Network Working Group
Internet-Draft
Intended status: Informational
Expires: April 19, 2018

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October 16, 2017

YANG PUSH Based Generalized Network Control Automation Problem Statement
draft-bryskin-netconf-automation-framework-00

Abstract

This document describes the objective of the YANG PUSH based generalized network control automation framework.

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 April 19, 2018.

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1. Introduction

YANG "Custom Subscription to Event Notifications" model [I-D.ietf-netconf-subscribed-notifications] allows for a network client automation of network remote monitoring. Specifically, using this model, a network client can subscribe on and receive one or more data streams, each associated with one or more events defined by YANG model(s) governing the network's YANG data store(s). The client can also tailor said streams to its needs by specifying filters on the streams contents, but, otherwise, the client has no control on the stream contents. For example, the client has no way of expanding a stream to carry additional information that was not defined to be a part of said stream.

YANG "Subscribing to YANG datastore push updates" model [I-D.ietf-netconf-yang-push], which is an augmentation of the "Custom Subscription to Event Notifications" model, defines a higher level of network remote monitoring automation - it allows for the client itself to define the origins, trigger/maintain conditions and contents of data streams to be sent by the network to the client. This capability is modeled via target-trigger-notify constructs, which allow for the client to specify data store nodes of interest and, possibly, sub-trees rooted by them (targets), conditions to trigger and maintain associated with them streams (e.g. particular change(s) in one or more of the nodes attributes), the contents of the streams and filters to further fine-tune the streams according to the client's needs.

It could be observed that the notify part of the target-trigger-notify construct stands for "send me notification', which is one of, generally speaking, many actions the client might want the network to

perform, provided that the target-trigger condition holds. For example, instead of sending a notification with some pre-denied content, the client might want the network to perform:

a. immediate network re-configuration (e.g. modification of one or more attributes of one or more CONFIG=TRUE data store nodes);

b. scheduling one time or periodic such reconfigurations in the future;

c. calling an RPC defined by one of the YANG models supported by the network (e.g. calling network's path computer to evaluate whether an alternative/more optimal path is available for a given connection);

d. Dynamic linking/unlinking parent and child data stores supported by the network;

e. etc.

It could also be observed that "periodic" and "on-change" are two of the conditions that the client might want. The conditions can be expanded to be a logical expression of other event states and some operational data states of the network., as well, as outputs of RPCs.

2. Objective

The main objective of the YANG PUSH Based Generalized Network Control Automation framework is to generalize the target-trigger-notify construct into event-condition-action construct, where:

event
: a particular change in the network state explicitly defined by one of the YANG models supported by the network or implicitly defined by the client, which is constantly monitored by the network;

condition
: a logical expression that is evaluated only once after the associated event is detected;

action
: an operation (non-exhaustive list of which is described above) to be carried out by the network when the associated event is detected and the associated condition is met.

The client will be able to describe the desired network behavior by configuring with the network event-condition-action triplets as rules prior to any services provided by the network to the client. Such an

approach will take the client out of the network control loop, thus, changing the client's role from being network's "micro-manager" to being network's "police officer", which interferes into network operations only in exceptional/unpredicted situations.

There are numerous benefits to such paradigm, including:

- o lower latency, faster responsiveness of the network to various events/conditions;
- o better scale (e.g. the client may control more networks because it does not have to monitor/micro-manage any of them);
- o CPU and bandwidth savings due to the reduced amount of communication between the client and the network.

It is envisioned that the YANG PUSH Based Generalized Network Control Automation framework will fit well within "SUPA Policy-based Management Framework" [I-D.ietf-supa-policy-based-management-framework], which will inherently provide a higher level of automation, for example, by:

a. combining multiple micro-conditions into a single macro-condition via a number of logical operations;

b. combining multiple micro-actions into a single transaction with a possibility of specifying policies with respect to handling errors/exceptions of each of the transaction components.

3. IANA Considerations

This document has no actions for IANA.

4. Security Considerations

This document does not define networking protocols and data, hence are not directly responsible for security risks.

5. Acknowledgements

6. References

6.1. Normative References

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