YANG Model for IPIPv4 Tunnel

draft-liu-rtgwg-ipipv4-tunnel-yang

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Current Scope

- IPv4 in IPv4 tunnels (RFC 1853)
- IPv6 to IPv4 tunnel (RFC 3056)
- IPv6 in IPv4 manual tunnel (RFC 2003)
- Configuration
- Operational state

Relationship with Other Modules

- An independent tree
- Links to ietf-interfaces
- Links to routing-instance
- Augments ietf-interfaces
  – Adds a single leaf to operational state
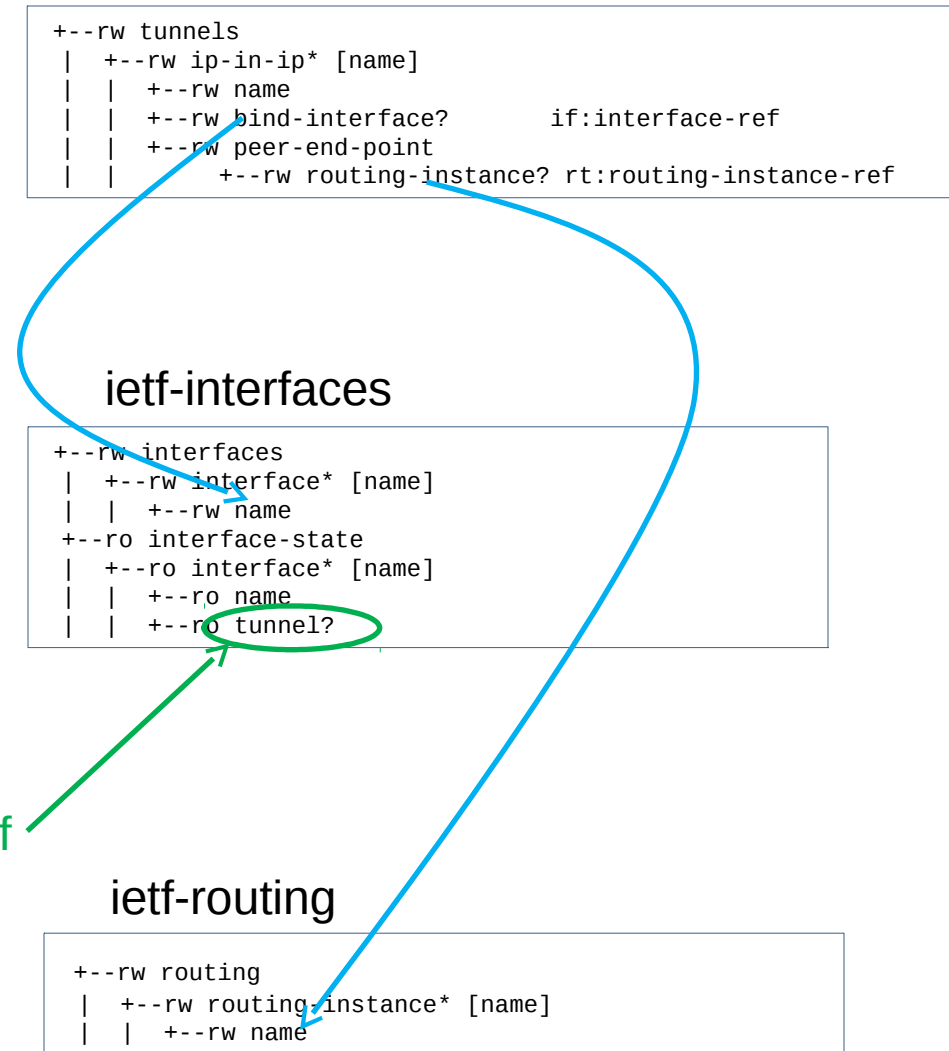
ietf-ipip4-tunnel

```
+--rw tunnels
|  +--rw ip-in-ip* [name]
|  |  +--rw name
|  |  +--rw bind-interface?        if:interface-ref
|  |  +--rw peer-end-point
|  |     +--rw routing-instance? rt:routing-instance-ref
```

ietf-interfaces

```
+--rw interfaces
|  +--rw interface* [name]
|  |  +--rw name
+--ro interface-state
|  +--ro interface* [name]
|  |  +--ro name
|  |  +--ro tunnel?
```

new leaf

ietf-routing

```
+--rw routing
|  +--rw routing-instance* [name]
|  |  +--rw name
```

