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IDR Working Group

A YANG Model for BGP-LS, BGP-LS-VPN, and BGP-LS-SPF draft-ietf-lsvr-bgp-ls-yang-03

Mahesh Jethanandani (mjethanandani@gmail.com)

Keyur Patel (keyur@arccus.com)

Aravind Babu MahendraBabu (aramahen@cisco.com)

What does this draft propose?

- Configuration and management for:
 - **BGP-LS**
 - **BGP-LS-SPF**
- Defines a model for the **Link-State Database (LSDB)**

Design: BGP YANG Augmentations

- **Augments the base BGP YANG model at the Global AFI/SAFI level**
 - Prefix limits
 - Instance identifiers
 - Algorithm types and node status
 - Reference/linkage to the LSDB
- **Augments at the Neighbor AFI/SAFI level**
 - Prefix limits
 - Other neighbor-specific BGP-LS configuration
 - Reference/linkage to the LSDB
- **Global AFI/SAFI statistics container**
 - BGP-LS updates sent/received
 - BGP-LS-SPF metrics: scheduled/computed runs, and max/min/average duration
- **Neighbor AFI/SAFI statistics container**
 - Neighbor-level counters and SPF-related statistics, aligned with global metrics

Yang tree of -02

```
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp:bgp:global
  /bgp:afi-safis/bgp:afi-safi:
+--rw link-state!
| +--rw prefix-limit
| | +--rw max-prefixes?          uint32
| | +--rw shutdown-threshold-pct? rt-types:percentage
| | +--rw restart-timer?        uint32
| +--rw max-rate?               uint32
| +--rw max-number?             uint32
| +--rw instance-id?            uint64
| +--rw asn-plus-bgp-ls-ids?    uint32
| +--ro local-databases
| | +--ro database* [vrf-name instance protocol-id area-id]
| | | +--ro vrf-name          string
| | | +--ro instance          string
| | | +--ro protocol-id      lsdb-proto-id-type
| | | +--ro area-id          uint32
| | +--ro nodes
| | | +--ro node* [handle]
| | | | +--ro node-id?        string
| | | | +--ro handle          uint64
| | | | +--ro type?           lsdb-obj-type
| | | | +--ro topology-id?   uint16
| | | | +--ro pdu-id?        uint32
| | | | +--ro attributes
| | | | | +--ro attribute*
| | | | | | [attribute-handle attribute-type]
| | | | | | +--ro attribute-handle  uint64
| | | | | | +--ro attribute-type    lsdb-attr-type
| | | | | | +--ro attribute-length? uint16
| | | | | | +--ro attribute-value?  union
```

```
+--ro attribute-value
+--ro tlvs
  +--ro tlv* []
  | +--ro multi-topology-identifier
  | | +--ro type?      identityref
  | | +--ro length?   uint16
  | | +--ro value*    uint16
  | +--ro node-flag-bits
  | | +--ro type?      identityref
  | | +--ro length?   uint8
  | | +--ro value?    bits
  | +--ro opaque-node-attribute
  | | +--ro type?      identityref
  | | +--ro length?   uint16
  | | +--ro value*    uint16
  | +--ro node-name
  | | +--ro type?      identityref
  | | +--ro length?   uint16
  | | +--ro value*    uint16
  | +--ro isis-area-identifier
  | | +--ro type?      identityref
  | | +--ro length?   uint16
  | | +--ro value*    uint16
  | +--ro ipv4-router-id
  | | +--ro type?      identityref
  | | +--ro length?   uint8
  | | +--ro value?    uint16
  | +--ro ipv6-router-id
  | | +--ro type?      identityref
  | | +--ro length?   uint8
  | | +--ro value?    uint16
  | +--ro unknown-tlvs
  | | +--ro unknown-tlv* []
  | | | +--ro type?      identityref
  | | | +--ro length?   uint16
  | | | +--ro value?    yang:hex-string
```

