INTERNATIONAL TELECOMMUNICATION UNION

CCITT I.121

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

INTEGRATED SERVICES DIGITAL NETWORK (ISDN) GENERAL STRUCTURE AND SERVICE CAPABILITIES

BROADBAND ASPECTS OF ISDN

Recommendation I.121

Geneva, 1991

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation I.121 was prepared by Study Group XVIII and was approved under the Resolution No. 2 procedure on the 5 of April 1991.

CCITT NOTES

1) In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication Administration and a recognized private operating agency.

2) A list of abbreviations used in this Recommendation can be found in Annex A.

Preamble to B-ISDN Recommendations

In 1990, CCITT SG XVIII approved a first set of Recommendations on B-ISDN. These are:

I.113 — Vocabulary of terms for broadband aspects of ISDN

I.121 — Broadband aspects of ISDN

I.150 — B-ISDN asynchronous transfer mode functional characteristics

I.211 — B-ISDN service aspects

I.311 — B-ISDN general network aspects

I.321 — B-ISDN Protocol Reference Model and its application

I.327 — B-ISDN functional architecture

I.361 — B-ISDN ATM Layer specification

I.362 — B-ISDN ATM Adaptation Layer (AAL) functional description

I.363 — B-ISDN ATM Adaptation Layer (AAL) specification

I.413 — B-ISDN user-network interface

I.432 — B-ISDN user-network interface — Physical Layer specification

I.610 — Operation and maintenance principles of B-ISDN access

These Recommendations address general B-ISDN aspects as well as specific service- and network-oriented issues, the fundamental characteristics of the asynchronous transfer mode (ATM), a first set of relevant ATM oriented parameters and their application at the user-network interface as well as impact on operation and maintenance of the B-ISDN access. They are an integral part of the well established I-Series Recommendations. The set of Recommendations are intended to serve as a consolidated basis for ongoing work relative to B-ISDN both within CCITT and in other organizations. They may also be used as a first basis towards the development of network elements.

CCITT will continue to further develop and complete these Recommendations in areas where there are unresolved issues and develop additional Recommendations on B-ISDN in the I-Series and other series in the future.

Recommendation I.121

BROADBAND ASPECTS OF ISDN

(revised 1990)

0 Foreword

This Recommendation states the basic principles of broadband aspects of integrated services digital network (B-ISDN) and indicates further developments of the ISDN network capabilities in order to support more advanced services and applications.

The B-ISDN Recommendations were written taking into account the following:

— the emerging demand for broadband services;

— the availability of high speed transmission, switching and signal processing technologies;

— the improved data and image processing capabilities available to the user;

— the advances in software application processing in the computer and telecommunication industries;

— the need to integrate both interactive and distribution services;

— the need to integrate both circuit and packet transfer mode into one universal broadband network;

— the need to provide flexibility in satisfying the requirements of both user and operator;

— the need to cover broadband aspects of ISDN in CCITT Recommendations.

1 General

1.1 The main feature of the ISDN concept is the support of a wide range of audio, video and data applications in the same network. A key element of service integration for an ISDN is the provision of a wide range of services to a broad variety of users utilizing a limited set of connection types and multipurpose user/network interfaces.

1.2 In the context of this Recommendation, the term B-ISDN is used for convenience in order to refer to and emphasize the broadband aspects of ISDN. The intent, however, is that there be one comprehensive notion of an ISDN which provides broadband and other ISDN services.

2 Principles of B-ISDN

2.1 Asynchronous transfer mode (ATM) is the transfer mode for implementing B-ISDN and is independent of the means of transport at the Physical Layer.

2.2 B-ISDN supports switched, semi-permanent and permanent, point-to-point and point-to-multipoint connections and provides on demand, reserved and permanent services. Connections in B-ISDN support both circuit mode and packet mode services of a mono- and/or multimedia type and of a connectionless or connection-oriented nature and in a bidirectional or unidirectional configuration.

2.3 The B-ISDN architecture is detailed in functional terms and is, therefore, technology and implementation independent.

2.4 A B-ISDN will contain intelligent capabilities for the purpose of providing advanced service characteristics, supporting powerful operation and maintenance tools, network control and management. Further inclusion of additional intelligent features has to be considered in an overall context and may be allocated to different network/terminal elements.

2.5 Since the B-ISDN is based on overall ISDN concepts, the ISDN access reference configuration is also the basis for the B-ISDN access reference configuration.

2.6 A layered structure approach, as used in established ISDN protocols, is also appropriate for similar studies in B-ISDN. This approach should also be used for studies on other overall aspects of B-ISDN including information transfer, control, intelligence and management.

2.7 Any extension of network capabilities or change in network performance parameters will not degrade the quality of service of existing services.

2.8 The evolution to B-ISDN should ensure the continued support of existing interfaces and services.

2.9 New network capabilities will be incorporated into B-ISDN in evolutionary steps to meet new user requirements and accommodate advances in network developments and progress in technology.

2.10 It is recognized that B-ISDN may be implemented in a variety of ways according to specific national situations.

3 Characteristics of an ATM-based B-ISDN

The underlaying asynchronous transfer mode (ATM) of the B-ISDN provides some specific, advantageous facilities:

— high flexibility of network access due to the cell transport concept and specific cell transfer principles;

— dynamic bandwidth allocation on demand with a fine degree of granularity;

— flexible bearer capability allocation and easy provision of semipermanent connections due to the virtual path concept;

— independence of the means of transport at the Physical Layer.

4 Evolution

4.1 B-ISDN will be based on the concepts developed for ISDN and may evolve by progressively incorporating directly into the network additional B-ISDN functions enabling new and advanced services.

4.2 The deployment of B-ISDN may require a period of time extending over one, or more, decade(s) as operators seek to find the most economic means of evolving to the B-ISDN. These evolutionary phases (e.g. deployment of metropolitan area networks, passive optical networks, local area networks and also satellite based networks) will need to be harmonized with the overall B-ISDN concepts ensuring the continued support of existing interfaces and services and be eventually integrated with the B-ISDN. In these evolutionary phases appropriate arrangements must be developed for the interworking of services on B-ISDN and services on other networks.

4.3 In the evolution towards a B-ISDN, some digital end-to-end connections may in part use digital transmission and switching equipment that has not been optimized for the B-ISDN, e.g. G.702 plesiochronous digital hierarchy transmission systems. Such connections may provide a reduced maximum service bit rate at the user-network interface (UNI).

ANNEX A

(to Recommendation I.121)

Alphabetical list of abbreviations contained in this Recommendation

ATM	Asynchronous transfer mode
B-ISDN	Broadband aspects of integrated services digital network