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**Yang Data Model for OSPF SR (Segment Routing) Protocol  
draft-ietf-ospf-sr-yang-00**

Abstract

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

Status of This Memo

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**1. Overview**

YANG [[RFC6020](#)] [[RFC7950](#)] is a data definition language used 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 for implementation of other interfaces, such as CLI and programmatic APIs.

This document defines a YANG data model that can be used to configure and manage OSPF Segment Routing and it is an augmentation to the OSPF YANG data model.

**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. OSPF Segment Routing**

This document defines a model for OSPF Segment Routing feature. It is an augmentation of the OSPF base model.

The OSPF SR YANG module requires support for the base segment routing module [[I-D.ietf-spring-sr-yang](#)], which defines the global segment routing configuration independent of any specific routing protocol

configuration, and support of OSPF base model[I-D.ietf-ospf-yang] which defines basic OSPF configuration and state.

```

module: ietf-ospf-sr
augment /rt:routing/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance:
  +--rw segment-routing
  | +--rw enabled?    boolean
  | +--rw bindings
  |   +--rw advertise
  |     | +--rw policies*  string
  |     +--rw receive?    boolean
  +--rw protocol-srgb {sr:protocol-srgb}?
    +--rw srgb* [lower-bound upper-bound]
      +--rw lower-bound  uint32
      +--rw upper-bound  uint32
augment /rt:routing/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance/ospf:areas/ospf:area/ospf:interfaces
  /ospf:interface:
  +--rw segment-routing
  +--rw adjacency-sid
    +--rw advertise-adj-group-sid* [group-id]
      | +--rw group-id  uint32
    +--rw advertise-protection?    enumeration
augment /rt:routing/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance/ospf:areas/ospf:area/ospf:interfaces
  /ospf:interface/ospf:fast-reroute:
  +--rw ti-lfa {ti-lfa}?
    +--rw enable?    boolean
augment /rt:routing-state/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance:
  +--ro segment-routing
  | +--ro enabled?    boolean
  | +--ro bindings
  |   +--ro advertise
  |     | +--ro policies*  string
  |     +--ro receive?    boolean
  +--ro protocol-srgb {sr:protocol-srgb}?
    +--ro srgb* [lower-bound upper-bound]
      +--ro lower-bound  uint32
      +--ro upper-bound  uint32
augment /rt:routing-state/rt:control-plane-protocols
  /rt:control-plane-protocol/ospf:ospf/ospf:instance
  /ospf:areas/ospf:area/ospf:interfaces/ospf:interface:
  +--ro segment-routing
  +--ro adjacency-sid
    +--ro advertise-adj-group-sid* [group-id]
      | +--ro group-id  uint32

```

```

    +--ro advertise-protection?      enumeration
augment /rt:routing-state/rt:control-plane-protocols
  /rt:control-plane-protocol/ospf:ospf/ospf:instance/ospf:areas
  /ospf:area/ospf:interfaces/ospf:interface/ospf:database
  /ospf:link-scope-lsa-type/ospf:link-scope-lsas/ospf:link-scope-lsa
  /ospf:version/ospf:ospfv2/ospf:ospfv2/ospf:body/ospf:opaque
  /ospf:extended-prefix-tlvs/ospf:extended-prefix-tlv:
+--ro prefix-sid-sub-tlvs
| +--ro prefix-sid-sub-tlv*
|   +--ro flags?          bits
|   +--ro mt-id?         uint8
|   +--ro algorithm?     uint8
|   +--ro sid?           uint32
+--ro sid-binding-sub-tlvs
  +--ro sid-binding-sub-tlv*
    +--ro flags?          bits
    +--ro mt-id?         uint8
    +--ro weight?        uint8
    +--ro sid-sub-tlv
      | +--ro sid?      uint32
    +--ro ero-metric-sub-tlv
      | +--ro metric?  uint32
    +--ro ipv4-ero-sub-tlv
      | +--ro flags?    bits
      | +--ro ipv4-address?  inet:ipv4-address
    +--ro unnumbered-ero-sub-tlv
      | +--ro flags?    bits
      | +--ro router-id?  yang:dotted-quad
      | +--ro interface-id?  uint32
    +--ro ipv4-backup-ero-sub-tlv
      | +--ro flags?    bits
      | +--ro ipv4-address?  inet:ipv4-address
    +--ro unnumbered-backup-ero-sub-tlv
      +--ro flags?      bits
      +--ro router-id?  yang:dotted-quad
      +--ro interface-id?  uint32
augment /rt:routing-state/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance/ospf:areas/ospf:area/ospf:database
  /ospf:area-scope-lsa-type/ospf:area-scope-lsas/ospf:area-scope-lsa
  /ospf:version/ospf:ospfv2/ospf:ospfv2/ospf:body/ospf:opaque
  /ospf:extended-prefix-tlvs/ospf:extended-prefix-tlv:
+--ro prefix-sid-sub-tlvs
| +--ro prefix-sid-sub-tlv*
|   +--ro flags?          bits
|   +--ro mt-id?         uint8
|   +--ro algorithm?     uint8
|   +--ro sid?           uint32
+--ro sid-binding-sub-tlvs

