
AtlanticWave SDX
INTERNATIONAL DISTRIBUTED SOFTWARE-DEFINED EXCHANGE
Americas' Research Platform (AmRP) Working Group Meeting
October 2022
Los Angeles
New York
Miami
Panama
Fortaleza
Rio de Janeiro
Sao Paulo
Santiago
Luanda
Capetown
AtlanticWave-SDX 2.0
Vasilka Chergarova
IT Assistant Director
Florida International University

AtlanticWave-SDX 2.0

AtlanticWave-SDX: A Distributed Production SDX, supporting research, enhancing operations, and interoperability testing at national and international scales. NSF Award# OAC-2029278

Development team: FIU, RENCI, USC-ISI, RNP, UFRGS

Goals:

- **Core goal**: Enhancing AtlanticWave-SDX with *Autonomic Network Architecture* concepts and designs
  - Self-management, resilient, scalable, and secure
- **Network-driven goals**:
  - Autonomic operation by leveraging network telemetry
  - New network services (L3VPN and Cloud)
  - Improving orchestration across OXPs to enhance end-to-end network services
  - Ability to analyze INT data to create control loops for self-management and enable policy-driven configurations
- **User-driven goals**:
  - Enhance user experience via CILogon
  - Enable integration with scientific workflows, including Pegasus and OSG
  - Integrate with interdomain orchestrators: SENSE/AutoGOLE and FABRIC

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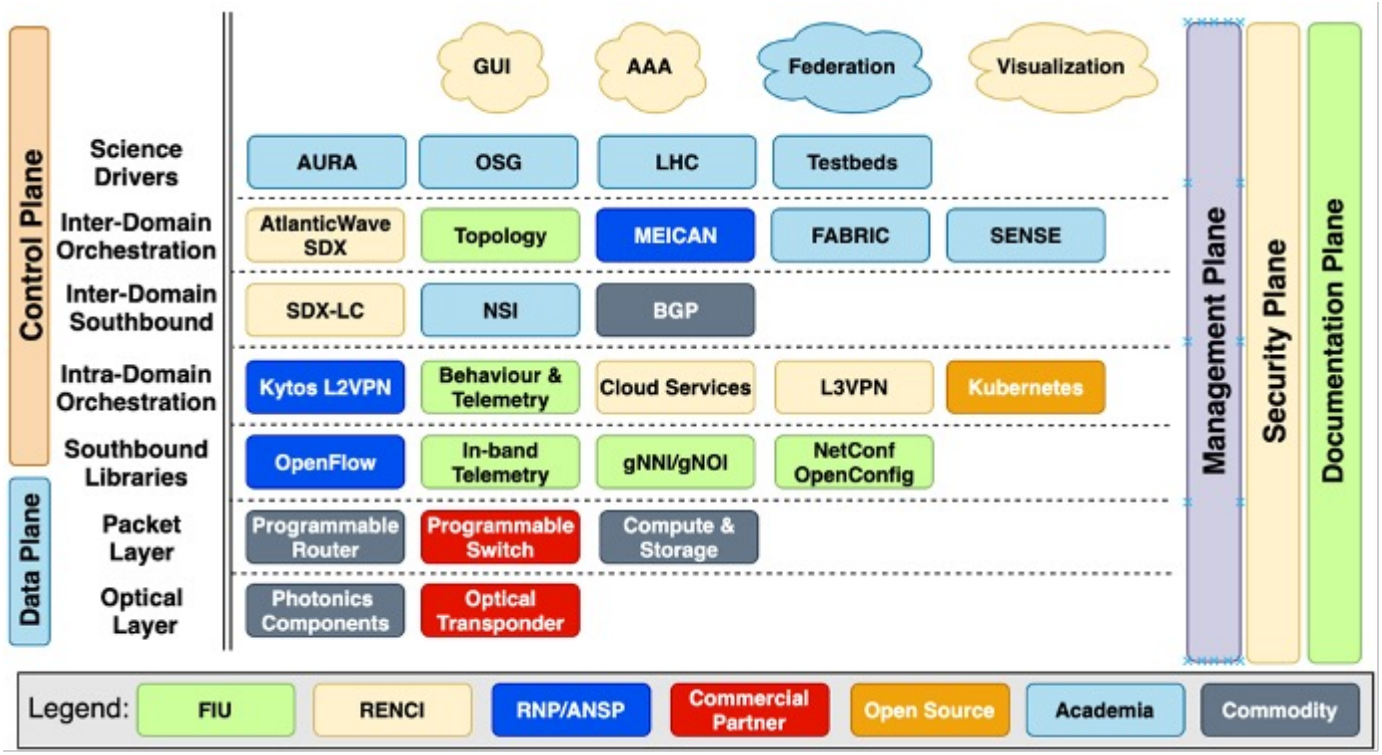
Architecture and Stakeholders



