

Network Working Group
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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. In particular, it defines objects for managing the Open Shortest Path First Routing Protocol.

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

Please send comments to ospf@discuss.microsoft.com.

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[1](#) Overview

[1.1](#) The SNMPv2 Network Management Framework

This document describes aspects of the SNMPv2 Network Management Framework, which consists of a number of components. They are:

- An overall architecture, described in [RFC 2571](#) [[1](#)].
- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, [RFC 1155](#) [[2](#)], STD 16, [RFC 1212](#) [[3](#)] and [RFC 1215](#) [[4](#)]. The second version, called SMIV2, is described in STD 58, [RFC 2578](#) [[5](#)], [RFC 2579](#) [[6](#)] and [RFC 2580](#) [[7](#)].
- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, [RFC 1157](#) [[8](#)]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is

called SNMPv2c and described in [RFC 1901](#) [9] and [RFC 1906](#) [10]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [10], [RFC 2572](#) [11] and [RFC 2574](#) [12].

- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, [RFC 1157](#) [8]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [13].
- A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in [RFC 2575](#) [15].

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[1.2](#) The SMI, and Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations.

[1.3](#) Object Identification

Objects in the SMI are defined by types, and are named by an OBJECT IDENTIFIER, which is an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

[1.4](#) Textual Conventions

Several data types in this MIB document are termed textual conventions. Textual conventions enhance the readability of the specification and can ease comparison with other specifications if appropriate. It should be noted that textual conventions have no effect on either the syntax nor the semantics of any managed objects. Objects defined in terms of one of these methods are always encoded by means of the rules that define the primitive type. Textual conventions are used for the convenience of readers and writers in pursuit of the goal of clear, concise, and

unambiguous MIB documents.

1.5 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-

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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.).

1.6 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

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- 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.

2 Structure of this MIB

This MIB is composed of the following sections:

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

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

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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.

OSPF-MIB DEFINITIONS ::= BEGIN

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IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, Counter32, Gauge32,
Integer32, Unsigned32, IPAddress, mib-2
FROM SNMPv2-SMI
TEXTUAL-CONVENTION, TruthValue, RowStatus
FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP
FROM SNMPv2-CONF

InterfaceIndexOrZero
FROM IF-MIB;

ospf MODULE-IDENTITY

LAST-UPDATED "200304011015Z" -- Apr 01, 2003 10:15:00 GMT

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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 the document defining this MIB module for more information"

REVISION "200304011015Z" -- Apr 01, 2003 10:15:00 GMT

DESCRIPTION

"Updated for latest changes to OSPF Version 2.

See [Appendix B](#) for details."

REVISION "9501201225Z" -- Fri Jan 20 12:25:50 PST 1995

DESCRIPTION

"The initial SMIPv2 revision of this MIB module, published in [RFC1850](#)."

::= { mib-2 14 }

-- Note the Area ID, in OSPF, has the same format as an IP Address,
-- but has the function of defining a summarization point for

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-- Link State Advertisements

```

AreaID ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "An OSPF Area Identifier."
    SYNTAX          IPAddress

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

RouterID ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "A OSPF Router Identifier."
    SYNTAX          IPAddress

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

Metric ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "The OSPF Internal Metric."
    SYNTAX          Integer32 (0..'FFFF'h)

BigMetric ::= TEXTUAL-CONVENTION
    STATUS          current
    DESCRIPTION
        "The OSPF External Metric."
    SYNTAX          Integer32 (0..'FFFFFF'h)

-- Status Values

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) }

-- Note that the following Time Durations are measured in seconds

PositiveInteger ::= TEXTUAL-CONVENTION
    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

```

```

STATUS      current
DESCRIPTION
    "The range of intervals on which hello messages are
    exchanged."
SYNTAX      Integer32 (1..'FFFF'h)

```

```
UpToMaxAge ::= TEXTUAL-CONVENTION
```

```

STATUS      current
DESCRIPTION
    "The values that one might find or configure for
    variables bounded by the maximum age of an LSA."
SYNTAX      Integer32 (0..3600)

```

```
-- The range of ifIndex
```

```
InterfaceIndex ::= TEXTUAL-CONVENTION
```

```

STATUS      obsolete
DESCRIPTION
    "The range of ifIndex. This statement
    no longer used and is included for backwards-
    compatibility "
SYNTAX      Integer32

```

```
-- Potential Priorities for the Designated Router Election
```

```
DesignatedRouterPriority ::= TEXTUAL-CONVENTION
```

```

STATUS      current
DESCRIPTION
    "The values defined for the priority of a system for
    becoming the designated router."
SYNTAX      Integer32 (0..'FF'h)

```

```
TOSType ::= TEXTUAL-CONVENTION
```

```

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

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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)

-- 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."

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."

::= { ospfGeneralGroup 2 }

ospfVersionNumber OBJECT-TYPE

SYNTAX INTEGER { version2 (2) }
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The current version number of the OSPF proto-
 col is 2."
 REFERENCE
 "OSPF Version 2, Title"
 ::= { ospfGeneralGroup 3 }

ospfAreaBdrRtrStatus OBJECT-TYPE

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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 config-
 ured as an Autonomous System border router."
 REFERENCE
 "OSPF Version 2, [Section 3.3](#) Classification of
 routers"
 ::= { ospfGeneralGroup 5 }

ospfExternLsaCount OBJECT-TYPE

SYNTAX Gauge32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of external (LS type 5) link-state
 advertisements in the link-state database."
 REFERENCE
 "OSPF Version 2, [Appendix A.4.5](#) AS external link
 advertisements"
 ::= { ospfGeneralGroup 6 }

ospfExternLsaChecksumSum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The 32-bit 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 }

ospfTOSupport OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

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DESCRIPTION

"The router's support for type-of-service routing."

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."

::= { 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 advertise-

```

        ments."
    ::= { 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)."
    DEFVAL { -1 }
    ::= { ospfGeneralGroup 11 }

```

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```

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 Multi-
        cast 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 mul-
        ticast 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 Auto-

```

nomous 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."

