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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in IPv6-based internets. In particular, it defines objects for managing the Open Shortest Path First (OSPF) Routing Protocol for IPv6, otherwise known as OSPF version 3 (OSPFv3).

Please send comments to ospf@ietf.org.

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1. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580]

2. Overview

This memo defines a portion of the Management Information Base (MIB) for managing the Open Shortest Path First Routing Protocol for IPv6 [RFC5340], otherwise known as OSPF version 3 (OSPFv3). Though the fundamental mechanisms of OSPF version 2 (OSPFv2) [RFC2328] remain unchanged in OSPFv3, some changes were necessary due to differences in IP address size and in protocol semantics between IPv4 and IPv6. In many cases, where the protocol operations have not changed from OSPFv2, the specification for OSPFv3 does not restate the details, but instead refers to the relevant sections in the OSPFv2 specification. This MIB follows along the same lines and includes Reference clauses referring to the OSPFv2 specification when applicable.

2.1. IPv6 Interfaces

IPv6 interfaces attach to links [RFC2460]. A link is roughly defined as the layer below IPv6 (e.g. Ethernet, IPv4 Tunnel). One or more IPv6 prefixes can be associated with an IPv6 interface. IPv6 interfaces and the prefixes associated with those interfaces can be configured via the IP-MIB [RFC4293]. IPv6 interfaces are configured in the IPv6 Interface Table and IPv6 prefixes are configured in the Internet Address Prefix Table. An IPv6 interface is identified by a unique index value. IPv6 Address Prefix Table entries associated with an IPv6 interface reference the interface’s index.

Whereas an interface identifier in OSPFv2 is a local IPv4 address or MIB-2 interface index, an OSPFv3 interface identifier is an IPv6 interface index. For example, the index value of an OSPFv3 Interface Table entry is the IPv6 interface index of the IPv6 interface over which OSPFv3 is configured to operate.

2.2. Addressing Semantics

Router ID, Area ID and Link State ID remain at the OSPFv2 size of 32 bits. To ensure uniqueness, a router running both IPv4 and IPv6
concurrently can continue to use a local IPv4 host address, represented as an unsigned 32-bit value, as the OSPFv3 Router ID. Otherwise, the Router ID must be selected using another method (e.g. administratively assigned).

Router ID, Area ID and Link State ID do not have addressing semantics in OSPFv3, so their syntax is changed to Unsigned32. The Router ID index component comes before the Link State ID index component in the OSPFv3 MIB because the lack of addressing semantics in Link State IDs make them less unique identifiers than the Router ID. It is more useful to do partial OID lookups extending to the Router ID rather than the Link State ID.

2.3. Authentication

In OSPFv3, authentication has been removed from the protocol itself. MIB objects related to authentication are not carried forward from the OSPFv2 MIB.

2.4. Type of Service

OSPFv2 MIB objects related to Type of Service (ToS) are not carried forward to the OSPFv3 MIB.

2.5. Flooding Scope

Flooding scope for LSAs has been generalized and is now explicitly encoded in the LSA’s LS type field. The action to take upon receipt of unknown LSA types is also encoded in the LS type field [RFC5340]. The OSPFv3 MIB defines three Link State Database tables, one each for Area-scope LSAs, Link-scope LSAs and AS-scope LSAs.

2.6. Virtual Links

Since addressing semantics have been removed from router-LSAs in OSPFv3, Virtual Links now need to be assigned an interface ID for advertisement in Hello packets and in router-LSAs. A read-only object has been added to the Virtual Interface Table entry to view the assigned interface ID.

2.7. Neighbors

The OSPFv3 Neighbor Table is a read-only table that contains information learned from Hellos received from neighbors, including configured neighbors. The OSPFv3 Configured Neighbor Table contains entries for manually configured neighbors for use on NBMA and Point-to-Multipoint interface types.

2.8. OSPFv3 Counters

This MIB defines several counters, namely:

- ospfv3OriginateNewLsas, ospfv3RxNewLsas in the
ospfv3GeneralGroup
- ospfv3AreaSpfRuns, ospfv3AreaNssaTranslatorEvents in the ospfv3AreaTable
- ospfv3IfEvents in the ospfv3IfTable
- ospfv3VirtIfEvents in the ospfv3VirtIfTable
- ospfv3NbrEvents in the ospfv3NbrTable
- ospfv3VirtNbrEvents in the ospfv3VirtNbrTable

As a best practice, a management entity, when reading these counters, should use the discontinuity object, ospfv3DiscontinuityTime, to determine if an event that would invalidate the management entity understanding of the counters has occurred. A restart of the OSPFv3 routing process is a possible example of a discontinuity event.

2.9. Multiple OSPFv3 Instances

SNMPv3 supports "Contexts" that can be used to implement MIB views on multiple OSPFv3 instances on the same system. See [RFC3411] or its successors for details.

2.10. Notifications

Notifications define a set of notifications, objects, and mechanisms to enhance the ability to manage IP internetworks that use OSPFv3 as their Interior Gateway Protocol (IGP).

2.11. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

3. OSPFv3 Notification Overview

3.1. Introduction

OSPFv3 is an event-driven routing protocol, where an event can be a change in an OSPFv3 interface’s link-level status, the expiration of an OSPFv3 timer, or the reception of an OSPFv3 protocol packet. Many of the actions that OSPFv3 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 notifications.

3.2. Ignoring Initial Activity

The majority of critical events occur when OSPFv3 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 notifications is unnecessary since the events are expected. To avoid unnecessary notifications, a router should not originate expected OSPFv3 interface-related notifications until two of that interface’s dead timer intervals have elapsed. The expected OSPFv3 interface notifications are ospfv3IfStateChange, ospfv3VirtIfStateChange, ospfv3NbrStateChange, and ospfv3VirtNbrStateChange.

### 3.3 Throttling Notifications

The mechanism for throttling the notifications is similar to the mechanism explained in [RFC 1224](https://www.rfc-editor.org/rfc/rfc1224). The basic premise of the throttling mechanism is that of a sliding window, defined in seconds and an upper bound on the number of notifications that may be generated within this window. Note that unlike [RFC 1224](https://www.rfc-editor.org/rfc/rfc1224), notifications are not sent to inform the network manager that the throttling mechanism has kicked in.

A single window should be used to throttle all OSPFv3 notifications types except for the ospfv3LsdbOverflow and the ospfv3LsdbApproachingOverflow notifications, which should not be throttled. For example, with a window time of 3, an upper bound of 3, and events to cause notifications 1, 2, 3, and 4 (4 notifications within a 3-second period), the 4th notification should not be generated.

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

### 3.4 One Notification Per OSPFv3 Event

Several of the notifications defined in this MIB are generated as the result of finding an unusual condition while parsing an OSPFv3 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 notifications and variables, OSPFv3 should generate at most one notification per OSPFv3 event. Only the variables associated with the first unusual condition should be included with the notification. Similarly, if more than one type of unusual condition is encountered while parsing the packet, only the first event will generate a notification.

### 3.5 Polling Event Counters

Many of the tables in the OSPFv3 MIB contain generalized event counters. By enabling the notifications 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 OSPFv3 notifications when a particular counter starts increasing abnormally.

4. Structure of the OSPFv3 MIB

The MIB is composed of the following sections:

- General Variables
- Area Table
- Area-Scope Link State Database
- Link-Scope Link State Databases (non-virtual and virtual)
- AS-Scope Link State Database
- Host Table
- Interface Table
- Virtual Interface Table
- Neighbor Table
- Configured Neighbor Table
- Virtual Neighbor Table
- Area Aggregate Table
- Notifications

4.1. General Variables

The General Variables are global to the OSPFv3 Process.

4.2. Area Table

The Area Data Structure describes the OSPFv3 Areas that the router participates in.

4.3. Area-Scope, Link-Scope and AS-Scope Link State Database

The Link State Databases are provided primarily to provide detailed information for network debugging. There are separate tables for Link-Scope LSAs received over non-virtual and virtual interfaces.

4.4. Host Table

The Host Table is provided to view configured Host Route information.

4.5. Interface Table

The Interface Table describes the various IPv6 links on which OSPFv3 is configured.

4.6. Virtual Interface Table

The Virtual Interface Table describes virtual OSPFv3 links.

4.7. Neighbor, Configured Neighbor and Virtual Neighbor Tables
The Neighbor Table, the Configured Neighbor Table and the Virtual Neighbor Table describe the neighbors to the OSPFv3 Process.

4.8. Area Aggregate Table

The Area Aggregate Table describes prefixes, which summarize routing information for export outside of an Area.

4.9 Notifications

Notifications are defined for OSPFv3 events. Several objects are defined specifically as variables to be used with notifications.

5. Definitions

OSPFV3-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, mib-2,
    Counter32, Gauge32, Integer32, Unsigned32
    FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, TruthValue, RowStatus, TimeStamp
    FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
    FROM SNMPv2-CONF
    InterfaceIndex
    FROM IF-MIB
    InetAddressType, InetAddress, InetAddressPrefixLength, InetAddressIPv6
    FROM INET-ADDRESS-MIB
    Metric, BigMetric, Status,
    HelloRange, DesignatedRouterPriority
    FROM OSPF-MIB;

ospfv3MIB MODULE-IDENTITY
    LAST-UPDATED "200907161200Z"
    ORGANIZATION "IETF OSPF Working Group"
    CONTACT-INFO
        "WG E-Mail: ospf@ietf.org
        WG Chairs: Acee Lindem
            acee@redback.com
        Abhay Roy
            akr@cisco.com
        Editors: Dan Joyal
            Nortel
            600 Technology Park Drive
            Billerica, MA  01821, USA
            djoyal@nortel.com"
**DESCRIPTION**

"The MIB module for OSPF version 3.

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

REVISION "200907161200Z"
DESCRIPTION -- RFC Editor assigns RFC xxxx
"Initial version, published as RFC xxxx"
-- RFC Ed.: replace xxxx with actual RFC number & remove this note

::= { mib-2 YYY }
-- RFC Ed.: replace YYY with IANA-assigned number & remove this note

-- Textual conventions

Ospfv3UpToRefreshIntervalTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current
DESCRIPTION
"The values one might be able to configure for
variables bounded by the Refresh Interval"
REFERENCE
"OSPF Version 2, Section B. Architectural Constants"
SYNTAX Unsigned32 (1..1800)

Ospfv3DeadIntervalRangeTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current
DESCRIPTION
"The range, in seconds, of dead interval value."
REFERENCE
"OSPF Version 3, Section C.3 Router interface
parameters"
SYNTAX Unsigned32 (1..‘FFFF’h)

Ospfv3RouterIdTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current
DESCRIPTION
"A 32-bit, unsigned integer uniquely identifying the
router in the Autonomous System. To ensure
uniqueness, this may default to the value of one of
the router’s IPv4 host addresses if IPv4 is
configured on the router."
REFERENCE
"OSPF Version 3, Section C.1 Global parameters"
SYNTAX  Unsigned32 (1..'FFFFFFFF'h)

Ospfv3LsIdTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS  current
DESCRIPTION
"A unique 32-bit identifier of the piece of the routing domain that is being described by a Link State advertisement. In contrast to OSPFv2, the LSID has no addressing semantics."
REFERENCES
"OSPF Version 2, Section 2.1.4 Link State ID"
SYNTAX  Unsigned32 (1..'FFFFFFFF'h)

Ospfv3AreaIdTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS  current
DESCRIPTION
"An OSPFv3 Area Identifier. A value of zero identifies the backbone area."
REFERENCE
"OSPF Version 3, Section C.3 Router interface parameters"
SYNTAX  Unsigned32 (0..'FFFFFFFF’h)

Ospfv3IfInstIdTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS  current
DESCRIPTION
"An OSPFv3 interface instance ID"
REFERENCE
"OSPF Version 3, Section C.3 Router interface parameters"
SYNTAX  Unsigned32 (0..255)

Ospfv3LsaSequenceTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
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."
SYNTAX  Integer32

Ospfv3LsaAgeTC ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current
DESCRIPTION "The age of the link state advertisement in seconds. The high order bit of the LS age field is considered the DoNotAge bit for support of on-demand circuits."
REFERENCE "OSPF Version 2, Section 12.1.1, LS age and Extending OSPF to Support Demand Circuits, Section 2.2, The LS age field."
SYNTAX Unsigned32 (0..3600 | 32768..36368)

-- Top-level structure of MIB
ospfv3Notifications OBJECT IDENTIFIER ::= { ospfv3MIB 0 }
ospfv3Objects OBJECT IDENTIFIER ::= { ospfv3MIB 1 }
ospfv3Conformance OBJECT IDENTIFIER ::= { ospfv3MIB 2 }

-- OSPFv3 General Variables

-- These parameters apply globally to the Router’s OSPFv3 Process.
ospfv3GeneralGroup OBJECT IDENTIFIER ::= { ospfv3Objects 1 }

ospfv3RouterId OBJECT-TYPE
SYNTAX Ospfv3RouterIdTC
MAX-ACCESS read-write
STATUS current
DESCRIPTION "A 32-bit unsigned integer uniquely identifying the router in the Autonomous System. To ensure uniqueness, this may default to the 32-bit unsigned integer representation of one of the router’s IPv4 interface addresses (if IPv4 is configured on the router).

