   IANA Allocation Guidelines for the Address Resolution Protocol (ARP)

Status of This Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Abstract

   This document specifies the IANA guidelines for allocating new values
   in the Address Resolution Protocol (ARP). This document also
   reserves some numbers for experimentation purposes. The changes also
   affect other protocols that employ values from the ARP name spaces.

1. Introduction

   This document specifies the IANA guidelines [RFC5226] for allocating
   new values for various fields in the Address Resolution Protocol
   (ARP) [RFC0826]. The change is also applicable to extensions of ARP
   that use the same message format, such as [RFC0903], [RFC1931], and
   [RFC2390].

   The change also affects other protocols that employ values from the
   ARP name spaces. For instance, the ARP hardware address type
   (ar$hrd) number space is also used in the "htype" (hardware address
   type) fields in the Bootstrap Protocol (BOOTP) [RFC0951] and Dynamic
   Host Configuration Protocol (DHCP) [RFC2131], as well as in the
   "hardware type" field in the DHCP Unique Identifiers in DHCPv6
   [RFC3315]. These protocols are therefore affected by the update in
   the IANA rules. Other affected specifications include the
   specialized address resolution mechanisms in:

   o HYPERchannel [RFC1044]

   o DHCP options [RFC2132] [RFC4361]

   o ATM (Asynchronous Transfer Mode) ARP [RFC2225]

   o HARP (High-Performance Parallel Interface ARP) [RFC2834] [RFC2835]

   o Dual MAC (Media Access Control) FDDI (Fiber Distributed Data
      Interface) ARP [RFC1329]

   o MAPOS (Multiple Access Protocol over Synchronous Optical Network/
      Synchronous Digital Hierarchy) ARP [RFC2176]

   o FC (Fibre Channel) ARP [RFC4338]

   o DNS DHCID Resource Record [RFC4701]

   The IANA guidelines are given in Section 2. Previously, no IANA
   guidance existed for such allocations. The purpose of this document
   is to allow IANA to manage number assignments based on these
   guidelines in a consistent manner.

   This document also reserves some numbers for experimentation
   purposes. These numbers are given in Section 3.

2. IANA Considerations

    The following rules apply to the fields of ARP:

    ar$hrd (16 bits) Hardware address space

        Requests for ar$hrd values below 256 or for a batch of more than
        one new value are made through Expert Review [RFC5226].

        Note that certain protocols, such as BOOTP and DHCPv4, employ
        these values within an 8-bit field. The expert should determine
        that a need to allocate the new values exists and that the
        existing values are insufficient to represent the new hardware
        address types. The expert should also determine the applicability
        of the request and assign values higher than 255 for requests that
        do not apply to BOOTP/DHCPv4. Similarly, the expert should assign
        1-octet values for requests that apply to BOOTP/DHCPv4, as for
        example the "IPsec tunnel" with value 31 [RFC3456]. Conversely,
        ARP-only uses, without a foreseeable reason to use the same value
        in BOOTP/DHCPv4, should favor 2-octet values.

        Requests for individual new ar$hrd values that do not specify a
        value, or where the requested value is greater than 255, are made
        through First Come First Served [RFC5226]. The assignment will
        always result in a 2-octet value.

    ar$pro (16 bits) Protocol address space

        These numbers share the Ethertype space. The Ethertype space is
        administered as described in [RFC5342].

    ar$op (16 bits) Opcode

        Requests for new ar$op values are made through IETF Review or IESG
        Approval [RFC5226].

3. Allocations Defined in This Document

    When testing new protocol extension ideas, it is often necessary to
    use an actual constant in order to use the new function, even when
    testing in a closed environment. This document reserves the
    following numbers for experimentation purposes in ARP:

    o Two new ar$hrd values are allocated for experimental purposes:
       HW_EXP1 (36) and HW_EXP2 (256). Note that these two new values
       were purposely chosen so that one would be below 256 and the other
       would be above 255, and so that there would be different values in
       the least and most significant octets.

   o Two new values for the ar$op are allocated for experimental
      purposes: OP_EXP1 (24) and OP_EXP2 (25).

   Note that Appendix B.2 of [RFC5342] lists two Ethertypes that can be
   used for experimental purposes.

   In addition, for both ar$hrd and ar$op, the values 0 and 65535 are
   marked as reserved. This means that they are not available for
   allocation.

4. Security Considerations

   This specification does not change the security properties of the
   affected protocols.

   However, a few words are necessary about the use of the experimental
   code points defined in Section 3. Potentially harmful side effects
   from the use of the experimental values need to be carefully
   evaluated before deploying any experiment across networks that the
   owner of the experiment does not entirely control. Guidance given in
   [RFC3692] about the use of experimental values needs to be followed.

5. Acknowledgments

   The lack of any current rules has come up as new values were
   requested from IANA, who contacted the IESG for advice. The author
   would like to thank Michelle Cotton in particular for bringing up
   this issue. The author would also like to thank Brian Carpenter,
   Thomas Narten, Scott Bradner, Donald Eastlake, Andrew G. Malis, Brian
   Haberman, Robert Sparks, Larry Zhu, and Dave Thaler for feedback.

6. References

6.1. Normative References

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   [RFC1044] Hardwick, K. and J. Lekashman, "Internet Protocol on
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   [RFC1329]   Kuehn, P., "Thoughts on Address Resolution for Dual MAC
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   [RFC2131]   Droms, R., "Dynamic Host Configuration Protocol",
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   [RFC2225]   Laubach, M. and J. Halpern, "Classical IP and ARP over
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   [RFC3315]   Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C.,
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   [RFC4701]   Stapp, M., Lemon, T., and A. Gustafsson, "A DNS Resource
               Record (RR) for Encoding Dynamic Host Configuration
               Protocol (DHCP) Information (DHCID RR)", RFC 4701,
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   [RFC5342]   Eastlake. , D., "IANA Considerations and IETF Protocol
               Usage for IEEE 802 Parameters", BCP 141, RFC 5342,
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6.2. Informative References

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              "Reverse Address Resolution Protocol", STD 38, RFC 903,
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   [RFC1931] Brownell, D., "Dynamic RARP Extensions for Automatic
              Network Address Acquisition", RFC 1931, April 1996.

   [RFC2390] Bradley, T., Brown, C., and A. Malis, "Inverse Address
              Resolution Protocol", RFC 2390, September 1998.

   [RFC3456] Patel, B., Aboba, B., Kelly, S., and V. Gupta, "Dynamic
              Host Configuration Protocol (DHCPv4) Configuration of
              IPsec Tunnel Mode", RFC 3456, January 2003.

Appendix A. Changes from the Original RFCs

   This document specifies only the IANA rules associated with various
   fields in ARP. The specification of these rules also affects the
   allocation of corresponding fields in protocols listed in Section 1
   that share the registry. This document does not make any changes in
   the operation of these protocols themselves.

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