Google Cloud

OpenConfig - progress toward vendor-neutral network management

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on behalf of Google network operations and OpenConfig group

OPENCONFIG
www.openconfig.net

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

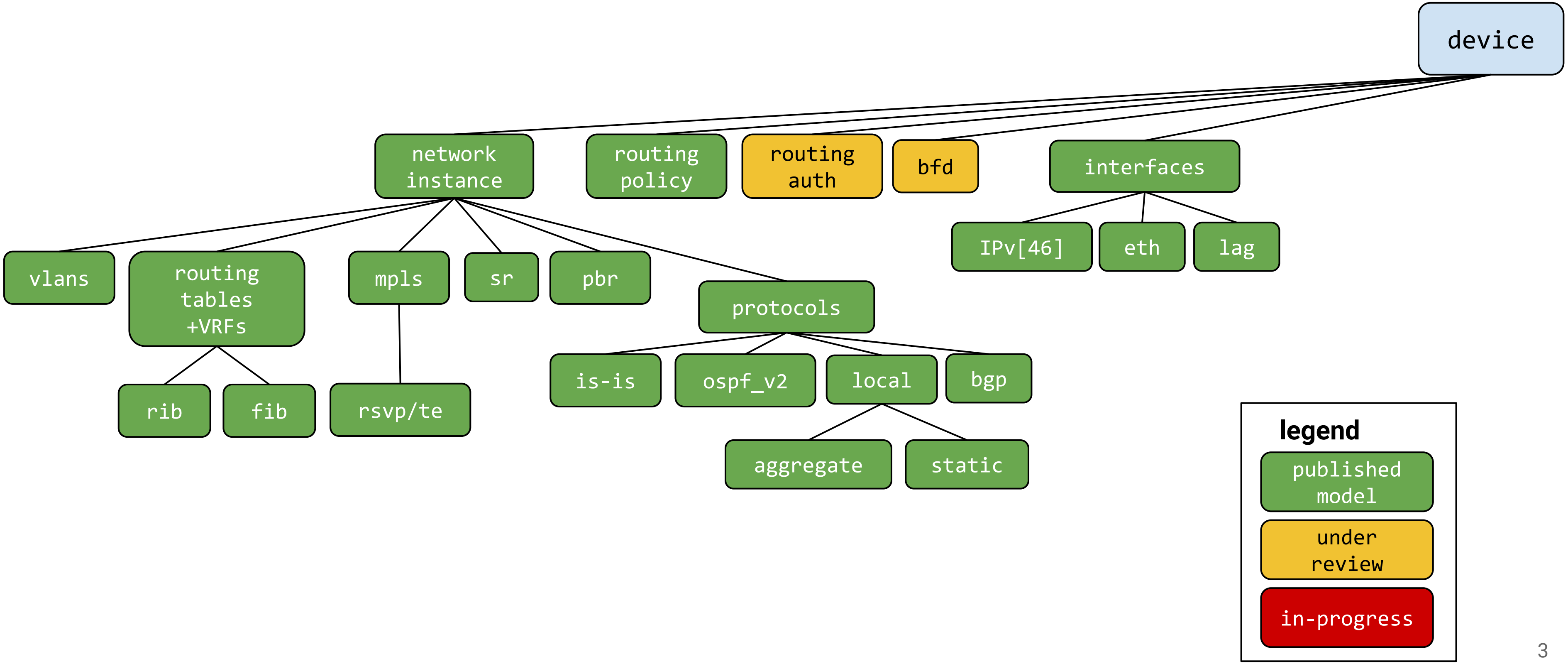
Participants

Google AT&T Microsoft BT Facebook Level3 Verizon Yahoo! Comcast

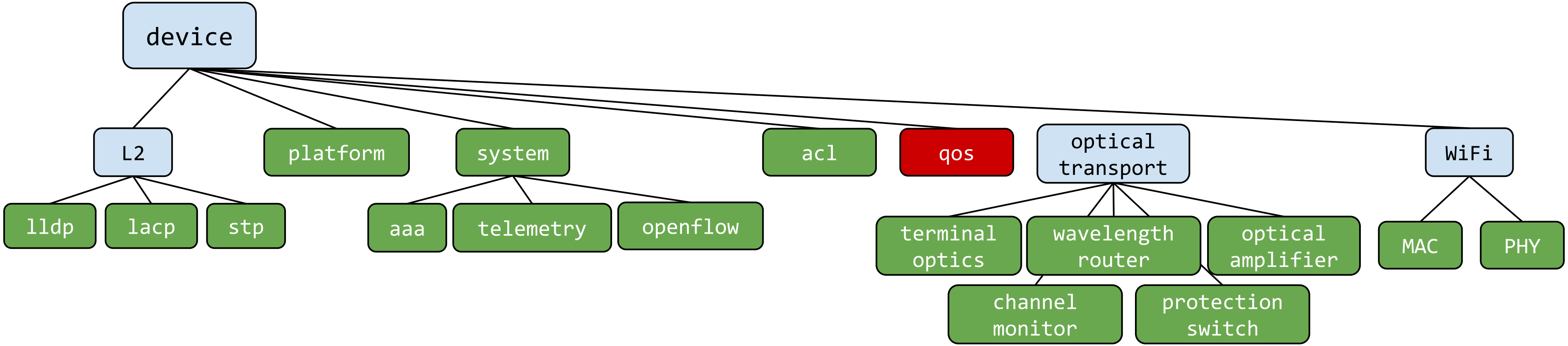
Cox Jive Apple DT-Terastream Bell Canada SK Telecom Bloomberg Netflix

