

INTERNATIONAL
STANDARD

ISO/IEC
10022

Second edition
1996-09-01

Information technology — Open Systems Interconnection — Physical Service Definition

*Technologies de l'information — Interconnexion de systèmes ouverts
(OSI) — Définition du service physique*



Reference number
ISO/IEC 10022:1996(E)

AVA Documents
Document Sharing Hub

Contents

	<i>Page</i>
1 Scope	1
2 Normative references	1
2.1 Identical Recommendations International Standards	1
3 Definitions	1
3.1 Basic Reference Model definitions	1
3.2 Service convention definitions	2
4 Abbreviations	2
5 Conventions	2
5.1 General conventions	2
5.2 Parameters	2
5.3 PhC endpoint identification convention	3
6 Overview and general characteristics	3
7 Features of the Physical Service	3
7.1 The Physical Service offers the following features to a PhS user	3
7.2 Other aspects of the Physical Service include	4
8 Classes of Physical Service	4
9 Model of the Physical Service	4
9.1 Model of the layer service	4
9.2 Model of a point-to-point PhC	5
9.3 Model of a relayed point-to-point PhC where the relay is controlled within the PhS Provider	5
9.4 Model of a relayed point-to-point PhC where the relay is controlled from the Network Layer	6
10 Quality of Physical Service	6
10.1 Definition of PhC QOS	6
10.2 Determination of QOS values	8
11 Sequence of primitives	8
11.1 Relation of primitives at the two PhC endpoints	8
11.2 Sequence of primitives at one PhC endpoint	8
12 PhC activation phase	14
12.1 Function	14
12.2 Types of primitives and parameters	14
12.3 Sequence of primitives	14

© ISO/IEC 1996

All rights reserved. Unless otherwise specified, 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 publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

13	PhC deactivation phase	14
13.1	Function	14
13.2	Types of primitives and parameters	14
13.3	Sequence of primitives	14
14	Data transfer phase	17
14.1	Function	17
14.2	Types of primitives and parameters	17
14.3	Sequence of primitives	17
Annex A	Internal structure of the Physical Layer	18
A.1	Introduction	18
A.2	Classifications regarding multiplexing	18
A.3	Isochronous transmission	18
Annex B	Operation of data link protocol using the half-duplex physical service	20
B.1	Introduction	20
B.2	Operation	20
Annex C	Composite state transition diagram	23
C.1	Introduction	23

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. 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 voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 10022 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.211.

This second edition cancels and replaces the first edition (ISO/IEC 10022:1990), which has been technically revised.

Annexes A to C of this International Standard are for information only.

Introduction

This Recommendation | International Standard is one of a set of Recommendations and 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 the Open Systems Interconnection (OSI) Basic Reference Model (see ITU-T Rec. X.200 | ISO/IEC 7498-1). The OSI Basic Reference Model subdivides the area of standardization for interconnection into a series of layers of specification, each of manageable size.

This Recommendation | International Standard defines the service provided by the Physical Layer to the Data Link Layer at the boundary between the Physical and Data Link Layers of the OSI Basic Reference Model. It provides for the designers of Data Link Protocols a definition of the Physical Service existing to support the Data Link Protocol and for the designers of Physical Protocols a definition of the services to be made available through the action of the Physical Protocol over the underlying physical media, which are external to the OSI Physical Layer. The relationship of the Physical Layer with the Data Link Layer is illustrated in Figure Intro. 1.

NOTE – It is important to distinguish the specialized use of the term “Service” within the set of OSI Recommendations | International Standards from its use elsewhere to describe the provision of a service by some organizations (i.e. the provision of a service by an Administration as defined in Recommendations of the ITU-T).

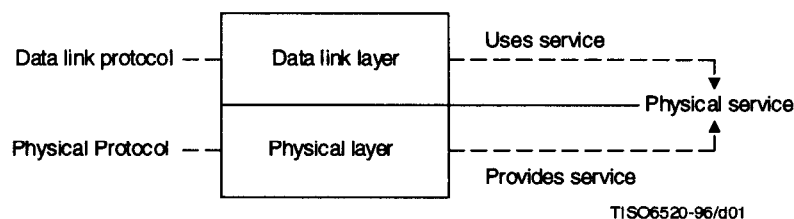


Figure Intro. 1 – Relationship of this Recommendation | International Standard to other OSI Recommendations | International Standards

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – PHYSICAL SERVICE DEFINITION

1 Scope

This Recommendation | International Standard defines the OSI Physical 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 which they take;
- 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 Physical Service and thus supplement the OSI Basic Reference Model in guiding the development of Physical Layer protocols.

