

Extending ExoGENI Slice-based L2 Network Transit Service to Chameleon

Yuanjun Yao, Qiang Cao, Jeff Chase
Duke University



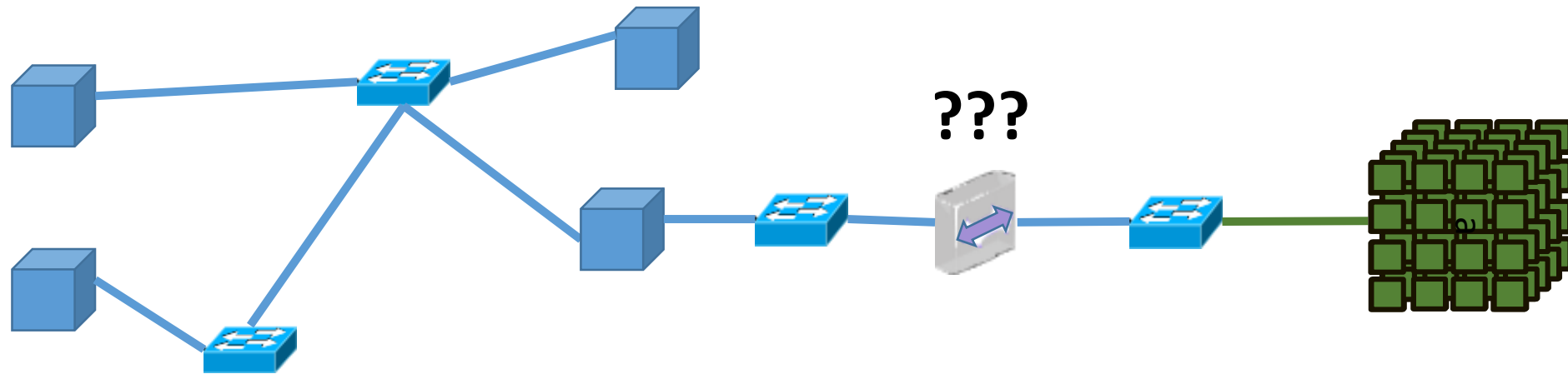
Cong Wang, Mert Cevik, Paul Ruth
Renaissance Computing Institute



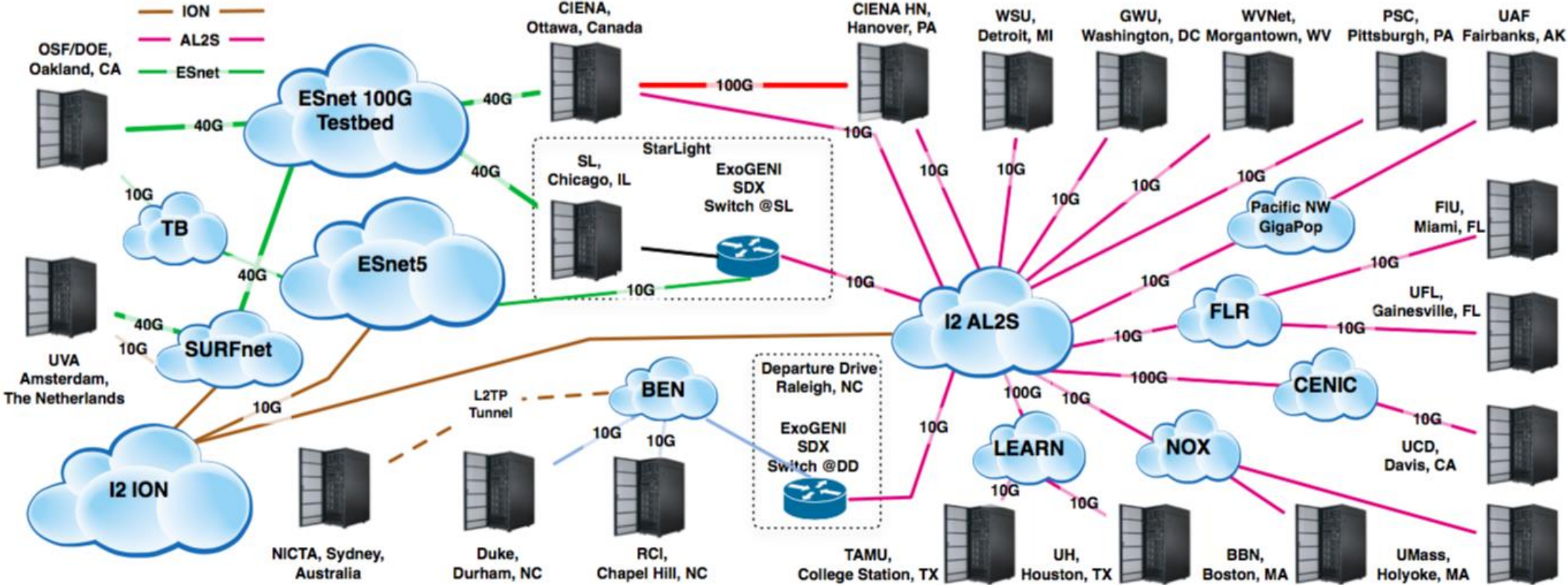
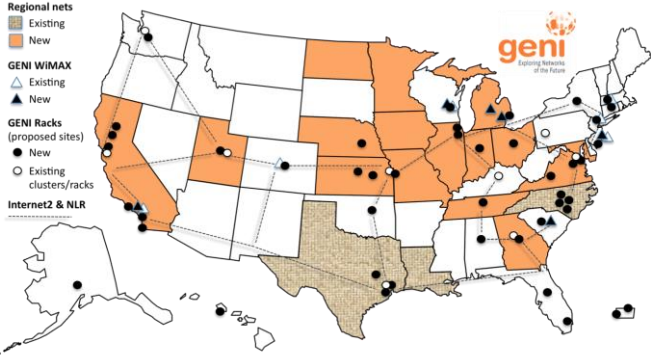
Integrating Edge Clouds with Chameleon

