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YANG Data Model for IS-IS Application-Specific Link Attributes and Flexible Algorithm
draft-ietf-lsr-isis-flex-algo-yang-06

Abstract

This document defines a YANG data model to support IS-IS Application-Specific Link Attributes and Flexible Algorithm.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Overview

This document defines two YANG [RFC7950] data modules. The first module is to provide support for configuration and operational state for IS-IS Application-Specific Link Attributes as defined in [RFC9479], and the second module is to support IS-IS Flexible Algorithm as defined in [RFC9350]. Both modules are augmenting the IETF IS-IS YANG model [RFC9130].

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

2. YANG Module for IS-IS Application-Specific Link Attributes

This document defines a YANG module for IS-IS Application-Specific Link Attributes as defined in [RFC9479]. This YANG module references [RFC6991], [RFC8349], [RFC8919], [RFC9130], and [RFC9350].

```
module: ietf-isis-link-attr
  augment /rt:routing/rt:control-plane-protocols
            /rt:control-plane-protocol/isis:isis:
    +--rw isis-link-attr
       +--rw (link-attr-op-mode)
          +--:(legacy)
          |  +--rw legacy?         empty
          +--:(transition)
          |  +--rw transition?     empty
```

```
           +--:(app-specific)
              +--rw app-specific?   empty
     augment /rt:routing/rt:control-plane-protocols
               /rt:control-plane-protocol/isis:isis/isis:interfaces
               /isis:interface:
       +--rw isis-asla
          +--rw interface-asla* [sabm-bit]
             +--rw sabm-bit                     identityref
             +--rw unidirectional-link-delay?   uint32
             +--rw metric-type?                 uint8
             +--rw metric?                      uint32
     augment /rt:routing/rt:control-plane-protocols
               /rt:control-plane-protocol/isis:isis/isis:database
               /isis:levels/isis:lsp/isis:extended-is-neighbor
               /isis:neighbor/isis:instances/isis:instance:
       +--ro asla-sub-tlvs
          +--ro asla-sub-tlv* []
             +--ro l-flag?         boolean
             +--ro sabm-length?    uint8
             +--ro r-flag?         boolean
             +--ro udabm-length?   uint8
             +--ro sabm
             |  +--ro sabm-bits*   identityref
             +--ro udabm
             +--ro unknown-tlvs
                +--ro unknown-tlv* []
                   +--ro type?     uint16
                   +--ro length?   uint16
                   +--ro value?    yang:hex-string
     augment /rt:routing/rt:control-plane-protocols
               /rt:control-plane-protocol/isis:isis/isis:database
               /isis:levels/isis:lsp/isis:mt-is-neighbor/isis:neighbor
               /isis:instances/isis:instance:
       +--ro asla-sub-tlvs
          +--ro asla-sub-tlv* []
             +--ro l-flag?         boolean
             +--ro sabm-length?    uint8
             +--ro r-flag?         boolean
             +--ro udabm-length?   uint8
             +--ro sabm
             |  +--ro sabm-bits*   identityref
             +--ro udabm
             +--ro unknown-tlvs
                +--ro unknown-tlv* []
                   +--ro type?     uint16
                   +--ro length?   uint16
                   +--ro value?    yang:hex-string
     augment /rt:routing/rt:control-plane-protocols
```

```
               /rt:control-plane-protocol/isis:isis/isis:database
               /isis:levels/isis:lsp:
         +--ro application-specific-srlg-tlv
            +--ro as-srlg-tlv* []
               +--ro neighbor-system-id?   isis:system-id
               +--ro pseudo-node-id?       uint8
               +--ro l-flag?               boolean
               +--ro sabm-length?          uint8
               +--ro r-flag?               boolean
               +--ro udabm-length?         uint8
               +--ro sabm
               |  +--ro sabm-bits*   identityref
               +--ro udabm
               +--ro length-of-sub-tlvs?   uint8
               +--ro link-id-sub-tlvs
               |  +--ro link-local-remote-ids
               |  |  +--ro link-local-id?    union
               |  |  +--ro link-remote-id?   union
               |  +--ro ipv4-interface-addr
               |  |  +--ro ipv4-int-addr?   inet:ipv4-address
               |  +--ro ipv4-neighbor-addr
               |  |  +--ro ipv4-neighbor-addr?   inet:ipv4-address
               |  +--ro ipv6-interface-addr
               |  |  +--ro ipv6-int-addr?   inet:ipv6-address
               |  +--ro ipv6-neighbor-addr
               |     +--ro ipv6-neighbor-addr?   inet:ipv6-address
               +--ro srlgs
                  +--ro srlg*   uint32
```

```
<CODE BEGINS> file "ietf-isis-link-attr@2026-03-31.yang"
module ietf-isis-link-attr {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-isis-link-attr";
  prefix isis-link-attr;

  import ietf-inet-types {
    prefix inet;
    reference
      "RFC 6991: Common YANG Data Types";
  }
  import ietf-routing {
    prefix rt;
    reference
      "RFC 8349: A YANG Data Model for Routing
                 Management (NMDA Version)";
  }
