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**Integrated Services Digital Network (ISDN);
Digital Subscriber Signalling System No. one (DSS1) protocol;
Data link layer;
Part 2: General protocol specification**

[ITU-T Recommendation Q.921 (1993), modified]

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS is an updated version of ETS 300 125 Part 2. In addition, it was enhanced to cover service aspects of the data link layer protocol for inter-exchange signalling between Private Telecommunications Network eXchanges (PTNXs) in Private Telecommunication Networks (PTNs). Annex ZC identifies the technical differences between this ETS and ETS 300 125 Part 2.

This ETS is part 2 of a multi-part standard covering the Integrated Services Digital Network (ISDN) Digital Subscriber Signalling System No. one (DSS1) data link layer specification as described below:

Part 1: "General aspects [ITU-T Recommendation Q.920 (1993), modified]";

Part 2: "General protocol specification [ITU-T Recommendation Q.921 (1993), modified]";

Part 3: "Frame relay protocol specification";

Part 4: "Protocol Implementation Conformance Statement (PICS) proforma specification for the general protocol";

Part 5: "PICS proforma specification for the frame relay protocol";

Part 6: "Test Suite Structure and Test Purposes (TSS&TP) specification for the general protocol";

Part 7: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the general protocol".

| Transposition dates | |
|---|------------------|
| Date of adoption of this ETS: | 10 November 1995 |
| Date of latest announcement of this ETS (doa): | 28 February 1996 |
| Date of latest publication of new National Standard or endorsement of this ETS (dop/e): | 31 August 1996 |
| Date of withdrawal of any conflicting National Standard (dow): | 31 August 1996 |

Endorsement notice

The text of ITU-T Recommendation Q.921 (1993) was approved by ETSI as an ETS with agreed modifications as given below.

NOTE: New or modified text is indicated using sidebars. In addition, underlining and/or strike-out are used to highlight detailed modifications where necessary.

Page 1

Add the following four clauses (Scope, Normative references, Definitions, Abbreviations) at the start of the text:

Scope

This European Telecommunication Standard (ETS) describes in general terms the link access procedure of the Digital Subscriber Signalling System No. one (DSS1) protocol when used in the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators, or in a Private Telecommunication Network (PTN), at the T reference point or the S reference point or the coincident S and T reference point (as defined in ITU-T Recommendation I.411 [15]).

Annex ZA of this ETS describes in general terms the link access procedure for use in a symmetrical application between two Private Telecommunication Network eXchanges (PTNXs) at the Q reference point (see ETS 300 475-1 [14]).

Conformance to this ETS is met by conforming to the specific protocol standards for individual applications. Therefore, no separate method of testing is provided for this ETS.

The field of application of this ETS is determined by specific protocol standards for individual applications.

Normative references

This ETS incorporates by dated and 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.

- [9] ETS 300 011 (1990): "Integrated Services Digital Network (ISDN); Primary rate user-network interface layer 1 specification and test principles".
- [10] ETS 300 012 (1990): "Integrated Services Digital Network (ISDN); Basic user-network interface layer 1 specification and test principles".
- [11] ETS 300 402-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 1: General aspects [ITU-T Recommendation Q.920 (1993), modified]".
- [12] ETS 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".
- [13] ETS 300 415 (1995): "Private Telecommunication Network (PTN); Terms and definitions".
- [14] ETS 300 475-1: "Private Telecommunication Network (PTN); Reference configuration; Part 1: Reference configuration for PTN eXchanges (PTNX) [ISO/IEC 11579-1 (1994), modified]".
- [15] ITU-T Recommendation I.411 (1993): "ISDN user network interfaces - reference configurations".

NOTE: The references listed in this ETS are a continuation of publications referenced in ITU-T Recommendation Q.921.

Definitions

For the purposes of this ETS, the following definitions apply, together with those given in the referenced publications:

Assignment Source Point (ASP): Layer management entity at the network side performing TEI management.

automatic TEI assignment: Layer management procedure between user side and network side (ASP) which associates within one interface a unique numeric value for a layer 2 terminal identity (TEI value) to a variable called TEI of a specific terminal equipment. The TEI, which is part of the DLCI, is selected by the ASP.

broadcast data link connection; broadcast connection: A connection with the capability to support more than two connection-endpoints (see [X.200 § 5.3.1.4] multi-endpoint-connection).

confirm (primitive): [X.210 § 3.2.7] A primitive issued by a service-provider to complete, at a particular service-access-point, some procedure previously invoked by a request at that service-access-point.

confirmed service: [X.210 § 3.2.12] A service which results in an explicit confirmation from the service-provider. There is not necessarily any relationship to a response from the peer service user.

connection: [X.200 § 5.3.1.2] An association established by the "service provider" layer between two or more "service user" entities for the transfer of data.

connection-endpoint: [X.200 § 5.3.1.3] A terminator at one end of a connection within a service-access-point.

Connection Endpoint Identifier (CEI): [X.200 § 5.4.1.5] An identifier of a connection-endpoint which can be used to identify the corresponding connection at a service-access-point.

Connection Endpoint Suffix (CES): [X.200 § 5.4.1.6] A part of a connection-endpoint-identifier which is unique within the scope of a service-access-point.

Connection Management Entity (CME): An entity for the purpose of management of resources that have impact on an individual data link connection.

D-channel: [I.412] The D-channel represents the portion of the information-carrying capacity of the ISDN user-network interface primarily intended to carry access signalling information. In addition, a D-channel may also be used to carry other information such as packet-switched data, teleaction information, etc.

data link connection: [X.212] An association established by a data link layer between two or more data link service users for the transfer of data, which provides explicit identification of a set of data link data transmissions and agreement concerning the data link transmission services to be provided for the set.

NOTE: This definition clarifies the definition given in CCITT Recommendation X.200.

Data Link Connection Identifier (DLCI): An address conveyed in a PDU which indicates the source and destination of an intended instance of communication at the data link layer.

function: [X.200 § 5.2.1.7] A part of the activity of entities.

indication (primitive): [X.210 § 3.2.5] A primitive issued by a service-provider either:

- a) to invoke some procedure; or
- b) to indicate that a procedure has been invoked by the service-user at the peer service-access-point.

interface-control-information: [X.200] Information transferred between a "service user" entity and a "service provider" entity to co-ordinate their joint operation.

interface-data: [X.200] Information transferred from a "service user" entity to a "service provider" entity for transmission to a correspondent "service user" entity over a connection, or conversely, information transferred from a "service provider" entity to a "service user" entity after being received over a connection from a correspondent "service user" entity.

Interface Data Unit (IDU): [X.200] The unit of information transferred across a service-access-point between a "service user" entity and a "service provider" entity in a single interaction. Each interface-data-unit contains interface-control-information and may also contain the whole or part of a service-data-unit.

