

ITU-T

I.310

(03/93)

OVERALL NETWORK ASPECTS AND FUNCTIONS

ITU-T Recommendation I.310

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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 I.310 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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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.310**ISDN – NETWORK FUNCTIONAL PRINCIPLES***(Malaga-Torremolinos, 1984; amended at Melbourne, 1988 and at Helsinki, 1993)***1 General****1.1 Basic philosophy of the functional description**

The objective of this Recommendation is to provide a common understanding of the ISDN capabilities, including terminal, network and specialized service centre aspects.

A functional description of ISDN capabilities must allow a clear distinction between definition/specification aspects of services provided by the ISDN and the actual specification of the equipment utilized to support those services. Therefore, an implementation-independent approach should be adopted.

Moreover in the context of this Recommendation the adjective “functional” is used in the sense of an implementation-independent approach. The noun “function” itself has a specific meaning which is explained below.

The description of network capabilities is consistent with the protocol reference model, e.g.:

- the layering structure of all systems involved in a communication process, i.e. partitioning the required functions between different layers;
- the clear discrimination between layer service concept, layer function concept and layer protocol concept.

Furthermore, the three following distinctions apply:

- distinction between basic services and supplementary services;
- distinction between ISDN capabilities and services offered to the customer;
- distinction between static and dynamic aspects of the description.

NOTE – The inclusion in this Recommendation of aspects of intelligent network architecture, as described in Recommendations I.312/Q.1201, I.328/Q.1202, I.329/Q.1203, and further Recommendations of the Q.1200-Series is subject to further study.

1.2 Services supported by an ISDN

The concepts and the principles of an ISDN are described in Recommendation I.120. The services supported by an ISDN are given in the I.200-Series Recommendations. A classification and the tools for the description of telecommunication services are specified in Recommendation I.210 according to the description method as given in Recommendation I.130. The network capabilities to support these services are defined in the I.300-Series Recommendations. The relationship between these Recommendations and some other relevant I-Series Recommendations is shown in Figure 1.

It should be noted that the service concept defined in Recommendation I.210 is different from the layer service concept of the OSI model. The telecommunication service concept in Recommendation I.210 corresponds to the services offered to users by the network. Besides operational and commercial aspects, the provision of these telecommunication services (bearer and teleservices) and associated supplementary services requires the availability of appropriate capabilities:

- network capabilities, in various network equipments (exchanges etc.);
- terminal capabilities;
- specialized service centre capabilities, when required.

1.3 Generic description of required capabilities

ISDN capabilities are the total sum of the functions required to support all basic and supplementary services offered by the ISDN.

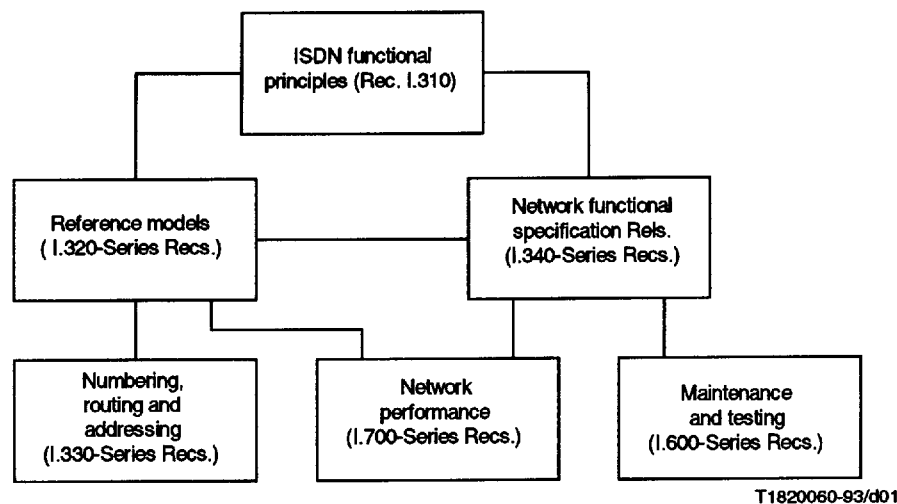


FIGURE 1/I.310
ISDN network series of Recommendations

1.3.1 Static description

The identification and characterization of these functions, which are related to the specification and analysis of these basic and supplementary services, form the first step of the generic description. This part of the generic description is intrinsically static.

1.3.2 Dynamic description

The use of a basic or supplementary service generally requires cooperation between functions located in different equipment.

The static description of the ISDN capabilities, which will be a list of functions, is not sufficient. It is necessary, in addition, to depict the sequence of events and the activation of functions coordinated by suitable inter-equipment signals. This second step is the dynamic aspect of the description. This involves firstly an identification and characterization of the functions and then a method of showing the dynamic interaction between functions.

2 Objectives of the functional description of the ISDN

As described in Recommendation I.120, an integrated services digital network (ISDN) is a network providing end-to-end digital connectivity to support a wide range of telecommunication services.

The characterization of ISDN is centered on three main areas:

- a) the standardization of services offered to users, so as to enable services to be internationally compatible;
- b) the standardization of user-network interfaces, so as to enable terminal equipment to be portable [and to assist in a)];
- c) the standardization of ISDN capabilities to the degree necessary to allow user-network and network-network interworking, and thus achieve a) and b) above.

