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GSM FAX & DATA SERVICES

MESSAGE SEQUENCE CHARTS

T30

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List of Figures and Tables

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Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-service Switching Centre (BSS - MSC) interface
(GSM 4.22, September 1994, version 4.3.0)

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1.2 Abbreviations

ACI	AT Command Interpreter
AGCH	Access Grant Channel
AT	Attention sequence "AT" to indicate valid commands of the ACI
BCCH	Broadcast Control Channel
BCS	Binary Coded Signals
BS	Base Station
BSIC	Base Station Identification Code
C/R	Command/Response
C1	Path Loss Criterion
C2	Reselection Criterion
CBCH	Cell Broadcast Channel
CBQ	Cell Bar Qualify
CC	Call Control
CCCH	Common Control Channel
CCD	Condat Coder Decoder
CKSN	Ciphering Key Sequence Number
CRC	Cyclic Redundancy Check
DCCH	Dedicated Control Channel
DISC	Disconnect Frame
DL	Data Link Layer
DM	Disconnected Mode Frame
DTX	Discontinuous Transmission
EA	Extension Bit Address Field
EL	Extension Bit Length Field
EMMI	Electrical Man Machine Interface
EOL	End Of Line
F	Final Bit
F&D	Fax and Data Protocol Stack
FACCH	Fast Associated Control Channel
FHO	Forced Handover
GP	Guard Period
GSM	Global System for Mobile Communication
HDLC	High level Data Link Control
HISR	High level Interrupt Service Routine
HPLMN	Home Public Land Mobile Network
I	Information Frame
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
ITU	International Telecommunication Union
IWF	Interworking Function
Kc	Authentication Key
L	Length Indicator
LAI	Location Area Information
LISR	Low level Interrupt Service Routine
LPD	Link Protocol Discriminator
M	More Data Bit
MCC	Mobile Country Code
MM	Mobility Management
MMI	Man Machine Interface
MNC	Mobile Network Code

MS	Mobile Station
MSG	Message phase in the GSM 3.45 protocol
N(R)	Receive Number
N(S)	Send Number
NCC	National Colour Code
NECI	New Establishment Causes included
OTD	Observed Time Difference
P	Poll Bit
P/F	Poll/Final Bit
PCH	Paging Channel
PCO	Point of Control and Observation
PDU	Protocol Description Unit
PL	Physical Layer
PLMN	Public Land Mobile Network
RACH	Random Access Channel
REJ	Reject Frame
RNR	Receive Not Ready Frame
RR	Radio Resource Management
RR	Receive Ready Frame
RTD	Real Time Difference
RTOS	Real Time Operating System
SABM	Set Asynchronous Balanced Mode
SACCH	Slow Associated Control Channel
SAP	Service Access Point
SAPI	Service Access Point Identifier
SDCCH	Slow Dedicated Control Channel
SIM	Subscriber Identity Module
SMS	Short Message Service
SMSCB	Short Message Service Cell Broadcast
SS	Supplementary Services
T.4	CCITT Standardisation for Document coding of Group 3 Facsimile Apparatus
TAP	Test Application Program
TCH	Traffic Channel
TCH/F	Traffic Channel Full Rate
TCH/H	Traffic Channel Half Rate
TDMA	Time Division Multiple Access
TE	Terminal Equipment - e. g. a PC
TMSI	Temporary Mobile Subscriber Identity
UA	Unnumbered Acknowledgement Frame
UI	Unnumbered Information Frame
V(A)	Acknowledgement State Variable
V(R)	Receive State Variable
V(S)	Send State Variable
VPLMN	Visiting Public Land Mobile Network

1.3 Terms

Entity:	Program which executes the functions of a layer
Message:	A message is a data unit which is transferred between the entities of the same layer (peer-to-peer) of the mobile and infrastructure side. Message is used as a synonym to protocol data unit (PDU). A message may contain several information elements.
Primitive:	A primitive is a data unit which is transferred between layers on one component (mobile station or infrastructure). The primitive has an operation code which identifies the primitive and its parameters.
Service Access Point:	A Service Access Point is a data interface between two layers on one component (mobile station or infrastructure).

2 Overview

The Protocol Stacks are used to define the functionality of the GSM protocols for interfaces. The GSM specifications are normative when used to describe the functionality of interfaces, but the stacks and the subdivision of protocol layers does not imply or restrict any implementation.

The protocol stack for fax and data transmission consists of several entities. Each entity has one ore more service access points, over which the entity provides a service for the upper entity. The entity, which is described in this document, is coloured grey in the following figure :

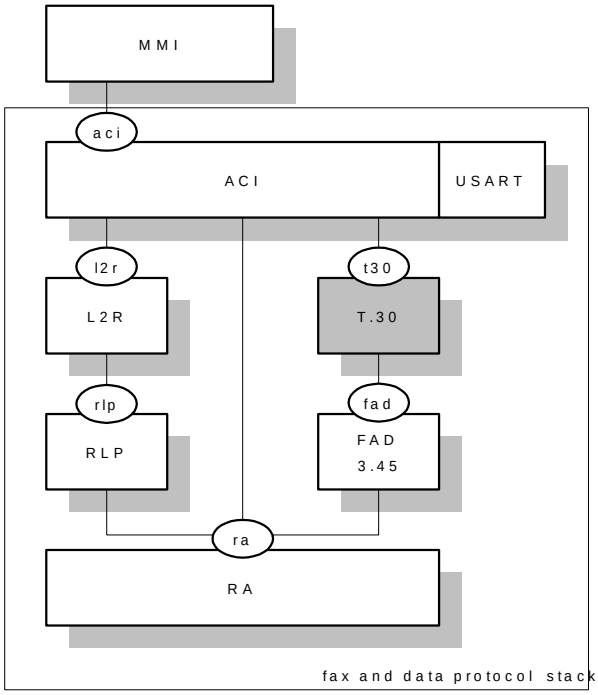


Figure 2-1: Architecture of the fax and data protocol stack

The information units passed via the SAPs are called primitives and consists of an operation code and several parameters. See the Users Guide for details.

The entities of the fax and data protocol stack are:

2.1 RA - Rate Adaptation

This entity performs an adaptation between an asynchronous or synchronous data stream with several bit rates on to the fixed bit rate used at the TCH. This is performed by the rate adaptation functions RA1' and RA0 described in GSM 04.21.

2.2 RLP - Radio Link Protocol

This entity provides a Layer 2 protocol for asynchronous reliable data transfer as specified in GSM 04.22. It includes error correction, sequence numbers and a mechanism for repeating corrupted and lost messages.

2.3 L2R - Layer 2 Relay Functionality

The L2R provides relay functions in order to adapt the character-oriented data received from the TE via USART to the bit-oriented RLP protocol.

2.4 FAD 03.45 - Fax Adaptation Protocol

The fax adaptation protocol, as specified in GSM 03.45, provides synchronisation with the BCS and MSG modems of the peer entity. It uses byte repetition in conjunction with a voting algorithm to handle corruption on the TCH data stream. The non-transparent fax protocol in accordance with GSM 03.46 is not part of this implementation.

The fax adapter enables T.30 to send BCS at 300 BPS and T.4 MSG in 2400, 4800, 7200 and 9600 BPS.

2.5 T.30 - Fax Protocol Entity

The protocol uses binary coded signals packed in HDLC frames to set up and release a connection in the message phase of the FAX transmission. This entity is specified in the ITU-T.30. The main tasks of this unit are:

- Building the HDLC frames with CRC.
- Performing bit stuffing/de-stuffing.
- Executing a sequence of 5 phases: 1.) set up, 2.) pre-message procedures, 3.) transmission/reception, 4.) post message procedures, 5.) waiting for call release.

2.6 ACI - AT Command Interpreter

The ACI is specified in GSM 07.07. It is responsible for call establishment via the GSM voice protocol stack and terminal adaptation for asynchronous transparent character-oriented data transmission. The ACI is able to receive AT commands and send the replies over the USART driver to a remote PC. This makes it possible to control the voice and data protocol stack from a remote application running on a PC. The ACI also provides a unique interface for an internal MMI in the MS.

2.7 USART - Universal Synchronous Asynchronous Receiver Transmitter Driver

The USART is a hardware component that facilitates a connection between the mobile station and terminal equipment (e.g. a PC). This interface uses some of the circuits described in V.24.

The data exchange provided by this unit is serial and asynchronous (synchronous communication is not in the scope of this document). A driver that uses interrupts to manage a circular buffer for the sending and receiving direction is necessary in order to use this component in the F&D. The driver has to be able to perform flow control.

3 Introduction

3.1 Overview

Each facsimile-procedure can be described by five separate and consecutive phases:

Phase A: Call set-up.
Phase B: Pre-message procedure for identifying and selecting the required facilities.
Phase C: Message transmission (includes phasing and synchronization where appropriate).
Phase D: Post-message procedure including end-of-message and confirmation and multi-document procedures.
Phase E: Call release.

For digital document facsimile terminals conforming to Recommendation T.4, the binary coded system shall be the standard signalling arrangement.

The binary coded signalling system is based on a High Level Data Link Control (HDLC) format developed for data transmission procedures. The basic HDLC structure consists of a number of frames, each of which is subdivided into a number of fields. It provides for frame labelling, error checking and confirmation of correctly received information and the frames can be easily extended if this should be required in the future.

The transmission of the facsimile message itself (phase C) will be according to the modulation system described in the appropriate Recommendation for the facsimile terminal.

3.2 Classification of operating methods

Based upon all combinations which may result from the fact that there are manually operated terminals and automatic facsimile terminals, the operating methods shown in the following table are possible.

Method No.	Description of operating method	Direction of facsimile transmission	Overall designation
1	*Manual* operation at calling terminal and	Calling terminal *transmits to* called terminal	1-T
	Manual operation at called terminal	Calling terminal *receives from* called terminal	1-R
2	*Manual* operation at calling terminal and	Calling terminal *transmits to* called terminal	2-T
	Automatic operation at called terminal	Calling terminal *receives from* called terminal	2-R
3	*Automatic* operation at calling terminal and	Calling terminal *transmits to* called terminal	3-T
	Manual operation at called terminal	Calling terminal *receives from* called terminal	3-R
4	*Automatic* operation at calling terminal and	Calling terminal *transmits to* called terminal	4-T
	Automatic operation at called terminal	Calling terminal *receives from* called terminal	4-R
4 *bis*	*Automatic* operation using the procedures defined in Recommendation V.8 at calling terminal and	Calling terminal *transmits to* called terminal using the procedures defined in Recommendation V.8	4-T
	Automatic operation using the procedures defined in Recommendation V.8 at called terminal	Calling terminal *receives from* called terminal using the procedures defined in Recommendation V.8	4-R

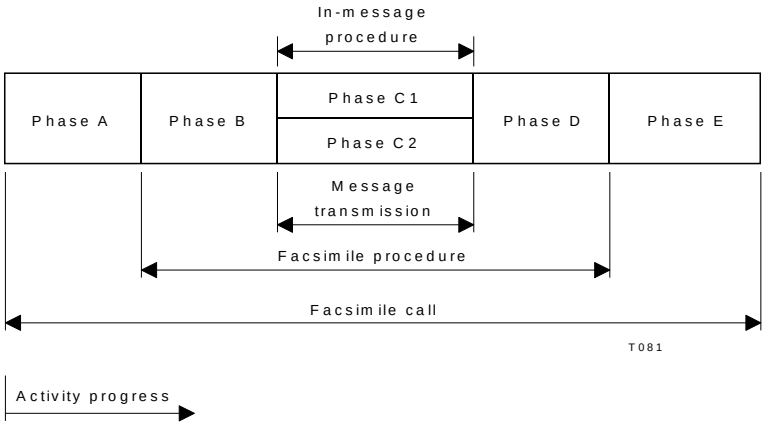
Table 3-1

3.3 General provisions

If any malfunction of the facsimile procedures is detected, the call should be released.

Where the called destination is an automatic facsimile terminal which is not ready or not able to operate, the call should not be answered automatically.

3.4 Time sequence of a facsimile call



FI **Figure 2-1**

3.5 Description of phases

3.5.1 Phase A – Call establishment

Call establishment can be realized manually and/or automatically. Phase A is part of the voice-stack.

3.5.2 Phase B – Pre-message procedure

The pre-message procedure consists of the identification of capabilities and the commanding of the chosen conditions as well as the confirmation of acceptable conditions.

When connection is established between a terminal operating in accordance with this Recommendation and a terminal operating in a non-ITU-T manner, the terminals should disconnect before the in-message procedure unless both terminals include optional, compatible procedures.

3.5.2.1 Identification section

- capabilities identification;
- confirmation for reception;
- terminal identification (option);
- non-standard facilities identification (option).

3.5.2.2 Command section

- capabilities command;
- training;
- synchronization;

as well as the following optional commands:

- non-standard facilities command;
- terminal identification command;
- polling (send) command;
- echo suppressor disabling.

3.5.3 Phase C1 – In-message procedure

The in-message procedure takes place at the same time as message transmission and controls the complete signalling for in-message procedure, e.g. in-message synchronization, error detection and correction and line supervision.

3.5.4 Phase C2 – Message transmission

The message transmission procedure is covered by Recommendation T.4.

3.5.5 Phase D – Post-message procedure

The post-message procedure includes information regarding:

- end-of-message signalling;
- confirmation signalling;
- multipage signalling;
- end-of-facsimile procedure signalling.

3.5.6 Phase E – Call release

Call release shall be realized manually and/or automatically. Phase E is part of the voice-stack.

3.6 Phases B, C and D – Facsimile procedure

When entering phase B, the following rules should be adhered to:

All manual receiving terminals and all auto-answering terminals must enter phase B by identifying their capabilities. All manual transmitting terminals and all auto-calling terminals must enter phase B prepared to detect the capabilities and issue the appropriate mode setting command. To allow for operating method 2-R, the delay between the transmission of the digital identification signals shall be 4.5 seconds ± 15% when sent from a manual receiving terminal.

3.6.1 Signal sequences

The recommended system utilizes the interchange of signals between the two terminals to verify compatibility and assure operation. To do this, the called terminal identifies its capabilities. The calling terminal responds to this accordingly with a command. Now the transmitter continues phase B.

Following the transmission of the message, the transmitter sends an end-of-message signal and the receiver confirms reception. Multiple documents can then be transmitted by the repetition of this procedure.

3.7 Phase E – Call release

Call release occurs after the last post-message signal of the procedure or under certain conditions, e.g.

3.7.1 Time out

When a signal as specified by the facsimile procedure is not received within the specified time-out period, the terminal may signal to the operator (if one is in attendance) or disconnect the telephone connection.

3.7.2 Procedural interrupt

The facsimile procedure may be interrupted by sending a procedural interrupt signal, by notifying the attending operator or by disconnecting the connection.

3.8 Binary coded signalling procedure

300 bits per second is the standard data signalling rate for the transmission of binary coded procedural data.

The transmission of training, TCF, and all in-message signals, shall be at the data rate of the high-speed message channel.

Transmission of signals utilizing the modulation system of V.21 channel No. 2 should be followed by a delay of 75 ± 20 milliseconds before the signalling, utilizing a different modulation system, commences (e.g. the delay between DCS and the V.27 *ter* or V.29 training sequence).

The transmission of signalling utilizing the modulation systems of Recommendations V.27 *ter*, V.29, or V.17 should be followed by a delay of 75 ± 20 milliseconds before the signalling, utilizing a different modulation system, commences (e.g. the delay between RTC and MPS).

3.9 Description Phases B, C and D

3.9.1 Calling terminal wishes to transmit

Calling terminal		**Called terminal**	
		1.	Transmit DIS
2.	DIS detected		
3.	Transmit DCS		
		4.	DCS detected
		5.	Select mode
6.	Transmit training		
		7.	Training
		8.	Transmit CFR
9.	Detect CFR		
10.	Transmit message		
		11.	Receive message
12.	At the end of message send: a) EOM, or b) EOP, or c) MPS, or d) PRI-Q, or		
		13.	Detect EOM, EOP, MPS, PRI-Q
		14.	Transmit one of the confirmation signals of post-message responses
NOTE – Binary coded signals must be preceded by a preamble.			

3.9.2 Calling terminal wishes to receive

Calling terminal		Called terminal	
		1.	Transmit DIS
2.	DIS detected		
3.	Transmit DTC		
		4.	DTC detected
		5.	Transmit DCS
6.	DCS detected		
7.	Select mode		
		8.	Transmit training
9.	Training		
10.	Transmit CFR		
		11.	Detect CFR
		12.	Transmit message
13.	Receive message		
		14.	At the end of message send: a) EOM, or b) EOP, or c) MPS, or d) PRI-Q, or
15.	Detect EOM, EOP, MPS, PRI-Q		
16.	Transmit one of the confirmation signals of post-message responses		

3.10 Binary coded signal functions and formats

An HDLC frame structure is utilized for all binary coded facsimile control procedures. The basic HDLC structure consists of a number of frames, each of which is subdivided into a number of fields. It provides for frame labelling, error checking and confirmation of correctly received information.

More specifically, the example format in the figure below is used for binary coded signalling. This example shows an initial identification sequence.

In the following descriptions of the fields, the order in which the bits are transmitted is from the most to the least significant bit, i.e. from left to right as printed. The exception to this is the CSI format.

Any initial (capabilities identification) non-standard frame which is transmitted shall be accompanied by a mandatory frame. The mandatory frame shall always be the last one transmitted.

A terminal which receives optional frame(s) which it does not recognize shall discard the frame(s) and use the mandatory frames in continuing the procedure.

3.10.1 Preamble

The preamble shall precede all binary coded signalling whenever a new transmission of information begins in any direction (i.e. for each line turnaround). This preamble assures that all elements of the communication channel (e.g. echo suppressors) are properly conditioned so that the subsequent data may be passed unimpaired. This preamble shall be a series of flag sequences for 1 s ± 15%.

3.10.2 Message/signalling delineation

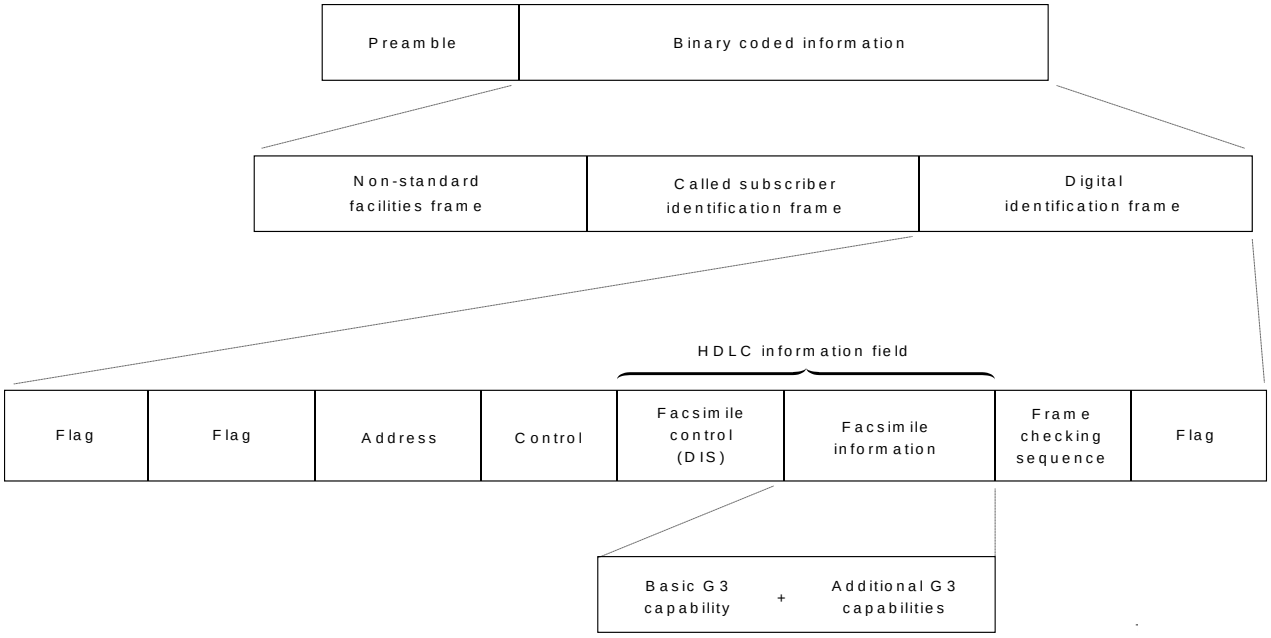


Figure 2-2

The transmission of the delineation signal, either the RTC signal, shall be followed by a delay of 75 ± 20 ms before the binary coded modulation system commences to transmit.

After receipt of a signal using the binary coded modulation system, the transmitting terminal must wait at least 75 ms before sending any signals using V.27 *ter*/V.29/V.17 modulation system.

3.10.3 Flag sequence

The eight bit HDLC flag sequence is used to denote the beginning and end of the frame. For the facsimile procedure, the flag sequence is used to establish bit and frame synchronisation. The trailing flag of one frame may be the leading flag of the following frame.

Continued transmission of the flag sequence may be used to signal to the distant terminal that the terminal remains on line but is not presently prepared to proceed with the facsimile procedure.

Format: 0111 1110

3.10.4 Address field

The eight bit HDLC address field is intended to provide identification of specific terminal(s) in a multi-point arrangement. In the case of transmission on the general switched telephone network, this field is limited to a single format.

Format: 1111 1111

3.10.5 Control field

The eight bit HDLC control field provides the capability of encoding the commands and responses unique to the facsimile control procedures.

Format: 1100 0000 non-final frame
Format: 1100 1000 final frame

A final frame is defined as the last frame transmitted prior to an expected response from the distant terminal.

3.10.6 Information field

The HDLC information field is of variable length and contains specific information for the control and message interchange between two facsimile terminals. In this Recommendation it is divided into two parts, the Facsimile Control Field (FCF) and the Facsimile Information Field (FIF).

3.10.6.1 Facsimile Control Field (FCF)

The facsimile control field is defined to be the first 8 or 16 bits of the HDLC information field. An FCF of 16 bits should be applied only for the optional T.4 error correction mode. This field contains the complete information regarding the type of information being exchanged and the position in the overall sequence. The bit assignments within the FCF are as follows:

Where X appears as the first bit of FCF, X will be defined as follows:

- X is set to 1 by the terminal which receives a valid DIS signal;
- X is set to 0 by the terminal which receives a valid and appropriate response to a DIS signal;
- X will remain unchanged until the terminal again enters the beginning of phase B.

3.10.6.1.1 Initial identification

From the called to the calling terminal.

Digital Identification Signal (DIS)
Characterizes the standard ITU-T capabilities of the called terminal.
Format: 0000 0001

Called Subscriber Identification (CSI)
This optional signal may be used to provide the specific identity of the called subscriber by its international telephone number.
Format: 0000 0010

Non-Standard Facilities (NSF)
This optional signal may be used to identify specific user requirements which are not covered by the T-Series Recommendations.
Format: 0000 0100

3.10.6.1.2 Command to send

From a calling terminal wishing to be a receiver to a called terminal which is capable of transmitting.

Digital Transmit Command (DTC)
The digital command response to the standard capabilities identified by the DIS signal.
Format: 1000 0001

Calling Subscriber Identification (CIG)
This optional signal indicates that the following FIF information is an identification of that calling terminal. It may be used to provide additional security to the facsimile procedure.
Format: 1000 0010

Non-Standard facilities Command (NSC)
This optional signal is the digital command response to the information contained in the NSF signal.
Format: 1000 0100

Password (PWD)
This optional signal indicates that the following FIF information is a password for the polling mode. It

may be used to provide additional security to the facsimile procedure. PWD is only sent if bit 50 in DIS is set.

Format: 1000 0011

Selective Polling (SEP)
This optional signal indicates that the following FIF information is a subaddress for the polling mode. It may be used to indicate that a specific document shall be polled at the called terminal. SEP is only sent if bit 47 in DIS is set.

Format: 1000 0101

3.10.6.1.3 Command to receive

From the transmitter to the receiver.

Digital Command Signal (DCS)
The digital set-up command responding to the standard capabilities identified by the DIS signal.

Format: X100 0001

Transmitting Subscriber Identification (TSI)
This optional signal indicates that the following FIF information is the identification of the transmitting terminal. It may be used to provide additional security to the facsimile procedures.

Format: X100 0010

Non-Standard facilities Set-up (NSS)
This optional signal is the digital command response to the information contained in the NSC or NSF signal.

Format: X100 0100

Subaddress (SUB)
This optional signal indicates that the following FIF information is a subaddress in the called subscriber's domain. It may be used to provide additional routing information in the facsimile procedure. SUB is only sent if bit 49 in DIS/DTC is set.

Format: X100 0011

Password (PWD)
This optional signal indicates that the following FIF information is a password for transmission. PWD is only sent if bit 50 in DIS is set.

Format: X100 0101

Training Check (TCF)
This digital command is sent through the T.4 modulation system to verify training and to give a first indication of the acceptability of the channel for this data rate. No HDLC frame is required for this command.

Format: A series of 0s for 1.5 s ± 10%.

3.10.6.1.4 Pre-message response signals

From the receiver to the transmitter.

Confirmation To Receive (CFR)
A digital response confirming that the entire pre-message procedure has been completed and the message transmissions may commence.

Format: X010 0001

Failure To Train (FTT)
A digital response rejecting the training signal and requesting a retrain.

Format: X010 0010

3.10.6.1.5 In-message procedure

From the transmitter to the receiver. The in-message procedure formats and specific signals shall be consistent with Recommendation T.4.

3.10.6.1.6 Post-message commands

From the transmitter to the receiver.

End Of Message (EOM)
To indicate the end of a complete page of facsimile information and to return to the beginning of phase B.
Format: X111 0001

MultiPage Signal (MPS)
To indicate the end of a complete page of facsimile information and to return to the beginning of phase C upon receipt of a confirmation.
Format: X111 0010

End Of Procedures (EOP)
To indicate the end of a complete page of facsimile information and to further indicate that no further documents are forthcoming and to proceed to phase E, upon receipt of a confirmation.
Format: X111 0100

Procedure Interrupt – End Of Message (PRI-EOM)
To indicate the same as an EOM command with the additional optional capability of requesting operator intervention. If operator intervention is accomplished, further facsimile procedures shall commence at the beginning of phase B.
Format: X111 1001

Procedure Interrupt – MultiPage Signal (PRI-MPS)
To indicate the same as an MPS command with the additional optional capability of requesting operator intervention. If operator intervention is accomplished, further facsimile procedures shall commence at the beginning of phase B.
Format: X111 1010

Procedure Interrupt – End Of Procedure (PRI-EOP)
To indicate the same as an EOP command with the additional optional capability of requesting operator intervention. If operator intervention is accomplished, further facsimile procedures shall commence at the beginning of phase B.
Format: X111 1100

3.10.6.1.7 Post-message responses

From the receiver to the transmitter.

Message Confirmation (MCF)
To indicate that a complete message has been satisfactorily received and that additional messages may follow. (This is a positive response to MPS, EOM and EOP)
Format: X011 0001

Retrain Positive (RTP)
To indicate that a complete message has been received and that additional messages may follow after retransmission of training and CFR.
Format: X011 0011

Retrain Negative (RTN)
To indicate that the previous message has not been satisfactorily received. However, further receptions may be possible, provided training is retransmitted.
Format: X011 0010

Procedure Interrupt Positive (PIP)
To indicate that a message has been received but that further transmissions are not possible without operator intervention. Failing operator intervention and if further documents are to follow, the facsimile procedure shall begin at the beginning of phase B. This is a positive response only to MPS, EOM, EOP, PRI-Q.
Format: X011 0101

Procedure Interrupt Negative (PIN)
To indicate that the previous (or in-process) message has not been satisfactorily received and that further transmissions are not possible without operator intervention. Failing operator intervention and if further documents are to follow, the facsimile procedure shall begin at the beginning of phase B. This is a negative response only to MPS, EOM, EOP, PRI-Q. All terminals shall be able to recognize the PIN and PIP signals. The ability to transmit these signals is optional.
Format: X011 0100

File Diagnostics Message (FDM)
This digital response may be used in place of MCF. Applicable only to the optional BFT mode.
Format: X011 1111

3.10.6.1.8 Other line control signals

For the purpose of handling errors and controlling the state of the line.

Disconnect (DCN)
This command indicates the initiation of phase E (call release). This command requires no response.
Format: X101 1111

Command Repeat (CRP)
This optional response indicates that the previous command was received in error and should be repeated in its entirety (i.e. optional frames included).
Format: X101 1000

3.10.6.2 Facsimile Information Field (FIF)

In many cases the FIF will be followed by the transmission of additional 8-bit octets to further clarify the facsimile procedure. This information for the basic binary coded system would consist of the definition of the information in the DIS, DCS, DTC, CSI, CIG, TSI, NSC, NSF, NSS, PWD, SEP, SUB, FDM and CTC signals.

3.10.6.2.1 DIS standard capabilities

Additional information fields will be transmitted immediately following the DIS facsimile control field. The bit assignment for this information is given in the table below where a 1 indicates the condition is valid, except where specifically noted otherwise (e.g. bits 11, 12, 13, 14 and 21, 22, 23).

3.10.6.2.2 DCS standard commands

When issuing the command, bits 1, 4 and 9 shall be set to 0. The DCS standard commands are formatted as shown in the table below.

3.10.6.2.3 DTC standard commands

The DTC standard capabilities are formatted as shown in the table below.

Bit No.	DIS/DTC	Note	DCS	Note
1	Reserved	1	Reserved	1
2	Reserved	1	Reserved	1
3	Reserved	1	Reserved	1
4	Reserved	1	Reserved	1
5	Reserved	1	Reserved	1
6	V.8 capabilities	23	Invalid	24
7	"0" = 256 octets preferred "1" = 64 octets preferred	23 42	Invalid	24
8	Reserved	1	Reserved	1
9	Ready to transmit a facsimile document (polling)	18	Set to "0"	
10	Receiver fax operation	19	Receiver fax operation	20
11, 12, 13, 14	Data signalling rate		Data signalling rate	33
0, 0, 0, 0	Rec. V.27 *ter* fall-back mode		2400 bit/s, Rec. V.27 *ter*	
0, 1, 0, 0	Rec. V.27 *ter*	3	4800 bit/s, Rec. V.27 *ter*	
1, 0, 0, 0	Rec. V.29		9600 bit/s, Rec. V.29	
1, 1, 0, 0	Recs. V.27 *ter* and V.29		7200 bit/s, Rec. V.29	
0, 0, 1, 0	Not used		Invalid	31
0, 1, 1, 0	Reserved		Invalid	31
1, 0, 1, 0	Not used		Reserved	
1, 1, 1, 0	Invalid	32	Reserved	
0, 0, 0, 1	Not used		14400 bit/s, Rec. V.17	
0, 1, 0, 1	Reserved		12000 bit/s, Rec. V.17	
1, 0, 0, 1	Not used		9600 bit/s, Rec. V.17	
1, 1, 0, 1	Recs. V.27 *ter*, V.29, and V.17		7200 bit/s, Rec. V.17	
0, 0, 1, 1	Not used		Reserved	
0, 1, 1, 1	Reserved		Reserved	
1, 0, 1, 1	Not used		Reserved	
1, 1, 1, 1	Reserved		Reserved	
15	R8 × 7.7 lines/mm and/or 200 × 200 pels/25.4 mm	10, 11	R8 × 7.7 lines/mm or 200 × 200 pels/25.4 mm	10
16	Two dimensional coding capability		Two dimensional coding	
17, 18	Recording width capabilities	27	Recording width	27
(0,0)	Scan line length 215 mm ± 1%		Scan line length 215 mm ± 1%	
(0,1)	Scan line length 215 mm ± 1% and scan line length 255 mm ± 1% and scan line length 303 mm ± 1%		Scan line length 303 mm ± 1%	
(1,0)	Scan line length 215 mm ± 1% and scan line length 255 mm ± 1%		Scan line length 255 mm ± 1%	
(1,1)	Invalid	6	Invalid	
19, 20	Maximum recording length capability		Maximum recording length	
(0,0)	A4 (297 mm)	2	A4 (297 mm)	
(0,1)	Unlimited		Unlimited	
(1,0)	A4 (297 mm) and B4 (364 mm)		B4 (364 mm)	
(1,1)	Invalid		Invalid	

Bit No.	DIS/DTC	Note	DCS	Note
21, 22, 23	Minimum scan line time capability at the receiver	4, 8 23	Minimum scan line time	24
(0,0,0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$		20 ms	
(0,0,1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$		40 ms	
(0,1,0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$		10 ms	
(1,0,0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$		5 ms	
(0,1,1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$			
(1,1,0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$			
(1,0,1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$			
(1,1,1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$		0 ms	
24	Extend field	5	Extend field	5
25	Reserved	1, 41	Reserved	1, 41
26	Uncompressed mode		Uncompressed mode	
27	Error correction mode	17	Error correction mode	17
28	Set to “0”		Frame size 0 = 256 octets Frame size 1 = 64 octets	7 24
29	Reserved	1	Reserved	1
30	Reserved	1	Reserved	1
31	T.6 coding capability	9, 17	T.6 coding enabled	9
32	Extend field	5	Extend field	5
33	Reserved	1	Reserved	1
34	Reserved	1	Reserved	1
35	Reserved	1	Reserved	1
36	Reserved	1	Reserved	1
37	Reserved	1	Reserved	1
38	Reserved	1	Reserved	1
39	Reserved	1	Reserved	1
40	Extend field	5	Extend field	5
41	R8 × 15.4 lines/mm	10	R8 × 15.4 lines/mm	10
42	300 × 300 pels/25.4 mm		300 × 300 pels/25.4 mm	
43	R16 × 15.4 lines/mm and/or 400 × 400 pels/25.4 mm	10, 12	R16 × 15.4 lines/mm and/or 400 × 400 pels/25.4 mm	10, 12
44	Inch based resolution preferred	13, 14	Resolution type selection “0”: metric based resolution “1”: inch based resolution	13, 14
45	Metric based resolution preferred	13,14	Don’t care	
46	Minimum scan line time capability for higher resolutions “0”: $T_{15.4} = T_{7.7}$ “1”: $T_{15.4} = 1/2\ T_{7.7}$	15	Don’t care	
47	Selective polling	26	Set to “0”	
48	Extend field	5	Extend field	5
49	Subaddressing capability		Subaddressing transmission	
50	Password	26	Password transmission	
51	Ready to transmit a data file (polling)	21	Set to “0”	
52	Reserved	1	Reserved	1
Bit No.	**DIS/DTC**	**Note**	**DCS**	**Note**