Integrated Services Digital Network (ISDN): [I.112 § 2.3 definition 308] A network that provides or supports a range of different telecommunication services and provides digital connections between user-network interfaces.

layer: [X.200 § 5.2.1.2] A subdivision of the system architecture, constituted by subsystems of the same rank.

layer management: [X.200 § 8.1.6] Functions related to the management of the layer partly performed in the layer itself according to the protocol of the layer (activities such as activation and error control) and partly performed as a subset of systems management.

Layer Management Entity (LME): An entity for the purpose of management of resources that have layer-wide impact.

Link Access Procedure (LAP): Class of a procedure based on HDLC elements of procedures for use on the link layer.

(N)-entity: [X.200 § 5.2.1.11] An active element within a (N)-subsystem.

(N)-subsystem: [X.200 § 5.2.1.1] An element in a hierarchical division of an open system which interacts directly only with elements in the next higher division or the next lower division of that open system.

network side: Location in relation to the user-network interface indicating that the context to which this term refers is at the network side of the user-network interface.

network side system management entity: An entity for the purpose of management communications at the network side of the user-network interface.

non-automatic TEI assignment: Layer management local interaction between layer management entity and data link layer entity at the user side which associates within one interface a numeric value for a layer 2 terminal identity (TEI value) to a variable called TEI of a specific terminal equipment. The TEI, which is part of the DLCI, is selected by the user.

persistent deactivation: The term "persistent layer 1 deactivation" defines condition which shall be satisfied before the data link layer assumes layer 1 deactivation and takes the actions according to the protocol specification. Persistency is achieved if:

- a) the deactivation is an intended action within layer 1 caused by the functional block responsible for deactivation of the layer 1; or
- b) layer 1 lost connectivity during a time interval, the value of which is outside the scope of this ETS, but which should be defined for each specific transmission facility.

point-to-point data link connection; point-to-point connection: A connection with two connection-endpoints.

Private Telecommunication Network (PTN); private network: [ETS 300 415 [13] subclause 4.3].

Private Telecommunication Network eXchange (PTNX): [ETS 300 415 [13] subclause 4.4].

protocol: [X.200 § 5.2.1.9] A set of rules and formats (semantic and syntactic) which determines the communication behaviour of entities in the performance of functions.

Protocol Data Unit (PDU): [X.200 § 5.6.1.3] A unit of data specified in a protocol and consisting of protocol-control-information and possibly user-data.

Protocol Control Information (PCI): [X.200 § 5.6.1.1] Information exchanged between entities using a connection (provided by the next lower layer), to co-ordinate their joint operation.

reference point: [I.411 § 2.3] Conceptual point dividing set of functions which form functional groups. In a specific access arrangement, a reference point may correspond to a physical interface between pieces of equipment, or there may not be any physical interface corresponding to the reference point. Physical interfaces which do not correspond to a reference point (e.g. transmission link interfaces) will not be the subject of ISDN user-network interface Recommendations.

request (primitive): [X.210 § 3.2.4] A primitive issued by a service-user to invoke some procedure.

response (primitive): [X.210 § 3.2.6] A primitive issued by a service-user to complete, at a particular service-access-point, some procedure previously invoked by an indication at that service-access-point.

service ("layer" service): [X.200 § 5.2.1.5] A capability of the providing layer and the layers beneath it, which is provided to "service user" entities at the boundary between the "service provider" layer and the "service user" layer.

Service Access Point (SAP): [X.200 § 5.2.1.8] The point at which services are provided by a "service provider" entity to a "service user" entity.

Service Data Unit (SDU): [X.200 § 5.6.1.4] An amount of interface-data whose identity is preserved from one end of a connection to the other.

service-primitive; primitive: [X.210 § 3.2.3] An abstract, implementation independent interaction between a service-user and the service-provider.

service-provider: [X.210 § 3.2.2] An abstract machine which models the behaviour of the totality of the entities providing the service, as viewed by the user.

service-user: [X.210 § 3.2.1] An abstract representation of the totality of those entities in a single system that make use of a service through a single access point.

system management: [X.200 § 8.1.4] Function in the Application Layer related to the management of various system resources and their status across all layers of the system architecture.

system management entity: [X.200 § 8.1.5] An entity for the purpose of systems-management communications.

Terminal Endpoint Identifier (TEI): Portion of a DLCI associated with one (point-to-point data link) or more than one (broadcast data link) terminal equipment.

unconfirmed service: [X.210 § 3.2.11] A service which does not result in an explicit confirmation from the service-provider.

user-data: [X.200 § 5.6.1.2] The data transferred between "service provider" entities on behalf of the "service user" entities for whom "service provider" entities are providing services.

user side: Location in relation to the user-network interface indicating that the context to which this term refers is at the user side of the user-network interface.

user side system management entity: An entity for the purpose of management communications at the user side of the user-network interface.

Abbreviations

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

| | |
|-------|--|
| ACK | ACKnowledgement |
| Ai | Action indicator |
| ASP | Assignment Source Point |
| C/R | Command/Response field bit |
| CEI | Connection Endpoint Identifier |
| CES | Connection Endpoint Suffix |
| CME | Connection Management Entity |
| DISC | DISConnect |
| DL- | communication between layer 3 and Data Link layer |
| DLCI | Data Link Connection Identifier |
| DM | Disconnected Mode |
| EA | Extended Address field bit |
| ERR | ERRor |
| ET | Exchange Termination |
| FCS | Frame Check Sequence |
| FRMR | FRaMe Reject |
| HDLC | High-level Data Link Control procedures |
| I | Information |
| ID | IDentity |
| IDU | Interface Data Unit |
| ISDN | Integrated Services Digital Network |
| k | Maximum number of outstanding frames (window size) |
| L1 | Layer 1 |
| L2 | Layer 2 |
| L3 | Layer 3 |
| LAP | Link Access Procedure |
| LAPB | Link Access Procedure - Balanced |
| LAPD | Link Access Procedure on the D-channel |
| LME | Layer Management Entity |
| M | Modifier function bit |
| MDL- | communication between layer Management and Data Link layer |
| MPH- | communication between system Management and PHysical layer |
| NT2 | Network Termination 2 |
| OSI | Open System Interconnection |
| PCI | Protocol Control Information |
| PDU | Protocol Data Unit |
| P/F | Poll/Final bit |
| PI | Parameter Identifier |
| PH- | communication between data link layer and PHysical layer |
| PL | Parameter Length |
| PTN | Private Telecommunication Network |
| PTNX | Private Telecommunication Network eXchange |
| PV | Parameter Value |
| RC | Retransmission Counter |
| REC | RECEiver |
| REJ | REJect |
| Ri | Reference number |
| RNR | Receive Not Ready |
| RR | Receive Ready |
| RX | Receive |
| S | Supervisory |
| S | Supervisory function bit |
| SABME | Set Asynchronous Balanced Mode Extended |
| SAP | Service Access Point |
| SAPI | Service Access Point Identifier |
| SDL | Specification and Description Language |
| SDU | Service Data Unit |
| TE | Terminal Equipment |
| TEI | Terminal Endpoint Identifier |

| | |
|------|----------------------------|
| TX | Transmit |
| U | Unnumbered |
| UA | Unnumbered Acknowledgement |
| UI | Unnumbered Information |
| V(S) | Send state Variable |
| V(A) | Acknowledge state Variable |
| V(R) | Receive state Variable |
| N(S) | Send sequence Number |
| N(R) | Receive sequence Number |
| XID | eXchange IDentification |