Edge clouds, cloudlets:
Smart cities, IoT, data gathering, low-latency apps

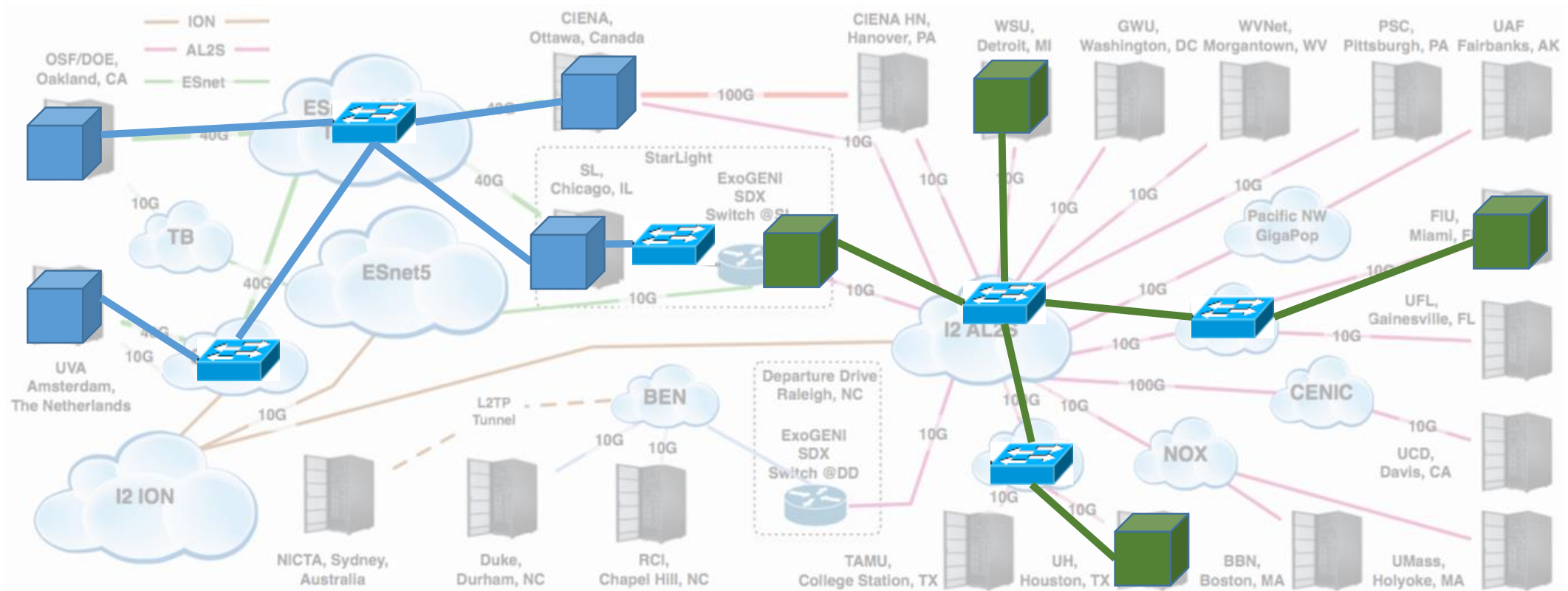
Compute Cloud



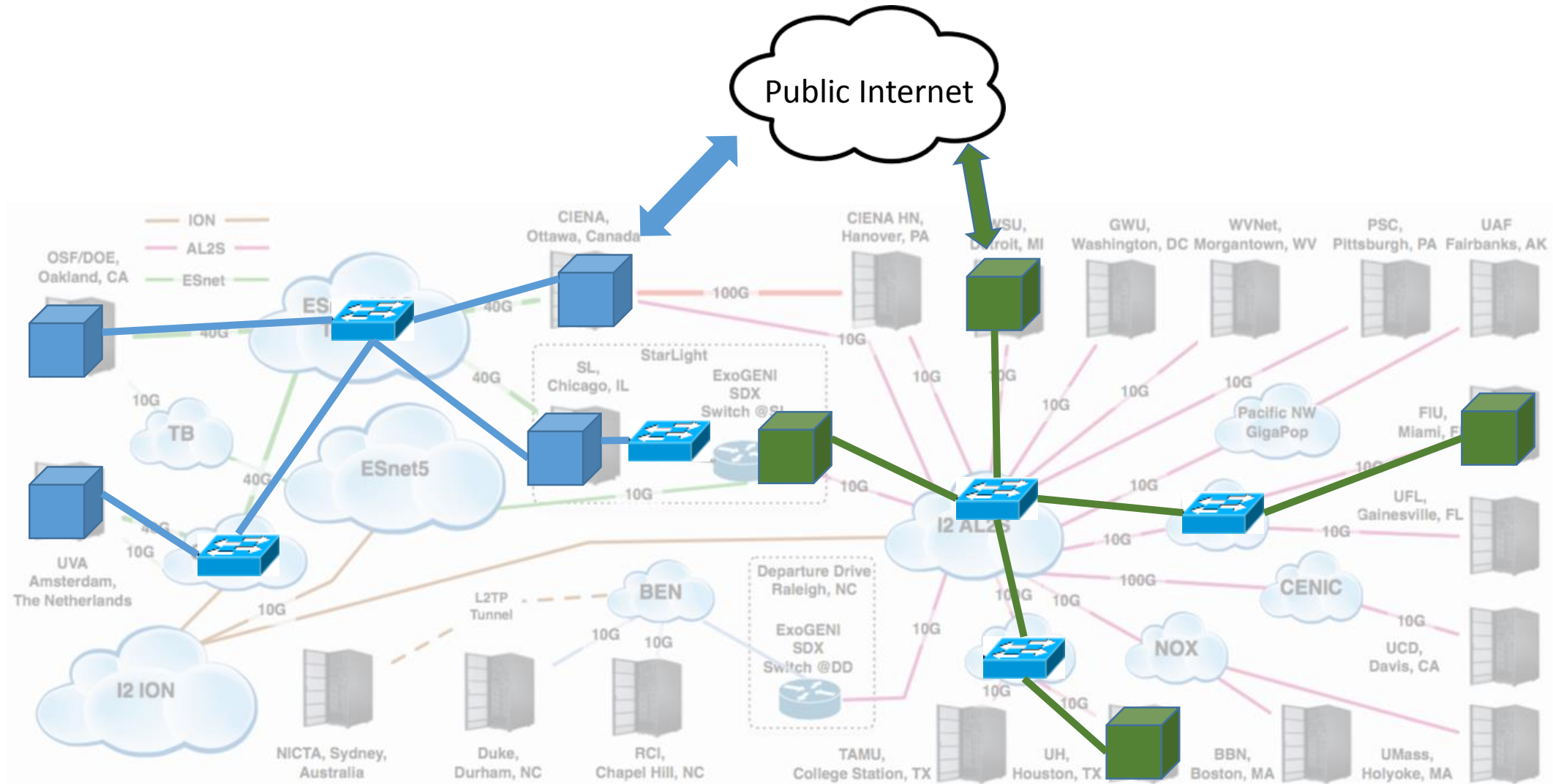
ExoGENI



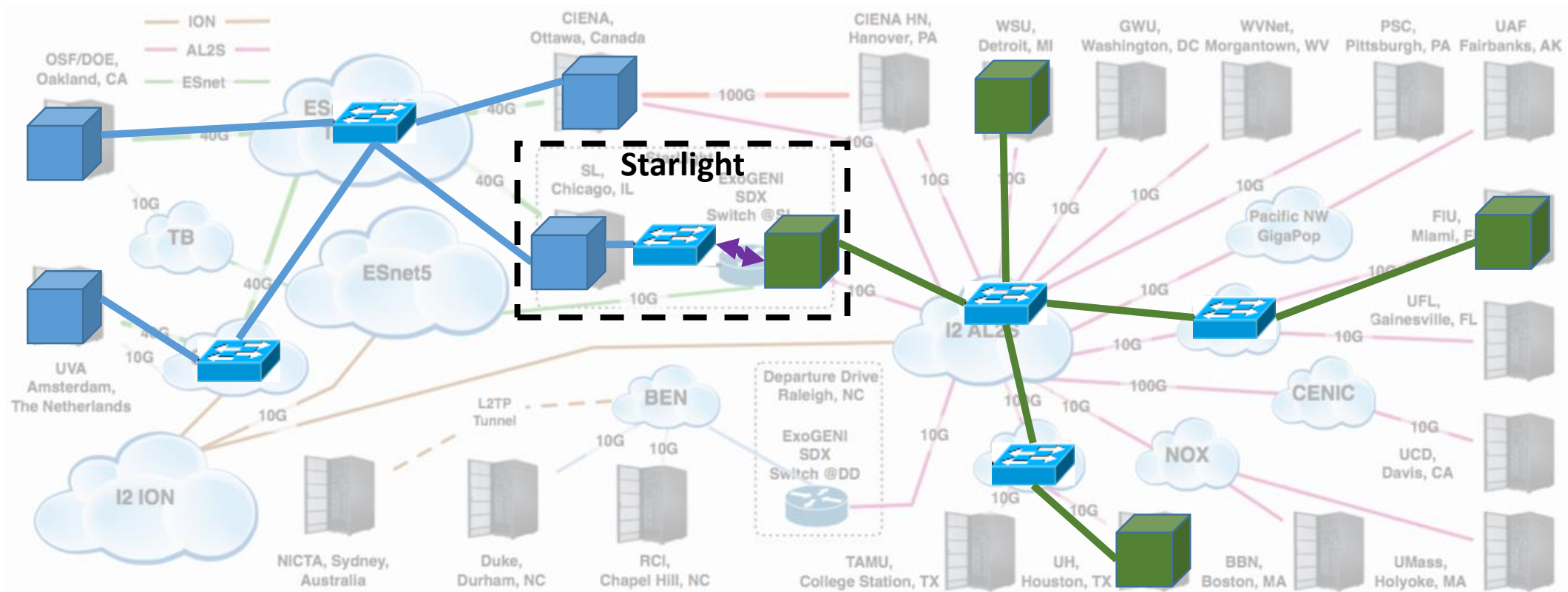
