



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.212

(11/95)

**DATA NETWORKS AND OPEN SYSTEM
COMMUNICATIONS**

**OPEN SYSTEMS INTERCONNECTION –
SERVICE DEFINITIONS**

**INFORMATION TECHNOLOGY –
OPEN SYSTEMS INTERCONNECTION –
DATA LINK SERVICE DEFINITION**

ITU-T Recommendation X.212

(Previously “CCITT Recommendation”)

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. Some 179 member countries, 84 telecom operating entities, 145 scientific and industrial organizations and 38 international organizations participate in ITU-T which is the body which sets world telecommunications standards (Recommendations).

The approval of Recommendations by the Members of ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, 1993). In addition, the World Telecommunication Standardization Conference (WTSC), which meets every four years, approves Recommendations submitted to it and establishes the study programme for the following period.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC. The text of ITU-T Recommendation X.212 was approved on 21st of November 1995. The identical text is also published as ISO/IEC International Standard 8886.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

© ITU 1996

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

ITU-T X-SERIES RECOMMENDATIONS

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

(February 1994)

ORGANIZATION OF X-SERIES RECOMMENDATIONS

Subject area	Recommendation Series
PUBLIC DATA NETWORKS	
Services and Facilities	X.1-X.19
Interfaces	X.20-X.49
Transmission, Signalling and Switching	X.50-X.89
Network Aspects	X.90-X.149
Maintenance	X.150-X.179
Administrative Arrangements	X.180-X.199
OPEN SYSTEMS INTERCONNECTION	
Model and Notation	X.200-X.209
Service Definitions	X.210-X.219
Connection-mode Protocol Specifications	X.220-X.229
Connectionless-mode Protocol Specifications	X.230-X.239
PICS Proformas	X.240-X.259
Protocol Identification	X.260-X.269
Security Protocols	X.270-X.279
Layer Managed Objects	X.280-X.289
Conformance Testing	X.290-X.299
INTERWORKING BETWEEN NETWORKS	
General	X.300-X.349
Mobile Data Transmission Systems	X.350-X.369
Management	X.370-X.399
MESSAGE HANDLING SYSTEMS	X.400-X.499
DIRECTORY	X.500-X.599
OSI NETWORKING AND SYSTEM ASPECTS	
Networking	X.600-X.649
Naming, Addressing and Registration	X.650-X.679
Abstract Syntax Notation One (ASN.1)	X.680-X.699
OSI MANAGEMENT	X.700-X.799
SECURITY	X.800-X.849
OSI APPLICATIONS	
Commitment, Concurrency and Recovery	X.850-X.859
Transaction Processing	X.860-X.879
Remote Operations	X.880-X.899
OPEN DISTRIBUTED PROCESSING	X.900-X.999

CONTENTS

	<i>Page</i>
1 Scope	1
2 Normative references	1
2.1 Identical Recommendations International Standards	1
3 Definitions	1
3.1 OSI Reference Model definitions	1
3.2 Service Conventions definitions	2
3.3 Data Link Service definitions	2
4 Abbreviations	2
5 Conventions	2
5.1 General conventions	2
5.2 Parameters	3
6 Overview of the Data Link Service	3
7 Classes and types of Data Link Service	3
8 Features of the connection-mode Data Link Service	4
9 Model of the connection-mode Data Link Service	4
9.1 DLC Endpoint Connection Identification	4
9.2 Model of a Data-link-connection	4
10 Quality of connection-mode Data Link Service	7
10.1 Determination of QOS for Connection-mode Service	7
10.2 Definition of connection-mode QOS parameters	8
11 Sequence of primitives	10
11.1 Concepts used to define the connection-mode Data Link Service	10
11.2 Constraints of Sequence of Primitives	10
12 Connection establishment phase	12
12.1 Function	12
12.2 Types of primitives and parameters	13
12.3 Sequence of primitives	14
13 Connection release phase	14
13.1 Function	14
13.2 Types of primitive and parameters	15
13.3 Sequence of primitives when releasing an established DLC	16
13.4 Sequence of primitives in a DLS user rejection of DLC establishment attempt	17
13.5 Sequence of primitives in a DLS provider rejection of a DLC establishment attempt	17
13.6 Sequence of primitives in a DLS user abort of a DLC establishment attempt	17
14 Data transfer phase	18
14.1 Data transfer	18
14.2 Reset service	19
15 Features of the Connectionless-mode Data Link Service	21
16 Model of the Connectionless-mode Data Link Service	21
16.1 Model of a data-link-connectionless-mode data transmission	22
17 Quality of Connectionless-mode Service	22
17.1 Determination of QOS for Connectionless-mode Service	23
17.2 Definition of connectionless-mode QOS parameters	23



