


A YANG Data Model for NTP

draft-wu-ntp-ntp-cfg-03



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Introduction

Yang
Data
Model

Management of
NTP demon –
client and server

Configurations
State

NTP as per RFC
5905

Most features
of NTPv4 are
covered

Recent Changes

Yang tree rearranged as per NMDA

- Network Management Datastore Architecture
- [draft-ietf-netmod-revised-datastores-02](#)

NTP Interface

- Corrections in Yang

Use of presence

Yang Data-type correction

Removed auto-key

- As per WG feedback

Yang tree rearranged

- As per NMDA (Network Management Datastore Architecture)
 - *draft-ietf-netmod-revised-datastores-02*
 - Guidelines to Yang Authors - *draft-dsdt-nmda-guidelines*
 - *Separating operational state from configuration in a separate branch in the data model has been found operationally complicated, and typically impacts the readability of module.*
- Changes
 - Clock state is moved before association
 - Leafs of “associations-status” container are merged with “associations” container

```
+-ro clock-state
+-ro system-status
+-ro clock-state?      ntp-clock-status
+-ro clock-stratum?   ntp-stratum
+-ro clock-refid?     union
+-ro nominal-freq?    decimal64
+-ro actual-freq?     decimal64
+-ro clock-precision? uint8
+-ro clock-offset?    decimal64
+-ro root-delay?      decimal64
+-ro root-dispersion? decimal64
+-ro peer-dispersion? decimal64
+-ro reference-time?  yang:date-and-time
+-ro sync-state?      ntp-sync-state
+-rw associations* [address association-type]
+-rw address           inet:host
+-rw association-type  association-modes
+-rw authentication
+-rw (authentication-type)?
+--:(symmetric-key)
+-rw key-id?          leafref
+-rw prefer?          boolean
+-rw burst?            boolean
+-rw iburst?           boolean
+-rw source?           if:interface-ref
+-rw minpoll?          ntp-minpoll
+-rw maxpoll?          ntp-maxpoll
+-rw port?             uint16
+-rw version?          ntp-version
+-ro stratum?          ntp-stratum
+-ro refid?            union
+-ro reach?            uint8
+-ro unreachable?     uint8
+-ro poll?             uint8
+-ro now?              uint32
+-ro offset?           decimal64
+-ro delay?            decimal64
+-ro dispersion?       decimal64
+-ro originate-time?  yang:date-and-time
+-ro receive-time?    yang:date-and-time
+-ro transmit-time?   yang:date-and-time
+-ro input-time?      yang:date-and-time
+-ro ntp-statistics
+-ro packet-sent?      yang:counter32
+-ro packet-sent-fail? yang:counter32
+-ro packet-received?  yang:counter32
+-ro packet-dropped?  yang:counter32
```

