Management Information Base for OSPFv3

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1. 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 Routing Protocol for IPv6.

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

2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:
An overall architecture, described in RFC 2571 [1].

Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIv2, is described in STD 58, RFC 2578 [5], RFC 2579 [6] and RFC 2580 [7].

Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].

Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].

A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [16].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIv2. A MIB conforming to the SMIv1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIv2 will be converted into textual descriptions in SMIv1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.
mechanisms of OSPF version 2 (OSPFv2) 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.

An attempt was made to align the OSPFv3 MIB as closely as possible with the OSPFv2 MIB. The following subsections highlight the major differences between the OSPFv2 MIB and the OSPFv3 MIB. A detailed list of differences can be found in Appendix A.

3.1. IPv6 Interfaces

IPv6 interfaces attach to links [17]. 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 IPv6-MIB [20]. IPv6 interfaces are configured in the IPv6 Interface Table and IPv6 prefixes are configured in the IPv6 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.

3.2. Addressing Semantics

Router ID, Area ID and Link State ID remain at the OSPFv2 size of 32 bits, therefore, they cannot be assigned IPv6 addresses. A router running both IPv4 and IPv6 concurrently can continue to use a local IPv4 interface address as the OSPFv3 router ID. Otherwise, the router ID must be selected using another method (e.g. administratively assigned). The Link State ID has no addressing semantics in OSPFv3.

The syntax of Router ID, Area ID and Link State ID remains the same as in the OSPFv2 MIB (i.e. ipAddress). The order of the Router ID and Link State ID index components in Link State Database Tables are reversed in OSPFv3 since 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 LSID.

3.3. Authentication

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

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

3.5. 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 [19]. The OSPFv3 MIB defines three Link State Database tables, one each for Area-scope LSAs, Link-scope LSAs and AS-scope LSAs.

3.6. 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. An object has been added to the Virtual Interface Table entry for this purpose.

3.7. Neighbors

The OSPFv2 Neighbor Table has been split into two tables. The OSPFv3 Neighbor Table is a read-only table and it contains information learned from Hellos received from neighbors, including NBMA neighbors. The OSPFv3 NBMA Neighbor Table contains entries for manually configured neighbors and neighbors dynamically discovered by lower-level protocols such as Inverse Neighbor Discovery.

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 Database
- AS-Scope Link State Database
- Host Table
- Interface Table
- Virtual Interface Table
- Neighbor Table
- NBMA Neighbor Table
- Virtual Neighbor Table
- Aggregate Range Table

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.

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, NBMA Neighbor and Virtual Neighbor Tables

The Neighbor Table, the NBMA Neighbor Table and the Virtual Neighbor Table describe the neighbors to the OSPFv3 Process.

4.8. Aggregate Range Table

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

5. Definitions

OSPFV3-MIB DEFINITIONS ::= BEGIN

IMPORTS
   MODULE-IDENTITY, OBJECT-TYPE, mib-2,
   Counter32, Gauge32, Integer32, IpAddress,
   Unsigned32
   FROM SNMPv2-SMI
   TruthValue, StorageType, RowStatus
   MODULE-COMPLIANCE, OBJECT-GROUP
   FROM SNMPv2-CONF
   InterfaceIndex
   FROM IF-MIB
   InetAddressType, InetAddress, InetAddressPrefixLength
   FROM INET-ADDRESS-MIB
   AreaID, RouterID, Metric, BigMetric, Status,
   HelloRange, UpToMaxAge, DesignatedRouterPriority
   FROM OSPF-MIB;

ospfv3MIB MODULE-IDENTITY
   LAST-UPDATED "200204021200Z"
   ORGANIZATION "IETF OSPF Working Group"
   CONTACT-INFO
"WG E-Mail: ospf@discuss.microsoft.com
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DESCRIPTION
"The MIB module to describe OSPF version 3"
REVISION "200204021200Z"
DESCRIPTION -- RFC Editor assigns RFC xxxx
"Initial version, published as RFC xxxx"
::= { mib-2 xx } -- IANA assigns xx

-- Top-level structure of MIB
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         RouterID
MAX-ACCESS      read-write
STATUS         current
DESCRIPTION
"A 32-bit 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 interface addresses if IPv4 is
configured on the router."
::= { ospfv3GeneralGroup 1 }

ospfv3AdminStat 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 interface; ‘disabled’ disables it on all interfaces."

::= { 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 note whether this 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."
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 Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The 32-bit unsigned sum of the LS checksums of the AS-scoped link-state advertisements con-
tained in the link-state database. This sum can be used to determine if there has been a change in a router’s link state database, and to compare the link-state database of two routers.

::= { ospfv3GeneralGroup 7 }

ospfv3OriginatedNewLsas 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."

::= { ospfv3GeneralGroup 8 }

ospfv3ReceivedNewLsas 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."

::= { ospfv3GeneralGroup 9 }

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. OspfExtAreaLsdbLimit 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)."

::= { ospfv3GeneralGroup 10 }

ospfv3MulticastExtensions OBJECT-TYPE
SYNTAX BITS {
  intraAreaMulticast(0),
  interAreaMulticast(1),
  interAsMulticast(2)
MAX-ACCESS      read-write
STATUS          current
DESCRIPTION
   "A Bit Mask indicating whether the router is forwarding IPv6 multicast datagrams based on the algorithms defined in the Multicast Extensions to OSPF.

If intraAreaMulticast set, indicates that the router can forward IPv6 multicast datagrams in the router's directly attached areas (called intra-area multicast routing).

If interAreaMulticast set, indicates that the router can forward IPv6 multicast datagrams between OSPFv3 areas (called inter-area multicast routing).

If interAsMulticast set, indicates that the router can forward IPv6 multicast datagrams between Autonomous Systems (called inter-AS multicast routing).

