Abstract

This document defines YANG data models that can be used to configure and manage Dynamic Flooding for IS-IS and OSPF.

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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 RFC 2119 [RFC2119].

2. Introduction


3. OSPF Data Model

module ietf-dynamic-flooding-ospf {
  yang-version 1.1;

  prefix ospf-df;

  import ietf-ospf {
    prefix "ospf";
    reference "RFC XXXX - YANG model for Open Shortest Path First (OSPF).
    Please replace XXXX with published RFC number for draft-ietf-ospf-yang-21.";
  }

  import ietf-yang-types {
    prefix "yang";
    reference "RFC 6991: Common YANG Data Types";
  }

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

  organization
      "IETF LSR - Link State Routing Working Group";
}
feature dynamic-flooding-ospf {
  description
    "Support for OSPF dynamic flooding";
  reference
    "RFC XXXX - Dynamic Flooding on Dense Graphs";
}

identity ospfv2-dynamic-flooding-opaque-lsa {
  base ospf:ospfv2-area-scope-opaque-lsa;
  description
    "OSPFv2 dynamic-flooding-opaque-lsa. RFC XXX- Replace XXXX with published RFC number for draft-ietf-lsr-dynamic-flooding ";
}

identity ospfv3-dynamic-flooding-opaque-lsa {
  base ospf:ospfv3-lsa-type;
  description
    "OSPFv3 dynamic-flooding-opaque-lsa. RFC XXX- Replace XXXX with published RFC number for draft-ietf-lsr-dynamic-flooding ";
}

identity ospfv2-dynamic-flooding-opaque-lsa {
  base ospf:ospfv2-opaque-lsa-type;
  description "OSPFv2 Dynamic Flooding Opaque LSA - Type TBD";
}

identity ospfv3-dynamic-flooding-opaque-lsa {
  base ospf:ospfv3-lsa-type;
  description "OSPFv3 Dynamic Flooding LSA - Type TBD";
}

grouping ospf-area-leader-tlv {
  description "Area leader TLV for OSPFv2/OSPFv3. A TLV of RI LSA";
  leaf priority {
    type uint8;
    description "Router's priority for Area leader";
  }
  leaf Algorithm {
    type uint8;
    description "Routers Algorithm to calculate Flooding Topology.";
  }
}

grouping dynamic-flooding-tlv {
  description "Dynamic-flooding TLV for OSPFv2/OSPFv3. A TLV of RI LSA";
  leaf-list algorithm;
type uint8;
description "List of Algorithm's supported by the advertising node";
}

grouping ospfv2-area-router-id-tlv-entry {
description "ospfv2 area router ID TLV entries";
leaf connection-type {
type uint8;
description "Defines the connection type ";
}
leaf number-of-ids {
type uint16;
description "the number of ID present in this TLV entry";
}
leaf-list originating-router-id {
type yang:dotted-quad;
description "list of the originating-router-ids";
}
}

grouping ospfv2-area-router-id-tlv {
description "definition for OSPFv2 Dynamic flooding area router-ID TLV";
leaf start-index {
type uint16;
description "Starting index of the first router/designated router ID";
}
leaf last-flag {
type bits {
bit last-router-designated-router-id {
description "when set, this TLV is the last Index in the full list of router IDs for the area";
reference "RFC XXXX- Dynamic flooding on Dense graphs; Replace XXXX with published RFC number for draft-ietf-lsr-dynamic-flooding-03";
}
description "last flag";
}
list ospfv2-router-id-tlv-entry {
description "list of ospfv2 router-ID TLV entries";
uses ospfv2-area-router-id-tlv-entry;
}
}

grouping ospfv3-area-router-id-tlv-entry {
description "ospfv3 area router ID TLV entries";
leaf connection-type {
type uint8;
}
description "Defines the connection type ";
}
leaf number-of-ids {
    type uint16;
    description "the number of ID present in this TLV entry";
}
choice originating-router-id {
    description "list of the originating-router-ids";
    container router-id {
        when "derived-from(../connection-type,'router')" {
            description "Only applies when connection type is Router";
        }
        description "originating-router-id";
        leaf-list originating-router-id {
            type yang:dotted-quad;
            description "list of the originating-router-ids";
        }
    }
    container designated-router-id {
        when "derived-from(../connection-type,'designated-router')" {
            description "Only applies when connection type is designated Router";
        }
        description "originating-router-id";
        list originating-router-id-list {
            description "originating-router-id";
            leaf originating-router-id {
                type yang:dotted-quad;
                description "originating-router-ids";
            }
            leaf interface-id {
                type yang:dotted-quad;
                description "interface-ids";
            }
        }
    }
}

