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YANG Notification Transport Capabilities
draft-ietf-netconf-yp-transport-capabilities-05

Abstract

This document specifies a YANG module for YANG notifications transport capabilities which augments the notification capabilities model. The module provides transport protocol, transport encoding, and transport encryption system capabilities for transport-specific notification. This YANG module can be used by the client to learn capability information from the server at runtime or at implementation time, by making use of the YANG instance data file format.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 18 December 2025.

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1. Introduction

The "ietf-system-capabilities" YANG module defined in [RFC9196] allows a client to discover a set of capabilities supported by a server (including, basic system capabilities and YANG-Push related capabilities) both at implementation time and at runtime. These capabilities allow a client to adjust its behavior to take advantage of the features exposed by the server.

However, clients and servers may still support various different transport specific parameters (e.g., transport protocol, encoding format or encryption). As described in Section 3.2 of [RFC8641]. A simple negotiation (e.g., inserting hints into error responses to a failed RPC request) between subscribers and publishers for subscription parameters increases the likelihood of success for

subsequent RPC requests, but not guaranteed and widely supported, which may cause unexpected failure or additional message exchange between client and server.

This document defines a more deterministic solution that relies upon a YANG module for YANG notifications transport capabilities that is built on top of [RFC9196]. The module can be used by a client to discover capability information from a server at runtime or at implementation time, by making use of the YANG instance data file format.

1.1. 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.

The terms "subscriber", "publisher", and "receiver" are used as defined in [RFC8639].

The terms "client", and "server" are used as defined in [RFC8342].

2. Capabilities for Systems and Datastore Update Notifications

Section 3.1 of [RFC8641] lists the server capabilities related to YANG-Push that are supported in the YANG module "ietf-notification-capabilities".

These server capabilities are transport independent, session level capabilities. They can be provided either at the implementation time or reported at runtime.

This document provides additional transport related attributes associated with system capabilities:

* Specification of transport protocols that a client can request to establish an HTTPS-based [I-D.ietf-netconf-https-notif] or UDP-based [I-D.ietf-netconf-udp-notif] configured transport connection.

* Specification of transport encoding, including JSON or XML as defined in [RFC8040] or CBOR as defined in [RFC9254] the client can request to encode YANG notifications;

* Specification of secure transport mechanisms that are needed by a client to communicate with a server including DTLS 1.2 [RFC6347], DTLS 1.3 [RFC9147], TLS 1.2 [RFC5246], TLS 1.3 [RFC8446].

* To that end, the model defined in this document augments the System Capabilities model[RFC9196].

2.1. Tree Diagram

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

```
module: ietf-yp-transport-capabilities

  augment /sysc:system-capabilities/notc:subscription-capabilities:
    +--ro transport-capabilities
       +--ro transport-capability* [transport-protocol]
          +--ro transport-protocol    identityref
          +--ro security-protocol*    union
          +--ro encoding-format*      identityref
```

