

NETCONF Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: January 4, 2021

Z. Wang  
Q. Wu  
Huawei  
P. Liu  
H. Cai  
China Mobile  
July 3, 2020

**Bulk Subscription to YANG Event Notification**  
**draft-wang-netconf-bulk-subscribed-notifications-02**

Abstract

This document defines a YANG data model and associated mechanism that allows subscriber applications to bulk subscribe to publishers' event streams based on bundle group information such as bundle size and bundle latency. This allows the publishers to report multiple notifications in a single bundling message.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on January 4, 2021.

Copyright Notice

Copyright (c) 2020 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must

include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction . . . . .</a>	<a href="#">2</a>
<a href="#">1.1.</a>	<a href="#">Terminology . . . . .</a>	<a href="#">3</a>
<a href="#">2.</a>	<a href="#">Model Overview . . . . .</a>	<a href="#">4</a>
<a href="#">3.</a>	<a href="#">Bulk Subscription YANG Module . . . . .</a>	<a href="#">5</a>
<a href="#">4.</a>	<a href="#">Bulk Notification YANG Module . . . . .</a>	<a href="#">9</a>
<a href="#">5.</a>	<a href="#">IANA Considerations . . . . .</a>	<a href="#">10</a>
<a href="#">5.1.</a>	<a href="#">Updates to the IETF XML Registry . . . . .</a>	<a href="#">10</a>
<a href="#">5.2.</a>	<a href="#">Updates to the YANG Module Names Registry . . . . .</a>	<a href="#">10</a>
<a href="#">6.</a>	<a href="#">Security Considerations . . . . .</a>	<a href="#">11</a>
<a href="#">7.</a>	<a href="#">Acknowledgements . . . . .</a>	<a href="#">11</a>
<a href="#">8.</a>	<a href="#">References . . . . .</a>	<a href="#">12</a>
<a href="#">8.1.</a>	<a href="#">Normative References . . . . .</a>	<a href="#">12</a>
<a href="#">8.2.</a>	<a href="#">Informative References . . . . .</a>	<a href="#">13</a>
	<a href="#">Authors' Addresses . . . . .</a>	<a href="#">13</a>

## [1.](#) Introduction

Subscription to YANG Notifications for Datastore Updates [[RFC8641](#)] uses a "target" object in subscription protocol operation for identifying the targeted source of information against which the subscription is applied and supports multiple subscriptions on a single transport session. Notification Message Headers and Bundles [I-D.ietf-netconf-notification-messages] allows multiple notifications bundled into one transportable message. However the subscription protocol operation doesn't provide specific criteria to classify subscriptions and therefore lacks the capability to explicitly indicate which specific subscription associated with the notification should be bundled together, e.g., subscription A and B are bundled based on their relationship with a set of YANG data models while subscription C and D are bundled based on "transport" and "encoding" parameters, both bundled groups are transported in the same transport session. A bundle size, bundle latency associated with a set of subscriptions or YANG data models enables the ability to perform encapsulation operation on a set of subscriptions with common characteristics via a single transaction. The bundle size and bundle latency provides a more optimal mechanism for notification encapsulation which would otherwise require multiple atomic transactions on a per subscription (i.e., one message per notification) basis. Following are some of the use-cases where such identifier can be used.



- o For a dynamic subscription, the subscriber may have already had priori knowledge about correlation relation between subscriptions(e.g., aggregated subscribed data from multiple sources). With this priori knowledge, it might send a bundle subscription RPC request to indicate what specific notifications associated with the subscription must be bundled together.
- o For a configured subscription, self-explanation data Node tag capability advertisement describing correlation between data nodes in different YANG data model from different publisher can be used to further establish correlation relation between subscriptions. The correlation relation between subscriptions can be configured back onto publisher, which help determine which notifications can be bundles and which notifications are not.
- o With the above bundle subscription indication from subscriber to the publisher, multiple notifications corresponding to the request protocol operation for those notifications are bundled into one transportable message using Notification Message Headers and Bundles defined in [I-D.ietf-netconf-notification-messages].

This document defines a YANG data model and associated mechanism that classify subscription based on various different filtering criteria and allow subscriber applications to bulk subscribe/unsubscribe to publisher's targeted object source based on bundle size and bundle latency. This also allows the publishers to report multiple notification in a single bundling message defined in [I-D.ietf-netconf-notification-messages].

