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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

ISDN USER-NETWORK INTERFACES

ISDN USER-NETWORK INTERFACES INTERFACE STRUCTURES AND ACCESS CAPABILITIES

ITU-T Recommendation I.412

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation I.412 was published in Fascicle III.8 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation I.412

ISDN USER-NETWORK INTERFACES
INTERFACE STRUCTURES AND ACCESS CAPABILITIES

(Malaga-Torremolinos, 1984; amended at Melbourne, 1988)

1 General

This Recommendation defines limited sets of both channel types and interface structures for ISDN user-network physical interfaces.

2 Definitions

2.1 A channel represents a specified portion of the information-carrying capacity of an interface.

2.2 Channels are classified by channel types, which have common characteristics. Channel types are specified in § 3.

2.3 The channels are combined into interface structures, specified in § 4. An interface structure defines the maximum digital information-carrying capacity across a physical interface.

2.4 In an actual access arrangement some of the channels available across an ISDN user-networks physical interface, as defined in the applicable interface structure, may not be supported by the network. Some ISDN services will not require the full capacity of a B-channel; in those cases in which users require only such services, the access capability might be further reduced. The capability provided by those channels that are actually available for communication purposes, is referred to as the access capability provided through the interface.

3 Channel types and their use

3.1 *B-channel*

3.1.1 The B-channel is a 64 kbit/s channel accompanied by timing.

Note - The method for providing this timing is a subject of the individual interface Recommendations.

A B-channel is intended to carry a wide variety of user information streams. A distinguishing characteristic is that a B-channel does not carry signalling information for circuit switching by the ISDN. Signalling information used for circuit switching by the ISDN is carried over other types of channels, e.g. a D-channel.

3.1.2 User information streams may be carried on a B-channel on a dedicated, alternate (within one call or as separate calls), or simultaneous basis, consistent with the B-channel bit rate. The following are samples of user information streams:

i) voice encoded at 64 kbit/s according to Recommendation G.711;

ii) data information corresponding to circuit or packet-switching user classes of service at bit rates less than or equal to 64 kbit/s, according to Recommendation X.1;

iii) wideband voice encoded at 64 kbit/s according to Recommendation G.722;

iv) voice encoded at bit rates lower than 64 kbit/s alone, or combined with other digital information streams.

It is recognized that a B-channel may also be used to carry user information streams not covered by CCITT Recommendations.

3.1.3 B-channels may be used to provide access to a variety of communication modes within the ISDN. Examples of these modes are:

i) circuit switching;

ii) packet switching, supporting packet mode terminals; and

iii) semi-permanent connections.

In case i), the ISDN can provide either a transparent end-to-end 64 kbit/s connection or a connection specifically suited to a particular service, such as telephony, in which case a transparent 64 kbit/s connection may not be provided.

In case ii), the B-channel will carry protocols at layers 2 and 3 according to Recommendation X.25 which have to be handled by the network. The application of D-channel protocols for this case is for further study.

In case iii), the semi-permanent connection can be provided, for example by using circuit or packet switching modes.

3.1.4 Single information streams at bit rates less than 64 kbit/s should be rate adapted to be carried on the B-channel as described in Recommendation I.460.

3.1.5 Multiple information streams from a given user may be multiplexed together in the same B-channel, but for circuit switching, an entire B-channel will be switched to a single user-network interface. This multiplexing should be in accordance with Recommendation I.460.

Note - Independent routing of subrate channels circuit switched to different destinations is for further study.

3.2 *D-channel*

3.2.1 The D-channel may have different bit rates as specified in § 4.

A D-channel is primarily intended to carry signalling information for circuit switching by the ISDN.

A D-channel uses a layered protocol according to Recommendations I.440, I.441, I.450 and I.451. In particular the link access procedure is frame oriented (Note).

Note - The use of Signalling System No. 7 at a user-network interface is for further study.

3.2.2 In addition to signalling information for circuit switching, a D-channel may also be used to carry teleaction information and packet-switched data.