Throughout the text of ITU-T Recommendation Q.921

Replace references as shown in the following table.

| Reference in ITU-T Recommendation Q.921 | Modified reference |
|---|--|
| ITU-T Recommendation I.430 [5] | ETS 300 012 [10] |
| ITU-T Recommendation I.431 [6] | ETS 300 011 [9] |
| ITU-T Recommendation Q.920 [1] | ITU-T Recommendation Q.920 as modified by ETS 300 402-1 [11] |
| ITU-T Recommendation Q.931 [3] | ITU-T Recommendation Q.931 as modified by ETS 300 403-1 [12] |

Page 5, clause 1, last paragraph

Delete the last paragraph referring to abstract test suites:

~~The abstract test suites for testing conformance to this Recommendation are contained in Recommendation Q.921-bis [4].~~

Page 1, subclause 2.3, second paragraph

Insert after the second paragraph referring to the support of a LAPB data link connection within the D-channel:

Networks conforming to this ETS do not support the LAPB data link connection within the D-channel.

Page 3, subclause 2.7, last two paragraphs

The last two paragraphs have the status of notes. As a consequence, replace the last two paragraphs by:

NOTE 1: As a typical implementation at the transmitter, the initial content of the register of the device computing the remainder of the division is preset to all 1s and is then modified by division by the generator polynomial (as described above) on the address, control and information fields; the ones complement of the resulting remainder is transmitted as the 16-bit FCS.

NOTE 2: As a typical implementation at the receiver, the initial content of the register of the device computing the remainder is preset to all 1s. The final remainder, after multiplication by x^{16} and then division (modulo 2) by the generator polynomial $x^{16} + x^{12} + x^5 + 1$ of the serial incoming protected bits and the FCS, will be 0001 1101 0000 1111 (x^{15} through x^0 , respectively) in the absence of transmission errors.

Page 5, subclause 2.9, item b)

Replace item b) and add a note:

- b) has fewer than six octets between flags of frames that contain sequence numbers (see note) and fewer than five octets between flags of frames that do not contain sequence numbers, or

NOTE: The order of checking the content of the control field, and frame formats for compliance with the specification, are an implementation matter. Therefore, a S-format with two octet address field and modulo 8 sequence number format can be identified to be an invalid frame according to subclause 2.9 item b), or to be an undefined control field according to subclause 3.6.1. Either of these two verdicts is in compliance with this ETS.

Page 9, table 2/Q.921

Replace table 2/Q.921 by:

| SAPI value | Related layer or layer management entity |
|------------|--|
| 0 | Call control procedures |
| 1-11 | Reserved for future standardization |
| 12 | Connectionless network applications |
| 13-15 | Reserved for future standardization |
| 16 | Packet communication conforming to X.25 level 3 procedures |
| 17-31 | Reserved for future standardization |
| 32-62 | Not available for Q.921 |
| 63 | Layer 2 management procedures |

Page 10, table 5/Q.921, note

Replace the note in table 5/Q.921 by:

NOTE: According to subclause 5.4.2.2, European networks do not support automatic negotiation of data link layer parameter values, thus XID is associated with an application not supported. Consequently, the XID frame shall be discarded and no action shall be taken as a result of that frame, according to subclause 3.6.1.

Page 11, subclause 3.6.7, second paragraph

Add after the second paragraph:

The optional procedure for the retransmission of an REJ response frame is not used by networks conforming to this ETS.

Subclause 4.1.1, table 6/Q.921

Replace table 6/Q.921 by:

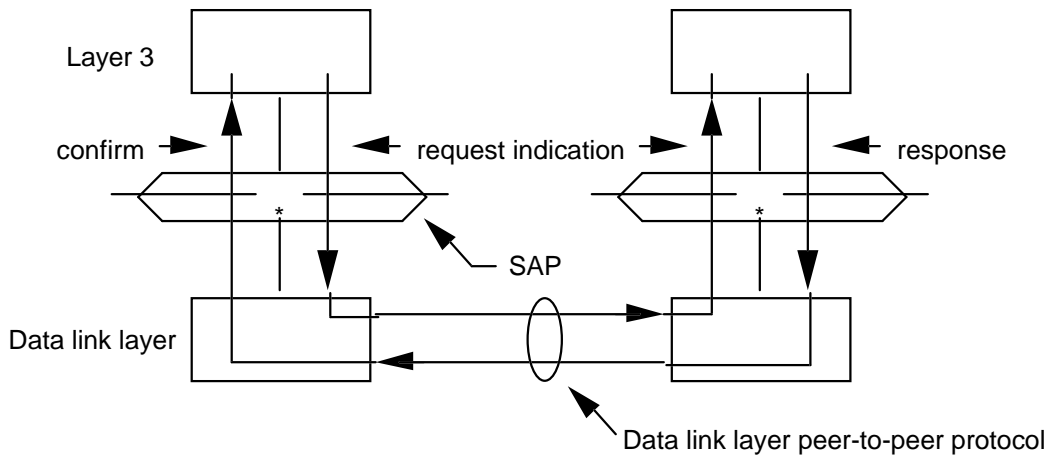
| Generic name | Type | | | | Parameters | | Parameter data contents (note 1) |
|---|---------|------------|----------|---------|--------------------|----------------|---|
| | Request | Indication | Response | Confirm | Priority indicator | Parameter data | |
| L3 <---> L2 | | | | | | | |
| DL-ESTABLISH | u + n | u + n | - | u + n | - | - | - |
| DL-RELEASE | u + n | u + n | - | u + n | - | - | - |
| DL-DATA | u + n | u + n | - | - | - | X | Layer 3 PDU (peer-to-peer message) |
| DL-UNIT DATA | u + n | u + n | - | - | - | X | Layer 3 PDU (peer-to-peer message) |
| M <---> L2 | | | | | | | |
| MDL-ASSIGN | u + n | u | - | - | - | X | TEI value, CES (note 2) |
| MDL-REMOVE | u + n | - | - | - | - | X | TEI value, CES |
| MDL-ERROR | - | u + n | u | - | - | X | Reason for error message |
| MDL-UNIT DATA | u + n | u + n | - | - | - | X | Layer management PDU (peer-to-peer message) |
| L2 <---> L1 | | | | | | | |
| PH-DATA | u + n | u + n | - | - | X (note 3) | X | Data link layer PDU (peer-to-peer frame) |
| PH-ACTIVATE | u + n | u + n | - | - | - (note 4) | - | - |
| PH-DEACTIVATE | - | u + n | - | - | - | - | - |
| M <---> L1 | | | | | | | |
| MPH-ACTIVATE (note 5) | - | u + n | - | - | - | - | - |
| MPH-DEACTIVATE (note 5) | n | u + n | - | - | - | - | - |
| MPH-INFORMATION | - | u (note 6) | - | - | - | X | Connected/disconnected |
| L3 <---> L2 := Layer 3/data link layer boundary L2 <---> L1 := Data link layer/physical layer boundary M <---> L2 := Management entity/data link layer boundary M <---> L1 := Management entity/physical layer boundary u := Exists at user side n := Exists at network side u + n := Exists at both user and network side X := Exists - := Does not exist | | | | | | | |
| NOTE 1: Although not shown below, the CES is implicitly associated with each L3-L2 primitive, indicating the applicable connection endpoint. NOTE 2: TEI value is included only in the MDL-ASSIGN.request. NOTE 3: The parameter "Priority indicator" only relates to the request type. NOTE 4: The PH-ACTIVATE.indication primitive is also used as confirm. NOTE 5: The MPH-ACTIVATE and MPH-DEACTIVATE primitive are confined to the usage defined in annex G/Appendix III. Other uses are outside the scope of this ETS. NOTE 6: Only applies to the basic access. | | | | | | | |

