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Yang Data Model for OSPF Protocol
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Abstract

This document defines a YANG data model that can be used to configure and manage OSPF.

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Table of Contents

1.	Overview	2
1.1.	Requirements Language	2
2.	Design of Data Model	3
2.1.	Overview	3
2.2.	OSPFv2 and OSPFv3	4
2.3.	Optional Features	4
2.4.	Inheritance	4
2.5.	OSPF Router Configuration	5
2.6.	OSPF Address-Family Configuration	5
2.7.	OSPF Area Configuration	7
2.8.	OSPF Interface Configuration	9
3.	OSPF Yang Module	10
4.	Security Considerations	32
5.	Acknowledgements	32
6.	References	33
6.1.	Normative References	33
6.2.	Informative References	33

[1.](#) Overview

YANG [[RFC6020](#)] is a data definition language that was introduced to define the contents of a conceptual data store that allows networked devices to be managed using NETCONF [[RFC6241](#)]. YANG is proving relevant beyond its initial confines, as bindings to other interfaces (e.g. ReST) and encodings other than XML (e.g. JSON) are being defined. Furthermore, YANG data models can be used as the basis of implementation for other interfaces, such as CLI and programmatic APIs.

A core routing data model is defined in [[I-D.ietf-netmod-routing-cfg](#)], and it proposed a basis for the development of data models for routing protocols. This document defines a YANG data model that can be used to configure and manage OSPF and it is an augment to the core routing data model.

This document defines a YANG data model that can be used to configure and manage OSPF. Both OSPFv2 and OSPFv3 are supported. In addition to the core OSPF protocol, features described in different separate OSPF RFC are also supported. Those non-core features are made optional in the data model provided.

[1.1.](#) Requirements Language

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 [[RFC2119](#)].

2. Design of Data Model

Although the basis of OSPF configuration elements like routers, areas and interfaces remains the same, the detailed configuration model varies among different vendors. Differences are observed in term of how protocol engine is tied to routing domain, how multiple protocol engines could be instantiated and configuration inheritance, just to name a few.

The goal of this document is to define a data model that is capable of representing these differences. There is very little information that is designated as "mandatory", providing freedom to vendors to adapt this data model to their product implementation.

2.1. Overview

The OSPF YANG module defined in this document has all the common building blocks for OSPF protocol.

The OSPF YANG module augments the routing/routing-instance/routing-protocols/routing-protocol path of the ietf-routing module.

```
module: ospf
  +--rw routing
    +--rw routing-instance [name]
      +--rw routing-protocols
        +--rw routing-protocol [name]
          +--rw ospf:ospf-router [version name]
            .
            .
            +--rw ospf:ospf-afs
              +--rw ospf:ospf-af [vrf-name afi safi]
                .
                .
                +--rw ospf:ospf-areas
                  .
                  .
                  +--rw ospf:ospf-area [area-id]
                    .
                    .
                    +--rw ospf:ospf-interfaces
                      .
                      .
                      +--rw ospf:ospf-interface [interface]
                        .
                        .
```


The ospf-router is intended to match to the vendor specific OSPF configuration construct which is identified by a local identifier 'name'. The field 'version' allows support for OSPFv2 and OSPFv3.

The container ospf-afs includes one or more OSPF protocol engines, each encapsulated in the ospf-af entity. Each ospf-af includes information for the routing domain it is running on based on the [vrf-name afi safi] specification. There is no default routing domain assumed by the data model. For example, to enable OSPF on the default IPv4 routing domain of the vendor, this model requires an explicit ospf-af entity with the specification like ["default" "ipv4" "unicast"]. The ospf-af also contains OSPF router level configuration

The ospf-areas/ospf-area and ospf-intefaces/ospf-interface contains the OSPF configuration for the area and interface level respectively

2.2. OSPFv2 and OSPFv3

The defined data model supports both OSPFv2 and OSPFv3.

The field 'version' is used to indicate the OSPF version and is a mandatory. Based on the version set, the data model change accordingly to accommodate the difference between the two versions.

2.3. Optional Features

Optional features are features beyond the basic of OSPF configurations and it is up to a vendor to decide the support of a particular feature on a particular device.

This module has declared a number of features, such as NSR, max-LSA etc.. It is intended that vendors will extend the features list.

