

Network Working Group
Editors
Internet Draft
Joyal
Obsoletes: [RFC 1850](#)
Nortel

Dan

Galecki

Piotr

Airvana

Giacalone

Spencer

CSFB

Authors

Original

Coltun

Rob

Acoustra

Touch

Baker

Fred

Systems

Cisco

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OSPF Version 2 Management Information Base

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Abstract

This memo defines a portion of the Management Information Base (MIB)

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for use with network management protocols in TCP/IP-based internets.

In particular, it defines objects for managing version 2 of the Open

Shortest Path First Routing Protocol. Version 2 of the OSPF protocol

is specific to the IPv4 address family. Version 3 of the OSPF protocol is specific to the IPv6 address family.

This memo obsoletes [RFC 1850](#), however, it is designed to be backwards compatible. The functional differences between this memo and [RFC 1850](#) are explained in [section 12](#).

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[1.](#) Overview

[1.1](#) The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7](#) of [RFC 3410](#) [[RFC3410](#)].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

[1.2](#) Conceptual Row Creation

For the benefit of row-creation in "conceptual" tables, DEFVAL (Default Value) clauses are included in the definitions in [section 3](#), suggesting values which an agent should use for instances of variables which need to be created due to a Set-Request, but which are not specified in the Set-Request. DEFVAL clauses have not been specified for some objects which are read-only, implying that they are zeroed upon row creation. These objects are of the SYNTAX Counter32 or Gauge32.

For those objects not having a DEFVAL clause, both management stations and agents should heed the Robustness Principle of the Internet (see [RFC-791](#)):

"be liberal in what you accept, conservative in what you send"

Therefore, management stations should include as many of these

columnar objects as possible (e.g., all read-write objects) in a Set-Request when creating a conceptual row. Agents should accept a Set-Request with as few of these columnar objects as they need (e.g., the minimum contents of a "row-creating" SET consists of those objects for which, as they cannot be intuited, no default

is specified.).

1.3 Default Configuration

OSPF is a powerful routing protocol, equipped with features to handle virtually any configuration requirement that might reasonably

be found within an Autonomous System. With this power comes a fair degree of complexity, which the sheer number of objects in the MIB will attest to. Care has therefore been taken, in constructing this

MIB, to define default values for virtually every object, to minimize the amount of parameterization required in the typical case. That default configuration is as follows:

Given the following assumptions:

- IP has already been configured
- The ifTable has already been configured
- ifSpeed is estimated by the interface drivers
- The OSPF Process automatically discovers all IP Interfaces and creates corresponding OSPF Interfaces
- The OSPF Process automatically creates the Areas required for the Interfaces

The simplest configuration of an OSPF process requires that:

- The OSPF Process be Enabled.

This can be accomplished with a single SET:

```
ospfAdminStat := enabled.
```

The configured system will have the following attributes:

- The RouterID will be one of the IP addresses of the device
- The device will be neither an Area Border Router nor an Autonomous System Border Router.
- Every IP Interface, with or without an address, will be an OSPF Interface.
- The AreaID of each interface will be 0.0.0.0, the Backbone.
- Authentication will be disabled

- All Broadcast and Point to Point interfaces will be operational. NBMA Interfaces require the configuration

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of at least one neighbor.

- Timers on all direct interfaces will be:

Hello Interval:	10 seconds
Dead Timeout:	40 Seconds
Retransmission:	5 Seconds
Transit Delay:	1 Second
Poll Interval:	120 Seconds

- No direct links to hosts will be configured.
- No addresses will be summarized
- Metrics, being a measure of bit duration, are unambiguous and intelligent.
- No Virtual Links will be configured.

1.4 OSPF Counters

This MIB defines several counters, namely:

- ospfOriginateNewLsas, ospfRxNewLsas in the ospfGeneralGroup
- ospfSpfRuns, ospfAreaNssaTranslatorEvents in the ospfAreaTable
- ospfIfEvents in the ospfIfTable
- ospfVirtIfEvents in the ospfVirtIfTable
- ospfNbrEvents in the ospfNbrTable
- ospfVirtNbrEvents in the ospfVirtNbrEvents.

As a best practice, a management entity, when reading these counters, should use the discontinuity object, ospfDiscontinuityTime, to determine if an event which would invalidate the management entity understanding of the counters has occurred. A restart of the OSPF routing process is a possible example of a discontinuity event.

1.5 Multiple OSPF Instances

SNMPv3 supports "Contexts" which can be used to implement MIB views on multiple OSPF instances on the same system. See [RFC 3411](#) or its successors for details.

1.6 Conventions

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. Structure of this MIB

This MIB is composed of the following sections:

General Variables
Area Data Structure
Area Stub Metric Table
Link State Database
Address Range Table
Host Table
Interface Table
Interface Metric Table
Virtual Interface Table
Neighbor Table
Virtual Neighbor Table
External Link State Database
Aggregate Range Table
Local Link State Database
AS-scope Link State Database

It supports the base OSPFv2 specification [[RFC2328](#)] and extensions to OSPFv2 such as [[RFC1765](#)], [[RFC1793](#)], [[RFC2370](#)], [[RFC3101](#)] and [[RFC3623](#)].

There exists a separate MIB for notifications ("traps"), which is entirely optional.

2.1 The Purposes of the sections in this MIB

2.1.1 General Variables

The General Variables describe (as it may seem from the name) variables which are global to the OSPF Process.

2.1.2 Area Data Structure and Area Stub Metric Table

The Area Data Structure describes all of the OSPF Areas that the router participates in. The Area Table includes data for NSSA translation.

The Area Stub Metric Table describes the metrics advertised into a stub area by the default router(s).

2.1.3 Link State Database and External Link State Database

The Link State Database is provided primarily to provide detailed information for network debugging.

2.1.4 Address Table and Host Tables

The Address Range Table and Host Table are provided to view configured Network Summary and Host Route information.

2.1.5 Interface and Interface Metric Tables

The Table and the Interface Metric Table together describe

the various IP interfaces to OSPF. The metrics are placed in separate tables in order to simplify dealing with multiple types of service. The Interface table includes Link-Local (Opaque Type-9) LSA statistics.

2.1.6 Virtual Interface Table

The Virtual Interface Table describes virtual links to the OSPF Process, similarly to the (non-Virtual)Interface Tables. This table includes Link-Local (Opaque Type-9) LSA statistics.

2.1.7 Neighbor and Virtual Neighbor Tables

The Neighbor Table and the Virtual Neighbor Table describe the neighbors to the OSPF Process.

2.1.8 Local Link State Database Table and Virtual Local Link State Database Table

The Local Link State Database Table and Virtual Local Link State Database Table are identical to the OSPF LSDB Table in format, but contain only Link-Local (Opaque Type-9) Link State Advertisements for non-virtual and virtual links.

2.1.9 AS-scope Link State Database Table

The AS-scope Link State Database Table is identical to the OSPF LSDB Table in format, but contains only AS-scoped Link State Advertisements.

2.1.10 Area Lsa Count Table

The table, which maintains number of link state advertisements on the per area per LSA type basis.

3. OSPF MIB Module

```
OSPF-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, Counter32, Gauge32,
    Integer32, Unsigned32, IpAddress, mib-2
        FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, TruthValue, RowStatus, TimeStamp
        FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    InterfaceIndexOrZero
        FROM IF-MIB;
```

ospf MODULE-IDENTITY

LAST-UPDATED "200605240900Z" -- May 24, 2006 09:00:00 EST

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ORGANIZATION "IETF OSPF Working Group"

CONTACT-INFO

"WG E-Mail: ospf@ietf.org

WG Chairs: acee@cisco.com
rohit@gmail.com

Editors: Dan Joyal
Nortel
600 Technology Park Drive
Billerica, MA 01821
djoyal@nortel.com

Piotr Galecki
Airvana
19 Alpha Road
Chelmsford, MA 01824
pgalecki@airvana.com

Spencer Giacalone
Credit Suisse First Boston
Eleven Madison Ave
New York, NY 10010-3629
spencer.giacalone@csfb.com"

DESCRIPTION

"The MIB module to describe the OSPF Version 2 Protocol. Note that some objects in this MIB module may pose a significant security risk. Refer to the Security Considerations section in RFC XXXX for more information.

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This version of this MIB module is part of RFC XXXX; see the RFC itself for full legal notices."

-- RFC Editor: please fill in XXXX and remove this note

REVISION "200605240900Z" -- May 24, 2006 09:00:00 EST

DESCRIPTION

"Updated for latest changes to OSPF Version 2:
- updated the General Group with the new ospfRFC1583Compatibility, ospfReferenceBandwidth and ospfDiscontinuityTime objects
- added graceful restart related objects
- added stub router related objects
- updated the Area Table with NSSA related objects
- added ospfAreaAggregateExtRouteTag object
- added opaque LSA related objects
- updates to the Compliances and Security sections
- added area LSA counter table
- added section describing translation of notification

parameters between SNMP versions
- added ospfComplianceObsolete to contain obsolete
object groups
- deprecated ospfExtLsdbTable
See [section 12](#) of RFC XXXX for more details.

This version published as part of RFC XXXX"

-- RFC Editor: please fill in XXXX and remove this note

REVISION "199501201225Z" -- Fri Jan 20 12:25:50 PST 1995

DESCRIPTION

"The initial SMIV2 revision of this MIB module, published
in [RFC1850](#)."

::= { mib-2 14 }

AreaID ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"An OSPF Area Identifier.

Note that the Area ID, in OSPF, has the same format
as an IP Address, but has the function of defining
a summarization point for Link State Advertisements."

SYNTAX IPAddress

RouterID ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A OSPF Router Identifier.

Note that the Router ID, in OSPF, has the same format
as an IP Address, but identifies the router independent
of its IP Address."

SYNTAX IPAddress

Metric ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"The OSPF Internal Metric.

Note the OSPF Metric is defined as an unsigned value
in the range."

SYNTAX Integer32 (0..'FFFF'h)

BigMetric ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"The OSPF External Metric."

SYNTAX Integer32 (0..'FFFFFF'h)

Status ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"An indication of the operability of an OSPF function or feature. For example, The status of an interface: 'enabled' indicates that it is willing to communicate with other OSPF Routers, while 'disabled' indicates that it is not."

SYNTAX INTEGER { enabled (1), disabled (2) }

PositiveInteger ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"A positive integer. Values in excess are precluded as unnecessary and prone to interoperability issues."

SYNTAX Integer32 (0..'7FFFFFFF'h)

HelloRange ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"The range of intervals in seconds on which hello messages are exchanged."

SYNTAX Integer32 (1..'FFFF'h)

UpToMaxAge ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"The values in seconds that one might find or configure for variables bounded by the maximum age of an LSA."

SYNTAX Integer32 (0..3600)

DesignatedRouterPriority ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"The range of values defined for the priority of a system for becoming the designated router."

SYNTAX Integer32 (0..'FF'h)

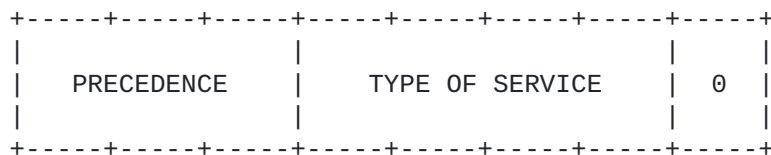
TOSType ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d-0"

STATUS current

DESCRIPTION

"Type of Service is defined as a mapping to the IP Type of Service Flags as defined in the IP Forwarding Table MIB



IP TOS

IP TOS

Field	Policy	Field	Policy
Contents	Code	Contents	Code
0 0 0 0 ==>	0	0 0 0 1 ==>	2
0 0 1 0 ==>	4	0 0 1 1 ==>	6
0 1 0 0 ==>	8	0 1 0 1 ==>	10
0 1 1 0 ==>	12	0 1 1 1 ==>	14
1 0 0 0 ==>	16	1 0 0 1 ==>	18
1 0 1 0 ==>	20	1 0 1 1 ==>	22
1 1 0 0 ==>	24	1 1 0 1 ==>	26
1 1 1 0 ==>	28	1 1 1 1 ==>	30

The remaining values are left for future definition."

SYNTAX Integer32 (0..30)

OspfAuthenticationType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The authentication type."

SYNTAX INTEGER {
 none (0),
 simplePassword (1),
 md5 (2)
 -- reserved for specification by IANA (> 2)
 }

-- OSPF General Variables

-- Note: These parameters apply globally to the Router's

-- OSPF Process.

ospfGeneralGroup OBJECT IDENTIFIER ::= { ospf 1 }

ospfRouterId OBJECT-TYPE

SYNTAX RouterID

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A 32-bit integer uniquely identifying the
 router in the Autonomous System.

By convention, to ensure uniqueness, this
 should default to the value of one of the
 router's IP interface addresses.

This object is persistent and when written
 the entity SHOULD save the change to non-volatile storage."

REFERENCE

"OSPF Version 2, C.1 Global parameters"

::= { ospfGeneralGroup 1 }

ospfAdminStat OBJECT-TYPE

SYNTAX Status

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The administrative status of OSPF in the router. The value 'enabled' denotes that the OSPF Process is active on at least one interface; 'disabled' disables it on all interfaces.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfGeneralGroup 2 }

ospfVersionNumber OBJECT-TYPE

SYNTAX INTEGER { version2 (2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current version number of the OSPF protocol is 2."

REFERENCE

"OSPF Version 2, Title"

::= { ospfGeneralGroup 3 }

ospfAreaBdrRtrStatus OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A flag to note whether this router is an area border router."

REFERENCE

"OSPF Version 2, [Section 3](#) Splitting the AS into Areas"

::= { ospfGeneralGroup 4 }

ospfASBdrRtrStatus OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A flag to note whether this router is configured as an Autonomous System border router.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

REFERENCE

"OSPF Version 2, [Section 3.3](#) Classification of routers"

::= { ospfGeneralGroup 5 }

ospfExternLsaCount OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only


```

STATUS          current
DESCRIPTION
  "The number of external (LS type 5) link-state
  advertisements in the link-state database."
REFERENCE
  "OSPF Version 2, Appendix A.4.5 AS external link
  advertisements"
 ::= { ospfGeneralGroup 6 }

```

ospfExternLsaChecksumSum OBJECT-TYPE

```

SYNTAX          Integer32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "The 32-bit sum of the LS checksums of
  the external link-state advertisements
  contained in the link-state database. This sum
  can be used to determine if there has been a
  change in a router's link state database, and
  to compare the link-state database of two
  routers. The value should be treated as unsigned
  when comparing two sums of checksums."
 ::= { ospfGeneralGroup 7 }

```

ospfTOSsupport OBJECT-TYPE

```

SYNTAX          TruthValue
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
  "The router's support for type-of-service routing.

  This object is persistent and when written
  the entity SHOULD save the change to non-volatile
  storage."
REFERENCE
  "OSPF Version 2, Appendix F.1.2 Optional TOS
  support"
 ::= { ospfGeneralGroup 8 }

```

ospfOriginateNewLsas OBJECT-TYPE

```

SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
  "The number of new link-state advertisements
  that have been originated. This number is
  incremented each time the router originates a new
  LSA.

  Discontinuities in the value of this counter can
  occur at re-initialization of the management system,
  and at other times as indicated by the value of
  ospfDiscontinuityTime."

```



```
::= { ospfGeneralGroup 9 }
```

```
ospfRxNewLsas OBJECT-TYPE
```

```
SYNTAX Counter32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The number of link-state advertisements received  
determined to be new instantiations.
```

```
This number does not include newer instantiations  
of self-originated link-state advertisements.
```

```
Discontinuities in the value of this counter can  
occur at re-initialization of the management system,  
and at other times as indicated by the value of  
ospfDiscontinuityTime."
```

```
::= { ospfGeneralGroup 10 }
```

```
ospfExtLsdbLimit OBJECT-TYPE
```

```
SYNTAX Integer32 (-1..'7FFFFFFF'h)
```

```
MAX-ACCESS read-write
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The maximum number of non-default  
AS-external-LSAs entries that can be stored in the  
link-state database. If the value is -1, then  
there is no limit.
```

```
When the number of non-default AS-external-LSAs  
in a router's link-state database reaches  
ospfExtLsdbLimit, the router enters  
Overflow-State. The router never holds more than  
ospfExtLsdbLimit non-default AS-external-LSAs  
in its database. OspfExtLsdbLimit MUST be set  
identically in all routers attached to the OSPF  
backbone and/or any regular OSPF area. (i.e.,  
OSPF stub areas and NSSAs are excluded).
```

```
This object is persistent and when written  
the entity SHOULD save the change to non-volatile  
storage."
```

```
DEFVAL { -1 }
```

```
::= { ospfGeneralGroup 11 }
```

```
ospfMulticastExtensions OBJECT-TYPE
```

```
SYNTAX Integer32
```

```
MAX-ACCESS read-write
```

```
STATUS current
```

```
DESCRIPTION
```

```
"A Bit Mask indicating whether the router is  
forwarding IP multicast (Class D) datagrams  
based on the algorithms defined in the  
Multicast Extensions to OSPF.
```


Bit 0, if set, indicates that the router can forward IP multicast datagrams in the router's directly attached areas (called intra-area multicast routing).

Bit 1, if set, indicates that the router can forward IP multicast datagrams between OSPF areas (called inter-area multicast routing).

Bit 2, if set, indicates that the router can forward IP multicast datagrams between Autonomous Systems (called inter-AS multicast routing).

Only certain combinations of bit settings are allowed, namely: 0 (no multicast forwarding is enabled), 1 (intra-area multicasting only), 3 (intra-area and inter-area multicasting), 5 (intra-area and inter-AS multicasting) and 7 (multicasting everywhere). By default, no multicast forwarding is enabled.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

```
DEFVAL { 0 }
 ::= { ospfGeneralGroup 12 }
```

ospfExitOverflowInterval OBJECT-TYPE

```
SYNTAX      PositiveInteger
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
```

"The number of seconds that, after entering OverflowState, a router will attempt to leave OverflowState. This allows the router to again originate non-default AS-external-LSAs. When set to 0, the router will not leave Overflow-State until restarted.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

```
DEFVAL { 0 }
 ::= { ospfGeneralGroup 13 }
```

ospfDemandExtensions OBJECT-TYPE

```
SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
```

"The router's support for demand routing.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

REFERENCE

"Extending OSPF to Support Demand Circuits"

::= { ospfGeneralGroup 14 }

ospfRFC1583Compatibility OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates metrics used to choose among multiple AS-external-LSAs. When RFC1583Compatibility is set to enabled, only cost will be used when choosing among multiple AS-external-LSAs advertising the same destination. When RFC1583Compatibility is set to disabled, preference will be driven first by type of path using cost only to break ties.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

REFERENCE

"OSPF Version 2, [Section 16.4.1](#) External path preferences"

::= { ospfGeneralGroup 15 }

ospfOpaqueLsaSupport OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The router's support for Opaque LSA types.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

REFERENCE

"The OSPF Opaque LSA Option"

::= { ospfGeneralGroup 16 }

ospfReferenceBandwidth OBJECT-TYPE

SYNTAX Unsigned32

UNITS "kilobits per second"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Reference bandwidth in kilobits/second for calculating default interface metrics. The default value is 100,000 KBPS (100 MBPS)

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfGeneralGroup 17 }

ospfRestartSupport OBJECT-TYPE

SYNTAX INTEGER { none (1),
plannedOnly (2),
plannedAndUnplanned (3)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The router's support for OSPF graceful restart. Options include: no restart support, only planned restarts or both planned and unplanned restarts.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfGeneralGroup 18 }

ospfRestartInterval OBJECT-TYPE

SYNTAX Integer32 (1..1800)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Configured OSPF graceful restart timeout interval.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfGeneralGroup 19 }

ospfRestartStrictLsaChecking OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates if strict LSA checking is enabled for graceful restart.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfGeneralGroup 20 }

ospfRestartStatus OBJECT-TYPE

SYNTAX INTEGER { notRestarting (1),
plannedRestart (2),
unplannedRestart (3)


```

    }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Current status of OSPF graceful restart."
    ::= { ospfGeneralGroup 21 }

ospfRestartAge OBJECT-TYPE
    SYNTAX          Unsigned32
    UNITS           "seconds"
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Remaining time in current OSPF graceful restart
        interval."
    ::= { ospfGeneralGroup 22 }

ospfRestartExitReason OBJECT-TYPE
    SYNTAX          INTEGER { none (1),          -- none attempted
                              inProgress (2),    -- restart in
                                                  -- progress
                              completed (3),     -- successfully
                                                  -- completed
                              timedOut (4),      -- timed out
                              topologyChanged (5) -- aborted due to
                                                  -- topology change.
    }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Describes the outcome of the last attempt at a
        graceful restart. If the value is 'none', no restart
        has yet been attempted. If the value is 'inProgress',
        a restart attempt is currently underway."
    ::= { ospfGeneralGroup 23 }

ospfAsLsaCount OBJECT-TYPE
    SYNTAX          Gauge32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The number of AS-scope link-state
        advertisements in the AS-scope link-state database."
    ::= { ospfGeneralGroup 24 }

ospfAsLsaCksumSum OBJECT-TYPE
    SYNTAX          Unsigned32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The 32-bit unsigned sum of the LS checksums of
        the AS link-state advertisements contained in the AS-scope
        link-state database. This sum can be used to determine

```


if there has been a change in a router's AS-scope link state database, and to compare the AS-scope link-state database of two routers."
 ::= { ospfGeneralGroup 25 }

ospfStubRouterSupport OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The router's support for stub router functionality.