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 OverflowState until restarted."

DEFVAL { 0 }

::= { ospfGeneralGroup 13 }

ospfDemandExtensions OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

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"The router's support for demand routing."

REFERENCE

"Extending OSPF to Support Demand Circuits"

::= { ospfGeneralGroup 14 }

ospfRFC1583Compatibility OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates metrics used to choose among multiple AS-external-LSAs. When RFC1583Compatibility is set to enabled, only cost will be used when choosing among multiple AS-external-LSAs advertising the same

destination. When RFC1583Compatibility is set to disabled, preference will be driven first by type of path using cost only to break ties."

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."

REFERENCE

"The OSPF Opaque LSA Option"

::= { ospfGeneralGroup 16 }

ospfTrafficEngineeringSupport OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The router's support for OSPF traffic engineering."

::= { ospfGeneralGroup 17 }

ospfReferenceBandwidth OBJECT-TYPE

SYNTAX Unsigned32

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)"

::= { ospfGeneralGroup 18 }

ospfRestartSupport OBJECT-TYPE

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

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}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

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

```

 ::= { ospfGeneralGroup 19 }

ospfRestartInterval OBJECT-TYPE
    SYNTAX      Integer32 (0..1800)
    UNITS       "seconds"
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "Configured OSPF hitless restart timeout interval."
 ::= { ospfGeneralGroup 20 }

ospfRestartStatus OBJECT-TYPE
    SYNTAX      INTEGER { notRestarting (1),
                          plannedRestart (2),
                          unplannedRestart (3)
                        }
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Current status of OSPF hitless restart."
 ::= { ospfGeneralGroup 21 }

ospfRestartAge OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Remaining time in current OSPF hitless 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

```

hitless 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."

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.ö

::= { ospfGeneralGroup 27 }

-- OSPF Area Data Structure

-- The OSPF Area Data Structure contains information
-- regarding the various areas. The interfaces and
-- virtual links are configured as part of these areas.
-- Area 0.0.0.0, by definition, is the Backbone Area

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."

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."

INDEX { ospfAreaId }

::= { ospfAreaTable 1 }

OspfAreaEntry ::=

SEQUENCE {

ospfAreaId

AreaID,

ospfAuthType

Integer32,

ospfImportAsExtern

INTEGER,

ospfSpfRuns

Counter32,

ospfAreaBdrRtrCount

Gauge32,

ospfAsBdrRtrCount

```

    Gauge32,
ospfAreaLsaCount
    Gauge32,
ospfAreaLsaCksumSum
    Integer32,
ospfAreaSummary
    INTEGER,
ospfAreaStatus

```

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```

    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      Integer32
            -- none (0),
            -- simplePassword (1)
            -- md5 (2)
            -- reserved for specification by IANA (> 2)
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "The authentication type specified for an area.
    Additional authentication types may be assigned
    locally on a per Area basis."
REFERENCE
    "OSPF Version 2, Appendix D Authentication"
DEFVAL { 0 } -- 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

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"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."

::= { 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 }

ospfAreaLsaCksumSum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The 32-bit unsigned sum of the link-state advertisements' LS checksums contained in this

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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 neither originate nor propagate 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."

::= { 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

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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
    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."
    ::= { ospfAreaEntry 14 }
```

```
-- OSPF Area Default Metric Table
```

```
-- The OSPF Area Default Metric Table describes the metrics
-- that a default Area Border Router will advertise into a
-- Stub area.
```

```
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"
```

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```
::= { 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."
```

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 inter-
faces 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."
```

```
::= { 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 ad-
vertised as a default route."
```

```
DEFVAL { ospfMetric }
```

```
::= { ospfStubAreaEntry 5 }
```

```
-- OSPF Link State Database
```

```
-- The Link State Database contains the Link State
-- Advertisements from throughout the areas that the
-- device is attached to.
```

```
ospfLsdbTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF OspfLsdbEntry
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"The OSPF Process's Link State Database."
```

```
REFERENCE
```

```
"OSPF Version 2, Section 12 Link State Adver-
tisements"
```

```
::= { 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 }

-- Note: External Link State Advertisements are permitted
-- for backward compatibility, but should be displayed in
-- the ospfAsLsdbTable rather than here.

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

```

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```

STATUS        current
DESCRIPTION
    "The type of the link state advertisement.
    Each link state type has a separate advertise-
    ment format."
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 }

```

```

-- Note that the OSPF Sequence Number is a 32 bit signed
-- 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.

```

ospfLsdbSequence OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The sequence number field is a signed 32-bit integer. 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"

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::= { ospfLsdbEntry 5 }

ospfLsdbAge OBJECT-TYPE

SYNTAX Integer32 -- Should be 0..MaxAge, except when
 -- doNotAge bit is set
 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."
 REFERENCE
 "OSPF Version 2, [Section 12](#) Link State Adver-
 tisements"
 ::= { ospfLsdbEntry 8 }

-- Address Range Table

-- 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.

ospfAreaRangeTable OBJECT-TYPE

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SYNTAX SEQUENCE OF OspfAreaRangeEntry
 MAX-ACCESS not-accessible
 STATUS obsolete
 DESCRIPTION
 "A range if IP addresses 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"
 REFERENCE
 "OSPF Version 2, [Appendix C.2](#) Area parameters"
 ::= { ospf 5 }

ospfAreaRangeEntry OBJECT-TYPE

SYNTAX OspfAreaRangeEntry
 MAX-ACCESS not-accessible
 STATUS obsolete
 DESCRIPTION
 "A range if IP addresses 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"
 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 }

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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."