Only certain combinations of bit settings are allowed, namely:
- All bits cleared (no multicasting)
- intraAreaMulticast only,
- intraAreaMulticast and interAreaMulticast,
- intraAreaMulticast and interAsMulticast
- intraAreaMulticast, interAreaMulticast and interAsMulticast

By default, all bits are cleared."
::= { ospfv3GeneralGroup 11 }

ospfv3ExitOverflowInterval OBJECT-TYPE
SYNTAX      Unsigned32
UNITS       "seconds"
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
   "The number of seconds that, after entering OverflowState, a router will attempt to leave OverflowState. This allows the router to again originate non-default AS-External-LSAs. When set to 0, the router will not leave Overflow-State until restarted."
::= { ospfv3GeneralGroup 12 }

ospfv3DemandExtensions OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
   "The router’s support for demand routing."
REFERENCE
ospfv3TrafficEngineeringSupport OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"The router’s support for traffic engineering extensions."
::= { ospfv3GeneralGroup 14 }

-- The OSPFv3 Area Data Structure contains information
-- regarding the various areas. The interfaces and
-- virtual links are configured as part of these areas.
-- Area 0.0.0.0, 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."
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."
INDEX { ospfv3AreaId }
::= { ospfv3AreaTable 1 }

Ospfv3AreaEntry ::= SEQUENCE {
ospfv3AreaId
   AreaID,
ospfv3ImportAsExtern
   INTEGER,
ospfv3SpfRuns
   Counter32,
ospfv3AreaBdrRtrCount
   Gauge32,
ospfv3AsBdrRtrCount
   Gauge32,
ospfv3AreaScopeLsaCount
   Gauge32,
ospfv3AreaScopeLsaCksumSum
   Integer32,
ospfv3AreaSummary
  INTEGER,
ospfv3AreaStatus
    RowStatus,
ospfv3StubMetric
    BigMetric,
ospfv3AreaNssaTranslatorRole
  INTEGER,
ospfv3AreaNssaTranslatorState
  INTEGER,
ospfv3AreaNssaTranslatorStabilityInterval
  Unsigned32,
ospfv3AreaNssaTranslatorEvents
  Counter32
}

ospfv3AreaId OBJECT-TYPE
SYNTAX          AreaID
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION

"A 32-bit integer uniquely identifying an area. Area ID 0.0.0.0 is used for the OSPFv3 backbone."
REFERENCE
"OSPF Version 2, Appendix C.2 Area parameters"
::= { ospfv3AreaEntry 1 }

ospfv3ImportAsExtern 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 Type-7 LSAs which have Area-scope"
REFERENCE
"OSPF Version 2, Appendix C.2 Area parameters"
DEFVAL { importExternal }
::= { ospfv3AreaEntry 2 }

ospfv3SpfRuns 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."
::= { 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 SPF Pass."
  ::= { ospfv3AreaEntry 4 }

ospfv3AsBdrRtrCount 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."
  ::= { 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."
  ::= { ospfv3AreaEntry 6 }

ospfv3AreaScopeLsaCksumSum OBJECT-TYPE
  SYNTAX          Integer32
  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, and 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 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 area. It will rely entirely on its default route.

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

DEFVAL { noAreaSummary }
::= { ospfv3AreaEntry 8 }

ospfv3AreaStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
::= { ospfv3AreaEntry 9 }

ospfv3StubMetric OBJECT-TYPE
SYNTAX          BigMetric
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"The metric value advertised for the default route into Stub and NSSA 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 ability to perform NSSA translation of type-7 LSAs into type-5 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 type-7 LSAs into type-5 LSAs. When this object is set to enabled, the NSSA Border router’s ospfv3AreaNssTranslatorRole has been set to always. When this object is set to elected, a candidate NSSA Border router is translating type-7 LSAs into type-5. When this object is set to
disabled, a candidate NSSA Border router is NOT translating type-7 LSAs into type-5.

::= { ospfv3AreaEntry 12 }

ospfv3AreaNssaTranslatorStabilityInterval OBJECT-TYPE
SYNTAX          Unsigned32
UNITS           "seconds"
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
 "The number of seconds after an elected translator determines its services are no longer required, that it should continue to perform its translation duties."
DEFVAL { 40 }
::= { 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 boot-up."
::= { ospfv3AreaEntry 14 }

-- OSPFv3 AS-Scope Link State Database

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

ospfv3AsLsdbTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3AsLsdbEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
 "The OSPFv3 Process's AS-Scope Link State Database."
::= { 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
   INTEGER,
ospfv3AsLsdbRouterId
   RouterID,
ospfv3AsLsdbLsid
   ApplicationProtocolAddress
}
IpAddress,
ospfv3AsLsdbSequence
    Integer32,
ospfv3AsLsdbAge
    Integer32,
ospfv3AsLsdbChecksum
    Integer32,
ospfv3AsLsdbAdvertisement
    OCTET STRING

ospfv3AsLsdbType OBJECT-TYPE
SYNTAX
    INTEGER {
        asExternalLink(16389) -- 0x4005
    }
MAX-ACCESS
    not-accessible
STATUS
    current
DESCRIPTION
    "The type of the link state advertisement. Each link state type has a separate advertise-
ment format. AS-Scope LSAs with the U-bit set are also store in this database."
::= { ospfv3AsLsdbEntry 1 }

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

ospfv3AsLsdbLsid OBJECT-TYPE
SYNTAX
    IpAddress
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.

ospfv3AsLsdbSequence OBJECT-TYPE
SYNTAX
    Integer32
MAX-ACCESS
    read-only
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**

Integer32 -- Should be 0..MaxAge

-- unless DoNotAge bit is set

**UNITS**

"seconds"

**MAX-ACCESS**

read-only

**STATUS**

current

**DESCRIPTION**

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

**REFERENCE**

"OSPF Version 2, Section 12.1.1 LS age"

::= { 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 }

-- OSPFv3 Area-Scope Link State Database

-- The Link State Database contains the Area-Scope Link State

-- Advertisements from throughout the area that the
ospfv3AreaLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF Ospfv3AreaLsdbEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The OSPFv3 Process’s Area-Scope Link State Database."
::= { 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 {
    ospfv3AreaLsdbAreaId AreaID,
    ospfv3AreaLsdbType INTEGER,
    ospfv3AreaLsdbRouterId RouterID,
    ospfv3AreaLsdbLsid IpAddress,
    ospfv3AreaLsdbSequence Integer32,
    ospfv3AreaLsdbAge Integer32,
    ospfv3AreaLsdbChecksum Integer32,
    ospfv3AreaLsdbAdvertisement OCTET STRING
}

ospfv3AreaLsdbAreaId OBJECT-TYPE

SYNTAX AreaID
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 INTEGER {
    routerLsa(8193), -- 0x2001
    networkLsa(8194), -- 0x2002
}
interAreaPrefixLsa(8195), -- 0x2003
interAreaRouterLsa(8196), -- 0x2004
groupMembershipLsa(8198), -- 0x2006
nssaExternalLsa(8199), -- 0x2007
intraAreaPrefixLsa(8201) -- 0x2009
)
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 with the U-bit set are also stored in this database."
::= { ospfv3AreaLsdbEntry 2 }

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

ospfv3AreaLsdbLsid OBJECT-TYPE
SYNTAX IpAddress
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 Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The sequence number field is a signed 32-bit integer. It is used to detect old and duplicate link state advertisements. The space of sequence numbers is linearly ordered. The
larger the sequence number the more recent the advertisement."

