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Information processing systems — Data communications — Use of the X.25 packet level protocol in local area networks

*Systèmes de traitement de l'information — Communication de données — Emploi
du protocole X.25 au niveau paquet dans des réseaux locaux*



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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) together form a system for worldwide standardization as a whole. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for approval before their acceptance as International Standards. They are approved in accordance with procedures requiring at least 75 % approval by the national bodies voting.

International Standard ISO/IEC 8881 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

Introduction

ISO 8802 specifies the Medium Access Control (MAC) and Logical Link Control (LLC) procedures for accessing a Local Area Network (LAN). This International Standard specifies the use of the X.25 Packet Level Protocol (PLP) (both X.25/PLP:1980 and X.25/PLP:1984), as specified in ISO 8208, to provide additional capabilities beyond those available using the MAC and LLC procedures. These additional capabilities include the ability to support the OSI Connection-mode Network Service in a LAN station, as specified in ISO 8878, and the ability to attach terminals to a LAN station acting as a Packet Assembly/Disassembly Facility (see, for example, CCITT Recommendations X.3, X.28, and X.29).

The X.25 PLP provides several functional capabilities that include, but are not limited to

- a) multiplexing — the ability to support multiple data streams;
- b) transfer of addressing information — the ability to transfer addressing information, including OSI Network Service Access Point addresses;
- c) segmenting and reassembly — the ability to divide a data unit into smaller packets for transfer over a LAN and to reassemble packets into the original data unit;
- d) flow control — the ability to control, for each data stream, the flow of data between transmitting and receiving Data Terminal Equipment (DTE);
- e) transfer of expedited data — the ability to transfer a small amount of data outside the normal flow-control procedures;
- f) error control — the ability to detect errors at the Packet Level; and
- g) reset and restart — the ability to reinitialize communication paths at the Packet Level in the event that non-recoverable error conditions are encountered.

When using the X.25 PLP within a LAN, the X.25 PLP operates in the point-to-point (DTE-to-DTE) mode without an intervening packet-switched network. The LAN station operates one Packet Level Entity for each DTE/DTE interface (i.e., for each station with which it communicates).

ISO/IEC/TR 10029 describes the operation of an interworking unit to connect an X.25 Packet Level Entity in a LAN station to another X.25 Packet Level Entity.

HIC	Highest Incoming Channel
HOC	Highest Outgoing Channel
HTC	Highest Two-way Channel
LAN	Local Area Network
LCN	Logical Channel Number
LIC	Lowest Incoming Channel
LLC	Logical Link Control
LOC	Lowest Outgoing Channel
LTC	Lowest Two-way Channel
MAC	Medium Access Control
NSAP	Network Service Access Point
PDU	Protocol Data Unit
PL	Packet Level
PLP	Packet Level Protocol
SNPA	Subnetwork Point of Attachment
XID	Exchange Identification

5 Underlying layer considerations

When the X.25 PLP is used in a LAN, it is used in the point-to-point (DTE-to-DTE) mode allowed by ISO 8208. In this case, each LAN station acts as a DTE. The LAN station (conceptually) operates one PL Entity for each DTE/DTE interface in which it is involved (i.e., for each remote LAN station with which it communicates). Within a LAN station, the PL Entity associated with a DTE/DTE interface is identified by the Medium Access Control (MAC) Address of the remote LAN station. The DTE/DTE interface is thus identified by the pair of MAC Addresses of the two LAN stations associated with the interface. These concepts are illustrated in Figure 1.

6 Packet Level considerations

6.1 Logical channel number assignment

In the case of DTE/DTE communication over LANs, the task of agreeing to the ranges of logical channels available for each pair of communicating DTEs is potentially difficult. Different stations on a LAN, performing different functions

over X.25 PLP, could have very different requirements in terms of the number of simultaneous Virtual Calls to be handled when communicating with another individual LAN station. To alleviate this problem, the following scheme is used.

