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INTEGRATED SERVICES DIGITAL NETWORK (ISDN) SERVICE CAPABILITIES

PRINCIPLES OF TELECOMMUNICATION SERVICES SUPPORTED BY AN ISDN AND THE MEANS TO DESCRIBE THEM

ITU-T Recommendation I.210

(Previously "CCITT Recommendation")

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 I.210 was revised by the ITU-T Study Group XVIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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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Recommendation I.210**PRINCIPLES OF TELECOMMUNICATION SERVICES SUPPORTED
BY AN ISDN AND THE MEANS TO DESCRIBE THEM***(Malaga-Torremolinos, 1984; amended at Melbourne, 1988 and at Helsinki, 1993)***1 General**

An ISDN will support a wide range of services as described generally in Recommendation I.120. The purpose of this Recommendation is to provide a classification of such services, the means for the description of such services based on the description method as defined in Recommendation I.130, and to give a basis for the definition of the network capabilities required by an ISDN. These network capabilities are defined in the I.300-Series Recommendations.

Using the service concepts and the means for the description of services as given in this Recommendation, recommended bearer services are defined and described in the I.230-Series Recommendations, recommended teleservices are defined and described in the I.240-Series Recommendations and recommended supplementary services are defined and described in the I.250-Series Recommendations.

2 Service concepts

2.1 Services supported by an ISDN are the communication capabilities made available to customers by telecommunication service providers. An ISDN will provide a set of network capabilities which are defined by standardized protocols and functions and enable telecommunication services to be offered to customers.

A service provision by a telecommunication service provider to a customer connected to an ISDN may cover the whole or only part of the means required to fully support the service. The operational and commercial features associated with provision of the service are included in the service concept.

The service classification and descriptions which follow are independent of different possible arrangements for ownership and provision to the customer of the means required to support a service. The customer may therefore be offered, by the Administration, services or service support.

2.2 The method used for the characterization of telecommunication services is described in Recommendation I.130 "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN". Within this method the first stage is an overall service description from the user's point of view. In stage 1 there are three steps:

- Step 1.1: Prose service definition and description;
- Step 1.2: Static description of the service using attributes;
- Step 1.3: Dynamic description of the service using graphic means.

Together these three steps define the service characteristics as they apply at a given reference point where the customer accesses the service.

Annexes A to D give the format of stage 1 service descriptions as follows:

- Annex A: Structure for prose service definition and description;
- Annex B: List of attributes and their possible values for describing bearer services;
- Annex C: List of attributes and their possible values for describing teleservices;
- Annex D: Dynamic description of the service using graphic means.

NOTES

- 1 Recommendation I.140 describes the use of attributes for this purpose.
- 2 The use of attributes for describing supplementary services is for further study.

This format allows the information contained within stage 1 to be structured in a consistent, comprehensive and logical manner. Only one overall format is recommended but it is recognized that certain sections of this format are only applicable to certain types of services.

2.3 Telecommunication services are classified using their static characteristics described by attributes. Therefore this Recommendation (except Annexes A and D) deals mainly with step 1.2 of the description method.

A telecommunication service is, from the static point of view, composed of

- technical attributes as seen by the customer; and
- other attributes associated with the service provision, e.g. operational and commercial attributes.

Realization of the technical attributes of a telecommunication service requires a combination of network and terminal capabilities and other service providing systems.

2.4 Telecommunication services are divided into two broad families, i.e.

- bearer services; and
- teleservices.

A supplementary service modifies or supplements a basic telecommunication service. Consequently, it cannot be offered to a customer as a stand alone service. It must be offered together with or in association with a basic telecommunication service. The same supplementary service may be common to a number of telecommunication services.

NOTE – The concept of supplementary services corresponds to the concept of optional user facilities in the X-Series Recommendations.

The concepts introduced here are illustrated in Table 1 and are defined in more detail in 5.