### **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.

This document uses the following terms:

**Event:** An event is something that happens that may be of interest - a configuration change, a fault, a change in status, crossing a threshold, or an external input to the system, for example. Often, this results in an asynchronous message, sometimes referred to as a notification or event notification, being sent to interested parties to notify them that this event has occurred [RFC5277].

**Client:** Defined in [RFC8342].



Configuration: Defined in [[RFC8342](#)].

Configured subscription: Defined in [[RFC8639](#)]

Configuration datastore: Defined in [[RFC8342](#)].

Event record: A set of information detailing an event [[RFC8639](#)].

Event stream: A continuous, chronologically ordered set of events aggregated under some context [[RFC8639](#)].

Notification message: Information intended for a receiver indicating that one or more events have occurred [[RFC8639](#)].

Publisher: An entity responsible for streaming notification messages per the terms of a subscription [[RFC8639](#)].

Receiver: A target to which a publisher pushes subscribed event records. For dynamic subscriptions, the receiver and subscriber are the same entity [[RFC8639](#)].

Subscriber: A client able to request and negotiate a contract for the generation and push of event records from a publisher. For dynamic subscriptions, the receiver and subscriber are the same entity [[RFC8639](#)].

Subscription: A contract with a publisher, stipulating the information that one or more receivers wish to have pushed from the publisher without the need for further solicitation [[RFC8639](#)].

## **2. Model Overview**

The YANG data model for the Bulk Subscriptions to YANG Event Notification has been split into two modules:

- o The `ietf-bulk-subscription.yang` module defines a list for classifying different subscriptions corresponding to target object into groups. Each group is associated with a bundle size, bundle latency and a set of subscriptions. A set of subscription is identified by a "group-id" string. This string is used both as an index within the bulk subscription module. It associate a specific bundle group with a group of subscriptions and a set of YANG data models, as shown in the subscription augmentation. In addition, `ietf-subscribed-notifications.yang` module defined in [[RFC8639](#)] is augmented with "max-bundle-size", "max-bundle-latency" and "compression-algorithm" to enhance QoS feature and provide additional subscription bundle classification criteria.



- o The ietf-bulk-notification.yang module augment the YANG structure of ietf-notification-messages.yang [[draft-ietf-netconf-notification-messages](#)], a "group-id" is added to the "message-header" of the ietf-notification-messages.yang to indicate the group to which a set of notifications belongs. In addition, "compression-algorithm" parameter is augmented to "message-header" to inform the corresponding receivers of compression algorithm to be used by the publisher.

The following tree diagrams [[RFC8340](#)] provide an overview of the data model for "ietf-bulk-subscription.yang" module and the "ietf-bulk-notification.yang" module.

```

module: ietf-bulk-subscription
  +--rw bundle-groups
    +--rw bundle-group* [group-id]
      +--rw group-id      string
      +--rw subscription-id*  leafref
      +--rw yang-module*     yang:yang-identifier

  augment /sn:subscriptions/sn:subscription:
    +--rw max-bundle-size      uint32
    +--rw max-bundle-latency    uint32
    +--rw compression-algorithm string

  +---x bundle-subscription
    +---input
      +---w group-id?          -> /bundle-groups/bundle-group/group-id
      +--rw max-bundle-size      uint32
      +---w max-bundle-latency    uint32
      +---w compression-algorithm string
      +---w subscription-id*      subscription-id
      +---w masked-subscription-id* subscription-id

module: ietf-bulk-notification
  augment-structure /nm:message/nm:message-header:
    +--rw group-id?      string
    +--rw compression-algorithm string
  
```

### 3. Bulk Subscription YANG Module

```

<CODE BEGINS> file "ietf-bulk-subscription@2019-09-23.yang"
module ietf-bulk-subscription {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-bulk-subscription";
  prefix bs;

  import ietf-subscribed-notifications {
  
```



```
    prefix sn;
  }
  import ietf-yang-types {
    prefix yang;
  }
```

organization

"IETF NETCONF (Network Configuration) Working Group";

contact

"";

description

"NETCONF Protocol Data Types and Protocol Operations.

Copyright (c) 2011 IETF Trust and the persons identified as  
the document authors. All rights reserved.

Redistribution and use in source and binary forms, with or  
without modification, is permitted pursuant to, and subject  
to the license terms contained in, the Simplified 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 6241](#); see  
the RFC itself for full legal notices.";

revision 2019-09-23 {

description

"Initial revision";

reference "RFC XXXX: Bulk Subscription to YANG Event Notification";

}

identity encode-cbor {

base sn:encoding;

description

"Encode data using cbor.";

}

identity encode-gpb {

base sn:encoding;

description

"Encode data using gpb.";

}

container bundle-groups {

list bundle-group {

key "group-id";

leaf group-id {

type string;

description

"This group ID is used as an index within the bulk subscription

module

Wang, et al.

