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

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

Please send comments to ospf@peach.ease.lsoft.com.

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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

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.

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

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- 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

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 "200601130900Z" -- Jan 13, 2006 09:00:00 EST
    ORGANIZATION "IETF OSPF Working Group"
    CONTACT-INFO
        "WG E-Mail: ospf@peach.ease.lsoft.com
```

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

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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 "200601130900Z" -- Jan 13, 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

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```
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

+-----+-----+-----+-----+-----+-----+-----+-----+											
	PRECEDENCE				TYPE OF SERVICE					0	
+-----+-----+-----+-----+-----+-----+-----+-----+											

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 inter-
 face; 'disabled' disables it on all inter-

faces.

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 Unsigned32

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MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned 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."

::= { 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

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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

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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 }

ospfAsLsaChecksumSum 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 }

-- OSPF Area Table

-- 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,
 ospfAreaLsaCksumSum
 Unsigned32,
 ospfAreaSummary
 INTEGER,
 ospfAreaStatus
 RowStatus,
 ospfAreaNssaTranslatorRole
 INTEGER,
 ospfAreaNssaTranslatorState

INTEGER,
ospfAreaNssaTranslatorStabilityInterval
PositiveInteger,
ospfAreaNssaTranslatorEvents
Counter32

}

ospfAreaId OBJECT-TYPE

SYNTAX AreaID

MAX-ACCESS read-only

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

"Indicates whether an area is a Stub area, NSSA, or standard 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 }

::= { 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 Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The 32-bit unsigned 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."

```
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
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
MAX-ACCESS  read-only
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
  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
  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

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

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.

 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,
    ospfAreaRangeStatus
        RowStatus,
    ospfAreaRangeEffect
        INTEGER
}
```

ospfAreaRangeAreaId OBJECT-TYPE

SYNTAX AreaID

MAX-ACCESS read-only

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

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

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

ospfHostIpAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

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
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 current
DESCRIPTION
 "Displays the Area the Host Entry is to be found within."
REFERENCE
 "OSPF Version 2, [Appendix C.7](#) Host parameters"
::= { ospfHostEntry 5 }

ospfHostCfgAreaID OBJECT-TYPE

SYNTAX AreaID
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"Allows the configuration of the Area the Host Entry is
to be found within."

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 }

::= { 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
STATUS      current
DESCRIPTION
    "The IP address of this OSPF interface."
 ::= { ospfIfEntry 1 }

```

ospfAddressLessIf OBJECT-TYPE

```

SYNTAX      InterfaceIndexOrZero
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "For the purpose of easing the instantiation 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  
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 }

ospfIfLsaChecksumSum 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"

::= { 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  
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  
STATUS      current  
DESCRIPTION  
    "For the purpose of easing the instancing of  
    addressed and addressless interfaces; This  
    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  
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
STATUS      current
DESCRIPTION
    "The Transit Area that the Virtual Link
    traverses. By definition, this is not 0.0.0.0"
 ::= { ospfVirtIfEntry 1 }

```

ospfVirtIfNeighbor OBJECT-TYPE

```

SYNTAX      RouterID
MAX-ACCESS  read-only
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
            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
}

ospfNbrIpAddress OBJECT-TYPE
SYNTAX IpAddress

MAX-ACCESS read-only
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
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,

ospfVirtNbrState

INTEGER,

ospfVirtNbrEvents

Counter32,

ospfVirtNbrLsRetransQLen

Gauge32,

ospfVirtNbrHelloSuppressed

TruthValue,

ospfVirtNbrRestartHelperStatus

INTEGER,

ospfVirtNbrRestartHelperAge

Unsigned32,

ospfVirtNbrRestartHelperExitReason

INTEGER

}

ospfVirtNbrArea OBJECT-TYPE

SYNTAX AreaID

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Transit Area Identifier."

::= { ospfVirtNbrEntry 1 }

ospfVirtNbrRtrId OBJECT-TYPE

SYNTAX RouterID

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A 32-bit integer uniquely identifying the
neighboring router in the Autonomous System."
::= { ospfVirtNbrEntry 2 }

ospfVirtNbrIpAddress 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
    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"
    ::= { ospfExtLsdbEntry 1 }

ospfExtLsdbLsid OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS   read-only
    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
    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
```

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```
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 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

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

SYNTAX INTEGER {
summaryLink (3),
nssaExternalLink (7)
}

MAX-ACCESS read-only

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

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

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

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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 -'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"

::= { 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	

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```

        "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 {
    ospfNbrIpAddress,
    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,

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```
    ospfVirtNbrIpAddress,  
    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,

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```
    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,
    ospfExternLsaChecksumSum,
    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,
    ospfNbmaNbrStatus,
    ospfNbmaNbrPermanence,
    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,
        ospfHostAreaID,
        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](#) [24]. 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](#)

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[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.

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;
```

ospfTrap MODULE-IDENTITY

LAST-UPDATED "200601130900Z" -- Jan 13, 2006 09:00:00 EST

ORGANIZATION "IETF OSPF Working Group"

CONTACT-INFO

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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 "200601130900Z" -- Jan 13, 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

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-- 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

```

```
    ospfNbrIpAddr,  
    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
ospfRestartStatus,
ospfRestartInterval,
ospfRestartExitReason

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```

    }
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 {

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```

    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 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 and Keith McCloghrie for their constructive comments.

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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 [[RFC 2178](#)].

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.

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

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

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-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

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-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

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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 section
- 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.

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.

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