TABLE 1/I.210
Classification of telecommunication services

Telecommunication service			
Bearer service		Teleservice	
Basic bearer service	Basic bearer service + supplementary services	Basic teleservice	Basic teleservice + supplementary services

3 Customer access to telecommunication services supported by an ISDN

3.1 Considering the reference configurations defined in Recommendation I.411, customers can access various telecommunication services at different access points. Figure 1 shows these access points.

This figure takes into account the fact that the network provider may offer to a customer connected to an ISDN the whole or only part of the means to fully support the service.

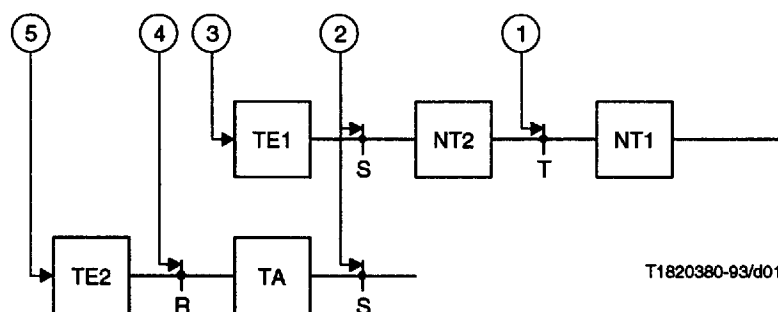


FIGURE 1/I.210
Customer access to services supported by an ISDN

3.2 The definitions of the access points introduced in Figure 1 are as follows:

- i) Access points 1 (reference point T) and 2 (reference point S) are the access points for bearer services supported by an ISDN. The choice between access point 1 (T) and 2 (S) depends on the ownership and form of provision (to the customer) of the communications equipment at the customer premises. The service classification and descriptions in the following are independent of different possible arrangements for such provision.
- ii) At access point 4 (reference point R), depending on the type of terminal adaptors provided, other CCITT standardized services may be accessed, e.g. according to the X- and V-Series Recommendations.
- iii) At access points 3 and 5 (user-to-terminal interface), teleservices are accessed – the teleservice concept includes the terminal capabilities.

3.3 The following customer entities may be connected at access points 1 and 2:

- customer terminals;
- customer systems, e.g. PABXs, LANs, service vendor systems;
- private networks.

NOTE – Customer terminals and systems may be private or provided by Administrations.

All customer equipment connected to an ISDN interface at one of these access points should meet the specifications of the protocols at that interface for all the layers that are included in the definition of the telecommunication service used.

For some telecommunication services the service definition also covers some terminal functions and characteristics in addition to those specified by the protocols at the interface. This relates in particular to teleservices, and also to supplementary services (see Recommendation I.250).

3.4 From the user's point of view the telecommunication services as defined in the I.200-Series Recommendations will be used for some applications. For example, the telephony teleservice will be typically used for a human conversation (application). Likewise bearer services will be used for applications. The area of applications is outside the scope of the I-Series Recommendations. The user's application of services is the responsibility of the user and not of the network. The network can have no knowledge of what application is being used at any given time.

3.5 The telecommunication service, as described in this Recommendation, is time-independent, that is to say that the description is valid for all the time the service is available. Whenever a demand or reserved service is invoked by a user, then the particular instance of the service is referred to as a *call*. Similarly, the instance also applies to the application as described in 3.4. The instance of an application is referred to as a *communication*.

4 Capabilities to support a telecommunication service

4.1 The capabilities required to fully support a telecommunication service for a customer connected to an ISDN include:

- network capabilities;
- terminal capabilities, when required;
- other services providing capabilities, when required;
- operational and commercial features associated with the service provision (i.e. sales or marketing aspects).

4.2 Network capabilities are described in detail in Recommendation I.310. Two different levels of ISDN network capabilities are introduced in that Recommendation:

- low layer capabilities which relate to bearer services;
- high layer capabilities which together with low layer capabilities relate to teleservices.

The low layer capabilities are defined as a set of low layer functions (LLF) (relating to layers 1-3 in Recommendation X.200) which provide the capability for the carriage of user information over an ISDN connection. These functions include:

- basic low layer functions (BLLF) supporting the necessary layer 1-3 requirements;
- additional low layer functions (ALLF) supporting, in addition to BLLFs, lower layer requirements of supplementary services.