  import ietf-isis {
    prefix isis;
```

```
      reference
        "RFC 9130: YANG Data Model for the IS-IS Protocol";
    }

    organization
      "IETF LSR - Link State Routing Working Group";
    contact
      "WG Web:   <https://datatracker.ietf.org/wg/lsr>
       WG List:  <mailto:lsr@ietf.org>

       Author:   Yingzhen Qu
                 <mailto:yingzhen.ietf@gmail.com>
       Author:   Acee Lindem
                 <mailto:acee.ietf@gmail.com>
       Author:   Stephane Litkowski
                 <mailto:slitkows.ietf@gmail.com>
       Author:    Madhavi Joshi
                <madhavi@arrcus.com>
      ";
    description
      "This YANG module defines the configuration and operational
       state for IS-IS application specific link attributes feature as
       defined in RFC 9479.

       This YANG model conforms to the Network Management
       Datastore Architecture (NMDA) as described in RFC 8342.

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       (http://trustee.ietf.org/license-info).

       This version of this YANG module is part of RFC XXXX;
       see the RFC itself for full legal notices.

       The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL
       NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'NOT RECOMMENDED',
       'MAY', and 'OPTIONAL' in this document are to be interpreted as
       described in BCP 14 (RFC 2119) (RFC 8174) when, and only when,
       they appear in all capitals, as shown here.";

    revision 2026-03-31 {
      description
```

```
        "Initial version";
      reference
        "RFC XXXX: YANG Data Model for IS-IS Application-Specific
                   Link Attributes and Flexible Algorithm";
    }

    identity sabm-bit {
      description
        "Base identity for Standard Application Identifier
         Bit Mask (SABM) bits.";
      reference
        "RFC 8919: IS-IS Application-Specific Link Attributes";
    }

    identity rsvp-te-bit {
      base sabm-bit;
      description
        "R bit, RSVP-TE.";
    }

    identity sr-policy-bit {
      base sabm-bit;
      description
        "S bit, Segment Routing Policy.";
    }

    identity lfa-bit {
      base sabm-bit;
      description
        "F bit, Loop Free Alternate (LFA). Includes all LFA types.";
    }

    identity flex-algo-bit {
      base sabm-bit;
      description
        "X bit, flexible algorithm.";
      reference
        "RFC 9350: IGP Flexible Algorithm, Section 12.";
    }

    grouping application-identifier-bit-mask {
      description
        "Identification of the set of applications associated with
         link attribute advertisements";
      leaf l-flag {
        type boolean;
        description
          "Legacy Flag. When set, all of the applications
```

```
            specified in the bit mask MUST use the legacy
            advertisements.";
        }
        leaf sabm-length {
          type uint8;
          description
            "Standard Application Identifier Bit Mask Length in
             octets.";
        }
        leaf r-flag {
          type boolean;
          default "false";
          description
            "Reserved.";
        }
        leaf udabm-length {
          type uint8;
          description
            "User Defined Application Identifier Bit Mask Length
             in octets.";
        }
        container sabm {
          leaf-list sabm-bits {
            type identityref {
              base sabm-bit;
            }
            description
              "SABM bits list. This list will contain
               identities for the bits which are set in the
               SABM bits.";
          }
          description
            "Standard Application Identifier Bit Mask.";
        }
        container udabm {
          description
            "User Defined Application Identifier Bit Mask.
             This container is to be augmented by user defined
             applications.";
        }
      }

      grouping application-specific-link-attributes-sub-tlv {
        description
          "Grouping for specification of the applications and
           application-specific attribute values.";
        container asla-sub-tlvs {
          list asla-sub-tlv {
```

```
          uses application-identifier-bit-mask;
          uses isis:unknown-tlvs;
          description
            "List of application specific link attributes sub-tlvs.";
        }
        description
          "Application specific link attributes sub-tlv.";
      }
    }

    grouping application-specific-srlg-tlv {
      description
        "Grouping of a TLV to advertise application-specific
         SRLGs for a given link.";
      container application-specific-srlg-tlv {
        list as-srlg-tlv {
          leaf neighbor-system-id {
            type isis:system-id;
            description
              "Neighbor System-ID.";
          }
          leaf pseudo-node-id {
            type uint8;
            description
              "Pseudo-node ID.";
          }
          uses application-identifier-bit-mask;
          leaf length-of-sub-tlvs {
            type uint8;
            description
              "Length of sub-tlvs.";
          }
          container link-id-sub-tlvs {
            description
