Abstract

This document defines a YANG data model for BIER TE configuration and operation.

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1. Introduction

[I-D.eckert-bier-te-arch] introduces an architecture for BIER-TE: Traffic Engineering for Bit Index Explicit Replication (BIER). This document defines a YANG data model for BIER TE. The content is in keeping with the TE architecture draft.

2. Design of the Data Model

Instead of using respective sub-domain-id, si and bsl information like in BIER yang draft [I-D.chh-bier-bier-yang], this document tries to group these sub-domain-id, si and bsl information in a new bier-common grouping to simplify the reference. Later yang modules may import the common grouping easily. Further, if this optimization is recognized, then BIER yang draft [I-D.chh-bier-bier-yang] will be updated to group these sub-domain-id, si and bsl information as well.

The TE model is a submodule of the BIER. The augment should be modified later.

module: ietf-bier-te
augment /rt:routing:
  +--rw bier-te-config
    +--rw te-subdomain* [subdomain-id]
      |  +--rw subdomain-id sub-domain-id
      |  +--rw adj-id* [adjID]
      |     |  +--rw adjID adjid
      |     |  +--rw adj-if uint32
      |  +--rw adjID-type te-adjID-type
      +--rw te-bsl* [fwd-bsl]
        |  +--rw fwd-bsl bsl
        |  +--rw te-si* [si]
        |     |  +--rw si si
        +--rw te-f-index* [te-f-index]
          |  +--rw te-f-index bit-string
          +--rw f-bm bit-string
          +--rw f-intf uint32
          +--rw f-type te-adj-type
augment /rt:routing:
  +--ro bier-te-state
    +--ro te-subdomain* [subdomain-id]
      +--ro subdomain-id  sub-domain-id
      +--ro adj-id* [adjID]
        +--ro adjID      adjid
        +--ro adj-if     uint32
        +--ro adjID-type te-adjID-type
      +--ro te-bsl* [fwd-bsl]
        +--ro fwd-bsl  bsl
      +--ro te-si* [si]
        +--ro si
        +--ro te-f-index* [te-f-index]
          +--ro te-f-index  bit-string
          +--ro f-bm      bit-string
          +--ro f-intf    uint32
          +--ro f-type    te-adj-type
          +--ro ecmp-index? uint32
          +--ro frr-index? uint32
      +--ro ecmp-path* [index]
        +--ro index  uint32
        +--ro number* [number]
          +--ro number  uint16
          +--ro out-if  uint32
      +--ro btaft* [adj-index]
        +--ro adj-index  uint32
        +--ro bitposition  bit-string
        +--ro resetbitmask  bit-string
        +--ro addbitmask  bit-string

notifications:
  +---n bier-te-notification
    +--ro adjID-is-zero* [if-index]
      +--ro if-index  uint32
      +--ro adjID-type? te-adjID-type
3. BIER-TE configuration

The BIER-TE information is indexed by the sub-domain ID. Maybe there are some global BIER-TE information, it should be added in later version.

One interface can be used in different sub-domain, so the BIER TE adjacency information is managed by BIER TE other than by interface.

Because the BIER-TE is controlled by controller now, the information about IGP is not defined. If in the future the IGP is used to carry the information about BIER-TE, the IGP extension will be added in this document.

4. Notifications

If the adjacency id of one adjacency is set to zero, the value is invalid. The notification should be sent to controller and network manager.