High layer capabilities are defined as a set of high layer functions (HLF) generally associated with layers 4 to 7 in Recommendation X.200.

High layer functions are sub-divided into basic high layer functions (BHLF) and additional high layer functions (AHLF).

NOTE – Depending on national regulations, ALLF, BHLF, and AHLF may be provided by administrations, or other suppliers.

4.3 The concept of describing network capabilities in terms of low layer capabilities and high layer capabilities can equally be applied to describe terminal capabilities. In the description of teleservices the HLF and LLF are included in the service definition. In the case of bearer service definition the terminal capabilities are not included but the terminal must conform to the LLF of the bearer service.

NOTE – The relationships between service categories, network/terminal capabilities and functions are illustrated in Table 2.

TABLE 2/I.210

Relationship between service categories, network/terminal capabilities and functions

Telecom- munication service	Network capabilities specified				Terminal capabilities specified				Commercial features/ Operational capabilities
	LLF		HLF		LLF		HLF		
	BLLF	ALLF ^{a)}	BHLF ^{a)}	AHLF ^{a)}	BLLF	ALLF	BHLF	AHLF	
Bearer service	X	Optional	–	–	–	–	–	–	X
Teleservice	X	Optional	Optional	Optional	X	Optional	X	Optional	X
^{a)} Depending on national regulations, ALLF, BHLF and AHLF may be provided by administrations or other suppliers. X Specified – Not specified									

4.4 The operational service capabilities associated with a service offering may include capabilities for maintenance, charging, user control of service features, etc.

The use of such capabilities may involve terminal-network communication and may therefore be viewed as specific applications.

A more precise description of these capabilities and the relationship to Recommendation X.200 needs further study.

5 Telecommunication service classification

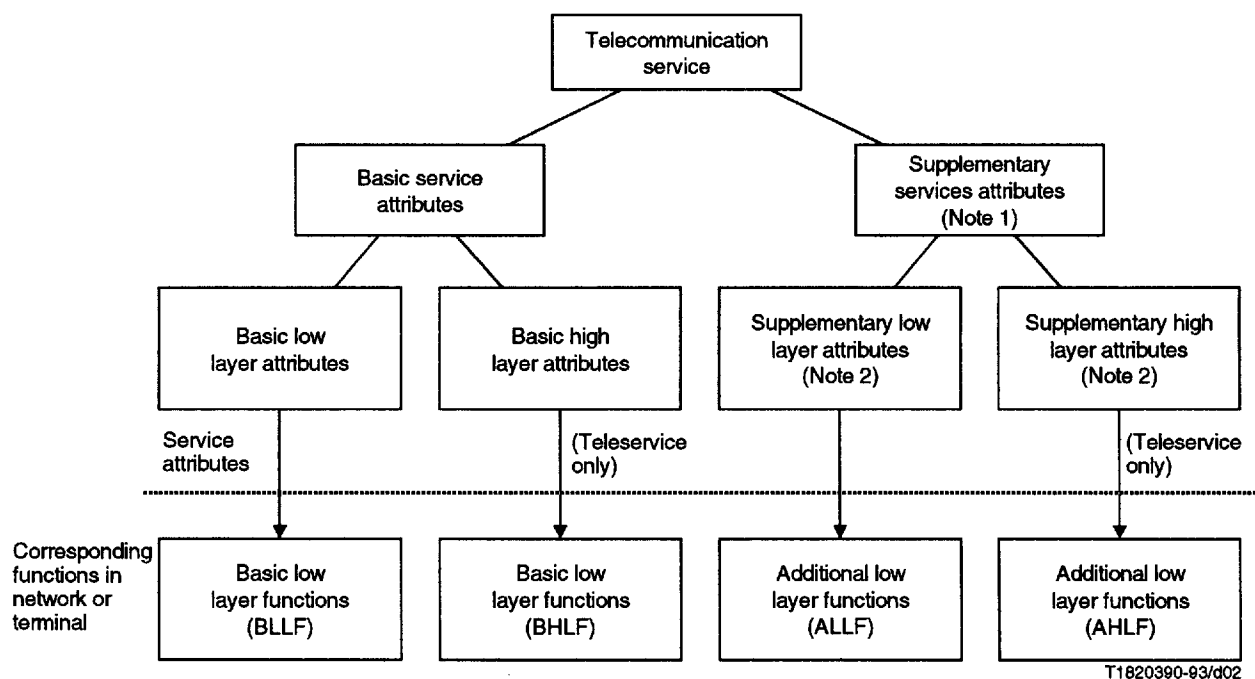
5.1 The static characteristics of a telecommunication service supported by an ISDN are described by service attributes. They are given in Annexes B and C.

