Washington International Exchange (WIX)
as a
Software Defined Exchange (SDX)

FIRE-GENI Workshop
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Tom Lehman
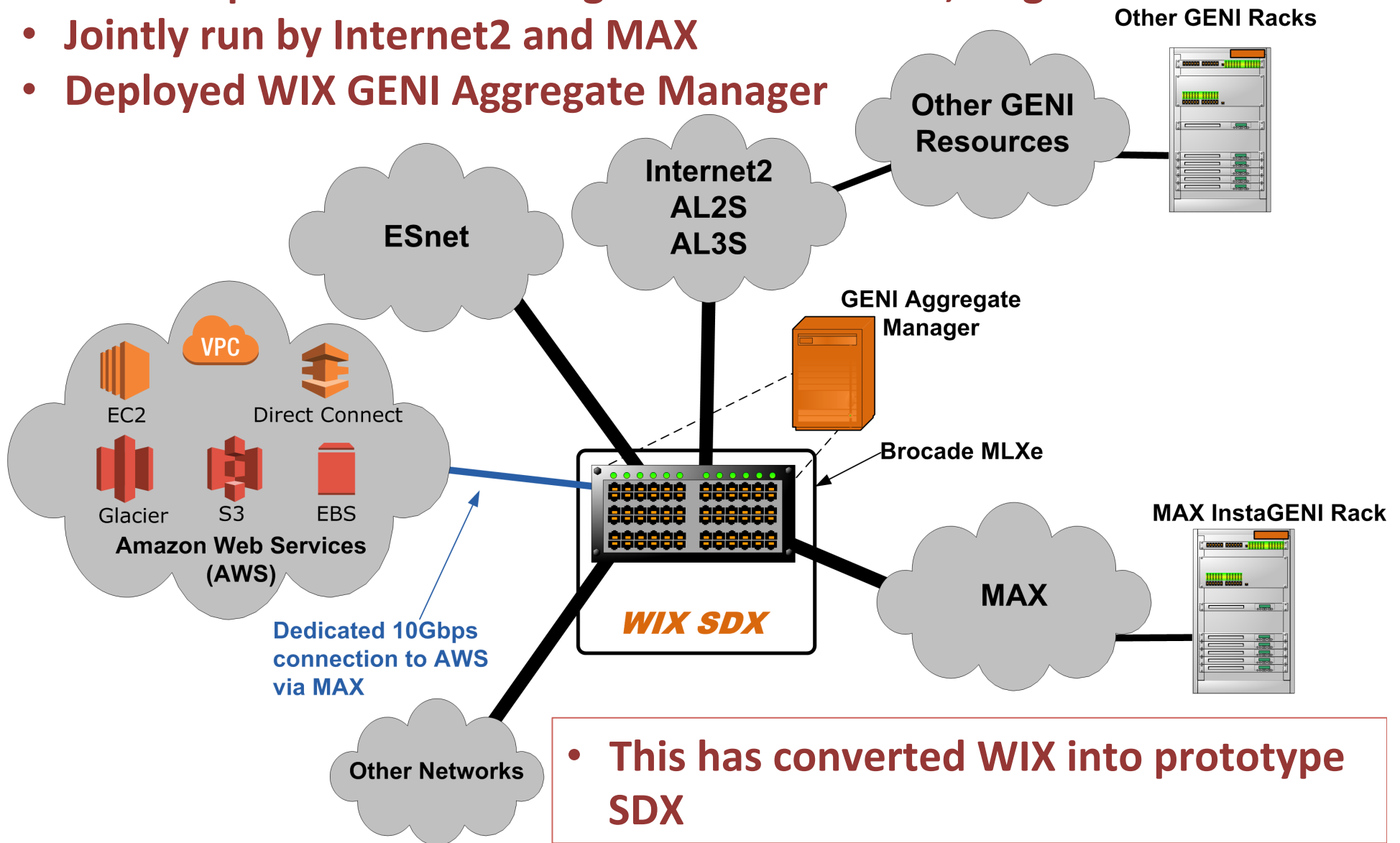University of Maryland
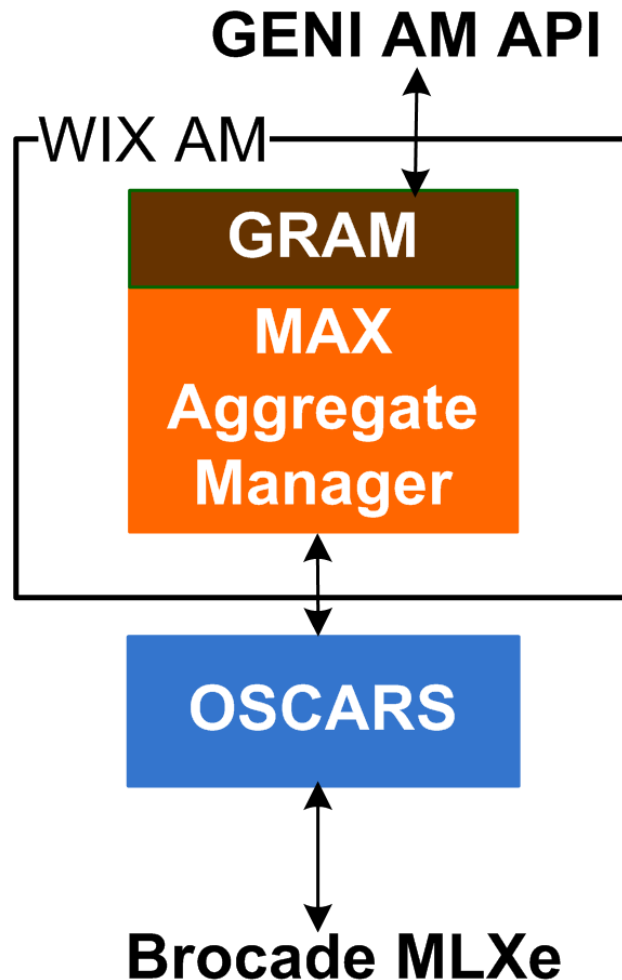Mid-Atlantic Crossroads (MAX)

