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YangPush Notification Capabilities
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Abstract

This document proposes a YANG module that allows a YANG server to specify for which data nodes it will send "YANG Datastore Subscription" on-change notifications. It also proposes to use YANG Instance Data to document this information in implementation time.

Status of This Memo

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[1.](#) Terminology

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.

On-change Notification Capability: The capability of the YANG server to send on-change notifications on the change of the value for a specific data node.

Implementation-time information: Information about the YANG server's behavior that is made available during the implementation of the server, available from a source other than a running Yang server.

Runtime-information: Information about the YANG server's behavior that is available from the running YANG server via a protocol like NETCONF, RESTCONF or HTTPS.

[2.](#) Introduction

As defined in [[I-D.ietf-netconf-yang-push](#)] a YANG server may allow clients to subscribe to updates from a datastore and subsequently push such update notifications to the client. Notifications may be sent periodically or on-change (more or less immediately after each change).

In some cases, a publisher supporting on-change notifications will not be able to push updates for some object types on-change. Reasons

for this might be that the value of the datastore node changes frequently (e.g. in-octets counter), that small object changes are frequent and meaningless (e.g., a temperature gauge changing 0.1 degrees), or that the implementation is not capable of on-change notification for a particular object. In those cases, it will be important for client applications to have a way to identify for which objects on-change notifications are supported and for which ones are not supported.

Faced with the reality that support for on-change notification does not mean that such notifications will be sent for any specific data node, client/management applications can not rely on the on-change functionality unless the client has some means to identify for which objects on-change notifications are supported and for which ones are not supported. YANG models are meant to be used as an interface contract. Without identification of data nodes supporting on-change, this contract would only state the YANG server may (or may not) send on-change notifications for a data node specified in a YANG module.

This document proposes a YANG module that allows a client to identify which data nodes support on-change notification, removing the uncertainty for on-change notifications.

On-change Notification Capability information will be needed both in implementation-time and run-time.

Run-time information is needed

- o for any "purely model driven" client, e.g. a Netconf-browser. As long as it has a valid model, it does not care which data nodes send notification, it will just handle what's available.
- o to check that early implementation time information about the capability is indeed what the server supports
- o in case the capability might change during run-time e.g. due to licensing, HW constraints etc.

Implementation time information is needed by Network Management System (NMS) implementers. During NMS implementation for any functionality that depends on the notifications the information about on change notification capability is needed. If the information is not available early in some document, but only as instance data from the network node, the NMS implementation will be delayed, because it has to wait for the network node to be ready. Also assuming that all NMS implementers will have a correctly configured network node available to retrieve data from, is an expensive proposition. (An NMS may handle dozens of network node types.) Often a fully

functional NMS is a requirement for introducing a new network node type into a network, so delaying the NMS effectively delays the availability of the network node as well.

Implementation time information is needed by system integrators. System integrators will need information about on change notification capability early. When introducing a network node type into their network operators often need to integrate the node type into their own management system. The NMS may have management functions that depend on on-change notifications. The network operator needs to plan his management practices and NMS implementation before he even decides to buy the specific network node type. Moreover the decision to buy the node type sometimes depends on these management possibilities.

3. On-change Notification Capability Model

As described above a number of stakeholders need information about the on change notification capability both in implementation and run-time. It is a goal to provide this information in a format that is

- o vendor independent (standard)
- o formal (no freeform English text please)
- o the same both in implementation-time and run-time

The YANG module `ietf-notification-capabilities` is defined to provide information about the on-change notification capabilities. There is a default notification capability separately for `config false` and `config true` data nodes. There is also an `on-change-notification-capability` list containing a potentially different true/false notification capability for any data node in the schema tree. Unless a node is in the list with a specific capability value, it inherits its `on-change-notification-capability` from its parent in the data tree, or from the relevant default values.

The instance information SHALL be provided in two ways both following the `ietf-notification-capabilities` module:

- o It SHALL be provided by the implementer as YANG instance data file complying to the [[I-D.lengyel-netmod-yang-instance-data](#)]. The file SHALL be available already in implementation time retrievable in a way that does not depend on a live network node. E.g. download from product Website.
- o It SHALL be available via Netconf or Restconf from the live YANG server during runtime.

3.1. Tree Diagram

The following tree diagram [RFC8340] provides an overview of the data model.

```
module: ietf-notification-capabilities
  +--ro on-change-notification-capability
    +--ro notification-sent-for-config-default?  boolean
    +--ro notification-sent-for-state-default?   boolean
    +--ro on-change-notification-capability* [node-selector]
      +--ro node-selector                      nacm:node-instance-identifier
      +--ro on-change-notification-sent        boolean
```

3.2. YANG Module

```
<CODE BEGINS> file "ietf-notification-capabilities.yang"
```

```
module ietf-notification-capabilities {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-notification-capabilities";
  prefix inc;

  import ietf-netconf-acm { prefix nacm; }

  organization
    "IETF NETCONF (Network Configuration) Working Group";

  contact
    "WG Web:  <https://datatracker.ietf.org/wg/netconf/>
     WG List: <mailto:netconf@ietf.org>

     WG Chair: Kent Watsen
               <mailto:kwatsen@juniper.net>

     WG Chair: Mahesh Jethanandani
               <mailto:mjethanandani@gmail.com>

     Editor:   Balazs Lengyel
               <mailto:balazs.lengyel@ericsson.com>";
```

```
description "This module specifies for which data nodes will the
  YANG server send on-change notifications.
```

On-change notification capability is marked as true or false.
This marking is inherited from the parent down the data tree
unless explicitly marked otherwise.

