7.3/T.105 [3] applies with the following exceptions:

7.3.1 SBV_Channel_Open

The following parameters are not used by “Packet mode access for Syntax-based Videotex via PSTN”:

- Req_OB_Called_Address ;
- Req_OB_Called_Subaddress
- OB_Application_Address;
- OB_Application_Selection;
- OB_Application_Data;
- Req_OB_User _Data
- Ind_OB_Cause.

7.3.2 SBV_Channel_Error

The following parameter is not used by “Packet mode access for Syntax-based Videotex via PSTN”:

- Ind_OB_Cause.

8 Protocol

Clause 8/T.105 [3] applies.

9 Coding

Clause 9/T.105 [3] applies.

However, the following parameters shall not be used (see Table 40/T.105 [3]):

- Ind_OB_Cause;
- OB_Application_Address;
- OB_Application_Data;
- OB_Application_Selection;
- OB_User_Data;
- Req_OB_Called_Address;
- Req_OB_Called_Subaddress;
- Req_OB_User_Data.

10 Use of Recommendation X.3 [12] Parameters

Clause 10/T.105 [3] applies with the following exception:

In Table 43/T.105 [3], the parameter 11 may take one among the following values:

12 (2400 bit/s), 13 (4800 bit/s), 14 (9600 bit/s) and 15 (19200 bit/s) (see Recommendation X.3 [12] for details).

In that case, the Note 6 of Table 43/T.105 [3] does not apply.

11 Bearer Independent Service (BIS) for Syntax-based Videotex

Clause 11/T.105 [3] applies with respect to the In-band procedures.

12 Lower Layers

This clause describes the lower layers (layer 1 to 3) for a "Packet mode access for Syntax-based Videotex via PSTN" terminal. The description makes the difference between modems operating in half-duplex mode and those operating in full-duplex.

This clause does not apply for modems operating in "Asynchronous" interface. The protocols to be used for modems operating in "Asynchronous" interface are described in clause 13.

12.1 Layer 3 protocols

12.1.1 Full-duplex mode

The layer 3 protocol to be used is described in Recommendation T.90 [1]

12.1.2 Half-duplex mode

The layer 3 protocol to be used is described in Recommendation T.90 [1] with the following supplementary rules:

– the default packet window size is 3.

NOTE – This default window size has been chosen because it allows a more efficient throughput in half-duplex.

12.2 Layer 2

12.2.1 Full-duplex mode

The layer 2 protocol to be used is defined in Recommendation T.90 [1].

Alternatively, the layer 2 may also be embedded within the modem as described in Recommendation V.42 [11].

NOTE –The exact procedure for such a configuration needs further study.

12.2.2 Half-duplex mode

The layer 2 protocol to be used is described in Recommendation T.90 [l]. The specific procedure (LAPX) to be applied in case of half-duplex mode is described in 5.6/X.32 [13].

12.3 Layer 1 protocol

The layer 1 protocol to be used is the one described in the CCITT Recommendation, listed in clause 2 (V Series of Recommendations), related to the type of modem used. For V.29 [8] modems, Annex F describes the operating sequences for V.29 short turn around.

13 Asynchronous interface

Videotex Services operating over the PSTN may wish to use different types of modems in “Asynchronous” interface, allowing an increase speed of communication, without modifying the lower layers protocols (error correction procedure by example) already used .

For modems operating in the “Asynchronous” interface, the lower layers protocols to be used are those already defined by the different Videotex Services.

Annex A
Examples of configurations

(This annex forms an integral part of this Recommendation)

A.1 Symbols

See Figure A.1.

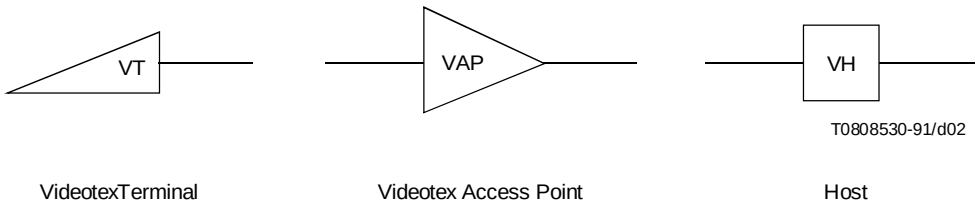

FIGURE A.1/T.104

Symbols

A.2 Connection to a VH

The Videotex Terminal is connected directly to a Videotex Host via the PSTN. At the protocol level, one connection is estatblished between the terminal and host. See Figures A.2 and A.3.