grouping ospfv3-area-router-id-tlv {
    description "Definition for OSPFv3 Dynamic flooding area router-ID TLV";
    leaf start-index {
        type uint16;
        description "Starting index of the first router/designated router ID";
    }
    leaf last-flag {
        type bits {
            bit last-router-designated-router-id {
                description "when set, this TLV is the last Index in the full list of router IDs for the area";
            }
        }
    }
}
grouping ospfv3-router-id-tlv-entry {
  description "list of OSPFv3 router-ID TLV entries";
  uses ospfv3-area-router-id-tlv-entry;
}

list ospfv3-router-id-tlv-entry {
  description "list of OSPFv3 router-ID TLV entries";
  uses ospfv3-area-router-id-tlv-entry;
}

augment flooding-path-tlv {
  description "definition for OSPFv2/OSPFv3 Flooding Path TLV";
  leaf start-index {
    type uint16;
    description "Starting index of the first router/designated router ID";
  }
  leaf-list indices {
    type uint16;
    description "index of the next router ID in the path";
  }
}

augment flooding-request-bit {
  description "definition for adding flooding request bit (FR-bit) to LLS type-1 extended options. Need to be defined";
}

augment link-attribute-bits-tlv {
  description "definition for link-attribute-bits-tlv, a sub-tlv for OSPFv2 Extended link TLV and a sub-tlv for OSPFv3 router-link TLV";
  leaf link-attributes-bits {
    type bits {
      bit LEEF {
        description "when set, conveys which edges are currently enabled in the flooding topology";
      }
    }
    description "link-attributes-bits";
  }
}

augment "rt:routing/rt:control-plane-protocols/rt:control-plane-protocol/ospf:ospf/ospf:areas/ospf:area" {
  if-feature dynamic-flooding-ospf;
  description "Dynamic-flooding config model augmentation";
  contains dynamic-flooding {
    description "to Enable/Disable dynamic flooding for this specific OSPF area";
  }
}
leaf enable {
  type boolean;
  description "Enable/Disable dynamic-flooding";
}

/*
 * Dynamic flooding state augmentation to OSPF2 module
 */

  if-feature dynamic-flooding-ospf;
  description "dynamic flooding TLVs augmentation";
  container area-leader-tlv {
    description "Area-leader-tlv";
    uses ospf-area-leader-tlv;
  }
  container dynamic-flooding-tlv {
    description "dynamic-flooding-tlv";
    uses dynamic-flooding-tlv;
  };
}

  if-feature dynamic-flooding-ospf;
  description "ospfv2-dynamic-flooding-opaque-lsa augmentation";
  container ospfv2-dynamic-flooding-opaque-lsa {
    description "OSPFv2 Dynamic flooding opaque LSA.";
    //                      uses unknown-tlvs;
    container ospfv2-area-router-id-tlv {
      description "ospfv2-area-router-id-tlv";
      uses ospfv2-area-router-id-tlv;
    }
    container flooding-path-tlv {
      description "ospf flooding-path-tlv";
      uses flooding-path-tlv;
    }
  };
}

augment ... {
  if-feature dynamic-flooding-ospf;
  description "ospf-link-attributes-bits-tlv augmentation";
  container ospf-link-attributes-bits-tlv {
    description "ospf link attributes bits tlv. RFC XXXX- Dynamic flooding on Dense graphs; Replace XXXX with published RFC number for draft-ietf-lsr-dynamic-flooding-03";
    uses link-attribute-bits-tlv;
  };
}
Dynamic flooding state augmentation to OSPF3 module

    if-feature dynamic-flooding-ospf;
    description "ospfv3-dynamic-flooding-opaque-lsa augmentation";
    container ospfv3-dynamic-flooding-opaque-lsa {
        description "ospfv3-dynamic-flooding-opaque-lsa definition";
        //                      uses unknown-tlvs;
        container ospfv3-area-router-id-tlv {
            description "ospfv3-area-router-id-tlv";
            uses ospfv3-area-router-id-tlv;
        }
        container flooding-path-tlv {
            description "ospf flooding-path-tlv";
            uses flooding-path-tlv;
        }
    }
}

