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IANA Considerations for OSPF

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 assignments in that range MUST only be made for Standards Track RFCs (as defined in [RFC2434]).

Some of the registries defined below reserve a range of values for Experimentation. For guidelines regarding the use of such values see [RFC3692]. 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 [RFC3692]. 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. "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 (Structure of Management Information) enterprise code (see [ENTERPRISE-NUMBERS]) 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 recognizes; if so, the implementation MAY choose to interpret the code point and data structure. Otherwise, it SHOULD ignore the code point, unless the protocol machinery says how to deal with the data structure (as defined in the previous paragraph). This allows multiple vendor private extensions to coexist 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 [RFC2119].

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 predate 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 [RFC2328], updated in Section A.1 of [RFC2370]. See also [RFC3101].)

Assignment policy: Standards Action.

2.2. OSPFv3 Options

(Defined in Section A.2 of [RFC2740])

Assignment policy: Standards Action.

2.3. OSPF Packet Type (Both v2 and v3)

(Defined in Section A.3.1 of [RFC2328])

Range	Assignment Policy
0	Not to be assigned
1-5	Already assigned
6-127	Standards Action
128-255	Reserved

2.3.1. OSPF Authentication Type

(Defined in Section A.3.1 of [RFC2328])

(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

2.4. OSPFv2 Link State (LS) Type

(Defined in Section A.4.1 of [RFC2328])

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, what the flooding scope of the LSA (Link State Advertisement) is, and how backward compatibility is maintained.

2.4.1. OSPFv2 Router LSA Link Type

(Defined in Section A.4.2 of [RFC2328])

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.

No Experimental range is defined, due to possible backwards compatibility issues.

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, and how backward compatibility is maintained.

2.4.2. OSPFv2 Router Properties

(Defined in Section A.4.2 of [RFC2328], updated in [RFC3101])

This 8-bit 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

This registry is created by [OSPF-CAP]. This document provides the values to be populated for values defined in Section A.4.2.1 of [RFC2740].

2.5.1. OSPFv3 Prefix Options

(Defined in Section A.4.1.1 of [RFC2740])

Assignment policy: Standards Action.

2.5.2. OSPFv3 Router LSA Link Type

(Defined in Section A.4.3 of [RFC2740])

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.

No Experimental range is defined, due to possible backwards compatibility issues.

2.6. OSPFv2 Opaque LSA Type

(Defined in Section A.2 of [RFC2370])

(Note: this registry is called "OSPF Opaque LSA Option" by IANA. See also [RFC3630].)

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 Appendix A of [RFC3623])

Range	Assignment Policy
0	Not to be assigned
1-3	Already assigned
4-255	Standards Action
256-65519	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

This document specifies assignment policy for several existing IANA registries and creates several more.

5.1. OSPFv2 Options Registry

Section 2.1 defines the policy for allocation of bits from this registry as "Standards Action". There are only 8 bits in this field, and 6 are already assigned. The initial registry contents are given below.

OSPFv2 Options Registry (Section 2.1)

Value	Description	Reference
0x02	E-bit	[RFC2328]
0x04	MC-bit	[RFC1584]
0x08	N/P-bit	[RFC3101]
0x10	Reserved	
0x20	DC-bit	[RFC1793]
0x40	O-bit	[RFC2370]

5.2. OSPFv3 Options Registry

Section 2.2 defines the policy for allocation of bits from this registry as "Standards Action". There are 24 bits in this field, and 6 are assigned. The initial registry contents are given below.

OSPFv3 Options Registry (Section 2.2)

Value	Description	Reference
0x000001	V6-bit	[RFC2740]
0x000002	E-bit	[RFC2328]
0x000004	MC-bit	[RFC1584]
0x000008	N-bit	[RFC3101]
0x000010	R-Bit	[RFC2740]
0x000020	DC-bit	[RFC1793]

5.3. OSPF Packet Type Registry

Section 2.3 defines the policy for allocation of values from this registry for different ranges. The initial registry contents are given below.

OSPF Packet Type (Section 2.3)

Value	Description	Reference
1	Hello	[RFC2328]
2	Database Description	[RFC2328]
3	Link State Request	[RFC2328]
4	Link State Update	[RFC2328]
5	Link State Ack	[RFC2328]

5.4. OSPF Authentication Type Registry

This registry already exists at IANA, called "ospf-authentication-codes". Section 2.3.1 defines the policy for allocation from this registry for different ranges.

5.5. OSPFv2 Link State Type Registry

Section 2.4 defines the policy for allocations from this registry for different ranges. The initial registry contents are given below.

OSPFv2 Link State (LS) Type (Section 2.4)

Value	Description	Reference
1	Router-LSA	[RFC2328]
2	Network-LSA	[RFC2328]
3	Summary-LSA (IP network)	[RFC2328]
4	Summary-LSA (ASBR)	[RFC2328]
5	AS-external-LSA	[RFC2328]
6	Group-membership-LSA	[RFC1584]
7	NSSA AS-external LSA	[RFC3101]
8	Reserved	
9	Link-local Opaque LSA	[RFC2370]
10	Area-local Opaque LSA	[RFC2370]
11	Opaque LSA	[RFC2370]

5.6. OSPFv2 Router LSA Link Type Registry

Section 2.4.1 defines the policy for allocations from this registry for different ranges. The initial registry contents are given below.

OSPFv2 Router LSA Link Type (Section 2.4.1)

Value	Description	Reference
1	Point-to-Point connection to another router	[RFC2328]
2	Transit Network	[RFC2328]
3	Stub Network	[RFC2328]
4	Virtual Link	[RFC2328]

5.7. OSPFv2 Router Properties Registry

Section 2.4.2 defines the policy for allocation of bits from this registry as "Standards Action". There are only 8 bits in this field, and 5 are already assigned. The initial registry contents are given below.

