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**A YANG Model for MPLS MSD
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Abstract

This document defines a YANG data module augmenting the IETF MPLS YANG model to provide support for MPLS Maximum SID Depths (MSDs) as defined in [RFC 8476](#) and [RFC 8491](#).

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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 a YANG data module augmenting the IETF MPLS YANG model [[RFC8960](#)], which itself augments [[RFC8349](#)], to provide operational state for various MSDs[RFC8662].

The augmentation defined in this document requires support for the MPLS base model[RFC8960] which defines basic MPLS configuration and state.

The YANG module in this document conforms to the Network Management Datastore Architecture (NMDA) [[RFC8342](#)].

[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. YANG Module for MPLS MSD

This document defines a YANG module for MSD extensions
[RFC8476][RFC8491] to MPLS base model as defined in [RFC8960].

```
module: ietf-mpls-msd
  augment /rt:routing/mpls:mpls:
    +--ro msd
      +--ro node-msds* [msd-type]
        | +--ro msd-type      identityref
        | +--ro msd-value?    uint8
      +--ro link-msds* [interface]
        +--ro interface      if:interface-ref
        +--ro link-msd* [msd-type]
          +--ro msd-type      identityref
          +--ro msd-value?    uint8
```

```
<CODE BEGINS> file "ietf-mpls-msd@2021-08-01.yang"
module ietf-mpls-msd {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-mpls-msd";
  prefix mpls-msd;

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

  import ietf-interfaces {
    prefix if;
    reference
      "RFC 8343: A YANG Data Model for Interface
      Management (NMDA Version)";
  }

  import ietf-mpls {
    prefix mpls;
    reference "RFC 8960: A YANG Data Model for MPLS Base";
  }

  organization
    "IETF MPLS - MPLS Working Group";
  contact
    "WG Web:   <https://tools.ietf.org/wg/mpls/>
    WG List:  <mailto:mpls@ietf.org>
```


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";

description

"The YANG module augments the base MPLS model, and it is to manage different types of MSDs.

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

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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: YANG Data Model for Segment Routing.";

```
revision 2021-08-01 {  
  description  
    "Initial Version";  
  reference "RFC XXXX: YANG Data Model for Segment Routing.";  
}
```

```
identity msd-base-type {  
  description  
    "Base identity for MSD Type";
```



```
}

identity base-mpls-msd {
  base msd-base-type;
  description
    "Base MPLS Imposition MSD.";
  reference
    "RFC 8491: Singling MSD using IS-IS.";
}

identity erld-msd {
  base msd-base-type;
  description
    "ERLD-MSD is defined to advertise the ERLD.";
  reference
    "RFC 8662: Entropy Label for Source Packet Routing in
      Networking (SPRING) Tunnels";
}

grouping max-sid-depth {
  description
    "Maximum SID Depth (MSD) grouping.";
  list node-msds {
    key "msd-type";
    leaf msd-type {
      type identityref {
        base msd-base-type;
      }
      description
        "MSD types";
    }
    leaf msd-value {
      type uint8;
      description
        "MSD value, in the range of 0-255.";
    }
  }
  description
    "Node MSD is the smallest link MSD supported by
      the node.";
}
list link-msds {
  key "interface";
  leaf interface {
    type if:interface-ref;
    description
      "Reference to device interface.";
  }
  list link-msd {
```



```
    key "msd-type";
    leaf msd-type {
        type identityref {
            base msd-base-type;
        }
        description
            "MSD type";
    }
    leaf msd-value {
        type uint8;
        description
            "MSD value, in the range of 0-255.";
    }
    description
        "List of link MSDs";
}
description
    "MSD supported by an individual interface.";
}
}

augment "/rt:routing/mpls:mpls" {
    description
        "This module augments MPLS data model (RFC 8960)
        with MSD.";
    container msd {
        config false;
        description
            "Maximum SID Depth (MSD) operational state.";
        uses max-sid-depth;
    }
}
}
<CODE ENDS>
```

3. 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 (NACM) [[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.

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. These are the subtrees and data nodes and their sensitivity/vulnerability:

```
/rt:routing/mpls:mpls/msd/node-msds
```

```
/rt:routing/mpls:mpls/msd/link-msds
```

Exposure of the node's maximum SID depth may be useful in mounting a Denial-of-Service (DoS) attack by sending packets to the node that the router can't process.

4. 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-mpls-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-mpls-msd
namespace: urn:ietf:params:xml:ns:yang:ietf-mpls-msd
prefix: mpls-msd
reference: RFC XXXX
```

5. 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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