2.4. Inheritance

This defined data model supports configuration inheritance for areas and interfaces.

Area related configurations specified in the ospf-areas container apply to all ospf-area.

Interface related configurations specified in ospf-areas container apply to all ospf-interface in all ospf-area's.

Interface related configurations specified in ospf-interfaces container apply to all ospf-interface in the enclosing ospf-area.

2.5. OSPF Router Configuration

The container ospf-router is the top level container in this data model. The main purpose of the ospf-router is to specify the OSPF version and the local name for the enclosed ospf-afs container which has the protocol configuration specifics.

```
module: ospf
  +--rw ospf-router [version name]
    +--rw version      uint8
    +--rw name         string
    .
    .
```

2.6. OSPF Address-Family Configuration

The container ospf-afs contains one or more ospf-af's each represents an OSPF protocol engine. Each ospf-af indicates the routing domain it is associated with based on [vrf-name afi safi] and contains the router level configurations.


```
module: ospf
```

```
  +--rw ospf-router [version name]
    ...
    +--rw ospf-afs
      +--rw ospf-af [vrf-name afi safi]
        +--rw vrf-name          string
        +--rw afi                enumeration
        +--rw safi              enumeration
        +--rw router-id
        | ...
        +--rw distance?         uint8
        +--rw default-originate
        | ...
        +--rw auto-cost
        | ...
        +--rw default-metric?    uint32
        +--rw summary-prefix [prefix]
        | ...
        +--rw max-lsa
        | ...
        +--rw maximum
        | ...
        +--rw ignore
        | ...
        +--rw log
        | ...
        +--rw nsr
        | ...
        +--rw nsf
        | ...
        +--rw protocol
        | ...
        +--rw spf
        | ...
        +--rw snmp
        | ...
        +--rw redistribute
        | ...
        +--rw timers
        | ...
        +--rw mpls
        | ...
        +--rw fast-reroute
        | ...
```


2.7. OSPF Area Configuration

The container ospf-areas contains one or more ospf-area's each represents an area in the OSPF protocol. Each ospf-area contains configurations of that area and the ospf-interfaces container which includes all the OSPF interfaces active in the enclosing area.

The ospf-areas also contains area configuration that could be inherited to all ospf-area's defined. Similarly, the ospf-area also contains interface configuration that could be inherited to all the ospf-interface's defined.

```
module: ospf
  +--rw ospf-router [version name]
    ...
  +--rw ospf-afs
    +--rw ospf-af [vrf-name afi safi]
      ...
    +--rw ospf-areas
      +--rw loopback? enumeration
      +--rw network-type? enumeration
      +--rw passive? boolean
      +--rw mtu-ignore? boolean
      +--rw flood-reduction-enable? boolean
      +--rw demand-circuit? boolean
      +--rw demand-circuit-ignore-enable? boolean
      +--rw prefix-suppression? boolean
      +--rw ttl-security
      ...
    +--rw packet-size
      ...
    +--rw authentication
      ...
    +--rw database-filter
      ...
    +--rw neighbor [ip-address]
      ...
    +--rw bfd
      ...
    +--rw cost? uint16
    +--rw hello-interval? uint16
    +--rw dead-interval? uint16
    +--rw retransmit-interval? uint16
    +--rw transmit-delay? uint16
    +--rw ospf-area [area-id]
      +--rw area-id uint32
      +--rw area-notation? enumeration
      +--rw (area-type)?
        ...
      +--rw default-cost? uint32
      +--rw range [prefix]
        ...
      +--rw virtual-link
        ...
      +--rw sham-link
        ...
    +--rw mpls-te-config
      ...
```


2.8. OSPF Interface Configuration

The container `ospf-areas` contains one or more `ospf-interface`'s each represents an interface in the OSPF protocol. Each `ospf-interface` contains configurations of that interface.

