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Contents

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Foreword

This ETSI Technical Report (ETR) was produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

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1 Scope

This ETSI Technical Report (ETR) provides the general concepts, principles and requirements for numbering and addressing to be applied within B-ISDN networks. E.164 numbering plan will be used as a basis for the B-ISDN numbering and if additional requirements not covered by the present E.164 numbering scheme are necessary they will be studied. Aspects related to number portability are not discussed in this ETR.

2 References

This ETR incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETR only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

[2] ITU-T Recommendation E.165: "Timetable for coordinated implementation of the full capability of the numbering plan for the ISDN era".

[3] ITU-T Recommendation E.166: "Numbering plan interworking for the E.164 and X.121 numbering plans".

[4] ITU-T Recommendation I.121: "Broadband aspects of ISDN".

[5] ITU-T Recommendation I.327: "B-ISDN functional architecture".

[6] ITU-T Recommendation I.330: "ISDN numbering and addressing principles".

[7] ITU-T Recommendation I.334: "Principles relating ISDN numbers/sub-addresses to the OSI reference model network layer addresses".

[8] ITU-T Recommendation X.121: "International numbering plan for public data networks".

[9] ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection - Basic reference model: The basic model".

[10] ITU-T Recommendation I.320: "ISDN protocol reference model".

[11] ITU-T Recommendation I.321: "B-ISDN protocol reference model and its application".

[12] ITU-T Recommendation X.213: "Information Technology - network service definition for open systems interconnection".

[13] ETR 325: "Broadband Integrated Services Digital Network (B-ISDN); General principles and functional requirements for interworking B-ISDN and narrowband-ISDN".

3 Abbreviations

For the purposes of this ETR, the following abbreviations apply:

AESA	ATM End System Address
ATM	Asynchronous Transfer Mode
BCD	Binary Coded Decimal
B-ISDN	Broadband Integrated Services Digital Network
CC	Country Code
DSP	Domain Specific Part
IDP	Initial Domain Part

IN	Intelligent Network
ISDN	Integrated Services Digital Network
MSN	Multiple Subscriber Number
NSN	National Significant Number
QoS	Quality of Service

4 Number and address concept

The number is a string of decimal digits and represents the traditional addressing information in the network. The numbering plan defines the syntax and the semantic of a number and each number belongs to a specific numbering plan.

The number identifies the points of attachment of customer premises or private environments at the public termination. In some specific case the number can be used to identify interfaces corresponding to reference points not related to the attachment of the customer premises to the network. For example the number could be used to identify interfaces between two nodes, between a public network and a specialized node (e.g. a server) or within the private domain.

The number usually contains the information necessary to define the route to reach the point identified by the number.

The number space is controlled by some authorities in order to ensure uniqueness and adherence to the semantics.

The address specifies the location information of an entity involved in a communication. The communication entity that the address specifies can belong to the public network or to the private environment.

The addressing plan defines the syntax and the semantic of a address and each address belongs to a specific addressing plan.

The address space is controlled by some authorities in order to ensure uniqueness and adherence to the semantics. In some cases these authorities will be network specific, in other cases they could be national or international authorities.

4.1 The B-ISDN number and address

The B-ISDN number is a number related to B-ISDN and the B-ISDN numbering plan.

The B-ISDN address is the address used to locate communication entity in B-ISDN. The B-ISDN address comprises the B-ISDN number and the B-ISDN additional addressing information.

Figure 1 describes the B-ISDN number and the B-ISDN address.

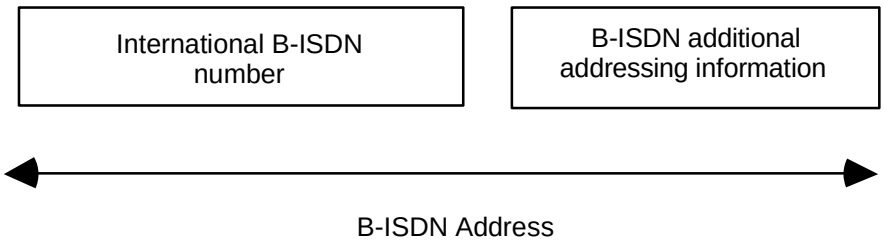


Figure 1: B-ISDN Address

In the following of this ETR the concept of transport part of B-ISDN (or more shortly Transport B-ISDN) is used. The Transport B-ISDN is intended to be the portion of B-ISDN that offers a connectivity with standardized classes of services. The functions of the Transport B-ISDN are implemented by User Protocol Blocks up to Layer 3 and Control Protocol Blocks up to Layer 7. ITU-T Recommendation I.320 and I.321 describes the structure and the functions of the Transport B-ISDN.

