Is gNMI becoming the de-facto standard for equipment management ?

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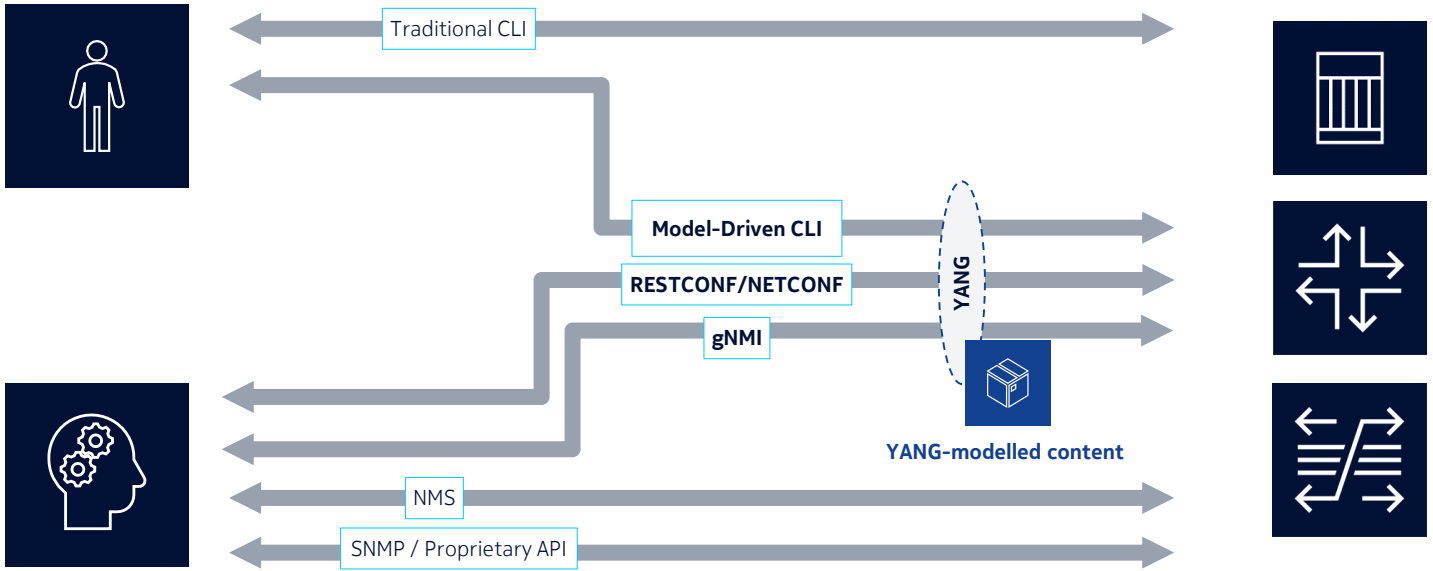
Xantaro SERVICE INTEGRATION