REFERENCE
"OSPF Version 2, Section 12.1.6 LS sequence number"
::= { ospfv3AreaLsdbEntry 5 }

ospfv3AreaLsdbAge OBJECT-TYPE
SYNTAX Integer32 -- Should be 0..MaxAge
-- unless DoNotAge bit is set
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This field is the age of the link state advertisement in seconds."
REFERENCE
"OSPF Version 2, Section 12.1.1 LS age"
::= { 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"
::= { ospfv3AreaLsdbEntry 7 }

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 }

-- OSPFv3 Link-Scope Link State Database

-- The Link State Database contains the Link-Scope Link State
-- Advertisements from the links that the
-- device is attached to.

ospfv3LinkLsdbTable OBJECT-TYPE

SYNTAX SEQUENCE OF Ospfv3LinkLsdbEntry
MAX-ACCESS not-accessible
The OSPFv3 Process’s Link-Scope Link State Database.

```
::= { ospfv3Objects 5 }

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

Ospfv3LinkLsdbEntry ::= SEQUENCE {
   ospfv3LinkLsdbIfIndex
      InterfaceIndex,
   ospfv3LinkLsdbType
      INTEGER,
   ospfv3LinkLsdbRouterId
      RouterID,
   ospfv3LinkLsdbLsid
      IpAddress,
   ospfv3LinkLsdbSequence
      Integer32,
   ospfv3LinkLsdbAge
      Integer32,
   ospfv3LinkLsdbChecksum
      Integer32,
   ospfv3LinkLsdbAdvertisement
      OCTET STRING
}

ospfv3LinkLsdbIfIndex OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
   "The identifier of the link from which the LSA
   was received."
REFERENCE
   "OSPF Version 2, Appendix C.2 Area parameters"
 ::= { ospfv3LinkLsdbEntry 1 }

ospfv3LinkLsdbType OBJECT-TYPE
SYNTAX INTEGER {
   linkLsa(8) -- 0x0008
 }

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
   "The type of the link state advertisement.
   Each link state type has a separate advertise-
ment format. Link-Scope LSAs with the U-bit set
are also stored in this database.

::= { ospfv3LinkLsdbEntry 2 }

ospfv3LinkLsdbRouterId OBJECT-TYPE
SYNTAX RouterID
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The 32 bit number that uniquely identifies the
originating router in the Autonomous System."
REFERENCE
"OSPF Version 2, Appendix C.1 Global parameters"

::= { ospfv3LinkLsdbEntry 3 }

ospfv3LinkLsdbLsid OBJECT-TYPE
SYNTAX IpAddress
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."

::= { ospfv3LinkLsdbEntry 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.

ospfv3LinkLsdbSequence OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The sequence number field is a signed 32-bit
integer. It is used to detect old and duplicate link state advertisements. The space of
sequence numbers is linearly ordered. The larger the sequence number the more recent the
advertisement."
REFERENCE
"OSPF Version 2, Section 12.1.6 LS sequence
number"

::= { ospfv3LinkLsdbEntry 5 }

ospfv3LinkLsdbAge OBJECT-TYPE
SYNTAX Integer32 -- Should be 0..MaxAge
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This field is the age of the link state advertisement in seconds."

REFERENCE
"OSPF Version 2, Section 12.1.1 LS age"
::= { ospfv3LinkLsdbEntry 6 }

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 7 }

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 8 }

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

ospfv3HostTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3HostEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The list of Hosts, and their metrics, that the router will advertise as host routes."

REFERENCE
"OSPF Version 2, Appendix C.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."

INDEX                      
{ ospfv3HostAddressType, 
  ospfv3HostAddress } 
::= { ospfv3HostTable 1 } 

Ospfv3HostEntry ::= SEQUENCE {
  ospfv3HostAddressType
    InetAddressType, 
  ospfv3HostAddress
    InetAddress, 
  ospfv3HostMetric
    Metric, 
  ospfv3HostStatus
    RowStatus, 
  ospfv3HostAreaID
    AreaID
}

ospfv3HostAddressType OBJECT-TYPE
SYNTAX          InetAddressType
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "The address type of ospfv3HostAddress. Only IPv6
   addresses without zone index are expected."
REFERENCE
  "OSPF Version 2, Appendix C.6 Host route parameters"
::= { ospfv3HostEntry 1 } 

ospfv3HostAddress OBJECT-TYPE
SYNTAX          InetAddress (SIZE (16))
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
  "The IPv6 Address of the Host. Must be a Global
   or Site-local 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 } 

ospfv3HostStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
::= { ospfv3HostEntry 4 }

ospfv3HostAreaID OBJECT-TYPE
SYNTAX AreaID
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The Area the Host Entry is to be found within. By default, the area that a subsuming OSPFv3 interface is in, or 0.0.0.0"
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 Version 2, 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."
INDEX { ospfv3IfIndex }
::= { ospfv3IfTable 1 }

Ospfv3IfEntry ::= SEQUENCE {
ospfv3IfIndex
InterfaceIndex,
ospfv3IfAreaId
AreaID,
ospfv3IfType
INTEGER,
ospfv3IfAdminStat
Status,
ospfv3IfRtrPriority
DesignatedRouterPriority,
ospfv3IfTransitDelay
  UpToMaxAge,
ospfv3IfRetransInterval
  UpToMaxAge,
ospfv3IfHelloInterval
  HelloRange,
ospfv3IfRtrDeadInterval
  Unsigned32,
ospfv3IfPollInterval
  Unsigned32,
ospfv3IfState
  INTEGER,
ospfv3IfDesignatedRouter
  RouterID,
ospfv3IfBackupDesignatedRouter
  RouterID,
ospfv3IfEvents
  Counter32,
ospfv3IfStatus
  RowStatus,
ospfv3IfMulticastForwarding
  INTEGER,
ospfv3IfDemand
  TruthValue,
ospfv3IfMetricValue
  Metric,
ospfv3IfLinkScopeLsaCount
  Gauge32,
ospfv3IfLinkLsaCksumSum
  Integer32,
ospfv3IfInstId
  Integer32
}

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 }

ospfv3IfAreaId OBJECT-TYPE
SYNTAX             AreaID
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"A 32-bit integer uniquely identifying the area to which the interface connects. Area ID 0.0.0.0 is used for the OSPFv3 backbone."