On-change notifications SHALL be sent for a config=true data node if one of the following is true:

- it is specified in the on-change-notification-capability list and has a on-change-notification-sent value true or
- notifications are sent for its parent data node and it is not specified in the on-change-notification-capability list or
- if it is a top level data-node and is not specified in the on-change-notification-capability list and the notification-sent-for-config-default is true.

On-change notifications SHALL be sent for a config=false data node if one of the following is true:

- it is specified in the on-change-notification-capability list and has an on-change-notification-sent value true or
- notifications are sent for its parent data node which is also config=false and it is not specified in the on-change-notification-capability list or
- if it is a top level data-node or has a config=true parent data node and is not specified in the on-change-notification-capability list and the notification-sent-for-state-default is true.

";

reference "RFC XXXX Yang-Push";

```
revision 2018-07-02 {  
  description "Initial version";  
  reference  
    "RFC XXX: YangPush Notification Capabilities";  
}
```

```
container on-change-notification-capability {  
  config false;  
  description "Contains default values for the  
    on-change-notifiction-capability and a list of data nodes that  
    have the on-change-notification-capability specifically defined.";
```

```
  leaf notification-sent-for-config-default {  
    type boolean;  
    default true;  
    description "Specifies the default value for  
      top level configuration data nodes for the  
      on-change-notification-sent capability.";  
  }
```

```
  leaf notification-sent-for-state-default {  
    type boolean;  
    default false;
```



```
    description "Specifies the default value
      top level state data nodes for the
      on-change-notification-sent capability.";
  }

  list on-change-notification-capability {
    key node-selector ;
    description "A list of data nodes that have the
      on-change-notification-capability specifically defined.

      Should be used when specific data nodes support
      on-change notification in a module/subtree that
      generally does not support it or when some data nodes
      do not support the notification in a module/subtree
      that generally supports on-change notifications.";

    leaf node-selector {
      type nacm:node-instance-identifier;
    }

    leaf on-change-notification-sent {
      type boolean;
      mandatory true;
      description "Specifies whether the YANG server will
        send on-change notifications for the selected
        data nodes.";
    }
  }
}
```

<CODE ENDS>

4. Security Considerations

The YANG module defined in this document is designed to be accessed via YANG based management protocols, such as NETCONF and RESTCONF. Both of these protocols have mandatory-to- implement secure transport layers (e.g., SSH, TLS) with mutual authentication.

The NETCONF access control model (NACM) provides the means to restrict access for particular users to a pre-configured subset of all available protocol operations and content.

5. IANA Considerations

5.1. The IETF XML Registry

This document registers one URI in the IETF XML registry [[RFC3688](#)]. Following the format in [[RFC3688](#)], the following registrations are requested:

URI: urn:ietf:params:xml:ns:yang:ietf-notification-capabilities
Registrant Contact: The NETCONF WG of the IETF.
XML: N/A, the requested URI is an XML namespace.

5.2. The YANG Module Names Registry

This document registers one YANG module in the YANG Module Names registry [[RFC7950](#)]. Following the format in [[RFC7950](#)], the the following registrations are requested:

name: ietf-notification-capabilities
namespace: urn:ietf:params:xml:ns:yang:ietf-notification-capabilities
prefix: inc
reference: RFC XXXX

6. Open Issues

Do we need separate defaults/individual lists for every datastore?
Proposal: no, it would be an overkill.

Should type nacm:node-instance-identifier be moved to yang-types?
It is useful for more then just nacm.

7. References

7.1. Normative References

- [I-D.ietf-netconf-yang-push]
Clemm, A., Voit, E., Prieto, A., Tripathy, A., Nilsen-Nygaard, E., Bierman, A., and B. Lengyel, "YANG Datastore Subscription", [draft-ietf-netconf-yang-push-17](#) (work in progress), July 2018.
- [I-D.lengyel-netmod-yang-instance-data]
Lengyel, B. and B. Claise, "YANG Instance Data Files and their use for Documenting Server Capabilities", [draft-lengyel-netmod-yang-instance-data-02](#) (work in progress), July 2018.

- [RFC7950] Bjorklund, M., Ed., "The YANG 1.1 Data Modeling Language", [RFC 7950](#), DOI 10.17487/RFC7950, August 2016, <<https://www.rfc-editor.org/info/rfc7950>>.

7.2. Informative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.
- [RFC8340] Bjorklund, M. and L. Berger, Ed., "YANG Tree Diagrams", [BCP 215](#), [RFC 8340](#), DOI 10.17487/RFC8340, March 2018, <<https://www.rfc-editor.org/info/rfc8340>>.

Appendix A. Changes between revisions

v01 - v02

- o Instead of augmenting ietf-yang-library a more simple standalone model is proposed.

v00 - v01

- o Corrections
- o Augment only the new yanglib
- o Correct the condtions for notifying state data

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