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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 new metadata of the YANG push update notification header 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 [\[RFC8641\]](#), 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 during the subscription period described in Section 3.6 of [\[RFC8641\]](#) 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. This implies that the YANG receiver needs to lookup the subscription inventory for a subscription ID in each notification message to determine the YANG module name, namespace, and filter definitions.

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 semantic version to which the YANG module version needs to be backward compatible to and advertises its specific YANG module revision inband. Besides the existing Subscription ID, the YANG module name, namespace, revision and filtering metadata is added to the YANG push notification header to lift the YANG push receiver need to lookup the subscription inventory information.

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 Metadata in Streaming Update

Along with the subscribed content, besides the Subscription ID, the following metadata objects are part of a "push-update" or "push-change-update" notification.

module: Describes the YANG module name for the related streamed content.

namespace: Describes the YANG module namespace as specified in Section 7.1.3 of [[RFC6020](#)] for the related streamed content.

revision: Describes the YANG module revision as specified in Section 7.1.2 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.

datastore-xpath-filter:

Describes the YANG module xpath filter as specified in Section 6.4 of [[RFC6020](#)] for the related streamed content.

datastore-subtree-filter: Describes the YANG module subtree filter as specified in Section 6 of [[RFC6241](#)] for the related streamed content.

Figure 1 provides an example of a notification message with the YANG module name, revision, revision label and datastore-xpath-filter for a subscription tracking the operational status of a single Ethernet interface (per [[RFC8343](#)]). This 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>2022-09-02T10:59:55.32Z</eventTime>
  <push-update xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-push">
    <id>101</id>
    <module>ietf-interfaces</module>
    <namespace>urn:ietf:params:xml:ns:yang:ietf-interfaces</namespace>
    <revision>2014-05-08</revision>
    <revision-label>1.0.0</revision-label>
    <datastore-xpath-filter>ietf-interfaces:interfaces</datastore-xpath-f
    <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>
```

Figure 1: XML Push Example for a Periodical Notification Message

Figure 2 provides an example of a JSON encoded, [[RFC8259](#)], 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-notification:notification": {
    "eventTime": "2022-09-02T10:59:55.32Z",
    "ietf-yang-push:push-update": {
      "id": 101,{
        "module": "ietf-interfaces",{
          "namespace": "urn:ietf:params:xml:ns:yang:ietf-interfaces",{
            "revision": "2014-05-08",{
              "revision-label": "1.0.0",{
                "datastore-xpath-filter": "ietf-interfaces:interfaces",
                "datastore-contents": {
                  "ietf-interfaces:interface": {
                    "name": {
                      "eth0": {
                        "oper-status": "up",
                      }
                    }
                  }
                }
              }
            }
          }
        }
      }
    }
  }
}

```

Figure 2: JSON Push Example for a Periodical Notification Message

4. The "ietf-yang-push-metadata" Module

4.1. Data Model Overview

This YANG module augments the "ietf-yang-push" module to add subscription metadata into the "push-update" and "push-change-update" notification and the ability to define the "revision" and "revision-label" in the "establish-subscription" and "modify-subscription" in the datastore push subscription.

module: ietf-yang-push-metadata

```
augment /yp:push-update:
  +--ro module?                string
  +--ro namespace?            string
  +--ro revision?              rev:revision-date-or-label
  +--ro revision-label?        ysver:version
  +--ro datastore-xpath-filter? yang:xpath1.0 {sn:xpath}?
  +--ro datastore-subtree-filter? <anydata> {sn:subtree}?
augment /yp:push-change-update:
  +--ro module?                string
  +--ro namespace?            string
  +--ro revision?              rev:revision-date-or-label
  +--ro revision-label?        ysver:version
  +--ro datastore-xpath-filter? yang:xpath1.0 {sn:xpath}?
  +--ro datastore-subtree-filter? <anydata> {sn:subtree}?
augment /sn:establish-subscription/sn:input/sn:target:
  +-- revision?                rev:revision-date-or-label
  +-- revision-label?          ysver:version
augment /sn:modify-subscription/sn:input/sn:target:
  +-- revision?                rev:revision-date-or-label
  +-- revision-label?          ysver:version
augment /sn:subscription-started/sn:target:
  +-- revision?                rev:revision-date-or-label
  +-- revision-label?          ysver:version
augment /sn:subscription-modified/sn:target:
  +-- revision?                rev:revision-date-or-label
  +-- revision-label?          ysver:version
augment /sn:subscriptions/sn:subscription/sn:target:
  +--rw revision?              rev:revision-date-or-label
  +--rw revision-label?        ysver:version
```