53	Binary File Transfer (BFT)	16, 17	Binary File Transfer (BFT)	16, 17
54	Document Transfer Mode (DTM)	17	Document Transfer Mode (DTM)	17
55	Electronic Data Interchange (EDI)	17	Electronic Data Interchange (EDI)	17
56	Extend field	5	Extend field	5
57	Basic Transfer Mode (BTM)	17	Basic Transfer Mode (BTM)	17
58	Reserved	1	Reserved	1
59	Ready to transmit a character or mixed mode document (polling)	17, 22	Set to “0”	
60	Character mode	17	Character mode	17
61	Reserved	1	Reserved	1
62	Mixed mode (Annex E/T.4)	17	Mixed mode (Annex E/T.4)	17
63	Reserved	1	Reserved	1
64	Extend field	5	Extend field	5
65	Processable mode 26 (Rec. T.505)		Processable mode 26 (Rec. T.505)	
66	Digital network capability	43	Digital network capability	43
67 (0) (1)	Duplex and half duplex capabilities Half duplex operation only Duplex and half duplex operation		Duplex and half duplex capabilities Half duplex operation only Duplex operation	
68	JPEG coding	25, 34	JPEG coding	25, 34
69	Full colour mode	35	Full colour mode	35
70	Set to “0”		Preferred Huffman tables	36
71	12 bits/pel component	37	12 bits/pel component	37
72	Extend field	5	Extend field	5
73	No subsampling (1:1:1)	38	No subsampling (1:1:1)	38
74	Custom illuminant	39	Custom illuminant	39
75	Custom gamut range	40	Custom gamut range	40
76	North American Letter (215.9 × 279.4 mm) capability	28	North American Letter (215.9 × 279.4 mm)	28
77	North American Legal (215.9 × 355.6 mm) capability	28	North American Legal (215.9 × 355.6 mm)	28
78	Single-progression sequential coding (Rec. T.85) basic capability	29, 30	Single-progression sequential coding (Rec. T.85) basic	29
79	Single-progression sequential coding (Rec. T.85) optional L0 capability	29, 30	Single-progression sequential coding (Rec. T.85) optional L0	29
80	Extend field	5	Extend field	5

Notes	
1	Bits that are indicated as “Reserved” shall be set to “0”.
2	Standard facsimile terminals conforming to Recommendation T.4 must have the following capability: Paper length = 297 mm.
3	Where the DIS or DTC frame defines V.27 *ter* capabilities, the terminal may be assumed to be operable at either 4800 or 2400 bit/s. Where the DIS or DTC frame defines V.29 capabilities, the terminal may be assumed to be operable at either 9600 or 7200 bit/s per Recommendation V.29; where it defines Recommendation V.17, the terminal may be assumed to be operable at 14 400 bit/s, 12 000 bit/s, 9600 bit/s or 7200 bit/s per Recommendation V.17.
4	$T_{7.7}$ and $T_{3.85}$ refer to the scan line times to be utilized when the vertical resolution is 7.7 lines/mm (or 200 lines/25.4 mm or 300 lines/25.4 mm) or 3.85 lines/mm, respectively (see bit 15 above). $T_{7.7}$ =1/2 $T_{3.85}$ indicates that when the vertical resolution is 7.7 lines/mm or 200 lines/25.4 mm or 300 lines/25.4 mm, the scan line time can be decreased by half.
5	The standard FIF field for the DIS, DTC and DCS signals is 24 bits long. If the “extend field” bit(s) is

	a “1”, the FIF field shall be extended by an additional eight bits.
6	Existing terminals may send the invalid (1,1) condition for bits 17 and 18 of their DIS signal. If such signal is received, it should be interpreted as (0,1).
7	The values of bit No. 28 in the DCS command is valid only when the indication of the T.4 error correction mode is invoked by bit 27.
8	The optional T.4 error correction mode of operation requires 0 ms of the minimum scan line time capability. Bits 21-23 in DIS/DTC signals indicate the minimum scan line time of a receiver regardless of the availability of the error correction mode. In case of error correction mode, the sender sends DCS signal with bits 21-23 set to 1, 1, 1 indicating 0 ms capability. In case of normal transmission, the sender sends DCS signal with bits 21-23 set to the appropriateness according to the capabilities of the two terminals.
9	T.6 coding scheme capability specified by bit 31 is valid only when bit 27 (error correction mode) is set as a “1”.
10	Resolutions of R8 and R16 are defined as follows: R8 = 1728 pels/(215 mm ± 1%) for ISO A4, North American Letter and Legal R8 = 2048 pels/(255 mm ± 1%) for ISO B4 R8 = 2432 pels/(303 mm ± 1%) for ISO A3 R16 = 3456 pels/(215 mm ± 1%) for ISO A4, North American Letter and Legal R16 = 4096 pels/(255 mm ± 1%) for ISO B4 R16 = 4864 pels/(303 mm ± 1%) for ISO A3
11	Bit 15, when set to “1”, is interpreted according to bit 44 and 45 as follows: bit 44 bit 45 Interpretation 0 0 (invalid) 1 0 200 × 200 pels/25.4 mm 0 1 R8 × 7.7 lines/mm 1 1 R8 × 7.7 lines/mm and 200 × 200 pels/25.4 mm “1” in bit 15 without bits 41, 42, 43, 44, 45 and 46 indicates R8 × 7.7 lines/mm.
12	Bit 43, when set to “1”, is interpreted according to bit 44 and 45 as follows: bit 44 bit 45 Interpretation 0 0 (invalid) 1 0 400 × 400 pels/25.4 mm 0 1 R16 × 15.4 lines/mm 1 1 R16 × 15.4 lines/mm and 400 × 400 pels/25.4 mm
13	Bits 44 and 45 are used only in conjunction with bits 15 and 43. Bit 44 in DCS, when used, shall correctly indicate the resolution of the transmitted document, which means that bit 44 in DCS may not always match the indication of bits 44 and 45 in DIS/DTC. Cross selection will cause the distortion and reduction of reproducible area. If a receiver indicates in DIS that it prefers to receive metric based information but the transmitter has only the equivalent inch based information (or vice versa), then communication shall still take place.
14	Bits 44 and 45 do not require the provision of any additional features on the terminal to indicate to the sending or receiving user whether the information was transmitted or received on a metric-metric, inch-inch, metric-inch, inch-metric basis.
15	$T_{15.4}$ refers to the scan line times to be utilized when the vertical resolution is 15.4 lines/mm or 400 lines/mm. $T_{15.4}$ = 1/2 $T_{7.7}$ indicates that when $T_{7.7}$ is 10, 20 or 40 ms, the scan line time can be decreased by half in higher resolution mode. When $T_{7.7}$ is 5 ms [i.e. (bit 21, bit 22, bit 23) = (1, 0, 0), (0, 1, 1)] or 0 ms [i.e. (1, 1, 1)], bit 46 in DIS/DTC should be set to “0” ($T_{15.4}$ = $T_{7.7}$).
16	The binary file transfer protocol is described in Recommendation T.434.
17	When either bit of 31, 51, 53, 54, 55, 57, 59, 60, 62, 78 and 79 is set to “1”, bit 27 shall also be set to “1”.
18	Bit 9 indicates that there is a facsimile document ready to be polled from the answering terminal. It is not an indication of a capability.
19	Bit 10 indicates that the answering terminal has receiving capabilities.
20	Bit 10 in DCS is a command to the receiving terminal to set itself in the receive mode.
21	Bit 51 indicates that there is a data file ready to be polled from the answering terminal. It is not an indication of a capability. This bit is used in conjunction with bits 53, 54 and 57.

22	Bit 59 indicates that there is a character coded or mixed mode document ready to be polled from the answering terminal. It is not an indication of a capability. This bit is used in conjunction with bits 60, 62 and 65.
23	When the optional procedure defined in Annex C of T30 is used, in DIS/DTC bits 6 and 7 shall be set to “0” and bits 21 to 23 and 27 shall be set to “1”.
24	When the optional procedure defined in Annex C of T30 is used, in DCS bits 6, 7 and 28 shall be set to “0” and bits 21 to 23 and 27 shall be set to “1”.
25	The optional continuous-tone colour mode and gray-scale mode protocols are described in Annex E of T30. If bit 68 in the DIS/DTC frame is set to “1”, indicating JPEG mode capability, then bit 15 and bit 27 in the DIS/DTC frame are also set to “1”. Bit 15 indicates 200 x 200 pels/25.4 mm resolution capability, which is basic for colour facsimile. Bit 27 indicates error correction mode capability, which is mandatory for colour facsimile. Bits 69 to 75 are relevant only if bit 68 is set to “1” (JPEG mode).
26	To provide an error recovery mechanism, when PWD/SEP/SUB frames are sent with DCS or DTC, bits 49 and 50 in DCS or bits 47 and 50 in DTC shall be set to “1”. Terminals conforming to the 1993 version of this Recommendation may set the above bits to “0” even though PWD/SEP/SUB frames are transmitted.
27	The corresponding scan line lengths for inch based resolutions can be found in 2.2/T.4.
28	While using bits 76 and 77 in DIS/DTC, the terminal is required to be able to receive ISO A4 documents in every combination of bits 76 and 77. A4, B4 and A3 transmitters may ignore the settings of bits 76 and 77.
29	The coding scheme indicated by bits 78 and 79 is defined in Recommendation T.85.
30	When bit 79 in DIS is set to “1”, bit 78 shall also be set to “1”.
31	Some terminals which conform to the 1994 and earlier versions of this Recommendation may have used this bit sequence to indicate use of the V.33 modulation system.
32	Some terminals which conform to the 1994 and earlier versions of this Recommendation may have used this bit sequence to indicate V.27 *ter*, V.29 and V.33 capabilities. In order to maintain compatibility with such terminals, a terminal which has the capability to receive using the modulation system defined in Recommendation V.17 must also be capable of receiving using the modulation system defined in Recommendation V.33. Further, a terminal which has the capability to receive using the modulation system defined in Recommendation V.33 must also be capable of receiving using the modulation system defined in Recommendation V.29.
33	When the modulation system defined in Recommendation V.34 is used, bits 11-14 in DCS are invalid and should be set to “0”.
34	In a DIS/DTC frame, setting bit 68 to 1 indicates that the called terminal’s JPEG mode is available and can decode continuous-tone image data (8 bits/component or more). Setting bit 68 to 0 indicates that the called terminal’s JPEG mode is not available and it cannot decode JPEG encoded data. In a DCS frame, setting bit 68 to 1 indicates that the calling terminal’s JPEG mode is used and JPEG encoded image data are sent. Setting bit 68 to 0 indicates that the JPEG mode is not used and image is not encoded using JPEG.
35	In a DIS/DTC frame, setting bit 69 to 1 indicates that the called terminal has full colour capability. It can accept full colour image data in CIELAB space. Setting bit 69 to 0 indicates that the called terminal has gray-scale mode only, that is, it accepts only the lightness component (the L* component) in the CIELAB representation. In a DCS frame, setting bit 69 to 1 indicates that the calling terminal sends image in full colour representation in the CIELAB space. Setting bit 69 to 0 indicates that the calling terminal sends only the lightness component (the L* component) in the CIELAB representation. Note that if bit 68 = 1 and bit 69 = 0, the continuous-tone image data have no colour component. The image data are called gray-scale or black and white gray-scale images. Continuous-tone full colour image capability is enabled only when bits 68 and 69 are both set to one.
36	Bit 70 is called “Indication of default Huffman tables”. A means is provided to indicate to the called terminal that the Huffman tables are the default tables. Default tables are specified only for the default image intensity resolution (8 bits/pel/component). The default Huffman tables are to be determined (for example, Tables K.3 to K.6/T.81). In a DIS/DTC frame, bit 70 is not used and is set to zero. In a DCS frame, setting bit 70 to 0 indicates that the calling terminal does not identify the Huffman tables that it uses to encode the image data as the default tables. Setting bit 70 to 1 indicates that the calling terminal identifies the Huffman tables that it uses to encode the image data as the default tables.
37	In a DIS/DTC frame, setting bit 71 to 0 indicates that the called terminal can only accept image data that are digitised to 8 bits/pel/component. Setting bit 71 to 1 indicates that the called terminal can

	also accept image data that are digitised to 12 bits/pel/component. In a DCS frame, setting bit 71 to 0 indicates that the calling terminal's image data are digitised to 8 bits/pel/component. Setting bit 71 to 1 indicates that the calling terminal's image data are digitised to 12 bits/pel/component.
38	In a DIS/DTC frame, setting bit 73 to 0 indicates that the called terminal expects a 4:1:1 subsampling ratio of the chrominance components in the image data; the a* and b* components in the CIELAB colour space representation are subsampled four times to one against the L* (Lightness) component. The details are described in Annex E of T.4. Setting bit 73 to 1 indicates that the called terminal, as an option, accepts no subsampling in the chrominance components in the image data. In a DCS frame, setting bit 73 to 0 indicates that the called terminal uses a 4:1:1 subsampling ratio of the a* and b* components in the image data. Setting bit 73 to 1 indicates that the called terminal does no subsampling.
39	In a DIS/DTC frame, setting bit 74 to 0 indicates that the called terminal expects that the CIE Standard Illuminant D50 is used in the colour image data as specified in Recommendation T.42. Setting bit 74 to 1 indicates that the called terminal can also accept other illuminant types besides the D50 illuminant. The specification of illuminant is embedded into the JPEG syntax as described in Annex E of T.4. In a DCS frame, setting bit 74 to 0 indicates that the calling terminal uses D50 illuminant in the colour image data representation as specified in Recommendation T.42. Setting bit 74 to 1 indicates that another type of illuminant is used, the specification of which is embedded into the JPEG syntax as described in Annex E of T.4.
40	In a DIS/DTC frame, setting bit 75 to 0 indicates that the called terminal expects that the colour image data are represented using the default gamut range as specified in Recommendation T.42. Setting bit 75 to 1 indicates that the called terminal can also accept other gamut ranges, the specification of which is embedded into the JPEG syntax as described in Annex E of T.4. In a DCS frame, setting bit 75 to 0 indicates that the calling terminal uses the default gamut range as specified in Recommendation T.42. Setting bit 75 to 1 indicates that the calling terminal uses a different gamut range, the specification of which is embedded into the JPEG syntax as described in Annex E of T.4.
41	Some terminals which conform to the pre-1996 versions of this Recommendation may set this bit to "1". Such terminals will give an answering sequence as shown in Figure III.2 of T30.
42	It is understood that for backwards compatibility, a transmitting terminal may ignore the request for the 64 octet frame and therefore the receiving terminal must be prepared to handle 256 octet frames by some means.
43	See T30 C.7.2.

Table 3-2

3.10.6.2.4 CSI coding format

The facsimile information field of the CSI signal shall be the international telephone number including the "+" character, the telephone country code, area code and subscriber number. This field shall consist of 20 numeric digits coded as shown in the table below but excluding the "*" and "#" characters. The least significant bit of the least significant digit shall be the first bit transmitted.

3.10.6.2.5 CIG coding format

The facsimile information field of the CIG signal shall be the international telephone number including the "+" character, telephone country code, area code and subscriber number. This field shall consist of 20 numeric digits coded as shown in the table below but excluding the "*" and "#" characters. The least significant bit of the least significant digit shall be the first bit transmitted.

3.10.6.2.6 TSI coding format

The facsimile information field of the TSI signal shall be the international telephone number including the "+" character, telephone country code, area code and subscriber number. This field shall consist of 20 numeric digits coded as shown in the table below but excluding the "*" and "#" characters. The least significant bit of the least significant digit shall be the first bit transmitted.

3.10.6.2.7 Non-standard capabilities (NSF, NSC, NSS)

When a non-standard capabilities FCF is utilized, it must be immediately followed by an FIF. This information field will consist of at least two octets. The first octet will contain an ITU-T country code (The procedure for obtaining a registered ITU-T code is given in Recommendation T.35). Additional information could then be transmitted within the FIF field. This information is not specified and can be used to describe non-standard features, etc.

3.10.6.2.8 PWD coding format

The facsimile information field of the PWD signal shall consist of 20 numeric digits coded as shown in the table below but excluding the "+" character. The least significant bit of the least significant digit shall be the first bit transmitted. The unused octets in the information field shall be filled with the "space" character and the information should be right justified.

3.10.6.2.9 SEP coding format

The facsimile information field of the SEP signal shall consist of 20 numeric digits coded as shown in the table below but excluding the "+" character. The least significant bit of the least significant digit shall be the first bit transmitted. The unused octets in the information field shall be filled with the "space" character and the information should be right justified.

3.10.6.2.10 SUB coding format

The facsimile information field of the SUB signal shall consist of 20 numeric digits coded as shown in the table below but excluding the "+" character. The least significant bit of the least significant digit shall be the first bit transmitted. The unused octets in the information field shall be filled with the "space" character and the information should be right justified.

Digit	MSB (FB)	Bits	LSB
+	0	010101	1
0	0	011000	0
1	0	011000	1
2	0	011001	0
3	0	011001	1
4	0	011010	0
5	0	011010	1
6	0	011011	0
7	0	011011	1
8	0	011100	0
9	0	011100	1
Space	0	010000	0
*	0	010101	0
#	0	010001	1

Table 3-3

MSB = Most Significant Bit LSB = Least Significant Bit FB = Fill Bit

The "+" character shall not be used in the PWD/SEP/SUB signals.
The "*" and "#" characters shall not be used in the CSI/CIG/TSI signals.

3.10.7 Frame Checking Sequences (FCSs)

The FCS shall be a 16-bit sequence. It shall be the 1s complement of the sum (modulo 2) of:

1) remainder of x^k ($x^{15} + x^{14} + x^{13} + \ldots + x^2 + x + 1$) divided (modulo 2) by the generator polynomial $x^{16} + x^{12} + x^5 + 1$, where k is the number of bits in the frame existing between, but not including, the final bit of the opening flag and the first bit of the FCS, excluding bits inserted for transparency; and

2) the remainder after multiplication by x16 and then division (modulo 2) by the generator polynomial x16 + x12 + x5 + 1, of the content of the frame, existing between, but not including, the final bit of the opening flag and the first bit of the FCS, excluding bits inserted for transparency.

As a typical implementation, at the transmitter, the initial remainder of the division is preset to all 1s and is then modified by division by the generator polynomial (as described above) on the address, control and information fields; the 1s complement of the resulting remainder is transmitted as the 16-bit FCS sequence.

At the receiver, the initial remainder is preset to all 1s and the serial incoming protected bits and the FCS when divided by the generator polynomial will result in a remainder of 0001110100001111 (x^{15} through x^0, respectively) in the absence of transmission errors.

The FCS shall be transmitted to the line commencing with the coefficient of the highest term.

3.11 Binary coded signalling implementation requirements

3.11.1 Commands and responses

A response must be sent, and only sent, upon detecting a valid command. Upon receiving a valid response, a new command must be issued within 3 seconds.

3.11.1.1 Optional command and response frames

If optional frames (e.g. NSF or NSF, CSI) are sent, they must directly precede any mandatory command/response frame which is sent. In this case, bit 5 of the control field is 0 for the optional frames and is 1 only for the final frame.

3.11.1.2 Options within standard frames

Certain optional portions of standard signals (e.g. the fifth bit of the PRI-Q signal) need not be utilized at either the transmitting terminal or the receiving terminal. However, the use of these optional portions of standard signals shall not cause erroneous operation.

3.11.2 Line control procedures and error recovery

Once the transmitting and receiving terminals have been identified, all commands are initiated by the transmitting terminal and solicit an appropriate response from the receiving terminal. Furthermore, the transmission of a response is permitted only when solicited by a valid command. If the transmitting terminal does not receive an appropriate valid response within 3 s ± 15%, it will repeat the command. After three unsuccessful attempts, the transmitting terminal will send the disconnect (DCN) command and terminate the call. A command or a response is not valid and should be discarded if:

- any of the frames, optional or mandatory, have an FCS error;
- any single frame exceeds 3 s ± 15% (see Note 1);
- the final frame does not have the control bit 5 set to a binary 1;
- the final frame is not a recognized standard command/response frame (see Appendix II).

The delay of 3 seconds before retransmission of the command can be shortened by the use of the optional command repeat (CRP) response. If the transmitting terminal receives a CRP response, it may immediately retransmit the most recent command.

During the initial pre-message procedure, neither terminal has a defined role (i.e. transmitter or receiver). Therefore, the terminal transmitting the DIS command will continue to retransmit it until, according to the procedures, each terminal has identified itself and the normal line control procedures may be followed.

NOTES

1 The implications of a maximum frame length of 3 s ± 15% are:
- no transmitted frame should exceed 2.55 s (i.e. 3 s – 15%);
- any frame which is received and is detected as greater than 3.45 s shall be discarded (i.e. 3 s + 15%);
- a frame received which is between 2.55 and 3.45 s duration may be discarded.

2 A terminal may discard a received DIS signal with the identical bit allocation as that terminal has issued.

3.11.3 Timing considerations

3.11.3.1 Time-outs

Time-outs T1 defines the amount of time two terminals will continue to attempt to identify each other. T1 is 35 ± 5 seconds, begins upon entering phase B, and is reset upon detecting a valid signal or when T1 times out.

Time-out T2 makes use of the tight control between commands and responses to detect the loss of command/response synchronization. T2 is 6 ± 1 seconds and begins when initiating a command search. T2 is reset when an HDLC flag is received or when T2 times out.

Time-out T3 defines the amount of time a terminal will attempt to alert the local operator in response to a procedural interrupt. Failing to achieve operator intervention, the terminal will discontinue this attempt and shall issue other commands or responses. T3 is 10 ± 5 seconds, begins on the first detection of a procedural interrupt command/response signal (i.e. PIN/PIP or PRI-Q) and is reset when T3 times out or when the operator initiates a line request.

3.12 HDLC-Frame structure

Preamble 0111 1110 7E for 1s	BCS-Info							
	Digital ID Frame							
	Flag 0111 1110 7E	Flag 0111 1110 7E	Address 1111 1111 FF	Control	FCF	FIF	FCS 16 bit frame checking sequ.	Flag 0111 1110 7E
				Non-final 1100 0000 C0	DIS 0000 0001 01	Mand. Tab2 / T.30	Initial Id's	
				Final 1100 1000 C8	CSI 0000 0010 02	Opt. 20 byte tel.no.		
					NSF 0000 0100 04	Opt. 1 byte country-code + add. info		
					DTC 1000 0001 81	Mand. Tab2 / T.30	Commands To Send	
					CIG 1000 0010 82	Opt. 20 byte tel.no.		
					NSC 1000 0100 84	Opt. 1 byte country-code + add. info		
					PWD 1000 0011 83	If bit 50 in DIS is set 20 bytes (password)		
					SEP 1000 0101 85	If bit 47 in DIS is set 20 bytes (selective polling)		
					DCS x100 0001 41 / C1	Mand. Tab2 / T.30	Commands To Receive	
					TSI x100 0010 42 / C2	Opt. 20 bytes tel.no.		
					NSS x100 0100 44 / C4	Opt. 1 byte country-code + add. info		
					SUB X100 0011 43 / C3	If bit 49 in DIS or DTC is set 20 bytes		
					PWD x100 0101 45 / C5	If bit 50 in DIS is set 20 bytes (password)		
					TCF	0's for 1.5s No HDLC-Frame required		
					CFR x010 0001 21 / A1		Pre-msg Response Signals	
					FTT x010 0010 22 / A2			
						See T.4-Recommendation	In-msg Procedure	
					EOM x111 0001 71 / F1	End of page (next page phase B)	Post-msg Commands	
					MPS x111 0010 72 / F2	End of page (next page phase C)		
					EOP x111 0100 74 / F4	End of procedure -> call release		
					PRI-EOM x111 1001 79 / F9	End of page (next page phase B) with operator intervention		
					PRI-MPS x111 1010 7A / FA	End of page (next page phase C) with operator intervention		
					PRI-EOP x111 1100 7C/ FC	End of procedure -> call release with operator intervention		

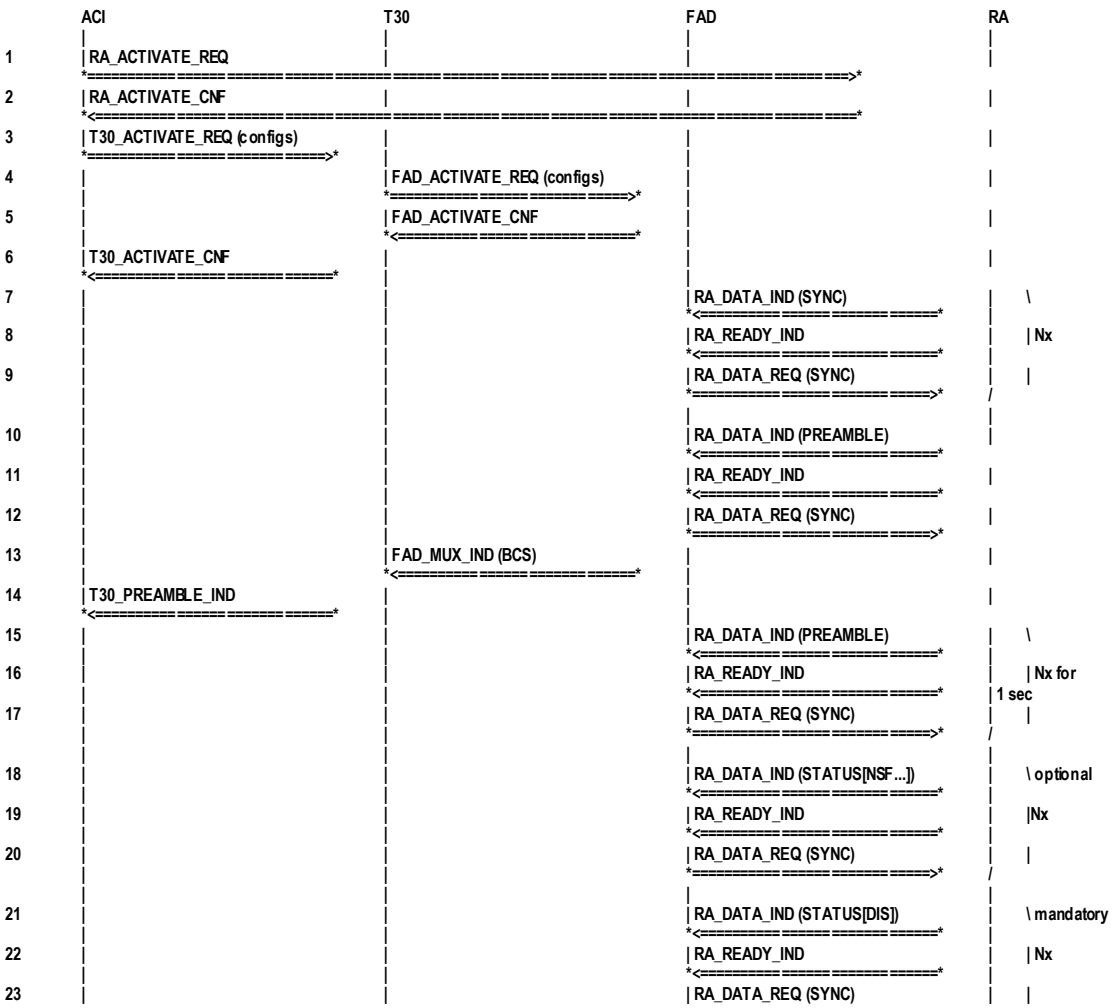
x = 0
station which receives a valid response to a DIS
x = 1
station which receives a valid DIS signal

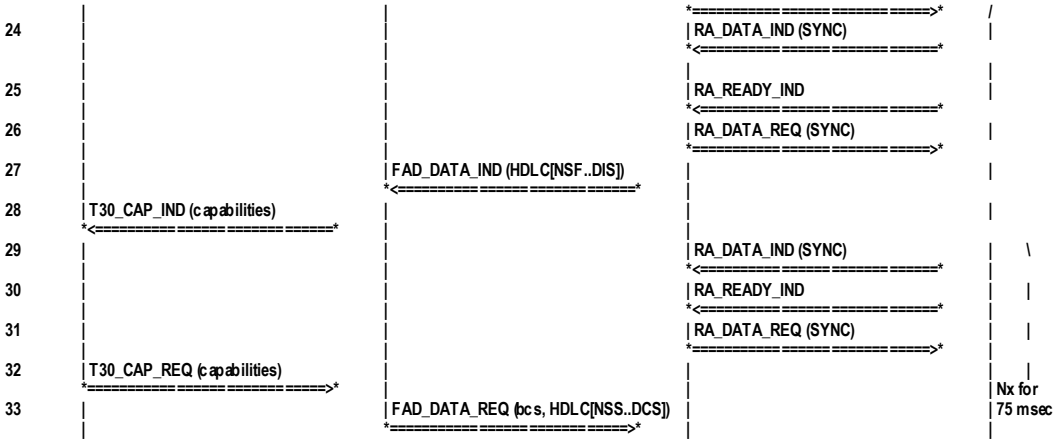
MCF x011 0001 31 / B1	Positive response to MPS, EOM, EOP, RR, PPS	Post-msg Responses
RTP x011 0011 33 / B3	Not applicable in opt. T4 error correction mode	
RTN x011 0010 32 / B2	Not applicable in opt. T4 error correction mode	
PIP x011 0101 35 / B5	Positive response to MPS, EOM, EOP, PRI-Q	
PIN x011 0100 34 / B4	Negative response to MPS, EOM, EOP, PRI-Q	
FDM x011 1111 3F / BF	If bit 53 in DIS is set Instaed of MCF	
DCN x101 1111 5F / DF	-> call release	
CRP x101 1000 58 / D8	Repeat last command incl. opt. frames	

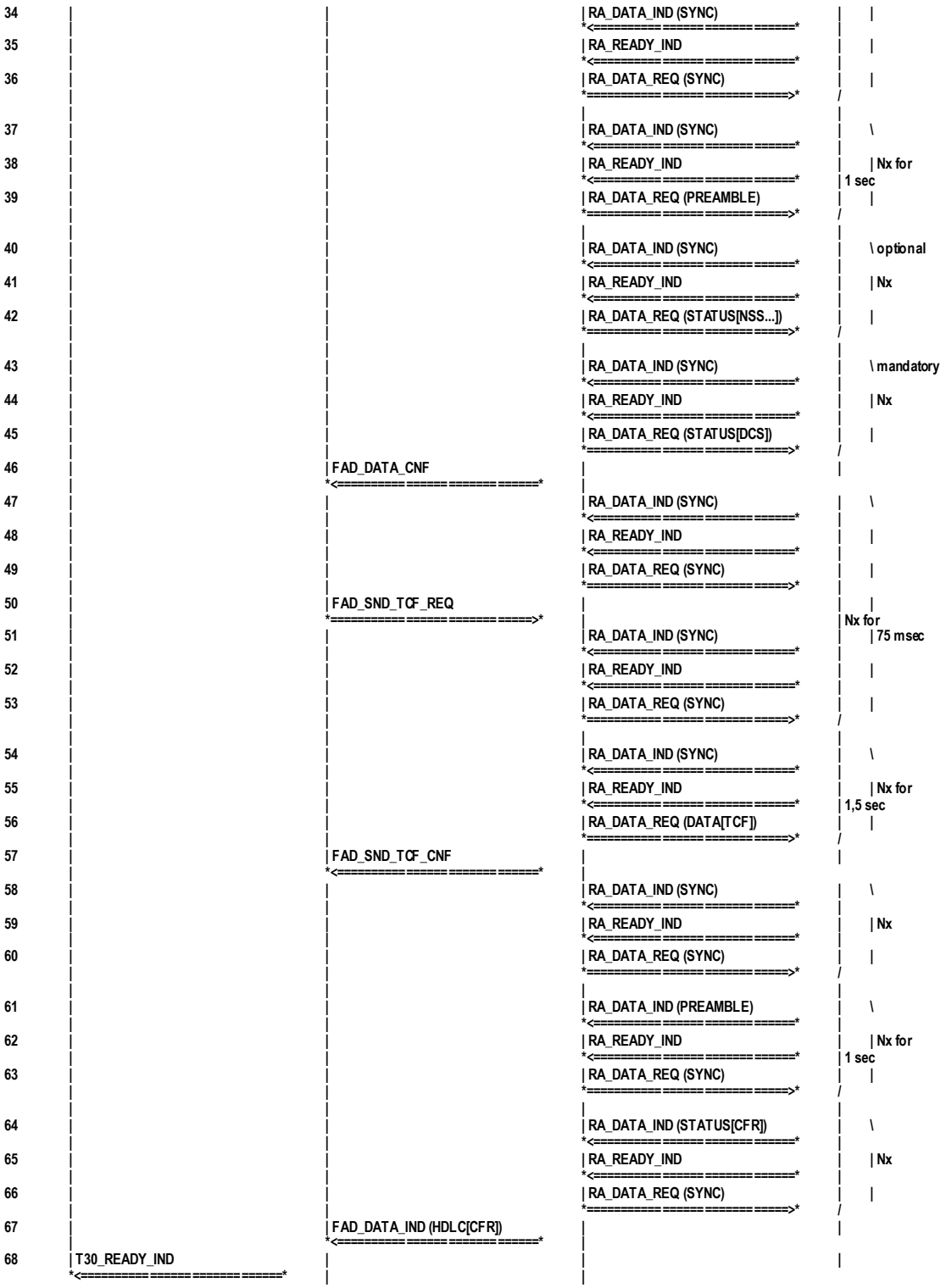
Repeat command after 3 sec if no valid response is received. After 3 unsuccessfully attempts send DCN and terminate call.

