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BIER TE YANG model
draft-zhang-bier-te-yang-07

Abstract

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

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[1. Introduction](#)

[I-D.ietf-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. In addition, this YANG data model contains BIER TE frr items of [[I-D.eckert-bier-te-frr](#)].

[2. Design of the Data Model](#)

The BIER TE YANG model includes BIER TE adjacency configuration and forwarding items configuration. Some features can also be used to enhance BIER TE function, like ECMP and FRR.

```
module: ietf-bier-te
augment /rt:routing:
  +-rw bier-te
    +-rw subdomain* [subdomain-id]
      +-rw subdomain-id    uint16
      +-rw te-adj-id
        |  +-rw si* [si]
        |    +-rw si    uint16
        |    +-rw adj* [adj-id]
        |      +-rw adj-id    uint16
        |      +-rw adj-if    if:interface-ref
        |      +-rw bp-type?  enumeration
    +-rw bsl* [fwd-bsl]
      +-rw fwd-bsl    uint16
      +-rw si* [si]
        +-rw si          uint16
        +-rw te-bift-id
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```

|   |   +-rw type?    enumeration
|   |   +-rw value     rt-types:mpls-label
|   +-rw fwd-items* [te-bp]
|       +-rw te-bp      uint16
|       +-rw bp-type?   enumeration
|       +-rw (fwd-type)
|           |   +-:(connected)
|           |   +-:(routed)
|           |   +-:(local-decap)
|           |   +-:(other)
|       +-rw dnr-flag?  boolean
|       +-rw out-info
|           |   +-rw fwd-intf      if:interface-ref
|           |   +-rw te-out-bift-id
|               +-rw type?    enumeration
|               +-rw value     rt-types:mpls-label
|   +-rw te-frr {bier-te-frr}?
|       +-rw frr-index?  uint16
|       +-rw resetbitmask* [bitmask]
|           +-rw bitmask   bit-string
|   +-rw te-ecmp* [out-if] {bier-te-ecmp}?
|       +-rw out-if      if:interface-ref
|       +-rw te-out-bift-id
|           +-rw type?    enumeration
|           +-rw value     rt-types:mpls-label
|   +-rw te-frr-items {bier-te-frr}?
|       +-rw btaft* [frr-index]
|           +-rw frr-index  uint16
|           +-rw frr-si     uint16
|           +-rw frr-bsl    uint16
|           +-rw addbitmask* [bitmask]
|               +-rw bitmask   bit-string

notifications:
  +-n bier-te-notification
  +-ro bp-is-zero* [if-index]
      +-ro if-index    if:interface-ref
      +-ro bp-type?   enumeration

```

[3.](#) BIER-TE configuration

The BIER-TE forwarding item is indexed by the combination of sub-domain-id, BitStringLength and set identifier.

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

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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. RPCs

TBD.

6. BIER TE YANG model

```
<CODE BEGINS> file "ietf-bier-te.yang"

module ietf-bier-te {

    yang-version 1.1;

    namespace "urn:ietf:params:xml:ns:yang:ietf-bier-te";

    prefix bier-te;

    import ietf-routing {
        prefix "rt";
        reference "RFC8022";
    }

    import ietf-interfaces {
        prefix "if";
        reference "RFC7223";
    }

    import ietf-routing-types {
        prefix "rt-types";
        reference "RFC8294";
    }

    organization " IETF BIER(Bit Indexed Explicit Replication)
                  Working Group";
    contact
        "WG Web:  <http://tools.ietf.org/wg/bier/>
        WG List: <mailto:bier@ietf.org>
```

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```
Editor: Zheng Zhang
        <mailto:zhang.zheng@zte.com.cn>
Editor: Cui Wang
        <mailto:wang.cui1@zte.com.cn>
Editor: Ran Chen
        <mailto:chen.ran@zte.com.cn>
Editor: Fangwei Hu
        <mailto:hu.fangwei@zte.com.cn>
Editor: Mahesh Sivakumar
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";
description
" The module defines the YANG definitions for BIER TE.

