Internet
Internet-Draft
Intended status: Standards Track
Expires: 7 January 2026

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6 July 2025

IS-IS YANG Model Augmentations for Additional Features - Release 1
draft-ietf-lsr-isis-yang-augmentation-v1-10

Abstract

This document defines YANG data modules augmenting the IETF IS-IS YANG model to provide support for IS-IS Minimum Remaining Lifetime as defined in RFC 7987, and Signaling Maximum SID Depth Using IS-IS as defined in RFC 8491.

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

YANG [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 YANG data modules augmenting the IETF IS-IS YANG model [RFC9130], which itself augments [RFC8349], to provide support for configuration and operational state for the following IS-IS features:

RFC7987: IS-IS Minimum Remaining Lifetime[RFC7987].

RFC8491: Signaling Maximum SID Depth (MSD) Using IS-IS [RFC8491].

The augmentations defined in this document require support for the IS-IS base model[RFC9130], which specifies the basic IS-IS configuration and state. The IS-IS YANG model augments the ietf-routing YANG model defined in [RFC8349].

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.

1.2. Tree diagram

Tree diagrams used in this document follow the notation defined in [RFC8340].

2. YANG Module for IS-IS Minimum Remaining Lifetime

This document defines a YANG module for IS-IS Minimum Remaining Lifetime as defined in [RFC7987]. It is an augmentation of the IS-IS base model.

```
module: ietf-isis-remaining-lifetime

  notifications:
    +---n corrupt-remaining-lifetime
       +--ro routing-protocol-name?   -> /rt:routing
                                         /control-plane-protocols
                                         /control-plane-protocol/name
       +--ro isis-level?              level
       +--ro lsp-id?                  isis:lsp-id
```

```
<CODE BEGINS> file "ietf-isis-remaining-lifetime@2024-09-02.yang"
module ietf-isis-remaining-lifetime {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-isis-remaining-lifetime";

  prefix isis-remaining-lifetime;

  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>";

     description
       "This YANG module defines a notification which is sent when the
        IS-IS system detects corrupted lifetime of an LSP. This is for
        IS-IS Minimum Remaining Lifetime feature as defined in RFC 7987.

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        forth in Section 4.c of the IETF Trust's Legal Provisions
        Relating to IETF Documents
        (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.";

     reference "RFC XXXX";

     revision 2024-09-02 {
       description
         "Initial version";
       reference
         "RFC XXXX: A YANG Data Model for IS-IS Minimum Remaining
         Lifetime.";
     }

     notification corrupt-remaining-lifetime {
       uses isis:notification-instance-hdr;
       leaf lsp-id {
         type isis:lsp-id;
         description "LSP ID";
       }
```

```
       description
         "This notification is sent when the system
          detects corrupted lifetime of an LSP.";
       reference "RFC 7987: IS-IS Minimum Remaining Lifetime";
     }
   }
   <CODE ENDS>
```