DEFVAL          { '00000000'H } -- 0.0.0.0
::= { ospfv3IfEntry 2 }

ospfv3IfType OBJECT-TYPE
SYNTAX INTEGER {
  broadcast(1),
  nbma(2),
  pointToPoint(3),
  pointToMultipoint(5)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The OSPFv3 interface type."
 ::= { ospfv3IfEntry 3 }

ospfv3IfAdminStat 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."
DEFVAL { enabled }
 ::= { ospfv3IfEntry 4 }

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 5 }

ospfv3IfTransitDelay OBJECT-TYPE
SYNTAX UpToMaxAge
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The estimated number of seconds it takes to transmit a link state update packet over this interface."
DEFVAL { 1 }
 ::= { ospfv3IfEntry 6 }

ospfv3IfRetransInterval OBJECT-TYPE
SYNTAX UpToMaxAge
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds between link-state advertisement retransmissions, for adjacencies belonging to this interface. This value is also used when retransmitting database description and link-state request packets."
DEFVAL { 5 }
::= { ospfv3IfEntry 7 }

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 8 }

ospfv3IfRtrDeadInterval OBJECT-TYPE
SYNTAX Unsigned32
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds that a router’s Hello packets have not been seen before it’s neighbors declare the router down. This should be some multiple of the Hello interval. This value must be the same for all routers attached to a common network."
DEFVAL { 40 }
::= { ospfv3IfEntry 9 }

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 10 }

ospfv3IfState OBJECT-TYPE
SYNTAX INTEGER {
down(1),
loopback(2),
waiting(3),
pointToPoint(4),
designatedRouter(5),
backupDesignatedRouter(6),
otherDesignatedRouter(7)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The OSPFv3 Interface State."
::= { ospfv3IfEntry 11 }

ospfv3IfDesignatedRouter OBJECT-TYPE
SYNTAX RouterID
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The Router ID of the Designated Router."
::= { ospfv3IfEntry 12 }

ospfv3IfBackupDesignatedRouter OBJECT-TYPE
SYNTAX RouterID
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 OSPF interface has changed its state, or an error has occurred."
::= { ospfv3IfEntry 15 }

ospfv3IfStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
::= { ospfv3IfEntry 17 }

ospfv3IfMulticastForwarding OBJECT-TYPE
SYNTAX INTEGER {
broadcast(1), -- no multicast forwarding
multicast(2), -- using multicast address
unicast(3) -- to each OSPFv3 neighbor
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The way multicasts should be forwarded on this interface; not forwarded, forwarded as data link multicasts, or forwarded as data link unicasts. Data link multicasting is not meaningful on point to point and NBMA interfaces, and setting ospfv3MulticastForwarding to 0 effectively disables all multicast forwarding."

DEFVAL { blocked }
 ::= { ospfv3IfEntry 18 }

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 19 }

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 \(10^8 / \text{ifSpeed}\)."
 ::= { ospfv3IfEntry 20 }

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 21 }

ospfv3IfLinkLsaCksumSum OBJECT-TYPE
SYNTAX Integer32
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, and to compare the link-state database of two routers."
 ::= { ospfv3IfEntry 22 }

ospfv3IfInstId OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"Enables multiple instances of OSPFv3 to be run over a single link. Each protocol instance would be assigned a separate ID. This ID has local link significance only."
DEFVAL          { 0 }
 ::= { ospfv3IfEntry 23 }

-- OSPFv3 Virtual Interface Table

-- The Virtual Interface Table describes the virtual links that the OSPFv3 Process is configured to carry on.

ospfv3VirtIfTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3VirtIfEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION

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"Information about this router’s virtual interfaces."
REFERENCE
"OSPF Version 2, 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."
INDEX         { ospfv3VirtIfAreaId, ospfv3VirtIfNeighbor }
 ::= { ospfv3VirtIfTable 1 }

Ospfv3VirtIfEntry ::= SEQUENCE {
opfv3VirtIfAreaId
    AreaID, 
opfv3VirtIfNeighbor
    RouterID, 
opfv3VirtIfIndex
    InterfaceIndex, 
opfv3VirtIfTransitDelay
    UpToMaxAge, 
opfv3VirtIfRetransInterval
    UpToMaxAge, 
opfv3VirtIfHelloInterval
    HelloRange, 
opfv3VirtIfRtrDeadInterval
    Unsigned32, 
opfv3VirtIfState
    INTEGER, 
opfv3VirtIfEvents
}
Counter32,
ospfv3VirtIfStatus
  RowStatus,
ospfv3VirtIfLinkScopeLsaCount
  Gauge32,
ospfv3VirtIfLinkLsaCksumSum
  Integer32
}

ospfv3VirtIfAreaId OBJECT-TYPE
SYNTAX          AreaID
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "The Transit Area that the Virtual Link
traverses. By definition, this is not 0.0.0.0"
::= { ospfv3VirtIfEntry 1 }

ospfv3VirtIfNeighbor OBJECT-TYPE
SYNTAX          RouterID
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION     "The Router ID of the Virtual Neighbor."
::= { ospfv3VirtIfEntry 2 }

ospfv3VirtIfIndex OBJECT-TYPE
SYNTAX          InterfaceIndex
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION     "The interface ID assigned 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 }

ospfv3VirtIfTransitDelay OBJECT-TYPE
SYNTAX          UpToMaxAge
UNITS           "seconds"
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION     "The estimated number of seconds it takes to
transmit a link-state update packet over this
interface."
DEFVAL          { 1 }
::= { ospfv3VirtIfEntry 4 }

ospfv3VirtIfRetransInterval OBJECT-TYPE
SYNTAX          UpToMaxAge
UNITS           "seconds"
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION     "The number of seconds between link-state ad-