The `ospf-interfaces` also contain interface configuration that could be inherited to all `ospf-interface`'s defined.

```
module: ospf
  +--rw ospf-router [version name]
    ...
    +--rw ospf-afs
      +--rw ospf-af [vrf-name afi safi]
        ...
        +--rw ospf-areas
          ...
          +--rw ospf-interfaces
            +--rw network-type?          enumeration
            +--rw passive?                boolean
            +--rw mtu-ignore?             boolean
            +--rw flood-reduction-enable? boolean
            +--rw demand-circuit?         boolean
            +--rw demand-circuit-ignore-enable? boolean
            +--rw prefix-suppression?     boolean
            +--rw ttl-security
              ...
            +--rw packet-size
              ...
            +--rw authentication
              ...
            +--rw database-filter
              ...
            +--rw neighbor [ip-address]
              ...
            +--rw bfd
              ...
            +--rw cost?                   uint16
            +--rw hello-interval?         uint16
            +--rw dead-interval?          uint16
            +--rw retransmit-interval?     uint16
            +--rw transmit-delay?         uint16
            +--rw ospf-interface [interface]
              +--rw interface             if:interface-ref
              +--rw network-type?         enumeration
              +--rw passive?              boolean
              +--rw mtu-ignore?           boolean
              +--rw flood-reduction-enable? boolean
```



```
+--rw demand-circuit?          boolean
+--rw demand-circuit-ignore-enable? boolean
+--rw prefix-suppression?      boolean
+--rw ttl-security
   ...
+--rw packet-size
   ...
+--rw authentication
   ...
+--rw database-filter
   ...
+--rw neighbor [ip-address]
   ...
+--rw bfd
   ...
+--rw cost?                    uint16
+--rw hello-interval?         uint16
+--rw dead-interval?          uint16
+--rw retransmit-interval?    uint16
+--rw transmit-delay?         uint16
```

