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Draft for Development

Open Systems Interconnection: naming and addressing (ISO 7498/PDAD 3)

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This publication is not to be regarded as a British Standard. It is being issued in the Draft for Development series of publications and is of a provisional nature because the subject matter is in the process of ongoing development within the International Standards Committee (ISO/TC 97/SC 21 Information Retrieval, Transfer and Management for Open Systems Interconnection).

A review of this Draft for Development will be carried out not later than two years after its publication.

Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development will be made in an announcement in the appropriate issue of *BSI News*. Observations which it is felt should receive attention before the official call for comments will be welcomed. According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

National foreword

This Draft for Development has been prepared under the direction of the Office and Information Standards Committee.

The primary objective of this Draft for Development is to give advance guidance to product and systems designers concerned with naming and addressing for Open Systems Interconnection (OSI).

The text of the Draft for Development is identical with the proposed Draft Addendum ISO 7498/PDAD 3 (reference ISO/TC 97/SC21 N 944) issued February 1986 by the International Organization for Standardization (ISO).

For ease of reproduction the ISO text has been reproduced unchanged.

The UK has actively participated through BSI Technical Committee IST/21 in the development of the proposed ISO Draft Addendum. The Technical Committee will review any agreed amendments or addenda to the ISO text and will, where appropriate, update the text of this Draft for Development by means of an amendment or revision. When the ISO draft reaches an appropriate level of agreement and stability, this Draft for Development may be converted to a British Standard.

This Draft for Development contains the text of one of the set of Draft Addenda to the Basic Reference Model for Open Systems Interconnection (BS 6568):

ISO 7498/DAD 1 Connectionless-mode transmission (DD 125)

ISO 7498/PDAD 2 Security architecture (DD 148)

ISO 7498/PDAD 3 Naming and addressing (DD 149)

A brochure giving details of existing and projected British Standards publications for Open Systems Interconnection (OSI), data communications, database and computer graphics may be obtained from the Sales Department, BSI, Linford Wood, Milton Keynes, MK14 6LE, at no charge. Press releases for new British Standard publications in these areas will be issued to the computing press, and details of all new publications will be recorded in full in *BSI News*.

Terminology and conventions. The text of the proposed Draft Addendum has been approved as suitable for publication as a Draft for Development without deviation. Some terminology and certain conventions are not identical with those used in Drafts for Development; attention is drawn especially to the following.

Wherever the words 'standard' or 'addendum' appear, referring to this Draft for Development, they should be read as 'Draft for Development'.

Cross-references

International standard	Corresponding British Standard
ISO 7498-1984	BS 6568 : 1984 Description of basic reference model for open systems interconnection (Identical)

At the time of publication of this Draft for Development, SC21 N 876, to which reference is made in the text, has not yet reached Draft Proposal stage nor has it been issued as a Draft for Development.

0. INTRODUCTION

This standard is Part 3 of the Basic Reference Model for Open Systems Interconnection, ISO7498. The standard extends the basic architecture described in Sections 5.4 of ISO7498.

This standard provides a framework for the identification (naming) and location (addressing) of objects in the Open Systems Interconnection Environments (OSIE) which require intercommunication.

This addendum has sufficient flexibility to accommodate advances in technology and expansion in user demands. This flexibility is also intended to allow the phased transition from existing implementations to OSI standards.

Note - The addendum is expected to be subject to future expansion. Some anticipated directions of extensions are indicated by notes or footnotes in this International Standard.

This standard, in recognition of the above, states the architectural principles which must be followed in the production of any standards which involve the identification (naming) and location (addressing) of objects within the OSIE which require intercommunication.

The architectural principles stated within this standard ensure that any standard produced involving the identification and location of objects within the OSIE which require intercommunication will:

- a) avoid any restrictions on:
 - the functionality that may be made available through current or future International Standards;
 - the functionality of any Real Open System;
 - the internal design of any Real Open System
- b) preserve the principle of layer independence in the OSIE. That is, the internal functioning of one Layer shall not be constrained by any Layer;
- c) preserve the principle of implementation independence in the OSIE, as expressed in clause 4.2 of ISO 7498. That is, no Open System (or administrator thereof) shall be required to know anything about the implementation design of any other Open System (or administration thereof), nor shall any Open System impose such knowledge as a condition for communication using OSI standards;
- d) provide economical support for intercommunication within the OSIE; in particular individual standards produced within the framework

specified by this standard should provide facilities which give adequate levels of performance, reliability, integrity and ease of administration by humans in respect of identifying and locating objects within the OSIE which require intercommunication.

The description of naming and addressing for the OSI environment given in this addendum is developed in stages:

Clause 5 introduces general concepts of naming and addressing;

Clause 6 prescribes, for the OSI environment, the objects named, the operation of addressing and the uses of addressing;

Clause 7 prescribes, for the OSI environment, the objective of naming and addressing and the means employed to meet that objective;

Clause 8 prescribes the nature and use of addressing information in (N)-services;

Clause 9 prescribes the nature and use of addressing information in (N)-protocols;

Clause 10 provides a layer independent description of the layer directory functions necessary to support the addressing structure established by clauses 7, 8 and 9;

Clause 11 prescribes the use of the directory functions in each layer;

Clause 12 defines the nature of addressing demands and registration authorities;

Clause 13 prescribes the registration authorities required for the OSI environment; and

Clause 14 prescribes the requirements for directory services in the OSIE.

1 SCOPE AND FIELD OF APPLICATION

This standard establishes the principles of naming and addressing in OSI. It defines the allocation of naming and addressing functions to each layer of the Basic Reference Model.

This standard is neither intended to be an implementation specification nor a basis for appraising the conformance of implementations.

[ISO page 2]

This publication is a Draft for Development and is therefore not to be regarded as a British Standard. See page 1.

2. REFERENCES

- 2.1 ISO 7498 Information Processing - Open Systems Interconnection - Basic Reference Model.
- 2.2 SC21/N876 OSI Management Framework.

3. DEFINITIONS

The following terms are defined or referenced in this Addendum. The clause references which appear in parentheses indicate clauses in this Addendum which contain additional discussion of the defined term and related concepts.

- 3.1 (N)-address: a name which is used to identify a set of (N)-service-access-points which are unique within the OSIE.

- 3.2 (N)-address-selector: an element of addressing information defined by the local administration of an end system which identifies the set of (N)-SAP's local to the (N)-subsystem.

Note 1: the concept of (N)-address-selectors is only applies above the Network Layer.

Note 2: There is no distinction between a null selector value and the absence of a selector.

- 3.3 (N)-association: a cooperative relationship between two (N)-entities that is formed by their exchange of (N)-protocol-control-information.

- 3.4 calling-(N)-address: an address parameter appearing in an (N)-service request or indication primitive that identifies the (N)-address at the (N)-initiator.

Note: In the service definition of a particular layer, such a parameter may there be referred to as a "calling-(N)-address" or "source-address" or some other name. Throughout this Addendum, however, only the term "calling-(N)-address" is used.

- 3.5 called-(N)-address: an address parameter appearing in an (N)-service request or indication primitive that identifies the (N)-address at the (N)-recipient.

[ISO page 3]

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This publication is a Draft for Development and is therefore not to be regarded as a British Standard. See page 1.

Note: In the service definition of a particular layer, such a parameter may there be referred to as a "called-(N)-address" or "destination-address" or some other name. Throughout this Addendum, however, only the term "called-(N)-address" is used.

- 3.6 descriptive name: a kind of name that identifies an object by means of a set of assertions concerning the properties of the object.
- 3.7 (N)-directory-function: an (N)-function that processes (N)-addresses, (N-1)-addresses, (N)-titles, and (N)-PAI to provide mappings among these categories of information.
- 3.8 generic name: a name of a set of objects such that, when used its effect is to select exactly one member of the set.
- 3.9 global naming-domain: a naming-domain which contains all names of objects of a specific type and within which all of these names are unambiguous.
- 3.10 group-name: a name of a set of objects such that, when used its effect is to select all members of the set.
- 3.11 (N)-initiator: an (N)-entity which issues an (N-1)-request primitive.
- 3.12 name: a linguistic construct which corresponds to an object in some universe of discourse.
- 3.13 naming-authority: a registration authority which allocates names according to specified rules. Where the naming-authority allocates titles, it is known as a title-authority. Where the naming-authority allocates addresses, it is known as an addressing-authority.
- 3.14 naming-domain: the set of all possible names that may be assigned to objects of a particular type. Where the name is a title, the set is known as a title-domain. Where the name is an address, the set is known as an address-domain.
- 3.15 naming-subdomain: a disjoint subset of any naming domain.
- 3.16 primitive name: a kind of name, assigned by a designated naming-authority, the internal structure of which is not required to be understood or to have significance to users of the name.
- 3.17 (N)-recipient: an (N)-entity which receives an (N-1)-indication primitive.

- 3.18 responding-(N)-address: an address parameter appearing in an (N)-service-response or confirm primitive.

Note: In the service definition of a particular layer, such a parameter may be referred to as a "called-address" or "responding address." Throughout this Addendum, however, only the term "responding-(N)-address" is used.

- 3.19 (N)-service-access-point-address: a name used to identify a single (N)-SAP which is unique within the OSIE.
- 3.20 subnetwork point of attachment (SNPA): a point of interface between a real subnetwork and external equipment attached to it.
- 3.21 subnetwork address: an identifier assigned to a subnetwork-point of attachment by the registration authority of the subnetwork.
- 3.22 synonymous name; synonym: a name that identifies an object that is also identified by another distinct name. Synonymous generic names are distinct generic names that name the identical set; synonymous group names are group names that name the identical set.
- 3.23 (N)-title: a name that is used unambiguously to identify an (N)-entity.
- 3.24 universe of discourse: a shared model of some part of a real or hypothetical world which is understood in some way by all participants.

4. ABBREVIATIONS

This Addendum makes use of the following abbreviations:

- | | | |
|-----|----------|-------------------------------------|
| 4.1 | NSAP | Network Service Access Point |
| 4.2 | TSAP | Transport Service Access Point |
| 4.3 | SSAP | Session Service Access Point |
| 4.4 | PSAP | Presentation Service Access Point |
| 4.5 | PCI | Protocol Control Information |
| 4.6 | OSI | Open System Interconnection |
| 4.7 | (N)-CEPI | (N)-Connection-Endpoint-Identifier |
| 4.8 | SNPA | Subnetwork Point of Attachment |
| 4.9 | (N)-PAI | (N)-Protocol Addressing Information |

[ISO page 5]

Documents

5. BASIC CONCEPTS OF NAMING

- 5.1 Names are linguistic constructs expressed in some language. They correspond to objects in some universe of discourse. The correspondence between names (in the language) and objects (in the universe of discourse) is the relation of denoting. A name denotes (identifies) the object to which it is bound.
- 5.2 Within the context of OSI, names denote particular communications objects in the Open Systems Interconnection Environment (OSIE).
- 5.3 Two distinct kinds of names, primitive and descriptive, can be identified. Within any particular universe of discourse, a primitive name is a name assigned by a naming authority to a specific object. A naming authority is simply a source of names. The only constraints imposed upon naming authorities are that all of the names it provides must be:
- (1) expressed in a prescribed language, and
 - (2) distinct.
- 5.4 A descriptive name consists of a set of assertions. These assertions are expressed in some defined formal language. This definition determines those linguistic constructs which are well-formed descriptive names. A descriptive name may be incomplete, in that many objects satisfy all the assertions, or it may be complete, when it serves to identify a single object. A complete descriptive name is functionally equivalent to a primitive name. A primitive name may occur as a part of a descriptive name.
- 5.5 A primitive name must be unambiguous, that is it denotes just one object. However, a particular name need not be the only name that unambiguously denotes the object.

6 OSI NAMING AND ADDRESSING CONCEPTS AND THE CORRECT USE OF ADDRESSES

- 6.1 Within the scope of this standard, (N)-entities are the objects which need to be identified and located. In this context, an (N)-entity is an embodiment of all, or an autonomous part of, the functionality of an (N)-layer which is independently identifiable and locatable.
- 6.2 Within an open system, (N+1)-entities and (N)-entities are bound together by (N)-service-access-points [(N)-SAP's]. The (N)-entities provide services to the (N+1)-entities via the exchange of service primitives through the (N)-SAP's.

[ISO page 6]

- 6.3 An (N)-entity is identified by an (N)-entity-title. An (N)-entity-title provides an identification of an (N)-entity that is independent of the (N-1)-SAP(s) to which it is bound.
- 6.4 An (N+1)-entity is located by its binding to one or more (N)-SAP's. An (N)-SAP is identified by one or more (N)-addresses.

Note: An NSAP address is used to access a transport entity,
a TSAP address is used to access a session entity,
a SSAP address is used to access a presentation entity,
a PSAP address is used to access an application entity.

- 6.5 (N)-addresses have a limited scope. They are used to distinguish among (N)-SAP's, and only (N)-SAP's. Addressing rules shall not be used to make the structure of a real open system visible to the OSI environment.

- 6.6 The correct use of (N)-addresses is as follows:

- a) to distinguish among sets of (N+1)-entities supporting different (N+1)-protocols or sets of (N+1)-protocols;
- b) to accommodate security and management requirements; or
- c) to distinguish among (N+1)-entities bound to different (N)-SAP(s) in order to allow the re-establishment of communication with an invocation of one of these (N+1)-entities.

Note: The (N)-SAP-address alone is not sufficient to allow re-establishment of communication.

- 6.7 The incorrect use of (N)-addresses includes, but is not limited to, the following:

- a) to distinguish among aspects of protocols that are subject to negotiation (classes, subsets, quality of service, protocol versions) or parameter values;
- b) to distinguish between connection-mode and connectionless-mode operation at the (N+1)-layer;
- c) to derive routing information above the network layer; or
- d) to distinguish among hardware components.

Note: In some configuration, the use of an (N)-address as defined in 6.6 can lead to an (N+1)-entity being wholly contained within a single hardware component. In that case, the (N)-address identifies the (N+1)-entity; it does not identify the hardware component.

7 OSI ADDRESSING MODEL

7.1 Associations Between Peer (N)-Entities

7.1.1 An (N)-association is a cooperative relationship between two (N)-entities that is formed by their exchange of (N)-protocol-control-information. Cooperation between two (N)-entities requires the establishment and maintenance of related state information in each (N)-entity. This state information supports an (N)-association between the (N)-entities.

7.1.2 An (N)-entity may support one or more independent (N)-associations at any one time. The communications behavior of the (N)-entity with respect to a specific (N)-association is defined by the (N)-entity-type and by the state information maintained by the (N)-entity which is specific to that (N)-association.

7.1.3 An (N)-association-identifier is associated with each (N)-association. This identifier is unique within the scope of a pair of cooperating (N)-entities. It serves to identify the related state information contained within each (N)-entity. The identifier has two components, one being determined by each (N)-entity.

Note: Certain (N)-layer protocols may not need explicit (N)-association-identifiers.

7.1.4 Two (N)-entities can establish (N-1)-connection(s) to support an (N)-association. The lifetime of an (N)-association may exceed the lifetime of these (N-1)-connection(s). The binding of an (N)-association with (N-1)-connection(s) may change with time.

Note: An (N)-association could be associated with a sequence of (N-1)-connections with a one-to-one binding at any point in time; alternatively, there could be a one-to-many binding at some points.

7.2 Attachment of (N)-Entities to (N)-SAPS

7.2.1 An (N)-entity within the (N)-layer may be attached to one or more (N-1)-SAPs, and to one or more (N)-SAPs. The attachment of an (N)-entity produces a correspondence between the (N)-SAPs and the (N-1)-SAPs.

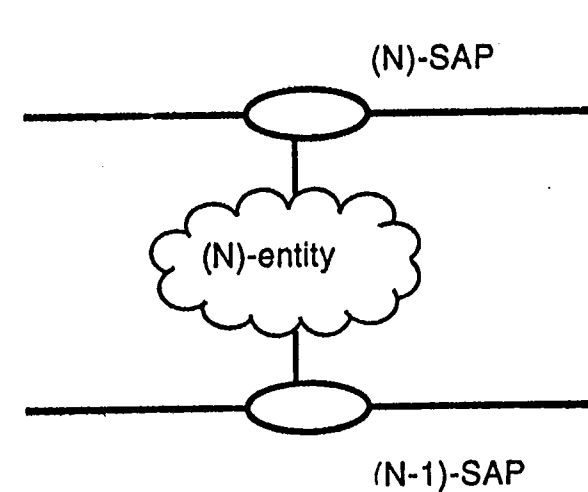
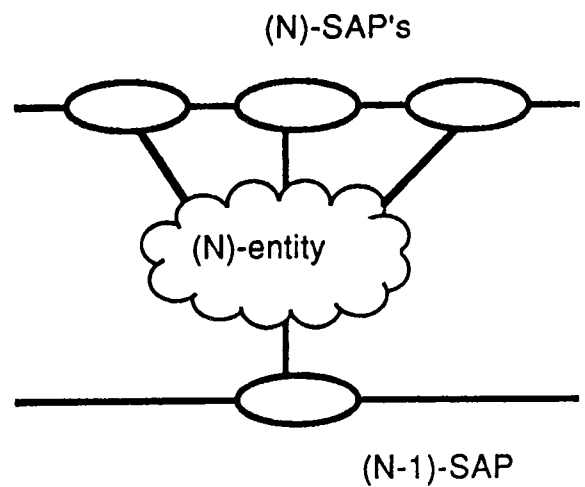
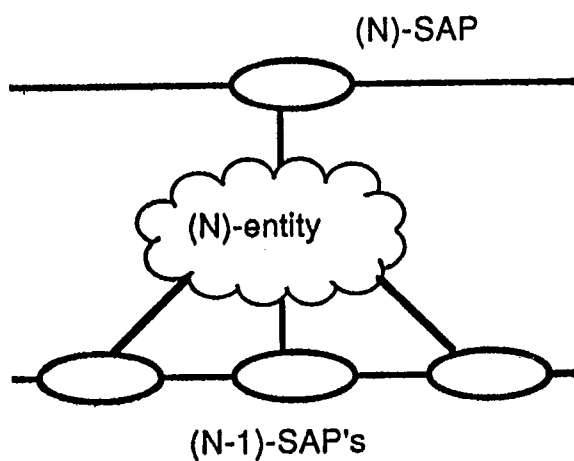
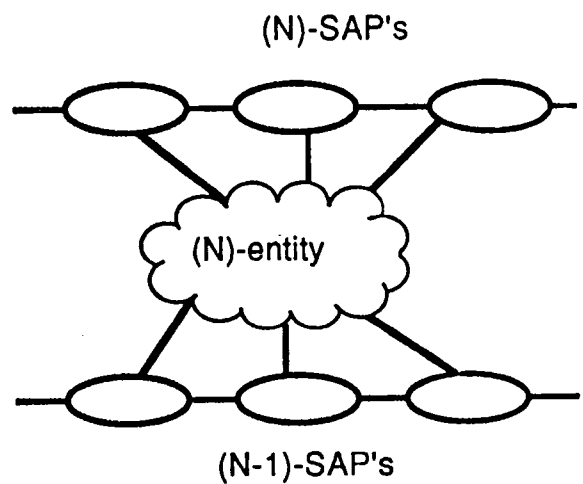
Note: Each (N-1)-SAP and each (N)-SAP has a single (N)-entity attached to it. The (N)-entity is (implicitly) identified by an (N-1)-SAP to which it is attached.

7.2.2 Such correspondences may be of the type (see figure 1):

- a) one-to-one: one (N)-SAP is related to one (N-1)-SAP;
- b) many-to-one: multiple (N)-SAPs are related to one (N-1)-SAP;
- c) one-to-many: one (N)-SAP is related to multiple (N-1)-SAPs;
- d) many-to-many: multiple (N)-SAPs are related to multiple (N-1)-SAPs.

7.2.3 The (N)-SAP correspondences described above have to be clearly distinguished from multiplexing of (N)-connections. There is no relationship between the (N)-SAP/(N-1)-SAP correspondences identified in Figure 1 and multiplexing. An (N)-multiplexing function provides for the mapping of several (N)-connections onto a single (N-1)-connection. The (N)-connections may all terminate in a single (N)-SAP or they may terminate in separate (N)-SAPs. The (N)-connections are distinguished from each other by elements of (N)-PCI.

Note: Logical channel numbers in CCITT recommendation X.25 and connection references in the OSI Transport Protocol ISO 8073 are examples of information exchanged in layer PCI to distinguish connections when multiplexing is used.

**One-to-One Correspondence****Many-to-One Correspondence****One-to-Many Correspondence****Many-to-Many Correspondence****Figure 1 Permitted (N)-SAP Correspondences**