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YANG Data Model for BGP about RPKI  
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Abstract

This document defines YANG data models for configuring and managing BGP information about Resource Public Key Infrastructure (RPKI).

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## 1. Introduction

[RFC6810] and [RFC8210] describes a protocol to deliver Resource Public Key Infrastructure (RPKI) prefix origin data and router keys from a trusted cache server to a router, referred to as RPKI-Router protocol. [I-D.ietf-sidrops-8210bis] updates [RFC8210].

[RFC6811] validates the origination Autonomous System (AS) of BGP routes based on the Validated ROA Payload (VRP) received from the RPKI cache server. [I-D.ietf-sidrops-aspa-verification] makes use of Autonomous System Provider Authorization (ASPA) objects in the Resource Public Key Infrastructure (RPKI) to verify the Border Gateway Protocol (BGP) AS\_PATH attribute of advertised routes. [RFC8635] describes that the public key is published in the Resource Public Key Infrastructure (RPKI) and sent to the router via the RPKI to Router protocol for verifying the signature of BGPsec announcements.

This document defines YANG [RFC7950] data models for configuring and managing BGP information about RPKI.

The YANG data models in this document conform to the Network Management Datastore Architecture (NMDA) [RFC8342].

## 1.1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 2. Model Overview

Three YANG data models are defined in this document to augment BGP YANG model [I-D.ietf-idr-bgp-model].

The `ietf-bgp-origin-as-validation.yang` data model provides the methods for configuring BGP origin AS validation.

- o Origin AS validation parameters for BGP routes.

- o Origin AS validity states of BGP routes.

The `ietf-bgp-sec.yang` data model provides the methods for configuring BGPSec.

- o BGPSec parameters for BGP routes.

- o BGPSec validity states of BGP routes.

The `ietf-bgp-aspa.yang` data model provides the methods for configuring BGP AS PATH Verification Based on ASPA.

- o BGP ASPA parameters for BGP routes.

- o AS PATH validity states of BGP routes.

## 3. BGP Origin AS Validation YANG Module

### 3.1. Tree View

The complete tree of the `ietf-bgp-origin-as-validation.yang` data model is represented as following. See [RFC8340] for an explanation of the symbols used.

```
module: ietf-bgp-origin-as-validation

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast:
  +--rw origin-as-validation
    +--rw enabled?          boolean
    +--rw eligible-prefix-policy? leafref
    +--rw redistribution-as? inet:as-number

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast:
  +--rw origin-as-validation
    +--rw enabled?          boolean
    +--rw eligible-prefix-policy? leafref
    +--rw redistribution-as? inet:as-number

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-pre:
  +--ro statistics
    +--ro validation-state-unverified? yang:gauge32
    +--ro validation-state-unknown?    yang:gauge32
    +--ro validation-state-invalid?    yang:gauge32
    +--ro validation-state-valid?      yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-pre:
  +--ro statistics
    +--ro validation-state-unverified? yang:gauge32
    +--ro validation-state-unknown?    yang:gauge32
    +--ro validation-state-invalid?    yang:gauge32
    +--ro validation-state-valid?      yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-post:
  +--ro statistics
    +--ro validation-state-unverified? yang:gauge32
    +--ro validation-state-unknown?    yang:gauge32
    +--ro validation-state-invalid?    yang:gauge32
    +--ro validation-state-valid?      yang:gauge32
```

```

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-post:
  +--ro statistics
    +--ro validation-state-unverified?   yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast/bgp:loc-
rib:
  +--ro statistics
    +--ro validation-state-unverified?   yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast/bgp:loc-
rib:
  +--ro statistics
    +--ro validation-state-unverified?   yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-pre:
  +--ro statistics
    +--ro validation-state-unverified?   yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-pre:
  +--ro statistics
    +--ro validation-state-unverified?   yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32

