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## **Support of Versioning in YANG Notifications Subscription**

### **Abstract**

This document extends the YANG notifications subscription mechanism to specify the YANG module semantic version at the subscription. Then, a new extension with the revision and the semantic version of the YANG push subscription state change notification is proposed.

### **Requirements Language**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

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## 1. Introduction

In order to process the received YANG push notification messages described in section 3.7 of [RFC8641] at the YANG push receiver, a semantic reference to the YANG module and the XPath or subtree is needed to determine the data types for each field and which part of the YANG module the metrics are expose from.

This specification applies to the YANG push configured subscriptions defined in Section 2.5 of [RFC8639], where a publisher is configured to stream notification out of band, as opposed to dynamic subscriptions defined in Section 2.4 of [RFC8639], where the subscriber can initiate and modify the subscription dynamically in-band. In the latter case, the subscriber knows already all the subscriber YANG-related information, which it has to know in order to configure the subscription.

This semantic reference is available when the subscription is being establish as described in Section 3.6 of [RFC8641] and being streamed from the publisher to receiver with the subscription state change notifications described in Section 2.7 of [RFC8639] where for each subscription a locally unique subscription ID described in Section 4.3.2 of [RFC8641] is being issued and streamed as metadata with the notification message in the YANG push message header.

The semantics can change between different YANG module revisions. The YANG module version statement is specified in Section 7.1.2 of [RFC6020] and states that the newer revision needs to be backward compatible to the previous revision. Section 3.1 of [I-D.ietf-netmod-yang-module-versioning] specifies that newer semantic versions introduced in [I-D.ietf-netmod-yang-semver] MAY not be backward compatible to the previous version when indicated with non-backwards-compatible keyword.

The YANG notifications subscription mechanism defined in [\[RFC8641\]](#) does not allow to specify the YANG module revision. When a network node is upgraded, the subscribed YANG module revision MAY have updated and might, consequently, break the data processing pipeline since the YANG push receiver may not be aware of this change.

This documents extends the current YANG notifications subscription mechanism to allow to subscribe to a specific revision or latest YANG module semantic version to which the YANG module version needs to be backward compatible to. The subscription state change "subscription-started" and "subscription-modified" notification messages are also extended to include the revision and semantic version.

## 2. Extend the Datastore Selection

The YANG notifications subscription OPTIONALLY can be restricted to the following YANG module revision for future capabilities:

**latest:** Restricts the subscription to the latest YANG module revision.

**revision:** Restricts the subscription to a specific YANG module revision. Example: "2014-05-08".

**latest-compatible-semversion:** Restricts the subscription to the latest compatible YANG module semantic version referenced to. Example: "2.0.0".

If nothing is specified, latest YANG module version is implied.

## 3. Extend the Subscription State Change Notifications

Besides the Subscription ID and the xpath or sub-tree filter reference as described in Section 2.7 of [\[RFC8639\]](#), the following metadata objects are part of a "subscription-started" or "subscription-modified" subscription state change notification.

**revision:** Describes the YANG module revision as specified in Section 7.1.9 of [\[RFC6020\]](#) for the related streamed content.

**revision-label:** Describes the YANG module semantic version as specified in [\[I-D.ietf-netmod-yang-semver\]](#) for the related streamed content.

[Figure 1](#) provides an example of a "subscription-modified" subscription state change notification message with the YANG revision, revision label and datastore-xpath-filter for tracking the operational status of a single Ethernet interface (per [\[RFC8343\]](#)). This subscription state change notification message is encoded XML [\[W3C.REC-xml-20081126\]](#) over the Network Configuration Protocol (NETCONF) as per [\[RFC8640\]](#).

```

<notification xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
  <eventTime>2023-01-03T10:00:00Z</eventTime>
  <subscription-modified
    xmlns="urn:ietf:params:xml:ns:yang:ietf-subscribed-notifications">
    <id>101</id>
    <revision>2014-05-08</revision>
    <revision-label>1.0.0</revision-label>
    <stream-xpath-filter xmlns:int="urn:ietf:params:xml:ns:yang:ietf-int
      /int:interfaces
    </stream-xpath-filter>
    <stream>NETCONF</stream>
  </subscription-modified>
</notification>

```

Figure 1: XML Push Example for a subscription-modified notification message

Figure 2 provides an example of a JSON encoded, [\[RFC8259\]](#), subscription state change notification message over HTTPS-based [\[I-D.ietf-netconf-https-notif\]](#) or UDP-based [\[I-D.ietf-netconf-udp-notif\]](#) transport for the same subscription.

```

{
  "ietf-restconf:notification" : {
    "eventTime": "2023-01-03T10:00:00Z",
    "ietf-subscribed-notifications:subscription-modified": {
      "id": 101,
      "revision": "2014-05-08",
      "revision-label": "1.0.0",
      "stream-xpath-filter": "/ietf-interfaces:interfaces",
      "stream": {
        "ietf-netconf-subscribed-notifications" : "NETCONF"
      }
    }
  }
}

```

Figure 2: JSON Push Example for a subscription-modified notification message

## 4. The "ietf-yang-push-revision" Module

### 4.1. Data Model Overview

This YANG module augments the "ietf-yang-push" module with the revision and revision-label in the "subscription-started" and "subscription-modified" subscription state change notifications and the ability to define the "revision" and "revision-label" in the "establish-subscription" and "modify-subscription" RPCs in the datastore push subscription.

