SURF Intelligent networks AIOps enabler – Workflow Orchestrator telemetry module

1. Name and Organisation: Peter Boers, SURF

2. Title: Workflow Orchestrator telemetry module

3. **Rationale**: A vendor-agnostic Telemetry platform needs to be developed to facilitate the introduction of AIOps in an orchestrated multivendor network. We would like to develop a deployment setup – using open-source tooling – that is highly scalable and capable of streaming telemetry from gNMI-capable network devices. Accurate, up-to-date and vendor agnostic Telemetry is a pre-requisite for introducing Machine Learning into Network Operations. This project will extend the current work led by Hans Trompert in WP7-T3 and provide a pluggable module for the Workflow Orchestrator.

   Architecture and tool choice: There are a number of tools/plugins that support the use of gNMI as a method of streaming telemetry. However they make use of static configuration, are not designed to scale dynamically and are only able to query metrics that are configured through a configuration file. gNMIc is a tool that is designed with scalability and flexibility out of the box and it also provides a gRPC interface to interact with the network on demand.

   As networks and network services change it is necessary to be able to dynamically add or reduce the number of targets that are monitored and scale up or down according to the amount of metrics that are gathered. Deploying gNMIc on Kubernetes and combining cloud native technology with an event-based architecture will enable the telemetry solution to process real-time events from the network and be able to feed a data pipeline that can be used for machine learning algorithms or provide operators with real time metrics in tools such as the Workflow Orchestrator gui and/or Grafana.

   As well as providing telemetry data, gNMIc can also be used to command the network to provide, on demand, operational data such as optic power levels, BGP status, interface status, displaying of routing/mac tables by using the gNMI protocol to communicate with the network devices. This makes it is possible to integrate operational device data into the Workflow Orchestrator gui, so NOC operators can combine customer facing information with resource facing information in a unified view.

   At this point in time the Openconfig project which develops gNMIc does not provide resources to deploy gNMIc on Kubernetes. This project proposes to develop these resources so that an autoscaling

gNMIc pipeline can be deployed. Furthermore this project will create an integration in the Workflow Orchestrator that enables gNMIc to automatically discover network targets to stream data from. This integration is optional in its usage, i.e the user does not have to deploy the Workflow Orchestrator in combination with the gNMIc deployment to make use of the proposed telemetry solution. Lastly this proposal will create a proof of concept implementation in the Workflow Orchestrator gui that shows the Admin and Operational status of network interfaces per “reference node product.” This work will explore how the gNMI interface can be used to show operational, resource facing telemetry, together with customer facing resources in a Network Management System style pane of view in the Workflow Orchestrator gui.

The architecture of a AIOps enabled network making use of gNMIc as a telemetry platform and the Workflow Orchestrator as network orchestrator is drawn in Figure 1. The areas highlighted in purple will be part of the output of this proposal.

