

BIER WG
Internet-Draft
Intended status: Standards Track
Expires: September 12, 2019

Zheng. Zhang
Cui. Wang
Ran. Chen
Fangwei. Hu
ZTE Corporation
Mahesh. Sivakumar
Cisco Systems, Inc.
Huanan. Chen
China Telecom
March 11, 2019

BIER TE YANG model
draft-zhang-bier-te-yang-06

Abstract

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

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on September 12, 2019.

Copyright Notice

Copyright (c) 2019 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must

include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction	2
2.	Design of the Data Model	2
3.	BIER-TE configuration	3
4.	Notifications	4
5.	RPCs	4
6.	BIER TE YANG model	4
7.	IANA Considerations	13
8.	Acknowledgement	14
9.	Normative References	14
	Authors' Addresses	15

[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 te-bift-id
|   +--rw type?      enumeration
|   +--rw value      rt-types:mpls-label
+--rw bsl* [fwd-bsl]
|   +--rw fwd-bsl    uint16

```

```

|   +--rw si* [si]
|       +--rw si          uint16
|       +--rw te-bift-id
|           |   +--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.

Zhang, et al.

Expires September 12, 2019

[Page 3]

Internet-Draft

BIER TE YANG Model

March 2019

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.

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";

```

Zhang, et al.

Expires September 12, 2019

[Page 4]

Internet-Draft

BIER TE YANG Model

March 2019

```

contact
  "WG Web:  <http://tools.ietf.org/wg/bier/>
   WG List: <mailto:bier@ietf.org>

   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
            <mailto:masivaku@cisco.com>

  ";

```

```

description

```

```

  " The module defines the YANG definitions for BIER TE.

```

```

  Copyright (c) 2018 IETF Trust and the persons
  identified as authors of the code.  All rights reserved.

```

Redistribution and use in source and binary forms, with or 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>).

This version of this YANG module is part of [RFC 3618](#); see the RFC itself for full legal notices."

```
revision 2019-03-11 {
  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 {
  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.";
        }
        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

```



```

    }
    enum ring-counterclockwise {
        description "Describes counterclockwise adjacency in
                    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.";
    }
}
description "The collection of all possible adjacency
            type.";
}
}

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;
        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.";
        }
        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;
    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;
            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.";
}

        container te-bift-id {
            description "The bift-id which is used to locate
                        the specific forwarding item.";
            uses te-bift-id;
        }
}

```

```

    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
*/
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

The authors would like to thank Min Gu (gumin20181129@163.com) for her testing, verification and valuable suggestion.

9. Normative References

[I-D.eckert-bier-te-frr]
 Eckert, T., Cauchie, G., Braun, W., and M. Menth,
 "Protection Methods for BIER-TE", [draft-eckert-bier-te-frr-03](#) (work in progress), March 2018.

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

Chen, R., hu, f., Zhang, Z., dai.xianxian@zte.com.cn, d., and M. Sivakumar, "YANG Data Model for BIER Protocol", [draft-ietf-bier-bier-yang-04](#) (work in progress), September 2018.

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

Eckert, T., Cauchie, G., Braun, W., and M. Menth, "Traffic Engineering for Bit Index Explicit Replication (BIER-TE)", [draft-ietf-bier-te-arch-01](#) (work in progress), October 2018.

[RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.

[RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", [RFC 6020](#), DOI 10.17487/RFC6020, October 2010, <<https://www.rfc-editor.org/info/rfc6020>>.

[RFC6087] Bierman, A., "Guidelines for Authors and Reviewers of YANG Data Model Documents", [RFC 6087](#), DOI 10.17487/RFC6087, January 2011, <<https://www.rfc-editor.org/info/rfc6087>>.

[RFC7223] Bjorklund, M., "A YANG Data Model for Interface Management", [RFC 7223](#), DOI 10.17487/RFC7223, May 2014, <<https://www.rfc-editor.org/info/rfc7223>>.

[RFC8279] Wijnands, IJ., Ed., Rosen, E., Ed., Dolganow, A., Przygienda, T., and S. Aldrin, "Multicast Using Bit Index Explicit Replication (BIER)", [RFC 8279](#), DOI 10.17487/RFC8279, November 2017, <<https://www.rfc-editor.org/info/rfc8279>>.

[RFC8349] Lhotka, L., Lindem, A., and Y. Qu, "A YANG Data Model for Routing Management (NMDA Version)", [RFC 8349](#), DOI 10.17487/RFC8349, March 2018, <<https://www.rfc-editor.org/info/rfc8349>>.

Authors' Addresses

Zheng(Sandy) Zhang
ZTE Corporation
No. 50 Software Ave, Yuhuatai Distinct
Nanjing
China

Email: zhang.zheng@zte.com.cn

Cui(Linda) Wang
ZTE Corporation

Email: lindawangjoy@gmail.com

Ran Chen
ZTE Corporation
No. 50 Software Ave, Yuhuatai Distinct
Nanjing
China

Email: chen.ran@zte.com.cn

Fangwei Hu
ZTE Corporation
No.889 Bibo Rd
Shanghai
China

Email: hu.fangwei@zte.com.cn

Mahesh Sivakumar
Cisco Systems, Inc.
510 McCarthy Blvd
Milpitas, California 95035
United States

Email: masivaku@cisco.com

Huanan Chen
China Telecom
109 West Zhongshan Ave
Guangzhou, Guangdong 510630
China

Phone: +86 20 38639346
Email: chenhuanan@gsta.com