4.  IS-IS Data Model

This data model augments the IS-IS YANG model [I-D.ietf-isis-yang-isis-cfg] with extensions to support Dynamic Flooding [I-D.ietf-lsr-dynamic-flooding].
Internet-Draft    YANG Data Model for Dynamic Flooding    September 2019

// IETF:
// OpenConfig:
// namespace "http://openconfig.net/yang/openconfig-isis-dynflood"

prefix isis-dynflood;

// OpenConfig:
// import openconfig-network-instance {
//   prefix oc-netinst;
// }

// NB: This module is currently under development and is intended to augment
// the IETF IS-IS module (currently draft-ietf-isis-yang-isis-cfg-35).
// While that is in process, we are developing against the openconfig model, and
// references to IETF paths are commented out.

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

organization "IETF LSR Working Group";
contact "WG List: <mailto:lsr@ietf.org>";
description "First draft of a YANG model for IS-IS dynamic flooding.

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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.

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revision 2019-08-22 {
  description "Initial revision";
  reference "RFC XXXX";
}

// OpenConfig:
// typedef extended-system-id {
//   type string {
//     pattern
//     '[0-9A-Fa-f]{4}\.[0-9A-Fa-f]{4}\.[0-9A-Fa-f]{4}\.
//     +[0-9][0-9]';
//   }
//   description
//   "This type defines IS-IS system-id using pattern. The extended
//    system-id contains the pseudonode number in addition to the
//    system-id.
//    An example system-id is 0143.0438.AEF0.00";
// }

feature area-leader {
  description "Election of a leader for the area.";
}

feature dynamic-flooding {
  if-feature area-leader;
  description "Compute a reduced flooding topology.";
}

grouping area-leader-global-cfg {
  description "Enable area leader capability";
  leaf value {
    type boolean;
    default false;
    description "Enable area leader capability";
  }
grouping area-leader-priority-cfg {
  description "Set the area leader priority";
  leaf value {
    type uint8;
    default 200;
    description "Area leader priority";
  }
}

grouping area-leader-algorithm-cfg {
  description "Select the flooding topology computation algorithm";
  leaf value {
    type uint8;
    default 0;
    description "Dynamic flooding algorithm selection";
  }
}

grouping area-leader-parameters {
  description "Area leader configuration parameters";
  container area-leader {
    description "Area leader configuration parameters";
    container config {
      description "Area leader configuration";
      container enable {
        if-feature area-leader;
        description "Area leader global enable configuration";
        uses area-leader-global-cfg;
      }
      container level-1 {
        description "level-1 specific configuration";
        uses area-leader-global-cfg;
      }
      container level-2 {
        description "level-2 specific configuration";
        uses area-leader-global-cfg;
      }
      container priority {
        if-feature area-leader;
        description "Area leader priority configuration";
        uses area-leader-priority-cfg;
      }
    }
  }
}
container level-2 {
    description "level-2 specific configuration";
    uses area-leader-priority-cfg;
}

container algorithm {
    if-feature dynamic-flooding;
    description "Area leader algorithm configuration";
    uses area-leader-algorithm-cfg;
    container level-1 {
        description "level-1 specific configuration";
        uses area-leader-algorithm-cfg;
    }
    container level-2 {
        description "level-2 specific configuration";
        uses area-leader-algorithm-cfg;
    }
}

grouping dynamic-flooding-global-cfg {
    description "Enable dynamic flooding capability";
    leaf value {
        type boolean;
        default false;
        description "Enable dynamic flooding capability";
    }
}

grouping dynamic-flooding-parameters {
    description "Dynamic flooding configuration parameters";
    container dynamic-flooding {
        description "Dynamic flooding configuration parameters";
        container config {
            description "Dynamic flooding configuration";
            container enable {
                if-feature dynamic-flooding;
                description "Dynamic flooding global enable configuration";
                uses dynamic-flooding-global-cfg;
                container level-1 {
                    description "level-1 specific configuration";
                    uses dynamic-flooding-global-cfg;
                }
                container level-2 {
                    description "level-2 specific configuration";
                }
            }
        }
    }
}
uses dynamic-flooding-global-cfg;
}
}
}
}

