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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](mailto:ospf@discuss.microsoft.com).

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### Table of Contents

The SNMPv2 Network Management Framework  
Object Definitions

Expires October 2000

[Page 1]

<a href="#">1</a>	<a href="#">Overview</a>	<a href="#">3</a>
<a href="#">1.1</a>	<a href="#">The SNMPv2 Network Management Framework</a>	<a href="#">3</a>
<a href="#">1.2</a>	<a href="#">The SMI, and Object definitions</a>	<a href="#">3</a>
<a href="#">1.3</a>	<a href="#">Object Identification</a>	<a href="#">4</a>
<a href="#">1.4</a>	<a href="#">Textual Conventions</a>	<a href="#">4</a>
<a href="#">1.5</a>	<a href="#">Conceptual Row Creation</a>	<a href="#">4</a>
<a href="#">1.6</a>	<a href="#">Default Configuration</a>	<a href="#">5</a>
<a href="#">2</a>	<a href="#">Structure of this MIB</a>	<a href="#">6</a>
<a href="#">2.1</a>	<a href="#">The Purposes of the sections in this MIB</a>	<a href="#">6</a>
<a href="#">2.1.1</a>	<a href="#">General Variables</a>	<a href="#">6</a>
<a href="#">2.1.2</a>	<a href="#">Area Data Structure and Area Stub Metric Table</a>	<a href="#">7</a>
<a href="#">2.1.3</a>	<a href="#">Link State Database and External Link State Database</a>	<a href="#">7</a>
<a href="#">2.1.4</a>	<a href="#">Address Table and Host Tables</a>	<a href="#">7</a>
<a href="#">2.1.5</a>	<a href="#">Interface and Interface Metric Tables</a>	<a href="#">7</a>
<a href="#">2.1.6</a>	<a href="#">Virtual Interface Table</a>	<a href="#">7</a>
<a href="#">2.1.7</a>	<a href="#">Neighbor and Virtual Neighbor Tables</a>	<a href="#">7</a>
<a href="#">2.1.8</a>	<a href="#">Local Link State Database Table and Virtual Local Link State Database Table</a>	<a href="#">7</a>
<a href="#">3</a>	<a href="#">OSPF-MIB Definitions</a>	<a href="#">7</a>
<a href="#">3.1</a>	<a href="#">OSPF General Variables</a>	<a href="#">11</a>
<a href="#">3.2</a>	<a href="#">OSPF Area Table</a>	<a href="#">16</a>
<a href="#">3.3</a>	<a href="#">OSPF Area Default Metrics</a>	<a href="#">21</a>
<a href="#">3.4</a>	<a href="#">OSPF Link State Database</a>	<a href="#">23</a>
<a href="#">3.5</a>	<a href="#">OSPF Address Range Table</a>	<a href="#">26</a>
<a href="#">3.6</a>	<a href="#">OSPF Host Table</a>	<a href="#">28</a>
<a href="#">3.7</a>	<a href="#">OSPF Interface Table</a>	<a href="#">30</a>
<a href="#">3.8</a>	<a href="#">OSPF Interface Metric Table</a>	<a href="#">37</a>
<a href="#">3.9</a>	<a href="#">OSPF Virtual Interface Table</a>	<a href="#">40</a>
<a href="#">3.10</a>	<a href="#">OSPF Neighbor Table</a>	<a href="#">44</a>
<a href="#">3.11</a>	<a href="#">OSPF Virtual Neighbor Table</a>	<a href="#">48</a>
<a href="#">3.12</a>	<a href="#">OSPF External Link State Database</a>	<a href="#">51</a>
<a href="#">3.13</a>	<a href="#">OSPF Route Table Use</a>	<a href="#">54</a>
<a href="#">3.14</a>	<a href="#">OSPF Area Aggregate Table</a>	<a href="#">55</a>
<a href="#">3.15</a>	<a href="#">OSPF Local LSDB Table</a>	<a href="#">57</a>
<a href="#">3.16</a>	<a href="#">OSPF Virtual Local LSDB Table</a>	<a href="#">61</a>
<a href="#">3.17</a>	<a href="#">Conformance Information</a>	<a href="#">64</a>
<a href="#">4</a>	<a href="#">OSPF Trap overview</a>	<a href="#">73</a>
<a href="#">4.1</a>	<a href="#">Introduction</a>	<a href="#">73</a>
<a href="#">4.2</a>	<a href="#">Approach</a>	<a href="#">74</a>
<a href="#">4.3</a>	<a href="#">Ignoring Initial Activity</a>	<a href="#">74</a>
<a href="#">4.4</a>	<a href="#">Throttling Traps</a>	<a href="#">74</a>
<a href="#">4.5</a>	<a href="#">One Trap Per OSPF Event</a>	<a href="#">75</a>
<a href="#">4.6</a>	<a href="#">Polling Event Counters</a>	<a href="#">75</a>
<a href="#">5</a>	<a href="#">OSPF Trap Definitions</a>	<a href="#">76</a>
<a href="#">5.1</a>	<a href="#">Trap Support Objects</a>	<a href="#">76</a>
<a href="#">5.2</a>	<a href="#">Traps</a>	<a href="#">78</a>
<a href="#">5.3</a>	<a href="#">Conformance Information</a>	<a href="#">83</a>

<a href="#">6</a>	Acknowledgements .....	<a href="#">84</a>
<a href="#">7</a>	References .....	<a href="#">84</a>
<a href="#">A</a>	TOS Support .....	<a href="#">86</a>

<a href="#">B</a> Changes from <a href="#">RFC 1850</a> .....	<a href="#">86</a>
<a href="#">B.1</a> <a href="#">RFC 1859</a> Compatibility .....	<a href="#">86</a>
<a href="#">B.2</a> OSPF Traffic Engineering Support .....	<a href="#">86</a>
<a href="#">B.3</a> OSPF NSSA Enhancement Support .....	<a href="#">86</a>
<a href="#">B.4</a> OSPF MTU Mismatch Support .....	<a href="#">87</a>
<a href="#">B.5</a> Opaque LSA Support .....	<a href="#">87</a>
<a href="#">B.6</a> OSPF Compliance .....	<a href="#">89</a>
<a href="#">B.7</a> Miscellaneous .....	<a href="#">90</a>
<a href="#">C</a> Security Considerations .....	<a href="#">90</a>
<a href="#">D</a> Authors' Addresses .....	<a href="#">91</a>
<a href="#">E</a> Full Copyright Statement .....	<a href="#">91</a>

## [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](#)].

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

Expires October 2000

[Page 3]

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"

Therefor, management stations should include as many of these  
columnar objects as possible (e.g., all read-write objects) in a Set-



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

### **1.6 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.

Expires October 2000

[Page 5]

- Authentication will be disabled
- All Broadcast and Point to Point interfaces will be operational. NBMA Interfaces require the configuration of at least one neighbor.
- Timers on all direct interfaces will be:

Hello Interval:	10 seconds
Dead Timeout:	40 Seconds
Retransmission:	5 Seconds
Transit Delay:	1 Second
Poll Interval:	120 Seconds
- No direct links to hosts will be configured.
- No addresses will be summarized
- Metrics, being a measure of bit duration, are unambiguous and intelligent.
- No Virtual Links will be configured.