Cross-Slice Stitching on ExoGENI



Cross-Slice Stitching on ExoGENI

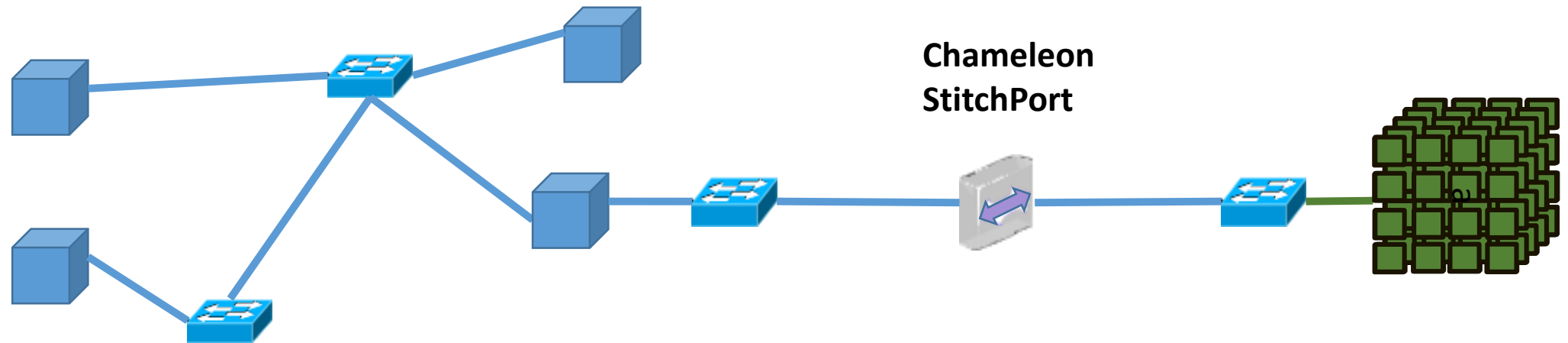


Cross-Slice Stitching on ExoGENI



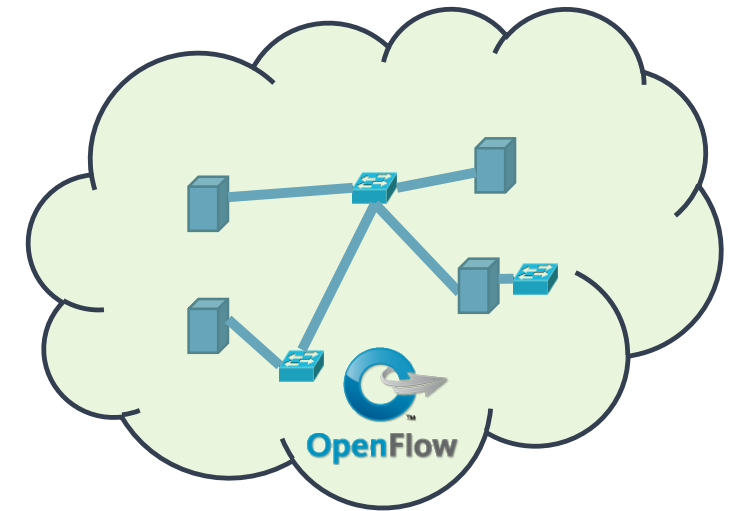
Stitching to Chameleon Nodes

Stitching points of presence on ExoGENI and Chameleon nodes



Cross-Slice Stitching is Useful

- Bandwidth provisioned links
- Direct cross-slice networking at L2: flexible for inter-domain network services
 - Elastic NFV services
 - Software defined exchange (SDX)



SDX (+/-)