```

```

+--ro sid-binding-sub-tlv*
  +--ro flags?          bits
  +--ro mt-id?         uint8
  +--ro weight?        uint8
  +--ro sid-sub-tlv
  | +--ro sid?         uint32
  +--ro ero-metric-sub-tlv
  | +--ro metric?     uint32
  +--ro ipv4-ero-sub-tlv
  | +--ro flags?      bits
  | +--ro ipv4-address?  inet:ipv4-address
  +--ro unnumbered-ero-sub-tlv
  | +--ro flags?      bits
  | +--ro router-id?  yang:dotted-quad
  | +--ro interface-id?  uint32
  +--ro ipv4-backup-ero-sub-tlv
  | +--ro flags?      bits
  | +--ro ipv4-address?  inet:ipv4-address
  +--ro unnumbered-backup-ero-sub-tlv
    +--ro flags?      bits
    +--ro router-id?  yang:dotted-quad
    +--ro interface-id?  uint32
augment /rt:routing-state/rt:control-plane-protocols/rt:control-plane-protocol
  /ospf:ospf/ospf:instance/ospf:database/ospf:as-scope-lsa-type
  /ospf:as-scope-lsas/ospf:as-scope-lsa/ospf:version/ospf:ospfv2
  /ospf:ospfv2/ospf:body/ospf:opaque/ospf:extended-prefix-tlvs
  /ospf:extended-prefix-tlv:
+--ro prefix-sid-sub-tlvs
| +--ro prefix-sid-sub-tlv*
|   +--ro flags?      bits
|   +--ro mt-id?     uint8
|   +--ro algorithm?  uint8
|   +--ro sid?       uint32
+--ro sid-binding-sub-tlvs
  +--ro sid-binding-sub-tlv*
    +--ro flags?          bits
    +--ro mt-id?         uint8
    +--ro weight?        uint8
    +--ro sid-sub-tlv
    | +--ro sid?         uint32
    +--ro ero-metric-sub-tlv
    | +--ro metric?     uint32
    +--ro ipv4-ero-sub-tlv
    | +--ro flags?      bits
    | +--ro ipv4-address?  inet:ipv4-address
    +--ro unnumbered-ero-sub-tlv
    | +--ro flags?      bits
    | +--ro router-id?  yang:dotted-quad

```

```

    | +--ro interface-id?  uint32
+--ro ipv4-backup-ero-sub-tlv
    | +--ro flags?        bits
    | +--ro ipv4-address?  inet:ipv4-address
+--ro unnumbered-backup-ero-sub-tlv
    +--ro flags?          bits
    +--ro router-id?      yang:dotted-quad
    +--ro interface-id?   uint32
augment /rt:routing-state/rt:control-plane-protocols/rt:control-plane-protocol
/ospf:ospf/ospf:instance/ospf:areas/ospf:area/ospf:database
/ospf:area-scope-lsa-type/ospf:area-scope-lsas/ospf:area-scope-lsa
/ospf:version/ospf:ospfv2/ospf:ospfv2/ospf:body/ospf:opaque
/ospf:extended-link-tlvs/ospf:extended-link-tlv:
+--ro adj-sid-sub-tlvs
| +--ro adj-sid-sub-tlv*
|   +--ro flags?      bits
|   +--ro mt-id?      uint8
|   +--ro weight?     uint8
|   +--ro sid?        uint32
+--ro lan-adj-sid-sub-tlvs
  +--ro lan-adj-sid-sub-tlv*
    +--ro flags?          bits
    +--ro mt-id?          uint8
    +--ro weight?         uint8
    +--ro neighbor-router-id? yang:dotted-quad
    +--ro sid?            uint32
augment /rt:routing-state/rt:control-plane-protocols
/rt:control-plane-protocol/ospf:ospf/ospf:instance/ospf:areas/ospf:area
/ospf:interfaces/ospf:interface/ospf:database/ospf:link-scope-lsa-type
/ospf:link-scope-lsas/ospf:link-scope-lsa/ospf:version/ospf:ospfv2
/ospf:ospfv2/ospf:body/ospf:opaque:
+--ro extended-prefix-range-tlvs
| +--ro extended-prefix-range-tlv*
|   +--ro range-size?      uint16
|   +--ro flags?          bits
|   +--ro prefix?         inet:ip-prefix
|   +--ro prefix-sid-sub-tlvs
|   | +--ro prefix-sid-sub-tlv*
|   | | +--ro flags?      bits
|   | | +--ro mt-id?      uint8
|   | | +--ro algorithm?  uint8
|   | | +--ro sid?        uint32
|   +--ro sid-binding-sub-tlvs
|   | +--ro sid-binding-sub-tlv*
|   | | +--ro flags?          bits
|   | | +--ro mt-id?          uint8
|   | | +--ro weight?         uint8
|   | | +--ro sid-sub-tlv

