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A YANG Data Model for MPLS Base and Static LSPs

(draft-saad-mpls-static-yang-00)

Tarek Saad	(Cisco)
Kamran Raza	(Cisco) >> Presenter
Rakesh Gandhi	(Cisco)
Xufeng Liu	(Ericsson)
Vishnu Pavan Beeram	(Juniper)
Himanshu Shah	(Ciena)
Jescia Chen	(Huawei)
Raqib Jones	(Brocade)
Bin Wen	(Comcast)

Objective

- The goal of this draft is to specify two YANG models:
  - MPLS Base
  - MPLS Static LSPs
- The MPLS base YANG module serves as a **base** framework for configuring and managing an MPLS switching subsystem.
- The MPLS Static LSP module defines YANG data to configure and manage MPLS Static LSP(s).
  - augments the MPLS base YANG module

MPLS Base

- The MPLS base model augments the core routing data model [I-D.ietf-netmod-routing-cfg] with additional data specific to MPLS switching.
  - augments routing-instance and hence allow MPLS protocols to run in the context of a routing-instance (VRF).
- Defines MPLS interface list
- Defines base MPLS label type “mpls-label” to be used by other MPLS/LxVPN models.
- It is expected that other YANG modules for MPLS technology (such as LDP/TE-RSVP) will augment this base, as applicable.

MPLS Base: The base tree

mpls-base

```
module: ietf-mpls
augment /rt:routing/rt:routing-instance:
      +--rw mpls
```

mpls-protocol-xxx

```
module: ietf-mpls
augment /rt:routing/rt:routing-instance/mpls:mpls
      +--rw mpls-xxx
          + ....
```

mpls-base state (derived)

```
module: ietf-mpls
augment /rt:routing-state/rt:routing-instance:
      +--ro mpls
```

MPLS Base: Interface

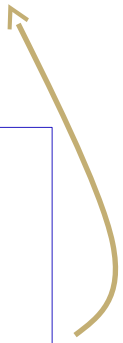
- Enables MPLS switching on an interface
- MPLS protocols may reference this to enable their control plane procedures, and add their attribute, on their configured interfaces.

mpls-base interface

```
module: ietf-mpls
augment /rt:routing/rt:routing-instance:
      +--rw mpls
        +--rw interface* [name]
          +--rw name      if:interface-ref
```

mpls protocol "x" interface

```
module: ietf-mpls
+--rw mpls-xxx!
      +--rw interface* [interface]
                +--rw interface              leaf-ref
                   +--rw proto-param …
```



MPLS Base: Dependencies

- Dependencies on following evolving/changing items:
  - Augmentation off ietf-routing
  - rt:routing-state/ (ref: Open Config)