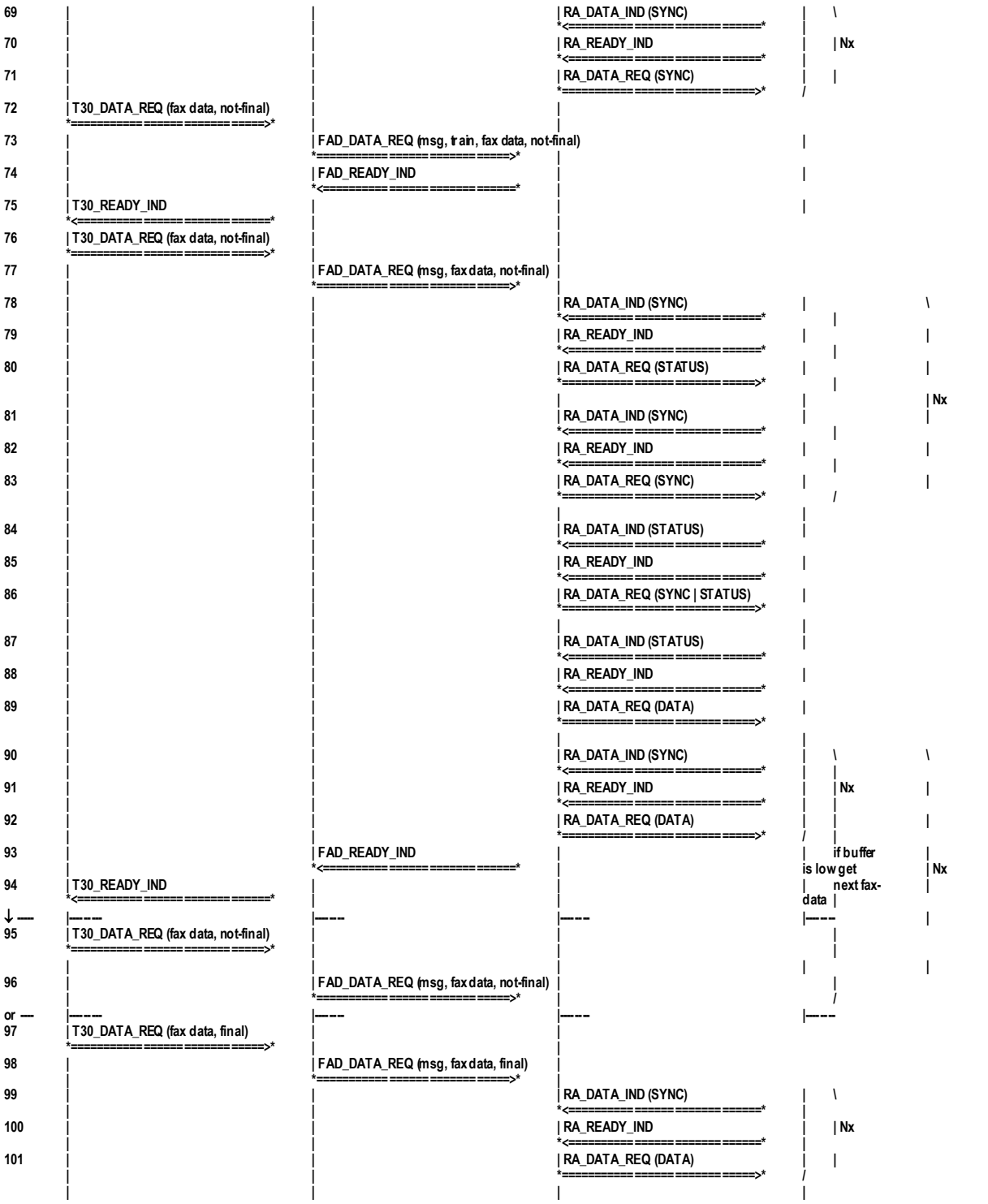
4 Protocol - Overview

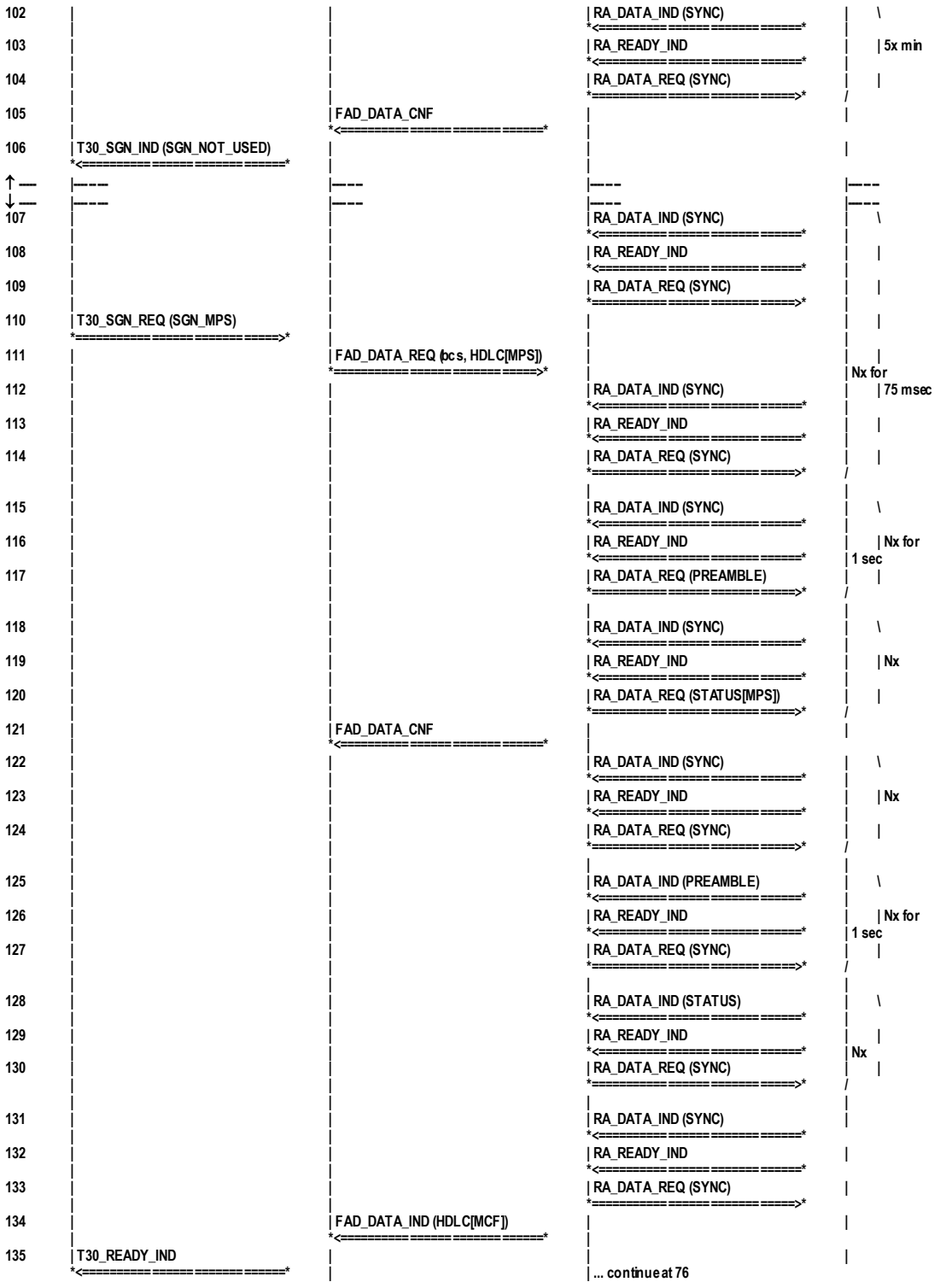
4.1 Send Fax (9600, 4800, 2400), best case

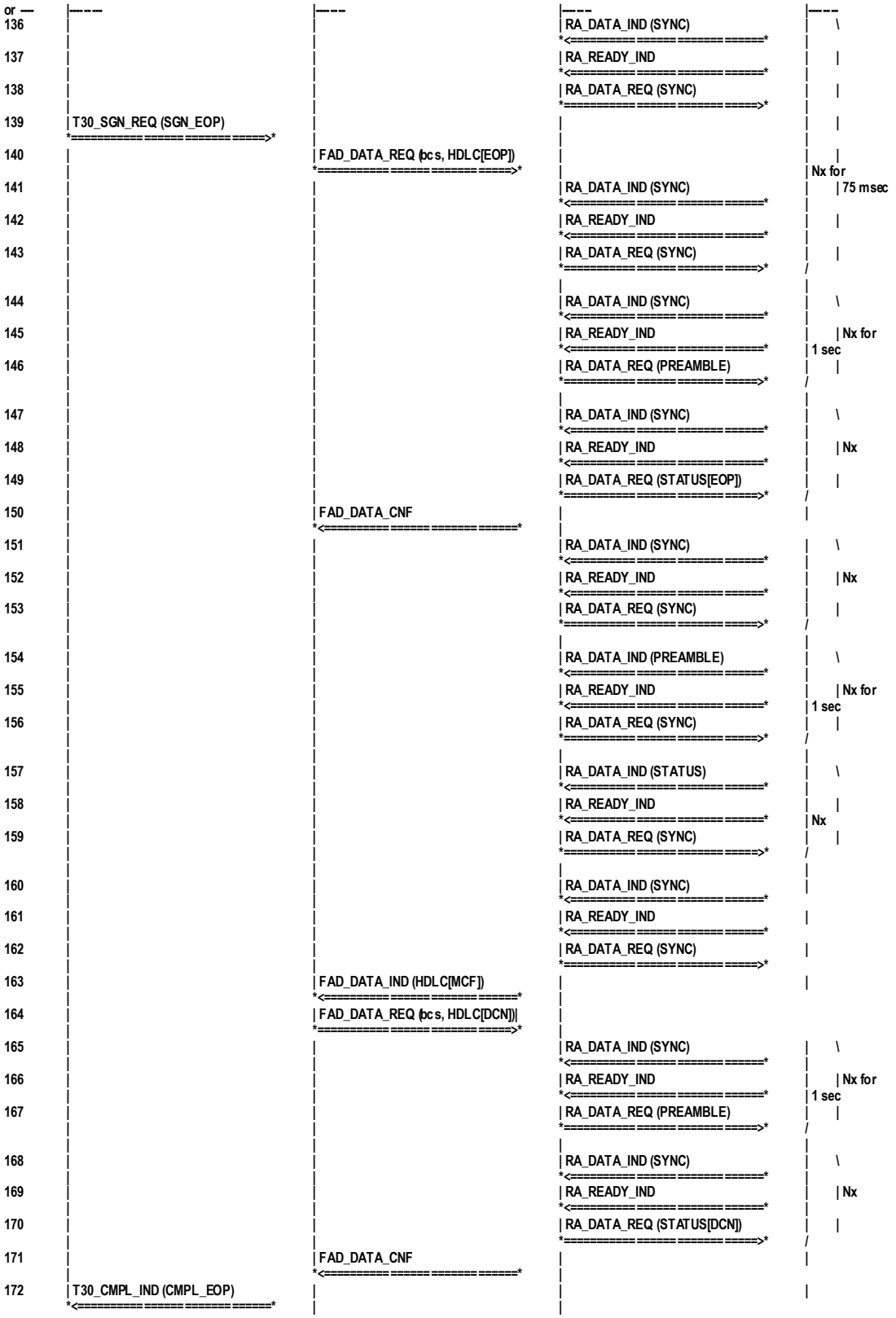


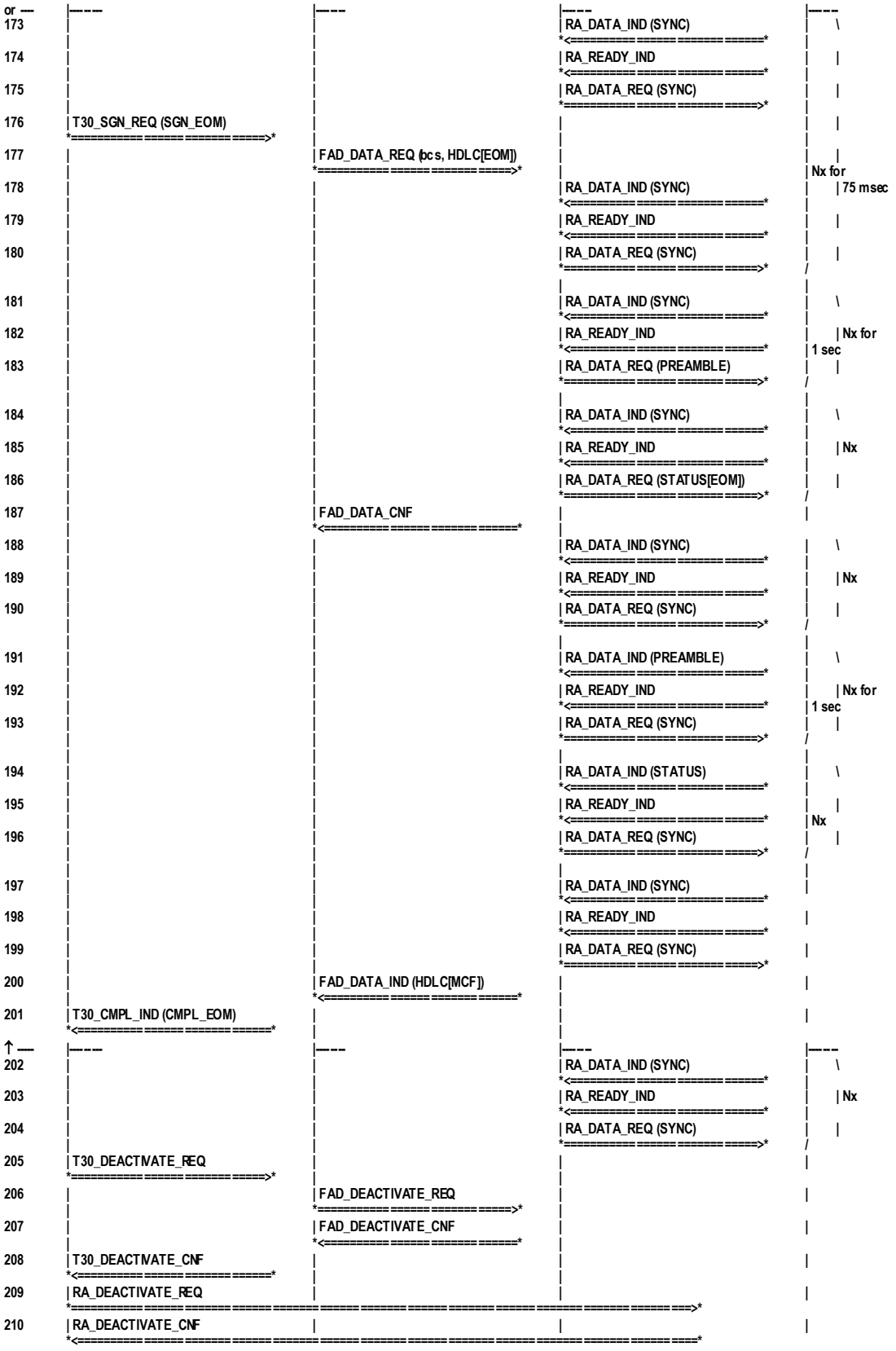

24
RA_DATA_IND (SYNC)
25
RA_READY_IND
26
RA_DATA_REQ (SYNC)
27
FAD_DATA_IND (HDLC[NSF..DIS])
28
T30_CAP_IND (capabilities)
29
RA_DATA_IND (SYNC)
30
RA_READY_IND
31
RA_DATA_REQ (SYNC)
32
T30_CAP_REQ (capabilities)
33
FAD_DATA_REQ (pcs, HDLC[NSS..DCS])
Nx for
75 msec


34 RA_DATA_IND (SYNC)
35 RA_READY_IND
36 RA_DATA_REQ (SYNC)
37 RA_DATA_IND (SYNC)
38 RA_READY_IND
39 RA_DATA_REQ (PREAMBLE)
40 RA_DATA_IND (SYNC)
41 RA_READY_IND
42 RA_DATA_REQ (STATUS[NSS...])
43 RA_DATA_IND (SYNC)
44 RA_READY_IND
45 RA_DATA_REQ (STATUS[DCS])
46 FAD_DATA_CNF
47 RA_DATA_IND (SYNC)
48 RA_READY_IND
49 RA_DATA_REQ (SYNC)
50 FAD_SND_TCF_REQ
51 RA_DATA_IND (SYNC)
52 RA_READY_IND
53 RA_DATA_REQ (SYNC)
54 RA_DATA_IND (SYNC)
55 RA_READY_IND
56 RA_DATA_REQ (DATA[TCF])
57 FAD_SND_TCF_CNF
58 RA_DATA_IND (SYNC)
59 RA_READY_IND
60 RA_DATA_REQ (SYNC)
61 RA_DATA_IND (PREAMBLE)
62 RA_READY_IND
63 RA_DATA_REQ (SYNC)
64 RA_DATA_IND (STATUS[CFR])
65 RA_READY_IND
66 RA_DATA_REQ (SYNC)
67 FAD_DATA_IND (HDLC[CFR])
68 T30_READY_IND
Nx for 1 sec
optional
Nx
mandatory
Nx for 75 msec
Nx for 1,5 sec
Nx for 1 sec

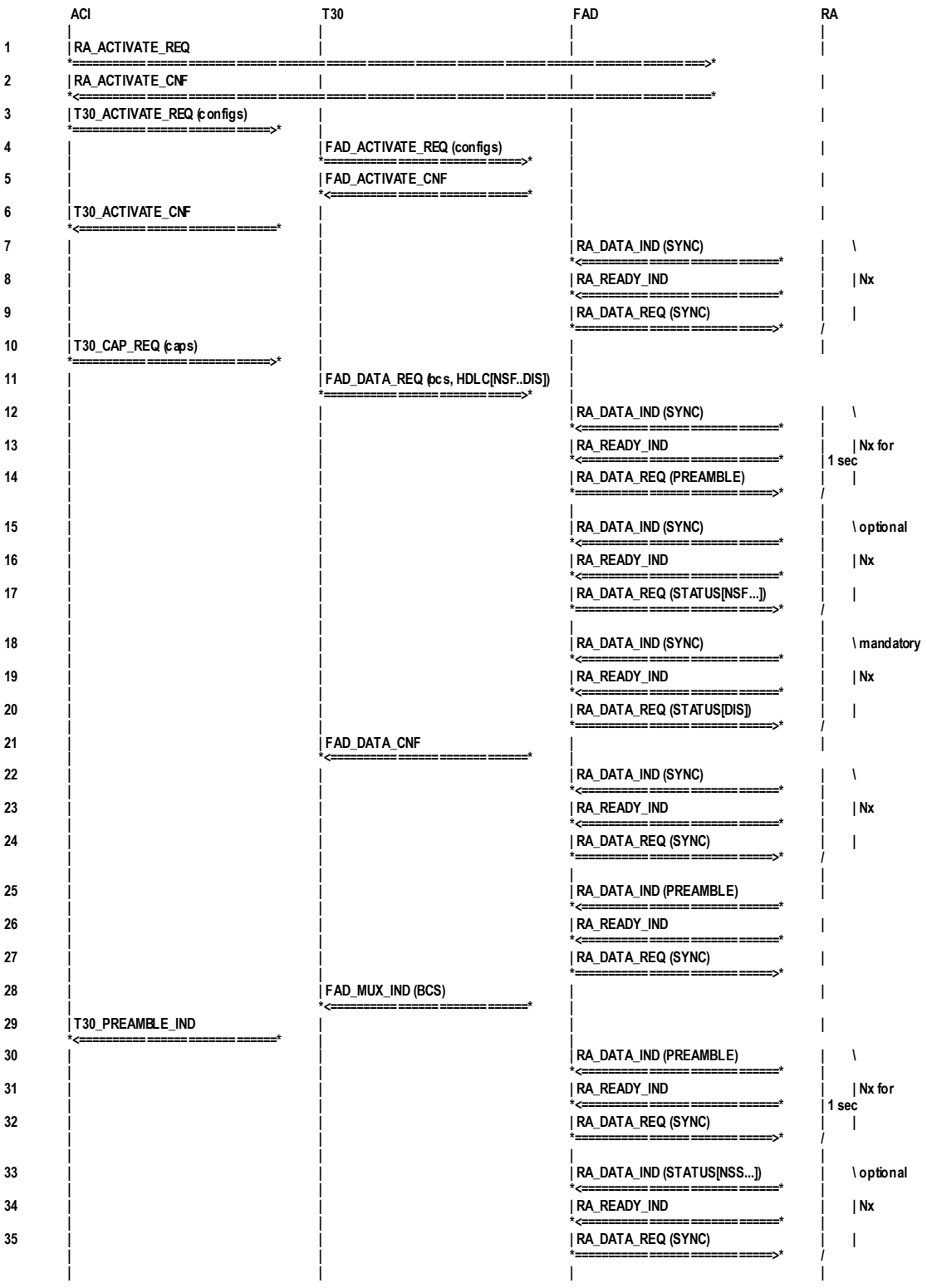

69 RA_DATA_IND (SYNC)
70 RA_READY_IND
71 RA_DATA_REQ (SYNC)
72 T30_DATA_REQ (fax data, not-final)
73 FAD_DATA_REQ (msg, train, fax data, not-final)
74 FAD_READY_IND
75 T30_READY_IND
76 T30_DATA_REQ (fax data, not-final)
77 FAD_DATA_REQ (msg, fax data, not-final)
78 RA_DATA_IND (SYNC)
79 RA_READY_IND
80 RA_DATA_REQ (STATUS)
81 RA_DATA_IND (SYNC)
82 RA_READY_IND
83 RA_DATA_REQ (SYNC)
84 RA_DATA_IND (STATUS)
85 RA_READY_IND
86 RA_DATA_REQ (SYNC | STATUS)
87 RA_DATA_IND (STATUS)
88 RA_READY_IND
89 RA_DATA_REQ (DATA)
90 RA_DATA_IND (SYNC)
91 RA_READY_IND
92 RA_DATA_REQ (DATA)
93 FAD_READY_IND
if buffer is low get next fax-data
Nx
94 T30_READY_IND
95 T30_DATA_REQ (fax data, not-final)
96 FAD_DATA_REQ (msg, fax data, not-final)
or
97 T30_DATA_REQ (fax data, final)
98 FAD_DATA_REQ (msg, fax data, final)
99 RA_DATA_IND (SYNC)
100 RA_READY_IND
101 RA_DATA_REQ (DATA)

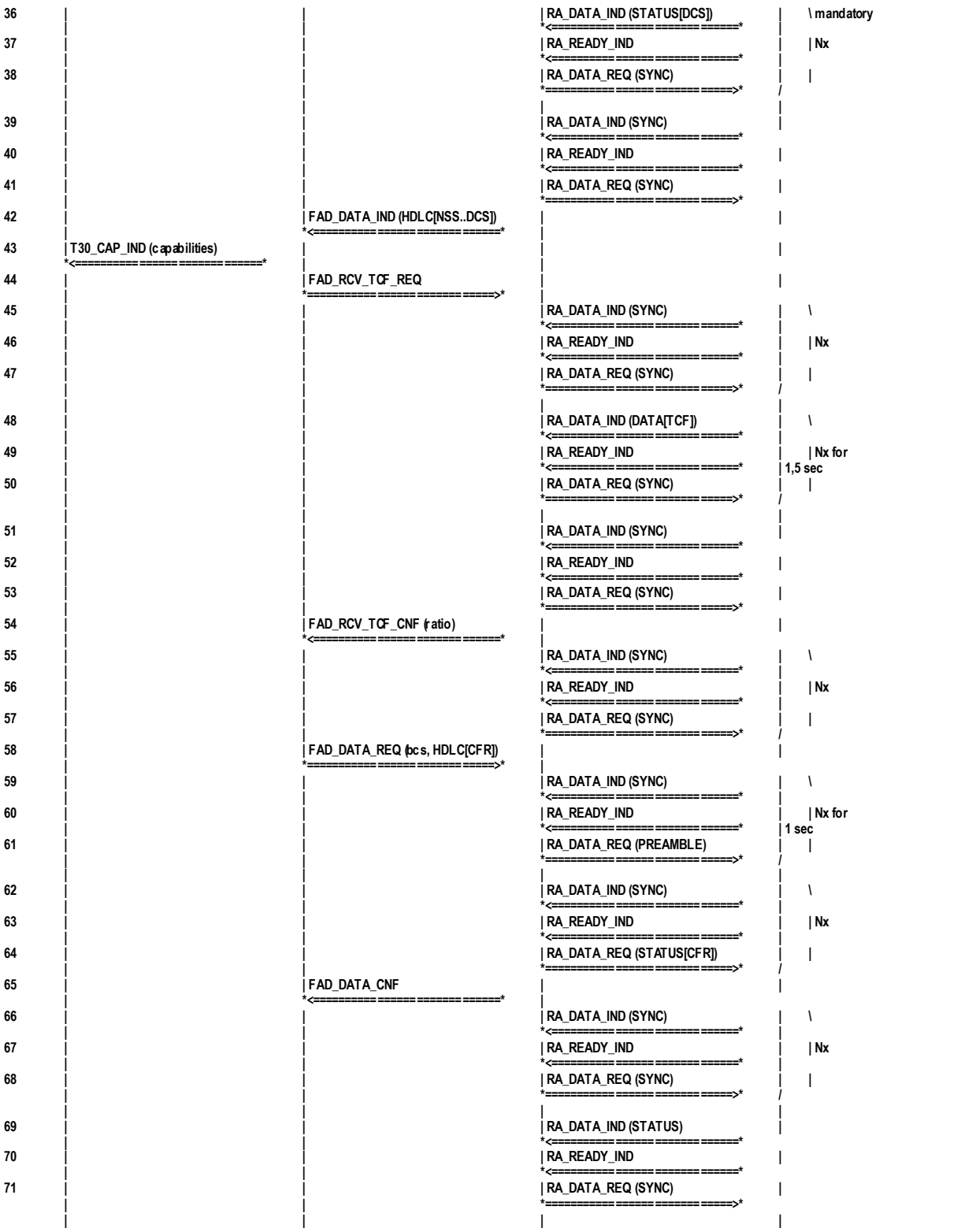

102 RA_DATA_IND (SYNC)
103 RA_READY_IND
104 RA_DATA_REQ (SYNC)
105 FAD_DATA_CNF
106 T30_SGN_IND (SGN_NOT_USED)
107 RA_DATA_IND (SYNC)
108 RA_READY_IND
109 RA_DATA_REQ (SYNC)
110 T30_SGN_REQ (SGN_MPS)
111 FAD_DATA_REQ (pcs, HDLC[MPS])
112 RA_DATA_IND (SYNC)
113 RA_READY_IND
114 RA_DATA_REQ (SYNC)
115 RA_DATA_IND (SYNC)
116 RA_READY_IND
117 RA_DATA_REQ (PREAMBLE)
118 RA_DATA_IND (SYNC)
119 RA_READY_IND
120 RA_DATA_REQ (STATUS[MPS])
121 FAD_DATA_CNF
122 RA_DATA_IND (SYNC)
123 RA_READY_IND
124 RA_DATA_REQ (SYNC)
125 RA_DATA_IND (PREAMBLE)
126 RA_READY_IND
127 RA_DATA_REQ (SYNC)
128 RA_DATA_IND (STATUS)
129 RA_READY_IND
130 RA_DATA_REQ (SYNC)
131 RA_DATA_IND (SYNC)
132 RA_READY_IND
133 RA_DATA_REQ (SYNC)
134 FAD_DATA_IND (HDLC[MCF])
135 T30_READY_IND
... continue at 76
5x min
Nx for 75 msec
Nx for 1 sec
Nx
Nx
Nx for 1 sec
Nx

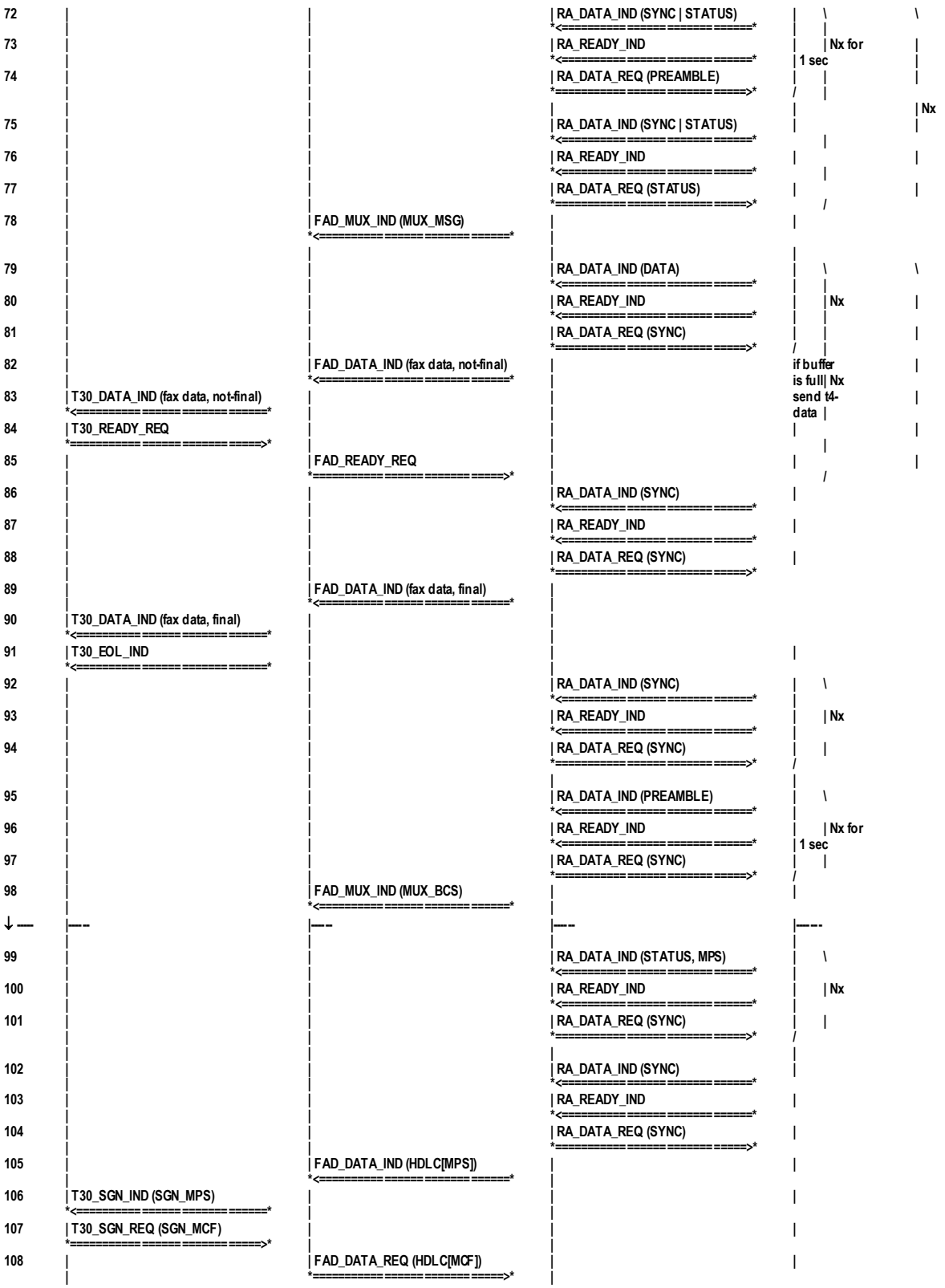

or —
136 RA_DATA_IND (SYNC)
137 RA_READY_IND
138 RA_DATA_REQ (SYNC)
139 T30_SGN_REQ (SGN_EOP)
140 FAD_DATA_REQ (pcs, HDLC[EOP])
Nx for
141 RA_DATA_IND (SYNC) 75 msec
142 RA_READY_IND
143 RA_DATA_REQ (SYNC)
144 RA_DATA_IND (SYNC)
145 RA_READY_IND Nx for
1 sec
146 RA_DATA_REQ (PREAMBLE)
147 RA_DATA_IND (SYNC)
148 RA_READY_IND Nx
149 RA_DATA_REQ (STATUS[EOP])
150 FAD_DATA_CNF
151 RA_DATA_IND (SYNC)
152 RA_READY_IND Nx
153 RA_DATA_REQ (SYNC)
154 RA_DATA_IND (PREAMBLE)
155 RA_READY_IND Nx for
1 sec
156 RA_DATA_REQ (SYNC)
157 RA_DATA_IND (STATUS)
158 RA_READY_IND
Nx
159 RA_DATA_REQ (SYNC)
160 RA_DATA_IND (SYNC)
161 RA_READY_IND
162 RA_DATA_REQ (SYNC)
163 FAD_DATA_IND (HDLC[MCF])
164 FAD_DATA_REQ (pcs, HDLC[DCN])
165 RA_DATA_IND (SYNC)
166 RA_READY_IND Nx for
1 sec
167 RA_DATA_REQ (PREAMBLE)
168 RA_DATA_IND (SYNC)
169 RA_READY_IND Nx
170 RA_DATA_REQ (STATUS[DCN])
171 FAD_DATA_CNF
172 T30_CMPL_IND (CMPL_EOP)

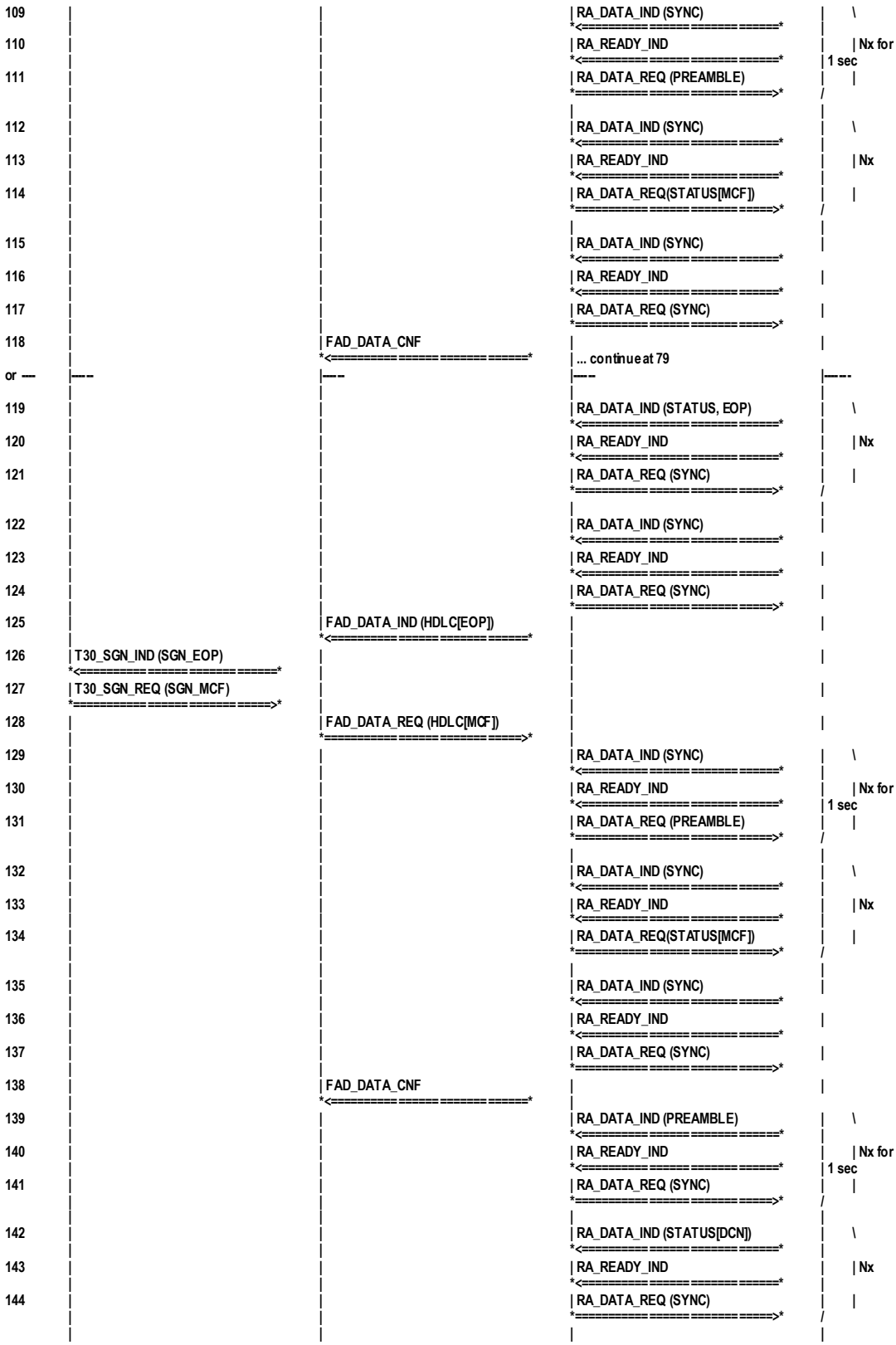

or —
173
RA_DATA_IND (SYNC)
174
RA_READY_IND
175
RA_DATA_REQ (SYNC)
176
T30_SGN_REQ (SGN_EOM)
177
FAD_DATA_REQ (pcs, HDLC[EOM])
178
RA_DATA_IND (SYNC)
179
RA_READY_IND
180
RA_DATA_REQ (SYNC)
181
RA_DATA_IND (SYNC)
182
RA_READY_IND
183
RA_DATA_REQ (PREAMBLE)
184
RA_DATA_IND (SYNC)
185
RA_READY_IND
186
RA_DATA_REQ (STATUS[EOM])
187
FAD_DATA_CNF
188
RA_DATA_IND (SYNC)
189
RA_READY_IND
190
RA_DATA_REQ (SYNC)
191
RA_DATA_IND (PREAMBLE)
192
RA_READY_IND
193
RA_DATA_REQ (SYNC)
194
RA_DATA_IND (STATUS)
195
RA_READY_IND
196
RA_DATA_REQ (SYNC)
197
RA_DATA_IND (SYNC)
198
RA_READY_IND
199
RA_DATA_REQ (SYNC)
200
FAD_DATA_IND (HDLC[MCF])
201
T30_CMPL_IND (CMPL_EOM)
Nx for 75 msec
Nx for 1 sec
Nx
↑ —
202
RA_DATA_IND (SYNC)
203
RA_READY_IND
204
RA_DATA_REQ (SYNC)
205
T30_DEACTIVATE_REQ
206
FAD_DEACTIVATE_REQ
207
FAD_DEACTIVATE_CNF
208
T30_DEACTIVATE_CNF
209
RA_DEACTIVATE_REQ
210
RA_DEACTIVATE_CNF

