Filter-Based RIB Data Model
draft-hares-i2rs-fb-rib-data-model-00

Abstract

This document defines a data model for the I2RS Filter-based Routing Information Base (RIB) Yang data model. A routing system uses the Filter-based RIB to program FIB entries that process incoming packets by matching on multiple fields within the packet and then performing a specified action on it. The FB-RIB can also specify an action to forward the packet according to the FIB entries programmed using the RIBs of its routing instance.

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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This Internet-Draft will expire on April 21, 2016.
1. Introduction

The Interface to the Routing System (I2RS) [I-D.ietf-i2rs-architecture] architecture provides dynamic read and write access to the information and state within the routing elements. The I2RS client interacts with the I2RS agent in one or more network routing systems.

This document provides a yang module for the I2RS filter Based Routing Information Base (FB-RIB) and describes the I2RS interaction with routing filters within a routing element. The informational model for the FB-RIB is in [I-D.kini-i2rs-fb-rib-info-model]
1.1. Definition of I2RS Filter Based RIB

Filter-based routing is a technique used to make packet forwarding decisions based on a filter that is matched to the incoming packets and the specified action. It should be noted that this is distinct from the static routes in the RIB [I-D.ietf-i2rs-rib-info-model] where the routing is destination address based.

A Filter-Based RIB (Routing Information Base) is contained in a routing instance (defined in [I-D.ietf-i2rs-rib-info-model]). It contains a list of filters (match-action conditions), a list of interface the filter-based forwarding operates on. Filter-based RIBs (FB-RIBs) operate only on the interface the FB-RIB are configured on.

A Filter Based RIB uses Event-Condition-Action policy. A Filter-based RIB entry specifies matches on fields in a packet (which may include layer 2 fields, IP header fields, transport or application fields) or size of the packet or interface received on. The matches are contained in an ordered list of filters which contain pairs of match condition-action (aka event-condition-action).

If all matches fail, default action is to forward the packet using FIB entries that were programmed by the Routing Informational Base (RIB) manager described in [I-D.ietf-i2rs-rib-info-model].

Actions in the condition-action pair may impact forwarding or set something in the packet that will impact forwarding. Policy actions are typically applied before applying QoS constraints since policy actions may override QoS constraint.

The Filter-Based RIB resides in ephemeral state as does the I2RS RIB and I2RS topology models.

2. 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].

In this document, these words will appear with that interpretation only when in ALL CAPS. Lower case uses of these words are not to be interpreted as carrying RFC-2119 significance.
3. Definitions and Acronyms

CLI

Command Line Interface

FB-RIB

Filter-Based Routing Information Base

FB-Route

The policy rules in the filter-based RIB are prescriptive of the Event-Condition-Action form which is often represented by if Condition then action".

Policy Group

Policy Groups are groups of policy rules. The groups of policy in the basic network policy [I-D.hares-i2rs-bnp-info-model] allow grouping of policy by name. This name allow easier management of customer-based or provider based filters.

RIB IM

RIB Informational Model (RIB IM) [I-D.ietf-i2rs-rib-info-model]

Routing instance

A routing instance, in the context of the FB-FIB is a collection of RIBs, interfaces, and routing parameters. A routing instance creates a logical slice of the router and allows different logical slices; across a set of routers; to communicate with each other.

4. The Top-level Yang structure for the FB-RIB
module: FB-RIB
  +--FB-RIB-module
    +--rw FB-RIB-instance-name
    +--rw RB-RIB-router-id
      uses rt:router-id
    +--rw FB-RIB* [rib-name]
      |  +--rw rib-Name
      |  +--rw rib-afi
      |  +--rw fb-rib-intf* if:inteface-ref
    +--rw I2RS-default-RIB
      |    +--rw RIB-name
      |    uses i2rs-rib:name
      |    +--rw fb-rib-status-info
      |    +--rw fb-rib-update-ref uint64
      +--rw fb-rib-Group*
      +--rw filter-type // for group
      +--rw order-number // for group
        + choice (filter-type)
          +--case: acl
            uses: acl: access_lists: access-list-entries
            // operational status augment to group
            augments: access_lists: access-list-entries
            uses fb-rib-group-order_status;

