Extensible YANG Model for YANG-Push Notifications

I-D: draft-ietf-netconf-notif-envelope-03

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Extensible YANG model for YANG-Push Notifications

Status of the draft

- Draft under WGLC since **28th August** [1]
  - Extended WGLC to facilitate early reviews by OPSDIR and YANGDOCTORS
  - YANGDOCTOR review by Jürgen Schönwälder: "**Almost Ready**"
  - OPSDIR review by Joe Clarke: "**Has Issues**"
- WGLC forwarded to CORE WG for review
  - No feedback received from CORE WG yet
- Received reviews from Paul Aitken, Qin Wu, Rob Wilton, Reshad Rahman, Jürgen Schönwälder and Joe Clark
  - Thanks a lot for the reviews!
- 2 last-minute "open discussions"

[1] https://mailarchive.ietf.org/arch/msg/netconf/V0awk3huXZg7V_DIQn5fFNn5kvo/

Extensible YANG model for YANG-Push Notifications

Changes since -02

- Editorial changes fixing ambiguity
- Fixed XML/JSON/CBOR examples
- Removed “The 'contents' element MUST be located at the end of the notification envelope structure.”
- Removed references
  - RFC3339 (Timestamps) → Rely on ietf-yang-types@2025-06-23.yang for the compliance with RFC3339 and RFC9557 (Timestamps with Additional Information)
  - RFC1213 (MIB, for the definition of sysName) → Rely on ietf-yang-types@2025-06-23.yang for the newly defined “type inet:host-name”
- Changed “type inet:hostname” to “type inet:host-name” for the definition of a hostname
- New text: “The hostname MUST be configured before by the administrator to identify the node uniquely.”
- Made .sid file normative
- New YANG features:
  - “feature notification-envelope”: Support of the notif-envelope
  - “feature hostname-sequence-number”: Support of the hostname and sequence number

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Last minute discussion (1)

- Reshad suggested changing “timestamp” to “observed-timestamp”

(Current version & position from the authors)

Proposal from Reshad

Reasons in favor of “observed-timestamp”:

- XML readability

Arguments against “observed-timestamp”:

- draft-ietf-netmod-rfc8407bis-28#section-4.3.1 states that the name should not be repeated within a container

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Last minute discussion (2)

- Current:
  - Toggling “enable-notification-envelope” kills all the active subscriptions (both dynamic and configured)
- Joe Clarke (OPSDIR review) proposes to
  - Enable toggling “enable-notification-envelope” **only** if all active subscriptions are terminated (less disruptive)

```
When active subscriptions exist, the 'enable-notification-envelope'
node MUST NOT be modified until all such subscriptions have been
terminated.  The publisher MUST reject any attempt to change the
'enable-notification-envelope' node while active subscriptions are
actively sending notifications.  Any new subscription after the
change uses the header defined by the node 'enable-notification-
envelope', i.e. encoded as Section 3.3.1 when enabled and as defined
in [RFC5277] if disabled.
```

Proposal from the authors

Extensible YANG model for YANG-Push Notifications

Next steps

- OPSDIR review
- Send to the IESG for publication

BACKUP

Extensible YANG model for YANG-Push Notifications

Proposal of this I-D

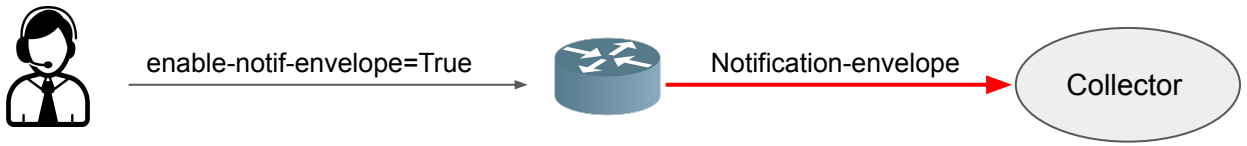
- Structure defined as a notification containing
  - event-time
  - metadata(s)
  - contents

```
structure envelope:
  +-- event-time          yang:date-and-time
  +-- hostname?           inet:host
  +-- sequence-number?    yang:counter32
  +-- contents?           <anydata>
```

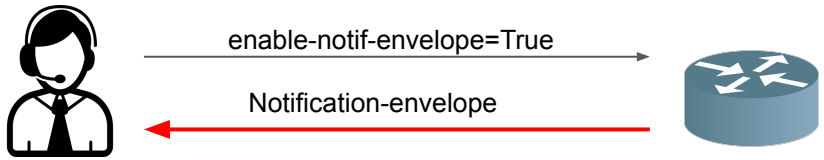
```
{
    "ietf-yp-notification:envelope": {
        "event-time": "2024-10-10T08:00:11.22Z",
        "contents": {
          "ietf-yang-push:push-update": {
              "id": 1011,
              "datastore-contents": {
                  "ietf-interfaces:interfaces": [
                      {
                          "interface": {
                              "name": "eth0",
                              "oper-status": "up"
                          }
                      }
                  ]
              }
          }
        }
    }
}
```

