EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 402-1

November 1995

Source: ETSI TC-SPS

Reference: DE/SPS-05035-1

ICS: 33.080, 35.100.20

Key words: ISDN, DSS1, layer 2, D-channel, LAPD, SSIG, QSIG

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]

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

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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 1. In addition, it was enhanced to cover service aspects of the data link layer protocol for inter-exchange signalling between Private Telecommunication Network eXchanges (PTNXs) in Private Telecommunication Networks (PTNs). Annex ZB identifies the technical differences between this ETS and ETS 300 125 Part 1.

This ETS is part 1 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.920 (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 [21]).

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 [20]).

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.

[14]   ETS 300 011 (1990): "Integrated Services Digital Network (ISDN); Primary rate user-network interface layer 1 specification and test principles".

[15]   ETS 300 012 (1990): "Integrated Services Digital Network (ISDN); Basic user-network interface layer 1 specification and test principles".

[16]   ETS 300 402-2: "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]".

[17]   ETS 300 402-3: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 3: Frame relay protocol specification".

[18]   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]".

[19]   ETS 300 415 (1995): "Private Telecommunication Network (PTN); Terms and definitions".

[20]   ETS 300 475-1: "Private Telecommunication Network (PTN); Reference configuration; Part 1: Reference configuration for PTN eXchanges (PTNX) [ISO/IEC 11579-1 (1994), modified]".

[21]   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.920.

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 [19] subclause 4.3].

Private Telecommunication Network eXchange (PTNX): [ETS 300 415 [19] 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:

ASP	Assignment Source Point
CEI	Connection Endpoint Identifier
CES	Connection Endpoint Suffix
CME	Connection Management Entity
DL-	communication between layer 3 and Data Link layer
DLCI	Data Link Connection Identifier
ET	Exchange Termination
FCS	Frame Check Sequence
HDLC	High-level Data Link Control procedures
I	Information
IDU	Interface Data Unit
ISDN	Integrated Services Digital Network
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
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
PDU	Protocol Data Unit
PH-	communication between data link layer and PHysical layer
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network eXchange
SABME	Set Asynchronous Balanced Mode Extended
SAP	Service Access Point
SAPI	Service Access Point Identifier
SDU	Service Data Unit
TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
TX	Transmit
UA	Unnumbered Acknowledgement
UI	Unnumbered Information

Throughout the text of ITU-T Recommendation Q.920

Replace references as shown in the following table.

Reference in ITU-T Recommendation Q.920	Modified reference
ITU-T Recommendation I.430 [9]	ETS 300 012 [15]
ITU-T Recommendation I.431 [10]	ETS 300 011 [14]
ITU-T Recommendation Q.921 [1]	ITU-T Recommendation Q.921 as modified by ETS 300 402-2 [16]
ITU-T Recommendation Q.922 [2]	ETS 300 402-3 [17]
ITU-T Recommendation Q.931 [12]	ITU-T Recommendation Q.931 as modified by ETS 300 403-1 [18]

Page 1, clause 1, initial note

Delete the initial note starting with "NOTE - This Recommendation was originally written ..."

Page 1, clause 1, first paragraph

Delete the second sentence, referring to the application of this protocol which is for further study:

~~The application of this protocol to other channel types is for further study.~~

Page 1, clause 1, fourth paragraph

Add the following note after the fourth paragraph which ends with "In a mixed public/private network situation, the public network assumes the network side, and the private network assumes the user side.":

NOTE: For further details see annex ZA to this ETS.

Page 10, subclause 3.4.2, item a)

Add the following note to subclause 3.4.2, item a):

NOTE: If non-automatic TEI values are in use, then the TEI-unassigned state may only exist under limited conditions, e.g. on power up.

Page 12, subclause 4.4, item b)

Modify item b):

b)   data link connection parameter passing (an optional service performed on a per connection basis). <u>This service is currently not supported by European networks.</u>

Page 17, subclause 5.2, second paragraph

Delete the second paragraph of subclause 5.2.

Page 19

Insert a new subclause:

5.5   Overall data

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, some SDUs may be serviced with a high priority, based on the SAPI value.

