The System field identifies a unique system (ES or IS) within an Area. The format, value, structure and meaning of this field is left to the discretion of its administrator.

The NSAP Selector field identifies a direct user of the Network Layer service, usually a Transport entity. (The NSAP Selector may also identify other direct users of the Network Service if required by the Acquisition Authority.) GOSIP allows a system administrator to configure NSAP Selector-to-Transport entity mappings because, for example, several transport entities may co-exist in some systems.

References

[1] Lyman Chapin. *Proposed ANS for the Structure of the DSP Part of the NSAP Address When the ISO DCC IDI Format is used with the ISO DCC Code '840'*. Technical Report 1990-26, ANSI X3S3.3, (forthcoming).

[2] Richard Colella, Ella Gardner, and Ross Callon. *Guidelines for OSI NSAP Allocation in the Internet*. Technical Report, (Pending Publication).

[3] GOSIP Advanced Requirements Group. *Government Open Systems Interconnection Profile (GOSIP) Version 2 [Final Text]*. Federal Information Processing Standard, U.S. Department of Commerce, National Institute of Standards and Technology, Gaithersburg, MD, (Pending Publication).

[4] GOSIP Advanced Requirements Group. *Government Open Systems Interconnection Profile (GOSIP) Version 1*. Federal Information Processing Standard 146, U.S. Department of Commerce, National Institute of Standards and Technology, National Technical Information Service, Springfield, VA, August 1988.

[5] ISO/IEC. *Information Processing Systems – Data Communications – Network Service Definition Addendum 2: Network Layer Addressing*. International Standard 8348/Addendum 2, ISO/IEC JTC 1, Switzerland, 1988.

[6] ISO/IEC. *Intermediate System to Intermediate System Intra-Domain Routeing Exchange Protocol for use in Conjunction with the Protocol for Providing the Connectionless-mode Network Service (ISO 8473)*. Draft International Standard 10589, ISO/IEC JTC 1, Switzerland, November 1990.

responsibilities to further structure and assign NSAP addresses. The hierarchical decomposition of Routing Domains into subdomains may greatly reduce the resources required in the maintenance, computation and storage of routing information.

This GOSIP makes provisions for the establishment of Administrative Domains, Routing Domains and one level of routing subdomains (called Areas). This decomposition of the routing environment allows, where appropriate, administrative entities to request the delegation of responsibility for the organization and administration of their systems and subnetworks. The provision of two levels of routing structures within an Administrative Domain will allow Administrative Authorities to engineer routing configurations that best serve their individual needs.

Figure 5.1.3 depicts the GOSIP NSAP address structure. This structure is mandatory for addresses allocated from the ICD 0005 addressing domain.

IDP		DSP						
AFI	IDI							
47	0005	DFI	Admin Author.	Reserved	Routing Domain	Area	System	NSel
1	2	1	3	2	2	2	6	1

(octets)

Figure 5.1.3 GOSIP NSAP Address Structure

The DSP Format Identifier (DFI) specifies the structure, semantics and administration requirements associated with the remainder of the DSP. This field provides for graceful support of future DSP structures should the need arise. Currently, only one DSP format (DFI=10000000) is defined under ICD 0005. The remainder of this section describes this DSP format.

The Administrative Authority field identifies the entity that is responsible for the organization of ISs and ESs into Routing Domains and Areas; the allocation and assignment of the remaining portion of the DSP; and the policies that govern the dissemination of information within and external to the Administrative Domain. Note that it is unlikely that a large number of Federal Government organizations will establish their own Administrative Domains. Instead, it is more likely that Administrative Domains will be established for collective organizations that autonomously operate large inter-networks and that individual organizations would correspondingly be delegated authority for Routing Domains or Areas.

The Reserved field is positioned to be available for encoding higher level routing structures above those of the routing domain or to be used to expand either the Administrative Authority or the Routing Domain fields in future DSP formats should the need arise.

The Routing Domain field identifies a unique Routing Domain within an Administrative Domain.

The Area field identifies a unique subdomain of the Routing Domain.

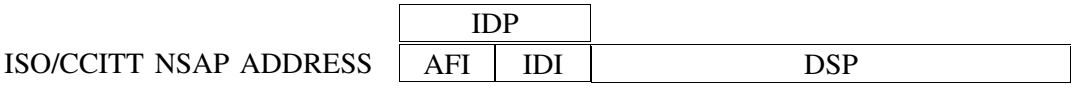


Figure 5.1.1 NSAP Address Structure

The National Institute of Standards and Technology (NIST) has been designated as the authority to administer the addressing domain identified by IDI value 0005 under AFI 47. The AFI value of decimal 47 specifies that the IDI part is interpreted as a four decimal digit International Code Designator (ICD) and that the DSP has a binary abstract syntax. ICDs are allocated and assigned by ISO [ISO 27] and identify international organizations that are the authorities for address administration for an addressing subdomain.