 This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
 REFERENCE
 "OSPF Stub Router Advertisement"
 ::= { ospfGeneralGroup 26 }

ospfStubRouterAdvertisement OBJECT-TYPE

SYNTAX INTEGER {
 doNotAdvertise (1),
 advertise(2)
 }
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION
 "This object controls the advertisement of stub router LSA's by the router. The value doNotAdvertise will result in the advertisement of a standard router LSA and is the default value.

 This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
 ::= { ospfGeneralGroup 27 }

ospfDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value of sysUpTime on the most recent occasion at which any one of this MIB's counters suffered a discontinuity.

 If no such discontinuities have occurred since the last reinitialization of the local management subsystem, then this object contains a zero value."
 ::= { ospfGeneralGroup 28 }


```
-- The OSPF Area Table contains information
-- regarding the various areas.
```

```
ospfAreaTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF OspfAreaEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"Information describing the configured parameters and
cumulative statistics of the router's attached areas.
The interfaces and virtual links are configured
as part of these areas. Area 0.0.0.0, by definition,
is the Backbone Area."
```

```
REFERENCE
```

```
"OSPF Version 2, Section 6 The Area Data Structure"
```

```
::= { ospf 2 }
```

```
ospfAreaEntry OBJECT-TYPE
```

```
SYNTAX OspfAreaEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"Information describing the configured parameters and
cumulative statistics of one of the router's attached
```

```
areas.
```

```
The interfaces and virtual links are configured as part of
these areas. Area 0.0.0.0, by definition, is the Backbone
Area.
```

```
Information in this table is persistent and when this
```

```
object
```

```
is written the entity SHOULD save the change to non-
```

```
volatile
```

```
storage."
```

```
INDEX { ospfAreaId }
```

```
::= { ospfAreaTable 1 }
```

```
OspfAreaEntry ::=
```

```
SEQUENCE {
```

```
ospfAreaId
```

```
AreaID,
```

```
ospfAuthType
```

```
OspfAuthenticationType,
```

```
ospfImportAsExtern
```

```
INTEGER,
```

```
ospfSpfRuns
```

```
Counter32,
```

```
ospfAreaBdrRtrCount
```

```
Gauge32,
```

```
ospfAsBdrRtrCount
```

```
Gauge32,
```

```
ospfAreaLsaCount
```

Gauge32,
ospfAreaLsaChecksumSum
Integer32,

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```

ospfAreaSummary
    INTEGER,
ospfAreaStatus
    RowStatus,
ospfAreaNssaTranslatorRole
    INTEGER,
ospfAreaNssaTranslatorState
    INTEGER,
ospfAreaNssaTranslatorStabilityInterval
    PositiveInteger,
ospfAreaNssaTranslatorEvents
    Counter32
}

```

ospfAreaId OBJECT-TYPE

```

SYNTAX      AreaID
MAX-ACCESS  read-only -- read-only since originally
              -- an SMIV1 index

STATUS      current
DESCRIPTION
    "A 32-bit integer uniquely identifying an area.
    Area ID 0.0.0.0 is used for the OSPF backbone."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaEntry 1 }

```

ospfAuthType OBJECT-TYPE

```

SYNTAX      OspfAuthenticationType
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "The authentication type specified for an area."
REFERENCE
    "OSPF Version 2, Appendix D Authentication"
DEFVAL { none } -- no authentication, by default
 ::= { ospfAreaEntry 2 }

```

ospfImportAsExtern OBJECT-TYPE

```

SYNTAX      INTEGER {
                importExternal (1),
                importNoExternal (2),
                importNssa (3)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION

```

standard "Indicates whether an area is a Stub area, NSSA, or area. Type-5 AS-External LSAs and Type-11 Opaque LSAs are not imported into Stub Areas or NSSAs. NSSAs import AS-External data as Type-7 LSAs"

```

REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"

```

DEFVAL { importExternal }

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```
::= { ospfAreaEntry 3 }
```

```
ospfSpfRuns OBJECT-TYPE
```

```
SYNTAX Counter32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The number of times that the intra-area route table has been calculated using this area's link-state database. This is typically done using Dijkstra's algorithm.
```

```
Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ospfDiscontinuityTime."
```

```
::= { ospfAreaEntry 4 }
```

```
ospfAreaBdrRtrCount OBJECT-TYPE
```

```
SYNTAX Gauge32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The total number of area border routers reachable within this area. This is initially zero, and is calculated in each SPF Pass."
```

```
::= { ospfAreaEntry 5 }
```

```
ospfAsBdrRtrCount OBJECT-TYPE
```

```
SYNTAX Gauge32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The total number of Autonomous System border routers reachable within this area. This is initially zero, and is calculated in each SPF Pass."
```

```
::= { ospfAreaEntry 6 }
```

```
ospfAreaLsaCount OBJECT-TYPE
```

```
SYNTAX Gauge32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The total number of link-state advertisements in this area's link-state database, excluding AS External LSA's."
```

```
::= { ospfAreaEntry 7 }
```

```
ospfAreaLsaChecksumSum OBJECT-TYPE
```

```
SYNTAX Integer32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```


"The 32-bit sum of the link-state advertisements' LS checksums contained in this area's link-state database. This sum excludes external (LS type 5) link-state advertisements. The sum can be used to determine if there has been a change in a router's link-state database, and to compare the link-state database of two routers. The value should be treated as unsigned when comparing two sums of checksums."

DEFVAL { 0 }
 ::= { ospfAreaEntry 8 }

ospfAreaSummary OBJECT-TYPE

SYNTAX INTEGER {
 noAreaSummary (1),
 sendAreaSummary (2)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The variable ospfAreaSummary controls the import of summary LSAs into stub and NSSA areas. It has no effect on other areas.

If it is noAreaSummary, the router will not originate summary LSAs into the stub or NSSA area. It will rely entirely on its default route.

If it is sendAreaSummary, the router will both summarize and propagate summary LSAs."

DEFVAL { noAreaSummary }
 ::= { ospfAreaEntry 9 }

ospfAreaStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."

::= { ospfAreaEntry 10 }

ospfAreaNssaTranslatorRole OBJECT-TYPE

SYNTAX INTEGER { always (1), candidate (2) }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates an NSSA Border router's ability to


```

        perform NSSA translation of type-7 LSAs into
        type-5 LSAs."
    DEFVAL { candidate }
    ::= { ospfAreaEntry 11 }

ospfAreaNssaTranslatorState OBJECT-TYPE
    SYNTAX      INTEGER { enabled (1),
                        elected (2),
                        disabled (3)
                    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates if and how an NSSA Border router is
        performing NSSA translation of type-7 LSAs into type-5
        LSAs. When this object set to enabled, the NSSA Border
        router's OspfAreaNssaExtTranslatorRole has been set to
        always. When this object is set to elected, a candidate
        NSSA Border router is Translating type-7 LSAs into type-5.
        When this object is set to disabled, a candidate NSSA
        Border router is NOT translating type-7 LSAs into type-5."
    ::= { ospfAreaEntry 12 }

ospfAreaNssaTranslatorStabilityInterval OBJECT-TYPE
    SYNTAX      PositiveInteger
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The number of seconds after an elected translator
        determines its services are no longer required, that
        it should continue to perform its translation duties."
    DEFVAL { 40 }
    ::= { ospfAreaEntry 13 }

ospfAreaNssaTranslatorEvents OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates the number of Translator State changes
        that have occurred since the last boot-up.

        Discontinuities in the value of this counter can occur
        at re-initialization of the management system, and at other
        times as indicated by the value of ospfDiscontinuityTime."
    ::= { ospfAreaEntry 14 }

-- OSPF Area Default Metric Table

ospfStubAreaTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfStubAreaEntry

```



```

MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "The set of metrics that will be advertised
    by a default Area Border Router into a stub area."
REFERENCE
    "OSPF Version 2, Appendix C.2, Area Parameters"
 ::= { ospf 3 }

```

```

ospfStubAreaEntry OBJECT-TYPE
SYNTAX        OspfStubAreaEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION

```

```

    "The metric for a given Type of Service that
    will be advertised by a default Area Border
    Router into a stub area.

```

```

Information in this table is persistent and when this
object
is written the entity SHOULD save the change to non-
volatile
storage."

```

```

REFERENCE
    "OSPF Version 2, Appendix C.2, Area Parameters"
INDEX { ospfStubAreaId, ospfStubTOS }
 ::= { ospfStubAreaTable 1 }

```

```

OspfStubAreaEntry ::=
SEQUENCE {
    ospfStubAreaId
        AreaID,
    ospfStubTOS
        TOSType,
    ospfStubMetric
        BigMetric,
    ospfStubStatus
        RowStatus,
    ospfStubMetricType
        INTEGER
}

```

```

ospfStubAreaId OBJECT-TYPE
SYNTAX        AreaID
MAX-ACCESS    read-only -- read-only since originally an
                    -- SMIV1 index
STATUS        current
DESCRIPTION
    "The 32 bit identifier for the Stub Area. On
    creation, this can be derived from the
    instance."
 ::= { ospfStubAreaEntry 1 }

```

ospfStubTOS OBJECT-TYPE
SYNTAX TOSType

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```

MAX-ACCESS    read-only -- read-only since originally an
                -- SMIV1 index
STATUS        current
DESCRIPTION
    "The Type of Service associated with the
    metric. On creation, this can be derived from
    the instance."
 ::= { ospfStubAreaEntry 2 }

ospfStubMetric OBJECT-TYPE
SYNTAX        BigMetric
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The metric value applied at the indicated type
    of service. By default, this equals the least
    metric at the type of service among the
    interfaces to other areas."
 ::= { ospfStubAreaEntry 3 }

ospfStubStatus OBJECT-TYPE
SYNTAX        RowStatus
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "This object permits management of the table by
    facilitating actions such as row creation,
    construction and destruction.

    The value of this object has no effect on
    whether other objects in this conceptual row can be
    modified."
 ::= { ospfStubAreaEntry 4 }

ospfStubMetricType OBJECT-TYPE
SYNTAX        INTEGER {
                ospfMetric (1), -- OSPF Metric
                comparableCost (2), -- external type 1
                nonComparable (3) -- external type 2
            }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "This variable displays the type of metric
    advertised as a default route."
DEFVAL { ospfMetric }
 ::= { ospfStubAreaEntry 5 }

-- OSPF Link State Database

ospfLsdbTable OBJECT-TYPE
SYNTAX        SEQUENCE OF OspfLsdbEntry

```



```

MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "The OSPF Process's Link State Database (LSDB).
    The LSDB contains the Link State Advertisements
    from throughout the areas that the device is attached to."
REFERENCE
    "OSPF Version 2, Section 12 Link State Advertisements"
 ::= { ospf 4 }

```

```

ospfLsdbEntry OBJECT-TYPE
SYNTAX        OspfLsdbEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "A single Link State Advertisement."
INDEX { ospfLsdbAreaId, ospfLsdbType,
        ospfLsdbLsid, ospfLsdbRouterId }
 ::= { ospfLsdbTable 1 }

```

```

OspfLsdbEntry ::=
SEQUENCE {
    ospfLsdbAreaId
        AreaID,
    ospfLsdbType
        INTEGER,
    ospfLsdbLsid
        IpAddress,
    ospfLsdbRouterId
        RouterID,
    ospfLsdbSequence
        Integer32,
    ospfLsdbAge
        Integer32,
    ospfLsdbChecksum
        Integer32,
    ospfLsdbAdvertisement
        OCTET STRING
}

```

```

ospfLsdbAreaId OBJECT-TYPE
SYNTAX        AreaID
MAX-ACCESS    read-only -- read-only since originally an
                    -- SMIV1 index
STATUS        current
DESCRIPTION
    "The 32 bit identifier of the Area from which
    the LSA was received."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfLsdbEntry 1 }

```

```

ospfLsdbType OBJECT-TYPE

```



```

SYNTAX          INTEGER {
                routerLink (1),
                networkLink (2),
                summaryLink (3),
                asSummaryLink (4),
                asExternalLink (5), -- but see ospfAsLsdbTable
                multicastLink (6),
                nssaExternalLink (7),
                areaOpaqueLink (10)
                }
MAX-ACCESS      read-only -- read-only since originally an
                  -- SMIV1 index
STATUS          current
DESCRIPTION     "The type of the link state advertisement.
                Each link state type has a separate advertisement
                format.

                Note: External Link State Advertisements are permitted
                for backward compatibility, but should be displayed
                in the ospfAsLsdbTable rather than here."
REFERENCE      "OSPF Version 2, Appendix A.4.1 The Link State
                Advertisement header"
 ::= { ospfLsdbEntry 2 }

ospfLsdbLsid OBJECT-TYPE
SYNTAX          IPAddress
MAX-ACCESS      read-only -- read-only since originally an
                  -- SMIV1 index
STATUS          current
DESCRIPTION     "The Link State ID is an LS Type Specific field
                containing either a Router ID or an IP Address;
                it identifies the piece of the routing domain
                that is being described by the advertisement."
REFERENCE      "OSPF Version 2, Section 12.1.4 Link State ID"
 ::= { ospfLsdbEntry 3 }

ospfLsdbRouterId OBJECT-TYPE
SYNTAX          RouterID
MAX-ACCESS      read-only -- read-only since originally an
                  -- SMIV1 index
STATUS          current
DESCRIPTION     "The 32 bit number that uniquely identifies the
                originating router in the Autonomous System."
REFERENCE      "OSPF Version 2, Appendix C.1 Global parameters"
 ::= { ospfLsdbEntry 4 }

ospfLsdbSequence OBJECT-TYPE

```


SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The sequence number field is a signed 32-bit integer. It starts with the value '80000001'h, or -'7FFFFFFF'h, and increments until '7FFFFFFF'h. Thus, a typical sequence number will be very negative. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."
 REFERENCE
 "OSPF Version 2, [Section 12.1.6](#) LS sequence number"
 ::= { ospfLsdbEntry 5 }

ospfLsdbAge OBJECT-TYPE

SYNTAX Integer32 -- Should be 0..MaxAge, except when
 -- doNotAge bit is set
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "This field is the age of the link state advertisement in seconds."
 REFERENCE
 "OSPF Version 2, [Section 12.1.1](#) LS age"
 ::= { ospfLsdbEntry 6 }

ospfLsdbChecksum OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "This field is the checksum of the complete contents of the advertisement, excepting the age field. The age field
 is
 excepted so that an advertisement's age can be incremented without updating the checksum. The checksum used is the
 same
 that is used for ISO connectionless datagrams; it is commonly referred to as the Fletcher checksum."
 REFERENCE
 "OSPF Version 2, [Section 12.1.7](#) LS checksum"
 ::= { ospfLsdbEntry 7 }

ospfLsdbAdvertisement OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1..65535))
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The entire Link State Advertisement, including

its header.

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Note that for variable length LSAs, SNMP agents may not be able to return the largest string size"

REFERENCE

"OSPF Version 2, [Section 12](#) Link State Advertisements"

::= { ospfLsdbEntry 8 }

-- Address Range Table

ospfAreaRangeTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfAreaRangeEntry

MAX-ACCESS not-accessible

STATUS obsolete

DESCRIPTION

"The Address Range Table acts as an adjunct to the Area Table. It describes those Address Range Summaries that are configured to be propagated from an Area to reduce the amount of information about it which is known beyond its borders. It contains a set of IP address ranges specified by an IP address/IP network mask pair. For example, class B address range of X.X.X.X with a network mask of 255.255.0.0 includes all IP addresses from X.X.0.0 to X.X.255.255.

Note that this table is obsoleted and is replaced by the Area Aggregate Table."

REFERENCE

"OSPF Version 2, [Appendix C.2](#) Area parameters"

::= { ospf 5 }

ospfAreaRangeEntry OBJECT-TYPE

SYNTAX OspfAreaRangeEntry

MAX-ACCESS not-accessible

STATUS obsolete

DESCRIPTION

"A single area address range.

Information in this table is persistent and when this object is written the entity SHOULD save the change to non-volatile storage."

REFERENCE

"OSPF Version 2, [Appendix C.2](#) Area parameters"

INDEX { ospfAreaRangeAreaId, ospfAreaRangeNet }

::= { ospfAreaRangeTable 1 }

OspfAreaRangeEntry ::=

SEQUENCE {

ospfAreaRangeAreaId

AreaID,

ospfAreaRangeNet

IpAddress,

ospfAreaRangeMask
IpAddress,

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```

ospfAreaRangeStatus
    RowStatus,
ospfAreaRangeEffect
    INTEGER
}

```

ospfAreaRangeAreaId OBJECT-TYPE

```

SYNTAX      AreaID
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index

STATUS      obsolete
DESCRIPTION
    "The Area the Address Range is to be found
    within."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaRangeEntry 1 }

```

ospfAreaRangeNet OBJECT-TYPE

```

SYNTAX      IPAddress
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index

STATUS      obsolete
DESCRIPTION
    "The IP Address of the Net or Subnet indicated
    by the range."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaRangeEntry 2 }

```

ospfAreaRangeMask OBJECT-TYPE

```

SYNTAX      IPAddress
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "The Subnet Mask that pertains to the Net or
    Subnet."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaRangeEntry 3 }

```

ospfAreaRangeStatus OBJECT-TYPE

```

SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "This object permits management of the table by
    facilitating actions such as row creation,
    construction and destruction.

