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**Network Aspects (NA);
Connectionless Broadband Data Service (CBDS)
Part 1: Overview**

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Foreword

This part of European Telecommunication Standard (ETS) 300 217 has been prepared by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

According to CCITT Recommendation I.130, the following three level structure is used to describe the characterisation of telecommunication services:

- Stage 1: is an overall service description, from the user's standpoint;
- Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1;
- Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

This ETS details the stage 1 aspects for the Connectionless Broadband Data Service (CBDS).

This part constitutes Part 1 of the 4 part ETS on the CBDS, and gives a general overview of the service.

A list of informative references, used throughout this document, is given in Annex A.

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1 Scope

This part of European Telecommunication Standard (ETS) defines the stage 1 of the Connectionless Broadband Data Service (CBDS) which can be provided by Metropolitan Area Networks (MANs) (see ETS 300 211 [6]) and an Asynchronous Transfer Mode (ATM) based network. Whilst this bearer service category is aiming primarily at Local Area Network (LAN) interconnections (see ISO/IEC DIS 8802-1 [16]), other uses are also envisaged.

This 4 part ETS defines a CBDS which is independent of the layers above. The bearer service category could be provided by any network but it is particularly suited for MANs and an ATM based network. Each Protocol Data Unit (PDU) is transferred transparently and separately without the establishment of an end-to-end connection, with no guarantee of delivery and no acknowledgement of delivery. However, the underlying network provides a highly reliable service which is reflected by the defined Quality of Service (QOS) parameters.

If certain applications require a better QOS, higher layer protocols, e.g. connection-oriented transport protocols, will perform additional functions. Since the network provides a transparent transfer of data, at least in principle, any higher layer protocol may be employed. The inherent delay of long distance communications could degrade end to end performance as seen by the user if end to end communication protocols are not adequate.

This 4 part ETS contains a stage 1 description of the CBDS, according to CCITT Recommendation I.130, which contains a general description and a list of communication attributes. However, this document goes beyond a stage 1 description where additional information seems to be required for an early implementation of the CBDS.

This part, Part 1, contains an overview of the CBDS. The description of the basic bearer service category is given in Part 2 of this ETS, ETS 300 217-2 [12]. Part 3, ETS 300 217-3 [13] defines the supplementary services. Part 4, ETS 300 217-4 [14] describes the address screening supplementary service.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative 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 ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ISO/IEC 8802-3 (1990): "Information processing systems - Local area networks - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) - access method and physical layer specifications".
- [2] ISO/IEC 8802-5 (1988): "Information processing systems - Local area networks - Part 5: Token ring access method and physical layer specifications."
- [3] IEEE 802.6 (1990): "Distributed Queue Dual Bus (DQDB) subnetwork of a metropolitan area network (MAN)".
- [4] CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".
- [5] CCITT Recommendation I.413 (1991): "B-ISDN user-network interface".
- [6] ETS 300 211 (1992): "Network Aspects (NA); Metropolitan Area Network (MAN) Principles and architecture".
- [7] CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".
- [8] CCITT Recommendation E.800 (1988): "Quality of service and dependability vocabulary".
- [9] CCITT Recommendation I.324 (1988): "ISDN network architecture".

- [10] CCITT Recommendation I.327: "B-ISDN functional architecture".
- [11] CCITT Recommendation I.230 (1988): "Definition of bearer service categories".
- [12] ETS 300 217-2 (1992): "Network Aspects (NA); Connectionless Broadband Data Service (CBDS) Part 2: Basic bearer service definition".
- [13] ETS 300 217-3 (1992): "Network Aspects (NA); Connectionless Broadband Data Service (CBDS) Part 3: Definition of supplementary services".
- [14] ETS 300 217-4 (1992): "Network Aspects (NA); Connectionless Broadband Data Service (CBDS) Part 4: Address screening supplementary service".
- [15] ETS 300 212 (1992): "Network Aspects (NA); Metropolitan Area Network (MAN) Media access control layer and physical layer specification".
- [16] ISO/IEC DIS 8802-1: "Information processing systems - Local area networks - Part 1: General introduction".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of all 4 parts of this ETS, the following definitions apply:

Access class: a subscription condition defining the maximum allowed sustained information rate across an interface at the T reference point.

