



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.39

(10/96)

SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATION

Public data networks – Interfaces

**Procedures for the exchange of control
information and user data between a Facsimile
Packet Assembly/Disassembly (FPAD) facility
and a packet mode Data Terminal Equipment
(DTE) or another FPAD**

ITU-T Recommendation X.39

(Previously "CCITT Recommendation")

ITU-T X-SERIES RECOMMENDATIONS
DATA NETWORKS AND OPEN SYSTEM COMMUNICATION

PUBLIC DATA NETWORKS	X.1-X.199
Services and facilities	X.1-X.19
Interfaces	X.20-X.49
Transmission, signalling and switching	X.50-X.89
Network aspects	X.90-X.149
Maintenance	X.150-X.179
Administrative arrangements	X.180-X.199
OPEN SYSTEM INTERCONNECTION	X.200-X.299
Model and notation	X.200-X.209
Service definitions	X.210-X.219
Connection-mode protocol specifications	X.220-X.229
Connectionless-mode protocol specifications	X.230-X.239
PICS proformas	X.240-X.259
Protocol Identification	X.260-X.269
Security Protocols	X.270-X.279
Layer Managed Objects	X.280-X.289
Conformance testing	X.290-X.299
INTERWORKING BETWEEN NETWORKS	X.300-X.399
General	X.300-X.349
Satellite data transmission networks	X.350-X.399
MESSAGE HANDLING SYSTEMS	X.400-X.499
DIRECTORY	X.500-X.599
OSI NETWORKING AND SYSTEM ASPECTS	X.600-X.699
Networking	X.600-X.629
Efficiency	X.630-X.649
Naming, Addressing and Registration	X.650-X.679
Abstract Syntax Notation One (ASN.1)	X.680-X.699
OSI MANAGEMENT	X.700-X.799
Systems Management framework and architecture	X.700-X.709
Management Communication Service and Protocol	X.710-X.719
Structure of Management Information	X.720-X.729
Management functions	X.730-X.799
SECURITY	X.800-X.849
OSI APPLICATIONS	X.850-X.899
Commitment, Concurrency and Recovery	X.850-X.859
Transaction processing	X.860-X.879
Remote operations	X.880-X.899
OPEN DISTRIBUTED PROCESSING	X.900-X.999

For further details, please refer to ITU-T List of Recommendations.

FOREWORD

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

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

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation X.39 was revised by ITU-T Study Group 7 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 5th of October 1996.

NOTE

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

© ITU 1997

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

	<i>Page</i>
Preface	1
1 Procedures for the exchange of FPAD control information and user data.....	2
1.2 Address field and destination G3FE telephone number	2
1.3 Call user data	2
1.4 User sequences	3
1.5 FPAD messages	3
2 User Data Transfer	3
3 Procedure for the use of FPAD messages	3
3.1 Procedures for reading, setting, and setting and reading of FPAD parameters	3
3.2 Procedures for inviting the FPAD to clear.....	5
3.3 Error handling procedures by the FPAD	5
3.4 Procedure for inviting the FPAD to reselect the called DTE.....	5
3.5 Facsimile procedure	5
3.6 Ancillary signals, commands and responses procedures	5
4 Formats.....	6
4.1 Introduction	6
4.2 Call user data format.....	6
4.3 User sequence format	6
4.4 Control message format.....	7
Annex A	13
Annex B – Characteristics of virtual calls and Recommendation X.25 as related to the FPAD representation of a G3 facsimile equipment and a packet mode DTE (or remote FPAD).....	15
B.1 General interface characteristics	15
B.2 Interface procedures for virtual call control	15
B.3 Interface procedures for data transfer	15
B.4 Virtual call characteristics	15
Annex C – Alphabetical list of abbreviations used in this Recommendation.....	16
Annex D – Access to MHS	17
D.1 Introduction	17
D.2 References	18
D.3 Format of the MHS related FPAD messages	18
D.4 Mapping of the MHS related FPAD messages to the MHS features.....	21

SUMMARY

This Recommendation describes procedures for the exchange of control information and user data between a Facsimile Packet Assembly/Disassembly (FPAD) and a packet mode DTE or another FPAD.

06-10-1996

p. iv

Recommendation X.39

**PROCEDURES FOR THE EXCHANGE OF CONTROL INFORMATION
AND USER DATA BETWEEN A FACSIMILE PACKET ASSEMBLY/
DISASSEMBLY (FPAD) FACILITY AND A PACKET MODE
DATA TERMINAL EQUIPMENT (DTE) OR ANOTHER FPAD**

(Geneva, 1991; revised in 1996)

Preface

The establishment in various countries of public data networks providing packet switched data transmission services creates a need to produce standards to facilitate international interworking.

