INTERNATIONAL TELECOMMUNICATION UNION

CCITT X.5

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

DATA COMMUNICATION NETWORKS: SERVICES AND FACILITIES, INTERFACES

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

Recommendation X.5

Geneva, 1992

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation X.5 was prepared by Study Group VII and was approved under the Resolution No. 2 procedure on the 10th of February 1992.

CCITT NOTES

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

2) A list of abbreviations used in this Recommendation can be found in Annex A.

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Recommendation X.5

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

(Geneva, 1991)

Preface

The establishment in various countries of public data networks providing packet switched data transmission services creates a need to produce standards to facilitate G3 facsimile equipment access from the public telephone network.

The CCITT,

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.39 defines the procedures between a facsimile packet assembly/disassembly facility (FPAD) and a packet mode DTE or another FPAD, Recommendation X.38 defines the G3 facsimile equipment/DCE interface for a facsimile equipment accessing the FPAD;

(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 incorporation of a PAD;

(c) that G3 facsimile or associated equipments will send and receive network control information and user information in the form of dual-tone multi-frequency codes defined in Recommendation Q.23 or signals defined in Recommendations T.4 and T.30;

(d) 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;

(e) 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

(1) that the functions performed by, and operational characteristics of, the FPAD for the G3 facsimile equipment are described below in § 2.

(2) that the operation of FPAD for the G3 facsimile equipment should depend on the possible values of internal variables known as FPAD parameters which are described in § 3.

(3) that the FPAD parameters for the G3 facsimile equipment and their possible values are listed below in § 4.

1 Introduction

An FPAD is a facility which offers a G3 facsimile equipment the opportunity to use a public data network to convey facsimile control and image data to another G3 facsimile equipment or to an application DTE. The FPAD also allows an application DTE to establish a connection and to send control and image data to a G3 facsimile equipment.

It is an underlying principle of the FPAD environment that to the degree possible, the performance and quality of the service of the two G3 facsimile equipments as available today utilizing the general switched telephone network are not negatively affected.

Note – The term G3 facsimile equipment used here is slightly different from the T-Series Recommendations. In this Recommendation it is taken to be a G3 facsimile equipment which conforms to Recommendation T.4/T.30, along with the necessary ancillary control device as described in § 2.1.1 of Recommendation X.38.

1.1 *Scope*

Support for the following cases is provided in the FPAD Series of Recommendations:

a) *A G3 facsimile equipment to a G3 facsimile equipment* – A G3 facsimile equipment establishes a call to a G3 facsimile equipment, dialling in one or two stages the number of the called G3 facsimile equipment:
   - the calling G3 facsimile equipment transmits document(s) to the called G3 facsimile equipment;
   - the called G3 facsimile equipment transmits document(s) to the calling G3 facsimile equipment.

b) *A G3 facsimile equipment to an application DTE* – A G3 facsimile equipment establishes a call to an application DTE, dialling in one or two stages the number of the called application DTE:
   - the calling G3 facsimile equipment transmits document(s) to the called application DTE;
   - the called application DTE transmits document(s) to the calling G3 facsimile equipment.

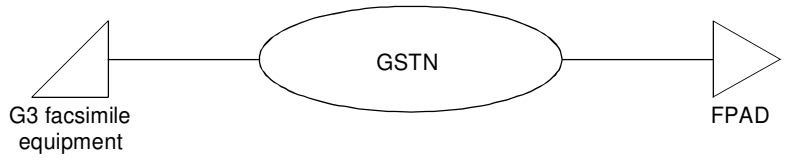
c) *An application DTE calling to a G3 facsimile equipment* – An application DTE establishes a call to a G3 facsimile equipment:
   - the calling application equipment transmits document(s) to the called G3 facsimile;
   - the called G3 facsimile equipment transmits document(s) to the calling application DTE.

Note – Additional cases are for further study.

1.2 *Physical configurations*

1.2.1 *G3 facsimile equipment/FPAD*

Two models are defined for the connection of a G3 facsimile equipment and an FPAD. These two models are illustrated in Figure 1/X.5.



a) G3 facsimile equipment/FPAD connected via the general switched telephone network

b) G3 facsimile equipment/FPAD connected directly

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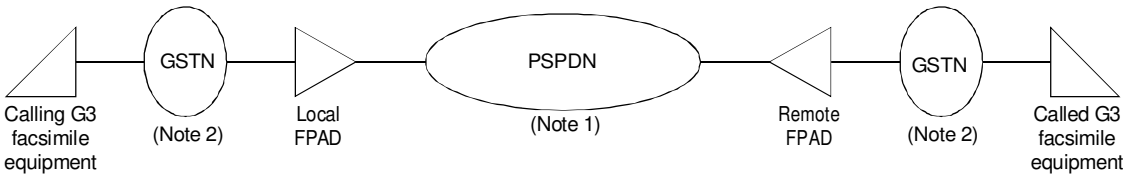
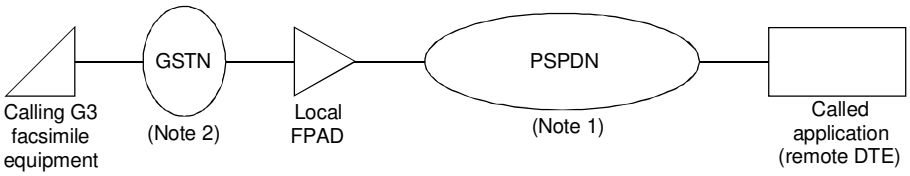
FIGURE 1/X.5