MPLS Base: Next Steps

- Soliciting comments from WG

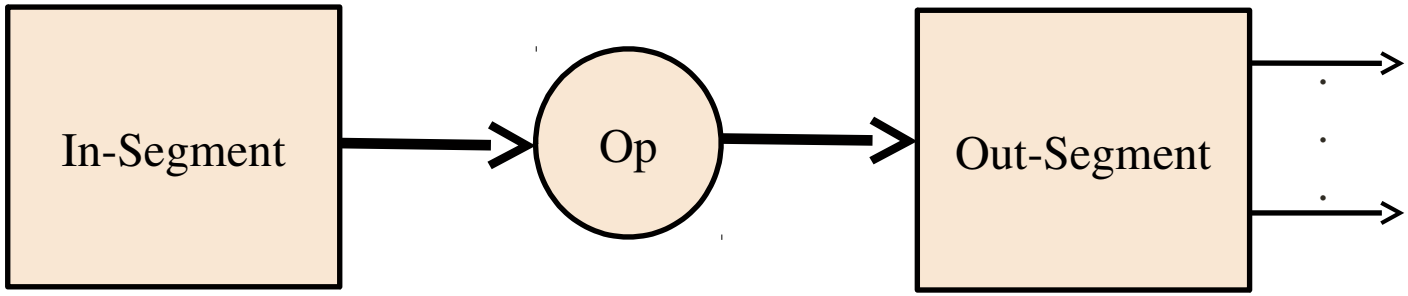
MPLS Static LSPs

- The MPLS Static LSP model augments the MPLS base data model and defines parameters related to MPLS Static LSPs.
- Follows the approach described in [I-D.openconfig-netmod-opstate] to represent data pertaining to intended state (configuration), applied state, and derived state data elements.
- Consistent with IP-Static model being defined under [I-D.ietf-netmod-routing-cfg]
- Current focus:
  - IP unicast
  - p2p LSP

MPLS Static LSPs: Building Blocks

- An MPLS Static LSP is defined as an ordered set of following three:
  - In-segment
  - Operation
  - Out-segment
- In-Segment: Incoming segment of an LSP that is used as a lookup key for taking a forwarding action.
- Operation: Operation (or action) that needs to be performed if lookup succeeds.
- Out-Segment: Outgoing segment of an LSP that contains the actual forwarding information
  - An Out-segment typically comprise 1 or more forwarding paths

MPLS Static LSPs: Building Blocks (2)



ip-prefix,
or
local-label

impose
swap
pop
pop-impose*
pop-and-lookup

MPLS Static LSPs: Forwarding Path

- Two types of forwarding paths defined:
  - Simple path
    - Uni-path
    - Basic attributes
  - Path List
    - Multi-path
    - Enhanced attributes (such as protection)
- Path attributes:
  - Table Id (next revision)
  - Nexthop address
  - Nexthop interface
  - Label stack (0 or more labels)
  - Load factor
  - Role (primary / backup etc)
  - Path-Id / Backup path-id for protection

MPLS Static: Tree Diagram

```
module: ietf-mpls
module: ietf-mpls-static
  augment /rt:routing/rt:routing-instance/mpls:mpls:
    +--rw static-lsps
      +--rw static-lsp* [name]
        +--rw name      string
        +--rw config
        |  +--rw in-segment
        |  |  +--rw (type)?
        |  |     +--:(ip-prefix)
        |  |     |  +--rw ip-prefix?       inet:ip-prefix
        |  |     +--:(mpls-label)
        |  |        +--rw incoming-label?   mpls:mpls-label
        |  +--rw operation?           enumeration
        |  +--rw (out-segment)?
        |     +--:(simple-path)
        |     |  +--rw next-hop?            inet:ip-address
        |     |  +--rw outgoing-label?      mpls:mpls-label
        |     |  +--rw outgoing-interface?  if:interface-ref
```

MPLS Static: Tree Diagram (2)

```
|    +--:(path-list)
|       +--rw paths* [path-index]
|          +--rw path-index           uint32
|          +--rw backup-path-index?   uint32
|          +--rw next-hop?            inet:ip-address
|          +--rw outgoing-labels* [index]
|          |  +--rw index    uint32
|          |  +--rw label?   mpls:mpls-label
|          +--rw outgoing-interface?   if:interface-ref
|          +--rw loadshare?           mpls:percent
|          +--rw role?                enumeration
+--ro state
    +--ro in-segment
    |  +-- . . .
     +--ro operation
     +--ro (out-segment)?
        +-- . . .
```

MPLS Static: Next Steps

- Update the -00 rev with sections explaining container and leave objects
- Enhance the model:
  - Extend beyond simple LSPs:
    - Different types of nexthops
    - Enhance path attributes
- Seeking comments from WG

Backup Slides

MPLS Base: Tree Diagram - Rev -00

mpls-base interface

```
module: ietf-mpls
augment /rt:routing/rt:routing-instance:
      +--rw mpls
        +--rw interface* [name]
           +--rw name      if:interface-ref
           +--rw config
           |  +--rw enabled
           +--ro state
              +--ro enabled
```