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**SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATIONS**

Public data networks – Services and facilities

Packet assembly/disassembly facility (PAD) in a public data network

ITU-T Recommendation X.3

(Previously CCITT Recommendation)

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

PUBLIC DATA NETWORKS

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 SYSTEMS INTERCONNECTION

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

General	X.300–X.349
---------	-------------

Satellite data transmission systems	X.350–X.399
-------------------------------------	-------------

MESSAGE HANDLING SYSTEMS

	X.400–X.499
--	-------------

DIRECTORY

	X.500–X.599
--	-------------

OSI NETWORKING AND SYSTEM ASPECTS

Networking	X.600–X.629
Efficiency	X.630–X.639
Quality of service	X.640–X.649
Naming, Addressing and Registration	X.650–X.679
Abstract Syntax Notation One (ASN.1)	X.680–X.699

OSI MANAGEMENT

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 and ODMA functions	X.730–X.799

SECURITY

	X.800–X.849
--	-------------

OSI APPLICATIONS

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

ITU-T RECOMMENDATION X.3

PACKET ASSEMBLY/DISASSEMBLY FACILITY (PAD) IN A PUBLIC DATA NETWORK

Summary

This Recommendation describes the functions performed by, and operational characteristics of, the PAD for the start-stop mode DTE. It provides the operation of the PAD depending on the possible values of PAD parameters. This revision includes a new parameter for the selection of the default packet size and additional PAD service and command signals for Chinese extended dialogue mode.

Source

ITU-T Recommendation X.3 was revised by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 31 March 2000.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the 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.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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CONTENTS

Page

Scope	1
1 Description of the basic functions and user selectable functions of the PAD.....	2
1.3 Functions of the PAD.....	2
1.4 User selectable functions which may be provided by the PAD.....	2
2 Characteristics of PAD parameters.....	5
2.4 Determination of the values of PAD parameters.....	5
3 List of PAD parameters and possible values	5
3.1 PAD recall using a character	6
3.2 Echo	6
3.3 Selection of data forwarding character(s).....	6
3.4 Selection of idle timer delay.....	6
3.5 Ancillary device control.....	7
3.6 Control of PAD service signals and PAD command signals.....	7
3.7 Selection of operation of PAD on receipt of break signal from the start-stop mode DTE	8
3.8 Discard output	8
3.9 Padding after carriage return	8
3.10 Line folding.....	8
3.11 Binary speed.....	8
3.12 Flow control of the PAD by the start-stop mode DTE	9
3.13 Linefeed insertion after carriage return	9
3.14 Linefeed padding.....	10
3.15 Editing.....	10
3.16 Character delete.....	10
3.17 Line delete.....	10
3.18 Line display.....	10
3.19 Editing PAD service signals.....	11
3.20 Echo mask	11
3.21 Parity treatment	11
3.22 Page wait.....	12
3.23 Size of input field	12
3.24 End-of-frame	12
3.25 Selection of extended data forwarding signals.....	12
3.26 Display interrupt.....	13
3.27 Confirmation of display interrupt.....	13
3.28 Diacritic character editing	13
3.29 Extended echo mask.....	14
3.30 Selection of the default packet size	14

Recommendation X.3

PACKET ASSEMBLY/DISASSEMBLY FACILITY (PAD) IN A PUBLIC DATA NETWORK

(revised in 2000)

Scope

The establishment in various countries of public data networks providing packet switched data transmission services creates a need to produce standards to facilitate access from the public telephone network, circuit switched public data networks and leased circuits.

The ITU-T,

considering

- a) that Recommendations X.1 and X.2 define the user classes of service and user facilities in public data networks, Recommendation X.96 defines call progress signals, Recommendation X.29 defines the procedures between a packet assembly/disassembly facility (PAD) and a packet mode DTE or another PAD, Recommendation X.28 defines the DTE/DCE interface for a start-stop mode DTE accessing the PAD;
- b) that the logical control links for packet switched data transmission services are defined in Recommendation X.92, and that in particular Recommendation X.92 allows for the incorporation of a PAD;
- c) the urgent need to allow interworking between a start-stop mode DTE on a public switched telephone network, a public switched data network or leased circuit, and a packet mode DTE or another start-stop mode DTE using the virtual call facility of the packet switched data service;
- d) that DTEs operating in the start-stop mode will send and receive network control information and user information in the form of characters or the break signals;
- e) that DTEs operating in the packet mode will send and receive network control information and user information in the form of packets in accordance with Recommendation X.25;
- f) that the packet mode DTE shall not be obliged to use the control procedures for PAD functions, but that some packet mode DTEs may wish to control specific functions of the PAD,

recommend

- 1) that the functions performed by, and operational characteristics of, the PAD for the start-stop mode DTE are described below in clause 1, *Description of the basic functions and user selectable functions of the PAD*;
- 2) that the operation of the PAD for the start-stop mode DTE should depend on the possible values of internal variables known as PAD parameters which are described below in clause 2, *Characteristics of PAD parameters*;
- 3) that the PAD parameters for the start-stop mode DTE and their possible values should be those which are listed below in clause 3, *List of PAD parameters and possible values*;
- 4) that the PAD features described in clauses 1, 2 and 3 could be expanded by future studies to allow interworking with non packet mode DTEs other than start-stop mode DTEs.

