SC26 Network Research Exhibition: Demonstration Preliminary Abstract

Scitags Based Network Insight Discovery Across IOWN and Trans-Pacific Network

Ting-Yu Lin, Li-Chi Ku, Hui-Lan Lee, Min Chen

NCHC, National Institutes of Applied Research, Taiwan.

tingyulin, lku, gracelee, minchen@niar.org.tw

Fei Yeh, Jim Chen

International Center for Advanced Internet Research, Northwestern University

Fyeh, jim-chen@northwestern.edu

Abstract

The emergence of the Innovative Optical and Wireless Network (IOWN) addresses the growing demand for ultra-low latency, high bandwidth and energy efficient optical networks. While operated in the fundamental level of the transmission network, traffic monitoring and analysis from a higher level are mandatory to better understand the intents and purposes behind the usage. As one of the best candidates, Scientific network tags (scitags) is a technology to label the traffic from the source level. The label can be later collected and analyzed from any point along the transmission path to accurately summarize the traffic from the network flow perspective. Together with the power of the active network measurement and visualization, such as perfSONAR and Grafana, the insight of the network traffic over low level transmission services such as IOWN can be discovered.

In SC26, the feasibility of using scitags and measurement tools on IOWN-inspired networks will be demonstrated, highlighting the potential of this approach for future network architectures.

Goals

An IOWN-inspired transpacific network will be demonstrated, with low-latency performance validated against theoretical limits and scitags-enabled measurement and visualization providing end-to-end traffic insight.

1. An operational transpacific network between Taiwan and Chicago will be established via a 100G international circuit across NCHC, PacWave, NA-REX and StarLight, leveraging TWAREN's IOWN-ready infrastructure.
2. Low-latency traffic of the IOWN-inspired network will be demonstrated in SC26 by comparison with theoretical values, extending our prior test in Taiwan, which showed substantial reduction in latency to the transpacific environment.
3. Scitags will be applied to enable flow-level traffic identification, and will be integrated with measurement and visualization frameworks to provide end-to-end visibility of the transpacific IOWN-inspired network.

Impacts

Through this demonstration, the feasibility of integrating scitags and measurement tools over high bandwidth IOWN connections will be validated, enabling flow-level traffic insight and improved observability for future network architectures.

Resources

1. A 100G IOWN-inspired network testbed leveraging resources from TWAREN, PacificWave, StarLight and NA-REX including high-performance switches, international circuit connectivity, and coherent QSFP-DD optical modules.
2. Servers and SmartNICs for online Scitags extraction.
3. perfSONAR measurement nodes deployment among the participating IOWN test sites.

Involved Parties

- Ting-Yu Lin, NCHC/NIAR, tingyulin@niar.org.tw
- Li-Chi Ku, NCHC/NIAR, lku@niar.org.tw
- Hui-Lan Lee, NCHC/NIAR, gracelee@niar.org.tw
- Min Chen, NCHC/NIAR, minchen@niar.org.tw
- Jim Chen, iCAIR, jim-chen@northwestern.edu
- Fei Yeh, iCAIR, Fyeh@northwestern.edu