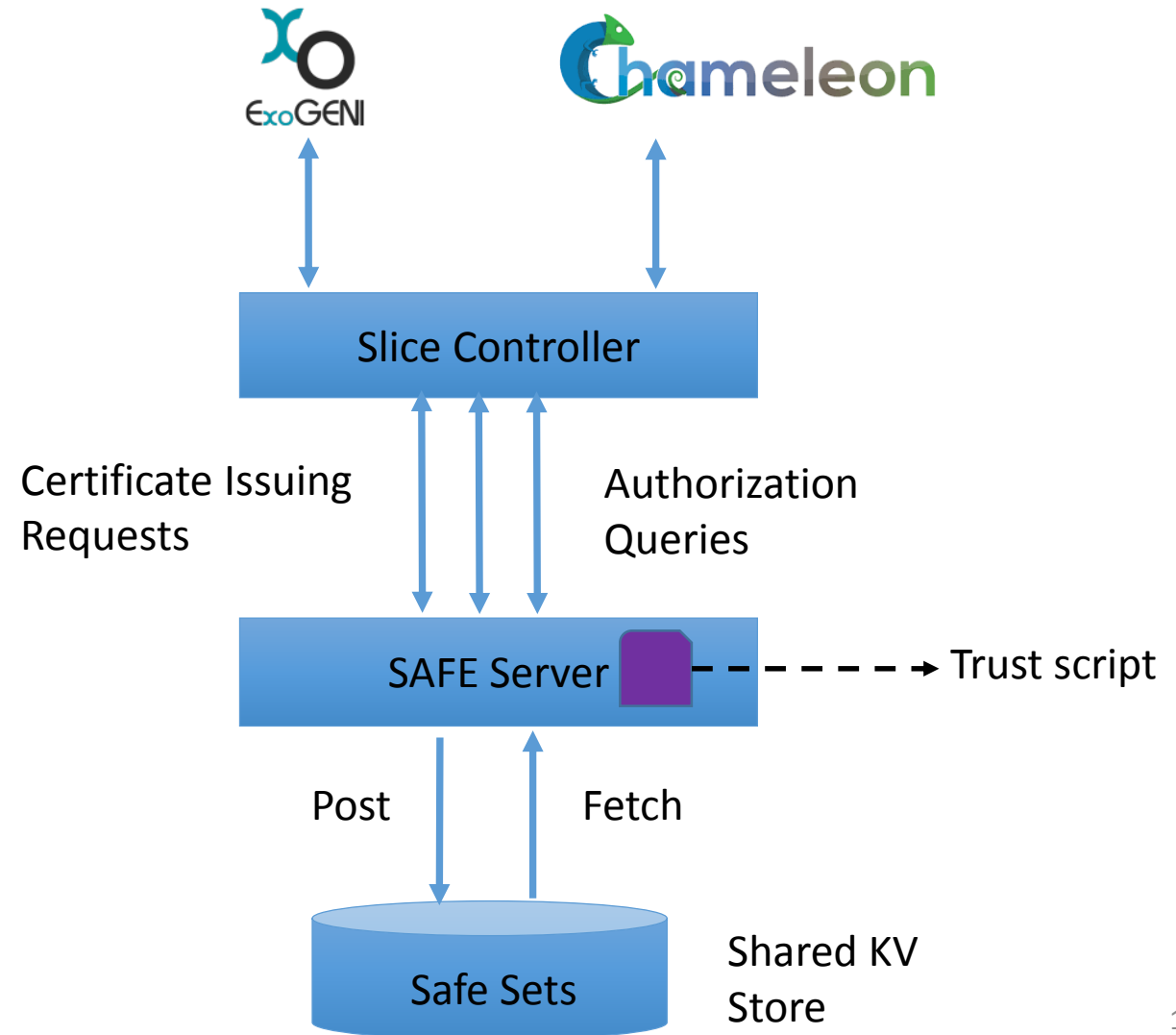
Automated and Safe Stitching

- Automated stitching
- Safe Stitching
 - Authorized stitch operation
 - User-specified stitch policy
 - User-specified traffic policy