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
REFERENCE "OSPF Version 3, Section C.1 Global parameters"
::= { ospfv3GeneralGroup 1 }

ospfv3AdminStatus OBJECT-TYPE
SYNTAX Status
MAX-ACCESS read-write
STATUS current
DESCRIPTION "The administrative status of OSPFv3 in the router. The value ‘enabled’ denotes that the OSPFv3 Process is active on at least one
This object is persistent and when written the entity SHOULD save the change to non-volatile storage."

::= { ospfv3GeneralGroup 2 }

ospfv3VersionNumber OBJECT-TYPE
SYNTAX INTEGER { version3 (3) }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The version number of OSPF for IPv6 is 3."
::= { ospfv3GeneralGroup 3 }

ospfv3AreaBdrRtrStatus OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A flag to denote whether this router is an area border router. The value of this object is true(1) when the router is an area border router."
REFERENCE
"OSPF Version 2, Section 3 Splitting the AS into Areas"
::= { ospfv3GeneralGroup 4 }

ospfv3ASBdrRtrStatus OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"A flag to note whether this router is configured as an Autonomous System border router.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
REFERENCE
"OSPF Version 2, Section 3.3 Classification of routers"
::= { ospfv3GeneralGroup 5 }

ospfv3AsScopeLsaCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of AS-Scope (e.g. AS-External) link state advertisements in the link state database."
::= { ospfv3GeneralGroup 6 }
ospfv3AsScopeLsaCksumSum OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the LS checksums of the AS-scoped link state advertisements contained in the link state database. This sum can be used to determine if there has been a change in a router’s link state database or to compare the link state database of two routers."
::= { ospfv3GeneralGroup 7 }

ospfv3OriginateNewLsas OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of new link-state advertisements that have been originated. This number is incremented each time the router originates a new LSA.

Discontinuities in the value of this counter can occur at re-initialization of the management system and at other times as indicated by the value of ospfv3DiscontinuityTime."
::= { ospfv3GeneralGroup 8 }

ospfv3RxNewLsas OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of link state advertisements received determined to be new instantiations. This number does not include newer instantiations of self-originated link state advertisements.

Discontinuities in the value of this counter can occur at re-initialization of the management system and at other times as indicated by the value of ospfv3DiscontinuityTime."
::= { ospfv3GeneralGroup 9 }

ospfv3ExtLsaCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of External (LS type 0x4005) in the link state database"
	::= { ospfv3GeneralGroup 10 }

ospfv3ExtAreaLsdbLimit 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 ospfv3ExtAreaLsdbLimit, the router enters Overflow state. The router never holds more than ospfv3ExtAreaLsdbLimit non-default AS-external-LSAs in its database. ospfv3ExtAreaLsdbLimit MUST be set identically in all routers attached to the OSPFv3 backbone and/or any regular OSPFv3 area. (i.e., OSPFv3 stub areas and NSSAs are excluded).

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
	::= { ospfv3GeneralGroup 11 }

ospfv3ExitOverflowInterval OBJECT-TYPE
SYNTAX          Unsigned32
UNITS           "seconds"
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
 "The number of seconds that, after entering Overflow State, a router will attempt to leave Overflow State. This allows the router to again originate non-default, AS-External-LSAs. When set to 0, the router will not leave Overflow State until restarted.

This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
	::= { ospfv3GeneralGroup 12 }

ospfv3DemandExtensions OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
"The router’s support for demand circuits.
The value of this object is true(1) when
demand circuits are supported.

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

REFERENCE
"OSPF Version 2, Appendix on Demand Circuits"
::= { ospfv3GeneralGroup 13 }

ospfv3ReferenceBandwidth OBJECT-TYPE
SYNTAX Unsigned32
UNITS "kilobits per second"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"Reference bandwidth in kilobits per second for
calculating default interface metrics. The
default value is 100,000 KBPS (100 MBPS)

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

REFERENCE
"OSPF Version 2, Section C.3 Router interface
parameters"
DEFVAL { 100000 }
::= { ospfv3GeneralGroup 14 }

ospfv3RestartSupport OBJECT-TYPE
SYNTAX INTEGER { none (1),
plannedOnly (2),
plannedAndUnplanned (3)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"The router’s support for OSPF Graceful restart.
Options include: no restart support, only planned
restarts or both planned and unplanned restarts.

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

REFERENCE "Graceful OSPF Restart, Appendix B.1 Global
Parameters"
::= { ospfv3GeneralGroup 15 }

ospfv3RestartInterval OBJECT-TYPE
SYNTAX Ospfv3UpToRefreshIntervalTC
UNITS "seconds"
MAX-ACCESS    read-write  
STATUS       current  
DESCRIPTION  
"Configured OSPF Graceful restart timeout interval.  
This object is persistent and when written the entity SHOULD save the change to non-volatile storage." 
REFERENCE "Graceful OSPF Restart, Appendix B.1 Global Parameters (Minimum subset)"
DEFVAL { 120 }
::= { ospfv3GeneralGroup 16 }

ospfv3RestartStrictLsaChecking OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current  
DESCRIPTION  
"Indicates if strict LSA checking is enabled for graceful restart. A value of true(1) indicates that strict LSA checking is enabled.  
This object is persistent and when written the entity SHOULD save the change to non-volatile storage." 
REFERENCE "Graceful OSPF Restart, Appendix B.2 Global Parameters (Optional)"
DEFVAL { true }
::= { ospfv3GeneralGroup 17 }

ospfv3RestartStatus OBJECT-TYPE
SYNTAX      INTEGER { notRestarting (1),  
plannedRestart (2),  
unplannedRestart (3)  
}
MAX-ACCESS  read-only
STATUS      current  
DESCRIPTION  
"The current status of OSPF Graceful restart capability."
::= { ospfv3GeneralGroup 18 }

ospfv3RestartAge OBJECT-TYPE
SYNTAX      Ospfv3UpToRefreshIntervalTC
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current  
DESCRIPTION  
"Remaining time in current OSPF Graceful restart interval."
::= { ospfv3GeneralGroup 19 }

ospfv3RestartExitReason OBJECT-TYPE
SYNTAX      INTEGER { none (1),
inProgress (2),
completed (3),
timedOut (4),
topologyChanged (5)
}
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
"Describes the outcome of the last attempt at a
Graceful restart.

none:..........no restart has yet been attempted.
inProgress:....a restart attempt is currently underway.
completed:.....the last restart completed successfully.
timedOut:......the last restart timed out.
topologyChanged:the last restart was aborted due to
               a topology change."
::= { ospfv3GeneralGroup 20 }

ospfv3NotificationEnable OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This object provides a coarse level of control
over the generation of OSPFv3 notifications.
Fine grain control can be accomplished by utilizing
the objects defined in RFC 3413 [RFC3413]
specifically, those described in section 6.

If this object is set to true(1), then it enables
the generation of OSPFv3 notifications. If it is
set to false(2), these notifications are not
generated.

This object is persistent and when written the
entity SHOULD save the change to non-volatile
storage."
::= { ospfv3GeneralGroup 21 }

ospfv3StubRouterSupport OBJECT-TYPE
SYNTAX   TruthValue
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The router’s support for stub router functionality. An
object value of true(1) indicates that stub router
functionality is supported."
REFERENCE
"OSPF Stub Router Advertisement"
::= { ospfv3GeneralGroup 22 }

ospfv3StubRouterAdvertisement OBJECT-TYPE
SYNTAX       INTEGER {
            doNotAdvertise (1),
            advertise(2)
        }
MAX-ACCESS   read-write
STATUS       current
DESCRIPTION
  "This object controls the advertisement of stub LSAs by the router. The value
doNotAdvertise(1) will result in the advertisement of standard LSAs and is the default value.

  This object is persistent and when written the entity SHOULD save the change to non-volatile storage."
REFERENCE
  "OSPF Stub Router Advertisement, Section 2. Proposed Solution"
DEFVAL { doNotAdvertise }
 ::= { ospfv3GeneralGroup 23 }

ospfv3DiscontinuityTime OBJECT-TYPE
SYNTAX       TimeStamp
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
  "The value of sysUpTime on the most recent occasion at which any one of this MIB’s counters suffered a discontinuity.

  If no such discontinuities have occurred since the last reinitialization of the local management subsystem, then this object contains a zero value."
 ::= { ospfv3GeneralGroup 24 }

ospfv3RestartTime OBJECT-TYPE
SYNTAX       TimeStamp
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
  "The value of sysUpTime on the most recent occasion at which the ospfv3RestartExitReason was updated."
 ::= { ospfv3GeneralGroup 25 }

-- The OSPFv3 Area Data Structure contains information regarding the various areas. The interfaces and virtual links are configured as part of these areas.
-- Area 0, by definition, is the Backbone Area

ospfv3AreaTable OBJECT-TYPE
SYNTAX       SEQUENCE OF Ospfv3AreaEntry
MAX-ACCESS   not-accessible
STATUS       current
DESCRIPTION
"Information describing the configured parameters and cumulative statistics of the router’s attached areas. The interfaces and virtual links are configured as part of these areas. Area 0, by definition, is the Backbone Area."

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

::= { ospfv3Objects 2 }

ospfv3AreaEntry OBJECT-TYPE
SYNTAX          Ospfv3AreaEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"Information describing the configured parameters and cumulative statistics of one of the router’s attached areas.

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

INDEX           { ospfv3AreaId }
::= { ospfv3AreaTable 1 }

Ospfv3AreaEntry ::= SEQUENCE {
    ospfv3AreaId
      Ospfv3AreaIdTC,
    ospfv3AreaImportAsExtern
      INTEGER,
    ospfv3AreaSpfRuns
      Counter32,
    ospfv3AreaBdrRtrCount
      Gauge32,
    ospfv3AreaAsBdrRtrCount
      Gauge32,
    ospfv3AreaScopeLsaCount
      Gauge32,
    ospfv3AreaScopeLsaCksumSum
      Unsigned32,
    ospfv3AreaSummary
      INTEGER,
    ospfv3AreaRowStatus
      RowStatus,
    ospfv3AreaStubMetric
      BigMetric,
    ospfv3AreaNssaTranslatorRole
      INTEGER,
    ospfv3AreaNssaTranslatorState
      INTEGER,
    ospfv3AreaNssaTranslatorStabInterval
      Unsigned32,
}

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ospfv3AreaNssaTranslatorEvents
   Counter32,
ospfv3AreaStubMetricType
   INTEGER,
ospfv3AreaTEEnabled
   TruthValue
}

ospfv3AreaId OBJECT-TYPE
SYNTAX          Ospfv3AreaIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "A 32-bit unsigned integer uniquely identifying an area.
   Area ID 0 is used for the OSPFv3 backbone."
REFERENCE
   "OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3AreaEntry 1 }

ospfv3AreaImportAsExtern OBJECT-TYPE
SYNTAX          INTEGER { importExternal(1), -- normal area
                        importNoExternal(2), -- stub area
                        importNssa(3)        -- not-so-stubby-area
                    }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
   "Indicates whether an area is a Stub area, NSSA, or
   standard area. AS-scope LSAs are not imported into Stub
   Areas or NSSAs. NSSAs import AS-External data as NSSA
   LSAs which have Area-scope."
REFERENCE
   "OSPF Version 2, Appendix C.2 Area parameters"
DEFVAL { importExternal }
::= { ospfv3AreaEntry 2 }

ospfv3AreaSpfRuns OBJECT-TYPE
SYNTAX          Counter32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
   "The number of times that the intra-area route
   table has been calculated using this area’s
   link state database. This is typically done
   using Dijkstra’s algorithm.

   Discontinuities in the value of this counter
   can occur at re-initialization of the management
   system and at other times as indicated by the
   value of ospfv33DiscontinuityTime."
::= { ospfv3AreaEntry 3 }
ospfv3AreaBdrRtrCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of area border routers reachable within this area. This is initially zero, and is calculated in each Shortest Path First (SPF) pass."
DEFVAL { 0 }
::= { ospfv3AreaEntry 4 }

ospfv3AreaAsBdrRtrCount 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."
DEFVAL { 0 }
::= { ospfv3AreaEntry 5 }

ospfv3AreaScopeLsaCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of Area-Scope link state advertisements in this area’s link state database."
DEFVAL { 0 }
::= { ospfv3AreaEntry 6 }

ospfv3AreaScopeLsaCksumSum OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the Area-Scope link state advertisements’ LS checksums contained in this area’s link state database. The sum can be used to determine if there has been a change in a router’s link state database or to compare the link-state database of two routers."
::= { ospfv3AreaEntry 7 }

ospfv3AreaSummary OBJECT-TYPE
SYNTAX INTEGER {
    noAreaSummary(1),
    sendAreaSummary(2)
}

MAX-ACCESS       read-create
STATUS          current
DESCRIPTION
"The variable ospfv3AreaSummary controls the
import of Inter-Area LSAs into stub and
NSSA areas. It has no effect on other areas.