The ITU-T,

considering

- (a) that Recommendations X.1 and X.2 define the user classes of service and facilities in a public data network, and Recommendation X.96 defines call progress signals;
- (b) that Recommendation X.5 defines the FPAD in a public data network;
- (c) that Recommendation X.38 defines the G3 facsimile equipment/DCE interface for a G3 facsimile equipment accessing the FPAD in a public data network;
- (d) that Recommendation X.25 defines the interface between the DTE and the DCE for DTEs operating in a packet mode in public data networks;
- (e) the need to allow interworking between a G3 facsimile equipment in a general switched telephone network or a leased line and a packet mode DTE using the virtual call facility of the packet switched transmission service;
- (f) the need to allow interworking between FPADs;
- (g) that the packet mode DTE shall not be obliged to use the control procedures for FPAD functions, but that some packet mode DTEs may wish to control specific functions of the FPAD,

unanimously declares that

- (1) the X.39 procedures shall apply to the X.25 interface between the DCE and the packet mode DTE;
- (2) the X.39 procedures shall be applied for interworking between FPADs;
- (3) the procedures be as specified in clause 1;
- (4) the manner in which user data is transferred be as specified below in clause 2;
- (5) the procedure for the control of the FPAD via FPAD messages be as specified below in clause 3;
- (6) the formats of data fields which are transferable on a virtual call be as specified below in clause 4.

NOTE – For ease of understanding, this Recommendation refers to specific packet types and procedures of Recommendation X.25. When FPAD to FPAD interworking is considered within a national network, these packet types or procedures may have a different form from those used in Recommendation X.25 but will have the same operational meaning.

1 Procedures for the exchange of FPAD control information and user data

1.1 The exchange of control information and user data between an FPAD and a packet mode DTE or between FPADs is performed by using data fields defined in Recommendation X.25.

1.2 Address field and destination G3FE telephone number

The telephone number of the destination G3FE is placed in the call request packet either in the address field or in the call user data field.

The originating FPAD shall choose which field to use in placing a call according to prior knowledge of the capabilities of the remote FPAD, the intermediary networks, and/or the remote DTE which receives the call. In cases where the call user data field is used, the address field of the call request packet contains the DTE address of the remote FPAD or the remote DTE.

When an FPAD receives a call, it shall check the call user data field in the call request packet according to 1.3.1 to determine which field contains the destination G3FE telephone number.

NOTE – Recommendation X.39 (1992) defines only the use of the address field to carry the destination G3FE telephone number. If an FPAD conforms to such a version of Recommendation X.39, it will always use the address field of the call request packet to receive the destination G3FE telephone number.

Other methods, in addition to those specified herein to transfer the telephone number of the destination G3FE, may also be supported.

1.3 Call user data

The FPAD will send call request packets and receive incoming call packets including a call user data field.

The call user data field is comprised of two fields:

- a) the protocol identifier field; and
- b) the call data field.

1.3.1 Protocol identifier field

The format of the protocol identifier field is defined in 4.2.1. Incoming calls with an invalid protocol identifier field will be cleared.

Bits 2 and 1 of octet 3 of the protocol identifier field are used as follows:

- Bits 2 and 1 = 00 the destination G3FE telephone number is contained in the address field and the call data field shall be discarded if received.
- = 01 the destination G3FE telephone number is contained in the call data field or the call shall terminate in the FPAD.
- = 10 reserved.
- = 11 reserved.

NOTE – A call may be terminated in an FPAD to carry information for billing, management, maintenance, etc. The details of such calls are for further study.

1.3.2 Call data field

Call data field is used only when bits 2 and 1 of octet 3 of the protocol identifier field are '01' respectively. If bits 8 to 1 of octet 1 of the call data field are '0000 0010', the destination G3FE telephone number is contained in octet 6 and subsequent octets, using a maximum of 8 octets, but no more than necessary. The telephone number in the format of E.164 is encoded in BCD, with the first digit in the high 4 bits 8, 7, 6 and 5 of octet 6, the second digit in the low 4 bits 4, 3, 2 and 1 of octet 6 and subsequent digits in subsequent octets. If the total number of digits is odd, the low 4 bits of the last octet used is filled with '1111'.

Combinations other than '0000 0010' of octet 1 are reserved. The action by the FPAD upon receiving an incoming call packet with a reserved combination of octet 1 is for further study.

1.4 User sequences

1.4.1 User sequences are used to exchange facsimile image data (which is defined in Recommendations T.4 and T.30) between an FPAD and a packet mode DTE or a remote FPAD.