Access class mechanism: functions limiting the information rate across the T reference point to enforce the access class.

Duplicated PDU: duplication of a PDU occurs if a previously received PDU is received once more across the same interface at the T reference point. This applies whether the destination address is an individual or a group address.

Duplicated PDUs ratio: the ratio of the number of duplicated PDUs to the total number of PDUs transferred in one direction between the source interface at the T reference point and the destination interface at the T reference point.

The total number of transferred PDUs, here considered, includes:

- correct PDUs;
- incorrect PDUs.

Lost and misdelivered PDUs are not considered for this definition.

$$\text{Duplicated PDU ratio} = \frac{\text{duplicated PDUs}}{\text{correct PDUs} + \text{incorrect PDUs}}$$

NOTE 1: Duplicated PDUs caused by user action such as retransmission are excluded from the duplicated PDU ratio.

Extra PDUs: includes duplicated as well as misdelivered PDUs.

Incorrect PDU: a PDU is declared to be incorrect if its content is different from the original sent as far as the parts required to be transparently transferred are concerned. PDUs which are discarded by the receiving user due to errors detected by the protocol operating across the interface at the T reference point are not considered incorrect.

Information rate: the data rate available to the user at the T reference point excluding the overhead.

Interruption: CCITT Recommendation E.800 [8], definition 4101:

"Temporary inability of a service to be provided persisting for more than a given time duration characterised by a change beyond given limits in at least one parameter essential for the service".

Lost PDU: a PDU is declared to be lost if, because of a fault of the network (or the corresponding service), it is not delivered across the intended interface at the T reference point. Lost PDUs include also both those PDUs that have to be discarded by the network due to errors detected and those PDUs that are received by the destination user but are discarded by the destination user as a result of errors detected by the protocol operating across the interface at the T reference point. PDUs not delivered as a result of conditions not being the fault of the service provider, such as non-delivery caused by supplementary services (e.g. address screening), are not considered lost. PDUs not delivered as a result of equipment outages at the destination or congestion across the interface at the T reference point at the destination are also not considered lost.

Lost PDU ratio: the ratio of the number of lost PDUs to the sum of lost PDUs and the total number of PDUs transferred in one direction between the source interface at the T reference point and destination interface at the T reference point.

The total number of transferred PDUs, here considered, includes:

- correct PDUs;
- incorrect PDUs.

Misdelivered and duplicated PDUs are not considered for this definition.

$$\text{Lost PDU ratio} = \frac{\text{lost PDUs}}{\text{correct PDUs} + \text{incorrect PDUs} + \text{lost PDUs}}$$

Maximum Information Rate (MIR): the maximum instantaneous value of the information rate during transmission.

Misdelivered PDU: a PDU is declared to be misdelivered when it is being determined that the PDU delivered across a specific interface at the T reference point was actually intended to be delivered to another interface. Whether the information contained in the PDUs is correct or incorrect is considered irrelevant for the identification of misdelivered PDUs.

Misdelivered PDU ratio: the ratio of the number of misdelivered PDUs to the total number of PDUs received across one interface at the T reference point.

The total number of received PDUs includes:

- correct PDUs;
- incorrect PDUs;
- misdelivered PDUs.

Lost and duplicated PDUs are not considered for this definition.

$$\text{Misdelivered PDU ratio} = \frac{\text{misdelivered PDUs}}{\text{correct PDUs} + \text{incorrect PDUs} + \text{misdelivered PDUs}}$$

This requirement establishes the maximum allowable inaccuracy of the routing elements of the network, including software and hardware.

Missequenced PDU: for this definition it is necessary to define when a segmented PDU is defined as has been sent or received. A PDU is considered as received when the End Of Message (EOM) cell/segment of the PDU has been received. Similarly a PDU is considered as being sent when its EOM cell/segment has been sent.

A PDU is missequenced if it is received after another PDU which was sent across the same source to the same destination interface at the T reference point at the same priority and was sent across the source interface at the T reference point after the first PDU.