::= { 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 (adver-
tiseMatching), or result in the subnet's not
being advertised at all outside the area."

DEFVAL { advertiseMatching }

::= { ospfAreaRangeEntry 5 }

-- OSPF Host Table

-- 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

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-- are found within.

ospfHostTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfHostEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The list of Hosts, and their metrics, that the
router will advertise as host routes."

REFERENCE

"OSPF Version 2, [Appendix C.7](#) Host route param-
eters"

::= { 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."

INDEX { ospfHostIpAddress, ospfHostTOS }

::= { ospfHostTable 1 }

OspfHostEntry ::=

SEQUENCE {
 ospfHostIpAddress
 IpAddress,
 ospfHostTOS
 TOSType,
 ospfHostMetric
 Metric,
 ospfHostStatus
 RowStatus,
 ospfHostAreaID
 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"

```
    ters"
    ::= { 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."
    ::= { ospfHostEntry 4 }
```

ospfHostAreaID OBJECT-TYPE

```
    SYNTAX      AreaID
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The Area the Host Entry is to be found within."
    REFERENCE
        "OSPF Version 2, Appendix C.7 Host parameters"
    ::= { ospfHostEntry 5 }
```

-- OSPF Interface Table

-- The OSPF Interface Table augments the ipAddrTable
-- with OSPF specific information.

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."
    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."

```
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

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TruthValue,
ospfIfAuthType
INTEGER,
ospfIfLsaCount
Gauge32,
ospfIfLsaChecksumSum
Integer32

}

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 instancing of
addressed and address less interfaces; This
variable takes the value 0 on interfaces with
IP Addresses, and the corresponding value of
ifIndex for interfaces having no IP Address."

::= { ospfIfEntry 2 }

ospfIfAreaId OBJECT-TYPE

SYNTAX AreaID
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"A 32-bit integer uniquely identifying the area
to which the interface connects. Area ID
0.0.0.0 is used for the OSPF backbone."

DEFVAL { '00000000'H } -- 0.0.0.0

::= { ospfIfEntry 3 }

ospfIfType OBJECT-TYPE

```

SYNTAX      INTEGER {
                broadcast (1),
                nbma (2),
                pointToPoint (3),
                pointToMultipoint (5)
            }
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION
    "The OSPF interface type.
    By way of a default, this field may be intuited

```

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```

    from the corresponding value of ifType. Broad-
    cast 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 in-
        terface 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 eligi-
        ble 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

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The estimated number of seconds it takes to transmit a link state update packet over this interface."

DEFVAL { 1 }

::= { ospfIfEntry 7 }

ospfIfRetransInterval OBJECT-TYPE

SYNTAX UpToMaxAge

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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"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."

DEFVAL { 5 }

::= { ospfIfEntry 8 }

ospfIfHelloInterval OBJECT-TYPE

SYNTAX HelloRange

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

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
 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),

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 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."
::= { 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. [[RFC-1704](#)]

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."

::= { 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 INTEGER (0..255)

```

        -- none (0),
        -- simplePassword (1)
        -- md5 (2)
        -- reserved for specification by IANA (> 2)
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "The authentication type specified for an in-
    terface. Additional authentication types may
    be assigned locally.

    Note that this object can be used to engage
    in significant attacks against an OSPF router."
REFERENCE
    "OSPF Version 2, Appendix D Authentication"
DEFVAL { 0 } -- 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      Integer32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The 32-bit unsigned sum of the link-state ad-
        vertisements' 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 data-
        base, and to compare the interface link-state database of
        routers attached to the same subnet."
    ::= { ospfIfEntry 22 }

```

```
-- OSPF Interface Metric Table
```

```
-- 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:

--      Metric = referenceBandwidth / 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.
```

```
ospfIfMetricTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfIfMetricEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "The TOS metrics for a non-virtual interface
         identified by the interface index."
    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 in-
         terface identified by the interface index."
    REFERENCE
```

```
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 in-
    stance."
 ::= { 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 in-
    terfaces having no IP Address. On row crea-
    tion, 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 }

```

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```

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."
    ::= { ospfIfMetricEntry 5 }

```

-- OSPF Virtual Interface Table

```

--      The Virtual Interface Table describes the virtual
--      links that the OSPF Process is configured to
--      carry on.

```

```

ospfVirtIfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfVirtIfEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Information about this router's virtual inter-
        faces."
    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."
    INDEX { ospfVirtIfAreaId, ospfVirtIfNeighbor }
    ::= { ospfVirtIfTable 1 }
```

```
OspfVirtIfEntry ::=
    SEQUENCE {
        ospfVirtIfAreaId
            AreaID,
        ospfVirtIfNeighbor
```

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```
        RouterID,
    ospfVirtIfTransitDelay
        UpToMaxAge,
    ospfVirtIfRetransInterval
        UpToMaxAge,
    ospfVirtIfHelloInterval
        HelloRange,
    ospfVirtIfRtrDeadInterval
        PositiveInteger,
    ospfVirtIfState
        INTEGER,
    ospfVirtIfEvents
        Counter32,
    ospfVirtIfAuthType
        INTEGER,
    ospfVirtIfAuthKey
        OCTET STRING,
    ospfVirtIfStatus
        RowStatus,
    ospfVirtIfLsaCount
        Gauge32,
    ospfVirtIfLsaCksumSum
        Integer32
}
```

```
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

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The estimated number of seconds it takes to transmit a link-state update packet over this interface."