3. YANG Module for IS-IS Flexible Algorithms: Bandwidth, Delay, Metrics and Constraints

This document defines a YANG module for IS-IS Flexible Algorithms: Bandwidth, Delay, Metrics and Constraints [I-D.ietf-lsr-flex-algo-bw-con]. It is an augmentation of the IS-IS base model and the Flexible Algorithm YANG module .

```
module: ietf-isis-flex-algo-bw-con
  augment /rt:routing/rt:control-plane-protocols
          /rt:control-plane-protocol/isis:isis/isis:interfaces
          /isis:interface:
    +--rw generic-metrics
       +--rw generic-metric* [metric-type]
          +--rw metric-type     identityref
          +--rw metric-value?   uint32
  augment /rt:routing/rt:control-plane-protocols
          /rt:control-plane-protocol/isis:isis
          /isis-flex-algo:isis-flex-algo:
    +--rw bandwidth-constraints
    |  +--rw constraint* [constraint-type]
    |     +--rw constraint-type    identityref
    |     +--rw bandwidth-value?   te-types:te-bandwidth
    |     +--rw threshold?         uint8
    +--rw (metric-derivation-method)?
    |  +--:(reference-bandwidth)
    |  |  +--rw reference-bandwidth
    |  |     +--rw reference-bandwidth?     rt-types:bandwidth-ieee-float32
    |  |     +--rw granularity-bandwidth?   rt-types:bandwidth-ieee-float32
    |  +--:(bandwidth-thresholds)
    |     +--rw bandwidth-thresholds
    |        +--rw bandwidth-threshold* [bandwidth-threshold]
    |           +--rw bandwidth-threshold    rt-types:bandwidth-ieee-float32
    |           +--rw threshold-metric?      rt-types:uint24
    +--rw exclude-min-bw?               rt-types:bandwidth-ieee-float32
    +--rw exclude-max-delay?            rt-types:uint24
  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 generic-metric-sub-tlvs
       +--ro generic-metric-sub-tlv* []
          +--ro metric-type?   identityref
          +--ro value?         isis:wide-metric
  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
          /isis-link-attr:asla-sub-tlvs/isis-link-attr:asla-sub-tlv:
    +--ro generic-metric-sub-tlvs
       +--ro generic-metric-sub-tlv* []
          +--ro metric-type?   identityref
          +--ro value?         isis:wide-metric
  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 generic-metric-sub-tlvs
       +--ro generic-metric-sub-tlv* []
          +--ro metric-type?   identityref
          +--ro value?         isis:wide-metric
  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/isis-link-attr:asla-sub-tlvs
          /isis-link-attr:asla-sub-tlv:
    +--ro generic-metric-sub-tlvs
       +--ro generic-metric-sub-tlv* []
          +--ro metric-type?   identityref
          +--ro value?         isis:wide-metric
  augment /rt:routing/rt:control-plane-protocols
          /rt:control-plane-protocol/isis:isis/isis:database
          /isis:levels/isis:lsp/isis:router-capabilities
          /isis-flex-algo:fad-tlvs/isis-flex-algo:fad-tlv:
    +--ro faemb-sub-tlv
    |  +--ro min-bandwidth?   rt-types:bandwidth-ieee-float32
    +--ro faemd-sub-tlv
    |  +--ro max-link-delay?   rt-types:uint24
    +--ro fadrb-sub-tlv
    |  +--ro fadrb-flags*              identityref
    |  +--ro reference-bandwidth?     rt-types:bandwidth-ieee-float32
    |  +--ro granularity-bandwidth?   rt-types:bandwidth-ieee-float32
    +--ro fadbt-sub-tlv
       +--ro fadbt-flags*           identityref
       +--ro bandwidth-threshold* []
          +--ro bandwidth-threshold?   rt-types:bandwidth-ieee-float32
          +--ro threshold-metric?      rt-types:uint24
```

```
  <CODE BEGINS> file "ietf-isis-flex-algo-bw-con@2025-07-06.yang"
  module ietf-isis-flex-algo-bw-con {
    yang-version 1.1;
    namespace "urn:ietf:params:xml:ns:yang:ietf-isis-flex-algo-bw-con";
    prefix isis-flex-algo-bw;

    import ietf-routing {
      prefix rt;
      reference "RFC 8349: A YANG Data Model for Routing
                 Management (NMDA Version)";
    }

    import ietf-routing-types {
      prefix "rt-types";
      reference "RFC 8294: Common YANG Data Types for the
                 Routing Area";
    }

    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-isis-flex-algo {
      prefix isis-flex-algo;
    }

    import ietf-isis-link-attr {
      prefix isis-link-attr;
    }

    import iana-igp-metric-types {
      prefix iana-metric-types;
    }

    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>
      ";

    description
      "The YANG module defines the configuration and operational
       state for IS-IS protocol as defined in
       draft-ietf-lsr-flex-algo-bw-con, IGP Flexible Algorithms:
       Bandwidth, Delay, Metrics and Constraints

       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;
       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.";


    reference "RFC XXXX.";

    revision 2025-07-06 {
      description
        "Initial Version";
      reference
        "RFC XXXX";
    }

    /* Identities */

    identity bandwidth-constraint-type {
      description
```

```
        "Base identity for bandwidth constraint types.";
    }

    identity min-bw {
      base bandwidth-constraint-type;
      description
        "Minimum bandwidth constraint.";
    }

    identity max-bw {
      base bandwidth-constraint-type;