In certain cases where such signalling is not being utilized, the D-channel may support only teleaction information or packet-switched data.

3.3 *H-channels*

3.3.1 H-channels have the following bit rates, accompanied by timing:

H_0 channel: 384 kbit/s

H_1 channels: 1536 (H_{11}) and 1920 (H_{12}) kbit/s.

Note - The method for providing this timing is a subject of the individual interface Recommendation.

Higher rate H-channels are for further study.

An H-channel is intended to carry a variety of user information streams. A distinguishing characteristic is that an H-channel does not carry signalling information for circuit switching by the ISDN.

3.3.2 User information streams may be carried on an H-channel on a dedicated, alternate (within one call or as separate calls), or simultaneous basis, consistent with the H-channel bit rates. The following are examples of user information streams:

i) fast facsimile;

ii) video: e.g. for teleconferencing;

iii) high speed data;

iv) high quality audio or sound programme material;

v) information streams, each at rates lower than the respective H-channel bit rate (e.g. voice at 64 kbit/s), which have been rate adapted or multiplexed together;

vi) packet-switched information.

3.4 *Other channels*

For further study.

4 Interface structures

ISDN user-network physical interfaces at ISDN reference points S and T shall comply with one of the interface structures defined below.

4.1 *B-channel interface structures*

4.1.1 *Basic interface structure*

4.1.1.1 The basic interface structure is composed of two B-channels and one D-channel, 2 B + D. The bit rate of the D-channel in this interface structure is 16 kbit/s.

4.1.1.2 The B-channels may be used independently; i.e. in different connections at the same time.

4.1.1.3 With the basic interface structure, two B-channels and one D-channel are always present at the ISDN user-network physical interface. One or both B-channels, however, may not be supported by the network. See Appendix I.

4.1.2 *Primary rate B-channel interface structures*

These structures correspond to the primary rates of 1544 kbit/s and 2048 kbit/s.

4.1.2.1 The primary rate B-channel interface structures are composed of B-channels and one D-channel. The bit rate of this D-channel is 64 kbit/s.

4.1.2.2 At the 1544 kbit/s primary rate the interface structure is 23 B + D.

4.1.2.3 At the 2048 kbit/s primary rate the interface structure is 30 B + D.

4.1.2.4 With the primary rate B-channel interface structures, the designated number of B-channels is always present at the ISDN user-network physical interface. One or more of the B-channels may not be supported by the network.

4.1.2.5 In the case of a user-network access arrangement containing multiple interfaces, it is possible for the D-channel in one structure to carry the signalling for B-channels in another primary rate structure without an activated D-channel. When a D-channel is not activated, the designated time slot may or may not be used to provide an additional B-channel, depending on the situation; e.g., 24 B for a 1544 kbit/s interface.

4.2 *H-channel interface structure*

4.2.1 *Primary rate interface H_0-channel structures*

4.2.1.1 The primary rate interface H_0-channel structures are composed of H_0-channels with or without a D-channel, as indicated below. When present in the same interface structure the bit rate of the D-channel is 64 kbit/s. Additional primary rate interface H_0-channel are for further study.

4.2.1.2 At the 1544 kbit/s primary rate interface the H_0-channel structures are 4 H_0 and 3 H_0 + D. The use of the additional capacity across the interface is for further study. When the D-channel is not provided, signalling for the H_0-channels is provided by the D-channel in another interface

4.2.1.3 At the 2048 kbit/s primary rate interface the H_0-channel structure is 5 H_0 + D. In the case of a user-network access arrangement containing multiple interfaces, it is possible for the D-channel in one structure to carry the signalling for H_0-channels in another primary rate interface without a D-channel in use.

4.2.1.4 With the primary rate interface H_0-channel structures, the designated number of H_0-channels is always present at the user-network physical interface. One or more of the H_0-channels may not be supported by the network.