Model Architecture

```
+--rw tunnels
|  +--rw ip-in-ip* [name]
|  +--rw ipv6to4-auto* [name]
|  +--rw ipv6v4-manual* [name]
|     +--rw name                   string
|     +--rw description?           string
|     +--rw bind-interface?        if:interface-ref
|     +--rw clear-df?              empty
|     +--rw shutdown?              empty
|     +--rw mtu?                   uint16
|     +--rw mirror-destination?    string
|     +--rw peer-end-point
|        +--rw local?              inet:ipv4-address-no-zone
|        +--rw remote?             inet:ipv4-address-no-zone
|        +--rw routing-instance?   rt:routing-instance-ref
+--ro tunnel-state
   +--ro ip-in-ip* [name]
   +--ro ipv6to4-auto* [name]
   +--ro ipv6v4-manual* [name]
Augment /if:interfaces-state/if:interface:
   +--ro tunnel? enumeration
```

Configuration for IPv4 in IPv4 Tunnel

```
+--rw tunnels
|  +--rw ip-in-ip* [name]
|  |  +--rw name                   string
|  |  +--rw description?           string
|  |  +--rw bind-interface?        if:interface-ref
|  |  +--rw clear-df?              empty
|  |  +--rw shutdown?              empty
|  |  +--rw mtu?                   uint16
|  |  +--rw mirror-destination?    string
|  |  +--rw peer-end-point
|  |     +--rw local?              inet:ipv4-address-no-zone
|  |     +--rw remote?             inet:ipv4-address-no-zone
|  |     +--rw routing-instance?   rt:routing-instance-ref
```

Configuration for IPv6 toIPv4 Auto Tunnel

```
+--rw tunnels
|        …
|  +--rw ipv6to4-auto* [name]
|  |  +--rw name                string
|  |  +--rw description?        string
|  |  +--rw bind-interface?     if:interface-ref
|  |  +--rw clear-df?           empty
|  |  +--rw shutdown?           empty
|  |  +--rw mtu?                uint16
|  |  +--rw mirror-destination? string
|  |  +--rw peer-end-point
|  |     +--rw local?   inet:ipv4-address-no-zone
```

Only local end-point is necessary.
No need to specify remote end-point

Configuration for IPv6 in IPv4 Manual Tunnel

```
+--rw tunnels
|  …
|  +--rw ipv6v4-manual* [name]
|     +--rw name                  string
|     +--rw description?          string
|     +--rw bind-interface?       if:interface-ref
|     +--rw clear-df?             empty
|     +--rw shutdown?             empty
|     +--rw mtu?                  uint16
|     +--rw mirror-destination?   string
|     +--rw peer-end-point
|        +--rw local?             inet:ipv4-address-no-zone
|        +--rw remote?            inet:ipv4-address-no-zone
|        +--rw routing-instance?  rt:routing-instance-ref
```

Operational State for IPv4 in IPv4 Tunnel

```
+--ro tunnel-state
   +--ro ip-in-ip*
   |  +--ro name?                     string
   |  +--ro local-ip?                 inet:ipv4-address-no-zone
   |  +--ro remote-ip?                inet:ipv4-address-no-zone
   |  +--ro state?                    enumeration
   |  +--ro bind-interface?           if:interface-state-ref
   |  +--ro user-configured?          boolean
   |  +--ro routing-instance?         rt:routing-instance-ref
   |  +--ro mtu?                      uint16
   |  +--ro clear-df?                 empty
   |  +--ro tunnel-id?                uint32
   |  +--ro down-reason?              string
   |  +--ro resolved-interface-name?  string
```