FIGURE A.2/T.104

Connection to a VH

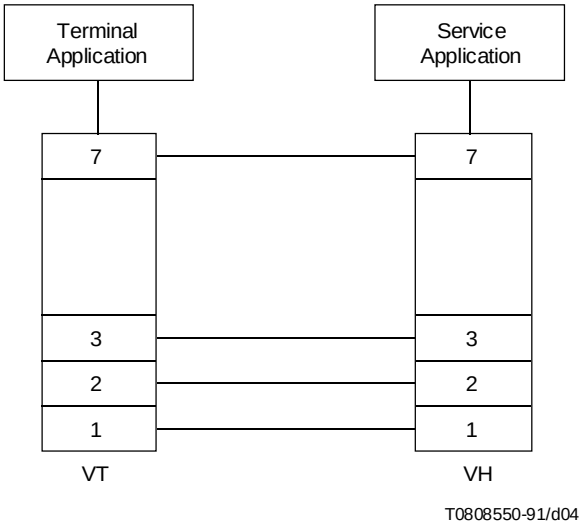

FIGURE A.3/T.104

Protocol stack for VT-VH connection

A.3 Access to a VS via a VAP

The terminal accesses a Videotex Service via a Videotex Access Point. The Host Access Network will be a PDN (generally a PSPDN). See Figure A.4.

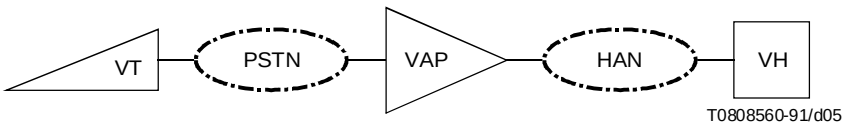

FIGURE A.4/T.104

Connection via a VAP

The connection establishment with the host does not have any influence on the protocol stack between the terminal and the VAP. As far as the terminal is concerned, only a connection to the VAP exists. In terms of the protocol stack there is an end-to-end connection on layer 3 between the two sides, with an Application Layer on top. See Figure A.5.

A.3.1 Service selection after a dialogue with the VAP

The terminal is connected to a VAP, which sets up a second connection to a server after some dialogue between the terminal and the VAP. This is basically a refinement of the access to a VH. See Figure A.6.

A.3.2 Service selection using a VS identification

A connection is established between the terminal and the VAP. On this connection, layer 2 and layer 3 are set up. The layer 3 CALL REQUEST carries the address or the name of the requested application. This information is used by the VAP to establish an end-to-end dialogue between the terminal and the VH. See Figure A.7.

