IANA Considerations for OSPF
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Status of this Memo

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Abstract

   This memo creates a number of OSPF registries and provides guidance
   to IANA for assignment of code points within these registries.

Table of Contents

[1]. **Introduction**

   This memo defines various OSPF registries for IANA to set up and
   maintain for OSPF code points. In some cases, this memo defines
   ranges of code point values within these registries; each such range
   has a different assignment policy.

   The terms used in describing the assignment policies are as follows:
      - Standards Action
      - Experimentation
      - Vendor Private Use
      - Reserved

   Standards Action means that assignment in that range MUST only be
   made for Standards Track RFCs (as defined in [4]).

   A range of values MAY be reserved for Experimentation as set out in
   [9]. Values from this range MUST NOT be assigned by IANA. Further
   guidance on the use of the Experimentation range may be found in
   paragraphs 4, 5 and 6 of [9]. An implementation MAY choose to not
   support values from the Experimentation range. In such a case, the
   protocol data structure with a code point from the Experimentation
   range is ignored, unless other protocol machinery says how to deal
   with it. (An example of such protocol machinery is the U bit in
   OSPFv2 Opaque LSAs.) "Ignored" in this context means that the
   associated data structure is removed from the received packet before
   further processing, including flooding.

   Values set aside as Vendor Private Use MUST NOT be assigned by IANA.
   A protocol data structure whose code point falls in this range MUST
   have a disambiguating field identifying the Vendor. This identifier
   consists of four octets of the Vendor's SMI enterprise code (see
   [10]) in network byte order; the location of this code must be
   well-defined per data structure. An implementation that encounters a
   Vendor Private code point SHOULD check whether the enterprise code is
   one that it recognises; if so, the implementation MAY choose to
   interpret the code point and data structure. Otherwise, it SHOULD
   ignore the code point, unless protocol machinery says how to deal
   with the data structure (as defined in the previous paragraph). This
   allows multiple vendor private extensions to co-exist in a network.

   Values in the Reserved range MUST NOT be assigned until a Standards
   Track or Best Common Practices RFC is published defining the
   assignment policy for that range. This RFC MUST be the product of
   the OSPF Working Group; if the OSPF WG is terminated, then it MUST be
   reviewed by an Expert Reviewer designated by the IESG.

1.1 Conventions used 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 RFC 2119 [1].

2. OSPF Registries

This section lists the various registries for OSPF protocol code
points. Note that some of these are for OSPF, and some are specific
to a particular version of OSPF; also, some registries pre-date this
memo.

Registries that are specific to one version of OSPF reflect the
version number in the registry name (e.g., OSPFv2 Options). A
registry whose name does not mention a version number applies to both
OSPFv2 and OSPFv3 (e.g., OSPF Packet Type).

2.1 OSPFv2 Options

(Defined in section A.2 of [2], updated in section A.1 of [3]. See
also [6].)

Assignment policy: Standards Action.

2.2 OSPFv3 Options

(Defined in section A.2 of [5])

Assignment policy: Standards Action.

2.3 OSPF Packet Type (both v2 and v3)

(Defined in section A.3.1 of [2])

```
                +---------+--------------------+
                | Range   | Assignment Policy  |
                +---------+--------------------+
                | 0       | Not to be assigned |
                |         |                    |
                | 1-5     | Already assigned   |
                |         |                    |
                | 5-127   | Standards Action   |
                |         |                    |
                | 128-255 | Reserved           |
                +---------+--------------------+
```

2.3.1 OSPF Authentication Type

(Defined in section A.3.1 of [2])

(Note: this registry is called "OSPF AUTHENTICATION CODES" by IANA.)

```
+-------------+-------------------+
| Range       | Assignment Policy |
+-------------+-------------------+
| 0-2         | Already assigned  |
|             |                   |
| 3-247       | Standards Action  |
|             |                   |
| 248-65519   | Reserved          |
|             |                   |
| 65520-65535 | Experimentation   |
+-------------+-------------------+
```

It is unclear at this point if it makes sense to have a Vendor
Private Use range for this registry.

2.4 OSPFv2 Link State (LS) Type

(Defined in section A.4.1 of [2])

```
+---------+--------------------+
| Range   | Assignment Policy  |
+---------+--------------------+
| 0       | Not to be assigned |
|         |                    |
| 1-11    | Already assigned   |
|         |                    |
| 12-127  | Standards Action   |
|         |                    |
| 128-255 | Reserved           |
+---------+--------------------+
```

If a new LS Type is documented, the documentation MUST say how the
Link State ID is to be filled in, as well as what the flooding scope
of the LSA is.

2.4.1 OSPFv2 Router LSA Link Type

(Defined in section A.4.2 of [2])

```
+---------+--------------------+
| Range   | Assignment Policy  |
+---------+--------------------+
| 0       | Not to be assigned |
|         |                    |
| 1-4     | Already assigned   |
|         |                    |
| 5-127   | Standards Action   |
|         |                    |
```

```
                        | 128-255 | Reserved           |
                        +---------+--------------------+
```

There is no range for Vendor Private Use, as there is no space for an
enterprise code to identify the Vendor.

There is currently no range for Experimental, as it is not clear that
such extensions will be backward compatible.

If a new Router LSA Link Type is documented, the documentation SHOULD
say how the Link State ID, Link ID and Link Data fields are to be
filled in.