The addressing domain identified by ICD 0005 shall be available for use by all of the Federal Government. The NIST shall specify the structure and semantics of the DSP associated with ICD 0005 and delegate the task of administering the assignment of DSP values to the General Services Administration (GSA). This is summarized in Figure 5.1.2.

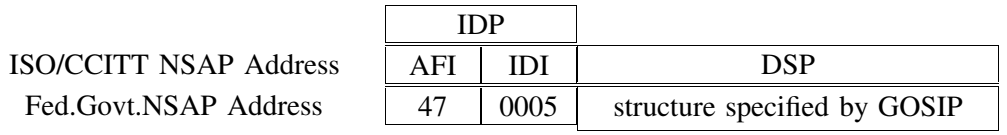


Figure 5.1.2 The NIST ICD Addressing Domain

NSAP addresses, encoded as NPAI in appropriate NPDUs, serve as the primary input to the routing and relaying functions of protocol entities providing the Network Service. As such, the semantics of NSAP addresses must convey information required for routing as well as address administration.

The basic principles of Network Layer routing, as defined in the OSI Routing Framework [ISO 48], include:

- The global OSI environment will consist of a number of Administrative Domains. An Administrative Domain consists of a collection of End Systems (ESs) and Intermediate Systems (ISs), and subnetworks operated by a single entity or Administrative Authority. The Administrative Authority is responsible for the organization of ESs and ISs into Routing Domains; the further structuring and assignment of NSAP addresses; the policies that govern the information that is collected and disseminated both internally and externally to the Administrative Domain; and, the establishment of subdomains and the corresponding delegation of responsibilities.
- A Routing Domain is a set of ESs and ISs which operate according to the same routing procedures and which is wholly contained within a single Administrative Domain. An Administrative Authority may delegate to the entity responsible for a Routing Domain the

Note that CLNP encodes NSAP addresses using the *preferred binary encoding*, as defined in [5].]

5.1.1 NSAP Address Administration, Routing Structures and NSAP Address Structure

Network Service Access Point (NSAP) addresses specify the points where the communication capability of the Network Layer (i.e., the Network Service) is made available to its users. In effect they address the direct users of the Network Service, normally transport entities. The semantics of NSAP addresses are encoded into Network Protocol Address Information (NPAI) and conveyed in the appropriate protocol data units (PDUs) between protocol entities providing the Network Service.

The basic principles of Network Layer addressing, as defined in Addendum 2 to the Network service definition [ISO 5], include:

- NSAP address administration is based on the concept of hierarchical Addressing Domains. An Addressing Domain is a set of addresses interrelated by virtue of being administered by a common authority. The term authority refers to the entity that specifies the structure and ensures the uniqueness of identifiers in the associated domain. In practice the structure of NSAP addresses reflects this administrative hierarchy in that, at any level of the hierarchy, an initial part of the address unambiguously identifies the Addressing (sub) Domain.
- The first three levels of the NSAP addressing domain are standardized and result in the NSAP address structure in Figure 5.1.1. The Initial Domain Part (IDP) of the address consists of two parts, the Authority and Format Identifier (AFI) and the Initial Domain Identifier (IDI). The AFI specifies the format of the IDI, the authority that is responsible for allocating IDI values, and the syntax used to represent the Domain Specific Part (DSP). The IDI is interpreted according to the value of the AFI and its value identifies the authority responsible for the structure and assignment of DSP values. The DSP is allocated and assigned by the authority specified by the IDP part.

The recommended DSP format for use in the U.S. portion of the Internet which is addressed under the IDP with AFI=47 and IDI=0005 is that specified in Section 5.1.1 of GOSIP Version 2[1] (this section is reproduced for reference as Appendix A). There are primarily three reasons for recommending this format:

- it is consistent with the emerging OSI intra-domain routing protocol in DIS 10589 [6],
- it will encourage a uniform addressing scheme throughout the Internet (both government and non-government), and,
- its alignment with GOSIP Version 2 means that it is likely to be supported in vendor products.