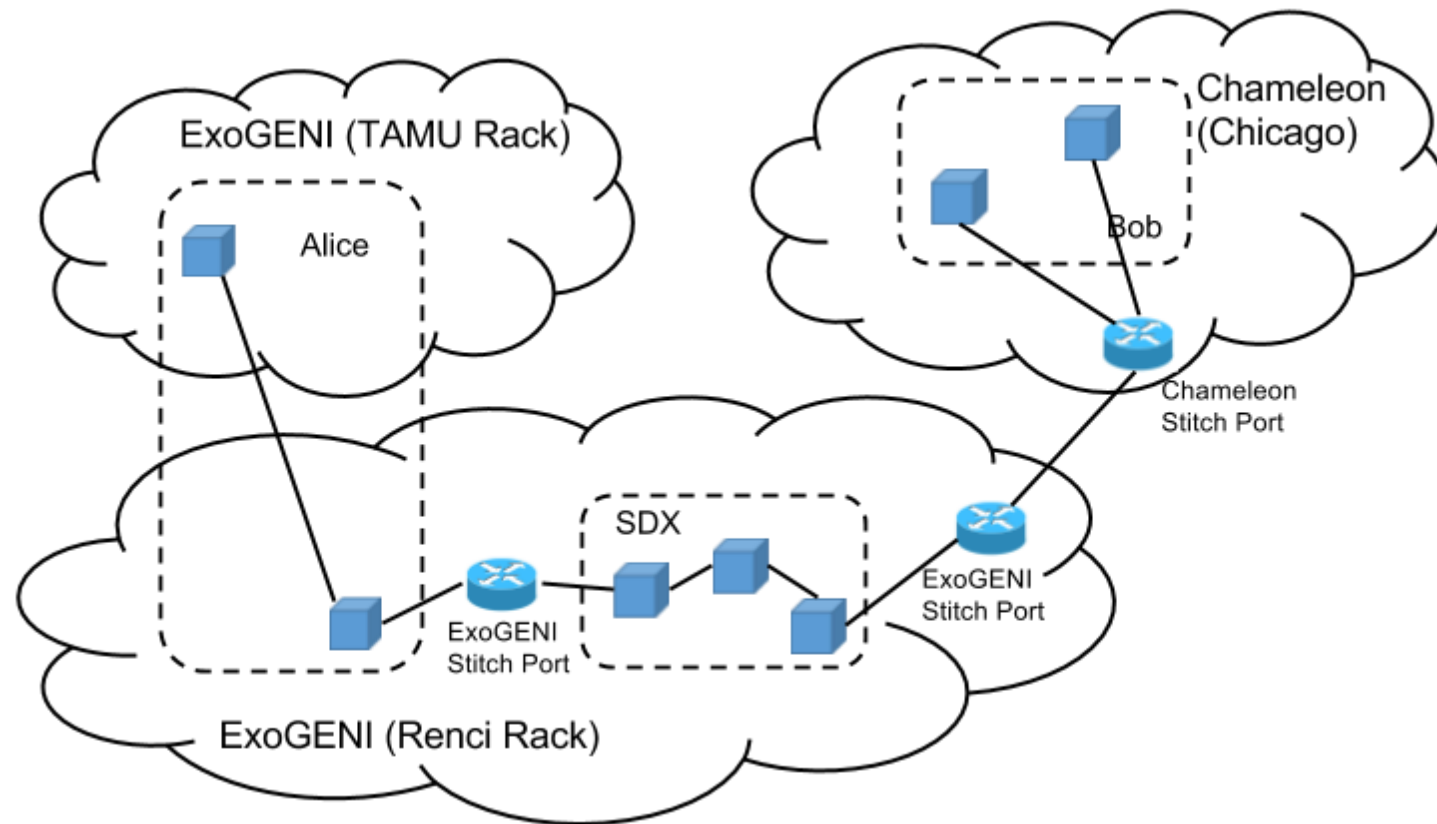
SAFE-based slice controller

SAFE (Secure Authorization for Federated Environments)

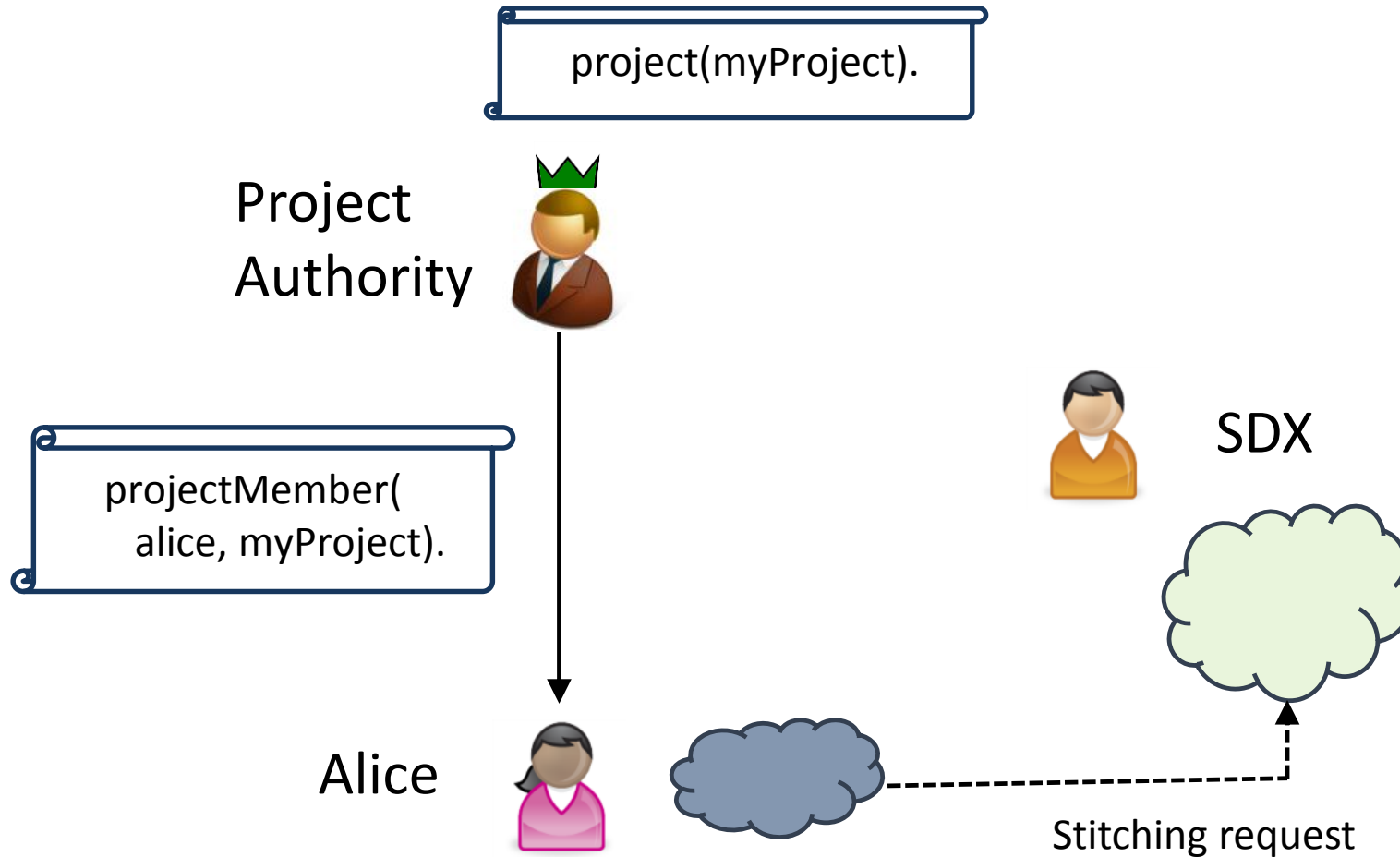
- SAFE application
- SAFE policy: Datalog
- SAFE server
- SAFE sets