In B-ISDN the two parts of the B-ISDN address namely the B-ISDN number and the B-ISDN additional addressing information are handled in two different ways. The B-ISDN number is used by the Transport B-ISDN to identify the interface corresponding to the specific number.

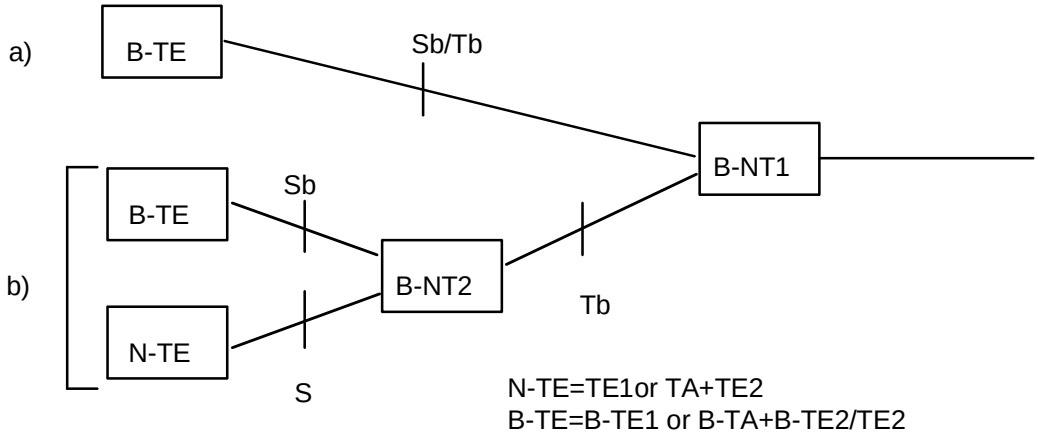
The B-ISDN additional addressing information is something that allows the identification of resources outside the Transport B-ISDN (e.g. resources in the private domain). Then the additional addressing information is not used by the transport part of B-ISDN to determine the location of the communication entity identified by the address. The interpretation of the additional addressing information is left to the upper layers of B-ISDN or to resources outside B-ISDN.

The B-ISDN numbering plan and the B-ISDN addressing plan are described in clause 5 and 7.

5 B-ISDN numbering requirements

The B-ISDN number is used to identify both the originating and the destination endpoints.

Figure 2 depicts the reference configuration to connect the N-ISDN and B-ISDN terminals to B-ISDN. The functions performed by the functional groupings shown in figure 2 are described in the annex A of ETR 325.



Legend
TA: Terminal Adapter
TE: Terminal Equipment
B-NT1: Broadband Network Termination 1
B-NT2: Broadband Network Termination 2

Figure 2: Configuration for narrow and broadband terminals

The B-ISDN number unambiguously identifies:

- the interface corresponding to the reference point Tb

- the interface corresponding to the reference point Tb/Sb when Tb and Sb are coincident

- the interface Sb and S when narrowband and broadband terminals are connected to B-ISDN via the functional group B-NT2.

The use of the B-ISDN number at the Sb or S interface is the case of the use the B-ISDN number to identify interfaces within the private domain. In particular if the subscriber installation includes the functional group B-NT2 the use of the B-ISDN number to identify interfaces within the private domain is the Direct Dialling (DDI) supplementary service. If the subscriber installation does not include the B-NT2 the digits of the B-ISDN number are used in the context of Multiple Subscriber Number (MSN) supplementary service. The number of digits used in the provision of the MSN supplementary service is network dependent.

In the specific cases where two functional groupings are coincident, the interface corresponding to the reference point located between the two functional groupings is inside the functional grouping and is referred as a "virtual interface".

When the B-NT1 and B-NT2 are coincident the B-ISDN number may identify the virtual interface at the reference point Tb (figure 3a).

When the B-NT2 and the B-TA (or the TA) are coincident the B-ISDN number may identify the virtual interface at the reference Sb and S (figure 3b).