vertisement retransmissions, for adjacencies
belonging to this interface. This value is also used when retransmitting database description and link-state request packets. This value should be well over the expected round-trip time."

DEFVAL { 5 }
::= { ospfv3VirtIfEntry 5 }

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 6 }

ospfv3VirtIfRtrDeadInterval OBJECT-TYPE
SYNTAX Unsigned32
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The number of seconds that a router’s Hello packets have not been seen before it’s neighbors declare the router down. This should be some multiple of the Hello interval. This value must be the same for the virtual neighbor."

DEFVAL { 60 }
::= { ospfv3VirtIfEntry 7 }

ospfv3VirtIfState OBJECT-TYPE
SYNTAX INTEGER {
   down(1), -- these use the same encoding
   pointToPoint(4) -- as the ospfv3IfTable
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"OSPF virtual interface states."
::= { ospfv3VirtIfEntry 8 }

ospfv3VirtIfEvents OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of state changes or error events on this Virtual Link"
::= { ospfv3VirtIfEntry 9 }
ospfv3VirtIfStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
"This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
::= { ospfv3VirtIfEntry 10 }

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 11 }

ospfv3VirtIfLinkLsaCksumSum OBJECT-TYPE
SYNTAX          Integer32
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, and to compare the link-state database of two routers."
::= { ospfv3VirtIfEntry 12 }

-- OSPFv3 Neighbor Table
-- The OSPFv3 Neighbor Table describes all neighbors in
-- the locality of the subject router.

ospfv3NbrTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3NbrEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"A table of non-virtual neighbor information."
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  ::= { ospfv3NbrTable 1 }

Ospfv3NbrEntry ::= SEQUENCE {
    ospfv3NbrIfIndex INTERFACEIndex,
    ospfv3NbrRtrId RouterID,
    ospfv3NbrAddressType InetAddressType,
    ospfv3NbrAddress InetAddress,
    ospfv3NbrOptions Integer32,
    ospfv3NbrPriority DesignatedRouterPriority,
    ospfv3NbrState INTEGER,
    ospfv3NbrEvents Counter32,
    ospfv3NbrLsRetransQLen Gauge32,
    ospfv3NbrHelloSuppressed TruthValue,
    ospfv3NbrIfId INTERFACEIndex

    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 }

    ospfv3NbrRtrId OBJECT-TYPE
        SYNTAX          RouterID
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION     "A 32-bit integer (represented as a type IpAddress) uniquely identifying the neighboring router in the Autonomous System."
        ::= { ospfv3NbrEntry 2 }

    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 3 }

ospfv3NbrAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE (16))
MAX-ACCESS read-only

DESCRIPTION
"The IPv6 address of the neighbor associated with
the local link."
 ::= { ospfv3NbrEntry 4 }

ospfv3NbrOptions OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A Bit Mask corresponding to the neighbor’s op-
tions field."
REFERENCE
"OSPF Version 3, Appendix A.2 the Options field"
 ::= { ospfv3NbrEntry 5 }

ospfv3NbrPriority OBJECT-TYPE
SYNTAX DesignatedRouterPriority
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The priority of this neighbor in the designat-
ed router election algorithm. The value 0 sig-
nifies that the neighbor is not eligible to be-
come the designated router on this particular
network."
 ::= { ospfv3NbrEntry 6 }

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 Neigh-
bor."
REFERENCE
"OSPF Version 2, Section 10.1 Neighbor States"
 ::= { ospfv3NbrEntry 7 }

ospfv3NbrEvents OBJECT-TYPE
DESCRIPTION
"The number of times this neighbor relationship has changed state, or an error has occurred."
::= { ospfv3NbrEntry 8 }

ospfv3NbrLsRetransQLen OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current length of the retransmission queue."
::= { ospfv3NbrEntry 9 }

ospfv3NbrHelloSuppressed OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indicates whether Hellos are being suppressed to the neighbor"
::= { ospfv3NbrEntry 10 }

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 11 }

-- OSPFv3 NBMA Neighbor Table
-- The OSPFv3 NBMA Neighbor Table describes all configured -- NBMA neighbors and neighbors dynamically discovered by -- lower-level protocols such as Inverse Neighbor Discovery.

ospfv3NhmaNbrTable OBJECT-TYPE
SYNTAX SEQUENCE OF Ospfv3NhmaNbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table of configured non-virtual neighbor information and neighbors dynamically discovered by lower-level protocols such as Inverse Neighbor Discovery."
REFERENCE
"OSPF Version 2, Section 10 The Neighbor Data Structure"
::= { ospfv3Objects 10 }
ospfv3NbmaNbrEntry OBJECT-TYPE
SYNTAX Ospfv3NbmaNbrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The information regarding a single configured neighbor or neighbor discovered by lower-level protocols such as Inverse Neighbor Discovery."
REFERENCE "OSPF Version 2, Section 10 The Neighbor Data Structure"
INDEX { ospfv3NbmaNbrIfIndex, ospfv3NbmaNbrAddressType, ospfv3NbmaNbrAddress }
::= { ospfv3NbmaNbrTable 1 }

Ospfv3NbmaNbrEntry ::= SEQUENCE {
  ospfv3NbmaNbrIfIndex InterfaceIndex,
  ospfv3NbmaNbrAddressType InetAddressType,
  ospfv3NbmaNbrAddress InetAddress,
  ospfv3NbmaNbrPriority DesignatedRouterPriority,
  ospfv3NbmaNbrRtrId RouterID,
  ospfv3NbmaNbrState INTEGER,
  ospfv3NbmaNbrStorageType StorageType,
  ospfv3NbmaNbrStatus RowStatus
}

ospfv3NbmaNbrIfIndex 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."
::= { ospfv3NbmaNbrEntry 1 }

ospfv3NbmaNbrAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The address type of ospfv3NbrAddress. Only IPv6 addresses without zone index are expected."