Expires January 4, 2021

[Page 6]

```
        , which indicates subscription classification criteria.";
    }
    leaf-list subscription-id {
        type leafref {
            path "/sn:subscriptions/sn:subscription/sn:id";
        }
        description
            "subscription-id";
    }
    leaf-list yang-module {
        type yang:yang-identifier;
        description
            "Name of the YANG module list supported by the publisher.";
    }
    description
        "List for group that classify different subscriptions into groups.";
}
leaf compression-algorithm {
    type string;
    description
        "The technology with which an originator compress bytestream
        contents.";
}
description
    "Container for subscription group.";
}
augment "/sn:subscriptions/sn:subscription" {
    leaf max-bundle-size {
        type uint32;
        default 400;
        description
            "The maximum number of data objects to be included by the publisher in a
            single message to receivers.";
    }
    leaf max-bundle-latency {
        type uint32;
        units centiseconds;
        default 400;
        description
            "The maximum latency before a specific YANG Notifications generated
            must egress a publisher.";
    }
    leaf compression-algorithm {
        type string;
        description
            "The technology with which an originator compress bytestream
            contents.";
    }
}
```



```
    description
      "Augment the subscribed-notifications module with transport specific
information.";
  }

  rpc bundle-subscription {
    description
      "Bundle subscription. This parameter indicates what subscription must be
bundled together.";
    input {
      leaf group-id {
        type string;
        description
          "This group ID is used as an index within the bulk subscription module";
      }
      leaf-list subscription-id {
        type uint32;
        description
          "Subscription-id parameter indicates what subscription must be bundled
together.";
      }
      leaf-list mask-subscription-id {
        type uint32;
        description
          "Mask subscription-id parameter indicates what subscription must
not be bundled together.";
      }
      leaf max-bundle-size {
        type uint32;
        default 400;
        description
          "The maximum number of data objects to be included by the publisher in a
single
message to recievers.";
      }
      leaf max-bundle-latency {
        type uint32;
        units centiseconds;
        default 400;
        description
          "The maximum latency before a specific YANG Notifications generated
must egress a publisher.";
      }
      leaf compression-algorithm {
        type string;
        description
          "The technology with which an originator compress bytestream
contents.";
```

```
}  
}  
}  
}
```

<CODE ENDS>

#### **4. Bulk Notification YANG Module**

```
<CODE BEGINS> file "ietf-bulk-notification@2019-09-23.yang"
module ietf-bulk-notification {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-bulk-notification";
  prefix bn;

  import ietf-yang-structure-ext {
    prefix sx;
  }
  import ietf-notification-messages {
    prefix nm;
  }

  organization
    "IETF NETCONF (Network Configuration) Working Group";
  contact
    "";
  description
    "NETCONF Protocol Data Types and Protocol Operations.

    Copyright (c) 2011 IETF Trust and the persons identified as
    the document authors. All rights reserved.

    Redistribution and use in source and binary forms, with or
    without modification, is permitted pursuant to, and subject
    to the license terms contained in, the Simplified 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 6241; see
    the RFC itself for full legal notices."

  revision 2019-09-23 {
    description
      "Initial revision";
    reference
      "RFC XXXX: Bulk Subscription to YANG Event Notification";
  }

  sx:augment-structure "/nm:message/nm:message-header" {
    leaf group-id {
      type string;
      description
```



```
        "To identify the group to which a set of notifications belongs.";
    }
    leaf compression-algorithm {
        type string;
        description
            "The technology with which an originator compress bytestream
            contents.";
    }
    description
        "Group related informations are added to the 'message-header' of
        the ietf-notification-messages to identify the group to which a
        set of notifications belongs and compression algorithms used by
        the publisher.";
}
}
<CODE ENDS>
```

## 5. IANA Considerations

### 5.1. Updates to the IETF XML Registry

This document registers two URIs in the IETF XML registry [[RFC3688](#)]. Following the format in [[RFC3688](#)], the following registrations are requested to be made:

```
-----
URI: urn:ietf:params:xml:ns:yang:ietf-bulk-subscription
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.
```

```
URI: urn:ietf:params:xml:ns:yang:ietf-bulk-notification
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.
-----
```

### 5.2. Updates to the YANG Module Names Registry

This document registers two YANG modules in the YANG Module Names registry [[RFC7950](#)]. . Following the format in [[RFC6020](#)], the following registration has been made:



```
-----  
Name:      ietf-bulk-subscription  
Namespace: urn:ietf:params:xml:ns:yang:ietf-bulk-subscription  
Prefix:    trig  
Reference: RFC xxxx  
  
Name:      ietf-bulk-notification  
Namespace: urn:ietf:params:xml:ns:yang:ietf-bulk-notification  
Prefix:    evt  
Reference: RFC xxxx  
-----
```

## 6. Security Considerations

The YANG module specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [RFC6241] or RESTCONF [RFC8040]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [RFC6242]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [RFC8446].

