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Draft for Development

Open Systems Interconnection: network layer addressing

(ISO/DIS 8348/DAD 2)

Projet à développer. Interconnexion des systèmes ouverts: Adressage à couches de réseau

Entwurf zur weiteren Ausarbeitung. Kommunikation Offener Systeme:
Schichtadressierung im Netzwerk

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Contents

	BS page		BS page
National foreword	2	10. Reference publication format	29
Committees responsible	Back cover	10.1 Decimal reference publication format	29
		10.2 Hexadecimal reference publication format	29
Draft for Development		Annexes	
0. Introduction	3	A. Network entity titles	30
1. Scope and field of application	3	B. NSAP address allocation	31
2. References	3	C. Rationales	32
		D. Initial assignment of ISO DCC values	35
Section one. General		National appendices	
3. Definitions	5	A. General information on the OSI network layer	37
3.1 Reference model definitions	5	B. British Standards and Drafts for Development for OSI, data communications and computer graphics	38
3.2 Service conventions definitions	5		
3.3 Network layer architecture definitions	5		
3.4 Network addressing definitions	6		
4. Abbreviations	7		
5. Conventions	7		
		Tables	
Section two. Network layer addressing		8-1. AFI allocations	18
6. Concepts and terminology for network layer addressing	8	8-2. AFI values	19
6.1 Network addresses	8	8-3. Maximum DSP length	23
6.2 Domains	10	8-4. Values of g	26
6.3 Authorities	11	8-5. Maximum NSAP address lengths	27
6.4 Network address allocation	12		
7. Principles for creating the OSI network addressing scheme	12	Figures	
7.1 Hierarchical structure of NSAP addresses	12	6-1. Subnetwork address	8
7.2 Global identification of any NSAP	14	6-2. NSAP address	9
7.3 Route independence	14	6-3. Network addressing domains	11
7.4 Service type independence	15	7-1. Hierarchical structure of NSAP addresses	13
8. Network address definition	15	8-1. Relationship of NSAP address semantics and syntax	15
8.1 Network address semantics	16	8-2. NSAP address structure	16
8.2 Network address abstract syntax	17	B-1. NSAP address allocation	31
8.3 Network address encodings	24	9. Provision of OSI network service	37
8.4 Maximum network address length	26	10. Service-mode conversions	38
9. Character based DSP allocation	28		

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 progress of ongoing development within the International Standards Committee (ISO/TC 97/SC 6 Telecommunications and Information Exchange between Systems).

It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

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.

DD 134:1985

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 the Network Layer of the Basic Reference Model for Open Systems Interconnection (OSI).

The text of the Draft for Development is identical with the revised text of the second draft proposed addendum to ISO/DIS 8348 (reference ISO/TC 97 SC 6 N 3444) as approved by ISO/TC 97 SC 6 WG2 in Ottawa, March 1985, and submitted to the International Organization for Standardization (ISO) for issue for DIS ballot.

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

The UK has actively participated through BSI Technical Committee OIS/6 in the development of the 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 via an amendment or revision. When the ISO draft reaches an appropriate level of agreement and stability, this Draft for Development may then be converted to a British Standard.

The revised text of ISO/DIS 8348, i.e. as approved for publication as ISO 8348, has been published as DD 119. ISO/DIS 8348/DAD 1 relates to connectionless-mode operation and the DIS ballot on DAD 1 terminates on 7 August 1985.

The text of DAD 1 has been approved by the BSI technical committee for publication as a national appendix to DD 118 Open Systems Interconnection: protocol to provide the connectionless-mode network service (ISO/DIS 8473).

Other Drafts for Development specify various protocols that, used either singly or in combination, provide either the connection-mode or the connectionless-mode Network Service.

A brief summary of the Network Layer, to assist comprehension of the interrelationship between the various Network Layer publications, is attached as national appendix A.

A Department of Trade and Industry IT Standards Unit Technical Guide, TG 100/1, 'Intercept recommendations for the OSI Network Layer' is currently available from the DTI HQ Library, Room LG37, 1 Victoria Street, London SW1H 0ET.

For information, a list of published British Standards and Drafts for Development (together with those scheduled for publication at the time of publication of this Draft for Development) for OSI, data communications and computer graphics is attached as national appendix B. Press Releases for new OSI and data communications British Standards publications 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 draft Addendum to ISO/DIS 8348 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 word 'Addendum' appears, referring to this Draft for Development, it should be read as 'Draft for Development'.