3. OSPF Yang Module

```
<CODE BEGINS>
module ospf {
  namespace "urn:cisco:params:xml:ns:yang:ospf";
  // replace with IANA namespace when assigned
  prefix ospf;

  import ietf-inet-types {
    prefix "inet";
  }

  import ietf-yang-types {
    prefix "yang";
  }

  import ietf-interfaces {
    prefix "if";
  }

  import ietf-routing {
    prefix "rt";
  }

  organization
    "Cisco Systems
     170 West Tasman Drive
```



```
    San Jose, CA 95134-1706
    USA";
contact
  "Derek Yeung myeung@cisco.com
  Yingzhen Qu yiqu@cisco.com
  Alexander Clemm alex@cisco.com";

description
  "This YANG module defines the generic configuration
  data for OSPF, which is common across all of the vendor
  implementations of the protocol. It is intended that the module
  will be extended by vendors to define vendor-specific
  OSPF configuration parameters and policies,
  for example route maps or route policies.

  Terms and Acronyms

  OSPF (ospf): Open Shortest Path First

  IP (ip): Internet Protocol

  IPv4 (ipv4):Internet Protocol Version 4

  IPv6 (ipv6): Internet Protocol Version 6

  MTU (mtu) Maximum Transmission Unit
  ";

revision 2014-02-14 {
  description
    "Initial revision.";
}

feature ospfv3-authentication-trailer {
  description
    "OSPFv3 Cryptographic Authentication as in RFC 6506.";
}

feature ospfv2-authentication-SHA {
  description
    "OSPFv2 support of HMAC-SHA algorithms as in RFC 5709.";
}

feature ospf-madj {
  description
    "OSPF multi-area adjacency support as in RFC 5185.";
}
```



```
feature ospf-lls {
  description
    "OSPF link-local signaling (LLS) as in RFC 5613.";
}

feature flood-reduction {
  description
    "OSPF Flood Reduction.";
}

feature demand-circuit-ignore {
  description
    "Ignore demand circuit auto-negotiation requests.";
}

feature security {
  description
    "Enable/Disable TTL security.";
}

feature packet-size {
  description
    "Customize size of OSPF packets up to MTU.";
}

feature nsf-cisco {
  description
    "Enable Cisco Non Stop Forwarding.";
}

feature loopback-config {
  description
    "OSPF loopback configuration.";
}

feature max-lsa {
  description
    "Maximum number of LSAs OSPF process will receive.";
}

feature maximum-ecmp {
  description
    "Maximum number of ECMP paths.";
}

feature nsr {
  description
    "Enable NSR.";
```



```
}

feature spf {
  description
    "SPF configuration";
}

feature nssa-only {
  description
    "Limit summary to NSSA areas.";
}

feature nssa-ext-capability {
  description
    "Send domain specific capabilities into NSSA.";
}

identity ospf {
  base "rt:routing-protocol";
  description "OSPF routing protocol";
}

grouping interface-internal-inherit-config {
  leaf cost {
    description
      "Interface cost.";
    type uint16 {
      range "1..65535";
    }
  }
}

leaf hello-interval {
  description
    "Time between HELLO packets.";
  units seconds;
  type uint16 {
    range "1..65535";
  }
}

leaf dead-interval {
  description
    "Interval after which a neighbor is declared dead.";
  units seconds;
  type uint16 {
    range "1..65535";
  }
  must "dead-interval > ../hello-interval" {
```



```
        error-app-tag dead-interval-invalid;
        error-message "The dead interval must be "
            + "larger than the hello interval";
    }
}

leaf retransmit-interval {
    description
        "Time between retransmitting lost link state advertisements.";
    units seconds;
    type uint16 {
        range "1..65535";
    }
}

leaf transmit-delay {
    description
        "Estimated time needed to send link-state update.";
    units seconds;
    type uint16 {
        range "1..65535";
    }
}
} // interface-internal-inherit-config

grouping interface-inherit-config {
    leaf network-type {
        description
            "Network type.";
        type enumeration {
            enum "broadcast" {
                description
                    "Specify OSPF broadcast multi-access network.";
            }
            enum "non-broadcast" {
                description
                    "Specify OSPF NBMA network.";
            }
            enum "point-to-multipoint" {
                description
                    "Specify OSPF point-to-multipoint network.";
            }
            enum "point-to-point" {
                description
                    "Specify OSPF point-to-point network.";
            }
        }
    }
}
```



```
leaf passive {
  description
    "Enable/Disable passive.";
  type boolean;
}

leaf mtu-ignore {
  description
    "Enable/Disable ignoring of MTU in DBD packets.";
  type boolean;
}

leaf flood-reduction-enable {
  if-feature flood-reduction;
  type boolean;
}

leaf demand-circuit {
  description
    "Enable/Disable demand circuits.";
  type boolean;
}

leaf demand-circuit-ignore-enable {
  if-feature demand-circuit-ignore;
  type boolean;
}

leaf prefix-suppression {
  description
    "Suppress advertisement of the prefixes.";
  type boolean;
}

leaf lls-enable {
  if-feature ospf-lls;
  description
    "link-local signaling (LLS) support.";
  type boolean;
}

container ttl-security {
  if-feature security;
  leaf enable {
    type boolean;
  }
  leaf hops {
    type uint8 {
```



```
        range "1..254";
    }
}