UNIVERSITY OF MARYLAND

MAX
MID-ATLANTIC CROSSROADS

WIX

- **WIX is a production Exchange Point in McLean, Virginia**
- **Jointly run by Internet2 and MAX**
- **Deployed WIX GENI Aggregate Manager**

- **This has converted WIX into prototype SDX**

WIX GENI AM

GENI AM API

WIX AM

GRAM

MAX Aggregate Manager

OSCARS

Brocade MLXe

- Replaced SFA with GRAM
- Adds AM APIv3 and Policy Features
- MAX AM interacts with OSCARS for southbound network control
- DOE OSCARS dynamic provisioning system deployed on multiple networks including ESnet, I2 AL2S, MAX, others

Why Do We Want WIX to be an SDX?

- Would like be able control Exchange Point resource utilization, in an automated fashion:
  - at the Federation (Clearinghouse) level, Virtual Organization (Project) Level, Slice Level, and User Level
  - also need to be able to adjust authorizations and access polices in near-real time
- Example use case: MAX AWS Direct Connect Access
  - MAX AWS Direct Connect is available by stitching to a specific WIX Interface/VLAN combination
  - Would like to make this available to GENI Users, but need to be able to control that access in flexible ways

SDX Functionality

Current SDX Functionality

- Establish resource quotas on a Clearinghouse, Slice, or User basis

- Resource types are total bandwidth, number of VLANs in use
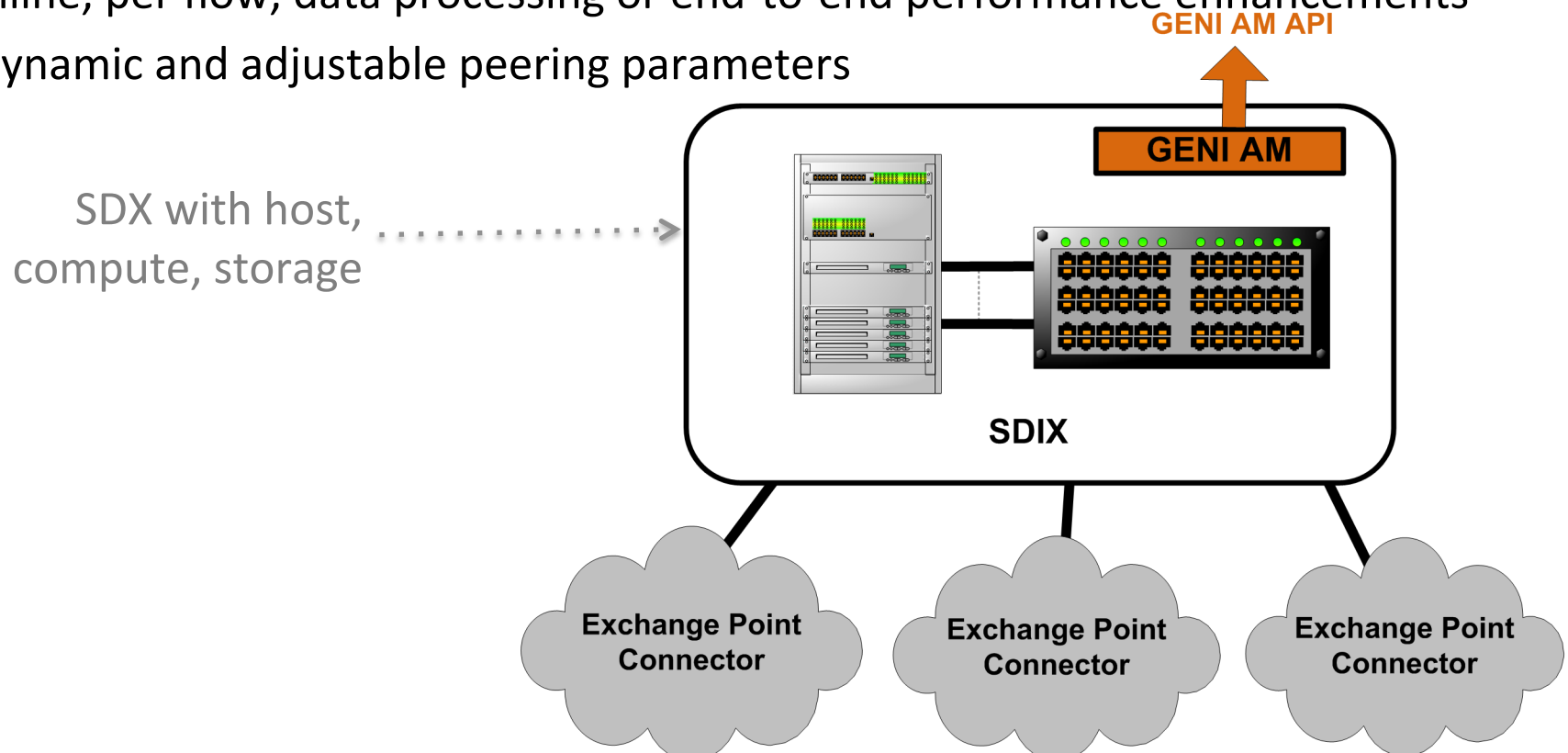
Future Capabilities Desired

- Additional parameters available for resource access
  - Interfaces, VLAN Ranges
  - at the Federation (Clearinghouse) level, Virtual Organization (Project) Level, Slice Level, and User Level

- Ability for real-time resource utilization adjustments based on user priority and preemption

- SDXs with compute and storage embedded

SDXs with Compute/Storage

- Longer Term we imagine a distributed ecosystem of SDXs which can be orchestrated to add control end-to-end flows