    The value of this object has no effect on
    whether other objects in this conceptual row can be
    modified."

```



```
 ::= { ospfAreaRangeEntry 4 }
```

```
ospfAreaRangeEffect OBJECT-TYPE
```

```
SYNTAX          INTEGER {
                    advertiseMatching (1),
                    doNotAdvertiseMatching (2)
                  }
```

```
MAX-ACCESS      read-create
```

```
STATUS          obsolete
```

```
DESCRIPTION
```

```
    "Subnets subsumed by ranges either trigger the
    advertisement of the indicated summary
    (advertiseMatching), or result in the subnet's not
    being advertised at all outside the area."
```

```
DEFVAL { advertiseMatching }
```

```
 ::= { ospfAreaRangeEntry 5 }
```

```
-- OSPF Host Table
```

```
ospfHostTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF OspfHostEntry
```

```
MAX-ACCESS      not-accessible
```

```
STATUS          current
```

```
DESCRIPTION
```

```
    "The Host/Metric Table indicates what hosts are directly
    attached to the Router, what metrics and types
    of service should be advertised for them
    and what Areas they are found within."
```

```
REFERENCE
```

```
    "OSPF Version 2, Appendix C.7 Host route
    parameters"
```

```
 ::= { ospf 6 }
```

```
ospfHostEntry OBJECT-TYPE
```

```
SYNTAX          OspfHostEntry
```

```
MAX-ACCESS      not-accessible
```

```
STATUS          current
```

```
DESCRIPTION
```

```
    "A metric to be advertised, for a given type of
    service, when a given host is reachable."
```

```
Information in this table is persistent and when this
object is written the entity SHOULD save the change to non-
volatile storage."
```

```
INDEX { ospfHostIpAddress, ospfHostTOS }
```

```
 ::= { ospfHostTable 1 }
```

```
OspfHostEntry ::=
```

```
SEQUENCE {
    ospfHostIpAddress
```

IpAddress,
ospfHostTOS

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```

    TOSType,
ospfHostMetric
    Metric,
ospfHostStatus
    RowStatus,
ospfHostAreaID
    AreaID,
ospfHostCfgAreaID
    AreaID
}

```

```

ospfHostIpAddress OBJECT-TYPE
SYNTAX      IPAddress
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The IP Address of the Host."
REFERENCE
    "OSPF Version 2, Appendix C.7 Host route parameters"
 ::= { ospfHostEntry 1 }

```

```

ospfHostTOS OBJECT-TYPE
SYNTAX      TOSType
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The Type of Service of the route being configured."
REFERENCE
    "OSPF Version 2, Appendix C.7 Host route parameters"
 ::= { ospfHostEntry 2 }

```

```

ospfHostMetric OBJECT-TYPE
SYNTAX      Metric
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "The Metric to be advertised."
REFERENCE
    "OSPF Version 2, Appendix C.7 Host route parameters"
 ::= { ospfHostEntry 3 }

```

```

ospfHostStatus OBJECT-TYPE
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This object permits management of the table by
    facilitating actions such as row creation,
    construction and destruction.

```

The value of this object has no effect on

whether other objects in this conceptual row can be modified."

::= { ospfHostEntry 4 }

ospfHostAreaID OBJECT-TYPE

SYNTAX AreaID
MAX-ACCESS read-only
STATUS deprecated

DESCRIPTION

"The OSPF Area to which the Host belongs.
Deprecated by ospfHostCfgAreaID."

REFERENCE

"OSPF Version 2, [Appendix C.7](#) Host parameters"

::= { ospfHostEntry 5 }

ospfHostCfgAreaID OBJECT-TYPE

SYNTAX AreaID
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"To configure the OSPF Area to which the Host belongs."

REFERENCE

"OSPF Version 2, [Appendix C.7](#) Host parameters"

::= { ospfHostEntry 6 }

-- OSPF Interface Table

ospfIfTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfIfEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"The OSPF Interface Table describes the interfaces
from the viewpoint of OSPF.

It augments the ipAddrTable with OSPF specific
information."

REFERENCE

"OSPF Version 2, [Appendix C.3](#) Router interface
parameters"

::= { ospf 7 }

ospfIfEntry OBJECT-TYPE

SYNTAX OspfIfEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"The OSPF Interface Entry describes one interface
from the viewpoint of OSPF.

Information in this table is persistent and when this
object is written the entity SHOULD save the change to non-

volatile

```
    storage."  
    INDEX { ospfIfIpAddress, ospfAddressLessIf }
```

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```
::= { ospfIfTable 1 }
```

```
OspfIfEntry ::=
SEQUENCE {
    ospfIfIpAddress
        IPAddress,
    ospfAddressLessIf
        InterfaceIndexOrZero,
    ospfIfAreaId
        AreaID,
    ospfIfType
        INTEGER,
    ospfIfAdminStat
        Status,
    ospfIfRtrPriority
        DesignatedRouterPriority,
    ospfIfTransitDelay
        UpToMaxAge,
    ospfIfRetransInterval
        UpToMaxAge,
    ospfIfHelloInterval
        HelloRange,
    ospfIfRtrDeadInterval
        PositiveInteger,
    ospfIfPollInterval
        PositiveInteger,
    ospfIfState
        INTEGER,
    ospfIfDesignatedRouter
        IPAddress,
    ospfIfBackupDesignatedRouter
        IPAddress,
    ospfIfEvents
        Counter32,
    ospfIfAuthKey
        OCTET STRING,
    ospfIfStatus
        RowStatus,
    ospfIfMulticastForwarding
        INTEGER,
    ospfIfDemand
        TruthValue,
    ospfIfAuthType
        OspfAuthenticationType,
    ospfIfLsaCount
        Gauge32,
    ospfIfLsaChecksumSum
        Unsigned32,
    ospfIfDesignatedRouterId
        RouterID,
    ospfIfBackupDesignatedRouterId
        RouterID
}
```



```

ospfIfIpAddress OBJECT-TYPE
    SYNTAX      IPAddress
    MAX-ACCESS   read-only -- read-only since originally an
                        -- SMIV1 index
    STATUS       current
    DESCRIPTION
        "The IP address of this OSPF interface."
    ::= { ospfIfEntry 1 }

ospfAddressLessIf OBJECT-TYPE
    SYNTAX      InterfaceIndexOrZero
    MAX-ACCESS   read-only -- read-only since originally an
                        -- SMIV1 index
    STATUS       current
    DESCRIPTION
        "For the purpose of easing the instancing of
        addressed and address less interfaces; This
        variable takes the value 0 on interfaces with
        IP Addresses, and the corresponding value of
        ifIndex for interfaces having no IP Address."
    ::= { ospfIfEntry 2 }

ospfIfAreaId OBJECT-TYPE
    SYNTAX      AreaID
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "A 32-bit integer uniquely identifying the area
        to which the interface connects. Area ID
        0.0.0.0 is used for the OSPF backbone."
    DEFVAL { '00000000'H } -- 0.0.0.0
    ::= { ospfIfEntry 3 }

ospfIfType OBJECT-TYPE
    SYNTAX      INTEGER {
        broadcast (1),
        nbma (2),
        pointToPoint (3),
        pointToMultipoint (5)
        }
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The OSPF interface type.
        By way of a default, this field may be intuited
        from the corresponding value of ifType.
        Broadcast LANs, such as Ethernet and IEEE 802.5,
        take the value 'broadcast', X.25 and similar
        technologies take the value 'nbma', and links
        that are definitively point to point take the
        value 'pointToPoint'."
    ::= { ospfIfEntry 4 }

```



```
ospfIfAdminStat OBJECT-TYPE
    SYNTAX      Status
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The OSPF interface's administrative status.
        The value formed on the interface, and the interface
        will be advertised as an internal route to some area.
        The value 'disabled' denotes that the interface is
        external to OSPF."
    DEFVAL { enabled }
    ::= { ospfIfEntry 5 }

ospfIfRtrPriority OBJECT-TYPE
    SYNTAX      DesignatedRouterPriority
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The priority of this interface. Used in
        multi-access networks, this field is used in
        the designated router election algorithm. The
        value 0 signifies that the router is not eligible
        to become the designated router on this particular
        network. In the event of a tie in this value,
        routers will use their Router ID as a tie breaker."
    DEFVAL { 1 }
    ::= { ospfIfEntry 6 }

ospfIfTransitDelay OBJECT-TYPE
    SYNTAX      UpToMaxAge
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The estimated number of seconds it takes to
        transmit a link state update packet over this
        interface. Note that minimal value SHOULD be
        1 second."
    DEFVAL { 1 }
    ::= { ospfIfEntry 7 }

ospfIfRetransInterval OBJECT-TYPE
    SYNTAX      UpToMaxAge
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The number of seconds between link-state advertisement
        retransmissions, for adjacencies belonging to this
        interface. This value is also used when retransmitting
        database description and link-state request packets.
        Note that minimal value SHOULD be 1 second."
```



```
DEFVAL { 5 }
 ::= { ospfIfEntry 8 }
```

ospfIfHelloInterval OBJECT-TYPE

```
SYNTAX      HelloRange
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"The length of time, in seconds, between the Hello packets that the router sends on the interface. This value must be the same for all routers attached to a common network."

```
DEFVAL { 10 }
 ::= { ospfIfEntry 9 }
```

ospfIfRtrDeadInterval OBJECT-TYPE

```
SYNTAX      PositiveInteger
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"The number of seconds that a router's Hello packets have not been seen before it's neighbors declare the router

down.

This should be some multiple of the Hello interval. This value must be the same for all routers attached to a common network."

```
DEFVAL { 40 }
 ::= { ospfIfEntry 10 }
```

ospfIfPollInterval OBJECT-TYPE

```
SYNTAX      PositiveInteger
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"The larger time interval, in seconds, between the Hello packets sent to an inactive non-broadcast multi-access neighbor."

```
DEFVAL { 120 }
 ::= { ospfIfEntry 11 }
```

ospfIfState OBJECT-TYPE

```
SYNTAX      INTEGER {
                down (1),
                loopback (2),
                waiting (3),
                pointToPoint (4),
                designatedRouter (5),
                backupDesignatedRouter (6),
                otherDesignatedRouter (7)
            }
MAX-ACCESS  read-only
```

STATUS

current

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```

DESCRIPTION
    "The OSPF Interface State."
DEFVAL { down }
 ::= { ospfIfEntry 12 }

ospfIfDesignatedRouter OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP Address of the Designated Router."
    DEFVAL { '00000000'H } -- 0.0.0.0
    ::= { ospfIfEntry 13 }

ospfIfBackupDesignatedRouter OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP Address of the Backup Designated
         Router."
    DEFVAL { '00000000'H } -- 0.0.0.0
    ::= { ospfIfEntry 14 }

ospfIfEvents OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of times this OSPF interface has
         changed its state, or an error has occurred.

         Discontinuities in the value of this counter can occur
         at re-initialization of the management system, and at other
         times as indicated by the value of ospfDiscontinuityTime."
    ::= { ospfIfEntry 15 }

ospfIfAuthKey OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (0..256))
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The cleartext password used as an OSPF
         Authentication key when simplePassword security
         is enabled. This object does not access any OSPF
         Cryptographic (e.g. MD5) Authentication Key under
         any circumstance.

         If the key length is shorter than 8 octets, the
         agent will left adjust and zero fill to 8 octets.

         Unauthenticated interfaces need no authentication
         key, and simple password authentication cannot use

```


a key of more than 8 octets.

Note that the use of simplePassword authentication is NOT recommended when there is concern regarding attack upon the OSPF system. SimplePassword authentication is only sufficient to protect against accidental misconfigurations because it re-uses cleartext passwords. [[RFC1704](#)]

When read, ospfIfAuthKey always returns an Octet String of length zero."

REFERENCE

"OSPF Version 2, [Section 9](#) The Interface Data Structure"

DEFVAL { '0000000000000000'H } -- 0.0.0.0.0.0.0.0
 ::= { ospfIfEntry 16 }

ospfIfStatus OBJECT-TYPE

SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."

::= { ospfIfEntry 17 }

ospfIfMulticastForwarding OBJECT-TYPE

SYNTAX INTEGER {
 blocked (1), -- no multicast forwarding
 multicast (2), -- using multicast address
 unicast (3) -- to each OSPF neighbor
 }

MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"The way multicasts should forwarded on this interface; not forwarded, forwarded as data link multicasts, or forwarded as data link unicasts. Data link multicasting is not meaningful on point to point and NBMA interfaces, and setting ospfMulticastForwarding to 0 effectively disables all multicast forwarding."

DEFVAL { blocked }
 ::= { ospfIfEntry 18 }

ospfIfDemand OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-create


```
STATUS          current
DESCRIPTION
    "Indicates whether Demand OSPF procedures (hello
    suppression to FULL neighbors and setting the
    DoNotAge flag on propagated LSAs) should be
    performed on this interface."
DEFVAL { false }
 ::= { ospfIfEntry 19 }

ospfIfAuthType OBJECT-TYPE
SYNTAX          OspfAuthenticationType
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "The authentication type specified for an interface.

    Note that this object can be used to engage
    in significant attacks against an OSPF router."
REFERENCE
    "OSPF Version 2, Appendix D Authentication"
DEFVAL { none } -- no authentication, by default
 ::= { ospfIfEntry 20 }

ospfIfLsaCount OBJECT-TYPE
SYNTAX          Gauge32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The total number of link-local link state advertisements
    in this interface's link-local link state database."
 ::= { ospfIfEntry 21 }

ospfIfLsaCksumSum OBJECT-TYPE
SYNTAX          Unsigned32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The 32-bit unsigned sum of the link-state
    advertisements' LS checksums contained in this
    interface's link-local link state database.
    The sum can be used to determine if there has
    been a change in the interface's link state
    database, and to compare the interface link-state
    database of routers attached to the same subnet."
 ::= { ospfIfEntry 22 }

ospfIfDesignatedRouterId OBJECT-TYPE
SYNTAX          RouterID
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The Router ID of the Designated Router."
 ::= { ospfIfEntry 23 }
```



```
ospfIfBackupDesignatedRouterId OBJECT-TYPE
    SYNTAX      RouterID
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The Router ID of the Backup Designated Router."
    ::= { ospfIfEntry 24 }
```

-- OSPF Interface Metric Table

```
ospfIfMetricTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfIfMetricEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The Metric Table describes the metrics to be advertised
        for a specified interface at the various types of service.
        As such, this table is an adjunct of the OSPF Interface
        Table.
```

Types of service, as defined by [RFC 791](#), have the ability to request low delay, high bandwidth, or reliable linkage.

For the purposes of this specification, the measure of bandwidth:

$$\text{Metric} = \text{referenceBandwidth} / \text{ifSpeed}$$

is the default value.

The default reference bandwidth is 10^8 .

For multiple link interfaces, note that ifSpeed is the sum of the individual link speeds. This yields a number having the following typical values:

Network Type/bit rate	Metric
>= 100 MBPS	1
Ethernet/802.3	10
E1	48
T1 (ESF)	65
64 KBPS	1562
56 KBPS	1785
19.2 KBPS	5208
9.6 KBPS	10416

Routes that are not specified use the default (TOS 0)

metric

Note that the default reference bandwidth can be configured using the general group object ospfReferenceBandwidth."

REFERENCE

"OSPF Version 2, [Appendix C.3](#) Router interface

parameters"

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```
 ::= { ospf 8 }
```

```
ospfIfMetricEntry OBJECT-TYPE
```

```
SYNTAX      OspfIfMetricEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
  "A particular TOS metric for a non-virtual interface
  identified by the interface index.
```

```
  Information in this table is persistent and when this
```

```
object
```

```
  is written the entity SHOULD save the change to non-
```

```
volatile
```

```
  storage."
```

```
REFERENCE
```

```
  "OSPF Version 2, Appendix C.3 Router interface
  parameters"
```

```
INDEX { ospfIfMetricIpAddress,
        ospfIfMetricAddressLessIf,
        ospfIfMetricTOS }
```

```
 ::= { ospfIfMetricTable 1 }
```

```
OspfIfMetricEntry ::=
```

```
SEQUENCE {
```

```
  ospfIfMetricIpAddress
```

```
    IPAddress,
```

```
  ospfIfMetricAddressLessIf
```

```
    InterfaceIndexOrZero,
```

```
  ospfIfMetricTOS
```

```
    TOSType,
```

```
  ospfIfMetricValue
```

```
    Metric,
```

```
  ospfIfMetricStatus
```

```
    RowStatus
```

```
}
```

```
ospfIfMetricIpAddress OBJECT-TYPE
```

```
SYNTAX      IPAddress
```

```
MAX-ACCESS  read-only -- read-only since originally an
                  -- SMIV1 index
```

```
STATUS      current
```

```
DESCRIPTION
```

```
  "The IP address of this OSPF interface. On row
  creation, this can be derived from the instance."
```

```
 ::= { ospfIfMetricEntry 1 }
```

```
ospfIfMetricAddressLessIf OBJECT-TYPE
```

```
SYNTAX      InterfaceIndexOrZero
```

```
MAX-ACCESS  read-only -- read-only since originally an
                  -- SMIV1 index
```

```
STATUS      current
```

```
DESCRIPTION
```

"For the purpose of easing the instancing of
addressed and addressless interfaces; This

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```

    variable takes the value 0 on interfaces with
    IP Addresses, and the value of ifIndex for
    interfaces having no IP Address. On row
    creation, this can be derived from the instance."
 ::= { ospfIfMetricEntry 2 }

ospfIfMetricTOS OBJECT-TYPE
    SYNTAX      TOSType
    MAX-ACCESS  read-only -- read-only since originally an
                        -- SMIV1 index
    STATUS      current
    DESCRIPTION
        "The type of service metric being referenced.
        On row creation, this can be derived from the
        instance."
 ::= { ospfIfMetricEntry 3 }

ospfIfMetricValue OBJECT-TYPE
    SYNTAX      Metric
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The metric of using this type of service on
        this interface. The default value of the TOS 0
        Metric is 10^8 / ifSpeed."
 ::= { ospfIfMetricEntry 4 }

ospfIfMetricStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This object permits management of the table by
        facilitating actions such as row creation,
        construction and destruction.