Use Case: Network Transit Service for ExoGENI and Chameleon Users



A simple stitching policy



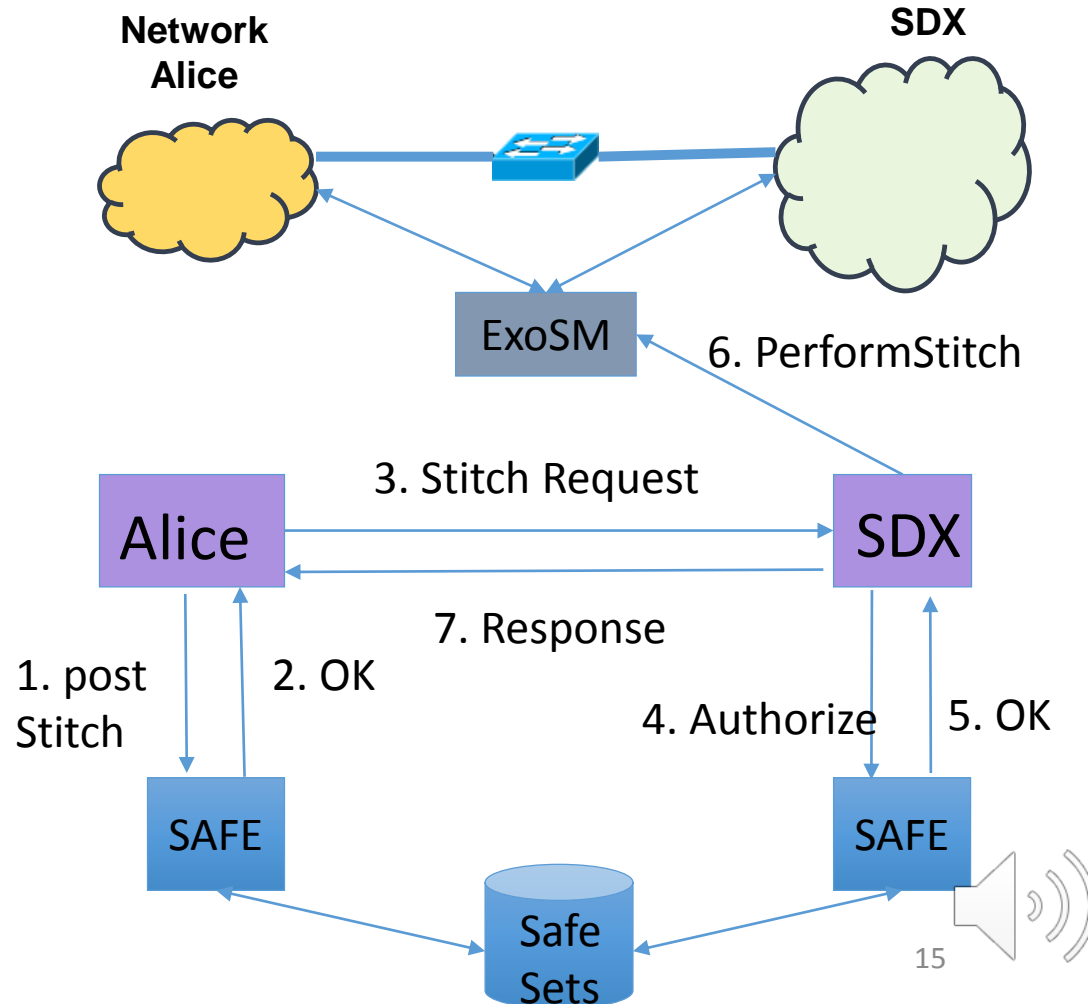
Stitching policy

```
allowStitchFrom(?Alice) :-  
  acceptPA(?PA),  
  ?PA: project(?Project),  
  ?PA: projectMember(?Alice, ?Project).
```



allowStitchFrom(alice)?