container packet-size {
    if-feature packet-size;
    description
        "Customize size of OSPF packets up to MTU.";
    leaf enable {
        type boolean;
    }
    leaf size {
        type uint16 {
            range "576..10000";
        }
    }
}

container ospf-multiarea-adj {
    if-feature ospf-madj;
    description
        "Configure ospf multi-area.";
    leaf multi-area {
        type uint32;
    }
    leaf cost {
        type uint16;
    }
}

container ospfv3-authentication {
    when "../../version = 3";
    description "Configure authentication for ospfv3.";
    if-feature ospfv3-authentication-trailer;
    leaf key-chain {
        type string;
    }
    container ipsec {
        leaf spi {
            type uint32 {
                range "256..4294967295";
            }
        }
        leaf encrypted {
            type uint8 {
                range "0..7";
            }
        }
    }
}
```



```
    }
    leaf key {
      type string;
    }
  }
}

container ospfv2-authentication {
  when "../.../version = 2";
  description "Configure authentication for ospfv2.";
  leaf enable {
    type boolean;
  }
  choice authentication-type-selection {
    case clear-text {
      description
        "Use clear-text authentication.";
      leaf key {
        type string {
          length "1..8";
        }
      }
    }
    case message-digest {
      description
        "Use message-digest authentication.";
      list message-digest-key {
        key key-id;
        leaf key-id {
          type uint8 {
            range "1..255";
          }
        }
        leaf algorithm {
          type enumeration {
            enum "md5";
          }
        }
        leaf key {
          type string {
            length "1..8";
          }
        }
      }
    }
  }
  case cryptographic {
    if-feature ospfv2-authentication-SHA;
    description
```



```
        "OSPFv2 Cryptographic Authentication(SHA) as in RFC 5709.";
    leaf key-chain {
        type string {
            length "1..8";
        }
    }
}
}
}

container database-filter {
    description
        "Filter OSPF LSA during synchronization and flooding";
    leaf enable {
        type boolean;
    }
    leaf lsa-type {
        type enumeration {
            enum "all";
        }
    }
    leaf direction {
        type enumeration {
            enum "out";
        }
    }
}

list neighbor {
    description
        "Specify a neighbor router.";
    key "address";

    leaf address {
        type inet:ip-address;
    }

    leaf cost {
        type uint16 {
            range "1..65535";
        }
    }
    leaf poll-interval {
        units seconds;
        type uint16 {
            range "1..65535";
        }
    }
}
```



```
    leaf priority {
      type uint8 {
        range "1..255";
      }
    }
  }
}

container bfd {
  leaf enable {
    description
      "enable bfd.";
    type boolean;
  }

  leaf minimum-interval {
    description
      "bfd hello interval";
    type uint16 {
      range "15..30000";
    }
  }
  leaf multiplier {
    description
      "detect multiplier";
    type uint8 {
      range "2..50";
    }
  }
}

uses interface-internal-inherit-config;

} // grouping interface-inherit-config

grouping area-inherit-config {
  leaf loopback {
    if-feature loopback-config;
    description
      "OSPF loopback configuration.";
    type enumeration {
      enum "stub";
      enum "host";
    }
  }
}
} // grouping area-inherit-config

// data nodes follow
```



```
augment "/rt:routing/rt:routing-instance/rt:routing-protocols/"
  + "rt:routing-protocol" {
    list ospf-router {

      description
        "This is a top-level container for the OSPF router.";

      when "../type=ospf";

      key "version name";
      leaf version {
        description
          "OSPF version.";
        type uint8 {
          range "2..3";
        }
      }

      leaf name {
        description
          "Name, combined with
           ospf_router/ospf-vrfs/ospf-vrf/name,
           identify an OSPF protocol instance.";
        type string;
      }

      container ospf-afs {
        list ospf-af {
          key "vrf-name afi safi";
          leaf vrf-name {
            type string;
          }

          leaf afi {
            type enumeration {
              enum "ipv4" {
                description
                  "IPv4";
              }
              enum "ipv6" {
                description
                  "IPv6";
              }
            }
          }
        }

        leaf safi {
          type enumeration {
```



```
        enum "unicast" {
            description
                "unicast";
        }
    }
}

container router-id {
    description
        "Defined in RFC 2328. A 32-bit number that uniquely
        identifies the router.";
    leaf static_config {
        description
            "Define whether a static router-id is configured.";
        type boolean;
    }
    leaf router-id {
        type inet:ip-address;
    }
}

leaf distance {
    description
        "Define an administrative distance.";
    type uint8 {
        range "1..255";
    }
}

container default-originate {
    description
        "Control distribution of default route information.";
    leaf enable {