```

```

|   |   | +--ro sid?   uint32
|   |   +--ro ero-metric-sub-tlv
|   |   | +--ro metric?   uint32
|   |   +--ro ipv4-ero-sub-tlv
|   |   | +--ro flags?     bits
|   |   | +--ro ipv4-address?  inet:ipv4-address
|   |   +--ro unnumbered-ero-sub-tlv
|   |   | +--ro flags?     bits
|   |   | +--ro router-id?   yang:dotted-quad
|   |   | +--ro interface-id? uint32
|   |   +--ro ipv4-backup-ero-sub-tlv
|   |   | +--ro flags?     bits
|   |   | +--ro ipv4-address?  inet:ipv4-address
|   |   +--ro unnumbered-backup-ero-sub-tlv
|   |   | +--ro flags?     bits
|   |   | +--ro router-id?   yang:dotted-quad
|   |   | +--ro interface-id? uint32
|   +--ro unknown-tlvs
|     +--ro unknown-tlv*
|       +--ro type?      uint16
|       +--ro length?   uint16
|       +--ro value?    yang:hex-string
+--ro sr-algorithm-tlv
| +--ro sr-algorithm*   uint8
+--ro sid-range-tlvs
  +--ro sid-range-tlv*
    +--ro range-size?   ospf:uint24
    +--ro sid-sub-tlv
      +--ro sid?       uint32
augment /rt:routing-state/rt:control-plane-protocols
  /rt:control-plane-protocol/ospf:ospf/ospf:instance/ospf:areas
  /ospf:area/ospf:database/ospf:area-scope-lsa-type
  /ospf:area-scope-lsas/ospf:area-scope-lsa/ospf:version
  /ospf:ospfv2/ospf:ospfv2/ospf:body/ospf:opaque:
+--ro extended-prefix-range-tlvs
| +--ro extended-prefix-range-tlv*
|   +--ro range-size?      uint16
|   +--ro flags?          bits
|   +--ro prefix?         inet:ip-prefix
|   +--ro prefix-sid-sub-tlvs
|     +--ro prefix-sid-sub-tlv*
|       +--ro flags?      bits
|       +--ro mt-id?      uint8
|       +--ro algorithm?  uint8
|       +--ro sid?        uint32
|   +--ro sid-binding-sub-tlvs
|     +--ro sid-binding-sub-tlv*
|       +--ro flags?      bits