              "Link Identifier sub-TLVs.";
            container link-local-remote-ids {
              description
                "Link local/remote identifier sub-tlv.";
              leaf link-local-id {
                type union {
                  type inet:ipv4-address;
                  type uint32;
                }
                description
                  "Local identifier of the link.
                   It could be an IPv4 address or a local identifier.";
              }
              leaf link-remote-id {
```

```
        type union {
          type inet:ipv4-address;
          type uint32;
        }
        description
          "Remote identifier of the link.
           It could be an IPv4 address or a remotely learned
           identifier.";
      }
    }
    container ipv4-interface-addr {
      leaf ipv4-int-addr {
        type inet:ipv4-address;
        description
          "IPv4 address for the interface.";
      }
      description
        "IPv4 interface address sub-tlv.";
    }
    container ipv4-neighbor-addr {
      leaf ipv4-neighbor-addr {
        type inet:ipv4-address;
        description
          "IPv4 address for a neighboring router
           on this link.";
      }
      description
        "IPv4 neighbor address sub-tlv.";
    }
    container ipv6-interface-addr {
      leaf ipv6-int-addr {
        type inet:ipv6-address;
        description
          "IPv6 address for the interface.";
      }
      description
        "IPv6 interface address sub-tlv.";
    }
    container ipv6-neighbor-addr {
      leaf ipv6-neighbor-addr {
        type inet:ipv6-address;
        description
          "IPv6 address for a neighboring router
           on this link.";
      }
      description
        "IPv6 neighbor address sub-tlv.";
    }
```

```
          }
          container srlgs {
            description
              "List of SRLGs.";
            leaf-list srlg {
              type uint32;
              description
                "SRLG value of the link.";
            }
          }
          description
            "List of application specific SRLG tlvs.";
        }
        description
          "Application specific SRLG tlv.";
      }
    }

    /* Configuration */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol configuration
         with application specific link attributes.";
      container isis-link-attr {
        choice link-attr-op-mode {
          mandatory true;
          leaf legacy {
            type empty;
            description
              "Only send legacy advertisements.";
          }
          leaf transition {
            type empty;
            description
              "Send both application-specific and legacy
               advertisements.";
          }
          leaf app-specific {
            type empty;
            description
```

```
              "Only send application-specific advertisements.";
          }
          description
            "Link attributes mode";
        }
        description
          "Link attributes operation mode.";
      }
    }

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:interfaces/isis:interface" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/"
         + "rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used.";
      }
      description
        "This augments IS-IS interface configuration
         with application specific link attributes.";
      container isis-asla {
        list interface-asla {
          key "sabm-bit";
          leaf sabm-bit {
            type identityref {
              base sabm-bit;
            }
            description
              "Application-Specific Bit:
               0 - RSVP TE.
               1 - Segment Routing Policy.
               2 - Loop-Free Alternate.";
          }
          leaf unidirectional-link-delay {
            type uint32 {
              range "0 .. 16777215";
            }
            description
              "This 24-bit field carries the average link delay in
               microseconds.";
          }
          leaf metric-type {
            type uint8;
            description
              "IGP metric type.";
          }
```

```
          leaf metric {
            type uint32 {
              range "1 .. 16777215";
            }
            description
              "metric value.";
          }
          description
            "ASLA interface configuration.";
        }
        description
          "Application specific link attributes configuration.";
      }
    }

    /* TLV 22 */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:extended-is-neighbor/isis:neighbor"
          + "/isis:instances/isis:instance" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB TLV22.";
      uses application-specific-link-attributes-sub-tlv;
    }

    /* TLV 223 */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:mt-is-neighbor/isis:neighbor"
          + "/isis:instances/isis:instance" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB TLV223.";
      uses application-specific-link-attributes-sub-tlv;
    }
```

```
    /* Application-specific SRLG TLV 238 */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB.";
      uses application-specific-srlg-tlv;
    }
  }
  <CODE ENDS>
```