Annex ZA (normative): **Inter-exchange signalling data link layer protocol in Private Telecommunication Networks (PTNs) - Overview of the functions of the data link layer for the support of inter-exchange signalling in PTNs and additions to concepts and terminology to accommodate PTN inter-exchange requirements**

ZA.1 Overview of the functions and procedures of the data link layer

ZA.1.1 General

Subclause 3.1 shall apply whereby the data link layer user invokes those functions and procedures of the data link layer which allow two peer-to-peer layer 3 entities to communicate on a single point-to-point data link connection, making use of the acknowledged information transfer service. For the acknowledged information transfer the properties defined in subclause 3.3 apply.

Figure ZA.1 shows point-to-point information transfer in the case of two interconnected PTNXs and depicts the point-to-point nature of both layers 1 and 2.
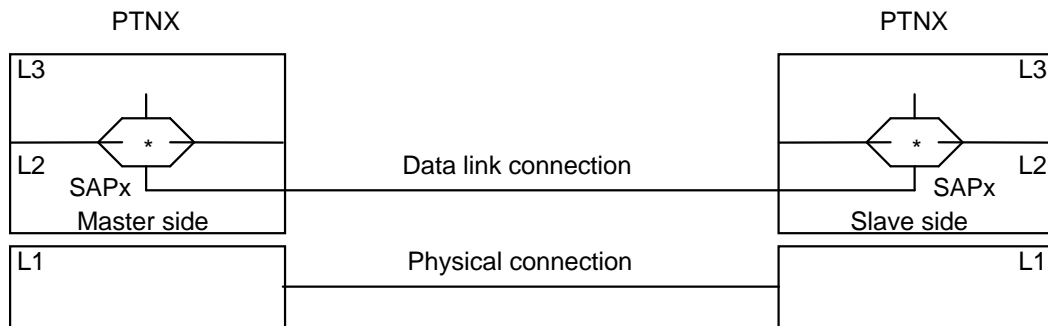

Figure ZA.1: Point-to-point data link connection

ZA.1.2 Overview of data link layer structure

ZA.1.2.1 Data link procedure

Subclause 5.1 shall apply.

ZA.1.2.2 Multiplex procedure

Subclause 5.2 shall apply.

ZA.1.2.3 Structure of the data link procedure and management function

The functional model of the data link procedure (including management functions) is shown in figure ZA.2. This figure is shown for informative purposes only and is not intended to constrain implementations.

The Layer Management Entity (LME) provides for the management of resources that have a layer wide impact.

The Connection Management Entity (CME) provides for the management of resources that have an impact on individual connections.
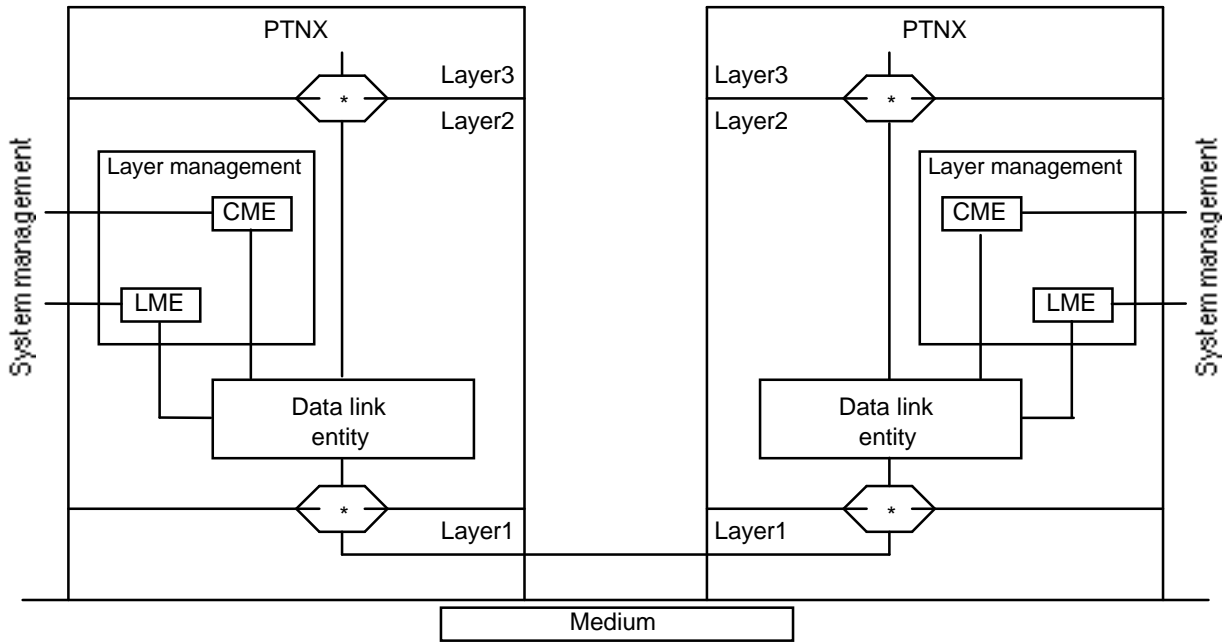
Figure ZA.2: Functional model of data link layer structure

