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## PUBLIC DATA NETWORK: SERVICES AND FACILITIES

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# INTERNATIONAL USER CLASSES OF SERVICE IN, AND CATEGORIES OF ACCESS TO, PUBLIC DATA NETWORKS AND INTEGRATED SERVICES DIGITAL NETWORKS (ISDNs)

## ITU-T Recommendation X.1

(Previously “CCITT Recommendation”)

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## FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. 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, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation X.1 was prepared by the ITU-T Study Group VII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

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NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR, or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 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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# INTERNATIONAL USER CLASSES OF SERVICE IN, AND CATEGORIES OF ACCESS TO, PUBLIC DATA NETWORKS AND INTEGRATED SERVICES DIGITAL NETWORKS (ISDNs)

*(Geneva, 1972; amended at Geneva, 1976 and 1980; Malaga-Torremolinos, 1984; Melbourne, 1988 and Helsinki, 1993)*

## 1 Introduction

The establishment in various countries of public networks for data transmission and ISDNs for integrated services creates a need to standardize user classes of service and categories of access. This standardization is required to meet the following goals:

a) providing sufficient data signalling rates to meet users' needs;

b) allowing optimization of data terminal equipment (DTE) and transmission and switching costs to provide an overall economic service to the user;

c) recognizing particular operating modes of users' DTE;

d) allowing users to transfer information consisting of any bit sequence and of any number of bits up to a certain amount;

e) recognizing the interaction between users' requirements, technical limitations and tariff structure that may influence how DTE gains access to public data transmission services.

An international user class of service is a category of data transmission service in which the data signalling rate, call control signalling rates and data terminal equipment operation modes are standardized. A category of access identifies the method by which DTE gain access to a specific data transmission service.

There are three public data transmission services, namely leased circuit, circuit-switched, and packet-switched.

Access for data terminal equipment (DTE) to data transmission services may be achieved by any of the following:

a) by direct connection of the DTE to the public data network or ISDN; or

b) by switched connection of the DTE to a PDN via an intermediate public network of another type (including a PDN, PSTN or ISDN); or

c) by switched connection of the DTE to an ISDN (including through a Terminal Adaptor) via an intermediate public network of another type.

The categories of access described in this Recommendation take into account direct connections (see note) to public data networks and ISDNs and the various access cases where interworking with other public networks is involved. Access to the packet-switched data transmission service via the PAD or FPAD function, as defined in Recommendations X.3 or X.5, respectively, is also covered in this Recommendation.

NOTE – Direct connections may be provided by means of leased circuits or by dedicated access circuits.

For example, packet mode terminals may access the public packet-switched data transmission service, in user classes of service 8 to 11, either via a direct connection (see above note) or via a switched connection. The switched connection can be established using a circuit-switched data network (CSDN), a public switched telephone network (PSTN), or an ISDN. In all of these switched cases, an interworking function will be required to access the packet-switched data trnsmission service.

It is not mandatory for Administrations to provide all of the data transmission services, user classes of service, or categories of access contained in this Recommendation. In addition, categories of access have not been recognized for every user class of service; absence is indicated by an " – " in the tables below.

## 2 Access to a leased circuit data transmission service

TABLE 2-1/X.1

**Access by data terminal equipment operating in synchronous mode using X.21 or X.21*bis* interfaces**

| User class of service | Data signalling rate in the data transfer phase (see Notes 1 and 2) | Categories of access: |
|---|---|---|
| | | Access by a direct connection |
| 3 | 600 bit/s | F1 |
| 4 | 2400 bit/s | F2 |
| 5 | 4800 bit/s | F3 |
| 6 | 9600 bit/s | F4 |
| 7 | 48 kbit/s | F5 |
| 19 | 64 kbit/s | F6 |
| 31 | 128 kbit/s | F7 |
| 32 | 192 kbit/s | F8 |
| 33 | 256 kbit/s | F9 |
| 35 | 384 kbit/s | F10 |
| 37 | 512 kbit/s | F11 |
| 45 | 1024 kbit/s | F12 |
| 53 | 1536 kbit/s | F13 |
| 59 | 1920 kbit/s | F14 |

NOTES

1 Some Administrations are offering leased circuits asynchronous services for terminals operating at the data signalling rate of 600 bit/s, 1200 bit/s, 2400 bit/s, 4800 bit/s, 9600 bit/s, 10 units/character, start-stop in the data transfer phase. These services are supported by the synchronous network bearer channels with asynchronous to synchronous coding according to Recommendation X.52 for 1200 bit/s. For the data signalling rates of 600 bit/s, 2400 bit/s, 4800 bit/s and 9600 bit/s, the asynchronous to synchronous coding of Recommendation V.14 is used.

