

Network Working Group
INTERNET-DRAFT
Expiration Date: February 2001
Filename:[draft-ietf-ospf-mib-update-03.txt](#)

S. Giacalone
Predictive Systems
D. Joyal
Nortel Networks
Rob Coltun
Redback Networks
Fred Baker
Cisco Systems
August 2000

OSPF Version 2 Management Information Base

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC2026](#). Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at
<http://www.ietf.org/ietf/1id-abstracts.txt>

The list of Internet-Draft Shadow Directories can be accessed at
<http://www.ietf.org/shadow.html>.

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.

Copyright Notice

Copyright (C) The Internet Society (1999). All Rights Reserved.

Table of Contents

The SNMPv2 Network Management Framework
Object Definitions

Expires February 2001

[Page 1]

1	Overview	3
1.1	The SNMPv2 Network Management Framework	3
1.2	The SMI, and Object definitions	3
1.3	Object Identification	4
1.4	Textual Conventions	4
1.5	Conceptual Row Creation	4
1.6	Default Configuration	5
2	Structure of this MIB	6
2.1	The Purposes of the sections in this MIB	6
2.1.1	General Variables	6
2.1.2	Area Data Structure and Area Stub Metric Table	7
2.1.3	Link State Database and External Link State Database	7
2.1.4	Address Table and Host Tables	7
2.1.5	Interface and Interface Metric Tables	7
2.1.6	Virtual Interface Table	7
2.1.7	Neighbor and Virtual Neighbor Tables	7
2.1.8	Local Link State Database Table and Virtual Local Link State Database Table	7
3	OSPF-MIB Definitions	7
3.1	OSPF General Variables	11
3.2	OSPF Area Table	16
3.3	OSPF Area Default Metrics	21
3.4	OSPF Link State Database	23
3.5	OSPF Address Range Table	26
3.6	OSPF Host Table	28
3.7	OSPF Interface Table	30
3.8	OSPF Interface Metric Table	37
3.9	OSPF Virtual Interface Table	40
3.10	OSPF Neighbor Table	44
3.11	OSPF Virtual Neighbor Table	48
3.12	OSPF External Link State Database	51
3.13	OSPF Route Table Use	54
3.14	OSPF Area Aggregate Table	55
3.15	OSPF Local LSDB Table	58
3.16	OSPF Virtual Local LSDB Table	61
3.17	Conformance Information	65
4	OSPF Trap overview	73
4.1	Introduction	73
4.2	Approach	74
4.3	Ignoring Initial Activity	74
4.4	Throttling Traps	74
4.5	One Trap Per OSPF Event	75
4.6	Polling Event Counters	75
5	OSPF Trap Definitions	76
5.1	Trap Support Objects	76
5.2	Traps	78
5.3	Conformance Information	83

6	Acknowledgements	84
7	References	84
A	TOS Support	86

B Changes from RFC 1850	86
B.1 RFC 1583 Compatibility	86
B.2 OSPF Traffic Engineering Support	86
B.3 OSPF NSSA Enhancement Support	87
B.4 OSPF MTU Mismatch Support	87
B.5 Opaque LSA Support	87
B.6 OSPF Compliance	89
B.7 OSPF Authentication and Security.....	90
B.8 Miscellaneous	90
C Security Considerations	91
D Authors' Addresses	91
E Full Copyright Statement	92

[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 February 2001

[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"

Expires February 2001

[Page 4]

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.

Expires February 2001

[Page 5]

- The AreaID of each interface will be 0.0.0.0, the Backbone.
- Authentication will be disabled
- All Broadcast and Point to Point interfaces will be operational. NBMA Interfaces require the configuration of at least one neighbor.
- Timers on all direct interfaces will be:

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

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

Expires February 2001

[Page 6]

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

2.1.2 Area Data Structure and Area Stub Metric Table

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

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

2.1.3 Link State Database and External Link State Database

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

2.1.4 Address Table and Host Tables

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

2.1.5 Interface and Interface Metric Tables

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

2.1.6 Virtual Interface Table

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

2.1.7 Neighbor and Virtual Neighbor Tables

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

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

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

Expires February 2001

[Page 7]

OSPF-MIB DEFINITIONS ::= BEGIN

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 "0008071225Z" -- Mon Aug 7 12:25:50 GMT 2000
ORGANIZATION "IETF OSPF Working Group"
CONTACT-INFO
" Spencer Giacalone
Postal: Predictive Systems
25a Vreeland Road
Florham Park, NJ 07932
Tel: +1 (973) 301-5695
E-Mail: spencer.giacalone@predictive.com

Dan Joyal
Postal: Nortel Networks
600 Technology Park Drive
Billerica, MA 01821
Tel: +1 (978) 288-2629
E-Mail: djoyal@nortelnetworks.com"

DESCRIPTION

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

REVISION "0008071225Z" -- Mon Aug 7 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."

Expires February 2001

[Page 8]

SYNTAX IPAddress

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

RouterID ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A OSPF Router Identifier."

SYNTAX IPAddress

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

Metric ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The OSPF Internal Metric."

SYNTAX Integer32 (0..'FFFF'h)

BigMetric ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The OSPF External Metric."

SYNTAX Integer32 (0..'FFFFFF'h)

-- Status Values

Status ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

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

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

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

PositiveInteger ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

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

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

HelloRange ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

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

Expires February 2001

[Page 9]

SYNTAX Integer32 (1..'FFFF'h)

UpToMaxAge ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

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

SYNTAX Integer32 (0..3600)

-- The range of ifIndex

InterfaceIndex ::= TEXTUAL-CONVENTION

STATUS 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 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

Expires February 2001

[Page 10]

The remaining values are left for future definition."

SYNTAX Integer32 (0..30)

-- OSPF General Variables

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

ospfGeneralGroup OBJECT IDENTIFIER ::= { ospf 1 }

ospfRouterId OBJECT-TYPE

SYNTAX RouterID

MAX-ACCESS read-write

STATUS current

DESCRIPTION

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

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

REFERENCE

"OSPF Version 2, C.1 Global parameters"

::= { ospfGeneralGroup 1 }

ospfAdminStat OBJECT-TYPE

SYNTAX Status

MAX-ACCESS read-write

STATUS current

DESCRIPTION

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

::= { ospfGeneralGroup 2 }

ospfVersionNumber OBJECT-TYPE

SYNTAX INTEGER { version2 (2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current version number of the OSPF proto-
col is 2."