For the part of the U.S. Internet which is addressed based on the ANSI-regulated U.S. DCC (Data Country Code) prefix, the precise format is outside of the scope of this standard. There is a proposal in ANSI X3S3.3 [1] to create an American National Standard (ANS) for the DSP structure under the U.S. DCC. This will provide a structure for the DSP which is similar to that specified within GOSIP Version 2. This document is in technical alignment with the current ANSI proposal. For more information, contact the chair of X3S3.3.

For the part of the Internet which is outside the U.S., again the precise format is outside the scope of this standard. However, it is recommended that the DSP portion of the address be structured similarly to that specified within GOSIP Version 2.

A Appendix: Extract from GOSIP Version 2

[This appendix contains a copy of Section 5.1.1 from GOSIP Version 2, which describes the GOSIP Version 2 NSAP structure.

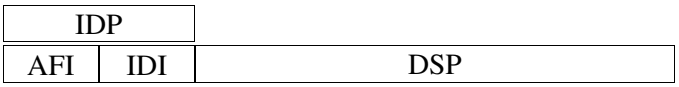
Addendum 2 to the Network layer service definition [5] defines two representations for NSAP addresses. The *abstract syntax* is a descriptive device used for people to discuss and write NSAP addresses; it dictates the form taken on paper.

The *encoding* is how the NSAP addresses are represented in protocol data units. The encoding is a mapping from the abstract syntax to the octets carried in a protocol.

The AFI, IDI, and DFI values in the GOSIP excerpt are presented in their abstract syntax:

Field	Abstract Syntax	Value
AFI	decimal	47
IDI	decimal	0005
DFI	binary	1000 0000

[1]GSA will accept requests from non-U.S. government organizations for NSAP addressing authority under the GOSIP Version 2 NSAP structure. See [2] for more information.



IDP Initial Domain Part
AFI Authority and Format Identifier
IDI Initial Domain Identifier
DSP Domain Specific Part

Figure 1: ISO/CCITT NSAP address structure.

1 Introduction

The Internet is moving towards a multi-protocol environment that includes OSI. To support OSI, it is necessary to address network layer entities and network service users. The basic principles of OSI Network Layer addressing and Network Service Access Points (NSAPs) are defined in Addendum 2 to the Network service definition [5]. These principles include NSAP address administration based upon the concept of hierarchical addressing domains and international standardization of the topmost levels of global NSAP addressing domain. The Initial Domain Part (IDP) of an NSAP address identifies the authority responsible for the structure and assignment of the remainder of the address, the Domain Specific Part (DSP) (see Figure 1). For example, an IDP may identify a country's ISO Member Body, such as ANSI in the U.S. or BSI in the UK, or an organization of international standing, such as the U.S. National Institute of Standards and Technology (NIST).

While [5] ensures coordination of the format and assignment of IDPs, it places no constraint on the structure of DSPs, leaving such decisions to those who implement and deploy OSI. To support OSI in the Internet requires that a choice be made as to the appropriate DSP format.

The manner in which NSAPs are assigned is strongly related to the ability to aggregate address information at the boundaries of routing domains and confederations of domains. The ability to achieve address aggregation at these boundaries is important to allow efficient routing in very large internets. The relationship between address assignment, address aggregation, and routing efficiency is beyond the scope of this document. Detailed discussion of these issues is the subject of a forthcoming document [2].

2 Recommended DSP Format

NSAP addresses for use within the U.S. portion of the Internet are expected to be based primarily on two address prefixes: the IDP format administered for NIST by GSA and the DCC format administered by ANSI.

Network Working Group
INTERNET DRAFT

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February 12, 1991

OSI NSAP Address Format For Use In The Internet

Status of This Memo

This draft document will be submitted to the RFC editor as a protocol specification. Distribution of this document is unlimited. Comments should be sent to Richard Colella ("colella@osi3.ncsl.nist.gov").

Abstract

The Internet is moving towards a multi-protocol environment that includes OSI. To support OSI, it is necessary to address network layer entities and network service users. The basic principles of OSI Network Layer addressing and Network Service Access Points (NSAPs) are defined in Addendum 2 to the OSI Network service definition. This internet draft recommends a structure for the Domain Specific Part of NSAP addresses for use in the Internet that is consistent with these principles.

NOTE

This document is aligned with U.S. GOSIP Version 2 [3]. The final text of the technical specification is available as of January 1991.

An errata to GOSIP Version 1 [4] became effective in August 1990 mandating use of the GOSIP Version 2 NSAP format with Version 1. The errata is an official part of the GOSIP Version 1 FIPS; it is published as a section within GOSIP Version 2.

This document is also aligned with the current work in ANSI X3S3.3 on the DSP structure for NSAP addresses under the U.S. Data Country Code.