



Americas Lightpaths Express & Protect

AmLight ExP and AtlanticWave-SDX projects updates



**South American Astronomy Coordination Committee
(SAACC) Meeting
October 19, 2017**

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Outline

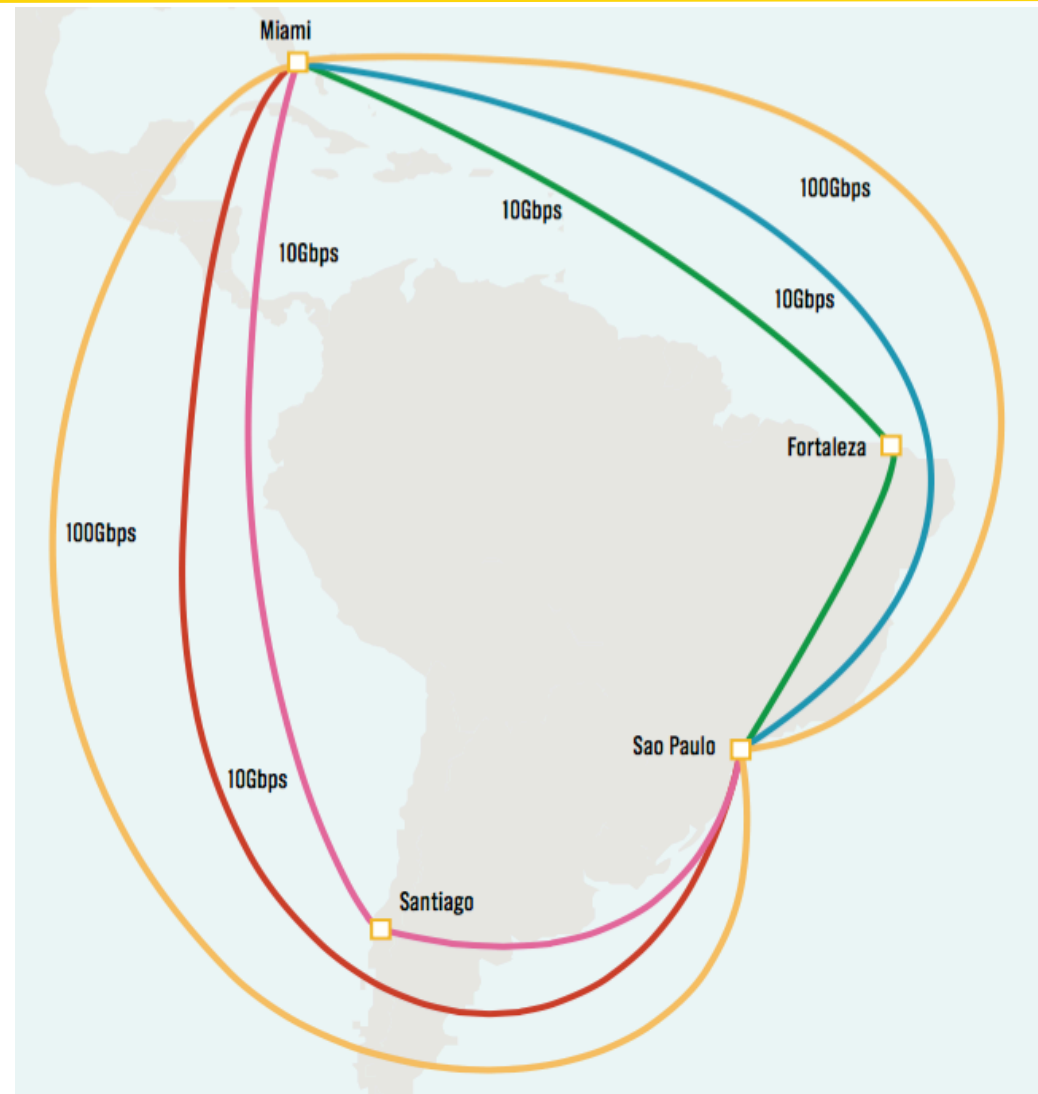
- AmLight Express and Protect (AmLight ExP)
- AtlanticWave-SDX
- LSST NET