#### 4.1.1. Tree View

The following is the YANG tree diagram [\[RFC8340\]](#) for the ietf-yang-push-revision YANG module

```
module: ietf-yang-push-revision
```

```
augment /sn:establish-subscription/sn:input/sn:target:
  +--rw revision?          rev:revision-date-or-label
  +-- revision-label?     ysver:version
augment /sn:modify-subscription/sn:input/sn:target:
  +--rw revision?          rev:revision-date-or-label
  +-- revision-label?     ysver:version
augment /sn:subscription-started/sn:target:
  +--ro revision           rev:revision-date-or-label
  +-- revision-label?     ysver:version
augment /sn:subscription-modified/sn:target:
  +--ro revision           rev:revision-date-or-label
  +-- revision-label?     ysver:version
augment /sn:subscriptions/sn:subscription/sn:target:
  +--ro revision           rev:revision-date-or-label
  +--rw revision-label?   ysver:version
```

#### 4.1.2. Full Tree View

The following is the YANG tree diagram [[RFC8340](#)] for the ietf-yang-push-revision augmentation within the ietf-subscribed-notifications, including the RPCs and notifications.

```
pyang -f tree ietf-yang-push-revision.yang ietf-yang-revisions.yang ietf-  
ietf-yang-push-revision.yang:118 (at ietf-yang-push-revision.yang:88): e  
module: ietf-subscribed-notifications
```

```
+--ro streams  
| +--ro stream* [name]  
|   +--ro name string  
|   +--ro description? string  
|   +--ro replay-support? empty {replay}?  
|   +--ro replay-log-creation-time yang:date-and-time {replay}?  
|   +--ro replay-log-aged-time? yang:date-and-time {replay}?  
+--rw filters  
| +--rw stream-filter* [name]  
|   +--rw name string  
|   +--rw (filter-spec)?  
|     +--:(stream-subtree-filter)  
|       | +--rw stream-subtree-filter? <anydata> {subtree}?  
|     +--:(stream-xpath-filter)  
|       | +--rw stream-xpath-filter? yang:xpath1.0 {xpath}?  
+--rw subscriptions  
  +--rw subscription* [id]  
    +--rw id subscription-id  
    +--rw (target)  
      +--:(stream)  
        | +--rw (stream-filter)?  
        | | +--:(by-reference)  
        | | | +--rw stream-filter-name stream-filter-r  
        | | | +--:(within-subscription)  
        | | | +--rw (filter-spec)?  
        | | |   +--:(stream-subtree-filter)  
        | | |     | +--rw stream-subtree-filter? <anydata> {subt  
        | | |     +--:(stream-xpath-filter)  
        | | |       +--rw stream-xpath-filter? yang:xpath1.0 {  
        | | +--rw stream stream-ref  
        | | +--ro replay-start-time? yang:date-and-t  
        | | +--rw configured-replay? empty {configur  
        | +--:(yfm:revision)  
        | | +--ro yfm:revision rev:revision-da  
        | +--:(yfm:revision-label)  
        | | +--rw yfm:revision-label? ysver:version  
    +--rw stop-time? yang:date-and-t  
    +--rw dscp? inet:dscp {dscp  
    +--rw weighting? uint8 {qos}?  
    +--rw dependency? subscription-id  
    +--rw transport? transport {conf  
    +--rw encoding? encoding  
    +--rw purpose? string {configu  
    +--rw (notification-message-origin)? {configured}?  
      +--:(interface-originated)  
      | +--rw source-interface? if:interface-re  
      +--:(address-originated)  
      | +--rw source-vrf? -> /ni:network-  
      | +--rw source-address? inet:ip-address  
    +--ro configured-subscription-state? enumeration {co  
    +--rw receivers  
      +--rw receiver* [name]  
        +--rw name string  
        +--ro sent-event-records? yang:zero-based-counter64  
        +--ro excluded-event-records? yang:zero-based-counter64
```

```

+--ro state enumeration
+---x reset {configured}?
  +--ro output
    +--ro time yang:date-and-time