2 The support of user classes of service 3 to 7 and 19 in the ISDN may be provided by means of a terminal adaptor (in accordance with Recommendation X.30). The concept of terminal adaptor functional grouping is defined in Recommendation I.411.

## 3 Access to a circuit-switched data transmission service

TABLE 3-1/X.1

**Access by data terminal equipment operating in start-stop mode using X.20 or X.20 *bis* interfaces**
(see Note 1)

| User class of service | Data signalling rate and code structure in data transfer phase (see Note 2) | Call control signals in the call control phase | Categories of access: Access by a direct connection |
|---|---|---|---|
| 1 | 300 bit/s, 11[a] units/character start-stop | 300 bit/s, International Alphabet No. 5 (11 units/character) start-stop | A2 |
| 2 | 50 to 200 bit/s, 7.5 to 11[a] units/character start-stop (see Notes 3 and 4) | 200 bit/s, International Alphabet No. 5 (11 units/character) start-stop (see Note 5) | A1 |
| 14 | 600 bit/s, 10 units/character start-stop | 600 bit/s, International Alphabet No. 5 (10 units/character) start-stop | A3 |
| 15 | 1200 bit/s, 10 units/character start-stop | 1200 bit/s, International Alphabet No. 5 (10 units/character) start-stop | A4 |
| 16 | 2400 bit/s, 10 units/character start-stop | 2400 bit/s, International Alphabet No. 5 (10 units/character) start-stop | A5 |
| 17 | 4800 bit/s, 10 units/character start-stop | 4800 bit/s, International Alphabet No. 5 (10 units/character) start-stop | A6 |
| 18 | 9600 bit/s, 10 units/character start-stop | 9600 bit/s, International Alphabet No. 5 (10 units/character) start-stop | A7 |

[a] Usage in accordance with Recommendation X.4.

NOTES

1 There is no user class of service for data signalling rate of 50 bit/s, the transmission mode of 7.5 units/character start-stop and address selection and call progress signals at 50 bit/s, International Telegraph Alphabet No. 2. However, several Administrations have indicated that their telex service (50-baud, International Telegraph Alphabet No. 2) will be provided as one of the many services carried by their public data network.

2 User classes of service 1, 2 and 15 are supported by the synchronous network bearer channels with asynchronous to synchronous coding according to Recommendation X.52. For user classes of service 14, 16, 17 and 18, the asynchronous to synchronous coding of Recommendation V.14 is used.

3 User class of service 2 will provide, in the data transfer phase, for operation at the following data signalling rates and code structures:

50 bit/s (7.5 units/character)

100 bit/s (7.5 units/character)

110 bit/s (11 units/character)

134.5 bit/s (9 units/character)

200 bit/s (11 units/character)

Call control signals would be at 200 bit/s, International Alphabet No. 5 (11 units/character).

4 For international user class of service 2, it should be noted that some public data networks may not be able to prevent two terminals working at different data signalling rates and code structures from being connected together by means of a circuit-switched connection.

5 Some Administrations have indicated that, for certain data signalling rates listed in Note 3 above, they will permit users in class of service 2 to operate the same signalling rate and code structure for both data transfer and address selection and to receive call progress signals at these signalling rates and code structures. Where International Alphabet No. 5 is used for the call control signals, the appropriate parts of Recommendation X.20 shall apply.