1.2.2 *Operating environments*

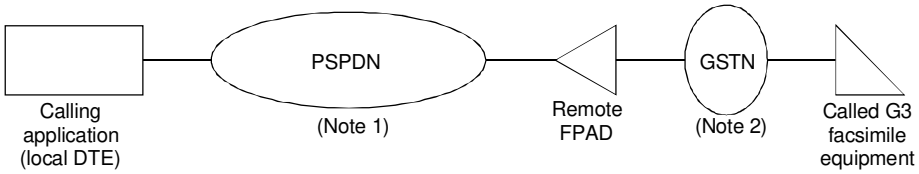
Three scenarios are defined in which two G3 facsimile equipments or a G3 facsimile equipment and an application DTE may operate. These scenarios are illustrated in Figure 2/X.5.



a) G3 facsimile equipment to G3 facsimile equipment



b) G3 facsimile equipment to application DTE



c) Application DTE to G3 facsimile equipment

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Note 1 – The FPAD and the PSPDN are shown as separate elements. This is for clarity only and should not imply that the FPAD is not, or could not be, an integral part of the PSPDN.

Note 2 – The G3 facsimile equipment and the FPAD are shown connected by the general switched telephone network. In each case, the G3 facsimile equipment and FPAD may be directly connected.

Note 3 – In this Figure and throughout the FPAD Series of Recommendations, "local FPAD" or "local DTE" is the FPAD or DTE associated with the "calling" G3 facsimile equipment or application DTE. Similarly, "remote FPAD" or "remote DTE" is associated with the "called" G3 facsimile equipment or application DTE.

Note 4 – The scenarios in this Figure do not preclude the use of a single FPAD as a local or remote FPAD on a call-by-call basis.

FIGURE 2/X.5

1.3 *Requirements*

1.3.1 *G3 facsimile equipment requirements*

For a G3 facsimile equipment to operate in the context of an FPAD, the facsimile equipment must:

– support all mandatory standard capabilities defined in Recommendation T.4, and

– operate according to the procedures defined in Recommendation T.30.

For the facsimile equipment to operate in the two-stage dialling mode, the facsimile equipment must provide a signalling method as defined in § 2.1 of Recommendation X.38.

The facsimile equipment may:

– request any optional standard capability defined in Recommendations T.4 and T.30 (see Note 1);

– request any non-standard capability; and

– operate manually or automatically (see Note 2).

Note 1 – Section 2.4 defines the optional standard capabilities that must be supported by an FPAD. If a G3 facsimile equipment requests one of these optional standard capabilities, the FPAD will relay the request for the optional standard capability unchanged. Similarly, if the G3 facsimile equipment requests an optional standard capability which is supported by the FPAD as an option (e.g. error correction mode), the FPAD will relay the request unchanged. If the G3 facsimile equipment requests an optional standard capability (or value of such capability) which is not supported by the FPAD, the FPAD will alter the coding of the request by:

– replacing the capability value with the highest values available in the FPAD, or

– "turning off" the request when no alternative value is available (e.g. error correction mode).

Note 2 – Certain restrictions may apply in the case of a facsimile equipment operating automatically as the calling station. Refer to Recommendation X.38.

1.3.2 *Requirements of an application DTE*

For an application DTE (either calling or called) to participate in the FPAD environment, it must emulate the public data interface of an FPAD as defined in Recommendation X.39.

An application DTE may:

– set and/or read the FPAD parameters of an FPAD;

– enter into an interactive dialogue as defined in Recommendation X.38.

2 Description of the basic functions and user selectable functions of the FPAD

2.1 *Configuration of the FPAD by the G3 facsimile equipment*

The FPAD performs a number of functions and exhibits operational characteristics. Some of the functions allow either or both the G3 facsimile equipment and the application DTE (or remote FPAD) to configure the FPAD so that its operation is adapted to the application.

2.2 *FPAD parameters*

The operation of FPAD depends on the values of the set of internal variables called FPAD parameters. This set of parameters exists for each G3 facsimile equipment independently. The current value of each FPAD parameter defines the operational characteristics of its related functions.

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

2.3 *Functions of the FPAD*

2.3.1 *Basic functions*

Basic functions include:

– assembly of facsimile image data into packets;

– disassembly of the user data fields of packets;

– handling of virtual call set-up and call clearing;

– generation of service signals;

– a mechanism for forwarding packets when the proper conditions exist, e.g. when a packet is full;

– a mechanism for transmitting facsimile image data to G3 facsimile equipments; and

– a mechanism for setting the current value of FPAD parameters.