- Project of the U.S. National Science Foundation (NSF), Award #ACI-1451018
- Interconnects the U.S. to key aggregation points in South and Central America (Brazil, Chile, Panama)
- Cooperative partnership with ANSP, RNP, CLARA, REUNA, AURA, FLR, Internet2
- Evolving a rational network infrastructure, using both spectrum and leased bandwidth capacity



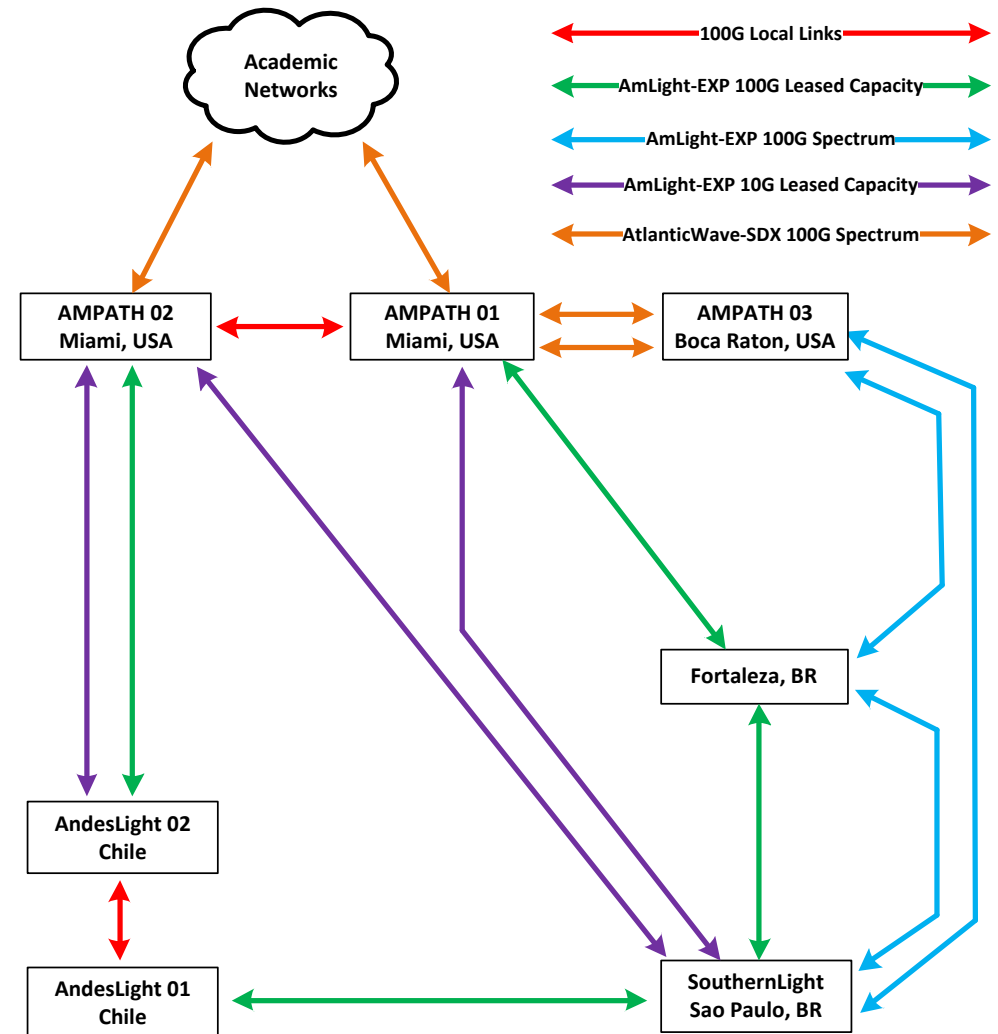
AmLight Network Topology Today

- 100G Miami-São Paulo, Atlantic
- 100G Miami-São Paulo, Pacific
- 4x10G links
 - landings in São Paulo, Fortaleza, and Santiago
- 240G of aggregate bandwidth capacity