2.4.2 OSPFv2 Router Properties

(Defined in section A.4.2 of [2], updated in [6])

This field in the Router LSA is unnamed; it is the field immediately
following the Router LSA length.

Assignment policy: Standards Action.

2.5 OSPFv3 LSA Function Code

(Defined in section A.4.2.1 of [5])

```
               +-----------+--------------------+
               | Range     | Assignment Policy  |
               +-----------+--------------------+
               | 0         | Not to be assigned |
               |           |                    |
               | 1-9       | Already assigned   |
               |           |                    |
               | 10-255    | Standards Action   |
               |           |                    |
               | 255-8175  | Reserved           |
               |           |                    |
               | 8175-8183 | Experimentation    |
               |           |                    |
               | 8184-8191 | Vendor Private Use |
               +-----------+--------------------+
```

In an OSPFv3 LSA with LSA Function Code in the Vendor Private Use
range, the first four octets following the 20 octets of LSA header
MUST be the Vendor enterprise code.

If a new LSA Function Code is documented, the documentation MUST
include the valid combinations of the U, S2 and S1 bits for the LSA.

It SHOULD also say how the Link State ID is to be filled in.

2.5.1 OSPFv3 Prefix Options

(Defined in section A.4.1.1 of [5])

Assignment policy: Standards Action.

2.5.2 OSPFv3 Router LSA Link Type

(Defined in section A.4.3 of [5])

```
+---------+-------------------+
| Range   | Assignment Policy |
+---------+-------------------+
| 0       | Not to be assigned |
|         |                   |
| 1-4     | Already assigned  |
|         |                   |
| 5-127   | Standards Action  |
|         |                   |
| 128-255 | Reserved          |
+---------+-------------------+
```

There is no range for Vendor Private Use, as there is no space for an
enterprise code to identify the Vendor.

There is currently no range for Experimental, as it is not clear that
such extensions will be backward compatible.

2.6 OSPFv2 Opaque LSA Type

(Defined in section A.2 of [3])

(Note: this registry is called "OSPF Opaque LSA Option" by IANA. See
also [8].)

```
+---------+-------------------+
| Range   | Assignment Policy |
+---------+-------------------+
| 0       | Not to be assigned |
|         |                   |
| 1-3     | Already assigned  |
|         |                   |
| 4-127   | Standards Action  |
|         |                   |
| 128-247 | Reserved          |
|         |                   |
```

```
                        | 248-251 | Experimentation    |
                        |         |                    |
                        | 252-255 | Vendor Private Use |
                        +---------+--------------------+
```

   In an OSPFv2 Opaque LSA with Opaque LSA Type in the Vendor Private
   Use range, the first four octets of Opaque Information MUST be the
   Vendor enterprise code.

   A document defining a new Standards Track Opaque LSA with TLVs and
   sub-TLVs MUST describe ranges and assignment policies for these TLVs.

2.6.1 OSPFv2 Grace LSA Top Level TLVs

   (Defined in Section A of [7])

```
                +-------------+--------------------+
                | Range       | Assignment Policy  |
                +-------------+--------------------+
                | 0           | Not to be assigned |
                |             |                    |
                | 1-3         | Already assigned   |
                |             |                    |
                | 4-255       | Standards Action   |
                |             |                    |
                | 255-65519   | Reserved           |
                |             |                    |
                | 65520-65527 | Experimentation    |
                |             |                    |
                | 65528-65535 | Vendor Private Use |
                +-------------+--------------------+
```

   In a Grace LSA, if a top-level TLV has a Type from the Vendor Private
   Use range, the Length MUST be at least four, and the first four
   octets of the Value field MUST be the Vendor enterprise code.

[3](). Acknowledgments

Many thanks to Adrian Farrel and Acee Lindem for their review and comments.

4. **Security Considerations**

   The lack of adequate IANA guidelines may be viewed as an avenue for
   Denial of Service attacks on IETF protocols (in this case, OSPFv2 and
   OSPFv3), and on the IETF Standards Process in general. This memo
   attempts to close this loophole for OSPFv2 and OSPFv3.

   Authors contemplating extensions to OSPF SHOULD examine such
   extensions carefully, and consider whether new registries are needed,
   and if so, allocation policies within each registry.

5. IANA Considerations

   Done, at last.

6. References

6.1 Normative References

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

[2] Moy, J., "OSPF Version 2", STD 54, RFC 2328, April 1998.

[3] Coltun, R., "The OSPF Opaque LSA Option", RFC 2370, July 1998.

[4] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA
     Considerations Section in RFCs", BCP 26, RFC 2434, October 1998.

[5] Coltun, R., Ferguson, D. and J. Moy, "OSPF for IPv6", RFC 2740,
     December 1999.

[6] Murphy, P., "The OSPF Not-So-Stubby Area (NSSA) Option",
     RFC 3101, January 2003.

[7] Moy, J., Pillay-Esnault, P. and A. Lindem, "Graceful OSPF
     Restart", RFC 3623, November 2003.

[8] Katz, D., Kompella, K. and D. Yeung, "Traffic Engineering (TE)
     Extensions to OSPF Version 2", RFC 3630, September 2003.

[9] Narten, T., "Assigning Experimental and Testing Numbers
     Considered Useful", BCP 82, RFC 3692, January 2004.

6.2 Informative References

[10] "PRIVATE ENTERPRISE NUMBERS".

      http://www.iana.org/assignments/enterprise-numbers

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