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                     Filter-Based RIB Data Model
                  draft-hares-i2rs-fb-rib-data-model-01

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 RIBto 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.

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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 that this is
   distinct from the static routes in the RIB
   [I-D.ietf-i2rs-rib-info-model] where the routing is destination
   ddress 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

   The Top-level Yang structure for the FB-RIB types is:

```
       module: FB-RIB
       fb-rib-types module
       +--rw fib-ribs
          +--rw fb-rib*  [rib-name]
          |   +--rw rib-name string
          |   +--rw rib-afi inet:afi
          |   +--rw fb-rib-intf* if:interface-ref
          |   +--rw default-i2rs-rib rt:rt-2rs-rib:name
          |   +--rw fb-rib-status-info
          |   |   +--rw fb-rib-update-ref uint64
          |    |   +--rw instance-using*
          |   |  device:networking-instance:networking-instance-name
          |   +--rw fb-rib-Group* [name]
          |   |   +--rw name string
          |   |   +--rw order-number uint64
          |    |   |    +--rw filter-type identityref // acl, eca
          |   |   +--rw acl-policy
          |   |   |   +--rw group*
          |    |   |   |        acl:access_lists:access-list-entries
          |   |   +--rw eca-policy* bnp-eca:rule-group:name
          |   |   +--rw fb-rib-group-order_status
                     +--rw default-group-order uint16
                     +--rw group-refcnt uint16
                        +--rw group-installed uint16


               Figure 4: FB RIB Type Structure
```

   The Top-level Yang structure for a global FB-RIB types (similar to
   acl) is:

```
   ietf-fb-rib module
    +--rw ietf-fb-rib
          +--rw default-instance-name string
       +--rw default-router-id rt:router-id
             uses fb-ribs


        Figure 5: Global FB RIB Yang Structure
```

   The Top-level Yang structure for an instance fb-rib is:

```
    instance-fb-rib-model:
      imports fb-rib-types (fb-rib-t)

      augments rt:logical-network-elements:\
         logical-network-element:network-instances: \
            network-instance
          uses fb-ribs-t:fb-ribs
```

           Figure 6: Instance FB RIB Yang Structure

5.  yang models

5.1.  Filter-Based RIB types

```
 //<CODE BEGINS> file "ietf-fb-rib-types@2016-01-03.yang"
  module ietf-fb-rib-types {
    yang-version "1";

    // namespace
  namespace "urn:ietf:params:xml:ns:yang:ietf-fb-rib-types";
  prefix "fb-rib-t";
  import ietf-interfaces {prefix "if";}
  import ietf-access-control-list {prefix "acl";}
  import ietf-routing {prefix "rt";}

    // 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.
```

    revision "2016-01-03" {
       description
         "Filter-Based RIB protocol ";
         reference "draft-hares-i2rs-fb-rib-data-model-01";
    }

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

      grouping fb-rib-group-order-status {
          leaf group-order{
            type uint16;
            description "group order";
           }
          leaf group-refcnt {
            type uint16;
            description "refcnt for this group";
                }
           leaf group-installed {
            type uint16;
            description "number of rules installed";
                }
               description "fb-rib group list order
                  and status info.";
          }
```

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

        grouping default-fb-rib {

                leaf default-rib {
                        type string;
                        description "default ribs for
                          normal and ephemeral filter-based rib
                          should use rt:routing:routing-instance:name";
                }

                leaf i2rs-instance {
                        type string;
                    description "default I2RS RIB
                          should use
                i2rs-rib:routing-instance:name";
                }
                leaf rib-name {
                        type string;
                  description "name of RIB";
                }

                leaf fb-rib-update-ref {
                        type uint64;
                        description " number of
                          updates to this FB RIB
                    since last reboot";
                }
             description "I2RS RIB which will be used
                   even if none of the policy match";
      }

      grouping fb-ribs {
          list fib-rib {
                  key fb-rib-name;
                  leaf fb-rib-name {
                        type string;
                                mandatory true;
                        description "RIB name";
          }
```

```
                   uses rt:address-family;
             list fb-rib-intf {
                      key "name";
                      leaf name {
                           type if:interface-ref;
                        description
                         "A reference to the name of a
                             configured network layer
                         interface.";
                       }
                     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.";
             }
                   uses default-fb-rib;
             list instance-using {
                      key instance-name;
                      leaf instance-name {
                        type string;
                        description
                             " name of instance using this fb-rib
                               rt:routing-instance";
                      }
                     description "instances using
                      this fb-rib";
                   }
                   list fb-rib-group {
                      key group-name;
                   leaf group-name {
                        type string;
                        description "policy-group name";
                      }
                     leaf fb-group-policy-type {
                      type fb-rib-policy-type-def;
                      description "Policy type (acl/eca)";
                     }
                   list acl-group {
                      key name;
                          leaf name {
                            type string;
                            description "name of access
```

```
                                    list group";
                                  }
                              list acls {
                                key fb-acl-name;
                                leaf fb-acl-name {
                                  type acl:access-control-list-ref;
                                  description "acl list name
                                        associated with FB-RIB list";
                                }
                                leaf fb-acl-type {
                                        type acl:acl-type;
                                        description "acl type";
                              }
                   description "list of acls";
                                }
                description "acl group entry";
                           }
                         list eca-group {
                           key name;
                           leaf eca-group-name {
                             type string;
                             description "name of eca
                                 group (?? should it
                                 link 5o bnp-eca group
                                 name)";
                           }
                            description "list of eca groups";
                         }
                       uses fb-rib-group-order-status;
                       description "list of ordered policy
                         groups ";
                   }
               description  "Configuration of
                  an filter-based rib list";
             }
         description "fb-rib group";
     }
   }
 // <CODE ENDS>


5.2.  FB-RIB

   //<CODE BEGINS> file "ietf-fb-rib@2016-01-03.yang"
   module ietf-fb-rib {
     yang-version "1";

     // namespace
```

```
namespace "urn:ietf:params:xml:ns:yang:ietf-fb-rib";
// replace with iana namespace when assigned
  prefix "fb-rib";

// import some basic inet types
import ietf-yang-types {prefix "yang";}
import ietf-routing { prefix "rt"; }
import fb-rib-types { prefix "fb-rib-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 Top level module describes a
   YANG model for the I2RS Filter-based RIB
   which is an global protocol independent FB RIB module.";

revision "2016-01-03" {
  description "initial revision";
  reference "draft-hares-i2rs-fb-rib-data-model-01";
}

    container ietf-fb-rib {
      presence "top-level structure";
    leaf default-instance-name {
          type string;
             mandatory true;
      description
        "A routing instance is identified by its name,
         INSTANCE_name.  This MUST be unique across all routing
         instances in a given network device.";
      }
          leaf default-router-id {
              type yang:dotted-quad;
              description "Default router id";
          }
```

```
                    uses fb-rib-t:fb-ribs;
            description "i2rs FB-RIB";
               }

             augment "/rt:routing/rt:routing-instance" {
               when "FB-RIB=='true'";
                   container instance-fb-fib {
                   uses fb-rib-t:fb-ribs;
              description "instance filter-based rib";
          }
             description "fb-rib augments routing instance";
           }
     }

     //<CODE ENDS>
```

# 6.  IANA Considerations

   TBD

# 7.  Security Considerations

   A I2RS RIB is ephemeral data store that will dyanamically 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 dyanmic 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

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[RFC2119]  Bradner, S., "Key words for use in RFCs to Indicate
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          DOI 10.17487/RFC2119, March 1997,
          <http://www.rfc-editor.org/info/rfc2119>.

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