AmLight Network Activities in year 3

- Adding Santiago, Chile and Fortaleza, Brazil to 100G ring in Q4 2017 (green)
- Extending AMPATH to Boca Raton (orange)
- Spectrum for the Express in AmLight-ExP (blue)
 - Availability expected by Dec 2017
 - Procuring equipment
 - Testing with leased capacity
- 10G links for additional protection (purple)



AtlanticWave-SDX

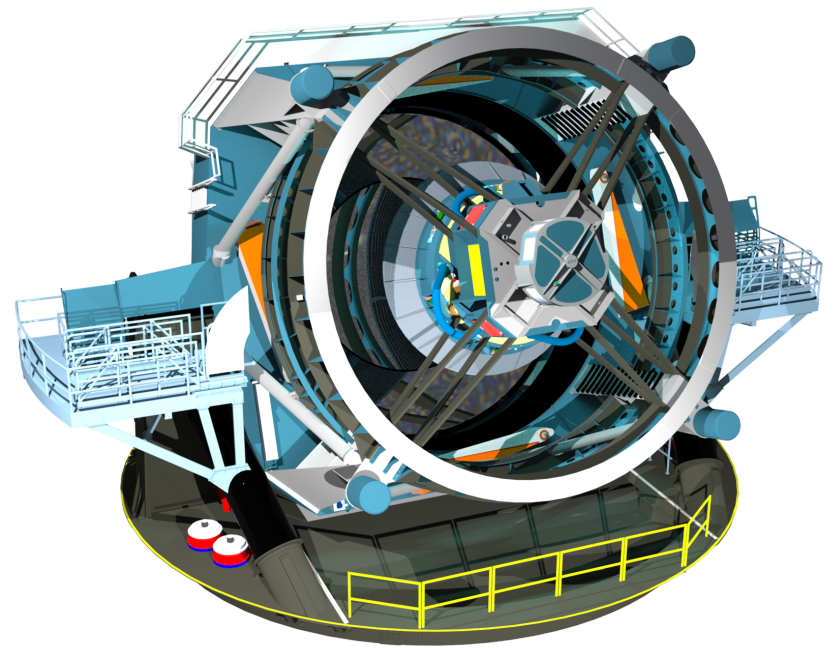
- Why is a Software-Defined Exchange (SDX) relevant to the SAACC?
- Motivation for SDX
- What is a SDX?
- AtlanticWave-SDX project

Why is SDX relevant to the SAACC?

- What do domain scientists need to do?
 - Move bulk data
 - Move streams of data
 - Connect instruments with data processing
 - Remote control
 - Share resources
 - Etc.

Use Case: Astronomy

- Two possible types of data
 - Bulk data from previous night's viewing
 - Streamed data from instruments
- Need to get data from source to destination
 - Bulk transfers are simple
 - Streamed data should use dedicated path between instrument and processing center

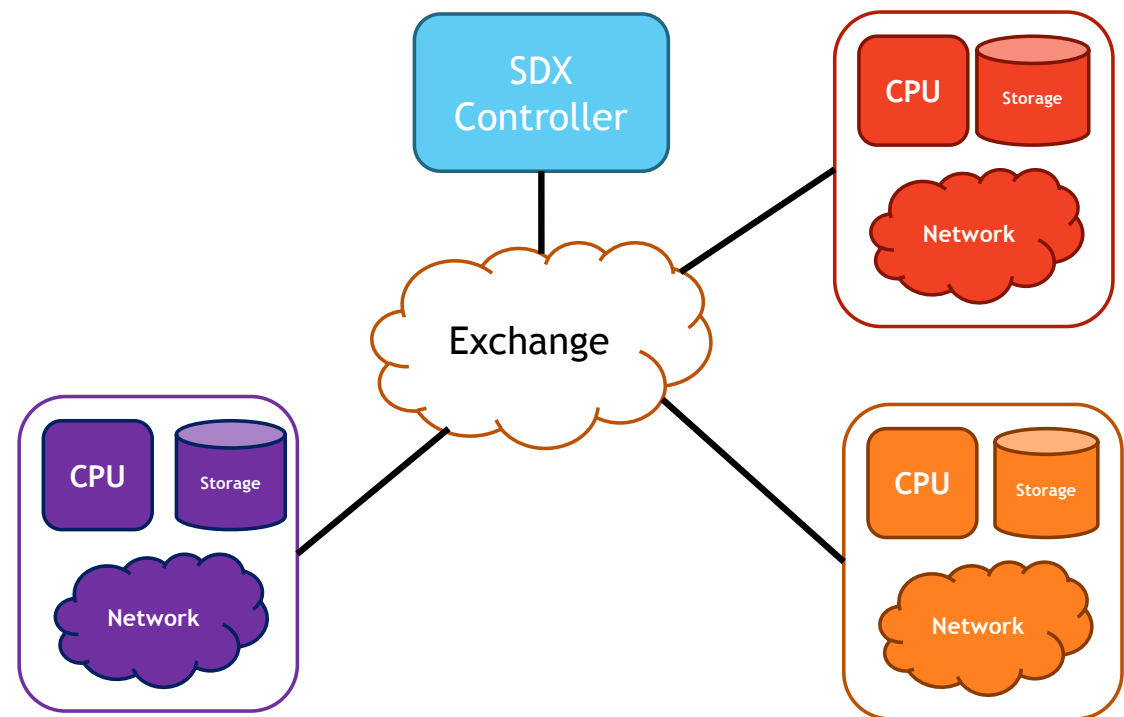


Motivation for SDX

- Setting up a network connection is complicated for a domain scientist
 - Calls to local IT people
 - Shuffled to the right person, eventually
 - Local network admin needs details
 - Bulk transfers? Streaming data? How much? How fast? What timeframes?
 - Local network admin needs to talk to destination network admin and network provider(s)
 - To set up path/VLANs/everything else
- Half a dozen or so emails or phone calls
- Days to weeks to set up a connection

Software-Defined Exchange (SDX)

- An SDX allows multiple independent administrative domains to share computing, storage, and networking resources
- For a domain scientist, an SDX can
 - Automate the provisioning of a network connection
 - Allocate resources
 - Schedule a workflow
 - Release network resources

