gRPC Services under One Roof
Introduction and Practical use cases

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Agenda

- Introduction to gRPC
- Introduction and use cases for:
  - gNMI
  - gNOI
  - gNSI
  - gRIBI

GitHub Repo for this talk

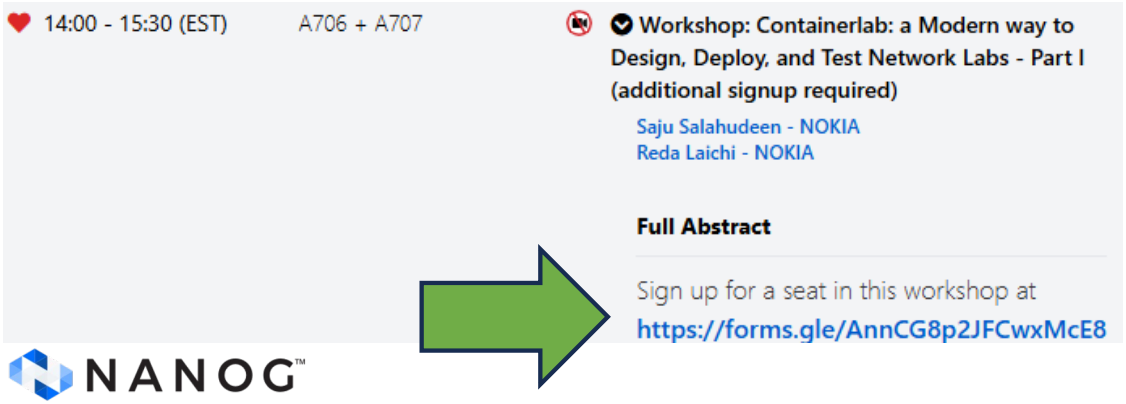
https://github.com/srlinuxamericas/n93-grpc

Containerlab Workshop at N93

Time: Wednesday 2PM

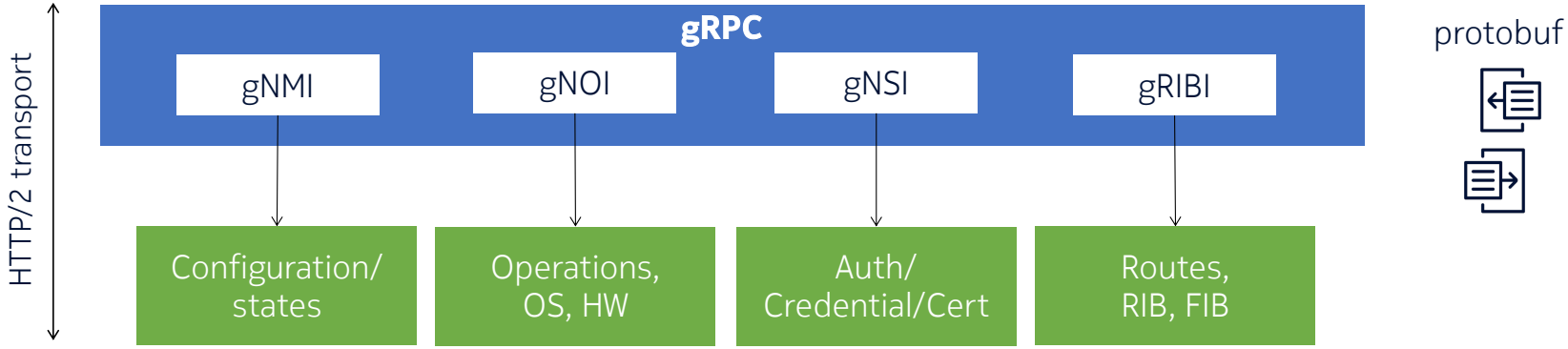
Room: A706 + A707

Registration Required



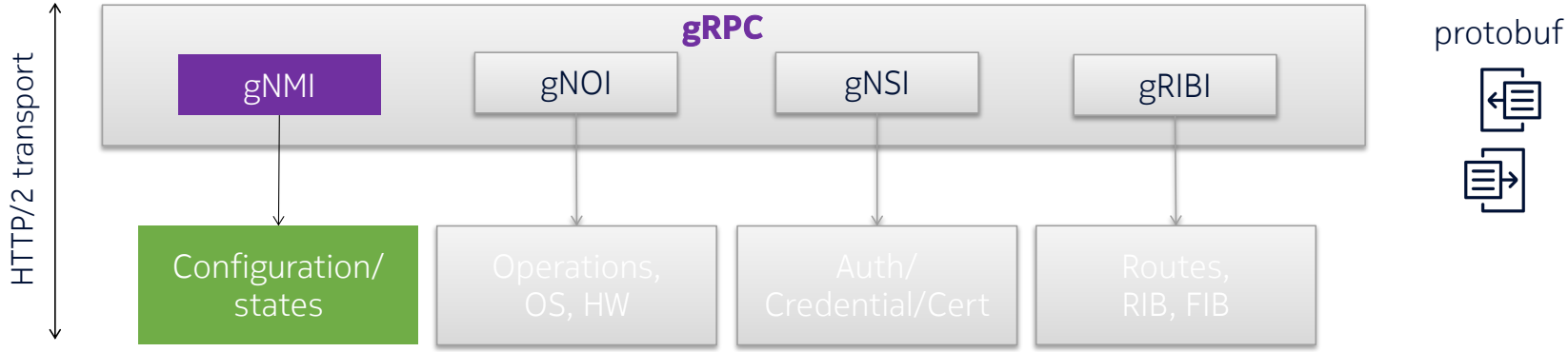
gRPC-based services

- RPC framework using HTTP 2.0 as the underlying transport
- gRPC does not expose HTTP 2.0 to the user (unlike REST)
- All services leverage Proto Buffer
- Network management and programmability
- Different data models and focus