```

```

|   |   |--ro mt-id?                               uint8
|   |   |--ro weight?                             uint8
|   |   |--ro sid-sub-tlv
|   |   |   |--ro sid?    uint32
|   |   |--ro ero-metric-sub-tlv
|   |   |   |--ro metric?  uint32
|   |   |--ro ipv4-ero-sub-tlv
|   |   |   |--ro flags?   bits
|   |   |   |--ro ipv4-address?  inet:ipv4-address
|   |   |--ro unnumbered-ero-sub-tlv
|   |   |   |--ro flags?   bits
|   |   |   |--ro router-id?  yang:dotted-quad
|   |   |   |--ro interface-id? uint32
|   |   |--ro ipv4-backup-ero-sub-tlv
|   |   |   |--ro flags?   bits
|   |   |   |--ro ipv4-address?  inet:ipv4-address
|   |   |--ro unnumbered-backup-ero-sub-tlv
|   |   |   |--ro flags?   bits
|   |   |   |--ro router-id?  yang:dotted-quad
|   |   |   |--ro interface-id? uint32
|   |--ro unknown-tlvs
|   |   |--ro unknown-tlv*
|   |   |--ro type?    uint16
|   |   |--ro length?  uint16
|   |   |--ro value?   yang:hex-string
|--ro sr-algorithm-tlv
| |--ro sr-algorithm*  uint8
|--ro sid-range-tlvs
| |--ro sid-range-tlv*
|   |--ro range-size?  ospf:uint24
|   |--ro sid-sub-tlv
|     |--ro sid?    uint32
augment /rt:routing-state/rt:control-plane-protocols
  /rt:control-plane-protocol/ospf:ospf/ospf:instance/ospf:database
  /ospf:as-scope-lsa-type/ospf:as-scope-lsas/ospf:as-scope-lsa
  /ospf:version/ospf:ospfv2/ospf:ospfv2/ospf:body/ospf:opaque:
|--ro extended-prefix-range-tlvs
| |--ro extended-prefix-range-tlv*
|   |--ro range-size?          uint16
|   |--ro flags?              bits
|   |--ro prefix?             inet:ip-prefix
|   |--ro prefix-sid-sub-tlvs
|     |--ro prefix-sid-sub-tlv*
|       |--ro flags?          bits
|       |--ro mt-id?          uint8
|       |--ro algorithm?      uint8
|       |--ro sid?            uint32
|--ro sid-binding-sub-tlvs

```



```

| | +--ro sid-binding-sub-tlv*
| | | +--ro flags? bits
| | | +--ro mt-id? uint8
| | | +--ro weight? uint8
| | | +--ro sid-sub-tlv
| | | | +--ro sid? uint32
| | | +--ro ero-metric-sub-tlv
| | | | +--ro metric? uint32
| | | +--ro ipv4-ero-sub-tlv
| | | | +--ro flags? bits
| | | | +--ro ipv4-address? inet:ipv4-address
| | | +--ro unnumbered-ero-sub-tlv
| | | | +--ro flags? bits
| | | | +--ro router-id? yang:dotted-quad
| | | | +--ro interface-id? uint32
| | | +--ro ipv4-backup-ero-sub-tlv
| | | | +--ro flags? bits
| | | | +--ro ipv4-address? inet:ipv4-address
| | | +--ro unnumbered-backup-ero-sub-tlv
| | | | +--ro flags? bits
| | | | +--ro router-id? yang:dotted-quad
| | | | +--ro interface-id? uint32
| | +--ro unknown-tlvs
| | | +--ro unknown-tlv*
| | | | +--ro type? uint16
| | | | +--ro length? uint16
| | | | +--ro value? yang:hex-string
+--ro sr-algorithm-tlv
| +--ro sr-algorithm* uint8
+--ro sid-range-tlvs
| +--ro sid-range-tlv*
| | +--ro range-size? ospf:uint24
| | +--ro sid-sub-tlv
| | | +--ro sid? uint32

```

### 3. OSPF Segment Routing Yang Module

```

<CODE BEGINS> file "ietf-ospf-sr@2016-10-31.yang"
module ietf-ospf-sr {
  namespace "urn:ietf:params:xml:ns:yang:ietf-ospf-sr";

  prefix ospf-sr;

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

  import ietf-yang-types {

```

```
    prefix "yang";
  }

import ietf-routing {
  prefix "rt";
}
import ietf-segment-routing-common {
  prefix "sr-cmn";
}
import ietf-segment-routing {
  prefix "sr";
}
import ietf-ospf {
  prefix "ospf";
}

organization
  "Cisco Systems
  170 West Tasman Drive
  San Jose, CA 95134-1706
  USA";

contact
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description
```