	<i>Page</i>
18 Sequence of connectionless-mode primitives at one DLSAP	24
19 Data transfer	25
19.1 Function	25
19.2 Types of primitives and parameters	25
19.3 Sequence of primitives	26

Summary

This Recommendation | International Standard defines the set of capabilities, in terms of an abstract service definition, provided by the Data Link Layer to the Network Layer. For designers of Network Layer protocols, it provides a definition of the Data Link service to allow design and implementation independent of details of the Data Link Layer protocol. For designers of Data Link Layer protocols, it defines the set of capabilities to be made available through the action of the protocol.

Introduction

This Recommendation | International Standard is one of a set of Recommendations | International Standards produced to facilitate the interconnection of information processing systems. It is related to other Recommendations | International Standards in the set as defined by ITU-T Rec. X.200 | ISO/IEC 7498-1, OSI Reference Model – The Basic Model. The reference model described by ITU-T Rec. X.200 | ISO/IEC 7498-1 subdivides the area of standardization for Open Systems Interconnection (OSI) into a series of layers of specification, each of a manageable size.

This Recommendation | International Standard defines the services provided by the Data Link Layer to the Network Layer at the boundary between the Data Link and Network Layers of the OSI Reference Model. It provides for the designers of network protocols a definition of the Data Link Service existing to support the network protocol and for the designers of Data Link Protocols a definition of the services to be made available through the action of the Data Link Protocol over the underlying service. The relationship is illustrated in Figure Intro. 1.

Throughout the set of OSI Recommendations | International Standards, the term “service” refers to the abstract capability provided by one layer of the OSI Reference Model to the layer immediately above. Thus, the Data Link Service defined in this Recommendation | International Standard is a conceptual architectural service, independent of administrative divisions.

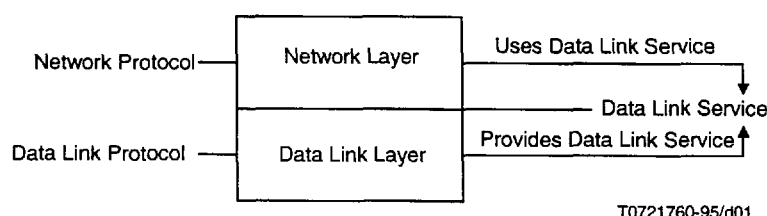


Figure Intro. 1 – Relationship of this Recommendation | International Standard to other OSI Recommendations | International Standards

Page blank

Page in

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

**INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION –
DATA LINK SERVICE DEFINITION****1 Scope**

This Recommendation | International Standard defines the OSI Data Link Service in terms of:

- a) the primitive actions and events of the service;
- b) the parameters associated with each primitive action and event, and the form that they take; and
- c) the interrelationship between, and the valid sequences of these actions and events.

The principal objective of this Recommendation | International Standard is to specify the characteristics of a conceptual Data Link Service and thus, supplement the OSI Reference Model in guiding the development of Data Link Protocols.

This Recommendation | International Standard does not specify individual implementation or products, nor does it constrain the implementation of Data Link entities and interfaces within an information processing system.

There is no conformance of equipment to this Data Link Service Definition Recommendation | International Standard. Instead, conformance is achieved through implementation of conforming Data Link Protocols that fulfil the Data Link Service defined in this Recommendation | International Standard.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and International Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*.
- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: Conventions for the definition of OSI services*.

PART 1 – GENERAL**3 Definitions****3.1 OSI Reference Model definitions**

This Recommendation | International Standard is based on the concepts developed and makes use of the following terms defined in ITU-T Rec. X.200 | ISO/IEC 7498-1:

- a) Data link entity;
- b) Data Link Layer;
- c) Data Link Service;
- d) Data-link-service-access-point;

ISO/IEC 8886 : 1996 (E)

- e) Data-link-service-access-point-address;
- f) Data-link-service-data-unit;
- g) Reset.

3.2 Service Conventions definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.210 | ISO/IEC 10731, as they apply to the Data Link Layer:

- a) Data Link Service Users;
- b) Data Link Service Provider;
- c) Primitive;
- d) Request;
- e) Indication;
- f) Response;
- g) Confirm.