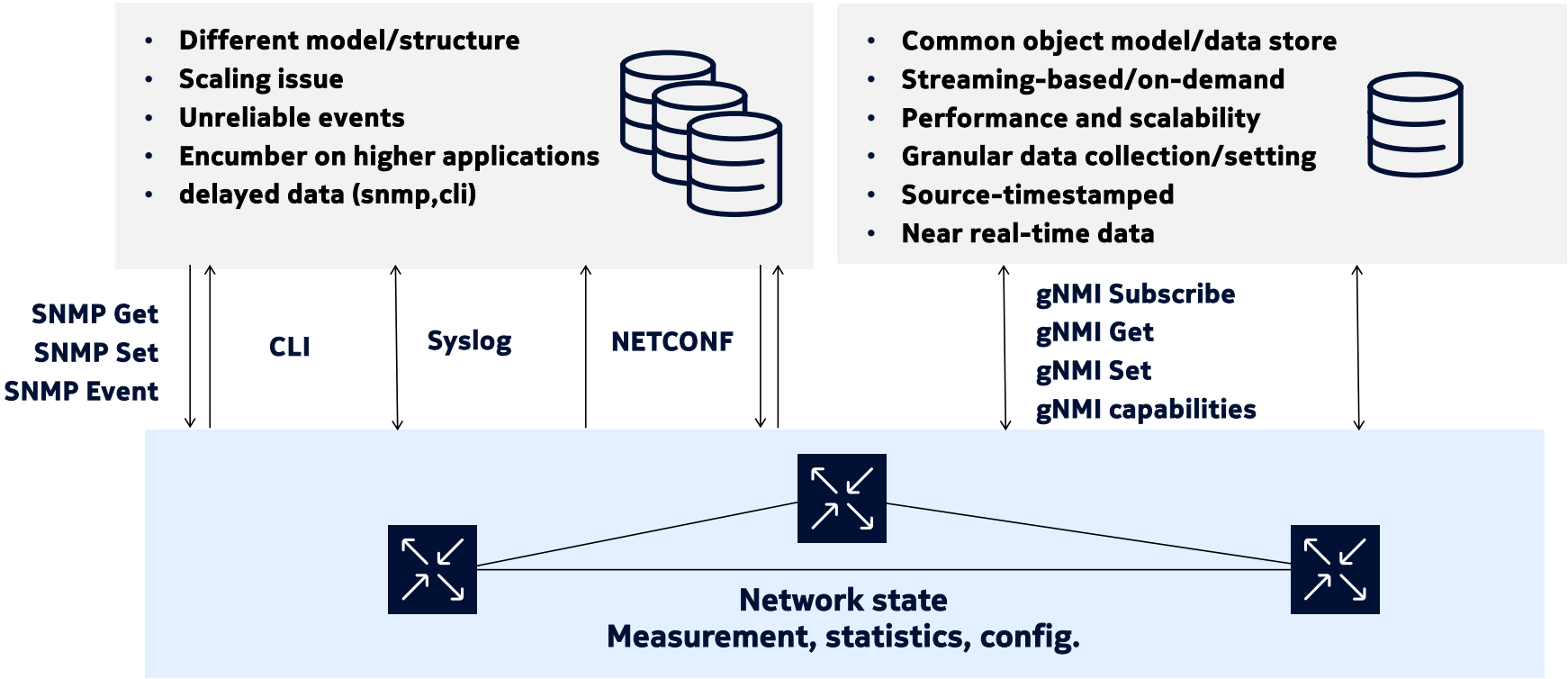


gNMI

- gRPC Network Management Interface
- gRPC based service for configuration, state and telemetry
- Standards defined by OpenConfig - https://github.com/openconfig/gnoi