        The value of this object has no effect on
        whether other objects in this conceptual row can be
        modified."
 ::= { ospfIfMetricEntry 5 }

-- OSPF Virtual Interface Table

ospfVirtIfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfVirtIfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Information about this router's virtual interfaces
        that the OSPF Process is configured to carry on."
    REFERENCE
        "OSPF Version 2, Appendix C.4 Virtual link

```



```

    parameters"
 ::= { ospf 9 }

```

```
ospfVirtIfEntry OBJECT-TYPE
```

```
SYNTAX      OspfVirtIfEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "Information about a single Virtual Interface.
```

```
    Information in this table is persistent and when this
```

```
object
```

```
    is written the entity SHOULD save the change to non-
```

```
volatile
```

```
    storage."
```

```
INDEX { ospfVirtIfAreaId, ospfVirtIfNeighbor }
```

```
::= { ospfVirtIfTable 1 }
```

```
OspfVirtIfEntry ::=
```

```
SEQUENCE {
```

```
    ospfVirtIfAreaId
```

```
        AreaID,
```

```
    ospfVirtIfNeighbor
```

```
        RouterID,
```

```
    ospfVirtIfTransitDelay
```

```
        UpToMaxAge,
```

```
    ospfVirtIfRetransInterval
```

```
        UpToMaxAge,
```

```
    ospfVirtIfHelloInterval
```

```
        HelloRange,
```

```
    ospfVirtIfRtrDeadInterval
```

```
        PositiveInteger,
```

```
    ospfVirtIfState
```

```
        INTEGER,
```

```
    ospfVirtIfEvents
```

```
        Counter32,
```

```
    ospfVirtIfAuthKey
```

```
        OCTET STRING,
```

```
    ospfVirtIfStatus
```

```
        RowStatus,
```

```
    ospfVirtIfAuthType
```

```
        OspfAuthenticationType,
```

```
    ospfVirtIfLsaCount
```

```
        Gauge32,
```

```
    ospfVirtIfLsaCksumSum
```

```
        Unsigned32
```

```
 }
```

```
ospfVirtIfAreaId OBJECT-TYPE
```

```
SYNTAX      AreaID
```

```
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
```

```
STATUS      current
```

DESCRIPTION

"The Transit Area that the Virtual Link

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traverses. By definition, this is not 0.0.0.0"
 ::= { ospfVirtIfEntry 1 }

ospfVirtIfNeighbor OBJECT-TYPE

SYNTAX RouterID
MAX-ACCESS read-only -- read-only since originally an
 -- SMIV1 index
STATUS current
DESCRIPTION
 "The Router ID of the Virtual Neighbor."
 ::= { ospfVirtIfEntry 2 }

ospfVirtIfTransitDelay OBJECT-TYPE

SYNTAX UpToMaxAge
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The estimated number of seconds it takes to
 transmit a link-state update packet over this
 interface. Note that minimal value SHOULD be
 one second."
DEFVAL { 1 }
 ::= { ospfVirtIfEntry 3 }

ospfVirtIfRetransInterval OBJECT-TYPE

SYNTAX UpToMaxAge
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The number of seconds between link-state
 advertisement retransmissions, for adjacencies
 belonging to this interface. This value is
 also used when retransmitting database
 description and link-state request packets. This
 value should be well over the expected
 round-trip time. Note that minimal value SHOULD be
 one second."
DEFVAL { 5 }
 ::= { ospfVirtIfEntry 4 }

ospfVirtIfHelloInterval OBJECT-TYPE

SYNTAX HelloRange
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "The length of time, in seconds, between the
 Hello packets that the router sends on the
 interface. This value must be the same for the
 virtual neighbor."
DEFVAL { 10 }


```
::= { ospfVirtIfEntry 5 }
```

```
ospfVirtIfRtrDeadInterval OBJECT-TYPE
```

```
SYNTAX      PositiveInteger
```

```
UNITS       "seconds"
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The number of seconds that a router's Hello
    packets have not been seen before it's
    neighbors declare the router down. This should be
    some multiple of the Hello interval. This
    value must be the same for the virtual neighbor."
```

```
DEFVAL { 60 }
```

```
::= { ospfVirtIfEntry 6 }
```

```
ospfVirtIfState OBJECT-TYPE
```

```
SYNTAX      INTEGER {
                down (1), -- these use the same encoding
                pointToPoint (4) -- as the ospfIfTable
            }
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "OSPF virtual interface states."
```

```
DEFVAL { down }
```

```
::= { ospfVirtIfEntry 7 }
```

```
ospfVirtIfEvents OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The number of state changes or error events on
    this Virtual Link.
```

```
    Discontinuities in the value of this counter can occur
    at re-initialization of the management system, and at other
    times as indicated by the value of ospfDiscontinuityTime."
```

```
::= { ospfVirtIfEntry 8 }
```

```
ospfVirtIfAuthKey OBJECT-TYPE
```

```
SYNTAX      OCTET STRING (SIZE(0..256))
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The cleartext password used as an OSPF
    Authentication key when simplePassword security
    is enabled. This object does not access any OSPF
    Cryptographic (e.g. MD5) Authentication Key under
    any circumstance.
```

```
    If the key length is shorter than 8 octets, the
```


agent will left adjust and zero fill to 8 octets.

Unauthenticated interfaces need no authentication key, and simple password authentication cannot use a key of more than 8 octets.

Note that the use of simplePassword authentication is NOT recommended when there is concern regarding attack upon the OSPF system. SimplePassword authentication is only sufficient to protect against accidental misconfigurations because it re-uses cleartext passwords. [[RFC1704](#)]

When read, ospfIfAuthKey always returns an Octet String of length zero."

REFERENCE

"OSPF Version 2, [Section 9](#) The Interface Data Structure"

DEFVAL { '0000000000000000'H } -- 0.0.0.0.0.0.0.0
 ::= { ospfVirtIfEntry 9 }

ospfVirtIfStatus OBJECT-TYPE

SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."

::= { ospfVirtIfEntry 10 }

ospfVirtIfAuthType OBJECT-TYPE

SYNTAX OspfAuthenticationType
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"The authentication type specified for a virtual interface.

Note that this object can be used to engage in significant attacks against an OSPF router."

REFERENCE

"OSPF Version 2, [Appendix E](#) Authentication"

DEFVAL { none } -- no authentication, by default
 ::= { ospfVirtIfEntry 11 }

ospfVirtIfLsaCount OBJECT-TYPE

SYNTAX Gauge32
 MAX-ACCESS read-only
 STATUS current


```

DESCRIPTION
    "The total number of link-local link state advertisements
    in this virtual interface's link-local link state
database."

```

```
 ::= { ospfVirtIfEntry 12 }
```

```
ospfVirtIfLsaCksumSum OBJECT-TYPE
```

```
SYNTAX      Unsigned32
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The 32-bit unsigned sum of the link-state
    advertisements' LS checksums contained in this
    virtual interface's link-local link state database.
    The sum can be used to determine if there has
    been a change in the virtual interface's link state
    database, and to compare the virtual interface
    link-state database of the virtual neighbors."

```

```
 ::= { ospfVirtIfEntry 13 }
```

```
-- OSPF Neighbor Table
```

```
ospfNbrTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF OspfNbrEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "A table describing all non-virtual neighbors
    in the locality of the OSPF router."

```

```
REFERENCE
```

```
    "OSPF Version 2, Section 10 The Neighbor Data
    Structure"

```

```
 ::= { ospf 10 }
```

```
ospfNbrEntry OBJECT-TYPE
```

```
SYNTAX      OspfNbrEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The information regarding a single neighbor.

```

```

    Information in this table is persistent and when this
object      is written the entity SHOULD save the change to non-
volatile   storage."

```

```
REFERENCE
```

```
    "OSPF Version 2, Section 10 The Neighbor Data
    Structure"

```

```
INDEX { ospfNbrIpAddress, ospfNbrAddressLessIndex }
```

```
 ::= { ospfNbrTable 1 }
```

```
OspfNbrEntry ::=  
  SEQUENCE {  
    ospfNbrIpAddress
```

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```

    IPAddress,
ospfNbrAddressLessIndex
    InterfaceIndexOrZero,
ospfNbrRtrId
    RouterID,
ospfNbrOptions
    Integer32,
ospfNbrPriority
    DesignatedRouterPriority,
ospfNbrState
    INTEGER,
ospfNbrEvents
    Counter32,
ospfNbrLsRetransQLen
    Gauge32,
ospfNbmaNbrStatus
    RowStatus,
ospfNbmaNbrPermanence
    INTEGER,
ospfNbrHelloSuppressed
    TruthValue,
ospfNbrRestartHelperStatus
    INTEGER,
ospfNbrRestartHelperAge
    Unsigned32,
ospfNbrRestartHelperExitReason
    INTEGER
}

```

ospfNbrIpAddr OBJECT-TYPE

```

SYNTAX      IPAddress
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index

STATUS      current
DESCRIPTION
    "The IP address this neighbor is using in its
    IP Source Address. Note that, on addressless
    links, this will not be 0.0.0.0, but the
    address of another of the neighbor's interfaces."
 ::= { ospfNbrEntry 1 }

```

ospfNbrAddressLessIndex OBJECT-TYPE

```

SYNTAX      InterfaceIndexOrZero
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index

STATUS      current
DESCRIPTION
    "On an interface having an IP Address, zero.
    On addressless interfaces, the corresponding
    value of ifIndex in the Internet Standard MIB.
    On row creation, this can be derived from the
    instance."
 ::= { ospfNbrEntry 2 }

```


ospfNbrRtrId OBJECT-TYPE

SYNTAX RouterID
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"A 32-bit integer (represented as a type
IpAddress) uniquely identifying the neighboring
router in the Autonomous System."

DEFVAL { '00000000'H } -- 0.0.0.0
::= { ospfNbrEntry 3 }

ospfNbrOptions OBJECT-TYPE

SYNTAX Integer32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"A Bit Mask corresponding to the neighbor's
options field.

Bit 0, if set, indicates that the system will
operate on Type of Service metrics other than
TOS 0. If zero, the neighbor will ignore all
metrics except the TOS 0 metric.

Bit 1, if set, indicates that the associated
area accepts and operates on external
information; if zero, it is a stub area.

Bit 2, if set, indicates that the system is
capable of routing IP Multicast datagrams; i.e.,
that it implements the Multicast Extensions to
OSPF.

Bit 3, if set, indicates that the associated
area is an NSSA. These areas are capable of
carrying type 7 external advertisements, which
are translated into type 5 external advertisements
at NSSA borders."

REFERENCE

"OSPF Version 2, [Section 12.1.2](#) Options"

DEFVAL { 0 }
::= { ospfNbrEntry 4 }

ospfNbrPriority OBJECT-TYPE

SYNTAX DesignatedRouterPriority
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The priority of this neighbor in the designated
router election algorithm. The value 0 signifies
that the neighbor is not eligible to become
the designated router on this particular network."


```
DEFVAL { 1 }
 ::= { ospfNbrEntry 5 }
```

```
ospfNbrState OBJECT-TYPE
    SYNTAX      INTEGER {
        down (1),
        attempt (2),
        init (3),
        twoWay (4),
        exchangeStart (5),
        exchange (6),
        loading (7),
        full (8)
    }
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The State of the relationship with this Neighbor."
    REFERENCE
        "OSPF Version 2, Section 10.1 Neighbor States"
    DEFVAL { down }
    ::= { ospfNbrEntry 6 }
```

```
ospfNbrEvents OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The number of times this neighbor relationship
         has changed state, or an error has occurred.

         Discontinuities in the value of this counter can occur
         at re-initialization of the management system, and at other
         times as indicated by the value of ospfDiscontinuityTime."
    ::= { ospfNbrEntry 7 }
```

```
ospfNbrLsRetransQLen OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The current length of the retransmission
         queue."
    ::= { ospfNbrEntry 8 }
```

```
ospfNbmaNbrStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "This object permits management of the table by
         facilitating actions such as row creation,
         construction and destruction."
```


The value of this object has no effect on whether other objects in this conceptual row can be modified."

::= { ospfNbrEntry 9 }

ospfNbmaNbrPermanence OBJECT-TYPE

SYNTAX INTEGER {
dynamic (1), -- learned through protocol
permanent (2) -- configured address
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable displays the status of the entry. 'dynamic' and 'permanent' refer to how the neighbor became known."

DEFVAL { permanent }

::= { ospfNbrEntry 10 }

ospfNbrHelloSuppressed OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates whether Hellos are being suppressed to the neighbor."

::= { ospfNbrEntry 11 }

ospfNbrRestartHelperStatus OBJECT-TYPE

SYNTAX INTEGER { notHelping (1),
helping (2)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates whether the router is acting as a graceful restart helper for the neighbor."

::= { ospfNbrEntry 12 }

ospfNbrRestartHelperAge OBJECT-TYPE

SYNTAX Unsigned32

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Remaining time in current OSPF graceful restart interval, if the router is acting as a restart helper for the neighbor."

::= { ospfNbrEntry 13 }

ospfNbrRestartHelperExitReason OBJECT-TYPE

SYNTAX INTEGER { none (1), -- not attempted


```

        inProgress (2),      -- restart in
                             -- progress
        completed (3),      -- successfully
                             -- completed
        timedOut (4),       -- timed out
        topologyChanged (5) -- aborted due to
                             -- topology
                             -- change.
    }
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Describes the outcome of the last attempt at acting
     as a graceful restart helper for the neighbor."
 ::= { ospfNbrEntry 14 }

-- OSPF Virtual Neighbor Table

ospfVirtNbrTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfVirtNbrEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table describes all virtual neighbors.
         Since Virtual Links are configured
         in the virtual interface table, this table is read-only."
    REFERENCE
        "OSPF Version 2, Section 15 Virtual Links"
    ::= { ospf 11 }

ospfVirtNbrEntry OBJECT-TYPE
    SYNTAX      OspfVirtNbrEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Virtual neighbor information.

         Information in this table is persistent and when this
object          is written the entity SHOULD save the change to non-
volatile       storage."
    INDEX { ospfVirtNbrArea, ospfVirtNbrRtrId }
    ::= { ospfVirtNbrTable 1 }

OspfVirtNbrEntry ::=
    SEQUENCE {
        ospfVirtNbrArea
            AreaID,
        ospfVirtNbrRtrId
            RouterID,
        ospfVirtNbrIpAddr
            IpAddress,

```

ospfVirtNbrOptions
Integer32,

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```

ospfVirtNbrState
    INTEGER,
ospfVirtNbrEvents
    Counter32,
ospfVirtNbrLsRetransQLen
    Gauge32,
ospfVirtNbrHelloSuppressed
    TruthValue,
ospfVirtNbrRestartHelperStatus
    INTEGER,
ospfVirtNbrRestartHelperAge
    Unsigned32,
ospfVirtNbrRestartHelperExitReason
    INTEGER
}

```

ospfVirtNbrArea OBJECT-TYPE

```

SYNTAX      AreaID
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The Transit Area Identifier."
 ::= { ospfVirtNbrEntry 1 }

```

ospfVirtNbrRtrId OBJECT-TYPE

```

SYNTAX      RouterID
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "A 32-bit integer uniquely identifying the
     neighboring router in the Autonomous System."
 ::= { ospfVirtNbrEntry 2 }

```

ospfVirtNbrIpAddr OBJECT-TYPE

```

SYNTAX      IPAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The IP address this Virtual Neighbor is using."
 ::= { ospfVirtNbrEntry 3 }

```

ospfVirtNbrOptions OBJECT-TYPE

```

SYNTAX      Integer32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A Bit Mask corresponding to the neighbor's
     options field.

    Bit 1, if set, indicates that the system will
     operate on Type of Service metrics other than

```


TOS 0. If zero, the neighbor will ignore all metrics except the TOS 0 metric.

Bit 2, if set, indicates that the system is Network Multicast capable; ie, that it implements OSPF Multicast Routing."

::= { ospfVirtNbrEntry 4 }

ospfVirtNbrState OBJECT-TYPE

SYNTAX INTEGER {
 down (1),
 attempt (2),
 init (3),
 twoWay (4),
 exchangeStart (5),
 exchange (6),
 loading (7),
 full (8)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The state of the Virtual Neighbor Relationship."

::= { ospfVirtNbrEntry 5 }

ospfVirtNbrEvents OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times this virtual link has changed its state, or an error has occurred.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ospfDiscontinuityTime."

::= { ospfVirtNbrEntry 6 }

ospfVirtNbrLsRetransQLen OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current length of the retransmission queue."

::= { ospfVirtNbrEntry 7 }

ospfVirtNbrHelloSuppressed OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates whether Hellos are being suppressed


```

    to the neighbor"
 ::= { ospfVirtNbrEntry 8 }

ospfVirtNbrRestartHelperStatus OBJECT-TYPE
    SYNTAX      INTEGER { notHelping (1),
                          helping (2)
                        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates whether the router is acting
         as a graceful restart helper for the neighbor."
 ::= { ospfVirtNbrEntry 9 }

ospfVirtNbrRestartHelperAge OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Remaining time in current OSPF graceful restart
         interval, if the router is acting as a restart
         helper for the neighbor."
 ::= { ospfVirtNbrEntry 10 }

ospfVirtNbrRestartHelperExitReason OBJECT-TYPE
    SYNTAX      INTEGER { none (1),          -- not attempted
                          inProgress (2),   -- restart in
                                              -- progress
                          completed (3),    -- successfully
                                              -- completed
                          timedOut (4),     -- timed out
                          topologyChanged (5) -- aborted due to
                                              -- topology
                                              -- change.
                        }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Describes the outcome of the last attempt at acting
         as a graceful restart helper for the neighbor."
 ::= { ospfVirtNbrEntry 11 }

-- OSPF Link State Database, External

ospfExtLsdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfExtLsdbEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "The OSPF Process's External LSA Link State Database."

```


This table is identical to the OSPF LSDB Table in format, but contains only External Link State Advertisements. The purpose is to allow external LSAs to be displayed once for the router rather than once in each non-stub area.

Note that external LSAs are also in the AS-scope Link State Database."

REFERENCE

"OSPF Version 2, [Section 12](#) Link State Advertisements"

::= { ospf 12 }

ospfExtLsdbEntry OBJECT-TYPE

SYNTAX OspfExtLsdbEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"A single Link State Advertisement."

INDEX { ospfExtLsdbType, ospfExtLsdbLsid,
ospfExtLsdbRouterId }

::= { ospfExtLsdbTable 1 }

OspfExtLsdbEntry ::=

SEQUENCE {

ospfExtLsdbType

INTEGER,

ospfExtLsdbLsid

IpAddress,

ospfExtLsdbRouterId

RouterID,

ospfExtLsdbSequence

Integer32,

ospfExtLsdbAge

Integer32,

ospfExtLsdbChecksum

Integer32,

ospfExtLsdbAdvertisement

OCTET STRING

}

ospfExtLsdbType OBJECT-TYPE

SYNTAX INTEGER {
asExternalLink (5)
}

MAX-ACCESS read-only -- read-only since originally an
-- SMIV1 index

STATUS deprecated

DESCRIPTION

"The type of the link state advertisement.

Each link state type has a separate advertisement
format."

REFERENCE

"OSPF Version 2, [Appendix A.4.1](#) The Link State

Advertisement header"

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```
 ::= { ospfExtLsdbEntry 1 }
```

```
ospfExtLsdbLsid OBJECT-TYPE
```

```
SYNTAX      IPAddress
```

```
MAX-ACCESS  read-only -- read-only since originally an
-- SMIV1 index
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
  "The Link State ID is an LS Type Specific field
  containing either a Router ID or an IP Address;
  it identifies the piece of the routing domain
  that is being described by the advertisement."
```

```
REFERENCE
```

```
  "OSPF Version 2, Section 12.1.4 Link State ID"
```

```
 ::= { ospfExtLsdbEntry 2 }
```

```
ospfExtLsdbRouterId OBJECT-TYPE
```

```
SYNTAX      RouterID
```

```
MAX-ACCESS  read-only -- read-only since originally an
-- SMIV1 index
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
  "The 32 bit number that uniquely identifies the
  originating router in the Autonomous System."
```

```
REFERENCE
```

```
  "OSPF Version 2, Appendix C.1 Global parameters"
```

```
 ::= { ospfExtLsdbEntry 3 }
```

```
ospfExtLsdbSequence OBJECT-TYPE
```

```
SYNTAX      Integer32
```

```
MAX-ACCESS  read-only
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
  "The sequence number field is a signed 32-bit
  integer. It starts with the value '80000001'h,
  or -'7FFFFFFF'h, and increments until '7FFFFFFF'h.
  Thus, a typical sequence number will be very negative.
  It is used to detect old and duplicate link state
  advertisements. The space of sequence numbers is linearly
  ordered. The larger the sequence number the more recent
  the advertisement."
```

```
REFERENCE
```

```
  "OSPF Version 2, Section 12.1.6 LS sequence
  number"
```

```
 ::= { ospfExtLsdbEntry 4 }
```

```
ospfExtLsdbAge OBJECT-TYPE
```

```
SYNTAX      Integer32 -- Should be 0..MaxAge, except when
-- doNotAge bit is set
```

```
UNITS      "seconds"
```

```
MAX-ACCESS  read-only
```

```
STATUS      deprecated
```

```
DESCRIPTION
```



```

    "This field is the age of the link state
    advertisement in seconds."
REFERENCE
    "OSPF Version 2, Section 12.1.1 LS age"
 ::= { ospfExtLsdbEntry 5 }

ospfExtLsdbChecksum OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "This field is the checksum of the complete
        contents of the advertisement, excepting the
        age field. The age field is excepted so that
        an advertisement's age can be incremented
        without updating the checksum. The checksum
        used is the same that is used for ISO
        connectionless datagrams; it is commonly referred
        to as the Fletcher checksum."
    REFERENCE
        "OSPF Version 2, Section 12.1.7 LS checksum"
 ::= { ospfExtLsdbEntry 6 }

ospfExtLsdbAdvertisement OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(36))
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The entire Link State Advertisement, including
        its header."
    REFERENCE
        "OSPF Version 2, Section 12 Link State
        Advertisements"
 ::= { ospfExtLsdbEntry 7 }

-- OSPF Use of the CIDR Route Table

ospfRouteGroup      OBJECT IDENTIFIER ::= { ospf 13 }

-- The IP Forwarding Table defines a number of objects for use by
-- the routing protocol to externalize its information. Most of
-- the variables (ipForwardDest, ipForwardMask, ipForwardPolicy,
-- ipForwardNextHop, ipForwardIfIndex, ipForwardType,
-- ipForwardProto, ipForwardAge, and ipForwardNextHopAS) are
-- defined there.

-- Those that leave some discretion are defined here.

-- ipCidrRouteProto is, of course, ospf (13).

-- ipCidrRouteAge is the time since the route was first
-- calculated, as opposed to the time since the last SPF run.
```



```
--      ipCidrRouteInfo is an OBJECT IDENTIFIER for use by the routing
--      protocol. The following values shall be found there depending
--      on the way the route was calculated.
```

```
ospfIntraArea      OBJECT IDENTIFIER ::= { ospfRouteGroup 1 }
ospfInterArea      OBJECT IDENTIFIER ::= { ospfRouteGroup 2 }
ospfExternalType1  OBJECT IDENTIFIER ::= { ospfRouteGroup 3 }
ospfExternalType2  OBJECT IDENTIFIER ::= { ospfRouteGroup 4 }
```

```
--      ipCidrRouteMetric1 is, by definition, the primary routing
--      metric. Therefore, it should be the metric that route
--      selection is based on. For intra-area and inter-area routes,
--      it is an OSPF metric. For External Type 1 (comparable value)
--      routes, it is an OSPF metric plus the External Metric. For
--      external Type 2 (non-comparable value) routes, it is the
--      external metric.
```

```
--      ipCidrRouteMetric2 is, by definition, a secondary routing
--      metric. Therefore, it should be the metric that breaks a tie
--      among routes having equal metric1 values and the same
--      calculation rule. For intra-area, inter-area routes, and
--      External Type 1 (comparable value) routes, it is unused. For
--      external Type 2 (non-comparable value) routes, it is the
metric
--      to the AS border router.
```

```
--      ipCidrRouteMetric3, ipCidrRouteMetric4, and ipCidrRouteMetric5
--      are unused.
```

```
-- The OSPF Area Aggregate Table
```

```
--
-- This table replaces the OSPF Area Summary Table, being an
-- extension of that for CIDR routers.
```

```
ospfAreaAggregateTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF OspfAreaAggregateEntry
```

```
MAX-ACCESS      not-accessible
```

```
STATUS          current
```

```
DESCRIPTION
```

```
"The Area Aggregate Table acts as an adjunct
to the Area Table. It describes those address aggregates
that are configured to be propagated from an Area.
Its purpose is to reduce the amount of information
which is known beyond Area's borders.
```

```
It contains a set of IP address ranges
specified by an IP address/IP network mask pair.
For example, class B address range of X.X.X.X
with a network mask of 255.255.0.0 includes all IP
addresses from X.X.0.0 to X.X.255.255.
```

```
Note that if ranges are configured such that one range
```