4.2.1.5 In the case of a user-network access arrangement containing multiple interfaces it is possible for the D-channel of one structure to carry the signalling for H_0-channels in another primary rate interface structure without an activated D-channel. When a D-channel is not required in a 1544 kbit/s interface, the 4 H_0-channel structure may be used.

4.2.2. *Primary rate interface H_1-channel structures*

4.2.2.1 *1536 kbit/s H_{11}-channel Structure*

The 1536 kbit/s H_{11}-channel structure is composed of one 1536 kbit/s H_{11}-channel. Signalling for the H_{11}-channel, if required, is carried in a D-channel on another interface structure within the same user-network access arrangement.

4.2.2.2 *1920 kbit/s H_{12}-channel Structure*

The 1920 kbit/s H_{12}-channel structure is composed of one 1920 kbit/s H_{12}-channel and a D-channel. The bit rate of the D-channel is 64 kbit/s. Signalling for the H_{12}-channel, if required, is carried in this D-channel or the D-channel of another interface structure within the same user-network access arrangement.

4.3 *Primary rate interface structures for mixtures of B- and H_0-*channels

A primary rate interface may have a structure consisting of a single D-channel and any mixture of B- and H_0-channels. The bit rate of the D-channel is 64 kbit/s. In the case of a user-network access arrangement containing multiple interfaces, a D-channel in one interface structure may also carry signalling for channels in another interface structure. When a D-channel is not activated, its 64 kbit/s capacity may or may not be used for the mixture of B- and H_0-channels, depending on the situation, e.g. 3 H_0 + 6 B for a 1544 kbit/s interface.

4.4 *Other interface structure(s)*

For further study.

5 Examples of application of interface structures

5.1 *Access arrangement for PABX, terminal controller, local area network, etc.*

Figure 1/I.412 illustrates a typical PABX, or LAN access arrangement. For this particular configuration it is not necessary to apply the same interface structure at both S and T reference points. For example, basic interface structures may be used for interfaces located at reference point S. Either basic or primary rate or other interface structures may be used at interfaces located at reference point T.

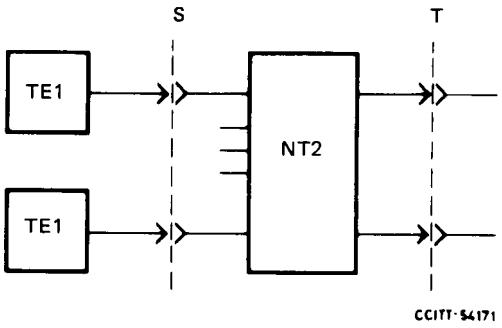

FIGURE 1/I.412

Example of the reference configurations for ISDN user-network interfaces applied to a physical configuration employing multiple connections

APPENDIX I

(to Recommendation I.412)

Access capabilities

I.1 As stated in § 2.4, not all of the channels present in an ISDN user-network physical interface are necessarily supported by the network. The resulting capability provided in an ISDN user-network access arrangement is defined as the access capability.

To assist in guiding the implementations of ISDN equipment and services around the world, several preferred access capabilities are identified here. While these preferred arrangements do not preclude the implementation of other access capabilities, they are intended to assist in the worldwide commonality which is a key objective of ISDN.

I.2 *Preferred access capabilities*

a) *Preferred basic access capabilities*

- 2 B + D
- B + D
- D

b) *Primary rate - B-channel access capabilities*

- n B + D

  $n \leq 23$ for 1544 kbit/s primary rate, unless signalling is provided in another physical interface (see § 4.1.2.5); then $n = 24$ may be allowed.

  $n \leq 30$ for 2048 kbit/s primary rate, unless signalling is provided in another physical interface (see § 4.1.2.5) then $n = 31$ may be allowed.

c) *Primary rate - H_0-channel access capabilities*

- n H_0 + D

  $n \leq 3$ for 1544 kbit/s primary rate

  $n \leq 5$ for 2048 kbit/s primary rate

- n H_0

  $n \leq 4$ for 1544 kbit/s primary rate

d) *Other channel structure access capabilities*

For further study.