Cross-Slice Stitching



Cross-Slice Networking Policies



SDX

```
connect(Alice,Bob) :-  
  Alice: allowTrafficFrom(Bob),  
  Bob: allowTrafficFrom(Alice).
```



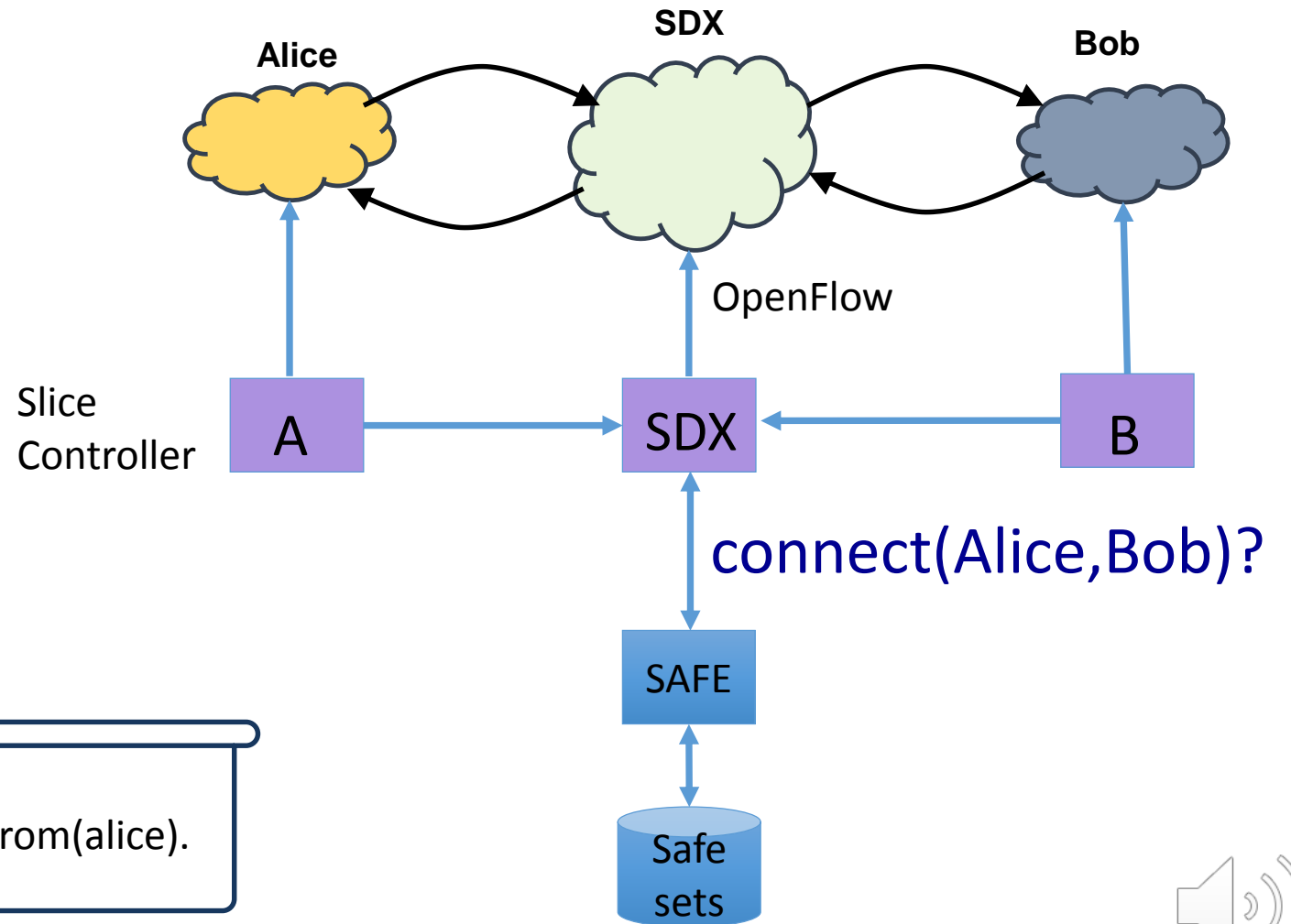
Alice

```
allowTrafficFrom(bob).
```



Bob

```
allowTrafficFrom(alice).
```



Conclusion

- L2 network stitching yields high-speed network path between slices
- Secure connections between slices
- Inter-domain network service and super facilities



Q&A