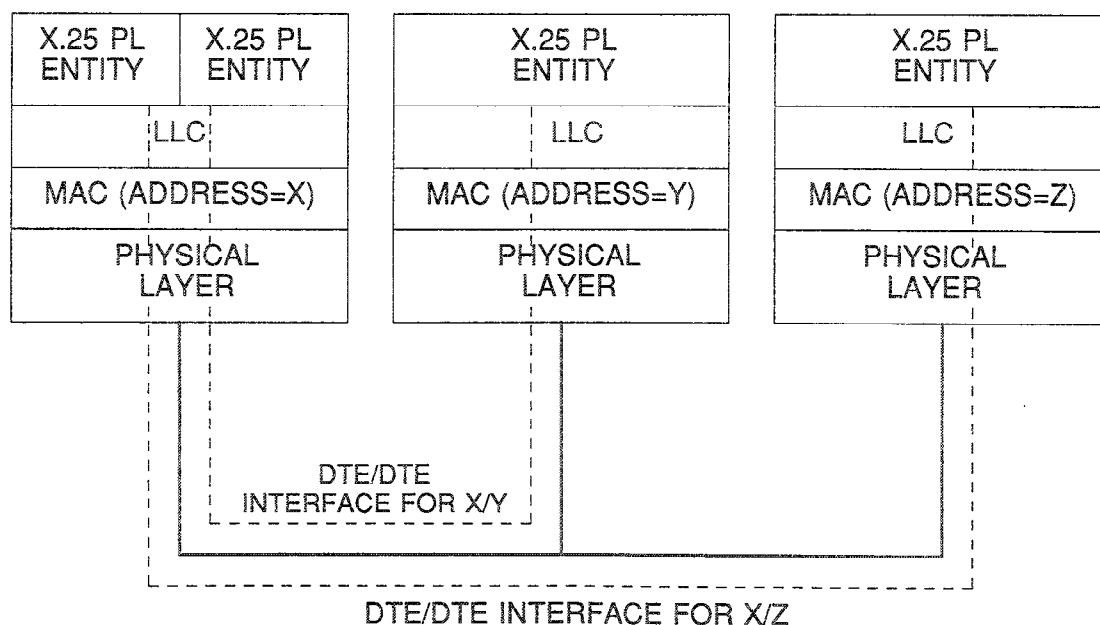
The LAN administration defines the logical-channel ranges (LIC, HIC, LTC, HTC, LOC, and HOC in ISO 8208) to be used by all DTEs attached to the LAN. Note that one occurrence of the logical-channel range parameters (LIC, etc.) exists for each X.25 PL Entity in a DTE and, therefore, multiple occurrences of all logical-channel numbers (up to the number of X.25 PL Entities) can result. A DTE may then assume that all logical channels within the defined ranges are available for use according to the procedures defined in ISO 8208.

However, a DTE need not allocate resources for all available logical channels. A DTE receiving an INCOMING CALL packet specifying a valid LCN within the defined range but which is not capable of accepting the call due to lack of logical-channel resources shall clear the call. In this case, the cause is "DTE Originated" and the diagnostic is "DTE Resource Constraint" (163).

One DTE assumes the role of a DCE for the purpose of logical-channel selection according to the procedures defined in ISO 8208. Clauses 8 and 11 below define the startup procedures to determine which DTE assumes the DCE role.

The On-line Facility Registration Facility may be used by a pair of DTEs to redefine the logical-channel ranges to be used between those DTEs (i.e., to change the values of LIC, etc.). The use of this facility requires prior, bilateral agreement between the DTEs.

NOTE — Following redefinition of the logical-channel ranges, the same considerations mentioned previously regarding the availability of resources to valid LCNs apply.



NOTE — The X.25 PLP is identified by a single Data Link Layer Service Access Point address.

Figure 1

Information processing systems — Data communications — Use of the X.25 packet level protocol in local area networks

Section 1: General

1 Scope

This International Standard deals with the use of the X.25 Packet Level Protocol (PLP) as specified in ISO 8208 operating over ISO 8802 Local Area Networks (LANs).

Section 2 of this International Standard specifies the operation of the X.25/PLP using the Logical Link Control (LLC) Type 2 procedures defined in ISO 8802-2. Section 3 of this International Standard specifies the operation of the X.25/PLP using the LLC Type 1 procedures defined in ISO 8802-2.

ISO/IEC/TR 10029:1989, *Information processing systems — Data communications — Operation of an X.25 interworking unit.*

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7498:1984, *Information processing systems — Open Systems Interconnection — Basic Reference Model.*

ISO 8208:1987, *Information processing systems — Data communications — X.25 Packet Level Protocol for Data Terminal Equipment.*

ISO 8208/Add. 1: ...,¹⁾ *Information processing systems — Data communications — X.25 Packet Level Protocol for Data Terminal Equipment — Addendum 1: Alternative logical channel number allocation.*

ISO 8348/Add. 2:1988, *Information processing systems — Data communications — Network service definition — Addendum 2: Network layer addressing.*

ISO 8802-2: ...,¹⁾ *Information processing systems — Local area networks — Part 2: Logical link control.*

ISO 8878:1987, *Information processing systems — Data communications — Use of X.25 to provide the OSI connection-mode network service.*

1) To be published