gNMI Overview



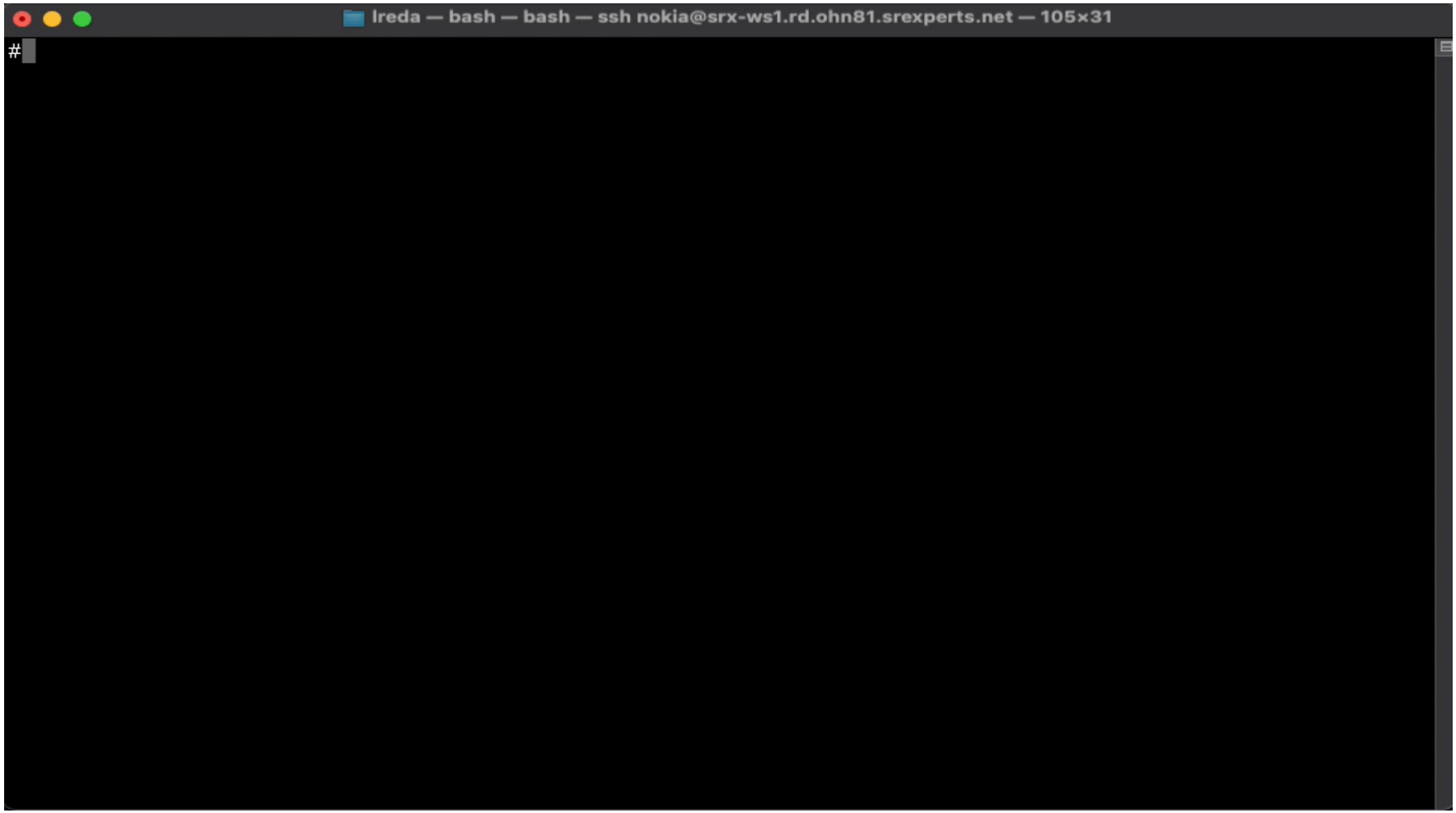
gNMI Use Cases

- Configuration: Initial deployment, underlay/overlay configuration, update configuration
- State retrieval: Troubleshooting, pre/post-configuration checks, closed-loop automation
- Streaming Telemetry: Statistics collection, performance monitoring, Alarm notification

gNMI Client

- gNMIc – gNMI CLI client that provides support for gNMI services
- Developed by Nokia and donated to Openconfig
- https://gnmic.openconfig.net/

gNMI for Configuration



gNMI for state retrieval

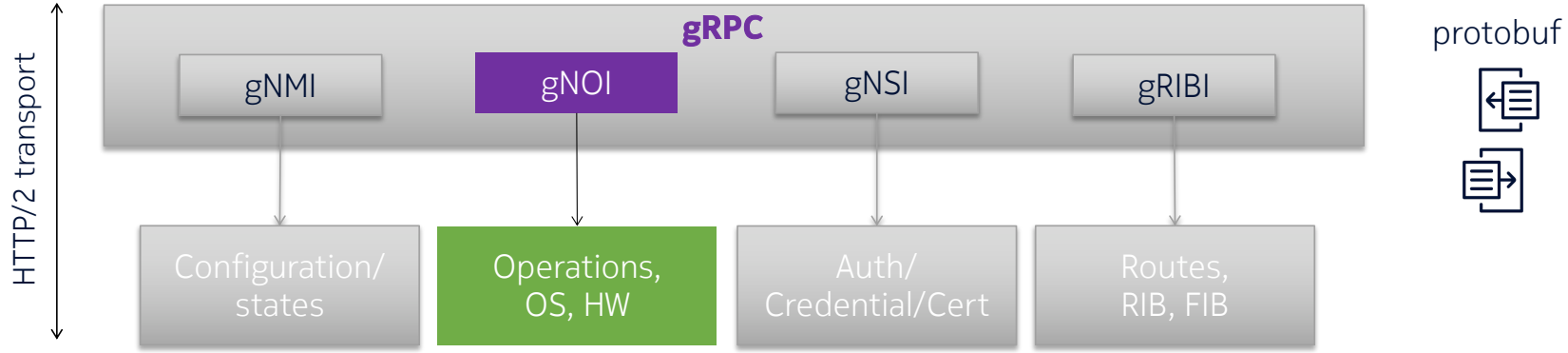
```
nokia@rd-srx-ws1-155afda:~/n93-grpc$
nokia@rd-srx-ws1-155afda:~/n93-grpc$ gnmic -a leaf1 -u admin -p admin --skip-verify get --path /interf
ace[name=ethernet-1/10]/oper-state/ --encoding json_ietf
```

gNMI for Streaming Telemetry

```
nokia@rd-srx-ws1-155afda:~/n93-grpc$
nokia@rd-srx-ws1-155afda:~/n93-grpc$
nokia@rd-srx-ws1-155afda:~/n93-grpc$ gnmic -a leaf1 -u admin -p admin --skip-verify sub --path /interf
ace[name=ethernet-1/10]/statistics/in-packets --mode stream --stream-mode on_change
```

gNOI

- gRPC Network Operations Interface
- gRPC based service for executing operational commands
- Standards defined by OpenConfig - https://github.com/openconfig/gnoi



