Internet Code Point Assignments for NSAP Addresses
draft-gray-rfc1888bis-03

Abstract

This document is intended to accomplish two highly inter-related tasks: to establish an "initial" Internet Code Point (ICP) assignment for each of IPv4 and IPv6 address encoding in Network Service Access Point (NSAP) Addresses, and to recommend an IANA assignment policy for currently unassigned ICP values. In the first task, this document is a partial replacement for RFC 1888 – particularly for section 6 of RFC 1888. In the second task, this document incorporates wording and specifications from ITU recommendation X.213 and further recommends that IANA use the "IETF consensus" assignment policy in making future ICP assignments.
1. Introduction

Section 6 of RFC 1888 [1888] previously provided for assignment of the initial Internet Code Point (ICP) value ‘0’ for encoding an IPv6 address in a Network Service Access (or Attachment) Point (NSAP) address. RFC 1888 also defined multiple means for restricted encoding of an NSAP address in an IPv6 address.

The means RFC 1888 defined for encoding NSAP addresses in IPv6 address format, was heavily annotated with warnings and limitations that apply should this encoding be used. Possibly as a result, these encodings are not used and appear never to have been used in any IPv6 deployment. In addition, section 6 contains minor errors. As a result of these various considerations, RFC 1888 [1888] has been obsoleted and declared Historic by RFC 4048 [4048].

It is the belief of the authors of this document that the errors in section 6 of RFC 1888 were - at least in part - the result of the fact that the ITU specification [X.213] that originally assigned Authority and Format Indentifier (AFI) 35 to IANA was not freely publicized, nor was it incorporated or explained using the mechanism commonly used in the IETF - i.e. - via an RFC.

It is therefore part of the purpose of this document to provide that explanation.

In addition, because there are other documents that refer to the IPv6 ICP assignment in RFC 1888, it is necessary for the errors in section 6 of RFC 1888 to be corrected - irrespective of the RFC’s ultimate status.

Finally, no previous RFC - including RFC 1888 - has ever formalized an assignment of an IPv4 ICP. This may have been - in part - because of a lack of formal definition of an IANA assignment policy for ICP values under the IANA allocated AFI (35).
IPv6 address encoding in an NSAP address - and - formalizes the ICP assignment for IPv4 address encoding in an NSAP address.

1.1. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [2119].

1.2. Acronyms and Terminology

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFI</td>
<td>Authority and Format Identifier</td>
</tr>
<tr>
<td>BCD</td>
<td>Binary Coded Decimal</td>
</tr>
<tr>
<td>DSP</td>
<td>Domain Specific Part</td>
</tr>
<tr>
<td>IANA</td>
<td>Internet Assigned Number Authority</td>
</tr>
<tr>
<td>ICP</td>
<td>Internet Code Point</td>
</tr>
<tr>
<td>IDI</td>
<td>Initial Domain Identifier</td>
</tr>
<tr>
<td>IDP</td>
<td>Initial Domain Part</td>
</tr>
<tr>
<td>IETF</td>
<td>Internet Engineering Task Force</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standardization Organization</td>
</tr>
<tr>
<td>NSAP</td>
<td>Network Service Access (or Attachment) Point (often NSAPA)</td>
</tr>
<tr>
<td>NSAPA</td>
<td>NSAP Address; 20 Octet Address Format</td>
</tr>
<tr>
<td>OSI</td>
<td>Open Systems Interconnect</td>
</tr>
<tr>
<td>RFC</td>
<td>Request For Comments</td>
</tr>
<tr>
<td>WIP</td>
<td>Work In Progress</td>
</tr>
</tbody>
</table>

2. IANA Considerations

An ITU Recommendation [X.213] has allocated two AFI designating IANA as the assignment authority. One of these two AFI (‘34’) is allocated for assignment of NSAPA in Decimal Numeric Format. This document does not address allocation for this AFI as it is not clear what - if any - use can be made of this encoding format at this time. The other AFI (‘35’) is to be used for binary encoding except as noted below.

The NSAPA format consists of an Initial Domain Part (IDP) and Domain Specific Part (DSP). The IDP, in turn, consists of an Authority and Format Identifier (AFI) and an Initial Domain Identifier (IDI). The AFI is defined to be a binary octet and the IDI is defined to be four decimal encoded in two octets using Binary Coded Decimal format. Each nibble of the IDI is used to represent a decimal digit - using binary value ‘0000’ through ‘1001’.