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

There is no conformance of equipment to this Recommendation | International Standard. Instead, conformance is achieved through implementation of conforming OSI Physical protocols that fulfil the Physical 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 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 editions of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU 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*.

3 Definitions

NOTE – Terms and definitions for Data communication and Open Systems Interconnection Architecture are given in ISO 2382-9 and ISO/IEC 2382-26.

3.1 Basic Reference Model definitions

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

- a) Data circuit;
- b) Physical connection;
- c) Physical layer;

- d) Physical media;
- e) Physical service;
- f) Physical service access point;
- g) Physical service data unit.

3.2 Service convention definitions

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

- a) Physical Service user;
- b) Physical Service provider;
- c) primitive;
- d) request;
- e) indication.

4 Abbreviations

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

OSI	Open Systems Interconnection
Ph	Physical
PhC	Physical Connection
PhL	Physical Layer
PhPDU	Physical Protocol Data Unit
PhS	Physical Service
PhSAP	Physical Service Access Point
PhSDU	Physical Service Data Unit
QOS	Quality of Service

5 Conventions

5.1 General conventions

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

The layer service model, service primitives, and time-sequence diagrams taken from those conventions 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) may convey parameters that indicate information available in the user/provider interaction.

The parameters which apply to each group of Physical Service primitives are set out in Table 1 to Table 4 (see clause 11 to clause 14). The tables also indicate the association of which parameters can be carried by each respective primitive.

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

- a) an indication that the parameter is conditional in some way:
 - (C) indicates that the parameter is not present on the primitive for every connection; the parameter definition describes the conditions under which the parameter is present or absent;
- b) a parameter specific constraint:
 - (=) indicates that the value supplied in an indication primitive is always identical to that supplied in a previous request primitive issued at the peer service access point;

- c) an indication that some note applies to the entry:

(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 PhSAP at which the primitive is issued.

5.3 PhC endpoint identification convention

If at a PhSAP there is more than one PhC and distinction among them is needed by the PhS user, PhC endpoint identification must be provided. All primitives issued at such a PhSAP would be required to use this mechanism to identify PhCs. Such an implicit identification is not described as a parameter of the service primitives in this Physical Service Definition.

When the PhC traverses relays which are controlled through a separate PhC, this implicit identification mechanism must provide additionally for identification of these dependencies.

6 Overview and general characteristics

The Physical Service provides for the transparent transfer of data between PhS users. It makes invisible to the PhS users the way in which supporting communication resources are utilized to achieve this transfer. Service classes are defined to categorize the distinctions that are visible to the PhS user.

The PhS provides for PhCs between PhS users. Since connections cannot be established through the protocol at the Physical Layer but rather are configured when the service is created, the PhC, which is a logical concept, nevertheless must relate directly to the real physical media paths provided to the Physical Layer. For this reason:

- a) There is no distinction between connection-mode and connectionless-mode at the Physical Layer. The service is independent of whether the higher layers operate in connection-mode or connectionless-mode.
- b) Each PhC is identified within the Physical Layer.
- c) A PhC can only relate to a particular PhSAP (i.e. a PhC implies a specific source PhSAP, and a specific destination PhSAP or group of PhSAPs if a multi-endpoint connection).

The PhC may traverse Physical Layer relay, or intermediate systems when several physical media are used in tandem. Such relaying may be controlled through a management function exercised over a separate, but related, PhC, or may be controlled from the Network Layer, as specified in ITU-T Rec. X.200 | ISO/IEC 7498-1, 7.5.4.2, for the interconnection of data circuits. The Physical Layer does not make any routing decisions. Intermediate systems may also be used for mapping different Physical Layer protocols associated with a PhC.

The Quality of Service provided by the Physical Service is pre-defined, in accordance with the class of service, though it may optionally be varied through management control of the configuration.

Actual data transmission takes place over the physical media. The mechanical, electromagnetic and other media dependent characteristics of the physical media connection are defined at the boundary (interface) between the Physical Layer and the physical media. Definitions of these characteristics are found in other ITU-T Recommendations and International Standards.