subsumes another range (e.g., 10.0.0.0 mask 255.0.0.0

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```

        and 10.1.0.0 mask 255.255.0.0),
        the most specific match is the preferred one."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospf 14 }

```

```
ospfAreaAggregateEntry OBJECT-TYPE
```

```
SYNTAX OspfAreaAggregateEntry
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"A single area aggregate entry.
```

```
Information in this table is persistent and when this
```

```
object
```

```
is written the entity SHOULD save the change to non-
```

```
volatile
```

```
storage."
```

```
REFERENCE
```

```
"OSPF Version 2, Appendix C.2 Area parameters"
```

```
INDEX { ospfAreaAggregateAreaID, ospfAreaAggregateLsdbType,
        ospfAreaAggregateNet, ospfAreaAggregateMask }
```

```
::= { ospfAreaAggregateTable 1 }
```

```
OspfAreaAggregateEntry ::=
```

```
SEQUENCE {
```

```
    ospfAreaAggregateAreaID
        AreaID,
```

```
    ospfAreaAggregateLsdbType
        INTEGER,
```

```
    ospfAreaAggregateNet
        IPAddress,
```

```
    ospfAreaAggregateMask
        IPAddress,
```

```
    ospfAreaAggregateStatus
        RowStatus,
```

```
    ospfAreaAggregateEffect
        INTEGER,
```

```
    ospfAreaAggregateExtRouteTag
        Unsigned32
}
```

```
ospfAreaAggregateAreaID OBJECT-TYPE
```

```
SYNTAX AreaID
```

```
MAX-ACCESS read-only -- read-only since originally an
                    -- SMIV1 index
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The Area the Address Aggregate is to be found
within."
```

```
REFERENCE
```

```
"OSPF Version 2, Appendix C.2 Area parameters"
```

```
::= { ospfAreaAggregateEntry 1 }
```

ospfAreaAggregateLsdbType OBJECT-TYPE

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```

SYNTAX      INTEGER {
                summaryLink (3),
                nssaExternalLink (7)
            }
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The type of the Address Aggregate. This field
    specifies the Lsdb type that this Address
    Aggregate applies to."
REFERENCE
    "OSPF Version 2, Appendix A.4.1 The Link State
    Advertisement header"
 ::= { ospfAreaAggregateEntry 2 }

```

ospfAreaAggregateNet OBJECT-TYPE

```

SYNTAX      IpAddress
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The IP Address of the Net or Subnet indicated
    by the range."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaAggregateEntry 3 }

```

ospfAreaAggregateMask OBJECT-TYPE

```

SYNTAX      IpAddress
MAX-ACCESS  read-only -- read-only since originally an
                -- SMIV1 index
STATUS      current
DESCRIPTION
    "The Subnet Mask that pertains to the Net or
    Subnet."
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfAreaAggregateEntry 4 }

```

ospfAreaAggregateStatus OBJECT-TYPE

```

SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "This object permits management of the table by
    facilitating actions such as row creation,
    construction and destruction.

    The value of this object has no effect on
    whether other objects in this conceptual row can be
    modified."
 ::= { ospfAreaAggregateEntry 5 }

```


ospfAreaAggregateEffect OBJECT-TYPE

```

SYNTAX      INTEGER {
                advertiseMatching (1),
                doNotAdvertiseMatching (2)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Subnets subsumed by ranges either trigger the
    advertisement of the indicated aggregate
    (advertiseMatching), or result in the subnet's not
    being advertised at all outside the area."
DEFVAL { advertiseMatching }
 ::= { ospfAreaAggregateEntry 6 }

```

ospfAreaAggregateExtRouteTag OBJECT-TYPE

```

SYNTAX      Unsigned32
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "External Route Tag to be included in NSSA (type-7)
    LSAs."
DEFVAL { 0 }
 ::= { ospfAreaAggregateEntry 7 }

```

-- OSPF Link State Database, Link-Local for non-virtual links

ospfLocalLsdbTable OBJECT-TYPE

```

SYNTAX      SEQUENCE OF OspfLocalLsdbEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The OSPF Process's Link-Local Link State Database
    for non-virtual links.
    This table is identical to the OSPF LSDB Table
    in format, but contains only Link-Local Link State
    Advertisements for non-virtual links. The purpose is
    to allow Link-Local LSAs to be displayed for each
    non-virtual interface. This table is implemented to
    support type-9 LSAs which are defined
    in 'The OSPF Opaque LSA Option'"
REFERENCE
    "OSPF Version 2, Section 12 Link State Advertisements
    and The OSPF Opaque LSA Option"
 ::= { ospf 17 }

```

ospfLocalLsdbEntry OBJECT-TYPE

```

SYNTAX      OspfLocalLsdbEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```



```

    "A single Link State Advertisement."
INDEX { ospfLocalLsdbIpAddress, ospfLocalLsdbAddressLessIf,
        ospfLocalLsdbType, ospfLocalLsdbLsid, ospfLocalLsdbRouterId
}
 ::= { ospfLocalLsdbTable 1 }

OspfLocalLsdbEntry ::=
SEQUENCE {
    ospfLocalLsdbIpAddress
        IPAddress,
    ospfLocalLsdbAddressLessIf
        InterfaceIndexOrZero,
    ospfLocalLsdbType
        INTEGER,
    ospfLocalLsdbLsid
        IPAddress,
    ospfLocalLsdbRouterId
        RouterID,
    ospfLocalLsdbSequence
        Integer32,
    ospfLocalLsdbAge
        Integer32,
    ospfLocalLsdbChecksum
        Integer32,
    ospfLocalLsdbAdvertisement
        OCTET STRING
}

ospfLocalLsdbIpAddress OBJECT-TYPE
SYNTAX      IPAddress
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The IP Address of the interface from
    which the LSA was received if the interface is
    numbered."
REFERENCE
    "OSPF Version 2, Appendix C.3 Interface parameters"
 ::= { ospfLocalLsdbEntry 1 }

ospfLocalLsdbAddressLessIf OBJECT-TYPE
SYNTAX      InterfaceIndexOrZero
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The Interface Index of the interface from
    which the LSA was received if the interface is
    unnumbered."
REFERENCE
    "OSPF Version 2, Appendix C.3 Interface parameters"
 ::= { ospfLocalLsdbEntry 2 }

ospfLocalLsdbType OBJECT-TYPE

```


SYNTAX INTEGER { localOpaqueLink (9) }
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The type of the link state advertisement.
 Each link state type has a separate
 advertisement format."
 REFERENCE
 "OSPF Version 2, [Appendix A.4.1](#) The Link State
 Advertisement header and "
 ::= { ospfLocalLsdbEntry 3 }

ospfLocalLsdbLsid OBJECT-TYPE

SYNTAX IpAddress
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The Link State ID is an LS Type Specific field
 containing a 32 bit identifier in IP address format;
 it identifies the piece of the routing domain
 that is being described by the advertisement."
 REFERENCE
 "OSPF Version 2, [Section 12.1.4](#) Link State ID"
 ::= { ospfLocalLsdbEntry 4 }

ospfLocalLsdbRouterId OBJECT-TYPE

SYNTAX RouterID
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The 32 bit number that uniquely identifies the
 originating router in the Autonomous System."
 REFERENCE
 "OSPF Version 2, [Appendix C.1](#) Global parameters"
 ::= { ospfLocalLsdbEntry 5 }

ospfLocalLsdbSequence OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The sequence number field is a signed 32-bit
 integer. It starts with the value '80000001'h,
 or -'7FFFFFFF'h, and increments until '7FFFFFFF'h.
 Thus, a typical sequence number will be very negative.
 It is used to detect old and duplicate link state
 advertisements. The space of sequence numbers is linearly
 ordered. The larger the sequence number the more recent
 the advertisement."
 REFERENCE
 "OSPF Version 2, [Section 12.1.6](#) LS sequence
 number"
 ::= { ospfLocalLsdbEntry 6 }

ospfLocalLsdbAge OBJECT-TYPE

SYNTAX Integer32 -- Should be 0..MaxAge, except when
-- doNotAge bit is set

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This field is the age of the link state advertisement in seconds."

REFERENCE

"OSPF Version 2, [Section 12.1.1](#) LS age"

::= { ospfLocalLsdbEntry 7 }

ospfLocalLsdbChecksum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This field is the checksum of the complete contents of the advertisement, excepting the age field. The age field is excepted so that an advertisement's age can be incremented without updating the checksum. The checksum used is the same that is used for ISO connectionless datagrams; it is commonly referred to as the Fletcher checksum."

REFERENCE

"OSPF Version 2, [Section 12.1.7](#) LS checksum"

::= { ospfLocalLsdbEntry 8 }

ospfLocalLsdbAdvertisement OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1..65535))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The entire Link State Advertisement, including its header.

Note that for variable length LSAs, SNMP agents may not be able to return the largest string size."

REFERENCE

"OSPF Version 2, [Section 12](#) Link State Advertisements"

::= { ospfLocalLsdbEntry 9 }

-- OSPF Link State Database, Link-Local for virtual Links

ospfVirtLocalLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfVirtLocalLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The OSPF Process's Link-Local Link State Database for virtual links.

This table is identical to the OSPF LSDB Table in format, but contains only Link-Local Link State Advertisements for virtual links. The purpose is to allow Link-Local LSAs to be displayed for each virtual interface. This table is implemented to support type-9 LSAs which are defined in 'The OSPF Opaque LSA Option'

REFERENCE

"OSPF Version 2, [Section 12](#) Link State Advertisements and The OSPF Opaque LSA Option"

::= { ospf 18 }

ospfVirtLocalLsdbEntry OBJECT-TYPE

SYNTAX OspfVirtLocalLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A single Link State Advertisement."

INDEX { ospfVirtLocalLsdbTransitArea,
ospfVirtLocalLsdbNeighbor,
ospfVirtLocalLsdbType,
ospfVirtLocalLsdbLsid,
ospfVirtLocalLsdbRouterId
}

::= { ospfVirtLocalLsdbTable 1 }

OspfVirtLocalLsdbEntry ::=

```
SEQUENCE {
    ospfVirtLocalLsdbTransitArea
        AreaID,
    ospfVirtLocalLsdbNeighbor
        RouterID,
    ospfVirtLocalLsdbType
        INTEGER,
    ospfVirtLocalLsdbLsid
        IPAddress,
    ospfVirtLocalLsdbRouterId
        RouterID,
    ospfVirtLocalLsdbSequence
        Integer32,
    ospfVirtLocalLsdbAge
        Integer32,
    ospfVirtLocalLsdbChecksum
        Integer32,
    ospfVirtLocalLsdbAdvertisement
        OCTET STRING
}
```

ospfVirtLocalLsdbTransitArea OBJECT-TYPE

SYNTAX AreaID

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The Transit Area that the Virtual Link
traverses. By definition, this is not 0.0.0.0"
REFERENCE
"OSPF Version 2, [Appendix C.3](#) Interface parameters"
 ::= { ospfVirtLocalLsdbEntry 1 }

ospfVirtLocalLsdbNeighbor OBJECT-TYPE
SYNTAX RouterID
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The Router ID of the Virtual Neighbor."
REFERENCE
"OSPF Version 2, [Appendix C.3](#) Interface parameters"
 ::= { ospfVirtLocalLsdbEntry 2 }

ospfVirtLocalLsdbType OBJECT-TYPE
SYNTAX INTEGER { localOpaqueLink (9) }
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The type of the link state advertisement.
Each link state type has a separate
advertisement format."
REFERENCE
"OSPF Version 2, [Appendix A.4.1](#) The Link State
Advertisement header"
 ::= { ospfVirtLocalLsdbEntry 3 }

ospfVirtLocalLsdbLsid OBJECT-TYPE
SYNTAX IPAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The Link State ID is an LS Type Specific field
containing a 32 bit identifier in IP address format;
it identifies the piece of the routing domain
that is being described by the advertisement."
REFERENCE
"OSPF Version 2, [Section 12.1.4](#) Link State ID"
 ::= { ospfVirtLocalLsdbEntry 4 }

ospfVirtLocalLsdbRouterId OBJECT-TYPE
SYNTAX RouterID
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The 32 bit number that uniquely identifies the
originating router in the Autonomous System."
REFERENCE

"OSPF Version 2, [Appendix C.1](#) Global parameters"
 ::= { ospfVirtLocalLsdbEntry 5 }

ospfVirtLocalLsdbSequence OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"The sequence number field is a signed 32-bit integer. It starts with the value '80000001'h, or -'7FFFFFFF'h, and increments until '7FFFFFFF'h. Thus, a typical sequence number will be very negative. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."

REFERENCE

"OSPF Version 2, [Section 12.1.6](#) LS sequence number"

::= { ospfVirtLocalLsdbEntry 6 }

ospfVirtLocalLsdbAge OBJECT-TYPE

SYNTAX Integer32 -- Should be 0..MaxAge, except when
 -- doNotAge bit is set

UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"This field is the age of the link state advertisement in seconds."

REFERENCE

"OSPF Version 2, [Section 12.1.1](#) LS age"

::= { ospfVirtLocalLsdbEntry 7 }

ospfVirtLocalLsdbChecksum OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"This field is the checksum of the complete contents of the advertisement, excepting the age field. The age field is excepted so that an advertisement's age can be incremented without updating the checksum. The checksum used is the same that is used for ISO connectionless datagrams; it is commonly referred to as the Fletcher checksum."

REFERENCE

"OSPF Version 2, [Section 12.1.7](#) LS checksum"

::= { ospfVirtLocalLsdbEntry 8 }

ospfVirtLocalLsdbAdvertisement OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1..65535))


```

MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "The entire Link State Advertisement, including
              its header."
REFERENCE    "OSPF Version 2, Section 12 Link State
              Advertisements.

              Note that for variable length LSAs, SNMP agents
              may not be able to return the largest string size."
 ::= { ospfVirtLocalLsdbEntry 9 }

-- OSPF Link State Database, AS-scope

ospfAsLsdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfAsLsdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "The OSPF Process's AS-scope LSA Link State Database.
                The Database contains the AS-scope Link State
                Advertisements from throughout the areas that
                the device is attached to.