## **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

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)

Expires October 2000

[Page 6]

variables which are global to the OSPF Process.

#### **2.1.2 Area Data Structure and Area Stub Metric Table**

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

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

#### **2.1.3 Link State Database and External Link State Database**

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

#### **2.1.4 Address Table and Host Tables**

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

#### **2.1.5 Interface and Interface Metric Tables**

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

#### **2.1.6 Virtual Interface Table**

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

#### **2.1.7 Neighbor and Virtual Neighbor Tables**

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

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

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

OSPF-MIB DEFINITIONS ::= BEGIN

Expires October 2000

[Page 7]

## IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE, Counter32, Gauge32,
Integer32, IpAddress
    FROM SNMPv2-SMI
TEXTUAL-CONVENTION, TruthValue, RowStatus
    FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP
    FROM SNMPv2-CONF
mib-2
    FROM RFC1213-MIB;
```

## ospf MODULE-IDENTITY

```
LAST-UPDATED "0005011225Z" -- Mon May 01 12:25:50 GMT 2000
ORGANIZATION "IETF OSPF Working Group"
CONTACT-INFO
    "      Spencer Giacalone
Postal: Predictive Systems
      145 Hudson Street
      New York, New York 10013
Tel:    +1 (973) 301-5695
E-Mail: spencer.giacalone@predictive.com

      Dan Joyal
Postal: Nortel Networks
      600 Technology Park Drive
      Billerica, MA 01821
Tel:    +1 (978) 288-2629
E-Mail: djoyal@nortelnetworks.com"
DESCRIPTION
    "The MIB module to describe the OSPF Version 2
    Protocol"
REVISION "0005011225Z" -- Mon May 01 12:25:50 GMT 2000
DESCRIPTION
    "Updated for latest changes to OSPF Version 2"
 ::= { 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
-- 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

Expires October 2000

[Page 8]



```
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

Expires October 2000

[Page 9]

variables bounded by the maximum age of an LSA."  
 SYNTAX Integer32 (0..3600)

-- The range of ifIndex

InterfaceIndex ::= TEXTUAL-CONVENTION  
 STATUS current  
 DESCRIPTION  
 "The range of ifIndex."  
 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
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

Expires October 2000

[Page 10]

-- 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

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

Expires October 2000

[Page 11]

```
    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 }

ospfExternLsaCksumSum 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 con-
        tained in the link-state database. This sum
        can be used to determine if there has been a
        change in a router's link state database, and
        to compare the link-state database of two
        routers."
 ::= { ospfGeneralGroup 7 }

ospfTOSSupport OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "The router's support for type-of-service rout-
        ing."
```

REFERENCE

"OSPF Version 2, [Appendix F.1.2](#) Optional TOS support"

Expires October 2000

[Page 12]



```
::= { 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 advertisements."

```
::= { 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 }
```

```
ospfMulticastExtensions OBJECT-TYPE
```

SYNTAX	Integer32
MAX-ACCESS	read-write
STATUS	current

Expires October 2000

[Page 13]

## DESCRIPTION

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

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

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

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

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

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

"The router's support for demand routing."

REFERENCE

Expires October 2000

[Page 14]

"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-write

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 }

ospfAsOpaqueLsdbLimit OBJECT-TYPE

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

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The maximum number of type-11 Opaque LSA entries that can be stored in the link-state database. If the value is -1, then there is no limit."

When the number of type-11 Opaque LSAs in a router's link-state database reaches

ospfAsOpaqueLsdbLimit, the router enters Overflow-  
State. The router never holds more than  
ospfAsOpaqueLsdbLimit type-11 Opaque LSAs

```
        in its database. OspfAsOpaqueLsdbLimit MUST be set
        identically in all routers in the OSPF domain."
    DEFVAL { -1 }
    ::= { ospfGeneralGroup 18 }
```

-- 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,

Expires October 2000

[Page 16]



```
    ospfAreaLsaCount
        Gauge32,
    ospfAreaLsaCksumSum
        Integer32,
    ospfAreaSummary
        INTEGER,
    ospfAreaStatus
        RowStatus
    ospfAreaNssaTranslatorRole
        INTEGER,
    ospfAreaNssaTranslatorState
        INTEGER,
    ospfAreaNssaTranslatorStabilityInterval
        PositiveInteger,
    ospfAreaNssaTranslatorEvents
        Counter32
}
```

ospfAreaId OBJECT-TYPE

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

ospfAuthType OBJECT-TYPE

```
SYNTAX      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)
```

Expires October 2000

[Page 17]

```
    }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "Indicates whether an area is a Stub area, NSSA, or standard
    area. Type-5 AS-External LSAs and Type-11 Opaque LSAs are
    not imported into Stub Areas or NSSAs. NSSAs import AS-
    External data as Type-7 LSAs"
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
DEFVAL { importExternal }
::= { ospfAreaEntry 3 }
```

ospfSpfRuns OBJECT-TYPE

```
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The number of times that the intra-area route
    table has been calculated using this area's
    link-state database. This is typically done
    using Dijkstra's algorithm."
::= { ospfAreaEntry 4 }
```

ospfAreaBdrRtrCount OBJECT-TYPE

```
SYNTAX          Gauge32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The total number of area border routers reach-
    able 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

Expires October 2000

[Page 18]

in this area's link-state database, excluding  
AS External LSA's."  
::= { ospfAreaEntry 7 }

ospfAreaLsaChecksumSum OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

DEFVAL { 0 }

::= { ospfAreaEntry 8 }

ospfAreaSummary OBJECT-TYPE

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

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

If it is noAreaSummary, the router will 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 variable displays the status of the en-

try. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

Expires October 2000

[Page 19]

```
::= { ospfAreaEntry 10 }
```

ospfAreaNssaTranslatorRole OBJECT-TYPE

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

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Indicates an NSSA Border router's ability to perform NSSA translation of type-7 LSAs into type-5 LSAs."

DEFVAL { candidate }

```
::= { ospfAreaEntry 11 }
```

ospfAreaNssaTranslatorState OBJECT-TYPE

SYNTAX INTEGER { enabled (1),  
elected (2),  
disabled (3)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates if and how an NSSA Border router is performing NSSA translation of type-7 LSAs into type-5 LSAs. When this object set to enabled, the NSSA Border router's OspfAreaNssaExtTranslatorRole has been set to always. When this object is set to elected, a candidate NSSA Border router is Translating type-7 LSAs into type-5. When this object is set to disabled, a candidate NSSA Border router is NOT translating type-7 LSAs into type-5."