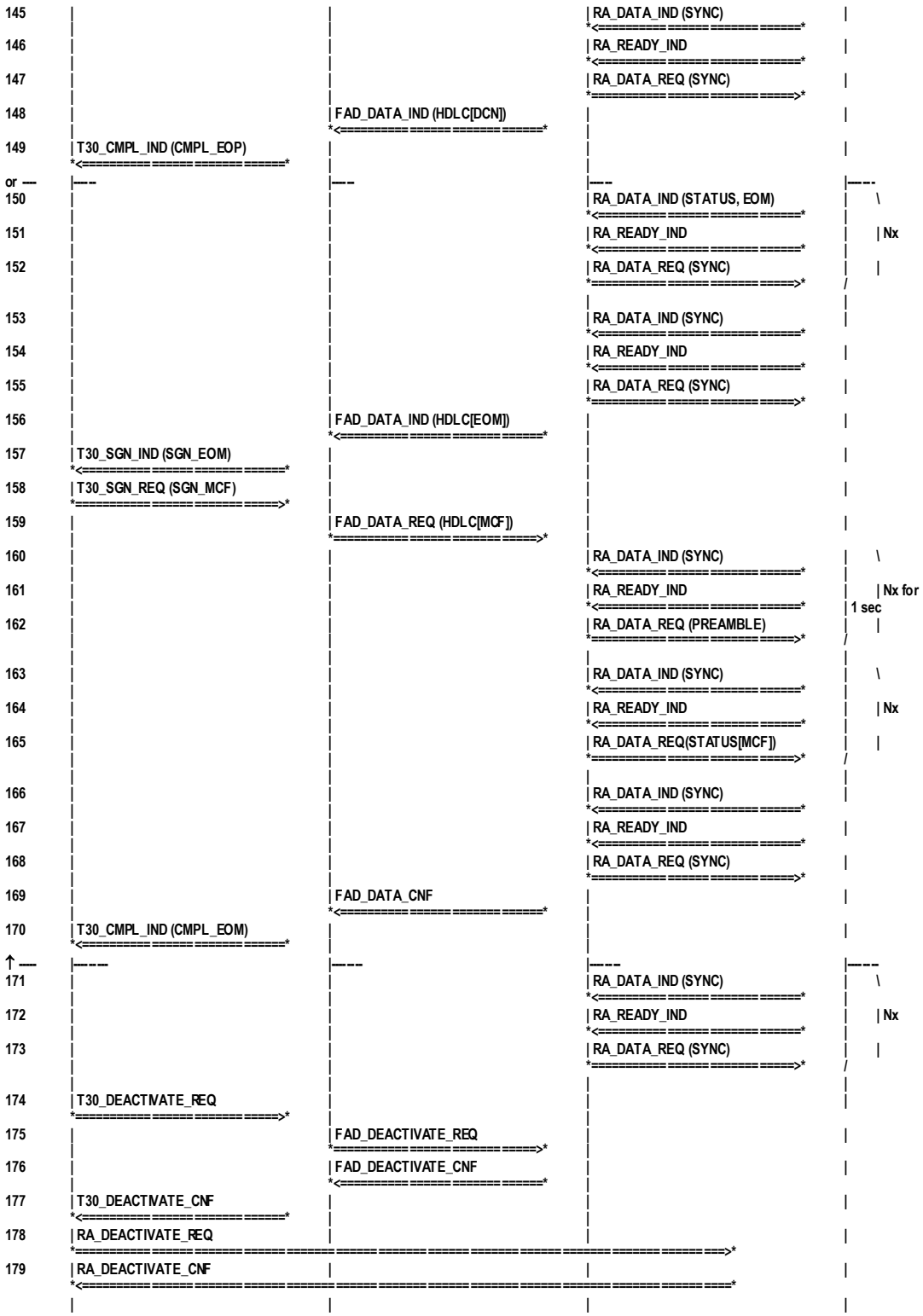
4.2 Receive Fax (9600, 4800, 2400), best case



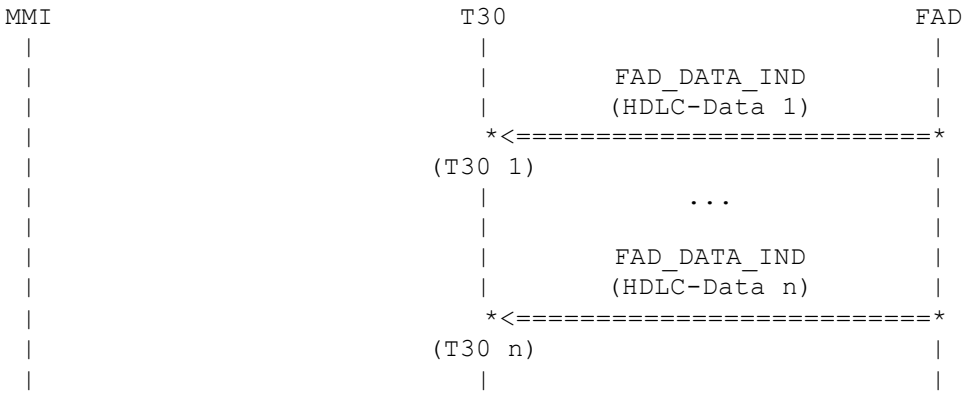

36 RA_DATA_IND (STATUS[DCS]) \ mandatory
37 RA_READY_IND | Nx
38 RA_DATA_REQ (SYNC) |
39 RA_DATA_IND (SYNC)
40 RA_READY_IND
41 RA_DATA_REQ (SYNC)
42 FAD_DATA_IND (HDLC[NSS..DCS])
43 T30_CAP_IND (capabilities)
44 FAD_RCV_TCF_REQ
45 RA_DATA_IND (SYNC) \
46 RA_READY_IND | Nx
47 RA_DATA_REQ (SYNC) |
48 RA_DATA_IND (DATA[TCF]) \
49 RA_READY_IND | Nx for
50 RA_DATA_REQ (SYNC) | 1,5 sec |
51 RA_DATA_IND (SYNC)
52 RA_READY_IND
53 RA_DATA_REQ (SYNC)
54 FAD_RCV_TCF_CNF (ratio)
55 RA_DATA_IND (SYNC) \
56 RA_READY_IND | Nx
57 RA_DATA_REQ (SYNC) |
58 FAD_DATA_REQ (pcs, HDLC[CFR])
59 RA_DATA_IND (SYNC) \
60 RA_READY_IND | Nx for
61 RA_DATA_REQ (PREAMBLE) | 1 sec |
62 RA_DATA_IND (SYNC) \
63 RA_READY_IND | Nx
64 RA_DATA_REQ (STATUS[CFR]) |
65 FAD_DATA_CNF
66 RA_DATA_IND (SYNC) \
67 RA_READY_IND | Nx
68 RA_DATA_REQ (SYNC) |
69 RA_DATA_IND (STATUS)
70 RA_READY_IND
71 RA_DATA_REQ (SYNC)


72 RA_DATA_IND (SYNC | STATUS)
73 RA_READY_IND
1 sec
74 RA_DATA_REQ (PREAMBLE)
75 RA_DATA_IND (SYNC | STATUS)
76 RA_READY_IND
77 RA_DATA_REQ (STATUS)
78 FAD_MUX_IND (MUX_MSG)
79 RA_DATA_IND (DATA)
80 RA_READY_IND
81 RA_DATA_REQ (SYNC)
82 FAD_DATA_IND (fax data, not-final)
if buffer is full
83 T30_DATA_IND (fax data, not-final)
send t4-data
84 T30_READY_REQ
85 FAD_READY_REQ
86 RA_DATA_IND (SYNC)
87 RA_READY_IND
88 RA_DATA_REQ (SYNC)
89 FAD_DATA_IND (fax data, final)
90 T30_DATA_IND (fax data, final)
91 T30_EOL_IND
92 RA_DATA_IND (SYNC)
93 RA_READY_IND
94 RA_DATA_REQ (SYNC)
95 RA_DATA_IND (PREAMBLE)
96 RA_READY_IND
1 sec
97 RA_DATA_REQ (SYNC)
98 FAD_MUX_IND (MUX_BCS)
99 RA_DATA_IND (STATUS, MPS)
100 RA_READY_IND
101 RA_DATA_REQ (SYNC)
102 RA_DATA_IND (SYNC)
103 RA_READY_IND
104 RA_DATA_REQ (SYNC)
105 FAD_DATA_IND (HDLC[MPS])
106 T30_SGN_IND (SGN_MPS)
107 T30_SGN_REQ (SGN_MCF)
108 FAD_DATA_REQ (HDLC[MCF])
Nx
Nx for


109 RA_DATA_IND (SYNC)
110 RA_READY_IND
111 RA_DATA_REQ (PREAMBLE)
112 RA_DATA_IND (SYNC)
113 RA_READY_IND
114 RA_DATA_REQ(STATUS[MCF])
115 RA_DATA_IND (SYNC)
116 RA_READY_IND
117 RA_DATA_REQ (SYNC)
118 FAD_DATA_CNF
... continue at 79
or ---
119 RA_DATA_IND (STATUS, EOP)
120 RA_READY_IND
121 RA_DATA_REQ (SYNC)
122 RA_DATA_IND (SYNC)
123 RA_READY_IND
124 RA_DATA_REQ (SYNC)
125 FAD_DATA_IND (HDLC[EOP])
126 T30_SGN_IND (SGN_EOP)
127 T30_SGN_REQ (SGN_MCF)
128 FAD_DATA_REQ (HDLC[MCF])
129 RA_DATA_IND (SYNC)
130 RA_READY_IND
131 RA_DATA_REQ (PREAMBLE)
132 RA_DATA_IND (SYNC)
133 RA_READY_IND
134 RA_DATA_REQ(STATUS[MCF])
135 RA_DATA_IND (SYNC)
136 RA_READY_IND
137 RA_DATA_REQ (SYNC)
138 FAD_DATA_CNF
139 RA_DATA_IND (PREAMBLE)
140 RA_READY_IND
141 RA_DATA_REQ (SYNC)
142 RA_DATA_IND (STATUS[DCN])
143 RA_READY_IND
144 RA_DATA_REQ (SYNC)
Nx for 1 sec
Nx



5 Protocol - HDLC Handling



(T30 1) ... (T30 n)

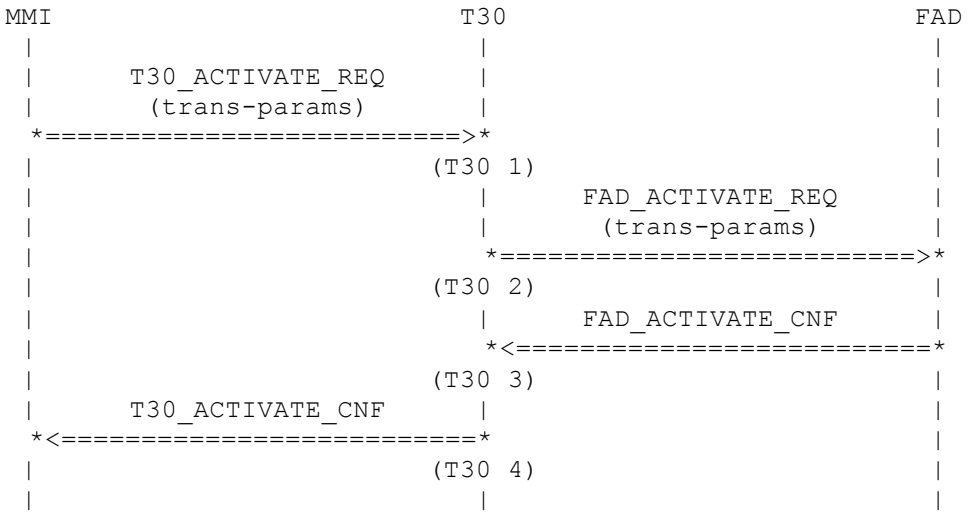
- FAD sends the bytes received to T30.
- T30 collects these bytes and looks for set final flag of FAD_DATA_IND.
- Detection the set final flag indicates that the HDLC frame has been received in full.
- Now T30 analyses the information received.
- The stuffing bits are first removed.
- The control field and the frame checking sequence are then checked.
- If the result is positive the command or response of the facsimile control field (FCF) is extracted and analysed.
- If data of the facsimile information field (FIF) exists it is extracted and analysed.
- If necessary the prepared information is sent to MMI with the appropriate primitive.

6 Protocol

6.1 Activation, Deactivation

6.1.1 Activation

6.1.1.1 Activation of T30



(T30 1)
T30 is in state T30_NULL.
T30 is activated by the primitive T30_ACTIVATE_REQ.
T30 changes to state T30_IDLE.

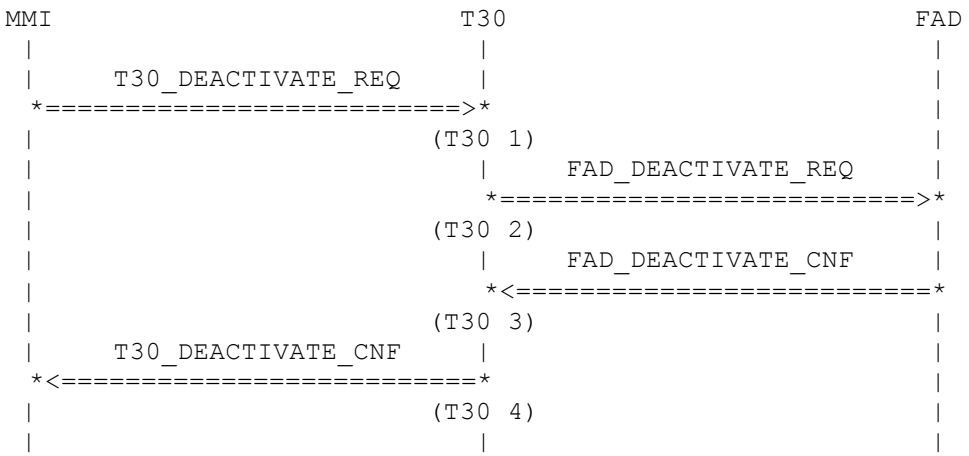
(T30 2)
T30 activates FAD with the primitive FAD_ACTIVATE_REQ.
T30 starts timer T1.

(T30 3)
T30 is informed by FAD that FAD is activated.

(T30 4)
T30 informs MMI that T30 and FAD is activated.

6.1.2 Deactivation

6.1.2.1 Deactivation of T30



(T30 1)
T30 is in state IDLE.
T30 is deactivated by MMI.
T30 changes to state T30_NULL.

(T30 2)
T30 deactivates FAD.

(T30 3)
T30 is informed by FAD that FAD is deactivated.

(T30 4)
T30 informs MMI that T30 and FAD is deactivated.

6.2 Modification, Configuration, Report

6.2.1 Modification

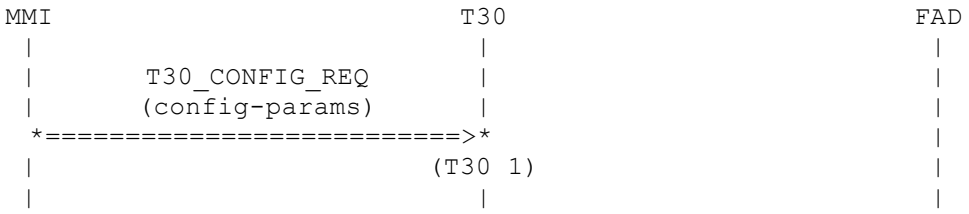
6.2.1.1 Set Transmission Parameters

(T30 1)
T30 receives transmission rate and access rate from MMI.

(T30 2)
T30 sends these parameters to FAD with the primitive FAD_MODIFY_REQ.

6.2.2 Configuration

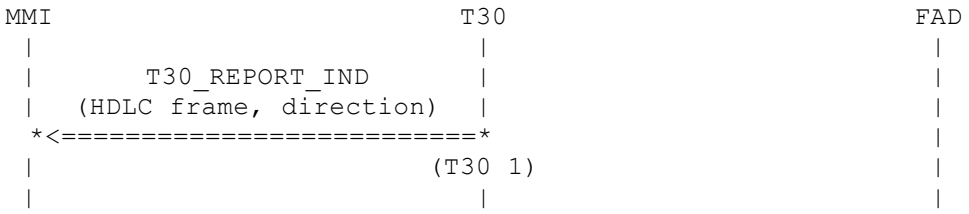
6.2.2.1 Obtain Configuration Parameters



(T30 1)
T30 receives configuration parameters from MMI to control the behaviour of T30.

6.2.3 Report

6.2.3.1 HDLC Report

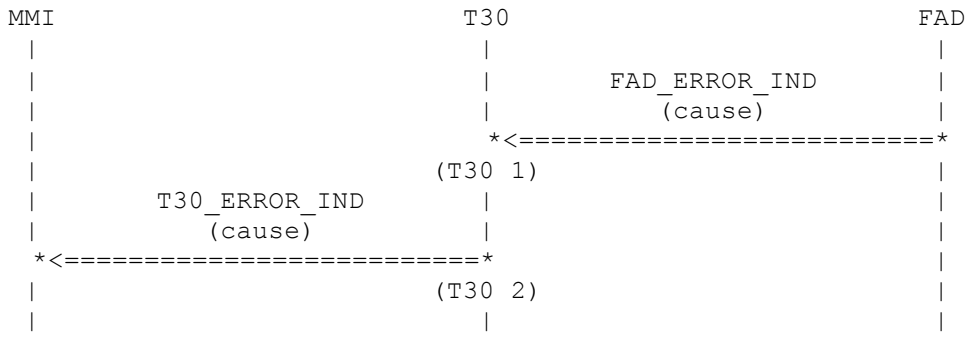


(T30 1)
The *hdlc report mode* in T30 is set.
MMI receives from T30 a copy of each sent or received HDLC frame.

6.3 Miscellaneous

6.3.1 Error Handling

6.3.1.1 Handling of Error Indication from FAD



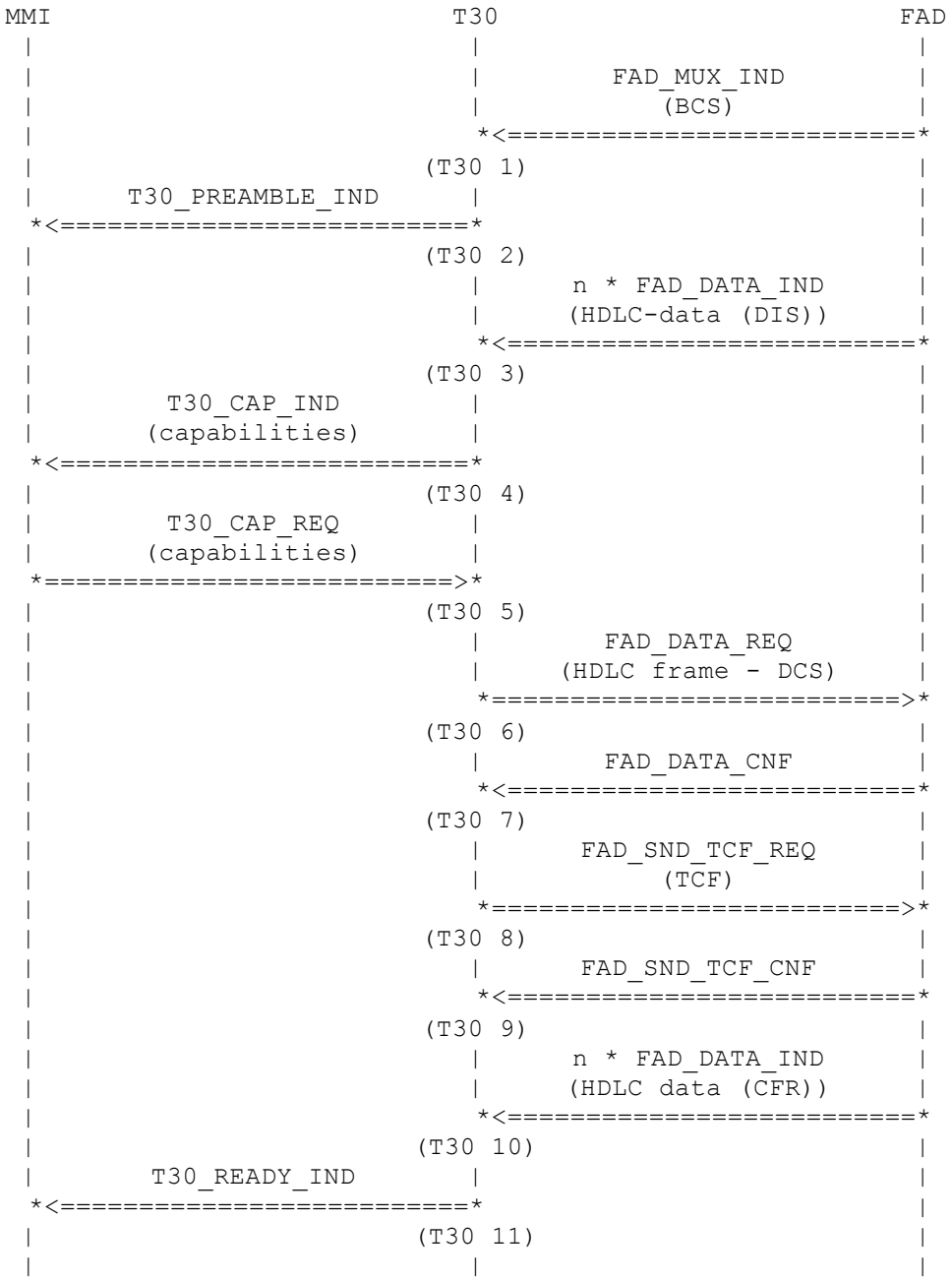
(T30 1)
T30 receives from FAD an error indication.

(T30 2)
T30 sends the error cause to MMI.
T30 stops the timers if they are running.
T30 changes to state T30_IDLE.

6.4 Pre-Message Phase

6.4.1 Send Fax

6.4.1.1 Normal Process



(T30 1)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 2)
T30 informs MMI that a preamble has been received.

(T30 3)
T30 expects the fax capabilities from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also Chapter 5). T30 then analyses the information. The frame contains the command *digital identification signal* (DIS) from the remote site.
T30 stops the timer T1.

(T30 4)
T30 extracts the fax capabilities and sends them to MMI.

(T30 5)
T30 receives the selected fax capabilities for further fax transfer to T30.

(T30 6)
T30 builds a HDLC frame containing the response *digital command signal* (DCS).
T30 requests FAD to send this frame to the remote site.

(T30 7)
T30 is informed by FAD that the HDLC frame has been sent.

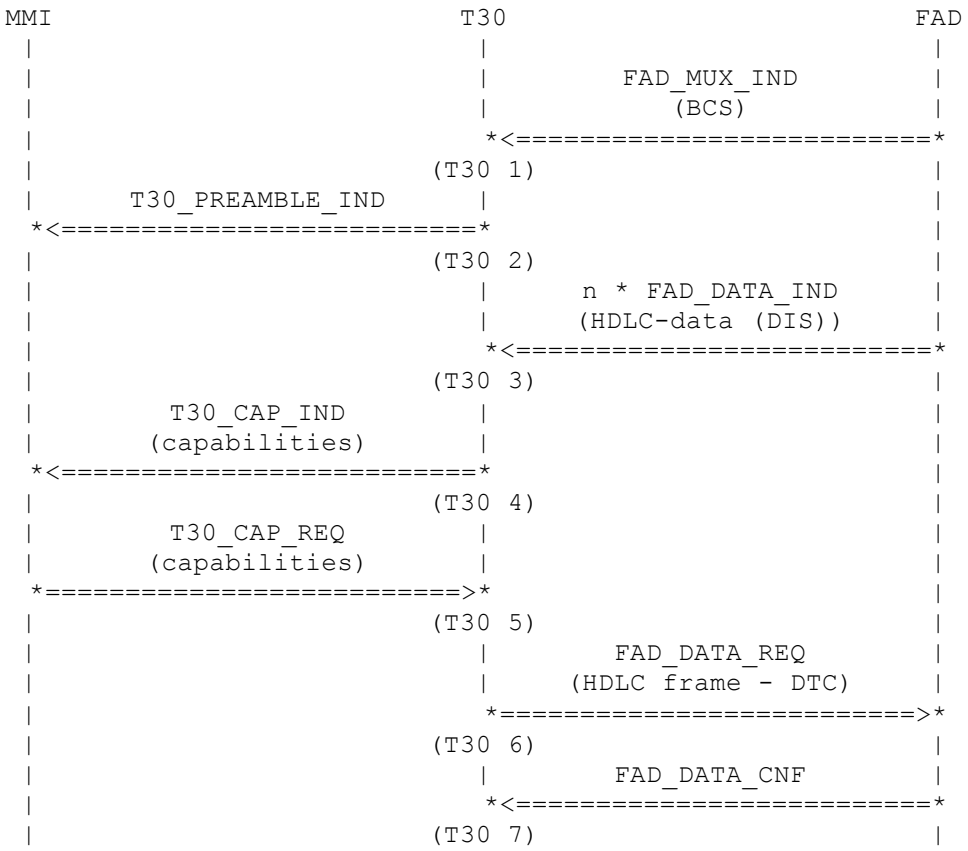
(T30 8)
T30 requests FAD to send the training checking frame (TCF).

(T30 9)
T30 is informed by FAD that the training checking has been sent.
T30 starts the timer T4.

(T30 10)
T30 awaits a response from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains the response *confirmation to receive* (CFR) from the remote site.

(T30 11)
T30 stops the timer T4.
T30 informs MMI that T30 is ready to send data.

6.4.1.2 Polling



(T30 1)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 2)
T30 informs MMI that a preamble has been received.

(T30 3)
T30 expects the fax capabilities from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also Chapter 5). T30 then analyses the information. The frame contains the command *digital identification signal* (DIS) from the remote site.
T30 stops the timer T1.

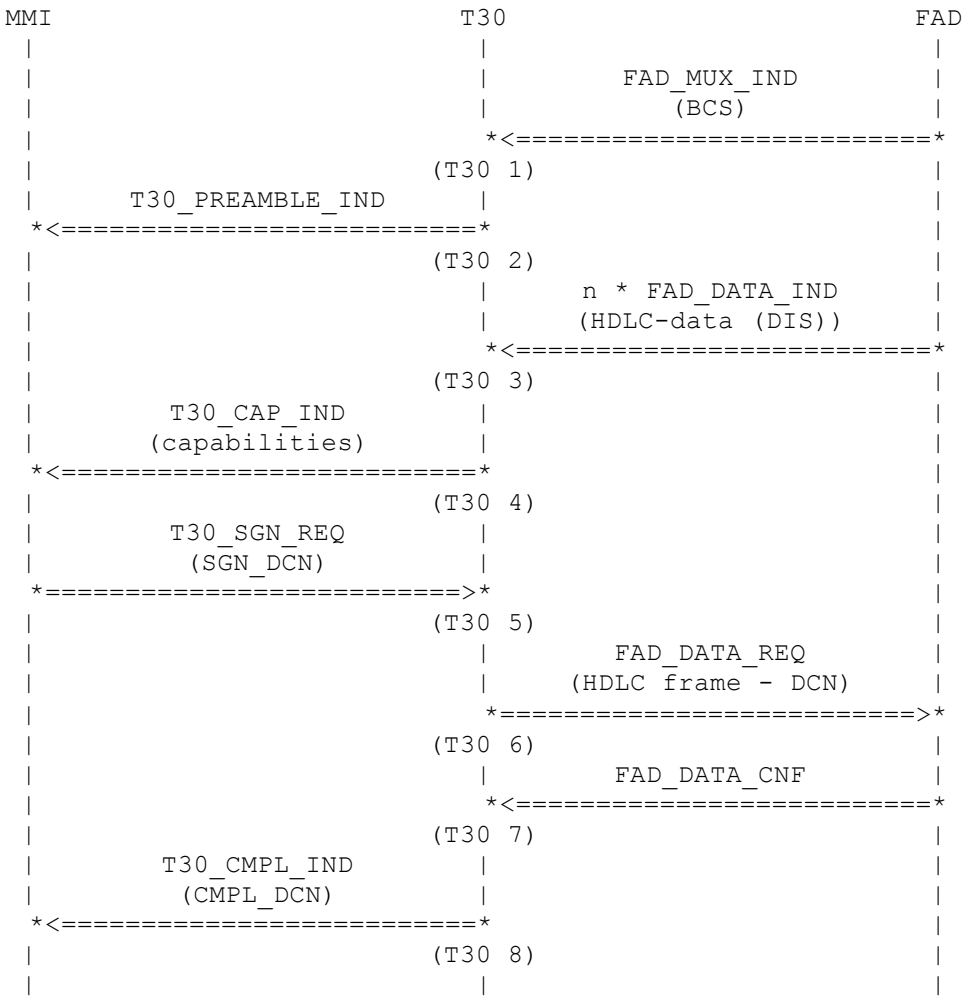
(T30 4)
T30 extracts the fax capabilities and sends them to MMI.

(T30 5)
T30 receives the selected fax capabilities for further polling fax transfer to T30.

(T30 6)
T30 builds a HDLC frame containing the response *digital transmit command* (DTC).
T30 requests FAD to send this frame to the remote site.

(T30 7)
T30 is informed by FAD that the HDLC frame has been sent.
T30 starts timer T1.

6.4.1.3 Disconnect Request



(T30 1)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 2)
T30 informs MMI that a preamble has been received.

(T30 3)
T30 expects the fax capabilities from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also Chapter 5). T30 then analyses the information. The frame contains the command *digital identification signal* (DIS) from the remote site.
T30 stops the timer T1.

(T30 4)
T30 extracts the fax capabilities and sends them to MMI.

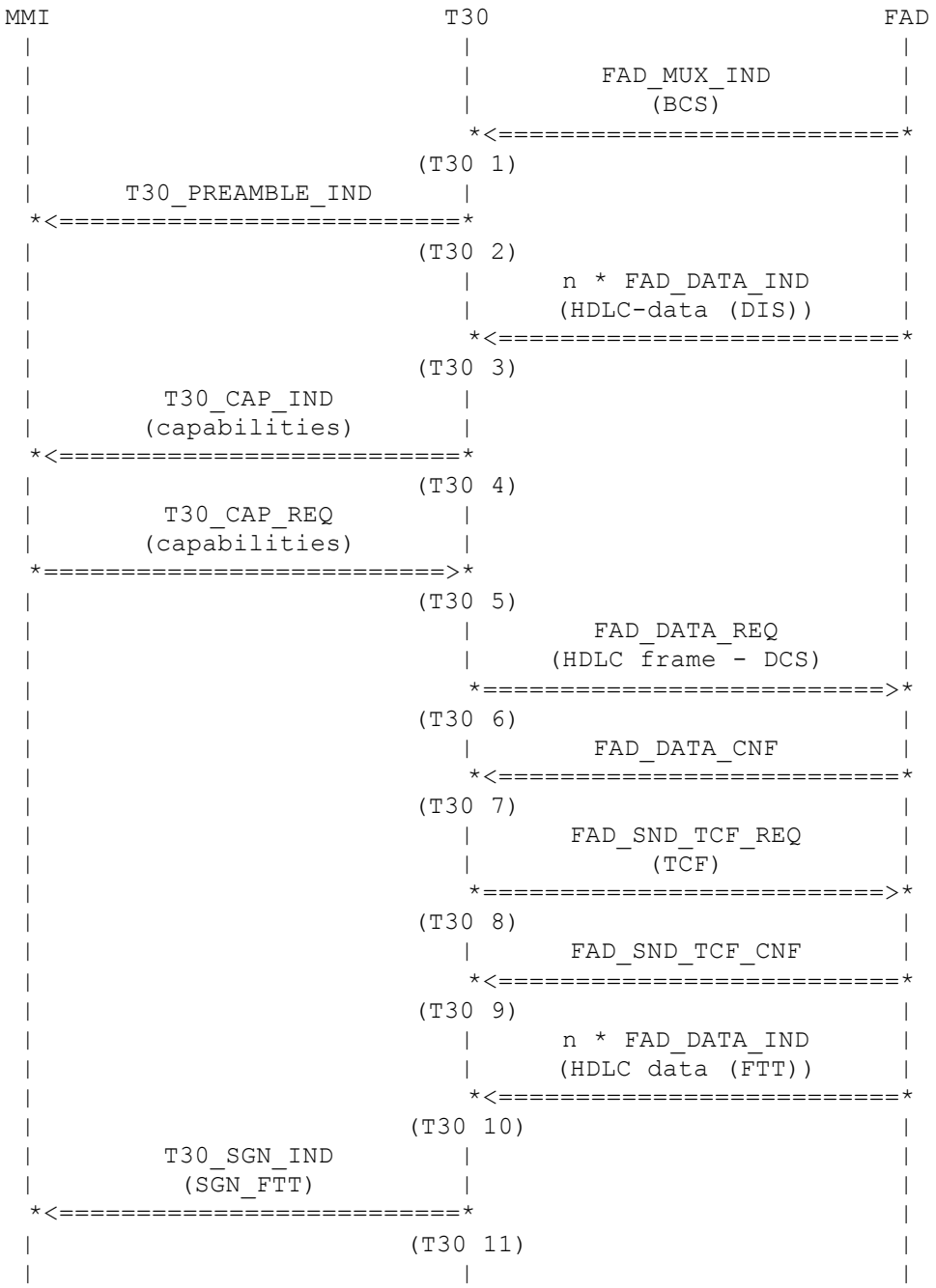
(T30 5)
T30 is requested by MMI to send a disconnect response.