There are two groups of service attributes applicable to user information flow:

- low layer attributes;
- high layer attributes.

Bearer services are defined as including only low layer attributes. Teleservices are defined as including both low layer attributes and high layer attributes.

The relationship between telecommunication service attributes and low/high layer functions is illustrated in Figure 2.



NOTES

- 1 A supplementary service cannot be offered as a stand alone service. This attribute is mainly concerned with supplementary services associated to basic telecommunications services. It could be split into sub-attributes depending on results of further studies. Supplementary services could also have an influence on some attributes characterizing basic telecommunication services.
- 2 The characterization of supplementary services using attributes requires further studies.

FIGURE 2/I.210
Relationship between service attributes and low/high layer functions

5.2 Bearer services supported by an ISDN

5.2.1 Bearer services supported by an ISDN provide the capability for information transfer between ISDN access points 1 or 2 and involve only low layer functions.

The customer may choose any set of high layer (at least 4 to 7) protocols for his communication, and the ISDN does not ascertain compatibility at these layers between customers. An example of a bearer service is a demand circuit-mode, 64 kbit/s unrestricted, 8 kHz structured bearer service.

5.2.2 Bearer services are characterized from a static point of view by a set of low layer attributes given in Annex B. These attributes are classified into three categories:

- information transfer attributes;
- access attributes; and
- general attributes, including operational and commercial attributes.

The bearer capability defines the technical features of a bearer service as they appear to the user at the appropriate access point (1 or 2).

The bearer capability is characterized by information transfer and access attributes. A bearer capability is associated with every bearer service.

NOTE – It is likely that some Quality of Service parameters – such as error rate or call set-up delay – should be extracted in order to form a new attribute allocated to the information transfer category. Identification and definition of such parameters require further consideration.

Individual bearer services categories are defined and described in the I.230-Series Recommendations.

5.2.3 A bearer service provides the user with the possibility of gaining access to various forms of communication, covering for example:

- information transfer between users employing the same access points (1 or 2) and access attributes (see Figure 3 a);
- information transfer between users employing different access attributes at the access points (1 or 2) involved (see Figure 3 b); and
- information transfer between a user and a separate resource providing high layer functions (see Figure 3c).

5.3 Teleservices supported by an ISDN

5.3.1 Teleservices provide the full capacity for communication by means of terminal and network functions and possibly functions provided by dedicated centres.

A teleservice supported by an ISDN should use only one (or a small number of) bearer capability(ies) recommended by the CCITT. It should be noted that in the case where more than one of the recommended bearer capabilities is used for a given teleservice, network interworking functions may be required under the responsibility of the teleservice provider. However, a user operating a specific application is not prevented from using a terminal compatible with a given teleservice in association with a bearer capability not recommended for this teleservice. Examples of teleservices are telephony, teletex and videotex.