```
::= { ospfAreaEntry 12 }
```

ospfAreaNssaTranslatorStabilityInterval OBJECT-TYPE

SYNTAX PositiveInteger

MAX-ACCESS read-write

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 }
```

Expires October 2000

[Page 20]



```
-- 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"
    ::= { 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

Expires October 2000

[Page 21]

creation, this can be derived from the instance."

::= { ospfStubAreaEntry 1 }

ospfStubTOS OBJECT-TYPE

SYNTAX TOSType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Type of Service associated with the metric. On creation, this can be derived from the instance."

::= { ospfStubAreaEntry 2 }

ospfStubMetric OBJECT-TYPE

SYNTAX BigMetric

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The metric value applied at the indicated type of service. By default, this equals the least metric at the type of service among the interfaces to other areas."

::= { ospfStubAreaEntry 3 }

ospfStubStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { ospfStubAreaEntry 4 }

ospfStubMetricType OBJECT-TYPE

SYNTAX INTEGER {  
ospfMetric (1), -- OSPF Metric  
comparableCost (2), -- external type 1  
nonComparable (3) -- external type 2  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable displays the type of metric advertised as a default route."

DEFVAL { ospfMetric }

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

Expires October 2000

[Page 22]

-- 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

Expires October 2000

[Page 23]

## 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 ospfExtLsdbTable rather than here.

## ospfLsdbType OBJECT-TYPE

SYNTAX INTEGER {  
    routerLink (1),  
    networkLink (2),  
    summaryLink (3),  
    asSummaryLink (4),  
    asExternalLink (5), -- but see ospfExtLsdbTable  
    multicastLink (6),  
    nssaExternalLink (7),  
    areaOpaqueLink (10)  
}

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The type of the link state advertisement.  
Each link state type has a separate advertisement format."

## 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	

Expires October 2000

[Page 24]



"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"

::= { 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 Advertisements"

::= { 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

SYNTAX SEQUENCE OF OspfAreaRangeEntry

MAX-ACCESS not-accessible

STATUS obsolete

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"

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 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"  
REFERENCE

Expires October 2000

[Page 26]

"OSPF Version 2, [Appendix C.2](#) Area parameters"  
INDEX { ospfAreaRangeAreaId, ospfAreaRangeNet }  
::= { ospfAreaRangeTable 1 }

OspfAreaRangeEntry ::=

```
SEQUENCE {
    ospfAreaRangeAreaId
        AreaID,
    ospfAreaRangeNet
        IPAddress,
    ospfAreaRangeMask
        IPAddress,
    ospfAreaRangeStatus
        RowStatus,
    ospfAreaRangeEffect
        INTEGER
}
```

ospfAreaRangeAreaId OBJECT-TYPE  
SYNTAX AreaID  
MAX-ACCESS read-only  
STATUS obsolete  
DESCRIPTION  
"The Area the Address Range is to be found  
within."  
REFERENCE  
"OSPF Version 2, [Appendix C.2](#) Area parameters"  
::= { ospfAreaRangeEntry 1 }

ospfAreaRangeNet OBJECT-TYPE  
SYNTAX IPAddress  
MAX-ACCESS read-only  
STATUS obsolete  
DESCRIPTION  
"The IP Address of the Net or Subnet indicated  
by the range."  
REFERENCE  
"OSPF Version 2, [Appendix C.2](#) Area parameters"  
::= { ospfAreaRangeEntry 2 }

ospfAreaRangeMask OBJECT-TYPE  
SYNTAX IPAddress  
MAX-ACCESS read-create  
STATUS obsolete  
DESCRIPTION  
"The Subnet Mask that pertains to the Net or  
Subnet."  
REFERENCE

"OSPF Version 2, [Appendix C.2](#) Area parameters"  
::= { ospfAreaRangeEntry 3 }

Expires October 2000

[Page 27]

## ospfAreaRangeStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS obsolete

## DESCRIPTION

"This variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { ospfAreaRangeEntry 4 }

## ospfAreaRangeEffect OBJECT-TYPE

SYNTAX INTEGER {

advertiseMatching (1),

doNotAdvertiseMatching (2)

}

MAX-ACCESS read-create

STATUS obsolete

## DESCRIPTION

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

DEFVAL { advertiseMatching }

::= { ospfAreaRangeEntry 5 }

## -- OSPF Host Table

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

## 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 parameters"

::= { ospf 6 }

## ospfHostEntry OBJECT-TYPE

SYNTAX OspfHostEntry

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	

Expires October 2000

[Page 28]



"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"  
::= { 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"

Expires October 2000

[Page 29]

```
:= { ospfHostEntry 3 }
```

```
ospfHostStatus OBJECT-TYPE
```

```
SYNTAX      RowStatus
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"This variable displays the status of the en-  
try. Setting it to 'invalid' has the effect of  
rendering it inoperative. The internal effect  
(row removal) is implementation dependent."
```

```
::= { 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 inter-  
faces 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 inter-  
face from the viewpoint of OSPF."
```

```
INDEX { ospfIfIpAddress, ospfAddressLessIf }  
::= { ospfIfTable 1 }
```

```
OspfIfEntry ::=
    SEQUENCE {
        ospfIfIpAddress
            IPAddress,
        ospfAddressLessIf
            Integer32,
        ospfIfAreaId
            AreaID,
        ospfIfType
            INTEGER,
        ospfIfAdminStat
            Status,
        ospfIfRtrPriority
            DesignatedRouterPriority,
        ospfIfTransitDelay
            UpToMaxAge,
        ospfIfRetransInterval
            UpToMaxAge,
        ospfIfHelloInterval
            HelloRange,
        ospfIfRtrDeadInterval
            PositiveInteger,
        ospfIfPollInterval
            PositiveInteger,
        ospfIfState
            INTEGER,
        ospfIfDesignatedRouter
            IPAddress,
        ospfIfBackupDesignatedRouter
            IPAddress,
        ospfIfEvents
            Counter32,
        ospfIfAuthKey
            OCTET STRING,
        ospfIfStatus
            RowStatus,
        ospfIfMulticastForwarding
            INTEGER,
        ospfIfDemand
            TruthValue,
        ospfIfAuthType
            INTEGER,
        ospfIfLsaCount
            Gauge32,
        ospfIfLsaCksumSum
            Integer32
    }
```

ospfIfIpAddress OBJECT-TYPE  
SYNTAX           IpAddress

Expires October 2000

[Page 31]

```
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The IP address of this OSPF interface."
::= { ospfIfEntry 1 }
```

ospfAddressLessIf OBJECT-TYPE

```
SYNTAX        Integer32
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
    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

Expires October 2000

[Page 32]



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  
    "The number of seconds between link-state ad-  
    vertisement retransmissions, for adjacencies  
    belonging to this interface. This value is  
    also used when retransmitting database descrip-  
    tion and link-state request packets."

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

Expires October 2000

[Page 33]

## 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),  
    otherDesignatedRouter (7)  
}

MAX-ACCESS read-only

STATUS	current
DESCRIPTION	"The OSPF Interface State."