                This table is identical to the OSPF LSDB Table
                in format, but contains only AS-scope Link State
                Advertisements. The purpose is to allow AS-scope
                LSAs to be displayed once for the router rather
                than once in each non-stub area."
    REFERENCE   "OSPF Version 2, Section 12 Link State
                Advertisements"
 ::= { ospf 19 }

ospfAsLsdbEntry OBJECT-TYPE
    SYNTAX      OspfAsLsdbEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION "A single Link State Advertisement."
    INDEX { ospfAsLsdbType, ospfAsLsdbLsid, ospfAsLsdbRouterId }
 ::= { ospfAsLsdbTable 1 }

OspfAsLsdbEntry ::=
    SEQUENCE {
        ospfAsLsdbType
            INTEGER,
        ospfAsLsdbLsid
            IpAddress,
        ospfAsLsdbRouterId
            RouterID,
        ospfAsLsdbSequence
    }

```



```

        Integer32,
ospfAsLsdbAge
        Integer32,
ospfAsLsdbChecksum
        Integer32,
ospfAsLsdbAdvertisement
        OCTET STRING
    }

```

ospfAsLsdbType OBJECT-TYPE

```

SYNTAX      INTEGER {
                asExternalLink (5),
                asOpaqueLink   (11)
            }
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The type of the link state advertisement.
     Each link state type has a separate
     advertisement format."
REFERENCE
    "OSPF Version 2, Appendix A.4.1 The Link State
     Advertisement header"
 ::= { ospfAsLsdbEntry 1 }

```

ospfAsLsdbLsid OBJECT-TYPE

```

SYNTAX      IpAddress
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The Link State ID is an LS Type Specific field
     containing either a Router ID or an IP Address;
     it identifies the piece of the routing domain
     that is being described by the advertisement."
REFERENCE
    "OSPF Version 2, Section 12.1.4 Link State ID"
 ::= { ospfAsLsdbEntry 2 }

```

ospfAsLsdbRouterId OBJECT-TYPE

```

SYNTAX      RouterID
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The 32 bit number that uniquely identifies the
     originating router in the Autonomous System."
REFERENCE
    "OSPF Version 2, Appendix C.1 Global parameters"
 ::= { ospfAsLsdbEntry 3 }

```

ospfAsLsdbSequence OBJECT-TYPE

```

SYNTAX      Integer32
MAX-ACCESS  read-only
STATUS      current

```


DESCRIPTION

"The sequence number field is a signed 32-bit integer. It starts with the value '80000001'h, or '-7FFFFFF'h, and increments until '7FFFFFF'h. Thus, a typical sequence number will be very negative. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."

REFERENCE

"OSPF Version 2, Section 12.1.6 LS sequence number"

::= { ospfAsLsdbEntry 4 }

ospfAsLsdbAge OBJECT-TYPE

SYNTAX Integer32 -- Should be 0..MaxAge, except when
-- doNotAge bit is set

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This field is the age of the link state advertisement in seconds."

REFERENCE

"OSPF Version 2, [Section 12.1.1](#) LS age"

::= { ospfAsLsdbEntry 5 }

ospfAsLsdbChecksum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This field is the checksum of the complete contents of the advertisement, excepting the age field. The age field is excepted so that an advertisement's age can be incremented without updating the checksum. The checksum used is the same that is used for ISO connectionless datagrams; it is commonly referred to as the Fletcher checksum."

REFERENCE

"OSPF Version 2, [Section 12.1.7](#) LS checksum"

::= { ospfAsLsdbEntry 6 }

ospfAsLsdbAdvertisement OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (1..65535))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The entire Link State Advertisement, including its header."

REFERENCE

"OSPF Version 2, [Section 12](#) Link State

Advertisements.

Note that for variable length LSAs, SNMP agents may not be able to return the largest string size."
 ::= { ospfAsLsdbEntry 7 }

-- OSPF Area LSA Counter Table

ospfAreaLsaCountTable OBJECT-TYPE
 SYNTAX SEQUENCE OF OspfAreaLsaCountEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table maintains per area per lsa type counters"
 ::= { ospf 20 }

ospfAreaLsaCountEntry OBJECT-TYPE
 SYNTAX OspfAreaLsaCountEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry with a number of link advertisements
 of a given type for a given area."
 INDEX { ospfAreaLsaCountAreaId, ospfAreaLsaCountLsaType }
 ::= { ospfAreaLsaCountTable 1 }

OspfAreaLsaCountEntry ::=

```

SEQUENCE {
    ospfAreaLsaCountAreaId
        AreaID,
    ospfAreaLsaCountLsaType
        INTEGER,
    ospfAreaLsaCountNumber
        Gauge32
}

```

ospfAreaLsaCountAreaId OBJECT-TYPE
 SYNTAX AreaID
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This entry Area ID."
 ::= { ospfAreaLsaCountEntry 1 }

ospfAreaLsaCountLsaType OBJECT-TYPE
 SYNTAX INTEGER {
 routerLink (1),
 networkLink (2),
 summaryLink (3),
 asSummaryLink (4),
 multicastLink (6),
 nssaExternalLink (7),


```

        areaOpaqueLink (10)
    }
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "This entry LSA type."
    ::= { ospfAreaLsaCountEntry 2 }

ospfAreaLsaCountNumber OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Number of LSAs of a given type for a given area."
    ::= { ospfAreaLsaCountEntry 3 }

-- conformance information

ospfConformance OBJECT IDENTIFIER ::= { ospf 15 }

ospfGroups OBJECT IDENTIFIER ::= { ospfConformance 1 }
ospfCompliances OBJECT IDENTIFIER ::= { ospfConformance 2 }

-- compliance statements

ospfCompliance MODULE-COMPLIANCE
    STATUS deprecated
    DESCRIPTION
        "The compliance statement for OSPF systems
        conforming to RFC 1850."
    MODULE -- this module
    MANDATORY-GROUPS {
        ospfBasicGroup,
        ospfAreaGroup,
        ospfStubAreaGroup,
        ospfIfGroup,
        ospfIfMetricGroup,
        ospfVirtIfGroup,
        ospfNbrGroup,
        ospfVirtNbrGroup,
        ospfAreaAggregateGroup
    }
    GROUP ospfHostGroup
    DESCRIPTION
        "This group is mandatory for OSPF systems that support
        attached hosts."
    GROUP ospfLsdbGroup
    DESCRIPTION
        "This group is mandatory for OSPF systems that display
        their per-area link state database."
    GROUP ospfExtLsdbGroup
    DESCRIPTION
        "This group is mandatory for OSPF systems that display

```



```
        their External link state database."
 ::= { ospfCompliances 1 }

ospfCompliance2 MODULE-COMPLIANCE
  STATUS          current
  DESCRIPTION
    "The compliance statement."
  MODULE          -- this module
  MANDATORY-GROUPS {
    ospfBasicGroup2,
    ospfAreaGroup2,
    ospfStubAreaGroup,
    ospfIfGroup2,
    ospfIfMetricGroup,
    ospfVirtIfGroup2,
    ospfNbrGroup2,
    ospfVirtNbrGroup2,
    ospfAreaAggregateGroup2
  }
  GROUP ospfHostGroup2
    DESCRIPTION
      "This group is mandatory for OSPF systems that support
      attached hosts."
  GROUP ospfLsdbGroup
    DESCRIPTION
      "This group is mandatory for OSPF systems that display
      their per-area link state database."
  GROUP ospfAsLsdbGroup
    DESCRIPTION
      "This group is mandatory for OSPF systems that display
      their AS-scope link state database."
  GROUP ospfLocalLsdbGroup
    DESCRIPTION
      "This group is mandatory for OSPF systems that display
      their per-link link state database for non-virtual
      links."
  GROUP ospfVirtLocalLsdbGroup
    DESCRIPTION
      "This group is mandatory for OSPF systems that display
      their per-link link state database for virtual links."
  GROUP ospfAreaLsaCountGroup
    DESCRIPTION
      "This group is mandatory for OSPF systems that display
      per area per LSA type counters."
 ::= { ospfCompliances 2 }

ospfComplianceObsolete MODULE-COMPLIANCE
  STATUS          obsolete
  DESCRIPTION
    "Contains obsolete object groups."
  MODULE          -- this module
  GROUP ospfAreaRangeGroup
    DESCRIPTION
```



```
        "This group is obsolete and it is mandatory only
        for non-CIDR OSPF systems that support multiple areas."
GROUP   ospfObsoleteGroup
        DESCRIPTION
        "This group contains obsolete objects,
        which are no longer required for OSPF systems."
 ::= { ospfCompliances 3 }

-- units of conformance

ospfBasicGroup   OBJECT-GROUP
  OBJECTS {
    ospfRouterId,
    ospfAdminStat,
    ospfVersionNumber,
    ospfAreaBdrRtrStatus,
    ospfASBdrRtrStatus,
    ospfExternLsaCount,
    ospfExternLsaCksumSum,
    ospfTOSupport,
    ospfOriginateNewLsas,
    ospfRxNewLsas,
    ospfExtLsdbLimit,
    ospfMulticastExtensions,
    ospfExitOverflowInterval,
    ospfDemandExtensions
  }
  STATUS      deprecated
  DESCRIPTION
    "These objects are used to monitor/manage
    global OSPF parameters. This object group
    conforms to RFC 1850."
 ::= { ospfGroups 1 }

ospfAreaGroup   OBJECT-GROUP
  OBJECTS {
    ospfAreaId,
    ospfImportAsExtern,
    ospfSpfRuns,
    ospfAreaBdrRtrCount,
    ospfAsBdrRtrCount,
    ospfAreaLsaCount,
    ospfAreaLsaCksumSum,
    ospfAreaSummary,
    ospfAreaStatus
  }
  STATUS      deprecated
  DESCRIPTION
    "These objects are used for OSPF systems
    supporting areas per RFC 1850."
 ::= { ospfGroups 2 }
```



```
ospfStubAreaGroup    OBJECT-GROUP
  OBJECTS {
    ospfStubAreaId,
    ospfStubTOS,
    ospfStubMetric,
    ospfStubStatus,
    ospfStubMetricType
  }
  STATUS      current
  DESCRIPTION
    "These objects are used for OSPF systems
    supporting stub areas."
  ::= { ospfGroups 3 }

ospfLsdbGroup        OBJECT-GROUP
  OBJECTS {
    ospfLsdbAreaId,
    ospfLsdbType,
    ospfLsdbLsid,
    ospfLsdbRouterId,
    ospfLsdbSequence,
    ospfLsdbAge,
    ospfLsdbChecksum,
    ospfLsdbAdvertisement
  }
  STATUS      current
  DESCRIPTION
    "These objects are used for OSPF systems
    that display their link state database."
  ::= { ospfGroups 4 }

ospfAreaRangeGroup   OBJECT-GROUP
  OBJECTS {
    ospfAreaRangeAreaId,
    ospfAreaRangeNet,
    ospfAreaRangeMask,
    ospfAreaRangeStatus,
    ospfAreaRangeEffect
  }
  STATUS      obsolete
  DESCRIPTION
    "These objects are used for non-CIDR OSPF
    systems that support multiple areas. This
    object group is obsolete."
  ::= { ospfGroups 5 }

ospfHostGroup        OBJECT-GROUP
  OBJECTS {
    ospfHostIpAddress,
    ospfHostTOS,
    ospfHostMetric,
    ospfHostStatus,
    ospfHostAreaID
```



```
    }
STATUS      deprecated
DESCRIPTION
    "These objects are used for OSPF systems
    that support attached hosts."
 ::= { ospfGroups 6 }

ospfIfGroup    OBJECT-GROUP
OBJECTS {
    ospfIfIpAddress,
    ospfAddressLessIf,
    ospfIfAreaId,
    ospfIfType,
    ospfIfAdminStat,
    ospfIfRtrPriority,
    ospfIfTransitDelay,
    ospfIfRetransInterval,
    ospfIfHelloInterval,
    ospfIfRtrDeadInterval,
    ospfIfPollInterval,
    ospfIfState,
    ospfIfDesignatedRouter,
    ospfIfBackupDesignatedRouter,
    ospfIfEvents,
    ospfIfAuthType,
    ospfIfAuthKey,
    ospfIfStatus,
    ospfIfMulticastForwarding,
    ospfIfDemand
}
STATUS      deprecated
DESCRIPTION
    "These objects are used to monitor/manage OSPF
    interfaces. This object group conforms to RFC 1850."
 ::= { ospfGroups 7 }

ospfIfMetricGroup    OBJECT-GROUP
OBJECTS {
    ospfIfMetricIpAddress,
    ospfIfMetricAddressLessIf,
    ospfIfMetricTOS,
    ospfIfMetricValue,
    ospfIfMetricStatus
}
STATUS      current
DESCRIPTION
    "These objects are used for OSPF systems for supporting
    interface metrics."
 ::= { ospfGroups 8 }

ospfVirtIfGroup    OBJECT-GROUP
OBJECTS {
    ospfVirtIfAreaId,
```



```
    ospfVirtIfNeighbor,
    ospfVirtIfTransitDelay,
    ospfVirtIfRetransInterval,
    ospfVirtIfHelloInterval,
    ospfVirtIfRtrDeadInterval,
    ospfVirtIfState,
    ospfVirtIfEvents,
    ospfVirtIfAuthType,
    ospfVirtIfAuthKey,
    ospfVirtIfStatus
  }
STATUS      deprecated
DESCRIPTION
  "These objects are used for OSPF systems for supporting
  virtual interfaces. This object group conforms
  to RFC 1850."
 ::= { ospfGroups 9 }

ospfNbrGroup      OBJECT-GROUP
OBJECTS {
  ospfNbrIpAddr,
  ospfNbrAddressLessIndex,
  ospfNbrRtrId,
  ospfNbrOptions,
  ospfNbrPriority,
  ospfNbrState,
  ospfNbrEvents,
  ospfNbrLsRetransQLen,
  ospfNbmaNbrStatus,
  ospfNbmaNbrPermanence,
  ospfNbrHelloSuppressed
}
STATUS      deprecated
DESCRIPTION
  "These objects are used to monitor/manage OSPF neighbors.
  This object group conforms to RFC 1850."
 ::= { ospfGroups 10 }

ospfVirtNbrGroup  OBJECT-GROUP
OBJECTS {
  ospfVirtNbrArea,
  ospfVirtNbrRtrId,
  ospfVirtNbrIpAddr,
  ospfVirtNbrOptions,
  ospfVirtNbrState,
  ospfVirtNbrEvents,
  ospfVirtNbrLsRetransQLen,
  ospfVirtNbrHelloSuppressed
}
STATUS      deprecated
DESCRIPTION
  "These objects are used to monitor/manage OSPF virtual
  neighbors. This object group conforms to RFC 1850."
```



```
::= { ospfGroups 11 }
```

```
ospfExtLsdbGroup    OBJECT-GROUP
```

```
  OBJECTS {
    ospfExtLsdbType,
    ospfExtLsdbLsid,
    ospfExtLsdbRouterId,
    ospfExtLsdbSequence,
    ospfExtLsdbAge,
    ospfExtLsdbChecksum,
    ospfExtLsdbAdvertisement
  }
```

```
  STATUS      deprecated
```

```
  DESCRIPTION
```

```
    "These objects are used for OSPF systems
    that display their link state database. This object
    group conforms to RFC 1850."
```

```
    This object group is replaced by the ospfAsLsdbGroup
    in order to support any AS-scope LSA type in a single
    table."
```

```
::= { ospfGroups 12 }
```

```
ospfAreaAggregateGroup    OBJECT-GROUP
```

```
  OBJECTS {
    ospfAreaAggregateAreaID,
    ospfAreaAggregateLsdbType,
    ospfAreaAggregateNet,
    ospfAreaAggregateMask,
    ospfAreaAggregateStatus,
    ospfAreaAggregateEffect
  }
```

```
  STATUS      deprecated
```

```
  DESCRIPTION
```

```
    "These objects are used for OSPF systems to support
    network prefix aggregation across areas."
```

```
::= { ospfGroups 13 }
```

```
ospfLocalLsdbGroup    OBJECT-GROUP
```

```
  OBJECTS {
    ospfLocalLsdbSequence,
    ospfLocalLsdbAge,
    ospfLocalLsdbChecksum,
    ospfLocalLsdbAdvertisement
  }
```

```
  STATUS      current
```

```
  DESCRIPTION
```

```
    "These objects are used for OSPF systems
    that display their Link-Local link state databases
    for non-virtual links."
```

```
  ::= { ospfGroups 14 }
```

```
ospfVirtLocalLsdbGroup    OBJECT-GROUP
```



```
OBJECTS {
    ospfVirtLocalLsdbSequence,
    ospfVirtLocalLsdbAge,
    ospfVirtLocalLsdbChecksum,
    ospfVirtLocalLsdbAdvertisement
}
STATUS          current
DESCRIPTION
    "These objects are used for OSPF systems
    that display their Link-Local link state databases
    for virtual links."
 ::= { ospfGroups 15 }

ospfAsLsdbGroup    OBJECT-GROUP
OBJECTS {
    ospfAsLsdbSequence,
    ospfAsLsdbAge,
    ospfAsLsdbChecksum,
    ospfAsLsdbAdvertisement
}
STATUS          current
DESCRIPTION
    "These objects are used for OSPF systems
    that display their AS-scope link state database."
 ::= { ospfGroups 16 }

ospfBasicGroup2    OBJECT-GROUP
OBJECTS {
    ospfRouterId,
    ospfAdminStat,
    ospfVersionNumber,
    ospfAreaBdrRtrStatus,
    ospfASBdrRtrStatus,
    ospfExternLsaCount,
    ospfExternLsaCksumSum,
    ospfTOSSupport,
    ospfOriginateNewLsas,
    ospfRxNewLsas,
    ospfExtLsdbLimit,
    ospfMulticastExtensions,
    ospfExitOverflowInterval,
    ospfDemandExtensions,
    ospfRFC1583Compatibility,
    ospfOpaqueLsaSupport,
    ospfReferenceBandwidth,
    ospfRestartSupport,
    ospfRestartInterval,
    ospfRestartStrictLsaChecking,
    ospfRestartStatus,
    ospfRestartAge,
    ospfRestartExitReason,
    ospfAsLsaCount,
    ospfAsLsaCksumSum,
```



```

    ospfStubRouterSupport,
    ospfStubRouterAdvertisement,
    ospfDiscontinuityTime
  }
STATUS      current
DESCRIPTION
  "These objects are used to monitor/manage OSPF global
  parameters."
 ::= { ospfGroups 17 }

ospfAreaGroup2    OBJECT-GROUP
OBJECTS {
  ospfAreaId,
  ospfImportAsExtern,
  ospfSpfRuns,
  ospfAreaBdrRtrCount,
  ospfAsBdrRtrCount,
  ospfAreaLsaCount,
  ospfAreaLsaCksumSum,
  ospfAreaSummary,
  ospfAreaStatus,
  ospfAreaNssaTranslatorRole,
  ospfAreaNssaTranslatorState,
  ospfAreaNssaTranslatorStabilityInterval,
  ospfAreaNssaTranslatorEvents
}
STATUS      current
DESCRIPTION
  "These objects are used by OSPF systems
  to support areas."
 ::= { ospfGroups 18 }

ospfIfGroup2      OBJECT-GROUP
OBJECTS {
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfIfAreaId,
  ospfIfType,
  ospfIfAdminStat,
  ospfIfRtrPriority,
  ospfIfTransitDelay,
  ospfIfRetransInterval,
  ospfIfHelloInterval,
  ospfIfRtrDeadInterval,
  ospfIfPollInterval,
  ospfIfState,
  ospfIfDesignatedRouter,
  ospfIfBackupDesignatedRouter,
  ospfIfEvents,
  ospfIfAuthType,
  ospfIfAuthKey,
  ospfIfStatus,
  ospfIfMulticastForwarding,

```



```

    ospfIfDemand,
    ospfIfLsaCount,
    ospfIfLsaCksumSum
  }
STATUS          current
DESCRIPTION
  "These objects are used to monitor/manage OSPF interfaces."
 ::= { ospfGroups 19 }

ospfVirtIfGroup2    OBJECT-GROUP
OBJECTS {
  ospfVirtIfAreaId,
  ospfVirtIfNeighbor,
  ospfVirtIfTransitDelay,
  ospfVirtIfRetransInterval,
  ospfVirtIfHelloInterval,
  ospfVirtIfRtrDeadInterval,
  ospfVirtIfState,
  ospfVirtIfEvents,
  ospfVirtIfAuthType,
  ospfVirtIfAuthKey,
  ospfVirtIfStatus,
  ospfVirtIfLsaCount,
  ospfVirtIfLsaCksumSum,
  ospfIfDesignatedRouterId,
  ospfIfBackupDesignatedRouterId
}
STATUS          current
DESCRIPTION
  "These objects are used to monitor/manage OSPF
  virtual interfaces."
 ::= { ospfGroups 20 }

ospfNbrGroup2      OBJECT-GROUP
OBJECTS {
  ospfNbrIpAddress,
  ospfNbrAddressLessIndex,
  ospfNbrRtrId,
  ospfNbrOptions,
  ospfNbrPriority,
  ospfNbrState,
  ospfNbrEvents,
  ospfNbrLsRetransQLen,
  ospfNbrmaNbrStatus,
  ospfNbrmaNbrPermanence,
  ospfNbrHelloSuppressed,
  ospfNbrRestartHelperStatus,
  ospfNbrRestartHelperAge,
  ospfNbrRestartHelperExitReason
}
STATUS          current
DESCRIPTION
  "These objects are used to monitor/manage OSPF

```