DEFVAL { 1 }

::= { ospfVirtIfEntry 3 }

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ospfVirtIfRetransInterval OBJECT-TYPE

SYNTAX UpToMaxAge

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."

DEFVAL { 5 }

::= { ospfVirtIfEntry 4 }

ospfVirtIfHelloInterval OBJECT-TYPE

SYNTAX HelloRange

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

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 }
```

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ospfVirtIfEvents OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

```
::= { 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. [[RFC-1704](#)]

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."

::= { ospfVirtIfEntry 10 }

ospfVirtIfAuthType OBJECT-TYPE

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SYNTAX INTEGER (0..255)
-- none (0),
-- simplePassword (1)
-- md5 (2)
-- reserved for specification by IANA (> 2)

MAX-ACCESS read-create
STATUS current

DESCRIPTION

"The authentication type specified for a virtual interface. Additional authentication types may be assigned locally."

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

REFERENCE

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

DEFVAL { 0 } -- 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 Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The 32-bit unsigned sum of the link-state ad-
vertisements' 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 data-
base, and to compare the virtual interface link-state
database of the virtual neighbors."

::= { ospfVirtIfEntry 13 }

-- OSPF Neighbor Table

-- The OSPF Neighbor Table describes all neighbors in
-- the locality of the subject router.

ospfNbrTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfNbrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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"A table of non-virtual neighbor information."

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."
    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 ad-
 dress 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 IpAd-
 dress) 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 op-
 tions 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 informa-
 tion; if zero, it is a stub area.

 Bit 2, if set, indicates that the system is ca-
 pable of routing IP Multicast datagrams; i.e.,

that it implements the Multicast Extensions to OSPF.

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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."

::= { ospfNbrEntry 7 }

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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."

::= { 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 en-
try. '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 hitless restart helper for the neighbor."
 ::= { ospfNbrEntry 12 }

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ospfNbrRestartHelperAge OBJECT-TYPE
 SYNTAX Unsigned32
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Remaining time in current OSPF hitless 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 hitless restart helper for the neighbor."
 ::= { ospfNbrEntry 14 }

```
-- OSPF Virtual Neighbor Table

-- This table describes all virtual neighbors.
-- Since Virtual Links are configured in the
-- virtual interface table, this table is read-only.
```

```
ospfVirtNbrTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfVirtNbrEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table of virtual neighbor information."
    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."
    INDEX { ospfVirtNbrArea, ospfVirtNbrRtrId }
    ::= { ospfVirtNbrTable 1 }
```

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```
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 us-
        ing."
    ::= { ospfVirtNbrEntry 3 }

```

```

ospfVirtNbrOptions OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "A Bit Mask corresponding to the neighbor's op-
        tions 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 imple-

```

ments 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."

::= { ospfVirtNbrEntry 6 }

ospfVirtNbrLsRetransQLen OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current length of the retransmission queue."

::= { ospfVirtNbrEntry 7 }

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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 hitless 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 hitless 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  
                      completed (3),      -- progress  
                      timedOut (4),       -- successfully  
                      topologyChanged (5) -- completed  
                      }                  -- timed out  
                      -- aborted due to  
                      -- topology  
                      -- change.
```

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

```
STATUS       current
```

```
DESCRIPTION
```

```
"Describes the outcome of the last attempt at acting  
as a hitless restart helper for the neighbor."
```

```
::= { ospfVirtNbrEntry 11 }
```

```
-- OSPF Link State Database, External
```

```
-- The Link State Database contains the 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 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 this table has been deprecated and is
--      replaced by the AS-scope Link State Database
```

```
ospfExtLsdbTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF OspfExtLsdbEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "The OSPF Process's External LSA Link State Database."
    REFERENCE
        "OSPF Version 2, Section 12 Link State Adver-
        tisements"
    ::= { 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

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```
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 advertise-
     ment 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 }
```

```
-- Note that the OSPF Sequence Number is a 32 bit signed
-- 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.
```

ospfExtLsdbSequence OBJECT-TYPE

```
SYNTAX      Integer32
```

MAX-ACCESS read-only
STATUS deprecated
DESCRIPTION

"The sequence number field is a signed 32-bit integer. 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

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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

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 Adver-
    tisements"
::= { ospfExtLsdbEntry 7 }

```

```
-- OSPF Use of the CIDR Route Table
```

```
    ospfRouteGroup      OBJECT IDENTIFIER ::= { ospf 13 }
```

```
-- The IP Forwarding Table defines a number of objects for use by
```

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```
-- 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

"A range of IP addresses specified by an IP
 address/IP network mask pair. For example,

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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 sub-
 sumes 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 range of IP addresses 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 range 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"

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

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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."

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::= { 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

-- 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".

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."

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

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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   read-only
    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   read-only
    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 read-only

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 read-only

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 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"

::= { ospfLocalLsdbEntry 5 }

-- Note that the OSPF Sequence Number is a 32 bit signed
-- 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.

ospfLocalLsdbSequence OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The sequence number field is a signed 32-bit

integer. 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."

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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

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."

REFERENCE

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

::= { ospfLocalLsdbEntry 9 }

-- OSPF Link State Database, Link-Local 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

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-- interface. This table is implemented to support type-9 LSAs
-- which are defined in "The OSPF Opaque LSA Option".

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."

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