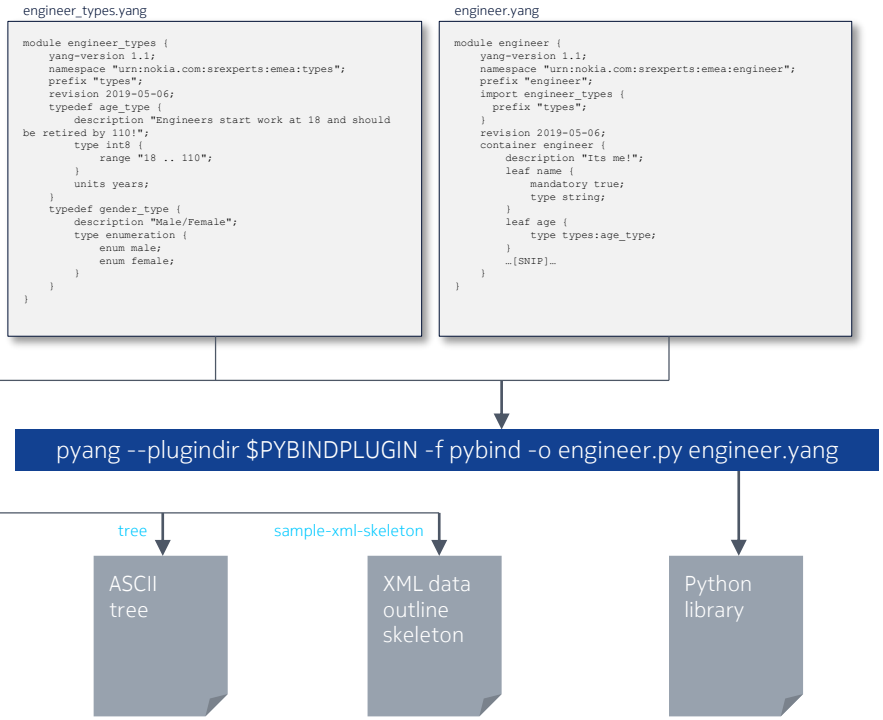
Equipment management options…



Learn YANG.....

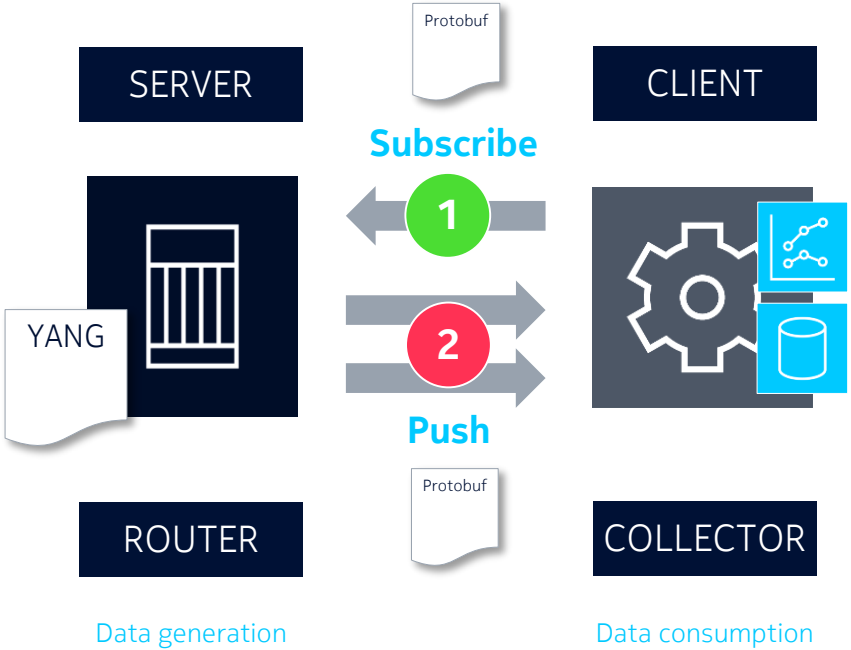
.....in the time it takes to drink a cup of tea

- Various Open Source tools available for YANG model manipulation
- Compile the model in various formats for use
- Once you have models you can auto format data or even auto-generate code
- OpenConfig Yang models for standardized Network Equipment management