3. YANG Module for IS-IS Flexible Algorithm

This section defines the YANG module for IS-IS Flexible Algorithm. The module uses the identities defined in the IANA-maintained YANG modules for IGP Algorithm Types [IANA-IGP-ALGO-Types] and IGP Metric Type [IANA-IGP-Metric-Types] in [I-D.ietf-lsr-ospf-flex-algo-yang]. This YANG module references [RFC8349], [RFC8776], and [RFC9130].

```
module: ietf-isis-flex-algo
  augment /rt:routing/rt:control-plane-protocols
            /rt:control-plane-protocol/isis:isis:
    +--rw isis-flex-algo
       +--rw flex-algo* [algo-number]
          +--rw algo-number             uint8
          +--rw advertise-definition?   boolean
          +--rw admin-groups
          |       {te-types:extended-admin-groups,
          |        te-types:named-extended-admin-groups}?
          |  +--rw exclude-admin-groups*       leafref
          |  +--rw include-any-admin-groups*   leafref
          |  +--rw include-all-admin-groups*   leafref
          +--rw exclude-srlgs*
          |       -> /te:te/globals/named-srlgs/named-srlg/name
          |       {te-types:named-srlg-groups}?
          +--rw metric-type?            identityref
          +--rw calc-type?              identityref
          +--rw prefix-metric!
          +--rw priority?               uint8
  augment /rt:routing/rt:control-plane-protocols
              /rt:control-plane-protocol/isis:isis
              /isis:database/isis:levels/isis:lsp
```

```
               /isis:router-capabilities:
       +--ro fad-tlvs
          +--ro fad-tlv* []
             +--ro algo-number?             uint8
             +--ro metric-type?           identityref
             +--ro calc-type?             identityref
             +--ro priority?              uint8
             +--ro fa-ex-ag-sub-tlv
             |  +--ro extended-admin-groups*   uint64
             +--ro fa-in-any-ag-sub-tlv
             |  +--ro extended-admin-groups*   uint64
             +--ro fa-in-all-ag-sub-tlv
             |  +--ro extended-admin-groups*   uint64
             +--ro fad-flags-sub-tlv
             |  +--ro fad-flags*   identityref
             +--ro fa-ex-srlg-sub-tlv
             |  +--ro srlgs*   uint32
             +--ro unknown-tlvs
                +--ro unknown-tlv* []
                   +--ro type?     uint16
                   +--ro length?   uint16
                   +--ro value?    yang:hex-string
     augment /rt:routing/rt:control-plane-protocols
             /rt:control-plane-protocol/isis:isis
             /isis:database/isis:levels/isis:lsp
             /isis:extended-ipv4-reachability/isis:prefixes:
       +--ro fapm-sub-tlvs
          +--ro fapm-sub-tlv* []
             +--ro algo-number?   uint8
             +--ro metric?      uint32
     augment /rt:routing/rt:control-plane-protocols
             /rt:control-plane-protocol/isis:isis
             /isis:database/isis:levels/isis:lsp
             /isis:mt-extended-ipv4-reachability/isis:prefixes:
       +--ro fapm-sub-tlvs
          +--ro fapm-sub-tlv* []
             +--ro algo-number?   uint8
             +--ro metric?      uint32
     augment /rt:routing/rt:control-plane-protocols
             /rt:control-plane-protocol/isis:isis
             /isis:database/isis:levels/isis:lsp
             /isis:ipv6-reachability/isis:prefixes:
       +--ro fapm-sub-tlvs
          +--ro fapm-sub-tlv* []
             +--ro algo-number?   uint8
             +--ro metric?      uint32
     augment /rt:routing/rt:control-plane-protocols
             /rt:control-plane-protocol/isis:isis
```

```
            /isis:database/isis:levels/isis:lsp
            /isis:mt-ipv6-reachability/isis:prefixes:
      +--ro fapm-sub-tlvs
         +--ro fapm-sub-tlv* []
            +--ro algo-number?   uint8
            +--ro metric?      uint32

    notifications:
      +---n flex-algo-not-supported
         +--ro routing-protocol-name?   leafref
         +--ro isis-level?              level
         +--ro algo-number?        uint8
```

```
<CODE BEGINS> file "ietf-isis-flex-algo@2026-03-31.yang"