JSON example without metadata

Configured Subscriptions



Dynamic Subscriptions



Extensible YANG model for YANG-Push Notifications

Proposal of this I-D

- YANG Notification structure for YANG-Push Notifications [RFC 8639/8641]
  - (1) Option to “opt-in” to this notification envelope
  - (2) Able to discover the capability of this new header through “ietf-notification-capabilities”
  - (3) Extensible header defined in YANG 1.1
  - (4) Definition of each encoding (XML, JSON, CBOR)
  - (5) Defines the first base extensions (I-D.tgraf-netconf-notif-sequencing; I-D.tgraf-netconf-yang-push-observation-time)

Extensible YANG model for YANG-Push Notifications

Reminder on current proposal

- Initial proposal was centralizing requests via an RPC call
  - Feedback: complex to manage
- Current proposal:
  - Switch headers using “/sn:subscriptions/inotenv:enable-notification-envelope”

```
module: ietf-yp-notification

  augment /sn:subscriptions:
    +--rw enable-notification-envelope?   boolean
    +--rw metadata
```

- When switching this node, existing Subscriptions are tore down:

```
When there are existing subscriptions and a client changes the node
'enable-notification-envelope', all existing subscriptions MUST be
terminated.  The publisher MUST send a 'subscription-terminated'
notification to all the existing subscriptions using the header
configured prior to the change.  Any new subscription after the
change use the header defined by the node 'enable-notification-
envelope', i.e. encoded as Section 3.3.1 when enabled and as defined
in [RFC5277] if disabled.
```

YANG model for NETCONF Event Notifications

Interim 2024-09-19 – draft-ahuang-netconf-notif-yang

- https://datatracker.ietf.org/doc/minutes-interim-2024-netconf-02-202409191300/
- Thorough review of draft-ahuang-netconf-notif-yang/YANG-Push/NETCONF Event Notifications

- Conclusion
  - draft-ahuang-netconf-notif-yang fixes a **gap** for YANG-Push but might be worth putting the effort on a brand new header
  - We need:
    - Bypass RFC5277, thus use YANG-Push only
    - Extensible header
      - be able to add new metadata (sequencing, versioning, others…)
    - A client should be able to “opt-in”
      - Clients that don’t support this new header should continue working seamlessly
    - The notification should be a YANG-based solution
    - Fix JSON and CBOR underspecification
      - including CBOR-SID allocation

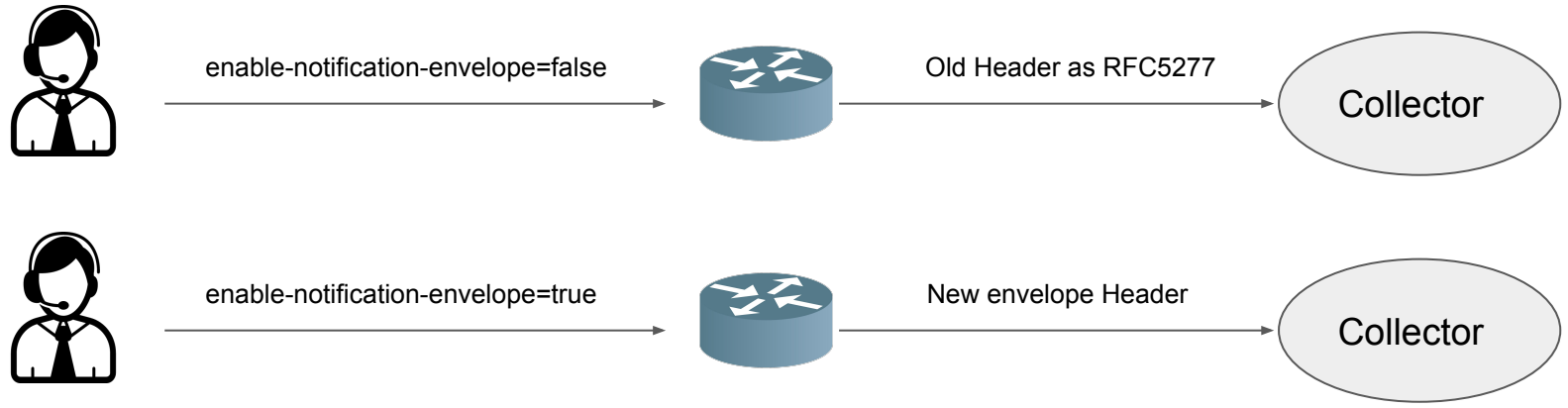
Extensible YANG model for YANG-Push Notifications

(1) Option to “opt-in” through a YANG-Push Subscription

- Configuration on Globally on the server via the RPC “enable-notif-envelope”

```
rpcs:
  +---x enable-notif-envelope
     +---w input
        +---w enable-notification-envelope?   boolean
        +---w metadata
```