Missequenced PDU ratio: is the ratio of the number of missequenced PDUs to the total number of PDUs transferred in one direction between the source interface at the T reference point and the destination interface at the T reference point.

The total number of transferred PDUs, here considered, includes:

- correct PDUs;
- incorrect PDUs.

Lost, misdelivered and duplicated PDUs are not considered for this definition.

$$\text{Missequenced PDU ratio} = \frac{\text{missequenced PDUs}}{\text{correct PDUs} + \text{incorrect PDUs}}$$

Protocol Data Unit (PDU): is a block of data which consists of all information (user data, addressing information and service parameters) related to a single, self-contained service instance.

NOTE 2: This definition covers the basic connectionless service PDU.

NOTE 3: Other terms used for the same purpose are: frame, message, datagram.

Quality of Service (QOS):

Quality of service is defined in CCITT Recommendation E.800 [8] as follows:

"The collective effect of service performances which determine the degree of satisfaction of a user of the service".

NOTE 4: The QOS is characterised by the combined aspects of service support performance, service operability performance, serviceability performance, service integrity and other factors specific for each service.

For a given service, QOS is a statement of the performance of the service as offered or specified to the customer. It is defined and measured in terms of parameters which are stated in user understandable language appropriate to the particular service concerned, and which are user verifiable. These parameters will depend upon the service definition, and upon the point at which the service is accessed by the user. Teleservice QOS parameters describe the QOS required by the user at the T reference point taking into account QOS compensation means provided in the terminals. Bearer service QOS parameters describe the QOS required from the network at the T, S or R reference points for the different services.

Receiving access class: access class referring to the traffic sent from the network to the user.

Scheduled service time: the time duration that the service provider is expected to make the service available to the users for a specific observation period.

Sending access class: access class referring to traffic sent from the user to the network.

Service: CCITT Recommendation I.112 [7], definition 201:

"That which is offered by an Administration to its customers in order to satisfy a specific telecommunication requirement".

NOTE 5: Bearer service and teleservice are types of telecommunication service. Other types of telecommunication service may be identified in future.

Service availability: is the long-term average of the ratio of aggregate time between interruptions to scheduled service time (expressed as a percentage) on a user-to-user basis.

Service availability decision parameters: a set of parameters defining the availability of the service on the basis of outage thresholds or acceptance ranges.

NOTE 6: The list of parameters with the actual values of the thresholds is for further study.

Sustained Information Rate (SIR): the long-term average of the information rate for bursty traffic.

Time between interruptions: CCITT Recommendation E.800 [8], definition 4102:

"The **time duration** between the end of one **interruption** and the beginning of the next".

Transit delay: is defined as the time between the instant when the transfer of a PDU across the source interface at the T reference point starts and the instant when the same PDU has been completely transferred across the destination interface at the T reference point.

NOTE 7: Transit delay is specified for each transfer of a PDU independently. Its specification is based on the maximum payload size.

Undetected error ratio: is the ratio of the number of incorrect PDUs to the total number of PDUs transferred in one direction between source interface at the T reference point and the destination interface at the T reference point.

The total number of transferred PDUs here considered, includes:

- correct PDUs;
- incorrect PDUs.

Lost, misdelivered and duplicated PDUs are not considered for this definition.

$$\text{Undetected error ratio} = \frac{\text{incorrect PDUs}}{\text{correct PDUs} + \text{incorrect PDUs}}$$

User: CCITT Recommendation I.112 [7], definition 401:

"A person or machine delegated by a customer to use the services and/or facilities of a telecommunication network".

3.2 Abbreviations

For the purpose of this ETS, the following abbreviations apply:

AF	Access Facility
ATM	Asynchronous Transfer Mode
CBDS	Connectionless Broadband Data Service
DA	Destination Address
DDI	Direct Dialling In
EOM	End Of Message
LAN	Local Area Network
MAN	Metropolitan Area Network
MIR	Maximum Information Rate
PDU	Protocol Data Unit
QOS	Quality of Service
SA	Source Address
SIR	Sustained Information Rate
T	T reference point
UMI	User MAN Interface
UNI	User Network Interface
USI	User Specific Interface

4 Reference configuration

Two types of network are presently identified for the provision of this service:

- MAN-technology-based networks;
- ATM based networks.