module ietf-isis-flex-algo {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-isis-flex-algo";
  prefix isis-flex-algo;

  import ietf-routing {
    prefix rt;
    reference
      "RFC 8349: A YANG Data Model for Routing
                 Management (NMDA Version)";
  }
  import ietf-te-types {
    prefix te-types;
    reference
      "RFC8776: Common YANG Data Types for Traffic Engineering.";
  }
  import ietf-isis {
    prefix isis;
    reference
      "RFC 9130: YANG Data Model for the IS-IS Protocol";
  }
  import ietf-te {
    prefix te;
  }
  import iana-igp-algo-types {
    prefix iana-algo-types;
  }
  import iana-igp-metric-types {
    prefix iana-metric-type;
  }

  organization
    "IETF LSR - Link State Routing Working Group";
  contact
```

```
       "WG Web:   <https://datatracker.ietf.org/wg/lsr>
        WG List:  <mailto:lsr@ietf.org>


        Author:    Yingzhen Qu
                  <mailto:yingzhen.ietf@gmail.com>
        Author:    Acee Lindem
                  <mailto:acee.ietf@gmail.com>
        Author:    Stephane Litkowski
                  <mailto:slitkows.ietf@gmail.com>
        Author:    Madhavi Joshi
                  <madhavi@arrcus.com>
       ";
     description
       "The YANG module defines the configuration and operational
        state for IS-IS Flexible Algorithm as defined in RFC 9350.

        This YANG model conforms to the Network Management
        Datastore Architecture (NMDA) as described in RFC 8342.

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        (https://trustee.ietf.org/license-info).

        This version of this YANG module is part of RFC XXXX;
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        The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL
        NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'NOT RECOMMENDED',
        'MAY', and 'OPTIONAL' in this document are to be interpreted as
        described in BCP 14 (RFC 2119) (RFC 8174) when, and only when,
        they appear in all capitals, as shown here.";

     revision 2026-03-31 {
       description
         "Initial Version";
       reference
         "RFC XXXX: YANG Data Model for IS-IS Application-Specific
                    Link Attributes and Flexible Algorithm";
     }

     /* Identities */
```

```
  identity fad-flags {
    description
      "Base identity for IS-IS FAD flags.";
  }

  identity m-bit {
    base fad-flags;
    description
      "M bit, when set, the flex-algo specific prefix and ASBR
       metric MUST be used for inter-area and external prefix
       calculation.";
  }

  /* Groupings */

  grouping fa-ex-ag-sub-tlv {
    container fa-ex-ag-sub-tlv {
      leaf-list extended-admin-groups {
        type uint64;
        description
          "Extended administrative group as defined in RFC 7308.";
      }
      description
        "The flex-algo exclude admin group sub-tlv.";
    }
    description
      "The flex-algo exclude admin group sub-tlv.";
  }

  grouping fa-in-any-ag-sub-tlv {
    container fa-in-any-ag-sub-tlv {
      leaf-list extended-admin-groups {
        type uint64;
        description
          "Extended administrative group as defined in RFC 7308.";
      }
      description
        "The flex-algo include-any admin group sub-tlv.";
    }
    description
      "The flex-algo include-any admin group sub-tlv.";
  }

  grouping fa-in-all-ag-sub-tlv {
    container fa-in-all-ag-sub-tlv {
      leaf-list extended-admin-groups {
        type uint64;
        description
```

```
            "Extended administrative group as defined in RFC 7308.";
        }
        description
          "The flex-algo include-all admin group sub-tlv.";
      }
      description
        "The flex-algo include-all admin group sub-tlv.";
    }

    grouping fad-flags-sub-tlv {
      container fad-flags-sub-tlv {
        leaf-list fad-flags {
          type identityref {
            base fad-flags;
          }
          description
            "Flex-algo definition flags list.";
        }
        description