1.4.2 User sequences are conveyed in the user data fields of complete packet sequences with $Q = 0$ in both directions on a virtual call (see Recommendation X.25).

1.4.3 There will be only one user sequence in a complete packet sequence.

1.4.4 The FPAD will transmit all data packets with D-bit set to 0.

On reception of a data packet with the D-bit set to 1, the FPAD will transmit the corresponding acknowledgement as soon as possible.

If the FPAD does not support the D-bit procedure, the FPAD may clear the virtual call.

NOTE – The possibility of linking the D-bit operation of Recommendation X.25 with the T.30 error correction mode to guarantee end-to-end delivery is for further study.

1.4.5 One user sequence may be conveyed in one or several complete packet sequences.

1.5 FPAD messages

1.5.1 FPAD messages are used to exchange the following between the FPAD and the packet mode DTE or a remote FPAD:

- a) FPAD control information;
- b) signals, commands and responses as defined in Recommendation T.30; and
- c) ancillary signals, commands and responses.

1.5.2 FPAD messages are conveyed in the user data fields of complete packet sequences with $Q = 1$, in both directions on a virtual call (see Recommendation X.25).

1.5.3 There will be only one FPAD message in a complete packet sequence.

1.5.4 The FPAD will transmit all data packets with the D-bit set to 0.

On reception of a data packet with both the Q-bit and D-bit set to 1, the FPAD will transmit the corresponding acknowledgement as soon as possible.

If the FPAD does not support the D-bit procedure, the FPAD may clear the virtual call.

2 User Data Transfer

2.1 Data packets will be forwarded by the FPAD in accordance with data forwarding conditions provided in 4.8/X.38.

2.2 The occurrence of a data forwarding condition will not cause the FPAD to transmit empty data packets.

3 Procedure for the use of FPAD messages

3.1 Procedures for reading, setting, and setting and reading of FPAD parameters

NOTE – The use of the plural in reference to FPAD parameters implies the existence of more than one; however, only one FPAD parameter has so far been defined. The use of plural has been continued throughout this and the other Recommendations of the Series as an indication that other FPAD parameters are for further study.

3.1.1 The current values of FPAD parameters may be changed and read by transmitting to the FPAD a set, read, or set and read FPAD message.

3.1.2 When the FPAD receives a set, read or set and read FPAD message, any data previously received will be delivered to the G3 facsimile equipment before taking action on the FPAD message. The FPAD will also consider the arrival of such an FPAD message as a data forwarding condition.

3.1.3 The FPAD will respond to a valid read or set and read FPAD message by transmitting a parameter indication FPAD message. This FPAD message will have a parameter field containing a list of parameter references and current values (after any necessary modification) of the FPAD parameters to which the received FPAD message referred.

3.1.4 The FPAD will not return a parameter indication FPAD message in response to a valid set FPAD message received.

3.1.5 Table 1 specifies the FPAD's response of the FPAD to set, set and read, and read FPAD messages.

3.1.6 If the function of a character is duplicated by the selection of parameter values by use of the set or set and read FPAD message, the FPAD will consider these parameter changes as valid, and will respond as described in this Recommendation.

TABLE 1/X.39

**FPAD message transmitted by the FPAD in response to set,
set and read, and read FPAD message**

FPAD message received by the FPAD		Action upon FPAD parameters	Corresponding parameter indication FPAD message transmitted to the packet mode DTE
Type	Parameter field		
Set	None	Reset all implemented X.5 parameters to their initial values corresponding to the initial profile	None
	List of selected parameters with the desired values	Set the selected parameters to the given values: a) if no error is encountered b) if the FPAD fails to modify the values of some parameters	a) none b) list of these invalid parameters (Note)
Set and read	None	Reset all implemented X.5 parameters to their initial values corresponding to the initial profile	List all implemented X.5 parameters and their initial values
	List of selected parameters with the desired values	Set the selected parameters to the given values	List of these parameters with their new current values (Note)
Read	None	None	List all implemented X.5 parameters with their current values
	List selected parameters	None	List of these parameters with their current new value
NOTE – If any of the parameters contain an error, the error bit is set and the value field is coded as described in Table 3.			

3.2 Procedures for inviting the FPAD to clear

3.2.1 The invitation to clear FPAD message is used to request that the FPAD clears the virtual call, after transmission of all data previously transmitted to the G3 facsimile equipment.

NOTE – The clear indication packet, which is transmitted by the FPAD after delivery of the last data to the G3 facsimile equipment, will have a clearing cause field set to DTE clearing.