The I.200-Series Recommendations identifies the range of telecommunication services to be offered in an ISDN, namely bearer services, teleservices, and associated supplementary services and the attributes characterizing those services. The I.400-Series Recommendations describes both the functional and technical aspects of user-network interfaces. This Recommendation defines the ISDN capabilities to support services via interfaces in terms of functions. A functional description enables a decoupling of services and ISDN capabilities, and therefore allows an implementation-independent approach.

The principal objectives of the ISDN functional method are

- 1) to define the ISDN capabilities, by building up a harmonized set of functions that are necessary and sufficient to support telecommunication services by their static and dynamic description;
- 2) to aid the evolution of ISDN capabilities (modifications, addition of capabilities to support new basic or supplementary services), by organizing this set of functions in an open-ended and modular structure;
- 3) to aid the standardization of system-independent switching functions between exchanges of differing designs and manufacture;
- 4) to aid the standardization of interworking standards between switching systems located in different countries;
- 5) to provide information for the preparation of functional specifications for new telecommunication services;
- 6) to maximize the exploitation of functions provided and available in switching systems.

The transition from an existing network to a comprehensive ISDN may require a period of time extending over one or more decades. Therefore the design of an ISDN will be revolutionary, adding capabilities in a flexible and modular manner. An ISDN may therefore be expected to provide an open-ended set of functional capabilities able to accommodate new needs as they arise at acceptable cost.

During a long intermediate period, some functions may not be implemented within a given ISDN. Also, specific arrangements should be used to ensure compatibility with existing networks and services. An ISDN should also give access to existing services and interwork with existing networks and terminals.

3 Generic description model

3.1 General concepts

The ISDN functional description defines a set of capabilities which enable bearer and teleservices to be offered to users (see Recommendation I.210). The services require two different levels of ISDN capabilities viz.:

- the low-layer functions (LLF) relate to the bearer services;
- the high-layer functions (HLF) together with the lower layer functions relate to the teleservices.

In addition, operation and maintenance capabilities are required to support both bearer and teleservices (see Figure 2).

The capabilities of the ISDN need a detailed and rigorous characterization because there is a wide range of standardization issues involved.

To achieve the functional objectives described in 2, the ISDN functional description has been designed to

- define the overall functional characteristics of the ISDN;
- be implementation-independent and place no constraints on national network architectures beyond the network and interface standards given in the I-Series Recommendations;
- take full account of the constraints of existing dedicated networks;
- support the layering protocol concepts defined in Recommendation I.320.

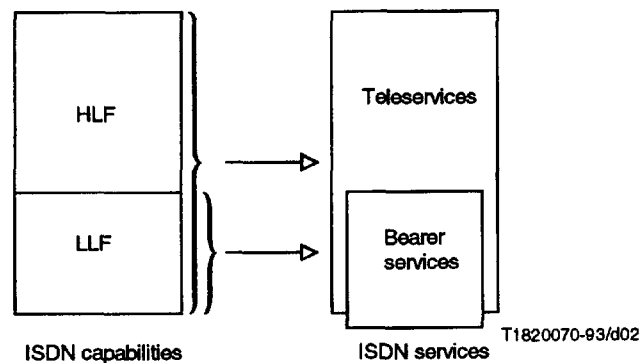


FIGURE 2/I.310
Relationship between telecommunication services
and network capabilities

For this purpose the concept of an ISDN function is used, which is defined as

“A distinguishing characteristic which describes functional capabilities of a given equipment, or system, or network, as seen from the designer point of view.”

As far as possible, the number of functions should be limited.

3.2 Static description model

3.2.1 Global functions (GF)

The description of ISDN capabilities concerns the low layers (1 to 3) in a global context (see Note), i.e. taking into account all the equipment involved in the communication, according to the protocol reference model (see Figure 3). In this context, a global function is defined as:

- referring to the ISDN capabilities;
- having a global significance in the lower layers.

The set of all GFs leads to the description of the total ISDN low layer capabilities.

NOTE – This concept of global function may be extended to describe the higher layer capabilities of ISDN terminals (and network capabilities, where these exist). In this case the GF has a global significance inside the higher layers.

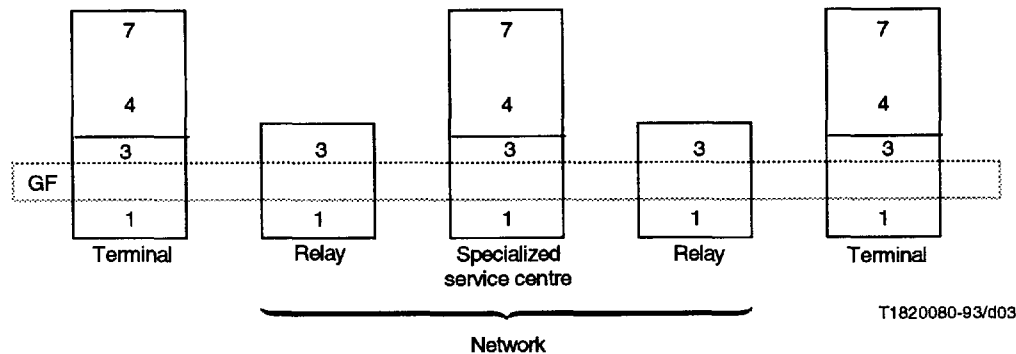


FIGURE 3/I.310
Global function concept