Currently Default=False



Extensible YANG model for YANG-Push Notifications

(2) Able to discover the capability of this new header

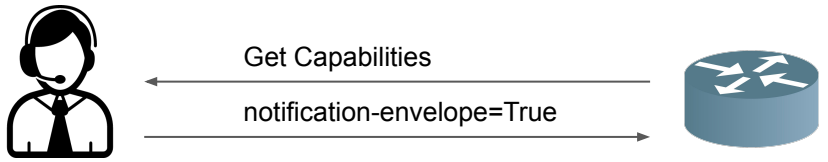
- Augmentation on notification capabilities (RFC9196)

```
module: ietf-yp-notification

  augment /sn:subscriptions:
    +--ro enable-notification-envelope?   boolean
    +--ro metadata
  augment /sysc:system-capabilities/notc:subscription-capabilities:
    +--ro notification-metadata
       +--ro notification-envelope?   boolean
       +--ro metadata
          +--ro hostname-sequence-number?   boolean
```

```
module: ietf-yp-observation

  augment /yp:push-update:
    +--ro timestamp?          yang:date-and-time
    +--ro point-in-time?      enumeration
  augment /yp:push-change-update:
    +--ro timestamp?          yang:date-and-time
    +--ro point-in-time?      enumeration
  augment /sysc:system-capabilities/notc:subscription-capabilities:
    +--ro yang-push-observation-supported?
            inotifseq:notification-support
            {yang-push-observation-timestamp}?
```



Extensible YANG model for YANG-Push Notifications

(3) Extensible header defined in YANG

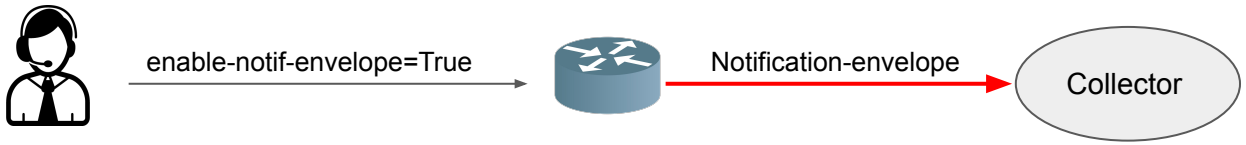
- Structure defined as a notification containing
  - event-time
  - metadata(s)
  - notification-contents

```
structure envelope:
  +-- event-time              yang:date-and-time
  +-- hostname?               inet:host
  +-- sequence-number?        yang:counter32
  +-- notification-contents?  <anydata>
```

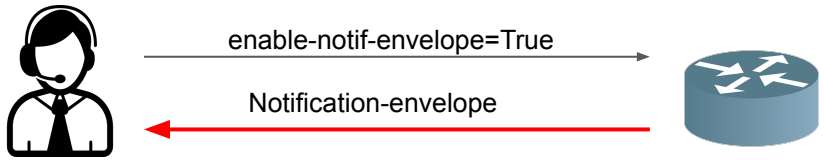
```
{
    "ietf-yp-notification:envelope": {
        "event-time": "2024-10-10T08:00:11.22Z",
        "notification-contents": {
          "ietf-yang-push:push-update": {
              "id": 1011,
              "datastore-contents": {
                  "ietf-interfaces:interfaces": [
                      {
                          "interface": {
                              "name": "eth0",
                              "oper-status": "up"
                          }
                      }
                  ]
              }
          }
    }
}
```

JSON example without metadata

Configured Subscriptions



Dynamic Subscriptions



Extensible YANG model for YANG-Push Notifications

(4) Definition of each encoding (XML, JSON, CBOR)

- Explicit definition of the content of the “envelope” (solving gap for JSON and CBOR)
  - Definition of the namespace (urn:ietf:params:xml:ns:netconf:notification:2.0)
  - Mandatory event-time node
  - Mandatory notification-contents node
  - Metadata present when configured

A YANG notification encoded in XML is structured as a root "envelope" container. The namespace of this container is the namespace defined in the YANG module "ietf-yp-notification":

urn:ietf:params:xml:ns:netconf:notification:2.0

Two mandatory child nodes within the "envelope" container are expected, representing the event time and the notification payload. The "event-time" node is defined within the same XML namespace as the "envelope" container. The "event-time" node MUST be compliant with [RFC3339]. Other metadata defined within the YANG module defined in Section 5 MUST use the same XML namespace. See Section 3.4 for more details.

Extensible YANG model for YANG-Push Notifications

(5) Extensions for hostname and sequence-number

- Definition of hostname and sequence-number extensions (draft-tgraf-netconf-notif-sequencing)
  - Present by default when the envelope is enabled
  - Discovery of support of this header through RFC9196

```
structure envelope:
  +-- event-time              yang:date-and-time
  +-- hostname?               inet:host
  +-- sequence-number?        yang:counter32
  +-- notification-contents?  <anydata>
```

```
{
    "ietf-yp-notification:envelope": {
    "event-time": "2023-03-25T08:30:11.22Z",
    "hostname": "example-router",
    "sequence-number": 1,
    "notification-contents": {
      "ietf-yang-push:push-update": {
        "id": 6666,
        "datastore-contents": {
          "ietf-interfaces:interfaces": [
            {
              "interface": {
                "name": "eth0",
                "type": "iana-if-type:ethernetCsmacd",
                "oper-status": "up",
                "mtu": 1500
              }
            }
          ]
        }
      }
    }
  }
}
```