Page 16, subclause 4.1.1.9

Delete subclause 4.1.1.9. The MDL-XID primitives are not applicable to networks conforming to this ETS.

Page 17, figure 7/Q.921

In figure 7/Q.921 there is an editorial error. The arrow for the response primitive points in the wrong direction. The correct relationship of the primitive types to layer 3 and the data link layer is illustrated in the figure below.



Page 17, subclause 4.1.3.1

Replace the text of subclause 4.1.3.1 by:

Since several SAPs may exist on the network side or user side, SDUs sent across one SAP may concur with those sent across other SAPs for the physical resources available for information transfer. Within the data link layer, SDUs associated with SAPI = 0 shall have a high priority, and SDUs associated with other SAPIs shall have a low priority. This priority shall be respected within the data link layer and shall be indicated to the physical layer by means of the priority indicator.

The priority indicator shall take the value "1" for high priority and the value "2" for low priority.

NOTE: Within a user side in a point-to-multipoint configuration, this priority indicator is used at the physical layer to influence the contention resolution between different terminals. In all other cases, the effect is local to any queues that may be provided.

Page 18, subclause 4.2.1, second paragraph

Replace the second paragraph:

In the scope of this ETS the interactions between layer 3 and the data link layer, and those between the data link layer and the physical layer are specified.

Page 18

Add a new subclause 4.2.3:

4.2.3 Data link layer - physical layer interactions

The interactions across the boundary between the data link layer and the physical layer allow:

- a) The data link layer at either side of the user-network interface to invoke the activation of the physical layer connection making use of the PH-ACTIVATE.request primitive. At the user side of the basic access, no PH-ACTIVATE.request primitive shall be issued, if the terminal is not in the connected status as indicated by the MPH-INFORMATION.indication primitive with the parameter "disconnected". In all other cases, the status is permanently connected. The successful activation is confirmed by the PH-ACTIVATE.indication primitive. An unsuccessful activation is indicated by the PH-DEACTIVATE.indication primitive.

- b) The physical layer to indicate to the data link layer that the physical layer connection has been activated, by means of the PH-ACTIVATE.indication primitive.
- c) The physical layer to indicate to the data link layer that the physical layer connection has been deactivated, by means of the PH-DEACTIVATE.indication primitive.
- d) The data link layer at either side of the user-network interface to request the physical layer in the activated state the transmission of the SDU passed from the data link layer to the physical layer by means of a PH-DATA.request primitive. The PH-DATA.request primitive includes a priority indicator with the values "high" or "low", representing two priority classes. The two priority classes apply to the physical layer and allow the data link layer to control the priority for the processing of SDUs within the physical layer. The priority mechanism makes provision that no low priority SDU is transmitted on the D-channel as long as there are high priority SDUs pending transmission within the physical layer.
- e) The physical layer in the activated state to deliver to the data link layer a received SDU This SDU is passed from the physical layer to the data link layer by means of a PH-DATA.indication primitive.

The interactions described in a), b) and c) above are related to physical connection status control while d) and e) refer to the information transfer on an activated physical connection i.e. on a activated D-channel.

The data link layer shall make provision that activation of the physical layer connection is invoked making use of the PH-ACTIVATE.request primitive when a data link layer connection is to be established and the physical layer is in the deactivated state, otherwise no PH-ACTIVATE.request primitive shall be issued. The data link layer shall not issue a PH-DATA.request primitive, if the physical layer connection is not in the activated state.

Page 22, clause 5, note

The note contains a mandatory requirement of this ETS. As a consequence, replace the note by:

A FRMR-response shall not be generated by a data link layer entity; however, on receipt of this frame actions according to subclause 5.8.6 of this ETS shall be taken.

Page 22, table 7/Q.921, note

Delete the note.

Page 22, subclause 5.2.1

Replace the complete text of subclause 5.2.1 by:

The procedures which apply to the transmission of information in unacknowledged operation are defined in subclauses 5.2.2 and 5.2.3.

No data link layer error recovery procedures are defined for unacknowledged operation.

If an implementation conforming to this ETS is used only in conjunction with a defined set of applications which do not use the unacknowledged information transfer service, and an open interface is not provided to user applications, e.g. for later inclusion of a new application, then, as an implementation option:

- a) the layer 2 protocol entity supporting any particular user application which does not use unacknowledged information transfer service, does not need to implement the generation of the UI frame, and may treat received UI frames as frames associated with an application not implemented according to subclause 3.6.1;
- b) the layer 2 protocol entity supporting layer 2 management (broadcast data link procedures) does not need to be implemented, if no peer-to-peer layer management is provided (see annex A).

Page 23, subclause 5.2.2, sixth and seventh paragraph

Replace the sixth paragraph "In the case of persistent layer 1 deactivation ..." and seventh paragraph "At the network side ..." by:

In the case of persistent layer 1 deactivation which is indicated by the PH-DEACTIVATE.indication primitive, the data link layer shall discard all UI transmission queues.

NOTE: At the network side, the deactivation is under control of the system management entity which provides that the PH-DEACTIVATE.indication primitive is issued only, if persistent deactivation has occurred. At the user side, the PH-DEACTIVATE.indication primitive indicates that the physical layer detected persistent deactivation.

Page 23, subclause 5.3.1, eighth paragraph

Replace the eighth paragraph "Typically, one TEI value (...) TEI and SAPI values." by:

Typically, one TEI value could be used by the user equipment in association with all SAPs supported (for example, a data link layer entity which has been assigned a TEI value could use that value for all SAPs which it supports).

If the user equipment supports a packet-mode terminal bearer capability on the D-channel, it shall associate a given TEI for a point-to-point data link connection with both, the SAP for support of call control procedures (SAPI = 0), and the SAP for support of packet communication conforming to X.25 level 3 procedures (SAPI = 16).