Comments received on -02

- Include support for Link-State NLRIs from **RFC 9552**
- Key modelling challenge
 - NLRI TLVs are **variable length**
 - No native construct for truly variable-length TLV container modelling
- Interoperability challenge
 - Endpoints may receive unknown/unrecognized TLVs
 - Need a strategy to preserve unknown TLVs without breaking schema compliance

Changes in -03 revision

- LSDB was previously defined using **TLV-centric representations** in the model
- BGP-LS Topology NLRIs and related attributes are now represented using **NLRI-expanded structures**
 - in-line with RFC9552 constructs
- Known attributes are explicitly modelled with **typed YANG fields**
 - reuse of known types - RFC 8294, RFC 9129 and RFC 9130
- Unknown or unsupported attributes (within a category) are preserved as **binary blobs** for extensibility and interoperability
- This revision includes **Node NLRIs and Node-related attributes only**

Yang tree of -03

```
augment /rt:routing/rt:control-plane-protocols
  /rt:control-plane-protocol/bgp:bgp/bgp:global
  /bgp:afi-safis/bgp:afi-safi:
+--rw link-state!
  +--rw prefix-limit
  |   +--rw max-prefixes?          uint32
  |   +--rw warning-threshold-pct? rt-types:percentage
  |   +--rw teardown?             boolean
  |   +--rw idle-time?            union
  |   +--ro prefix-limit-exceeded? boolean
+--rw max-rate?          uint32
+--rw max-number?        uint32
+--ro bgp-ls-topology
  +--ro instances
    +--ro instance* (vrf-name protocol identifier)
      +--ro vrf-name      string
      +--ro protocol      bgp-ls-topo-t:protocol
      +--ro identifier    uint64
      +--ro nodes
        +--ro ospf-node*
          |   (is-as-scoped area-id router-id dr-identifie
          |   +--ro is-as-scoped      boolean
          |   +--ro area-id
          |   |   ietf-ospf-t:area-id-type
          |   +--ro router-id        ietf-rt-t:router-id
          |   +--ro dr-identifier     inet:ipv4-address
          |   +--ro as                inet:as-number
          +--ro node-attributes
            +--ro node-attribute* (type)
```

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```
+--ro node-attributes
  +--ro node-attribute* (type)
    +--ro type
    |   identityref
  +--ro local-ipv4-router-ids
    |   +--ro router-id* ietf-rt-t:router-id
  +--ro local-ipv6-router-ids
    |   +--ro router-id* inet:ipv6-address
  +--ro unknowns
    |   +--ro unknown* (type)
    |   |   +--ro type      uint16
    |   |   +--ro value?   yang:hex-string
  +--ro multi-topology-ids
    |   +--ro multi-topology-id* uint16
  +--ro node-flag-bits
    |   +--ro flags?
    |   |   bgp-ls-topo-t:node-flag-bits
  +--ro opaque-node-attribute
    |   +--ro opaque-attrs? yang:hex-string
  +--ro node-name
    |   +--ro name? string
  +--ro sr-capabilities
    |   +--ro srgb* (start-label)
    |   |   +--ro start-label
    |   |   |   ietf-rt-t:mpls-label
    |   |   +--ro range-size? uint32
    |   +--ro isis-flags? binary
  +--ro sr-local-block
    |   +--ro srlb* (start-label)
    |   |   +--ro start-label
    |   |   |   ietf-rt-t:mpls-label
    |   |   +--ro range-size? uint32
    |   +--ro isis-flags? binary
  +--ro sr-algorithm
    |   +--ro algorithm* uint8
  +--ro node-msd
    |   +--ro msd* (msd-type)
    |   |   +--ro msd-type      uint8
    |   |   +--ro msd-value?   uint8
```

Code and Issues

- Tracked at <https://github.com/mjethanandani/bgp-ls>
- Add support for other known NLRIs specified in RFC 9552 and other BGP-LS drafts.

Next steps

- Requesting Working Group (WG) review and feedback