      description
        "Maximum bandwidth constraint.";
    }

    identity fadrb-flags {
      description
        "Base identity for OSPF Flexible Algorithm Definition
         Reference Bandwidth sub-tlv flags.";
    }

    identity g-bit {
      base fadrb-flags;
      description
        "G bit, when set, interface group mode MUST be used to
         derive total link bandwidth.";
    }

    identity fadbt-flags {
      description
        "Base identity for OSPF Flexible Algorithm Definition
         Reference Bandwidth sub-tlv flags.";
    }

    identity gp-bit {
      base fadbt-flags;
      description
        "G bit, when set, interface group mode MUST be used to
         derive total link bandwidth.";
    }

    /* Groupings */
    grouping bandwidth-constraint {
      description
        "Grouping for bandwidth constraints in Flex-Algo.";
      container bandwidth-constraints {
        list constraint {
          key "constraint-type";
```

```
          description
            "List of bandwidth constraints for the Flex-Algo.";
          leaf constraint-type {
            type identityref {
              base bandwidth-constraint-type;
            }
            description
              "Type of bandwidth constraint (e.g., min-bw, max-bw).";
          }
          leaf bandwidth-value {
            type te-types:te-bandwidth;
            description
              "Bandwidth value for the constraint.";
          }
          leaf threshold {
            type uint8 {
              range "1..100";
            }
            units "percent";
            description
              "Threshold percentage for triggering re-optimization.";
          }
        }
        description
          "Bandwidth constraints configuration for flex-algo.";
      }
    }

    grouping generic-metric-sub-tlv {
      container generic-metric-sub-tlvs {
        list generic-metric-sub-tlv {
          leaf metric-type {
            type identityref {
              base iana-metric-types:metric-type;
            }
              description
                "Type of metric to be used during the calculation.";
          }
          leaf value {
            type isis:wide-metric;
            description
              "A 24-bit unsigned integer representing the metric
               value. The valid range is from 0 to 16,777,215
               (0xFFFFFF).";
          }
          description
            "The list of generic metric sub-tlvs.";
        }
```

```
        description
          "The generic metric sub-tlv.";
      }
      description
        "The grouping for generic metric sub-tlv.";
    }

    grouping faemb-sub-tlv {
      container faemb-sub-tlv {
        leaf min-bandwidth {
          type rt-types:bandwidth-ieee-float32;
          description
            "A 32-bit field specifying the link bandwidth in IEEE
             floating point format (IEEE754). The units are
             bytes-per-second.";
        }
        description
          "Flex-algo Exclude Minimum Bandwidth sub-tlv (FAEMB).";
      }
      description
        "Grouping for FAEMB sub-tlv.";
    }

    grouping faemd-sub-tlv {
      container faemd-sub-tlv {
        leaf max-link-delay {
          type rt-types:uint24;
          description
            "A 24-bit field specifying the maximum link delay in
             microseconds.";
        }
        description
          "The Flex-algo Exclude Maximum Delay sub-tlv (FAEMD).";
      }
      description
        "Grouping for FAEMD sub-tlv.";
    }

    grouping fadrb-sub-tlv {
      container fadrb-sub-tlv {
        leaf-list fadrb-flags {
          type identityref {
            base fadrb-flags;
          }
          description
            "Flex-algo definition reference bandwidth sub-tlv
             flags list.";
        }
```

```
        leaf reference-bandwidth {
          type rt-types:bandwidth-ieee-float32;
          description
            "A 32-bit field specifying the link bandwidth in IEEE
             floating point format (IEEE754). The units are
             bytes-per-second.";
        }
        leaf granularity-bandwidth {
          type rt-types:bandwidth-ieee-float32;
          description
            "A 32-bit field specifying the link bandwidth in IEEE
             floating point format (IEEE754). The units are
             bytes-per-second.";
        }
        description
          "The Flex-algo Reference Bandwidth sub-tlv (FAEMD).";
      }
      description
        "Grouping for FADRB sub-tlv.";
    }

    grouping fadbt-sub-tlv {
      container fadbt-sub-tlv {
        leaf-list fadbt-flags {
          type identityref {
            base fadbt-flags;
          }
          description
            "Flex-algo definition bandwidth thresholds sub-tlv
             flags list.";
        }
        list bandwidth-threshold {
          leaf bandwidth-threshold {
            type rt-types:bandwidth-ieee-float32;
            description
              "Maximum link bandwidth. A 32-bit field specifying the
               link bandwidth in IEEE floating point format (IEEE754).
               The units are bytes-per-second.";
          }

          leaf threshold-metric {