The NETCONF 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.

There are a number of data nodes defined in this YANG module that are writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive in some network environments. Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations. These are the subtrees and data nodes and their sensitivity/vulnerability:

- o /bundle-groups/bundle-group/group-id
- o /sn:subscriptions/sn:subscription/bs:max-bundle-latency
- o /sn:subscriptions/sn:subscription/bs:max-bundle-size
- o /bundle-subscription/input/group-id

## 7. Acknowledgements

Thanks to Eric Voit for reviewing this draft and providing important input to this document.



## 8. References

### 8.1. Normative 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>>.
- [RFC5277] Chisholm, S. and H. Trevino, "NETCONF Event Notifications", [RFC 5277](#), DOI 10.17487/RFC5277, July 2008, <<https://www.rfc-editor.org/info/rfc5277>>.
- [RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", [RFC 6241](#), DOI 10.17487/RFC6241, June 2011, <<https://www.rfc-editor.org/info/rfc6241>>.
- [RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", [RFC 6242](#), DOI 10.17487/RFC6242, June 2011, <<https://www.rfc-editor.org/info/rfc6242>>.
- [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>>.
- [RFC8040] Bierman, A., Bjorklund, M., and K. Watsen, "RESTCONF Protocol", [RFC 8040](#), DOI 10.17487/RFC8040, January 2017, <<https://www.rfc-editor.org/info/rfc8040>>.
- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 8126](#), DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.
- [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>>.
- [RFC8341] Bierman, A. and M. Bjorklund, "Network Configuration Access Control Model", STD 91, [RFC 8341](#), DOI 10.17487/RFC8341, March 2018, <<https://www.rfc-editor.org/info/rfc8341>>.
- [RFC8342] Bjorklund, M., Schoenwaelder, J., Shafer, P., Watsen, K., and R. Wilton, "Network Management Datastore Architecture (NMDA)", [RFC 8342](#), DOI 10.17487/RFC8342, March 2018, <<https://www.rfc-editor.org/info/rfc8342>>.



- [RFC8407] Bierman, A., "Guidelines for Authors and Reviewers of Documents Containing YANG Data Models", [BCP 216](#), [RFC 8407](#), DOI 10.17487/RFC8407, October 2018, <<https://www.rfc-editor.org/info/rfc8407>>.
- [RFC8446] Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.3", [RFC 8446](#), DOI 10.17487/RFC8446, August 2018, <<https://www.rfc-editor.org/info/rfc8446>>.
- [RFC8639] Voit, E., Clemm, A., Gonzalez Prieto, A., Nilsen-Nygaard, E., and A. Tripathy, "Subscription to YANG Notifications", [RFC 8639](#), DOI 10.17487/RFC8639, September 2019, <<https://www.rfc-editor.org/info/rfc8639>>.
- [RFC8641] Clemm, A. and E. Voit, "Subscription to YANG Notifications for Datastore Updates", [RFC 8641](#), DOI 10.17487/RFC8641, September 2019, <<https://www.rfc-editor.org/info/rfc8641>>.

## **8.2. Informative References**

- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.
- [RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", [RFC 6020](#), DOI 10.17487/RFC6020, October 2010, <<https://www.rfc-editor.org/info/rfc6020>>.
- [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>>.

## **Authors' Addresses**

Michael Wang  
Huawei  
101 Software Avenue, Yuhua District  
Nanjing, Jiangsu 210012  
China

Email: wangzitao@huawei.com



Qin Wu  
Huawei  
101 Software Avenue, Yuhua District  
Nanjing, Jiangsu 210012  
China

Email: bill.wu@huawei.com

Peng Liu  
China Mobile  
32 Xuanwumen West St, Xicheng District  
Beijing 10053

Email: liupengyjy@chinamobile.com

Hui Cai  
China Mobile  
32 Xuanwumen West St, Xicheng District  
Beijing 10053

Email: caihui@chinamobile.com