In assigning allocation authority for AFI ‘35’ to IANA, ITU-T recommendation specifies that the two octet IDI will be used to hold an Internet Code Point (ICP) which - because of the decimal encoding - MUST be in the decimal range from ‘0’ to ‘9999’.

The ITU recommendation assumes the assignment of ICP ‘0’ (zero) for IPv6 address encoding in an Network Service Access Point Address (NSAPA or - often - NSAP). In addition, ITU-T assumed that IANA would assign an ICP for IPv4 address encoding in an NSAPA and X.213 assumes that the ICP value for this purpose would be ‘1’.
In an NSAPA, the DSP is the remaining octets after the IDP. For API ‘35’, this is 17 octets having a format as defined by IANA – or as defined by another party and published with IANA consent.

IANA – as the Authority responsible for the Authority and Format Identifier (AFI) ‘35’ – SHOULD NOT assign an ICP unless there is a corresponding defined, and published, format at the time of the code point assignment.

Given consent of IANA, the following ICP values are assigned on approval of this document:

<table>
<thead>
<tr>
<th>ICP Value</th>
<th>Address Encoding</th>
<th>Format Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘0’</td>
<td>IPv6</td>
<td>&lt;this document&gt;, section 3.2</td>
</tr>
<tr>
<td>‘1’</td>
<td>IPv4</td>
<td>&lt;this document&gt;, section 3.1</td>
</tr>
</tbody>
</table>

Remaining decimal values ‘2’ through ‘9999’ MUST be assigned on an IETF consensus basis [2434].

3. Initial Allocations and Uses

This document continues the ICP assignment and format definition as previously defined in RFC 1888, and formalizes the allocation of ICP value ‘1’ for IPv4 encoding and the format to be used. The sections below describe the specific IPv4 and IPv6 address encoding formats.

3.1. IPv4 Address Encoding in an NSAPA

If it is required, for whatever reason, to embed an IPv4 address inside a 20-octet NSAP address, then the following format MUST be used. Note: alignment is an artifact of existing NSAPA usage.

A specific possible use of this embedding is to express an IP address within the ATM Forum address format. Another possible use would be to allow CLNP packets that encapsulate IPv4 packets to be routed in a CLNP network using the IPv4 address architecture. Several leading octets of the IPv4 address could be used as a CLNP routing prefix.

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An NSAPA with an AFI value of ‘35’ and an ICP value of ‘1’ (one) encodes a 4 octet IPv4 address in the first 4 octets of the DSP. The last 13 octets of the DSP are unspecified in this document. To maintain compatibility with both NSAP format and IPv4 addressing, these octets MUST be present, but have no intrinsic significance for IPv4. The default values for the unspecified octets is zero.
An NSAPA with the IANA AFI code and ICP set to ‘1’ (one) is converted to an IPv4 address by stripping off the first 3 and the last 13 octets. If the NSAP addressed contents are passed to a higher layer, the last 13 octets SHOULD be presented to the higher layer as well.

If an NSAP address using this encoding is used for routing in an IPv4 routing architecture, only the 4 octet IPv4 address MAY be considered.

3.2. IPv6 Address Encoding in an NSAPA

If it is required, for whatever reason, to embed an IPv6 address inside a 20-octet NSAP address, then the following format MUST be used. Note: alignment is an artifact of existing NSAPA usage.

A specific possible use of this embedding is to express an IP address within the ATM Forum address format. Another possible use would be to allow CLNP packets that encapsulate IPv6 packets to be routed in a CLNP network using the IPv6 address architecture. Several leading octets of the IPv6 address could be used as a CLNP routing prefix.

An NSAPA with an AFI value of ‘35’ and an ICP value of ‘0’ (zero) encodes a 16 octet IPv6 address in the first 16 octets of the DSP. The last octet of the DSP is a selector. To maintain compatibility with both NSAP format and IPv6 addressing, this octet MUST be present, but it has no intrinsic significance for IPv6. Its default value is zero, but other values may be used as specified for any specific application. For example, this octet may be used to specify one of 255 possible port numbers.
higher layer, the last octet SHOULD be presented to the higher layer as well.

If an NSAP address using this encoding is used for routing in an IPv6 routing architecture, only the 16 octet IPv6 address MAY be considered.

4. Security Considerations

The NSAP encoding of IPv4 and IPv6 addresses is compatible with the corresponding security mechanisms of RFC 2401 [2401], hence this document introduces no new security exposure in the Internet.

5. References

5.1 Normative References


5.2 Informative References


6. Author Information

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