Oracle Tencent

OpenConfig data model progress 1/



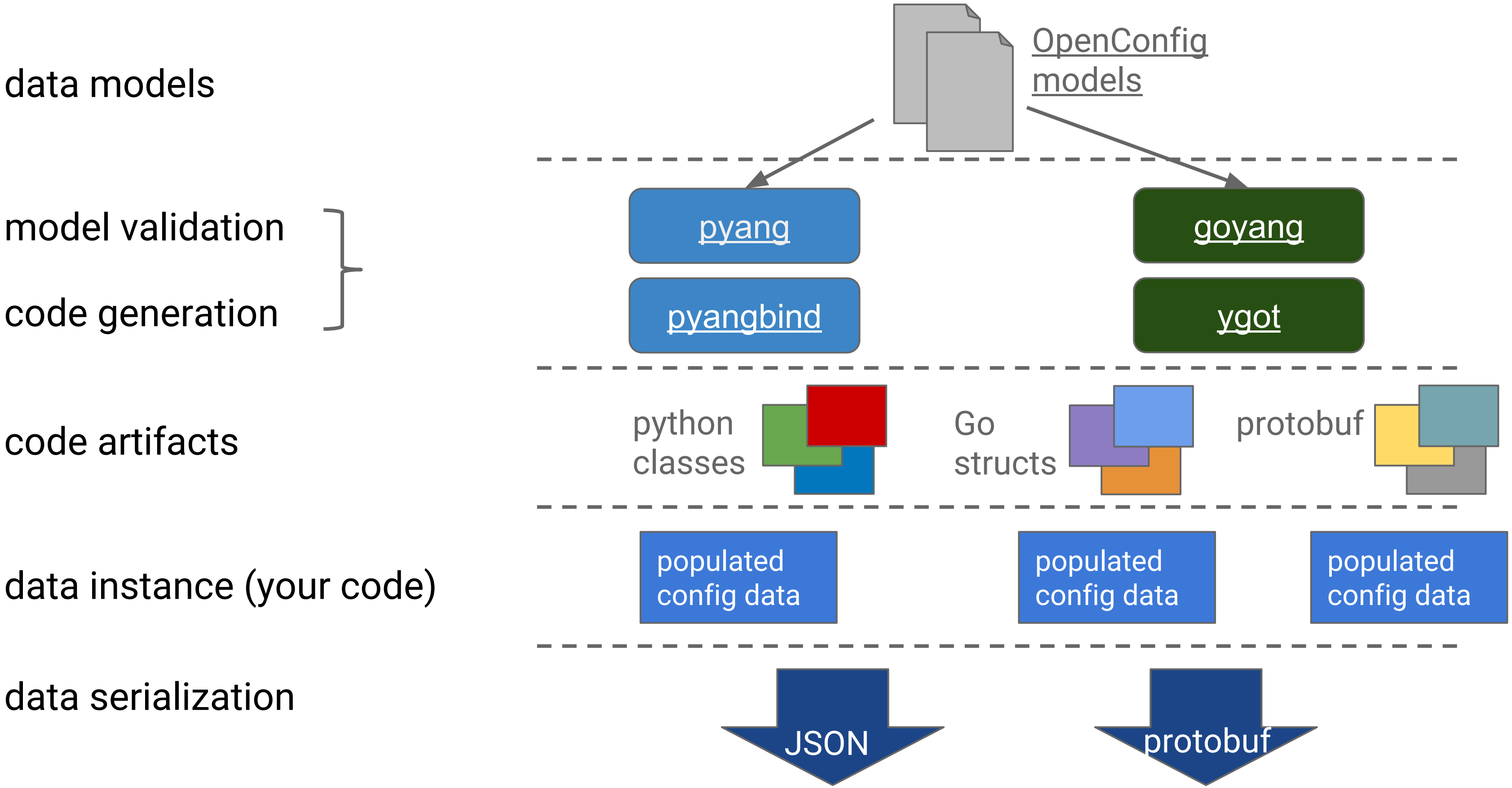
OpenConfig data model progress 2/



legend

- 🟩 published model
- 🟨 under review
- 🟥 in-progress

Turning YANG models into code



data models

OpenConfig models

model validation

code generation

pyang

pyangbind

goyang

ygot

code artifacts

python classes

Go structs

protobuf

data instance (your code)

populated config data

populated config data