```
neighbors."
 ::= { ospfGroups 21 }

ospfVirtNbrGroup2    OBJECT-GROUP
OBJECTS {
    ospfVirtNbrArea,
    ospfVirtNbrRtrId,
    ospfVirtNbrIpAddr,
    ospfVirtNbrOptions,
    ospfVirtNbrState,
    ospfVirtNbrEvents,
    ospfVirtNbrLsRetransQLen,
    ospfVirtNbrHelloSuppressed,
    ospfVirtNbrRestartHelperStatus,
    ospfVirtNbrRestartHelperAge,
    ospfVirtNbrRestartHelperExitReason
}
STATUS          current
DESCRIPTION
    "These objects are used to monitor/manage OSPF
    virtual neighbors."
 ::= { ospfGroups 22 }

ospfAreaAggregateGroup2    OBJECT-GROUP
OBJECTS {
    ospfAreaAggregateAreaID,
    ospfAreaAggregateLsdbType,
    ospfAreaAggregateNet,
    ospfAreaAggregateMask,
    ospfAreaAggregateStatus,
    ospfAreaAggregateEffect,
    ospfAreaAggregateExtRouteTag
}
STATUS          current
DESCRIPTION
    "These objects are used for OSPF systems to support
    network prefix aggregation across areas."
 ::= { ospfGroups 23 }

ospfAreaLsaCountGroup    OBJECT-GROUP
OBJECTS {
    ospfAreaLsaCountNumber
}
STATUS          current
DESCRIPTION
    "This objects are used for OSPF systems that display
    per area, per LSA-type counters."
 ::= { ospfGroups 24 }

ospfHostGroup2    OBJECT-GROUP
OBJECTS {
    ospfHostIpAddress,
    ospfHostTOS,
```



```

        ospfHostMetric,
        ospfHostStatus,
        ospfHostCfgAreaID
    }
STATUS      current
DESCRIPTION
    "These objects are used for OSPF systems
    that support attached hosts."
 ::= { ospfGroups 25 }

--      This object group is included for SMI conformance. It is not a
--      mandatory group for compliance with this MIB

ospfObsoleteGroup    OBJECT-GROUP
    OBJECTS {
        ospfAuthType
    }
STATUS      obsolete
DESCRIPTION
    "These objects are obsolete and are no longer required for
    OSPF systems. They are placed into this group for SMI
    conformance"
 ::= { ospfGroups 26 }

END

```

4. OSPF Trap Overview

4.1 Introduction

OSPF is an event driven routing protocol, where an event can be a change in an OSPF interface's link-level status, the expiration of an OSPF timer or the reception of an OSPF protocol packet. Many of the actions that OSPF takes as a result of these events will result in a change of the routing topology.

As routing topologies become large and complex it is often difficult to locate the source of a topology change or unpredicted routing path by polling a large number of routers. Because of the difficulty of polling a large number of devices, a more prudent approach is for devices to notify a network manager of potentially critical OSPF events using SNMP traps.

This section defines a set of traps, objects and mechanisms to enhance the ability to manage IP internetworks which use OSPF as its IGP. It is an optional but very useful extension to the OSPF MIB.

4.2 Approach

The mechanism for sending traps is straight-forward. When an exception event occurs, the application notifies the local agent who sends a trap to the appropriate SNMP management stations. The

message includes the trap type and may include a list of trap specific variables. [Section 5](#) gives the trap definitions which includes the variable lists. The router ID of the originator of the trap is included in the variable list so that the network manager may easily determine the source of the trap.

To limit the frequency of OSPF traps, the following additional mechanisms are suggested.

4.3 Ignoring Initial Activity

The majority of critical events occur when OSPF is enabled on a router, at which time the designated router is elected and neighbor adjacencies are formed. During this initial period a potential flood of traps is unnecessary since the events are expected. To avoid unnecessary traps, a router should not originate expected OSPF

interface related traps until two of that interface's dead timer intervals have elapsed. The expected OSPF interface traps are ospfIfStateChange, ospfVirtIfStateChange, ospfNbrStateChange, ospfVirtNbrStateChange, ospfTxRetranmit and ospfVirtIfTxRetransmit. Additionally, ospfMaxAgeLsa and ospfOriginateLsa traps should not

be

originated until two dead timer intervals have elapsed where the dead timer interval used should be the dead timer with the smallest value.

4.4 Throttling Traps

The mechanism for throttling the traps is similar to the mechanism explained in [RFC 1224](#) [[RFC1224](#)]. The basic premise of the throttling

mechanism is that of a sliding window, defined in seconds and an upper bound on the number of traps that may be generated within this

window. Note that unlike [RFC 1224](#), traps are not sent to inform the network manager that the throttling mechanism has kicked in.

A single window should be used to throttle all OSPF traps types except for the ospfLsdbOverflow and the ospfLsdbApproachingOverflow trap which should not be throttled. For example, with a window time

of 3, an upper bound of 3, and events to cause trap types 1,3,5 and 7 (4 traps within a 3 second period), the type 7 (the 4th) trap should not be generated.

Appropriate values are 7 traps with a window time of 10 seconds.

4.5 One Trap Per OSPF Event

Several of the traps defined in [section 5](#) are generated as the result of finding an unusual condition while

parsing an OSPF packet or a processing a timer event. There may be more than one unusual condition detected while handling the event. For example, a link-state update packet may contain several retransmitted link-state advertisements (LSAs), or a retransmitted database description packet may contain several

database description entries. To limit the number of traps and variables, OSPF should generate at most one trap per OSPF event. Only the variables associated with the first unusual condition should be included with the trap. Similarly, if more than one type of unusual condition is encountered while parsing the packet, only the first event will generate a trap.

4.6 Polling Event Counters

Many of the tables in the OSPF MIB contain generalized event counters. By enabling the traps defined in this document a network manager can obtain more specific information about these events. A network manager may want to poll these event counters and enable specific OSPF traps when a particular counter starts increasing abnormally.

The following table shows the relationship between the event counters defined in the OSPF MIB and the trap types.

Counter32	Trap Type
-----	-----
ospfOriginateNewLsas	ospfOriginateLsa
ospfIfEvents	ospfIfStateChange
	ospfConfigError
	ospfIfAuthFailure
	ospfRxBadPacket
	ospfTxRetransmit
ospfVirtIfEvents	ospfVirtIfStateChange
	ospfVirtIfConfigError
	ospfVirtIfAuthFailure
	ospfVirtIfRxBadPacket
	ospfVirtIfTxRetransmit
ospfNbrEvents	ospfNbrStateChange
ospfVirtNbrEvents	ospfVirtNbrStateChange
ospfExternLSACount	ospfLsdbApproachingOverflow
ospfExternLSACount	ospfLsdbOverflow

4.7 Translating Notification Parameters

The definition of the OSPF notifications pre-dates the [RFC 2578](#) [[RFC2578](#)] requirement of having a zero value for the penultimate sub-identifier for translating SNMPv2/SNMPv3 trap parameters to SNMPv1 trap parameters. [RFC 3584](#) [[RFC3584](#)], [section 3](#), defines the translation rules which can be implemented by intermediate proxy-agents or multi-lingual agents to convert SNMPv2/SNMPv3 notifications to SNMPv1 notifications and vice versa. The conversion is not reversible, that is, a conversion to one SNMP version and then back again will result in an incorrectly formatted version of the notification.

According to the rules specified in [RFC 3584, section 3.1](#), translation of OSPF notifications from SNMPv1 to SNMPv2/SNMPv3

would result in the SNMPv2/SNMPv3 snmpTrapOID being the concatenation of the SNMPv1 'enterprise' parameter and two additional sub-identifiers, '0' and the SNMPv1 'specific-trap' parameter.

According to the rules specified in [RFC 3584, section 3.2](#), translation of OSPF notifications from SNMPv2/SNMPv3 to SNMPv1, as the notifications are defined in this MIB, would result in the SNMPv1 'enterprise' parameter being set to the SNMPv2/SNMPv3 snmpTrapOID parameter value with the last sub-identifier removed and the 'specific-trap' parameter being set to the last sub-identifier of the SNMPv2/SNMPv3 snmpTrapOID parameter.

Note that a notification originated from an SNMPv1 agent will not be converted into the same notification that would be originated from a native SNMPv2/SNMPv3 agent.

[4.8 Historical Artifacts](#)

The MIB modules that are updated by this document were originally written in SMIV1 for SNMPv1 when only traps were used. Since this version of the MIB module is written in SMIV2, it should be understood that all types of notifications, trap and inform PDUs, may be used by native SNMPv2 and SNMPv3 agents, although only traps are mentioned. Also, for backwards compatibility, the OSPF Trap module remains rooted at {ospf 16}.

[5. OSPF Trap Definitions](#)

```
OSPF-TRAP-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, IPAddress
        FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
        FROM SNMPv2-CONF
    ospfRouterId, ospfIfIpAddress, ospfAddressLessIf, ospfIfState,
    ospfVirtIfAreaId, ospfVirtIfNeighbor, ospfVirtIfState,
    ospfNbrIpAddr, ospfNbrAddressLessIndex, ospfNbrRtrId,
    ospfNbrState, ospfVirtNbrArea, ospfVirtNbrRtrId,
    ospfVirtNbrState, ospfLsdbType, ospfLsdbLsid, ospfLsdbRouterId,
    ospfLsdbAreaId, ospfExtLsdbLimit, ospf, ospfAreaId,
    ospfAreaNssaTranslatorState, ospfRestartStatus,
    ospfRestartInterval, ospfRestartExitReason,
    ospfNbrRestartHelperStatus, ospfNbrRestartHelperAge,
    ospfNbrRestartHelperExitReason, ospfVirtNbrRestartHelperStatus,
    ospfVirtNbrRestartHelperAge, ospfVirtNbrRestartHelperExitReason
        FROM OSPF-MIB;
```


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ORGANIZATION "IETF OSPF Working Group"
CONTACT-INFO
"WG E-Mail: ospf@ietf.org"

WG Chairs: acee@cisco.com
rohit@gmail.com

Editors: Dan Joyal
Nortel
600 Technology Park Drive
Billerica, MA 01821
djoyal@nortel.com

Piotr Galecki
Airvana
19 Alpha Road
Chelmsford, MA 01824
pgalecki@airvana.com

Spencer Giacalone
Credit Suisse First Boston
Eleven Madison Ave
New York, NY 10010-3629
spencer.giacalone@csfb.com"

DESCRIPTION

"The MIB module to describe traps for the OSPF
Version 2 Protocol.

Copyright (C) The Internet Society (2006).
This version of this MIB module is part of
RFC XXXX; see the RFC itself for full legal
notices."

-- RFC Editor: please fill in XXXX and remove this note

REVISION "200605240900Z" -- May 24, 2006 09:00:00 EST

DESCRIPTION

"Updated for latest changes to OSPFv2:
-added graceful restart related traps
-added new config error types
-added ospfNssaTranslatorStatusChange trap.
See [section 12](#) of RFC XXXX for more details.

This version published as part of RFC XXXX"

-- RFC Editor: please fill in XXXX and remove this note

REVISION "199501201225Z" -- Fri Jan 20 12:25:50 PST 1995

DESCRIPTION

"The initial SMIV2 revision of this MIB module, published
in [RFC1850](#)."


```

 ::= { ospf 16 }

-- Trap Support Objects

-- The following are support objects for the OSPF traps.

ospfTrapControl OBJECT IDENTIFIER ::= { ospfTrap 1 }
ospfTraps OBJECT IDENTIFIER ::= { ospfTrap 2 }

ospfSetTrap OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(4))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "A four-octet string serving as a bit map for
        the trap events defined by the OSPF traps. This
        object is used to enable and disable specific
        OSPF traps where a 1 in the bit field
        represents enabled. The right-most bit (least
        significant) represents trap 0.

        This object is persistent and when written
        the entity SHOULD save the change to non-volatile
        storage."
    ::= { ospfTrapControl 1 }

ospfConfigErrorType OBJECT-TYPE
    SYNTAX      INTEGER {
        badVersion (1),
        areaMismatch (2),
        unknownNbmaNbr (3), -- Router is DR eligible
        unknownVirtualNbr (4),
        authTypeMismatch(5),
        authFailure (6),
        netMaskMismatch (7),
        helloIntervalMismatch (8),
        deadIntervalMismatch (9),
        optionMismatch (10),
        mtuMismatch (11),
        duplicateRouterId (12),
        noError (13) }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Potential types of configuration conflicts.
        Used by the ospfConfigError and
        ospfConfigVirtError traps. When the last value
        of a trap using this object is needed, but no
        traps of that type have been sent, this value
        pertaining to this object should be returned as
        noError"
    ::= { ospfTrapControl 2 }

```



```

ospfPacketType OBJECT-TYPE
    SYNTAX          INTEGER {
                    hello (1),
                    dbDescript (2),
                    lsReq (3),
                    lsUpdate (4),
                    lsAck (5),
                    nullPacket (6) }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "OSPF packet types. When the last value of a trap
        using this object is needed, but no traps of
        that type have been sent, this value pertaining
        to this object should be returned as nullPacket"
        ::= { ospfTrapControl 3 }

ospfPacketSrc OBJECT-TYPE
    SYNTAX          IpAddress
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The IP address of an inbound packet that cannot
        be identified by a neighbor instance. When
        the last value of a trap using this object is
        needed, but no traps of that type have been sent,
        this value pertaining to this object should
        be returned as 0.0.0.0"
        ::= { ospfTrapControl 4 }

-- Traps

ospfVirtIfStateChange NOTIFICATION-TYPE
    OBJECTS { ospfRouterId, -- The originator of the trap
              ospfVirtIfAreaId,
              ospfVirtIfNeighbor,
              ospfVirtIfState -- The new state
            }
    STATUS          current
    DESCRIPTION
        "An ospfVirtIfStateChange trap signifies that there
        has been a change in the state of an OSPF virtual
        interface.

        This trap should be generated when the interface
        state regresses (e.g., goes from Point-to-Point to Down)
        or progresses to a terminal state (i.e., Point-to-Point)."
        ::= { ospfTraps 1 }

ospfNbrStateChange NOTIFICATION-TYPE
    OBJECTS { ospfRouterId, -- The originator of the trap
              ospfNbrIpAddress,
              ospfNbrAddressLessIndex,

```



```

    ospfNbrRtrId,
    ospfNbrState -- The new state
  }
STATUS      current
DESCRIPTION
  "An ospfNbrStateChange trap signifies that
  there has been a change in the state of a
  non-virtual OSPF neighbor. This trap should be
  generated when the neighbor state regresses
  (e.g., goes from Attempt or Full to 1-Way or
  Down) or progresses to a terminal state (e.g.,
  2-Way or Full). When an neighbor transitions
  from or to Full on non-broadcast multi-access
  and broadcast networks, the trap should be
  generated by the designated router. A designated
  router transitioning to Down will be noted by
  ospfIfStateChange."
 ::= { ospfTraps 2 }

ospfVirtNbrStateChange NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfVirtNbrArea,
  ospfVirtNbrRtrId,
  ospfVirtNbrState -- The new state
}
STATUS      current
DESCRIPTION
  "An ospfVirtNbrStateChange trap signifies that there
  has been a change in the state of an OSPF virtual
  neighbor. This trap should be generated
  when the neighbor state regresses (e.g., goes
  from Attempt or Full to 1-Way or Down) or
  progresses to a terminal state (e.g., Full)."
 ::= { ospfTraps 3 }

ospfIfConfigError NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfPacketSrc, -- The source IP address
  ospfConfigErrorType, -- Type of error
  ospfPacketType
}
STATUS      current
DESCRIPTION
  "An ospfIfConfigError trap signifies that a
  packet has been received on a non-virtual
  interface from a router whose configuration
  parameters conflict with this router's
  configuration parameters. Note that the event
  optionMismatch should cause a trap only if it
  prevents an adjacency from forming."
 ::= { ospfTraps 4 }

```



```
ospfVirtIfConfigError NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfVirtIfAreaId,
            ospfVirtIfNeighbor,
            ospfConfigErrorType, -- Type of error
            ospfPacketType
          }
  STATUS      current
  DESCRIPTION
    "An ospfVirtIfConfigError trap signifies that a
    packet has been received on a virtual interface
    from a router whose configuration parameters
    conflict with this router's configuration
    parameters. Note that the event optionMismatch
    should cause a trap only if it prevents an
    adjacency from forming."
  ::= { ospfTraps 5 }

ospfIfAuthFailure NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfIfIpAddress,
            ospfAddressLessIf,
            ospfPacketSrc, -- The source IP address
            ospfConfigErrorType, -- authTypeMismatch or
                                -- authFailure
            ospfPacketType
          }
  STATUS      current
  DESCRIPTION
    "An ospfIfAuthFailure trap signifies that a
    packet has been received on a non-virtual
    interface from a router whose authentication key
    or authentication type conflicts with this
    router's authentication key or authentication
    type."
  ::= { ospfTraps 6 }

ospfVirtIfAuthFailure NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfVirtIfAreaId,
            ospfVirtIfNeighbor,
            ospfConfigErrorType, -- authTypeMismatch or
                                -- authFailure
            ospfPacketType
          }
  STATUS      current
  DESCRIPTION
    "An ospfVirtIfAuthFailure trap signifies that a
    packet has been received on a virtual interface
    from a router whose authentication key or
    authentication type conflicts with this router's
    authentication key or authentication type."
```



```
 ::= { ospfTraps 7 }

ospfIfRxBadPacket NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfIfIpAddress,
            ospfAddressLessIf,
            ospfPacketSrc, -- The source IP address
            ospfPacketType
          }
  STATUS      current
  DESCRIPTION
    "An ospfIfRxBadPacket trap signifies that an
    OSPF packet has been received on a non-virtual
    interface that cannot be parsed."
  ::= { ospfTraps 8 }

ospfVirtIfRxBadPacket NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfVirtIfAreaId,
            ospfVirtIfNeighbor,
            ospfPacketType
          }
  STATUS      current
  DESCRIPTION
    "An ospfVirtIfRxBadPacket trap signifies that an OSPF
    packet has been received on a virtual interface
    that cannot be parsed."
  ::= { ospfTraps 9 }

ospfTxRetransmit NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfIfIpAddress,
            ospfAddressLessIf,
            ospfNbrRtrId, -- Destination
            ospfPacketType,
            ospfLsdbType,
            ospfLsdbLsid,
            ospfLsdbRouterId
          }
  STATUS      current
  DESCRIPTION
    "An ospfTxRetransmit trap signifies than an
    OSPF packet has been retransmitted on a
    non-virtual interface. All packets that may be
    retransmitted are associated with an LSDB entry.
    The LS type, LS ID, and Router ID are used to
    identify the LSDB entry."
  ::= { ospfTraps 10 }

ospfVirtIfTxRetransmit NOTIFICATION-TYPE
  OBJECTS { ospfRouterId, -- The originator of the trap
            ospfVirtIfAreaId,
            ospfVirtIfNeighbor,
```



