

NETCONF Working Group
Internet-Draft
Intended status: Standards Track
Expires: May 2, 2021

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October 29, 2020

Bulk Subscription to YANG Event Notification
draft-wang-netconf-bulk-subscribed-notifications-03

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

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[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.

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  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
    , which indicates subscription classification criteria.";
```

}

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```
    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 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.";
    }
  }
}
```

```
}  
}  
}  
<CODE ENDS>
```

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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.

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    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, Hui Cai, Zitao Wang for reviewing this draft and providing important input to this document.

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