        type boolean;
        default "false";
    }
}

container auto-cost {
    description
        "Calculate OSPF interface cost according to bandwidth.";
    leaf enable {
        type boolean;
    }
    leaf reference-bandwidth {
        type uint32 {
            range "1..4294967";
        }
    }
}
```



```
    }
  }

  leaf default-metric {
    description
      "Calculate OSPF interface cost according to bandwidth.";
    type uint32 {
      range "1..16777214";
    }
  }

  when "../../../version = 2";
  list summary-prefix {
    description
      "Configure IP address summaries";
    key "prefix";
    leaf prefix {
      type inet:ipv4-prefix;
    }
    leaf advertise {
      type boolean;
    }
    leaf tag {
      type uint32 {
        range "0..4294967295";
      }
    }
    leaf nssa-only-enable {
      if-feature nssa-only;
      type boolean;
    }
  }
}

container max-lsa {
  if-feature max-lsa;
  description
    "Maximum number of LSAs OSPF process will receive.";
  leaf max {
    description
      "Maximum number of non self-generated LSAs this
      process can receive.";
    type uint32 {
      range "1..4294967294";
    }
  }
  leaf threshold {
    description
      "Threshold value (%) at which to generate
```



```
        a warning msg.";
    type uint8 {
        range "1..100";
    }
}
leaf warning-only {
    description
        "Only give warning message when limit is exceeded.";
    type boolean;
}
leaf ignore-time {
    description
        "Number of minutes during which all adjacencies
        are suppressed.";
    type uint16 {
        range "1..17895";
    }
}
leaf ignore-count {
    description
        "Count on how many times adjacencies can be
        suppressed.";
    type uint16 {
        range "1..65534";
    }
}
leaf reset-time {
    description
        "number of minutes after which ignore-count is
        reset to zero.";
    type uint16 {
        range "2..35791";
    }
}
}

container maximum {
    if-feature maximum-ecmp;
    description
        "Set OSPF limits.";
    leaf paths {
        description
            "Maximum number of ECMP paths.";
        type uint16 {
            range "1..32";
        }
    }
}
leaf interfaces {
```



```
    description
      "Maximum number of interfaces.";
    type uint16 {
      range "1..1024";
    }
  }
  container redistributed-prefixes {
    description
      "Maximum number of prefixes redistributed.";
    leaf max {
      type uint32 {
        range "1..4294967295";
      }
    }
    leaf threshold {
      description
        "Threshold value (%) at which to generate
         a warning msg.";
      type uint8 {
        range "1..100";
      }
    }
    leaf warning-only {
      description
        "Only give warning message when limit is exceeded.";
      type boolean;
    }
  }
}

container ignore {
  description
    "Do not complain about specific event.";
  leaf-list lsa {
    type enumeration {
      enum "mospf";
    }
  }
}

container log {
  description
    "Log ospf info.";
  leaf adjacency-changes {
    type boolean;
  }
}
```



```
container nsr {
  if-feature nsr;
  description
    "Enable NSR.";
  leaf enable {
    type boolean;
  }
}

container nsf {
  choice nsf-type {
    case cisco {
      if-feature nsf-cisco;
      description
        "Enable Cisco Non Stop Forwarding.";
      leaf cisco-enable {
        type boolean;
      }
    }
    case ietf {
      description
        "Enable IETF standardized graceful restart
        functionality that is described in
        RFC 3623 and 5187.";
      leaf ietf-enable {
        type boolean;
      }
      leaf ietf-helper-enable {
        type boolean;
      }
    }
  }
}

container protocol {
  description
    "Protocol specific configuration.";
  leaf shutdown {
    type boolean;
  }
}

container spf {
  if-feature spf;
  description
    "SPF configuration";
  leaf prefix-priority-policy {
    type string;
  }
}
```



```
    }
  }

  container snmp {
    description
      "Adjust ospf snmp parameters";
    leaf context {
      type string;
    }
  }

  container redistribute {
    description
      "Redistribute information from another routing protocol.
      This grouping is intended to be augmented by vendors
      to implement vendor-specific protocol redistribution
      configuration options.";
    choice protocol {
      case bgp {
        leaf enable-bgp {
          type boolean;
        }
      }
      case ospf {
        leaf enable-ospf {
          type boolean;
        }
      }
      case isis {
        leaf enable-isis {
          type boolean;
        }
      }
      case connected {
        leaf enable-connected {
          type boolean;
        }
      }
      case eigrp {
        leaf enable-eigrp {
          type boolean;
        }
      }
      case mobile {
        leaf enable-mobile {
          type boolean;
        }
      }
    }
  }
```



```
    case static {
      leaf enable-static {
        type boolean;
      }
    }
    case rip {
      leaf enable-rip {
        type boolean;
      }
    }
  }
}

container timers {
  description
    "Adjust routing timers.
    This grouping is intended to be augmented by vendors
    to implement vendor-specific protocol timers
    configuration options";