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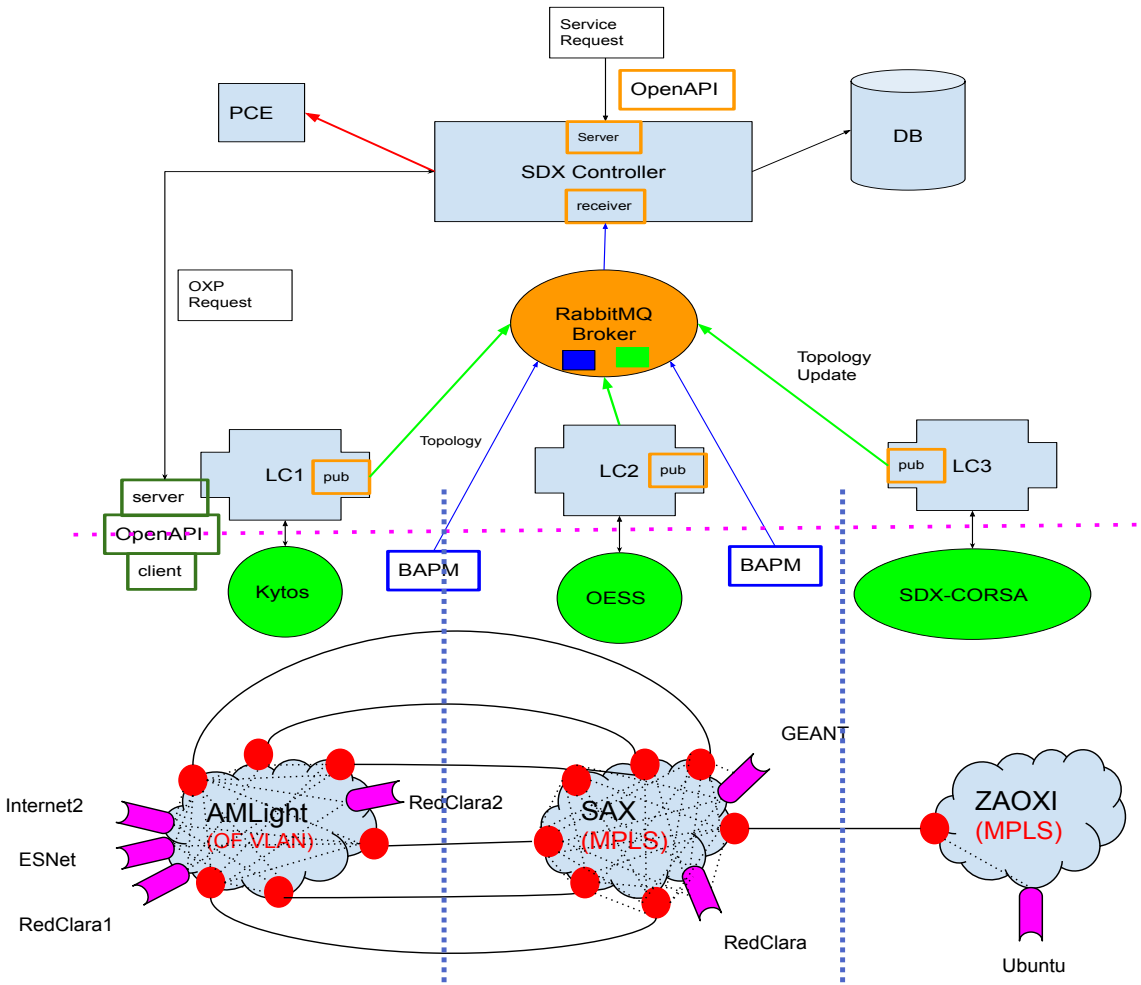
SDX 2.0 System Architecture



- **OXP:** AmLight, SAX, ZAOXI
- **Local Controllers:** Kytos, OESS, SDX-Corsa
- Message Broker
- SDX Controller