"This YANG module defines the generic configuration and operational state for OSPF Segment Routing, which is common across all of the vendor implementations. It is intended that the module will be extended by vendors to define vendor-specific OSPF Segment Routing configuration and operational parameters and 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  
";

```
revision 2016-10-31 {
  description
    "* Update authors information.
    * Add import of ietf-segment-routing-common module.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}

revision 2016-07-07 {
  description
    "* Change routing-protocol to control-plane-protocol.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}

revision 2016-03-20 {
  description
    "* Remove routing-instance.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}

revision 2015-10-19 {
  description
    "* Add per-protocol SRGB support.
    * Editorial changes.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}
```

```

revision 2015-09-02 {
  description
    "* Author list update.
    * Editorial changes.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}

revision 2015-07-06 {
  description
    "Initial revision.";
  reference
    "RFC XXXX: A YANG Data Model for OSPF Segment Routing.";
}

feature ti-lfa {
  description
    "Topology-Independent Loop-Free Alternate (TI-LFA)
    computation using segment routing.";
}

/* Configuration */

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/ospf:ospf/ospf:instance" {
  when "../..//rt:type = 'ospf:ospfv2' or "
    + "../..//rt:type = 'ospf:ospfv3'" {
  description
    "This augments the OSPF routing protocol when used.";
  }
  description
    "This augments the OSPF protocol configuration
    with segment routing.";
  uses sr:controlplane-cfg;
  container protocol-srgb {
    if-feature sr:protocol-srgb;
    uses sr-cmn:srgb-cfg;
    description
      "Per-protocol SRGB.";
  }
}

augment "/rt:routing/rt:control-plane-protocols/"
  + "rt:control-plane-protocol/ospf:ospf/ospf:instance/"
  + "ospf:areas/ospf:area/ospf:interfaces/ospf:interface" {
  when "../...//rt:type = 'ospf:ospfv2' or "
    + "../...//rt:type = 'ospf:ospfv3'" {
  description

```

```

        "This augments the OSPF interface configuration
        when used.";
    }
    description
        "This augments the OSPF protocol interface
        configuration with segment routing.";

    uses sr:igp-interface-cfg;
}

augment "/rt:routing/rt:control-plane-protocols/"
    + "rt:control-plane-protocol/ospf:ospf/ospf:instance/"
    + "ospf:areas/ospf:area/ospf:interfaces/ospf:interface/"
    + "ospf:fast-reroute" {
    when "../..../rt:type = 'ospf:ospfv2' or "
        + "../..../rt:type = 'ospf:ospfv3'" {
        description
            "This augments the OSPF routing protocol when used.";
    }
    description
        "This augments the OSPF protocol IP-FRR with TI-LFA.";

    container ti-lfa {
        if-feature ti-lfa;
        leaf enable {
            type boolean;
            description
                "Enables TI-LFA computation.";
        }
        description
            "Topology Independent Loop Free Alternate
            (TI-LFA) support.";
    }
}

/* Operational states */

augment "/rt:routing-state/"
    + "rt:control-plane-protocols/rt:control-plane-protocol/"
    + "ospf:ospf/ospf:instance" {
    when "../..../rt:type = 'ospf:ospfv2' or "
        + "../..../rt:type = 'ospf:ospfv3'" {
        description
            "This augments the OSPF routing protocol when used.";
    }
    description
        "This augments the OSPF protocol operational state
        with segment routing.";
}

```

```

    uses sr:controlplane-cfg;
    container protocol-srgb {
        if-feature sr:protocol-srgb;
        uses sr-cmn:srgb-cfg;
        description
            "Per-protocol SRGB.";
    }
}

augment "/rt:routing-state/"
    + "rt:control-plane-protocols/rt:control-plane-protocol/"
    + "ospf:ospf/ospf:instance/ospf:areas/ospf:area/"
    + "ospf:interfaces/ospf:interface" {
    when "../../../rt:type = 'ospf:ospfv2' or "
        + "../../../rt:type = 'ospf:ospfv3'" {
        description
            "This augments the OSPF routing protocol when used.";
    }
    description
        "This augments the OSPF protocol interface
        operational state with segment routing.";

    uses sr:igp-interface-cfg;
}

/* Database */

grouping sid-sub-tlv {
    description "SID/Label sub-TLV grouping.";
    container sid-sub-tlv {
        description
            "Used to advertise the SID/Label associated with a
            prefix or adjacency.";
        leaf sid {
            type uint32;
            description
                "Segment Identifier (SID) - A 20 bit label or
                32 bit SID.";
        }
    }
}

grouping prefix-sid-sub-tlvs {
    description "Prefix Segment ID (SID) sub-TLVs.";
    container prefix-sid-sub-tlvs {
        description "Prefix SID sub-TLV.";
        list prefix-sid-sub-tlv {
            description "Prefix SID sub-TLV.";
        }
    }
}

