IANA Allocation Policies For Values In the Internet Protocol and Related Headers

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Abstract

This memo provides guidance for the IANA to use in assigning parameters for fields in the IPv4, TCP, UDP, ICMP and IPv6 protocol headers.

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1. Introduction

For many years the Internet Assigned Numbers Authority (IANA) has allocated parameter values for fields in the network protocols which have been created or are maintained by the Internet Engineering Task Force (IETF). Starting a few years ago the IETF began to provide the IANA with guidance for the assignment of parameters for fields in newly developed protocols. Unfortunately this type of guidance was not consistently provided for the fields in protocols developed before 1998. This memo provides the IANA with guidance to be used in the assignment of parameters in some of these protocols. It is expected that additional memos will be developed in the future to provide guidance in other cases.

This memo addresses the fields within the IPv4, TCP, UDP, ICMP and IPv6 headers for which the IANA assigns values.

The terms "Specification Required", "Expert Review", "IESG Approval", "IETF Consensus", and "Standards Action", are used in this memo to refer to the processes described in [CONS].

2. Temporary Assignments

From time to time temporary assignments are made in the values for fields in these headers for use in experiments. IESG Approval is required for any such temporary assignments.

3. IANA Considerations for fields in the IPv4 header

The IPv4 header [V4] contains the following fields that carry values assigned by the IANA: Version (by definition always 4 in IPv4), Type of Service, Protocol, Source Address, Destination Address, and Option Type.

The IANA allocates values from the IP Version name space following a Standards Action process.

The Type of Service field described in [V4] has been superceded [DIFF] by the 6-bit Differentiated Services (DS) field and a 2-bit currently unused field. The IANA allocates values in the DS field following the IANA Considerations section in [DIFF]. The values in the 2-bit unused field are allocated following a Standards Action process.

IANA allocates values from the IPv4 Protocol name space following an Expert Review, IESG Approval or Standards Action process. The Expert
Review process should only be used in those special cases where non-disclosure information is involved. In these cases the expert should be designated by the IESG.

The IPv4 Source and Destination addresses use the same values. These values fall into a number of ranges (called "Classes") defined in [V4] and [MULT]. The guidelines for the allocation of the values from the IPv4 Class A, Class B and Class C unicast addresses are under the control of Internet Corporation for Assigned Names and Numbers (ICANN) other than values from the ranges 0/8 (which was reserved in [AN80]) and 127/8 (from which the loopback address has been taken) along with other values already assigned by the IETF for special functions or purposes. (For example, the private addresses defined in RFC 1918) Further assignments in the 0/8 and 127/8 ranges require an Standards Action process. The IETF has also assigned a number of IPv4 Class D (multicast) addresses for special purposes. The values in the range from 224.0.0.0 to 224.0.0.255, inclusive, are reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols, such as gateway discovery and group membership reporting. (See the IANA web page) New values in this range are assigned following an IESG Approval or Standards Action process. Assignments of individual Class D address follow an Expert Review, IESG Approval or Standards Action process. Until further work is done on multicast protocols large scale assignments of IPv4 Class D addresses is not recommended. IPv4 Class E addresses are reserved [MULT] and not to be assigned unless an IETF Standards Action modifies the IPv4 protocol in such a way as to make Class E addresses valid.

The IANA allocates values from the IPv4 Option Type name space following an IESG Approval, IETF Consensus or Standards Action process.

4. IANA Considerations for fields in the IPv6 header

The IPv6 header [V6] contains the following fields that carry values assigned from IANA-managed name spaces: Version (by definition always 6 in IPv6), Traffic Class, Next Header, Source and Destination Address. In addition, the IPv6 Hop-by-Hop Options and Destination Options extension headers include an Option Type field with values assigned from an IANA-managed name space.

The Version field in the IPv6 header uses the same name space as the Version field in the IPv4 header. Values in this field are allocated as described in Section 2.

The IPv6 Traffic Class uses the same namespace as the IPv4 6-bit DS
field and 2-bit unused field. Values in these fields are allocated as described in Section 2.

The IPv6 Next Header field carries values from the same name space as the IPv4 Protocol name space. These values are allocated as discussed in Section 2.

The IPv6 Source and Destination address fields both use the same values and are described in [V6AD]. The addresses are divided into ranges defined by a variable length Format Prefix (FP). The guidelines for the assignment of values in the Aggregatable Global Unicast Addresses FP (FP 001) are under the control of the Internet Corporation for Assigned Names and Numbers (ICANN). The responsibility for assigning values in each of the "unassigned" and "reserved" FPs is delegated by IESG Approval or Standards Action processes.

Values for the IPv6 Hop-by-Hop Options and Destination Options fields are allocated using an IESG Approval, IETF Consensus or Standards Action processes.

5. IANA Considerations for fields in the ICMP header

The ICMP header [ICMP] contains the following fields that carry values assigned from IANA-managed name spaces: Type and Code.

Values for the ICMP Type and Code fields are allocated using an IESG Approval or Standards Action processes.

6. IANA Considerations for fields in the UDP header

The UDP header [UDP] contains the following fields that carry values assigned from IANA-managed name spaces: Source and Destination Port.

Both the Source and Destination Port fields use the same namespace. Values in this namespace are assigned following a Specification Required, Expert Review, IESG Approval, IETF Consensus, or Standards Action process. Note that some assignments may involve non-disclosure information.

7. IANA Considerations for fields in the TCP header

The TCP header [TCP] contains the following fields that carry values assigned from IANA-managed name spaces: Source and Destination Port, Reserved Bits, and Option Kind.
Both the Source and Destination Port fields use the same namespace. Values in this namespace are assigned following a Specification Required, Expert Review, IESG Approval, IETF Consensus, or Standards Action process. Note that some assignments may involve non-disclosure information.

The reserved bits in the TCP header are assigned following a Standards Action process.

Values in the Option Kind field are assigned following an IESG Approval or Standards Action process.

8. Security Considerations

Security analyzers such as firewalls and network intrusion detection monitors often rely on unambiguous interpretations of the fields described in this memo. As new values for the fields are assigned, existing security analyzers that do not understand the new values may fail, resulting in either loss of connectivity if the analyzer declines to forward the unrecognized traffic, or loss of security if it does forward the traffic and the new values are used as part of an attack. This vulnerability argues for high visibility (which the Standards Action and IETF Consensus processes ensure) for the assignments whenever possible.

9. References

[AN80] Postel, J., "Assigned numbers", RFC 758, August 1979


[MULT] Deering, S. E., "Host extensions for IP multicasting", RFC 988, July 1986


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