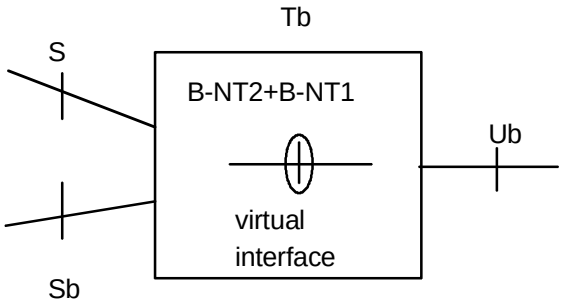


Figure 3a: Virtual interface at the reference point Tb

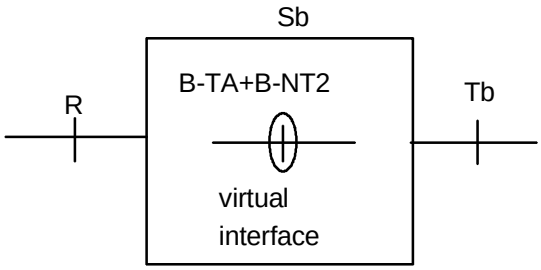


Figure 3b: Virtual interface at the reference point Sb

It should be noted that more than one number may be assigned to a user-to-network interface.

The use of a single B-ISDN number to identify a group of called parties (group number) is a requirement that the B-ISDN number has to meet.

The need for assigning B-ISDN number(s) to interfaces at different reference points requires further studies. As an example figure 4 shows the reference points P and M between the B-ISDN switched capabilities and generic servers. The functional architecture of the B-ISDN is described in ITU-T Recommendation I.327.

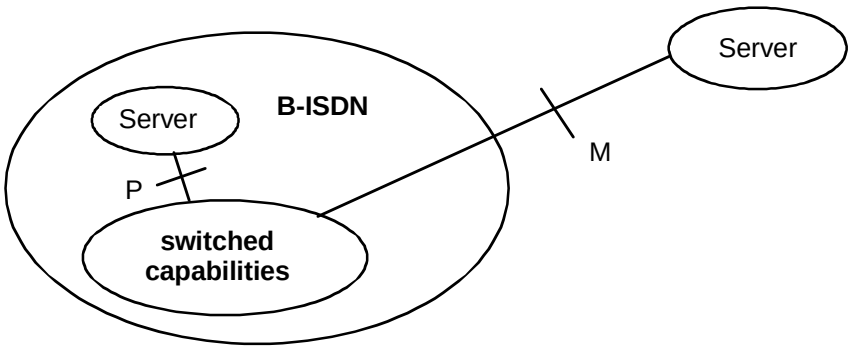


Figure 4: P and M reference points

The B-ISDN number does not give any indication about the nature of the service in terms of connections types, QoS parameters, etc..

The B-ISDN number is also used to the determine the route to the destination end point. B-ISDN supports the separation between the call control and the connection control. The connection control includes the functions used for the control of individual connections. The call control includes the functions used to set-up, modify and release a call.

The B-ISDN number is used by the connection control and the management plan to define the routing of the connection.

The B-ISDN number is also used by the call control and the management plan to define the routing of the call.

5.1 User requirements on numbering

The number is an object that is not only utilized by the network but it is used directly by the user as well. In this sense it is important to consider what the user requirements are on the number and on the numbering plan

The user requirements are mainly expressed in user friendliness that in this context is a measure of the ease of use of the number and of the numbering scheme from the user point of view. In particular there are specific user requirements concerning the type and formats of the selection information that should be provided. These can include structure, service variants, tariff perception and domain information.

Structure - In order to be handled in an easy manner the structure of the number as perceived by the user should be hierarchical and from the dialling viewpoint, only the necessary information needs to be dialled. The structure should be visible and meaningful to the user.

Service variants - From a user viewpoint, for some services it is important to be able to distinguish between different variants of the service. In the other words the number may give the possibility of identifying the various types of services (e.g. call supported by IN service, call to fixed or mobile terminal, etc.).

The possibility of distinguishing between the different service is also important from the network point of view: In particular the use of the network resources can be optimized making a distinction as soon as possible (e.g. in the local exchange) between the various services that in some cases are treated in different manners requiring the use of different network resources

Tariffing indication - Closely related to the service variants are the tariffing indications that may be contained in the number. By using these indications the user have an initial indication of the tariffing.

Domain information - The selection should indicate domains of major importance to the user, or to the operator:

- Operator or network serving the called party;

- Private network, in case the called party is served by a private network.