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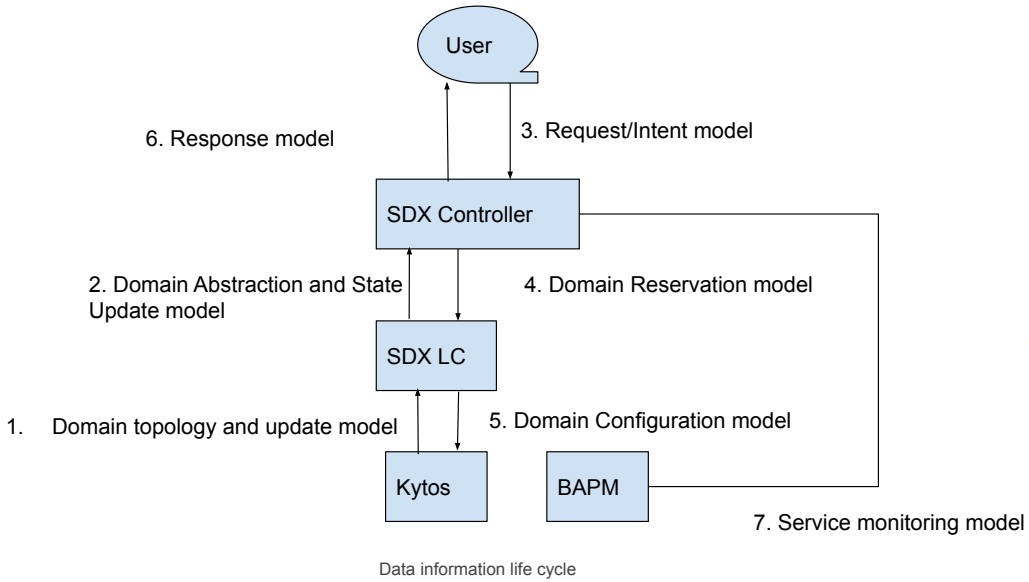
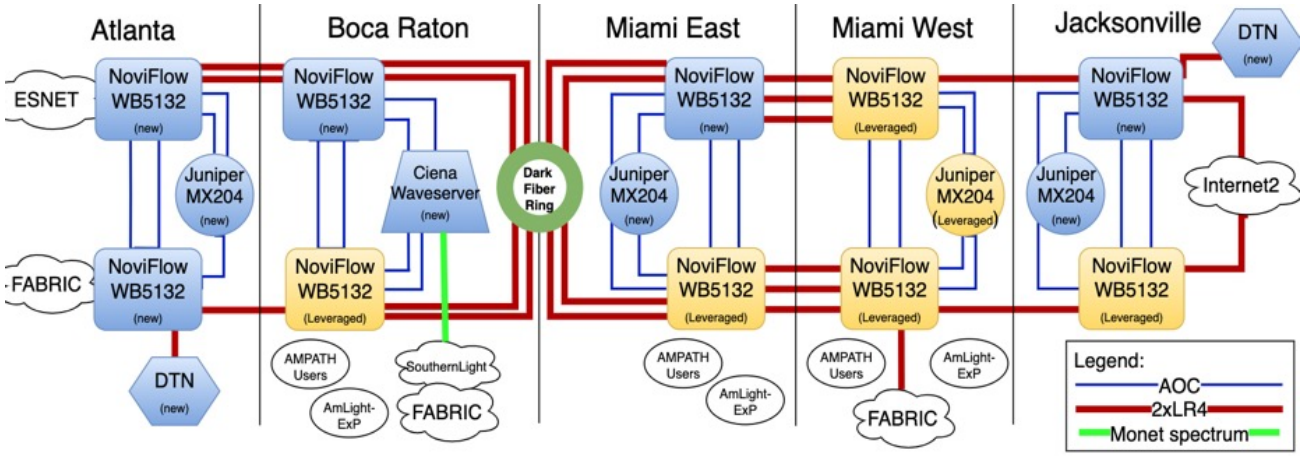
SDX 2.0 Data Model Flow



1. Domain provisioning system send topology description and update model to its SDX-LC via the RestAPI calls
2. SDX-LCs publish the topology and update models to the Rabbit MQ, that will be received by the SDX-Controller. SDX-Controller subsequently assembles the inter-domain topology model.
3. User and Applications send connection requests to the SDX-Controller via the RestAPI call.
4. SDX-Controller conducts the optimal path or TE (Traffic engineering) computation, break Down the results to per-domain sub-requests And and publish the breakdowns to the MQ.
5. Each SDX-LC will receive its own breakdown sub-request from the MQ, form the customized per-domain request to the domain provisioning System, e.g., Kytos via Kytos RestAPI.
6. The provisioning results (Response model) will be sent back to the SDX-Controller, available for Queries and other configuration and monitoring actions.
7. Measurement information is published to the MQ via the BAPM modules, that will be received by the SDX-Controller.

OXP: AMPATH



- Distributed OXP with colocation in Miami, Boca Raton, Jacksonville and Atlanta (soon)
- Access ports from 10G and 100G
- **Switching Fabric**: L2VPNs using SDN controllers with user interfaces that enable users to provision their own circuits
- **Routing Services**: IPv4, IPv6, Multicast IPv4, and VRF services. Networks can peer with AMPATH using MP-BGP
  - Mutually Agreed Norms for Routing Security (MANRS) best practices, Resource Public Key Infrastructure (RPKI)
- **Compute and storage**: One 100G DTN with NVMe cards available to the community
- **Monitoring and Measurement services**: Dedicated 10G perfSonar nodes at every site. In-band Network Telemetry (INT) enabled at every colocation site

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Julio Ibarra, FIU, PI
Jeronimo Bezerra, FIU, Co-PI
Heidi Morgan, USC-ISI, Co-PI
Yufeng Xin, RENCI, Co-PI
Lisandro Granville, UFRGS, Co-PI

contacts@amlight.net

NSF
FIU FLORIDA INTERNATIONAL UNIVERSITY
USC University of Southern California
renci
UFRGS UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
RNP
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