// IETF:
augment "/rt:routing/rt:control-plane-protocols/"
"*rt:control-plane-protocol/isis:isis" {
// OpenConfig:

description "Area leader and dynamic flooding configuration additions";
uses area-leader-parameters;
uses dynamic-flooding-parameters;
}

grouping dynamic-flooding-paths {

description "List of paths in the topology";
list paths {

cfg false;

description "A list of paths";
leaf-list path {

type uint16;

description "A list of node indices";
}
}
}

grouping dynamic-flooding-topology {

description "List of paths in the topology";
list paths {

cfg false;

description "A list of paths";
leaf-list path {

type string;

description "A list of node names";
}
}
}

grouping dynamic-flooding-interfaces {

description "List of flooding topology interfaces";
list interfaces {

cfg false;

description "List of interfaces and their temporary status";
leaf interface {

type string;
}
description "Interface name";
}
leaf temporary {
  type boolean;
  description "Set for partition repair or new adjacencies";
}
}

// OpenConfig:
// type extended-system-id;
// IETF:
// type isis:extended-system-id;
// description "Node id for the node";
}
}

container dynamic-flooding-paths {
  if-feature dynamic-flooding;
  description "Flooding topology with explicit paths";
  uses dynamic-flooding-paths;
container dynamic-flooding-topology {
  if-feature dynamic-flooding;
  description "Flooding topology with system names";
  uses dynamic-flooding-topology;
}

container dynamic-flooding-interfaces {
  if-feature dynamic-flooding;
  description "Interfaces on the flooding topology";
  uses dynamic-flooding-interfaces;
}

// IETF:
augment "/rt:routing/rt:control-plane-protocols/"
  "rt:control-plane-protocol/isis:isis" {
// OpenConfig:
  description "Area leader and dynamic flooding state additions";
  uses area-leader-state;
  uses dynamic-flooding-state;
}
grouping subtlv27-area-leader {
  description "Router capability subTLV for area leader capability";
  container area-leader {
    description "Area leader subTLV for router capabilities";
    leaf priority {
      type uint8;
      description "Area leader priority";
    }
    leaf algorithm {
      type uint8;
      description "Algorithm index for computing the flooding topology";
    }
  }
}
grouping subtlv28-dynamic-flooding {
  description "Dynamic flooding capability subTLV";
  container dynamic-flooding {
    description "Dynamic flooding capability subTLV";
    leaf-list algorithms {
      type uint8;
      description "Supported algorithm indices for distributed mode";
    }
  }
}
augment "/rt:routing/rt:control-plane-protocols"
  description "Additional router capability subTLVs for dynamic flooding"
  uses subtlv27-area-leader
  uses subtlv28-dynamic-flooding
}


grouping tlv17-area-node-ids {
  description "TLV 17: Area Node IDs"
  container area-node-ids {
    description "Dynamic flooding node id assignment TLV"
    leaf starting-index {
      type uint8;
      description "Starting index for the node ids in this TLV."
    }
    leaf flags {
      type bits {
        bit last {
          position 0;
          description "Set if this is the highest set of indices in the area."
        }
      }
      description "Flags field in the TLV."
    }
  }
  leaf-list nodes {
    // OpenConfig:
    // type extended-system-id;
    // IETF:
    type isis:extended-system-id;
    description "Nodes being assigned indices"
  }
}


grouping tlv18-flooding-path {
  description "Flooding topology path TLV"
  container flooding-path {
    description "Dynamic flooding path TLV"
    leaf-list nodes {
      type uint16;
      description "Nodes in the path"
    }
  }
}
5.  Acknowledgements

The authors would like to thank Derek Yeung, Nidhi Bhaskar, and Kavitha Prasad for their comments and assistance.

6.  Security Considerations

This document introduces no new security issues.

7.  Normative References


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