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# **A YANG Data Model for Routing Management**

`draft-ietf-netmod-routing-cfg-11`

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# Changes since -10

Minutes from IETF 87: *“Lada will work with authors of the I2RS working group to harmonize things with the information model defined by the I2RS working group ...”*

- terminology changes,
- address family info,
- keys for state lists, relationship between system-controlled and user controlled list entries,
- new options for nexthop specification,
- feature advanced-router replaced user-defined-routing-tables.

# Terminology

- router → routing instance,
- routing table → RIB.

```
+--ro routing-state
  +--ro routing-instance* [id]
  |   +--ro id
  |   +--ro name?
  |   +--ro type?
  |   +--ro router-id?
  |   +--ro default-ribs
  |   |   ...
  |   +--ro interfaces
  |   |   ...
  |   +--ro routing-protocols
  |   |   ...
+--ro ribs
  |   +--ro rib* [id]
  |   |   ...
+--ro route-filters
  +--ro route-filter* [name]
  |   ...
```

# Identities for Address Families

```
address-family
  ipv4
    ipv4-unicast
  ipv6
    ipv6-unicast
```

Two leafs with *enumeration* type were replaced with a single *identityref* leaf:

```
<address-family>ipV4</address-family>
<safi>nlrri-unicast</safi>
```



```
<address-family>v4ur:ipv4-unicast</address-family>
```

The module *iana-afn-safi* is no more imported.

# System- versus User-Controlled Entries

Entries in some operational state lists (`config false`):

## *system-controlled entry*

Created by the system and assigned a unique numerical `id` (list key); cannot be deleted.

User may provide additional configuration for such an entry by creating an entry in the config list with an arbitrary key (`name`) and a reference to the system-controlled entry's `id`.

## *user-controlled entry*

Created and deleted as a direct consequence of creating/deleting an entry in the config list.

The system also assigns an `id` but the user needn't use it.

# Example

- 1 A system-controlled entry is created automatically:

```
<rt:routing-state>
  <rt:routing-instance>
    <rt:id>1415926535</rt:id>
    <rt:router-id>192.0.2.1</rt:router-id> ← default value
    ...
```

- 2 User adds some configuration (changes router-id):

```
<rt:routing>
  <rt:routing-instance>
    <rt:name>rtr0</rt:name>
    <rt:routing-instance-id>1415926535</rt:routing-instance-id>
    <rt:description>Router A</rt:description>
    <rt:router-id>192.0.4.2</rt:router-id>
    ...
```

### ③ Final result:

```
<rt:routing-state>
  <rt:routing-instance>
    <rt:id>1415926535</rt:id>
    <rt:name>rtr0</rt:name>
    <rt:router-id>
      192.0.4.2
    </rt:router-id>
    ...
  </rt:routing-instance>
</rt:routing-state>
```

```
<rt:routing>
  <rt:routing-instance>
    <rt:name>rtr0</rt:name>
    <rt:routing-instance-id>
      1415926535
    </rt:routing-instance-id>
    <rt:description>
      Router A
    </rt:description>
    <rt:router-id>
      192.0.4.2
    </rt:router-id>
    ...
  </rt:routing-instance>
</rt:routing>
```

# Nexthop Options

- special nexthops

```
case special-nexthop {  
  leaf special-nexthop {  
    type enumeration {  
      enum blackhole; ← silently discard  
      enum unreachable; ← discard & notify  
      enum prohibit; ← discard & notify  
      enum receive; ← receive locally  
    }  
  }  
}
```




- simple nexthop (for IPv4 routes)

```
case simple-nexthop {
  leaf outgoing-interface {
    type leafref {
      path "/routing-state/routing-instance/"
        + "interfaces/interface/name";
    }
  }
  leaf gateway {
    type inet:ipv4-address;
  }
}
```

- nexthop list (for IPv6 routes)

```
+---:(nexthop-list) {advanced-router}?  
+---ro nexthop* [id]  
+---ro id                               uint64  
+---ro outgoing-interface?             leafref  
+---ro priority?                       enumeration  
+---ro weight?                         uint8  
+---ro v6ur:address?                   inet:ipv6-address
```



**feature**

# Feature advanced-router

Replaces and extends feature user-defined-routing-tables.

Includes:

- user-defined routing tables + related framework,
- multi-path routes (nexthop list).

# Open Issues

- Instead of `advanced-router`, more specific features may be useful.

Proposal: two features

- `multiple-ribs`,
- `multipath-routes`.

# Conclusions

- Minor update (features), then WGLC.
- I-D *draft-ietf-netmod-iana-afn-safi-00* can be dropped.
- I2RS WG can take this data model as a starting point and augment it with additional parameters.
- Individual submissions defining data models for OSPF and BGP are **not** compatible with the core routing data model:
  - *draft-yeung-netmod-ospf-00*,
  - *draft-zhdankin-netmod-bgp-cfg-00*.