  container lsa {
    leaf min-arrival {
      description
        "The minimum interval in milliseconds between
        accepting the same";
      units milliseconds;
      type uint32 {
        range "0..600000";
      }
    }
    leaf refresh {
      description
        "The minimum interval in seconds between refresh";
      units seconds;
      type uint32 {
        range "1800..2700";
      }
    }
  }
}

container throttle-lsa {
  leaf delay {
    description
      "Delay to generate first occurrence of LSA
      in milliseconds";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
}
```



```
    }
  }
  leaf min-delay {
    description
      "The Minimum delay between originating the same
       LSA in milliseconds";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
  leaf max-delay {
    description
      "The Maximum delay between originating the same
       LSA in milliseconds";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
}

container throttle-spf {
  leaf delay {
    description
      "Delay between receiving a change to SPF calculation
       in milliseconds";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
  leaf min-delay {
    description
      "Delay between first and second SPF calculation
       in milliseconds";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
  leaf max-delay {
    description
      "Maximum wait time in milliseconds for
       SPF calculations";
    units milliseconds;
    type uint32 {
      range "0..600000";
    }
  }
}
```



```
    }
  }
}

container mpls {
  description
    "OSPF MPLS configuraions.";
  leaf te-rid {
    description
      "Traffic Engineering stable IP address for system.";
    type if:interface-ref;
  }
  leaf ldp-sync-enable {
    description
      "Enable LDP IGP synchronization.";
    type boolean;
  }
  leaf ldp-autoconfig-enable {
    description
      "Enable LDP IGP interface auto-configuration.";
    type boolean;
  }
}

container fast-reroute {
  leaf fast-reroute-enable {
    description
      "IP fast reroute.";
    type boolean;
  }
}

container ospf-areas {
  description
    "The top level container for the list of areas of
    the OSPF router.";

  uses area-inherit-config;
  uses interface-inherit-config;

  list ospf-area {
    key "area-id";
    leaf area-id {
      type uint32;
    }

    leaf area-notation {
```



```
    description
      "Sets the default area notation.";
    type enumeration {
      enum "decimal";
      enum "dot";
    }
  }
choice area-type {
  case nssa {
    description
      "Specify area as a NSSA area.";
    leaf redistribute {
      type boolean;
    }
    leaf nssa-summary {
      type boolean;
    }
    leaf nssa-ext-capability {
      if-feature nssa-ext-capability;
      type boolean;
    }
    container default-information-originate {
      description
        "Originate Type 7 default into NSSA area.";
      leaf metric {
        type uint16 {
          range "1..65535";
        }
      }
      leaf metric-type {
        type uint8 {
          range "1..2";
        }
      }
    }
  }
  case stub {
    description
      "Specify area as a stub area.";
    leaf stub-summary {
      type boolean;
    }
    leaf stub-ext-capability {
      type boolean;
    }
  }
}
```



```
leaf default-cost {
  description
    "Set the summary default-cost of a NSSA/stub area.";
  type uint32 {
    range "1..16777215";
  }
}

list range {
  description
    "Summarize routes matching address/mask (border
    routers only)";
  key "prefix";
  leaf prefix {
    type inet:ipv4-prefix;
  }
  leaf advertise {
    type boolean;
  }
  leaf cost {
    type uint32 {
      range "0..16777214";
    }
  }
}

container virtual-link {
  description
    "Define a virtual link";
  leaf router-id {
    type inet:ip-address;
  }

  uses interface-internal-inherit-config;
}

container sham-link {
  leaf local-id {
    description
      "Address of the local end-point.";
    type inet:ip-address;
  }
  leaf remote-id {
    description
      "Address of the remote end-point.";
    type inet:ip-address;
  }

  uses interface-internal-inherit-config;
```



```
    }

    container mpls-te-config {
      leaf mpls-te-enable {
        description
          "Enable an ospf area to run MPLS
           Traffic Engineering.";
        type boolean;
      }
    }

    container ospf-interfaces {
      description
        "The top level container for the list of interfaces
         of the OSPF router.";
      uses interface-inherit-config;

      list ospf-interface {
        key "interface";
        leaf interface {
          type if:interface-ref;
        }
        uses interface-inherit-config;
      } // list ospf-interface
    } // container ospf-interfaces
  } // list ospf-area
} // container ospf-areas
} // container ospf-af
} // container ospf-afs
} // list ospf-router
} // container ospf-routers
}
<CODE ENDS>
```

4. Security Considerations

The data model defined does not create any security implications.

This draft does not change any underlying security issues inherent in [\[I-D.ietf-netmod-routing-cfg\]](#).

5. Acknowledgements

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6. References

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