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without modification, is permitted pursuant to, and subject
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Relating to IETF Documents
(http://trustee.ietf.org/license-info).
This version of this YANG module is part of RFC 3618; see
the RFC itself for full legal notices.";

revision 2019-03-23 {
    description
    "Initial revision.";
    reference
        "draft-ietf-bier-te-arch: Traffic Engineering for Bit Index
         Explicit Replication (BIER-TE)";
}

/*
 * Features
 */
feature bier-te-frr {
    description
        "Support Fast Re-route feature in BIER TE.";
}
feature bier-te-ecmp {
    description
        "Support ECMP feature in BIER TE.";
}

typedef bit-string {
```

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```

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

grouping te-frr {
    description "The TE fast re-route information.";
    list btaft {
        key "frr-index";
        description "The index of the frr paths. This item can be
                     used for multiple links protection in
                     different SI.";
        leaf frr-index {
            type uint16;
            mandatory true;
            description "The frr item index.";
        }
        leaf frr-si{
            type uint16;
            mandatory true;
            description "The set identifier of this forwarding
                         item.";
        }
        leaf frr-bsl {
            type uint16;
            mandatory true;
            description "The value of bitstringlength.";
        }
    list addbitmask {
        key "bitmask";
        description "The adding bitmask of the forwarding
                     item.";
        leaf bitmask {
            type bit-string;
            description "The adding bitmask of the forwarding
                         item. This item should be merged
                         into the packet's bit-string.";
        }
    }
}
}

grouping fwd-type {
    description "The collection of all possible forwarding types.";
    choice fwd-type {
        mandatory true;
        case connected {
            description "The forwarding type is connected.
                         Mostly connected interfaces.";
        }
    }
}

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```
        }
    case routed {
        description "The forwarding type is routed.
                      Mostly not connected interfaces.";
    }
    case local-decap {
        description "Means that the packet should be
                      decapsulated and forward out
                      of BIER domain.";
    }
    case other {
        description "Means that the packet should be
                      discarded.";
    }
    description "The collection of all possible forwarding
                  types.";
}
}

grouping bp-type {
    description "The collection of all possible adjacency type.;

leaf bp-type {
    type enumeration {
        enum p2p {
            description "Describes p2p adjacency.";
        }
        enum bfer {
            description "Describes bfer adjacency.";
        }
        enum leaf-bfer {
            description "Describes leaf-bfer adjacency.
                          There is no next BFR that the packet
                          should be forwarded.";
        }
        enum lan {
            description "Describes lan adjacency.";
        }
        enum spoke {
            description "Describes spoke adjacency of
                          hub-and-spoke.";
        }
        enum ring-clockwise {
            description "Describes clockwise adjacency in
                          ring.";
        }
        enum ring-counterclockwise {
            description "Describes counterclockwise adjacency in
                          ring.";
        }
    }
}
```

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```
                    ring.";  
    }  
    enum ecmp {  
        description "Describes ecmp adjacency.  
                    When the type is set to ecmp,  
                    the corresponding ecmp entry  
                    should be used to balance the load.";  
    }  
    enum virtual-link {  
        description "Describes virtual adjacency  
                    between two indirect connect  
                    nodes.";  
    }  
    enum other {  
        description "Describes other id type of  
                    adjacency.";  
    }  
}  
}  
  
grouping te-bift-id {  
    description "The index of BIER forwarding items. It usually  
                represents the combination of [SD, BSL, SI].";  
    leaf type {  
        type enumeration {  
            enum mpls {  
                description "The bift-id value is represent the  
                            BIER TE mpls forwarding plane. It  
                            is a mpls label.";  
            }  
            enum eth {  
                description "The bift-id value is represent the  
                            BIER TE ethernet forwarding plane.  
                            It is an index of ethernet  
                            encapsulation.";  
            }  
            enum other {  
                description "Describes other type of te-bift-id.";  
            }  
        }  
        description "The types of BIER TE bift-id. If this type  
                    is not set, mpls is default type.";  
    }  
    leaf value {  
        type rt-types:mpls-label;
```

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```
mandatory true;
description "The bift-id value of the forwarding
item. It can be a mpls label or an
index of ethernet encapsulation which
is used to represent specific
combination of [SD, BSL, SI]. The
ethernet index value is the same range
(20bits) as mpls label.";
}

}

grouping te-items {
    description "The BIER TE forwarding items collection.";
    uses fwd-type;

leaf dnr-flag {
    type boolean;
    description
        "When the flag is set to 1, the BP of adjacency
        should not be reset when packet copies are
        created. The flag makes sense only when the
        forwarding type is 'connected'.";
}

container out-info {
    description "The information of out forwarding
                packets. Includes the outbound interface
                and the bift-id of next hop.";
leaf fwd-intf {
    type if:interface-ref;
    mandatory true;
    description "The out interface of this
                forwarding item.";
}
container te-out-bift-id {
    description "The bift-id information
                corresponding to a specific
                outbound interface.";
    uses te-bift-id;
}

container te-frr {
    if-feature bier-te-frr;
leaf frr-index {
    type uint16;
    description "The index of this frr path.";
}
```