::= { ospfv3NbmaNbrEntry 2 }
ospfv3NbmaNbrAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE (16))
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The IPv6 address of the neighbor associated with
the local link."
::= { ospfv3NbmaNbrEntry 3 }

ospfv3NbmaNbrPriority OBJECT-TYPE
SYNTAX DesignatedRouterPriority
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The priority of this neighbor in the designat-
ed router election algorithm. The value 0 sig-
nifies that the neighbor is not eligible to be-
come the designated router on this particular
network."
DEFVAL { 1 }
::= { ospfv3NbmaNbrEntry 4 }

ospfv3NbmaNbrRtrId OBJECT-TYPE
SYNTAX RouterID
MAX-ACCESS read-only
STATUS current
DESCRIPTION "A 32-bit integer (represented as a type IpAd-
dress) uniquely identifying the neighboring
router in the Autonomous System. A value of
0.0.0.0 is returned until a Hello is received
from the configured neighbor."
::= { ospfv3NbmaNbrEntry 5 }

ospfv3NbmaNbrState 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 Neigh-
bor."
REFERENCE "OSPF Version 2, Section 10.1 Neighbor States"
::= { ospfv3NbmaNbrEntry 6 }
SYNTAX          StorageType
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
   "The storage type for this conceptual row. Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row. Manually configured entries will have a storage type of nonVolatile while entries dynamically created as a result of a lower-level protocol such as Inverse Neighbor Discovery will have a storage type of volatile."
DEFVAL          { nonVolatile }
 ::= { ospfv3NbmaNbrEntry 7 }

ospfv3NbmaNbrStatus OBJECT-TYPE
SYNTAX          RowStatus
MAX-ACCESS      read-create
STATUS          current
DESCRIPTION
   "This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
 ::= { ospfv3NbmaNbrEntry 8 }

-- OSPFv3 Virtual Neighbor Table

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

ospfv3VirtNbrTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3VirtNbrEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
   "A table of virtual neighbor information."
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
      AreaID, 
   ospfv3VirtNbrRtrId
      RouterID, 

ospfv3VirtNbrIfIndex
  InterfaceIndex,
ospfv3VirtNbrAddressType
  InetAddressType,
ospfv3VirtNbrAddress
  InetAddress,
ospfv3VirtNbrOptions
  Integer32,
ospfv3VirtNbrState
  INTEGER,
ospfv3VirtNbrEvents
  Counter32,
ospfv3VirtNbrLsRetransQLen
  Gauge32,
ospfv3VirtNbrHelloSuppressed
  TruthValue,
ospfv3VirtNbrIfId
  InterfaceIndex

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

ospfv3VirtNbrRtrId OBJECT-TYPE
SYNTAX           RouterID
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 }

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 4 }

ospfv3VirtNbrAddress OBJECT-TYPE
SYNTAX             InetAddress (SIZE (16))
MAX-ACCESS         read-only
STATUS             current
DESCRIPTION        "The IPv6 address advertised by this Virtual Neighbor. It must be a Site-Local or Global scope address."
::= { ospfv3VirtNbrEntry 5 }

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 6 }

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 7 }

ospfv3VirtNbrEvents OBJECT-TYPE
SYNTAX             Counter32
MAX-ACCESS         read-only
STATUS             current
DESCRIPTION        "The number of times this virtual link has changed its state, or an error has occurred."
::= { ospfv3VirtNbrEntry 8 }

ospfv3VirtNbrLsRetransQLen OBJECT-TYPE
SYNTAX             Gauge32
MAX-ACCESS         read-only
STATUS             current
DESCRIPTION        "The current length of the retransmission queue."
::= { ospfv3VirtNbrEntry 9 }

ospfv3VirtNbrHelloSuppressed OBJECT-TYPE
SYNTAX          TruthValue
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
"Indicates whether Hellos are being suppressed
to the neighbor"
::= { ospfv3VirtNbrEntry 10 }

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 11 }

--
-- The OSPFv3 Area Aggregate Table
--

ospfv3AreaAggregateTable OBJECT-TYPE
SYNTAX          SEQUENCE OF Ospfv3AreaAggregateEntry
MAX-ACCESS      not-accessible
STATUS          current
DESCRIPTION
"A range of IPv6 prefixes specified by a
prefix/prefix length pair. Note that if
ranges are configured such that one range sub-
sumes 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 range of IPv6 prefixes specified by a
prefix/prefix length pair. Note that if
ranges are configured such that one range sub-
sumes another range the most specific match is
the preferred one."

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

Ospfv3AreaAggregateEntry ::= SEQUENCE {
  ospfv3AreaAggregateAreaID
  AreaID,
ospfv3AreaAggregateAreaLsdbType
  INTEGER,
ospfv3AreaAggregatePrefixType
  InetAddressType,
ospfv3AreaAggregatePrefix
  InetAddress,
ospfv3AreaAggregatePrefixLength
  InetAddressPrefixLength,
ospfv3AreaAggregateStatus
  RowStatus,
ospfv3AreaAggregateEffect
  INTEGER
}

ospfv3AreaAggregateAreaID OBJECT-TYPE
SYNTAX        AreaID
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 4 }

ospfv3AreaAggregatePrefix OBJECT-TYPE
SYNTAX        InetAddress (SIZE (0..16))
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "The IPv6 Prefix."
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 }

ospfv3AreaAggregateStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This variable controls the status of the entry. The use of RowStatus is covered in more detail in [6]."
::= { 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 result in the prefix not being advertised at all outside the area."
DEFVAL { advertiseMatching }
::= { ospfv3AreaAggregateEntry 8 }

-- conformance information

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

-- compliance statements

ospfv3Compliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement...
MODULE -- this module
MANDATORY-GROUPS {