```

```
    +--ro validation-state-valid?          yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-post:
  +--ro statistics
    +--ro validation-state-unverified?    yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-post:
  +--ro statistics
    +--ro validation-state-unverified?    yang:gauge32
    +--ro validation-state-unknown?      yang:gauge32
    +--ro validation-state-invalid?      yang:gauge32
    +--ro validation-state-valid?        yang:gauge32

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro origin-as-validity?              origin-as-validity-state
  +--ro validity-invalid-reason?         route-validity-invalid-reason

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro origin-as-validity?              origin-as-validity-state
  +--ro validity-invalid-reason?         route-validity-invalid-reason

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:route-selection-options:
  +--rw origin-as
    +--rw enabled?                      boolean
    +--rw allow-invalid?                 boolean
    +--rw allow-not-found?               boolean
    +--rw eligible-prefix-policy?       leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
  /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
```

```
        /bgp:ipv4-unicast:
+--rw send-origin-as-validity?          boolean
+--rw export-origin-as-validation
|   +--rw enabled?                      boolean
|   +--rw allow-not-found?             boolean
|   +--rw eligible-prefix-policy?      leafref
+--rw statistics
    +--rw validation-state-unverified?  yang:gauge32
    +--rw validation-state-unknown?     yang:gauge32
    +--rw validation-state-invalid?     yang:gauge32
    +--rw validation-state-valid?       yang:gauge32

augment /rt:routing/rt:control-plane-protocols
        /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
        /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
        /bgp:ipv6-unicast:
+--rw send-origin-as-validity?          boolean
+--rw export-origin-as-validation
|   +--rw enabled?                      boolean
|   +--rw allow-not-found?             boolean
|   +--rw eligible-prefix-policy?      leafref
+--rw statistics
    +--rw validation-state-unverified?  yang:gauge32
    +--rw validation-state-unknown?     yang:gauge32
    +--rw validation-state-invalid?     yang:gauge32
    +--rw validation-state-valid?       yang:gauge32

augment /rt:routing/rt:control-plane-protocols
        /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
        /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
        /bgp:ipv4-unicast:
+--rw send-origin-as-validity?          boolean
+--rw export-origin-as-validation
    +--rw enabled?                      boolean
    +--rw allow-not-found?             boolean
    +--rw eligible-prefix-policy?      leafref

augment /rt:routing/rt:control-plane-protocols
        /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
        /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
        /bgp:ipv6-unicast:
+--rw send-origin-as-validity?          boolean
+--rw export-origin-as-validation
    +--rw enabled?                      boolean
    +--rw allow-not-found?             boolean
    +--rw eligible-prefix-policy?      Leafref
```

