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## Foreword

This European Telecommunication Standard (ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

The content of this ETS is adapted from CCITT Recommendation I.233.1.

This ETS consists of 4 parts as follows:

Part 1: "Part 1: General description".

Part 2: "Part 2: Integrated Services Digital Network (ISDN); Frame relay bearer service; Service definition".

**Part 3: "Part 3: Integrated Services Digital Network (ISDN); Frame relay data transmission service; Service definition".**

Part 4: "Part 4: Broadband Integrated Services Digital Network (B-ISDN); Frame relay bearer service; Service definition".

<b>Transposition dates</b>	
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## Introduction

The purpose of this ETS is to describe the network specific aspects of the frame relay service when it is offered on a network to provide the frame relay data transmission service.

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## 1 Scope

This European Telecommunication Standard (ETS) specifies the network specific aspects of the frame relay service when it is offered on a network to provide the frame relay data transmission service.

This ETS is applicable for all networks providing the frame relay data transmission service. This service is offered on user-network interfaces where the physical layer is unstructured, i.e. at any time, there exists at most a single physical connection on the user-network interface.

This ETS should be complemented with ETS 300 399-1 [1], for the common part of the frame relay service.

## 2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ETS 300 399-1: "Frame relay services; Part 1: General description".
- [2] CCITT Recommendation E.164: "Numbering plan for the ISDN era".
- [3] CCITT Recommendation G.703 (1991): "Physical/electrical characteristics of hierarchical digital interfaces".
- [4] CCITT Recommendation G.704 (1991): "Synchronous frame structures used at primary and secondary hierarchical levels".
- [5] ITU-T Recommendation G.957: "Optical interfaces for equipments and systems relating to the digital synchronous hierarchy".
- [6] CCITT Recommendation Q.922: "ISDN data link layer specification for frame mode bearer services".
- [7] ITU-T Recommendation Q.933: "Layer 3 signalling specification for frame mode bearer service".
- [8] ITU-T Recommendation V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".
- [9] ITU-T Recommendation V.28: "Electrical characteristics for unbalanced double-current interchange circuits".
- [10] CCITT Recommendation V.35 (1988): "Data transmission at 48 kbit/s using 60-108 kHz group band circuits".
- [11] CCITT Recommendation X.21: "Interface between data terminal equipment and data circuit-terminating equipment for synchronous operation on public data networks".
- [12] CCITT Recommendation X.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) on public data networks".
- [13] CCITT Recommendation X.121: "International numbering plan for public data networks".
- [14] ISO 2593: "Data communication- 34 pin DTE/DCE interface connector and pin assignments".

[15] ISO 4903: "Information technology- Data communication- 37-pole DTE/DCE interface connector and contact number assignments".

### **3 Definitions**

For the purpose of this ETS, the definitions given in ETS 300 399-1 [1], clause 3 apply.

### **4 Abbreviations**

For the purpose of this ETS, the following abbreviations apply:

CRC	Cyclic Redundancy Check
CSDU	Core Service Data Unit
DLCI	Data Link Connection Identifier
QoS	Quality of Service
STM-N	Synchronous Transport Module - N

### **5 General definition**

This service provides the bi-directional transfer of data units (Core Service Data Unit (CSDU)) from one user-network interface to another. The data units are routed through the network on the basis of an attached label. This label is a logical identifier with local significance (termed Data Link Connection Identifier (DLCI) in the protocol description). Per DLCI, the order of the data units is preserved from one user-network interface to another.

The user-network interface allows for the establishment of multiple on-demand and/or permanent frame relay virtual circuits to many destinations.

### **6 Description of the frame relay service**

The description of the frame relay service given in clause 6 of ETS 300 399-1 [1] applies.



## 7 Service classes

The service class definition given in clause 7 of ETS 300 399-1 [1] applies.

The service classes are defined per user-network interface.

The service classes supported are summarized in table 1. The service associations (columns in table 1) show the valid combinations of the individual frame relay data transmission services which apply separately to each user-network interface.

NOTE: It is not implied that a network should offer all frame relay data transmission services or all service associations.

**Table 1: Frame relay data transmission service classes**

Class		Characteristic	Service association	
P		Layer 2 permanent		
	1	Layer 1 permanent with Q.933, annex A connection monitoring with Q.933, annex B connection monitoring	♦	♦
	2	Layer 1 on-demand with Q.933, annex A connection monitoring with Q.933, annex B connection monitoring		
A		On-demand case A		♦
	1	Layer 1 permanent		
	2	Layer 1 on-demand		
B		On-demand case B		
	1	Layer 1 permanent		
	2	Layer 1 on-demand		
Q.933 = ITU-T Recommendation Q.933 [7].				

## 8 Procedures

The procedures defined in clause 8 of ETS 300 399-1 [1] apply.

## 9 Network capabilities for charging

The Network capabilities for charging given in clause 9 of ETS 300 399-1 [1] apply.

## 10 Interworking

The interworking specification given in clause 10 of ETS 300 399-1 [1] applies.