Expires October 2000

[Page 34]

```
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  
    "This object refers to the OSPF clear-text  
    password (e.g. the simplePassword Authentication Key).  
    It does not refer to any OSPF cryptographic password  
    or key. The OSPF cryptographic key is not accessible  
    via this MIB.
```

When the interface's Authentication Type is simplePassword, and the key length is shorter than 8 octets, the agent will left adjust and zero fill to 8 octets.

Note that unauthenticated interfaces need no

authentication key, and simple password authentication cannot use a key of more than 8 octets. Larger keys are useful only with authen-

tication mechanisms not specified in this document.

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 variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { 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 }

Expires October 2000

[Page 36]



```
::= { 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 interface. Additional authentication types may be assigned locally."

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 }
```

ospfIfLsaCksumSum 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 interface's link-local link state database. The sum can be used to determine if there has been a change in the interface's link state database, and to compare the interface link-state database of routers attached to the same subnet."

```
::= { ospfIfEntry 22 }
```

-- 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

Expires October 2000

[Page 37]

-- to request low delay, high bandwidth, or reliable linkage.

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

--  $Metric = 10^8 / ifSpeed$

-- is the default value. 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

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

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

INDEX { ospfIfMetricIpAddress,  
ospfIfMetricAddressLessIf,  
ospfIfMetricTOS }

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

Expires October 2000

[Page 38]

OspfIfMetricEntry ::=

```
SEQUENCE {  
    ospfIfMetricIpAddress  
        IPAddress,  
    ospfIfMetricAddressLessIf  
        Integer32,  
    ospfIfMetricTOS  
        TOSType,  
    ospfIfMetricValue  
        Metric,  
    ospfIfMetricStatus  
        RowStatus  
}
```

ospfIfMetricIpAddress OBJECT-TYPE

```
SYNTAX      IPAddress  
MAX-ACCESS  read-only  
STATUS      current
```

DESCRIPTION

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

::= { ospfIfMetricEntry 1 }

ospfIfMetricAddressLessIf OBJECT-TYPE

```
SYNTAX      Integer32  
MAX-ACCESS  read-only  
STATUS      current
```

DESCRIPTION

"For the purpose of easing the instancing of addressed and addressless interfaces; This variable takes the value 0 on interfaces with IP Addresses, and the value of ifIndex for interfaces having no IP Address. On row creation, this can be derived from the instance."

::= { ospfIfMetricEntry 2 }

ospfIfMetricTOS OBJECT-TYPE

```
SYNTAX      TOSType  
MAX-ACCESS  read-only  
STATUS      current
```

DESCRIPTION

"The type of service metric being referenced. On row creation, this can be derived from the instance."

::= { ospfIfMetricEntry 3 }

ospfIfMetricValue OBJECT-TYPE

SYNTAX	Metric
MAX-ACCESS	read-create
STATUS	current

Expires October 2000

[Page 39]

## 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 variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { 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 interfaces."

## 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  
RouterID,

Expires October 2000

[Page 40]



```
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 }
```

Expires October 2000

[Page 41]

## 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."

Expires October 2000

[Page 42]

```
DEFVAL { down }
::= { ospfVirtIfEntry 7 }
```

```
ospfVirtIfEvents OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The number of state changes or error events on
         this Virtual Link"
    ::= { ospfVirtIfEntry 8 }
```

```
ospfVirtIfAuthKey OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE(0..256))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "If Authentication Type is simplePassword, the
         device will left adjust and zero fill to 8 oc-
         tets.
```

Note that unauthenticated interfaces need no authentication key, and simple password authentication cannot use a key of more than 8 octets. Larger keys are useful only with authentication mechanisms not specified in this document.

When read, ospfVifAuthKey always returns a 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 variable displays the status of the en-
         try. Setting it to 'invalid' has the effect of
         rendering it inoperative. The internal effect
         (row removal) is implementation dependent."
    ::= { ospfVirtIfEntry 10 }
```

```
ospfVirtIfAuthType OBJECT-TYPE
```

```
SYNTAX      INTEGER (0..255)
             -- none (0),
             -- simplePassword (1)
```

Expires October 2000

[Page 43]

```
        -- md5 (2)
        -- reserved for specification by IANA (> 2)
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The authentication type specified for a virtu-
    al interface. Additional authentication types
    may be assigned locally."
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
    "A table of non-virtual neighbor information."
```

REFERENCE

"OSPF Version 2, [Section 10](#) The Neighbor Data Structure"

Expires October 2000

[Page 44]



```
::= { 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
        InterfaceIndex,
    ospfNbrRtrId
        RouterID,
    ospfNbrOptions
        Integer32,
    ospfNbrPriority
        DesignatedRouterPriority,
    ospfNbrState
        INTEGER,
    ospfNbrEvents
        Counter32,
    ospfNbrLsRetransQLen
        Gauge32,
    ospfNbmaNbrStatus
        RowStatus,
    ospfNbmaNbrPermanence
        INTEGER,
    ospfNbrHelloSuppressed
        TruthValue
}
```

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 InterfaceIndex``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.

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

Expires October 2000

[Page 46]

"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 }

ospfNbrLsRetransQLen OBJECT-TYPE

SYNTAX	Gauge32
MAX-ACCESS	read-only
STATUS	current

Expires October 2000

[Page 47]

## DESCRIPTION

"The current length of the retransmission queue."

::= { ospfNbrEntry 8 }

## ospfNbmaNbrStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"This variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { ospfNbrEntry 9 }

## ospfNbmaNbrPermanence OBJECT-TYPE

SYNTAX INTEGER {

dynamic (1), -- learned through protocol

permanent (2) -- configured address

}

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

DEFVAL { permanent }

::= { ospfNbrEntry 10 }

## ospfNbrHelloSuppressed OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Indicates whether Hellos are being suppressed to the neighbor"

::= { ospfNbrEntry 11 }

-- 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	

Expires October 2000

[Page 48]



"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 }

OspfVirtNbrEntry ::=

SEQUENCE {  
ospfVirtNbrArea  
AreaID,  
ospfVirtNbrRtrId  
RouterID,  
ospfVirtNbrIpAddr  
IpAddress,  
ospfVirtNbrOptions  
Integer32,  
ospfVirtNbrState  
INTEGER,  
ospfVirtNbrEvents  
Counter32,  
ospfVirtNbrLsRetransQLen  
Gauge32,  
ospfVirtNbrHelloSuppressed  
TruthValue  
}

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 }
```

Expires October 2000

[Page 49]

**ospfVirtNbrIpAddress OBJECT-TYPE**

SYNTAX           IpAddress

MAX-ACCESS       read-only

STATUS            current

## DESCRIPTION

"The IP address this Virtual Neighbor is using."

::= { ospfVirtNbrEntry 3 }

**ospfVirtNbrOptions OBJECT-TYPE**

SYNTAX           Integer32

MAX-ACCESS       read-only

STATUS            current

## DESCRIPTION

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

Bit 1, if set, indicates that the system will operate on Type of Service metrics other than TOS 0. If zero, the neighbor will ignore all metrics except the TOS 0 metric.

