Use cases for gRPC in network management

draft-talwar-rtgwg-grpc-use-cases-00

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gRPC: an open, multi-platform RPC framework

gRPC is an open source version of Google’s microservice communication framework.

gRPC leverages standard HTTP/2 as its transport layer:
- Binary framing, header compression
- Bidirectional streams, server push support
- Connection multiplexing across requests and streams

gRPC features:
- Load-balancing, app-level flow control, call-cancellation
- Serialization with protobuf (efficient wire encoding)
- Multi-platform, many supported languages
- Open source, under active development

See draft-kumar-rtgwg-grpc-protocol-00 for protocol details.
gRPC use cases for network management

- **streaming telemetry** -- high-volume data streaming from network devices
  - alternative to SNMP

- **network configuration** -- flexible RPC framework for config and oper commands
  - alternative to NETCONF, TL1, and proprietary protocols
Streaming telemetry architecture

stream data continuously -- with incremental updates
telemetry sent based on subscriptions
observe network state through a time-series data stream
device data follows a common model
gRPC for streaming telemetry

binary framing and header compression -- highly efficient bulk xfer
bidirectional streaming -- independent request and telemetry streams
flexible data encodings -- payload agnostic, can support XML, JSON, protobuf, ...
open source IDLs for 10 languages -- easy to stand up gRPC endpoints
gRPC for network configuration

flexible data encodings -- e.g., no requirement to use XML

support for a variety of security mechanisms -- TLS, simple auth, client-server mutual auth, ...

easy platform integration based on the large number of OSS language implementations available
gRPC implementation status

gRPC-based streaming telemetry on major platforms

- early-release implementations and announced support from: Arista, Cisco, Juniper, Ciena

gRPC network configuration implementations

- demos / early-release implementations from Cisco, Juniper (additional announcements pending)
Additional gRPC use cases

- multi-language communications with idiomatic APIs
- large-scale microservice communication
- native iOS / Android libs for efficient mobile communications to backend services
- highly efficient communication for cloud services (e.g., storage, messaging, ...)
- device-to-device and device-to-cloud for embedded systems
- unified IPC and remote communication
Additional material
Streaming telemetry and gRPC

Streaming telemetry benefits over SNMP

- devices stream data based on a specified frequency or upon state change
- data is sent as soon as it is available, reducing the need to buffer
- no single large request for all data (unlike SNMP polling)
- data sent incrementally, e.g., only for those data items that have changed
- ability to distribute the telemetry sources (e.g., directly to linecards)
- users issue subscription requests via RPC for data of interest
- data exported in a well-structured, common format, e.g., based on YANG models
- device and collector communicate over a secure, authenticated, reliable channel