```

    ospfPacketType,
    ospfLsdbType,
    ospfLsdbLsid,
    ospfLsdbRouterId
  }
STATUS      current
DESCRIPTION
  "An ospfVirtIfTxRetransmit trap signifies than an
  OSPF packet has been retransmitted on a virtual
  interface. All packets that may be retransmitted
  are associated with an LSDB entry. The LS
  type, LS ID, and Router ID are used to identify
  the LSDB entry."
 ::= { ospfTraps 11 }

ospfOriginatelsa NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfLsdbAreaId, -- 0.0.0.0 for AS Externals
  ospfLsdbType,
  ospfLsdbLsid,
  ospfLsdbRouterId
}
STATUS      current
DESCRIPTION
  "An ospfOriginatelsa trap signifies that a new
  LSA has been originated by this router. This
  trap should not be invoked for simple refreshes
  of LSAs (which happens every 30 minutes), but
  instead will only be invoked when an LSA is
  (re)originated due to a topology change.
  Additionally, this trap does not include LSAs that
  are being flushed because they have reached
  MaxAge."
 ::= { ospfTraps 12 }

ospfMaxAgeLsa NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfLsdbAreaId, -- 0.0.0.0 for AS Externals
  ospfLsdbType,
  ospfLsdbLsid,
  ospfLsdbRouterId
}
STATUS      current
DESCRIPTION
  "An ospfMaxAgeLsa trap signifies that one of
  the LSA in the router's link-state database has
  aged to MaxAge."
 ::= { ospfTraps 13 }

ospfLsdbOverflow NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfExtLsdbLimit
}

```



```

STATUS          current
DESCRIPTION
  "An ospfLsdbOverflow trap signifies that the
  number of LSAs in the router's link-state
  database has exceeded ospfExtLsdbLimit."
 ::= { ospfTraps 14 }

```

```

ospfLsdbApproachingOverflow NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
          ospfExtLsdbLimit
        }
STATUS          current
DESCRIPTION
  "An ospfLsdbApproachingOverflow trap signifies
  that the number of LSAs in the router's
  link-state database has exceeded ninety percent of
  ospfExtLsdbLimit."
 ::= { ospfTraps 15 }

```

```

ospfIfStateChange NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
          ospfIfIpAddress,
          ospfAddressLessIf,
          ospfIfState    -- The new state
        }
STATUS          current
DESCRIPTION
  "An ospfIfStateChange trap signifies that there
  has been a change in the state of a non-virtual
  OSPF interface. This trap should be generated
  when the interface state regresses (e.g., goes
  from Dr to Down) or progresses to a terminal
  state (i.e., Point-to-Point, DR Other, Dr, or
  Backup)."
 ::= { ospfTraps 16 }

```

```

ospfNssaTranslatorStatusChange NOTIFICATION-TYPE
OBJECTS { ospfRouterId, -- The originator of the trap
          ospfAreaId,
          ospfAreaNssaTranslatorState -- The current translation
                                     -- status
        }
STATUS          current
DESCRIPTION
  "An ospfNssaTranslatorStatusChange trap indicates that
there
  has been a change in the router's ability to translate OSPF
  type-7 LSAs into OSPF type-5 LSAs. This trap should be
  generated when the Translator Status transitions from or to
  any defined status on a per area basis."
 ::= { ospfTraps 17 }

```

```

ospfRestartStatusChange NOTIFICATION-TYPE

```

OBJECTS { ospfRouterId, -- The originator of the trap

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```

        ospfRestartStatus,
        ospfRestartInterval,
        ospfRestartExitReason
    }

```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "An ospfRestartStatusChange trap signifies that
    there has been a change in the graceful restart
    state for the router. This trap should be
    generated when the router restart status
    changes."

```

```
::= { ospfTraps 18 }
```

```
ospfNbrRestartHelperStatusChange NOTIFICATION-TYPE
```

```

OBJECTS { ospfRouterId, -- The originator of the trap
          ospfNbrIpAddress,
          ospfNbrAddressLessIndex,
          ospfNbrRtrId,
          ospfNbrRestartHelperStatus,
          ospfNbrRestartHelperAge,
          ospfNbrRestartHelperExitReason
        }

```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "An ospfNbrRestartHelperStatusChange trap signifies that
    there has been a change in the graceful restart
    helper state for the neighbor. This trap should be
    generated when the neighbor restart helper status
    transitions for a neighbor."

```

```
::= { ospfTraps 19 }
```

```
ospfVirtNbrRestartHelperStatusChange NOTIFICATION-TYPE
```

```

OBJECTS { ospfRouterId, -- The originator of the trap
          ospfVirtNbrArea,
          ospfVirtNbrRtrId,
          ospfVirtNbrRestartHelperStatus,
          ospfVirtNbrRestartHelperAge,
          ospfVirtNbrRestartHelperExitReason
        }

```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "An ospfVirtNbrRestartHelperStatusChange trap signifies
    that
    there has been a change in the graceful restart
    helper state for the virtual neighbor. This trap should be
    generated when the virtual neighbor restart helper status
    transitions for a virtual neighbor."

```

```
::= { ospfTraps 20 }
```

```
-- conformance information
```

```
ospfTrapConformance OBJECT IDENTIFIER ::= { ospfTrap 3 }
```



```

ospfTrapGroups      OBJECT IDENTIFIER ::= { ospfTrapConformance 1 }
ospfTrapCompliances OBJECT IDENTIFIER ::= { ospfTrapConformance 2 }

-- compliance statements

ospfTrapCompliance MODULE-COMPLIANCE
    STATUS      obsolete
    DESCRIPTION
        "The compliance statement"
    MODULE      -- this module
    MANDATORY-GROUPS { ospfTrapControlGroup }

    GROUP      ospfTrapControlGroup
    DESCRIPTION
        "This group is optional but recommended for all
        OSPF systems"
    ::= { ospfTrapCompliances 1 }

ospfTrapCompliance2 MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement"
    MODULE      -- this module
    MANDATORY-GROUPS { ospfTrapControlGroup, ospfTrapEventGroup }
    OBJECT      ospfConfigErrorType
    MIN-ACCESS  accessible-for-notify
    DESCRIPTION
        "This object is only required to be supplied within
        notifications."
    OBJECT      ospfPacketType
    MIN-ACCESS  accessible-for-notify
    DESCRIPTION
        "This object is only required to be supplied within
        notifications."
    OBJECT      ospfPacketSrc
    MIN-ACCESS  accessible-for-notify
    DESCRIPTION
        "This object is only required to be supplied within
        notifications."
    ::= { ospfTrapCompliances 2 }

-- units of conformance

ospfTrapControlGroup OBJECT-GROUP
    OBJECTS { ospfSetTrap,
              ospfConfigErrorType,
              ospfPacketType,
              ospfPacketSrc }
    STATUS      current
    DESCRIPTION
        "These objects are required to control traps
        from OSPF systems."
    ::= { ospfTrapGroups 1 }

```



```

ospfTrapEventGroup      NOTIFICATION-GROUP
  NOTIFICATIONS {
    ospfVirtIfStateChange,
    ospfNbrStateChange,
    ospfVirtNbrStateChange,
    ospfIfConfigError,
    ospfVirtIfConfigError,
    ospfIfAuthFailure,
    ospfVirtIfAuthFailure,
    ospfIfRxBadPacket,
    ospfVirtIfRxBadPacket,
    ospfTxRetransmit,
    ospfVirtIfTxRetransmit,
    ospfOriginateLsa,
    ospfMaxAgeLsa,
    ospfLsdbOverflow,
    ospfLsdbApproachingOverflow,
    ospfIfStateChange,
    ospfNssaTranslatorStatusChange,
    ospfRestartStatusChange,
    ospfNbrRestartHelperStatusChange,
    ospfVirtNbrRestartHelperStatusChange
  }
  STATUS      current
  DESCRIPTION
    "A grouping of OSPF Trap Events, as specified
    in NOTIFICATION-TYPE constructs."
  ::= { ospfTrapGroups 2 }

```

END

6. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

It is recommended that attention be specifically given to implementing the MAX-ACCESS clause in a number of objects, including

ospfIfAuthKey, ospfIfAuthType, ospfVirtIfAuthKey, and ospfVirtIfAuthType in scenarios that DO NOT use SNMPv3 strong security (i.e. authentication and encryption). Extreme caution must be used to minimize the risk of cascading security vulnerabilities when SNMPv3 strong security is not used. When SNMPv3 strong security is not used, these objects should have access of read-only, not read-create.

SNMPv1 by itself is not a secure environment. Even if the network

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itself is secure (for example by using IPsec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model [RFC 3414](#) [[RFC3414](#)] and the View-based Access Control Model [RFC 3415](#) [[RFC3415](#)] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

7. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor -----	OBJECT IDENTIFIER value -----
ospf	{ mib-2 14 }

8. Acknowledgements

This document was produced by the OSPF Working Group, and is based on the MIB for OSPF version 2 by Rob Coltun and Fred Baker [[RFC1850](#)]. The editors would like to acknowledge John Moy, Rob Coltun, Randall Atkinson, David T. Perkins, Ken Chapman, Brian Field, Acee Lindem, Vishwas Manral, Roy Jose, Don Goodspeed, Vivek Dubey, Keith McCloghrie, Bill Fenner and Dan Romascanu for their constructive comments.

9. References

9.1 Normative References

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11. TOS Support

For backward compatibility with previous versions of the OSPF MIB specification, TOS-specific information has been retained in this document, though the TOS routing option has been deleted from OSPF [[RFC2328](#)].

12. Changes from [RFC 1850](#)

This section documents the differences between this memo and [RFC 1850](#).

12.1 General Group Changes

Added object `ospfRFC1583Compatibility` to indicate support with "[RFC 1583](#) Compatibility" This object has DEFVAL of "enabled".

Added object `ospfReferenceBandwidth` to allow configuration of a reference bandwidth for calculation of default interface metrics.

Added objects `ospfRestartSupport`, `ospfRestartInterval`, `ospfRestartAge` `ospfRestartStrictLsaChecking` and `ospfRestartExitReason` to support graceful restart.

Added objects ospfStubRouterSupport and ospfStubRouteAdvertisement to support stub routers.

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Added object `ospfDiscontinuityTime` in order for a management entity to detect counter discontinuity events.

12.2 OSPF NSSA Enhancement Support

Added new objects to `OspfAreaTable` including:

- `ospfAreaNssaTranslatorRole` to indicate the configured NSSA translation role.
- `ospfAreaNssaTranslatorState` to indicate the current NSSA translation role.
- `ospfAreaNssaTranslatorStabilityInterval` to indicate time to continue to perform at current translation status.
- `ospfAreaNssaTranslatorEvents` to indicate the number of times OSPF Translation State has changed.

Added new object `ospfAreaAggregateExtRouteTag` to `ospfAreaAggregateTable`.

Added new object `ospfNssaTranslatorStatusChange` to `ospfTraps` in OSPF-TRAP-MIB DEFINITIONS.

Added `ospfAreaId` to IMPORTS in OSPF-TRAP-MIB DEFINITIONS to support `ospfNssaTranslatorStatusChange`.

Added `ospfAreaExtNssaTranslatorStatus` to IMPORTS in OSPF-TRAP-MIB DEFINITIONS to support `ospfNssaTranslatorStatusChange`.

Modified the DESCRIPTION clause of the `ospfAreaSummary` object in the `ospfAreaTable` to indicate support for NSSA.

Modified the DESCRIPTION clause of the `ospfImportAsExtern` object in the `ospfAreaTable` for clarity.

12.3 Opaque LSA Support

Added object `ospfOpaqueLsaSupport` to `ospfGeneralGroup` to indicate support of OSPF Opaque LSAs.

Created `ospfLocalLsdbTable`, for Link-local (type-9) LSA support. This table is indexed by:

- `ospflocalLsdbIpAddress`
- `ospfLocalLsdbAddressLessIf`
- `ospfLocalLsdbType`

-ospfLocalLsdbLsid

-ospfLocalLsdbRouterId

ospfLocalLsdbTable contains the following (columnar) objects:

-ospfLocalLsdbSequence, to indicate LSA instance

-ospfLocalLsdbAge

-ospfLocalLsdbChecksum

-ospfLocalLsdbAdvertisement, containing the entire LSA

Created ospfVirLocalLsdbTable, for Link-local (type-9) LSA support on virtual links. This table is indexed by:

-ospfVirtLocalLsdbTransitArea

-ospfVirtLocalLsdbNeighbor, to indicate the router ID of the virtual neighbor

-ospfVirLocalLsdbType

-ospfVirLocalLsdbLsid

-ospfVirLocalLsdbRouterId

ospfVirLocalLsdbTable contains the following (columnar) objects:

-ospfVirLocalLsdbSequence, to indicate LSA instance

-ospfVirLocalLsdbAge

-ospfVirLocalLsdbChecksum

-ospfVirLocalLsdbAdvertisement, containing the entire LSA

Added objects to ospfIfTable to support Link-local (type-9) LSAs, including:

-ospfIfLsaCount

-ospfIfLsaChecksumSum, to indicate the sum of the type-9 link-state advertisement checksums on this interface

Added objects to ospfVirIfTable, to support Link-local (type-9) LSAs

on virtual links, including:

-ospfVirIfLsaCount

-ospfVirIfLsaCksumSum, to indicate the sum of the type-9

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link-state advertisement checksums on this link.

To support area scope (type-10) LSAs, the enumeration areaOpaqueLink (10) was added to ospfLsdbType in the ospfLsdbTable.

Created ospfAsLsdbTable, for AS-scope LSA support. This table is indexed by:

- ospfAsLsdbType
- ospfAsLsdbLsid
- ospfAsLsdbRouterId

ospfAsLsdbTable contains the following (columnar) objects:

- ospfAsLsdbSequence, to indicate LSA instance
- ospfAsLsdbAge
- ospfAsLsdbChecksum
- ospfAsLsdbAdvertisement, containing the entire LSA

12.4 Graceful Restart Support

Added objects ospfRestartSupport, ospfRestartInterval, ospfRestartAge ospfRestartStrictLsaChecking and ospfRestartExitReason to general group.

Added objects ospfNbrRestartHelperStatus, ospfNbrRestartHelperAge and ospfNbrRestartHelperExitReason to OspfNbrTable.

Added objects ospfVirtNbrRestartHelperStatus, ospfVirtNbrRestartHelperAge and ospfVirtNbrRestartHelperExitReason to OspfVirtNbrTable.

12.5 OSPF Compliances

New compliance statements were added for new and for obsoleted conformance groups. These Statements include:

- ospfCompliance2
- ospfComplianceObsolete

New conformance groups were created to support new objects added to the group. These groups include:

- ospfBasicGroup2

- ospfAreaGroup2
- ospfIfGroup2
- ospfVirtIfGroup2
- ospfNbrGroup2
- ospfVirtNbrGroup2
- ospfAreaAggregateGroup2

Added completely new conformance groups, including:

- ospfLocalLsdbGroup, which specifies support for link local (type-9) LSAs.
- ospfVirtLocalLsdbGroup, which specifies support for link local (type-9) LSAs on virtual links.
- ospfObsoleteGroup, for obsolete objects and SMI compatibility.

12.6 OSPF Authentication and Security

As there has been significant concern in the community regarding cascading security vulnerabilities, the following changes have been incorporated:

- Modified the DESCRIPTION clause of ospfIfAuthKey due to security concerns, and to increase clarity
- Modified the DESCRIPTION clause of ospfVirtIfAuthKey due to security concerns, and to increase clarity
- Modified the DESCRIPTION clause of ospfIfAuthType due to security concerns, and to increase clarity
- Modified the DESCRIPTION clause of ospfVirtIfType due to security concerns, and to increase clarity
- Modified the OSPF MIB MODULE DESCRIPTION due to security concerns and to include a reference to the security considerations section in this document that will transcend compilation
- Modified the security considerations section to provide detail

12.7 OSPF Trap MIB

Added ospfTrapEventGroup.

Added importation of NOTIFICATION-GROUP.

Changed the STATUS of the ospfTrapCompliance MODULE-COMPLIANCE construct to obsolete.

Added ospfTrapCompliance2 MODULE-COMPLIANCE construct which replaces ospfTrapCompliance. OspfTrapCompliance includes an updated MANDATORY-GROUPS clause and new MIN-ACCESS specifications.

Added mtuMismatch enumeration to ospfConfigErrorType object in ospfTrapControl to imply MTU mismatch trap generation. in ospfIfConfigError.

Added noError enumeration to ospfConfigErrorType object for situations when traps are requested, but none have been sent. Updated the DESCRIPTION clause accordingly.

Added nullPacket enumeration to ospfPacketType object for situations when traps are requested, but none have been sent. Updated the DESCRIPTION clause accordingly.

Updated the DESCRIPTION clause of ospfPacketSrc for situations when traps are requested, but none have been sent.

Added NOTIFICATION-TYPE for ospfRestartStatusChange.

Added NOTIFICATION-TYPE for ospfNbrRestartHelperStatusChange.

Added NOTIFICATION-TYPE for ospfVirtNbrRestartHelperStatusChange.

12.8 Miscellaneous

Various sections, have been moved and or modified for clarity. Most of these changes are semantic in nature, and include, but are not limited to:

- The OSPF Overview section's format was revised. Unneeded information was removed. Removed information includes OSPF TOS default values.
- The Trap Overview section's format and working were revised. Unneeded information was removed.
- Modified the DESCRIPTION clause of "Status" "TEXTUAL-CONVENTION" for clarity
- The updates section was moved from the Overview to its own

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- Updated "REFERENCE" clauses in all objects, as needed
- Modified the SEQUENCE of the OspfIfTable to reflect the true order of the objects in the Table
- Modified the DESCRIPTION clause of all row management objects for clarity

Added ospfHostCfgAreaID to object to Host table with read-create access. Deprecated ospfHostAreaID.

Added importation of InterfaceIndexOrZero from IF-MIB. This TEXTUAL-CONVENTION will replace the InterfaceIndex TEXTUAL-CONVENTION.

Changed the SYNTAX clause of ospfNbrAddressLessIndex to use the semantically identical InterfaceIndexOrZero TEXTUAL-CONVENTION, as permitted by the SMI.

Changed the STATUS clause of the TEXTUAL-CONVENTION InterfaceIndex to obsolete and modified the DESCRIPTION accordingly.

Changed the SYNTAX clause of ospfAddressLessIf to use the semantically identical InterfaceIndexOrZero TEXTUAL-CONVENTION, as permitted by the SMI.

Changed the SYNTAX clause of ospfIfMetricAddressLessIf to use the semantically identical InterfaceIndexOrZero TEXTUAL-CONVENTION, as permitted by the SMI.

Changed importation of mib-2 from [RFC1213](#)-MIB to SNMPv2-SMI

Added Intellectual Property Rights section.

Updated REVISION DESCRIPTION clauses with description of major MIB modifications.

Moved all relevant MIB comments to objects' DESCRIPTION clauses.

Added reasoning for object deprecation.

Added persistence information for read-write, read-create objects.

Described conditions when columns can be modified in RowStatus managed rows as required by [RFC 2579](#).

Defined OspfAuthenticationType TC and modified authentication type objects to use the new type.

Made index objects of new tables not-accessible.

Added the UNITS clause to several objects.

Added ospfIfDesignatedRouterId and ospfIfBackupDesignatedRouterId to the OspfIfEntry.

Added the area LSA counter table.

Added IANA Considerations section.

13. Authors' Addresses

Dan Joyal (editor)
Nortel, Inc.
600 Technology Park Drive
Billerica, MA 01821
USA
EMail: djoyal@nortel.com

Piotr Galecki (editor)
Airvana, Inc.
19 Alpha Road
Chelmsford, MA 01824
USA
EMail: pgalecki@airvana.com

Spencer Giacalone (editor)
Credit Suisse First Boston
Eleven Madison Ave
New York, NY 10010-3629
USA
EMail: spencer.giacalone@csfb.com

Fred Baker
Cisco Systems
1121 Via Del Rey
Santa Barbara, California 93117
USA
EMail: fred@cisco.com

Rob Coltun
Touch Acoustra
3204 Brooklawn Terrace
Chevy Chase, MD 20815
USA
Email: undisclosed

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