If it is noAreaSummary, the router will neither
originate nor propagate Inter-Area LSAs into the
stub or NSSA area. It will only advertise a
default route.

If it is sendAreaSummary, the router will both
summarize and propagate Inter-Area LSAs."

DEFVAL { sendAreaSummary }

::= { ospfv3AreaEntry 8 }

ospfv3AreaRowStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"This object permits management of the table by
facilitating actions such as row creation,
construction and destruction.

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

::= { ospfv3AreaEntry 9 }

ospfv3AreaStubMetric OBJECT-TYPE
SYNTAX          BigMetric
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"The metric value advertised for the default route
into Stub and NSSA areas. By default, this equals the
least metric among the interfaces to other areas."

::= { ospfv3AreaEntry 10 }

ospfv3AreaNssaTranslatorRole OBJECT-TYPE
SYNTAX          INTEGER { always(1), candidate(2) }
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"Indicates an NSSA Border router’s policy for
perform NSSA translation of NSSA-LSAs into
AS-External-LSAs."

DEFVAL { candidate }

::= { ospfv3AreaEntry 11 }

ospfv3AreaNssaTranslatorState OBJECT-TYPE
SYNTAX INTEGER {
  enabled(1),
  elected(2),
  disabled(3)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Indicates if and how an NSSA Border router is performing NSSA translation of NSSA-LSAs into AS-External-LSAs. When this object is set to enabled, the NSSA Border router’s ospfv3AreaNssaTranslatorRole has been set to always. When this object is set to elected, a candidate NSSA Border router is translating NSSA-LSAs into AS-External-LSAs. When this object is set to disabled, a candidate NSSA Border router is NOT translating NSSA-LSAs into AS-External-LSAs."
::= { ospfv3AreaEntry 12 }

ospfv3AreaNssaTranslatorStabInterval OBJECT-TYPE
SYNTAX Unsigned32
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The stability interval defined as 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 }
::= { ospfv3AreaEntry 13 }

ospfv3AreaNssaTranslatorEvents OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Indicates the number of Translator State changes that have occurred since the last start-up of the OSPFv3 routing process.
Discontinuities in the value of this counter can occur at re-initialization of the management system and at other times as indicated by the value of ospfv3DiscontinuityTime."
::= { ospfv3AreaEntry 14 }

ospfv3AreaStubMetricType OBJECT-TYPE
SYNTAX INTEGER {
  ospfv3Metric (1), -- OSPF Metric
  comparableCost (2), -- external type 1
  nonComparable (3) -- external type 2
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This variable assigns the type of metric advertised as a default route."
DEFVAL { ospfv3Metric }
::= { ospfv3AreaEntry 15 }

ospfv3AreaTEEnabled OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates whether or not traffic engineering is enabled in the area. The object is set to the value true(1) to enable traffic engineering. Traffic engineering is disabled by default."
DEFVAL { false }
::= { ospfv3AreaEntry 16 }

-- OSPFv3 AS-Scope Link State Database

ospfv3AsLsdbTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3AsLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The OSPFv3 Process’s AS-Scope Link State Database (LSDB). The LSDB contains the AS-Scope Link State Advertisements from throughout the areas that the device is attached to."
::= { ospfv3Objects 3 }

ospfv3AsLsdbEntry OBJECT-TYPE
SYNTAX Ospfv3AsLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A single AS-Scope Link State Advertisement."
INDEX { ospfv3AsLsdbType,
ospfv3AsLsdbRouterId,
ospfv3AsLsdbLsid }
::= { ospfv3AsLsdbTable 1 }

Ospfv3AsLsdbEntry ::= SEQUENCE {
ospfv3AsLsdbType
Unsigned32,
ospfv3AsLsdbRouterId
Ospfv3RouterIdTC,
ospfv3AsLsdbLsid
Ospfv3LsIdTC,
ospfv3AsLsdbType OBJECT-TYPE
  SYNTAX          Unsigned32(0..’FFFFFFFF’h)
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION
      "The type of the link state advertisement.
      Each link state type has a separate
      advertisement format. AS-Scope LSAs not recognized
      by the router may be stored in the database."
  ::= { ospfv3AsLsdbEntry 1 }

ospfv3AsLsdbRouterId OBJECT-TYPE
  SYNTAX          Ospfv3RouterIdTC
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION
      "The 32 bit number that uniquely identifies the
      originating router in the Autonomous System."
  REFERENCE
      "OSPF Version 2, Appendix C.1 Global parameters"
  ::= { ospfv3AsLsdbEntry 2 }

ospfv3AsLsdbLsid OBJECT-TYPE
  SYNTAX          Ospfv3LsIdTC
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION
      "The Link State ID is an LS Type Specific field
      containing a unique identifier;
      it identifies the piece of the routing domain
      that is being described by the advertisement.
      In contrast to OSPFv2, the LSID has no
      addressing semantics."
  ::= { ospfv3AsLsdbEntry 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.
SYNTAX          Ospfv3LsaSequenceTC
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
 "The sequence number field is a signed 32-bit
integer. It is used to detect old and duplicate
link state advertisements. The space of
sequence numbers is linearly ordered. The
larger the sequence number the more recent the
advertisement."
REFERENCE
 "OSPF Version 2, Section 12.1.6  LS sequence
number"
 ::= { ospfv3AsLsdbEntry 4 }

ospfv3AsLsdbAge OBJECT-TYPE
SYNTAX          Ospfv3LsaAgeTC
UNITS           "seconds"
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
 "This field is the age of the link state
advertisement in seconds. The high order bit
of the LS age field is considered the DoNotAge
bit for support of on-demand circuits."
REFERENCE
 "OSPF Version 2, Section 12.1.1, LS age and
Extending OSPF to Support Demand Circuits,
Section 2.2, The LS age field."
 ::= { ospfv3AsLsdbEntry 5 }

ospfv3AsLsdbChecksum 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"
 ::= { ospfv3AsLsdbEntry 6 }

ospfv3AsLsdbAdvertisement OBJECT-TYPE
SYNTAX          OCTET STRING (SIZE (1..65535))
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"The entire Link State Advertisement, including its header."
::= { ospfv3AsLsdbEntry 7 }

ospfv3AsLsdbTypeKnown OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION     "The value true(1) indicates that the LSA type is recognized by this Router."
::= { ospfv3AsLsdbEntry 8 }

-- OSPFv3 Area-Scope Link State Database

ospfv3AreaLsdbTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3AreaLsdbEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "The OSPFv3 Process’s Area-Scope LSDB. The LSDB contains the Area-Scope Link State Advertisements from throughout the area that the device is attached to."
::= { ospfv3Objects 4 }

ospfv3AreaLsdbEntry OBJECT-TYPE
SYNTAX          Ospfv3AreaLsdbEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "A single Area-Scope Link State Advertisement."
INDEX           { ospfv3AreaLsdbAreaId, ospfv3AreaLsdbType, ospfv3AreaLsdbRouterId, ospfv3AreaLsdbLsid }
::= { ospfv3AreaLsdbTable 1 }

Ospfv3AreaLsdbEntry ::= SEQUENCE {
opfv3AreaLsdbAreaId
  Ospfv3AreaIdTC,
opfv3AreaLsdbType
  Unsigned32,
opfv3AreaLsdbRouterId
  Ospfv3RouterIdTC,
opfv3AreaLsdbLsid
  Ospfv3LsIdTC,
opfv3AreaLsdbSequence
  Ospfv3LsaSequenceTC,
opfv3AreaLsdbAge
  Ospfv3LsaAgeTC,
ospfv3AreaLsdbChecksum
  Integer32,
ospfv3AreaLsdbAdvertisement
  OCTET STRING,
ospfv3AreaLsdbTypeKnown
  TruthValue
}

ospfv3AreaLsdbAreaId OBJECT-TYPE
SYNTAX     Ospfv3AreaIdTC
MAX-ACCESS not-accessible
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"
::= { ospfv3AreaLsdbEntry 1 }

ospfv3AreaLsdbType OBJECT-TYPE
SYNTAX     Unsigned32(0..'FFFFFFFF'h)
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
  "The type of the link state advertisement. Each link
  state type has a separate advertisement format. Area-
  Scope LSAs unrecognized by the router are also stored
  in this database."
::= { ospfv3AreaLsdbEntry 2 }

ospfv3AreaLsdbRouterId OBJECT-TYPE
SYNTAX     Ospfv3RouterIdTC
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
  "The 32-bit number that uniquely identifies the
  originating router in the Autonomous System."
REFERENCE
  "OSPF Version 2, Appendix C.1 Global parameters"
::= { ospfv3AreaLsdbEntry 3 }

ospfv3AreaLsdbLsid OBJECT-TYPE
SYNTAX     Ospfv3LsIdTC
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
  "The Link State ID is an LS Type Specific field
  containing a unique identifier; it identifies the piece
  of the routing domain that is being described by the
  advertisement. In contrast to OSPFv2, the LSID has no
  addressing semantics."
::= { ospfv3AreaLsdbEntry 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.

ospfv3AreaLsdbSequence OBJECT-TYPE
SYNTAX Ospfv3LsaSequenceTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The sequence number field is a signed 32-bit integer. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."
REFERENCE "OSPF Version 2, Section 12.1.6 LS sequence number"
::= { ospfv3AreaLsdbEntry 5 }

ospfv3AreaLsdbAge OBJECT-TYPE
SYNTAX Ospfv3LsaAgeTC
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This field is the age of the link state advertisement in seconds. The high order bit of the LS age field is considered the DoNotAge bit for support of on-demand circuits."
REFERENCE "OSPF Version 2, Section 12.1.1, LS age and Extending OSPF to Support Demand Circuits, Section 2.2, The LS age field."
::= { ospfv3AreaLsdbEntry 6 }

ospfv3AreaLsdbChecksum 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"
ospfv3AreaLsdbAdvertisement OBJECT-TYPE
SYNTAX OCTET STRING (SIZE (1..65535))
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The entire Link State Advertisement, including its header."
 ::= { ospfv3AreaLsdbEntry 8 }

ospfv3AreaLsdbTypeKnown OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The value true(1) indicates that the LSA type is recognized by this Router."
 ::= { ospfv3AreaLsdbEntry 9 }

-- OSPFv3 Link-Scope Link State Database, for non-virtual interfaces

ospfv3LinkLsdbTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3LinkLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The OSPFv3 Process’s Link-Scope LSDB for non-virtual interfaces. The LSDB contains the Link-Scope Link State Advertisements from the interfaces that the device is attached to."
 ::= { ospfv3Objects 5 }

ospfv3LinkLsdbEntry OBJECT-TYPE
SYNTAX Ospfv3LinkLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A single Link-Scope Link State Advertisement."
INDEX { ospfv3LinkLsdbIfIndex, ospfv3LinkLsdbIfInstId, ospfv3LinkLsdbType, ospfv3LinkLsdbRouterId, ospfv3LinkLsdbLsid }
 ::= { ospfv3LinkLsdbTable 1 }

Ospfv3LinkLsdbEntry ::= SEQUENCE {
  ospfv3LinkLsdbIfIndex
    InterfaceIndex,
  ospfv3LinkLsdbIfInstId
    Ospfv3IfInstIdTC,
ospfv3LinkLsdbType
    Unsigned32,
ospfv3LinkLsdbRouterId
    Ospfv3RouterIdTC,
ospfv3LinkLsdbLsid
    Ospfv3LsIdTC,
ospfv3LinkLsdbSequence
    Ospfv3LsaSequenceTC,
ospfv3LinkLsdbAge
    Ospfv3LsaAgeTC,
ospfv3LinkLsdbChecksum
    Integer32,
ospfv3LinkLsdbAdvertisement
    OCTET STRING,
ospfv3LinkLsdbTypeKnown
    TruthValue
}

ospfv3LinkLsdbIfIndex OBJECT-TYPE
SYNTAX          InterfaceIndex
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "The identifier of the link from which the LSA
     was received."
::= { ospfv3LinkLsdbEntry 1 }

ospfv3LinkLsdbIfInstId OBJECT-TYPE
SYNTAX          Ospfv3IfInstIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "The identifier of the interface instance from
     which the LSA was received."
::= { ospfv3LinkLsdbEntry 2 }

ospfv3LinkLsdbType OBJECT-TYPE
SYNTAX          Unsigned32(0..'FFFFFFFF'h)
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "The type of the link state advertisement.
     Each link state type has a separate
     advertisement format. Link-Scope LSAs unrecognized
     by the router are also stored in this database."
::= { ospfv3LinkLsdbEntry 3 }

ospfv3LinkLsdbRouterId OBJECT-TYPE
SYNTAX          Ospfv3RouterIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "The 32 bit number that uniquely identifies the
originating router in the Autonomous System.