ZA.2 Concepts and terminology

ZA.2.1 General

The concepts and terminology described in clause 2 shall apply with the following addition:

- all data link entities at one end of a particular inter-PTNX signalling channel shall be designated as either "master" or "slave";

- PTNXs conforming to this annex shall be capable of providing both master and slave functions on different inter-PTNX signalling channels. Therefore, the configuration shown in figure ZA.3 may exist.
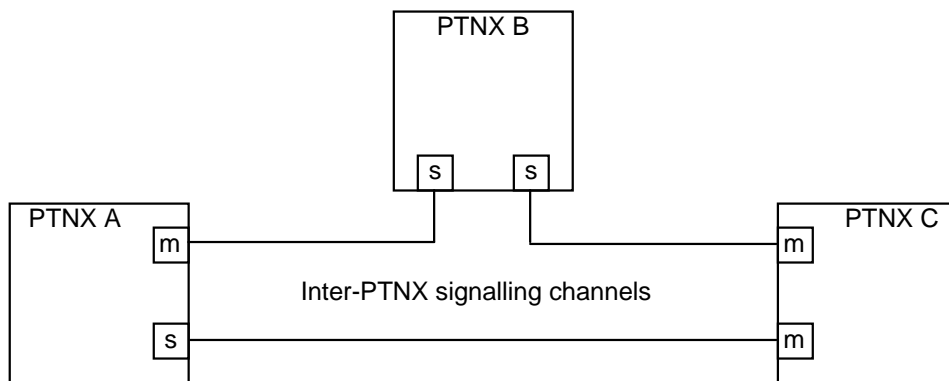

Figure ZA.3: Example of PTNX configuration

The assignment of the master or slave shall occur on initialization (or reinitialization) of the inter-PTNX signalling channels and the designation shall be decided at network configuration time. The assignment of master/slave relationships at the data link layer shall not preclude different master/slave relationships at other layers in the ISDN protocol reference model.

ZA.2.2   Data Link Connection Identification (DLCI)

Subclause 3.4.1 shall apply with the following exception:

Automatic TEI-assignment procedures shall not be used by equipment conforming to this annex.

ZA.2.3   Data link states

Subclause 3.4.2 shall apply.

ZA.2.4   Service characteristics

ZA.2.4.1   General

Subclause 4.1 shall apply.

ZA.2.4.2   Service provided to layer 3

Subclause 4.2 and its subclauses shall apply whereby layer 3 invokes the acknowledged information transfer service only.

ZA.2.4.3   Services provided to layer management

In equipment conforming to this annex, all layer management functions shall be performed locally. Therefore, no links for peer-to-peer management information are required.

ZA.2.4.4   Administrative services

The procedures for assignment, checking and removal of TEIs referenced in subclause 4.1 shall apply internally, but not on a peer-to-peer basis, to PTNXs conforming to this annex. The following primitives are defined:

a)   MDL-ASSIGN request

   The primitive is used by the Layer Management Entity (LME) to deliver to the Data Link Entity (DLE) the TEI value that is to be used for communication.

b)   MDL-ERROR indication/response

   These primitives are used to report error situations between layer management and the data link layer entities.

ZA.2.4.5   Services required from the physical layer

Subclause 4.6 shall apply.

Annex ZB (informative): Technical differences between ETS 300 402-1 and ETS 300 125 (Part 1)

This annex details the technical differences between this ETS and Part 1 of ETS 300 125 (1991).

1) A table has been added to subclause 3.4 to clarify allocation of layer 2 addressing space to the layer 2 protocols Q.921 and Q.922.

2) Annex ZA (normative) has been added to cover the Q reference point according to ETS 300 475-1 [20] (inter-exchange signalling data link layer protocol between PTNXs in a PTN).

History

Document history			
August 1994	Public Enquiry	PE 69:	1994-08-22 to 1994-12-16
August 1995	Vote	V 86:	1995-08-21 to 1995-10-27
November 1995	First Edition		