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Digitalno omrežje z integriranimi storitvami (ISDN) - Aplikacija informacijskih elementov: nosilna zmožnost (BC), združljivost zgornjih plasti (HCL) in združljivost spodnjih plasti (LLC) pri terminalih, ki podpirajo storitve ISDN

Integrated Services Digital Network (ISDN); Application of the Bearer Capability (BC), High Layer Compatibility (HLC) and Low Layer Compatibility (LLC) information elements by terminals supporting ISDN services

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Foreword

This ETSI Technical Report (ETR) has been produced by the Signalling Protocols and Switching (SPS) 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.

This fourth edition of ETR 018 replaces the third edition issued in January 1995.

The following modifications have been made as compared to the third edition:

- examples for the use of the File Transfer & Access Management (FTAM) teleservice have been added (see subclause 6.3.7);

- examples for the use of the Eurofile transfer teleservice have been added (see subclause 6.3.8).

Further enhancements of this ETR will (most likely) become necessary. Candidates for inclusion in a future edition are e.g.:

- an adjustment of the examples for the use of the FTAM teleservice following a possible amendment of ETS 300 403-1;

- examples to document the user signalling bearer service;

- examples to document the teleaction teleservice;

- examples to support channel aggregation as an application of the 64 kbit/s unrestricted bearer service.

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Introduction

This ETR specifies the coding of the information elements Bearer Capability (BC), High Layer Compatibility (HLC) and Low Layer Compatibility (LLC) to be used by terminals supporting the ISDN telecommunication services so far specified within ETSI and operating in the demand mode. It is based on ITU-T Recommendation Q.931 (1993) as modified by ETS 300 403-1, including its relevant annexes (B, I and J).

For each service it is specified which field values the calling user is requested to send and which field values the called user could expect to receive in a pure ISDN environment (clauses 6 and 7). Clause 8 specifies the codings to be used in the case of inter-working with non European ISDNs supporting restricted 64 kbit/s transfer capability. Furthermore, interworking with the Public Switched Telephone Network (PSTN) is also covered (subclause 9.1).

Unless otherwise stated, the use of the term "terminal" refers to customer's terminal apparatus which may be a Terminal Equipment type 1 (TE1), a Terminal Adapter (TA) together with a Terminal Equipment type 2 (TE2) or a Network Termination type 2 (NT2) as defined in ITU-T Recommendation I.411.

The terms "terminal" and "user" are used interchangeably.

The exact bit patterns correlated with the named field values can be found in the following subclauses of ETS 300 403-1:

- in subclause 4.5.5 for the Bearer capability information element;

- in subclause 4.5.17 for the High layer compatibility information element; and

- in subclause 4.5.19 for the Low layer compatibility information element.

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Generally, the information elements BC, HLC and LLC serve the following purposes:

At the calling side, the network checks that the bearer service requested by the calling user in the Bearer capability information element matches with the bearer service provided to that user by the network (see ETS 300 403-1, annex B).

At the called side, the called user performs network-to-user compatibility checking based on the content of the BC-information element, and user-to-user compatibility checking based on the content of the HLC- and LLC- information elements (see ETS 300 403-1, annex B).

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1 Scope

This ETSI Technical Report (ETR) provides supplementary information on the usage of the compatibility information elements Bearer Capability (BC), High layer Compatibility (HLC) and Low Layer Compatibility (LLC) for individual telecommunication services. It considers the telecommunications services as they are specified for public Integrated Services Digital Networks (ISDNs). It does not specify additional codings of the compatibility information elements which might be required to support the request and provision of telecommunication services by private networks.

Since some bearer services can be used to support various user applications, additional information on such applications is specified:

- in subclause 7.1 for the circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service;

- in subclause 7.2 for the circuit-mode 64 kbit/s 8 kHz structured 3,1 kHz audio bearer service.

The specific objective of this ETR is to provide guidance on the correct usage of ETS 300 403-1 [7] codepoints to the different ETSI Technical Committees or Technical Subcommittees dealing with services, ISDN terminals, Terminal Adapters (TAs) and documents on testing. This ETR shall help to assure inter-operability of terminals supporting the same telecommunication service and shall enable terminals to operate on different public ISDNs.