Cross-references

International standards	Corresponding British Standards
ISO 646:1983	BS 4730 : 1985 Specification for UK 7-bit coded character set Appendix A (Identical)
ISO 7498:1984	BS 6568 : 1984 Description of basic reference model for open systems interconnection (Identical)
ISO 7498/DAD 1	DD 125* Basic reference model for Open Systems Interconnection: connectionless-mode transmission (ISO 7498/DAD 1) (Identical)
ISO/DIS 8348	DD 119 : 1985 Open Systems Interconnection: connection-mode network service definition (ISO/DIS 8348) (Identical)
ISO/DIS 8348/DAD 1	DD 118* Open Systems Interconnection: protocol to provide the connectionless-mode network service incorporating the connectionless-mode service addendum (ISO/DIS 8348/DAD 1) National appendix C (Identical)
ISO/DIS 8509	DD 108* Open Systems Interconnection: service conventions (ISO/DIS 8509) (Identical)
ISO/DP 8648	DD 135* Open Systems Interconnection: internal organization of the network layer (ISO/DP 8648) (Identical)

The Technical Committee has reviewed the provisions of ISO 6523, ISO 2375 and CCITT Recommendations X.121, E.163, E.164 and F.69 and has decided that they are acceptable for use in conjunction with this Draft for Development.

* In preparation.

Information Processing Systems - Data Communications - Network Service Definition

ADDENDUM 2 COVERING NETWORK LAYER ADDRESSING

0. INTRODUCTION

This Addendum to the Network Service Definition Standard, ISO 8348, defines the abstract syntax and semantics of the Network Address (Network Service Access Point Address). The Network Address defined in this Addendum is the address that appears in the primitives of the connection-mode Network Service as the *calling address*, *called address*, and *responding address* parameters, and in the primitives of the connectionless-mode Network Service as the *source address* and *destination address* parameters.

1. SCOPE AND FIELD OF APPLICATION

The scope of this Addendum is the definition of the abstract syntax and semantics of the Network Address. This Addendum does not specify the way in which the semantics of the NSAP address are encoded in Network Layer protocols. The field of application of this Addendum is the same as the field of application described in clause 1 of the Network Service Definition (ISO 8348).

2. REFERENCES

ISO 7498 Information Processing Systems - Open Systems Interconnection - Basic Reference Model

[Note: See also CCITT Recommendation X.200]

DP 7498/DAD1 Information Processing Systems - Open Systems Interconnection - Addendum to the Basic Reference Model Covering Connectionless Data Transmission

TR 8509 Information Processing Systems - Open Systems Interconnection - Service Conventions

ISO 8348 Information Processing Systems - Data Communications - Network Service Definition

[Note: See also CCITT Recommendation X.213]

[ISO page 1]

DD 134:1985

ISO 8348/DAD2

- DIS 8348/DAD1 Information Processing Systems - Data Communications -
Addendum to the Network Service Definition Covering
Connectionless Data Transmission
- DP 8648 Information Processing Systems - Data Communications -
Internal Organization of the Network Layer
- ISO 6523 Data Interchange - Structure for the Identification of
Organizations
- ISO 646 7-bit Coded Character Set for Information Processing
Interchange
- ISO 2375 Procedure for the Registration of Escape Sequences
- CCITT X.121 International Numbering Plan for Public Data Networks
- CCITT E.163 Numbering Plan for the International Telephone Service
- CCITT E.164 The Numbering Plan for the ISDN Era
- CCITT F.69 Plan for Telex Destination Codes

TEMPORARY NOTE

The list of References in the published Addendum will contain only approved ISO Standards and CCITT Recommendations; items may need to be subtracted from, or added to, the current list.