(T30 6)
T30 builds a HDLC frame containing the response *disconnect* (DCN).
T30 requests FAD to send this frame to the remote site.

(T30 7)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 8)
T30 informs MMI that the disconnect has been sent.

6.4.1.4 Retraining Request



(T30 1)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 2)
T30 informs MMI that a preamble has been received.

(T30 3)
T30 expects the fax capabilities from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also Chapter 5). T30 then analyses the information. The frame contains the command *digital identification signal* (DIS) from the remote site.
T30 stops the timer T1.

(T30 4)
T30 extracts the fax capabilities and sends them to MMI.

(T30 5)
T30 receives the selected fax capabilities for further fax transfer to T30.

(T30 6)
T30 builds a HDLC frame containing the response *digital command signal* (DCS).
T30 requests FAD to send this frame to the remote site.

(T30 7)
T30 is informed by FAD that the HDLC frame has been sent.

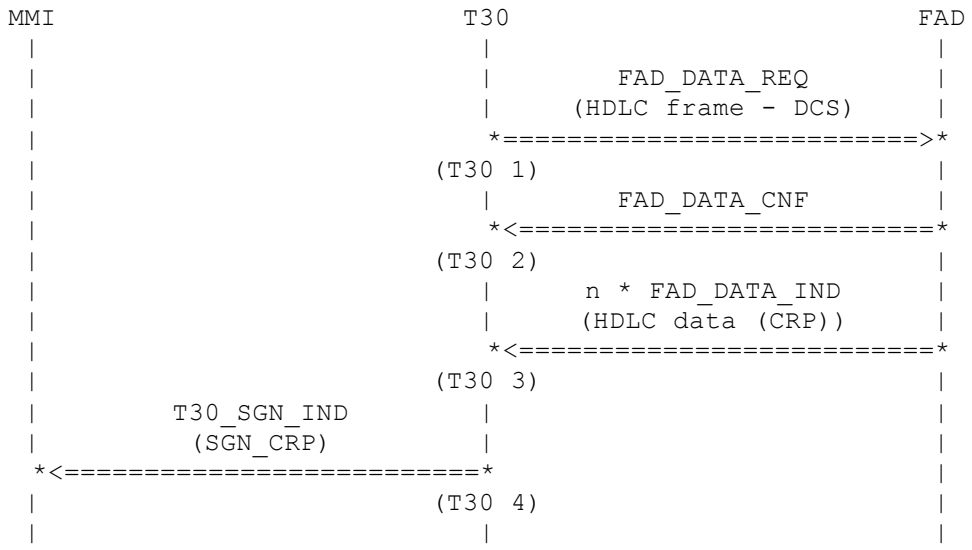
(T30 8)
T30 requests FAD to send the training checking frame (TCF).

(T30 9)
T30 is informed by FAD that the training checking has been sent.
T30 starts the timer T4.

(T30 10)
T30 awaits a response from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains the response *failure to train* (FTT) from the remote site.

(T30 11)
T30 stops timer T4.
T30 informs MMI that retrain is to performed.

6.4.1.5 Command Repeat



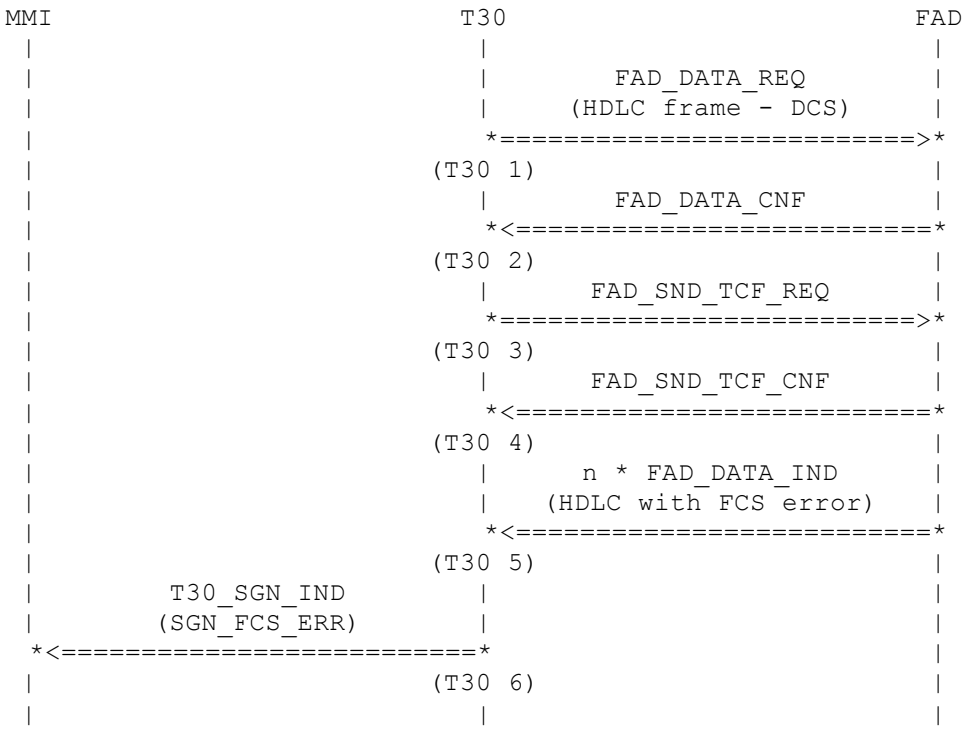
(T30 1)
T30 requests FAD to send the HDLC frame containing the response DCS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 3)
T30 awaits a response from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains the response *command repeat* (CRP) from the remote site.

(T30 4)
T30 informs MMI that a response *command repeat* has been received.

6.4.1.6 FCS Error



(T30 1)
T30 requests FAD to send the HDLC frame containing the response DCS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

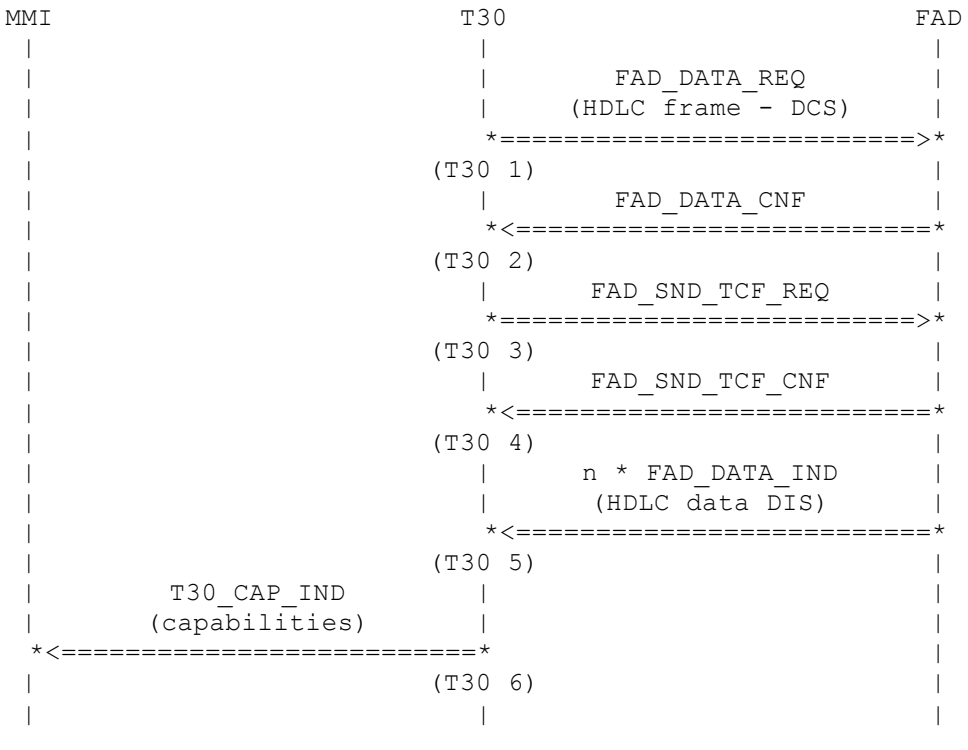
(T30 3)
T30 requests FAD to send the *training checking frame* (TCF).

(T30 4)
T30 is informed by FAD that the training checking has been sent.

(T30 5)
T30 awaits a response from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains an FCS error.

(T30 6)
T30 informs MMI that a response with fcs error has been received.

6.4.1.7 Digital Command Signal Failed



(T30 1)
T30 requests FAD to send the HDLC frame containing the response DCS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

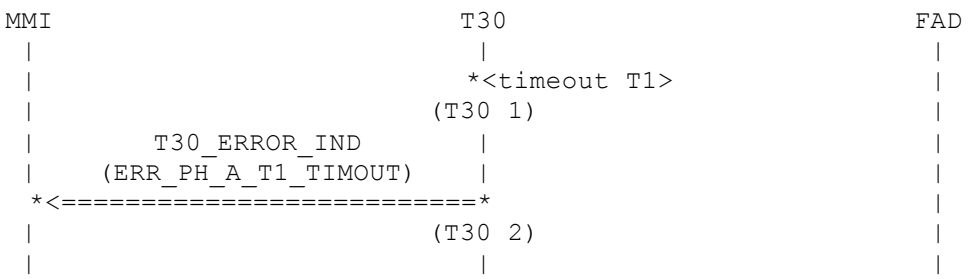
(T30 3)
T30 requests FAD to send the *training checking frame* (TCF).

(T30 4)
T30 is informed by FAD that the training checking has been sent.

(T30 5)
T30 awaits a response from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains the response *digital identification signal* (DIS) or *digital transmit command* (DTC) from the remote site.

(T30 6)
T30 informs MMI that a DIS or DTC has been received and sends the new fax capabilities to MMI.

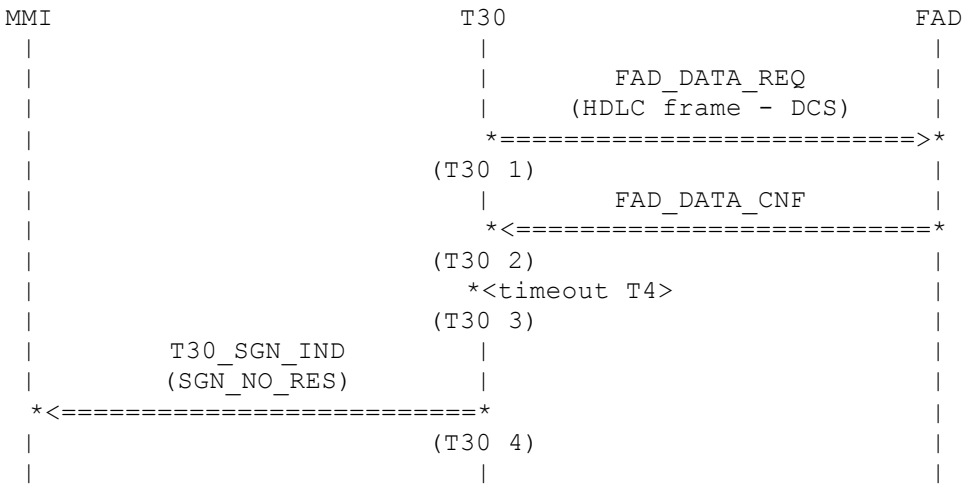
6.4.1.8 Timer T1 Expires



(T30 1)
Timer T1 has been expired.

(T30 2)
T30 informs MMI that no signal has been received.

6.4.1.9 Timer T4 Expires the First or Second Time



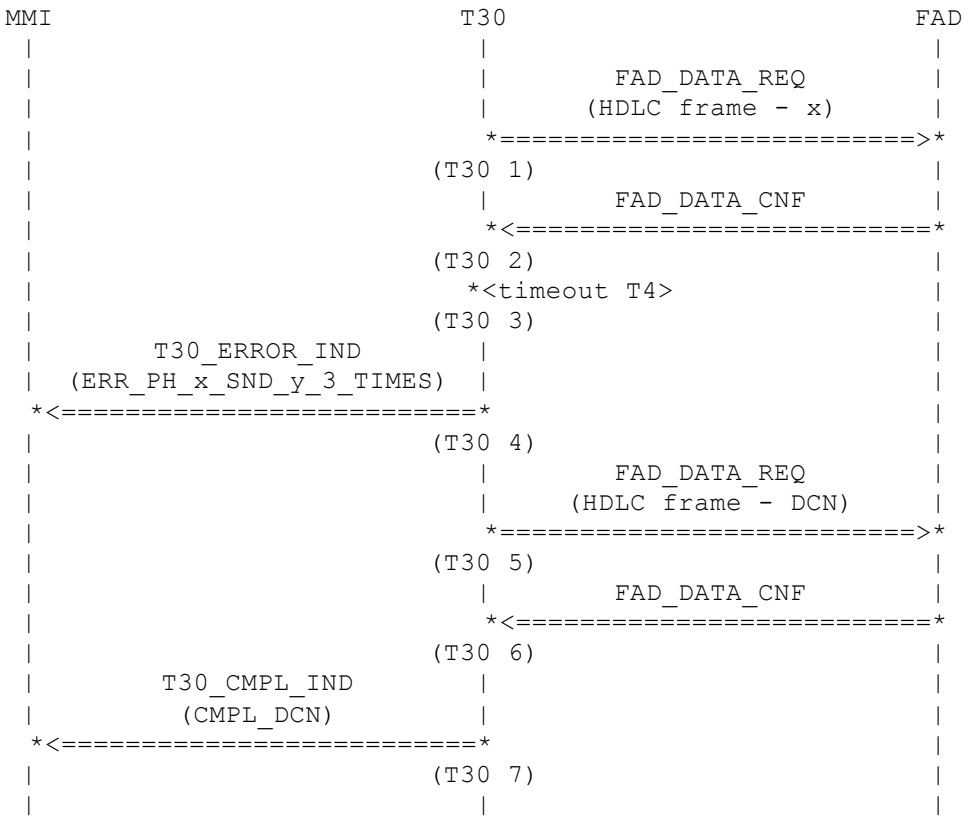
(T30 1)
T30 requests FAD to send the HDLC frame containing the response DCS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 3)
Timer T4 expires the first or second time.

(T30 4)
T30 informs MMI that no response has been received.

6.4.1.10 Timer T4 Expires the Third Time



(T30 1)
T30 requests FAD to send the HDLC frame containing the response DCS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 3)
Timer T4 expires the third time.

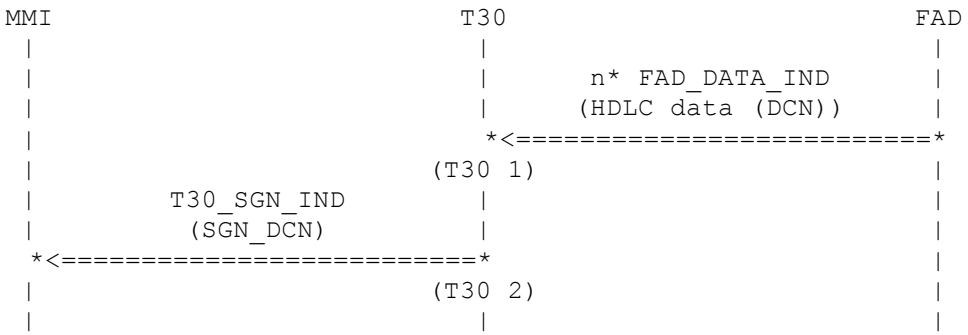
(T30 4)
T30 informs MMI that a disconnect is initiated.

(T30 5)
T30 builds a HDLC frame containing the response *disconnect* (DCN).
T30 requests FAD to send this frame to the remote site.

(T30 6)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 7)
T30 informs MMI that a *disconnect* has been sent.

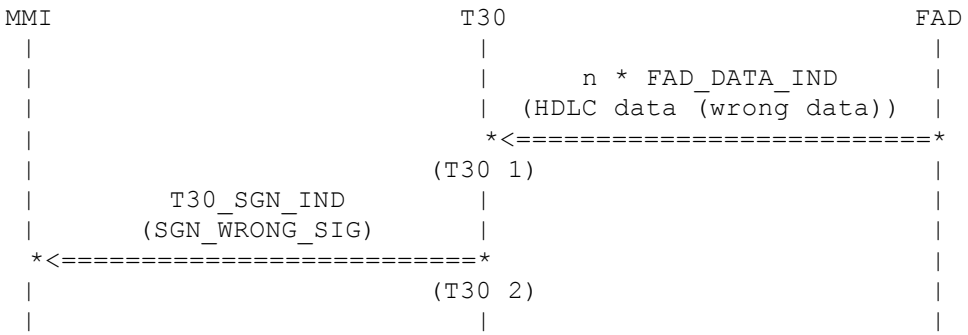
6.4.1.11 Receiving Disconnect from Remote Site



(T30 1)
T30 expects a response or command from the remote site.
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5). T30 then analyses the information. The frame contains the response *disconnect* (DCN) from the remote site.
T30 stops the timers if they are running.

(T30 2)
T30 informs MMI that a disconnect has been received from the remote site.

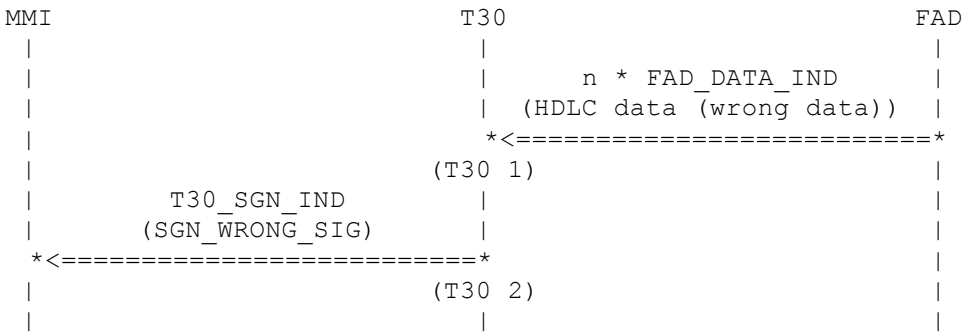
6.4.1.12 Wrong Command or Response Received in Idle State



(T30 1)
T30 expects the response or command from the remote site.
T30 obtains the bytes received from FAD. These bytes constitute a HDLC frame containing a command not expected. T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5).

(T30 2)
T30 then analyses the information. The frame contains a response that is not expected.
T30 informs MMI that a wrong signal has been received.

6.4.1.13 Wrong Command or Response Received not in Idle State

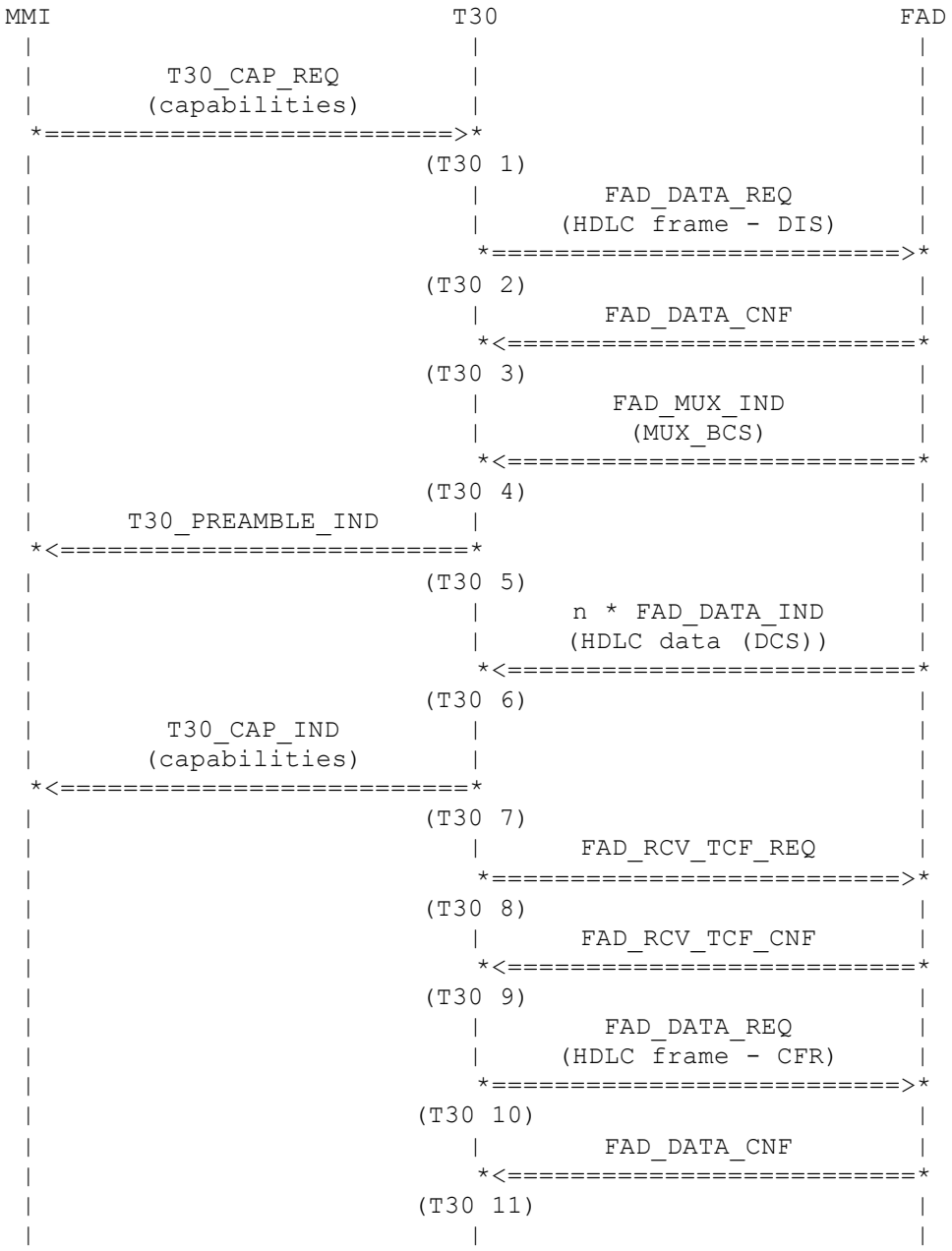


(T30 1)
T30 expects the response or command from the remote site.
T30 obtains the bytes received from FAD. These bytes constitute a HDLC frame containing a command not expected. T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full (see also chapter 5).

(T30 2)
T30 then analyses the information. The frame contains a response that is not expected.
T30 informs MMI that a wrong signal has been received.

6.4.2 Receive Fax

6.4.2.1 Normal Process



(T30 1)
T30 obtains the local fax capabilities from MMI.

(T30 2)
T30 restarts timer T1.
T30 builds a HDLC frame containing the *digital identification signal* (DIS).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the HDLC frame has been sent.
T30 starts the timer T4.

(T30 4)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 5)
T30 informs MMI that a preamble has been received.

(T30 6)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full. T30 then analyses the information (see also chapter 5). The frame contains the *digital command signal* (DCS) with the selected fax capabilities of the remote site.
T30 stops the timers T1 and T4 and starts timer T2 .

(T30 7)
T30 extracts the selected fax capabilities and sends them to MMI.

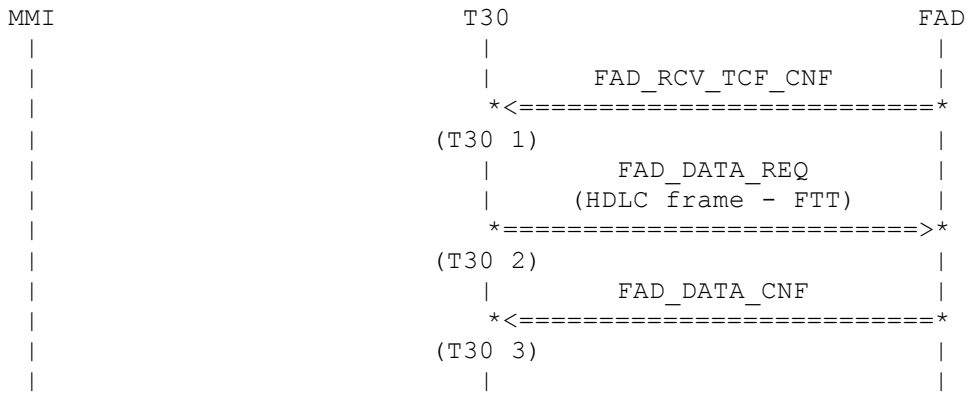
(T30 8)
T30 requests FAD to receive the TCF.

(T30 9)
T30 is informed by FAD about the ratio which has occurred during training checking. The ratio is satisfactory.

(T30 10)
T30 stops timer T2.
T30 builds the HDLC frame containing the response *confirmation to receive* (CFR).
T30 requests FAD to send this frame the remote site.

(T30 11)
T30 is informed by FAD that the HDLC frame has been sent.
T30 starts timer T2.

6.4.2.2 Handling of Bad Error Ratio

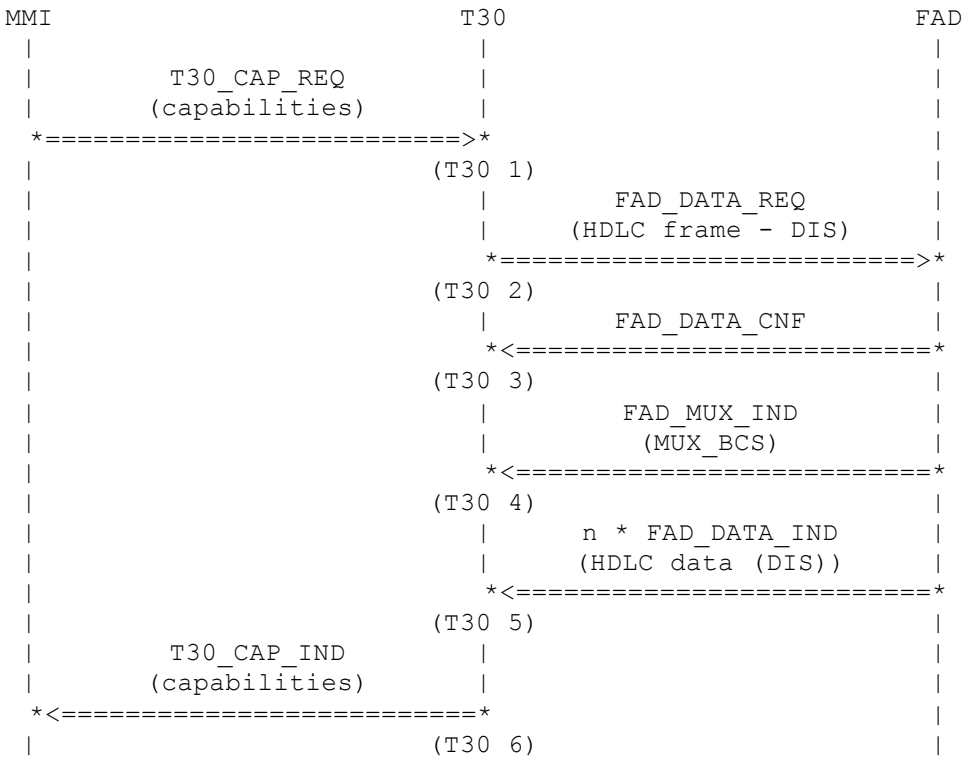


(T30 1)
FAD has received the training checking frame.
T30 is informed by FAD about the error ratio which has occurred during training checking. The ratio is bad.
T30 stops the timer T2.

(FAD 2)
T30 builds a HDLC frame containing the response *failure to train* (FTT).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the HDLC frame has been sent.

6.4.2.3 Digital Command Signal as Response



(T30 1)
T30 obtains the local fax capabilities from MMI.

(T30 2)
T30 restarts timer T1.
T30 builds a HDLC frame containing the *digital identification signal* (DIS).
T30 requests FAD to send this frame to the remote site.

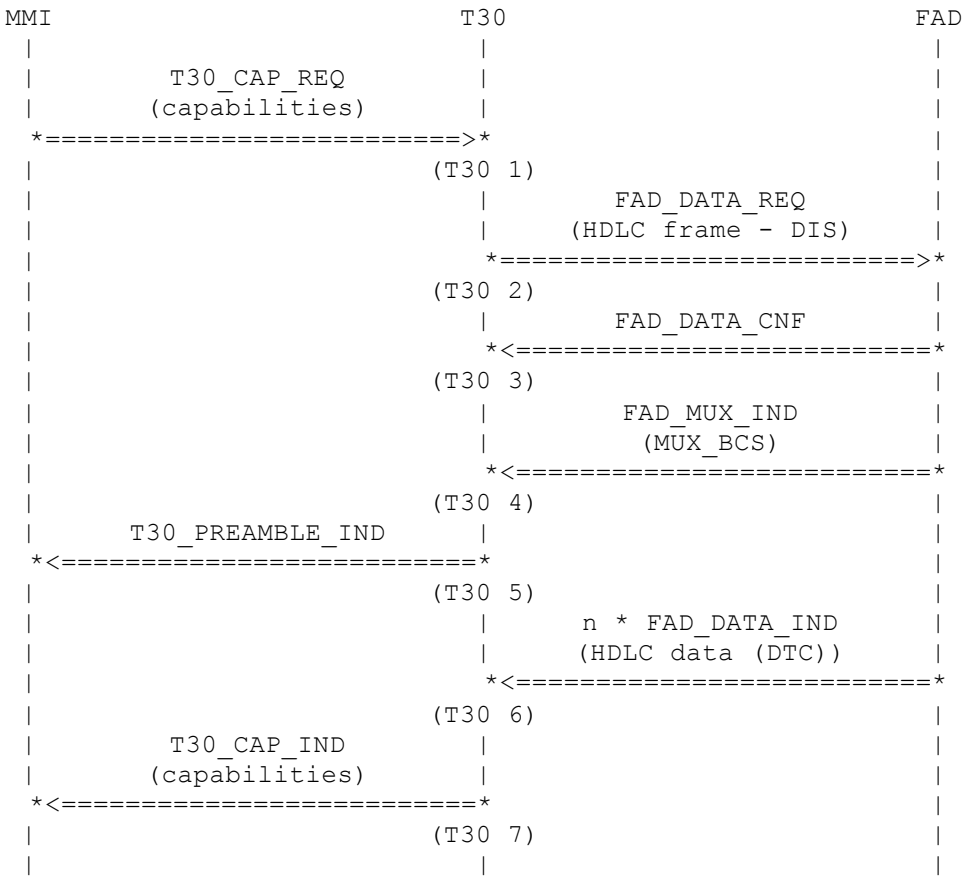
(T30 3)
T30 is informed by FAD that the HDLC frame has been sent.
T30 starts the timer T4.

(T30 4)
T30 is informed by FAD that bcs data is following.

(T30 5)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full. T30 then analyses the information (see also chapter 5). The frame contains the *identification signal* (DIS) with the fax capabilities of the remote site.
T30 stops the timers T1 and T4.

(T30 6)
T30 extracts the fax capabilities and sends them to MMI.

6.4.2.4 Polling Process



(T30 1)
T30 obtains the local fax capabilities from MMI.

(T30 2)
T30 restarts timer T1.
T30 builds a HDLC frame containing the *digital identification signal* (DIS).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the HDLC frame has been sent.
T30 starts the timer T4.

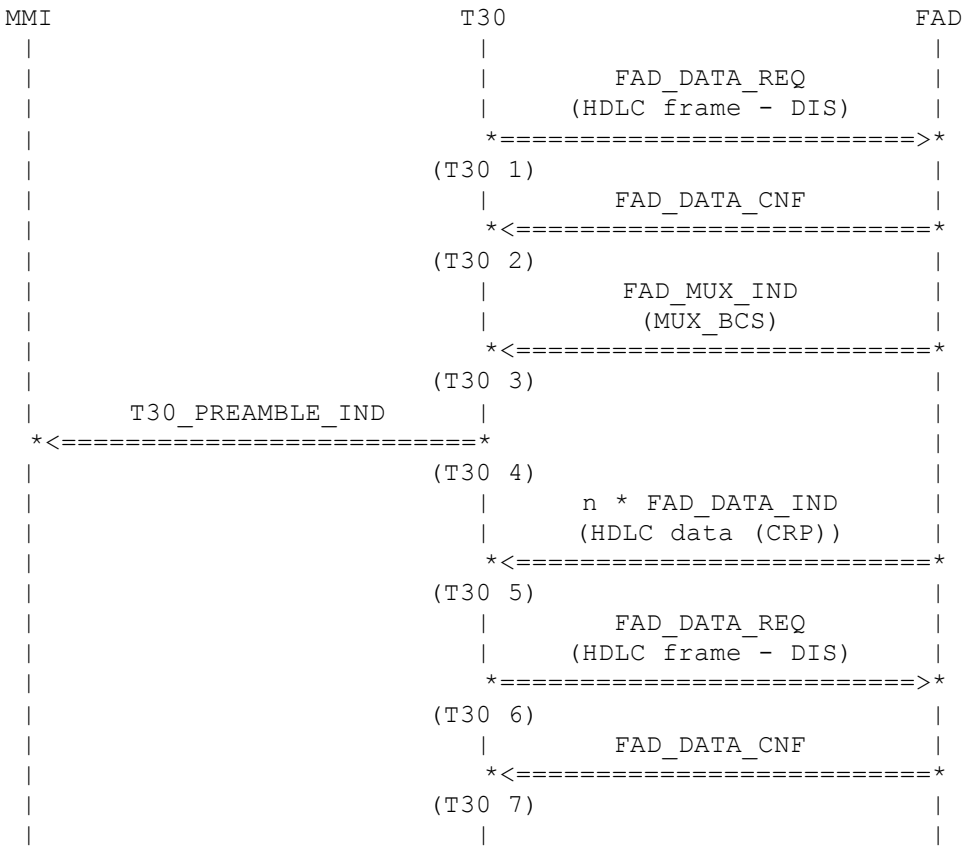
(T30 4)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

(T30 5)
T30 informs MMI that a preamble has been received.

