

Extensible YANG Model for YANG-Push Notifications

I-D: draft-netana-netconf-notif-envelope-00

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Extensible YANG model for YANG-Push Notifications

- YANG Notification structure for YANG-Push Notifications
 - (1) Option to “opt-in” through a YANG-Push Subscription
 - (2) Able to discover the capability of this new header through “ietf-notification-capabilities”
 - (3) Extensible header defined in YANG
 - (4) Definition of each encoding (XML, JSON, CBOR)
 - (5) Extensions for hostname and sequence-number included (I-D.tgraf-netconf-notif-sequencing)

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

YANG model for NETCONF Event Notifications

Problem statement - (draft-ahuang-netconf-notif-yang)

```
<notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
  <eventTime>2022-09-02T10:59:55.32Z</eventTime>
  <push-update xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-push">
    <id>101</id>
    <datastore-contents>
      <interfaces xmlns="urn:ietf:params:xml:ns:yang:ietf-interfaces">
        <interface>
          <name>eth0</name>
          <oper-status>up</oper-status>
        </interface>
      </interfaces>
    </datastore-contents>
  </push-update>
</notification>
```

```
{
  "ietf-notification:notification": {
    "eventTime": "2017-10-25T08:00:11.22Z",
    "ietf-yang-push:push-update": {
      "id": 1011,
      "datastore-contents": {
        "ietf-interfaces:interfaces": [
          "interface": {
            "name": "eth0",
            "oper-status": "up"
          }
        ]
      }
    }
  }
}
```

RFC 5277 - Netconf Event Notifications

RFC 8641 - YANG Push

YANG encodings:

- RFC 7950 - YANG XML
- RFC 7951 - YANG JSON
- RFC 9254 - YANG CBOR

Implementation Issues:

(1) YANG module not defined

(2) Non-existing Normative text defining this header

Extensible YANG model for YANG-Push Notifications

Proposal (comments)

- As requested
 - Scoped to YANG-Push (both dynamic and configured subscriptions)
 - Can be implemented with NETCONF and RESTCONF
 - Use a “notification” statement rather than a “sx:structure”
 - Given that is for YANG-Push, the following notifications are impacted:
 - push-update; push-change-update
 - subscription-started; subscription-modified; subscription-terminated
 - subscription-suspended; subscription-resumed; subscription-completed
 - replay-completed

Extensible YANG model for YANG-Push Notifications

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

- Configuration on a per-subscription basis

```
module: ietf-notification-container

  augment /sn:subscriptions/sn:subscription:
    +--rw enable-notification-envelope?  boolean {notification-envelope}?
    +--rw metadata
  augment /sn:establish-subscription/sn:input:
    +---w enable-notification-envelope?  boolean {notification-envelope}?
    +---w metadata
  augment /sn:modify-subscription/sn:input:
    +---w enable-notification-envelope?  boolean {notification-envelope}?
    +---w metadata
```

Currently
Default=False



enable-notification-envelope=false



Old Header as RFC5277

Collector



enable-notification-envelope=true



New envelope Header

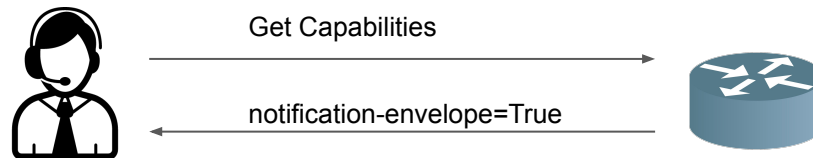
Collector

Extensible YANG model for YANG-Push Notifications

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

- Augmentation on notification capabilities (RFC9196)

```
augment /sysc:system-capabilities/notc:subscription-capabilities:  
  +--ro notification-metadata  
    +--ro notification-envelope?  boolean {notification-envelope}?  
    +--ro metadata
```



Extensible YANG model for YANG-Push Notifications

(3) Extensible header defined in YANG

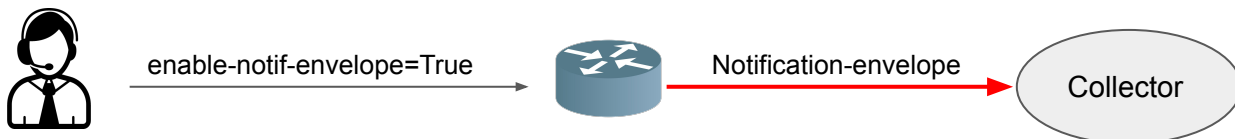
- Structure defined as a notification containing
 - event-time
 - metadata(s)
 - notification-contents

```
notifications:
  +---n envelope
    +---ro event-time          yang:date-and-time
    +---ro notification-contents? <anydata>
```

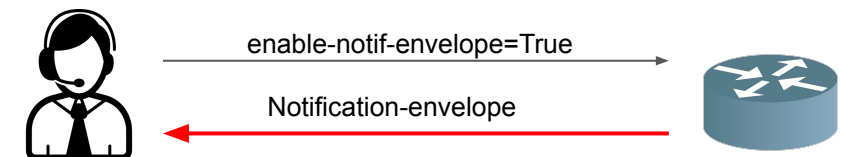
```
{
  "ietf-yp-notification:envelope": {
    "event-time": "2024-10-10T08:00:11.22Z",
    "notification-contents": {
      "ietf-yang-push:push-update": {
        "id": 1011,
        "datastore-contents": {
          "ietf-interfaces:interfaces": [
            {
              "interface": {
      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

```
notifications:
  +---n envelope
    +--ro event-time          yang:date-and-time
    +--ro hostname?          inet:host
    |      {notification-hostname-sequence-number}?
    +--ro sequence-number?   yang:counter32
    |      {notification-hostname-sequence-number}?
    +--ro 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
              }
            }
          ]
        }
      }
    }
  }
}
```

Extensible YANG model for YANG-Push Notifications

Discussion and open issues

- Is this approach the way to go?
- All the YANG notifications or only YANG-Push Notifications?
- Should this notification be defined as a “notification” or as a “sx:structure”?
- XML namespace: which one to use?
 - urn:ietf:params:xml:ns:netconf:notification:2.0 → following RFC5277
 - urn:ietf:params:xml:ns:yang:ietf-yp-notification → following YANG guidelines
- Which extensions should be added?
 - Enabled by default when the envelope is enabled?
 - YANG versioning? [draft-ietf-netconf-yang-notifications-versioning (*currently adopted*)]
 - Observation time? [draft-tgraf-netconf-yang-push-observation-time]
 - Some of the extensions only impact a subset of YANG-Push notifications
 - How to deal with this?

BACKUP