            type rt-types:uint24;
            description
              "Metric value range 1 - 16,777,215 (0xFFFFFF).";
          }
          description
            "List of bandwidth thresholds and metrics.";
        }
```

```
        description
          "The Flex-algo Bandwidth Thresholds sub-tlv (FADBT).";
      }
      description
        "Grouping for FADBT sub-tlv.";
    }

    /* Configurations */
    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 ISIS routing protocol when used.";
      }
      description
        "This augments the ISIS protocol interface
         configuration with generic metric configuration.";

      container generic-metrics {
        list generic-metric {
          key "metric-type";
          leaf metric-type {
            type identityref {
              base iana-metric-types:metric-type;
            }
            description
              "Type of metric to be used during the calculation.";
          }
          leaf metric-value {
            type uint32;
            description
              "Metric value, range is from 0 to 0xFFFFFFFF.";
          }
          description
            "Interface generic metric configuration per metric-type.";
        }
        description
          "Interface generic metric configuration.";
      }
    }

    augment "/rt:routing/rt:control-plane-protocols/"
       + "rt:control-plane-protocol/isis:isis/"
       + "isis-flex-algo:isis-flex-algo" {
      when "derived-from(/rt:routing/rt:control-plane-protocols/"
           + "rt:control-plane-protocol/rt:type, 'isis:isis')" {
```

```
        description
          "This augments the ISIS routing protocol when used.";
      }
      description
        "This augments ISIS protocol Flexible Algorithm with
         bandwidth constraints.";

      uses bandwidth-constraint;
      choice metric-derivation-method {
        description
          "Choice of automatic metric derivation methods.";
        container reference-bandwidth {
          description
            "Metric is inversely proportional to the link
             bandwidth.";
          leaf reference-bandwidth {
            type rt-types:bandwidth-ieee-float32;
            description
              "A 32-bit field specifying the link bandwidth in IEEE
               floating point format (IEEE754). The units are
               bytes-per-second.";
          }
          leaf granularity-bandwidth {
            type rt-types:bandwidth-ieee-float32;
            description
              "A 32-bit field specifying the link bandwidth in IEEE
               floating point format (IEEE754). The units are
               bytes-per-second.";
          }
        }
        container bandwidth-thresholds {
          description
            "Pre-define non-proportional metric values from the varying
             ranges of link bandwidth.";
          list bandwidth-threshold {
            key bandwidth-threshold;
            leaf bandwidth-threshold {
              type rt-types:bandwidth-ieee-float32;
              description
                "Maximum link bandwidth. A 32-bit field specifying the
                 link bandwidth in IEEE floating point format (IEEE754).
                 The units are bytes-per-second.";
            }
            leaf threshold-metric {
              type rt-types:uint24;
              description
                "Metric value range 1 - 16,777,215 (0xFFFFFF).";
            }
```

```
            description
              "List of bandwidth thresholds and metrics.";
          }
        }
      }

      leaf exclude-min-bw {
        type rt-types:bandwidth-ieee-float32;
        description
          "A 32-bit field specifying the link bandwidth in IEEE
           floating point format (IEEE754). The units are
           bytes-per-second.";
      }

      leaf exclude-max-delay {
        type rt-types:uint24;
        description
          "A 24-bit field specifying the maximum link delay in
           microseconds.";
      }
    }

    /* Database */

    /* 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 ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB TLV22.";

      uses generic-metric-sub-tlv;
    }

    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"+
            "/isis-link-attr:asla-sub-tlvs"+
            "/isis-link-attr:asla-sub-tlv" {
```

```
      when "/rt:routing/rt:control-plane-protocols/"+
           "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB TLV22 asla-sub-tlv.";

      uses generic-metric-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 ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB TLV223.";

      uses generic-metric-sub-tlv;
    }

    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"+
            "/isis-link-attr:asla-sub-tlvs"+
            "/isis-link-attr:asla-sub-tlv" {
      when "/rt:routing/rt:control-plane-protocols/"+
           "rt:control-plane-protocol/rt:type = 'isis:isis'" {
        description
          "This augment ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB TLV223 asla-sub-tlv.";

      uses generic-metric-sub-tlv;
    }

    augment "/rt:routing/rt:control-plane-protocols/"
          + "rt:control-plane-protocol/"
```