3. YANG Module

```
<CODE BEGINS> file "ietf-yp-transport-capabilities@2025-06-07.yang"
module ietf-yp-transport-capabilities {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-yp-transport-capabilities";
  prefix ntc;

  import ietf-subscribed-notifications {
    prefix sn;
    reference
      "RFC 8639: Subscription to YANG Notifications";
  }
  import ietf-system-capabilities {
    prefix sysc;
    reference
      "RFC 9196: YANG Modules Describing Capabilities for
       Systems and Datastore Update Notifications";
  }
  import ietf-notification-capabilities {
    prefix notc;
    reference
      "RFC 9196: YANG Modules Describing Capabilities for
       Systems and Datastore Update Notifications";
  }
  import ietf-tls-common {
```

```
      prefix tlscmn;
      reference
        "RFC 9645: YANG Groupings for TLS Clients and TLS Servers";
    }

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

       Authors:  Qin Wu
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    description
      "This module defines an extension to YANG-Push
       Notification Capabilities model that provides additional
       transport specific capabilities for YANG notifications.

       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 (RFC 2119) (RFC 8174) when, and only when,
       they appear in all capitals, as shown here.

       Copyright (c) 2025 IETF Trust and the persons identified as
       authors of the code.  All rights reserved.

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       without 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
       (http://trustee.ietf.org/license-info).

       This version of this YANG module is part of RFC XXXX
       (https://www.rfc-editor.org/info/rfcXXXX); see the RFC itself
       for full legal notices.";

    revision 2025-06-07 {
      description
        "Initial revision.";
      reference
```

```
      "RFC XXXX: YANG Notifications Transport Capabilities";
  }

  identity security-protocol {
    description
      "Identity for security protocols.";
  }

  identity dtls12 {
    base security-protocol;
    description
      "Indicates DTLS Protocol Version 1.2. DTLS 1.2 is obsolete,
       and thus it is NOT RECOMMENDED to enable this feature.";
    reference
      "RFC 6347: The Datagram Transport Layer Security (DTLS)
                 Protocol Version 1.2";
  }

  identity dtls13 {
    base security-protocol;
    description
      "Indicates DTLS Protocol Version 1.3.";
    reference
      "RFC 9147: The Datagram Transport Layer Security (DTLS)
                 Protocol Version 1.3";
  }

  augment "/sysc:system-capabilities"
        + "/notc:subscription-capabilities" {
    description
      "Adds system level capabilities.";
    container transport-capabilities {
      description
        "Specifies capabilities related to YANG-Push transports.";
      list transport-capability {
        key "transport-protocol";
        description
          "Indicates a list of capabilities related to notification
                  transport.";
        leaf transport-protocol {
          type identityref {
            base sn:transport;
          }
          description
            "Indicates supported transport protocol for YANG-Push.";
        }
        leaf-list security-protocol {
          type union {
```

```
                type identityref {
                  base security-protocol;
                }
                type identityref {
                  base tlscmn:tls-version-base;
                }
              }
              description
                "Indicates transport security protocol.";
            }
            leaf-list encoding-format {
              type identityref {
                base sn:encoding;
              }
              description
                "Indicates supported encoding formats.";
            }
          }
        }
      }
    }
    <CODE ENDS>
```

4. IANA Considerations

4.1. Updates to the IETF XML Registry

This document registers a URI in the "IETF XML Registry" [RFC3688]. Following the format in [RFC3688], the following registration has been made:

URI: urn:ietf:params:xml:ns:yang:ietf-yp-transport-capabilities
Registrant Contact: The IESG.
XML: N/A; the requested URI is an XML namespace.
Reference: RFC XXXX (RFC Ed.: replace XXX with actual RFC number and remove this note.)

4.2. Updates to the YANG Module Names Registry

This document registers one YANG module in the "YANG Module Names" registry [RFC6020]. Following the format in [RFC6020], the following registration has been made:

name: ietf-yp-transport-capabilities
namespace: urn:ietf:params:xml:ns:yang:ietf-yp-transport-capabilities
prefix: ntc
reference: RFC XXXX (RFC Ed.: replace XXX with actual RFC number and remove this note.)

5. Implementation Status

Note to the RFC-Editor: Please remove this section before publishing.

5.1. Huawei VRP

Huawei implemented this document for a YANG Push publisher in their VRP platform.

5.2. Cisco IOS XR

Cisco implemented this document for a YANG Push publisher in their IOS XR platform.

6. Security Considerations

This section is modeled after the template described in Section 3.7 of [I-D.ietf-netmod-rfc8407bis]

The "ietf-yp-transport-capabilities" YANG module defines a data model that is designed to be accessed via YANG-based management protocols, such as NETCONF [RFC6241] and RESTCONF [RFC8040]. These protocols have to use a secure transport layer (e.g., SSH [RFC4252], TLS [RFC8446], and QUIC [RFC9000]) and have to use mutual authentication.

The Network Configuration Access Control Model (NACM) [RFC8341] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

All protocol-accessible data nodes are read-only and cannot be modified. The data in the module is not security sensitive. It inherits all the security considerations of [RFC9196].

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Appendix A. Usage Example of interaction with UDP-Notif and HTTPS-Notif for Configured Subscription