List of current gNOI Services

SYSTEM

Ping
Traceroute
Time
SetPackage
SwitchControlProcessor
Reboot
RebootStatus
CancelReboot
KillProcess

FILE

Get
TransferToRemote
Put
Stat
Remove

FACTORYRESET

Start

HEALTHZ

Get
List
Acknowledge
Artifact
Check

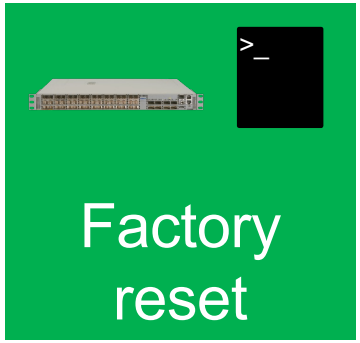
OS

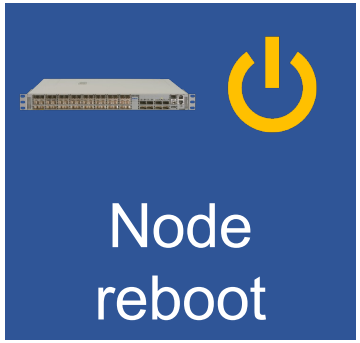
Install
Activate
Verify

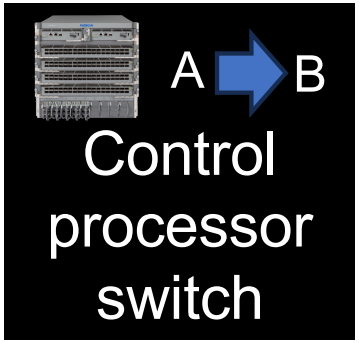
LINKQUALIFICATION

Create
Get
Capabilities
Delete
List

gNOI Use Cases







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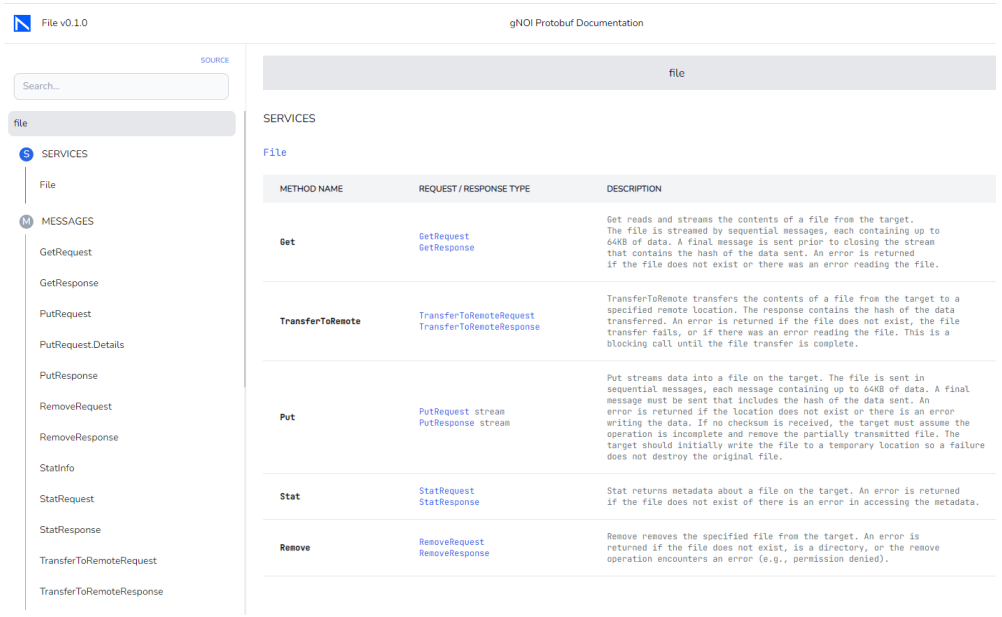
gNOI Services - File

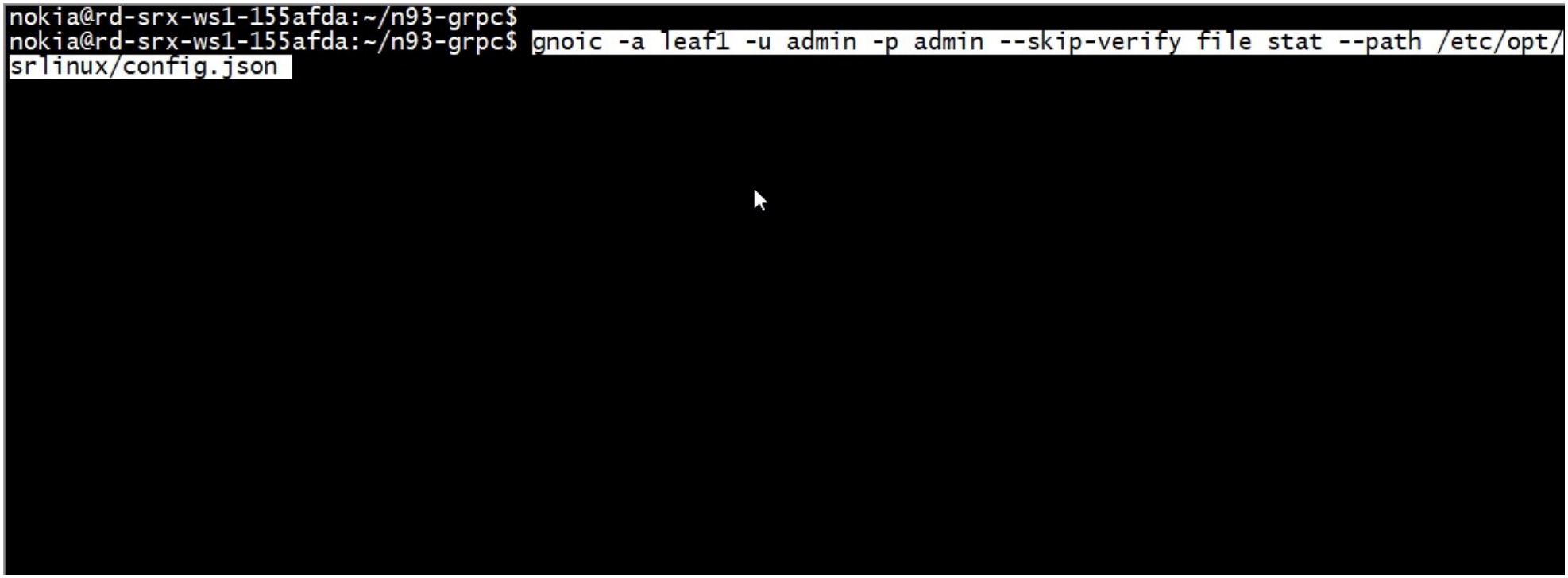
- gNOI File service – allows client to transfer files to and from the target node.
- gNOI File RPCs:
  - GET
  - PUT
  - REMOVE
  - STAT

