IETF 91 Honolulu
Yang Data Model for OSPF Protocol
draft-yeung-netmod-ospf-02

Derek Yeung

Derek Yeung (myeung@cisco.com)

Dean Bogdanovic (deanb@juniper.net)

Jeffrey Zhang (zzhang@juniper.net)

Kiran Agrahara Sreenivasa (kkoushik@Brocade.com)

YingZhen Qu (yiqu@cisco.com)

Goals

- Define OSPF data model that work for multiple vendors

- Support various configuration options for different vendors

- Support OSPFv2 & OSPFv3 in one model

- Support optional features

  - augment

  - feature

- Alignment between between routing model

  - Look & Feel, e.g. ISIS

  - Common groupings/constructs

Change since IETF90

- draft-yeung-netmod-ospf-yang-02.txt
- Multi-vendor efforts
  - Cisco
  - Juniper
  - Brocade
  - Ericsson
  - More …

Change since IETF90 (Cont)

- Updated high level hierarchy
  - Naming
  - Remove unnecessary containers
- Agreement on most config that should be
  - Required
  - if-feature
  - Vendor augmentation

Change since IETF90 (Cont)

- Separated rt:routing-protocol identities
  - ospfv2
  - ospfv3
- LSA decoded
- Notifications added
  - All traps common to OSPFv2 and OSPFv3 MIB

Feedbacks so far

- draft-hares-i2rs-ospf-compare-yang-00
- Yang Doctor (Ladislav Lhotka) comments
  - http://www.ietf.org/mail-archive/web/netmod/current/msg11029.html

Data Model OSPF Config

```
+--rw routing
    +--rw routing-instance [name]
        +--rw routing-protocols
            +--rw routing-protocol [name]
                +--rw ospf
                    +--rw all-instances-inherit {instance-inheritance}?
                            .
                     +--rw instance* [routing-instance af]
                              .
                         +--rw all-areas-inherit {area-inheritance}?
                                .
                         +--rw area* [area-id]
                                  .
                             +--rw all-interfaces-inherit {interface-inheritance}?
                                    .
                             +--rw interface [interface]
                                    .
                                 +--rw topology* [name]
                                      .
                         +--rw topology* [name]
                                .
```

Data Model Config: ospf

```
+--rw ospf
    +--rw all-instances-inherit {instance-inheritance}?
    |  +--rw area
    |  +--rw interface
    +--rw operation-mode?          identityref
```

Data Model Config: instance

```
+--rw ospf
   +--rw instance* [routing-instance af]
      +--rw routing-instance      rt:routing-instance-ref
      +--rw af                    identityref
      +--rw router-id?            yang:dotted-quad {router-id}?
      +--rw admin-distance
         .
      +--rw nsr {nsr}?
         .
      +--rw graceful-restart {graceful-restart}?
         .
      +--rw protocol-shutdown {protocol-shutdown}?
      |  +--rw shutdown?   boolean
      +--rw auto-cost {auto-cost}?
         .
      +--rw maximum
         .
      +--rw mpls
         .
      +--rw all-areas-inherit {area-inheritance}?
      |  +--rw area
      |  +--rw interface
```

Data Model Config: area

```
+--rw ospf
    +--rw instance* [routing-instance af]
       +--rw area* [area-id]
       |  +--rw area-id                    area-id-type
       |  +--rw area-type?                 identityref
       |  +--rw summary?                   boolean
       |  +--rw default-cost?              uint32
       |  +--rw virtual-link* [router-id]

              .
       |  +--rw sham-link* [local-id remote-id]

              .
       |  +--rw range* [prefix]

              .
       |  +--rw all-interfaces-inherit {interface-inheritance}?
       |  |  +--rw interface
```

Data Model Config: interface

```
+--rw ospf
    +--rw instance* [routing-instance af]
        +--rw area* [area-id]
        |   +--rw interface* [interface]
        |       +--rw interface                if:interface-ref
        |       +--rw network-type?            enumeration
        |       +--rw passive?                 boolean
        |       +--rw demand-circuit?          boolean {demand-circuit}?
        |       +--rw multi-area {multi-area-adj}?
        |           .
        |       +--rw static-neighbors
        |       |   +--rw neighbor* [address]
        |           .
        |       +--rw cost?                    uint16
        |       +--rw hello-interval?          uint16
        |       +--rw dead-interval?           uint16
        |       +--rw retransmit-interval?     uint16
        |       +--rw transmit-delay?          uint16
```