    ospfv3BasicGroup,
    ospfv3AreaGroup,
    ospfv3IfGroup,
ospfv3VirtIfGroup,
ospfv3NbrGroup,
ospfv3NmaNbrGroup,
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."

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

OBJECT          ospfv3HostAddressType
SYNTAX          InetAddressType { ipv6(2) }
DESCRIPTION
"An implementation is only required to support IPv6
address without zone index."

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

OBJECT          ospfv3NbmaNbrAddressType
SYNTAX          InetAddressType { ipv6(2) }
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."

::= { ospfv3Compliances 1 }

-- units of conformance

ospfv3BasicGroup OBJECT-GROUP
OBJECTS
{
    ospfv3RouterId,
    ospfv3AdminStat,
    ospfv3VersionNumber,
    ospfv3AreaBdrRtrStatus,
    ospfv3ASBdrRtrStatus,
    ospfv3AsScopeLsaCount,
    ospfv3AsScopeLsaCksumSum,
    ospfv30riginateNewLsas,
    ospfv3RxNewLsas,
    ospfv3ExtAreaLsdbLimit,
    ospfv3MulticastExtensions,
    ospfv3ExitOverflowInterval,
    ospfv3DemandExtensions,
    ospfv3TrafficEngineeringSupport
}
STATUS current
DESCRIPTION "These objects are required for OSPFv3 systems."
::= { ospfv3Groups 1 }

ospfv3AreaGroup OBJECT-GROUP
OBJECTS
{
    ospfv3ImportAsExtern,
    ospfv3SpfRuns,
    ospfv3AreaBdrRtrCount,
    ospfv3AsBdrRtrCount,
    ospfv3AreaScopeLsaCount,
    ospfv3AreaScopeLsaCksumSum,
    ospfv3AreaSummary,
    ospfv3AreaStatus,
    ospfv3StubMetric,
    ospfv3AreaNssaTranslatorRole,
    ospfv3AreaNssaTranslatorState,
    ospfv3AreaNssaTranslatorStabilityInterval,
    ospfv3AreaNssaTranslatorEvents
}
STATUS current
DESCRIPTION "These objects are required for OSPFv3 systems supporting areas."
::= { ospfv3Groups 2 }

ospfv3AsLsdbGroup OBJECT-GROUP
OBJECTS
{
    ospfv3AsLsdbSequence,
    ospfv3AsLsdbAge,
    ospfv3AsLsdbChecksum,
    ospfv3AsLsdbAdvertisement
}
STATUS current
DESCRIPTION "These objects are required for OSPFv3 systems that display their AS-scope link state database."
::= { ospfv3Groups 3 }
ospfv3AreaLsdbGroup OBJECT-GROUP
  OBJECTS
  |
  |
  |
  OSPFv3AreaLsdbSequence, ospfv3AreaLsdbAge,
    ospfv3AreaLsdbChecksum,
    ospfv3AreaLsdbAdvertisement
  }

STATUS current

DESCRIPTION
"These objects are required for OSPFv3 systems that display their Area-scope link state database."

::= { ospfv3Groups 4 }

ospfv3LinkLsdbGroup OBJECT-GROUP
  OBJECTS
  |
  |
  |
  ospfv3LinkLsdbSequence, ospfv3LinkLsdbAge,
    ospfv3LinkLsdbChecksum,
    ospfv3LinkLsdbAdvertisement
  }

STATUS current

DESCRIPTION
"These objects are required for OSPFv3 systems that display their Link-scope link state database."

::= { ospfv3Groups 5 }

ospfv3HostGroup OBJECT-GROUP
  OBJECTS
  |
  |
  |
  ospfv3HostMetric,
    ospfv3HostStatus,
    ospfv3HostAreaID
  }

STATUS current

DESCRIPTION
"These objects are required for OSPFv3 systems that support attached hosts."

::= { ospfv3Groups 6 }

ospfv3IfGroup OBJECT-GROUP
  OBJECTS
  |
  |
  |
  ospfv3IfAreaId,
    ospfv3IfType,
    ospfv3IfAdminStat,
    ospfv3IfRtrPriority,
    ospfv3IfTransitDelay,
    ospfv3IfRetransInterval,
    ospfv3IfHelloInterval,
    ospfv3IfRtrDeadInterval,
    ospfv3IfPollInterval,
    ospfv3IfState,
    ospfv3IfDesignatedRouter,
    ospfv3IfBackupDesignatedRouter,
    ospfv3IfEvents,
    ospfv3IfStatus,
    ospfv3IfMulticastForwarding,
ospfv3IfDemand,
ospfv3IfMetricValue,
ospfv3IfLinkScopeLsaCount,
ospfv3IfLinkLsaCksumSum,
ospfv3IfInstId
}

STATUS current
DESCRIPTION "These interface objects are required for OSPFv3 systems."
 ::= { ospfv3Groups 7 }

ospfv3VirtIfGroup OBJECT-GROUP
OBJECTS {
ospfv3VirtIfIndex,
ospfv3VirtIfTransitDelay,
ospfv3VirtIfRetransInterval,
ospfv3VirtIfHelloInterval,
ospfv3VirtIfRtrDeadInterval,
ospfv3VirtIfState,
ospfv3VirtIfEvents,
ospfv3VirtIfStatus,
ospfv3VirtIfLinkScopeLsaCount,
ospfv3VirtIfLinkLsaCksumSum
}

STATUS current
DESCRIPTION "These virtual interface objects are required for OSPFv3 systems."
 ::= { ospfv3Groups 8 }

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

STATUS current
DESCRIPTION "These neighbor objects are required for OSPFv3 systems."
 ::= { ospfv3Groups 9 }

ospfv3NbmaNbrGroup OBJECT-GROUP
OBJECTS {
ospfv3NbmaNbrPriority,
ospfv3NbmaNbrRtrId,
ospfv3NbmaNbrState,
ospfv3NbmaNbrStorageType,
ospfv3NbmaNbrStatus
}
These virtual neighbor objects are required for OSPFv3 systems.

::= { ospfv3Groups 11 }

ospfv3AreaAggregateGroup OBJECT-GROUP

OBJECTS

{ ospfv3AreaAggregateStatus, ospfv3AreaAggregateEffect }

END

6. Acknowledgements

This document is based on the MIB for OSPF version 2 by Rob Coltun and Fred Baker [18].

7. References


8. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

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

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [12] and the View-based Access Control Model RFC 2575 [15] is recommended.

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

9. Authors’ Addresses

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A. Differences from RFC 1850

1. Textual Conventions are imported from INET-ADDRESS-MIB, IF-MIB and OSPF-MIB MIBs.

2. The "ospf" prefix for entity names is changed to "ospfv3".

3. General Group object name ospfVersionNumber is changed to ospfv3VersionNumber and its value is changed from 2 to 3.

4. General Group object name ospfExternLsaCount is changed to ospfv3AsScopeLsaCount to indicate count of all AS-scoped LSAs in the database.

5. General Group object name ospfExternLsaCksumSum is changed to ospfv3AsScopeCksumSum to indicate checksum of all AS-scoped LSAs in the database.

6. Removed General Group object ospfTOSSupport.

7. Removed ospfAuthType object from Area entry.

8. Changed object names ospfAreaLsaCount and ospfAreaLsaCksumSum to ospfv3AreaScopeLsaCount and ospfv3AreaScopeLsaCksumSum.

9. Removed OSPF Area Default Metric Table.