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

::= { ospfv3LinkLsdbEntry 4 }

ospfv3LinkLsdbLsid OBJECT-TYPE
SYNTAX        Ospfv3LsIdTC
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
"The Link State ID is an LS Type Specific field containing a unique identifier; it identifies the piece of the routing domain that is being described by the advertisement. In contrast to OSPFv2, the LSID has no addressing semantics. However, in OSPFv3 the Link State ID always contains the flooding scope of the LSA."

::= { ospfv3LinkLsdbEntry 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.

ospfv3LinkLsdbSequence OBJECT-TYPE
SYNTAX          Ospfv3LsaSequenceTC
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"The sequence number field is a signed 32-bit integer. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."

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

::= { ospfv3LinkLsdbEntry 6 }

ospfv3LinkLsdbAge OBJECT-TYPE
SYNTAX        Ospfv3LsaAgeTC
UNITS          "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
"This field is the age of the link state advertisement in seconds. The high order bit of the LS age field is considered the DoNotAge bit for support of on-demand circuits."

REFERENCE
"OSPF Version 2, Section 12.1.1, LS age and
Extending OSPF to Support Demand Circuits,
Section 2.2, The LS age field.

::= { ospfv3LinkLsdbEntry 7 }

ospfv3LinkLsdbChecksum 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"
::= { ospfv3LinkLsdbEntry 8 }

ospfv3LinkLsdbAdvertisement OBJECT-TYPE
SYNTAX          OCTET STRING (SIZE (1..65535))
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"The entire Link State Advertisement, including
its header."
::= { ospfv3LinkLsdbEntry 9 }

ospfv3LinkLsdbTypeKnown OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"The value true(1) indicates that the LSA type is
recognized by this Router."
::= { ospfv3LinkLsdbEntry 10 }

-- OSPF Host Table

ospfv3HostTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3HostEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"The Host/Metric Table indicates what hosts are
directly attached to the router and their
corresponding metrics."
REFERENCE
"OSPF Version 2, Appendix C.6 Host route
parameters"
::= { ospfv3Objects 6 }

ospfv3HostEntry OBJECT-TYPE
SYNTAX Ospfv3HostEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A metric to be advertised when a given host is reachable.
The information in this table is persistent and when written the entity SHOULD save the change to non-volatile storage."
INDEX { ospfv3HostAddressType, ospfv3HostAddress }
::= { ospfv3HostTable 1 }

Ospfv3HostEntry ::= SEQUENCE {
ospfv3HostAddressType InetAddressType,
ospfv3HostAddress InetAddress,
ospfv3HostMetric Metric,
ospfv3HostRowStatus RowStatus,
ospfv3HostAreaID Ospfv3AreaIdTC
}

ospfv3HostAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The address type of ospfv3HostAddress. Only IPv6 global address type expected."
REFERENCE
"OSPF Version 2, Appendix C.6 Host route parameters"
::= { ospfv3HostEntry 1 }

ospfv3HostAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The IPv6 Address of the Host. Must be an IPv6 global address."
REFERENCE
"OSPF Version 2, Appendix C.6 Host route parameters"
::= { ospfv3HostEntry 2 }

ospfv3HostMetric OBJECT-TYPE
SYNTAX Metric
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The Metric to be advertised."
REFERENCE "OSPF Version 2, Appendix C.6 Host route parameters"
::= { ospfv3HostEntry 3 }

ospfv3HostRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."
::= { ospfv3HostEntry 4 }

ospfv3HostAreaID OBJECT-TYPE
SYNTAX Ospfv3AreaIdTC
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The Area the Host Entry is to be found within. By default, the area for the subsuming OSPFv3 interface or Area 0 if there is no subsuming interface."
REFERENCE "OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3HostEntry 5 }

-- OSPFv3 Interface Table

ospfv3IfTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3IfEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The OSPFv3 Interface Table describes the interfaces from the viewpoint of OSPFv3."
REFERENCE "OSPF for IPv6, Appendix C.3 Router interface parameters"
::= { ospfv3Objects 7 }

ospfv3IfEntry OBJECT-TYPE
SYNTAX Ospfv3IfEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The OSPFv3 Interface Entry describes one interface from the viewpoint of OSPFv3.

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

INDEX { ospfv3IfIndex, ospfv3IfInstId }
::= { ospfv3IfTable 1 }

Ospfv3IfEntry ::= SEQUENCE {
    ospfv3IfIndex         InterfaceIndex,
    ospfv3IfInstId        Ospfv3IfInstIdTC,
    ospfv3IfAreaId        Ospfv3AreaIdTC,
    ospfv3IfType          INTEGER,
    ospfv3IfAdminStatus   Status,
    ospfv3IfRtrPriority   DesignatedRouterPriority,
    ospfv3IfTransitDelay  Ospfv3UpToRefreshIntervalTC,
    ospfv3IfRetransInterval Ospfv3UpToRefreshIntervalTC,
    ospfv3IfHelloInterval HelloRange,
    ospfv3IfRtrDeadInterval Ospfv3DeadIntervalRangeTC,
    ospfv3IfPollInterval  Unsigned32,
    ospfv3IfState         INTEGER,
    ospfv3IfDesignatedRouter Ospfv3RouterIdTC,
    ospfv3IfBackupDesignatedRouter Ospfv3RouterIdTC,
    ospfv3IfEvents        Counter32,
    ospfv3IfRowStatus     RowStatus,
    ospfv3IfDemand        TruthValue,
ospfv3IfMetricValue
    Metric,
ospfv3IfLinkScopeLsaCount
    Gauge32,
ospfv3IfLinkLsaCksumSum
    Unsigned32,
ospfv3IfDemandNbrProbe
    TruthValue,
ospfv3IfDemandNbrProbeRetransLimit
    Unsigned32,
ospfv3IfDemandNbrProbeInterval
    Unsigned32,
ospfv3IfTEDisabled
    TruthValue,
ospfv3IfLinkLSASupression
    TruthValue
}

ospfv3IfIndex OBJECT-TYPE
SYNTAX          InterfaceIndex
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "The interface index of this OSPFv3 interface.
    It corresponds to the interface index of the
    IPv6 interface on which OSPFv3 is configured."
::= { ospfv3IfEntry 1 }

ospfv3IfInstId OBJECT-TYPE
SYNTAX          Ospfv3IfInstIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
    "Enables multiple interface instances of OSPFv3
to be run over a single link. Each interface
instance would be assigned a separate ID. This ID
has local link significance only."
::= { ospfv3IfEntry 2 }

ospfv3IfAreaId OBJECT-TYPE
SYNTAX          Ospfv3AreaIdTC
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
    "A 32-bit integer uniquely identifying the area
to which the interface connects. Area ID
0 is used for the OSPFv3 backbone."
DEFVAL          { 0 }
::= { ospfv3IfEntry 3 }

ospfv3IfType OBJECT-TYPE
SYNTAX          INTEGER {
    broadcast(1),
ospfv3IfAdminStatus OBJECT-TYPE
SYNTAX Status
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The OSPFv3 interface’s administrative status. The value formed on the interface, and the interface will be advertised as an internal route to some area. The value ‘disabled’ denotes that the interface is external to OSPFv3.

Note that a value of ‘disabled’ for the object ospfv3AdminStatus will override a value of ‘enabled’ for the interface."
DEFVAL { enabled }
::= { ospfv3IfEntry 5 }

ospfv3IfRtrPriority OBJECT-TYPE
SYNTAX DesignatedRouterPriority
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The priority of this interface. Used in multi-access networks, this field is used in the designated router election algorithm. The value 0 signifies that the router is not eligible to become the designated router on this particular network. In the event of a tie in this value, routers will use their Router ID as a tie breaker."
DEFVAL { 1 }
::= { ospfv3IfEntry 6 }

ospfv3IfTransitDelay OBJECT-TYPE
SYNTAX Ospfv3UpToRefreshIntervalTC
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The estimated number of seconds it takes to transmit a Link State Update packet over this interface. LSAs contained in the update packet must have their age incremented by this amount before transmission. This
value should take into account the transmission and propagation delays of the interface.

REFERENCE
"OSPF for IPv6, Appendix C.3 Router interface parameters."

DEFVAL { 1 }
::= { ospfv3IfEntry 7 }

ospfv3IfRetransInterval OBJECT-TYPE
SYNTAX Ospfv3UpToRefreshIntervalTC
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds between link state advertisement retransmissions for adjacencies belonging to this interface. This value is also used when retransmitting database description and link state request packets."

DEFVAL { 5 }
::= { ospfv3IfEntry 8 }

ospfv3IfHelloInterval OBJECT-TYPE
SYNTAX HelloRange
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The length of time, in seconds, between the Hello packets that the router sends on the interface. This value must be the same for all routers attached to a common network."

DEFVAL { 10 }
::= { ospfv3IfEntry 9 }

ospfv3IfRtrDeadInterval OBJECT-TYPE
SYNTAX Ospfv3DeadIntervalRangeTC
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds that a router’s Hello packets have not been seen before its neighbors declare the router down on the interface. 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 }
::= { ospfv3IfEntry 10 }

ospfv3IfPollInterval OBJECT-TYPE
SYNTAX Unsigned32
UNITS "seconds"
MAX-ACCESS    read-create  
STATUS        current  
DESCRIPTION   "The larger time interval, in seconds, between   
the Hello packets sent to an inactive,   
non-broadcast, multi-access neighbor."
DEFVAL        {   120   }
::= { ospfv3IfEntry 11 }

ospfv3IfState OBJECT-TYPE
SYNTAX       INTEGER {   down(1),   loopback(2),   waiting(3),   pointToPoint(4),   designatedRouter(5),   backupDesignatedRouter(6),   otherDesignatedRouter(7),   standby(8)   }
MAX-ACCESS   read-only  
STATUS       current  
DESCRIPTION   "The OSPFv3 Interface State. An interface may be   
in standby state if there are multiple interfaces   
on the link and another interface is active. The   
interface may be in down state if the underlying   
IPv6 interface is down or if the admin status is   
'disabled' either globally or for the interface."
::= { ospfv3IfEntry 12 }

ospfv3IfDesignatedRouter OBJECT-TYPE
SYNTAX       Ospfv3RouterIdTC  
MAX-ACCESS   read-only  
STATUS       current  
DESCRIPTION   "The Router ID of the Designated Router."
::= { ospfv3IfEntry 13 }

ospfv3IfBackupDesignatedRouter OBJECT-TYPE
SYNTAX       Ospfv3RouterIdTC  
MAX-ACCESS   read-only  
STATUS       current  
DESCRIPTION   "The Router ID of the Backup Designated   
Router."
::= { ospfv3IfEntry 14 }

ospfv3IfEvents OBJECT-TYPE
SYNTAX       Counter32  
MAX-ACCESS   read-only  
STATUS       current  
DESCRIPTION

"The number of times this OSPFv3 interface has changed its state or an error has occurred. Discontinuities in the value of this counter can occur at re-initialization of the management system and at other times as indicated by the value of ospfv3DiscontinuityTime."

::= { ospfv3IfEntry 15 }

ospfv3IfRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object permits management of the table by facilitating actions such as row creation, construction and destruction.

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

::= { ospfv3IfEntry 16 }

ospfv3IfDemand OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates whether Demand OSPFv3 procedures (hello suppression to FULL neighbors and setting the DoNotAge flag on propagated LSAs) should be performed on this interface."

DEFVAL { false }

::= { ospfv3IfEntry 17 }

ospfv3IfMetricValue OBJECT-TYPE
SYNTAX Metric
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The metric assigned to this interface. The default value of the Metric is Reference Bandwidth / ifSpeed. The value of the reference bandwidth can be set in the ospfv3ReferenceBandwidth object."

::= { ospfv3IfEntry 18 }

ospfv3IfLinkScopeLsaCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of Link-Scope link state advertisements in this link’s link state database."
::= { ospfv3IfEntry 19 }

ospfv3IfLinkLsaCksumSum OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the Link-Scope link state advertisements’ LS checksums contained in this link’s link state database. The sum can be used to determine if there has been a change in a router’s link state database or to compare the link state database of two routers."
::= { ospfv3IfEntry 20 }

ospfv3IfDemandNbrProbe OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates whether or not neighbor probing is enabled to determine whether or not the neighbor is inactive. Neighbor probing is disabled by default."
DEFVAL { false }
::= { ospfv3IfEntry 21 }

ospfv3IfDemandNbrProbeRetransLimit OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of consecutive LSA retransmissions before the neighbor is deemed inactive and the neighbor adjacency is brought down."
DEFVAL { 10 }
::= { ospfv3IfEntry 22 }

ospfv3IfDemandNbrProbeInterval OBJECT-TYPE
SYNTAX Unsigned32
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Defines how often the neighbor will be probed."
DEFVAL { 120 }
::= { ospfv3IfEntry 23 }

ospfv3IfTEDisabled OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "Indicates whether or not traffic engineering is disabled on the interface when traffic engineering is enabled in the area where the interface is attached. The object is set to the value true(1) to disable traffic engineering on the interface. Traffic engineering is enabled by default on the interface when traffic engineering is enabled in the area where the interface is attached."
DEFVAL { false }
::= { ospfv3IfEntry 24 }

ospfv3IfLinkLSASuppression OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "Specifies whether or not Link LSA origination needs to be suppressed for non-Broadcast or NBMA. The object is set to value true (1) to suppress the origination."
REFERENCE
 "OSPF Version 3, Appendix C.3."
DEFVAL { false }
::= { ospfv3IfEntry 25 }

-- OSPFv3 Virtual Interface Table

ospfv3VirtIfTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3VirtIfEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
 "Information about this router’s virtual interfaces that the OSPFv3 Process is configured to carry on."
REFERENCE
 "OSPF Version 3, Appendix C.4 Virtual link parameters"
::= { ospfv3Objects 8 }

ospfv3VirtIfEntry OBJECT-TYPE
SYNTAX          Ospfv3VirtIfEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
 "Information about a single Virtual Interface.
The information in this table is persistent
and when written the entity SHOULD save the change to non-volatile storage."