3.3 Data Link Service definitions

This Recommendation | International Standard makes use of the following terms:

a) **data-link-connection**

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 data transmission services to be provided for the set.

NOTE – This definition clarifies the definition given in ITU-T Rec. X.200 | ISO/IEC 7498-1.

b) **data-link-connection-mode data transmission**

The transmission of a Data-link-service-data-unit within the context of a Data-link-connection that has been previously established.

c) **data-link-connectionless-mode data transmission**

The transmission of a Data-link-service-data-unit not in the context of a Data-link-connection and not required to maintain any logical relationship among multiple invocations.

4 Abbreviations

For this purposes of this Recommendation | International Standard, the following abbreviations apply:

DL	Data Link
DLC	Data-link-connection
DLL	Data Link Layer
DLS	Data Link Service
DLSAP	Data-link-service-access-point
DLSDU	Data-link-service-data-unit
OSI	Open Systems Interconnection
QOS	Quality of Service

5 Conventions

5.1 General conventions

This Recommendation | International Standard uses the descriptive conventions given in ITU-T Rec. X.210 | ISO/IEC 10731.

The service model, service primitives, and time-sequence diagrams used are entirely abstract descriptions; they do not represent a specification for implementation.

5.2 Parameters

Service primitives, used to represent service user/service provider interactions (see ITU-T Rec. X.210 | ISO/IEC 10731), convey parameters which indicate information available in the user/provider interaction.

The parameters which apply to each group of Data Link Service primitives are set out in tables in clauses 12 to 14 and 19. Each "X" in the tables indicates that the primitive labelling the column in which it falls may carry the parameter labelling the row in which it falls.

Some entries are further qualified by items in brackets. These may be:

- a) *A parameter specific constraint:*
(=) indicates that the value supplied in an indication or confirm primitive is always identical to that supplied in a previous request or response primitive issued at the peer service-access-point
- b) *Indication that some Note applies to the entry:*
(See Note X) indicates that the referenced Note contains additional information pertaining to the parameter and its use.

In any particular interface, not all parameters need be explicitly stated. Some may be implicitly associated with the DLSAP at which the primitive is issued.

6 Overview of the Data Link Service

The DLS provides for the transparent and reliable transfer of data between DLS users. It makes invisible to these DLS users the way in which supporting communications resources are utilized to achieve this transfer.

In particular, the DLS provides for the following:

- a) *Independence of underlying Physical Layer* – The DLS relieves DLS users from all concerns regarding which configuration is available (e.g. point-to-point connection) or which physical facilities are used (e.g. half-duplex transmission).
- b) *Transparency of transferred information* – The DLS provides for the transparent transfer of DLS user-data. It does not restrict the content, format or coding of the information, nor does it ever need to interpret its structure or meaning.
- c) *Reliable transfer of data* – The DLS relieves the DLS user from loss, insertion, corruption or, if requested, misordering of data which may occur. In some cases of unrecoverable errors in the Data Link Layer, duplication or loss of DLSDUs may occur.

NOTE 1 – Detection of duplicate or lost DLSDUs may be performed by DLS users.

- d) *Quality of Service selection* – The DLS makes available to DLS users a means to request and to agree upon a quality of service for the transfer of data. QOS is specified by means of QOS parameters representing characteristics such as throughput, transit delay, accuracy and reliability.
- e) *Addressing* – The DLS allows the DLS user to identify itself and to specify the DLSAP to which a DLC is to be established whenever more than two DLSAPs are supported by the DLS provider. Data Link addresses have only local significance within a specific Data Link configuration over a single transmission medium (point-to-point or multi-point physical connection) or a group of parallel transmission media (multi-link or splitting function). Therefore it is not appropriate to define a global addressing structure.

NOTE 2 – The DLS is required to differentiate between the individual systems that are physically or logically connected to a multi-point Data Link and to differentiate between connections when the Data Link Layer includes a multiplexing function. For commonality with other Service definitions, this mechanism is referred to as addressing and the objects used to differentiate between systems are referred to as addresses.

7 Classes and types of Data Link Service

There are no distinct classes of Data Link Service defined. There are two types of Data Link Service:

- a) a connection-mode service (defined in Part 2); and
- b) a connectionless-mode service (defined in Part 3).

When making reference to this Recommendation | International Standard, a user or provider of Data Link Service shall state which types of service it expects to use or provide.