gNOI Client

- gNOIc – gNOI CLI client that provides support for select gNOI services
- https://gnoic.kmrd.dev/
- https://gnxi.srlinux.dev/

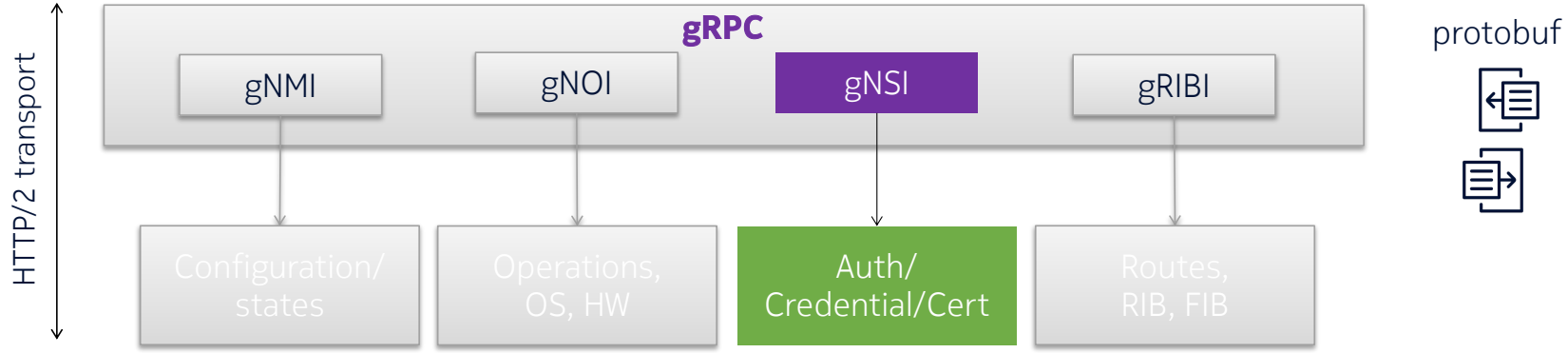


CONFIG BACKUP



gNSI

- gRPC Network Security Interface
- gRPC based service for security configuration
- Standards defined by OpenConfig - https://github.com/openconfig/gnsi

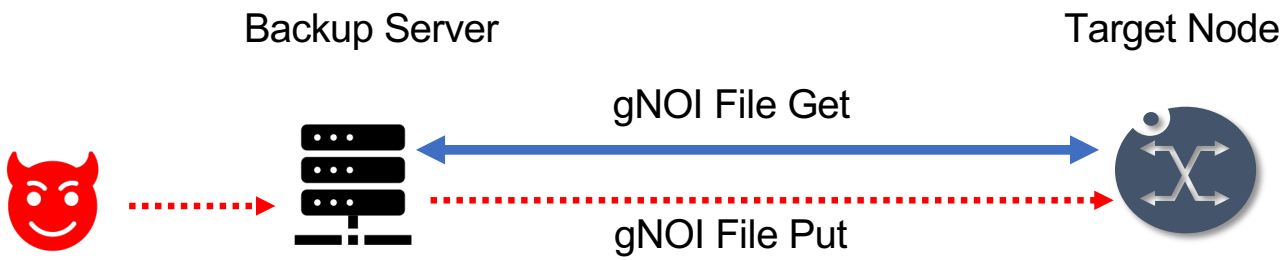


gNSI Services

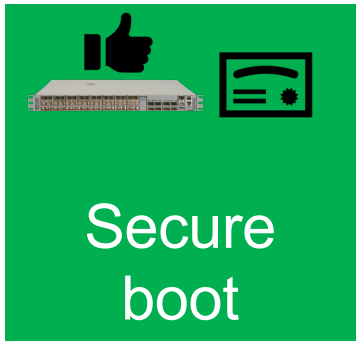
- Certz – allows a client to replace a certificate, trust bundle, CRL or a combination of these on a target node.
- Acctz – allows clients to stream accounting records from a target node.
- Pathz – allows access control for specific gNMI paths