If required, a number of TEI values can be requested by multiple use of the procedures defined in subclause 5.3.2. It shall be the responsibility of the user to maintain the association between TEI and SAPI values.

Pages 24 to 26, subclause 5.3.2

Add the following item d) to the three bullet lists containing the elements of the Identity request, Identity assigned and Identity denied messages, respectively:

- d) Layer management entity identifier.

Page 27, subclause 5.3.3.2

Add the following item c) to the bullet list containing the elements of the Identity check request message:

- c) Layer management entity identifier.

Add the following item d) to the bullet list containing the elements of the Identity check response message:

- d) Layer management entity identifier.

Page 28, subclause 5.3.4

Replace the complete text of subclause 5.3.4 by:

When the network side layer management entity determines that the removal of a TEI value (see subclause 5.3.4.2) is necessary, the ASP shall transmit a message containing the following elements and issue an MDL-REMOVE.request primitive:

- a) message type = Identity remove; and
- b) TEI value which is to be removed, as indicated in the Ai field (the value 127 indicates that all user equipments are requested to remove their TEI values; otherwise, the specific TEI value is requested to be removed); and

- c) Layer management entity identifier.

The Identity remove message shall be sent twice in succession, to overcome possible message loss.

When the user side layer management entity determines that the removal of a TEI value is necessary (see subclause 5.3.4.2), it shall instruct the data link layer entity to enter the TEI-unassigned state, using the MDL-REMOVE.request primitive.

Further action to be taken shall be:

- a) if automatic TEI values apply, initiation of automatic TEI assignment for a new TEI value; or
- b) if non-automatic TEI values apply, notification to the equipment user for the need for corrective action.

NOTE: In point-to-point configurations, unless there exists a pre-arrangement between the user side and the network side for the TEI value to be used, the user side initiates the link layer establishment procedures in order to allow the network side to offer calls.

Page 29, subclause 5.3.4.2

Replace the complete text of subclause 5.3.4.2 by:

At the user equipment, automatic TEI values shall be removed under the following conditions:

- a) on request from the ASP by an Identity remove message;
- b) on receipt of an MPH-INFORMATION.indication (disconnected) primitive; or
- c) on receipt of an Identity assigned message containing a TEI value in the Ai field, depending upon whether or not an Identity request message is outstanding. If an Identity request message is outstanding and the TEI received in the Ai field is already in use within the user equipment (see subclause 5.3.2), then the user equipment shall either remove the TEI value or invoke the TEI Identity verify procedures. If an Identity request message is not outstanding, then the user equipment shall either do nothing or check if the TEI received in the Ai field is already in use within the user equipment. If the TEI is in use, the user equipment shall either remove the TEI value or invoke the TEI Identity verify procedure.

In addition to the conditions identified above, on receipt of an MDL-ERROR.indication primitive indicating that the data link layer entity has assumed possible duplicate assignment of a TEI value, the user side equipment shall:

- either remove the concerned TEI value, as the preferred action; or
- request a TEI check procedure by the transmission of an Identity verify request message and proceed according to subclause 5.3.5.

At the user equipment, non-automatic TEI values can be removed on request from the ASP by an Identity remove message. On receipt of an MDL-ERROR.indication primitive indicating that the data link layer entity has assumed possible duplicate assignment of a TEI value, the concerned TEI can be removed in preference to requesting a TEI check procedure by the transmission of an Identity verify request message. If the Identity verify option is chosen, the user equipment shall proceed according to subclause 5.3.5. When the TEI value is removed, an appropriate indication shall be made to the user.

At the network side, automatic TEI values should be removed under the following conditions:

- a) following a TEI audit procedure showing that a TEI value is no longer in use;
- b) following a TEI audit procedure showing that duplicate TEI assignment has occurred; or

- c) on receipt of an MDL-ERROR.indication primitive indicating a possible duplicate TEI assignment, of which confirmation can be requested by the invocation of the TEI check procedures. If the TEI check procedure was invoked, the network side shall proceed according to subclause 5.3.3 in order to evaluate if the TEI value indicated in the MDL-ERROR.indication is "free", "single" or "duplicate". The appropriate action for the verdict "free" is remove TEI, for "duplicate" it is remove TEI locally and initiate TEI removal procedures while for "single" no action is taken.

At the network side, non-automatic TEI values should be removed under the following conditions:

- a) following a TEI audit procedure showing that duplicate TEI assignment has occurred; or
- b) on receipt of an MDL-ERROR.indication primitive indicating a possible duplicate TEI assignment, of which confirmation can be requested by the invocation of the TEI check procedures. If the TEI check procedure was invoked, the network side shall proceed according to subclause 5.3.3 in order to evaluate if the TEI value indicated in the MDL-ERROR.indication is "free", "single" or "duplicate". The appropriate action for the verdict "free" is remove TEI, for "duplicate" it is remove TEI locally and initiate TEI removal procedures while for "single" no action is taken.

Page 29, subclause 5.3.5.2

Add the following item d) to the bullet lists containing the elements of the Identity verify request message:

- d) Layer management entity identifier.

Page 32, subclause 5.4.2.2

Add at the end of the subclause:

Automatic negotiation of data link layer parameter values is not supported by networks conforming to this ETS.

Page 34, subclause 5.5.3.1, second paragraph

Replace the second paragraph by:

When layer 3 determines to request termination of the multiple frame operation, it shall use the DL-RELEASE.request primitive.

Subclause 5.5.3.1, last paragraph

Replace the last paragraph by:

In the case of persistent layer 1 deactivation which is indicated by the PH-DEACTIVATE.indication primitive, the data link layer entity shall discard all I queues and deliver to layer 3 a DL-RELEASE.confirm primitive if a DL-RELEASE.request primitive is outstanding, or otherwise a DL-RELEASE.indication primitive.

NOTE: At the network side, the deactivation is under control of the system management entity which provides that the PH-DEACTIVATE.indication primitive is issued only, if persistent deactivation has occurred. At the user side, the PH-DEACTIVATE.indication primitive indicates that the physical layer detected persistent deactivation.

Page 41, subclause 5.8.1

Add at the end of the subclause:

This additional procedure for the retransmission of an REJ response frame as described in appendix I is not supported by networks conforming to this ETS.

Page 44, subclause 5.9.8, first paragraph, first sentence

Modify the first sentence as follows:

Timer T203 represents the maximum time allowed in the multiple-frame established state without frames being exchanged.

Page 44

Add a new subclause 5.9.9:

5.9.9 Layer 2 response time

The maximum time between receipt of an incoming frame by a TE and the generation of an immediately required response by that TE shall not exceed:

- 500 ms for TEs operating as described in annex A;
- 200 ms for TEs not operating as described in annex A.

NOTE: This limit applies only under test conditions as described in TBR 3 and TBR 4. In conditions of actual use, the layer 2 response time may be greater (but less than T200), because of queuing of outgoing frames and contention for access to the D-channel.