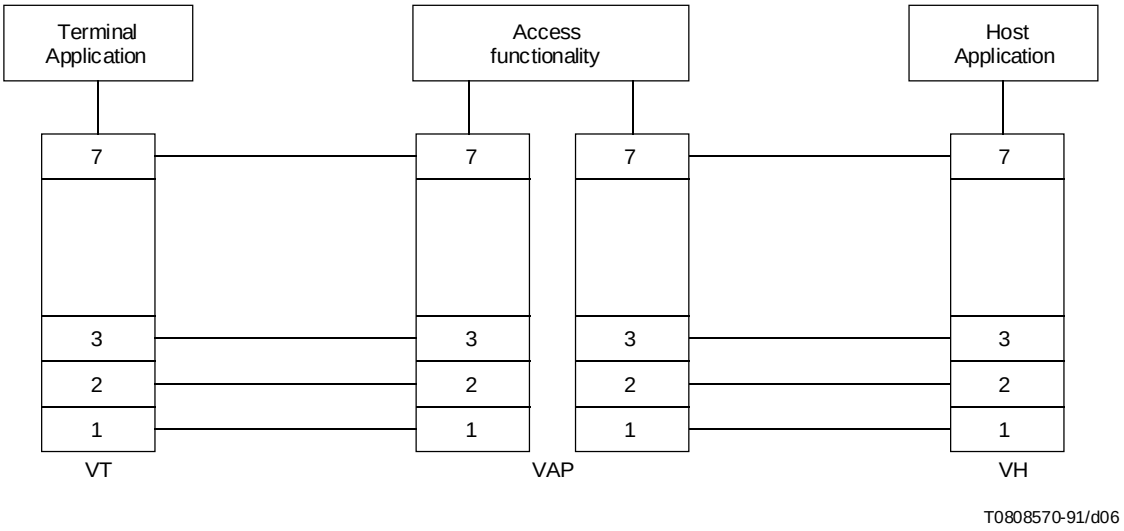

FIGURE A.5/T.104

Protocol stack for VT-VAP-VH connection

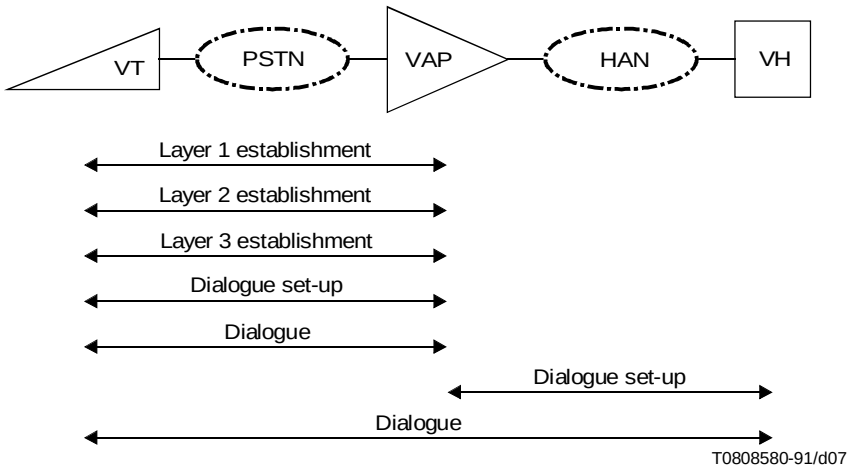

FIGURE A.6/T.104

Connection establishment after dialogue

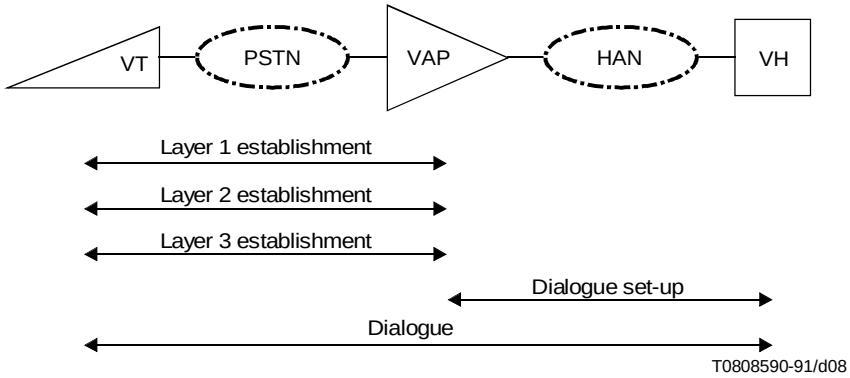

FIGURE A.7/T.104

Connection establishment without dialogue

A.3.2.1 VS identified by a network address

The application is selected by its VH-address on the Host Access Network. This address is inserted in the layer 3 CALL REQUEST and interpreted by the VAP to establish a connection with the VH.

Example – Assume that the VH-address is "12345678". This number is inserted in the layer 3 CALL REQUEST sent by the terminal to the VAP.

NOTE – Some user data (e.g. user-identification) may be associated with the VH-address. It will be conveyed transparently from the terminal to the VH.

