          IANA Considerations for Network Layer Protocol Identifiers

Abstract

   Some protocols being developed or extended by the IETF make use of
   the ISO/IEC (International Organization for Standardization /
   International Electrotechnical Commission) Network Layer Protocol
   Identifier (NLPID). This document provides NLPID IANA
   considerations.

Status of This Memo

   This memo documents an Internet Best Current Practice.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   BCPs is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6328.

Table of Contents

1. Introduction

   Some protocols being developed or extended by the IETF make use of
   the ISO/IEC (International Organization for Standardization /
   International Electrotechnical Commission) Network Layer Protocol
   Identifier (NLPID).

   The term "NLPID" is not actually used in [ISO9577], which refers to
   one-octet IPIs (Initial Protocol Identifiers) and SPIs (Subsequent
   Protocol Identifiers). While these are two logically separate kinds
   of one-octet identifiers, most values are usable as both an IPI and
   an SPI. In the remainder of this document, the term NLPID is used
   for such values.

   The registry of NLPID values is maintained by ISO/IEC by updating
   [ISO9577]. The procedure specified by ISO/IEC in that document is
   that an NLPID code point can be allocated without approval by
   ISO/IEC, as long as the code point is not in a range of values
   categorized for an organization other than the organization
   allocating the code point and as long as ISO/IEC JTC1 SC6 is
   informed.

   This document provides NLPID IANA considerations. That is, it
   specifies the level of IETF approval necessary for a code point to be
   allocated for IETF use, the procedures to be used and actions to be
   taken by IANA in connection with NLPIDs, and related guidelines.

   [RFC5226] is incorporated herein except to the extent that there are
   contrary provisions in this document.

   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 [RFC2119].

2. NLPIDs

   [ISO9577] defines one-octet network layer protocol identifiers that
   are commonly called NLPIDs, which is the term used in this document.

   NLPIDs are used in a number of protocols. For example, in the
   mar$pro.type field of the multicast address resolution server
   protocol [RFC2022], the ar$pro.type field of the NBMA (Non-Broadcast
   Multi-Access) next hop resolution protocol [RFC2332] and in the IS-IS
   Protocols Supported TLV [RFC1195]. See Appendix B.

2.1. Sub-Ranges of the NLPID

   Sub-ranges of the possible NLPID values are categorized by [ISO9577]
   for organizations as shown below, primarily for the ISO/IEC
   (International Organization for Standardization / International
   Electrotechnical Commission) and the ITU-T (International
   Telecommunication Union - Telecommunication Standardization Sector):

      Code Point Category
      ---------- --------
      0x00   ISO/IEC
      0x01-0x0F   ITU-T
      0x10-0x3F   ITU-T Rec. X.25 and ISO/IEC 8208
      0x40-0x43   ISO/IEC
      0x44   ITU-T
      0x45-0x4F   ISO/IEC
      0x50-0x6F   ITU-T Rec. X.25 and ISO/IEC 8208
      0x70-0x7F   Joint ITU-T and ISO/IEC
      0x80   ISO/IEC (see Section 2.2)
      0x81-0x8F   ISO/IEC
      0x90-0xAF   ITU-T Rec. X.25 and ISO/IEC 8208
      0xB0-0xBF   ITU-T
      0xC0-0xCF   Potentially available for IANA (see Section 2.3)
      0xD0-0xEF   ITU-T Rec. X.25 and ISO/IEC 8208
      0xF0-0xFE   Joint ITU-T and ISO/IEC
      0xFF   Reserved for an Extension mechanism to be
                  jointly developed by ITU-T and ISO/IEC

2.2. Code Point 0x80

   NLPID 0x80 is known as the IEEE (Institute of Electrical &
   Electronics Engineers) SNAP (SubNetwork Access Protocol) code point.
   It is followed by five octets, using the IEEE SNAP SAP (Service
   Access Point) conventions, to specify the protocol. Those
   conventions are described in Section 3 of [RFC5342]. In particular,
   it is valid for such a five-octet sequence to start with the IANA OUI
   (Organizationally Unique Identifier) followed by two further octets
   assigned by IANA as provided in [RFC5342]. The same IANA registry is
   used for such protocol identifiers whether they are planned to be
   introduced by the 0x80 NLPID or the IEEE SNAP SAP LSAPs (Link-Layer
   Service Access Points) (0xAAAA). Values allocated by IANA may be
   used in either context as appropriate.