Page 44, subclause 5.10.1

Replace the complete text of subclause 5.10.1 by:

The procedural elements defined in clause 5 allow for the supervision of the data link layer resource. This subclause describes procedures which may be used to provide this supervision function. The use of this function is mandatory for network side data link layer entities conforming to this ETS but optional for a user side data link layer entity.

Page 45, table 10/Q.921

Replace table 10/Q.921 by:

| Parameter | Point-to-point data link procedure on D-channel at 16 kbit/s | | Point-to-point data link procedure on D-channel at 64 kbit/s | | TEI management procedure (SAPI = 63) | |
|-----------|--|---|--|---|--------------------------------------|----------------|
| | Signalling (SAPI = 0) | Packet communication (SAPI = 16) or Connection-less network application (SAPI = 12) | Signalling (SAPI = 0) | Packet communication (SAPI = 16) or Connection-less network application (SAPI = 12) | User side | ASP |
| k | 1 | 3 | 7 | 7 | not applicable | not applicable |
| T200 | 1 s | 1 s | 1 s | 1 s | not applicable | not applicable |
| T201 | not applicable | not applicable | not applicable | not applicable | not applicable | 1 s |
| T202 | not applicable | not applicable | not applicable | not applicable | 2 s | not applicable |
| T203 | 10 s | 10 s | 10 s | 10 s | not applicable | not applicable |
| N200 | 3 | 3 | 3 | 3 | not applicable | not applicable |
| N201 | 260 | 260 | 260 | 260 | not applicable | not applicable |
| N202 | not applicable | not applicable | not applicable | not applicable | 3 | not applicable |

Page 46, annex A

Annex A has the status of a normative annex.

Replace the complete text of annex A by:

In certain applications it may be advantageous to have a single point-to-point signalling connection at layer 3. This implementation option uses the value 0 for the TEI. Use of the value 0 in such applications does not preclude using that value in other applications or networks.

In ISDNs conforming to this ETS, for both, user and network, an alternative arrangement (subject to agreement between network and user) is permitted for point-to-point configurations used for signalling (SAP identified by the SAPI value 0) on a single point-to-point data link connection. If in this point-to-point signalling configuration, a single TEI value is in use for all SAPs implemented, the following requirements are defined:

- layer 2 management procedures according to subclause 5.3 shall not be used;
- the value 0 shall be used for the TEI;
- two peer-to-peer layer 3 signalling entities shall communicate over a single point-to-point data link connection within the SAP identified by the SAPI value 0, making use of the acknowledged information transfer service provided by layer 2;
- any message associated with TEI administration procedures, if received (see also subclause 5.2.1), shall be discarded and no action shall be taken as a result of the receipt of that message.

Page 47, annex B

Annex B has the status of a normative annex.

Page 47, clause B.1, first paragraph

Replace the first paragraph by:

The purpose of this annex is to provide an SDL representation of the point-to-point procedures of the data link layer. This representation does not describe all of the possible actions of the data link layer entity, as a non-partitioned representation was selected in order to minimize its complexity. The SDL representation does not therefore constrain implementations from exploiting the full scope of the procedures as presented within the text of this ETS.

Pages 68 and 77, figures B-7/Q.921 (sheet 8 of 10) and B-8/Q.921 (sheet 7 of 9)

Add the following note 3 to figures B-7/Q.921 (sheet 8 of 10) and B-8/Q.921 (sheet 7 of 9), respectively:

NOTE 3: The optional procedure for the retransmission of an REJ response frame as described in appendix I is not supported by networks conforming to this ETS.

Page 85, annex C

Annex C has the status of a normative annex.

Page 86, annex D

Annex D has the status of a normative annex.

Page 148, annex E

Delete annex E. It is substituted by another part of this ETS.

Page 157, appendix I

Delete appendix I. It is not applicable to this ETS.

Page 158, appendix II

Appendix II has the status of an informative annex.

Page 160, appendix III

Appendix III has the status of an informative annex.

Page 160, clause III.1

Replace the text of clause III.1 by:

This appendix provides one example of a deactivation procedure which optionally may be used by the network side system management to control deactivation of the user-network interface at reference point S or T. Figure III-1/Q.921 provides a conceptual model of the interactions which are required for this deactivation procedure.

Page 166, appendix IV

Appendix IV has the status of an informative annex.

Page 166, clause IV.2

Delete clause IV.2. It is not applicable to this ETS.

Annex ZA (normative): Inter-exchange signalling data link layer protocol in Private Telecommunication Networks (PTNs) - Applicability and additions to frame structure, elements of procedures, formats of fields, elements for layer to layer communication, peer-to-peer procedures to accommodate PTN inter-exchange requirements

ZA.1 Frame structure for peer-to-peer communication

ZA.1.1 General

Subclause 2.1 shall apply.

ZA.1.2 Flag sequence

Subclause 2.2 shall apply.

ZA.1.3 Address field

The address field shall consist of two octets as illustrated in figure 1/Q.921. The format of the address field is defined in subclause ZA.2.2.

Networks conforming to this ETS do not support the LAPB data link connection within the D-channel.

ZA.1.4 Control field

Subclause 2.4 shall apply.

ZA.1.5 Information field

Subclause 2.5 shall apply.

ZA.1.6 Transparency

Subclause 2.6 shall apply.

ZA.1.7 Frame Check Sequence (FCS) field

Subclause 2.7 shall apply with the changes as given above.

ZA.1.8 Format convention

Subclause 2.8 and its subclauses shall apply.

ZA.1.9 Invalid frames

Subclause 2.9 shall apply.

ZA.1.10 Frame abort

Subclause 2.10 shall apply.

ZA.2 Elements of procedures and formats of fields for data link layer peer-to-peer communication

ZA.2.1 General

Subclause 3.1 shall apply.

ZA.2.2 Address field format

Subclause 3.2 shall apply.

ZA.2.3 Address field variables

ZA.2.3.1 Address field Extension Bit (EA)

Subclause 3.3.1 shall apply.

ZA.2.3.2 Command Response field bit (C/R)

The C/R bit identifies a frame as either a command or response. In the case of the interconnection of two PTNXs, the setting of the C/R bit for a particular data link depends on the assignment of "master" and "slave" sides of the inter-PTNX signalling channel. The coding of the C/R bit is shown in table ZA.1 below.

Table ZA.1: C/R field bit usage

| Command/Response | Direction | C/R Value |
|-------------------------|---------------------------|------------------|
| Command | master side to slave side | 1 |
| | slave side to master side | 0 |
| Response | master side to slave side | 0 |
| | slave side to master side | 1 |

ZA.2.3.3 Service Access Point Identifier (SAPI)

Subclause 3.3.3 shall apply with the exception that the use of any SAPI value other than 0 (e.g. 16 for X.25 packet mode) is beyond the scope of this annex.

ZA.2.3.4 Terminal Endpoint Identifier (TEI)

A TEI is associated with a specific point-to-point data link between two PTNXs. The TEI value used by equipment conforming to this annex shall be the value ZERO. The use of TEI values other than 0 are beyond the scope of this annex.