NTP Interface

Broadcast Server

- Used 'Presence' for this container
- Properties could be set

Broadcast Client

- Used 'Presence' for this container

Multicast Server

- Used 'list' to allow multiple multicast address
- Properties could be set

Multicast Client

- Used 'list' to allow multiple multicast address

Manycast server

- Used 'list' to allow multiple multicast address

Manycast Client

- Used 'list' to allow multiple multicast address
- Properties could be set

```
+--rw interface
+--rw interface* [interface]
+--rw interface if:interface-ref
+--rw broadcast-server!
+--rw ttl? uint8
+--rw authentication
|   +--rw (authentication-type)?
|   +--:(symmetric-key)
|   +--rw key-id? leafref
+--rw minpoll? ntp-minpoll
+--rw maxpoll? ntp-maxpoll
+--rw port? uint16
+--rw version? ntp-version
+--rw broadcast-client!
+--rw multicast-server* [address]
+--rw address
|   rt-types:ip-multicast-group-address
+--rw ttl? uint8
+--rw authentication
|   +--rw (authentication-type)?
|   +--:(symmetric-key)
|   +--rw key-id? leafref
+--rw minpoll? ntp-minpoll
+--rw maxpoll? ntp-maxpoll
+--rw port? uint16
+--rw version? ntp-version
+--rw multicast-client* [address]
+--rw address rt-types:ip-multicast-group-address
+--rw manycast-server* [address]
+--rw address rt-types:ip-multicast-group-address
+--rw manycast-client* [address]
+--rw address
|   rt-types:ip-multicast-group-address
+--rw authentication
|   +--rw (authentication-type)?
|   +--:(symmetric-key)
|   +--rw key-id? leafref
+--rw ttl? uint8
+--rw minclock? uint8
+--rw maxclock? uint8
+--rw beacon? uint8
+--rw minpoll? ntp-minpoll
+--rw maxpoll? ntp-maxpoll
+--rw port? uint16
+--rw version? ntp-version
```

Use of “presence”

- The presence of the container itself is configuration data.
- The container acts as both a configuration knob and a means of organizing related configuration.
- Broadcast client/server node
 - Removed the extra field
- Refclock-master node
 - Removed the extra field
- Authentication node
 - Incorrect usage of presence in authentication node
 - Authentication keys can be configured without enabling the authentication.

```
+--rw broadcast-server!  
| +--rw ttl?          uint8  
| +--rw authentication  
| | +--rw (authentication-type)?  
| | | +--:(symmetric-key)  
| | | | +--rw key-id?  leafref  
| +--rw minpoll?     ntp-minpoll  
| +--rw maxpoll?     ntp-maxpoll  
| +--rw port?        uint16  
| +--rw version?     ntp-version  
+--rw broadcast-client!  
+--rw multicast-server* [address]  
| +--rw address
```

```
+--rw ntp!  
| +--rw port?          uint16  
| +--rw refclock-master!  
| | +--rw master-stratum? ntp-stratum  
| +--rw authentication  
| | +--rw auth-enabled?  boolean  
| | +--rw trusted-keys* [key-id]  
| | | +--rw key-id  leafref  
| | +--rw authentication-keys* [key-id]  
| | | +--rw key-id  uint32  
| | | +--rw algorithm? identityref  
| | | +--rw password? ianach:crypt-hash  
+--rw access-rules  
| +--rw access-rule* [access-mode]
```

Yang Data-type correction

- Address data-type is changed -
 - from inet:ip-address
 - to **rt-types:ip-multicast-group-address**
 - for multicast and manycast client/server

```
++-rw interface
++-rw interface* [interface]
++-rw interface if:interface-ref
++-rw broadcast-server!
++-rw ttl? uint8
++-rw authentication
|   +-rw (authentication-type)?
|   +--:(symmetric-key)
|       +-rw key-id? leafref
++-rw minpoll? ntp-minpoll
++-rw maxpoll? ntp-maxpoll
++-rw port? uint16
++-rw version? ntp-version
++-rw broadcast-client!
++-rw multicast-server* [address]
++-rw address
|   rt-types:ip-multicast-group-address
++-rw ttl? uint8
++-rw authentication
|   +-rw (authentication-type)?
|   +--:(symmetric-key)
|       +-rw key-id? leafref
++-rw minpoll? ntp-minpoll
++-rw maxpoll? ntp-maxpoll
++-rw port? uint16
++-rw version? ntp-version
++-rw multicast-client* [address]
++-rw address rt-types:ip-multicast-group-address
++-rw manycast-server* [address]
++-rw address rt-types:ip-multicast-group-address
++-rw manycast-client* [address]
++-rw address
|   rt-types:ip-multicast-group-address
++-rw authentication
|   +-rw (authentication-type)?
|   +--:(symmetric-key)
|       +-rw key-id? leafref
++-rw ttl? uint8
++-rw minclock? uint8
++-rw maxclock? uint8
++-rw beacon? uint8
++-rw minpoll? ntp-minpoll
++-rw maxpoll? ntp-maxpoll
++-rw port? uint16
++-rw version? ntp-version
```

Yang Data-type correction (continue ...)