TABLE 3-2/X.1

**Access by data terminal equipment operating in synchronous mode using X.21 or X.21 *bis* interfaces**

| User class of service | Data signalling rate in the data transfer phase (see Note 1) | Call control signals in the call control phase (see Notes 2 and 3) | Categories of access: Access by a: Direct connection | Categories of access: Access by a: Direct connection provided by an ISDN (see Notes 4 and 5) |
|---|---|---|---|---|
| 3 | 600 bit/s | 600 bit/s, International Alphabet No. 5 | B1 | S1 |
| 4 | 2400 bit/s | 2400 bit/s, International Alphabet No. 5 | B2 | S2 |
| 5 | 4800 bit/s | 4800 bit/s, International Alphabet No. 5 | B3 | S3 |
| 6 | 9600 bit/s | 9600 bit/s, International Alphabet No. 5 | B4 | S4 |
| 7 | 48 kbit/s | 48 kbit/s, International Alphabet No. 5 | B5 | S5 |
| 30 | 64 kbit/s | 64 kbit/s, International Alphabet No. 5 | B6 | S6 |
| 31 | 128 kbit/s | 128 kbit/s, International Alphabet No. 5 | – | – |
| 32 | 192 kbit/s | 192 kbit/s, International Alphabet No. 5 | – | – |
| 33 | 256 kbit/s | 256 kbit/s, International Alphabet No. 5 | – | – |
| 35 | 384 kbit/s | 384 kbit/s, International Alphabet No. 5 | B7 | S7 |
| 37 | 512 kbit/s | 512 kbit/s, International Alphabet No. 5 | – | – |
| 45 | 1024 kbit/s | 1024 kbit/s, International Alphabet No. 5 | – | – |
| 53 | 1536 kbit/s | 1536 kbit/s, International Alphabet No. 5 | B8 | S8 |
| 59 | 1920 kbit/s | 1920 kbit/s, International Alphabet No. 5 | B9 | S9 |

NOTES

1 Some Administrations are offering circuit-switched asynchronous services for terminals operating at the data signalling rate of 600 bit/s, 1200 bit/s, 2400 bit/s, 4800 bit/s, 9600 bit/s with 10 units/character, start-stop in the data transfer phase and, respectively, 600 bit/s, 1200 bit/s, 2400 bit/s, 4800 bit/s, 9600 bit/s, International Alphabet No. 5, 10 units/character, start-stop in the call control phase. These services are supported by the synchronous network bearer channels with asynchronous to synchronous coding according to Recommendation X.52 for user classes of service 1 and 2 and for 1200 bit/s. For the data signalling rates of 600 bit/s, 2400 bit/s, 4800 bit/s, and 9600 bit/s, the asynchronous to synchronous coding of Recommendation V.14 is used.

2 Only applicable when using the Recommendation X.21 interface.

3 The characteristics at the reference point R for user classes of service 30 and higher are for further study.

4 The support of user classes of service 3 to 7 and 30 in the ISDN may be provided by means of a terminal adaptor (in accordance with Recommendation X.30). The concept of terminal adaptor functional grouping is defined in Recommendation I.411.

5 The call control signals used for categories of access S6 through S9 will be in accordance with those defined for ISDN at reference point S/T. For interface at reference point R, see the corresponding user class of service for the same data signalling rate in this table. Reference points R, S, and T are defined in Recommendation I.411.

## 4 Access to a packet-switched data transmission service

TABLE 4-1/X.1

**Access by data terminal equipment operating in synchronous mode using X.25 or X.32 interfaces**
(see Note 1)

| User class of service | Data signalling rate (see Note 2) | Categories of access | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Service provided by a PSPDN with access by a: | | | | Service provided by an ISDN with access by a: | | |
| | | Direct connection (see Notes 3 and 4) | Switched connection | | | Direct connection | | Switched connection via a B-channel (see Note 7) |
| | | | via a CSPDN | via a PSTN | via an ISDN B/H-channel (see Note 5) | via a B/H-channel (see Note 6) | via a D-channel | |
| 8 | 2400 bit/s | D1 | O1 | P2 | Q1 | T1 | U1 | Y1 |
| 9 | 4800 bit/s | D2 | O2 | P3 | Q2 | T2 | U2 | Y2 |
| 10 | 9600 bit/s | D3 | O3 | P4 | Q3 | T3 | U3 | Y3 |
| 26 | 14 400 bit/s | D14 | – | P5 | – | – | – | – |
| 11 | 48 kbit/s | D4 | O4 | – | Q4 | T4 | U4 (see Note 8) | Y4 |
| 12 | 1200 bit/s | – | – | P1 | – | – | – | – |
| 30 | 64 kbit/s | D5 | O5 | – | Q5 | T5 | U5 (see Note 8) | Y5 |
| 31 | 128 kbit/s | D6 | – | – | – | – | – | – |
| 32 | 192 kbit/s | D7 | – | – | – | – | – | – |
| 33 | 256 kbit/s | D8 | – | – | – | – | – | – |
| 35 | 384 kbit/s | D9 | – | – | Q6 | T6 | – | – |
| 37 | 512 kbit/s | D10 | – | – | – | – | – | – |
| 45 | 1024 kbit/s | D11 | – | – | – | – | – | – |
| 53 | 1536 kbit/s | D12 | – | – | Q7 | T7 | – | – |
| 59 | 1920 kbit/s | D13 | – | – | Q8 | T8 | – | – |

NOTES

1 The packet-switched data transmission service allows for communication between ISDN packet mode terminal equipments operating at 16 kbit/s, 64 kbit/s, 384 kbit/s, 1536 kbit/s and 1920 kbit/s (Terminal Equipment 1 according to Recommendation I.411) and Recommendations X.25 and/or X.28/X.38 data terminal equipment operating at different data signalling rates.

