

# SC18 Network Research Exhibition: Demonstration Preliminary Abstract

## SDN Federation Protocol: Toward Fine-Grained Interdomain Routing

Submitted on behalf of the team by: Qiao Xiang, Y. Richard Yang, Yale,  
{qiao.xiang, yry}@cs.yale.edu

### Abstract

Member networks of collaborative data sciences are increasingly deploying software defined networking (SDN) within their own networks, but still interconnected by the Border Gateway Protocol (BGP). The inconsistency between the fine-grained SDN policies used in member networks and the coarse-grained (i.e., destination IP based) routing information exchanged between member networks can lead to serious issues, including black holes, reduced reachability and forwarding loops. We design SFP, the first pull-based, fully-distributed, fine-grained interdomain routing protocol, in which member networks query neighbors for routing information of interest. We design SFP as a modular extension of BGP, and develop two novel techniques, on-demand information dissemination and an efficient algorithm MaxODI, to address the potential scalability concern of SFP.

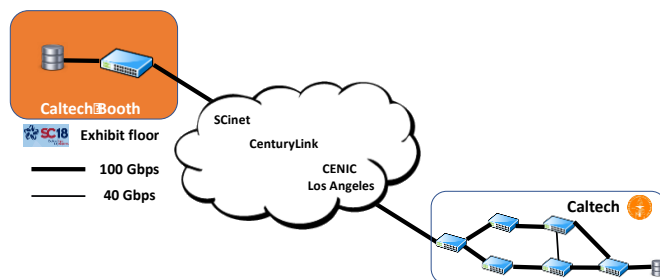
### Goals

The demonstration showcases that by supporting scalable, fine-grained, interdomain routing information exchange, SFP supports end-to-end path construction for scientific data flows across multiple member networks.

In particular, our demo showcases a scenario of four member networks, with one at the SC18 exhibit floor and three at Pasadena, California. In this scenario, the SFP speaker at the booth network sends interdomain routing discovery query to the member networks located at Pasadena, and selects the optimal path based on the collected response to steer scientific traffic from the booth to Pasadena over the WAN circuit. In contrast, due to the use-announcement inconsistency, BGP speakers in the same scenario will not be able to find the right path for the target scientific traffic.

### Resources

This demo is composed of four member networks. In particular, we will use one DTNs and one switch in the Caltech booth at SC18 exhibit floor to form one member network. This network will be connected to the Caltech SDN testbed located at Pasadena, California via a 100 Gbps WAN circuit, provided by SCinet, CenturyLink and CENIC Los Angeles. In the SDN testbed, several switches and DTNs will be used to form three other member networks.



### Involved Parties

- Qiao Xiang, Yale, qiao.xiang@cs.yale.edu
- J. Jensen Zhang, Yale, jingxuan.zhang@yale.edu
- X. Tony Wang, Tongji, 13xinwang@tongji.edu.cn
- Y. Jace Liu, Calgary, yang.liu5@calgary.ca
- Chin Guok, ESnet, chin@es.net
- Franck Le, IBM Watson, fle@us.ibm.com
- John MacAuley, ESnet, macauley@es.net
- Harvey Newman, Caltech, newman@hep.caltech.edu
- Y. Richard Yang, Yale, yry@cs.yale.edu