gNSI Services

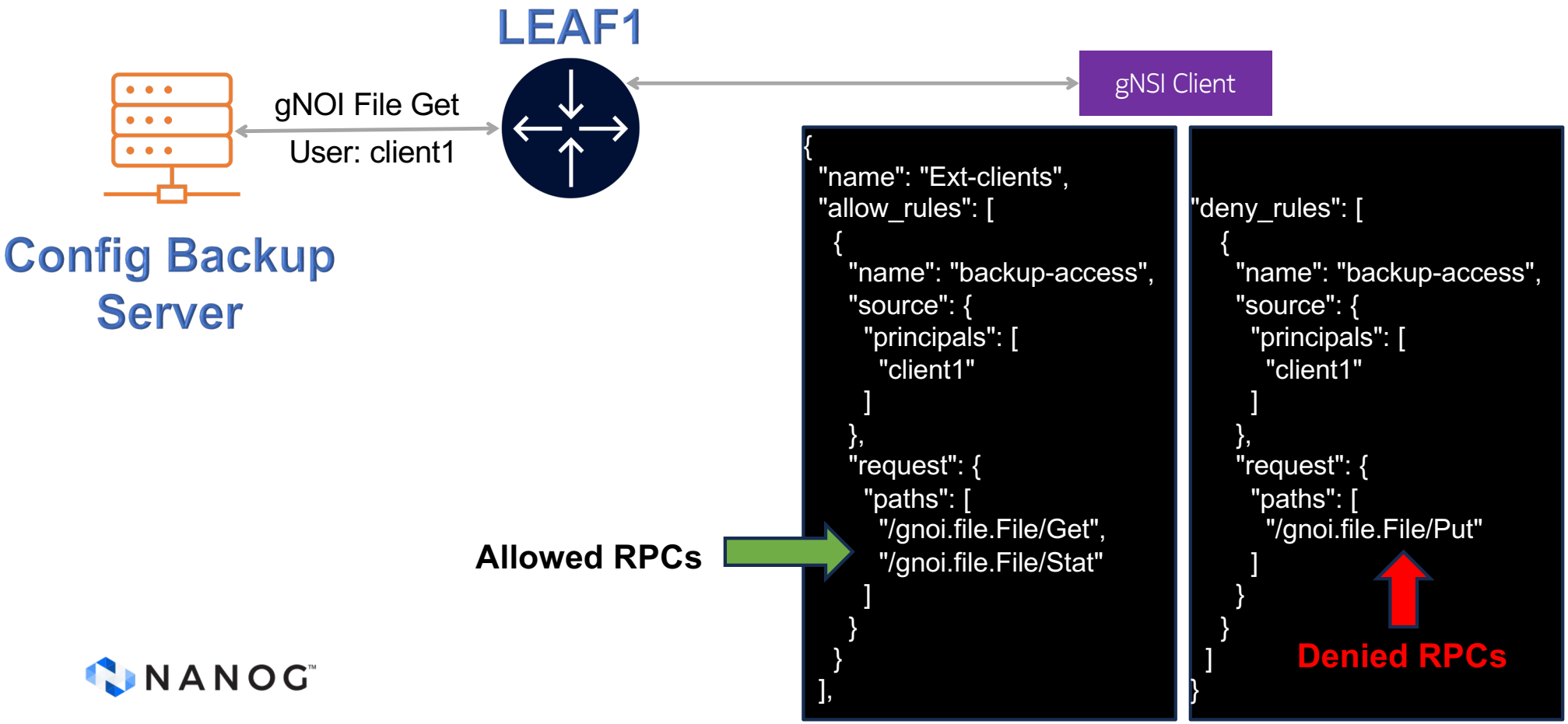
- Authz – gRPC-level authorization policy that defines which users can access which gRPC services/RPCs on the target node