INDEX
    { ospfv3VirtIfAreaId,
      ospfv3VirtIfNeighbor }

::= { ospfv3VirtIfTable 1 }

Ospfv3VirtIfEntry ::= SEQUENCE {
    ospfv3VirtIfAreaId
        Ospfv3AreaIdTC,
    ospfv3VirtIfNeighbor
        Ospfv3RouterIdTC,
    ospfv3VirtIfIndex
        InterfaceIndex,
    ospfv3VirtIfInstId
        Ospfv3IfInstIdTC,
    ospfv3VirtIfTransitDelay
        Ospfv3UpToRefreshIntervalTC,
    ospfv3VirtIfRetransInterval
        Ospfv3UpToRefreshIntervalTC,
    ospfv3VirtIfHelloInterval
        HelloRange,
    ospfv3VirtIfRtrDeadInterval
        Ospfv3DeadIntervalRangeTC,
    ospfv3VirtIfState
        INTEGER,
    ospfv3VirtIfEvents
        Counter32,
    ospfv3VirtIfRowStatus
        RowStatus,
    ospfv3VirtIfLinkScopeLsaCount
        Gauge32,
    ospfv3VirtIfLinkLsaCksumSum
        Unsigned32
}

ospfv3VirtIfAreaId OBJECT-TYPE
    SYNTAX          Ospfv3AreaIdTC
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The Transit Area that the Virtual Link traverses. By definition, this is not Area 0."

    ::= { ospfv3VirtIfEntry 1 }

ospfv3VirtIfNeighbor OBJECT-TYPE
    SYNTAX          Ospfv3RouterIdTC
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The Router ID of the Virtual Neighbor."

    ::= { ospfv3VirtIfEntry 2 }
ospfv3VirtIfIndex OBJECT-TYPE
SYNTAX                 InterfaceIndex
MAX-ACCESS            read-only
STATUS                current
DESCRIPTION
  "The local interface index assigned by the
  OSPFv3 process to this OSPFv3 virtual interface.
  It is advertised in Hello's sent over the virtual
  link and in the router's router-LSAs."
::= { ospfv3VirtIfEntry 3 }

ospfv3VirtIfInstId OBJECT-TYPE
SYNTAX                 Ospfv3IfInstIdTC
MAX-ACCESS            read-only
STATUS                current
DESCRIPTION
  "The local interface instance ID assigned by the
  OSPFv3 process to this OSPFv3 virtual interface."
::= { ospfv3VirtIfEntry 4 }

ospfv3VirtIfTransitDelay OBJECT-TYPE
SYNTAX                 Ospfv3UpToRefreshIntervalTC
UNITS                  "seconds"
MAX-ACCESS            read-create
STATUS                current
DESCRIPTION
  "The estimated number of seconds it takes to
  transmit a link state update packet over this
  interface."
DEFVAL                  { 1 }
::= { ospfv3VirtIfEntry 5 }

ospfv3VirtIfRetransInterval OBJECT-TYPE
SYNTAX                 Ospfv3UpToRefreshIntervalTC
UNITS                  "seconds"
MAX-ACCESS            read-create
STATUS                current
DESCRIPTION
  "The number of seconds between link state
  advertisement retransmissions for adjacencies
  belonging to this interface. This value is
  also used when retransmitting database
  description and link state request packets. This
  value should be well over the expected
  round-trip time."
DEFVAL                  { 5 }
::= { ospfv3VirtIfEntry 6 }

ospfv3VirtIfHelloInterval OBJECT-TYPE
SYNTAX                 HelloRange
UNITS                  "seconds"
MAX-ACCESS            read-create
STATUS                current
DESCRIPTION
"The length of time, in seconds, between the
Hello packets that the router sends on the
interface. This value must be the same for the
virtual neighbor."
DEFVAL { 10 }
::= { ospfv3VirtIfEntry 7 }

ospfv3VirtIfRtrDeadInterval OBJECT-TYPE
SYNTAX Ospfv3DeadIntervalRangeTC
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds that a router’s Hello
packets have not been seen before its
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 }
::= { ospfv3VirtIfEntry 8 }

ospfv3VirtIfState OBJECT-TYPE
SYNTAX INTEGER {
  down(1),
  pointToPoint(4)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"OSPF virtual interface states. The same encoding
as the ospfV3IfTable is used."
::= { ospfv3VirtIfEntry 9 }

ospfv3VirtIfEvents OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of state changes or error events on
this Virtual Link.

Discontinuities in the value of this counter
can occur at re-initialization of the management
system and at other times as indicated by the
value of ospfv3DiscontinuityTime."
::= { ospfv3VirtIfEntry 10 }

ospfv3VirtIfRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."
::= { ospfv3VirtIfEntry 11 }

ospfv3VirtIfLinkScopeLsaCount OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of Link-Scope link state advertisements in this virtual link’s link state database."
::= { ospfv3VirtIfEntry 12 }

ospfv3VirtIfLinkLsaCksumSum OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the Link-Scope link-state advertisements’ LS checksums contained in this virtual link’s link-state database. The sum can be used to determine if there has been a change in a router’s link state database or to compare the link state database of two routers."
::= { ospfv3VirtIfEntry 13 }

-- OSPFv3 Neighbor Table

ospfv3NbrTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3NbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table describing all neighbors in the locality of the OSPFv3 router."
REFERENCE
"OSPF Version 2, Section 10 The Neighbor Data Structure"
::= { ospfv3Objects 9 }

ospfv3NbrEntry OBJECT-TYPE
SYNTAX Ospfv3NbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The information regarding a single neighbor."

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

INDEX { ospfv3NbrIfIndex, ospfv3NbrIfInstId, ospfv3NbrRtrId }
::= { ospfv3NbrTable 1 }

Ospfv3NbrEntry ::= SEQUENCE {
  ospfv3NbrIfIndex
    InterfaceIndex,
  ospfv3NbrIfInstId
    ospfv3IfInstIdTC,
  ospfv3NbrRtrId
    Ospfv3RouterIdTC,
  ospfv3NbrAddressType
    InetAddressType,
  ospfv3NbrAddress
    InetAddress,
  ospfv3NbrOptions
    Integer32,
  ospfv3NbrPriority
    DesignatedRouterPriority,
  ospfv3NbrState
    INTEGER,
  ospfv3NbrEvents
    Counter32,
  ospfv3NbrLsRetransQLen
    Gauge32,
  ospfv3NbrHelloSuppressed
    TruthValue,
  ospfv3NbrIfId
    InterfaceIndex,
  ospfv3NbrRestartHelperStatus
    INTEGER,
  ospfv3NbrRestartHelperAge
    Ospfv3UpToRefreshIntervalTC,
  ospfv3NbrRestartHelperExitReason
    INTEGER
}

ospfv3NbrIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The local link ID of the link over which the neighbor can be reached."
::= { ospfv3NbrEntry 1 }

ospfv3NbrIfInstId OBJECT-TYPE
SYNTAX Ospfv3IfInstIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Interface instance over which the neighbor can be reached. This ID has local link significance only."
::= { ospfv3NbrEntry 2 }

ospfv3NbrRtrId OBJECT-TYPE
SYNTAX Ospfv3RouterIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A 32-bit unsigned integer uniquely identifying the Neighboring router in the Autonomous System."
::= { ospfv3NbrEntry 3 }

ospfv3NbrAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The address type of ospfv3NbrAddress. Only IPv6 addresses without zone index are expected."
::= { ospfv3NbrEntry 4 }

ospfv3NbrAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The IPv6 address of the neighbor associated with the local link."
::= { ospfv3NbrEntry 5 }

ospfv3NbrOptions OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A Bit Mask corresponding to the neighbor’s options field."
REFERENCE
"OSPF Version 3, Appendix A.2 the Options field"
::= { ospfv3NbrEntry 6 }

ospfv3NbrPriority OBJECT-TYPE
SYNTAX DesignatedRouterPriority
MAX-ACCESS read-only
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."
::= { ospfv3NbrEntry 7 }

ospfv3NbrState 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"
::= { ospfv3NbrEntry 8 }

ospfv3NbrEvents OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of times this neighbor relationship
has changed state or an error has occurred.
Discontinuities in the value of this counter
can occur at re-initialization of the management
system and at other times as indicated by the
value of ospfv3DiscontinuityTime."
::= { ospfv3NbrEntry 9 }

ospfv3NbrLsRetransQLen OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The current length of the retransmission
queue."
::= { ospfv3NbrEntry 10 }

ospfv3NbrHelloSuppressed OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Indicates whether Hellos are being suppressed
to the neighbor
::= { ospfv3NbrEntry 11 }

ospfv3NbrIfId OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The interface ID that the neighbor advertises in its Hello Packets on this link, that is, the neighbor's local interface index."
::= { ospfv3NbrEntry 12 }

ospfv3NbrRestartHelperStatus OBJECT-TYPE
SYNTAX INTEGER { notHelping (1),
               helping (2)
             }
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Indicates whether the router is acting as a Graceful restart helper for the neighbor."
::= { ospfv3NbrEntry 13 }

ospfv3NbrRestartHelperAge OBJECT-TYPE
SYNTAX Ospfv3UpToRefreshIntervalTC
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Remaining time in current OSPF Graceful restart interval, if the router is acting as a restart helper for the neighbor."
::= { ospfv3NbrEntry 14 }

ospfv3NbrRestartHelperExitReason OBJECT-TYPE
SYNTAX INTEGER { none (1),
                 inProgress (2),
                 completed (3),
                 timedOut (4),
                 topologyChanged (5)
               }
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Describes the outcome of the last attempt at acting as a Graceful restart helper for the neighbor.

none:..............no restart has yet been attempted.
inProgress:........a restart attempt is currently underway.
completed:........the last restart completed successfully.
timedOut:........the last restart timed out.
topologyChanged:the last restart was aborted due to
::= { ospfv3NbrEntry 15 }

-- OSPFv3 Configured Neighbor Table

ospfv3CfgNbrTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3CfgNbrEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "A table describing all configured neighbors. The configured neighbors table just gives
OSPFv3 information for sending OSPFv3 packets to potential neighbors and is typically used
on nbma and point-to-multipoint networks. Once a hello is received from a neighbor in
the configured neighbor table, an entry for that neighbor is created in the neighbor table
and adjacency state is maintained there. Neighbors on multi-access or point-to-point
networks can use multicast addressing, so only neighbor table entries are created for them."
REFERENCE
  "OSPF Version 2, Section 10 The Neighbor Data Structure"
::= { ospfv3Objects 10 }

ospfv3CfgNbrEntry OBJECT-TYPE
SYNTAX          Ospfv3CfgNbrEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "The information regarding a single configured neighbor. The information in this table is persistent
and when written the entity SHOULD save the change to non-volatile storage."
REFERENCE
  "OSPF Version 2, Section 10 The Neighbor Data Structure"
INDEX           { ospfv3CfgNbrIfIndex,
                      ospfv3CfgNbrIfInstId,
                      ospfv3CfgNbrAddressType,
                      ospfv3CfgNbrAddress }
::= { ospfv3CfgNbrTable 1 }

Ospfv3CfgNbrEntry ::= SEQUENCE {
Ospfv3IfInstIdTC,
ospfv3CfgNbrAddressType
     InetAddressType,
ospfv3CfgNbrAddress
     InetAddress,
ospfv3CfgNbrPriority
     DesignatedRouterPriority,
ospfv3CfgNbrRowStatus
     RowStatus
}

ospfv3CfgNbrIfIndex OBJECT-TYPE
SYNTAX          InterfaceIndex
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The local link ID of the link over which the
   neighbor can be reached."
::= { ospfv3CfgNbrEntry 1 }

ospfv3CfgNbrIfInstId OBJECT-TYPE
SYNTAX          Ospfv3IfInstIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "Interface instance over which the neighbor
   can be reached. This ID has local link
   significance only."
::= { ospfv3CfgNbrEntry 2 }

ospfv3CfgNbrAddressType OBJECT-TYPE
SYNTAX          InetAddressType
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The address type of ospfv3NbrAddress. Only IPv6
   addresses without zone index are expected."
::= { ospfv3CfgNbrEntry 3 }

ospfv3CfgNbrAddress OBJECT-TYPE
SYNTAX          InetAddress
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The IPv6 address of the neighbor associated with
   the local link."
::= { ospfv3CfgNbrEntry 4 }

ospfv3CfgNbrPriority 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 } ::= { ospfv3CfgNbrEntry 5 }

ospfv3CfgNbrRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object permits management of the table by facilitating actions such as row creation, construction and destruction.