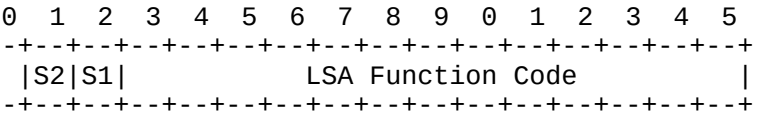
OSPFv2 Options Registry (Section 2.1)

Value	Description	Reference
0x01	B-bit	[RFC2328]
0x02	W-bit	[RFC2328]
0x04	V-bit	[RFC2328]
0x08	W-bit	[RFC1584]
0x10	Nt-bit	[RFC3101]

5.8. OSPFv3 LSA Function Code Registry

This registry is created by [OSPF-CAP], which also defines the registration policy. This section contains values that belong in this registry that were defined by [RFC2740].

As defined in [RFC2740], the first 3 bits of the LSA Function Code are the U, S1, and S2 bits. A given function code implies a specific setting for the U, S1, and S2 bits as shown in the "LS Type" column.



The U bit indicates how the LSA should be handled by a router which does not recognize the LSA's function code. Its values are:

U-bit	LSA Handling
0	Treat the LSA as if it had link-local flooding scope
1	Store and flood the LSA, as if type understood

The S1 and S2 bits indicate the flooding scope of the LSA. The values are:

S1	S2	Flooding Scope
0	0	Link-Local Scoping. Flooded only on link it is originated on
0	1	Area Scoping. Flooded to all routers in the originating area
1	0	AS Scoping. Flooded to all routers in the AS
1	1	Reserved

The initial registry contents are given below.

OSPFv3 LSA Function Code (Section 2.5)

LSA Function Code	LS Type	Description	Reference
1	0x2001	Router-LSA	[RFC2740]
2	0x2002	Network-LSA	[RFC2740]
3	0x2003	Inter-Area-Prefix-LSA	[RFC2740]
4	0x2004	Inter-Area-Router-LSA	[RFC2740]
5	0x4005	AS-External-LSA	[RFC2740]
6	0x2006	Group-membership-LSA	[RFC2740]
7	0x2007	Type-7-LSA	[RFC2740]
8	0x0008	Link-LSA	[RFC2740]
9	0x2009	Intra-Area-Prefix-LSA	[RFC2740]

5.9. OSPFv3 Prefix Options Registry

Section 2.5.1 defines the policy for allocation of bits from this registry as "Standards Action". There are only 8 bits in this field, and 4 are already assigned. The initial registry contents are given below.

OSPFv3 Prefix Options Registry (Section 2.5.1)

Value	Description	Reference
0x01	NU-bit	[RFC2740]
0x02	LA-bit	[RFC2740]
0x04	MC-bit	[RFC2740]
0x08	P-bit	[RFC2740]

5.10. OSPFv3 Router LSA Link Type Registry

Section 2.5.2 defines the policy for allocations from this registry for different ranges. The initial registry contents are given below.

OSPFv3 Router LSA Link Type (Section 2.5.2)

Value	Description	Reference
1	Point-to-Point connection to another router	[RFC2740]
2	Transit Network	[RFC2740]
3	Reserved	[RFC2740]
4	Virtual Link	[RFC2740]

5.11. OSPFv2 Opaque LSA Type Registry

This registry already exists at IANA, called "ospf-opaque-types". Section 2.6 defines the policy for allocation from this registry for different ranges.

5.12. OSPFv2 Grace LSA Top Level TLV Registry

Section 2.6.1 defines the policy for allocations from this registry for different ranges. The initial registry contents are given below.

OSPFv2 Grace LSA Top Level TLV (Section 2.6.1)

Value	Description	Reference
1	Grace Period	[RFC3623]
2	Graceful Restart reason	[RFC3623]
3	IP Interface Address	[RFC3623]

6. References

6.1. Normative References

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[RFC1584] Moy, J., "Multicast Extensions to OSPF", RFC 1584, March 1994.

[RFC1793] Moy, J., "Extending OSPF to Support Demand Circuits", RFC 1793, April 1995.

[RFC2328] Moy, J., "OSPF Version 2", STD 54, RFC 2328, April 1998.

[RFC2370] Coltun, R., "The OSPF Opaque LSA Option", RFC 2370, July 1998.

[RFC2434] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 2434, October 1998.

[RFC2740] Coltun, R., Ferguson, D., and J. Moy, "OSPF for IPv6", RFC 2740, December 1999.

[RFC3101] Murphy, P., "The OSPF Not-So-Stubby Area (NSSA) Option", RFC 3101, January 2003.

[RFC3623] Moy, J., Pillay-Esnault, P., and A. Lindem, "Graceful OSPF Restart", RFC 3623, November 2003.

[RFC3630] Katz, D., Kompella, K., and D. Yeung, "Traffic Engineering (TE) Extensions to OSPF Version 2", RFC 3630, September 2003.

[RFC3692] Narten, T., "Assigning Experimental and Testing Numbers Considered Useful", BCP 82, RFC 3692, January 2004.

6.2. Informative References

[ENTERPRISE-NUMBERS]
"PRIVATE ENTERPRISE NUMBERS",
http://www.iana.org/assignments/enterprise-numbers.

[OSPF-CAP] Lindem, A., "Extensions to OSPF for Advertising Optional Router Capabilities", Work in Progress, May 2007.

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