Adaptive Subscription
and Bulk Subscription

draft-wang-netconf-adaptive-subscription-01
draft-wang-netconf-bulk-subscribed-notifications-02

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Document Status

- **draft-wang-netconf-adaptive-subscription**
  - v-00 was first presented in the IETF 107 meeting, and it was suggested to setup design team to progress this work.
  - It was suggested to align with ECA model (draft-wwx-netmod-event-yang-08)
  - provision a ratio of the new measurement interval
    - provision "5" means do it five times faster than the original period
  - The characterization of on-change subscription as a degenerative case of periodic should be fixed

- **draft-wang-netconf-bulk-subscribed-notifications**
  - V-01 was secondly presented in the IETF 107 meeting, and it was suggested to setup design team to facilitate the discussion.
  - It was suggested to add default value of ‘max-bundle-latency’ for the publisher
  - Criteria to classify subscriptions based on different subscriber transport sessions, encoding, dscp, weight was discussed

- The latest update of draft-wang-netconf-adaptive-subscription is v-(01), changes compared to previous versions:
  - Add usage example of adaptive subscription;
  - Align with ECA model and data path, data, condition expression and ratio(i.e.,count) parameters based on earlier discussion;
  - Highlight the motivation to add adaptive subscription support;

- The latest update of draft-wang-netconf-bulk-subscribed-notifications is v-02, changes compared to previous versions:
  - Motivation polishing
  - Add bundle size to the model structure
  - Subtrees and data nodes path fixing
Adaptive Subscription Recap

• Motivation:
  – Where an increased data collection rate is being used, it becomes more likely that a burst of streamed data may temporarily overwhelm a receiver and consume expensive network resource (e.g., air interface resource).
  – If the rate at which we can collect a stream of data is set too low, these telemetry data are not sufficient to detect and diagnose problems and verify correct network behavior.
  – There is a need for a service to configure both collectors and publishers with multiple period intervals, counter threshold and automatically switch to different period intervals according to resource usage,
    • e.g., when the wireless signal strength falls below a configured low watermark, the subscribed data can be streamed at a higher rate
    • while when the wireless signal strength crosses a configured high watermark, the subscribed data can be streamed at lower rate.

• Goal:
  – Define a YANG data model and associated mechanism enabling subscriber's adaptive subscriptions to a publisher's event streams.
    • allows both subscriber and publisher to automatically adjust the volume of telemetry traffic sent from publisher to the receivers.
Adaptive Subscription Solution Overview

- "data-path" identifies data path of the targeted data object.
- "data" identifies the targeted data object that has been subscribed to.
- "xpath-expression" represents a logical expression, which can contain comparisons of datastore values and logical operations in the XPath format.
- "high-watermark" that defines the upper boundary for the targeted data object.
- "period" that defines the duration between push updates, the period can be changed based on trigger condition.
- "count" that specifies the count number of interval that has to pass before successive adaptive periodic push update records for the same subscription are generated for a receiver.
1. **Create Adaptive Subscription**: Scan all clients every 5 seconds up to 30 seconds if the rssi value of client is greater than -65dB; scan all client every 60 seconds up to 360 seconds, switch to 60 seconds period value if the rssi value of client is less than -65dB, and then send to the receivers to inform the receivers that the update interval value is switched to the new value.

   ```xml
   <establish-subscription
   xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
   <rp:subscribe
   xmlns:rp="urn:ietf:params:xml:ns:netconf:interfaces">
   <rp:device-id>example-wi-fi-mac</rp:device-id>
   <rp:subscription>
   <rp:notification>
   <rp:notification-extensions
   xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
   <rp:condition-expression>
   <rp:condition>
   <rp:condition-value>
   <rp:condition-field>
   <rp:condition-field-name>rss</rp:condition-field-name>
   <rp:condition-field-type>int</rp:condition-field-type>
   <rp:condition-field-value>-65</rp:condition-field-value>
   </rp:condition-field>
   <rp:condition-operator>==</rp:condition-operator>
   </rp:condition>
   <rp:condition-expression-operator>
   <rp:condition-expression-operator>
   <rp:condition-expression-value>-65</rp:condition-expression-value>
   </rp:condition-expression-operator>
   </rp:condition-expression>
   </rp:notification>
   </rp:notification-extensions>
   </rp:subscription>
   </rp:subscribe>
   </establish-subscription>
   ```

2. Upon the server switches to from the update interval 5 seconds to the new update interval 60 seconds, send to the receivers to inform the receivers that the update interval value is switched to the new value.

   ```xml
   <notification
   xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
   <event-time>2016-11-21T13:51:00Z</event-time>
   <adaptive-update
   xmlns="http://example.com/istf-adaptive-subscription">
   <id>0</id>
   <period>60</period>
   <rp:subscribe
   xmlns:rp="urn:ietf:params:xml:ns:yang:ietf-datastores">
   <rp:device-id>example-wi-fi-mac</rp:device-id>
   <rp:subscription>
   <rp:notification>
   <rp:notification-extensions
   xmlns="urn:ietf:params:xml:ns:netconf:notification:1.0">
   <rp:condition-expression>
   <rp:condition>
   <rp:condition-value>
   <rp:condition-field>
   <rp:condition-field-name>rss</rp:condition-field-name>
   <rp:condition-field-type>int</rp:condition-field-type>
   <rp:condition-field-value>-65</rp:condition-field-value>
   </rp:condition-field>
   <rp:condition-operator>==</rp:condition-operator>
   </rp:condition>
   <rp:condition-expression-operator>
   <rp:condition-expression-operator>
   <rp:condition-expression-value>-65</rp:condition-expression-value>
   </rp:condition-expression-operator>
   </rp:condition-expression>
   </rp:notification>
   </rp:notification-extensions>
   </rp:subscription>
   </rp:subscribe>
   </adaptive-update>
   </notification>
   ```

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**Use Case: Wireless performance monitoring**

- Scans all clients every 5 seconds up to 30 seconds if the rssi value of client is greater than -65dB.
- Scans all clients every 60 seconds up to 360 seconds if the rssi value of client is less than -65dB.
- Sends notification to receivers informing them of the update interval switch.
Bulk Subscription Recap

• Motivation:
  – 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
    • 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

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

#### a. Telemetry data Export capability Notification (Message Bundle Support)

#### b. Bulk Subscription to YANG Notification

#### c. Send bundled Message with bulk subscription extension to receiver

- **Augment ietf-subscribed-notifications module with bulk subscription attributes**

- **Define bundle subscription RPC to specify which subscriptions can be bundled and which not based on several subscription criteria such as encoding, transport**

- **Additional subscription criteria:**
  - **Max-bundle-latency:** The maximum latency before a specific YANG Notifications generated must egress a publisher. This attribute enhances QoS feature and provide additional subscription bundle classification criteria.
  - **Compression-algorithm:** The technology with which an originator compress byte stream contents. This attribute enhances QoS feature and provide additional subscription bundle classification criteria.

- **Subscription-id:** indicates what subscription must be bundled together.

- **Masked-subscription-id:** indicates what subscription must not be bundled together.

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**Module Code:**

```plaintext
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
  +++-rw 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
```
Next Steps

• Key value of adaptive subscription:
  • Address sampling performance bottleneck on the device when facing Massive Data Collection and Processing
  • Greatly reduce the amount of data to be exported

• Key value of bulk subscription:
  • Improves data collection efficiency and performance.
  • Work together with message bundling defined in [I-D. ietf-netconf-notification-messages]

• Request adoption call on two drafts?
• Address any comments received in the meeting.