          "IS-IS flex-algo definition flags.";
      }
      description
        "The flex-algo definition flags sub-tlv.";
    }

    grouping fa-ex-srlg-sub-tlv {
      container fa-ex-srlg-sub-tlv {
        leaf-list srlgs {
          type uint32;
          description
            "SRLG value as defined in RFC 4203.";
        }
        description
          "The flex-algo exclude SRLG sub-tlv.";
      }
      description
        "The flex-algo exclude SRLG sub-tlv.";
    }

    grouping fad-tlvs {
      container fad-tlvs {
        list fad-tlv {
          leaf algo-number {
            type uint8;
            description
              "Flex-algo number - A value not in the inclusive range
               of 128-255 is an invalid FAD TLV specification.";
          }
```

```
          leaf metric-type {
            type identityref {
              base iana-metric-type:metric-type;
            }
            description
              "Type of metric to be used during the calculation.";
          }
          leaf calc-type {
            type identityref {
              base iana-algo-types:algo-type;
            }
            description
              "IGP algorithm types, value from 0 to 127 as
               defined under 'Interior Gateway Protocol (IGP)
               Parameter' by IANA.";
          }
          leaf priority {
            type uint8;
            description
              "Priority of the advertisement.";
          }
          uses fa-ex-ag-sub-tlv;
          uses fa-in-any-ag-sub-tlv;
          uses fa-in-all-ag-sub-tlv;
          uses fad-flags-sub-tlv;
          uses fa-ex-srlg-sub-tlv;
          uses isis:unknown-tlvs;
          description
            "List of flex-algo definition TLVs.";
        }
        description
          "IS-IS Flexible Algorithm Definition TLV.";
      }
      description
        "IS-IS Flexible Algorithm Definition (FAD) TLV.";
    }

    grouping fapm-sub-tlvs {
      container fapm-sub-tlvs {
        list fapm-sub-tlv {
          leaf algo-number {
            type uint8;
            description
              "Flex-algo number - A value not in the inclusive range
               of 128-255 is an invalid FAPM sub-TLV specification.";
          }
          leaf metric {
            type uint32;
```

```
            description
              "Prefix metric.";
          }
          description
            "List of flex-algo prefix sub-tlvs.";
        }
        description
          "Flex-algo prefix metric sub-tlvs.";
      }
      description
        "Flexible Algorithm Prefix Metric (FAPM) sub TLVs.";
    }

    /* Configurations */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol configuration
         with flexible algorithm.";
      container isis-flex-algo {
        list flex-algo {
          key "algo-number";
          leaf algo-number {
            type uint8 {
              range "128..255";
            }
            description
              "Flex-algo number - must in in the inclusive range
               of 128-255.";
          }
          leaf advertise-definition {
            type boolean;
            default "true";
            description
              "Enable to advertise the flex-algo definition.";
          }
          container admin-groups {
            if-feature "te-types:extended-admin-groups";
            if-feature "te-types:named-extended-admin-groups";
            leaf-list exclude-admin-groups {
              type leafref {
```

```
            path "/te:te/te:globals/te:named-admin-groups/"
               + "te:named-admin-group/te:name";
          }
          description
            "Exclude rule used during the flex-algo
             path computation.";
        }
        leaf-list include-any-admin-groups {
          type leafref {
            path "/te:te/te:globals/te:named-admin-groups/"
               + "te:named-admin-group/te:name";
          }
          description
            "Include-any rule used during the flex-algo
             path computation.";
        }