The value of this object has no effect on whether other objects in this conceptual row can be modified."
 ::= { ospfv3CfgNbrEntry 6 }

-- OSPFv3 Virtual Neighbor Table

ospfv3VirtNbrTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3VirtNbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A table describing all virtual neighbors."
REFERENCE "OSPF Version 2, Section 15 Virtual Links"
 ::= { ospfv3Objects 11 }

ospfv3VirtNbrEntry OBJECT-TYPE
SYNTAX Ospfv3VirtNbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "Virtual neighbor information."
INDEX { ospfv3VirtNbrArea, ospfv3VirtNbrRtrId }
 ::= { ospfv3VirtNbrTable 1 }

Ospfv3VirtNbrEntry ::= SEQUENCE {
  ospfv3VirtNbrArea
    Ospfv3AreaIdTC, 
  ospfv3VirtNbrRtrId
    Ospfv3RouterIdTC, 
  ospfv3VirtNbrIfIndex
    InterfaceIndex, 
  ospfv3VirtNbrIfInstId
    Ospfv3IfInstIdTC, 
  ospfv3VirtNbrAddressType
    Ospfv3AddressType
  }

InetAddressType,
ospfv3VirtNbrAddress
   InetAddress,
ospfv3VirtNbrOptions
   Integer32,
ospfv3VirtNbrState
   INTEGER,
ospfv3VirtNbrEvents
   Counter32,
ospfv3VirtNbrLsRetransQLen
   Gauge32,
ospfv3VirtNbrHelloSuppressed
   TruthValue,
ospfv3VirtNbrIfId
   InterfaceIndex,
ospfv3VirtNbrRestartHelperStatus
   INTEGER,
ospfv3VirtNbrRestartHelperAge
   Ospfv3UpToRefreshIntervalTC,
ospfv3VirtNbrRestartHelperExitReason
   INTEGER
}

ospfv3VirtNbrArea OBJECT-TYPE
SYNTAX          Ospfv3AreaIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION      "The Transit Area Identifier."
::= { ospfv3VirtNbrEntry 1 }

ospfv3VirtNbrRtrId OBJECT-TYPE
SYNTAX          Ospfv3RouterIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION      "A 32-bit integer uniquely identifying the neighboring router in the Autonomous System."
::= { ospfv3VirtNbrEntry 2 }

ospfv3VirtNbrIfIndex OBJECT-TYPE
SYNTAX          InterfaceIndex
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION      "The local interface ID for the virtual link over which the neighbor can be reached."
::= { ospfv3VirtNbrEntry 3 }

ospfv3VirtNbrIfInstId OBJECT-TYPE
SYNTAX          Ospfv3IfInstIdTC
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION

"The interface instance for the virtual link over which the neighbor can be reached."
::= { ospfv3VirtNbrEntry 4 }

ospfv3VirtNbrAddressType OBJECT-TYPE
SYNTAX       InetAddressType
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION

"The address type of ospfv3VirtNbrAddress. Only IPv6 addresses without zone index are expected."
::= { ospfv3VirtNbrEntry 5 }

ospfv3VirtNbrAddress OBJECT-TYPE
SYNTAX       InetAddress
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION

"The IPv6 address advertised by this Virtual Neighbor. It must be a Global scope address."
::= { ospfv3VirtNbrEntry 6 }

ospfv3VirtNbrOptions OBJECT-TYPE
SYNTAX       Integer32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION

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

"OSPF Version 3, Appendix A.2 the Options field"
::= { ospfv3VirtNbrEntry 7 }

ospfv3VirtNbrState 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."
::= { ospfv3VirtNbrEntry 8 }

ospfv3VirtNbrEvents OBJECT-TYPE
SYNTAX       Counter32
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION

"The state of the Virtual Neighbor Relationship."
::= { ospfv3VirtNbrEntry 8 }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of times this virtual link has
changed its state or an error has occurred.
Discontinuities in the value of this counter
can occur at re-initialization of the management
system and at other times as indicated by the
value of ospfv3DiscontinuityTime."
::= { ospfv3VirtNbrEntry 9 }

ospfv3VirtNbrLsRetransQLen OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current length of the retransmission
queue."
::= { ospfv3VirtNbrEntry 10 }

ospfv3VirtNbrHelloSuppressed OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indicates whether Hellos are being suppressed
to the neighbor"
::= { ospfv3VirtNbrEntry 11 }

ospfv3VirtNbrIfId OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The interface ID that the neighbor advertises
in its Hello Packets on this virtual link, that is,
the neighbor’s local interface ID."
::= { ospfv3VirtNbrEntry 12 }

ospfv3VirtNbrRestartHelperStatus OBJECT-TYPE
SYNTAX INTEGER { notHelping (1),
helping (2) }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indicates whether the router is acting
as a Graceful restart helper for the neighbor."
::= { ospfv3VirtNbrEntry 13 }

ospfv3VirtNbrRestartHelperAge OBJECT-TYPE
SYNTAX Ospfv3UpToRefreshIntervalTC
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Remaining time in current OSPF Graceful restart interval, if the router is acting as a restart helper for the neighbor."
::= { ospfv3VirtNbrEntry 14 }

ospfv3VirtNbrRestartHelperExitReason OBJECT-TYPE
SYNTAX INTEGER { none (1),
inProgress (2),
completed (3),
timedOut (4),
topologyChanged (5) }
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Describes the outcome of the last attempt at acting as a Graceful restart helper for the neighbor.

none:..............no restart has yet been attempted.
inProgress:.......a restart attempt is currently underway.
completed:........the last restart completed successfully.
timedOut:........the last restart timed out.
topologyChanged:the last restart was aborted due to a topology change."
::= { ospfv3VirtNbrEntry 15 }

--
-- The OSPFv3 Area Aggregate Table
--

ospfv3AreaAggregateTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3AreaAggregateEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The Area Aggregate Table acts as an adjunct to the Area Table. It describes those address aggregates that are configured to be propagated from an area. Its purpose is to reduce the amount of information that is known beyond an Area’s borders.

A range of IPv6 prefixes specified by a prefix/prefix length pair. Note that if ranges are configured such that one range subsumes another range the most specific match is the preferred one."
::= { ospfv3Objects 12 }

ospfv3AreaAggregateEntry OBJECT-TYPE
SYNTAX Ospfv3AreaAggregateEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A single area aggregate entry.

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

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

INDEX { ospfv3AreaAggregateAreaID,
ospfv3AreaAggregateAreaLsdbType,
ospfv3AreaAggregatePrefixType,
ospfv3AreaAggregatePrefix,
ospfv3AreaAggregatePrefixLength }
::= { ospfv3AreaAggregateTable 1 }

Ospfv3AreaAggregateEntry ::= SEQUENCE {
ospfv3AreaAggregateAreaID Ospfv3AreaIdTC,
ospfv3AreaAggregateAreaLsdbType INTEGER,
ospfv3AreaAggregatePrefixType InetAddressType,
ospfv3AreaAggregatePrefix InetAddress,
ospfv3AreaAggregatePrefixLength InetAddressPrefixLength,
ospfv3AreaAggregateRowStatus RowStatus,
ospfv3AreaAggregateEffect INTEGER,
ospfv3AreaAggregateRouteTag Unsigned32 }

ospfv3AreaAggregateAreaID OBJECT-TYPE
SYNTAX Ospfv3AreaIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The Area the Address Aggregate is to be found
within."

REFERENCE
"OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3AreaAggregateEntry 1 }

ospfv3AreaAggregateAreaLsdbType OBJECT-TYPE
SYNTAX INTEGER {
interAreaPrefixLsa(8195), -- 0x2003
nssaExternalLsa(8199) -- 0x2007

MAX-ACCESS not-accessible
STATUS current

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

REFERENCE
"OSPF Version 2, Appendix A.4.1 The Link State Advertisement header"
::= { ospfv3AreaAggregateEntry 2 }

ospfv3AreaAggregatePrefixType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION
"The prefix type of ospfv3AreaAggregatePrefix. Only IPv6 addresses are expected."
::= { ospfv3AreaAggregateEntry 3 }

ospfv3AreaAggregatePrefix OBJECT-TYPE
SYNTAX InetAddress (SIZE (0..16))
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION
"The IPv6 Prefix."
REFERENCE
"OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3AreaAggregateEntry 4 }

ospfv3AreaAggregatePrefixLength OBJECT-TYPE
SYNTAX InetAddressPrefixLength (3..128)
UNITS "bits"
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION
"The length of the prefix (in bits). A prefix can not be shorter than 3 bits."
REFERENCE
"OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3AreaAggregateEntry 5 }

ospfv3AreaAggregateRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION
"This object permits management of the table by facilitating actions such as row creation, construction and destruction."
The value of this object has no effect on whether other objects in this conceptual row can be modified.

::= { ospfv3AreaAggregateEntry 6 }

ospfv3AreaAggregateEffect OBJECT-TYPE
SYNTAX INTEGER {
  advertiseMatching(1),
  doNotAdvertiseMatching(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Prefixes subsumed by ranges either trigger the advertisement of the indicated aggregate (advertiseMatching) or will result in the prefix not being advertised at all outside the area."
DEFVAL { advertiseMatching }
::= { ospfv3AreaAggregateEntry 7 }

ospfv3AreaAggregateRouteTag OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This tag is advertised only in the summarized AS-External LSA when summarizing from NSSA-LSAs to AS-External-LSAs."
DEFVAL { 0 }
::= { ospfv3AreaAggregateEntry 8 }

-- OSPFv3 Link-Scope Link State Database, for virtual interfaces

ospfv3VirtLinkLsdbTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3VirtLinkLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The OSPFv3 Process’s Link-Scope LSDB for virtual interfaces. The LSDB contains the Link-Scope Link State Advertisements from virtual interfaces."
::= { ospfv3Objects 13 }

ospfv3VirtLinkLsdbEntry OBJECT-TYPE
SYNTAX Ospfv3VirtLinkLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A single Link-Scope Link State Advertisement for a virtual interface."
INDEX { ospfv3VirtLinkLsdbIfAreaId, ospfv3VirtLinkLsdbIfNeighbor,}
ospfv3VirtLinkLsdbEntry ::= SEQUENCE {
  ospfv3VirtLinkLsdbIfAreaId
    Ospfv3AreaIdTC,
  ospfv3VirtLinkLsdbIfNeighbor
    Ospfv3RouterIdTC,
  ospfv3VirtLinkLsdbType
    Unsigned32,
  ospfv3VirtLinkLsdbRouterId
    Ospfv3RouterIdTC,
  ospfv3VirtLinkLsdbLsid
    Ospfv3LsIdTC,
  ospfv3VirtLinkLsdbSequence
    Ospfv3LsaSequenceTC,
  ospfv3VirtLinkLsdbAge
    Ospfv3LsaAgeTC,
  ospfv3VirtLinkLsdbChecksum
    Integer32,
  ospfv3VirtLinkLsdbAdvertisement
    OCTET STRING,
  ospfv3VirtLinkLsdbTypeKnown
    TruthValue
}

ospfv3VirtLinkLsdbIfAreaId OBJECT-TYPE
SYNTAX          Ospfv3AreaIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The Transit Area that the Virtual Link
traverses. By definition, this is not
Area 0."
 ::= { ospfv3VirtLinkLsdbEntry 1 }

ospfv3VirtLinkLsdbIfNeighbor OBJECT-TYPE
SYNTAX          Ospfv3RouterIdTC
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The Router ID of the Virtual Neighbor."
 ::= { ospfv3VirtLinkLsdbEntry 2 }

ospfv3VirtLinkLsdbType OBJECT-TYPE
SYNTAX          Unsigned32(0..'FFFFFFFF'h)
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "The type of the link state advertisement.
Each link state type has a separate
advertisement format. Link-Scope LSAs unrecognized by the router are also stored in this database.