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```
list resetbitmask {
    key "bitmask";
    description "The deleting bitmask of the
                 forwarding item.";
    leaf bitmask {
        type bit-string;
        description "The deleting bitmask of the
                     forwarding item.";
    }
}
description "If this link is protected, frr items can
            be used to forward flows when this link
            is down.";
}

grouping fwd-items {
    list si {
        key "si";
        description "The forwarding items of one set identifier.";
        leaf si{
            type uint16;
            mandatory true;
            description "The set identifier of this forwarding
                         item.";
        }
        container te-bift-id {
            description "The bift-id which is used to locate the
                         specific forwarding item.";
            uses te-bift-id;
        }
    }
    list fwd-items {
        key "te-bp";
        description "The forwarding information of one BIER TE
                     item.";
        leaf te-bp {
            type uint16;
            mandatory true;
            description "The bit index of a BIER TE forwarding
                         item.";
        }
        uses bp-type;
        uses te-items;
    }
    list te-ecmp {
        if-feature bier-te-ecmp;
```

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```
key "out-if";
leaf out-if {
    type if:interface-ref;
    description "The outgoing interface.";
}
container te-out-bift-id {
    description "The bift-id info for a specific
                outbound interface.";
    uses te-bift-id;
}
description "The list of the ecmp paths. When the
            type of BP is set to ecmp, this
            interface ecmp list should be used to
            balance the load on each interface.";
}
}
}
description "The forwarding items in one combination of
            SD, BSL and SI.";
}

grouping te-info {
    description "The BIER TE forwarding information.";
    list subdomain {
        key "subdomain-id";
        description "The forwarding items of one sub-domain.";
        leaf subdomain-id {
            type uint16;
            description "The sub-domain-id of this sub-domain.";
        }
        container te-adj-id {
            list si {
                key "si";
                description "The forwarding items of a set
                            identifier.";
                leaf si{
                    type uint16;
                    mandatory true;
                    description "The set identifier of this
                                forwarding item.";
                }
            }
            list adj {
                key "adj-id";
                description "The ID of an adjacency.";
                leaf adj-id {
                    type uint16;
                }
            }
        }
    }
}
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```
        mandatory true;
        description "The adjacency id.";
    }
    leaf adj-if {
        type if:interface-ref;
        mandatory true;
        description "The corresponding interface
                     of this adjacency.";
    }
    uses bp-type;
}
}
description "This adjacency ID information for BIER TE
             in a SI.";
}

list bsl {
    key "fwd-bsl";
    description "The forwarding items in one BSL.";
    leaf fwd-bsl {
        type uint16;
        description "The value of bitstringlength.";
    }
    uses fwd-items;
}

container te-frr-items {
    if-feature bier-te-frr;
    uses te-frr;
    description "The TE protective fast re-route items.";
}
}

/*
 * data nodes
 */
augment "/rt:routing" {
    description "The BIER TE information.";
    container bier-te {
        description "The BIER TE information container.";
        uses te-info;
    }
}

/*
 * Notifications
*/

```

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```
notification bier-te-notification {
    description
        "The notification is sent when a condition changes.";
    list bp-is-zero {
        key "if-index";
        description "The adjacency id is zero. It is invalid.";
        leaf if-index {
            type if:interface-ref;
            description "The adjacency id is zero.";
        }
        uses bp-type;
    }
}
<CODE ENDS>
```

[7. IANA Considerations](#)

The IANA is requested to assign two new URIs from the IETF XML registry ([\[RFC3688\]](#)). Authors are suggesting the following URI:

URI: urn:ietf:params:xml:ns:yang:ietf-bier-te

Registrant Contact: BIER WG

XML: N/A, the requested URI is an XML namespace

This document also requests one new YANG module name in the YANG Module Names registry ([\[RFC6020\]](#)) with the following suggestion:

name: ietf-bier-te

namespace: urn:ietf:params:xml:ns:yang:ietf-bier-te

prefix: bier-te

reference: RFC XXXX

[8. Acknowledgement](#)

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