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**Information technology —  
Telecommunications and information  
exchange between systems — Intermediate  
System to Intermediate System  
intra-domain routing information  
exchange protocol for use in conjunction  
with the protocol for providing the  
connectionless-mode network service  
(ISO 8473)**

*Technologies de l'information — Communication de données et échange d'informations entre systèmes — Protocole intra-domaine de routage d'un système intermédiaire à un système intermédiaire à utiliser conjointement avec le protocole fournissant le service de réseau en mode sans connexion (ISO 8473)*

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## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of the joint technical committee is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 10589 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This second edition cancels and replaces the first edition (ISO/IEC 10589:1992), which has been technically revised. It incorporates Cor.1:1993, Cor.2:1996, Cor.3:1996, Amd.1:1996 and Amd.2:1999.

Annexes A, E, G, H, I and J form a normative part of this International Standard. Annexes B, C, D and F are for information only.

Annexes G, H, I and J provide ICS proformas associated with intra-domain routing protocol management information.

## Introduction

This International Standard is one of a set of International Standards produced to facilitate the interconnection of open systems. The set of standards covers the services and protocols required to achieve such interconnection.

The protocol defined in this International Standard is positioned with respect to other related standards by the layers defined in ISO 7498 and by the structure defined in ISO 8648. In particular, it is a protocol of the Network Layer. This protocol permits Intermediate Systems within a routing domain to exchange configuration and routing information to facilitate the operation of the routing and relaying functions of the Network Layer.

The protocol is designed to operate in close conjunction with ISO 9542 and ISO 8473. ISO 9542 is used to establish connectivity and reachability between End Systems and Intermediate Systems on individual subnetworks. Data is carried using the protocol specified in ISO 8473. The related algorithms for route calculation and maintenance are also described.

The intra-domain IS-IS routing protocol is intended to support large routing domains consisting of combinations of many types of subnetworks. This includes point-to-point links, multipoint links, X.25 subnetworks, and broadcast subnetworks such as ISO 8802 LANs.

In order to support large routing domains, provision is made for intra-domain routing to be organised hierarchically. A large domain may be administratively divided into *areas*. Each system resides in exactly one area. Routing within an area is referred to as *Level 1 routing*. Routing between areas is referred to as *Level 2 routing*. Level 2 Intermediate Systems keep track of the paths to destination areas. Level 1 Intermediate Systems keep track of the routing within their own area. For an NPDU destined to another area, a Level 1 Intermediate System sends the NPDU to the nearest level 2 IS in its own area, regardless of what the destination area is. Then the NPDU travels via level 2 routing to the destination area, where it again travels via level 1 routing to the destination End System.

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# Information technology – Telecommunications and information exchange between systems – Intermediate System to Intermediate System intra-domain routing information exchange protocol for use in conjunction with the protocol for providing the connectionless-mode network service (ISO 8473)

## 1 Scope

This International Standard specifies a protocol which is used by Network Layer entities operating the protocol specified in ISO 8473 in Intermediate Systems to maintain routing information for the purpose of routing within a single routing domain. The protocol specified in this International Standard relies upon the provision of a connectionless-mode underlying service.<sup>1)</sup>

This International Standard specifies:

- a) procedures for the transmission of configuration and routing information between network entities residing in Intermediate Systems within a single routing domain;
- b) the encoding of the protocol data units used for the transmission of the configuration and routing information;
- c) procedures for the correct interpretation of protocol control information; and
- d) the functional requirements for implementation, claiming conformance to this International Standard.

The procedures are defined in terms of

- a) the interactions between Intermediate system Network entities through the exchange of protocol data units;
- b) the interactions between a Network entity and an underlying service provider through the exchange of subnetwork service primitives; and
- c) the constraints on route determination which must be observed by each Intermediate system when each has a routing information base which is consistent with the others.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 7498-3:1997, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing*

ISO/IEC 7498-4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework*

ISO/IEC 8208:2000, *Information technology – Data communications – X.25 Packet Layer Protocol for Data Terminal Equipment*

<sup>1)</sup> See ISO 8473 and its addendum 3 for the mechanisms necessary to realize this service on subnetworks based on ISO/IEC 8208, ISO 8802, and the OSI Data Link Service.