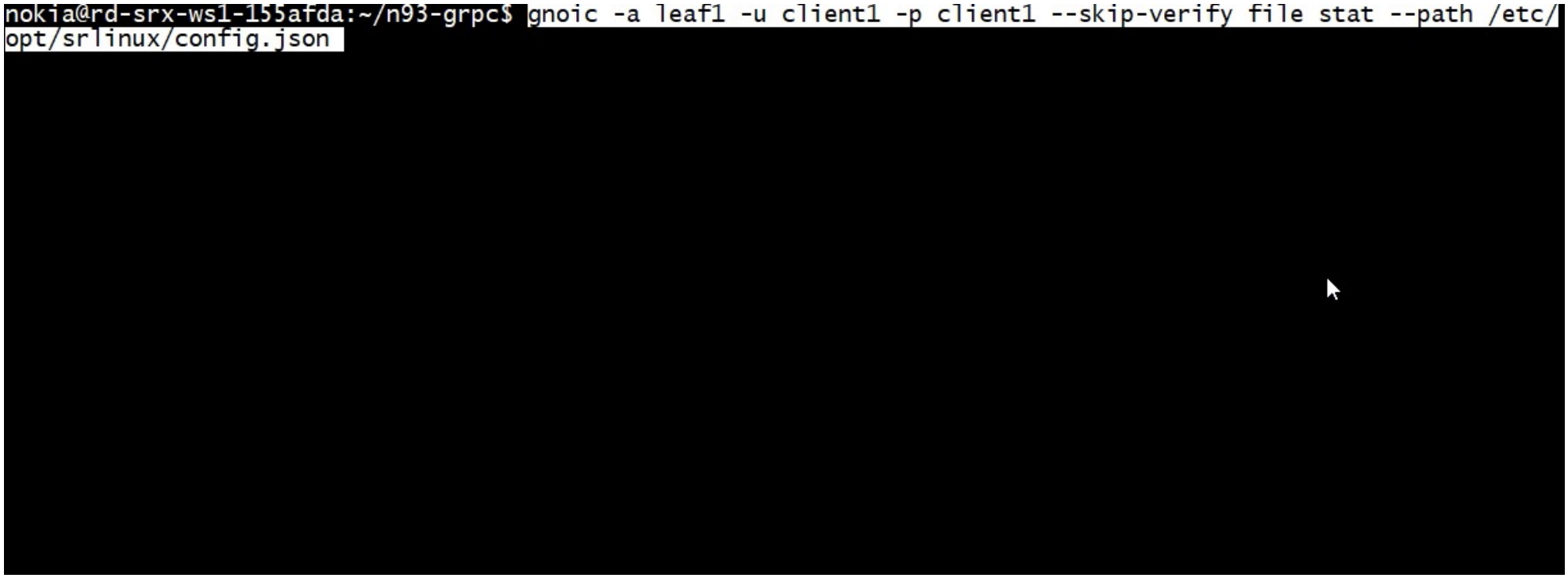
gNSI Usecases



gNSI Authz Demo Setup

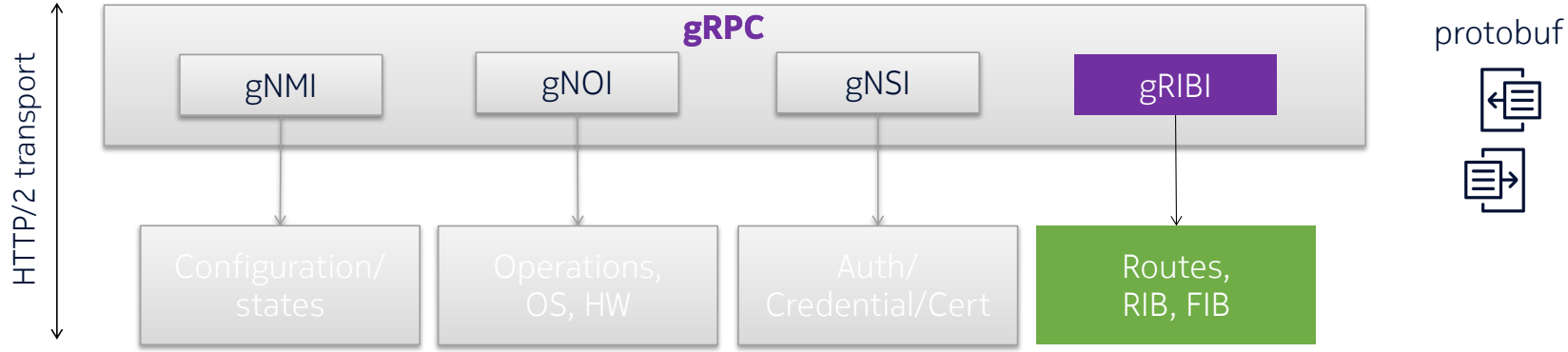


gNSI Authz Demo



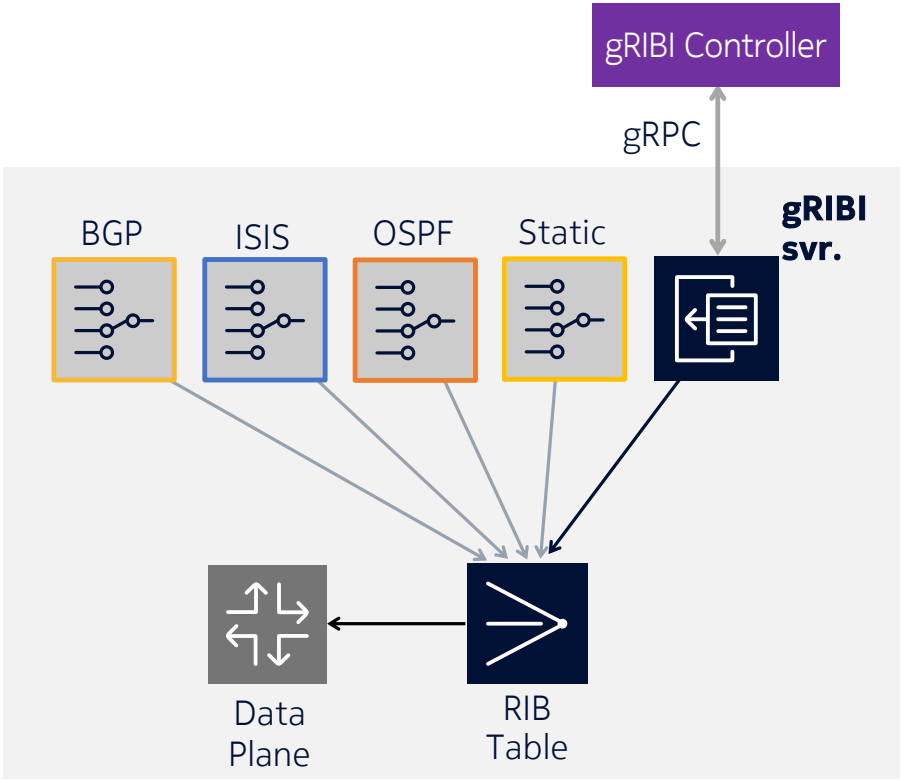
gRIBI

- gRPC Routing Information Base Interface
- gRPC based service for route injection
- Standards defined by OpenConfig - https://github.com/openconfig/gribi



gRIBI Overview

- Entries are created as though they are learned through a dynamic routing protocol
- Multiple gRIBI clients can connect to the network device (from all clients or a primary client only)
- Supported RPC
  - **Modify** RPC (ADD, DELETE, and REPLACE AFT Operations)
  - **Get** RPC
  - **Flush** RPC