[ISO page 2]

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SECTION ONE - GENERAL

3. DEFINITIONS

3.1 Reference Model Definitions

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

- a) Network layer
- b) Network service
- c) Network service access point
- d) Network service access point address
- e) Network entity
- f) Routing
- g) Network address
- h) Network protocol control information
- i) Network protocol data unit

3.2 Service Conventions Definitions

This Addendum makes use of the following terms defined in ISO 8509:

- j) Service user
- k) Service provider

3.3 Network Layer Architecture Definitions

This Addendum makes use of the following terms defined in ISO 8648 (Internal Organization of the Network Layer):

- l) Subnetwork
- m) Real subnetwork
- n) Subnetwork service
- o) Real end system
- p) Interworking unit
- q) Intermediate system

3.4 Network Addressing Definitions

This Addendum makes use of the following terms as defined below:

- r) DTE address: information used to identify a point of attachment to a public data network.
- s) Subnetwork point of attachment: a point at which a real end system, interworking unit, or real subnetwork is attached to a real subnetwork, and a conceptual point at which a subnetwork service is offered within an end or intermediate system.
- t) Subnetwork address (Subnetwork point of attachment address): information used in the context of a particular real subnetwork to identify a subnetwork point of attachment, or information used in the context of a particular subnetwork to identify the point at which the subnetwork service is offered within an end or intermediate system.
- u) Network protocol address information: information encoded in a network protocol data unit to carry the semantics of an NSAP address. (This is known as an "address signal" or as the "coding of an address signal" in the Public Data Network environment.)
- v) Naming Domain: a context within which a name allocated by a naming authority is unambiguous. Where the name is an address, the context within which the name is allocated is called an addressing domain.
- w) Global network addressing domain: an addressing domain consisting of all Network Service Access Point addresses in the OSI environment.
- x) Network addressing domain: a subset of the global network addressing domain consisting of all of the NSAP addresses allocated by one or more addressing authorities.
- y) Naming Authority: that which allocates names from a specified naming domain, and which ensures that names so allocated are unambiguous. Where the naming authority allocates addresses, it is called an addressing authority.
- z) Network addressing authority: an addressing authority that assigns and administers NSAP addresses within one or more network addressing domains.
- aa) Abstract syntax: a notation which enables data types to be defined, and values of those types specified, without determining the way in which they will be represented (encoded) for transfer by protocols.

4. ABBREVIATIONS

This Addendum makes use of the following abbreviations:

- a) NSAP - Network Service Access Point
- b) NPAI - Network Protocol Addressing Information
- c) DCC - Data Country Code
- d) CC - Country Code
- e) ICD - International Code Designator
- f) PSTN - Public Switched Telephone Network
- g) ISDN - Integrated Services Digital Network
- h) IDP - Initial Domain Part
- i) AFI - Authority and Format Identifier
- j) IDI - Initial Domain Identifier
- k) DSP - Domain Specific Part
- l) NPDU - Network Protocol Data Unit
- m) SNPA - Subnetwork Point of Attachment

5. CONVENTIONS

No particular standard conventions are invoked by this Addendum.

[ISO page 5]

SECTION TWO - NETWORK LAYER ADDRESSING

6. CONCEPTS AND TERMINOLOGY FOR NETWORK LAYER ADDRESSING

6.1 Network Addresses

This Addendum defines the Network Service Access Point (NSAP) address. Since the term "network address" is commonly used in different contexts to refer to different things, a more specific description of this concept is introduced below.

6.1.1 Subnetwork Address

In one context, the term "network address" may be used to refer to the point at which a *real end system*, *real subnetwork*, or *interworking unit* is attached to a real subnetwork, or to the point at which the subnetwork service is offered within an end or intermediate system. In the case of attachment to a public data network, this point is called a DTE/DCE interface, and the term "DTE address" is used in reference to it.

The specific term *subnetwork address* (or *subnetwork point of attachment address*) is used in this case, as illustrated in Figure 6-1:

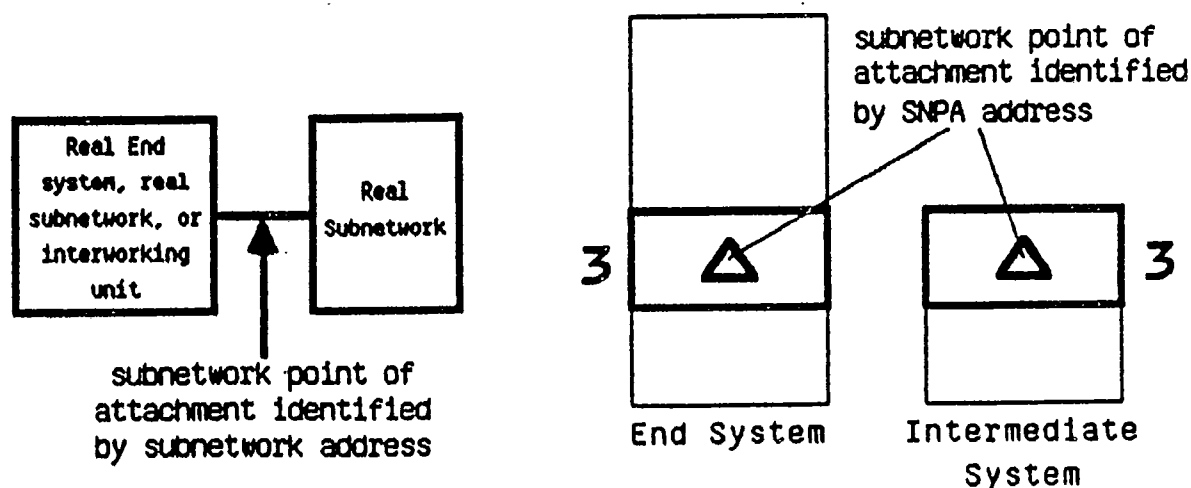


Figure 6-1 - Subnetwork Address

[ISO page 6]

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The subnetwork address is the information that a real subnetwork needs to identify a particular real end system, another real subnetwork, or interworking unit that is attached to that real subnetwork.

In the public network environment, the subnetwork address is what the public network operates on.

NOTE

The point identified by a subnetwork address is a point of interconnection between a real end system or interworking unit and a real subnetwork (in particular, in a public data network environment, a DTE/DCE interface), and is not an OSI Service Access Point.

6.1.2 NSAP Address

In another context, the term "network address" is used to refer to the *Network Service Access Point* (NSAP) at which the *OSI Network Service* is made available to a Network Service user by the Network Service provider.

The specific term *NSAP address* is used in this case, as illustrated in Figure 6-2:

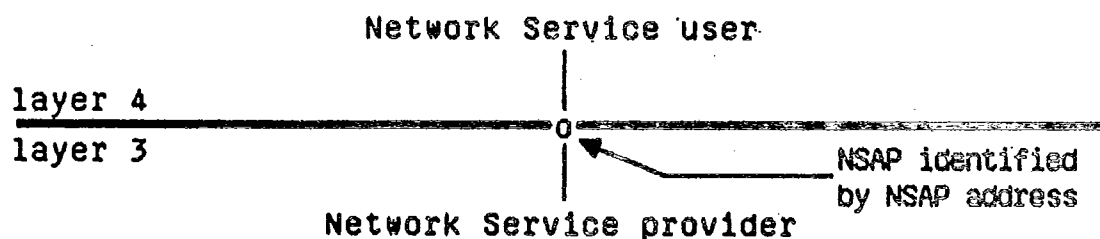


Figure 6-2 - NSAP Address

The NSAP address is the information that the OSI Network Service provider needs to identify a particular Network Service Access Point. The values of the *called address*, *calling address*, and *responding address* parameters in the N-CONNECT primitive, of the *responding address* parameter in the N_DISCONNECT primitive, and of the *source address* and *destination address* parameters in the N-UNITDATA primitive, are NSAP addresses.

Note that since the Network Service primitives are conceptual, no particular encoding of the NSAP address is specified by the Network Service Definition.

In both CCITT and ISO usage, the terms "Network Address" (with both the N and the A printed in capital letters) and "global network address" are synonymous with the term "NSAP address". Use of the term "NSAP

address" is preferred when it is essential to avoid confusion, particularly in spoken references where "capitalization" is not possible.

6.1.4 Network Protocol Address Information

In a third context, the term "network address" is used to refer to an address that is carried as *network protocol control information* in a network protocol data unit (NPDU).

The specific term *network protocol address information* (NPAI) is used in this case.

In the public network environment, NPAI is also known as an "address signal" or as the "coding of an address signal".

There is a relationship between the NSAP address that appears in Network Service primitives and the NPAI that appears in a Network Layer protocol, in that the semantics of the NSAP address is preserved by the NPAI. The precise encoding of NPAI is defined by Network Layer Protocol standards, which also specify the relationship between the NSAP address and the NPAI encoding employed by the protocol.

6.2 Domains

6.2.1 Global Network Addressing Domain

The *global network addressing domain* is an addressing domain consisting of all NSAP addresses in the OSI environment.

6.2.2 Network Addressing Domain

A *network addressing domain* is a subset of the global network addressing domain consisting of all of the NSAP addresses that are assigned by one or more addressing authorities. Every NSAP address is part of a network addressing domain that is administered directly by one and only one addressing authority. If that network addressing domain is part of a (hierarchically) higher addressing domain (which must wholly contain it), the authority for the (hierarchically) lower domain is authorized by the authority for the higher domain to assign NSAP addresses from the lower domain. All network addressing domains are in this way ultimately part of the global network addressing domain, for which the addressing authority is this Addendum.

The relationship of the concepts of clauses 6.2.1 and 6.2.2 is illustrated by Figure 6-3:

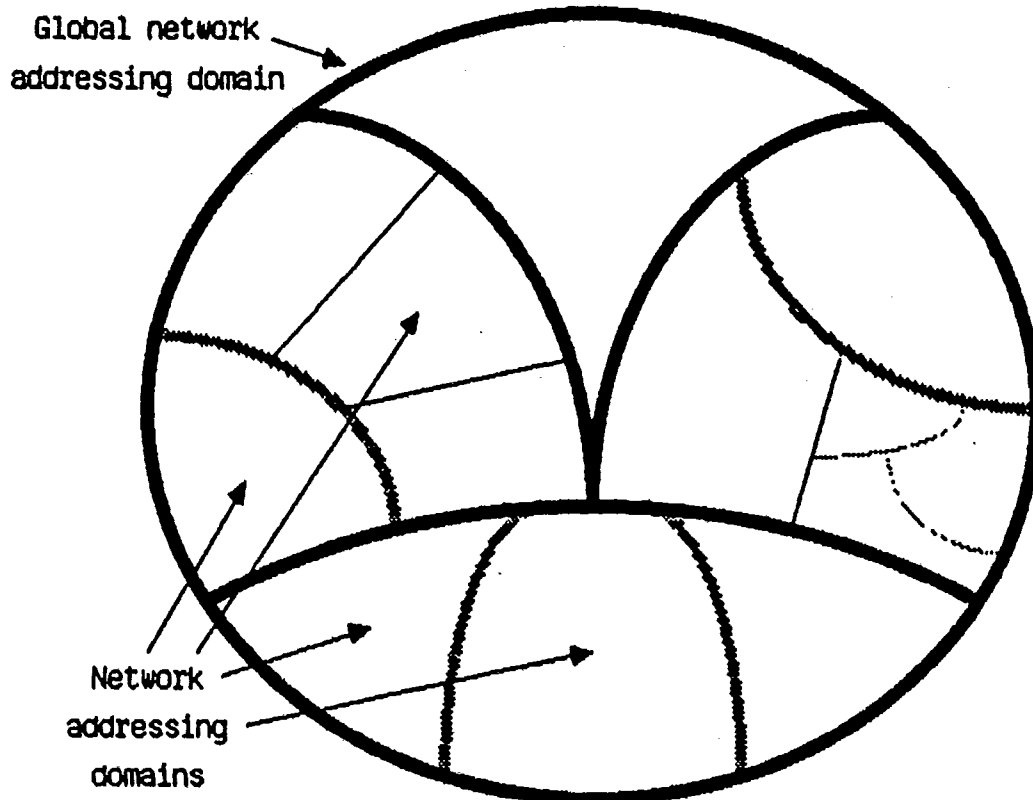


Figure 6-3 - Network Addressing Domains

6.3 Authorities

The uniqueness of identifiers within a network addressing domain is ensured by an *authority* associated with that domain. The term "authority" does not necessarily refer to an organization or administration; it is intended to refer to whatever it is (in an abstract sense) that ensures the uniqueness of identifiers in the associated domain.

[ISO page 9]

DD 134:1985

A network addressing domain is characterized by the addressing authority that administers the domain and by the rules that are established by that authority for specifying identifiers and identifying subdomains. The authority responsible for each domain determines how identifiers will be assigned and interpreted within that domain, and how any further subdomains will be created.

The operation of an authority is independent of that of other authorities on the same level of the hierarchy, subject only to any common rules imposed by the parent authority.

6.4 Network Address Allocation

An addressing authority shall either allocate complete NSAP addresses, or shall authorize one or more other authorities to allocate addresses. Each address allocated by an addressing authority shall include a domain identifier which identifies the allocating authority. An address shall not be allocated to identify a domain or NSAP if the address has previously been allocated to some other domain or NSAP, unless the authority can ensure that all use of the previous allocation has ceased.

The authority shall ensure that allocations are made in such a way that efficient use is made of the address space.

7. PRINCIPLES FOR CREATING THE OSI NETWORK ADDRESSING SCHEME

7.1 Hierarchical Structure of NSAP Addresses

NSAP addresses are based on the concept of hierarchical addressing domains, as explained in clause 6. Each domain may be further partitioned into subdomains. Accordingly, NSAP addresses have a hierarchical structure.

The conceptual structure of NSAP addresses follows the principle that, at any level of the hierarchy, an initial part of the address unambiguously identifies a subdomain, and the rest is allocated by the management of the subdomain to unambiguously identify either a lower level subdomain or an NSAP within the subdomain. The part of the address that identifies the subdomain depends on the level at which the address is viewed.

[ISO page 10]

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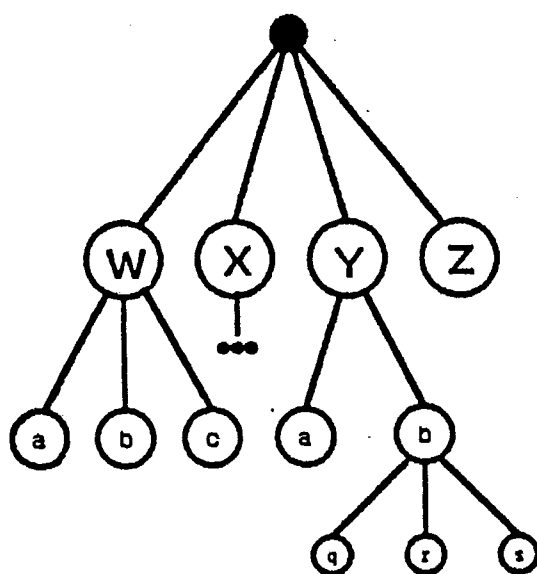
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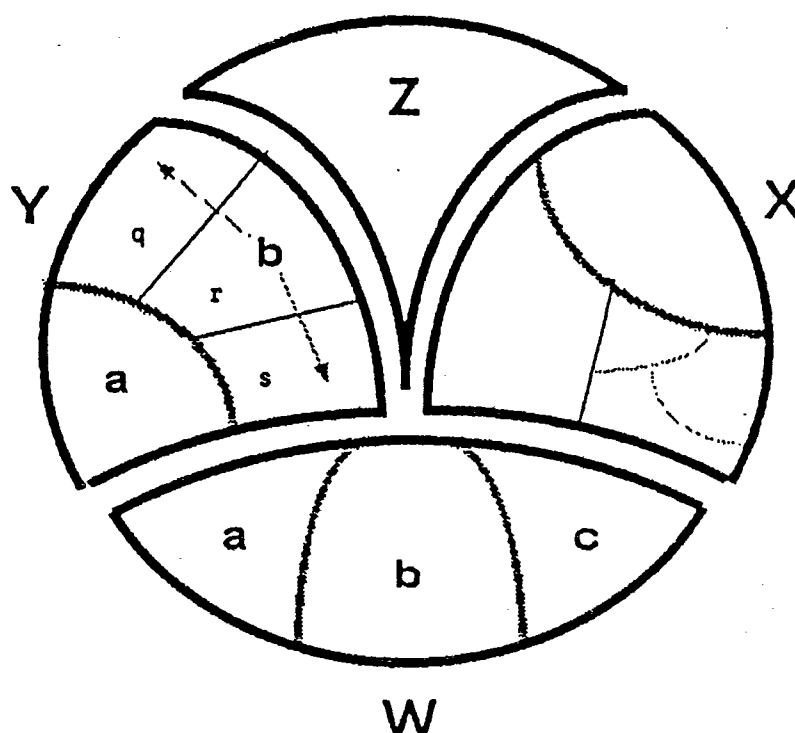
This conceptual structure should not be considered as implying any detailed administration of NSAP addresses.

Graphical representation of the hierarchical structure of NSAP addresses may be made according to an inverted tree diagram, as in Figure 7-1 (a), or a domain diagram, as in Figure 7-1 (b):



- W Subdomains of the global network addressing domain
- a Subdomains of W and Y
- q Subdomains of b

(a) Inverted Tree Diagram



(b) Domain Diagram

Figure 7-1 - Hierarchical Structure of NSAP Addresses