::= { ospfv3VirtLinkLsdbEntry 3 }

ospfv3VirtLinkLsdbRouterId OBJECT-TYPE
SYNTAX Ospfv3RouterIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The 32 bit number that uniquely identifies the originating router in the Autonomous System."
REFERENCE "OSPF Version 2, Appendix C.1 Global parameters"
::= { ospfv3VirtLinkLsdbEntry 4 }

ospfv3VirtLinkLsdbLsid OBJECT-TYPE
SYNTAX Ospfv3LsIdTC
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The Link State ID is an LS Type Specific field containing a unique identifier; it identifies the piece of the routing domain that is being described by the advertisement. In contrast to OSPFv2, the LSID has no addressing semantics."
::= { ospfv3VirtLinkLsdbEntry 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.

ospfv3VirtLinkLsdbSequence OBJECT-TYPE
SYNTAX Ospfv3LsaSequenceTC
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The sequence number field is a signed 32-bit integer. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The larger the sequence number the more recent the advertisement."
REFERENCE "OSPF Version 2, Section 12.1.6 LS sequence number"
::= { ospfv3VirtLinkLsdbEntry 6 }

ospfv3VirtLinkLsdbAge OBJECT-TYPE
SYNTAX Ospfv3LsaAgeTC
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This field is the age of the link state advertisement in seconds. The high order bit of the LS age field is considered the DoNotAge bit for support of on-demand circuits."
REFERENCE
"OSPF Version 2, Section 12.1.1, LS age and Extending OSPF to Support Demand Circuits, Section 2.2, The LS age field."
::= { ospfv3VirtLinkLsdbEntry 7 }

ospfv3VirtLinkLsdbChecksum 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"
::= { ospfv3VirtLinkLsdbEntry 8 }

ospfv3VirtLinkLsdbAdvertisement OBJECT-TYPE
SYNTAX OCTET STRING (SIZE (1..65535))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The entire Link State Advertisement, including its header."
::= { ospfv3VirtLinkLsdbEntry 9 }

ospfv3VirtLinkLsdbTypeKnown OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value true(1) indicates that the LSA type is recognized by this Router."
::= { ospfv3VirtLinkLsdbEntry 10 }

-- The Ospfv3 Notification Table

-- The Ospfv3 Notification Table records fields that are required for notifications
ospfv3NotificationEntry OBJECT IDENTIFIER
   ::= { ospfv3Objects 14 }

ospfv3ConfigErrorType OBJECT-TYPE
   SYNTAX   INTEGER {
     badVersion (1),
     areaMismatch (2),
     unknownNbmaNbr (3), -- Router is DR eligible
     unknownVirtualNbr (4),
     helloIntervalMismatch (5),
     deadIntervalMismatch (6),
     optionMismatch (7),
     mtuMismatch (8),
     duplicateRouterId (9),
     noError (10) }
   MAX-ACCESS accessible-for-notify
   STATUS   current
   DESCRIPTION
     "Potential types of configuration conflicts.
     Used by the ospfv3ConfigError and
     ospfv3ConfigVirtError notifications."
   ::= { ospfv3NotificationEntry 1 }

ospfv3PacketType OBJECT-TYPE
   SYNTAX   INTEGER {
     hello (1),
     dbDescript (2),
     lsReq (3),
     lsUpdate (4),
     lsAck (5),
     nullPacket (6) }
   MAX-ACCESS accessible-for-notify
   STATUS   current
   DESCRIPTION
     "OSPFv3 packet types."
   ::= { ospfv3NotificationEntry 2 }

ospfv3PacketSrc  OBJECT-TYPE
   SYNTAX   InetAddressIPv6
   MAX-ACCESS accessible-for-notify
   STATUS   current
   DESCRIPTION
     "The IPv6 address of an inbound packet that cannot
     be identified by a neighbor instance.

     Only IPv6 addresses without zone index are expected."
   ::= { ospfv3NotificationEntry 3 }

-- Notification definitions

-- The notifications need to throttled so as to not overwhelm the
-- management agent, in case of rapid changes to the OSPFv3 module.
ospfv3VirtIfStateChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3VirtIfState -- The new state
}
STATUS       current
DESCRIPTION
  "An ospfv3VirtIfStateChange notification signifies that
   there has been a change in the state of an OSPFv3 virtual
   interface.
   
   This notification 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)."
 ::= { ospfv3Notifications 1 }

ospfv3NbrStateChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3NbrState -- The new state
}
STATUS       current
DESCRIPTION
  "An ospfv3NbrStateChange notification signifies that
   there has been a change in the state of a non-virtual
   OSPFv3 neighbor. This notification 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 notification should be
   generated by the designated router. A designated
   router transitioning to Down will be noted by
   ospfIfStateChange."
 ::= { ospfv3Notifications 2 }

ospfv3VirtNbrStateChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3VirtNbrState -- The new state
}
STATUS       current
DESCRIPTION
  "An ospfv3VirtNbrStateChange notification signifies
   that there has been a change in the state of an OSPFv3
   virtual neighbor. This notification 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)."
 ::= { ospfv3Notifications 3 }

ospfv3IfConfigError NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification

ospfv3IfState, -- State of the interface
ospfv3PacketSrc, -- IPv6 address of source
ospfv3ConfigErrorType, -- Type of error
ospfv3PacketType -- Type of packet

STATUS current
DESCRIPTION
"An ospfv3IfConfigError notification signifies that a packet has been received on a non-virtual interface from a router whose configuration parameters conflict with this router's configuration parameters. Note that the event optionMismatch should cause a notification only if it prevents an adjacency from forming."

::= { ospfv3Notifications 4 }

ospfv3VirtIfConfigError NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
           ospfv3VirtIfState, -- State of the interface
           ospfv3ConfigErrorType, -- Type of error
           ospfv3PacketType
          }

STATUS current
DESCRIPTION
"An ospfv3VirtIfConfigError notification signifies that a packet has been received on a virtual interface from a router whose configuration parameters conflict with this router's configuration parameters. Note that the event optionMismatch should cause a notification only if it prevents an adjacency from forming."

::= { ospfv3Notifications 5 }

ospfv3IfRxBadPacket NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
           ospfv3IfState, -- State of the interface
           ospfv3PacketSrc, -- The source IPv6 address
           ospfv3PacketType -- Type of packet
          }

STATUS current
DESCRIPTION
"An ospfv3IfRxBadPacket notification signifies that an OSPFv3 packet that cannot be parsed has been received on a non-virtual interface."

::= { ospfv3Notifications 6 }

ospfv3VirtIfRxBadPacket NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
           ospfv3VirtIfState, -- State of the interface
           ospfv3PacketType -- Type of packet
          }

STATUS current
DESCRIPTION

"An ospfv3VirtIfRxBadPacket notification signifies that an OSPFv3 packet that cannot be parsed has been received on a virtual interface."

::= { ospfv3Notifications 7 }

ospfv3LsdbOverflow NOTIFICATION-TYPE

OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3ExtAreaLsdbLimit -- Limit on External LSAs
       }

STATUS       current

DESCRIPTION

"An ospfv3LsdbOverflow notification signifies that the number of LSAs in the router’s link-state database has exceeded ospfv3ExtAreaLsdbLimit."

::= { ospfv3Notifications 8 }

ospfv3LsdbApproachingOverflow NOTIFICATION-TYPE

OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3ExtAreaLsdbLimit
       }

STATUS       current

DESCRIPTION

"An ospfv3LsdbApproachingOverflow notification signifies that the number of LSAs in the router’s link-state database has exceeded ninety percent of ospfv3ExtAreaLsdbLimit."

::= { ospfv3Notifications 9 }

ospfv3IfStateChange NOTIFICATION-TYPE

OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3IfState   -- The new state
       }

STATUS       current

DESCRIPTION

"An ospfv3IfStateChange notification signifies that there has been a change in the state of a non-virtual OSPFv3 interface. This notification 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)."

::= { ospfv3Notifications 10 }

ospfv3NssaTranslatorStatusChange NOTIFICATION-TYPE

OBJECTS { ospfv3RouterId, -- The originator of the notification
          ospfv3AreaNssaTranslatorState  -- new state
       }

STATUS       current

DESCRIPTION

"An ospfv3NssaTranslatorStatusChange notification indicates that there has been a change in the router’s
ability to translate OSPFv3 NSSA LSAs into OSPFv3 External LSAs. This notification should be generated when the Translator Status transitions from or to any defined status on a per area basis."

::= { ospfv3Notifications 11 }

ospfv3RestartStatusChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
ospfv3RestartStatus, -- new status
ospfv3RestartInterval,
ospfv3RestartExitReason
}
STATUS       current
DESCRIPTION
"An ospfv3RestartStatusChange notification signifies that there has been a change in the graceful restart state for the router. This notification should be generated when the router restart status changes."

::= { ospfv3Notifications 12 }

ospfv3NbrRestartHelperStatusChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
ospfv3NbrRestartHelperStatus, -- new status
ospfv3NbrRestartHelperAge,
ospfv3NbrRestartHelperExitReason
}
STATUS       current
DESCRIPTION
"An ospfv3NbrRestartHelperStatusChange notification signifies that there has been a change in the graceful restart helper state for the neighbor. This notification should be generated when the neighbor restart helper status transitions for a neighbor."

::= { ospfv3Notifications 13 }

ospfv3VirtNbrRestartHelperStatusChange NOTIFICATION-TYPE
OBJECTS { ospfv3RouterId, -- The originator of the notification
ospfv3VirtNbrRestartHelperStatus, -- new status
ospfv3VirtNbrRestartHelperAge,
ospfv3VirtNbrRestartHelperExitReason
}
STATUS       current
DESCRIPTION
"An ospfv3VirtNbrRestartHelperStatusChange notification signifies that there has been a change in the graceful restart helper state for the virtual neighbor. This notification should be generated when the virtual neighbor restart helper status transitions for a virtual neighbor."

::= { ospfv3Notifications 14 }
-- conformance information

ospfv3Groups OBJECT IDENTIFIER ::= { ospfv3Conformance 1 }
ospfv3Compliances OBJECT IDENTIFIER ::= { ospfv3Conformance 2 }

-- compliance statements

ospfv3FullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement"
MODULE -- this module
MANDATORY-GROUPS {
  ospfv3BasicGroup,
  ospfv3AreaGroup,
  ospfv3IfGroup,
  ospfv3VirtIfGroup,
  ospfv3NbrGroup,
  ospfv3CfgNbrGroup,
  ospfv3VirtNbrGroup,
  ospfv3AreaAggregateGroup
}

GROUP ospfv3AsLsdbGroup
DESCRIPTION "This group is required for OSPFv3 systems that
display their AS-scope link state database."

GROUP ospfv3AreaLsdbGroup
DESCRIPTION "This group is required for OSPFv3 systems that
display their Area-scope link state database."

GROUP ospfv3LinkLsdbGroup
DESCRIPTION "This group is required for OSPFv3 systems that
display their Link-scope link state database
for non-virtual interfaces."

GROUP ospfv3VirtLinkLsdbGroup
DESCRIPTION "This group is required for OSPFv3 systems that
display their Link-scope link state database
for virtual interfaces."

GROUP ospfv3HostGroup
DESCRIPTION "This group is required for OSPFv3 systems that
support attached hosts."

GROUP ospfv3NotificationObjectGroup
DESCRIPTION "This group is required for OSPFv3 systems that
GROUP ospfv3NotificationGroup
DESCRIPTION
"This group is required for OSPFv3 systems that support OSPFv3 notifications."

OBJECT ospfv3NbrAddressType
SYNTAX InetAddressType { ipv6(2) }
DESCRIPTION
"An implementation is only required to support IPv6 address without zone index."

OBJECT ospfv3NbrAddress
SYNTAX InetAddress (SIZE (16))
DESCRIPTION
"An implementation is only required to support IPv6 address without zone index."

OBJECT ospfv3VirtNbrAddressType
SYNTAX InetAddressType { ipv6(2) }
DESCRIPTION
"An implementation is only required to support IPv6 address without zone index."

OBJECT ospfv3VirtNbrAddress
SYNTAX InetAddress (SIZE (16))
DESCRIPTION
"An implementation is only required to support IPv6 address without zone index."

::= { ospfv3Compliances 1 }
GROUP            ospfv3AsLsdbGroup
DESCRIPTION       "This group is required for OSPFv3 systems that display their AS-scope link state database."

GROUP            ospfv3AreaLsdbGroup
DESCRIPTION       "This group is required for OSPFv3 systems that display their Area-scope link state database."

GROUP            ospfv3LinkLsdbGroup
DESCRIPTION       "This group is required for OSPFv3 systems that display their Link-scope link state database for non-virtual interfaces."

GROUP            ospfv3VirtLinkLsdbGroup
DESCRIPTION       "This group is required for OSPFv3 systems that display their Link-scope link state database for virtual interfaces."

GROUP            ospfv3HostGroup
DESCRIPTION       "This group is required for OSPFv3 systems that support attached hosts."

GROUP            ospfv3NotificationObjectGroup
DESCRIPTION       "This group is required for OSPFv3 systems that support OSPFv3 notifications."

GROUP            ospfv3NotificationGroup
DESCRIPTION       "This group is required for OSPFv3 systems that support OSPFv3 notifications."

OBJECT            ospfv3RouterId
MIN-ACCESS        read-only
DESCRIPTION       "Write access is not required."

OBJECT            ospfv3AdminStatus
MIN-ACCESS        read-only
DESCRIPTION       "Write access is not required."