REFERENCE

"OSPF Version 2, Title"

::= { ospfGeneralGroup 3 }

ospfAreaBdrRtrStatus OBJECT-TYPE

SYNTAX	TruthValue
MAX-ACCESS	read-only

Expires February 2001

[Page 11]

STATUS current
DESCRIPTION
"A flag to note whether this router is an area
border router."
REFERENCE
"OSPF Version 2, [Section 3](#) Splitting the AS into
Areas"
::= { ospfGeneralGroup 4 }

ospfASBdrRtrStatus OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"A flag to note whether this router is config-
ured as an Autonomous System border router."
REFERENCE
"OSPF Version 2, [Section 3.3](#) Classification of
routers"
::= { ospfGeneralGroup 5 }

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

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

Expires February 2001

[Page 12]

DESCRIPTION

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

REFERENCE

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

::= { ospfGeneralGroup 8 }

ospfOriginateNewLsas OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of new link-state advertisements that have been originated. This number is incremented each time the router originates a new LSA."

::= { ospfGeneralGroup 9 }

ospfRxNewLsas OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of link-state advertisements received determined to be new instantiations. This number does not include newer instantiations of self-originated link-state 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 }
```

Expires February 2001

[Page 13]

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

```
ospfMulticastExtensions OBJECT-TYPE
```

```
SYNTAX      Integer32
```

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

```
STATUS      current
```

```
DESCRIPTION
```

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

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

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

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

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

```
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

Expires February 2001

[Page 14]

SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The router's support for demand routing."
REFERENCE
 "Extending OSPF to Support Demand Circuits"
::= { ospfGeneralGroup 14 }

ospfRFC1583Compatibility OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "Indicates metrics used to choose among multiple AS-external-LSAs. When RFC1583Compatibility is set to enabled, only cost will be used when choosing among multiple AS-external-LSAs advertising the same destination. When RFC1583Compatibility is set to disabled, preference will be driven first by type of path using cost only to break ties."
REFERENCE
 "OSPF Version 2, [Section 16.4.1](#) External path preferences"
::= { ospfGeneralGroup 15 }

ospfOpaqueLsaSupport OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-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 }

-- 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

Expires February 2001

[Page 15]

SYNTAX SEQUENCE OF OspfAreaEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "Information describing the configured parameters and cumulative statistics of the router's attached areas."
REFERENCE
 "OSPF Version 2, [Section 6](#) The Area Data Structure"
::= { ospf 2 }

ospfAreaEntry OBJECT-TYPE

SYNTAX OspfAreaEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "Information describing the configured parameters and cumulative statistics of one of the router's attached areas."
INDEX { ospfAreaId }
::= { ospfAreaTable 1 }

OspfAreaEntry ::=

SEQUENCE {
 ospfAreaId
 AreaID,
 ospfAuthType
 Integer32,
 ospfImportAsExtern
 INTEGER,
 ospfSpfRuns
 Counter32,
 ospfAreaBdrRtrCount
 Gauge32,
 ospfAsBdrRtrCount
 Gauge32,
 ospfAreaLsaCount
 Gauge32,
 ospfAreaLsaCksumSum
 Integer32,
 ospfAreaSummary
 INTEGER,
 ospfAreaStatus
 RowStatus,
 ospfAreaNssaTranslatorRole
 INTEGER,
 ospfAreaNssaTranslatorState

INTEGER,
ospfAreaNssaTranslatorStabilityInterval
PositiveInteger,

Expires February 2001

[Page 16]


```
    ospfAreaNssaTranslatorEvents
        Counter32
    }
```

ospfAreaId OBJECT-TYPE

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

ospfAuthType OBJECT-TYPE

```
SYNTAX      Integer32
            -- none (0),
            -- simplePassword (1)
            -- md5 (2)
            -- reserved for specification by IANA (> 2)
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "The authentication type specified for an area.
    Additional authentication types may be assigned
    locally on a per Area basis."
REFERENCE
    "OSPF Version 2, Appendix D Authentication"
DEFVAL { 0 } -- no authentication, by default
::= { ospfAreaEntry 2 }
```

ospfImportAsExtern OBJECT-TYPE

```
SYNTAX      INTEGER {
            importExternal (1),
            importNoExternal (2),
            importNssa (3)
            }
MAX-ACCESS  read-create
STATUS      current
DESCRIPTION
    "Indicates whether an area is a Stub area, NSSA, or standard
    area. Type-5 AS-External LSAs and Type-11 Opaque LSAs are
    not imported into Stub Areas or NSSAs. NSSAs import AS-
    External data as Type-7 LSAs"
REFERENCE
    "OSPF Version 2, Appendix C.2 Area parameters"
DEFVAL { importExternal }
```

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

```
ospfSpfRuns OBJECT-TYPE
```

Expires February 2001

[Page 17]

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

ospfAreaLsaCksumSum OBJECT-TYPE

SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the link-state ad-
vertisements' 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 entry. Setting it to 'invalid' has the effect of rendering it inoperative. The internal effect (row removal) is implementation dependent."

::= { 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

Expires February 2001

[Page 19]

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

ospfAreaNssaTranslatorStabilityInterval OBJECT-TYPE

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

ospfAreaNssaTranslatorEvents OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Indicates the number of Translator State changes
 that have occurred since the last boot-up."
::= { ospfAreaEntry 14 }

-- OSPF Area Default Metric Table

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

ospfStubAreaTable OBJECT-TYPE

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

DESCRIPTION

"The set of metrics that will be advertised by
a default Area Border Router into a stub area."

Expires February 2001

[Page 20]

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
creation, this can be derived from the in-
stance."