(T30 6)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated until the HDLC frame has been received in full. T30 then analyses the information (see also chapter 5). The frame contains the *digital transmit command* (DTC) with the fax capabilities of the remote site.
T30 stops the timers T1 and T4.

(T30 7)
T30 extracts the fax capabilities and sends them to MMI.

6.4.2.5 Command Repeat



(T30 1)
T30 builds a HDLC frame.
T30 requests FAD to send this frame to the remote site.

(T30 2)
T30 is informed by FAD that the frame has been sent.
T30 starts the timer T4.

(T30 3)
T30 is informed by FAD that a preamble has been received and an HDLC-frame will follow.

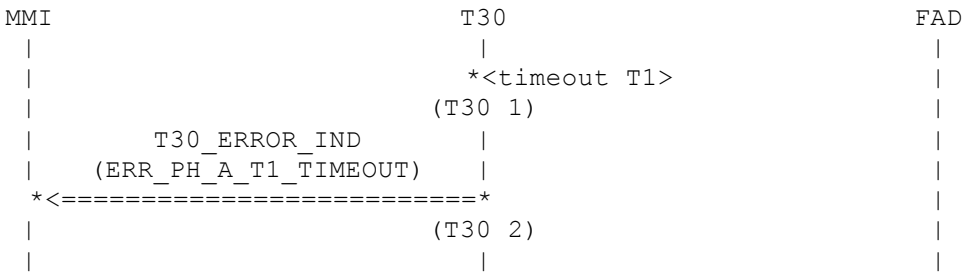
(T30 4)
T30 informs MMI that a preamble has been received.

(T30 5)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *command repeat* (CRP) from the remote site.
T30 stops the timer T4.

(T30 6)
T30 requests FAD to send the last frame to the remote site again.

(T30 7)
T30 is informed by FAD that the frame has been sent.
T30 starts the timer T4.

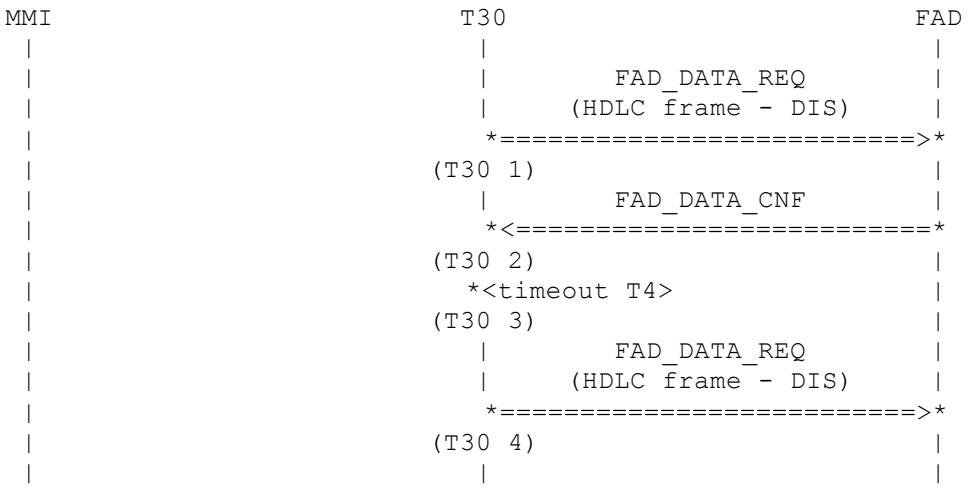
6.4.2.6 Timer T1 Expires



(T30 1)
Timer T1 has been expired.

(T30 2)
T30 stops timer T4.
T30 informs MMI that no signal has been received.

6.4.2.7 Timer T4 Expires



(T30 1)
T30 requests FAD to send the HDLC frame containing the response DIS.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

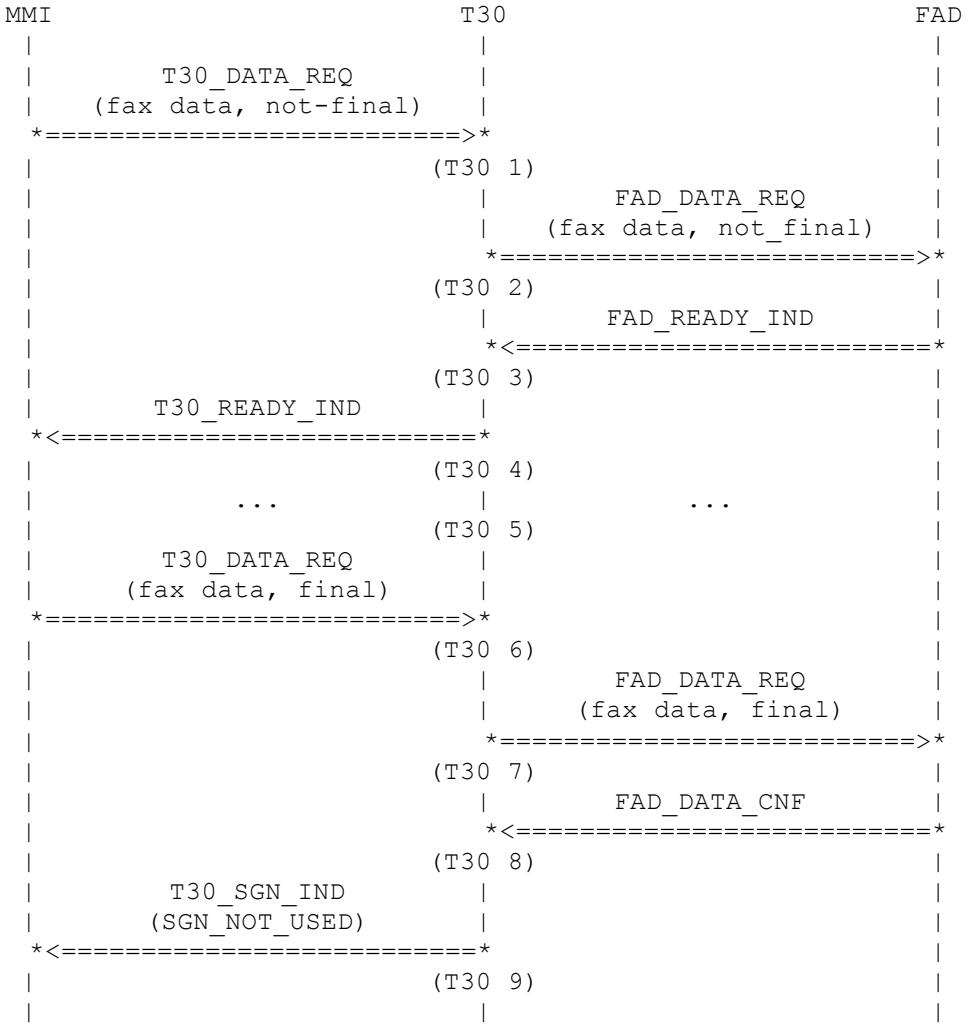
(T30 3)
Timer T4 expires.

(T30 4)
T30 requests FAD to send the HDLC frame containing the response DIS again. This is repeated till expiration of T1.

6.5 Message Phase

6.5.1 Send Fax

6.5.1.1 Normal Process



(T30 1)
T30 receives a fax data block from MMI.

(T30 2)
T30 sends this fax data block to FAD.

(T30 3)
T30 is informed by FAD that further fax data is needed.

(T30 4)
T30 requests fax data from MMI.

(T30 5)
Repeat steps T30 1 to T30 4 till final flag is set.

(T30 6)
T30 receives a fax data block from MMI. Final flag is set.

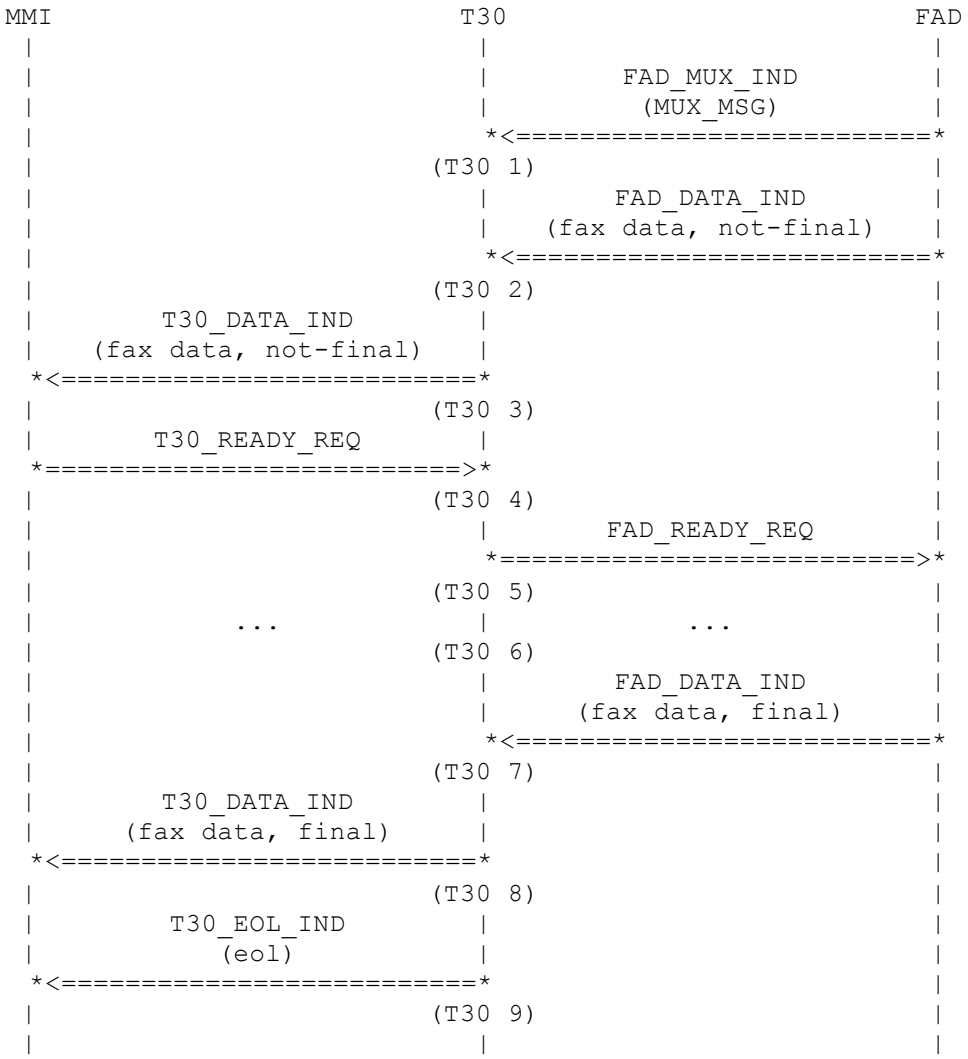
(T30 7)
T30 sends this last fax data block to FAD.

(T30 8)
T30 is informed by FAD that the last fax data block has been sent.

(T30 9)
T30 informs MMI that the last fax data block has been sent.

6.5.2 Receive Fax

6.5.2.1 Normal Process



(T30 1)
T30 is informed by FAD that message data is following.

(T30 2)
T30 receives the first fax data block from FAD.
T30 stops timer T2.

(T30 3)
T30 passes on this fax data block to MMI.

(T30 4)
T30 is requested by MMI to send the next fax data block.

(T30 5)
T30 requests FAD to send the next fax data block.

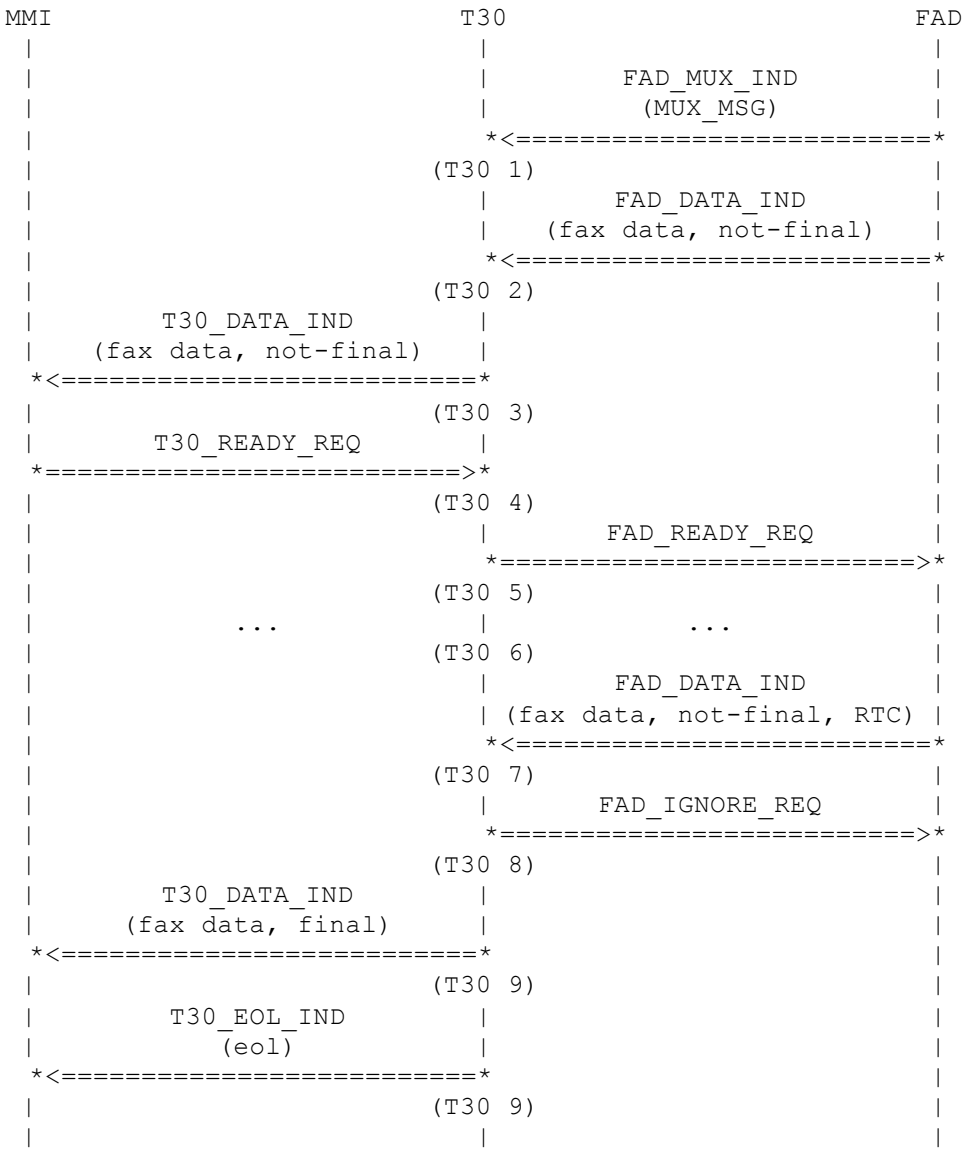
(T30 6)
Repeat steps T30-2 to T30-5 till final flag is set.

(T30 7)
T30 receives the next fax data block from FAD. The final flag is set.

(T30 8)
T30 passes on the final fax data block to MMI.
T30 starts timer T2.

(T30 9)
T30 informs MMI about the received number of lines in fax data.

6.5.2.2 RTC Received Before Final Fax Data Block



(T30 1)
T30 is informed by FAD that message data is following.

(T30 2)
T30 receives the first fax data block from FAD.
T30 stops timer T2.

(T30 3)
T30 passes on this fax data block to MMI.

(T30 4)
T30 is requested by MMI to send the next fax data block.

(T30 5)
T30 requests FAD to send the next fax data block.

(T30 6)
Repeat steps T30 1 to T30 4 till RTC is received.

(T30 7)
T30 receives the next fax data block from FAD. RTC is received.

(T30 8)
T30 informs FAD not to sent further fax data blocks.

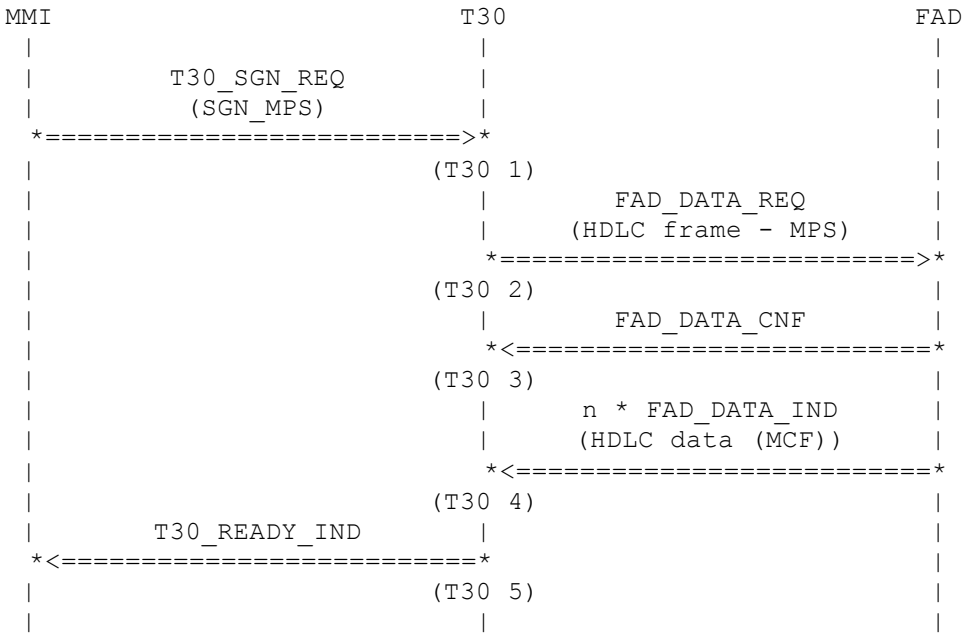
(T30 9)
T30 passes on the last fax data block to MMI.
T30 starts timer T2.

(T30 10)
T30 informs MMI about the received number of lines in fax data.

6.6 Post-Message Phase

6.6.1 Send Fax

6.6.1.1 Multipage Signal



(T30 1)
T30 is requested by MMI to send the command MPS.

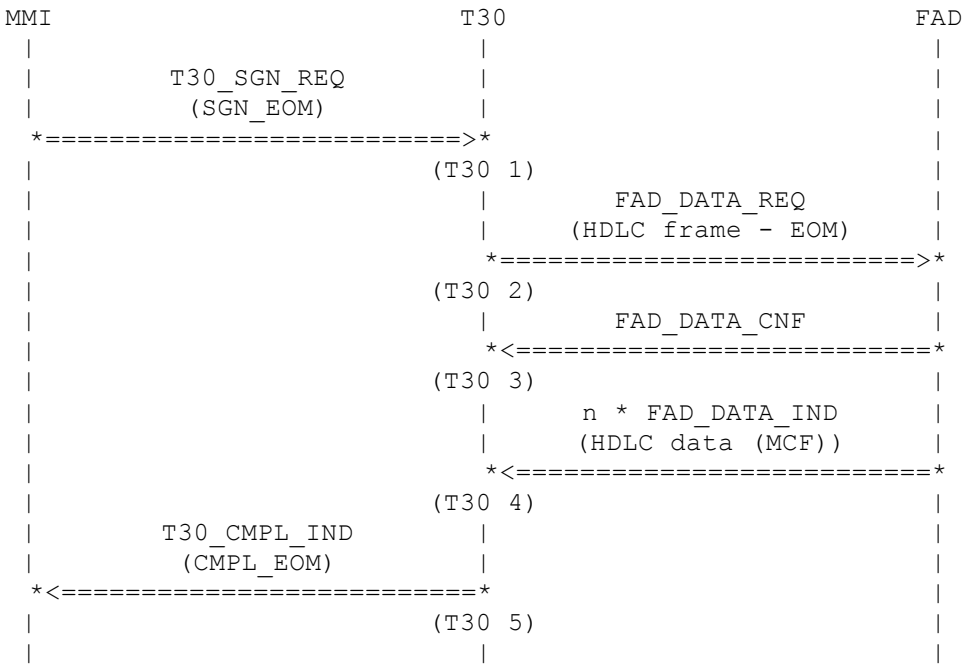
(T30 2)
T30 builds a HDLC frame containing the command *multipage signal* (MPS).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *message confirmation* (MCF) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 requests MMI to send the next page.

6.6.1.2 End of Message



(T30 1)
T30 is requested by MMI to send the command EOM.

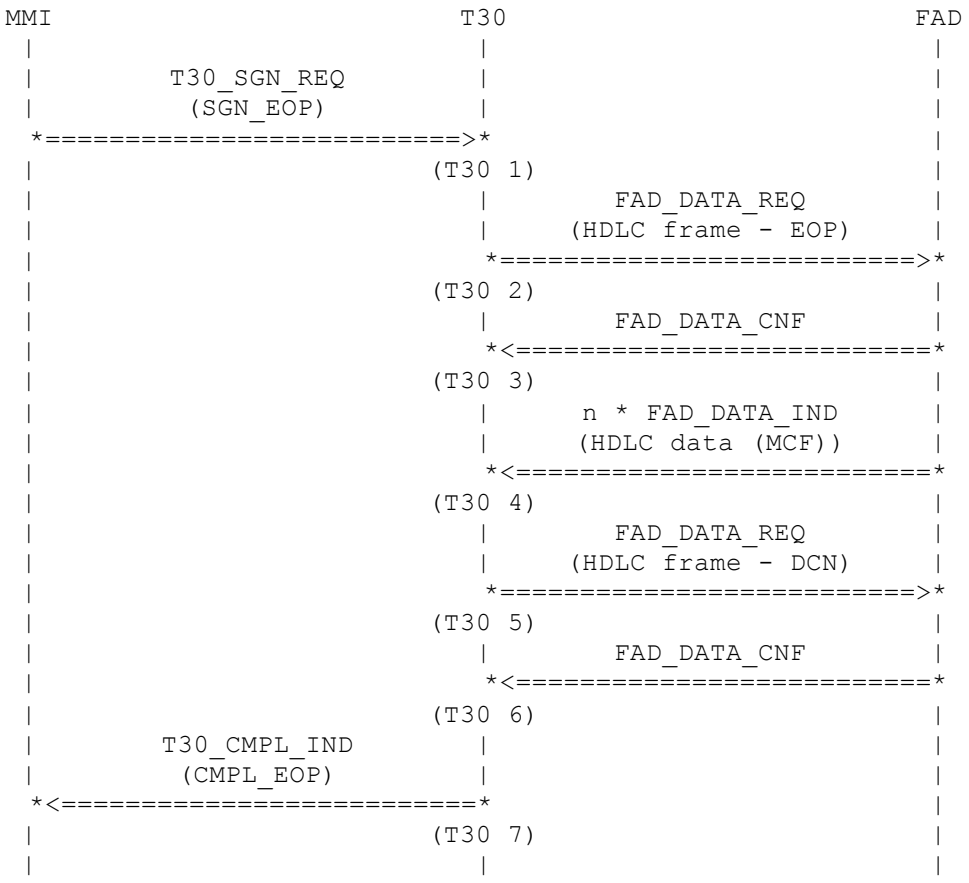
(T30 2)
T30 builds a HDLC frame containing the command *end of message* (EOM).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *message confirmation* (MCF) from the remote site.
T30 stops the repeat timer T4 and starts the timer T1.

(T30 5)
T30 informs MMI that *end of message* has been completed.

6.6.1.3 End Of Procedure



(T30 1)
T30 is requested by MMI to send the command EOP.

(T30 2)
T30 builds a HDLC frame containing the command *end of procedure* (EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

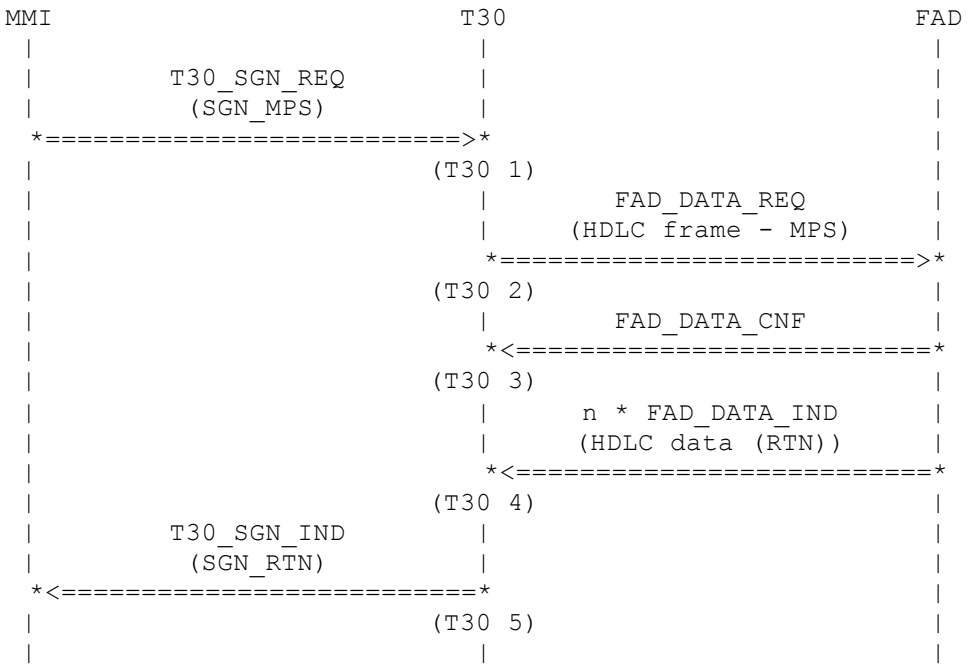
(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *message confirmation* (MCF) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 builds a HDLC frame containing the command *disconnect* (DCN).
T30 requests FAD to send this frame to the remote site.

(T30 6)
T30 is informed by FAD that the frame has been sent.

(T30 7)
T30 informs MMI that *end of procedure* has been finished.

6.6.1.4 Retraining Request Negative (RTN), MPS



(T30 1)
T30 is requested by MMI to send one of the commands MPS.

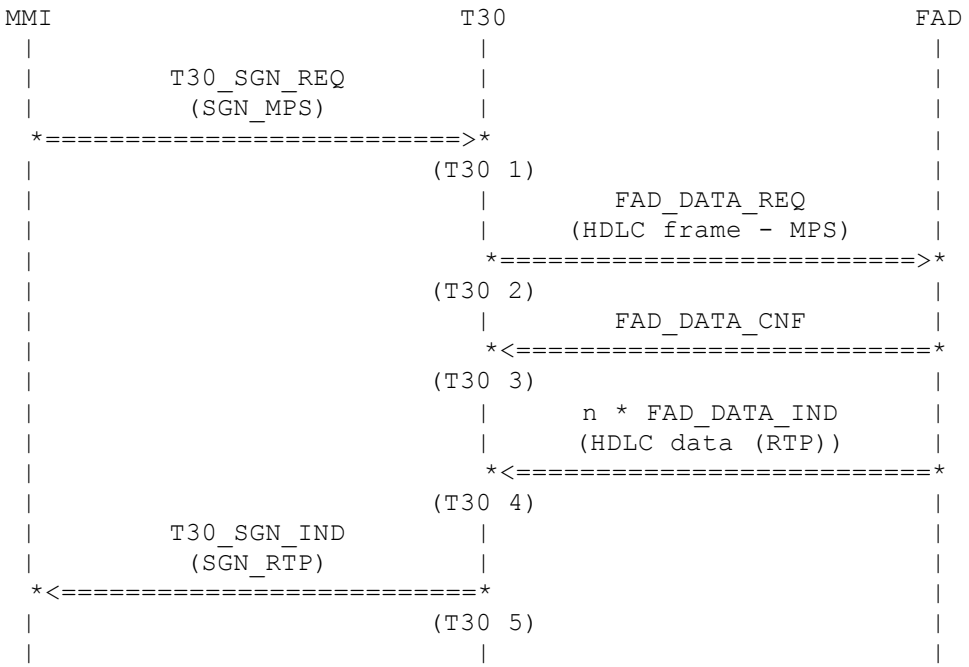
(T30 2)
T30 builds a HDLC frame containing command *multipage signal* (MPS).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain negative* (RTN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 informs MMI about the received retrain request.

6.6.1.5 Retraining Request Positive (RTP), MPS



(T30 1)
T30 is requested by MMI to send one of the commands MPS.

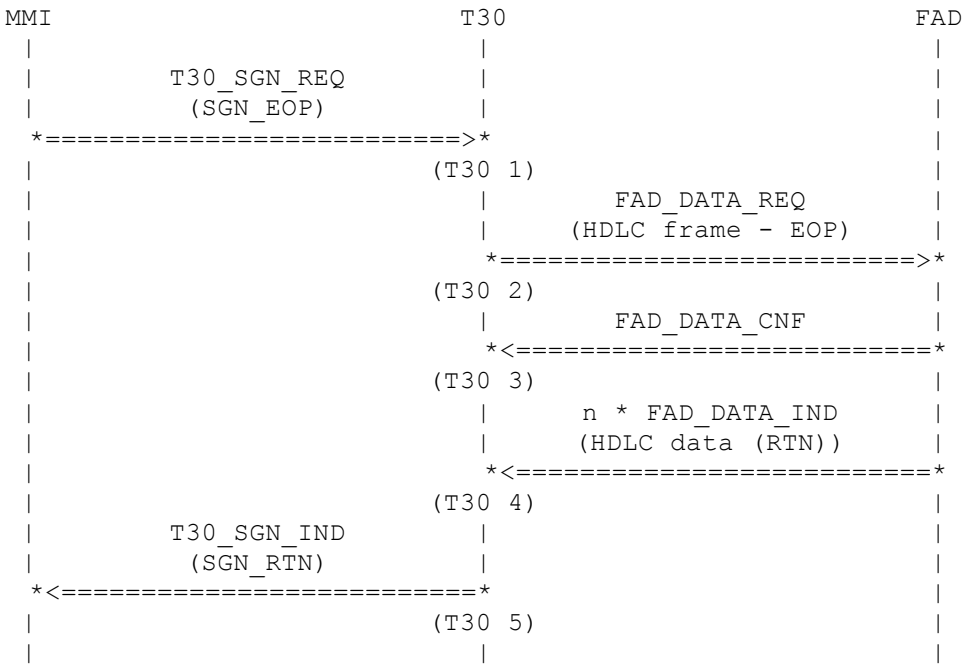
(T30 2)
T30 builds a HDLC frame containing the command *multipage signal* (MPS).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain positive* (RTP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 informs MMI about the received retrain request.

6.6.1.6 Retraining Request Positive (RTN), EOP



(T30 1)
T30 is requested by MMI to send one of the commands EOP.

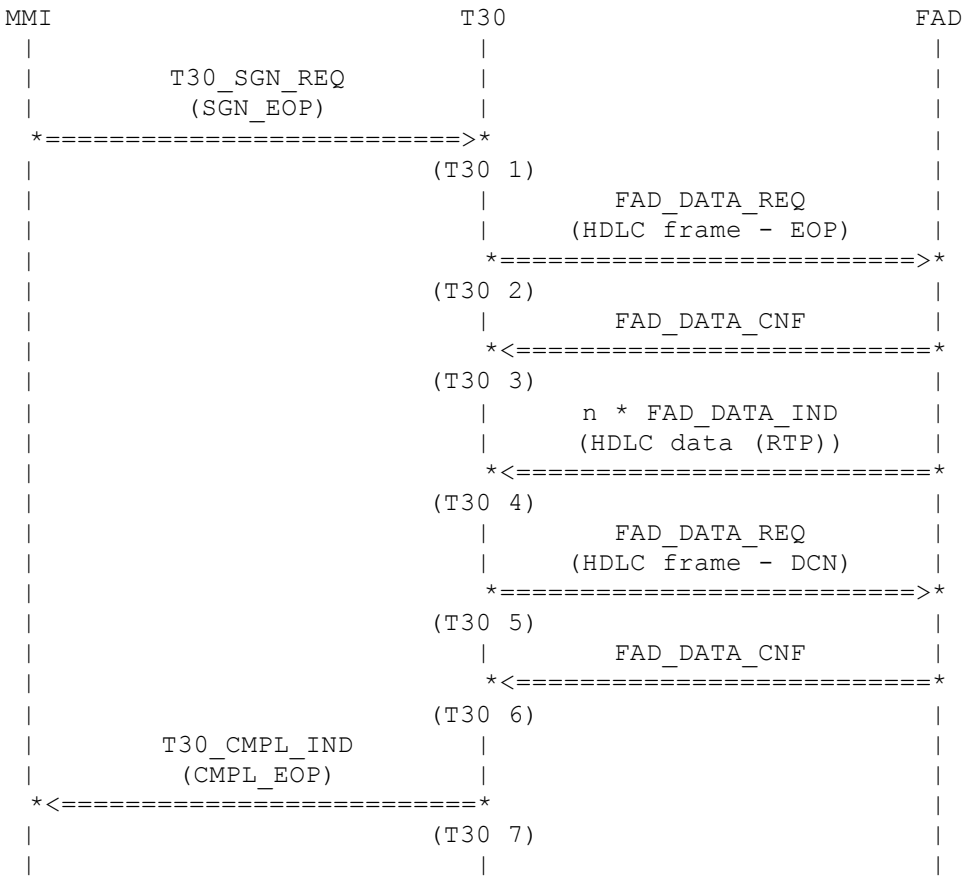
(T30 2)
T30 builds a HDLC frame containing the command *end of produre* (EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain negative* (RTN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 informs MMI about the received retrain request.

6.6.1.7 Retraining Request Positive (RTP), EOP



(T30 1)
T30 is requested by MMI to send one of the commands EOP.

