SC26 Network Research Exhibition: Demonstration Publishable Abstract

GP4L - Global Platform For Labs

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Abstract

GP4L (Global Platform For Lab) is a global overlay network composed of 100G/400G programmable switches and SmartNICs from the GNA-G AutoGOLE/SENSE Persistent Multi-Resource Testbed, NRP, FABRIC and the GEANT RARE initiative. It provides routing services using multiple open network operating systems, which implement traditional networking protocols and can be extended to integrate next generation features as an opt-In strategy. GP4L provides the means to implement production oriented feature experimentations and protocols, without impacting the rest of the network.

This showcase will include demonstration of advancements on the high performance software dataplane based on SmartNIC, VPP and multi control plane options (Figure 2). Demonstrate new integration capabilities to generate Digital Twin from GNA-G GREN Map topology files(Figure 1), and additionally support other NREs experimenting with at scale advanced/novel networking protocols and use cases, like PolKA (Polynomial Key-based Architecture) a stateless source routing protocol based on arithmetic operations over a polynomial encoded route label.

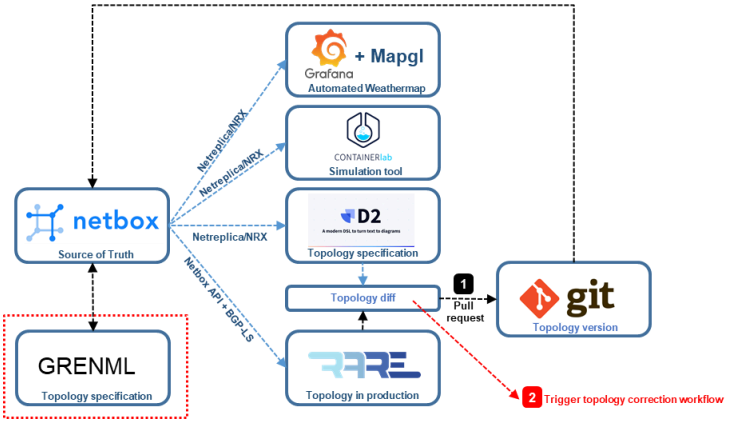


Figure 1: GP4L Automation Use Case

The Digital Twin use case (Figure 1) consists of using network topology files, in GRENML data format from the GNA-G GREN Map initiative, to create digital twins with multiple profiles, from 1-to-1 copies of real networks to obfuscated versions for sharable virtual labs. The Digital Twins are created using the Netbox, Netreplica, Containerlab software stack.

The high performance software dataplane (Figure 2) was presented at SC25 with focus on 400G performance evaluation and validation of multiple open/commercial control plane options. For SC26, the focus is to integrate SmartNIC QoS capabilities and validate VPP network emulation performance at 400G (delay, loss, jitter).

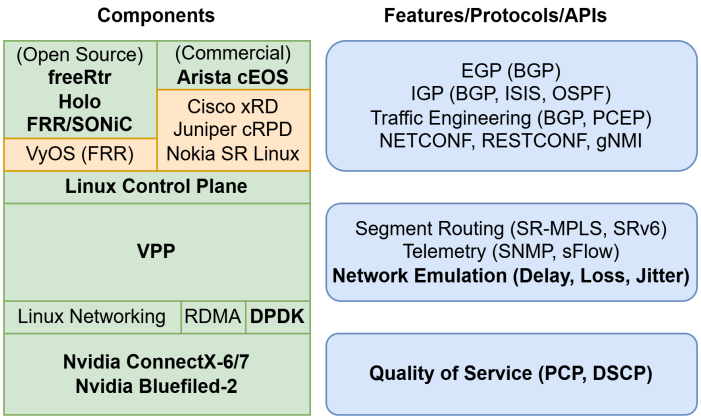


Figure 2: 100G Software Dataplane Architecture

Goals

Demonstrate a global programmable network testbed and its capability to accelerate the development, deployment and adoption of new protocols and management paradigms.

1. Support intercontinental high capacity transfers (up to 400G) of next generation protocols, i.e: PolKA
2. Support for 400G software dataplanes, network emulation and multiple control plane options.
3. Showcase the generation of Digital Twin from GNA-G GREN Map topology files using existing GP4L automation and orchestration components.

Resources

Capacity from trans-continental, international and regional networks manually provisioned or through AutoGOLE/SENSE.

P4 devices and DTNs from GNA-G AutoGOLE/SENSE, FABRIC, NRP and GEANT/RARE P4 testbed sites.

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