::= { 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 }

-- 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-

Expires February 2001

[Page 22]

```
    tissements"
    ::= { ospf 4 }
```

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

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

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

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

```
ospfLsdbType OBJECT-TYPE
    SYNTAX      INTEGER {
                    routerLink (1),
```

Expires February 2001

[Page 23]

```
        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 advertise-
    ment format."
REFERENCE
    "OSPF Version 2, Appendix A.4.1 The Link State
    Advertisement header"
::= { ospfLsdbEntry 2 }
```

ospfLsdbLsid OBJECT-TYPE

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

ospfLsdbRouterId OBJECT-TYPE

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

```
-- Note that the OSPF Sequence Number is a 32 bit signed
-- integer. It starts with the value '80000001'h,
-- or -'7FFFFFFF'h, and increments until '7FFFFFFF'h
-- Thus, a typical sequence number will be very negative.
```

ospfLsdbSequence	OBJECT-TYPE
SYNTAX	Integer32
MAX-ACCESS	read-only

Expires February 2001

[Page 24]

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 Adver-

Expires February 2001

[Page 25]

```
    tisements"
 ::= { ospfLsdbEntry 8 }
```

-- Address Range Table

-- The Address Range Table acts as an adjunct to the Area
-- Table; It describes those Address Range Summaries that
-- are configured to be propagated from an Area to reduce
-- the amount of information about it which is known beyond
-- its borders.

ospfAreaRangeTable OBJECT-TYPE

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

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

INDEX { ospfAreaRangeAreaId, ospfAreaRangeNet }

```
::= { ospfAreaRangeTable 1 }
```

OspfAreaRangeEntry ::=

SEQUENCE {

ospfAreaRangeAreaId

AreaID,

ospfAreaRangeNet

IpAddress,

ospfAreaRangeMask

IpAddress,
ospfAreaRangeStatus
RowStatus,

Expires February 2001

[Page 26]

```
    ospfAreaRangeEffect
        INTEGER
    }
```

ospfAreaRangeAreaId OBJECT-TYPE

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

ospfAreaRangeNet OBJECT-TYPE

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

ospfAreaRangeMask OBJECT-TYPE

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

ospfAreaRangeStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      obsolete
DESCRIPTION
    "This 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."
::= { ospfAreaRangeEntry 4 }
```

ospfAreaRangeEffect OBJECT-TYPE

SYNTAX INTEGER {
advertiseMatching (1),

Expires February 2001

[Page 27]

```
        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
    "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

Expires February 2001

[Page 28]


```
        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"

::= { ospfHostEntry 3 }

ospfHostStatus 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."

```
::= { ospfHostEntry 4 }
```

ospfHostAreaID OBJECT-TYPE

Expires February 2001

[Page 29]

```
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,

Expires February 2001

[Page 30]

```
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,
ospfIfLsaChecksumSum
    Integer32

}
```

ospfIfIpAddress OBJECT-TYPE

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

"The IP address of this OSPF interface."

::= { ospfIfEntry 1 }

ospfAddressLessIf OBJECT-TYPE

```
SYNTAX      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

Expires February 2001

[Page 31]

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

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

Expires February 2001

[Page 32]

STATUS current

DESCRIPTION

"The priority of this interface. Used in multi-access networks, this field is used in the designated router election algorithm. The value 0 signifies that the router is not eligible to become the designated router on this particular network. In the event of a tie in this value, routers will use their Router ID as a tie breaker."

DEFVAL { 1 }

::= { ospfIfEntry 6 }

ospfIfTransitDelay OBJECT-TYPE

SYNTAX UpToMaxAge

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 advertisement retransmissions, for adjacencies belonging to this interface. This value is also used when retransmitting database description and link-state request packets."

DEFVAL { 5 }

::= { ospfIfEntry 8 }

ospfIfHelloInterval OBJECT-TYPE

SYNTAX HelloRange

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

DEFVAL { 10 }

::= { ospfIfEntry 9 }

ospfIfRtrDeadInterval OBJECT-TYPE
SYNTAX PositiveInteger

Expires February 2001

[Page 33]

```
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The number of seconds that a router's Hello
    packets have not been seen before it's neigh-
    bors 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."
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

Expires February 2001

[Page 34]

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

```
ospfIfEvents OBJECT-TYPE
SYNTAX        Counter32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The number of times this OSPF interface has
    changed its state, or an error has occurred."
::= { ospfIfEntry 15 }
```

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

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

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

Note that the use of simplePassword authentication is NOT recommended when there is concern regarding attack upon the OSPF system. SimplePassword authentication is only sufficient to protect against accidental misconfigurations because it re-uses cleartext passwords. [[RFC-1704](#)]

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

REFERENCE

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

```
DEFVAL { '0000000000000000'H } -- 0.0.0.0.0.0.0.0
```

```
::= { ospfIfEntry 16 }
```

```
ospfIfStatus OBJECT-TYPE
```

Expires February 2001

[Page 35]

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 }
 ::= { ospfIfEntry 19 }

ospfIfAuthType OBJECT-TYPE

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

STATUS current

DESCRIPTION

"The authentication type specified for an in-

Expires February 2001

[Page 36]

terface. Additional authentication types may be assigned locally.

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

REFERENCE

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

DEFVAL { 0 } -- no authentication, by default

::= { ospfIfEntry 20 }

ospfIfLsaCount OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { ospfIfEntry 21 }

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

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

-- Metric = $10^8 / \text{ifSpeed}$

-- 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 interface identified by the interface index."