(T30 2)
T30 builds a HDLC frame containing the command *end of produre* (EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

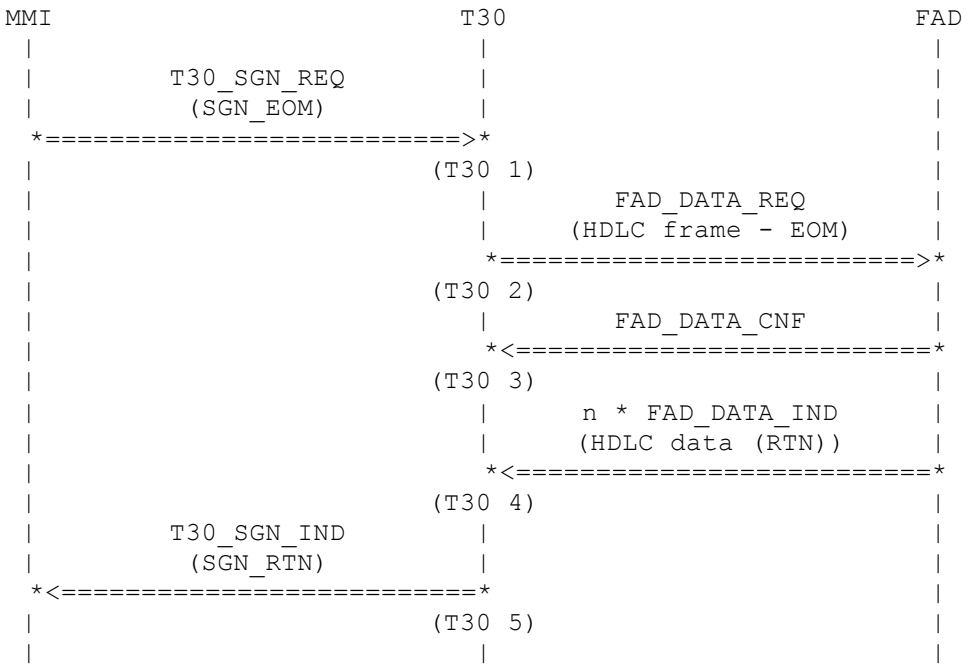
(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain positive* (RTP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 builds a HDLC frame containing the command *disconnect* (DCN).
T30 requests FAD to send this frame to the remote site.

(T30 6)
T30 is informed by FAD that the frame has been sent.

(T30 7)
T30 informs MMI about the received retrain request.

6.6.1.8 Retraining Request Positive (RTN), EOM



(T30 1)
T30 is requested by MMI to send one of the commands EOM.

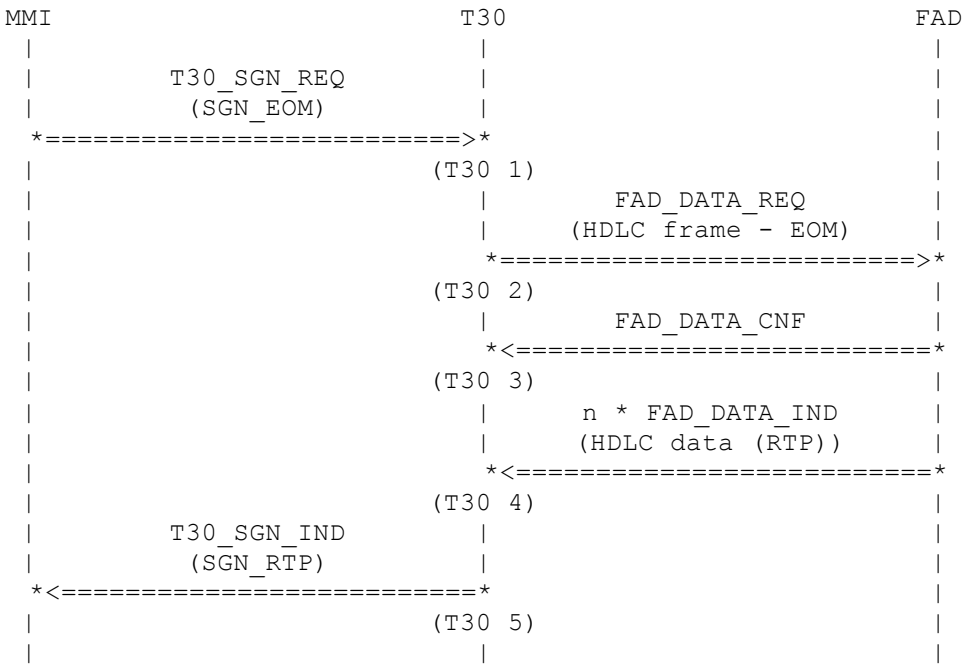
(T30 2)
T30 builds a HDLC frame containing the command *end of message* (EOM).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain negative* (RTN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 informs MMI about the received retrain request.

6.6.1.9 Retraining Request Positive (RTP), EOM



(T30 1)
T30 is requested by MMI to send one of the commands EOM.

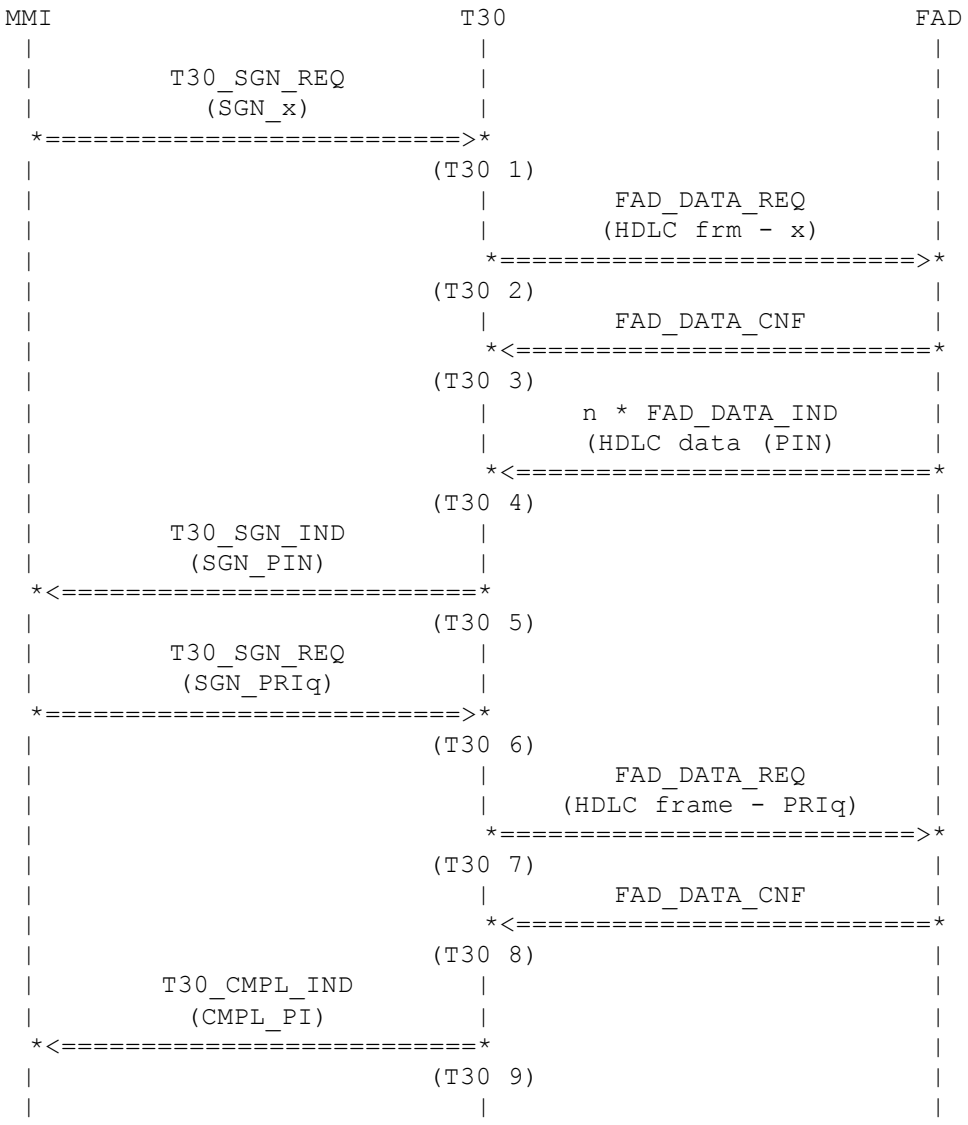
(T30 2)
T30 builds a HDLC frame containing the command *end of message* (EOM).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *retrain positive* (RTP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 informs MMI about the received retrain request.

6.6.1.10 Procedure Interrupt Negative (PIN) from Remote Site



(T30 1)
T30 is requested by MMI to send one of the commands MPS, EOM or EOP.

(T30 2)
T30 builds a HDLC frame containing one of the commands *multipage signal* (MPS), *end of message* (EOM) or *end of procedure* (EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt negative* (PIN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

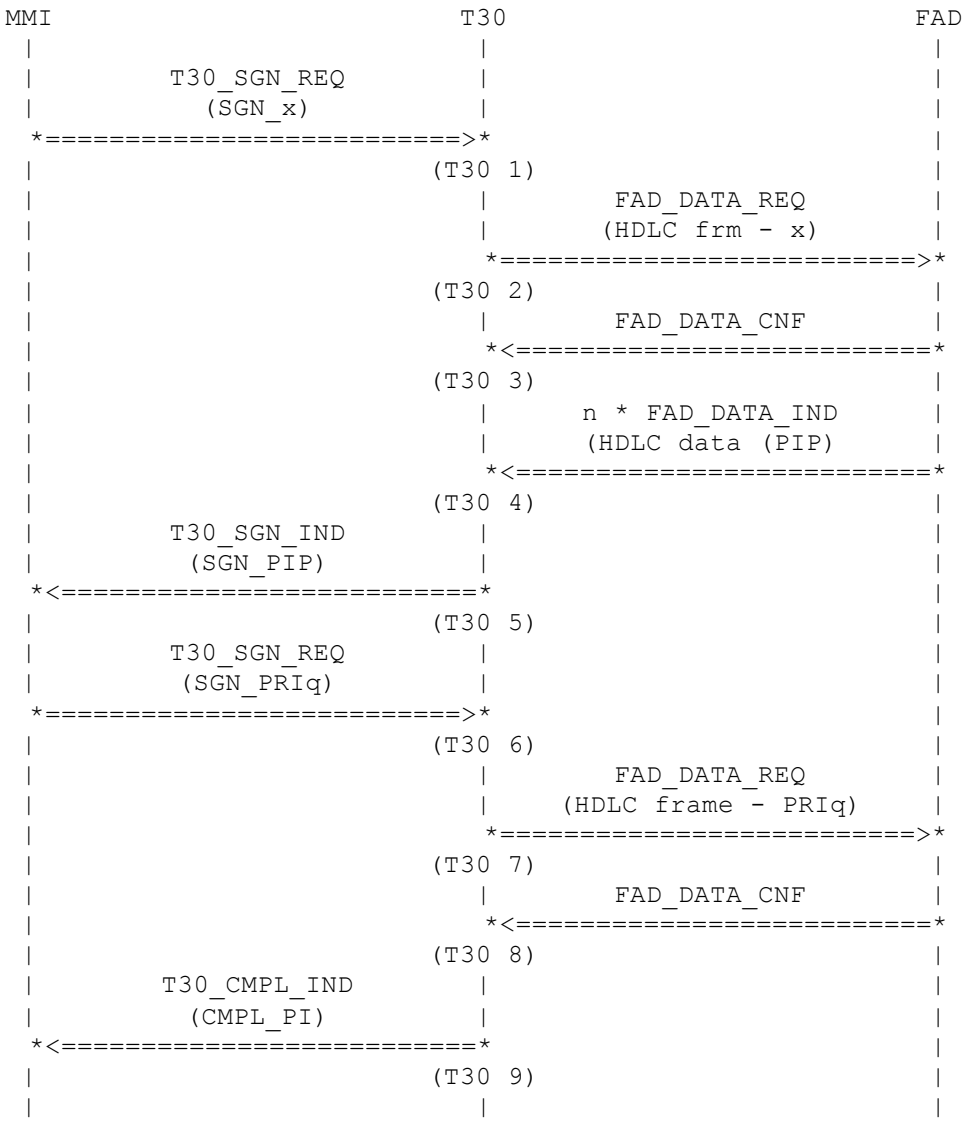
(T30 6)
T30 is requested by MMI to send the appropriate procedure interrupt command (PRIq = PRI_MPS, PRI_EOM or PRI_EOP).

(T30 7)
T30 builds a HDLC frame containing the procedure interrupt command.
T30 requests FAD to send this frame to the remote site.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the *procedure interrupt* has been completed.

6.6.1.11 Procedure Interrupt Positive (PIP) from Remote Site



(T30 1)
T30 is requested by MMI to send one of the commands MPS, EOM or EOP.

(T30 2)
T30 builds a HDLC frame containing one of the commands *multipage signal* (MPS), *end of message* (EOM) or *end of procedure* (EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt positive* (PIP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

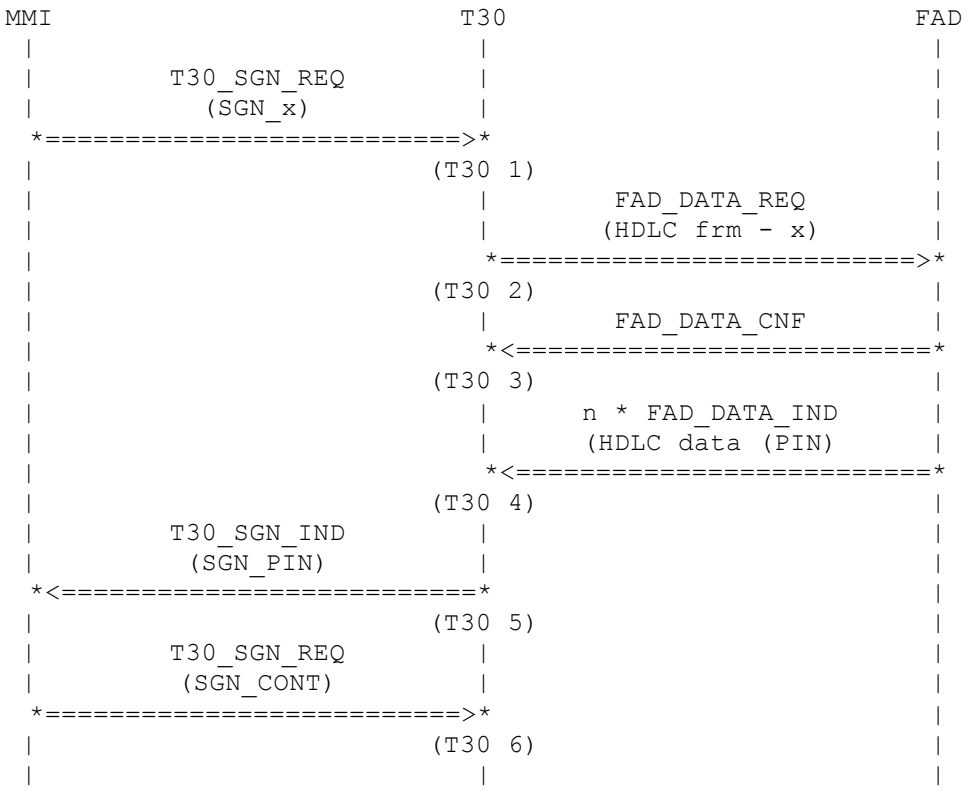
(T30 6)
T30 is requested by MMI to send the appropriate procedure interrupt command (PRIq = PRI_MPS, PRI_EOM or PRI_EOP).

(T30 7)
T30 builds a HDLC frame containing the procedure interrupt command.
T30 requests FAD to send this frame to the remote site.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the *procedure interrupt* has been completed.

6.6.1.12 Procedure Interrupt Negative (PIN) from Remote Site Rejected



(T30 1)
T30 is requested by MMI to send one of the commands MPS, EOM or EOP.

(T30 2)
T30 builds a HDLC frame containing one of the commands *multipage signal* (MPS), *end of message* (EOM) or *end of procedure* (EOP).
T30 requests FAD to send this frame to the remote site.

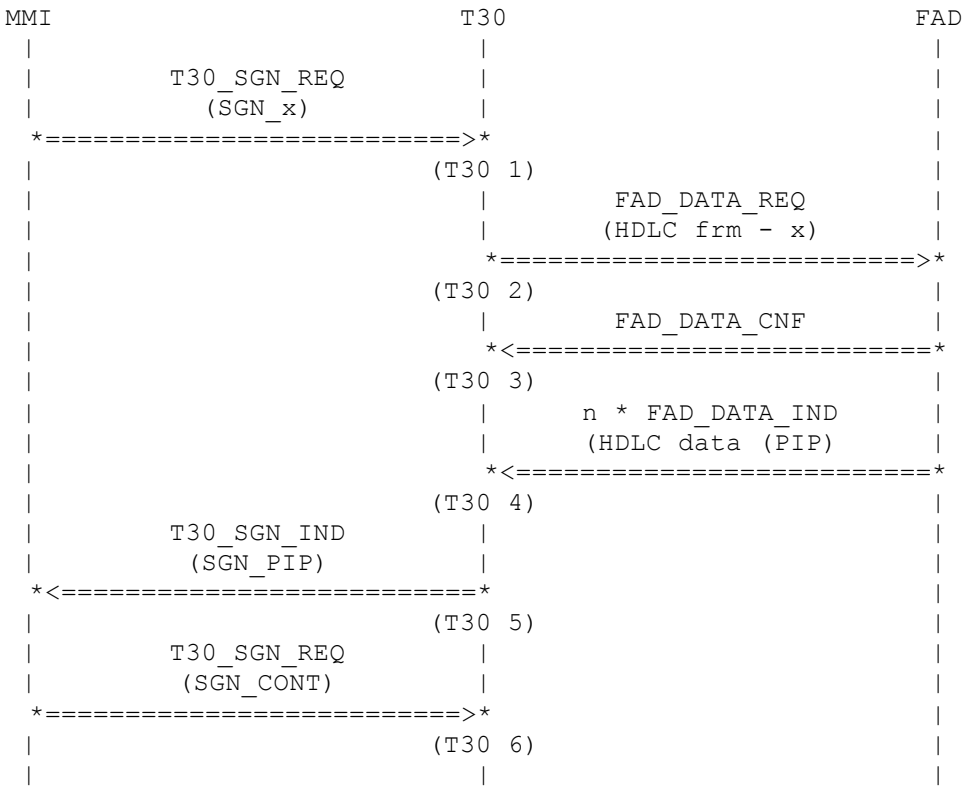
(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt negative* (PIN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

(T30 6)
T30 is requested by MMI to continue normally.
T30 changes to state T30_IDLE.

6.6.1.13 Procedure Interrupt Positive (PIP) from Remote Site Rejected



(T30 1)
T30 is requested by MMI to send one of the commands MPS, EOM or EOP.

(T30 2)
T30 builds a HDLC frame containing one of the commands *multipage signal* (MPS), *end of message* (EOM) or *end of procedure* (EOP).
T30 requests FAD to send this frame to the remote site.

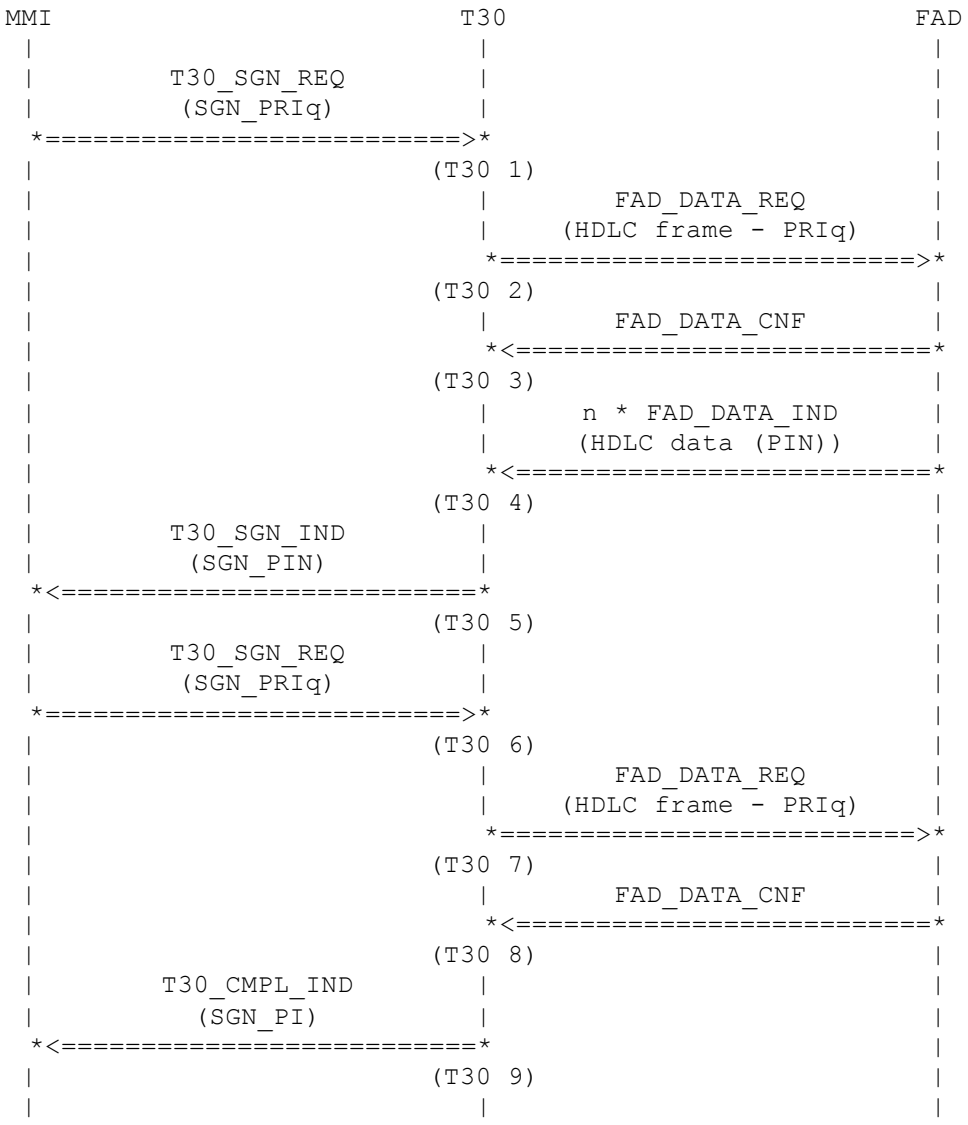
(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt positive* (PIP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

(T30 6)
T30 is requested by MMI to continue normally.
T30 changes to state T30_IDLE.

6.6.1.14 Procedure Interrupt Negative (PIN) from Local Site



(T30 1)
T30 is requested by MMI to send one of the commands PRI-MPS, PRI-EOM or PRI-EOP.

(T30 2)
T30 builds a HDLC frame containing one of the pri-commands *multipage signal* (PRI-MPS), *end of message* (PRI-EOM) or *end of produre* (PRI-EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt negative* (PIN) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

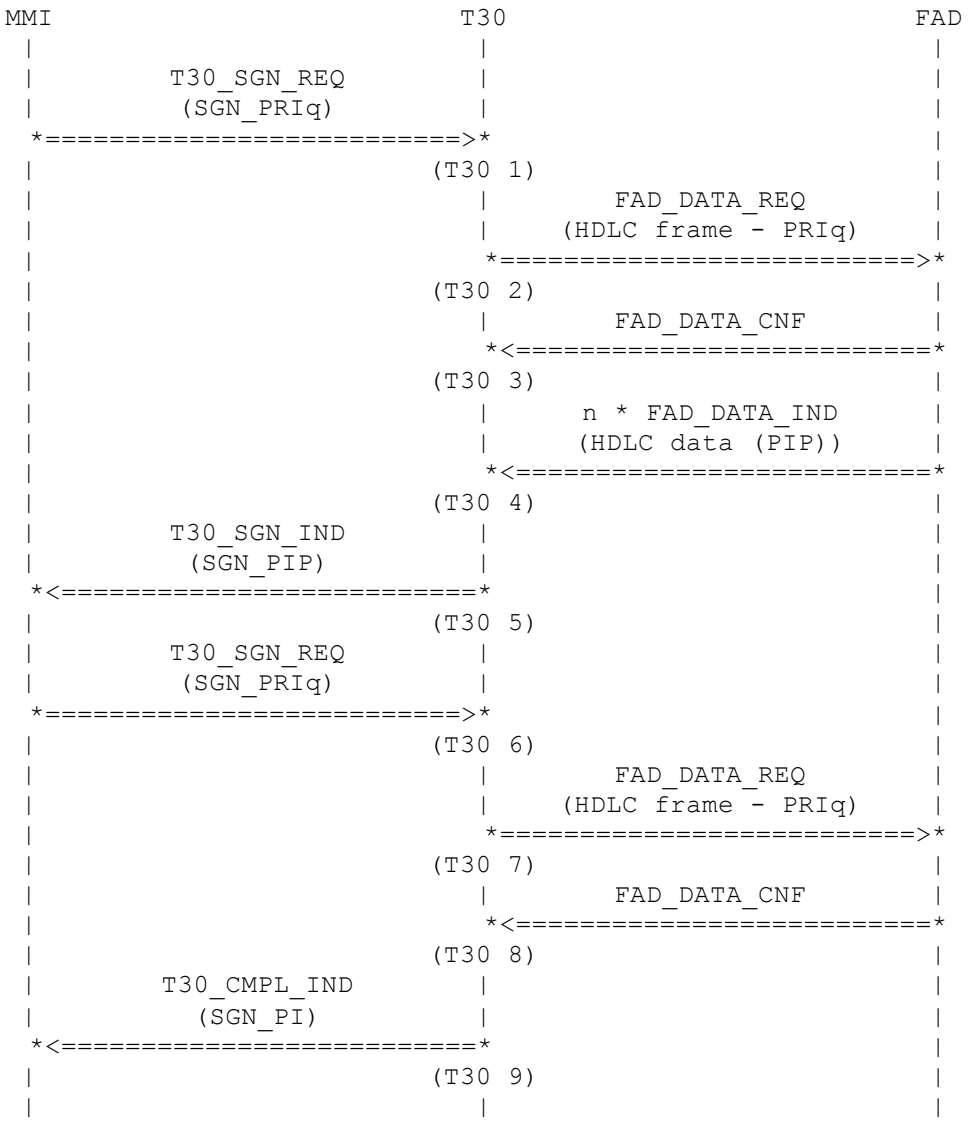
(T30 6)
T30 is requested by MMI to send the appropriate procedure interrupt command (PRIq = PRI_MPS, PRI_EOM or PRI_EOP).

(T30 7)
T30 builds a HDLC frame containing the procedure interrupt command.
T30 requests FAD to send this frame to the remote site.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the *procedure interrupt* has been completed.

6.6.1.15 Procedure Interrupt Positive (PIP) from Local Site



(T30 1)
T30 is requested by MMI to send one of the commands PRI-MPS, PRI-EOM or PRI-EOP.

(T30 2)
T30 builds a HDLC frame containing one of the pri-commands *multipage signal* (PRI-MPS), *end of message* (PRI-EOM) or *end of produre* (PRI-EOP).
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *procedure interrupt positive* (PIP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 sends the response from the remote site to MMI.

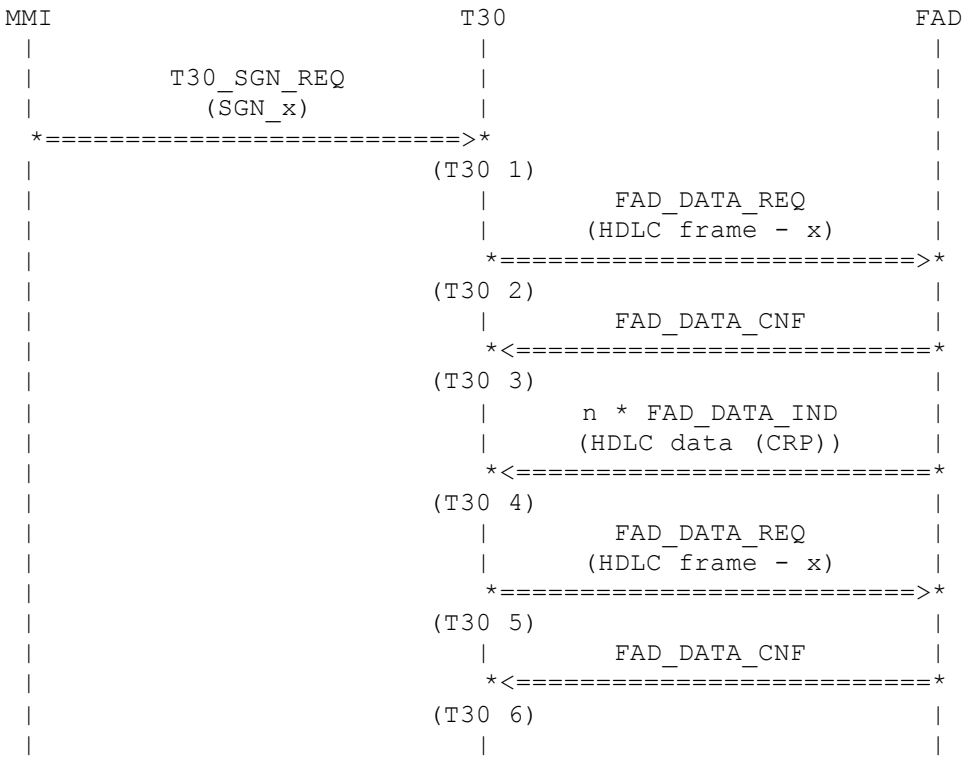
(T30 6)
T30 is requested by MMI to send the appropriate procedure interrupt command (PRIq = PRI_MPS, PRI_EOM or PRI_EOP).

(T30 7)
T30 builds a HDLC frame containing the procedure interrupt command.
T30 requests FAD to send this frame to the remote site.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the *procedure interrupt* has been completed.

6.6.1.16 Command Repeat



(T30 1)
T30 is requested by MMI to send a post message command.

(T30 2)
T30 builds a HDLC frame containing the post message command.
T30 requests FAD to send this frame to the remote site.

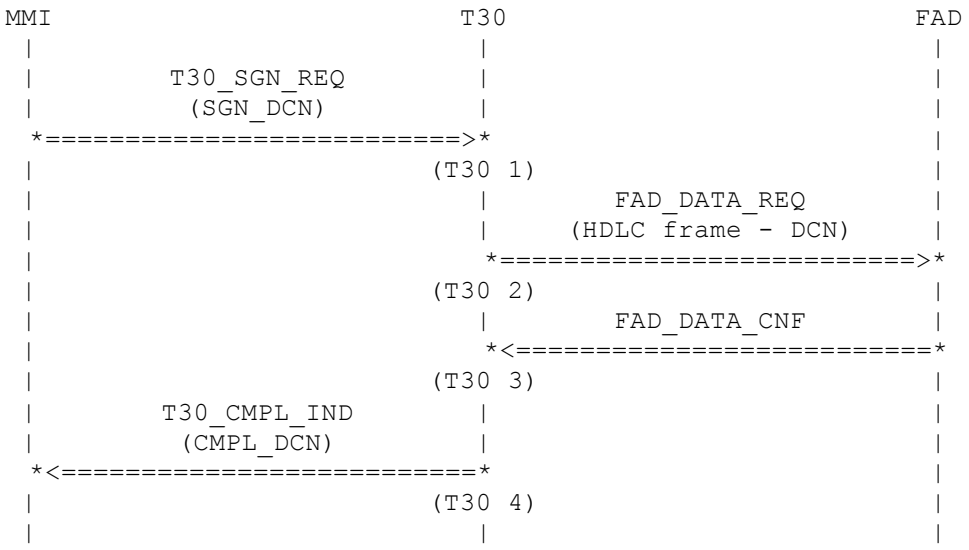
(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *command repeat* (CRP) from the remote site.
T30 stops the repeat timer T4.

(T30 5)
T30 requests FAD to send the post message command to the remote site again.

(T30 6)
T30 is informed by FAD that the command has been sent.

6.6.1.17 Disconnect Request



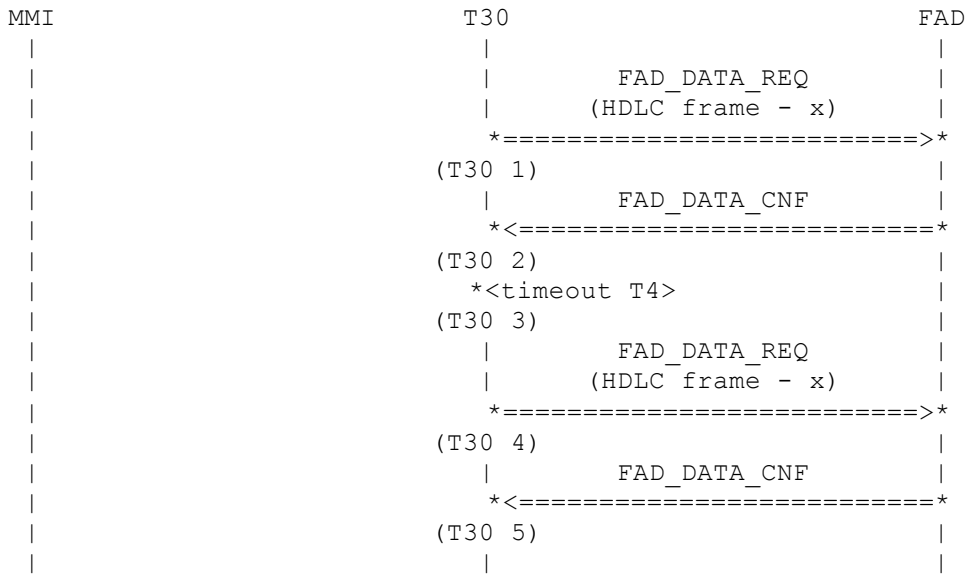
(T30 1)
T30 is requested by MMI to send a post message command.

(T30 2)
T30 builds a HDLC frame containing the post message command.
T30 requests FAD to send this frame to the remote site.

(T30 3)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T4.

(T30 4)
T30 informs MMI that a *disconnect* has been sent.

6.6.1.18 Timer T4 Expires the First or Second Time



(T30 1)
T30 requests FAD to send the HDLC frame containing a command.