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

        uses faemb-sub-tlv;
        uses faemd-sub-tlv;
        uses fadrb-sub-tlv;
        uses fadbt-sub-tlv;
      }
    }
```

4. YANG Module for IS-IS Maximum SID Depth

This document defines a module for Signaling Maximum SID Depth (MSD) using IS-IS [RFC8491]. It is an augmentation of the IS-IS base model.

The figure below describes the overall structure of the isis-msd YANG module:

```
   module: ietf-isis-msd
     augment /rt:routing/rt:control-plane-protocols
             /rt:control-plane-protocol/isis:isis/isis:database
             /isis:levels/isis:lsp/isis:router-capabilities:
       +--ro node-msd-tlv
          +--ro node-msds* [msd-type]
             +--ro msd-type     identityref
             +--ro msd-value?   uint8
     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 link-msd-sub-tlv
          +--ro link-msds* [msd-type]
             +--ro msd-type     identityref
             +--ro msd-value?   uint8
     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 link-msd-sub-tlv
          +--ro link-msds* [msd-type]
             +--ro msd-type     identityref
             +--ro msd-value?   uint8

   <CODE BEGINS> file "ietf-isis-msd@2025-02-26.yang"
   module ietf-isis-msd {
     yang-version 1.1;
     namespace "urn:ietf:params:xml:ns:yang:ietf-isis-msd";
     prefix isis-msd;

     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";
     }
     import ietf-mpls-msd {
       prefix mpls-msd;
     }

     organization
       "IETF LSR - LSR 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:    Jeff Tantsura
                  <mailto:jefftant.ietf@gmail.com>

       ";
     description
       "The YANG module augments the base ISIS model to
        manage different types of MSDs.

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

        Copyright (c) 2025 IETF Trust and the persons identified as
        authors of the code.  All rights reserved.

        Redistribution and use in source and binary forms, with or
        without modification, is permitted pursuant to, and subject to
        the license terms contained in, the Revised BSD License set
        forth in Section 4.c of the IETF Trust's Legal Provisions
        Relating to IETF Documents
        (https://trustee.ietf.org/license-info).