2.3.2 *Optional functions*

Optional functions (e.g. for profile selection), are for further study.

2.4 *Facsimile characteristics of the FPAD*

The FPAD will support all mandatory standard capabilities of a G3 facsimile equipment as defined in Recommendation T.4.

The FPAD will also support the following optional standard capabilities as defined in Recommendations T.4 and T.30:

a) *data signalling rate:*

– 7200 bit/s as per Rec. V.29;

– 9600 bit/s as per Rec. V.29;

b) *vertical resolution:*

– 7.7 line/mm;

c) *recording width capabilities:*

– all valid values are supported;

d) *maximum recording length capability:*

– all valid values are supported;

e) *minimum scan line time:*

– all valid values are supported.

Note – The explicit exclusion of additional optional standard capabilities (as defined in Recommendation T.4, e.g. 12.0, 14.4 kbit/s as per Rec. V.17) within this Recommendation, should not be construed as an indication that implementations may not offer these capabilities. Rather, that the above list represents the minimum set of capabilities required for FPAD operation. Further expansion may be undertaken.

2.5 *User selectable functions which may be provided by the FPAD*

A number of packet-switched data network facilities may be available either on a subscription basis or on a per call basis to G3 facsimile equipments, as described in Recommendation X.2 for user class of service 29. In addition, the following features may be available on a subscription basis:

– selection of an initial profile;

– other operational characteristics of the G3 facsimile equipments.

As defined in this Recommendation, parameters provide for functions which concern the management of the procedure between the G3 facsimile equipment and the FPAD.

The method for the control of these functions is specified in Recommendation X.38 for the G3 facsimile equipment and in Recommendation X.39 for the application DTE or for another FPAD.

Table 1/X.5 shows details of the valid values and combination of values of FPAD parameters. Other values and combinations are for further study.

TABLE 1/X.5

Possible values of FPAD parameters

Parameter reference number	Parameter description	Selectable possible values		FPAD parameter meaning	Remarks
		Mandatory	Optional (Note)		
1	Control of FPAD service signals (E)	0		No service signals are transmitted to the G3 facsimile equipment	Additional values for working with ancillary devices are for further study
		1		Tonal service signals are transmitted in the standard format	
			2	Oral service signals are transmitted in the standard format	
			3	DTMF service signals are transmitted in the standard format	
			8	Service signals are transmitted in a network dependent format	

E An essential parameter to be made available internationally

Note – These parameter values provide additional user facilities which are not necessarily provided in all FPADs.

2.5.1 *Control of FPAD service signals*

This function provides the G3 facsimile equipment with the ability to decide whether or not and in what format FPAD service signals are transmitted.

3 Characteristics of FPAD parameters

3.1 *Characteristics of parameters*

In this Recommendation FPAD parameters are identified by decimal numbers.

3.2 *Possible values of parameters*

In this Recommendation the possible values of parameters are represented by decimal numbers.

3.3 *Relationship with Recommendations X.38 and X.39*

Specific procedures, described in Recommendations X.38 and X.39 are available for initializing, reading and changing the values of FPAD parameters.

3.4 *Determination of the values of FPAD parameters*

3.4.1 *Initial values of FPAD parameters*

On initialization, the initial value of each FPAD parameter is set according to a predetermined set of values called an initial standard profile. Table 1/X.38 gives details of the initial values of parameters for the standard profile which have been agreed by the CCITT.

Networks may offer other standard profiles that provide different, predetermined sets of FPAD parameter values.

3.4.2 *Current values of FPAD parameters*

The current values of FPAD parameters are the values resulting from possible modifications by the FPAD, the G3 facsimile equipment and/or the application DTE (or remote FPAD).

Note 1 – The need for a G3 facsimile equipment to read the value of a parameter on a local FPAD is for further study.

Note 2 – The ability for a G3 facsimile equipment to set or read the value of a parameter on a remote FPAD is not currently provided. The need for this is for further study.

4 List of FPAD parameters and possible values

Restrictions on the permissible relationships between the values of the various parameters is a subject for further study.

4.1 *Control of FPAD service signals*

Reference 1

The parameter will have the following selectable values:

no service signals are transmitted to the G3 facsimile equipment	– represented by decimal 0
tonal service signals are transmitted in the standard format	– represented by decimal 1
oral service signals are transmitted in the standard format	– represented by decimal 2
DTMF service signals are transmitted in the standard format	– represented by decimal 3
service signals are transmitted in a network dependent format	– represented by decimal 8

Note 1 – Tonal, oral, DTMF service signals are defined in § 3.4.2 of Recommendation X.38.

Note 2 – Additional values for other types of service signals (e.g. for working with ancillary devices), are for further study.

Note 3 – The values of 9 are reserved for future extension.

ANNEX A

(to Recommendation X.5)

Alphabetical list of abbreviations used in this Recommendation

DTE Data terminal equipment

DTMF Dual-tone multi-frequency

FPAD Facsimile packet assembly/disassembly facility