6 B-ISDN numbering plan

ITU-T Recommendation E.164 [1] is the basis for the numbering plan for B-ISDN. E.164 guarantees both backward compatibility and consistency for customers and network operators.

In addition interworking mechanism with other public numbering plans are already defined. There is also sufficient flexibility within E.164 to facilitate the introduction of future requirements.

Figure 5 depicts the B-ISDN number on the base of the ITU-T Recommendation E.164 [1].

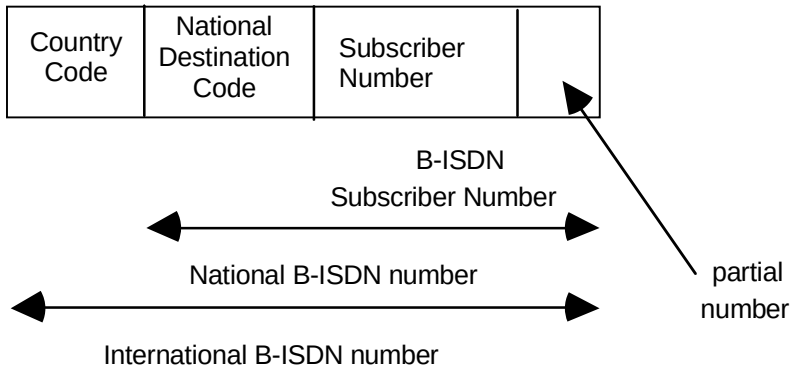


Figure 5: B-ISDN number structure

The International B-ISDN Number is composed of a variable length string of decimal digits arranged in specific code fields, up to a total maximum length of 12 digits (15 digits after time T, December 31, 1996). The International B-ISDN Number code fields are the Country Code (CC) and the National (Significant) Number (NSN). The NSN is used to select the destination subscriber within a national network. In selecting the destination subscriber, however it may be necessary to select a destination network. To accomplish this selection, the NSN code field comprise a National Destination Code (NDC) followed by the Subscriber Number.

Each NDC may have one of the following structures:

a) a Destination Network (DN) code, which can be used to select a destination network serving the destination subscriber;

b) a Trunk Code (TC);

c) any combination of DN and TC.

The partial number is the portion of the B-ISDN subscriber number used to identify interfaces within the private domain. The number of digits making the partial number depends on the requirements of the called subscriber equipment and on the capacity of the numbering plan used. In countries served by more than one B-ISDN the network identification is a national matter.

6.1 Individual and group number

B-ISDN number will be used to identify both originating and destination user-to-network interfaces (individual number) and they will be used also for identifying multiple destination interfaces (group number). A group number would not in itself address the individual destination interfaces but would be used as a destination number to route to an entity, or entities, capable of interpreting the group number into individual numbers.

The E.164 numbering plan does not provide the possibility of distinguishing between individual and group numbers. The group number can be performed by using a number address field in the appropriate protocol. To maintain the unambiguity of the E.164 numbering plan group numbers should not be allocated in a manner that allows the same B-ISDN number to be used within both an individual and a group number.

7 B-ISDN address requirements

The aim of the B-ISDN address is to give information about the location of an entity involved in a B-ISDN communication. A communication entity is a general sort of physical or logical entity that is involved in an instance of a communication. A network element, an interface, a protocol session are some examples of a communication entity.

It is worth noting that the communication entity whose the B-ISDN address specifies the location information can belong to the public domain or to the private environment.

The B-ISDN number contained in the B-ISDN address gives the information to identify the interface to which the communication entity identified by the address is connected. Usually the interface identified by the number is the user-to-network interface. In a future perspective the use of the B-ISDN number to identify other kinds of interfaces can be considered.

The additional address information of the B-ISDN address contains the additional information to specifically locate the communication entity.

The B-ISDN additional address information is something that is not interpretable by the transport portion of B-ISDN and then is transparently transported by the network. That means the B-ISDN additional address information is not used by the Transport B-ISDN to determine the route and the location of the telecommunication entity.

The B-ISDN address can support the Group Address that allows the use of a single destination address to identify a number of communication entities.

It should be noted that more than one B-ISDN address can be assigned to a single communication entity.

8 B-ISDN addressing plan

The B-ISDN address is used to the determine the route to the destination endpoint.