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

::= { ospfVirtNbrEntry 4 }

**ospfVirtNbrState OBJECT-TYPE**

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

MAX-ACCESS       read-only

STATUS            current

## DESCRIPTION

"The state of the Virtual Neighbor Relationship."

::= { ospfVirtNbrEntry 5 }

**ospfVirtNbrEvents OBJECT-TYPE**

SYNTAX           Counter32

MAX-ACCESS       read-only

STATUS           current

DESCRIPTION

"The number of times this virtual link has

Expires October 2000

[Page 50]

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 }

ospfVirtNbrHelloSuppressed OBJECT-TYPE

SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"Indicates whether Hellos are being suppressed  
to the neighbor"  
::= { ospfVirtNbrEntry 8 }

-- 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 Link State Advertisements with  
-- global flooding scope. The purpose is to allow external  
-- LSAs to be displayed once for the router rather  
-- than once in each non-stub area.

ospfExtLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfExtLsdbEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"The OSPF Process's Links State Database."  
REFERENCE  
"OSPF Version 2, [Section 12](#) Link State Adver-  
tisements"  
::= { ospf 12 }

ospfExtLsdbEntry OBJECT-TYPE

SYNTAX OspfExtLsdbEntry  
MAX-ACCESS not-accessible  
STATUS current

DESCRIPTION

"A single Link State Advertisement."

Expires October 2000

[Page 51]

```
INDEX { ospfExtLsdbType, ospfExtLsdbLsid, ospfExtLsdbRouterId }  
 ::= { ospfExtLsdbTable 1 }
```

```
OspfExtLsdbEntry ::=  
  SEQUENCE {  
    ospfExtLsdbType  
      INTEGER,  
    ospfExtLsdbLsid  
      IPAddress,  
    ospfExtLsdbRouterId  
      RouterID,  
    ospfExtLsdbSequence  
      Integer32,  
    ospfExtLsdbAge  
      Integer32,  
    ospfExtLsdbChecksum  
      Integer32,  
    ospfExtLsdbAdvertisement  
      OCTET STRING  
  }
```

```
ospfExtLsdbType OBJECT-TYPE  
  SYNTAX      INTEGER {  
                asExternalLink (5),  
                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"  
  ::= { ospfExtLsdbEntry 1 }
```

```
ospfExtLsdbLsid 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"
```

```
 ::= { ospfExtLsdbEntry 2 }  
ospfExtLsdbRouterId OBJECT-TYPE
```

Expires October 2000

[Page 52]



```
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"
::= { 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      current
DESCRIPTION
    "The sequence number field is a signed 32-bit
    integer. It is used to detect old and dupli-
    cate link state advertisements. The space of
    sequence numbers is linearly ordered. The
    larger the sequence number the more recent the
    advertisement."
REFERENCE
    "OSPF Version 2, Section 12.1.6 LS sequence
    number"
::= { ospfExtLsdbEntry 4 }
```

ospfExtLsdbAge OBJECT-TYPE

```
SYNTAX      Integer32 -- Should be 0..MaxAge, except when
                      -- doNotAge bit is set
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This field is the age of the link state adver-
    tisement in seconds."
REFERENCE
    "OSPF Version 2, Section 12.1.1 LS age"
::= { ospfExtLsdbEntry 5 }
```

ospfExtLsdbChecksum 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

Expires October 2000

[Page 53]

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 current

## DESCRIPTION

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

## REFERENCE

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

::= { ospfExtLsdbEntry 7 }

-- OSPF Use of the CIDR Route Table

ospfRouteGroup OBJECT IDENTIFIER ::= { ospf 13 }

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

-- Those that leave some discretion are defined here.

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

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

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

ospfIntraArea OBJECT IDENTIFIER ::= { ospfRouteGroup 1 }

ospfInterArea OBJECT IDENTIFIER ::= { ospfRouteGroup 2 }

ospfExternalType1 OBJECT IDENTIFIER ::= { ospfRouteGroup 3 }

ospfExternalType2 OBJECT IDENTIFIER ::= { ospfRouteGroup 4 }

-- ipCidrRouteMetric1 is, by definition, the primary routing  
-- metric. Therefore, it should be the metric that route

```
--      selection is based on. For intra-area and inter-area routes,
--      it is an OSPF metric. For External Type 1 (comparable value)
--      routes, it is an OSPF metric plus the External Metric. For
--      external Type 2 (non-comparable value) routes, it is the
--      external metric.

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

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

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

ospfAreaAggregateTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfAreaAggregateEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"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 configured such that one range subsumes another range (e.g., 10.0.0.0 mask 255.0.0.0 and 10.1.0.0 mask 255.255.0.0), the most specific match is the preferred one."

REFERENCE

"OSPF Version 2, [Appendix C.2](#) Area parameters"  
 ::= { ospf 14 }

ospfAreaAggregateEntry OBJECT-TYPE

SYNTAX OspfAreaAggregateEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A 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

Expires October 2000

[Page 55]

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  
}

ospfAreaAggregateAreaID OBJECT-TYPE

SYNTAX AreaID

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

## REFERENCE

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

::= { ospfAreaAggregateEntry 1 }

ospfAreaAggregateLsdbType OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The type of the Address Aggregate. This field specifies the Lsdb type that this Address Aggregate applies to."

## REFERENCE

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

Expires October 2000

[Page 56]



## 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 variable displays the status of the entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { 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 }

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

Expires October 2000

[Page 57]

```
--      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 Adver-  
tisements and The OSPF Opaque LSA Option"

::= { ospf 15 }

ospfLocalLsdbEntry OBJECT-TYPE

SYNTAX OspfLocalLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A single Link State Advertisement."

INDEX { ospfLocalLsdbIpAddress, ospfLocalLsdbAddressLessIf,  
ospfLocalLsdbType, ospfLocalLsdbLsid, ospfLocalLsdbRouterId  
}

::= { ospfLocalLsdbTable 1 }

OspfLocalLsdbEntry ::=

SEQUENCE {

ospfLocalLsdbIpAddress

IpAddress,

ospfLocalLsdbAddressLessIf

Integer32,

ospfLocalLsdbType

INTEGER,

ospfLocalLsdbLsid

IpAddress,

ospfLocalLsdbRouterId

RouterID,

ospfLocalLsdbSequence

Integer32,

ospfLocalLsdbAge

Integer32,

ospfLocalLsdbChecksum  
Integer32,  
ospfLocalLsdbAdvertisement

Expires October 2000

[Page 58]

```
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      Integer32
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 advertise-
    ment 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"

Expires October 2000

[Page 59]

```
::= { 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 dupli-  
cate link state advertisements. The space of  
sequence numbers is linearly ordered. The  
larger the sequence number the more recent the  
advertisement."
```

```
REFERENCE
```

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

```
::= { ospfLocalLsdbEntry 6 }
```

```
ospfLocalLsdbAge OBJECT-TYPE
```

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

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