          // operational status augment to individual ACL
          augments: access_lists:access-list-entries:
            access-list-entry
            uses fb-rib-rule-order-status;

        +--case: bnp-eca Rules
          uses bnp-eca: bnp-policy-set
          augments bnp-eca:bnp-policy-set:group-list:group
            uses fb-rib-group-order_status
          augment bnp-eca:bnp-policy-set:group-list:group:rule
            uses fb-rib-rule-order_status

Figure 4: FB RIB Yang Structure

5. yang models

5.1. Filter-Based RIB types

   //<CODE BEGINS> file "i2rs fb-rib-types@2015-10-17.yang"
module i2rs-fb-rib-types {
  yang-version "1";
  // namespace
    // replace with iana namespace when assigned
    prefix "i2rs-fbrib-t";

    // meta
    organization
        "IETF";

    contact
        "email: sriganesh.kini@ericsson.com
         email: cengiz@packetdesign.com
         email: anoop@ieee.duke.edu
         email: ivandean@gmal.org
         email: shares@ndzh.com;
         email: linda.dunbar@huawei.com;
         email: russ@riw.com;
         email: Jeff.Tantsura@ericsson.com;";

    description
        "This module describes a YANG model for the I2RS
         Filter-based RIB Types. These types
         specify types for the Filter-Based RIB.

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         the document authors. All rights reserved.

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         without modification, is permitted pursuant to, and subject
         to the license terms contained in, the Simplified BSD
         License set forth in Section 4.c of the IETF Trust’s Legal
         Provisions Relating to IETF Documents
         (http://trustee.ietf.org/license-info).";

    revision "2015-06-20" {
        description
            "I2RS Filter-Based RIB protocol ";
        reference "draft-hares-i2rs-fb-rib-data-model-00";
    }

typedef fb-rib-policy-type-def {
    type identityref {
        base "fb-rib-policy-type";
    }
    description
        "This type is used to refer to FB-RIB type";
}
identity fb-rib-policy-type {
    description "Types of filter-based policies: acl and eca";
}

identity fb-rib-acl {
    base fb-rib-policy-type;
    description "filter based policy based on access-lists";
}

identity fb-bnp-eca-rules {
    base fb-rib-policy-type;
    description "filter based policy based on qos forwarding rules";
}

typedef fb-rules-status {
    type identityref {
        base "fb-rule-opstat";
    }
    description "This type is used to refer to FB-RIB type";
}

identity fb-rule-opstat {
    description "operational statues for filter rules inactive and active";
}

identity fb-rule-inactive {
    base fb-rule-opstat;
    description "policy rule is inactive";
}

identity fb-rule-active {
    base fb-rule-opstat;
    description "policy rule is active";
}

grouping fb-rib-rule-order-status {
    leaf statement-order {
        description "order identifier";
        type uint16;
    }
}
leaf statement-oper_status {
    description "status of rule";
    type fb-rules-status;
}

grouping fb-rib-group-order-status {
    leaf group-order{
        type uint16;
        description "default group order";
    }
    leaf group-refcnt {
        type uint16;
        description "refcnt for this group";
    }
    leaf group-installed {
        type uint16;
        description "number of rules installed";
    }
}

grouping fb-rib-status-info {
    leaf fb-rib-update-ref {
        description "number of updates to this FB RIB since last reboot";
        type uint64;
    }
}

// <CODE ENDS>

5.2. fb-fib yang module

//<CODE BEGINS > file "i2rs fb-rib@2015-10-17.yang"
module i2rs-fb-rib {
    yang-version "1";