1 Description of the basic functions and user selectable functions of the PAD

1.1 The PAD performs a number of functions and exhibits operational characteristics. Some of the functions allow either or both the start-stop mode DTE and the packet mode DTE (or remote PAD) to configure the PAD so that its operation is adapted to the start-stop mode DTE characteristics, and possible to the application.

1.2 The operation of the PAD depends on the value of the set of internal variables called PAD parameters. This set of parameters exists for each start-stop mode DTE independently. The current value of each PAD parameter defines the operational characteristics of its related function.

1.3 Functions of the PAD

1.3.1 Basic functions include:

- assembly of characters into packets;
- disassembly of the *user data* field of packets;
- handling of virtual call set-up and clearing, resetting and interrupt procedures;
- generation of service signals;
- a mechanism for forwarding packets when the proper conditions exist, e.g., when a packet is full or an idle timer expires;
- a mechanism for transmitting data characters, including start, stop and parity elements as appropriate to the start-stop mode DTE;
- a mechanism for handling a *break* signal from the start-stop mode DTE;
- editing of *PAD command* signals;
- a mechanism for setting and reading the current value of PAD parameters.

1.3.2 Optional functions include:

- a mechanism for the selection of a standard profile;
- automatic detection of data rate, code, parity and operational characteristics;
- a mechanism for the remote DTE to request a virtual call between the start-stop mode DTE and another DTE.

1.4 User selectable functions which may be provided by the PAD

A number of packet-switched data network facilities may be available either on a subscription basis or on a per call basis, to start-stop mode DTEs as described in Recommendation X.2 for user classes of service 20 to 22. In addition, the following features may be available on a subscription basis:

- selection of an initial profile;
- modem type, speed, code and parity to be used by the PAD;
- other operational characteristics of the DTE.

As defined in this Recommendation, parameters provide for functions which concern:

- management of the procedure between the start-stop mode DTE and the PAD;
- management of the assembly and disassembly of packets;
- a number of additional functions related to the operational characteristics of the start-stop mode DTE;
- a number of additional functions related to videotex applications.

The method for the control of these functions is specified in Recommendation X.28 for the start-stop mode DTE and in Recommendation X.29 for the packet mode DTE or for another PAD.

Table 1 shows details of the valid values and combination of values of PAD parameters standardized by ITU-T. Other values and combinations of values are for further study.

1.4.1 PAD recall using a character

This function allows the start-stop mode DTE to initiate an escape from the *data transfer* state or the *connection in progress* state in order to send *PAD command signals*.

1.4.2 Echo

This function provides for characters received from the start-stop mode DTE to be transmitted back to the start-stop mode DTE as well as being interpreted by the PAD.

1.4.3 Selection of the data forwarding characters

This function allows the selection of defined sets of character(s) received from the start-stop mode DTE to be recognized by the PAD as an indication to complete the assembly and forward a complete packet sequence as defined in Recommendation X.25.

1.4.4 Selection of idle timer delay

This function allows the selection of the duration of an interval between successive characters received from the start-stop mode DTE which, when exceeded, will cause the PAD to terminate the assembly of a packet and to forward it as defined in Recommendation X.25.

1.4.5 Ancillary device control

This function allows for flow control between the PAD and the start-stop mode DTE. The PAD indicates whether it is ready or not to accept characters from the start-stop mode DTE by transmitting special characters. These characters are those which in International Alphabet No. 5 (IA5) are used to switch an ancillary transmitting device on and off.

1.4.6 Control of PAD service signals

This function provides the start-stop mode DTE with the ability to decide whether or not and in what format *PAD service* signals are transmitted.

1.4.7 Selection of operation of the PAD on receipt of the break signal

This function allows the selection of the operation of the PAD after the receipt of a *break* signal from the start-stop mode DTE.

1.4.8 Discard output

This function provides for a PAD to discard the content of user sequences in packets upon request rather than disassembling and transmitting these to the start-stop mode DTE.

1.4.9 Padding after carriage return

This function provides for the automatic insertion by the PAD of padding characters in the character stream transmitted to the start-stop mode DTE after the occurrence of a carriage return character. This allows for the printing mechanism for the start-stop mode DTE to perform the carriage return function correctly.

1.4.10 Line folding

This function provides for the automatic insertion by the PAD of appropriate format effectors in the character stream transmitted to the start-stop mode DTE. The predetermined maximum number of graphic characters per line may be set.

1.4.11 Flow control of the PAD by the start-stop mode DTE

This function allows for flow control between the start-stop mode DTE and the PAD. The start-stop mode DTE indicates whether it is ready or not to accept characters from the PAD by transmitting special characters. These characters are those which in IA5 are used to switch an ancillary transmitting device on and off.

1.4.12 Linefeed insertion after carriage return

This function provides for the automatic insertion by the PAD of a linefeed character in the character stream to or from the start-stop mode DTE or after each of each carriage return character. This function applies only in the *data transfer* state.