```

rpcs:

```

+---x establish-subscription
| +---w input
| | +---w (target)
| | | +--:(stream)
| | | | +---w (stream-filter)?
| | | | | +--:(by-reference)
| | | | | +---w stream-filter-name stream-filter
| | | | | +--:(within-subscription)
| | | | | +---w (filter-spec)?
| | | | | | +--:(stream-subtree-filter)
| | | | | | +---w stream-subtree-filter? <anydata> {su
| | | | | | +--:(stream-xpath-filter)
| | | | | | +---w stream-xpath-filter? yang:xpath1.0
| | | | | +---w stream stream-ref
| | | | | +---w replay-start-time? yang:date-and
| | | | +--:(yym:revision)
| | | | | +---w yym:revision? rev:revision-
| | | | +--:(yym:revision-label)
| | | | | +---w yym:revision-label? ysver:version
| | | +---w stop-time? yang:date-and
| | | +---w dscp? inet:dscp {ds
| | | +---w weighting? uint8 {qos}?
| | | +---w dependency? subscription-
| | | +---w encoding? encoding
| +--ro output
| | +--ro id subscription-id
| | +--ro replay-start-time-revision? yang:date-and-time {replay
+---x modify-subscription
| +---w input
| | +---w id subscription-
| | +---w (target)
| | | +--:(stream)
| | | | +---w (stream-filter)?
| | | | | +--:(by-reference)
| | | | | +---w stream-filter-name stream-filter
| | | | | +--:(within-subscription)
| | | | | +---w (filter-spec)?
| | | | | | +--:(stream-subtree-filter)
| | | | | | +---w stream-subtree-filter? <anydata> {su
| | | | | | +--:(stream-xpath-filter)
| | | | | | +---w stream-xpath-filter? yang:xpath1.0
| | | | | +---w (yym:revision)
| | | | | | +---w yym:revision? rev:revision-
| | | | | +--:(yym:revision-label)
| | | | | | +---w yym:revision-label? ysver:version
| | | +---w stop-time? yang:date-and
+---x delete-subscription
| +---w input
| | +---w id subscription-id
+---x kill-subscription
  +---w input
  | +---w id subscription-id

```

notifications:

```
+---n replay-completed {replay}?
| +--ro id      subscription-id
+---n subscription-completed {configured}?
| +--ro id      subscription-id
+---n subscription-modified
| +--ro id      subscription-id
| +--ro (target)
| | +--:(stream)
| | | +--ro (stream-filter)?
| | | | +--:(by-reference)
| | | | | +--ro stream-filter-name      stream-filter-re
| | | | | +--:(within-subscription)
| | | | | +--ro (filter-spec)?
| | | | | +--:(stream-subtree-filter)
| | | | | | +--ro stream-subtree-filter? <anydata> {subtr
| | | | | | +--:(stream-xpath-filter)
| | | | | | +--ro stream-xpath-filter?  yang:xpath1.0 {x
| | | | | +--ro stream                  stream-ref
| | | | +--ro replay-start-time?       yang:date-and-ti
| | | +--:(ypm:revision)
| | | | +--ro ypm:revision              rev:revision-dat
| | | +--:(ypm:revision-label)
| | | | +--ro ypm:revision-label?      ysver:version
| +--ro stop-time?                    yang:date-and-ti
| +--ro dscp?                         inet:dscp {dscp}
| +--ro weighting?                    uint8 {qos}?
| +--ro dependency?                   subscription-id
| +--ro transport?                    transport {confi
| +--ro encoding?                     encoding
| +--ro purpose?                       string {configur
+---n subscription-resumed
| +--ro id      subscription-id
+---n subscription-started {configured}?
| +--ro id      subscription-id
| +--ro (target)
| | +--:(stream)
| | | +--ro (stream-filter)?
| | | | +--:(by-reference)
| | | | | +--ro stream-filter-name      stream-filter-re
| | | | | +--:(within-subscription)
| | | | | +--ro (filter-spec)?
| | | | | +--:(stream-subtree-filter)
| | | | | | +--ro stream-subtree-filter? <anydata> {subtr
| | | | | | +--:(stream-xpath-filter)
| | | | | | +--ro stream-xpath-filter?  yang:xpath1.0 {x
| | | | | +--ro stream                  stream-ref
| | | | +--ro replay-start-time?       yang:date-and-ti
| | | | +--ro replay-previous-event-time? yang:date-and-ti
| | | +--:(ypm:revision)
| | | | +--ro ypm:revision              rev:revision-dat
| | | +--:(ypm:revision-label)
| | | | +--ro ypm:revision-label?      ysver:version
| +--ro stop-time?                    yang:date-and-ti
| +--ro dscp?                         inet:dscp {dscp}
| +--ro weighting?                    uint8 {qos}?
| +--ro dependency?                   subscription-id
```



```
| +--ro transport?          transport {confi
| +--ro encoding?          encoding
| +--ro purpose?           string {configur
+---n subscription-suspended
| +--ro id                  subscription-id
| +--ro reason              identityref
+---n subscription-terminated
  +--ro id                  subscription-id
  +--ro reason              identityref
```