A.3.2.2 VS identified by a name

The requested application is identified by a Videotex Service name. This name is inserted by the terminal in the layer 3 CALL REQUEST and interpreted by the VAP to establish the appropriate connection.

Example – Assume that the Videotex service name is "ETSI". This name is inserted in the layer 3 CALL REQUEST and translated by the VAP into the VH-address "12345678".

A.3.2.3 Establishment of the second VC by the VT

The terminal is connected to the VAP using a VC. The terminal may establish a second VC to connect to VH2.

The terminal shall present all the information which is received on the two different VCs. See Figure A.8.

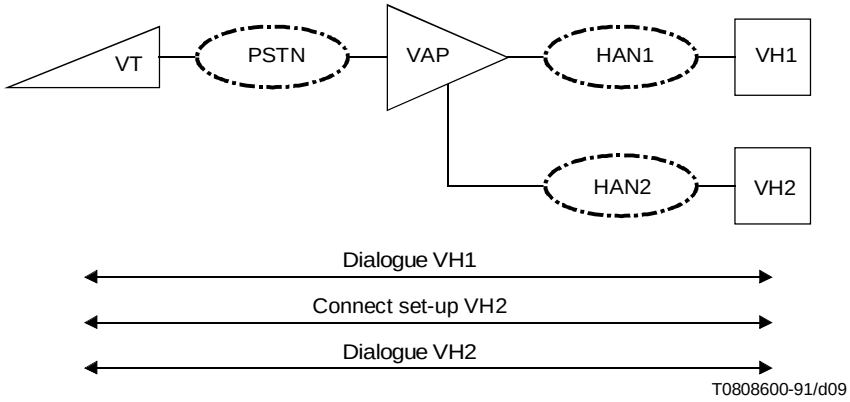

FIGURE A.8/T.104

Distributed hosts via two VC s initiated by the VT

A.4 Host to terminal call establishment

In all configurations described above, the initiative to establish the connection may also be taken by a VAP. Therefore, a terminal should be able to respond to incoming calls. The topology of the network behind the VAP is irrelevant. See Figure A.9.

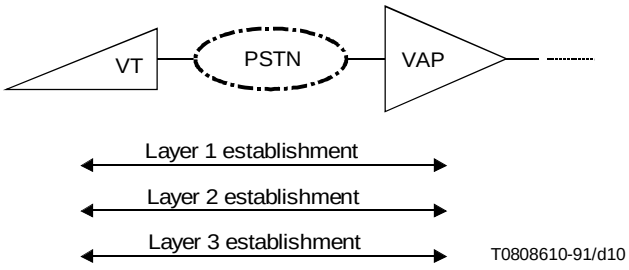

FIGURE A.9/T.104

Host to terminal connection establishment

A.5 Terminal to terminal communication

If the VAP in the above Figure A.9 is replaced by another terminal, the resulting configuration allows for a direct terminal to terminal communication, as shown in Figure A.10.

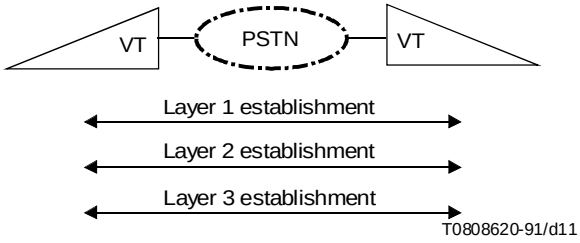

FIGURE A.10/T.104

Terminal to terminal communication

After establishment of layer 3, none of the service selection procedures are applicable. The application layer protocol does not contain any special support for this configuration.

Annex B

Usage of supplementary services

Annex B/T.105 [3] does not apply.

Annex C

Terminal Function basic state

Annex C/T.105 [3] applies. In addition, the default value for parameter reference 11 is in accordance with the modem speed.

Annex D

The SBV-Escape service

Annex D/T.105 [3] applies.

Annex E

Extended data forwarding signals

Annex E/T.105 [3] applies.