```

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```

MAX-ACCESS    read-only
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  read-only
    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  read-only
    STATUS      current
    DESCRIPTION
        "The type of the link state advertisement.
        Each link state type has a separate advertise-
        ment format."

```

REFERENCE

"OSPF Version 2, [Appendix A.4.1](#) The Link State Advertisement header and "
 ::= { ospfVirtLocalLsdbEntry 3 }

ospfVirtLocalLsdbLsid OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

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 read-only

STATUS current

DESCRIPTION

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

REFERENCE

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

-- Note that the OSPF Sequence Number is a 32 bit signed
-- 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.

ospfVirtLocalLsdbSequence OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The sequence number field is a signed 32-bit integer. 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
```

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

```
STATUS      current
```

DESCRIPTION

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

REFERENCE

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

```
::= { ospfVirtLocalLsdbEntry 7 }
```

ospfVirtLocalLsdbChecksum OBJECT-TYPE

```
SYNTAX      Integer32
```

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

```
STATUS      current
```

DESCRIPTION

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

REFERENCE

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

```
::= { ospfVirtLocalLsdbEntry 8 }
```

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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"

```
::= { ospfVirtLocalLsdbEntry 9 }
```

-- OSPF Link State Database, AS-scope

```
-- The Link State 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.
```

ospfAsLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfAsLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The OSPF Process's AS-scope LSA Link State Database."

REFERENCE

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

::= { 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   read-only
    STATUS       current
    DESCRIPTION
        "The type of the link state advertisement.
        Each link state type has a separate advertise-
        ment format."
    REFERENCE
        "OSPF Version 2, Appendix A.4.1 The Link State
        Advertisement header"
    ::= { ospfAsLsdbEntry 1 }

```

```

ospfAsLsdbLsid 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"
    ::= { ospfAsLsdbEntry 2 }

```

```

ospfAsLsdbRouterId 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"
    ::= { ospfAsLsdbEntry 3 }

```

```

-- Note that the OSPF Sequence Number is a 32 bit signed
-- 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.

ospfAsLsdbSequence OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The sequence number field is a signed 32-bit integer. 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

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(36))

MAX-ACCESS read-only

STATUS current
DESCRIPTION
 "The entire Link State Advertisement, including

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 its header."
REFERENCE
 "OSPF Version 2, [Section 12](#) Link State Adver-
 tisements"
 ::= { ospfAsLsdbEntry 7 }

-- conformance information

ospfConformance OBJECT IDENTIFIER ::= { ospf 15 }

ospfGroups OBJECT IDENTIFIER ::= { ospfConformance 1 }

ospfCompliances OBJECT IDENTIFIER ::= { ospfConformance 2 }

-- compliance statements

ospfCompliance MODULE-COMPLIANCE
 STATUS current
 DESCRIPTION
 "The compliance statement for [RFC 1850](#)."
 MODULE -- this module
 MANDATORY-GROUPS {
 ospfBasicGroup,
 ospfAreaGroup,
 ospfStubAreaGroup,
 ospfIfGroup,
 ospfIfMetricGroup,
 ospfVirtIfGroup,
 ospfNbrGroup,
 ospfVirtNbrGroup,
 ospfAreaAggregateGroup
 }
 ::= { 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 ospfHostGroup
DESCRIPTION
    "This group is mandatory for OSPF systems that support
    attached hosts."

```

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```

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."
::= { ospfCompliances 2 }

```

-- units of conformance

```

ospfBasicGroup    OBJECT-GROUP
OBJECTS {
    ospfRouterId,
    ospfAdminStat,
    ospfVersionNumber,
    ospfAreaBdrRtrStatus,
    ospfASBdrRtrStatus,
    ospfExternLsaCount,
    ospfExternLsaCksumSum,
    ospfTOSSupport,
    ospfOriginateNewLsas,
    ospfRxNewLsas,
    ospfExtLsdbLimit,
    ospfMulticastExtensions,

```

```

        ospfExitOverflowInterval,
        ospfDemandExtensions
    }
STATUS      current
DESCRIPTION
    "These objects are required for OSPF systems conforming to
    RFC 1850."
 ::= { ospfGroups 1 }

```

```

ospfAreaGroup      OBJECT-GROUP
OBJECTS {
    ospfAreaId,
    ospfImportAsExtern,
    ospfSpfRuns,
    ospfAreaBdrRtrCount,
    ospfAsBdrRtrCount,
    ospfAreaLsaCount,

```

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```

        ospfAreaLsaCksumSum,
        ospfAreaSummary,
        ospfAreaStatus
    }
STATUS      current
DESCRIPTION
    "These objects are required 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 required 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 required 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 required for non-CIDR OSPF
    systems that support multiple areas."

```

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```

::= { ospfGroups 5 }

```

```

ospfHostGroup    OBJECT-GROUP
OBJECTS {
    ospfHostIpAddress,
    ospfHostTOS,
    ospfHostMetric,
    ospfHostStatus,
    ospfHostAreaID
}
STATUS      current
DESCRIPTION
    "These objects are required 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 current

DESCRIPTION

"These objects are required for OSPF systems conforming
to [RFC 1850](#)."

::= { ospfGroups 7 }

ospfIfMetricGroup OBJECT-GROUP

```

OBJECTS {
    ospfIfMetricIpAddress,
    ospfIfMetricAddressLessIf,
    ospfIfMetricTOS,
    ospfIfMetricValue,
    ospfIfMetricStatus
}

```

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STATUS current

DESCRIPTION

"These objects are required for OSPF systems."

::= { ospfGroups 8 }

ospfVirtIfGroup OBJECT-GROUP

```

OBJECTS {
    ospfVirtIfAreaId,
    ospfVirtIfNeighbor,
    ospfVirtIfTransitDelay,
    ospfVirtIfRetransInterval,
    ospfVirtIfHelloInterval,
    ospfVirtIfRtrDeadInterval,
    ospfVirtIfState,
    ospfVirtIfEvents,
}

```