* Many other Open Source or Commercial tools are available

gRPC Introduction
Client - Server Architecture

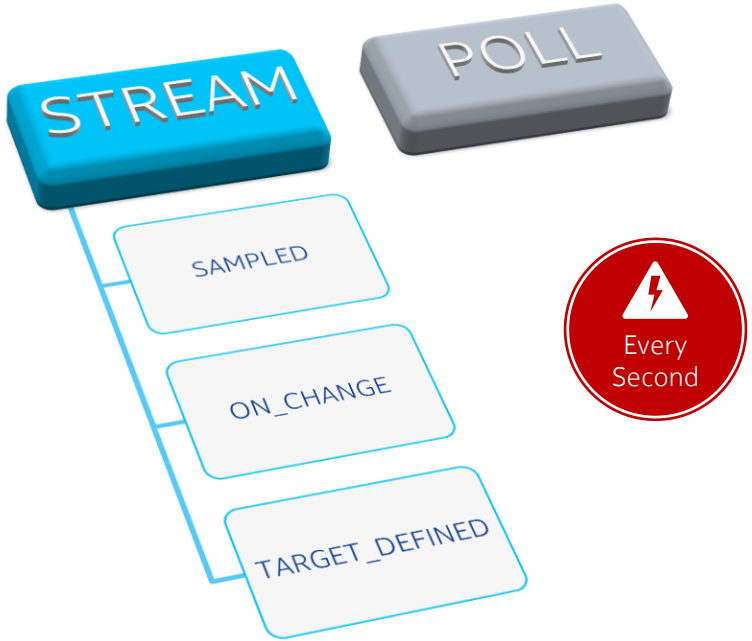


- Network elements **push** data (stats, op state, config…etc) to the subscribing collector(s) based on defined paths/frequencies or upon change of values
  - gNMI Remote procedure calls to Get, Set, Subscribe, etc.
    - Usage of Yang as data modeling
  - gNOI Remote procedure calls to clear counters, to reboot, etc.
  - gRIBI Remote procedure calls to query and program RIB

- RPC framework is based on gRPC – A service running on TCP port 57400 using HTTP/2. Protobuf service definition

gNMI Operations
Subscription modes

- **POLL** subscriptions
  - Initiated from the client
  - Tell the server to generate and supply updates for all defined paths
- **STREAM** subscriptions
  - **SAMPLE**d subscriptions tell the server to provide updates every *n* seconds
  - **ON_CHANGE** subscriptions tell the server to provide updates only when there has been a change
  - **TARGET_DEFINED** allows the client to defer selection of SAMPLE or ON_CHANGE to the server



Tools and Ecosystem

Leveraging Go libraries

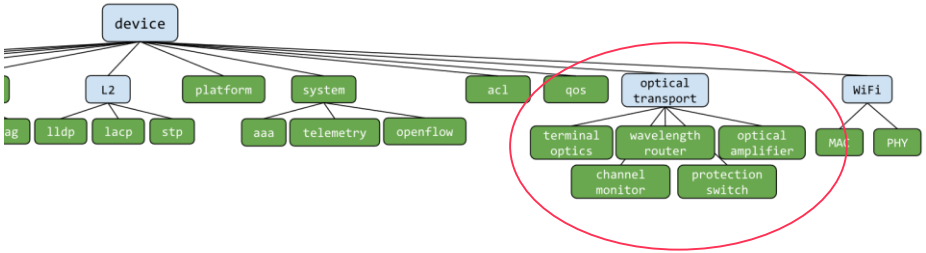
- Proof-of-concepts
  - gnmi_capabilities, gnmi_get, gnmi_set
  - gnmi_cli
- gNMIc – Fully-featured gNMI CLI client
  - Supports Capabilities, Get, Set and Subscribe RPCs
  - Acts both as client and collector
- gNMI Plugin to Telegraf (link)
  - Supports XPATH-based subscriptions to GRPC

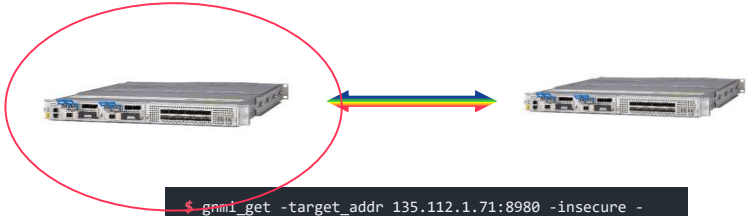
Leveraging Python grpcio library

- Wrappers to implement gNMI, implement Yang XPATHs
  - https://github.com/cisco-ie/cisco-gnmi-python
- Ansible `grpc` collection (https://galaxy.ansible.com/nokia/grpc)
  - Supports
    - gnmi_capabilities
    - gnmi_get
    - gnmi_config
    - gnmi_subscribe