   Because of the limited number of NLPID code points available for IANA
   allocation, use of the IEEE SNAP NLPID is RECOMMENDED rather than
   allocation of a new one-octet NLPID code point.

2.3. NLPIDs Available for IANA Allocation

   A limited number of code points are available that could be allocated
   by IANA under [ISO9577]. Because of this, it is desirable, where
   practical, to use code point 0x80, as discussed in Section 2.2 above,
   or to get code points allocated from the ranges categorized to other
   organizations. For example, code point 0x8E was allocated for IPv6
   [RFC2460], although it is in a range of code points categorized for
   ISO/IEC. One-byte code points are assigned to TRILL and IEEE 802.1aq
   as they are intended for use within the IS-IS Protocols Supported TLV
   [RFC1195].

   The table below, which includes two new code point allocations made
   by this document, shows those still available.

       Code Point Status
       ---------- --------
       0xC0   TRILL [RFC6325]
       0xC1   IEEE 802.1aq [802.1aq]
       0xC2-0xCB   Available
       0xCC   IPv4 [RFC791]
       0xCD-0xCE   Available
       0xCF   PPP [RFC1661]

3. IANA Considerations

   As long as code points are available, IANA will allocate additional
   values when required by applying the IETF Review policy as per
   [RFC5226].

   Whenever it allocates an NLPID, IANA will inform the IETF liaison to
   ISO/IEC JTC1 SC6 (Joint Technical Committee 1, Study Committee 6)
   [JTC1SC6], or if IANA is unable to determine that IETF liaison, the
   IAB. The liaison (or the IAB) will then ensure that ISO/IEC JTC1 SC6
   is informed so that [ISO9577] can be updated since ISO/IEC JTC1 SC6
   is the body that maintains [ISO9577]. To simplify this process, it
   is desirable that the IAB maintain an IETF liaison to ISO/IEC JTC1
   SC6.

   This document allocates the code points 0xC0 and 0xC1 as shown in
   Section 2.3 and IANA shall request the liaison (or the IAB) to so
   inform ISO/IEC JTC1 SC6.

   IANA maintains a web page showing NLPIDs that have been allocated to
   a protocol being developed or extended by the IETF or are otherwise
   of interest. The initial state of the web page is as shown in
   Appendix A. IANA will update this web page for (1) NLPIDs allocated
   by IANA and (2) other allocations or de-allocations when IANA is
   requested to make such changes to this web page by the IETF liaison
   mentioned above.

4. Security Considerations

   This document is concerned with allocation of NLPIDs. It is not
   directly concerned with security.

5. References

5.1. Normative References

   [ISO9577] International Organization for Standardization "Information
             technology - Telecommunications and Information exchange
             between systems - Protocol identification in the network
             layer", ISO/IEC TR 9577:1999, 1999-12-15.

   [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
             Requirement Levels", BCP 14, RFC 2119, March 1997.

   [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an
             IANA Considerations Section in RFCs", BCP 26, RFC 5226, May
             2008.

   [RFC5342] Eastlake 3rd., D., "IANA Considerations and IETF Protocol
             Usage for IEEE 802 Parameters", BCP 141, RFC 5342,
             September 2008.

   [RFC6325] Radia, P., Eastlake, D., Dutt, D., Gai, S., and A.
             Ghanwani, "RBridges: Base Protocol Specification", RFC
             6325, July 2011.

5.2. Informative References

   [802.1aq] Standard for Local and Metropolitan Area Networks / Virtual
             Bridged Local Area Networks / Amendment 9: Shortest Path
             Bridging, Draft IEEE P802.1aq/D2.1, 21 August 2009.

   [JTC1SC6] ISO/IEC JTC1 SC6 (International Organization for
             Standardization / International Electrotechnical
             Commission, Joint Technical Committee 1, Study Committee
             6), http://www.iso.org/iso/
             iso_technical_committee.html?commid=45072

   [RFC791] Postel, J., "Internet Protocol", STD 5, RFC 791, September
             1981.