10. Added object ospfv3StubMetric to Area entry as substitute for Area Default Metric Table.

11. Changed name of External LSDB Table to AS-Scope LSDB Table. Replaced object name prefix "ospfExtLsdb" with "ospfv3AsLsdb".

12. Changed name of LSDB Table to Area-Scope LSDB Table. Replaced object name prefix "ospfLsdb" with "ospfv3AreaLsdb".

13. Added ospfv3LinkLsdbTable which contains all LSAs of Link-Scope. Index of ospfv3LinkLsdbTable is interface index, LSA Type, Router ID and LSID.

14. Re-ordered Router ID and LSID index components of LSDB table entries. Since LSIDs no longer have addressing semantics, GET-NEXT operations on partial OIDs are more useful when the Router ID component comes before the LSID component.
(15) Address Range Table is removed.

(16) Removed ospfHostTOS from Host Table entry. Object ospfHostIpAddress changed to ospfv3HostAddress with SYNTAX changed from IpAddress to InetAddress.

(17) Added object ospfv3HostAddressType to Host Table entry to determine the address type of ospfv3HostAddress.

(18) The MAX-ACCESS value of object ospfv3HostAreaID is changed to read-create.

(19) Objects ospfIfIpAddress and ospfAddressLessIf removed from Interface entry and as Interface Table entry index components.

(20) Object ospfv3IfIndex added to Interface Table entry with SYNTAX InterfaceIndex. It replaces ospfIfIpAddress and ospfAddressLessIf as the Interface Table entry index.

(21) The SYNTAX of objects ospfIfDesignatedRouter and ospfIfBackupDesignatedRouter is changed from IpAddress to RouterID.

(22) Objects ospfIfAuthType and ospfIfAuthKey are removed from Interface and Virtual Interface entries.

(23) Added objects ospfv3IfLinkScopeLsaCount and ospfv3IfLinkLsaCksumSum to Interface entry. They maintain the count of Link-Scope LSAs and the checksum of the Link-Scope LSA database associated with the interface.

(24) Removed OSPF Interface Metric Table. Metric is now accessed via object ospfv3IfMetricValue in the Interface entry.

(25) Added object ospfv3IfInstId to Interface entry to enable the setting of the interface instance value of the interface. The default value is zero.

(26) Added object ospfv3VirtIfIndex to Virtual Interface entry which is used to assign a local interface ID to the virtual interface.

(27) Added objects ospfv3VirtIfLinkScopeLsaCount and ospfv3VirtIfLinkLsaCksumSum to Virtual Interface entry. They maintain the count of Link-Scope LSAs and the checksum of the Link-Scope LSA database associated with the virtual interface.

(28) The Neighbor Table (ospfv3NbrTable) is a read-only table and it contains only the neighbors that were learned from LSAs.

(29) Removed objects ospfNbrIpAddr and ospfNbrAddressLessIndex from Neighbor entry.
(30) Added object ospfv3NbrIfIndex to Neighbor entry. Index components ospfNbrIpAddr and ospfNbrAddressLessIndex are replaced with ospfv3NbrIfIndex and ospfv3NbrRtrId.

(31) Added object ospfv3NbrAddressType to Neighbor entry to determine the address type of ospfv3NbrAddress.

(32) Added object ospfv3NbrAddress to Neighbor entry. This object contains the neighbor’s IPv6 address.

(33) Removed objects ospfNbmaNbrStatus and ospfNbmaNbrPermanence from Neighbor entry.

(34) Added object ospfv3NbrIfId to Neighbor entry. This object contains the neighbor’s local interface index from the neighbor’s hellos advertised on the link.

(35) The MAX-ACCESS value of object ospfNbrPriority is changed to read-only. Removed DEFVAL for object ospfv3NbrPriority.

(36) Added ospfv3NbmaNbrTable (NBMA Neighbor Table) which contains all manually configured neighbors. Index of ospfv3NbmaNbrTable is ospfv3NbmaNbrIfIndex, ospfv3NbmaAddressType, and ospfv3NbmaNbrAddress.

(37) Added object ospfv3VirtNbrIfIndex to Virtual Neighbor entry. This is the interface index of the virtual link over which the virtual neighbor is reached.

(38) Changed object name ospfVirtNbrIpAddr to ospfv3VirtNbrAddress and SYNTAX from IpAddress to InetAddress.

(39) Added object ospfv3VirtNbrAddressType to Virtual Neighbor entry to determine the address type of ospfv3VirtNbrAddress.

(40) Added object ospfv3VirtNbrIfId to Virtual Neighbor entry. This is the virtual neighbor’s local virtual interface index from the neighbor’s hellos advertised on the virtual link.

(41) Changed object name ospfAreaAggregateMask to ospfv3AreaAggregatePrefixLenth and SYNTAX from IpAddress to InetAddressPrefixLength.

(42) Changed object name ospfAreaAggregateNet to ospfv3AreaAggregatePrefix and SYNTAX from IpAddress to InetAddress.

(43) Added object ospfv3AreaAggregatePrefixType to Area Aggregate entry to determine the address type of
ospfv3AreaAggregatePrefix.

(44) Index for Area Aggregate Table entry changed from ospfAreaAggregateAreaID, ospfAreaAggregateLsdbType, ospfAreaAggregateNet, ospfAreaAggregateMask to ospfv3AreaAggregateAreaID, ospfv3AreaAggregateAreaLsdbType, ospfv3AreaAggregatePrefixType, ospfv3AreaAggregatePrefix, ospfv3AreaAggregatePrefixLength.

(45) Conformance information is changed to reflect object groups removed or added.

(46) OSPFv3 traps are not defined.

(47) Added UNITS clause for the following objects: ospfv3ExitOverflowInterval, ospfv3AreaNssaTranslatorStabilityInterval, ospfv3AsLsdbAge, ospfv3AreaLsdbAge, ospfv3LinkLsdbAge, ospfv3IfTransitDelay, ospfv3IfRetransInterval, ospfv3IfHelloInterval, ospfv3IfRtrDeadInterval, ospfv3IfPollInterval, ospfv3VirtIfTransitDelay, ospfv3VirtIfRetransInterval, ospfv3VirtIfHelloInterval, ospfv3VirtIfRtrDeadInterval.

(48) Changed SYNTAX from PositiveInteger to Unsigned32 for the following objects: ospfv3ExitOverflowInterval, ospfv3IfRtrDeadInterval, ospfv3IfPollInterval, ospfv3VirtIfRtrDeadInterval.

(49) Changed MAX-ACCESS of row indices from read-only to not-accessible.

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