```

```

leaf flags {
  type bits {
    bit NP {
      description
        "No-PHP flag.";
    }
    bit M {
      description
        "Mapping server flag.";
    }
    bit E {
      description
        "Explicit-NULL flag.";
    }
    bit V {
      description
        "Value/Index flag.";
    }
    bit L {
      description
        "Local flag.";
    }
  }
  description "Segment Identifier (SID) Flags.";
}
leaf mt-id {
  type uint8;
  description "Multi-topology ID.";
}
leaf algorithm {
  type uint8;
  description
    "The algorithm associated with the prefix-SID.";
}
leaf sid {
  type uint32;
  description "An index or label.";
}
}
}

grouping sid-binding-sub-tlvs {
  description "SID/Label binding sub-TLV grouping.";
  container sid-binding-sub-tlvs {
    description "SID binding sub-TLVs.";
    list sid-binding-sub-tlv {
      description "SID binding sub-TLV.";
    }
  }
}

```

```

leaf flags {
  type bits {
    bit M {
      description
        "Mirroring context flag.";
    }
  }
  description "Flags.";
}
leaf mt-id {
  type uint8;
  description "Multi-topology ID.";
}
leaf weight {
  type uint8;
  description "Weight for load-balancing purposes.";
}

uses sid-sub-tlv;

container ero-metric-sub-tlv {
  description
    "The cost of an Explicit Route Object (ERO) path.";
  leaf metric {
    type uint32;
    description "The aggregate IGP or TE path cost.";
  }
}

container ipv4-ero-sub-tlv {
  description
    "The IPv4 ERO sub-TLV describes a path segment
    using IPv4 address.";
  leaf flags {
    type bits {
      bit L {
        description
          "If set, then the segment path is designated as
          'loose'. Otherwise, the path is 'strict'.";
      }
    }
    description "ERO Flags.";
  }
  leaf ipv4-address {
    type inet:ipv4-address;
    description "The address of the explicit route hop.";
  }
}

```



```

container unnumbered-ero-sub-tlv {
  description "The unnumbered interface ID ERO sub-TLV
              describes a path segment that includes an
              unnumbered interface.";
  leaf flags {
    type bits {
      bit L {
        description
          "If set, then the segment path is designated as
          'loose'. Otherwise as 'strict'.";
      }
    }
    description "ERO Flags.";
  }
  leaf router-id {
    type yang:dotted-quad;
    description "Router-id of the next-hop.";
  }
  leaf interface-id {
    type uint32;
    description
      "The identifier assigned to the link by the
      router specified by the router-id.";
  }
}
container ipv4-backup-ero-sub-tlv {
  description
    "The IPv4 backup ERO sub-TLV describes a path
    segment using IPv4 address.";
  leaf flags {
    type bits {
      bit L {
        description
          "If set, then the segment path is designated as
          'loose'. Otherwise as 'strict'.";
      }
    }
    description "Flags.";
  }
  leaf ipv4-address {
    type inet:ipv4-address;
    description "The address of the explicit route hop.";
  }
}
container unnumbered-backup-ero-sub-tlv {
  description
    "The unnumbered interface ID backup ERO sub-TLV
    describes a path segment that includes an

```

```

        unnumbered interface.";
    leaf flags {
        type bits {
            bit L {
                description
                    "If set, then the segment path is designated as
                    'loose'. Otherwise, the path is 'strict'.";
            }
        }
        description "Flags.";
    }
    leaf router-id {
        type yang:dotted-quad;
        description "Router-id of the next-hop.";
    }
    leaf interface-id {
        type uint32;
        description
            "The identifier assigned to the link by the
            router specified by the router-id.";
    }
}
}
}
}
}

grouping extended-prefix-range-tlvs {
    description "Extended prefix range TLV grouping.";

    container extended-prefix-range-tlvs {
        description "The list of range of prefixes.";
        list extended-prefix-range-tlv { //type=2?
            description "The range of prefixes.";
            leaf range-size {
                type uint16;
                description "The number of prefixes covered by the
                    advertisement.";
            }
            leaf flags {
                type bits {
                    bit IA {
                        description
                            "Inter-Area flag.";
                    }
                }
            }
            description "Flags.";
        }
        leaf prefix {