Example 1 – Nokia WDM

- Nokia WDM Nodes (1830 PSS/PSI) expose gRPC interface with OpenConfig Yang models for configuration and streaming of telemetry
- Transport network configuration and state information is well covered in OpenConfig Yang models





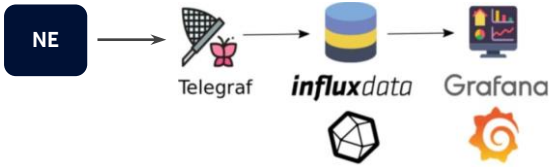
```
$ gnmi_get -target_addr 135.112.1.71:8980 -insecure -
username admin -password admin -xpath "wavelength-
router/port-spectrum-power-profiles/port[name=PORT-1-5-
4]/spectrum-power-profile/"  | json_ietf_pp

  update: <
    path: <
      elem: <
        name: "distribution"
        key: <
          key: "lower-frequency"
          value: "189193750"
        >
        key: <
          key: "upper-frequency"
          value: "189218750"
        >
      >
      elem: <
        name: "state"
      >
      elem: <
        name: "target-power"
      >
    >
    val: <
      json_ietf_val: ""-4.02""
    >
  >
>
```

Example 2 – Arista EOS

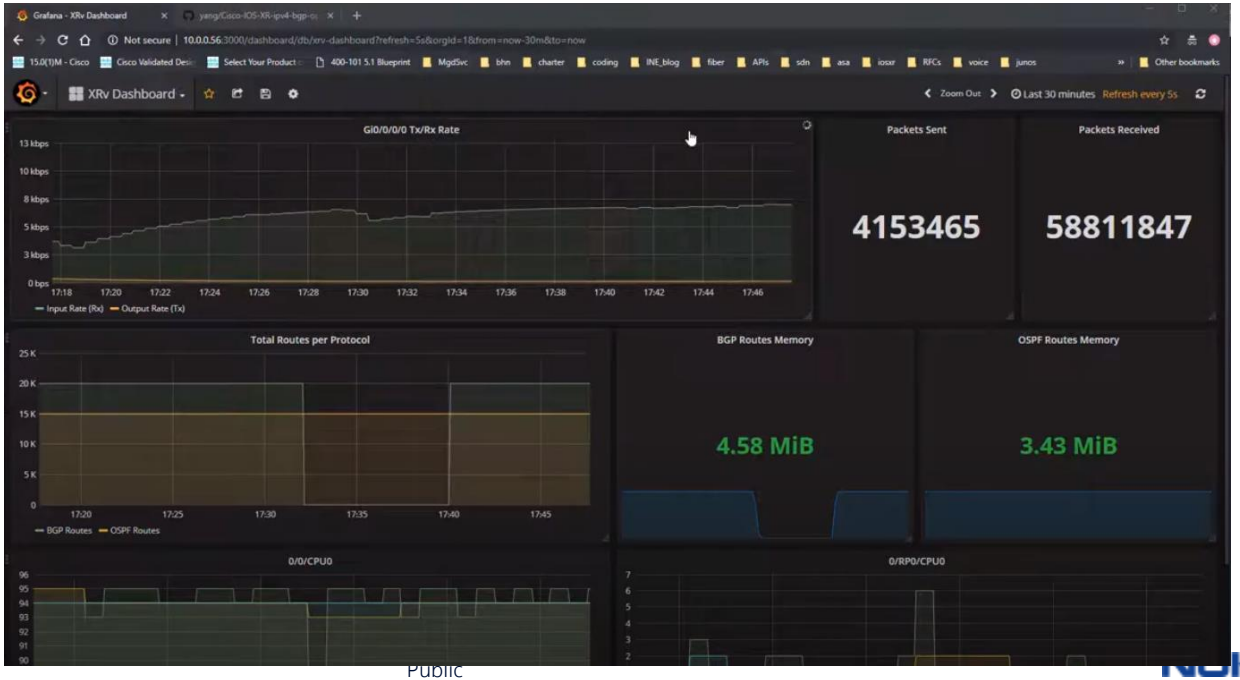
- Arista publishes its YANG models in the aristanetworks/yang repo
- Example using gNMIc client


```
$ gnmic -a 10.2.0.21:6030 -u admin -p admin --insecure get \
--path "/interfaces/interface[name=Ethernet1]/config/description"
{
  "source": "10.2.0.21:6030",
  "time": "1970-01-01T02:00:00+02:00",
  "updates": [
    {
      "Path": "/interfaces/interface[name=Ethernet1]/config/description",
      "values": {
        "interfaces/interface/config/description": "gnmic-example"
      }
    }
  ]
}
```

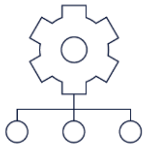
Example 3 –Telemetry



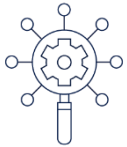
- gRPC event streaming can be collected by the Cisco gNMI plugin for Telegraf
  - Plugin config includes what XPATHs to collect, and what sample interval



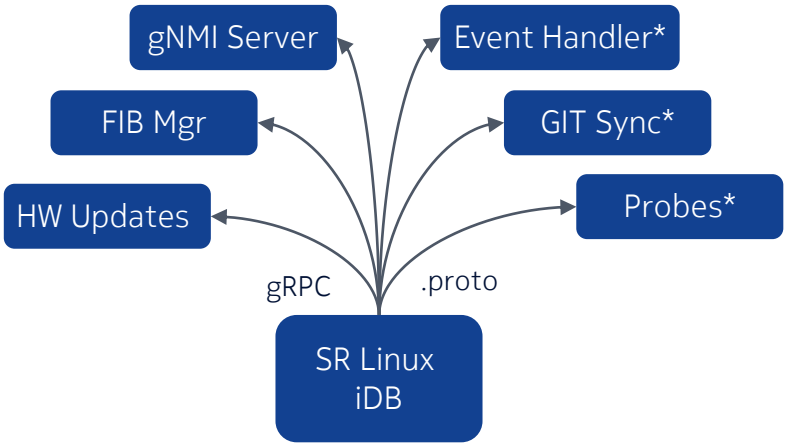
Example 4 – SR Linux – gRPC internally + Native exposure of data via gNMI streamed telemetry



Network Development Kit based on gRPC



TELEMETRY




```
---
- name: Run gNMI Demo against SRL hosts
  gather_facts: false
  hosts: nokia

  collections:
  - nokia.grpc

  tasks:
  - name: Get system name configuration (using gNMI GET Request)
    gnmi_get:
      type: CONFIG
      path:
        - /system/name
    register: gnmiget_ret

  - name: Subscribe to interface telemetery stats (using gNMI SUBSCRIPTION Request)
    gnmi_subscribe:
      duration: 5
      mode: STREAM
      subscription:
        - path: /interface[name=*]/statistics
          mode: SAMPLE
          sampleInterval: '1000000000'
    register: gnmisubs_ret

  - name: Show output of interface stats telemetry
    debug:
      msg: '{{ gnmisubs_ret.output }}'
```

* Custom extensions

Adoption

- Vendor-side
  - Nokia SROS and SR Linux
  - Nokia WDM systems - PSS
  - Arista EOS
  - Cisco IOS XR, XE, NX-OS
  - Juniper JunOS
  - SONiC
  - OpenDayLight, ONOS

  - Many many more

- Customer-side
  - Google, Apple, Microsoft, Tencent, Baidu,
  - 80% of Telco's are evaluating today the use of gRPC for telemetry usage

Adoption Poll

What is your take on gNMI / gRPC to manage your network equipment

1. I’m using it for both configuration tasks and streaming operational data

2. I’m just using it for streaming operational data

3. I’m evaluating the use in my organization

4. I’m happy with SNMP / NetConf / other mechanism and have no interested (yet)

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