Subscribing to datastore push updates draft-netmod-clemm-datastore-push-00.txt

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Motivation

- Many applications require continuous updates of datastore contents
  - Service assurance: continuous monitoring
  - Big Data: analyze network state & subscribe to continuous stream
  - SDN Controllers: caching of remote data
- Periodic polling has limitations (known from SNMP)
  - Additional load on network and devices
  - Lack of robustness, dealing with missed polling cycles
  - Difficult calibration, synchronization of polling cycles across network (makes polled data difficult to compare)
- Current interactions with datastore are request/response based
  - RFC 6470 defines configuration change notifications (root node+edit operation)
  - YANG datastores contain increasingly operational data; there is nothing that pushes actual datastore content

Solution overview

- Provide push mechanism as alternative to polling, centered around a datastore subscription service
- Requirements per draft-ietf-i2rs-pub-sub-requirements-00.txt
  - Consider this draft a “technical response”
- Subscription model
  - Subscription services
  - Subscription negotiation
  - Subscription management
- Push mechanism / transport
- Leverage RFC 5277
  - Some parameter extensions proposed
  - Require interleave support to support service primitives beyond create-subscriptions
  - Implies one subscription per session
- Alternative transport mappings conceivable but outside scope

Subscription primitives

- Create-subscription
  - Leverage RFC 5277 <create-subscription>
  - Subscribe to stream “push-update”
    - Built-in conceptual continuous & perpetual stream of datastore updates
  - Parameters:
    - Filter (e.g. subtree filter, xpath filter, allow filter extensions)
    - Subscription policy
      - Periodic
        - Frequency
      - On-change
        - Dampening period: minimum elapsed time between updates
        - Delta policy: optional, specify other change conditions such as magnitude of change
    - Start and stop time (like RFC 5277)

Subscription primitives (contd)

- Terminate-subscription
  - Maps to terminating the session in Netconf
  - Not an issue as long as one session per subscription
- Modify-subscription (optional, subject to discussion)
  - Introduce a new RPC <modify-subscription>
  - Parameters analogous to create-subscription
  - Requires interleaving capability
- Suspend-subscription, resume-subscription (optional, lesser priority, subject to discussion)
  - New RPCs <modify-subscription>, <suspend-subscription>
  - Requires interleaving capability

Discussion

- Possible alternative: configurable stream
  - Instead of stream “datastore-push”, configure “my-push-stream”
    - Control the “faucet” – source of the stream, not the “nozzle” (filter over a stream)
  - Define stream configuration model
    - Includes subscription policy, filters, etc.
      - Specify which conditions need to be met to generate a stream record
    - Configuration using <edit-config>
  - Use RFC 5277 as-is as an option
    - <create-subscription> subscribes to stream as a whole, without modifiers
    - Subscription is managed by configuring the stream itself (not the subscription)
  - Datastream-push may still be provided as default
  - Facilitate reuse of same stream by multiple subscribers

Subscription Negotiation

- Server may reject a subscription (or modification) request
  - Implementation limitations (e.g. on-change)
  - Resource limitations
    (e.g. update size, frequency)
  - Indicate as part of error response
- Response may include “acceptable” parameter settings
  - Increase chance of success of subsequent subscription request
  - Avoid try-and-error
- Additional notifications to indicate whenever server cannot keep “subscription promise”

Subscription management

- YANG Data Model to reflect subscriptions
- Data stream configuration would require data model extensions

Subscription Data Model

```
module: ietf-datastore-push
     +--ro datastore-push-subscription
        +--ro stream                        string
        +--ro subscription-id               subscription-identifier
        +--ro (filter)?
        |  +--:(subtree)
        |  |  +--ro subtree-filter
        |  +--:(xpath)
        |     +--ro xpath-filter            yang:xpath1.0
        +--ro (notification-trigger)
        |  +--:(periodic)
        |  |  +--ro period                  yang:timeticks
        |  +--:(on-change)
        |     +--ro (change-policy)
        |        +--:(update-dampening)
        |        |  +--ro period            yang:timeticks
        |        +--:(delta-policy)
        |           +--ro delta            uint32
        +--ro start-time?                   yang:date-and-time
        +--ro stop-time?                    yang:date-and-time
```

(next revision)

Push Data Stream and Transport

- Push-update notifications
  - Notification “push-update”
    - Subscription correlator
      - Ties update to a specific subscription
    - Data node with datastore update
      - Per subscription
      - Filtered per NACM rules
- Additional notifications when subscriptions are suspended, resumed, or terminated
  - Or compromised, when a subscription promise cannot be kept
- Leverage <notification> element (per RFC 5277)
- Alternative transport mappings conceivable but outside scope