PTNXs conforming to this annex shall assign the value TEI = 0 independently at each end of a particular inter-PTNX signalling channel.

ZA.2.4 Control field format

Subclause 3.4 and its subclauses shall apply.

ZA.2.5 Control field parameters and associated state variables

Subclause 3.5 and its subclauses shall apply.

ZA.2.6 Frame types

ZA.2.6.1 Commands and responses

Subclause 3.6.1 shall apply with the changes as given above.

ZA.2.6.2 Information (I) command

Subclause 3.6.2 shall apply.

ZA.2.6.3 Set Asynchronous Balanced Mode Extended (SABME) command

Subclause 3.6.3 shall apply.

ZA.2.6.4 Disconnect (DISC) command

Subclause 3.6.4 shall apply.

ZA.2.6.5 Unnumbered Information (UI) command

Subclause 3.6.5 shall apply.

ZA.2.6.6 Receive Ready (RR) command/response

Subclause 3.6.6 shall apply.

ZA.2.6.7 Reject (REJ) command/response

Subclause 3.6.7 shall apply with the changes as given above.

ZA.2.6.8 Receive Not Ready (RNR) command/response

Subclause 3.6.8 shall apply.

ZA.2.6.9 Unnumbered Acknowledgement (UA) response

Subclause 3.6.9 shall apply.

ZA.2.6.10 Disconnected Mode (DM) response

Subclause 3.6.10 shall apply.

ZA.2.6.11 Frame Reject (FRMR) response

Subclause 3.6.11 shall apply.

ZA.2.6.12 Exchange Identification (XID) command/response

Subclause 3.6.12 shall apply.

ZA.3 Elements for layer to layer communication

ZA.3.1 General

Subclause 4.1 shall apply with the changes as given above and the following exceptions:

- a) the following generic primitive types are not part of this annex:

| | |
|-----------------|--|
| MPH-ACTIVATE | not applicable to the Data Link Layer; |
| MPH-DEACTIVATE | not applicable to the Data Link Layer; |
| MPH-INFORMATION | not applicable to the Data Link Layer; |

- b) the following primitives are not part of this annex due to the fact that the layer 2 user does not implement the functionality which is making use of the layer 2 services associated with these primitives:

| | |
|-----------------------|--|
| DL-UNIT DATA.request | unacknowledged information transfer invoked by layer 3; |
| MDL-UNIT DATA.request | unacknowledged information transfer invoked by layer management. |

NOTE: Layer 3 and layer management, if receiving a DL-UNIT DATA.indication or a MDL-UNIT DATA.indication primitive, will discard its contents and not take any further action.

ZA.3.2 Primitive procedures

ZA.3.2.1 General

Subclause 4.2.1 shall apply.

ZA.3.2.2 Layer 3 - Data link layer interactions

Subclause 4.2.2 shall apply with the exception that the Data Link Connection Identifier (DLCI) state "information transfer" defined in support of broadcast data link procedures is not part of this annex.

Figure 8/Q.921 shall apply, with the exception of the state transitions as a result of the receipt of the DL-UNIT DATA.request primitive.

ZA.3.2.3 Data link layer - physical layer interactions

Subclause 4.2.3 items d) and e) shall apply.

The mechanism to detect loss of layer 1 capability is implementation dependent.

ZA.4 Definition of the peer-to-peer procedures of the data link layer

Clause 5 shall apply with the changes as given above.

ZA.4.1 Procedures for the use of the P/F bit

Subclause 5.1 shall apply.

ZA.4.2 Procedures for unacknowledged information transfer

Subclause 5.2.1 shall apply with the changes as given above.

Subclause 5.2.2 shall apply with the exception that the generation of the UI frame may not be implemented due to the fact that the layer 2 users do not implement the functionality which requires the transmission of this frame.

Subclause 5.2.3 shall apply.

ZA.4.3 Terminal Endpoint Identifier (TEI) management procedures

ZA.4.3.1 General

PTNXs conforming to this annex shall implement non-automatic TEI assignment procedures. The TEI Management procedures defined in the following subclauses are defined internally to the PTNX as no peer-to-peer management information transfer procedures are part of this annex.

The applicability of automatic TEI assignment procedures and peer-to-peer management information transfer to PTNX interconnection scenarios shall not be used by equipment conforming to this annex. The layer management, if receiving a MDL-UNIT DATA.indication primitive, shall discard its contents and take no further action.

ZA.4.3.2 TEI assignment procedures

The TEI value to be used for a particular data link shall be delivered by the Layer Management Entity (LME) to the Data Link Layer entity via the MDL-ASSIGN.request primitive.

ZA.4.3.3 TEI check procedures

The procedures defined in subclause 5.3.3 to enable checking of a TEI value are not part of this annex.

Since equipment conforming to this annex implements non-automatic TEI assignment procedures only, using the fixed TEI value 0 for the single data link connection on the D-channel, duplicate TEI assignment cannot occur.

ZA.4.3.4 TEI removal procedures

The procedures defined in subclause 5.3.4 to enable removal of a TEI value are not part of this annex. Equipment conforming to this annex may initiate TEI removal procedures internally.

ZA.4.3.5 TEI identity verify procedures

The procedures defined in subclause 5.3.5 to enable checking of a TEI value are not part of this annex.

ZA.4.3.6 Formats and codes

The format and codes defined in subclause 5.3.6 are not part of this annex, as no peer-to-peer messages are defined for the support of management procedures.

ZA.4.4 Initialization of data link layer parameters

Subclause 5.4 shall apply with the changes as given above.

ZA.4.5 Procedures for establishment and release of multiple frame operation

The provision of extended multiple frame operation (modulo 128 sequencing) shall be supported by equipment conforming to this annex.

ZA.4.5.1 Establishment of multiple frame operation

Subclause 5.5.1 shall apply.

ZA.4.5.2 Information transfer

Subclause 5.5.2 shall apply.

ZA.4.5.3 Termination of multiple frame operation

Subclause 5.5.3 shall apply.

ZA.4.5.4 TEI-assigned state

Subclause 5.5.4 shall apply.

ZA.4.5.5 Collision of unnumbered commands and responses

Subclause 5.5.5 shall apply.

ZA.4.5.6 Unsolicited DM response and SABME or DISC command

Subclause 5.5.6 shall apply with the exception that equipment supporting LAPB protocol procedures on the D-channel is beyond the scope of this annex.

ZA.4.6 Procedures for information transfer in multiple frame operation

Subclause 5.6 shall apply.

ZA.4.6.1 Transmitting I frames

Subclause 5.6.1 shall apply.

ZA.4.6.2 Receiving I frames

Subclause 5.6.2 shall apply.

ZA.4.6.3 Sending and receiving acknowledgements

Subclause 5.6.3 shall apply.

ZA.4.6.4 Receiving REJ frames

Subclause 5.6.4 shall apply.

ZA.4.6.5 Receiving RNR frames

Subclause 5.6.5 shall apply.