4.2. YANG Module

The YANG module has six leaves augmenting the model of [YANG-push \[RFC8641\]](#).

<CODE BEGINS> file "ietf-yang-push-metadata@2022-10-10.yang"

```
module ietf-yang-push-metadata {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-yang-push-metadata";
  prefix ypm;
  import ietf-yang-types {
    prefix yang;
    reference
      "RFC 6991: Common YANG Data Types";
  }
  import ietf-subscribed-notifications {
    prefix sn;
    reference
      "RFC 8639: Subscription to YANG Notifications";
  }
  import ietf-yang-push {
    prefix yp;
    reference
      "RFC 8641: Subscription to YANG Notifications for Datastore Update";
  }
  import ietf-yang-revisions {
    prefix rev;
    reference
      "RFC XXXX: draft-ietf-netmod-yang-module-versioning-06, Updated YANG
      Module Revision Handling";
  }
  import ietf-yang-semver {
    prefix ysver;
    reference
      "RFC XXXX: draft-ietf-netmod-yang-semver-07, YANG Semantic Versioning";
  }

  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 metadata."

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```

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

```
revision 2022-09-21 {
  description
    "First revision";
  reference
    "RFC XXXX: Support of Versioning in YANG Notifications Subscriptio
}
```

```
feature yang-push-metadata-supported {
  description
    "This feature indicates the YANG Notifications have the metadata
    defined in this YANG module.";
}
```

```
grouping yang-push-module-version {
  leaf revision {
    type rev:revision-date-or-label;
    description
      "This references the YANG module revision of the sent notificati
  }
  leaf revision-label {
    type ysver:version;
    description
      "This references the YANG module semversion of the sent notifica
  }
}
```

```
grouping yang-push-metadata {
  leaf module {
    type string;
    description
      "This references the YANG module of the sent notification.";
  }
  leaf namespace {
    type string;
    description
      "This references the YANG module namespace of the sent notificat
  }
}
```

```
uses ypm:yang-push-module-version;
```

```
leaf datastore-xpath-filter {
  type yang:xpath1.0;
  if-feature "sn:xpath";
  description
    "This references the YANG module xpath of the sent notification.
```



```

    }
    anydata datastore-subtree-filter {
        if-feature "sn:subtree";
        description
            "This references the YANG module subtree of the sent notificatio
    }
}
// Event notifications
augment "/yp:push-update" {
    description
        "This augmentation adds the module, the namespace, the revision, t
        semversion, the xpath and the subtree in the push-update notificat
        uses ypm:yang-push-metadata;
}

augment "/yp:push-change-update" {
    description
        "This augmentation adds the module, the namespace, the revision, t
        semversion, the xpath and the subtree in the push-change-update no
        uses ypm:yang-push-metadata;
}

// Subscription parameters
augment "/sn:establish-subscription/sn:input/sn:target" {
    uses ypm:yang-push-module-version;
}
augment "/sn:modify-subscription/sn:input/sn:target" {
    uses ypm:yang-push-module-version;
}

// Subscription notifications
augment "/sn:subscription-started/sn:target" {
    uses ypm:yang-push-module-version;
}
augment "/sn:subscription-modified/sn:target" {
    uses ypm:yang-push-module-version;
}

// Subscription container
augment "/sn:subscriptions/sn:subscription/sn:target" {
    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 documents adds no additional security considerations.

6. IANA Considerations

This document has no IANA actions.

7. Acknowledgements

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