```
STATUS      current
```

```
DESCRIPTION
```

```
"This field is the age of the link state adver-  
tisement 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	

Expires October 2000

[Page 60]



"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  
-- 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 16 }

## ospfVirtLocalLsdbEntry OBJECT-TYPE

SYNTAX OspfVirtLocalLsdbEntry

MAX-ACCESS	not-accessible
STATUS	current
DESCRIPTION	

Expires October 2000

[Page 61]

```
"A single Link State Advertisement."
INDEX { ospfVirtLocalLsdbTransitArea,
        ospfVirtLocalLsdbNeighbor,
        ospfVirtLocalLsdbType,
        ospfVirtLocalLsdbLsid,
        ospfVirtLocalLsdbRouterId
      }
 ::= { ospfVirtLocalLsdbTable 1 }

OspfVirtLocalLsdbEntry ::=
SEQUENCE {
    ospfVirtLocalLsdbTransitArea
        AreaID,
    ospfVirtLocalLsdbNeighbor
        RouterID,
    ospfVirtLocalLsdbType
        INTEGER,
    ospfVirtLocalLsdbLsid
        IpAddress,
    ospfVirtLocalLsdbRouterId
        RouterID,
    ospfVirtLocalLsdbSequence
        Integer32,
    ospfVirtLocalLsdbAge
        Integer32,
    ospfVirtLocalLsdbChecksum
        Integer32,
    ospfVirtLocalLsdbAdvertisement
        OCTET STRING
  }

ospfVirtLocalLsdbTransitArea OBJECT-TYPE
SYNTAX      AreaID
MAX-ACCESS  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 advertisement 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

"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 }

## 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 }

-- conformance information

Expires October 2000

[Page 64]



```
ospfConformance OBJECT IDENTIFIER ::= { ospf 20 }
```

```
ospfGroups      OBJECT IDENTIFIER ::= { ospfConformance 1 }
```

```
ospfCompliances OBJECT IDENTIFIER ::= { ospfConformance 2 }
```

```
-- compliance statements
```

```
-- This compliance statement is deprecated and replaced  
-- by ospfCompliance2
```

```
ospfCompliance MODULE-COMPLIANCE
```

```
    STATUS      deprecated
```

```
    DESCRIPTION
```

```
        "The compliance statement."
```

```
    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,
```

```
        ospfNbrGroup,
```

```
        ospfVirtNbrGroup,
```

```
        ospfAreaAggregateGroup
```

```
    }
```

```
    GROUP ospfHostGroup
```

```
    DESCRIPTION
```

```
        "This group is mandatory for OSPF systems that support
```

```
        attached hosts."
GROUP   ospfLsdbGroup
DESCRIPTION
```

Expires October 2000

[Page 65]

```
        "This group is mandatory for OSPF systems that display
        their per-area link state database."
GROUP   ospfExtLsdbGroup
    DESCRIPTION
        "This group is mandatory for OSPF systems that display
        their AS 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

-- This object group is deprecated and replaced by ospfBasicGroup2

ospfBasicGroup    OBJECT-GROUP
    OBJECTS {
        ospfRouterId,
        ospfAdminStat,
        ospfVersionNumber,
        ospfAreaBdrRtrStatus,
        ospfASBdrRtrStatus,
        ospfExternLsaCount,
        ospfExternLsaCksumSum,
        ospfTOSSupport,
        ospfOriginateNewLsas,
        ospfRxNewLsas,
        ospfExtLsdbLimit,
        ospfMulticastExtensions,
        ospfExitOverflowInterval,
        ospfDemandExtensions
    }
    STATUS      deprecated
    DESCRIPTION
        "These objects are required for OSPF systems."
    ::= { ospfGroups 1 }

-- This object group is deprecated and replaced by ospfAreaGroup2

ospfAreaGroup    OBJECT-GROUP
    OBJECTS {
```

ospfAreaId,  
ospfImportAsExtern,  
ospfSpfRuns,

Expires October 2000

[Page 66]

```
        ospfAreaBdrRtrCount,
        ospfAsBdrRtrCount,
        ospfAreaLsaCount,
        ospfAreaLsaCksumSum,
        ospfAreaSummary,
        ospfAreaStatus
    }
STATUS      current
DESCRIPTION
    "These objects are required for OSPF systems
    supporting areas. This statement is included
    for backwards-compatibility. The ospfAreaGroup2
    statement is recommended"
::= { 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,

Expires October 2000

[Page 67]

```
        ospfAreaRangeStatus,
        ospfAreaRangeEffect
    }
    STATUS    obsolete
    DESCRIPTION
        "These objects are required for non-CIDR OSPF
        systems that support multiple areas."
    ::= { 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 }
```

-- This object group is deprecated and replaced by ospfIfGroup2

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

STATUS deprecated

DESCRIPTION

"These objects are required for OSPF systems."

Expires October 2000

[Page 68]



```
::= { ospfGroups 7 }
```

```
ospfIfMetricGroup    OBJECT-GROUP
```

```
  OBJECTS {
```

```
    ospfIfMetricIpAddress,  
    ospfIfMetricAddressLessIf,  
    ospfIfMetricTOS,  
    ospfIfMetricValue,  
    ospfIfMetricStatus  
  }
```

```
  STATUS      current
```

```
  DESCRIPTION
```

```
    "These objects are required for OSPF systems."
```

```
::= { ospfGroups 8 }
```

```
-- This object group is deprecated and replaced by ospfVirtIfGroup2
```

```
ospfVirtIfGroup      OBJECT-GROUP
```

```
  OBJECTS {
```

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

```
  STATUS      deprecated
```

```
  DESCRIPTION
```

```
    "These objects are required for OSPF systems."
```

```
::= { ospfGroups 9 }
```

```
ospfNbrGroup         OBJECT-GROUP
```

```
  OBJECTS {
```

```
    ospfNbrIpAddress,  
    ospfNbrAddressLessIndex,  
    ospfNbrRtrId,  
    ospfNbrOptions,  
    ospfNbrPriority,  
    ospfNbrState,  
    ospfNbrEvents,  
    ospfNbrLsRetransQLen,  
    ospfNbmaNbrStatus,  
    ospfNbmaNbrPermanence,
```

```
        ospfNbrHelloSuppressed
    }
STATUS      current
```

Expires October 2000

[Page 69]

## DESCRIPTION

"These objects are required for OSPF systems."  
::= { ospfGroups 10 }

ospfVirtNbrGroup      OBJECT-GROUP

OBJECTS {  
    ospfVirtNbrArea,  
    ospfVirtNbrRtrId,  
    ospfVirtNbrIpAddress,  
    ospfVirtNbrOptions,  
    ospfVirtNbrState,  
    ospfVirtNbrEvents,  
    ospfVirtNbrLsRetransQLen,  
    ospfVirtNbrHelloSuppressed  
}