- Date and Time
 - Data-type of originate-time, receive-time, transmit-time, input-time and reference-time is changed from string to **yang:date-and-time**
- Counters
 - Data-type of packet statistic is changed from uint32 to **yang:counter32**

```

+--ro clock-state
+--ro system-status
+--ro clock-state?          ntp-clock-status
+--ro clock-stratum?       ntp-stratum
+--ro clock-refid?         union
+--ro nominal-freq?        decimal64
+--ro actual-freq?         decimal64
+--ro clock-precision?     uint8
+--ro clock-offset?        decimal64
+--ro root-delay?          decimal64
+--ro root-dispersion?     decimal64
+--ro peer-dispersion?     decimal64
+--ro reference-time?      yang:date-and-time
+--ro sync-state?          ntp-sync-state
+--rw associations* [address association-type]
+--rw address               inet:host
+--rw association-type      association-modes
+--rw authentication
+--rw (authentication-type)?
+--:(symmetric-key)
+--rw key-id?               leafRef
+--rw prefer?               boolean
+--rw burst?                boolean
+--rw iburst?               boolean
+--rw source?               if:interface-ref
+--rw minpoll?              ntp-minpoll
+--rw maxpoll?              ntp-maxpoll
+--rw port?                 uint16
+--rw version?              ntp-version
+--ro stratum?              ntp-stratum
+--ro refid?                union
+--ro reach?                uint8
+--ro unreachable?         uint8
+--ro poll?                 uint8
+--ro now?                  uint32
+--ro offset?               decimal64
+--ro delay?                decimal64
+--ro dispersion?           decimal64
+--ro originate-time?       yang:date-and-time
+--ro receive-time?         yang:date-and-time
+--ro transmit-time?        yang:date-and-time
+--ro input-time?           yang:date-and-time
+--ro ntp-statistics
+--ro packet-sent?          yang:counter32
+--ro packet-sent-fail?     yang:counter32
+--ro packet-received?      yang:counter32
+--ro packet-dropped?       yang:counter32

```


Removed auto-key

- Authentication mode
 - Auto-key is removed
 - *As per the feedback from the WG during the Chicago meeting*

```
+--rw authentication
  |--rw auth-enabled?          boolean
  |--rw trusted-keys* [key-id]
  |   |--rw key-id             leafref
  |--rw authentication-keys* [key-id]
  |   |--rw key-id             uint32
  |   |--rw algorithm?         identityref
  |   |--rw password?          ianach:crypt-hash
+--rw access-rules
  |--rw access-rule* [access-mode]
```

Next Step

- Call for work group adoption!
- More reviews
 - Review comments are always welcome!



Thank You!