        leaf-list include-all-admin-groups {
          type leafref {
            path "/te:te/te:globals/te:named-admin-groups/"
               + "te:named-admin-group/te:name";
          }
          description
            "Include-all rule used during the flex-algo
             path computation.";
        }
        description
          "Specify links for the flex-algo path computation.";
      }
      leaf-list exclude-srlgs {
        if-feature "te-types:named-srlg-groups";
        type leafref {
          path "/te:te/te:globals/te:named-srlgs/te:named-srlg/"
             + "te:name";
        }
        description
          "Shared Risk Link Groups (SRLGs) to be excluded during
           the flex-algo path computation.";
      }
      leaf metric-type {
        type identityref {
          base iana-metric-type:metric-type;
        }
        description
          "Type of metric to be used during the calculation.";
      }
      leaf calc-type {
        type identityref {
          base iana-algo-types:algo-type;
```

```
            }
            default "iana-algo-types:algo-spf";
            description
              "Calcuation-type. Value from 0-127 inclusive from the
               IANA 'IGP Algorithm Types' registry defined under the
               'Interior Gateway Protocol (IGP) Parameters' registry.";
          }
          container prefix-metric {
            presence "Use flex-algo specific prefix metric.";
            description
              "Use flex-algo prefix metric.";
          }
          leaf priority {
            type uint8;
            description
              "Priority of the advertisement.";
          }
          description
            "List of flex-algo configurations.";
        }
        description
          "Flexible Algorithm configuration.";
      }
    }

    /* Database */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:router-capabilities" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/"
         + "rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB router capability.";
      uses fad-tlvs;
    }

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:extended-ipv4-reachability/"
          + "isis:prefixes" {
      when "/rt:routing/rt:control-plane-protocols/"
```

```
          + "rt:control-plane-protocol/"
          + "rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB prefix.";
      uses fapm-sub-tlvs;
    }

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:mt-extended-ipv4-reachability/isis:prefixes" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/"
         + "rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB prefix.";
      uses fapm-sub-tlvs;
    }

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:ipv6-reachability/isis:prefixes" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/"
         + "rt:type = 'isis:isis'" {
        description
          "This augment IS-IS routing protocol when used";
      }
      description
        "This augments IS-IS protocol LSDB prefix.";
      uses fapm-sub-tlvs;
    }

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:mt-ipv6-reachability/isis:prefixes" {
      when "/rt:routing/rt:control-plane-protocols/"
         + "rt:control-plane-protocol/"
         + "rt:type = 'isis:isis'" {
        description
```

```
            "This augment IS-IS routing protocol when used";
        }
        description
          "This augments IS-IS protocol LSDB prefix.";
        uses fapm-sub-tlvs;
      }

      /* notification */

      notification flex-algo-not-supported {
        uses isis:notification-instance-hdr;
        leaf algo-number {
          type uint8;
          description
            "Flex-algo identifier which is not supported by the OSPF
             instance. A value not in the inclusive range of 128-255
             is indicative of an invalid FAD algorithm specification.";
        }
        description
          "This notification is sent when an IS-IS instance does not
           support this flex-algo.";
      }
    }
    <CODE ENDS>
```