```

        ospfVirtIfAuthType,
        ospfVirtIfAuthKey,
        ospfVirtIfStatus
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems conforming
        to RFC 1850."
    ::= { ospfGroups 9 }

ospfNbrGroup      OBJECT-GROUP
    OBJECTS {
        ospfNbrIpAddress,
        ospfNbrAddressLessIndex,
        ospfNbrRtrId,
        ospfNbrOptions,
        ospfNbrPriority,
        ospfNbrState,
        ospfNbrEvents,
        ospfNbrLsRetransQLen,
        ospfNbmaNbrStatus,
        ospfNbmaNbrPermanence,
        ospfNbrHelloSuppressed
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems conforming
        to RFC 1850."
    ::= { ospfGroups 10 }

ospfVirtNbrGroup  OBJECT-GROUP
    OBJECTS {
        ospfVirtNbrArea,
        ospfVirtNbrRtrId,
        ospfVirtNbrIpAddress,
        ospfVirtNbrOptions,
        ospfVirtNbrState,
        ospfVirtNbrEvents,

```

```

        ospfVirtNbrLsRetransQLen,
        ospfVirtNbrHelloSuppressed
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems conforming
        to RFC 1850."
    ::= { ospfGroups 11 }

```

```

ospfExtLsdbGroup      OBJECT-GROUP
  OBJECTS {
    ospfExtLsdbType,
    ospfExtLsdbLsid,
    ospfExtLsdbRouterId,
    ospfExtLsdbSequence,
    ospfExtLsdbAge,
    ospfExtLsdbChecksum,
    ospfExtLsdbAdvertisement
  }
  STATUS      deprecated
  DESCRIPTION
    "These objects are required for OSPF systems
    that display their link state database conforming
    to RFC 1850. This object replaced be replaced by
    ospfAsLsdbGroup."
  ::= { ospfGroups 12 }

```

```

ospfAreaAggregateGroup  OBJECT-GROUP
  OBJECTS {
    ospfAreaAggregateAreaID,
    ospfAreaAggregateLsdbType,
    ospfAreaAggregateNet,
    ospfAreaAggregateMask,
    ospfAreaAggregateStatus,
    ospfAreaAggregateEffect
  }
  STATUS      current
  DESCRIPTION
    "These objects are required for OSPF systems."
  ::= { ospfGroups 13 }

```

```

ospfLocalLsdbGroup      OBJECT-GROUP
  OBJECTS {
    ospfLocalLsdbIpAddress,
    ospfLocalLsdbAddressLessIf,
    ospfLocalLsdbType,
    ospfLocalLsdbLsid,
    ospfLocalLsdbRouterId,
    ospfLocalLsdbSequence,
    ospfLocalLsdbAge,
    ospfLocalLsdbChecksum,
    ospfLocalLsdbAdvertisement
  }

```

DESCRIPTION

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

::= { ospfGroups 14 }

ospfVirtLocalLsdbGroup OBJECT-GROUP

OBJECTS {

ospfVirtLocalLsdbTransitArea,
ospfVirtLocalLsdbNeighbor,
ospfVirtLocalLsdbType,
ospfVirtLocalLsdbLsid,
ospfVirtLocalLsdbRouterId,
ospfVirtLocalLsdbSequence,
ospfVirtLocalLsdbAge,
ospfVirtLocalLsdbChecksum,
ospfVirtLocalLsdbAdvertisement
}

STATUS current

DESCRIPTION

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

::= { ospfGroups 15 }

ospfAsLsdbGroup OBJECT-GROUP

OBJECTS {

ospfAsLsdbType,
ospfAsLsdbLsid,
ospfAsLsdbRouterId,
ospfAsLsdbSequence,
ospfAsLsdbAge,
ospfAsLsdbChecksum,
ospfAsLsdbAdvertisement
}

STATUS current

DESCRIPTION

"These objects are required 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,

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ospfRxNewLsas,
ospfExtLsdbLimit,
ospfMulticastExtensions,
ospfExitOverflowInterval,
ospfDemandExtensions,
ospfRFC1583Compatibility,
ospfOpaqueLsaSupport,
ospfTrafficEngineeringSupport,
ospfReferenceBandwidth,
ospfRestartSupport,
ospfRestartInterval,
ospfRestartStatus,
ospfRestartAge,
ospfRestartExitReason,
ospfAsLsaCount,
ospfAsLsaCksumSum,
ospfStubRouterSupport,
ospfStubRouterAdvertisement
}

STATUS current

DESCRIPTION

"These objects are required for OSPF systems."

::= { 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 required for OSPF systems
supporting areas. This statement is recommended
for use. "

::= { ospfGroups 18 }

ospfIfGroup2 OBJECT-GROUP

OBJECTS {

ospfIfIpAddress,
ospfAddressLessIf,
ospfIfAreaId,
ospfIfType,

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ospfIfAdminStat,
ospfIfRtrPriority,
ospfIfTransitDelay,
ospfIfRetransInterval,
ospfIfHelloInterval,
ospfIfRtrDeadInterval,
ospfIfPollInterval,
ospfIfState,
ospfIfDesignatedRouter,
ospfIfBackupDesignatedRouter,
ospfIfEvents,
ospfIfAuthType,
ospfIfAuthKey,
ospfIfStatus,
ospfIfMulticastForwarding,
ospfIfDemand,
ospfIfLsaCount,
ospfIfLsaCksumSum
}

STATUS current

DESCRIPTION

"These objects are required for OSPF systems."

::= { ospfGroups 19 }

ospfVirtIfGroup2 OBJECT-GROUP

OBJECTS {

ospfVirtIfAreaId,
ospfVirtIfNeighbor,
ospfVirtIfTransitDelay,
ospfVirtIfRetransInterval,
ospfVirtIfHelloInterval,
ospfVirtIfRtrDeadInterval,
ospfVirtIfState,
ospfVirtIfEvents,
ospfVirtIfAuthType,
ospfVirtIfAuthKey,
ospfVirtIfStatus,
ospfVirtIfLsaCount,