        This version of this YANG module is part of RFC XXXX
        (https://www.rfc-editor.org/info/rfcXXXX); 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.";
     reference
       "RFC XXXX: YANG Data Model for ISIS MSD";

     revision 2025-02-26 {
       description
         "Initial Version";
       reference
         "RFC XXXX: YANG Data Model for ISIS MSD.";
```

```
    }

    grouping link-msd-sub-tlv {
      description
        "Link Maximum SID Depth (MSD) grouping for an interface.";
      container link-msd-sub-tlv {
        list link-msds {
          key "msd-type";
          uses mpls-msd:msd-type-value;
          description
            "List of link MSDs";
        }
        description
          "Link MSD sub-tlvs.";
      }
    }

    /* Node MSD TLV */

    augment "/rt:routing/"
          + "rt:control-plane-protocols/rt:control-plane-protocol"
          + "/isis:isis/isis:database/isis:levels/isis:lsp"
          + "/isis:router-capabilities" {
      when "derived-from-or-self(../../../../../rt:type,"
         + "'isis:isis')" {
        description
          "This augment ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB router capability.";
      container node-msd-tlv {
        list node-msds {
          key "msd-type";
          uses mpls-msd:msd-type-value;
          description
            "Node MSD is the smallest link MSD supported by
             the node.";
        }
        description
          "Node MSD is the number of SIDs supported by a node.";
        reference
          "RFC 8491: Signaling Maximum SID Depth (MSD) Using IS-IS";
      }
    }

    /* link MSD sub-tlv */

    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 "derived-from-or-self(../../../../../../../../rt:type,"
         + "'isis:isis')" {
        description
          "This augment ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB neighbor with
         Link MSD sub-TLV.";
      uses link-msd-sub-tlv;
    }

    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 "derived-from-or-self(../../../../../../../../rt:type,"
         + "'isis:isis')" {
        description
          "This augment ISIS routing protocol when used";
      }
      description
        "This augments ISIS protocol LSDB neighbor.";
      uses link-msd-sub-tlv;
    }
  }
  <CODE ENDS>
```

5. Security Considerations

The YANG modules specified in this document define a schema for data that is designed to be accessed via network management protocols such as NETCONF [RFC6241] or RESTCONF [RFC8040]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [RFC6242]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [RFC8446].

The NETCONF access control model [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a pre-configured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in the modules that are writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations. These correspond to the following schema nodes:

/isis:isis/isis:interfaces/isis:interface/isis-link-attr - Modification of link attributes operation mode could result in traffic being redirected or DoS attack.

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.These correspond to the following schema nodes:

/isis:isis/isis:database/isis:levels/isis:lsp/isis:mt-is-neighbor/isis:neighbor/isis:instances/isis:instance/application-specific-link-attributes-sub-tlvs

/isis:isis/isis:database/isis:levels/isis:lsp/application-specific-srlg-tlv

/isis:router-capabilities/node-msd-tlv

/isis:isis/isis:database/isis:levels/isis:lsp//isis:extended-is-neighbor/isis:neighbor/link-msd-sub-tlv

/isis:isis/isis:database/isis:levels/isis:lsp//isis:mt-is-neighbor/isis:neighbor/link-msd-sub-tlv

6. IANA Considerations

This document registers URIs in the IETF XML registry [RFC3688]. Following the format in [RFC3688], the following registrations is requested to be made:

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

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

This document registers the YANG modules in the YANG Module Names registry [RFC6020].

```
  name: ietf-isis-remaining-lifetime
  namespace: urn:ietf:params:xml:ns:yang:ietf-isis-remaining-lifetime
  prefix: isis-remaining-lifetime
  reference: RFC XXXX

  name: ietf-isis-flex-algo-bw-con
  namespace: urn:ietf:params:xml:ns:yang:ietf-isis-flex-algo-bw-con
  prefix: isis-flex-algo-bw-con
  reference: RFC XXXX

  name: ietf-isis-msd
  namespace: urn:ietf:params:xml:ns:yang:ietf-isis-msd
  prefix: isis-msd
  reference: RFC XXXX
```

7. Acknowledgements

This document was produced using Marshall Rose’s xml2rfc tool.

The YANG model was developed using the suite of YANG tools written and maintained by numerous authors.

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