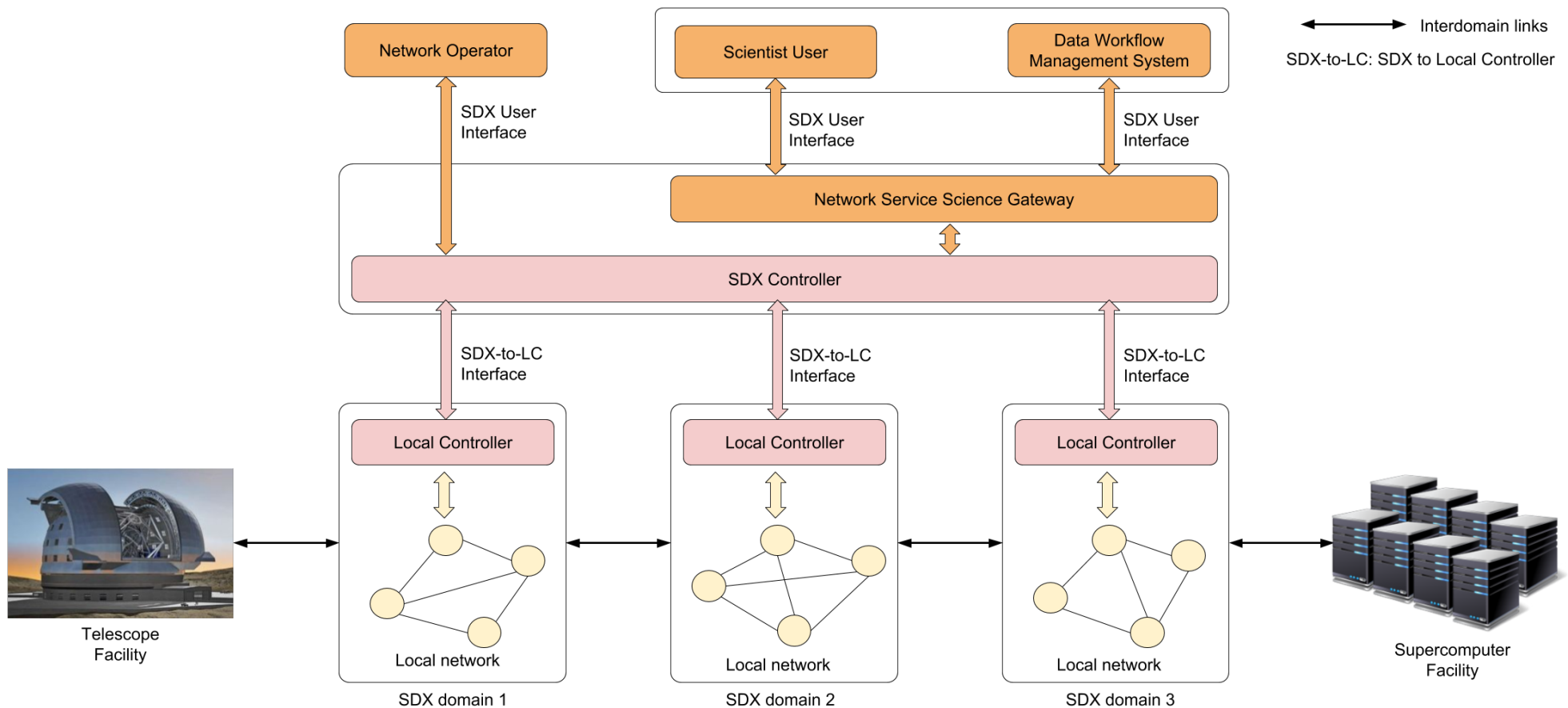


AtlanticWave-SDX: IRNC Award #OAC-1451024


- AtlanticWave-SDX (Awave-SDX) is building a distributed intercontinental experimental SDX in response to a growing demand to:
 - Support end-to-end services capable of
 - Spanning multiple SDN domains
 - Application provisioning of end-to-end Layer 2 circuits
 - Providing network programmability
- Florida International University (FIU) and Georgia Institute of Technology (GT) are implementing AtlanticWave-SDX, in collaboration with other exchange points supporting SDN



AtlanticWave-SDX Architecture



SDX User Interface

 [Home](#) [Topology](#) [Requests](#) [About Us](#) [sdonovan](#)

Request a Pipe

Users can request for a pipe based on their requirements and role


[Network Engineers Scientists](#)

Enter start date:	Enter the desired bandwidth: Bandwidth in Bytes	Enter the source VLAN: Source VLAN
Enter the start time: --:-- --	Enter the physical port number at source: Source Port#	Enter the destination VLAN: Destination VLAN
Enter the end date:	Enter the physical port number destination: Destination Port#	Select source: bridge 1
Enter the end time: --:-- --		Select destination: bridge 1

[Preview](#) [Submit](#)

[View all rules](#)

Network Engineer Interface

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Request a Data Transfer

Users can request for a data transfer based on their requirements and role

[Network Engineers Scientists](#)

Source:
Destination:
Deadline: mm/dd/yyyy --:-- --
Size: bytes

[Preview](#) [Submit](#)

[View all rules](#)

Domain Scientist Interface

LSST NET

- LSST NET is the LSST Network Engineering Team
- Monthly (1 hour) meeting
- Efficient Agenda
 - NET Action Items Status
 - Requirements Clarifications and Verification Plans
 - Network Design and End-to-End Test Plan and QoS planning
 - First fiber optic light event planning
 - ADASS conference
 - Super Computing 2017
- <https://confluence.lsstcorp.org/pages/viewpage.action?pageId=20284335>



THANK YOU!



AARCLight

- AARCLight is the Americas-Africa Research and eduCation Lightpaths project
- Phenomenon:
- Goal
- Objectives:
 - Use spectrum on SACS cable
 - Bridge spectrum on Monet and SACS submarine cables
 - Leverage infrastructure emerging in Fortaleza, Brazil (refer to Michael)
 - Establish a high-performance network link between the U.S. and south west Africa via Angola
- Science Drivers:
 - Radio astronomy
 - Square Kilometer Array (SKA)
- Next Steps:
 - Develop partnerships with Regional and National Networks in Africa
 - Develop a strategy to leverage Fortaleza with RNP and ANSP
 - Write report to NSF in fulfillment of planning grant