```

        ospfVirtIfLsaCksumSum
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems."
    ::= { ospfGroups 20 }

```

```

ospfNbrGroup2      OBJECT-GROUP
    OBJECTS {
        ospfNbrIpAddress,
        ospfNbrAddressLessIndex,
        ospfNbrRtrId,
        ospfNbrOptions,
        ospfNbrPriority,
        ospfNbrState,

```

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```

        ospfNbrEvents,
        ospfNbrLsRetransQLen,
        ospfNbmaNbrStatus,
        ospfNbmaNbrPermanence,
        ospfNbrHelloSuppressed,
        ospfNbrRestartHelperStatus,
        ospfNbrRestartHelperAge,
        ospfNbrRestartHelperExitReason
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems."
    ::= { ospfGroups 21 }

```

```

ospfVirtNbrGroup2  OBJECT-GROUP
    OBJECTS {
        ospfVirtNbrArea,
        ospfVirtNbrRtrId,
        ospfVirtNbrIpAddress,
        ospfVirtNbrOptions,
        ospfVirtNbrState,
        ospfVirtNbrEvents,
        ospfVirtNbrLsRetransQLen,
        ospfVirtNbrHelloSuppressed,
        ospfVirtNbrRestartHelperStatus,
        ospfVirtNbrRestartHelperAge,
        ospfVirtNbrRestartHelperExitReason
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems."

```

```
::= { ospfGroups 22 }
```

```
ospfAreaAggregateGroup2    OBJECT-GROUP
    OBJECTS {
        ospfAreaAggregateAreaID,
        ospfAreaAggregateLsdbType,
        ospfAreaAggregateNet,
        ospfAreaAggregateMask,
        ospfAreaAggregateStatus,
        ospfAreaAggregateEffect,
        ospfAreaAggregateExtRouteTag
    }
    STATUS      current
    DESCRIPTION
        "These objects are required for OSPF systems."
    ::= { ospfGroups 23 }
```

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

```
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```

```
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 24 }
```

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

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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 defined in section x.

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

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, ospfRestartInterval,
ospfRestartExitReason, ospfNbrRestartHelperStatus,
ospfNbrRestartHelperAge, ospfNbrRestartHelperExitReason,
ospfVirtNbrRestartHelperStatus, ospfVirtNbrRestartHelperAge,
ospfVirtNbrRestartHelperExitReason
    FROM OSPF-MIB;

```

ospfTrap MODULE-IDENTITY

```

LAST-UPDATED "200304011015Z" -- Apr 01, 2003 10:15:00 GMT
ORGANIZATION "IETF OSPF Working Group"
CONTACT-INFO
    "WG E-Mail: ospf@discuss.microsoft.com
    WG Chairs: John.Moy@sycamorenet.com
               acee@redback.com
               rohit@xebeo.com

```

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```

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Postal: Predictive Systems
       25a Vreeland Road
       Florham Park, NJ 07932
Tel:   +1 (973) 301-5695
E-Mail: spencer.giacalone@predictive.com

```

Dan Joyal
 Postal: Nortel Networks
 600 Technology Park Drive
 Billerica, MA 01821
 E-Mail: djoyal@nortelnetworks.com"

DESCRIPTION
 "The MIB module to describe traps for the OSPF
 Version 2 Protocol."
 REVISION "200304011015Z" -- Apr 01, 2003 10:15:00 GMT
 DESCRIPTION
 "Updated for latest version of OSPFv2"
 REVISION "9501201225Z" -- Fri Jan 20 12:25:50 PST 1995
 DESCRIPTION
 "The initial SMIV2 revision of this MIB module, published
 in [RFC1850](#)."
 ::= { ospf 16 }

-- Trap Support Objects

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

ospfTrapControl OBJECT IDENTIFIER ::= { ospfTrap 1 }

ospfTraps OBJECT IDENTIFIER ::= { ospfTrap 2 }

ospfSetTrap OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(4))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A four-octet string serving as a bit map for
 the trap events defined by the OSPF traps. This
 object is used to enable and disable specific
 OSPF traps where a 1 in the bit field
 represents enabled. The right-most bit (least
 significant) represents trap 0."

::= { 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),
        noError (12) }
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
```

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```
}  
STATUS      current  
DESCRIPTION  
    "An ospfIfStateChange trap signifies that there  
    has been a change in the state of an OSPF vir-  
    tual interface.  
  