5. BIER TE YANG module

<CODE BEGINS> file "ietf-bier-te.yang"
module ietf-bier-te {
    namespace "urn:ietf:params:xml:ns:yang:ietf-bier-te";

    prefix bier-te;

    import ietf-routing {
        prefix "rt";
    }
    /* import bier-common {
        prefix "bier-common";
    } */

    organization "IETF BIER(Bit Indexed Explicit Replication ) Working Group";

    contact
    "WG List:  <mailto:bier@ietf.org>
    WG Chair: Tony Przygienda
              <mailto:tonysietf@gmail.com>
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    Editor:    Zheng Zhang
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typedef te-adj-type {
    type enumeration {
        enum "connected" {
            description
            "The type of adjacency is connected. Mostly connected interfaces.";
        }
        enum "routed" {
            description
            "The type of adjacency is routed. Mostly not connected interfaces.";
        }
        enum "local-decap" {
            description
            "Means that the packet should be decapsulated and forward out BIER domain.";
        }
        enum "ecmp" {
            description
            "There is more than one path in the adjacency with equal cost.";
        }
        enum "other" {
            description
            "Means that the packet should be discarded.";
        }
    }
    description "The collection of all possible adjacency type ";
}

typedef te-adjID-type {
    type enumeration {
        enum "p2p" {
            description
            "This enum describes p2p adjacency.";
        }
        enum "bfer" {
            description
            "";
        }
    }
    description "";
}

typedef te-adjID-type {
    type enumeration {
        enum "p2p" {
            description
            "This enum describes p2p adjacency.";
        }
        enum "bfer" {
            description
            "";
        }
    }
    description "";
}
"This enum describes bfer adjacency."
} enum "leaf-bfer" {
    description
    "This enum describes leaf-bfer adjacency. There is no next BFR that the packet should be forwarded.";
} enum "lan" {
    description
    "This enum describes lan adjacency."
} enum "spoke" {
    description
    "This enum describes spoke adjacency of hub-and-spoke."
} enum "ring-clockwise" {
    description
    "This enum describes clockwise adjacency in ring."
} enum "ring-counterclockwise" {
    description
    "This enum describes counterclockwise adjacency in ring."
} enum "ecmp" {
    description
    "This enum describes ecmp adjacency."
} enum "virtual-link" {
    description
    "This enum describes virtual adjacency between two indirect connect nodes."
} enum "other" {
    description
    "This enum describes other id type of adjacency."
}
}
default "lan";

description "The collection of all possible adjacency type ;
}

typedef bsl {
    type enumeration{
        enum 64-bit{
            description "bitstringlength is 64";
        }
        enum 128-bit{
            description "bitstringlength is 128";
        }
    }
}
enum 256-bit{
    description "bitstringlength is 256";
}
enum 512-bit{
    description "bitstringlength is 512";
}
enum 1024-bit{
    description "bitstringlength is 1024";
}
enum 2048-bit{
    description "bitstringlength is 2048";
}
enum 4096-bit{
    description "bitstringlength is 4096";
}

description "The bitstringlength type for imposition mode";
}

typedef aid {
    type uint32;
    description "The type for adjacency ID.";
}

/* The definition of si/sub-domain-id/bit-string will be deleted later. */
typedef si {
    type uint16;
    description "The type for set identifier";
}

typedef sub-domain-id {
    type uint16;
    description "The type for sub-domain-id";
}

typedef bit-string {
    type uint16;
    description "The bit mask of one bitstring.";
}

/* The bier-common grouping will be moved to BIER yang. */
grouping bier-common {
    description "Common information in BIER";
}
leaf subdomain-id {
    type sub-domain-id;
    description "ID of the sub domain.";
}

leaf si {
    type si;
    description "The value of the set identifier.";
}

leaf bsl {
    type bsl;
    description "The BitStringLength supported by this node.";
}

leaf bit-string {
    type bit-string;
    description "The bit-string for BIER forwarding.";
}


grouping te-adjID {
    list adj-id {
        key "adjID";
        description "This ID information of one adjacency.";
        leaf adjID {
            type adjid;
            mandatory true;
            description "The adjacency id.";
        }
        leaf adj-if {
            /* type if:if-index; */
            type uint32; /* for compilation */
            mandatory true;
            description "The corresponding interface of this adjacency.";
        }
        leaf adjID-type {
            type te-adjID-type;
            mandatory true;
            description "This is the adjacency ID type information for BIER TE.";
        }
    }
    description "This group presents adjacency ID information for BIER TE.";
}