    // namespace
    namespace "urn:TBD1:params:xml:ns:yang:rt:i2rs:fbrib";
    // replace with iana namespace when assigned
    prefix "i2rs-fbrib";

import ietf-interfaces { prefix "if"; }
import ietf-routing { prefix "rt"; }
import i2rs-rib { prefix "i2rs-rib"; }
import i2rs-fb-rib-types { prefix "i2rs-fbrib-t"; }
import i2rs-eca-policy { prefix "i2rs-eca"; }

organization
  "IETF";

contact
  "email: sriganesh.kini@ericsson.com
       email: cengiz@packetdesign.com
       email: anoop@ieee.duke.edu
       email: ivandean@gmail.org
       email: shares@ndzh.com;
       email: linda.dunbar@huawei.com;
       email: russ@riw.com;
       email: Jeff.Tantsura@ericsson.com;"

description
  "This module describes a YANG model for the I2RS Filter-based RIB which is a protocol independent I2RS module."

revision "2015-10-18" {
  description "initial revision"
  reference "draft-kini-i2rs-fb-rib-info-model-03"
}

grouping fb-rib-group-list-entry {
  description "lists of groups of ordered lists"
  leaf group-name {
    description "policy-group name"
    type string;
  }
  uses i2rs-fbrib-t:fb-rib-group-order-status;
  leaf fb-group-policy-type {
    description "Policy type (acl/eca)"
    type i2rs-fbrib-t:fb-rib-policy-type-def;
  }
  choice fb-rib-policy-type {
    case fb-rib-acl {
      // re-add when ietf-access-control-list works
      // uses acl:access_lists;
      uses i2rs-fbrib-t:fb-rib-group-order-status;
    }
case fb-eca-rules {
   /// re-add i2rs-eca:bnp-ecap-policy-set:policy groups
   /// linked to this
   uses i2rs-fbrib-t:fb-rib-group-order-status;
 }

container fb-rib_status {
   leaf fb-rib-update-ref {
      type uint64;
      description "reference count for fb-rib";
   }
}

grouping I2RS-Default-RIB {
   description "I2RS RIB which will be used
   even if none of the policy match";
   /// problem with my use format - add back after fix
   // uses i2rs-rib:rib-list:name;
   uses i2rs-fbrib-t:fb-rib-status-info;
}

/// top level FB-RIB structure
container FB-RIB-routing-instance {
   description "Configuration of an 'i2rs' pseudo-protocol instance
   consists of a list of ribs."

   leaf FB-RIB-instance-name {
      description "A routing instance is identified by its name,
      INSTANCE_name. This MUST be unique across all routing
      instances in a given network device."
      type string;
      mandatory true;
   }
   uses rt:router-id;

   list FB-RIB {
      key rib-Name;
      leaf rib-Name {
         description "RIB name"
         type string;
         mandatory true;
      }
      // fix the afi list to key point
leaf rib-afi {
  description "RIB AFI";
  type uint32;
}
list fb-rib-intf {
  description "This represents the list of interfaces associated with this routing instance. The interface list helps constrain the boundaries of packet forwarding. Packets coming on these interfaces are directly associated with the given routing instance. The interface list contains a list of identifiers, with each identifier uniquely identifying an interface.";
  key "name";
  leaf name {
    type if:interface-ref;
    description "A reference to the name of a configured network layer interface.";
  }
}
uses I2RS-Default-RIB;
list fb-rib-group {
  description "list of policy groups ";
  key grp-name;
  uses i2rs-eca:rule-group;
}

// <CODE ENDS>

6. IANA Considerations

TBD.

7. Security Considerations

A I2RS RIB is ephemeral data store that will dynamically change traffic paths set by the routing configuration. An I2RS FB-RIB provides dynamic Event-Condition-Action policy that will further change the operation of forwarding by allow dynamic policy and
ephemeral RIBs to alter the traffic paths set by routing configuration. Care must be taken in deployments to use the appropriate security and operational control to make use of the tools the I2RS RIB and I2RS FB-RIB provide.

8. References

8.1. Normative References:

[I-D.hares-i2rs-bnp-info-model]

[I-D.ietf-i2rs-architecture]

[I-D.ietf-i2rs-rib-data-model]

[I-D.ietf-i2rs-rib-info-model]

[I-D.ietf-netmod-acl-model]

[I-D.kini-i2rs-fb-rib-info-model]
8.2. Informative References

[I-D.ietf-i2rs-usecase-reqs-summary]


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