

SC19 Network Research Exhibition: Demonstration Preliminary Abstract

International P4 Networking Testbed

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Abstract

To realize the advantages of the P4 network programming language (“Protocol Independent, Target Independent, Field Reconfigurable”) [1], including for data intensive science, network research institutions around the world organized a collaboration to design, implement, and operate an International P4 Testbed (Fig-1). This testbed provides a highly distributed network research and development environment that can support advanced empirical experiments at global scale, including on 100 Gbps paths.

Goals

1 As a part of an initiative funded by the National Science Foundation’s (NSF) International Research Network Connections (IRNC) program, the International Center for Advanced Internet Research (iCAIR) designed, implemented and now operates International Software Defined Exchange (SDX) at the StarLight International/National Communications Exchange Facility (StarLight). This SDX supports multiple national and international network research testbeds, including a P4 testbed that allows member institutions to share multiple distributed P4 resources over international research and education networks.

2 The implementation includes access to the P4Runtime implementation. The current P4Runtime specification includes a Multi-Controller design which is implemented in a Master/primary and Secondary/standby model [2]. One P4 testbed project has modified this current design to support Master/Provider and multiple Secondary/Tenants model for three international P4 testbed network scenarios.

3 Other research projects on this testbed are exploring highly granulated telemetry insight into data flows, using capabilities for marking, tracking and analyzing individual packets for high fidelity views into real time traffic flows, even for high capacity E2E flows.

5 Other P4 research projects are exploring mechanisms for using P4 to enable enhanced network control planes for generalized network operations.

6 The international P4 consortium is exploring options for adding additional resources to the testbed including NIC that can support compiled P4 code.

7 The SC19 demonstrations will showcase multiple P4 capabilities.

Resources

Required resources from SCinet are a portion of the 10*100 Gbps circuits requested from the SCinet WAN group connecting the StarLight facility in Chicago to the StarLight booth on the SC19 showfloor

Involved Parties

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- Metropolitan Research and Education Network
- StarLight International/National Communication Exchange Facility and Consortium
- SCinet
- CenturyLink

REFERENCE

- [1] P4 project. <https://p4.org/>
- [2] P4 P4Runtime Specification version 1.0.0, The P4.org API Working Group, 2019-01-29

International P4 Experimental Networks (i-P4EN)

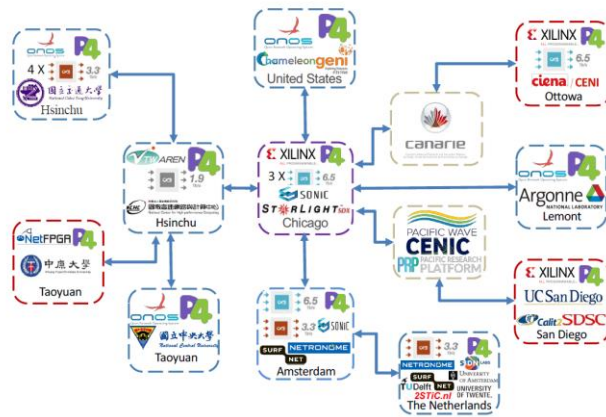


Figure 1