## 11 Attributes and values of attributes

### 11.1 Frame relay data transmission service attributes

The attributes and values are given in table 2.

Table 2: Frame relay data transmission service attributes

Information transfer attributes		
1	Information transfer mode	Frame
2	Information transfer rate	Less than or equal to the maximum bit rate of the user information access channel and the throughput of the frame relay connection (DLCI)
3	Information transfer capability	Unrestricted
4	Structure	Service data unit integrity
5	Establishment of communication	On-demand Permanent
6	Symmetry	Bi-directional symmetric
7	Communication configuration	Point-to-point
Access attributes		
8	Access channel	Access rate: see subclause 11.2.1 Access interface: see subclause 11.2.2
9	Access protocol	
9.1	Signalling access protocol layer 1	see subclauses 11.2.1 and 11.2.2
9.2	Signalling access protocol layer 2 (permanent)	none or Q.922 (core functions and data link control)
	Signalling access protocol layer 2 (case A)	Q.922 (core functions and data link control)
9.3	Signalling access protocol layer 3 (permanent)	none or Q.933 (annex A or B)
	Signalling access protocol layer 3 (case A)	Q.933
9.4	Information access protocol layer 1	see subclauses 11.2.1 and 11.2.2
9.5	Information access protocol layer 2 (core functions)	Q.922 (core functions)
9.6	Information access protocol layer 2 (data link control)	user specific; Q.922 data link control required for interworking with X.25
General attributes		
10	Supplementary services provided	For further study
11	Quality of Service (QoS)	Implementation dependent (note)
12	Interworking possibilities	Implementation dependent
13	Operational and commercial	See clause 9 of ETS 300 399-1 [1]
Q.922 = CCITT Recommendation Q.922 [6]      Q.933 = ITU-T Recommendation Q.933 [7] X.25 = ITU-T Recommendation X.25.		
NOTE: Congestion management will affect QoS.		

## 11.2 Physical layer attributes

The following attributes are given as examples only; a network is not obliged to provide all of these attributes, neither is it restricted to them.

### 11.2.1 Access rate

The following access rates may be offered on the interfaces specified below:

- 64 kbit/s;
- 128 kbit/s;
- 192 kbit/s;
- 256 kbit/s;
- 384 kbit/s;
- 512 kbit/s;
- 1 024 kbit/s;
- 1 536 kbit/s;
- 1 920 kbit/s;
- 1 984 kbit/s;
- 2 048 kbit/s;
- 34,368 Mbit/s;
- 139,264 Mbit/s;

- 155,52 Mbit/s.

### 11.2.2 Physical layer interface

#### a) CCITT Recommendation G.703 [3].

Applicable sections of CCITT Recommendation G.703 [3] are:

- Introduction;
- § 6: Interface at 2 048 kbit/s;
- annex A: Definition of codes;
- annex B: Specification of the overvoltage protection requirement.

#### b) CCITT Recommendation G.704 [4].

Applicable sections of this CCITT Recommendation are:

- General;
- § 2.3: Basic frame structure at 2 048 kbit/s;
- § 5: Characteristics of frame structures carrying channels at various bit rates in 2 048 kbit/s interfaces;
- annex A, § A.3: Cyclic Redundancy Check 4 (CRC-4) procedure for interfaces at 2 048 kbit/s.

NOTE: § 1 "General" specifies the electrical interface characteristics to be according to CCITT Recommendation G.703 [3].

#### c) CCITT Recommendation V.35 [10].

The interface specifications are:

- electrical characteristics according to CCITT Recommendation V.35 [10] and ITU-T Recommendation V.28 [9];
- connector and pin assignment according to ISO 2593 [14];
- interchange circuit definitions according to ITU-T Recommendation V.24 [8].

#### d) CCITT Recommendation X.21 [11].

This unstructured interface uses the leased line (i.e. point-to-point) subset of the CCITT Recommendation X.21 [11]. The interface specifications are:

- electrical characteristics according to CCITT Recommendation X.27;
- connector and pin assignment according to ISO 4903 [15];
- interchange circuit definitions according to CCITT Recommendation X.24 [12].

#### e) Electrical interface for STM-1 according to CCITT Recommendation G.703 [3].

For further study.

#### f) Optical interface for STM-1, STM-4, and STM-16 according to ITU-T Recommendation G.957 [5].

For further study.

## 12 Dynamic description

No dynamic description is provided for this ETS.

## 13 Numbering plan

Both the CCITT Recommendation E.164 [2] and the CCITT Recommendation X.121 [13] numbering plans are applicable. The numbering plan used is service provider dependent.

## Annex A (informative): Bibliography

The following references are given for informative purposes:

- 1) CCITT Recommendation I.233.1: "ISDN frame relaying bearer service".
- 2) CCITT Recommendation I.320: "ISDN protocol reference model".
- 3) ITU-T Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
- 4) CCITT Recommendation X.27: "Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications".
- 5) CCITT Recommendation X.200: "Reference Model of Open Systems Interconnection for CCITT applications".
- 6) ITU-T Recommendation X.210: "Open Systems Interconnection layer service definition conventions".

## History

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