   [RFC1195] Callon, R., "Use of OSI IS-IS for routing in TCP/IP and
             dual environments", RFC 1195, December 1990.

   [RFC1661] Simpson, W., Ed., "The Point-to-Point Protocol (PPP)", STD
             51, RFC 1661, July 1994.

   [RFC1707] McGovern, M. and R. Ullmann, "CATNIP: Common Architecture
             for the Internet", RFC 1707, October 1994.

   [RFC2022] Armitage, G., "Support for Multicast over UNI 3.0/3.1 based
             ATM Networks", RFC 2022, November 1996.

   [RFC2332] Luciani, J., Katz, D., Piscitello, D., Cole, B., and N.
             Doraswamy, "NBMA Next Hop Resolution Protocol (NHRP)", RFC
             2332, April 1998.

   [RFC2460] Deering, S. and R. Hinden, "Internet Protocol, Version 6
             (IPv6) Specification", RFC 2460, December 1998.

6. Acknowledgements

   The contributions and support of the following people, listed in
   alphabetic order, are gratefully acknowledged:

      Ayan Banerjee, Gonzalo Camarillo, Dinesh Dutt, Don Fedyk, Alfred
      Hines, Russ Housley, Andrew Malis, Radia Perlman, Dan Romascanu,
      and Peter Ashwood-Smith.

Appendix A. Initial IANA NLPID Web Page

   NLPIDs of Interest

      Code Point Use
      ---------- --------
       0x00   Null
       0x08   Q.933 (RFC 2427)
       0x80   IEEE SNAP (RFC 6328)
       0x81   ISO CLNP (Connectionless Network Protocol)
       0x82   ISO ES-IS
       0x83   IS-IS (RFC 1195)
       0x8E   IPv6 (RFC 2460)
       0xB0   FRF.9 (RFC 2427)
       0xB1   FRF.12 (RF C2427)
       0xC0   TRILL (RFC 6325)
       0xC1   IEEE 802.1aq
       0xCC   IPv4 (RFC 791)
       0xCF   PPP (RFC 1661)

   Note: According to [RFC1707], NLPID 0x70 was assigned to IPv7. That
   assignment appears to no longer be in effect as it is not listed in
   ISO/IEC 9577. IPv7 was itself a temporary code point assignment made
   while a decision was being made between three candidates for the next
   generation of IP after IPv4. Those candidates were assigned IPv6,
   IPv7, and IPv8. IPv6 was selected.

Appendix B. RFC References to NLPID

   The following RFCs, issued before the end of March 2009, excluding
   other survey RFCs and obsolete RFCs, reference the NLPID as such:

   RFC 1195 Use of OSI IS-IS for Routing in TCP/IP and Dual
                Environments
   RFC 1356 Multiprotocol Interconnect on X.25 and ISDN in the Packet
                Mode
   RFC 1377 The PPP OSI Network Layer Control Protocol (OSINLCP)
   RFC 1661 The Point-to-Point Protocol (PPP)
   RFC 1707 CATNIP: Common Architecture for the Internet
   RFC 1755 ATM Signaling Support for IP over ATM
   RFC 2022 Support for Multicast over UNI 3.0/3.1 based ATM Networks
   RFC 2332 NBMA Next Hop Resolution Protocol (NHRP)
   RFC 2337 Intra-LIS IP multicast among routers over ATM using Sparse
                Mode PIM
   RFC 2363 PPP Over FUNI
   RFC 2390 Inverse Address Resolution Protocol
   RFC 2427 Multiprotocol Interconnect over Frame Relay
   RFC 2590 Transmission of IPv6 Packets over Frame Relay Networks
                Specification
   RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
   RFC 2955 Definitions of Managed Objects for Monitoring and
                Controlling the Frame Relay/ATM PVC Service Interworking
                Function
   RFC 3070 Layer Two Tunneling Protocol (L2TP) over Frame Relay
   RFC 5308 Routing IPv6 with IS-IS

Author's Address

   Donald E. Eastlake 3rd
   Huawei Technologies
   155 Beaver Street
   Milford, MA 01757 USA

   Phone: +1-508-333-2270
   EMail: d3e3e3@gmail.com