The structures acceptable for the B-ISDN address are depicted in figure 6 and the choice of the option is network dependent.

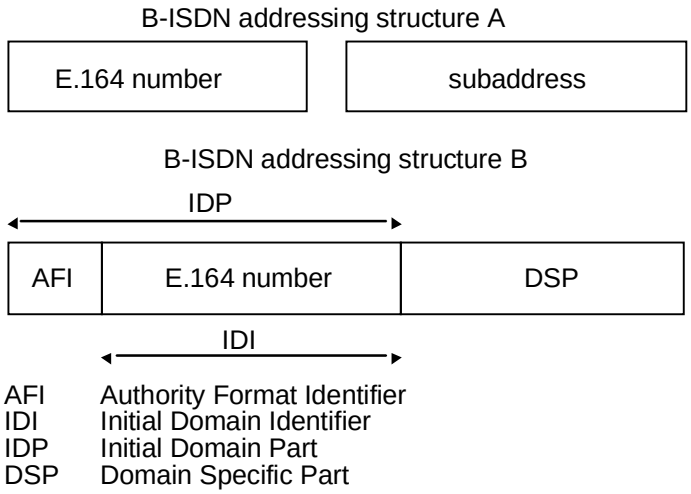


Figure 6: Possible structures of the B-ISDN address

Structure A

Structure A is based on the use of the subaddress. The additional address information which is added to complement the addressing information provided by the E.164 number in order to identify the entity involved in the specific B-ISDN communication is called subaddress. The subaddress may be a simple string of digits or it may be a structured address. For example the subaddress may be a NSAP address as defined in ITU-T Recommendation X.213, annex A.

The main purpose of such an addressing structure is to identify network entities or application processes beyond the public boundary independently of the specific network. The subaddress is carried transparently across the B-ISDN and it is not used to determine the location of the entity identified within the public domain by the B-ISDN address.

While the E.164 number is a mandatory element in the identification of endpoints, the additional address information may be optionally present. The subaddress, being an addressing mechanism independent of the network technique, can not substitute the E.164 numbering role, i.e. it cannot identify user to network

interfaces and it cannot be used for routing purpose. Public B-ISDN shall not be required to examine or operate on any additional address information.

The subaddress is a sequence of digits with a maximum length of 40 digits (20 octets).

Structure B

Structure B is based on the use of the E.164 format of the NSAP address defined in Recommendation X.213 annex A. The E.164 number contained in the IDI identifies the user to network interface associated to the entity identified by the B-ISDN address. This structure is known as an ATM End System Address (AESA).

The Initial Domain Part (IDP) specifies an administrative authority which has the responsibility for allocating and assigning the values of the Domain Specific Part (DSP). The IDP consists of two fields the Authority and Format Identifier (AFI) and the IDI.

The AFI identifies the coding authority, the format of the IDI and the syntax of the remainder address. The Format Identifier values may be 45 or 59 (E.164 value). Other values of the AFI and their usage are described in ITU Recommendation X.213. This field is 1 octet long. The encoding used is the Binary Coded Decimal (BCD) syntax.

The IDI field is 8 octets, encoded with BCD syntax. An appropriate number of leading padding characters (either 0000 or 1111) are used to obtain a maximum length of the E.164 number (15 digits). A trailing semi octet of 1111 is used to obtain octet alignment.

The Domain Specific Part is 11 octets, the encoding is specified by the authority identified by the IDP. The authority determines how it will be assigned and interpreted within that domain. The authority can create further sub-domains.

The use of the subaddress in conjunction with structure B is allowed to further complement addressing information in the private domain. Table 1 describes all the possible combinations of the structures described before.

Table 1: Structure Combination

B-ISDN address	B-ISDN number	Additional Address
E.164 number	E.164 number	null
E.164 number + Subaddress	E.164 number	Subaddress
NSAP (E.164 format)	E.164 number extracted from the NSAP IDI field	NSAP (E.164 format) (note)
NSAP (E.164 format) + Subaddress	E.164 number extracted from the NSAP IDI field	NSAP (E.164 format) + Subaddress (note)
NOTE: In the case of the N-SAP (E.164 format) the additional addressing information must be considered the N-SAP without the E.164 number contained in the IDI field. However in the B-ISDN signalling system (B-ISUP User Part) the parameter devoted to carry the additional addressing information and called ATM End System Address transports for sake of simplicity the whole N-SAP.		

History

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