The following instance-data example describes the notification transport capabilities of a hypothetical "acme-router".

```
   ================= NOTE: '\' line wrapping per RFC 8792 ==================

   <?xml version="1.0" encoding="UTF-8"?>
   <instance-data-set
     xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-instance-data"
     xmlns:hnt="urn:ietf:params:xml:ns:yang:ietf-https-notif-transport"
     xmlns:sn="urn:ietf:params:xml:ns:yang:ietf-subscribed-notifications"
     xmlns:tlscmn="urn:ietf:params:xml:ns:yang:ietf-tls-common"
     xmlns:tlscmn="urn:ietf:params:xml:ns:yang:ietf-tls-common"
     xmlns:unt="urn:ietf:params:xml:ns:yang:ietf-udp-notif-transport">
     <name>acme-router-notification-capabilities</name>
     <content-schema>
       <module>ietf-system-capabilities@2020-03-23</module>
       <module>ietf-notification-capabilities@2020-03-23</module>
       <module>ietf-yp-transport-capabilities@2025-06-07</module>
     </content-schema>
     <!-- revision date, contact, etc. -->
     <description>Server Capability Discovery</description>
     <content-data>
       <system-capabilities xmlns="urn:ietf:params:xml:ns:yang:ietf-system-\
         capabilities">
         <subscription-capabilities xmlns="urn:ietf:params:xml:ns:yang:ietf\
           -notification-capabilities">
           <transport-capabilities xmlns="urn:ietf:params:xml:ns:yang:ietf-\
             yp-transport-capabilities">
             <transport-capability>
               <transport-protocol>hnt:https</transport-protocol>
               <encoding-format>sn:encode-xml</encoding-format>
               <encoding-format>sn:encode-json</encoding-format>
               <security-protocol>tlscmn:tls12</security-protocol>
               <security-protocol>tlscmn:tls13</security-protocol>
             </transport-capability>
             <transport-capability>
               <transport-protocol>unt:udp-notif</transport-protocol>
               <encoding-format>sn:encode-json</encoding-format>
               <encoding-format>unt:encode-cbor</encoding-format>
               <security-protocol>dtls12</security-protocol>
               <security-protocol>dtls13</security-protocol>
             </transport-capability>
           </transport-capabilities>
         </subscription-capabilities>
       </system-capabilities>
     </content-data>
   </instance-data-set>
```

In addition, the client could also query notification transport capabilities from the server. For example, the client sends <get> request message to the the server to query from the server.

```
   ================= NOTE: '\' line wrapping per RFC 8792 ==================

   <rpc message-id="101"
     xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
     <get>
       <filter type="subtree">
         <system-capabilities xmlns="urn:ietf:params:xml:ns:yang:ietf-syste\
           m-capabilities">
           <subscription-capabilities xmlns="urn:ietf:params:xml:ns:yang:ie\
             tf-notification-capabilities">
             <transport-capabilities xmlns="urn:ietf:params:xml:ns:yang:iet\
               f-yp-transport-capabilities"/>
           </subscription-capabilities>
         </system-capabilities>
       </filter>
     </get>
   </rpc>
```

The server returns server data export capability using <rpc-reply> as follows:

```
   ================= NOTE: '\' line wrapping per RFC 8792 ==================

   <rpc-reply xmlns="urn:ietf:params:xml:ns:netconf:base:1.0"
     xmlns:sc="urn:ietf:params:xml:ns:yang:ietf-system-capabilities"
     xmlns:nc="urn:ietf:params:xml:ns:yang:ietf-notification-capabilities"
     xmlns:tc="urn:ietf:params:xml:ns:yang:ietf-yp-transport-capabilities"
     xmlns:hnt="urn:ietf:params:xml:ns:yang:ietf-https-notif-transport"
     xmlns:sn="urn:ietf:params:xml:ns:yang:ietf-subscribed-notifications"
     xmlns:unt="urn:ietf:params:xml:ns:yang:ietf-udp-notif-transport"
     xmlns:tlscmn="urn:ietf:params:xml:ns:yang:ietf-tls-common" message-id=\
     "101">
     <data>
       <sc:system-capabilities>
         <nc:subscription-capabilities>
           <transport-capabilities xmlns="urn:ietf:params:xml:ns:yang:ietf-\
             yp-transport-capabilities">
             <transport-capability>
               <transport-protocol>hnt:https</transport-protocol>
               <encoding-format>sn:encode-xml</encoding-format>
               <encoding-format>sn:encode-json</encoding-format>
               <security-protocol>tlscmn:tls12</security-protocol>
               <security-protocol>tlscmn:tls13</security-protocol>
             </transport-capability>
             <transport-capability>
               <transport-protocol>unt:udp-notif</transport-protocol>
               <encoding-format>sn:encode-json</encoding-format>
               <encoding-format>unt:encode-cbor</encoding-format>
               <security-protocol>dtls12</security-protocol>
               <security-protocol>dtls13</security-protocol>
             </transport-capability>
           </transport-capabilities>
         </nc:subscription-capabilities>
       </sc:system-capabilities>
     </data>
   </rpc-reply>
```

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