Google Cloud

OpenConfig - progress toward vendor-neutral network management

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OpenConfig projects

Data models
models for common configuration and operational state data across platforms

Streaming telemetry
Scalable, secure, real-time monitoring with modern streaming protocols

RPCs and tools
Management RPC specs and implementations
Tooling to build config and monitoring stacks

Participants

Google  AT&T  Microsoft  BT  Facebook  Level3  Verizon  Yahoo!  Comcast  Cox  Jive  Apple  DT-Terastream  Bell Canada  SK Telecom  Bloomberg  Netflix  Oracle  Tencent
Turning YANG models into code

- Data models
- Model validation
- Code generation
- Code artifacts
- Data instance (your code)
- Data serialization

OpenConfig models

Python classes

Go structs

Protobuf

Populated config data

JSON

Protobuf
gNMI -- single common service for state management

```protobuf
go
gNMI = 3

option (gnmi_service) = "0.4.0";

service gNMI {
  // Retrieve the set of capabilities supported by the target.
  rpc Capabilities(CapabilityRequest) returns (CapabilityResponse);

  // Retrieve a snapshot of data from the target.
  rpc Get(GetRequest) returns (GetResponse);

  // Modify the state of data on the target.
  rpc Set(SetRequest) returns (SetResponse);

  // Subscribe to stream of values of particular paths within the data tree.
  rpc Subscribe(stream SubscribeRequest) returns (stream SubscribeResponse);
}
```

Vendor implementations in early release images -- routing and transport
Vendor implementations and deployment

steady progress on data model support

- BGP, interfaces, policy, terminal optics all have shipping or early release implementations
- several other models available for testing

streaming telemetry

- shipping from multiple vendors -- close to deprecating SNMP on some platforms

vendors with shipping or early-release code:

Arista  Ciena  Cisco  Juniper  Nokia
What’s else OpenConfig is working on

models:
  QoS, SR-TE, probes, BFD, flow sampling, user activity logging, ...

streaming telemetry:
  more data coverage, native OpenConfig-based notifications

RPCs and tools:
  gNOI feedback and development, open source telemetry collector, reference implementations

community:
  updated participation process for implementors, more operators formally joining

native implementations:
  continued work with vendors to expand and improve model support
Thank You
OpenConfig open source tools

[GitHub link](https://github.com/openconfig/)

- **public**: YANG data models published by OpenConfig
- **gnmi**: gNMI service definition and reference implementation
- **gnoi**: gNOI microservice definitions for operational commands
- **ygot**: YANG Go Tools -- model-to-code generation in Go
- **goyang**: YANG model parser and compiler
- **oc-pyang**: OpenConfig model checker and documentation generator
Elements of a streaming telemetry solution

- analytics applications
- scalable collector infrastructure
- common streaming protocol
- data normalization
- device instrumentation

GRPC

OpenConfig data models
gNMI -- management software built on gRPC

gRPC -- performant, secure RPC framework evolved from Google Stubby
  ● bidirectional streaming built on standard HTTP/2
  ● pluggable load balancing, tracing, health checking and auth
  ● client libraries in 10 languages

gNMI -- gRPC Network Management Interface
  ● single service for state management (streaming telemetry and configuration)
  ● offers an implemented alternative to NETCONF, RESTCONF, ...
  ● designed to carry any tree-structured data (not only YANG-modeled)
## OpenConfig tools ecosystem

### language bindings / data serialization

- **pyangbind** -- Python classes from YANG models, JSON serialization
- **goyang** -- Go language compiler for YANG models
- **ygot** -- library to generate, populate, validate, and serialize Go structs from YANG models

### YANG model authoring

- OpenConfig [style guide](#)
- OpenConfig YANG model [checker](#)
- OpenConfig [documentation generator](#)

### telemetry software

- Go language gNMI client [reference impl](#)
- **BigMuddy** -- Cisco UDP telemetry collector
- **OpenNTI** -- Juniper UDP telemetry collector
- **Arista** -- gRPC telemetry collector

### NMS client / server

- **gNMI** -- gRPC based management protocol spec
- **pynms** -- example Python NMS code (beta)
Engaging with OpenConfig

network operators
- just join -- bring use cases, model extensions, tools, reviews, ...
- use the models and tools -- help improve them
- push your vendors for native support

vendors
- feedback on models (particularly on implementability)
- implement streaming telemetry and native model support
- engage via your customers

OSS projects and ISVs
- adopt OpenConfig as a management API for common elements
- continue to build the model-based management ecosystem