Operational State for IPv6 to IPv4 Auto Tunnel

```
+--ro tunnel-state

   …
   +--ro ipv6to4-auto*
   |  +--ro name?                     string
   |  +--ro local-ip?                 inet:ipv4-address-no-zone
   |  +--ro remote-ip?                inet:ipv4-address-no-zone
   |  +--ro state?                    enumeration
   |  +--ro bind-interface?           if:interface-state-ref
   |  +--ro user-configured?          boolean
   |  +--ro routing-instance?         rt:routing-instance-ref
   |  +--ro mtu?                      uint16
   |  +--ro clear-df?                 empty
   |  +--ro tunnel-id?                uint32
   |  +--ro down-reason?              string
   |  +--ro resolved-interface-name?  string
```

Operational State IPv6 in IPv4 Manual Tunnel

```
+--ro tunnel-state

   …
   +--ro ipv6v4-manual*
      +--ro name?                      string
      +--ro local-ip?                  inet:ipv4-address-no-zone
      +--ro remote-ip?                 inet:ipv4-address-no-zone
      +--ro state?                     enumeration
      +--ro bind-interface?            if:interface-state-ref
      +--ro user-configured?           boolean
      +--ro routing-instance?          rt:routing-instance-ref
      +--ro mtu?                       uint16
      +--ro clear-df?                  empty
      +--ro tunnel-id?                 uint32
      +--ro down-reason?               string
      +--ro resolved-interface-name?   string
```

ietf-interface Operational State Augment

```
augment /if:interfaces-state/if:interface:
   +--ro tunnel?    enumeration
                    (ip-ip, ipv6v4-manual, ipv6to4-auto)
```

Comparison

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```
+--rw tunnels
|   +--rw ip-in-ip* [name]
|   +--rw ipv6to4-auto* [name]
|   +--rw ipv6v4-manual* [name]
|      +--rw name                string
|      +--rw description?        string
|      +--rw bind-interface?     if:interface-ref
|      +--rw clear-df?           empty
|      +--rw shutdown?           empty
|      +--rw mtu?                uint16
|      +--rw mirror-destination? string
|      +--rw peer-end-point
|         +--rw local?
|                 inet:ipv4-address-no-zone
|         +--rw remote?
|                 inet:ipv4-address-no-zone
|         +--rw routing-instance?
|                 rt:routing-instance-ref
+--ro tunnel-state
   +--ro ip-in-ip* [name]
   +--ro ipv6to4-auto* [name]
   +--ro ipv6v4-manual* [name]
Augment /if:interfaces-state/if:interface:
   +--ro tunnel? enumeration
```

draft-zheng-intarea-tunneling-for-ipv6-yang

```
+--rw tunneling-for-IPv6
   +--rw Tunnel* [tunnel-name]
      +--rw tunnel-name
              string
      +--ro tunnel-interface-name?
              if:interface-ref
      +--rw tunnel-type?
              enumeration
              (manual, 6to4, auto-tunnel)
      +--rw source-ip-address?
              inet:ipv4-address
      +--rw source-interface?
              if:interface-ref
      +--rw destination-ip-address?
              inet:ipv4-address
```

Problem:
Type of a tunnel can be
changed after configuration

Detail:
Different tunnel types
have different attributes

- Missing some attributes, e.g. MTU
No operational states yet

Next Steps

- Additional attributes to be included based on IP-tunnel-MIB
  - TOS
  - Hop-limit
- Coordinate YANG models
  - draft-liu-rtgwg-ipipv4-tunnel-yang
  - draft-zheng-intarea-tunneling-for-ipv6-yang
- Solicit comments
- Which WG?