

Information technology — Framework for protocol identification and encapsulation

ICS 35.100.01

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

National foreword

This British Standard reproduces verbatim ISO/IEC 14765:1997 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee IST/6, Data communications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO/IEC title page, pages ii to iv, pages 1 to 18 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

This British Standard, having been prepared under the direction of the DISC Board, was published under the authority of the Standards Board and comes into effect on 15 December 1997

© BSI 04-2000

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 28856 0

Contents

	Page
National foreword	Inside front cover
Foreword	iii
Text of ISO/IEC 14765	1

INTERNATIONAL STANDARD

ISO/IEC 14765

First edition
1997-06-15

Information technology — Framework for protocol identification and encapsulation

*Technologies de l'information — Cadre général pour identification et
encapsulage de protocole*



Contents

	Page
Foreword	iii
1 Scope	1
2 Normative references	1
2.1 Identical Recommendations International Standards	1
2.2 Additional references	1
3 Abbreviations	1
4 Definitions and concepts	2
4.1 Basic Reference Model concepts	2
4.2 Additional definitions and concepts	2
5 Overview	2
5.1 General	2
5.2 Interworking and encapsulation	3
6 Principles of protocol identification	3
6.1 Need for protocol identification	3
6.2 Protocol identifier registries and values	3
6.3 Protocol identification methods	5
6.4 Protocol identifiers	5
7 Principles of protocol encapsulation	6
7.1 Encapsulation function	6
7.2 Protocol encapsulation methods	8
7.3 Relationships among EFs, EdPs, and EgPs	9
Annex A Current Recommendations International Standards supporting PIE principles	13
Annex B Examples of protocol identification and encapsulation methods	15
Figure 1 — Framework for protocol identification and encapsulation principles	4
Figure 2 — Relationship of IPI and SPI	6
Figure 3 — Generic operation of an encapsulation function	7
Figure 4 — Possible relationships of EdPs and EgPs	8
Figure 5 — Combination of multiple EFs over a single EgP	9
Figure 6 — One PDU of only supported EdP encapsulated in EgP	10
Figure 7 — Multiple PDUs of only supported EdP encapsulated in EgP	10
Figure 8 — Multiple PDUs of one of the EdPs encapsulated in EgP	10
Figure 9 — PDUs from multiple EdPs encapsulated in EgP	11
Figure 10 — PDUs from same EdP encapsulated in EgP	11
Figure 11 — One PDU of EDP encapsulated within multiple PDUs of EgP	12
Figure 12 — Relationships among EFs, EdPs, and EgPs	12
Figure A.1 — Relationship of Recommendations International Standards supporting principles of protocol identification and encapsulation	14
Figure B.1 — ISDN D-channel with “SAPI” identification	15
Figure B.2 — Q.931 Identification by Low Layer Compatibility (LLC) Information Element in ISDN	16
Figure B.3 — Identification by Logical Link Control Address in LANs	17
Figure B.4 — ITU-T Rec. X.263 ISO/IEC TR 9577 IPI	17
Figure B.5 — ITU-T Rec. X.263 ISO/IEC TR 9577 SPI in X.25 call request	18
Figure B.6 — ITU-T Rec. X.264 and ISO/IEC 11570 identification of Transport Protocols	18

Descriptors: Data processing, information interchange, telecommunications, network interconnection, open systems interconnection, data transfer, protocols, identification methods.

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 14765 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.260. Annex A and Annex B of this International Standard are for information only.

1 Scope

In a layered approach to protocol architecture, protocols have a relationship to one another such that a protocol at layer (n) uses the services of the layer below it — the (n – 1) services — which, in turn, are provided by a layer (n – 1) protocol. One of the services used by a layer (n) protocol is the *encapsulation* of its (n) Protocol Data Units (PDUs) in a way which is transparent to it. Such encapsulation is realized by the carriage of the (n) PDUs as user data in an (n – 1) Service Data Unit (SDU).

In a limited case, the operation of a particular protocol at layer (n – 1) implies the operation, above layer (n – 1), of a single layer (n) protocol or single set of related (n) / (n + 1)... protocols. However, in a more general case, there may be more than one protocol (or set of related protocols starting) at layer (n) that can operate above layer (n – 1) in a given environment. In such cases, there is a need for explicit *identification* of the protocol (or set of protocols starting) at layer (n).

There also may be a need to manipulate the (n – 1) protocol (i.e. the *encapsulating* protocol) in certain ways specific to the layer (n) protocol (i.e. the *encapsulated* protocol). Such manipulations form the basis of a set of procedures that must be specified for the layer (n) protocol.

The above observations regarding protocol identification and encapsulation are also applicable in cases where an (n) layer is further divided into sublayers.

Cases in which an (n) protocol operates for the purpose of establishing a parallel universe of protocols (regardless of the layered structure of that universe) also give rise to a need for the (n) protocol to be able to identify the protocol(s) in the parallel universe. In these cases, however, there is no encapsulating/encapsulated relationship between the (n) protocol and the parallel universe set of protocols.

The above principles lead to a need to establish a framework for protocol identification and encapsulation. These principles apply to the relationship between two protocols (recognizing that one of them may be a set of related protocols) and can be applied recursively. This Recommendation | International Standard provides a framework for explicit protocol identification and for protocol encapsulation. Implicit protocol identification (see 4.2) is beyond the scope of 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 International 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.263 (1995) | ISO/IEC TR 9577:1996, *Information technology — Protocol identification in the network layer*.

2.2 Additional references

— ITU-T Recommendation X.37 (1995), *Encapsulation in X.25 packets of various protocols including frame relay*.

— ISO/IEC 13515¹⁾, *Information technology — Telecommunications and information exchange between systems — Generic Multiprotocol Encapsulation (GME): Application to frame relay and ATM*.

3 Abbreviations

EdP	Encapsulated Protocol
EF	Encapsulation Function
EgP	Encapsulating Protocol
EPIF	Encapsulated Protocol Information Field
IdP	Identified Protocol(s)
IgP	Identifying Protocol
IPi	Initial Protocol Identifier
PCI	Protocol Control Information
PDU	Protocol Data Unit
PEM	Protocol Encapsulation Method
PId	Protocol Identification
PIE	Protocol Identification and Encapsulation

¹⁾ Presently at the stage of draft.