STATUS              current

## DESCRIPTION

"These objects are required for OSPF systems."  
::= { ospfGroups 11 }

ospfExtLsdbGroup      OBJECT-GROUP

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

STATUS              current

## DESCRIPTION

"These objects are required for OSPF systems  
that display their link state database."  
::= { 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

Expires October 2000

[Page 70]

```
OBJECTS {
    ospfLocalLsdbIpAddress,
    ospfLocalLsdbAddressLessIf,
    ospfLocalLsdbType,
    ospfLocalLsdbLsid,
    ospfLocalLsdbRouterId,
    ospfLocalLsdbSequence,
    ospfLocalLsdbAge,
    ospfLocalLsdbChecksum,
    ospfLocalLsdbAdvertisement
}
STATUS      current
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 }

ospfBasicGroup2    OBJECT-GROUP
    OBJECTS {
        ospfRouterId,
        ospfAdminStat,
        ospfVersionNumber,
        ospfAreaBdrRtrStatus,
        ospfASBdrRtrStatus,
        ospfExternLsaCount,
        ospfExternLsaCksumSum,
        ospfTOSSupport,
        ospfOriginateNewLsas,
```

ospfRxNewLsas,  
ospfExtLsdbLimit,  
ospfMulticastExtensions,

Expires October 2000

[Page 71]

```
    ospfExitOverflowInterval,  
    ospfDemandExtensions,  
    ospfRFC1583Compatibility,  
    ospfOpaqueLsaSupport,  
    ospfTrafficEngineeringSupport,  
    ospfAsOpaqueLsdbLimit  
  }
```

STATUS current

DESCRIPTION

"These objects are required for OSPF systems."

::= { ospfGroups 16 }

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 17 }

ospfIfGroup2 OBJECT-GROUP

OBJECTS {

```
    ospfIfIpAddress,  
    ospfAddressLessIf,  
    ospfIfAreaId,  
    ospfIfType,  
    ospfIfAdminStat,  
    ospfIfRtrPriority,  
    ospfIfTransitDelay,  
    ospfIfRetransInterval,  
    ospfIfHelloInterval,  
    ospfIfRtrDeadInterval,  
    ospfIfPollInterval,
```

```
ospfIfState,  
ospfIfDesignatedRouter,  
ospfIfBackupDesignatedRouter,
```

Expires October 2000

[Page 72]



```
        ospfIfEvents,
        ospfIfAuthType,
        ospfIfAuthKey,
        ospfIfStatus,
        ospfIfMulticastForwarding,
        ospfIfDemand,
        ospfIfLsaCount,
        ospfIfLsaCksumSum
    }
STATUS      current
DESCRIPTION
    "These objects are required for OSPF systems."
    ::= { ospfGroups 18 }

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 19 }

END
```

## [4](#) OSPF Trap Overview

### [4.1](#) Introduction

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

As routing topologies become large and complex it is often difficult to locate the source of a topology change or unpredicted routing path by polling a large number of routers. Because of the difficulty of

polling a large number of devices, a more prudent approach is for devices to notify a network manager of potentially critical OSPF events using SNMP traps.

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

## **4.2 Approach**

The mechanism for sending traps is straight-forward. When an exception event occurs, the application notifies the local agent who sends a trap to the appropriate SNMP management stations. The message includes the trap type and may include a list of trap specific variables. [Section 5](#) gives the trap definitions which includes the variable lists. The router ID of the originator of the trap is included in the variable list so that the network manager may easily determine the source of the trap.

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

## **4.3 Ignoring Initial Activity**

The majority of critical events occur when OSPF is enabled on a router, at which time the designated router is elected and neighbor adjacencies are formed. During this initial period a potential flood of traps is unnecessary since the events are expected. To avoid unnecessary traps, a router should not originate expected OSPF interface related traps until two of that interface's dead timer intervals have elapsed. The expected OSPF interface traps are `ospfIfStateChange`, `ospfVirtIfStateChange`, `ospfNbrStateChange`, `ospfVirtNbrStateChange`, `ospfTxRetranmit` and `ospfVirtIfTxRetransmit`. Additionally, `ospfMaxAgeLsa` and `ospfOriginateLsa` traps should not be originated until two dead timer intervals have elapsed where the dead timer interval used should be the dead timer with the smallest value.

## **4.4 Throttling Traps**

The mechanism for throttling the traps is similar to the mechanism explained in [RFC 1224](#) [24]. The basic premise of the throttling mechanism is that of a sliding window, defined in seconds and an upper bound on the number of traps that may be generated within this window. Note that unlike [RFC 1224](#), traps are not sent to inform the network manager that the throttling mechanism has kicked in.

A single window should be used to throttle all OSPF traps types except for the `ospfLsdbOverflow` and the `ospfLsdbApproachingOverflow`

trap which should not be throttled. For example, with a window time of 3, an upper bound of 3, and events to cause trap types 1,3,5 and 7

Expires October 2000

[Page 74]

(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  
ospfExternLSACount

ospfLsdbApproachingOverflow  
ospfLsdbOverflow

Expires October 2000

[Page 75]

OSPF-TRAP-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, IpAddress
    FROM SNMPv2-SMI
MODULE-COMPLIANCE, OBJECT-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,
    ospfAreaExtNssaTranslatorStatus
    FROM OSPF-MIB;
```

ospfTrap MODULE-IDENTITY

```
    LAST-UPDATED "0005011225Z" -- Mon May 01 12:25:50 GMT 2000
    ORGANIZATION "IETF OSPF Working Group"
    CONTACT-INFO
        "      Spencer Giacalone
        Postal: Predictive Systems
                145 Hudson Street
                New York, New York 10013
        Tel:      +1 (973) 301-5695
        E-Mail:   spencer.giacalone@predictive.com

        Dan Joyal
        Postal: Nortel Networks
                600 Technology Park Drive
                Billerica, MA 01821
        Tel:      +1 (978) 288-2629
        E-Mail:   djoyal@nortelnetworks.com"
    DESCRIPTION
        "The MIB module to describe traps for the OSPF
        Version 2 Protocol."
    REVISION "0005011225Z" -- Mon May 01 12:25:50 GMT 2000
    DESCRIPTION
        "Updated for latest version of OSPFv2"
    ::= { ospf 21 }
```

-- 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))

Expires October 2000

[Page 76]



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) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Potential types of configuration conflicts. Used by the ospfConfigError and ospfConfigVirtError traps."

::= { ospfTrapControl 2 }

ospfPacketType OBJECT-TYPE

SYNTAX INTEGER {

hello (1),  
dbDescript (2),  
lsReq (3),  
lsUpdate (4),  
lsAck (5) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"OSPF packet types."

::= { ospfTrapControl 3 }

ospfPacketSrc OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS           current

DESCRIPTION

"The IP address of an inbound packet that can-

Expires October 2000

[Page 77]

```
    not be identified by a neighbor instance."
 ::= { ospfTrapControl 4 }
```

## -- Traps

### ospfVirtIfStateChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfVirtIfAreaId,
  ospfVirtIfNeighbor,
  ospfVirtIfState -- The new state
}
```

```
STATUS      current
```

#### DESCRIPTION

"An ospfIfStateChange trap signifies that there has been a change in the state of an OSPF virtual interface.