REFERENCE

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

INDEX { ospfIfMetricIpAddress,
ospfIfMetricAddressLessIf,
ospfIfMetricTOS }

::= { ospfIfMetricTable 1 }

OspfIfMetricEntry ::=

SEQUENCE {

ospfIfMetricIpAddress

IpAddress,

ospfIfMetricAddressLessIf

Integer32,

ospfIfMetricTOS
TOSType,
ospfIfMetricValue

Expires February 2001

[Page 38]

```
        Metric,
    ospfIfMetricStatus
        RowStatus
    }
```

ospfIfMetricIpAddress OBJECT-TYPE

```
SYNTAX      IPAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The IP address of this OSPF interface. On row
    creation, this can be derived from the in-
    stance."
::= { ospfIfMetricEntry 1 }
```

ospfIfMetricAddressLessIf OBJECT-TYPE

```
SYNTAX      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 in-
    terfaces having no IP Address. On row crea-
    tion, this can be derived from the instance."
::= { ospfIfMetricEntry 2 }
```

ospfIfMetricTOS OBJECT-TYPE

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

ospfIfMetricValue OBJECT-TYPE

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

ospfIfMetricStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

Expires February 2001

[Page 39]

```
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."
::= { ospfIfMetricEntry 5 }
```

```
-- OSPF Virtual Interface Table
```

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

```
ospfVirtIfTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF OspfVirtIfEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Information about this router's virtual inter-
      faces."
REFERENCE
    "OSPF Version 2, Appendix C.4 Virtual link
      parameters"
::= { ospf 9 }
```

```
ospfVirtIfEntry OBJECT-TYPE
```

```
SYNTAX          OspfVirtIfEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Information about a single Virtual Interface."
INDEX { ospfVirtIfAreaId, ospfVirtIfNeighbor }
::= { ospfVirtIfTable 1 }
```

```
OspfVirtIfEntry ::=
```

```
SEQUENCE {
    ospfVirtIfAreaId
        AreaID,
    ospfVirtIfNeighbor
        RouterID,
    ospfVirtIfTransitDelay
        UpToMaxAge,
    ospfVirtIfRetransInterval
        UpToMaxAge,
    ospfVirtIfHelloInterval
        HelloRange,
```

ospfVirtIfRtrDeadInterval
PositiveInteger,
ospfVirtIfState

Expires February 2001

[Page 40]


```
    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 }
```

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

Expires February 2001

[Page 41]

also used when retransmitting database description and link-state request packets. This value should be well over the expected round-trip time."

DEFVAL { 5 }

::= { ospfVirtIfEntry 4 }

ospfVirtIfHelloInterval OBJECT-TYPE

SYNTAX HelloRange

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The length of time, in seconds, between the Hello packets that the router sends on the interface. This value must be the same for the virtual neighbor."

DEFVAL { 10 }

::= { ospfVirtIfEntry 5 }

ospfVirtIfRtrDeadInterval OBJECT-TYPE

SYNTAX PositiveInteger

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

DEFVAL { 60 }

::= { ospfVirtIfEntry 6 }

ospfVirtIfState OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"OSPF virtual interface states."

DEFVAL { down }

::= { ospfVirtIfEntry 7 }

ospfVirtIfEvents OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of state changes or error events on

Expires February 2001

[Page 42]

this Virtual Link"
::= { ospfVirtIfEntry 8 }

ospfVirtIfAuthKey OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(0..256))
MAX-ACCESS read-create
STATUS current

DESCRIPTION

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

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

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

Note that the use of simplePassword authentication is NOT recommended when there is concern regarding attack upon the OSPF system. SimplePassword authentication is only sufficient to protect against accidental misconfigurations because it re-uses cleartext passwords. [[RFC-1704](#)]

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

REFERENCE

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

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

ospfVirtIfStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This 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."

::= { ospfVirtIfEntry 10 }

ospfVirtIfAuthType OBJECT-TYPE

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

Expires February 2001

[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.

    Note that this object can be used to engage
    in significant attacks against an OSPF router."
REFERENCE
    "OSPF Version 2, Appendix E Authentication"
DEFVAL { 0 } -- no authentication, by default
::= { ospfVirtIfEntry 11 }
```

ospfVirtIfLsaCount OBJECT-TYPE

```
SYNTAX          Gauge32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The total number of link-local link state advertisements
    in this virtual interface's link-local link state database."
::= { ospfVirtIfEntry 12 }
```

ospfVirtIfLsaCksumSum OBJECT-TYPE

```
SYNTAX          Integer32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The 32-bit unsigned sum of the link-state ad-
    vertisements' LS checksums contained in this
    virtual interface's link-local link state database.
    The sum can be used to determine if there has
    been a change in the virtual interface's link state data-
    base, and to compare the virtual interface link-state
    database of the virtual neighbors."
::= { ospfVirtIfEntry 13 }
```

-- OSPF Neighbor Table

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

ospfNbrTable OBJECT-TYPE

```
SYNTAX          SEQUENCE OF OspfNbrEntry
MAX-ACCESS      not-accessible
```

STATUS current

DESCRIPTION

"A table of non-virtual neighbor information."

Expires February 2001

[Page 44]

REFERENCE

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

::= { ospf 10 }

ospfNbrEntry OBJECT-TYPE

SYNTAX OspfNbrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The information regarding a single neighbor."

REFERENCE

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

INDEX { ospfNbrIpAddress, ospfNbrAddressLessIndex }

::= { ospfNbrTable 1 }

OspfNbrEntry ::=

SEQUENCE {

ospfNbrIpAddress

IpAddress,

ospfNbrAddressLessIndex

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-

Expires February 2001

[Page 45]

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

Expires February 2001

[Page 46]

are translated into type 5 external advertisements at NSSA borders."

REFERENCE

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

DEFVAL { 0 }

::= { ospfNbrEntry 4 }

ospfNbrPriority OBJECT-TYPE

SYNTAX DesignatedRouterPriority

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

DEFVAL { 1 }

::= { ospfNbrEntry 5 }

ospfNbrState OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The State of the relationship with this Neighbor."

REFERENCE

"OSPF Version 2, [Section 10.1](#) Neighbor States"

DEFVAL { down }

::= { ospfNbrEntry 6 }

ospfNbrEvents OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times this neighbor relationship has changed state, or an error has occurred."