### 3.2. Yang Module

```
<CODE BEGINS> file "ietf-bgp-origin-as-validation@2022-10-18.yang"

module ietf-bgp-origin-as-validation {
  yang-version "1.1";
  namespace "urn:ietf:params:xml:ns:yang:"
    + "ietf-bgp-origin-as-validation";
  prefix "oav";

  import ietf-yang-types {
    prefix "yang";
    reference
      "RFC 6991: Common YANG Data Types.";
  }

  import ietf-inet-types {
    prefix "inet";
    reference
      "RFC 6991: Common YANG Data Types";
  }

  import ietf-routing {
    prefix "rt";
    reference
      "RFC 8349, A YANG Data Model for Routing Management
      (NMDA Version).";
  }

  import ietf-bgp {
    prefix "bgp";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-types {
    prefix "bt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-rib-types {
    prefix "brt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }
}
```



```
import ietf-routing-policy {
  prefix rt-pol;
  reference
    "RFC 9067: A YANG Data Model for Routing Policy Management.";
}

organization
  "IETF SIDROPS Working Group";

contact
  "TBD";

description
  "This module describes configuration of the BGP origin AS
  validation.

  This YANG model conforms to the Network Management
  Datastore Architecture (NMDA) as described in RFC 8342.

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  This version of this YANG module is part of RFC XXXX;
  see the RFC itself for full legal notices.

  The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL
  NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'NOT RECOMMENDED',
  'MAY', and 'OPTIONAL' in this document are to be interpreted as
  described in BCP 14 (RFC 2119) (RFC 8174) when, and only when,
  they appear in all capitals, as shown here.";

reference "RFC XXXX";

revision 2022-10-18 {
  description
    "Initial Version";
  reference
    "RFC XXXX, YANG Data Model for RPKI to Router Protocol";
}

identity ineligible-orgen-as {
```

```
    base brt:ineligible-route-reason;
    description
        "Route was ineligible due to origin as validation";
}

typedef route-validity-invalid-reason {
    type enumeration {
        enum ineligible-orgen-as {
            description
                "Route was ineligible due to origin as number mismatch";
        }
        enum ineligible-max-len {
            description
                "Route was ineligible due to prefix maximum length
mismatch";
        }
    }
    description
        "Origin AS validation state invalid reason of BGP routes.";
}

typedef origin-as-validity-state {
    type enumeration {
        enum not-found {
            description
                "No VRP Covers the Route Prefix.";
        }
        enum valid {
            description
                "At least one VRP Matches the Route Prefix.";
        }
        enum invalid {
            description
                "At least one VRP Covers the Route Prefix, but no VRP
Matches it.";
        }
        enum disabled {
            description
                "BGP origin AS validation is not enabled.";
        }
    }
    description
        "Origin AS validation state of BGP routes.";
    reference
        "RFC 6811, BGP Prefix Origin Validation.";
}

grouping origin-as-validation-config {
```

```
description
  "Origin AS validation of BGP prefix.";
container origin-as-validation {
  leaf enabled {
    type boolean;
    default "false";
    description
      "Whether origin-AS validation of BGP prefix is enabled.";
  }
  leaf eligible-prefix-policy {
    type leafref {
      path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
        + "rt-pol:policy-definition/rt-pol:name";
    }
    description
      "A reference to a routing policy which can be used to
       restrict the prefixes for which Origin AS validation
       is enabled.";
  }
  leaf redistribution-as {
    type inet:as-number;
    description
      "Uses this AS number in the origin-AS validation for
       redistributed routes since they have no AS-PATH.";
    reference
      "RFC 8481, Clarifications to BGP Origin Validation Based
       on Resource Public Key Infrastructure (RPKI).";
  }
  description
    "Origin AS validation of BGP prefix.";
}
}

grouping origin-as-selection-option {
  description
    "Origin AS option for BGP route selection.";
  container origin-as {
    leaf enabled {
      type boolean;
      default "false";
      description
        "When enabled allows the origin AS validity states to be
         taken into consideration in the best-path calculation.";
    }
    leaf allow-invalid {
      type boolean;
      default "false";
      description
```

```
        "When enabled allows the route with 'invalid' origin AS
        to be taken into consideration in the best-path
        calculation.";
    }
    leaf allow-not-found {
        type boolean;
        default "true";
        description
            "When enabled allows the route with 'not-found' origin
            AS to be taken into consideration in the best-path
            calculation.";
    }
    leaf eligible-prefix-policy {
        type leafref {
            path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
                + "rt-pol:policy-definition/rt-pol:name";
        }
        description
            "A reference to a routing policy which can be used to
            restrict the prefixes for which Origin AS option
            is enabled for BGP route selection.";
    }
    description
        "Origin AS option for BGP route selection.";
}

grouping origin-as-validity-advertisement {
    description
        "Advertisement of Origin Validation State Extended
        Community to neighbor(s).";
    leaf send-origin-as-validity {
        type boolean;
        default "false";
        description
            "If set to true, send the origin AS validity to the
            neighbor(s) using Origin Validation State Extended
            Community";
        reference
            "RFC 8097, BGP Prefix Origin Validation State Extended
            Community.";
    }
    leaf eligible-prefix-policy {
        type leafref {
            path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
                + "rt-pol:policy-definition/rt-pol:name";
        }
        description

```

```
        "A reference to a routing policy which can be used to
        restrict the prefixes for which Origin Validation
        State Extended Community is advertised.";
    }
}

grouping export-origin-as-validation-config {
    description
        "Export Origin AS validation of BGP prefix.";
    container export-origin-as-validation {
        leaf enabled {
            type boolean;
            default "false";
            description
                "When enabled allows the origin AS validity states to be
                taken into consideration in BGP export.";
        }
        leaf allow-not-found {
            type boolean;
            default "false";
            description
                "When enabled allows the route with 'not-found' origin
                AS to be sent to the neighbor.";
        }
        leaf eligible-prefix-policy {
            type leafref {
                path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
                    + "rt-pol:policy-definition/rt-pol:name";
            }
            description
                "A reference to a routing policy which can be used to
                restrict the prefixes for which Origin AS validity
                states are considered in BGP export.";
        }
    }
    description
        "Export Origin AS validation of BGP prefix.";
    reference
        "RFC 8893, Resource Public Key Infrastructure (RPKI) Origin
        Validation for BGP Export.";
}

grouping origin-as-validity-statistics {
    description
        "Origin-AS validation statistics.";
    container statistics {
        leaf validation-state-unverified {
            type yang:gauge32;
        }
    }
}
```

```

        description
            "The number of routes with validation state as
unverified.";
    }
    leaf validation-state-unknown {
        type yang:gauge32;
        description
            "The number of routes with validation state as
unknown.";
    }
    leaf validation-state-invalid {
        type yang:gauge32;
        description
            "The number of routes with validation state as
invalid.";
    }
    leaf validation-state-valid {
        type yang:gauge32;
        description
            "The number of routes with validation state as valid.";
    }
    description
        "Statistical data for Origin-AS validation states.";
}
}

augment "/rt:routing/rt:control-plane-protocols"
+ "/rt:control-plane-protocol/bgp:bgp/bgp:global"
+ "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast" {
    description
        "Origin AS validation augmentation of BGP IPv4 Unicast
        Address Family.";
    uses origin-as-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
+ "/rt:control-plane-protocol/bgp:bgp/bgp:global"
+ "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast" {
    description
        "Origin AS validation augmentation of BGP IPv6 Unicast
        Address Family.";
    uses origin-as-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
+ "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
+ "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
+ "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-pre" {