```

```

        type inet:ip-prefix;
        description "Address prefix.";
    }
    uses prefix-sid-sub-tlvs;
    uses sid-binding-sub-tlvs;
    uses ospf:unknown-tlvs;
}
}
}

grouping sr-algorithm-tlv {
    description "SR algorithm TLV grouping.";
    container sr-algorithm-tlv {
        description "All SR algorithm TLVs.";
        leaf-list sr-algorithm {
            type uint8;
            description
                "The Segment Routing (SR) algorithms that the router is
                currently using.";
        }
    }
}

grouping sid-range-tlvs {
    description "SID Range TLV grouping.";
    container sid-range-tlvs {
        description "List of SID range TLVs.";
        list sid-range-tlv {
            description "SID range TLV.";
            leaf range-size {
                type ospf:uint24;
                description "The SID range.";
            }
            uses sid-sub-tlv;
        }
    }
}

augment "/rt:routing-state/"
    + "rt:control-plane-protocols/rt:control-plane-protocol/"
    + "ospf:ospf/ospf:instance/ospf:areas/ospf:area/"
    + "ospf:interfaces/ospf:interface/ospf:database/"
    + "ospf:link-scope-lsa-type/ospf:link-scope-lsas/"
    + "ospf:link-scope-lsa/ospf:version/ospf:ospfv2/"
    + "ospf:ospfv2/ospf:body/ospf:opaque/"
    + "ospf:extended-prefix-tlvs/ospf:extended-prefix-tlv" {
when "../../../../../../../../../../../../../../../../../../../"
    + "rt:type = 'ospf:ospfv2'" {
    description

```

```

        "This augmentation is only valid for OSPFv2.";
    }
    description
        "SR specific TLVs for OSPFv2 extended prefix TLV
        in type 9 opaque LSA.";
    uses prefix-sid-sub-tlvs;
    uses sid-binding-sub-tlvs;
}

augment "/rt:routing-state/"
    + "rt:control-plane-protocols/rt:control-plane-protocol/"
    + "ospf:ospf/ospf:instance/ospf:areas/"
    + "ospf:area/ospf:database/"
    + "ospf:area-scope-lsa-type/ospf:area-scope-lsas/"
    + "ospf:area-scope-lsa/ospf:version/ospf:ospfv2/"
    + "ospf:ospfv2/ospf:body/ospf:opaque/"
    + "ospf:extended-prefix-tlvs/ospf:extended-prefix-tlv" {
when "../../../../../../../../../../../../../../../../../../../"
    + "rt:type = 'ospf:ospfv2'" {
    description
        "This augmentation is only valid for OSPFv2.";
    }
    description
        "SR specific TLVs for OSPFv2 extended prefix TLV
        in type 10 opaque LSA.";
    uses prefix-sid-sub-tlvs;
    uses sid-binding-sub-tlvs;
}

augment "/rt:routing-state/"
    + "rt:control-plane-protocols/rt:control-plane-protocol/"
    + "ospf:ospf/ospf:instance/ospf:database/"
    + "ospf:as-scope-lsa-type/ospf:as-scope-lsas/"
    + "ospf:as-scope-lsa/ospf:version/ospf:ospfv2/"
    + "ospf:ospfv2/ospf:body/ospf:opaque/"
    + "ospf:extended-prefix-tlvs/ospf:extended-prefix-tlv" {
when "../../../../../../../../../../../../../../../../../../../"
    + "rt:type = 'ospf:ospfv2'" {
    description
        "This augmentation is only valid for OSPFv2.";
    }
    description
        "SR specific TLVs for OSPFv2 extended prefix TLV
        in type 11 opaque LSA.";
    uses prefix-sid-sub-tlvs;
    uses sid-binding-sub-tlvs;
}

```

```

augment "/rt:routing-state/"
  + "rt:control-plane-protocols/rt:control-plane-protocol/"
  + "ospf:ospf/ospf:instance/ospf:areas/"
  + "ospf:area/ospf:database/"
  + "ospf:area-scope-lsa-type/ospf:area-scope-lsas/"
  + "ospf:area-scope-lsa/ospf:version/ospf:ospfv2/"
  + "ospf:ospfv2/ospf:body/ospf:opaque/"
  + "ospf:extended-link-tlvs/ospf:extended-link-tlv" {
when "../../../../../../../../../../../../../../../../../../../"
  + "rt:type = 'ospf:ospfv2'" {
  description
    "This augmentation is only valid for OSPFv2.";
}
description
  "SR specific TLVs for OSPFv2 extended link TLV
  in type 10 opaque LSA.";

container adj-sid-sub-tlvs {
  description "Adjacency SID optional sub-TLVs.";
  list adj-sid-sub-tlv {
    description "List of Adjacency SID sub-TLVs.";
    leaf flags {
      type bits {
        bit B {
          description
            "Backup flag.";
        }
        bit V {
          description
            "Value/Index flag.";
        }
        bit L {
          description
            "Local/Global flag.";
        }
        bit G {
          description
            "Group flag.";
        }
      }
      description "Flags.";
    }
    leaf mt-id {
      type uint8;
      description "Multi-topology ID.";
    }
    leaf weight {
      type uint8;
    }
  }
}