NTP Yang

```
module: ietf-ntp
  +-rw ntp!
  | +-rw port? uint16
  | +-rw refclock-master!
  | | +-rw master-stratum? ntp-stratum
  | +-rw authentication
  | | +-rw auth-enabled? boolean
  | | +-rw trusted-keys* [key-id]
  | | | +-rw key-id leafref
  | | +-rw authentication-keys* [key-id]
  | | | +-rw key-id uint32
  | | | +-rw algorithm? identityref
  | | | +-rw password? ianach:crypt-hash
  | +-rw access-rules
  | | +-rw access-rule* [access-mode]
  | | | +-rw access-mode access-modes
  | | | +-rw acl? -> /acl:access-lists/acl/acl-name
  +-ro clock-state
  | +-ro system-status
  | | +-ro clock-state? ntp-clock-status
  | | +-ro clock-stratum? ntp-stratum
  | | +-ro clock-refid? union
  | | +-ro nominal-freq? decimal64
  | | +-ro actual-freq? decimal64
  | | +-ro clock-precision? uint8
  | | +-ro clock-offset? decimal64
  | | +-ro root-delay? decimal64
  | | +-ro root-dispersion? decimal64
  | | +-ro peer-dispersion? decimal64
  | | +-ro reference-time? yang:date-and-time
  | | +-ro sync-state? ntp-sync-state
```

```
  +-rw associations* [address association-type]
  | +-rw address inet:host
  | +-rw association-type association-modes
  | +-rw authentication
  | | +-rw (authentication-type)?
  | | | +--:(symmetric-key)
  | | | | +-rw key-id? leafref
  | | +-rw minpoll? ntp-minpoll
  | | +-rw maxpoll? ntp-maxpoll
  | | +-rw port? uint16
  | | | +-rw key-id? leafref
  | | +-rw prefer? boolean
  | | +-rw burst? boolean
  | | +-rw iburst? boolean
  | | +-rw source? if:interface-ref
  | | +-rw minpoll? ntp-minpoll
  | | +-rw maxpoll? ntp-maxpoll
  | | +-rw port? uint16
  | | +-rw version? ntp-version
  | +-ro stratum? ntp-stratum
  | +-ro refid? union
  | +-ro reach? uint8
  | +-ro unreach? uint8
  | +-ro poll? uint8
  | +-ro now? uint32
  | +-ro offset? decimal64
  | +-ro delay? decimal64
  | +-ro dispersion? decimal64
  | +-ro originate-time? yang:date-and-time
  | +-ro receive-time? yang:date-and-time
  | +-ro transmit-time? yang:date-and-time
  | +-ro input-time? yang:date-and-time
  +-ro ntp-statistics
  | +-ro packet-sent? yang:counter32
  | +-ro packet-sent-fail? yang:counter32
  | +-ro packet-received? yang:counter32
  | +-ro packet-dropped? yang:counter32
```

```
  +-rw interface* [interface]
  | +-rw interface if:interface-ref
  | +-rw broadcast-server!
  | | +-rw ttl? uint8
  | | +-rw authentication
  | | | +-rw (authentication-type)?
  | | | | +--:(symmetric-key)
  | | | | | +-rw key-id? leafref
  | | +-rw minpoll? ntp-minpoll
  | | +-rw maxpoll? ntp-maxpoll
  | | +-rw port? uint16
  | | +-rw version? ntp-version
  | +-rw broadcast-client!
  | +-rw multicast-server* [address]
  | | +-rw address
  | | | rt-types:ip-multicast-group-address
  | | +-rw ttl? uint8
  | | +-rw authentication
  | | | +-rw (authentication-type)?
  | | | | +--:(symmetric-key)
  | | | | | +-rw key-id? leafref
  | | +-rw minpoll? ntp-minpoll
  | | +-rw maxpoll? ntp-maxpoll
  | | +-rw port? uint16
  | | +-rw version? ntp-version
  | +-rw multicast-client* [address]
  | | +-rw address rt-types:ip-multicast-group-address
  | | +-rw manycast-server* [address]
  | | | +-rw address rt-types:ip-multicast-group-address
  | | +-rw manycast-client* [address]
  | | | +-rw address
  | | | | rt-types:ip-multicast-group-address
  | | +-rw authentication
  | | | +-rw (authentication-type)?
  | | | | +--:(symmetric-key)
  | | | | | +-rw key-id? leafref
  | | +-rw ttl? uint8
  | | +-rw minclock? uint8
  | | +-rw maxclock? uint8
  | | +-rw beacon? uint8
  | | +-rw minpoll? ntp-minpoll
  | | +-rw maxpoll? ntp-maxpoll
  | | +-rw port? uint16
  | | +-rw version? ntp-version
  +-ro ntp-statistics
  | +-ro packet-sent? yang:counter32
  | +-ro packet-sent-fail? yang:counter32
  | +-ro packet-received? yang:counter32
  | +-ro packet-dropped? yang:counter32
```