```

```
    description
      "Augmentation of BGP IPv4 Unicast route statistics.";

    uses origin-as-validity-statistics;
  }

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
  + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-pre" {
  description
    "Augmentation of BGP IPv6 Unicast route statistics.";

  uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
  + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-post" {
  description
    "Augmentation of BGP IPv4 Unicast route statistics.";

  uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
  + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-in-post" {
  description
    "Augmentation of BGP IPv6 Unicast route statistics.";

  uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
  + "/bgp:loc-rib" {
  description
    "Augmentation of BGP IPv4 Unicast route statistics.";

  uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
```

```
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
    + "/bgp:loc-rib" {
description
    "Augmentation of BGP IPv6 Unicast route statistics.";

    uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
    + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-pre" {
description
    "Augmentation of BGP IPv4 Unicast route statistics.";

    uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
    + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-pre" {
description
    "Augmentation of BGP IPv6 Unicast route statistics.";

    uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
    + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-post" {
description
    "Augmentation of BGP IPv4 Unicast route statistics.";

    uses origin-as-validity-statistics;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
    + "/bgp:neighbors/bgp:neighbor/bgp:adj-rib-out-post" {
description
    "Augmentation of BGP IPv6 Unicast route statistics.";

    uses origin-as-validity-statistics;
}
```



```

    augment "/rt:routing/rt:control-plane-protocols"
      + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
      + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
      + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
    "Origin AS validity augmentation of BGP IPv4 Unicast
    route.";
  leaf origin-as-validity {
    type origin-as-validity-state;
    description
      "Origin AS validity of BGP IPv4 Unicast prefix";
  }
  leaf validity-invalid-reason {
    type route-validity-invalid-reason;
    description
      "Reason for marking a BGP IPv4 Unicast prefix as
invalid";
  }
}

```

```

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
    + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
    + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
    "Origin AS validity augmentation of BGP IPv6 Unicast
    route.";
  leaf origin-as-validity {
    type origin-as-validity-state;
    description
      "Origin AS validity of BGP IPv6 Unicast prefix";
  }
  leaf validity-invalid-reason {
    type route-validity-invalid-reason;
    description
      "Reason for marking a BGP IPv6 Unicast prefix as
invalid";
  }
}

```

```

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
    + "/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:route-selection-options" {
  when "derived-from-or-self(..../bgp:name, 'bt:ipv4-unicast') or "
    + "derived-from-or-self(..../bgp:name, 'bt:ipv6-unicast')";
  description
    "This augmentation is valid for IPv4 and IPv6 Unicast.";
}

```

```
    }
    description
      "augmentation of BGP route selection options";
    uses origin-as-selection-option;
  }

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
    + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv4-unicast" {
    description
      "augmentation of Origin Validation State Extended
      Community advertisement for IPv4 Unicast neighbor";
    uses origin-as-validity-advertisement;
    uses export-origin-as-validation-config;
    uses origin-as-validity-statistics;
  }

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
    + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv6-unicast" {
    description
      "augmentation of Origin Validation State Extended
      Community advertisement for IPv6 Unicast neighbor";
    uses origin-as-validity-advertisement;
    uses export-origin-as-validation-config;
    uses origin-as-validity-statistics;
  }

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
    + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv4-unicast" {
    description
      "augmentation of Origin Validation State Extended
      Community advertisement for IPv4 Unicast peer group";
    uses origin-as-validity-advertisement;
    uses export-origin-as-validation-config;
  }

  augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
    + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv6-unicast" {
    description
      "augmentation of Origin Validation State Extended
      Community advertisement for IPv6 Unicast peer group";
```

```
    uses origin-as-validity-advertisement;  
    uses export-origin-as-validation-config;  
  }  
}
```