For the MAN-technology-based networks, the description of the reference configuration may be found in ETS 300 211 [6].

For the ATM based networks, the basic architectural model defined in CCITT Recommendation I.324 [9] for ISDN, is completed in the CCITT Recommendation I.327 [10]. The access reference configuration for the ATM based networks may be found in CCITT Recommendation I.413 [5].

5 Subdivision of the service description

The service can be offered by different network technologies and different interfaces. The following three interfaces apply to the service (see figure 1):

- the User MAN Interface (UMI) (see ETS 300 211 [6]);
- the User Specific Interface (USI) (see ETS 300 211 [6]);
- the User Network Interface (UNI) (see CCITT Recommendation I.413 [5]).

The service is described by attributes which apply to the service as seen at the T reference point. According to CCITT Recommendation I.230 [11] the service can be seen as one bearer service category. As shown in table 1, the bearer services that may be offered at the various interfaces have the same values of the dominant attributes.

Table 1

Attributes	UMI	USI	UNI
Information transfer mode	PDU	PDU	PDU
Information transfer rate	Variable bit rate	Variable bit rate	Variable bit rate
Information transfer capability	Unrestricted	Unrestricted	Unrestricted
Structure	PDU integrity	PDU integrity	PDU integrity

According to the values of the secondary and qualifying attributes (see CCITT Recommendation I.230 [11]), in particular the access attributes, the following individual bearer services are identified:

- individual bearer service 1, offered through the UMI and UNI interfaces. In case where UMI and UNI interfaces are interconnected, additional capabilities may be required. These capabilities are for further study;
- individual bearer services, offered through the USI.

The interworking between the defined individual bearer services will be the subject of an ETSI Technical Report (ETR), where functional profiles will be defined (see DTR/NA-53202).

According to ISO/IEC TR 10000-1, a profile defines a combination of base standards that collectively perform a specified, well defined function.