Data Model Config: interface (Cont)

```
|      +--rw mtu-ignore?             boolean {mtu-ignore}?
|      +--rw lls?                    boolean {lls}?
|      +--rw prefix-suppression?     boolean {prefix-suppression}?
|      +--rw bfd?                    boolean {bfd}?
|      +--rw ttl-security {ttl-security}?

         .

|      +--rw protocol-shutdown {protocol-if-shutdown}?
          |  +--rw shutdown?    boolean
```

Data Model Config: MTR

```
+--rw ospf
    +--rw instance* [routing-instance af]
        +--rw area* [area-id]
            +--rw interface* [interface]
                +--rw topology* [name]
                    +--rw name    rt:rib-ref
                    +--rw cost?   uint32
    +--rw topology* [name]
        +--rw name    rt:rib-ref
        +--rw area* [area-id]
            +--rw area-id        area-id-type
            +--rw area-type?     identityref
            +--rw summary?       boolean
            .
            .
```

Data Model OSPF Operation

```
+--ro routing-state
    +--ro routing-instance [name]
        +--ro routing-protocols
            +--ro routing-protocol [name]
                +--ro ospf
                    +--ro instance [routing-instance af]
                        +--ro neighbor* [area-id interface neighbor-id]
                            .
                        +--ro interface* [area-id interface]
                            .
                        +--ro area* [area-id]
                            .
                        +--ro ospf-databases
                            +--ro link-scope-lsas* [area-id interface lsa-type]
                                .
                            +--ro ospf:area-scope-lsas* [area-id lsa-type]
                                .
                            +--ro ospf:as-scope-lsas* [lsa-type]
                                .
```

Data Model Op: neighbor

```
+--ro ospf
    +--ro instance* [routing-instance af]
        +--ro neighbor* [area-id interface neighbor-id]
        |  +--ro area-id          area-id-type
        |  +--ro interface        if:interface-ref
        |  +--ro neighbor-id      inet:ipv4-address
        |  +--ro address?         inet:ip-address
        |  +--ro dr?              inet:ipv4-address
        |  +--ro bdr?             inet:ipv4-address
        |  +--ro state?           nbr-state-type
```

Data Model Op: interface

```
+--ro ospf
    +--ro instance* [routing-instance af]
        +--ro interface* [area-id interface]
        |   +--ro area-id                 area-id-type
        |   +--ro interface               if:interface-ref
        |   +--ro network-type?           enumeration
        |   +--ro passive?                boolean
        |   +--ro demand-circuit?         boolean {demand-circuit}?
        |   +--ro multi-area {multi-area-adj}?
                   .
        |   +--ro static-neighbors
        |   |   +--ro neighbor* [address]
                   .
        |   +--ro cost?                   uint16
        |   +--ro hello-interval?         uint16
        |   +--ro dead-interval?          uint16
        |   +--ro retransmit-interval?    uint16
        |   +--ro transmit-delay?         uint16
```

Data Model Op: interface (Cont)

```
|  +--ro mtu-ignore?           boolean {mtu-ignore}?
|  +--ro lls?                  boolean {lls}?
|  +--ro prefix-suppression?   boolean {prefix-suppression}?
|  +--ro bfd?                  boolean {bfd}?
|  +--ro ttl-security {ttl-security}?

      .
|  +--ro protocol-shutdown {protocol-if-shutdown}?
|  |  +--ro shutdown?   boolean
|  +--ro state?                if-state-type
|  +--ro hello-timer?          uint32
|  +--ro wait-timer?           uint32
|  +--ro neighbor*
|  |  +--ro neighbor-id?   leafref
|  +--ro dr?                   inet:ipv4-address
|  +--ro bdr?                  inet:ipv4-address
|  +--ro topology* [name]
|     +--ro name     rt:rib-ref
```

Data Model Op: area

```
+--ro ospf
    +--ro instance* [routing-instance af]
       +--ro area* [area-id]
       |  +--ro area-id    area-id-type
```