## 4.2. YANG Module

The YANG module has two leaves augmenting the model of [Subscription to YANG Notifications](#) [[RFC8639](#)].

```

<CODE BEGINS> file "ietf-yang-push-revision@2023-01-12.yang"

module ietf-yang-push-revision {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-yang-push-revision";
  prefix ypm;
  import ietf-subscribed-notifications {
    prefix sn;
    reference
      "RFC 8639: Subscription to YANG Notifications";
  }
  import ietf-yang-revisions {
    prefix rev;
    reference
      "RFC XXXX: draft-ietf-netmod-yang-module-versioning-06, Updated YA
      Module Revision Handling";
  }
  import ietf-yang-semver {
    prefix ysver;
    reference
      "RFC XXXX: draft-ietf-netmod-yang-semver-08, YANG Semantic Version
  }

  organization "IETF NETCONF (Network Configuration) Working Group";
  contact
    "WG Web: <http://tools.ietf.org/wg/netconf/>
    WG List: <mailto:netconf@ietf.org>

    Authors: Thomas Graf
             <mailto:thomas.graf@swisscom.com>
             Benoit Claise
             <mailto:benoit.claise@huawei.com>
             Alex Huang Feng
             <mailto:alex.huang-feng@insa-lyon.fr>";

  description
    "Defines YANG push event notification header with the revision and
    the revision-label. Adds the support of the revision and
    revision-label selection in the YANG push subscription RPCs.

    Copyright (c) 2023 IETF Trust and the persons identified as
    authors of the code. All rights reserved.

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    modification, is permitted pursuant to, and subject to the license
    terms contained in, the Revised BSD License set forth in Section
    4.c of the IETF Trust's Legal Provisions Relating to IETF Documents
    (https://trustee.ietf.org/license-info).

    This version of this YANG module is part of RFC XXXX; see the RFC
    itself for full legal notices.";

  revision 2023-01-12 {
    description
      "First revision";
    reference
      "RFC XXXX: Support of Versioning in YANG Notifications Subscriptio

```

```

}

feature yang-push-revision-supported {
  description
    "This feature indicates the YANG Subscription Notifications support
    the revision and revision-label defined in this YANG module.";
}

grouping yang-push-module-version-config {
  description
    "This grouping combines the revision and revision-label leaves, with
    the revision being configurable.";
  leaf revision {
    type rev:revision-date-or-label;
    description
      "This references the YANG module revision to be sent in the subscription";
  }
  leaf revision-label {
    type ysver:version;
    description
      "This references the YANG module semversion to be sent in the subscription";
  }
}

grouping yang-push-module-version {
  description
    "This grouping combines the revision and revision-label leaves, with
    the revision being non configurable.";
  leaf revision {
    type rev:revision-date-or-label;
    config false;
    mandatory true;
    description
      "This references the YANG module revision of the sent notification";
  }
  leaf revision-label {
    type ysver:version;
    description
      "This references the YANG module semversion of the sent notification";
  }
}

// Subscription parameters
augment "/sn:establish-subscription/sn:input/sn:target" {
  description
    "Augment the establish-subscription RPC from the ietf-subscribed-notifications
    YANG module with the yang-push-module-version-config grouping.";
  uses ypm:yang-push-module-version-config;
}
augment "/sn:modify-subscription/sn:input/sn:target" {
  description
    "Augment the modify-subscription RPC from the ietf-subscribed-notifications
    YANG module with the yang-push-module-version-config grouping.";
  uses ypm:yang-push-module-version-config;
}

// Subscription notifications
augment "/sn:subscription-started/sn:target" {

```

```
description
    "Augment the subscription-started RPC from the ietf-subscribed-not
    YANG module with the yang-push-module-version grouping.";
    uses ypm:yang-push-module-version;
}
augment "/sn:subscription-modified/sn:target" {
description
    "Augment the subscription-modified RPC from the ietf-subscribed-no
    YANG module with the yang-push-module-version grouping.";
    uses ypm:yang-push-module-version;
}

// Subscription container
augment "/sn:subscriptions/sn:subscription/sn:target" {
description
    "Augment the subscriptions RPC from the ietf-subscribed-notificati
    YANG module with the yang-push-module-version grouping.";
    uses ypm:yang-push-module-version;
}
}

<CODE ENDS>
```

## 5. Security Considerations

The security considerations for the YANG notifications subscription mechanism are described in [RFC8641]. This document adds no additional security considerations.

## 6. IANA Considerations

This document has no IANA actions.

## 7. Acknowledgements

The authors would like to thank xxx for their review and valuable comments.

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