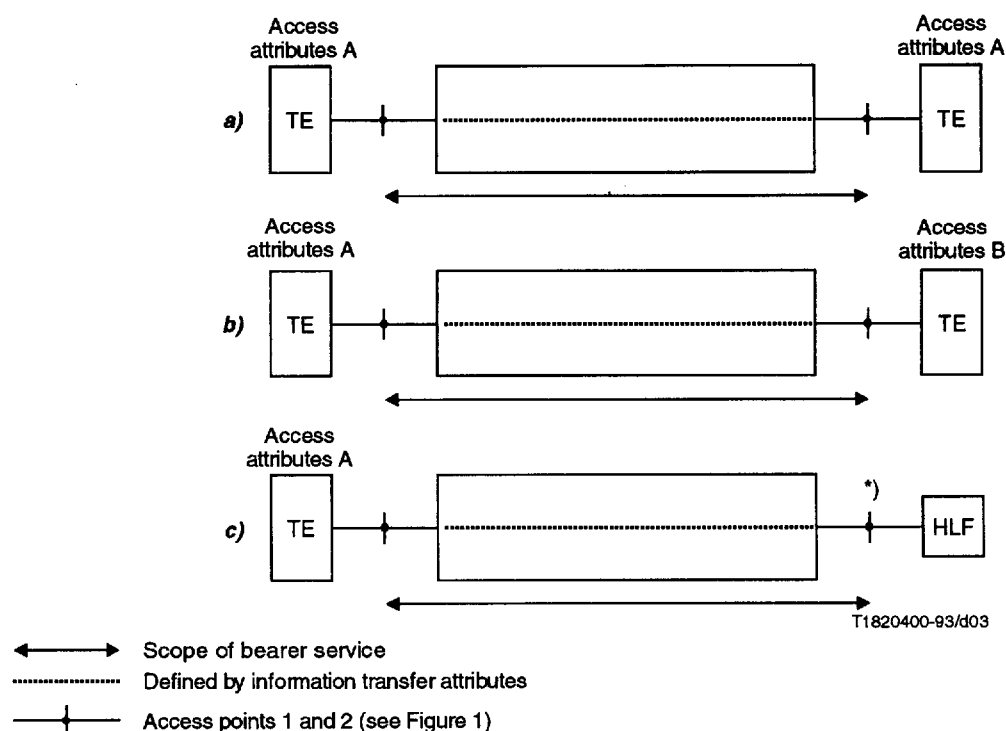
5.3.2 Teleservices are described from a static point of view by a set of low layer and high layer attributes, and operational and commercial attributes, as given in Annex C.

Low layer attributes are those used to characterize the bearer capability (see 5.2.2). High layer attributes are used in Recommendation I.241 to describe message-related (i.e. message on layer 7) characteristics of a service (basic high layer attributes) or of a supplementary service (supplementary high layer attributes). They refer to the functions and protocols of layers 4 to 7 in the Recommendation X.200 framework which are concerned with the transfer, storage and processing of user messages (provided by a subscriber's terminal, a retrieval centre, or a network service centre).

Therefore, not all these attributes can be applied directly at the user-to-terminal interface (access points 3 or 5) as they represent two kinds of features, the bearer capability and the terminal features, that are not directly perceived by the user.

The definition of appropriate attributes and the specifications of teleservices at this access point from the user point of view (man-machine interface) is for further study and the subject of E-and F-Series Recommendations.

Individual teleservices are defined and described in the I.240-Series Recommendations.



*) Access point to be defined but not necessarily subject to CCITT Recommendations (See Recommendation I.324).

NOTES

- 1 Further study is required on bearer services extending beyond the ISDN.
- 2 Further study is required on possible communications involving bearer services with different values allocated to information transfer attributes.

FIGURE 3/I.210
Examples of bearer service operation

5.3.3 A teleservice provides the user with the possibility of various forms of applications (or teleservice applications) covering, for example:

- teleservice application involving two terminals providing the same teleservice attributes at both access points (3 or 5) (see Figure 4 a);
- teleservice application involving a terminal at one access point (3 or 5) and HLF functions located within the ISDN (see Figure 4 b);
- teleservice application involving terminals based on different teleservice attributes at each access point – in this case, the use of HLF functions in the ISDN is necessary (interworking situation) (see Figure 4 c);
- teleservice application involving a terminal at one access point (3 or 5) and a system providing HLF functions (see Figure 4 d);
- teleservice application involving two terminals at both access points (3 or 5) and an intervening system providing HLF functions (see Figure 4 e). In this case, teleservice attributes can be different at each terminal access point.