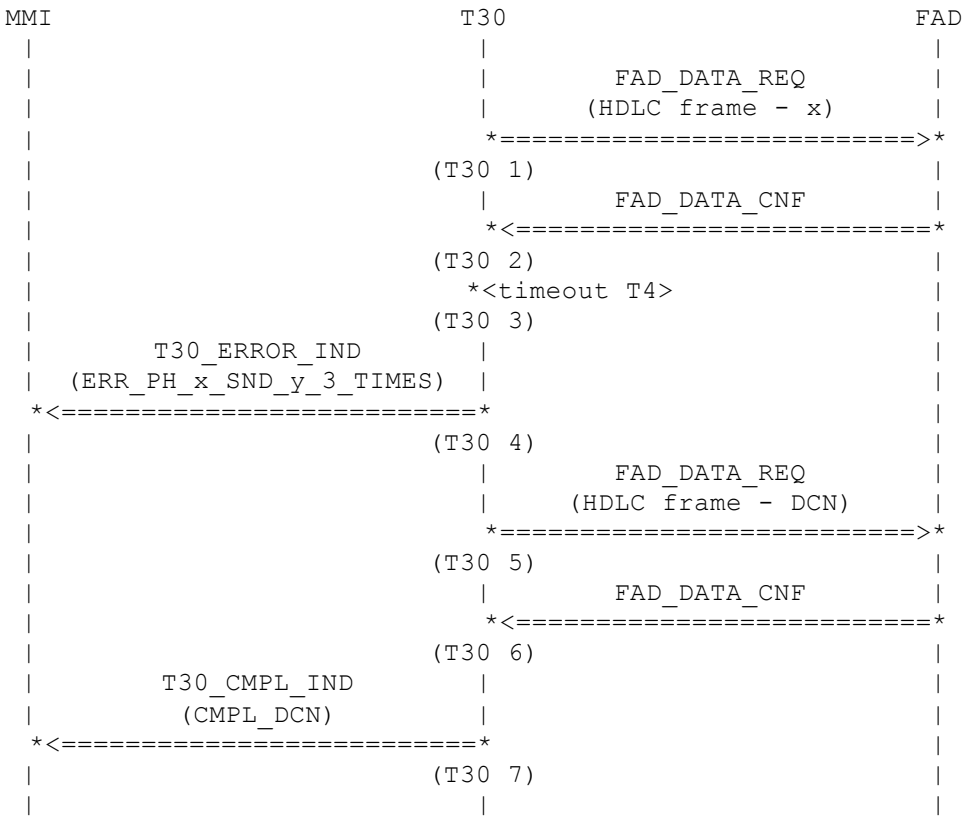
(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 3)
Timer T4 expires the first or second time.

(T30 4)
T30 requests FAD to send the HDLC frame containing the command again.

(T30 5)
T30 is informed by FAD that the HDLC frame has been sent.

6.6.1.19 Timer T4 Expires the Third Time



(T30 1)
T30 requests FAD to send the HDLC frame containing a command the third time.

(T30 2)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 3)
Timer T4 expires the third time.

(T30 4)
T30 informs MMI that a disconnect is initiated.

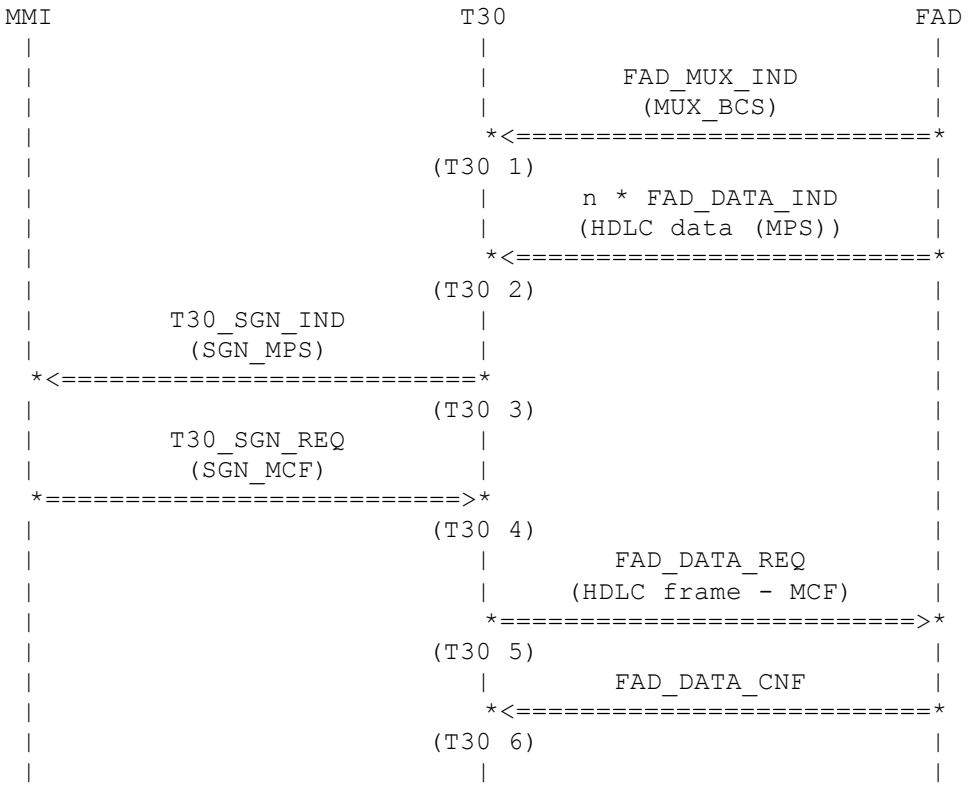
(T30 5)
T30 builds a HDLC frame containing the response *disconnect* (DCN).
T30 requests FAD to send this frame to the remote site.

(T30 6)
T30 is informed by FAD that the HDLC frame has been sent.

(T30 7)
T30 informs MMI that a *disconnect* has been sent.

6.6.2 Receive Fax

6.6.2.1 Multipage Signal



(T30 1)
T30 is informed by FAD that message data is following.

(T30 2)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the command *multipage signal* (MPS) from the remote site.
T30 stops timer T2.

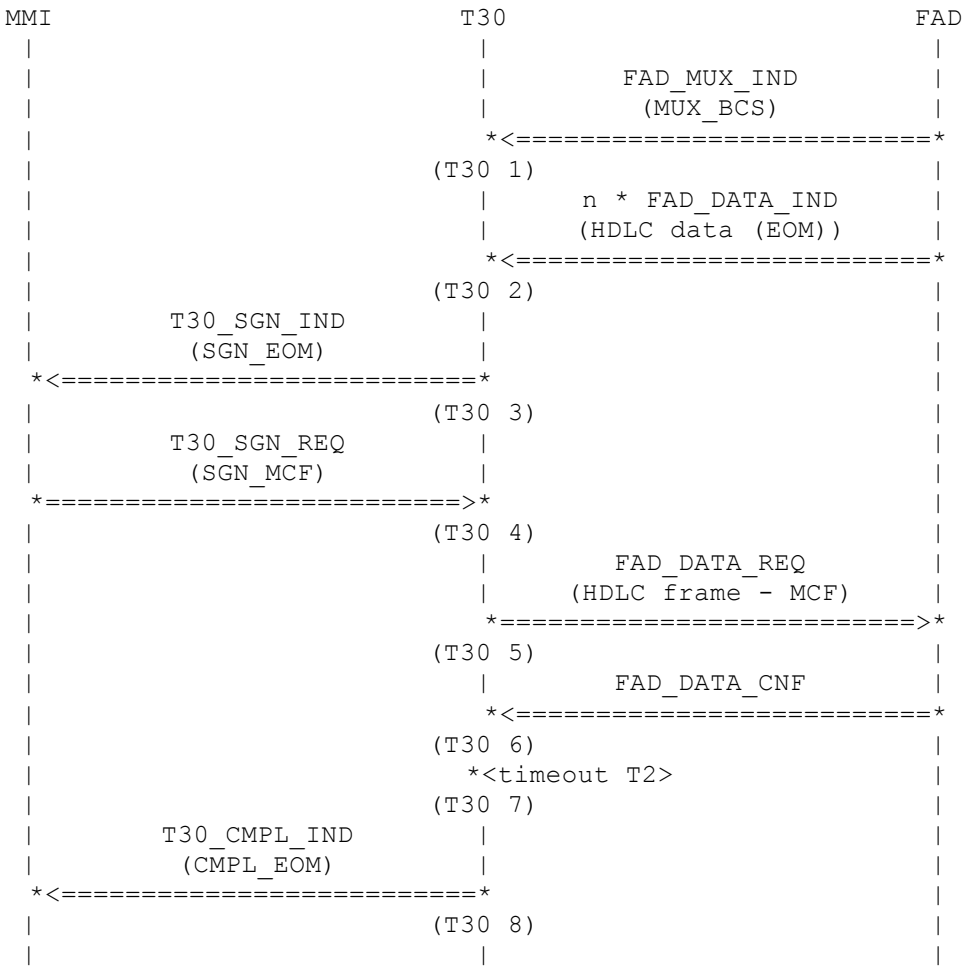
(T30 3)
T30 informs MMI about the received command.

(T30 4)
T30 is requested by MMI to send the response *message confirmation* (MCF).

(T30 5)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 6)
T30 is informed by FAD that the frame has been sent.

6.6.2.2 End Of Message



(T30 1)
T30 is informed by FAD that message data is following.

(T30 2)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the command *end of message* (EOM) from the remote site.

(T30 3)
T30 informs MMI about the received command.

(T30 4)
T30 is requested by MMI to send the response *message confirmation* (MCF).

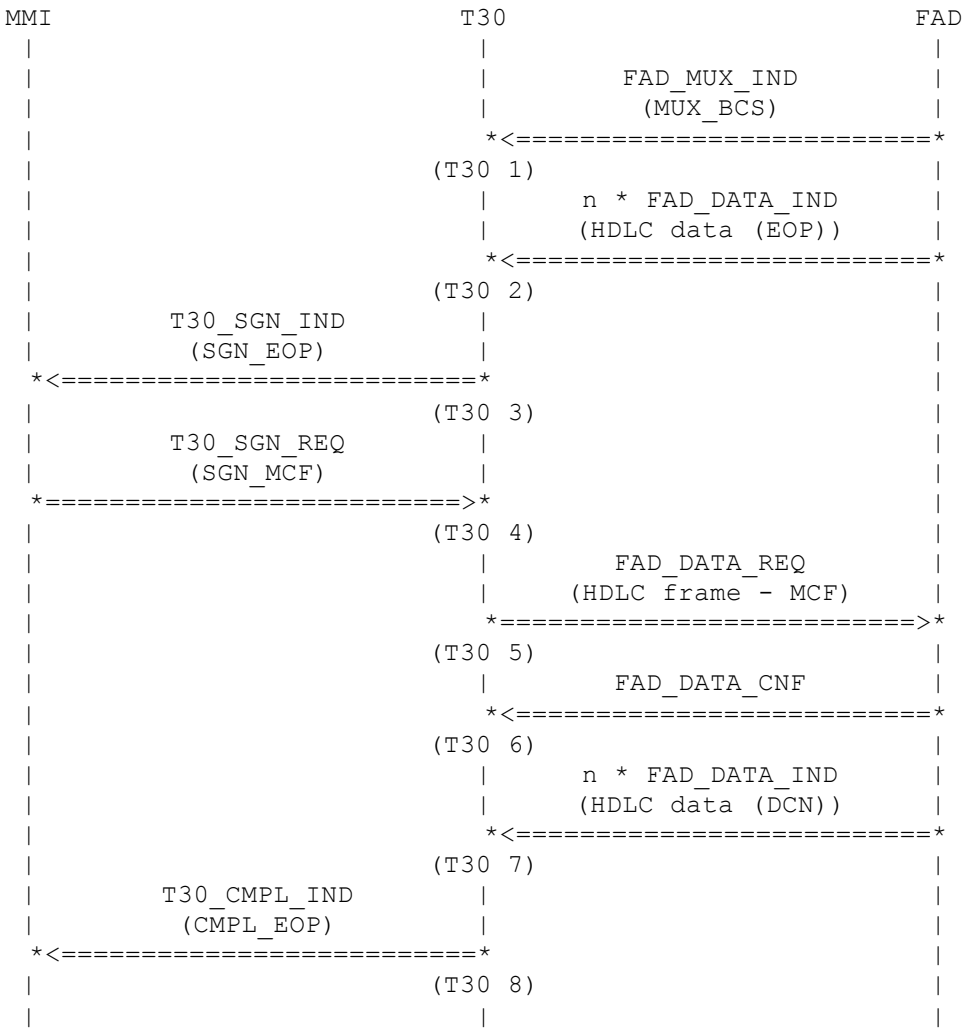
(T30 5)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 6)
T30 is informed by FAD that the frame has been sent.
T30 starts the timer T2 and waits that the timer expires.

(T30 7)
Timer T2 has been expired

(T30 8)
T30 informs MMI that *end of message* has been completed.

6.6.2.3 End of Procedure



(T30 1)
T30 is informed by FAD that message data is following.

(T30 2)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the command *end of procedure* (EOP) from the remote site.

(T30 3)
T30 informs MMI about the received command.

(T30 4)
T30 is requested by MMI to send the response *message confirmation* (MCF).

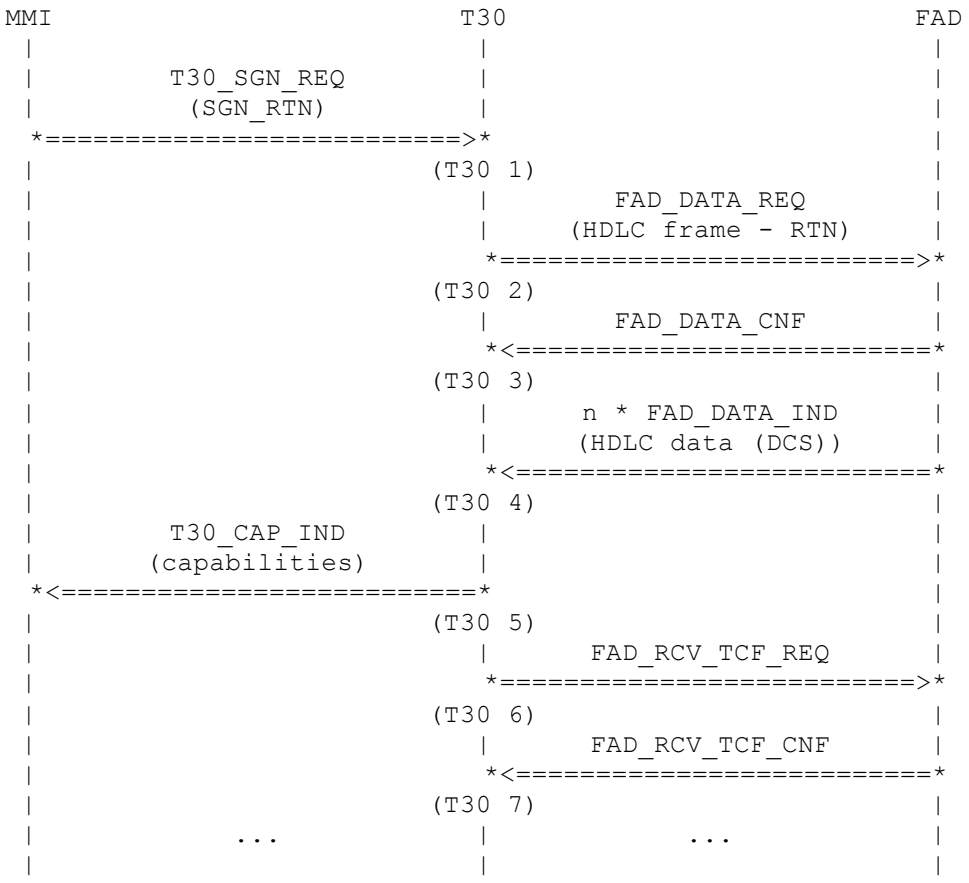
(T30 5)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 6)
T30 is informed by FAD that the frame has been sent.
T30 starts the repeat timer T2.

(T30 7)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the command *disconnect* (DCN) from the remote site.

(T30 8)
T30 informs MMI that *end of message* is completed.
T30 stops timer T2.
T30 changes to state T30_IDLE.

6.6.2.4 Retraining Request Negative (RTN)



(T30 1)
T30 is requested by MMI to send RTN.

(T30 2)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 3)
T30 is informed by FAD that the frame has been sent.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *digital command signal* (DCS) from the remote site.

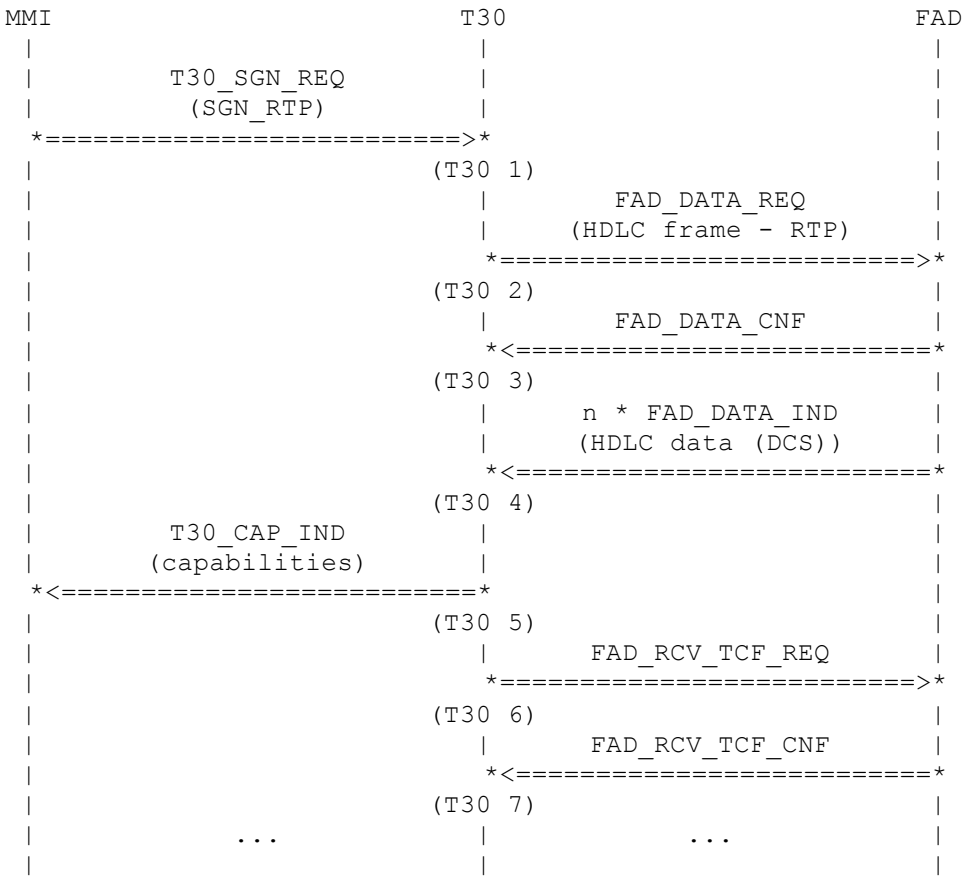
(T30 5)
T30 extracts the selected fax capabilities and sends them to MMI.

(T30 6)
T30 requests FAD to receive the TCF.

(T30 7)
T30 is informed by FAD about the ratio which has occurred during training checking.

...

6.6.2.5 Retraining Request Positive (RTP)



(T30 1)
T30 is requested by MMI to send RTP.

(T30 2)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 3)
T30 is informed by FAD that the frame has been sent.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains the response *digital command signal* (DCS) from the remote site.

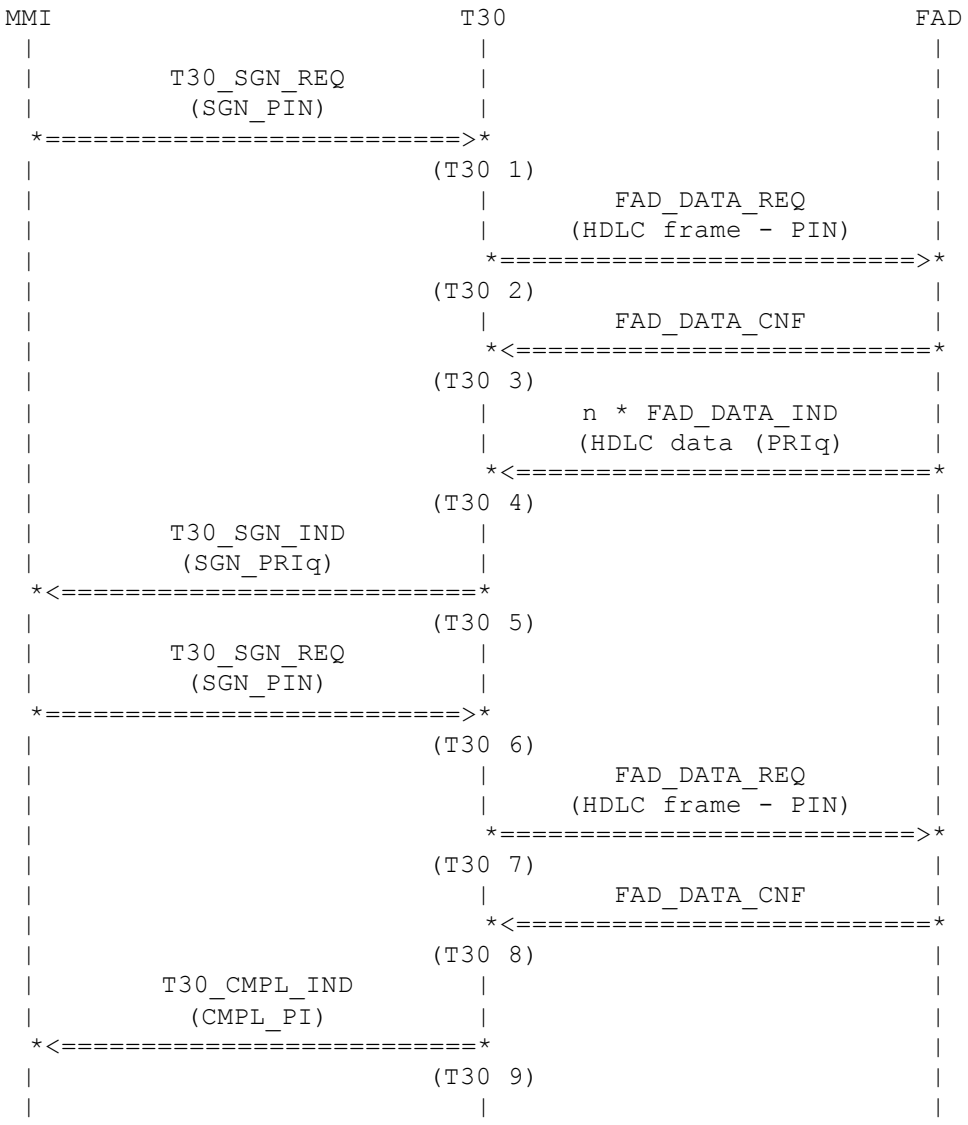
(T30 5)
T30 extracts the selected fax capabilities and sends them to MMI.

(T30 6)
T30 requests FAD to receive the TCF.

(T30 7)
T30 is informed by FAD about the ratio which has occurred during training checking.

...

6.6.2.6 Procedure Interrupt Negative (PIN) from Local Site



(T30 1)
T30 is requested by MMI to send one of the post message responses PIN.

(T30 2)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 3)
T30 is informed by FAD that the frame has been sent.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains a response *procedure interrupt* (PRI_EOM, PRI_EOP, PRI_MPS) from the remote site.

(T30 5)
T30 informs MMI that a procedure interrupt response has been received.

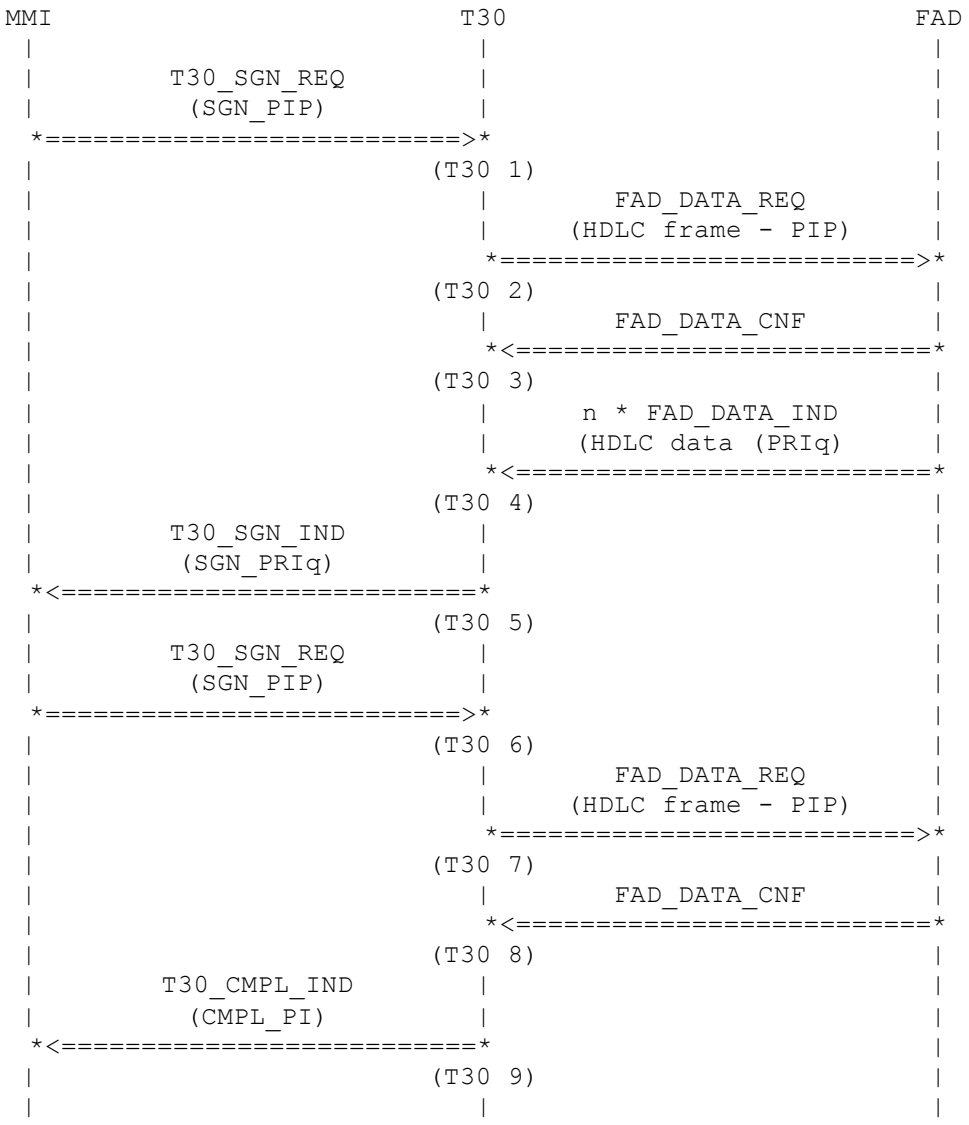
(T30 6)
T30 is requested by MMI to send one of the procedure interrupt response PIN.

(T30 7)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the procedure interrupt sequence has been completed.
T30 changes to state T30_IDLE.

6.6.2.7 Procedure Interrupt Positive (PIP) from Local Site



(T30 1)
T30 is requested by MMI to send one of the post message responses PIP

(T30 2)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 3)
T30 is informed by FAD that the frame has been sent.

(T30 4)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains a response *procedure interrupt* (PRI_EOM, PRI_EOP, PRI_MPS) from the remote site.

(T30 5)
T30 informs MMI that a procedure interrupt response has been received.

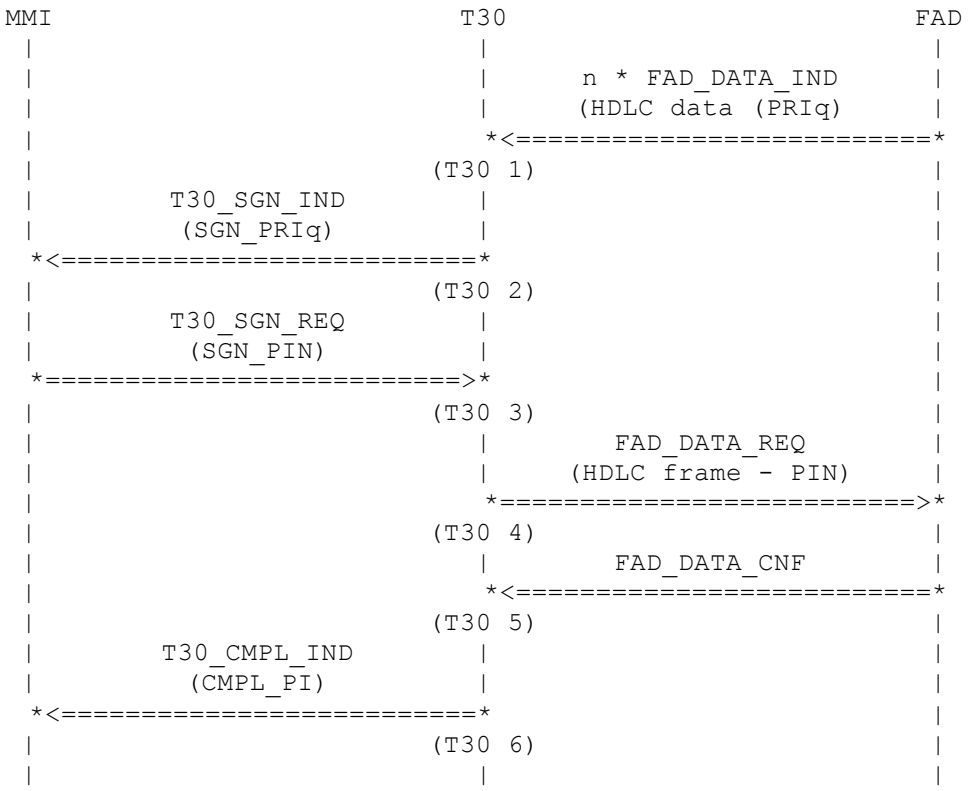
(T30 6)
T30 is requested by MMI to send one of the procedure interrupt response PIP.

(T30 7)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 8)
T30 is informed by FAD that the frame has been sent.

(T30 9)
T30 informs MMI that the procedure interrupt sequence has been completed.
T30 changes to state T30_IDLE.

6.6.2.8 Procedure Interrupt Negative (PRIq, PIN) from Remote Site



(T30 1)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains a response *procedure interrupt* (PRI_EOM, PRI_EOP, PRI_MPS) from the remote site.

(T30 2)
T30 informs MMI that a procedure interrupt response has been received.

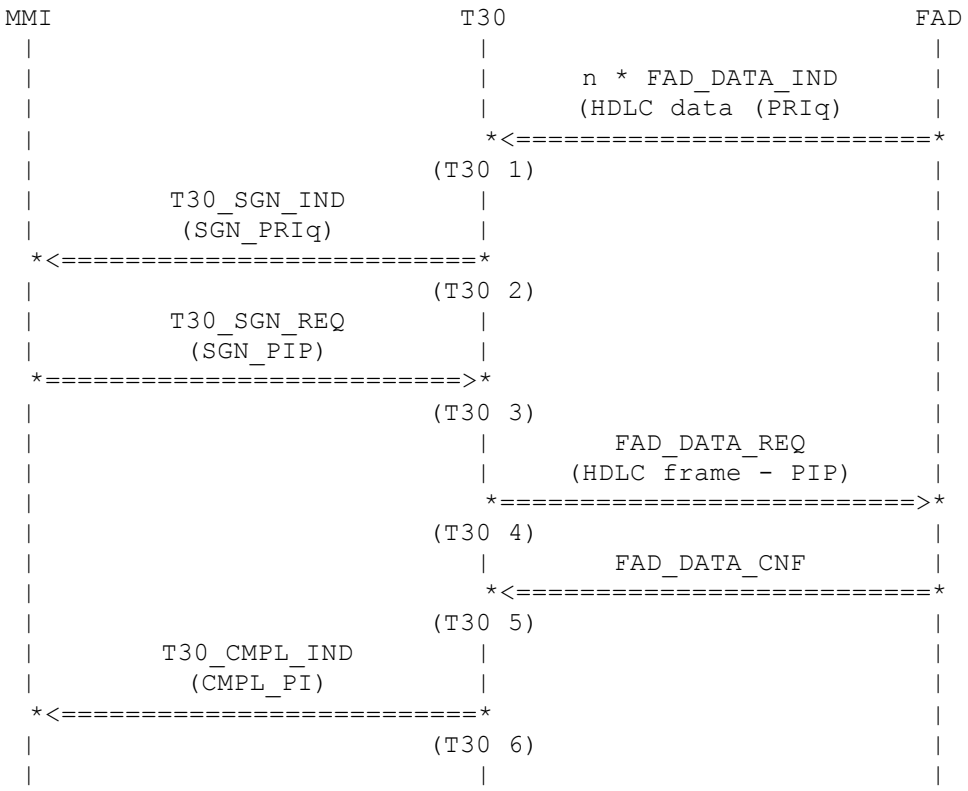
(T30 3)
T30 is requested by MMI to send one of the procedure interrupt response PIN.

(T30 4)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 5)
T30 is informed by FAD that the frame has been sent.

(T30 6)
T30 informs MMI that the procedure interrupt sequence has been completed.
T30 changes to state T30_IDLE.

6.6.2.9 Procedure Interrupt Positive (PRIq, PIP) from Remote Site



(T30 1)
T30 receives HDLC data from FAD with the primitive FAD_DATA_IND. This is repeated n times. After the HDLC frame has been received in full T30 analyses the information (see also chapter 5). The frame contains a response *procedure interrupt* (PRI_EOM, PRI_EOP, PRI_MPS) from the remote site.

(T30 2)
T30 informs MMI that a procedure interrupt response has been received.

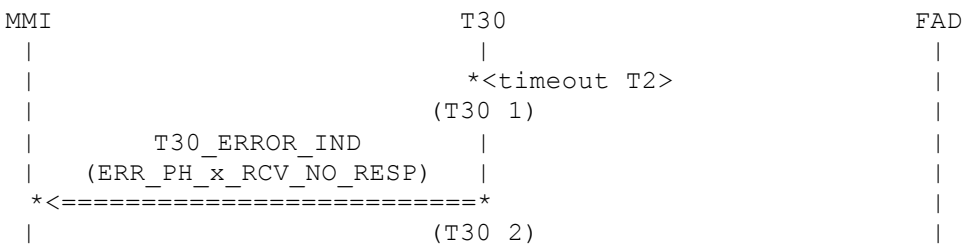
(T30 3)
T30 is requested by MMI to send one of the procedure interrupt response PIN or PIP.

(T30 4)
T30 forms a HDLC frame containing the response.
T30 requests FAD to send this HDLC frame.

(T30 5)
T30 is informed by FAD that the frame has been sent.

(T30 6)
T30 informs MMI that the procedure interrupt sequence has been completed.
T30 changes to state T30_IDLE.

6.6.2.10 Timer T2 Expires



(T30 1)
Timer T2 has been expired.

(T30 2)
T30 informs MMI that no response has been received from the remote site.

Appendices

A. Acronyms

DS-WCDMA Direct Sequence/Spread Wideband Code Division Multiple Access

B. Glossary

International Mobile Telecommunication 2000 (IMT-2000/ITU-2000) Formerly referred to as FPLMTS (Future Public Land-Mobile Telephone System), this is the ITU's specification/family of standards for 3G. This initiative provides a global infrastructure through both satellite and terrestrial systems, for fixed and mobile phone users. The family of standards is a framework comprising a mix/blend of systems providing global roaming. <URL: http://www.imt-2000.org/>