grouping te-ecmp {

description "The ecmp information.";
list ecmp-path {
    key "index";
    description "The index of the ecmp paths.";
    leaf index {
        type uint32;
        mandatory true;
        description "The ecmp index.";
    }
    list number {
        key "number";
        description "The list of the ecmp paths.";
        leaf number {
            type uint16;
            mandatory true;
            description "The number of the ecmp paths.";
        }
        leaf out-if {
            type uint32; /* for compilation */
            mandatory true;
            description "The outgoing interface.";
        }
    }
}
}
grouping te-frr {
    description "The TE fast reroute information.";
    list btaft {
        key "adj-index";
        description "The adjacency index of the frr paths.";
        leaf adj-index {
            type uint32;
            mandatory true;
            description "The frr adjacency index.";
        }
        leaf bitposition {
            type bit-string;
            mandatory true;
            description "The bitposition information.";
        }
        leaf resetbitmask {
            type bit-string;
            mandatory true;
            description "The deleting bitmask of the forwarding item.";
        }
        leaf addbitmask {

    }
}
type bit-string;
mandatory true;
description "The adding bitmask of the forwarding item.";
}
}

grouping te-items {

description "The BIER TE forwarding items collection.";
leaf f-bm {

type bit-string;
mandatory true;
description "The bitmask of the forwarding item.";
}
leaf f-intf {
/* type if:if-index; */
type uint32; /* for compilation */
mandatory true;
description "The out interface of this forwarding item.";
}
leaf f-type {

type te-adj-type;
mandatory true;
description "The forwarding type of this forwarding item.";
}
leaf ecmp-index {

type uint32;
description "The index of the possible ecmp paths.";
}
leaf frr-index {

type uint32;
description "The index of the fast forwarding route.";
}
}

grouping te-fwd-item {
list te-si {
 key "si";
description "The forwarding items of one set identifier.";
leaf si {
 type si;
mandatory true;
description "The set identifier of this forwarding item.";
}
list te-f-index {
 key "te-f-index";
description "The forwarding information of one BIER TE item.";
}
leaf te-f-index {
    type bit-string;
    mandatory true;
    description "Describe the bit index of BIER TE forwarding item.";
}
uses te-items;
}

description
"The forwarding items in one set identifier.";
}

grouping te-info {
    description "The BIER TE forwarding information.";
    list te-subdomain {
        key "subdomain-id";
        description "The forwarding items of one sub-domain.";
        leaf subdomain-id {
            type sub-domain-id;
            description "The sub-domain-id of this sub-domain.";
        }
        uses te-adjID;
    }
    list te-bsl {
        key "fwd-bsl";
        description "The forwarding items in one bitstringlength.";
        leaf fwd-bsl {
            type bsl;
            description "The value of bitstringlength.";
        }
        uses te-fwd-item;
    }
    uses te-ecmp;
    uses te-frr;
}
}
augment "/rt:routing" {
    description "The BIER TE information.";
    container bier-te-config {
        description "The BIER TE information container.";
        uses te-info;
    }
}
augment "/rt:routing" {
    description "The read-only BIER TE information.";
}
container bier-te-state {
    config false;
    description "The BIER TE information in nodes.";
    uses te-info;
}

notification bier-te-notification {
    description "This notification is sent when a condition changes in BIER TE.";
    list adjID-is-zero {
        key "if-index";
        description "The adjacency id is zero.";
        leaf if-index {
            type uint32;
            description "The adjacency id of this interface is zero.";
        }
        leaf adjID-type {
            type te-adjID-type;
            description "This is the adjacency ID type information for BIER TE.";
        }
    }
}

6. Normative References

[I-D.chh-bier-bier-yang]

[I-D.eckert-bier-te-arch]

[I-D.ietf-bier-architecture]


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