<CODE ENDS>

## 4. BGPsec YANG Module

### 4.1. Tree View

The complete tree of the ietf-bgp-sec.yang data model is represented as following. See [RFC8340] for an explanation of the symbols used.

```
module: ietf-bgp-sec

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast:
  +--rw bgpsec-validation
    +--rw enabled? boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast:
  +--rw bgpsec-validation
    +--rw enabled? boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro bgpsec-validity? bgpsec-validity-state

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro bgpsec-validity? bgpsec-validity-state

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:route-selection-options:
  +--rw bgpsec
    +--rw enabled? boolean
    +--rw allow-invalid? boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
  /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
  /bgp:ipv4-unicast:
  +--rw export-bgpsec-validation
    +--rw enabled? boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
  /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
  /bgp:ipv6-unicast:
```

```

  +--rw export-bgpsec-validation
    +--rw enabled?                boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
  /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
  /bgp:ipv4-unicast:
  +--rw export-bgpsec-validation
    +--rw enabled?                boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
  /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
  /bgp:ipv6-unicast:
  +--rw export-bgpsec-validation
    +--rw enabled?                boolean
    +--rw eligible-prefix-policy? leafref
```

## 4.2. Yang Module

```
<CODE BEGINS> file "ietf-bgp-sec@2022-10-18.yang"

module ietf-bgp-sec {
  yang-version "1.1";
  namespace "urn:ietf:params:xml:ns:yang:"
    + "ietf-bgp-sec";
  prefix "oav";

  import ietf-routing {
    prefix "rt";
    reference
      "RFC 8349, A YANG Data Model for Routing Management
      (NMDA Version).";
  }

  import ietf-bgp {
    prefix "bgp";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-types {
    prefix "bt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-rib-types {
    prefix "brt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import ietf-routing-policy {
    prefix rt-pol;
    reference
      "RFC 9067: A YANG Data Model for Routing Policy Management.";
  }

  organization
    "IETF SIDROPS Working Group";

  contact
    "TBD";

  description
```

"This module describes configuration of BGPsec.

This YANG model conforms to the Network Management Datastore Architecture (NMDA) as described in RFC 8342.

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This version of this YANG module is part of RFC XXXX; see the RFC itself for full legal notices.

The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'NOT RECOMMENDED', 'MAY', and 'OPTIONAL' in this document are to be interpreted as described in BCP 14 (RFC 2119) (RFC 8174) when, and only when, they appear in all capitals, as shown here.";