ZA.4.6.6 Data link layer own receiver busy condition

Subclause 5.6.6 shall apply.

ZA.4.6.7 Waiting acknowledgement

Subclause 5.6.7 shall apply.

ZA.4.7 Re-establishment of multiple frame operation

ZA.4.7.1 Criteria for re-establishment

Subclause 5.7.1 shall apply.

ZA.4.7.2 Procedures

Subclause 5.7.2 shall apply.

ZA.4.8 Exception conditions reporting and recovery

Subclause 5.8 shall apply with the exception that the actions to be taken by the connection management entity on receipt of a MDL-ERROR.indication primitive are defined in annex ZB.

ZA.4.8.1 N(S) sequence error

Subclause 5.8.1 shall apply with the changes as given above.

ZA.4.8.2 N(R) sequence error

Subclause 5.8.2 shall apply.

ZA.4.8.3 Timer recovery condition

Subclause 5.8.3 shall apply.

ZA.4.8.4 Invalid frame condition

Subclause 5.8.4 shall apply.

ZA.4.8.5 Frame rejection condition

Subclause 5.8.5 shall apply.

ZA.4.8.6 Receipt of an FRMR response frame

Subclause 5.8.6 shall apply.

ZA.4.8.7 Unsolicited response frames

Subclause 5.8.7 shall apply.

ZA.4.8.8 Duplicate assignment of a TEI value

Subclause 5.8.8 shall apply.

NOTE: As equipment conforming to this annex will only implement a single data link connection, duplicate TEI assignment cannot occur.

ZA.4.9 List of system parameters

Subclause 5.9 shall apply with the changes as given above and with the following exceptions:

- N202 and timers T201 and T202 are not part of this annex;
- the maximum number of outstanding I frames (k) shall have a value of 7 where a signalling channel of greater than or equal to 64 kbit/s is used and shall have a value of 3 where a signalling channel of less than 64 kbit/s is used.

Additional values of k may be used on particular inter-PTNX links by special arrangement between the two PTNXs.

ZA.4.10 Data link layer monitor function

The procedures described in subclause 5.10 with the changes as given above are mandatory for equipment conforming to this annex.

Annex ZB (informative): Inter-exchange signalling data link layer protocol in PTNs - Occurrence of the MDL-ERROR.indication primitive in the data link layer protocol for the support of Inter-exchange signalling in PTNs

ZB.1 Introduction

Table ZB.1 (derived from Appendix II, table II-1/Q.921) describes the error situations in which the MDL-ERROR.indication primitive will be generated. This primitive notifies the Data Link Layer's connection management entity of the occurred error situation. The table has been adapted from table II-1/Q.921 to reflect the peer-to-peer nature of the configuration of PTNXs conforming to this annex.

ZB.2 Layout of table ZB.1

The entries in the various columns of table ZB.1 should be interpreted as indicated here.

The "Error code" column gives the identification value of each error condition which will be included as a parameter with the MDL-ERROR.indication primitive.

The "Error condition" column, in conjunction with the "Affected states" column, describes unique protocol error events and the basic state of the Data Link entity at the point that the MDL-ERROR.indication primitive will be generated.

The columns entitled "Master management action" and "Slave management action" indicate the preferred action to be taken within the PTNX concerned. The actions for Master and Slave Data Link configurations are identical.

ZB.3 Preferred management actions

In general, the "Error log" described in table ZB.1 to be undertaken on receipt of the MDL-ERROR.indication primitive is an implementation option.

Table ZB.1: Master and slave management actions for MDL-ERROR.indications

| Error type | Error code | Error condition | Affected states | Master management action | Slave management action |
|---|------------|---|-----------------|--|--|
| Receipt of unsolicited Response | A | Supervisory (F=1) | 7 | Error log | Error log |
| | B | DM (F=1) | 7,8 | Error log | Error log |
| | C | UA (F=1) | 4,7,8 | Error log | Error log |
| | D | UA (F=0) | 4,5,6,7,8 | Error log | Error log |
| | E | DM (F=0) | 7,8 | Error log | Error log |
| Peer initiated Establishment | F | SABME | 7,8 | Error log | Error log |
| Unsuccessful retransmission (N200 times) | G | SABME | 7,8 | Indication that maintenance action is required since layer 2 is unable to provide services | Indication that maintenance action is required since layer 2 is unable to provide services |
| | H | SABME | 6 | | |
| | I | Status Enquiry | 8 | | |
| Other | J | N(R) Error | 7,8 | Error log | Error log |
| | K (note 1) | Receipt of FRMR response | 7,8 | Error log | Error log |
| | L | Receipt of frame with undefined control field | 4,5,6,7,8 | Error log | Error log |
| | M | Receipt of I field not permitted | 4,5,6,7,8 | (note 2) | (note 2) |
| | N | Receipt of frame with wrong size | 4,5,6,7,8 | Error log | Error log |
| | O | N201 Error | 4,5,6,7,8 | Error log | Error log |
| NOTE 1: The FRMR response will not be transmitted by a Data Link Layer entity conforming to this annex. | | | | | |
| NOTE 2: According to subclause 5.8.5, this error code will never be generated. | | | | | |

Annex ZC (informative): Technical differences between ETS 300 402-2 and ETS 300 125 (Part 2)

This annex details the technical differences between this ETS and Part 2 of ETS 300 125 (1991):

- 1) subclause 2.3 has been amended to clarify that networks conforming to this ETS do not support the LAPB data link connection within the D-channel;
- 2) subclause 2.9 item b) has been refined to clarify how a received S-format frame with a two octet address field and modulo 8 sequence number format is to be treated;
- 3) in subclause 3.3.3, a new SAP for support of teleaction communication has been assigned, with the value SAPI = 12, and the SAP reserved for packet mode communication using Q.931 call control procedures (value SAPI = 1) is removed;
- 4) a new subclause 4.2.3 specifies the interactions between the data link layer and the physical layer;
- 5) in subclause 5.2.1, an implementation option has been included to cover an arrangement where unacknowledged information transfer is not used. Under certain circumstances, the UI frame is defined to be associated with an application not implemented and no layer 2 peer-to-peer management is supported (this issue is related to annex A);
- 6) subclause 5.4 has been refined to clarify that in any case data link parameter initialization takes place while automatic negotiation (peer-to-peer) is optional. Automatic parameter negotiation is not supported by networks conforming to this ETS;
- 7) a new subclause 5.9.9 specifies the layer 2 response time of a TE when measured under test conditions;
- 8) annex A on the provision of point-to-point signalling connections has been refined to clarify the requirements in point-to-point configurations using for signalling a single point-to-point data link connection;
- 9) annex ZA (normative) and annex ZB (informative) have been added to cover the inter-exchange signalling data link layer protocol in PTN.

History

| Document history | | | |
|------------------|----------------|--------|--------------------------|
| November 1994 | Public Enquiry | PE 73: | 1994-11-07 to 1995-03-03 |
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