## ISO/IEC 10589:2002(E)

ISO/IEC 8348:1996, *Information technology – Open Systems Interconnection – Network Service Definition*

ISO/IEC 8473-1:1998, *Information technology – Protocol for providing the connectionless-mode network service: Protocol specification*

ISO/IEC 8473-4:1995, *Information technology – Protocol for providing the connectionless-mode network service: Provision of the underlying service by a subnetwork that provides the OSI data link service*

ISO 8648:1988, *Information processing systems – Open Systems Interconnection – Internal organization of the Network Layer*

ISO/IEC TR 8802-1:1997, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 1: Overview of Local Area Network Standards*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control*

ISO/IEC 8802-3:2000, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 8802-5:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 5: Token ring access method and physical layer specifications*

ISO/IEC 8802-6:1994, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 6: Distributed Queue Dual Bus (DQDB) access method and physical layer specifications*

ISO/IEC 9314 (all parts), *Information technology – Fibre Distributed Data Interface (FDDI)*

ISO 9542:1988, *Information processing systems – Telecommunications and information exchange between systems – End system to Intermediate system routing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO 8473)*

ISO/IEC TR 9575:1995, *Information technology – Telecommunications and information exchange between systems – OSI Routing Framework*

ISO/IEC TR 9577:1999, *Information technology – Protocol identification in the network layer*

ISO/IEC 15802-1:1995, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Common specifications – Part 1: Medium Access Control (MAC) service definition*

ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Management Information Services – Structure of management information: Management Information Model*

ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information – Part 4: Guidelines for the definition of managed objects*

ISO/IEC 10733:1998, *Information technology – Elements of management information related to the OSI Network Layer*

ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-1:1998, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements*

ISO/IEC 10165-6:1997, *Information technology – Open Systems Interconnection – Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management*

NOTE 1 – ISO/IEC 9646-1:1994 and ISO/IEC 9646-2:1994 supersede ISO/IEC 9646-1:1991 and ISO/IEC 9646-2:1991 respectively. However, when this International Standard was under development, the previous editions were valid and this International Standard is therefore based on these editions, which are listed below.

ISO/IEC 9646-1:1991, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts*

ISO/IEC 9646-2:1991, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract test suite specification*

### 3 Definitions

#### 3.1 Reference model definitions

This International Standard makes use of the following terms defined in ISO 7498:

- a) Network Layer
- b) Network Service access point
- c) Network Service access point address
- d) Network entity
- e) Routing
- f) Network protocol
- g) Network relay
- h) Network protocol data unit

#### 3.2 Network layer architecture definitions

This International Standard makes use of the following terms defined in ISO 8648:

- a) Subnetwork
- b) End system
- c) Intermediate system
- d) Subnetwork service
- e) Subnetwork Access Protocol
- f) Subnetwork Dependent Convergence Protocol
- g) Subnetwork Independent Convergence Protocol

#### 3.3 Network layer addressing definitions

This International Standard makes use of the following terms defined in ISO 8348:

- a) Subnetwork address
- b) Subnetwork point of attachment
- c) Network Entity Title

#### 3.4 Local area network definitions

This International Standard makes use of the following terms defined in ISO 8802:

- a) Multi-destination address
- b) Media access control
- c) Broadcast medium

#### 3.5 Routing framework definitions

This International Standard makes use of the following terms defined in ISO/IEC TR 9575:

- a) Administrative Domain
- b) Routing Domain
- c) Hop
- d) Black hole

#### 3.6 Additional definitions

For the purposes of this International Standard, the following definitions apply: