YANG-based Time Series Telemetry

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✅ Really Nice Graphs

- What is included?
- Traceability?
- Measurement Units?
- Precision?

Compare numbers and graphs? Between systems? Vendors?

Use as input for real decisions?
Philatelist Framework

**AGGREGATOR**
- Transform and aggregate data flows
- Deliver TSDB buckets with traceable, vendor agnostic, well defined data

**COLLECTOR**
- Collect from all kinds of sources
- Add YANG + Metadata as needed

**PROVIDER**
- Let's not implement Yet-Another-
- Scattered Sensors already abundant
- Pointers and Metadata
POWEFF builds on Philatelist

- **AGGREGATOR** • Transform and aggregate data flows
  • Deliver TSDB buckets with traceable, vendor agnostic, well defined data

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ietf-mlm-philatelist-AGGREGATOR.yang
ietf-mlm-philatelist-COLLECTOR.yang
ietf-poweff-PROVIDER.yang
Collection (Xmas-)Tree

Dashboard (and YANG API) on top

Time-Series Database Bucket

User visible-configuration, tying it all together

User visible-configuration, for collection processes

Existing devices of every kind, with varying interfaces
**Series:** Total CO2e/h  
**Scope:** Network, Compute, Building, Cooling  
Only OPEX included (no embedded C)  
**Precision:** ±18%

```
tlm-flow Top-co2e/h {  
    output destination Total-CO2e/h  
    output units CO2e/h  
    middle inputs [ Total-kW CO2-intensity ]  
    middle operation linear-multiply  
}

tlm-flow Network+Compute+Building+Cooling {  
    output destination Total-kW  
    output units kW  
    middle inputs [ Network, Compute, Building, Cooling ]  
    middle operation linear-sum  
}
```
This is the sort of metadata we need for a data stream to be able to make decisions.
Series: Total CO2e/h
Scope: Network, Compute, Building, Cooling
Only OPEX included (no embedded C)
Precision: ±18%

The aggregation & collection tree is built by user visible configuration on the controller level.
```
stmtlm-stream Network-Controller-Server {
    source [ 2001::0368, 2001::0369 ]
    sensor-group [ Ctrl-Power, Ctrl-Load, Service-List ]
    destination Ctrl
}
sensor-group Ctrl-Power {
    redfish-polling 15min
    path [ /redfish/v1/Chassis/0/power ]
}
sensor-group Ctrl-Load {
    snmp-polling 5min
    path [ .1.3.6.1.4.1.2021.10.1.3.2 ]
}
sensor-group Service-List {
    restconf-yang-push-subscription
    path [ /l3vpn-svc/vpn-services/vpn-id ]
}
```
Providers use configuration to know what data to collect, and how, for a class of devices. Device experts need to supply this information.
tlm-stream Network-FW {
  source [ 2001::2000/120 ]
  sensor-group [ FW-Power, FW-Load ]
  destination Front
}

sensor-group FW-Power {
  gnmi-polling 5min
  path [ /vendor-x/psu/current
         /vendor-x/psu/voltage ]
}

sensor-group FW-LoadFactor {
  file vendor-x-load-to-power-correction.csv
  path [ ApparentPower ActualPower ]
}

tlm-flow FW-Correction {
  output destination Front
  output units kW
  middle inputs [ FW-Power, FW-Load, FW-LoadFactor ]
  middle operation Apply-LoadCorrectionFactor
}
Some of the data is collected in (near) real-time, some may be fetched from files, or external sources. Varies by device type.
YANG to Time Series Database Mapping

Original YANG Instance-Identifier:
/interfaces/interface[name='eth0']/statistics/in-unicast-pkts

• Metric: interfaces_interface_statistics_in_unicast_pkts
• Value: 5432100
• Labels:
  • host = router-01
  • interfaces_interface_name = eth0
Handling Old and New Devices in Parallel

**Controller strategy** (existing devices)

- Work with existing devices
  - No time to wait for standards to develop, then deploy in field
- Add metadata
  - Device experts need to describe device data flows to controllers
- Reduce power draw on existing devices
  - Typically requires detailed knowledge about use case, device behavior

**Device strategy** (new devices)

- Develop standard ways to read power data from devices
  - Ways that include the metadata from day one
- Develop standard ways to control power draw in given use cases
  - Ways that describe the reduction in expectations, i.e. intent
- Implement, deploy
Thank you