Annex F

Operating sequences for V.29 short turn around

(This annex forms an integral part of this Recommendation)

F.1 Turn-ON sequence at 9600/7200 bits per second

During the interval between the OFF to ON transition of circuit 105 and the OFF to ON transition of circuit 106, synchronizing signals for proper conditioning of the receiving modem shall be generated by the transmitting modem. These signals are used to establish carrier detect, AGC if required, timing synchronization, equalizer convergence and descrambler synchronization.

The synchronization signals are defined in two separate sequences. The long one shall be used once at the beginning of the established connection. The short one may be used for all subsequent turn around in which the equalizer pattern is used to update and refine equalizer convergence.

NOTE – The facsimile service shall not use the short turn around. For the telematic services making use of Recommendation T.71, the short turn around shall be used except during the connection establisblment time.

Two sequences are defined:

a) a short one for turn around operation;

b) a longer one for initial establishment of the connection.

The sequence b) is only used after the first OFF to ON transition of circuit 105 following the OFF to ON transition of circuit 107, or at the OFF to ON transition of circuit 107 if the circuit 105 is already ON. After every subsequent OFF to ON transition of circuit 105, the sequence a) is used.

The sequences, for both 9600 and 7200 data rates, are divided into five segments as in Table F.l.

TABLE F.1/T.104

RTS/CTS Turn-ON sequence

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Total
Type of line signal	Unmodulated carrier	No transmitted energy	Alternations	Equalizer conditioning pattern	Scrambled all binary ONEs	
a)		48 SI	100 SI	62 SI	18 SI	228 SI
Protection against echo	185 ms to 200 ms	20 ms 48 SI	42 ms 128 SI	25 ms 384 SI	8 ms 48 SI	280 ms 608 SI
b)		20 ms	53 ms	160 ms	20 ms	438 ms
a)			100 SI	62 SI	18 SI	180 SI
Without any protection	0 ms	0 ms 48 SI	42 ms 128 SI	25 ms 384 SI	8 ms 48 SI	75 ms 608 SI
b)	0 ms	20 ms	53 ms	160 ms	20 ms	253 ms

Segment 3 of the synchronizing signal consists of alternations between two signal elements as described in 8.1/V.29. The duration of segment 3 is given in Table F.l.

Segment 4 of the synchronizing signal transmits two signal elements according to an equalizer condition pattern as described in 8.2/V.29 [8]. The duration of segment 4 is given in Table F.l.

Segment 5 commences transmission according to the encoding described in 2.2/V.29 [8] with continuous binary ONEs applied to the input of the data scrambler. At the end of segment 5, circuit 106 is turned ON and user data are applied to the input of the data scrambler. The duration of segment 5 is given in Table F.l.

F.2 Turn-ON sequence at 4800/2400 bit/s

When operating in the fallback mode at 4800 or 2400 bit/s, the modem shall conform to the turn-ON and Turn-OFF sequences given in V.27 *ter* [7].

F.3 Turn-OFF sequence

With or without protection against talker echo, the line signal emitted after the ON to OFF transition of circuit 105 shall consist of a segment A followed by a segment B.

Segment A shall consist of remaining data followed by continuous scrambled ONEs for a total duration in the range of 5 to 10 ms.

Segment B shall consist of a period of 20 ms of no transmitted energy.

The total duration for TURN-OFF time shall then be in the range 25-30 ms.

If an OFF to ON transition of circuit 105 occurs during the turn-OFF sequence, it will not he taken into account until the end of the turn-OFF sequence.

In addition, if circuit 105 goes ON during the reception of the segment A of the turn-OFF sequence, optionally the transmission of the turn-ON sequence shall be started within a time period of less than 20 ms after the reception of segment A.

F.4 Circuit 109

Circuit 109 shall turn ON after synchronizing is completed and prior to user data appearing on circuit 104. Circuit 109 is prevented from turning ON during reception of unmodulated carrier when the optional protection against talker echo is used.

F.5 Circuit 106

Circuit 106 response times are from the connection of an ON or OFF condition on:

- circuit 105 to the appearance of the corresponding ON or OFF condition on circuit 106; or
- circuit 107 (where circuit 105 is already ON) to the appearance of the corresponding ON or OFF condition on circuit 106.