```
::= { ospfNbrEntry 7 }
```

```
ospfNbrLsRetransQLen OBJECT-TYPE
```

Expires February 2001

[Page 47]

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

```
ospfNbmaNbrStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "This 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."
    ::= { ospfNbrEntry 9 }
```

```
ospfNbmaNbrPermanence OBJECT-TYPE
    SYNTAX      INTEGER {
                        dynamic (1), -- learned through protocol
                        permanent (2) -- configured address
                    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This variable displays the status of the en-
        try. 'dynamic' and 'permanent' refer to how
        the neighbor became known."
    DEFVAL { permanent }
    ::= { ospfNbrEntry 10 }
```

```
ospfNbrHelloSuppressed OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Indicates whether Hellos are being suppressed
        to the neighbor"
    ::= { ospfNbrEntry 11 }
```

```
-- 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

Expires February 2001

[Page 48]


```
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "A table of virtual neighbor information."
REFERENCE
    "OSPF Version 2, Section 15 Virtual Links"
::= { ospf 11 }
```

```
ospfVirtNbrEntry OBJECT-TYPE
    SYNTAX      OspfVirtNbrEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Virtual neighbor information."
    INDEX { ospfVirtNbrArea, ospfVirtNbrRtrId }
    ::= { ospfVirtNbrTable 1 }
```

```
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

Expires February 2001

[Page 49]

neighboring router in the Autonomous System."
::= { ospfVirtNbrEntry 2 }

ospfVirtNbrIpAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The IP address this Virtual Neighbor is using."

::= { ospfVirtNbrEntry 3 }

ospfVirtNbrOptions OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

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

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

::= { ospfVirtNbrEntry 4 }

ospfVirtNbrState OBJECT-TYPE

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

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The state of the Virtual Neighbor Relationship."

::= { ospfVirtNbrEntry 5 }

ospfVirtNbrEvents	OBJECT-TYPE
SYNTAX	Counter32
MAX-ACCESS	read-only

Expires February 2001

[Page 50]

```
STATUS      current
DESCRIPTION
    "The number of times this virtual link has
    changed its state, or an error has occurred."
 ::= { ospfVirtNbrEntry 6 }
```

ospfVirtNbrLsRetransQLen OBJECT-TYPE

```
SYNTAX      Gauge32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The current length of the retransmission
    queue."
 ::= { ospfVirtNbrEntry 7 }
```

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

Expires February 2001

[Page 51]

STATUS current
DESCRIPTION
"A single Link State Advertisement."
INDEX { ospfExtLsdbType, ospfExtLsdbLsid, ospfExtLsdbRouterId }
::= { ospfExtLsdbTable 1 }

OspfExtLsdbEntry ::=

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

ospfExtLsdbType OBJECT-TYPE
SYNTAX INTEGER {
 asExternalLink (5),
 asOpaqueLink (11)
}
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"
::= { 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"

Expires February 2001

[Page 52]


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

```
ospfExtLsdbRouterId 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"
```

```
::= { 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	

Expires February 2001

[Page 53]

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

REFERENCE

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

::= { ospfExtLsdbEntry 6 }

ospfExtLsdbAdvertisement OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(36))

MAX-ACCESS read-only

STATUS 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 sub-
        sumes another range (e.g., 10.0.0.0 mask
        255.0.0.0 and 10.1.0.0 mask 255.255.0.0), the
        most specific match is the preferred one."
    REFERENCE
        "OSPF Version 2, Appendix C.2 Area parameters"
    ::= { ospf 14 }
```

```
ospfAreaAggregateEntry OBJECT-TYPE
    SYNTAX      OspfAreaAggregateEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
```

"A range of IP addresses specified by an IP address/IP network mask pair. For example, class B address range of X.X.X.X with a network

mask of 255.255.0.0 includes all IP addresses from X.X.0.0 to X.X.255.255. Note that if ranges are range configured such that one range subsumes another range (e.g., 10.0.0.0 mask 255.0.0.0 and 10.1.0.0 mask 255.255.0.0), the most specific match is the preferred one."

REFERENCE

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

INDEX { ospfAreaAggregateAreaID, ospfAreaAggregateLsdbType,
ospfAreaAggregateNet, ospfAreaAggregateMask }

::= { ospfAreaAggregateTable 1 }

OspfAreaAggregateEntry ::=

```
SEQUENCE {
    ospfAreaAggregateAreaID
        AreaID,
    ospfAreaAggregateLsdbType
        INTEGER,
    ospfAreaAggregateNet
        IPAddress,
    ospfAreaAggregateMask
        IPAddress,
    ospfAreaAggregateStatus
        RowStatus,
    ospfAreaAggregateEffect
        INTEGER
}
```

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

Expires February 2001

[Page 56]

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

ospfAreaAggregateNet OBJECT-TYPE

SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The IP Address of the Net or Subnet indicated by the range."
REFERENCE
 "OSPF Version 2, [Appendix C.2](#) Area parameters"
 ::= { ospfAreaAggregateEntry 3 }

ospfAreaAggregateMask OBJECT-TYPE

SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The Subnet Mask that pertains to the Net or Subnet."
REFERENCE
 "OSPF Version 2, [Appendix C.2](#) Area parameters"
 ::= { ospfAreaAggregateEntry 4 }

ospfAreaAggregateStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
 "This 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 }
```

Expires February 2001

[Page 57]

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

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

ospfLocalLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF OspfLocalLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

REFERENCE

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

::= { ospf 17 }

ospfLocalLsdbEntry OBJECT-TYPE

SYNTAX OspfLocalLsdbEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A single Link State Advertisement."