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

```
::= { ospfTraps 1 }
```

### ospfNbrStateChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfNbrIpAddress,
  ospfNbrAddressLessIndex,
  ospfNbrRtrId,
  ospfNbrState -- The new state
}
```

```
STATUS      current
```

#### DESCRIPTION

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

```
::= { ospfTraps 2 }
```

### ospfVirtNbrStateChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
           ospfVirtNbrArea,
           ospfVirtNbrRtrId,
```

Expires October 2000

[Page 78]

```
        ospfVirtNbrState  -- The new state
    }
STATUS      current
DESCRIPTION
    "An ospfIfStateChange trap signifies that there
    has been a change in the state of an OSPF vir-
    tual neighbor. This trap should be generated
    when the neighbor state regresses (e.g., goes
    from Attempt or Full to 1-Way or Down) or
    progresses to a terminal state (e.g., Full)."
```

::= { ospfTraps 3 }

ospfIfConfigError NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
    ospfIfIpAddress,
    ospfAddressLessIf,
    ospfPacketSrc, -- The source IP address
    ospfConfigErrorType, -- Type of error
    ospfPacketType
}
STATUS      current
DESCRIPTION
    "An ospfIfConfigError trap signifies that a
    packet has been received on a non-virtual in-
    terface from a router whose configuration
    parameters conflict with this router's confi-
    guration parameters. Note that the event op-
    tionMismatch 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 pack-
    et 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 ad-
    jacency from forming."
```

::= { ospfTraps 5 }

ospfIfAuthFailure NOTIFICATION-TYPE

OBJECTS { ospfRouterId, -- The originator of the trap

Expires October 2000

[Page 79]

```
    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 in-
  terface from a router whose authentication key
  or authentication type conflicts with this
  router's authentication key or authentication
  type."
::= { ospfTraps 6 }
```

#### ospfVirtIfAuthFailure NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
    ospfVirtIfAreaId,
    ospfVirtIfNeighbor,
    ospfConfigErrorType, -- authTypeMismatch or
                        -- authFailure
    ospfPacketType
  }
STATUS      current
DESCRIPTION
  "An ospfVirtIfAuthFailure trap signifies that a
  packet has been received on a virtual interface
  from a router whose authentication key or au-
  thentication 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,

Expires October 2000

[Page 80]



```
    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,  
    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 than an OSPF packet has been retransmitted on a virtual interface. All packets that may be retransmitted are associated with an LSDB entry. The LS type, LS ID, and Router ID are used to identify the LSDB entry."

```
::= { ospfTraps 11 }
```

ospfOriginateLsa NOTIFICATION-TYPE

OBJECTS { ospfRouterId, -- The originator of the trap

Expires October 2000

[Page 81]

```
    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
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-

Expires October 2000

[Page 82]

```
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 }
```

-- conformance information

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

```
ospfTrapGroups OBJECT IDENTIFIER ::= { ospfTrapConformance 1 }
```

```
ospfTrapCompliances OBJECT IDENTIFIER ::= { ospfTrapConformance 2 }
```

-- compliance statements

ospfTrapCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

```
"The compliance statement "  
MODULE      -- this module  
MANDATORY-GROUPS { ospfTrapControlGroup }
```

Expires October 2000

[Page 83]

```
 ::= { ospfTrapCompliances 1 }

-- 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 }

END
```

## 6 Acknowledgements

This document was produced by the OSPF Working Group, and is based on the MIB for OSPF version 2 by Rob Coltun and Fred Baker [[18](#)].

The Authors acknowledge the following individuals:

- John Moy, Sycamore Networks
- Rob Coltun, RedBack Networks
- Pat Murphy, USGS

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Expires October 2000

[Page 84]



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Expires October 2000

[Page 85]

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#### A TOS Support

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

#### B Changes from [RFC 1850](#)

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

##### **[B.1 RFC 1583 Compatibility](#)**

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

##### **[B.2 OSPF Traffic Engineering Support](#)**

Added object ospfTrafficEngineeringSupport to ospfGeneralGroup to indicate support of OSPF traffic engineering.

### **B.3 OSPF NSSA Enhancement Support**

Expires October 2000

[Page 86]

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 Status has changed.

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

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

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

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

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

#### **B.4 OSPF MTU Mismatch Support**

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

#### **B.5 Opaque LSA Support**

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

Added object ospfAsOpaqueLsdbLimit to ospfGeneralGroup to indicate a limit of Type-11 LSAs in the LSDB before overflow .

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

- ospflocalLsdbIpAddress

-ospfLocalLsdbAddressLessIf

Expires October 2000

[Page 87]

- ospfLocalLsdbType
- ospfLocalLsdbLsid
- ospfLocalLsdbRouterId

ospfLocalLsdbTable contains the following (columnar) objects:

- ospfLocalLsdbSequence, to indicate LSA instance
- ospfLocalLsdbAge
- ospfLocalLsdbChecksum
- ospfLocalLsdbAdvertisement, containing the entire LSA

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

- ospfVirtLocalLsdbTransitArea
- ospfVirtLocalLsdbNeighbor, to indicate the router ID of the virtual neighbor
- ospfVirLocalLsdbType
- ospfVirLocalLsdbLsid
- ospfVirLocalLsdbRouterId

ospfVirLocalLsdbTable contains the following (columnar) objects:

- ospfVirLocalLsdbSequence, to indicate LSA instance
- ospfVirLocalLsdbAge
- ospfVirLocalLsdbChecksum
- ospfVirLocalLsdbAdvertisement, containing the entire LSA

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

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

Added objects to ospfVirIfTable, to support Link-local (type-9) LSAs on virtual links, including:

Expires October 2000

[Page 88]



-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.

To support AS scope (type-11) LSAs, the enumeration asOpaqueLink (11) was added to ospfExtLsdbType in the ospfExtLsdbTable.

## **B.6 OSPF Compliances**

Compliance statements were depreciated as needed due to the fact that many new items have been added to the MIB. These statements include:

-ospfCompliance

New compliance statements were added as needed to replace deprecated statements. These Statements include:

-ospfCompliance2

Conformance groups were depreciated as needed due to the fact that many new items have been added to the MIB. These groups include:

-ospfBasicGroup

-ospfAreaGroup

-ospfIfGroup

-ospfVirtIfGroup

New conformance groups were added as needed to replace deprecated groups. These groups include:

-ospfBasicGroup2

-ospfAreaGroup2

-ospfIfGroup2

-ospfVirtIfGroup2

Added completely new conformance groups as needed, including:

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

Expires October 2000

[Page 89]

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

## **B.7 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 ospfIfAuthKey due to security concerns, and to increase clarity

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

## **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.

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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Expires October 2000

[Page 91]

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