populated config data

data serialization

JSON

protobuf

gNMI -- single common service for state management

```
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.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

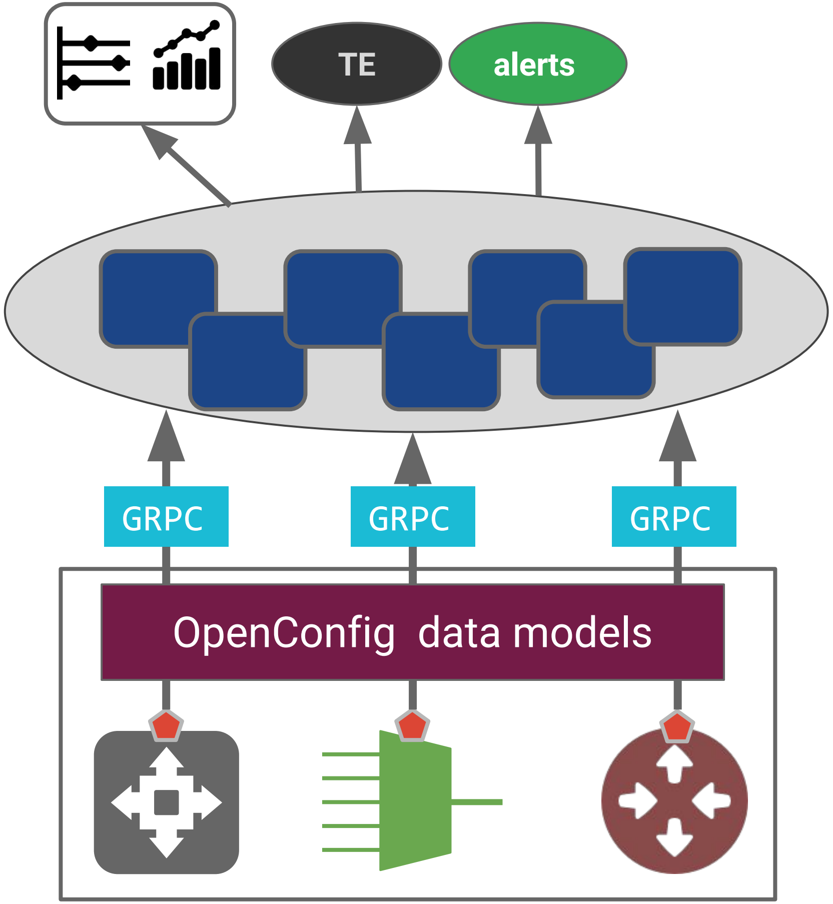
analytics applications

scalable collector infrastructure

common streaming protocol

data normalization

device instrumentation



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