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

::= { ospfLocalLsdbTable 1 }

OspfLocalLsdbEntry ::=

SEQUENCE {

ospfLocalLsdbIpAddress

IpAddress,

ospfLocalLsdbAddressLessIf

Integer32,

ospfLocalLsdbType

INTEGER,

ospfLocalLsdbLsid

IpAddress,

ospfLocalLsdbRouterId

RouterID,

ospfLocalLsdbSequence

Integer32,
ospfLocalLsdbAge
Integer32,

Expires February 2001

[Page 58]

```
    ospfLocalLsdbChecksum
        Integer32,
    ospfLocalLsdbAdvertisement
        OCTET STRING
}
```

ospfLocalLsdbIpAddress OBJECT-TYPE

```
SYNTAX      IpAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The IP Address of the interface from
    which the LSA was received if the interface is
    numbered."
REFERENCE
    "OSPF Version 2, Appendix C.3 Interface parameters"
::= { ospfLocalLsdbEntry 1 }
```

ospfLocalLsdbAddressLessIf OBJECT-TYPE

```
SYNTAX      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"
::= { 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

Expires February 2001

[Page 60]

MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This field is the checksum of the complete contents of the advertisement, excepting the age field. The age field is excepted so that an advertisement's age can be incremented without updating the checksum. The checksum used is the same that is used for ISO connectionless datagrams; it is commonly referred to as the Fletcher checksum."
REFERENCE
"OSPF Version 2, [Section 12.1.7](#) LS checksum"
::= { ospfLocalLsdbEntry 8 }

ospfLocalLsdbAdvertisement OBJECT-TYPE
SYNTAX OCTET STRING (SIZE (1..65535))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The entire Link State Advertisement, including its header."
REFERENCE
"OSPF Version 2, [Section 12](#) Link State Advertisements"
::= { ospfLocalLsdbEntry 9 }

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

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

ospfVirtLocalLsdbTable OBJECT-TYPE
SYNTAX SEQUENCE OF OspfVirtLocalLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The OSPF Process's Link-Local Link State Database for virtual links."
REFERENCE
"OSPF Version 2, [Section 12](#) Link State Advertisements and The OSPF Opaque LSA Option"
::= { ospf 18 }

ospfVirtLocalLsdbEntry OBJECT-TYPE
SYNTAX OspfVirtLocalLsdbEntry

Expires February 2001

[Page 61]

```
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "A single Link State Advertisement."
INDEX { ospfVirtLocalLsdbTransitArea,
        ospfVirtLocalLsdbNeighbor,
        ospfVirtLocalLsdbType,
        ospfVirtLocalLsdbLsid,
        ospfVirtLocalLsdbRouterId
      }
 ::= { ospfVirtLocalLsdbTable 1 }
```

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

```
ospfVirtLocalLsdbTransitArea OBJECT-TYPE
SYNTAX      AreaID
MAX-ACCESS  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."

Expires February 2001

[Page 62]

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	

Expires February 2001

[Page 63]

"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 Adver-  
tisements"  
::= { ospfVirtLocalLsdbEntry 9 }
```

Expires February 2001

[Page 64]


```
-- conformance information

ospfConformance OBJECT IDENTIFIER ::= { ospf 15 }

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

Expires February 2001

[Page 65]

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

Expires February 2001

[Page 66]

```
    ospfAreaId,  
    ospfImportAsExtern,  
    ospfSpfRuns,  
    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 {

Expires February 2001

[Page 67]

```
    ospfAreaRangeAreaId,
    ospfAreaRangeNet,
    ospfAreaRangeMask,
    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  
}
```

Expires February 2001

[Page 68]

STATUS deprecated

DESCRIPTION

"These objects are required for OSPF systems."

::= { 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 {

ospfNbrIpAddr,
ospfNbrAddressLessIndex,
ospfNbrRtrId,
ospfNbrOptions,
ospfNbrPriority,
ospfNbrState,
ospfNbrEvents,

ospfNbrLsRetransQLen,
ospfNbmaNbrStatus,
ospfNbmaNbrPermanence,

Expires February 2001

[Page 69]

```
        ospfNbrHelloSuppressed
    }
    STATUS          current
    DESCRIPTION
        "These objects are required for OSPF systems."
    ::= { ospfGroups 10 }

ospfVirtNbrGroup    OBJECT-GROUP
    OBJECTS {
        ospfVirtNbrArea,
        ospfVirtNbrRtrId,
        ospfVirtNbrIpAddr,
        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."

Expires February 2001

[Page 70]

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

```
ospfLocalLsdbGroup    OBJECT-GROUP
```

```
  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,
```

ospfExternLsaChecksumSum,
ospfTOSSupport,
ospfOriginateNewLsas,

Expires February 2001

[Page 71]

```
    ospfRxNewLsas,
    ospfExtLsdbLimit,
    ospfMulticastExtensions,
    ospfExitOverflowInterval,
    ospfDemandExtensions,
    ospfRFC1583Compatibility,
    ospfOpaqueLsaSupport,
    ospfTrafficEngineeringSupport
  }
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,
```

Expires February 2001

[Page 72]


```
        ospfIfDesignatedRouter,
        ospfIfBackupDesignatedRouter,
        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

Expires February 2001

[Page 74]

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

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

4.5 One Trap Per OSPF Event

Several of the traps defined in [section 5](#) are generated as the result of finding an unusual condition while parsing an OSPF packet or a processing a timer event. There may be more than one unusual condition detected while handling the event. For example, a link-state update packet may contain several retransmitted link-state advertisements (LSAs), or a retransmitted database description packet may contain several database description entries. To limit the number of traps and variables, OSPF should generate at most one trap per OSPF event. Only the variables associated with the first unusual condition should be included with the trap. Similarly, if more than one type of unusual condition is encountered while parsing the packet, only the first event will generate a trap.

4.6 Polling Event Counters

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

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

Counter32	Trap Type
-----	-----
ospfOriginateNewLsas	ospfOriginateLsa
ospfIfEvents	ospfIfStateChange
	ospfConfigError
	ospfIfAuthFailure
	ospfRxBadPacket
	ospfTxRetransmit
ospfVirtIfEvents	ospfVirtIfStateChange
	ospfVirtIfConfigError
	ospfVirtIfAuthFailure
	ospfVirtIfRxBadPacket
	ospfVirtIfTxRetransmit

ospfNbrEvents
ospfVirtNbrEvents
ospfExternLSACount

ospfNbrStateChange
ospfVirtNbrStateChange
ospfLsdbApproachingOverflow

Expires February 2001

[Page 75]

ospfExternLSACount

ospfLsdbOverflow

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 "0008071225Z" -- Mon Aug 7 12:25:50 GMT 2000

ORGANIZATION "IETF OSPF Working Group"

CONTACT-INFO

" Spencer Giacalone

Postal: Predictive Systems

25a Vreeland Road

Florham Park, NJ 07932

Tel: +1 (973) 301-5695

E-Mail: spencer.giacalone@predictive.com

Dan Joyal

Postal: Nortel Networks

600 Technology Park Drive

Billerica, MA 01821

Tel: +1 (978) 288-2629

E-Mail: djoyal@nortelnetworks.com"

DESCRIPTION

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

REVISION "0008071225Z" -- Mon Aug 7 12:25:50 GMT 2000

DESCRIPTION

"Updated for latest version of OSPFv2"

::= { ospf 16 }

-- Trap Support Objects

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

ospfTrapControl OBJECT IDENTIFIER ::= { ospfTrap 1 }

ospfTraps OBJECT IDENTIFIER ::= { ospfTrap 2 }

Expires February 2001

[Page 76]

ospfSetTrap OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(4))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

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

::= { ospfTrapControl 1 }

ospfConfigErrorType OBJECT-TYPE

SYNTAX INTEGER {

badVersion (1),

areaMismatch (2),

unknownNbmaNbr (3), -- Router is Dr eligible

unknownVirtualNbr (4),

authTypeMismatch(5),

authFailure (6),

netMaskMismatch (7),

helloIntervalMismatch (8),

deadIntervalMismatch (9),

optionMismatch (10),

mtuMismatch (11) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Potential types of configuration conflicts.

Used by the ospfConfigError and ospfConfigVirtualError 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

Expires February 2001

[Page 77]

DESCRIPTION

"The IP address of an inbound packet that cannot 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

Expires February 2001

[Page 78]