The typical codings specified in clause 6 should be supported by all users and networks supporting the corresponding telecommunications service. Other variants of these codings may be supported in addition, however, these variants might not provide for world-wide interoperability and might not guarantee terminal interchangeability.

The coding examples given in clause 7 are not exhaustive. They illustrate typical user applications involving bit rate adaption schemes where ETSI standardized interfaces are used.

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Clause 8 is devoted to examples showing the interworking of European ISDNs with non-European ISDNs supporting restricted 64 kbit/s transfer capability.

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Finally, clause 9 presents codings when interworking with non-ISDNs occurs.

2 References

This ETR incorporates by dated or undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications 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] ETS 300 080: "Integrated Services Digital Network (ISDN); ISDN lower layer protocols for telematic terminals".

[2] ETS 300 103 (1990): "Integrated Services Digital Network (ISDN); Support of CCITT Recommendation X.21, X.21 bis and X.20 bis based Data Terminal Equipments (DTEs) by an ISDN; Synchronous and asynchronous terminal adaption functions".

[3] ETS 300 218 (1993): "Integrated Services Digital Network (ISDN); Syntax-based Videotex lower layers protocols for ISDN packet mode (CCITT Recommendation X.31 Case A and Case B)".

[4] ETS 300 264 (1993): "Integrated Services Digital Network (ISDN); Videotelephony teleservice; Service description".

[5] ETS 300 383 (1995): "Integrated Services Digital Network (ISDN); File transfer over the ISDN; EUROFILE transfer profile".

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[6] ETS 300 388 (1995): "Integrated Services Digital Network (ISDN); File Transfer Access & Management (FTAM) over ISDN based on simple file transfer profile".

[7] ETS 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1); User-network interface layer 3 specification for basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[8] ITU-T Recommendation F.184: "Operational provisions for the international public facsimile service between subscriber stations with group 4 facsimile machines (telefax 4)".

[9] CCITT Recommendation F.200: "Teletex service".

[10] CCITT Recommendation F.220: "Service requirements unique to the processable mode number one (PM1) used within the teletex service".

[11] CCITT Recommendation F.230: "Service requirements unique to the mixed mode (MM) used within the teletex service".

[12] CCITT Recommendation T.90 (1992): "Characteristics and protocols for terminals for telematic services in ISDN".

[13] CCITT Recommendation V.110 (1992): "Support of data terminal equipments with V-Series type interfaces by an Integrated Services Digital Network (ISDN)".

[14] ITU-T Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[15] ITU-T Recommendation X.30 (1992): "Support of X.21, X.21 bis and X.20 bis based data terminal equipments (DTEs) by an Integrated Services Digital Network (ISDN)".

[16] ITU-T Recommendation X.31 (1993): "Support of packet mode terminal equipment by an ISDN".

[17] ITU-T Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".

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3 Abbreviations

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

AU	Access Unit
BC	Bearer Capability
CSPDN	Circuit Switched Public Data Network
FTAM	File Transfer Access & Management
HDLC	High Level Data Link Control
HLC	High Layer Compatibility
ISDN	Integrated Services Digital Network
LLC	Low Layer Compatibility
MSN	Multiple Subscriber Number
NIC	Network Independent Clock
NT	Network Termination
PSPDN	Packet Switched Public Data Network
PSTN	Public Switched Telephone Network
SAPI	Service Access Point Identifier
SUB	Subadressing
TA	Terminal Adapter
TE	Terminal Equipment

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4 General principles applicable to all services

For all services, the following principles apply:

a) the LLC information element is transferred transparently through an ISDN between the calling entity and the addressed entity. However, dependent on the charging principles applied, some networks may perform checks on the length of the LLC information elements;

b) the HLC information element is transferred transparently through an ISDN between the calling entity and the addressed entity. However, some networks may check its content, e.g., to associate a supplementary service to a teleservice;

c) where bearer services are specified, the HLC information element will normally not be present unless they are used to support high layer applications;

d) the coding examples consider the general case. In special terminal arrangements the user may need to rely on address information only. In these cases, the Multiple Subscriber Number (MSN) supplementary service shall be used;

e) a Terminal Equipment type 2 (TE2) together with a TA are assumed to provide the same functionality as a Terminal Equipment type 1 (TE1). Therefore, a TA should not generate and send a progress indicator when setting-up a connection. Consequently, a TA, e.g., adapting a two-wire analogue Public Switched Telephone Network (PSTN) user-network interface to the ISDN user-network interface will generate the BC and, if appropriate, the HLC and LLC information elements in accordance with the type of equipment it serves at the interface at the R reference point, namely:

Equipment connected to an interface at the R reference point	**BC-/HLC-/LLC-codepoints used at an interface at the coincident S&T reference point**		
	BC	**HLC**	**LLC**
analogue telephone	speech	telephony	
facsimile group 2/3 equipment	3,1 kHz audio	facsimile group 2/3	
voice band data equipment via modem	3,1 kHz audio		modem type

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For the presentation of the coding examples, the following conventions apply:

- octets 1 and 2 of the compatibility information elements, indicating the information element identifier and length respectively, are omitted from the considerations and therefore not shown in the examples;

- a dash instead of a field value indicates:

  a) at the calling side: this field is not included in the information element;

  b) at the called side: this field is not present;

- field values in brackets ( ) may or may not be included at the calling side and therefore not be present at the called side.

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5 Impact of interworking situations

5.1 Incoming calls from non-ISDNs

In the case of interworking with non-ISDNs, HLC and LLC information elements may be absent, and this interworking is shown with the presence of the Progress indicator information element. When this occurs, the terminal should accept the incoming call according to annex B of ETS 300 403-1 [7], i.e. it should regard the compatibility as successful if it is compatible with the included information, which as a minimum will be the Bearer capability information element.

5.2 BC and LLC application guidelines

In many cases, the same low layer information (e.g., the user rate and the rate adaption technique applied) can be coded in either the BC or the LLC information element. However, the provision of information in the one or the other information element has consequences with respect to the selection or the denial of a network provided interworking function.

The following guidelines exist for the application of BC and LLC information elements according to annex I of ETS 300 403-1 [7]:

Type I Information used only at the destination end to allow decision regarding terminal compatibility. This information, if required, shall be coded into octets (3a and) 5 to 7 of the LLC information element.

Type II Information to permit the network to select the bearer service. This information shall be coded into:

- octets 3 and 4 of the BC information element for circuit-mode traffic;
- octets 3 and 4, 6 and 7 of the BC information element for packet-mode traffic.

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Type III Information used by the addressed user to determine terminal compatibility and used by the network to facilitate interworking with other ISDNs or other dedicated networks. This information is encoded into octet 5 (including octets 5a-5d if appropriate) of the BC information element.

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These types of information can be used as follows:

Case 1 If the originating user wishes to transfer information end-to-end to ensure end user compatibility without invoking network interworking, then type I information together with type II information shall apply.

Case 2 If the originating user either requires network interworking or is willing to accept network interworking, should it be necessary in order to complete the call, then type III information together with type II information shall apply.

Consequently, if interworking with a PSTN, Circuit Switched Public Data Network (CSPDN) or the pan-European mobile cellular system is supported by the network by providing the appropriate functions (i.e. data extraction, modem pool) at the interworking unit, then those calls carrying the rate adaption information in the LLC information element may not be successfully completed. These calls will be successful instead, when the rate adaption information is included in the BC information element.

Terminals shall have the capability to determine compatibility independent of whether the compatibility information is coded in the BC information element (as type III information) or in the LLC information element (as type I information).

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6 Request and recognition of a basic telecommunication service in an ISDN environment

The examples given in this clause assume that a pure ISDN environment exists and no network-provided interworking function is selected.

Therefore, the particular user rate as well as the rate adaption technique applied are specified in the LLC information element, thus permitting compatibility decision by the destination terminal.

6.1 Request and recognition of a circuit-mode bearer service

6.1.1 Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer

6.1.1.1 Request by a calling terminal equipment

a) Bearer capability information element coding:

Octet	Information element field	Field value
3	Coding standard	CCITT standardized coding
	Information transfer capability	speech
4	Transfer mode	circuit mode
	Information transfer rate	64 kbit/s
5	User information layer 1 protocol	Recommendation G.711, A-law
6	User information layer 2 protocol	———
7	User information layer 3 protocol	———

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b) High layer compatibility information element coding:

This information element shall not be included.

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c) Low layer compatibility information element coding:

This information element is not required.