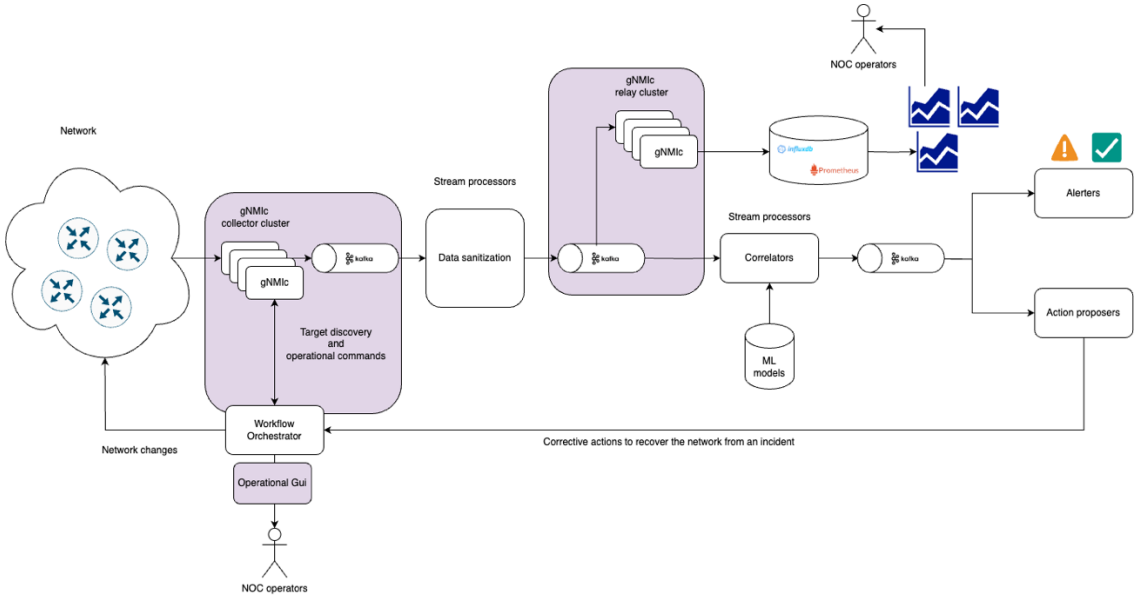

Figure 1

In conclusion: The output of this work will make it easier to monitor network resources in a vendor agnostic manner. With the example integration in the Workflow Orchestrator, we hope to extend the usability of the Workflow Orchestrator for its users. This work will be foundational for enabling AIOps on the network and a gNMI based single pane view on the network.

4. Output:

a. Helm chart[1] that combines gNMIc[2], kafka[3] to deploy an integrated Streaming Telemetry solution to Kubernetes. This should be developed in such a way that it can be used by any network operator. The helm chart will provide a way to configure a gNMIc and its related Kubernetes manifests/components. It will enable the user to setup a streaming pipeline that collects data and relays data to a data sink. It will also expose the gNMI interface so that the network can be queried through gNMIc for operational data. Not in scope are the deployment of InfluxDB and/or Prometheus as they already have helm charts available to deploy on Kubernetes. The Helm chart will include documentation for all parameters that can be tuned. It will be published to either the Workflow Orchestrator project github or contributed back to the gNMIc project.
b. An integration method with the Workflow Orchestrator [4] so that new network elements are automatically enrolled into the telemetry platform. This module is optional and can be enabled in gNMIc by using its discovery method. The Workflow Orchestrator will provide an endpoint that will expose the node subscriptions as targets for gNMIc. We will provide a python module that can be configured and used in the workflow orchestrator. This will be published on the Workflow Orchestrator github.
c. A proof of concept implementation of the gNMIc grpc interface in the Workflow Orchestrator GUI for the “reference node product”. On the subscription detail page of the “reference node product” the implementation will show the admin and operational state of all the nodes interfaces. This output of this code will be published on the Workflow Orchestrator github.

5. Users:
    a. Network operators who are moving towards gNMI based telemetry
    b. Multivendor network operators
    c. Users of the Workflow Orchestrator
6. Value: A highly scalable, vendor-agnostic, standardised telemetry deployment method
7. Team: Josephine Rutten and Peter Boers – both SURF
8. Time: 10 Months – March until (including) December.
9. Resources – Manpower:
   The following people will be working on this project. Resources requested to the NetDev Incubator are for funding of 1 developer at 0,9 FTE for 10 months.

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[1] https://helm.sh/docs/topics/charts/
[2] https://gnmic.openconfig.net/
[3] https://kafka.apache.org/
[4] https://github.com/workfloworchestrator/orchestrator-core

a. Josephine Rutten: Development - 10 months at 0.9 FTE
b. Peter Boers: Management/Architect

10. IPR: No
11. Personal data: No
12. Contribution to an existing GÉANT project service: It will contribute and extend work being done in WP7-T3
13. Supporting organisations:
    a. GÉANT:
        i. Name: Simone Spinelli
        ii. Organisation: GÉANT
        iii. Will you implement: yes
        iv. FTE: 0,1 internal for GÉANT.
        v. Would you work on this project if not being paid from GN5-1: yes
    b. HEAnet:
        i. Name: Dónal Cunningham
        ii. Organisation: HEAnet
        iii. Will you implement the work results in your own organisation? yes
        iv. How much of an FTE will your organisation dedicate to work on this project: 0
        v. Would you work on this project if not being paid from GN5-1: Yes