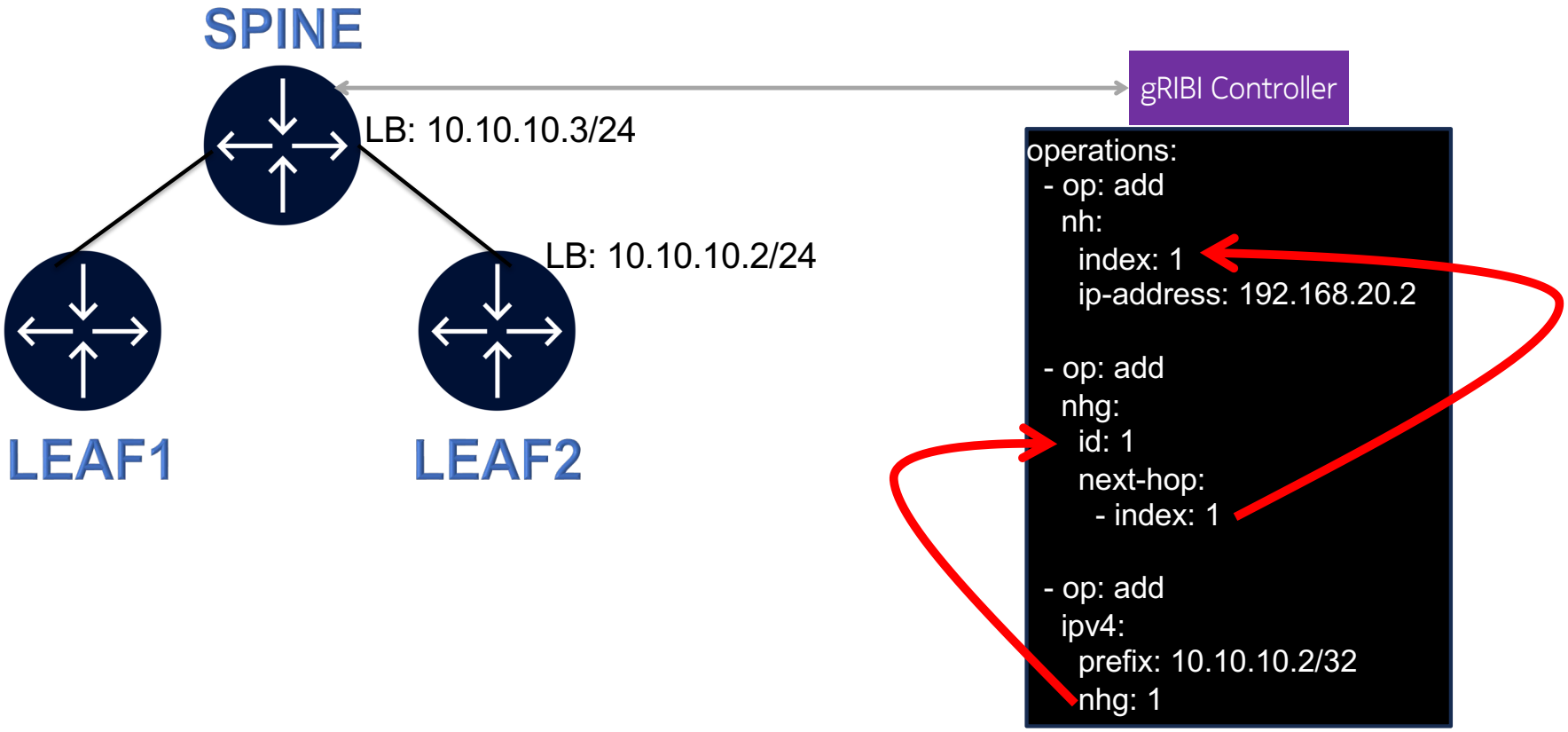
gRIBI Usecases

- SDN-based network control environment
- Emergency route update
- Peering/Traffic Engineering
- On-demand path creation

gRIBI Client

- gribic – gRIBI CLI client that provides support for gRIBI services
- https://gribic.kmrd.dev/

gRIBI Demo Topology



gRIBI Demo


spine
bash
--{ + running }--[ ]--
A:spine#
--{ + running }--[ ]--
A:spine# ping 10.10.10.2 network-instance default -c 1 -W 1
Current mode: + running
admin (68) Mon 10:48PM

Leveraging what we learned today

gNOI System Ping

1. Use gRPC to ping remote loopback IP (10.10.10.2)
2. Use gRPC to check Leaf2 route table entries → gNMI get
3. Use gRPC to configure gribic user, AAA rules
4. Use gribic to inject route on Spine → gNSI Authz Rotate
5. Use gRPC to check Leaf2 route table entries
6. Use gRPC to ping remote loopback IP (10.10.10.2)

gRIBI Demo

```
nokia@rd-srx-ws1-155afda:~/n93-grpc$
nokia@rd-srx-ws1-155afda:~/n93-grpc$ gnoic -a spine -u admin -p admin --skip-verify system ping --dest
ination 10.10.10.2 --ns default --count 1 --wait 1s
```

Future gRPC Services

- gNPSI – gRPC Network Packet Streaming Interface
- gSII – gRPC State Injection Interface

Source: https://github.com/openconfig

Summary

- Modern tools for network management
- Openconfig standards-based interfaces
- Vendor neutral RPCs
- Secure communication using TLS

Thank you

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