reference "RFC XXXX";

```
revision 2022-10-18 {  
  description  
    "Initial Version";  
  reference  
    "RFC XXXX, YANG Data Model for RPKI to Router Protocol";  
}
```

```
identity ineligible-bgp {  
  base brt:ineligible-route-reason;  
  description  
    "Route was ineligible due to bgpsec";  
}
```

```
typedef bgpsec-validity-state {  
  type enumeration {  
    enum valid {  
      description  
        "The BGPsec UPDATE message is valid.";  
    }  
    enum invalid {  
      description  
        "The BGPsec UPDATE message is invalid.";  
    }  
  }  
}
```

```
    }
    enum disabled {
      description
        "BGPsec validation is not enabled.";
    }
  }
  description
    "BGPsec validation state of BGP routes.";
  reference
    "RFC 8205, BGPsec Protocol Specification.";
}

grouping bgpsec-validation-config {
  description
    "BGPsec validation of BGP prefix.";
  container bgpsec-validation {
    leaf enabled {
      type boolean;
      default "false";
      description
        "Whether BGPsec validation of BGP prefix is enabled.";
    }
    leaf eligible-prefix-policy {
      type leafref {
        path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
          + "rt-pol:policy-definition/rt-pol:name";
      }
      description
        "A reference to a routing policy which can be used to
        restrict the prefixes for which BGPsec validation
        is enabled.";
    }
  }
  description
    "BGPsec validation of BGP prefix.";
}

grouping bgpsec-selection-option {
  description
    "BGPsec option for BGP route selection.";
  container bgpsec {
    leaf enabled {
      type boolean;
      default "false";
      description
        "When enabled allows the BGPsec validity states to be
        taken into consideration in the best-path calculation.";
    }
  }
}
```



```
    leaf allow-invalid {
      type boolean;
      default "false";
      description
        "When enabled allows the route with 'invalid' BGPsec
        to be taken into consideration in the best-path
        calculation.";
    }
    leaf eligible-prefix-policy {
      type leafref {
        path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
          + "rt-pol:policy-definition/rt-pol:name";
      }
      description
        "A reference to a routing policy which can be used to
        restrict the prefixes for which BGPsec option
        is enabled in BGP route selection.";
    }
  }
  description
    "BGPsec option for BGP route selection.";
}

grouping export-bgpsec-validation-config {
  description
    "Export BGPsec validation of BGP prefix.";
  container export-bgpsec-validation {
    leaf enabled {
      type boolean;
      default "false";
      description
        "When enabled allows the BGPsec validity states to be
        taken into consideration in BGP export.";
    }
    leaf eligible-prefix-policy {
      type leafref {
        path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
          + "rt-pol:policy-definition/rt-pol:name";
      }
      description
        "A reference to a routing policy which can be used to
        restrict the prefixes for which BGPsec validity
        states are considered in BGP export.";
    }
  }
  description
    "Export BGPsec validation of BGP prefix.";
}
}
```

```
augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast" {
  description
    "BGPSec augmentation of BGP IPv4 Unicast Address Family.";
  uses bgpsec-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast" {
  description
    " BGPSec augmentation of BGP IPv6 Unicast Address Family.";
  uses bgpsec-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
  + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
    " BGPSec augmentation of BGP IPv4 Unicast route.";
  leaf bgpsec-validity {
    type bgpsec-validity-state;
    description
      "BGPSec validity of BGP IPv4 Unicast prefix";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
  + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
    "BGPSec augmentation of BGP IPv6 Unicast route.";
  leaf bgpsec-validity {
    type bgpsec-validity-state;
    description
      "BGPSec validity of BGP IPv6 Unicast prefix";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi"
  + "/bgp:route-selection-options" {
  when "derived-from-or-self(..//bgp:name, 'bt:ipv4-unicast') or "
```

```
        + "derived-from-or-self(..../bgp:name, 'bt:ipv6-unicast')" {
        description
            "This augmentation is valid for IPv4 and IPv6 Unicast.";
        }
    description
        "augmentation of BGP route selection options";
    uses bgpsec-selection-option;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
    + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv4-unicast" {
    description
        "augmentation of BGPSec for IPv4 Unicast neighbor";
    uses export-bgpsec-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
    + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv6-unicast" {
    description
        "augmentation of BGPSec for IPv6 Unicast neighbor";
    uses export-bgpsec-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
    + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv4-unicast" {
    description
        "augmentation of BGPSec for IPv4 Unicast peer group";
    uses export-bgpsec-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
    + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
    + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv6-unicast" {
    description
        "augmentation of BGPSec for IPv6 Unicast peer group";
    uses export-bgpsec-validation-config;
}
}

<CODE ENDS>
```

## 5. BGP ASPA YANG Module

### 5.1. Tree View

The complete tree of the `ietf-bgp-aspa.yang` data model is represented as following. See [RFC8340] for an explanation of the symbols used.

```
module: ietf-bgp-aspa

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
  /bgp:neighbor:
  +--rw peer-role?          peer-role

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
  /bgp:peer-group:
  +--rw peer-role?          peer-role

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast:
  +--rw aspa-verification
    +--rw enabled?          boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast:
  +--rw aspa-verification
    +--rw enabled?          boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro aspa-verification-state? aspa-verification-state

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:rib
  /bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast
  /bgp:loc-rib/bgp:routes/bgp:route:
  +--ro aspa-verification-state? aspa-verification-state

augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi/bgp:route-selection-options:
  +--rw aspa
    +--rw enabled?          boolean
    +--rw allow-invalid?    boolean
    +--rw allow-unknown?    boolean
    +--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
```

```
    /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
    /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
    /bgp:ipv4-unicast:
+--rw export-aspa-validation
+--rw enabled?                boolean
+--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
    /rt:control-plane-protocol/bgp:bgp/bgp:neighbors
    /bgp:neighbor/bgp:afi-safis/bgp:afi-safi
    /bgp:ipv6-unicast:
+--rw export-aspa-validation
+--rw enabled?                boolean
+--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
    /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
    /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
    /bgp:ipv4-unicast:
+--rw export-aspa-validation
+--rw enabled?                boolean
+--rw eligible-prefix-policy? leafref

augment /rt:routing/rt:control-plane-protocols
    /rt:control-plane-protocol/bgp:bgp/bgp:peer-groups
    /bgp:peer-group/bgp:afi-safis/bgp:afi-safi
    /bgp:ipv6-unicast:
+--rw export-aspa-validation
+--rw enabled?                boolean
+--rw eligible-prefix-policy? leafref
```