Data Model Op: database

```
+--ro ospf
    +--ro instance* [routing-instance af]
        +--ro databases
        |   +--ro link-scope-lsas* [area-id interface lsa-type]
        |   |   +--ro area-id          uint32
        |   |   +--ro interface         if:interface-ref
        |   |   +--ro lsa-type          uint8
        |   |   +--ro link-scope-lsa* [lsa-id adv-router]

                    .

        |   +--ro area-scope-lsas* [area-id lsa-type]
        |   |   +--ro lsa-type          uint8
        |   |   +--ro area-id           uint32
        |   |   +--ro area-scope-lsa* [lsa-id adv-router]

                    .

        |   +--ro as-scope-lsas* [lsa-type]
        |       +--ro lsa-type          uint8
        |       +--ro as-scope-lsa* [lsa-id adv-router]

                    .
```

Data Model Op: LSA

```
|  |  +--ro <ANY>-lsa* [lsa-id adv-router]
      |  |    +--ro lsa-id              union
      |  |    +--ro adv-router          inet:ipv4-address
      |  |    +--ro decoded-completed?  boolean
      |  |    +--ro raw-data?           yang:hex-string
      |  |    +--ro (version)?
      |  |       +--:(ospfv2)
      |  |       |  +--ro ospfv2
      |  |       |     +--ro header
                            .
      |  |       |     +--ro body
      |  |       |        +--ro router
                               .
      |  |       |        +--ro network
                               .
      |  |       |        +--ro summary
                               .
      |  |       |        +--ro external
                               .
      |  |       |        +--ro opaque
                               .
```

Data Model Op: LSA (Cont)

```
|  |          +--:(ospfv3)
|  |             +--ro ospfv3
|  |                +--ro header
                       .
|  |                +--ro body
|  |                   +--ro router

                          .
|  |                   +--ro network

                          .
|  |                   +--ro inter-area-prefix

                          .
|  |                   +--ro inter-area-router

                          .
|  |                   +--ro as-external

                          .
|  |                   +--ro nssa

                          .
|  |                   +--ro link

                          .
|  |                   +--ro intra-area-prefix

                          .
```

Data Model OSPF Notification

```
notifications:
        +---n if-state-change
        +---n if-config-error
        +---n nbr-state-change
        +---n nbr-restart-helper-status-change
        +---n rx-bad-packet
        +---n lsdb-approaching-overflow
        +---n lsdb-overflow
        +---n nssa-translator-status-change
        +---n restart-status-change
```

Data Model OSPF Notification Example

```
notifications:

      +---n if-state-change
      | +--ro routing-instance?        rt:routing-instance-ref
      | +--ro routing-protocol-name?   string
      | +--ro instance-af
      | | +--ro af?   identityref
      | +--ro link-type?               identityref
      | +--ro interface
      | | +--ro interface?   if:interface-ref
      | +--ro virtual-link
      | | +--ro area-id?               uint32
      | | +--ro neighbor-router-id?   yang:dotted-quad
      | +--ro sham-link
      | | +--ro area-id?          uint32
      | | +--ro local-ip-addr?    inet:ip-address
      | | +--ro remote-ip-addr?   inet:ip-address
      | +--ro state?                   if-state-type
```

Next Steps

- More configurations/Operation state
  - Authentication
  - Counters
  - New features (SR, key-chain etc)
- Await feedback on
  - Protocol vs VRF centric
  - More notifications
  - RPC
- Continue alignment with ISIS

Next Steps (Cont)

- Address comments
  - draft-hares-i2rs-ospf-compare-yang-00
  - Yang Doctor comments
  - Need more feedbacks from WG
- OSPF WG adoption

Backup Slides

Configuration Style

- ## Protocol centric

```
router ospf 1
    vrf red

    …
router ospf 2
    vrf blue

    …
```

- ## VRF centric

```
vrf red
    router ospf 1

        …
vrf blue
    router ospf 2

        …
```

Inheritance

```
router ospfv3 201
  area 1 stub
  address-family ipv4 unicast
    router-id 4.1.1.4
  address-family ipv6 unicast
    router-id 4.1.1.6
  address-family ipv4 unicast vrf red
    router-id 4.1.2.4
```