



FABRIC @ SC25, St. Louis, MO
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Use Case: Connecting Major Facilities and R&E networks in Latin America and Africa to FABRIC

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AtlanticWave-SDX NSF #OAC-2029278

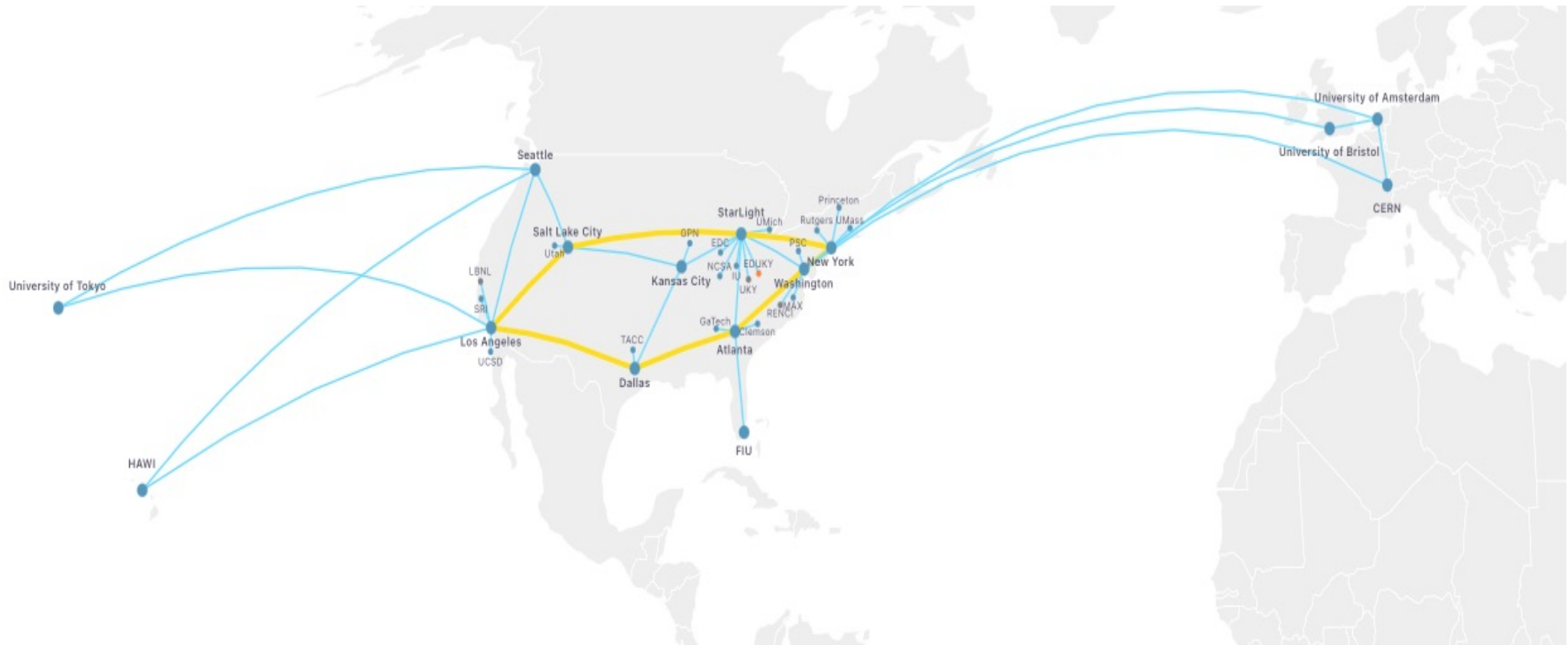
Outline

- The Challenge:
 - Connecting researchers to Latin American and African science resources
- Introducing AmLight and connectivity in Latin America and Africa
- List some Major Facilities and Resources available connected to AmLight
- The NSF IRNC AtlanticWave-SDX 2.0 project
- Integration with FABRIC presented at KNIT 10 and 11
 - Use cases
- Future Plans

The Challenge: Finding and Connecting to External Resources

- FABRIC offers valuable experiment resources, including GPUs, FPGAs, P4 switches, and high-performance storage.
- **FABRIC Facility Ports** enable integration of external resources, remote instruments, and data lakes.
- Network domains may exist between Facility Ports and external resources.
 - Connecting to those resources can be complex.
- Several initiatives improve research network connectivity through dynamic provisioning and public APIs.
 - Experimenters may still need to contact the NOC for path deployment.
- The **AtlanticWave-SDX** project streamlines connections between FABRIC experimenters and major facilities at **AmLight**.

FABRIC Topology



Major Facilities connected to AmLight

- PATH nodes in Miami and Chile*
 - Addresses the needs of the rapidly growing community of faculty and students who are embracing Distributed High Throughput Computing (dHTC) technologies and services to advance their research.
<https://path-cc.io>
- NRP cluster (4 nodes)
 - Provides access to cutting-edge technologies in AI, high-performance computing, data storage, and networking.
<https://nationalresearchplatform.org>
- Worldwide Large Hadron Collider Computing Grid (WLCG) Tier 2 datacenter at UNESP/SPRACE, Brazil
- Several telescopes in Chile, including
 - Vera Rubin Observatory
 - Atacama Large Millimeter Array (ALMA)
 - GEMINI South Telescope
- Open Science Grid (OSG) Origins and Caches
 - UNESP/SPRACE and FIU
- CPTEC - Center for Weather Forecast in Brazil
- HPC nodes in Brazil and South Africa

Other Resources connected to AmLight

■ Testbeds:

- FABRIC Node at Florida International University (FIU) with a 100G facility port
- RARE P4 testbed
 - Testbed created to focus on determining if a routing software platform solution can fit R&E use cases.
<https://wiki.geant.org/display/RARE>
- AmLight SDN testbed
 - Testbed created to enable researchers to try new SDN approaches over a production infrastructure
- AutoGOLE/SENSE

■ Instruments @ AmLight:

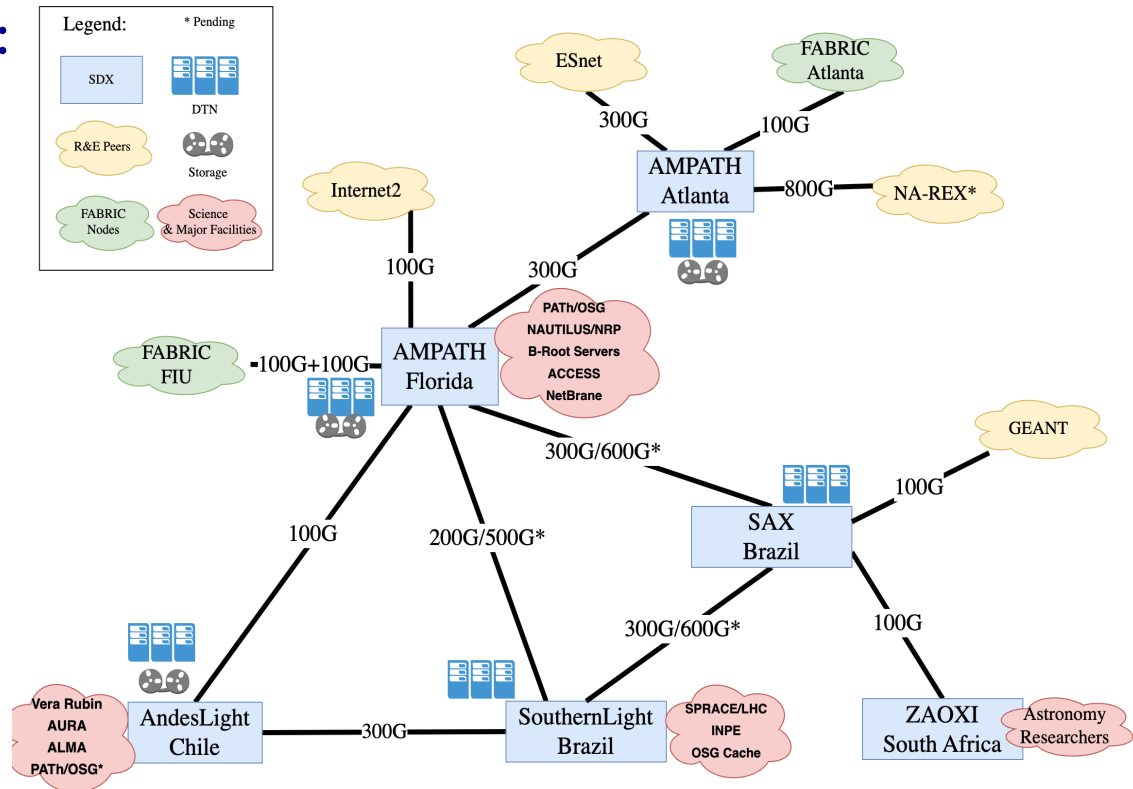
- Network Tester/Packet Generator
- In-band Network Telemetry (INT) datasets
- Data Transfer Nodes (DTNs)

NSF IRNC AtlanticWave-SDX 2.0

- AtlanticWave-SDX: A Distributed Production SDX, supporting research, enhancing operations, and interoperability testing at national and international scales.
 - NSF IRNC Award# OAC-2029278 (Dec 2020 to Nov 2025)
- Goals:
 - Improving the distributed SDX between the U.S., South America, and Africa
 - Evolving the development, integration and deployment of the AtlanticWave-SDX controller
 - Coordination and engagement towards the adoption of the AtlanticWave-SDX
 - **Enhancing integration with FABRIC to enable seamless integration of resources**

AtlanticWave-SDX: Connecting Science Resources

- 5 SDN Open eXchange Points, 1 API:
 - AMPATH, SouthernLight, AndesLight, SAX, and ZAOXI
- 100G+ to FABRIC, RENS, major facilities, testbeds, and scientific instruments
- 100G DTNs added to each SDX/OXP



Integration with FABRIC presented at KNIT 10 and 11

- *How to use FABRIC's Facility Ports and AtlanticWave-SDX to get to AmLight's remote resources and scientific instruments*
- *How to use the AtlanticWave-SDX's Python library, SDX-Lib*
- Use cases using FABRIC's facility port to AtlanticWave (via notebooks/artifacts):
 - Connecting to NRP @ AMPATH/Miami with a dedicated L2VPN
 - Connecting to a perfSONAR node @ AndesLight/Chile using a L3VPN/IP
 - Real-Time DDoS Attack Detection Using **Live** AmLight Network Data
- *Cyber Training on Accelerating Infrastructure Workloads using Next-Generation SmartNICs and DPUs (Award # 2417823)*
 - PI team: Elie Kfoury (PI), Ana Hunsinger, and Jorge Crichigno (Co-PI) (University of South Carolina)

Future: AmLight: The Next Frontier (2026-2030)

- NSF Award# OAC-2537489 (Dec 2025 to Nov 2030)
- Continue enhancing integration with FABRIC and SENSE:
 - Installing a dedicated 100G link for experimentation from Miami to Brazil and Argentina
 - Supporting P4 experiments leveraging P4 switches and SmartNICs
 - Building a telemetry distribution system
- The AmLight Data Pipeline - Producing high-quality data sets
- Adding support for provisioning services over Internet2 AL2S and NA-REX



Thank You!
Questions?

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