## 5.2. Yang Module

```
<CODE BEGINS> file "ietf-bgp-aspa@2022-10-18.yang"

module ietf-bgp-aspa {
  yang-version "1.1";
  namespace "urn:ietf:params:xml:ns:yang:"
    + "ietf-bgp-aspa";
  prefix "oav";

  import ietf-routing {
    prefix "rt";
    reference
      "RFC 8349, A YANG Data Model for Routing Management
      (NMDA Version).";
  }

  import ietf-bgp {
    prefix "bgp";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-types {
    prefix "bt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import iana-bgp-rib-types {
    prefix "brt";
    reference
      "RFC XXXX: YANG Model for Border Gateway Protocol (BGP-4)";
  }

  import ietf-routing-policy {
    prefix rt-pol;
    reference
      "RFC 9067: A YANG Data Model for Routing Policy Management.";
  }

  organization
    "IETF SIDROPS Working Group";

  contact
    "TBD";

  description
```

"This module describes configuration of the BGP AS PATH Verification Based on ASPA.

This YANG model conforms to the Network Management Datastore Architecture (NMDA) as described in RFC 8342.

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This version of this YANG module is part of RFC XXXX; see the RFC itself for full legal notices.

The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'NOT RECOMMENDED', 'MAY', and 'OPTIONAL' in this document are to be interpreted as described in BCP 14 (RFC 2119) (RFC 8174) when, and only when, they appear in all capitals, as shown here.";

