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YANG Data Model for LDP and mLDP

(draft-raza-mpls-ldp-mldp-yang-04)

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... and several other contributors as acknowledged in the draft

Revision History

- Rev -00
  - Posted before, and presented at, IETF 92 in Dallas.
  - Covered base LDP configuration, rpc, and notification
- Rev -01
  - posted before, and presented at, IETF 93 in Prague.
  - Covered base mLDP configuration, rpc, and notification
- Rev -02:
  - posted before, and presented at, IETF 94 in Yokohama
  - Alignment with mpls-base and open-config (work in progress)
- Rev -03:
  - posted before, and presented at, IETF 95 in Buenos Aires
  - Addressed comments from WG - MPLS WG chair (Ross) and others, general cleanup
- Rev -04:
  - posted before this IETF 96 in Berlin
  - Addressed comments from MPLS - RT

Changes in Rev -04

- Re-aligned with:
  - [I-D.ietf-mpls-base-yang]
  - [I-D.ietf-netmod-routing-cfg]
  - [I-D.rtgyangdt-rtgwg-ni-model]
- LDP module augments /rt:routing/rt:control-plane-protocols
  - draft-rtgyangdt-rtgwg-device-model-04, section 2.5 states: *"The routing module is expected to include all IETF defined control plane protocols, such as BGP, OSPF, LDP and RSVP-TE"*
- Addressed almost all of the MPLS-RT team review comments.
- Completed the section on mLDP derived state
- Clarified the semantics of "peer" when GR is in-progress.
- Added an Open Items section
- New author: Sowmya Krishnaswamy

MPLS-RT Comments

- No blocking issues raised by MPLS-RT and reviewers think that document is ready for WG adoption.
  - Thank you MPLS-RT team for the detailed review and comments.
- Bert Wijnen:
  - Dependency on currently debated opstate in netmod (e.g. [I-D.openconfig-netmod-opstate]) >> Addressed.
  - Reuse already defined data type (address family, port) >> Addressed
  - Lot of features and objects >> Evaluating
- Minto Jeyananth:
  - Clarify what are widely deployed non-RFC features >> Addressed
  - Upstream label allocation uses Context-Specific Label space >> Addressed
  - Should this I.D. cover independent-mode >> Yes
  - ordered-mode config: Explicit-null is missing + egress-ls

MPLS-RT Comments (2)

- Tarek Saad:
  - Partition into “base” and “extended” parts
  - mLDP into its own module
  - Realign with updated yang models in mpls-base and routing-cfg >> Addressed
  - Reuse already defined mpls-interface and mpls-label from [I-D.ietf-mpls-base-yang] instead of defining your own >> Addressed
  - Use of enum vs identities >> Addressed
  - Specification of default values. >> Addressed
  - Use of “presence” vs explicit “enable” keyword >> Addressed
- Mach Chen:
  - YANG validation check failures >> Addressed
  - Empty description >> Addressed
  - Fix augmentation paths >> Addressed

IETF

Derived State: mLDP

- Following are main areas for which mLDP operational “derived” state is defined:
  - Roots
  - Bindings:
    - FEC-label (MP)

Note that “applied” state is not presented here as it has been covered as part of intended (configuration) state.

Derived State: mLDP root

Tree:

```
+--rw mpls-ldp!
     +--rw mldp
        +--rw address-family* [af]
           +--ro ipv4 (or ipv6)
              +--ro roots* [root-address]
                 +-- ro is-self?        Boolean
                 +--ro reachability* [address interface]
          +--ro address      inet:ipv4-address
          +--ro interface    mpls-interface-ref
          +--ro peer?        leafref
```

Example:

```
 root 1.1.1.1:
          path1:
             RIB: GigEthernet 1/0, 12.1.0.2;
             LDP: peer 192.168.0.1:0
          path2:
             RIB: GigEthernet 2/0, 12.2.0.2;
             LDP: peer none

root 2.2.2.2:
          path1:
             RIB: 3.3.3.3;                    (NOTE: This is a recursive path)
             LDP: peer 192.168.0.3:0
```

Derived State: mLDP Bindings

Firstly, High level organization of the binding state:

```
+--rw mpls-ldp!
    +--rw mldp
       +--rw address-family* [af]
          +--ro ipv4 (or ipv6)
             +--ro bindings
                +--ro opaque-type-xxx     >>> lspid, bidir, src
       +-- ro fec-label* [root-address, <type-specific-key>]
                          +--ro root-address
                          +--ro ... < other-keys>
                          +--ro multipoint-type?      multipoint-type
                          +--ro peer* [direction peer advertisement-type]
                               +--ro direction            downstream-upstream
                               +--ro peer                 leafref
                               +--ro advertisement-type   advertised-received
                               +--ro label?               mpls:mpls-label
                               +--ro mbb-role?            enumeration
                               +--ro mofrr-role?          enumeration
```

Derived State: mLDP Bindings (2)

Table 1: MP Opaque Types and keys

Opaque Type	Key	RFC
Generic LSP Identifier	LSP Id	[RFC6388]
Transit IPv4 Source	Source, Group	[RFC6826]
Transit IPv6 Source	Source, Group	[RFC6826]
Transit IPv4 Bidir	RP, Group	[RFC6826]
Transit IPv6 Bidir	RP, Group	[RFC6826]
Transit VPNv4 Source	Source, Group, RD	[RFC7246]
Transit VPNv6 Source	Source, Group, RD	[RFC7246]
Transit VPNv4 Bidir	RP, Group, RD	[RFC7246]
Transit VPNv6 Bidir	RP, Group, RD	[RFC7246]
Recursive Opaque	Root	[RFC6512]
VPN-Recursive Opaque	Root, RD	[RFC6512]

`Opaque-type-lsp-id:` [root-address lsp-id recur-root-address recur-rd]

`Opaque-type-src:` [root-address source-address group-address rd recur-root-address recur-rd]

`Opaque-type-bidir:` [root-address rp group-address rd recur-root-address recur-rd]

Derived State: mLDP Bindings (3)

Example of P2MP FEC-label binding derived state:

FEC (root 2.2.2.2, S=192.168.1.1, G=224.1.1.1):

type: p2mp

upstream:

advertised:

peer 192.168.0.1:0, label 16000 (local)

downstream:

received:

peer 192.168.0.2:0, label 17000 (remote)

peer 192.168.0.3:0, label 18000 (remote)

FEC (root 2.2.2.2, S=192.168.1.1, G=224.1.1.2):

type: p2mp

upstream:

advertised:

peer 192.168.0.1:0, label 16001 (local), MBB role=active

peer 192.168.0.4:0, label 16002 (local), MBB role=standby

downstream:

received:

peer 192.168.0.2:0, label 17001 (remote)

peer 192.168.0.3:0, label 18001 (remote)

Derived State: mLDP Bindings (4)

Example of MP2MP FEC-label binding derived state:

FEC (root 2.2.2.2, lsp-id=2):
type: mp2mp
upstream:
advertised:
peer 192.168.0.1:0, label 16000 (local)
received:
peer 192.168.0.1:0, label 17000 (remote)
downstream:
advertised:
peer 192.168.0.2:0, label 16001 (local)
received:
peer 192.168.0.2:0, label 17001 (remote)

Pending/Open items

- (Re-)align with regards to OPSTATE decision
- Specify default values for RFC-defined configuration parameters
- Revisit and cut-down on the scope of the document
- Split the model into a base and extended items
- Add statistics for mLDP root LSPs and bindings

Next Steps

- Asking for WG adoption
- Address rest of the MPLS-RT comments post adoption