```

```

        description "Weight used for load-balancing.";
    }
    leaf sid {
        type uint32;
        description "Segment Identifier (SID) index/label.";
    }
}
}
}

```

```

container lan-adj-sid-sub-tlvs {
    description "LAN Adjacency SID optional sub-TLVs.";
    list lan-adj-sid-sub-tlv {
        description "List of LAN adjacency SID sub-TLVs.";
        leaf flags {
            type bits {
                bit B {
                    description
                        "Backup flag.";
                }
                bit V {
                    description
                        "Value/Index flag.";
                }
                bit L {
                    description
                        "Local/Global flag.";
                }
                bit G {
                    description
                        "Group flag.";
                }
            }
        }
        description "Flags.";
    }
    leaf mt-id {
        type uint8;
        description "Multi-topology ID.";
    }
    leaf weight {
        type uint8;
        description "Weight used for load-balancing.";
    }
    leaf neighbor-router-id {
        type yang:dotted-quad;
        description "Neighbor router ID.";
    }
    leaf sid {
        type uint32;
    }
}
}
}

```

```

        description "Segment Identifier (SID) index/label.";
    }
}
}
}

augment "/rt:routing-state/"
+ "rt:control-plane-protocols/rt:control-plane-protocol/"
+ "ospf:ospf/ospf:instance/ospf:areas/ospf:area/"
+ "ospf:interfaces/ospf:interface/ospf:database/"
+ "ospf:link-scope-lsa-type/ospf:link-scope-lsas/"
+ "ospf:link-scope-lsa/ospf:version/ospf:ospfv2/"
+ "ospf:ospfv2/ospf:body/ospf:opaque" {
when "../../../../../../../../../../../../../../../../../../../"
+ "rt:type = 'ospf:ospfv2'" {
description
    "This augmentation is only valid for OSPFv2.";
}

description
    "SR specific TLVs for OSPFv2 type 9 opaque LSA.";

uses extended-prefix-range-tlvs;
uses sr-algorithm-tlv;
uses sid-range-tlvs;
}

augment "/rt:routing-state/"
+ "rt:control-plane-protocols/rt:control-plane-protocol/"
+ "ospf:ospf/ospf:instance/ospf:areas/"
+ "ospf:area/ospf:database/"
+ "ospf:area-scope-lsa-type/ospf:area-scope-lsas/"
+ "ospf:area-scope-lsa/ospf:version/ospf:ospfv2/"
+ "ospf:ospfv2/ospf:body/ospf:opaque" {
when "../../../../../../../../../../../../../../../../../../../"
+ "rt:type = 'ospf:ospfv2'" {
description
    "This augmentation is only valid for OSPFv2.";
}

description
    "SR specific TLVs for OSPFv2 type 10 opaque LSA.";

uses extended-prefix-range-tlvs;
uses sr-algorithm-tlv;
uses sid-range-tlvs;
}

```

```

augment "/rt:routing-state/"
  + "rt:control-plane-protocols/rt:control-plane-protocol/"
  + "ospf:ospf/ospf:instance/ospf:database/"
  + "ospf:as-scope-lsa-type/ospf:as-scope-lsas/"
  + "ospf:as-scope-lsa/ospf:version/ospf:ospfv2/"
  + "ospf:ospfv2/ospf:body/ospf:opaque" {
when "../../../../../../../../../../../../../../../"
  + "rt:type = 'ospf:ospfv2'" {
  description
    "This augmentation is only valid for OSPFv2.";
  }
  description
    "SR specific TLVs for OSPFv2 type 11 opaque LSA.";

  uses extended-prefix-range-tlvs;
  uses sr-algorithm-tlv;
  uses sid-range-tlvs;
}
}
<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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