```
    ospfVirtNbrArea,
    ospfVirtNbrRtrId,
    ospfVirtNbrState  -- The new state
  }
STATUS          current
DESCRIPTION
  "An ospfIfStateChange trap signifies that there
  has been a change in the state of an OSPF 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 }
```

Expires February 2001

[Page 79]

ospfIfAuthFailure NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfPacketSrc, -- The source IP address
  ospfConfigErrorType, -- authTypeMismatch or
                        -- authFailure
  ospfPacketType
}
```

```
STATUS      current
```

DESCRIPTION

"An ospfIfAuthFailure trap signifies that a packet has been received on a non-virtual interface from a router whose authentication key or authentication type conflicts with this router's authentication key or authentication type."

```
::= { ospfTraps 6 }
```

ospfVirtIfAuthFailure NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfVirtIfAreaId,
  ospfVirtIfNeighbor,
  ospfConfigErrorType, -- authTypeMismatch or
                        -- authFailure
  ospfPacketType
}
```

```
STATUS      current
```

DESCRIPTION

"An ospfVirtIfAuthFailure trap signifies that a packet has been received on a virtual interface from a router whose authentication key or authentication type conflicts with this router's authentication key or authentication type."

```
::= { ospfTraps 7 }
```

ospfIfRxBadPacket NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfPacketSrc, -- The source IP address
  ospfPacketType
}
```

```
STATUS      current
```

DESCRIPTION

"An ospfIfRxBadPacket trap signifies that an OSPF packet has been received on a non-virtual interface that cannot be parsed."

```
::= { ospfTraps 8 }
```

```
ospfVirtIfRxBadPacket NOTIFICATION-TYPE
```

Expires February 2001

[Page 80]


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

ospfTxRetransmit NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfNbrRtrId, -- Destination
  ospfPacketType,
  ospfLsdbType,
  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 re-
  transmitted 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 retransmit-
  ted are associated with an LSDB entry. The LS
  type, LS ID, and Router ID are used to identify
```

```
the LSDB entry."  
::= { ospfTraps 11 }
```

Expires February 2001

[Page 81]

`ospfOriginateLsa NOTIFICATION-TYPE`

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfLsdbAreaId,  -- 0.0.0.0 for AS Externals
  ospfLsdbType,
  ospfLsdbLsid,
  ospfLsdbRouterId
}
```

```
STATUS      current
```

`DESCRIPTION`

"An ospfOriginateLsa trap signifies that a new LSA has been originated by this router. This trap should not be invoked for simple refreshes of LSAs (which happens every 30 minutes), but instead will only be invoked when an LSA is (re)originated due to a topology change. Additionally, this trap does not include LSAs that are being flushed because they have reached MaxAge."

```
::= { ospfTraps 12 }
```

`ospfMaxAgeLsa NOTIFICATION-TYPE`

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfLsdbAreaId,  -- 0.0.0.0 for AS Externals
  ospfLsdbType,
  ospfLsdbLsid,
  ospfLsdbRouterId
}
```

```
STATUS      current
```

`DESCRIPTION`

"An ospfMaxAgeLsa trap signifies that one of the LSA in the router's link-state database has aged to MaxAge."

```
::= { ospfTraps 13 }
```

`ospfLsdbOverflow NOTIFICATION-TYPE`

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfExtLsdbLimit
}
```

```
STATUS      current
```

`DESCRIPTION`

"An ospfLsdbOverflow trap signifies that the number of LSAs in the router's link-state database has exceeded ospfExtLsdbLimit."

```
::= { ospfTraps 14 }
```

`ospfLsdbApproachingOverflow NOTIFICATION-TYPE`

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfExtLsdbLimit
}
```

}
STATUS current
DESCRIPTION

Expires February 2001

[Page 82]

```
"An ospfLsdbApproachingOverflow trap signifies
that the number of LSAs in the router's link-
state database has exceeded ninety percent of
ospfExtLsdbLimit."
```

```
::= { ospfTraps 15 }
```

ospfIfStateChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfIfIpAddress,
  ospfAddressLessIf,
  ospfIfState -- The new state
}
```

```
STATUS current
```

DESCRIPTION

```
"An ospfIfStateChange trap signifies that there
has been a change in the state of a non-virtual
OSPF interface. This trap should be generated
when the interface state regresses (e.g., goes
from Dr to Down) or progresses to a terminal
state (i.e., Point-to-Point, DR Other, Dr, or
Backup)."
```

```
::= { ospfTraps 16 }
```

ospfNssaTranslatorStatusChange NOTIFICATION-TYPE

```
OBJECTS { ospfRouterId, -- The originator of the trap
  ospfAreaId,
  ospfAreaNssaTranslatorState -- The current translation
                                -- status
}
```

```
STATUS current
```