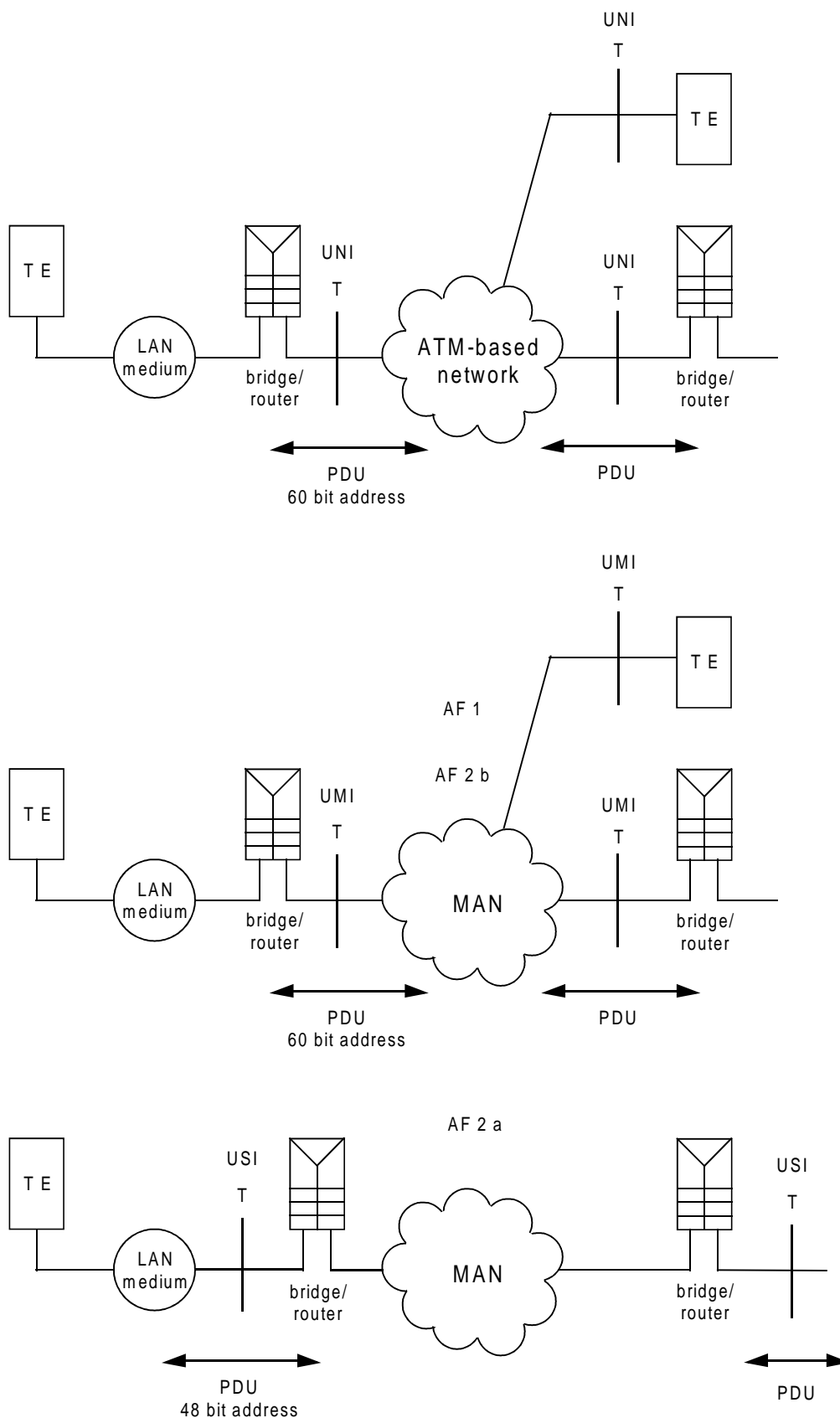


Figure 1: Location of the T reference point in case of UMI, UNI and USI

6 Addressing principles

6.1 Addressing principles for the UMI and UNI interfaces

The Source Address (SA) shall specify an individual interface at the T reference point. The Destination Address (DA) shall specify either an individual interface at the T reference point or a set of geographically distinct interfaces at the T reference point.

6.1.1 Individual/group addresses

An individual address is the address of a particular interface at the T reference point and may be used either as an SA or a DA.

A group address shall be used as a DA only.

A group address represents a set of individual (and only individual) addresses. A group address may be used as a DA but not as a SA. Group addresses are used for multicast purposes. Broadcasting is excluded.

SA validation shall be provided by the network.

PDUs with an invalid source address shall be discarded.

The source address used in a group addressed data unit may be one of the individual addresses.

6.1.2 Address type

The addresses shall be modelled according to CCITT Recommendation E.164 [4].

Several CCITT Recommendation E.164 [4] modelled numbers may be allocated to a single interface at the T reference point. These numbers shall either belong to a list of distinct or a range of sequential CCITT Recommendation E.164 [4] numbers similar to a Direct Dialling In (DDI) range.

The use of prefixes and escape codes is excluded.

A group address has the same format as an individual address, and a special code in the address type subfield (see ETS 300 212 [15]) indicates that it is a group address.

Interworking problems with other numbering schemes are for further study.

6.1.3 Allocation of addresses

Addresses are allocated to interfaces at the T reference point.

The addresses shall be administered by registration authorities:

These authorities are:

- for the assignment of the country codes: CCITT;
- for the national significant number: appropriate national authorities.

The same country codes shall be used as defined in CCITT Recommendation E.164 [4], Annex A.

6.2 Addressing principles for the USI

One USI shall be identified by only one CCITT Recommendation E.164 [4] modelled number.

The bridge or router serving the USI is responsible for the insertion of the CCITT Recommendation E.164 [4] SA in the PDUs sent toward the destination bridge or router. Further addressing mechanisms, especially concerning the DA, are for further study.

Annex A (informative): Bibliography

The following references appear for information purposes within the text of this part of ETS 300 217.

- [A1] ISO/IEC TR 10000-1/2 (1990): "Information technology: Framework and taxonomy of International Standardized Profiles": "Part 1: Framework"; "Part 2: Taxonomy of Profiles".
- [A2] CCITT Recommendation I.130 (1988): "Method for the characterisation of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [A3] DTR/NA-53202: "Complementary information to ETS 300 217".

History

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