

YANG Data Model for IPv4 ARP & IPv6 Address Resolution

[draft-ietf-rtgwg-arp-yang-model-04](#)

Feng Zheng , Bo Wu , Robert Wilton , Fan Zhang , Yongqing Zhu , Xiaojian Ding

[draft-zhang-rtgwg-ipv6-address-resolution-yang-00](#)

Fan Zhang , Yongqing Zhu , Bo Wu , Jiayuan Hu

Presenter: Fan Zhang

RTGWWG@IETF 120, July 2024

Recap - What does the IPv4 ARP model cover

- Existing *ietf-ip.yang* [RFC8344] covers **basic dynamic and static ARP** entries on an interface
- This draft covers the **extra bits of ARP** implementations that many vendors support, but *ietf-ip* doesn't cover, e.g.
 - Proxy ARP, Grat. ARP configuration, etc.
 - ARP statistics
- **Changes since -03 (IETF 106)**
 - Editorial improvements to YANG module, security sections
 - New co-authors

```
module: ietf-arp
  +--rw arp
    +--rw dynamic-learning?   boolean

  augment /if:interfaces/if:interface/ip:ipv4:
    +--rw arp
      +--rw expiry-time?      uint32
      +--rw dynamic-learning?  boolean
      +--rw proxy-arp
        | +--rw mode?         enumeration
      +--rw gratuitous-arp
        | +--rw enable?       boolean
        | +--rw interval?     uint32
      +--ro statistics
        +--ro in-requests-pkts?   yang:counter32
        +--ro in-replies-pkts?    yang:counter32
        +--ro in-gratuitous-pkts?  yang:counter32
        +--ro out-requests-pkts?   yang:counter32
        +--ro out-replies-pkts?    yang:counter32
        +--ro out-gratuitous-pkts? yang:counter32
    augment /if:interfaces/if:interface/ip:ipv4/ip:neighbor:
      +--ro remaining-expiry-time?  uint32
```

Gaps in the IPv6 Missing Part

- *draft-ietf-rtgwg-arp-yang-model* can **NOT** provide support for IPv6 address resolution
- **Protocols:** IPv6 Neighbor Discovery (ND) published in RFC 4861 & Duplicate Address Detection (DAD) published in RFC 4862
- **Existing YANG definitions**
 - **RFC8344:** *ietf-ip.yang* covers basic **dynamic and static IPv6 Neighbor Cache** entries and **DAD** on an interface
 - *leaf forwarding* defines IsRouter flag, *list neighbor* defines Neighbor Cache
 - *leaf dup-addr-detect-transmits* defines the number of consecutive NSs of DAD
 - **RFC8349:** *ietf-ipv6-router-advertisements.yang* only covers **Router Advertisement** [RFC 4861]

Design of IPv6 ND YANG model

- This document defines YANG data model "**ietf-nd**" to configure and manage IPv6 Neighbor Discovery (ND), which covers:
 - IPv6 Address Resolution
 - Proxy Neighbor Advertisement
 - Neighbor Unreachability Detection (NUD)
 - DAD
 - ND Statistics

YANG Module "ietf-nd"

■ ND configuration

- global configuration
- per interface ND configuration: augments "ipv6" of *ietf-ip.yang*

■ Related Features

- Neighbor Cache entry
- dynamic IPv6 address resolution
- NUD
- DAD
- proxy Neighbor Advertisement
- ND Statistics

```
module: ietf-nd
+--rw nd
  +--rw stale-timeout?  uint32
  augment /if:interfaces/if:interface/ip:ipv6:
    +--rw nd
      +--rw dynamic-discovery?  boolean
      +--rw nud?                 boolean
      +--rw reachable-time?     uint32
      +--rw ns-interval?        uint32
      +--rw stale-timeout?     uint32
      +--rw proxy-na
      | +--rw inter-vlan-proxy?  boolean
      | +--rw all-proxy?        boolean
      +--ro statistics
        +--ro in-ns-pkts?      yang:counter32
        +--ro in-na-pkts?     yang:counter32
        +--ro in-rs-pkts?     yang:counter32
        +--ro in-ra-pkts?     yang:counter32
        +--ro out-ns-pkts?    yang:counter32
        +--ro out-na-pkts?    yang:counter32
        +--ro out-rs-pkts?    yang:counter32
        +--ro out-ra-pkts?    yang:counter32
    augment /if:interfaces/if:interface/ip:ipv6/ip:neighbor:
      +--ro age?  uint32
```

Next steps

- Comments are welcome
- Request WG adoption of *draft-zhang-rtgwg-ipv6-address-resolution-yang*

Thanks!

YANG excerpts

RFC8344: A YANG Data Model for IP Management

```
module: ietf-ip
  augment /if:interfaces/if:interface:
    +--rw ipv6!
      +--rw enabled?          boolean
      +--rw forwarding?      boolean
      ...
    +--rw neighbor* [ip]
      | +--rw ip                inet:ipv6-address-no-zone
      | +--rw link-layer-address yang:phys-address
      | +--ro origin?          neighbor-origin
      | +--ro is-router?       empty
      | +--ro state?           enumeration
    +--rw dup-addr-detect-transmits? uint32
    +--rw autoconf
      ...
```

RFC8349: A YANG Data Model for Routing Management

```
module: ietf-ipv6-unicast-routing
  augment /if:interfaces/if:interface/ip:ipv6:
    +--rw ipv6-router-advertisements
      +--rw send-advertisements?    boolean
      +--rw max-rtr-adv-interval?   uint16
      +--rw min-rtr-adv-interval?   uint16
      +--rw managed-flag?           boolean
      +--rw other-config-flag?      boolean
      +--rw link-mtu?               uint32
      +--rw reachable-time?         uint32
      +--rw retrans-timer?          uint32
      +--rw cur-hop-limit?          uint8
      +--rw default-lifetime?       uint16
      +--rw prefix-list
      ...
```