4. Security Considerations

The YANG modules defined in this document are designed to be accessed via YANG-based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. These protocols have to use a secure transport layer (e.g., SSH [RFC4252], TLS [RFC8446], and QUIC [RFC9000]) and have to use mutual authentication.

The Network Configuration Access Control Model (NACM) [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in this YANG module that are writable/creatable/deletable (i.e., "config true", which is the default). All writable data nodes are likely to be reasonably sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) and delete operations to these data nodes without proper protection or authentication can have a negative effect on network operations. The following subtrees and data nodes have particular sensitivities/vulnerabilities:

/isis:isis/isis-link-attr/link-attr-op-mode - Modification to the protocol operation mode may result in traffic disruption.

/isis:isis/flex-algo - Modification to flex-algo configuration could be used to mount a DoS attack. For example, changing of calc-type may result in routing loops.

Some of the readable data nodes in the modules may be considered sensitive or vulnerable in some network environments. It is thus important to control read access (e.g., via get, get-config, or notification) to these data nodes. The exposure of the Link State Database (LSDB) will expose the detailed topology of the network. This may be undesirable since both due to the fact that exposure may facilitate other attacks. Additionally, network operators may consider their topologies to be sensitive confidential data.

5. IANA Considerations

This document registers a URI in the IETF XML registry [RFC3688]. Following the format in [RFC3688], the following registrations are requested:

URI: urn:ietf:params:xml:ns:yang:ietf-isis-link-attr
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.

URI: urn:ietf:params:xml:ns:yang:ietf-isis-flex-algo
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.

This document registers the YANG module in the YANG Module Names registry [RFC7950].

name: ietf-isis-link-attr
Maintained by IANA? N
namespace: urn:ietf:params:xml:ns:yang:ietf-isis-link-attr
prefix: isis-link-attr
reference: RFC XXXX

name: ietf-isis-flex-algo
Maintained by IANA? N
namespace: urn:ietf:params:xml:ns:yang:ietf-isis-flex-algo
prefix: isis-flex-algo
reference: RFC XXXX

6. Acknowledgements

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Appendix A. Example IS-IS Flex-Algo Configuration

The following is an example configuration for IS-IS Flexible Algorithm using the YANG model defined in this document.

Note: '\' line wrapping per [RFC8792].

```
<?xml version='1.0' encoding='UTF-8'?>
  <te xmlns="urn:ietf:params:xml:ns:yang:ietf-te">
    <enable>true</enable>
    <globals>
      <named-admin-groups>
        <named-admin-group>
          <name>blue</name>
        </named-admin-group>
      </named-admin-groups>
    </globals>
  </te>
  <routing xmlns="urn:ietf:params:xml:ns:yang:ietf-routing">
    <router-id>1.1.1.1</router-id>
    <control-plane-protocols>
      <control-plane-protocol>
        <type xmlns:isis="urn:ietf:params:xml:ns:yang:ietf-isis">\
          isis:isis</type>
        <name>isis</name>
        <isis xmlns="urn:ietf:params:xml:ns:yang:ietf-isis">
          <system-id>1111.2222.3333</system-id>
          <area-address>49.0001.0000.0000.0001</area-address>
          <isis-flex-algo xmlns="urn:ietf:params:xml:ns:yang:\
            ietf-isis-flex-algo">
            <flex-algo>
              <algo-number>200</algo-number>
              <admin-groups>
                <exclude-admin-groups>blue</exclude-admin-groups>
              </admin-groups>
              <metric-type xmlns:iana-metric-types=\
                "urn:ietf:params:xml:ns:yang:iana-igp-metric-types">\
                iana-metric-types:igp-metric</metric-type>
              <calc-type xmlns:iana-algo-types=\
                "urn:ietf:params:xml:ns:yang:iana-igp-algo-types">\
                iana-algo-types:algo-spf</calc-type>
              <prefix-metric/>
              <priority>100</priority>
            </flex-algo>
          </isis-flex-algo>
        </isis>
      </control-plane-protocol>
    </control-plane-protocols>
  </routing>
```

Appendix B. Example IS-IS Flex-Algo Configuration (JSON)

The following is an example configuration for IS-IS Flexible Algorithm in JSON format using the YANG model defined in this document.

```
{
  "te": {
    "enable": true,
    "globals": {
      "named-admin-groups": {
        "named-admin-group": {
          "name": "blue"
        }
      }
    }
  }
}
{
  "routing": {
    "router-id": "1.1.1.1",
    "control-plane-protocols": {
      "control-plane-protocol": {
        "type": "isis:isis",
        "name": "isis",
        "isis": {
          "system-id": "1111.2222.3333",
          "area-address": "49.0001.0000.0000.0001",
          "isis-flex-algo": {
            "flex-algo": {
              "algo-number": 200,
              "admin-groups": {
                "exclude-admin-groups": "blue"
              },
              "metric-type": "iana-metric-types:igp-metric",
              "calc-type": "iana-algo-types:algo-spf",
              "prefix-metric": "",
              "priority": 100
            }
          }
        }
      }
    }
  }
}
```

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