DESCRIPTION

```
"An ospfNssaTranslatorStatusChange trap indicates that there
has been a change in the router's ability to translate OSPF
type-7 LSAs into OSPF type-5 LSAs. This trap should be
generated when the Translator Status transitions from or to
any defined status on a per area basis."
```

```
::= { ospfTraps 17 }
```

-- 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 "

Expires February 2001

[Page 83]

```
MODULE      -- this module
MANDATORY-GROUPS { ospfTrapControlGroup }
::= { 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
- Randall Atkinson, Extreme Networks
- David T Perkins, SNMPinfo

[7](#) References

- [1] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", [RFC 2571](#), April 1999
- [2] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, [RFC 1155](#), May 1990
- [3] Rose, M., and K. McCloghrie, "Concise MIB Definitions",

STD 16, [RFC 1212](#), March 1991

Expires February 2001

[Page 84]

- [4] M. Rose, "A Convention for Defining Traps for use with the SNMP", [RFC 1215](#), March 1991
- [5] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999
- [6] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, [RFC 2579](#), April 1999
- [7] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M., and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, [RFC 2580](#), April 1999
- [8] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", STD 15, [RFC 1157](#), May 1990.
- [9] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Introduction to Community-based SNMPv2", [RFC 1901](#), January 1996.
- [10] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1906](#), January 1996.
- [11] Case, J., Harrington D., Presuhn R., and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", [RFC 2572](#), April 1999
- [21] Moy, J., "OSPF Version 2", [RFC 2328](#), Ascend Communications, Inc., April 1998.
- [13] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1905](#), January 1996.
- [14] Levi, D., Meyer, P., and B. Stewart, "SNMPv3 Applications", [RFC 2573](#), April 1999
- [15] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", [RFC 2575](#), April 1999
- [16] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction to Version 3 of the Internet-standard Network Management Framework", [RFC 2570](#), April 1999

[17] Deering, S., and R. Hinden, "Internet Protocol, Version 6

Expires February 2001

[Page 85]

(IPv6) Specification", [RFC 2460](#), December 1998.

- [18] Baker, F., and Coltun, R., "OSPF Version 2 Management Information Base", [RFC 1850](#), Cisco Systems, FORE Systems, November 1995.
- [19] Cerf, V., "IAB Recommendations for the Development of Internet Network Management Standards", [RFC 1052](#), NRI, April 1988.
- [20] Cerf, V., "Report of the Second Ad Hoc Network Management Review Group", [RFC 1109](#), NRI, August 1989.
- [21] Rose M., Editor, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, [RFC 1213](#), Performance Systems International, March 1991.
- [22] Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), International Organization for Standardization, International Standard 8824, December 1987.
- [23] Information processing systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Notation One (ASN.1), International Organization for Standardization, International Standard 8825, December 1987.
- [24] Steinberg, L., "Techniques for Managing Asynchronously Generated Alerts", [RFC 1224](#), IBM Corporation, May 1991.
- [25] Moy, J., "Multicast Extensions to OSPF", [RFC 1584](#), Proteon, Inc., September 1993.

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

Expires February 2001

[Page 86]

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

B.3 OSPF NSSA Enhancement Support

Added new objects to `OspfAreaTable` including:

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

Added new object `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.

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

-ospflocalLsdbIpAddress

Expires February 2001

[Page 87]

- ospfLocalLsdbAddressLessIf
- ospfLocalLsdbType
- ospfLocalLsdbLsid
- ospfLocalLsdbRouterId

ospfLocalLsdbTable contains the following (columnar) objects:

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

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

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

ospfVirLocalLsdbTable contains the following (columnar) objects:

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

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

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

Expires February 2001

[Page 88]

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

- ospfVirIfLsaCount

- ospfVirIfLsaChecksumSum, to indicate the sum of the type-9 link-state advertisement checksums on this link.

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

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:

Expires February 2001

[Page 89]

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

B.7 OSPF Authentication and Security

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

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

B.8 Miscellaneous

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

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

-Updated "REFERENCE" clauses in all objects, as needed

Expires February 2001

[Page 90]

-Modified the SEQUENCE of the OspfIfTable to reflect the true order of the objects in the Table

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.

It is recommended that attention be specifically given to implementing the MAX-ACCESS clause in a number of objects, including ospfIfAuthKey, ospfIfAuthType, ospfVirtIfAuthKey, and ospfVirtIfAuthType in scenarios that DO NOT use SNMPv3 strong security (i.e. authentication and encryption). Extreme caution must be used to minimize the risk of cascading security vulnerabilities when SNMPv3 strong security is not used. When SNMPv3 strong security is not used, these objects should have access of read-only, not read-create.

SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model [RFC 2574](#) [[RFC2574](#)] and the View-based Access Control Model [RFC 2575](#) [[RFC2575](#)] is recommended.

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

D Authors' Addresses

Spencer Giacalone
Predictive Systems, Inc.
145 Hudson Street
New York, NY 10013

Phone: +1 (973) 301-5695

Email: spencer.giacalone@predictive.com

Expires February 2001

[Page 91]

Dan Joyal
Nortel Networks, Inc.
600 Technology Park Drive
Billerica, MA 01821

Phone: +1 (978) 288-2629
EMail: djoyal@nortelnetworks.com

Rob Coltun
Redback Networks, Inc.
300 Furguson Drive
Mountain View, CA 94043

Phone: +1 (650) 390-9030
EMail: rcoltun@siara.com

Fred Baker
Cisco Systems, Inc.
519 Lado Drive
Santa Barbara, CA 93111

Phone: +1 (805) 681-0115
EMail: fred@cisco.com

E Full Copyright Statement

Copyright (C) The Internet Society (2000). All Rights Reserved.
This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION

HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF
MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Expires February 2001

[Page 92]