7 Features of the Physical Service

7.1 The Physical Service offers the following features to a PhS user

- a) **PhC activation:** The means to activate a PhC with another PhS user for the purpose of exchanging PhSDUs. More than one PhC may exist between the same pair of PhS users. The PhC Activation service is optional and need not apply for duplex or simplex transmission (i.e. sustained Data Transfer phase).

NOTE 1 – In a multiplexed realization of the Physical Layer, activation of the sublayer which carries all the PhCs (the control for which may appear to be at the service boundary relating to a particular PhC) may be necessary before activation of any of the other PhCs can occur. Such subsequent activations may provide only an activation indication at the service boundary, and may be implicit in the management or other action which establishes the entirety of a PhC which contains a Physical Layer relay.

- b) **PhC transfer:** The means of transferring PhSDUs on a PhC. A PhSDU consists of one bit or a string of bits. PhSDUs are transferred transparently over a PhC without change to the content (within the Quality of Service) or constraint on their data values. PhSDUs are delivered in the same order in which they are submitted.

NOTE 2 – Use of the term “bit” is not intended to preclude the use of non-binary codes.

- c) **PhC identification:** The means to identify, when necessary, individual PhCs at the PhSAPs. Note that the parameters to identify a particular PhC within the PhSAP are implicit (see 5.3).
- d) **PhC deactivation:** The means for unconditional, and therefore possible destructive, deactivation of a PhC by either the PhS user or by the PhS provider. The PhC Deactivation service is optional and need not apply for duplex or simplex transmission (i.e. sustained Data Transfer phase).

7.2 Other aspects of the Physical Service include

- a) The transfer of PhSDUs may be either duplex (two-way simultaneous), half-duplex (two-way alternate), or simplex (one way); either point-to-point or multi-endpoint; and either synchronous or asynchronous, as appropriate (see clause 8).
- b) The data signalling rate on the physical media may not correspond with the PhSDU throughput rate due to the inclusion of Physical Layer protocol control information, multiplexing function, encoding mechanisms, or other transmission control functions.
- c) PhSDU synchronization is provided by the Physical Service. This includes bit synchronization. Other delimiting may be available, which is a variable feature.
- d) PhC endpoint identifiers are not globally known. In the case of multiplexing, they will be conveyed implicitly or explicitly via the Physical protocol.
- e) Fault condition notifications to the PhS user, beyond conveying a PhC deactivation indication, are for further study. Fault condition notifications may include apparent faults due solely to transmission errors.

8 Classes of Physical Service

Distinctions of Physical Service are necessary to identify features that relate to the requirements of the service as seen by the Data Link Layer. These distinctions are:

- a) Type of transmission: synchronous and asynchronous.
- b) Mode of operation: duplex, half-duplex, and simplex.

NOTE 1 – While these modes describe the operation at the Physical Layer service boundary between the Physical Layer and the Data Link Layer, they do not necessarily imply the specific mode of operation of the Physical Layer entity and the interface between the Physical Layer and the underlying physical media. This applies to operations associated with specific PhS provider implementations, such as collision detection and multiplexing, which may map on to certain service primitives (for example, Activation and Deactivation) but are otherwise transparent to the PhS user.

- c) Topology: point-to-point and multi-endpoint.

NOTE 2 – This encompasses various forms of LAN topology (ring/bus).

- d) Constant or variable bit rate.

NOTE 3 – In a multiplexed structure, the overall aggregated bit rate will generally be constant. However, the division of this rate between the PhCs may not be constant. Where there is a choice (implying that there are other users of the facilities of the Physical Layer) a variable rate will normally be selected for the OSI data user. Further clarification is given in Annex A.

9 Model of the Physical Service

9.1 Model of the layer service

This Recommendation | International Standard uses the abstract model for a layer service defined in the OSI Service Conventions (see ITU-T Rec. X.210 | ISO/IEC 10731, clause 5). The model defines the interactions between the PhS users and the PhS provider that take place at PhSAPs. Information is passed between the PhS user and the PhS provider by service primitives, which may convey parameters. The description of the model is applicable to point-to-point PhCs (linking two PhSAPs). The extension of the model for multi-endpoint PhCs is for further study.