OBJECT            ospfv3ExtAreaLsdbLimit
MIN-ACCESS        read-only
DESCRIPTION       "Write access is not required."
OBJECT ospfv3ExitOverflowInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3DemandExtensions
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3ReferenceBandwidth
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3RestartSupport
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3RestartInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3RestartStrictLsaChecking
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3NotificationEnable
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3StubRouterAdvertisement
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaImportAsExtern
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaSummary
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaStubMetric
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaNssaTranslatorRole
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaNssaTranslatorStabInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaStubMetricType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaTEEnabled
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3HostMetric
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3HostRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3HostAreaID
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfAreaId
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfType
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."
OBJECT ospfv3IfAdminStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfRtrPriority
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfTransitDelay
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfRetransInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfHelloInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfRtrDeadInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfPollInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfDemand
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfMetricValue
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfDemandNbrProbe
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfDemandNbrProbeRetransLimit
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfDemandNbrProbeInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfTEDisabled
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3IfLinkLSASuppression
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3VirtIfTransitDelay
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3VirtIfRetransInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3VirtIfHelloInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3VirtIfRtrDeadInterval
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3VirtIfRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3CfgNbrPriority
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3CfgNbrRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaAggregateRowStatus
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaAggregateEffect
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

OBJECT ospfv3AreaAggregateRouteTag
MIN-ACCESS read-only
DESCRIPTION
"Write access is not required."

::= { ospfv3Compliances 2 }

-- units of conformance

ospfv3BasicGroup OBJECT-GROUP
  OBJECTS
    { ospfv3RouterId, ospfv3AdminStatus, ospfv3VersionNumber, ospfv3AreaBdrRtrStatus, ospfv3ASBdrRtrStatus, ospfv3AsScopeLsaCount, ospfv3AsScopeLsaCksumSum, ospfv3OriginaterNewLsas, ospfv3RxNewLsas, ospfv3ExtLsaCount, ospfv3ExtAreaLsdbLimit, ospfv3ExitOverflowInterval, ospfv3DemandExtensions, ospfv3ReferenceBandwidth, ospfv3RestartSupport, ospfv3RestartInterval, ospfv3RestartStrictLsaChecking, ospfv3RestartStatus, ospfv3RestartAge, ospfv3RestartExitReason, ospfv3NotificationEnable, ospfv3StubRouterSupport, ospfv3StubRouterAdvertisement, ospfv3DiscontinuityTime, ospfv3RestartTime }

STATUS current
DESCRIPTION
"These objects are used for managing/monitoring OSPFv3 global parameters."

::= { ospfv3Groups 1 }

ospfv3AreaGroup OBJECT-GROUP
OBJECTS

{ ospfv3AreaImportAsExtern,
  ospfv3AreaSpfRuns,
  ospfv3AreaBdrRtrCount,
  ospfv3AreaAsBdrRtrCount,
  ospfv3AreaScopeLsaCount,
  ospfv3AreaScopeLsaCksumSum,
  ospfv3AreaSummary,
  ospfv3AreaRowStatus,
  ospfv3AreaStubMetric,
  ospfv3AreaNssaTranslatorRole,
  ospfv3AreaNssaTranslatorState,
  ospfv3AreaNssaTranslatorStabInterval,
  ospfv3AreaNssaTranslatorEvents,
  ospfv3AreaStubMetricType,
  ospfv3AreaTEEnabled
}

STATUS current
DESCRIPTION
"These objects are used for OSPFv3 systems supporting areas."
::= { ospfv3Groups 2 }

ospfv3AsLsdbGroup OBJECT-GROUP
OBJECTS

{ ospfv3AsLsdbSequence,
  ospfv3AsLsdbAge,
  ospfv3AsLsdbChecksum,
  ospfv3AsLsdbAdvertisement,
  ospfv3AsLsdbTypeKnown
}

STATUS current
DESCRIPTION
"These objects are used for OSPFv3 systems that display their AS-scope link state database."
::= { ospfv3Groups 3 }

ospfv3AreaLsdbGroup OBJECT-GROUP
OBJECTS

{ ospfv3AreaLsdbSequence,
  ospfv3AreaLsdbAge,
  ospfv3AreaLsdbChecksum,
  ospfv3AreaLsdbAdvertisement,
  ospfv3AreaLsdbTypeKnown
}

STATUS current
DESCRIPTION
"These objects are used for OSPFv3 systems supporting areas."
::= { ospfv3Groups 1 }
"These objects are used for OSPFv3 systems that display their Area-scope link state database."
::= { ospfv3Groups 4 }

ospfv3LinkLsdbGroup OBJECT-GROUP
  OBJECTS
    { ospfv3LinkLsdbSequence,
      ospfv3LinkLsdbAge,
      ospfv3LinkLsdbChecksum,
      ospfv3LinkLsdbAdvertisement,
      ospfv3LinkLsdbTypeKnown
    }
  STATUS current
  DESCRIPTION
    "These objects are used for OSPFv3 systems that display their Link-scope link state database for non-virtual interfaces."
::= { ospfv3Groups 5 }

ospfv3HostGroup OBJECT-GROUP
  OBJECTS
    { ospfv3HostMetric,
      ospfv3HostRowStatus,
      ospfv3HostAreaID
    }
  STATUS current
  DESCRIPTION
    "These objects are used for OSPFv3 systems that support attached hosts."
::= { ospfv3Groups 6 }

ospfv3IfGroup OBJECT-GROUP
  OBJECTS
    { ospfv3IfAreaId,
      ospfv3IfType,
      ospfv3IfAdminStatus,
      ospfv3IfRtrPriority,
      ospfv3IfTransitDelay,
      ospfv3IfRetransInterval,
      ospfv3IfHelloInterval,
      ospfv3IfRtrDeadInterval,
      ospfv3IfPollInterval,
      ospfv3IfState,
      ospfv3IfDesignatedRouter,
      ospfv3IfBackupDesignatedRouter,
      ospfv3IfEvents,
      ospfv3IfRowStatus,
      ospfv3IfDemand,
      ospfv3IfMetricValue,
      ospfv3IfLinkScopeLsaCount,
      ospfv3IfLinkLsaChecksumSum,
      ospfv3IfDemandNbrProbe,
      ospfv3IfDemandNbrProbeRetransLimit,
ospfv3IfDemandNbrProbeInterval,  
ospfv3IfTEDisabled,  
ospfv3IfLinkLSASuppression
)

STATUS          current
DESCRIPTION
"These interface objects used for
managing/monitoring OSPFv3 interfaces."
::= { ospfv3Groups 7 }

ospfv3VirtIfGroup OBJECT-GROUP
  OBJECTS         {
    ospfv3VirtIfIndex,  
    ospfv3VirtIfInstId,  
    ospfv3VirtIfTransitDelay,  
    ospfv3VirtIfRetransInterval,  
    ospfv3VirtIfHelloInterval,  
    ospfv3VirtIfRtrDeadInterval,  
    ospfv3VirtIfState,  
    ospfv3VirtIfEvents,  
    ospfv3VirtIfRowStatus,  
    ospfv3VirtIfLinkScopeLsaCount,  
    ospfv3VirtIfLinkLsaCksumSum
  }

STATUS          current
DESCRIPTION
"These virtual interface objects are used for
managing/monitoring OSPFv3 virtual interfaces."
::= { ospfv3Groups 8 }

ospfv3NbrGroup OBJECT-GROUP
  OBJECTS         {
    ospfv3NbrAddressType,  
    ospfv3NbrAddress,  
    ospfv3NbrOptions,  
    ospfv3NbrPriority,  
    ospfv3NbrState,  
    ospfv3NbrEvents,  
    ospfv3NbrLsRetransQLen,  
    ospfv3NbrHelloSuppressed,  
    ospfv3NbrIfId,  
    ospfv3NbrRestartHelperStatus,  
    ospfv3NbrRestartHelperAge,  
    ospfv3NbrRestartHelperExitReason
  }

STATUS          current
DESCRIPTION
"These neighbor objects are used for
managing/monitoring OSPFv3 neighbors."
::= { ospfv3Groups 9 }

ospfv3CfgNbrGroup OBJECT-GROUP
  OBJECTS         {

ospfv3CfgNbrPriority,
ospfv3CfgNbrRowStatus
}
STATUS          current
DESCRIPTION     "These configured neighbor objects are used for
managing/monitoring OSPFv3 configured neighbors."
::= { ospfv3Groups 10 }

ospfv3VirtNbrGroup OBJECT-GROUP
OBJECTS         {
    ospfv3VirtNbrIfIndex,
    ospfv3VirtNbrIfInstId,
    ospfv3VirtNbrAddressType,
    ospfv3VirtNbrAddress,
    ospfv3VirtNbrOptions,
    ospfv3VirtNbrState,
    ospfv3VirtNbrEvents,
    ospfv3VirtNbrLsRetransQLen,
    ospfv3VirtNbrHelloSuppressed,
    ospfv3VirtNbrIfId,
    ospfv3VirtNbrRestartHelperStatus,
    ospfv3VirtNbrRestartHelperAge,
    ospfv3VirtNbrRestartHelperExitReason
}
STATUS          current
DESCRIPTION     "These virtual neighbor objects are used for
managing/monitoring OSPFv3 virtual neighbors."
::= { ospfv3Groups 11 }

ospfv3AreaAggregateGroup OBJECT-GROUP
OBJECTS         {
    ospfv3AreaAggregateRowStatus,
    ospfv3AreaAggregateEffect,
    ospfv3AreaAggregateRouteTag
}
STATUS          current
DESCRIPTION     "These area aggregate objects used required for
aggregating OSPFv3 prefixes for summarization
across areas."
::= { ospfv3Groups 12 }

ospfv3VirtLinkLsdbGroup OBJECT-GROUP
OBJECTS         {
    ospfv3VirtLinkLsdbSequence,
    ospfv3VirtLinkLsdbAge,
    ospfv3VirtLinkLsdbChecksum,
    ospfv3VirtLinkLsdbAdvertisement,
    ospfv3VirtLinkLsdbTypeKnown
}
STATUS          current
DESCRIPTION
"These objects are used for OSPFv3 systems
that display their Link-scope link state database
for virtual interfaces."
::= { ospfv3Groups 13 }

ospfv3NotificationObjectGroup OBJECT-GROUP
OBJECTS
{ 
  ospfv3ConfigErrorType, 
  ospfv3PacketType, 
  ospfv3PacketSrc 
}
STATUS current
DESCRIPTION
"These objects are used to record notification
parameters"
::= { ospfv3Groups 14 }

ospfv3NotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS
{ 
  ospfv3VirtIfStateChange, 
  ospfv3NbrStateChange, 
  ospfv3VirtNbrStateChange, 
  ospfv3IfConfigError, 
  ospfv3VirtIfConfigError, 
  ospfv3IfRxBadPacket, 
  ospfv3VirtIfRxBadPacket, 
  ospfv3LsdbOverflow, 
  ospfv3LsdbApproachingOverflow, 
  ospfv3IfStateChange, 
  ospfv3NssaTranslatorStatusChange, 
  ospfv3RestartStatusChange, 
  ospfv3NbrRestartHelperStatusChange, 
  ospfv3VirtNbrRestartHelperStatusChange 
}
STATUS current
DESCRIPTION
"This group is used for OSPFv3 notifications"
::= { ospfv3Groups 15 }

END

6. Security Considerations

There are a number of management objects defined in this MIB module
with 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. Improper manipulation of the objects represented
by this MIB module may result in disruption of network connectivity
by administratively disabling the entire OSPFv3 entity or individual
interfaces, by deleting configured neighbors, by reducing the limit on External LSAs, by changing ASBR status, by manipulating route aggregation, by manipulating interface and route metrics, by changing hello interval or dead interval, or by changing interface type. Remote monitoring can be defeated by disabling of SNMP notifications. Performance can be impacted by increasing the limit on External LSAs or changing DR/BDR priority.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. Unauthorized access to readable objects in this MIB module allows the discovery of the network topology and operating parameters which can be used to target further attacks on the network or to gain a competitive business advantage.

SNMP versions prior to SNMPv3 did not include adequate security. 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 module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

7. IANA Considerations

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

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>OBJECT IDENTIFIER value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ospfv3MIB</td>
<td>{ mib-2 YYY }</td>
</tr>
</tbody>
</table>

[Editor’s Note (to be removed prior to publication): the IANA is requested to assign a value for "YYY" under the ‘mib-2’ subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "YYY" (here and in the MIB module) with the assigned value and to remove this note.]
8. Acknowledgements

This document is based on the MIB for OSPF version 2 [RFC4750]. The editors would like to thank Toshiaki Takada, Ramachandran Radhakrishnan, Harikrishna Golapalli Mahesh Kurapati, Acee Lindem, Keith McCloghrie, Manish Gupta, Nic Neate, Vanitha N., Vivek Dubey, Ramana Koppula, Boris Benenson and Hong Zhang for their constructive comments. Special thanks to Joan Cucchiara for her thorough review as the MIB Doctor.

9. Normative References


10. Informative References


[RFC3410] Case, J., Mundy, R., Partain, D., Stewart, B., "Introduction and Applicability Statements for

[ RFC3411 ] Harrington, D., Presuhn, R., Wijnen, B.,

[ RFC3413 ] Levi, D., Meyer, P., Stewart, B.,

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