3.3 Error handling procedures by the FPAD

3.3.1 If the FPAD receives a set, read or set and read FPAD message containing an invalid reference to an FPAD parameter, the parameter field within the parameter indication FPAD message transmitted by the FPAD will contain an indication that this has occurred. The remaining valid references to FPAD parameters are processed by the FPAD.

Possible reasons for an invalid access to an FPAD parameter are:

- a) the parameter reference has not been implemented in the FPAD;
- b) the parameter value has not been implemented in the FPAD or cannot be altered from the current setting;
- c) the parameter is a read-only one (set and set and read FPAD messages only).

3.3.2 The FPAD will transmit an error FPAD message containing the message code of an invalid FPAD message received under the following conditions:

- a) if the FPAD receives an unrecognizable message code;
- b) if the parameter field following a recognizable message code is incorrect or incompatible with the message code;
- c) if the parameter field following a recognizable message code has an invalid format;
- d) if the FPAD receives an unsolicited parameter indication FPAD message;
- e) if the FPAD receives an FPAD message that is too long.

3.3.3 The FPAD will transmit an error FPAD message if an FPAD message containing less than 8 bits is received.

3.3.4 If the FPAD receives an error FPAD message, it will not respond with an FPAD message of any type. Subsequent action is for further study.

3.4 Procedure for inviting the FPAD to reselect the called DTE

The exact procedure for the reselection by the FPAD is for further study. It is anticipated that the procedure will be similar to the procedure outlined in 3.6/X.29.

3.5 Facsimile procedure

On receipt of an FPAD message with the message code indicating a control forwarding of a T.30 defined procedure, an FPAD transmits the corresponding signal, command or response defined in Recommendation T.30 to the G3 facsimile equipment in accordance with the procedure given in clause 4/X.38.

3.6 Ancillary signals, commands and responses procedures

On receipt of an FPAD message with the message code indicating an Ancillary control message, the FPAD passes the applicable parameter data to the applicable ancillary device indicated in the message for forwarding across the G3 facsimile equipment/DCE interface.

Codings of the ancillary control messages are defined in Table 6.

4 Formats

4.1 Introduction

Bits of an octet are numbered 8 to 1 where bit 1 is the low order bit and is transmitted first. Octets of user sequences and FPAD messages are consecutively numbered starting from 1 and are transmitted in this order.

4.2 Call user data format

See Figure 1.

4.2.1 Protocol identifier format

The coding of the protocol identifier field standardized by ITU-T consists of four octets.

The first octet is coded as follows:

- Bits 8 and 7 = 00 for ITU-T use.
- = 01 for national use.
- = 10 reserved for international user bodies (including ITU-T).
- = 11 for DTE-DTE use.

When bits 8 to 1 of octet 1 are set to 10100001, it indicates that an ITU-T non-start-stop mode PAD is in use.

When the packet assembly/disassembly facility is a G3 facsimile PAD facility (FPAD), bits 8 to 1 of octet 2 are set to “0000 0001”. Use of bits 2 and 1 of octet 3 is defined in 1.3.1. Bits 8 to 3 of octet 3 and all bits of octet 4 are ‘0’ and they are reserved as a future mechanism to providing a called PAD facility or packet mode DTE with additional information pertinent to the calling party.

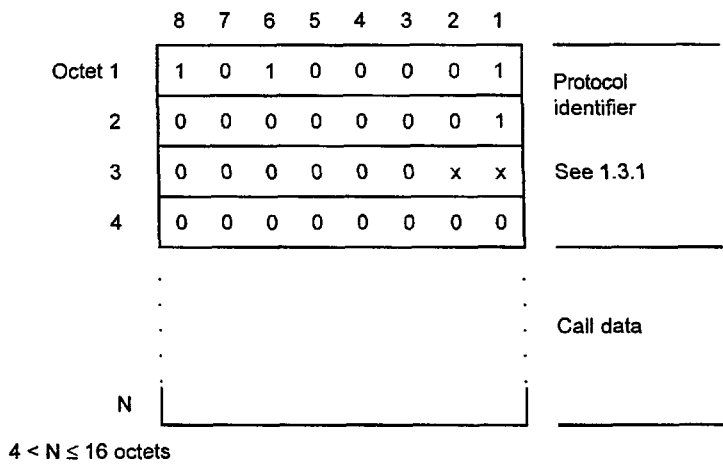


FIGURE 1/X.39
Call user data field format

4.3 User sequence format

4.3.1 The order of bit transmission, octet by octet, from an originating FPAD to the physical line of the packet network is the same as the bit order from the local G3 facsimile equipment to the originating FPAD on the PSTN line.

4.3.2 No maximum is specified for the length of a user sequence.