    This trap should be generated when the inter-  
    face state regresses (e.g., goes from Point-  
    to-Point to Down) or progresses to a terminal  
    state (i.e., Point-to-Point)."  
::= { ospfTraps 1 }
```

ospfNbrStateChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap  
    ospfNbrIpAddress,  
    ospfNbrAddressLessIndex,  
    ospfNbrRtrId,  
    ospfNbrState -- The new state  
}  
STATUS      current  
DESCRIPTION  
    "An ospfNbrStateChange trap signifies that  
    there has been a change in the state of a non-  
    virtual OSPF neighbor. This trap should be  
    generated when the neighbor state regresses  
    (e.g., goes from Attempt or Full to 1-Way or  
    Down) or progresses to a terminal state (e.g.,  
    2-Way or Full). When an neighbor transitions  
    from or to Full on non-broadcast multi-access  
    and broadcast networks, the trap should be gen-  
    erated 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 ospfIfStateChange 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

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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 ospfConfigError 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."

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::= { 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 ospfRxBadPacket 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,
```

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```
    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 ospfTxRetransmit trap signifies that an
    OSPF packet has been retransmitted on a virtual
    interface. All packets that may be retransmit-
    ted 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. Addi-
    tionally, this trap does not include LSAs that
    are being flushed because they have reached
    MaxAge."
::= { ospfTraps 12 }

```

ospfMaxAgeLsa NOTIFICATION-TYPE

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```

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 data-
    base 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
}

STATUS current

DESCRIPTION

"An ospfRestartStatus trap signifies that there has been a change in the hitless 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 ospfNbrRestartHelperStatus trap signifies that there has been a change in the hitless 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,

```

        ospfVirtNbrRestartHelperExitReason
    }
STATUS      current
DESCRIPTION
    "An ospfVirtNbrRestartHelperStatus trap signifies that
    there has been a change in the hitless 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

```

DESCRIPTION

"This object is only required to be supplied within notifications."

::= { ospfTrapCompliances 2 }

-- units of conformance

ospfTrapControlGroup OBJECT-GROUP

OBJECTS { ospfSetTrap,
 ospfConfigErrorType,
 ospfPacketType,
 ospfPacketSrc
 }

STATUS current

DESCRIPTION

"These objects are required to control traps from OSPF systems."

::= { ospfTrapGroups 1 }

ospfTrapEventGroup NOTIFICATION-GROUP

NOTIFICATIONS {
 ospfVirtIfStateChange,
 ospfNbrStateChange,
 ospfVirtNbrStateChange,
 ospfIfConfigError,
 ospfVirtIfConfigError,
 ospfIfAuthFailure,
 ospfVirtIfAuthFailure,
 ospfIfRxBadPacket,
 ospfVirtIfRxBadPacket,
 ospfTxRetransmit,
 ospfVirtIfTxRetransmit,
 ospfOriginateLsa,
 ospfMaxAgeLsa,
 ospfLsdbOverflow,
 ospfLsdbApproachingOverflow,
 ospfIfStateChange,
 ospfNssaTranslatorStatusChange,
 ospfRestartStatusChange,
 ospfNbrRestartHelperStatusChange,
 ospfVirtNbrRestartHelperStatusChange
}

STATUS current

DESCRIPTION

"A grouping of OSPF Trap Events, as specified

```
in NOTIFICATION-TYPE constructs."  
 ::= { ospfTrapGroups 2 }
```

END

6 Acknowledgements

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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 [18]. We would like to acknowledge John Moy, Rob Coltun, Randall Atkinson, David T. Perkins, Ken Chapman, Brian Field, Acee Lindem and Vishwas Manral for their constructive comments.

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A TOS Support

For backward compatibility with previous versions of the OSPF

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MIB specification, TOS-specific information has been retained in this document, though the TOS routing option has been deleted from OSPF [[RFC 2178](#)].

B Changes from [RFC 1850](#)

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

[B.1](#) General Group Changes

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

Added object ospfTrafficEngineeringSupport to indicate support of OSPF traffic engineering.

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

Added objects ospfRestartSupport, ospfRestartInterval, ospfRestartAge and ospfRestartExitReason to support graceful (hitless) restart.

Added objects ospfStubRouterSupport and ospfStubRouteAdvertisement to support stub routers.

[B.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

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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.

B.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

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-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

-ospfAsLsdbLsid

-ospfAsLsdbRouterId

ospfAsLsdbTable contains the following (columnar) objects:

-ospfAsLsdbSequence, to indicate LSA instance

-ospfAsLsdbAge

-ospfAsLsdbChecksum

-ospfAsLsdbAdvertisement, containing the entire LSA

B.4 Graceful Restart Support

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

Added objects ospfNbrRestartHelperStatus, ospfNbrRestartHelperAge and ospfNbrRestartHelperExitReason to OspfNbrTable.

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Added objects

ospfVirtNbrRestartHelperStatus, ospfVirtNbrRestartHelperAge and ospfVirtNbrRestartHelperExitReason to OspfVirtNbrTable.

B.5 OSPF Compliances

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

-ospfCompliance2

Conformance groups were depreciated due to the fact that

the objects in the group were deprecated.

- ospfExtLsdbGroup

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

- ospfBasicGroup2

- ospfAreaGroup2

- ospfIfGroup2

- ospfVirtIfGroup2

- ospfNbrGroup2

- ospfVirtNbrGroup2

- ospfAreaAggregateGroup2

Added completely new conformance groups, including:

- ospfLocalLsdbGroup, which specifies support for link local (type-9) LSAs.

- ospfVirtLocalLsdbGroup, which specifies support for link local (type-9) LSAs on virtual links.

- ospfObsoleteGroup, for obsolete objects and SMI compatibility.

B.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

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- 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

B.7 OSPF Trap MIB

Added ospfTrapEventGroup.

Added importation of NOTIFICATION-GROUP.

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

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

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

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

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

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

Added NOTIFICATION-TYPE for ospfRestartStatusChange.

Added NOTIFICATION-TYPE for ospfNbrRestartHelperStatusChange.

Added NOTIFICATION-TYPE for ospfVirtNbrRestartHelperStatusChange.

B.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 an appendix
- 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

Changed the MAX-ACCESS clause of ospfHostStatus to "read-create"

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

C 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 2574](#) [[RFC2574](#)] and the View-based Access Control Model [RFC 2575](#) [[RFC2575](#)] 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.

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