reference "RFC XXXX";

```
revision 2022-10-18 {
  description
    "Initial Version";
  reference
    "RFC XXXX, YANG Data Model for RPKI to Router Protocol";
}
```

```
identity ineligible-aspa {
  base brt:ineligible-route-reason;
  description
    "Route was ineligible due to ASPA verification";
}
```

```
typedef peer-role {
  type enumeration {
    enum customer {
      description
        "The role of the BGP peer is customer.";
    }
    enum provider {
      description
```



```
        "The role of the BGP peer is provider.";
    }
    enum lateral-peer {
        description
            "The role of the BGP peer is lateral peer.";
    }
    enum rs {
        description
            "The role of the BGP peer is Route Server (RS).";
    }
    enum rs-client {
        description
            "The role of the BGP peer is RS-client.";
    }
    enum mutual-transit {
        description
            "The role of the BGP peer is mutual-transit.";
    }
}
description
    "Roles of BGP peers.";
reference
    "RFC XXXX, BGP AS_PATH Verification Based on Autonomous
    System Provider Authorization (ASPA) Objects.";
}

typedef aspa-verification-state {
    type enumeration {
        enum valid {
            description
                "The ASPA verification outcome is valid.";
        }
        enum invalid {
            description
                "The ASPA verification outcome is invalid.";
        }
        enum unknown {
            description
                "The ASPA verification outcome is unknown.";
        }
        enum disabled {
            description
                "BGP ASPA verification is not enabled.";
        }
    }
}
description
    "ASPA verification state of BGP routes.";
reference
```

```
    "RFC XXXX, BGP AS_PATH Verification Based on Autonomous
      System Provider Authorization (ASPA) Objects.";
  }

  grouping aspa-config {
    description
      "ASPA verification of BGP prefix.";
    container aspa-verification {
      leaf enabled {
        type boolean;
        default "false";
        description
          "Whether ASPA verification of BGP prefix is enabled.";
      }
      leaf eligible-prefix-policy {
        type leafref {
          path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
            + "rt-pol:policy-definition/rt-pol:name";
        }
        description
          "A reference to a routing policy which can be used to
           restrict the prefixes for which ASPA verification
           is enabled.";
      }
    }
    description
      "ASPA verification of BGP prefix.";
  }
}

grouping aspa-selection-option {
  description
    "ASPA option for BGP route selection.";
  container aspa {
    leaf enabled {
      type boolean;
      default "false";
      description
        "When enabled allows the ASPA verification states to be
         taken into consideration in the best-path calculation.";
    }
    leaf allow-invalid {
      type boolean;
      default "false";
      description
        "When enabled allows the route with 'invalid' ASPA
         verification state to be taken into consideration in
         the best-path calculation.";
    }
  }
}
```

```
    leaf allow-unknown {
      type boolean;
      default "true";
      description
        "When enabled allows the route with 'unknown' ASPA
        verification state to be taken into consideration in
        the best-path calculation.";
    }
    leaf eligible-prefix-policy {
      type leafref {
        path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
          + "rt-pol:policy-definition/rt-pol:name";
      }
      description
        "A reference to a routing policy which can be used to
        restrict the prefixes for which ASPA option
        is enabled in BGP route selection.";
    }
  }
  description
    "ASPA option for BGP route selection.";
}

grouping export-aspa-validation-config {
  description
    "Export AS PATH validation of BGP prefix.";
  container export-aspa-validation {
    leaf enabled {
      type boolean;
      default "false";
      description
        "When enabled allows the AS PATH validity states to be
        taken into consideration in BGP export.";
    }
    leaf eligible-prefix-policy {
      type leafref {
        path "/rt-pol:routing-policy/rt-pol:policy-definitions/"
          + "rt-pol:policy-definition/rt-pol:name";
      }
      description
        "A reference to a routing policy which can be used to
        restrict the prefixes for which AS PATH validity
        states are considered in BGP export.";
    }
  }
  description
    "Export AS PATH validation of BGP prefix.";
}
```

```
augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
  + "/bgp:neighbor" {
  description
    "augmentation of BGP peer roles for neighbors";
  leaf peer-role {
    type peer-role;
    description
      "Role of the peer";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
  + "/bgp:peer-group" {
  description
    "augmentation of BGP peer roles for peer groups";
  leaf peer-role {
    type peer-role;
    description
      "Role of the peer group";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast" {
  description
    "ASPA verification augmentation of BGP IPv4 Unicast
    Address Family.";
  uses aspa-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast" {
  description
    "ASPA verification augmentation of BGP IPv6 Unicast
    Address Family.";
  uses aspa-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv4-unicast"
  + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
```

```

    "ASPA verification state augmentation of BGP IPv4
    Unicast route.";
  leaf aspa-verification-state {
    type aspa-verification-state;
    description
      "ASPA verification state of BGP IPv4 Unicast prefix.";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:rib"
  + "/bgp:afi-safis/bgp:afi-safi/bgp:ipv6-unicast"
  + "/bgp:loc-rib/bgp:routes/bgp:route" {
  description
    "ASPA verification state augmentation of BGP IPv6
    Unicast route.";
  leaf aspa-verification-state {
    type aspa-verification-state;
    description
      "ASPA verification state of BGP IPv6 Unicast prefix.";
  }
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:global"
  + "/bgp:afi-safis/bgp:afi-safi"
  + "/bgp:route-selection-options" {
  when "derived-from-or-self(..../bgp:name, 'bt:ipv4-unicast') or "
    + "derived-from-or-self(..../bgp:name, 'bt:ipv6-unicast')";
  description
    "This augmentation is valid for IPv4 and IPv6 Unicast.";
  }
  description
    "augmentation of BGP route selection options";
  uses aspa-selection-option;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
  + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
  + "/bgp:ipv4-unicast" {
  description
    "augmentation of AS PATH for IPv4 Unicast neighbor";
  uses export-aspa-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"

```

```
    + "/rt:control-plane-protocol/bgp:bgp/bgp:neighbors"
    + "/bgp:neighbor/bgp:afi-safis/bgp:afi-safi"
    + "/bgp:ipv6-unicast" {
  description
    "augmentation of AS PATH for IPv6 Unicast neighbor";
  uses export-aspa-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
  + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
  + "/bgp:ipv4-unicast" {
  description
    "augmentation of AS PATH for IPv4 Unicast peer group";
  uses export-aspa-validation-config;
}

augment "/rt:routing/rt:control-plane-protocols"
  + "/rt:control-plane-protocol/bgp:bgp/bgp:peer-groups"
  + "/bgp:peer-group/bgp:afi-safis/bgp:afi-safi"
  + "/bgp:ipv6-unicast" {
  description
    "augmentation of AS PATH for IPv6 Unicast peer group";
  uses export-aspa-validation-config;
}
}
```

<CODE ENDS>

## 6. Security Considerations

TBD

## 7. IANA Considerations

TBD

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## 8.2. Informative References

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