2 The support of user classes of service 8 to 11 and 30 and higher in the ISDN may be provided by means of a terminal adaptor (in accordance with Recommendation X.31). The concept of terminal adaptor functional grouping is defined in Recommendation I.411.

3 Recommendation X.31 (Case A) is appropriate at the S/T reference point when category of access D5 is provided via an ISDN B-channel or at the R reference point when categories of access D1, D2, D3, D4 and D5 are provided via an ISDN B-channel with terminal adaptors.

4 Direct connections include the cases where the data terminal equipment is connected to a network of a different type.

5 Recommendations X.31 (Case A) and X.32 are appropriate at the S/T reference point. Recommendation X.32 is appropriate at the R reference point.

6 The characteristics at the reference point R for user classes of service 30 and higher are for further study.

7 Definition of categories of access at data signalling rates higher than 64 kbit/s is for further study.

8 For 64 kbit/s D-channel only.

TABLE 4-2/X.1

**Access by data terminal equipment operating in start-stop mode using X.28 interface**
(see Notes 1 and 2)

| User class of service | Data signalling rate and code structure (see Note 3) | Categories of access | | |
|---|---|---|---|---|
| | | Access by a: | | |
| | | Direct connection (see Note 4) | Switched connection via a CSPDN | Switched connection via a PSTN |
| 20 (see Note 5) | 50-300 bit/s, 10 or 11 units/character | C1, C2, C3 | K1 | L1, L2, L3 |
| 21 | 75/1200 bit/s, 10 units/character (see Note 6) | C5 | – | L5 |
| 22 | 1200 bit/s, 10 units/character | C4 | K4 | L4 |
| 23 | 2400 bit/s, 10 units/character | C6 | K6 | L6 |
| 24 | 4800 bit/s, 10 units/character | C7 | K7 | L7 |
| 25 | 9600 bit/s, 10 units/character | C8 | K8 | L8 |
| 26 | 14 400 bit/s, 10 units/character | C9 | – | L9 |

NOTES

1 The packet-switched data transmission service allows for communication between Recommendations X.25 and/or X.28 data terminal equipments operating at different data signalling rates.

2 The support of user classes of service 20 to 25 in the ISDN may be provided by means of a terminal adaptor providing PAD functions. Other means to support these user classes of service in the ISDN are for further study.

3 Some Administrations are offering circuit-switched asynchronous services for terminals operating at the data signalling rate of 600 bit/s, 10 units/character, start-stop in the data transfer phase and 600 bit/s, International Alphabet No. 5, 10 units/character, start-stop in the call control phase. For the data signalling rate 600 bit/s, the asynchronous to synchronous coding of Recommendation V.14 is used.

4 Some Administrations may offer the categories of access of 600 bit/s.

5 User class of service 20 allows for categories of access according to the following speeds:

– by direct connection: C1 at 110 bit/s, C2 at 200 bit/s and C3 at 300 bit/s;

– by switched connection via a CSPDN: K1 at 300 bit/s;

– by switched connection via PSTN: L1 at 110 bit/s, L2 at 200 bit/s and L3 at 300 bit/s.

6 75 bit/s from DTE to DCE, 1200 bit/s from DCE to DTE.

TABLE 4-3/X.1

**Access by facsimile terminals using X.38 interface**
(see Note 1)

| User class of service | Data signalling rate |
|---|---|
| 29 | 300/2400/2400-14 400 (see Note 2) |

NOTES

1 The packet-switched data transmission service allows for communication between Recommendations X.25 and/or X.38 data terminal equipment operating at different data signalling rates.

2 Operation of the facsimile terminal equipment is in accordance with Recommendation T.4 for image data encoding at speeds of 2400-14 400 bit/s and in accordance with Recommendation T.30 for control signalling at speeds of 300 bit/s or, optionally, 2400 bit/s.