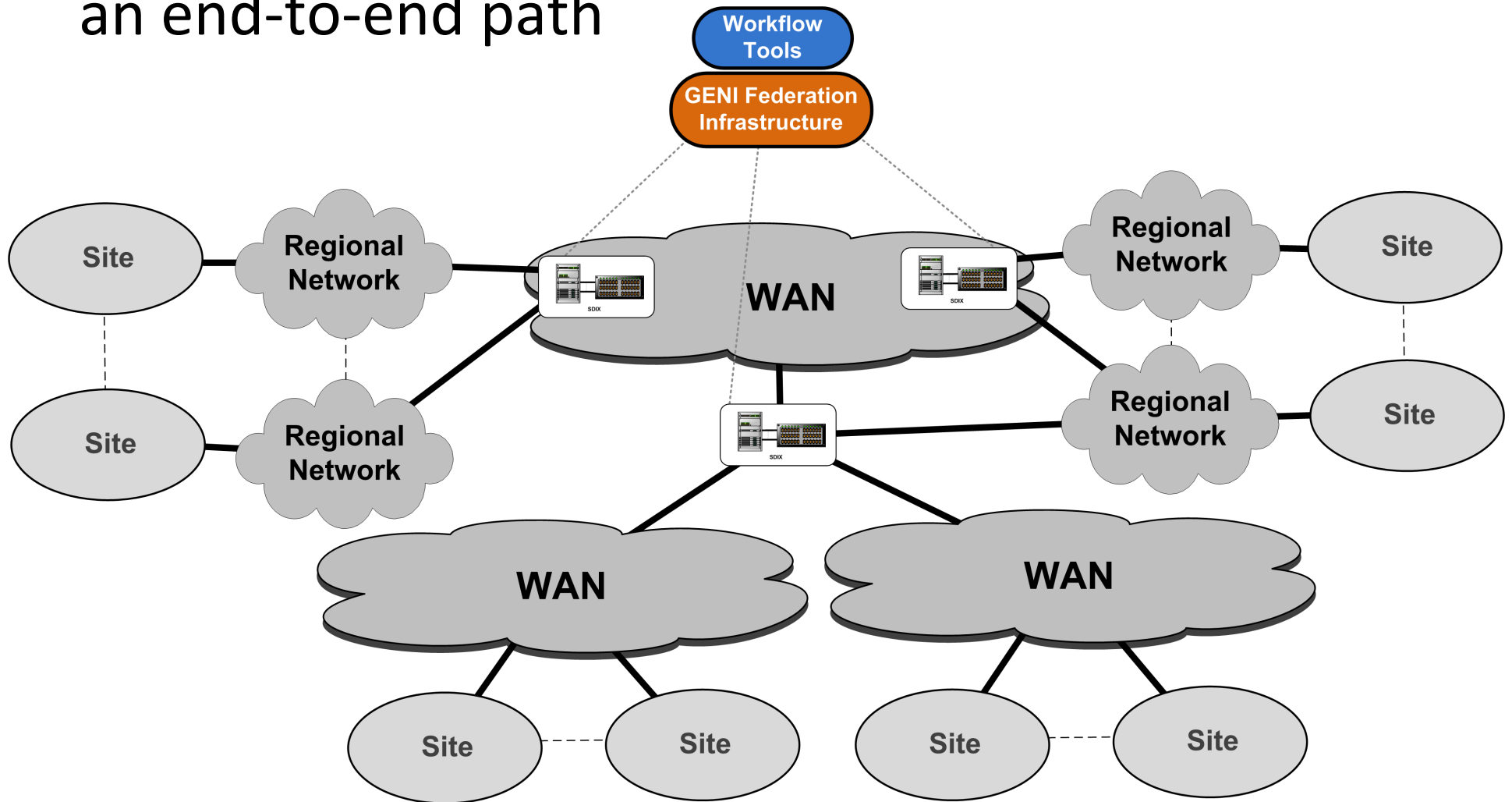- Enable options for new exchange point services using host/storage. Possible uses:
  - Hosting of services for common use by exchange point peers
  - Inline, per flow, data processing or end-to-end performance enhancements
  - Dynamic and adjustable peering parameters

SDX with host, compute, storage

GENI AM API

GENI AM

SDIX

Exchange Point Connector

Exchange Point Connector
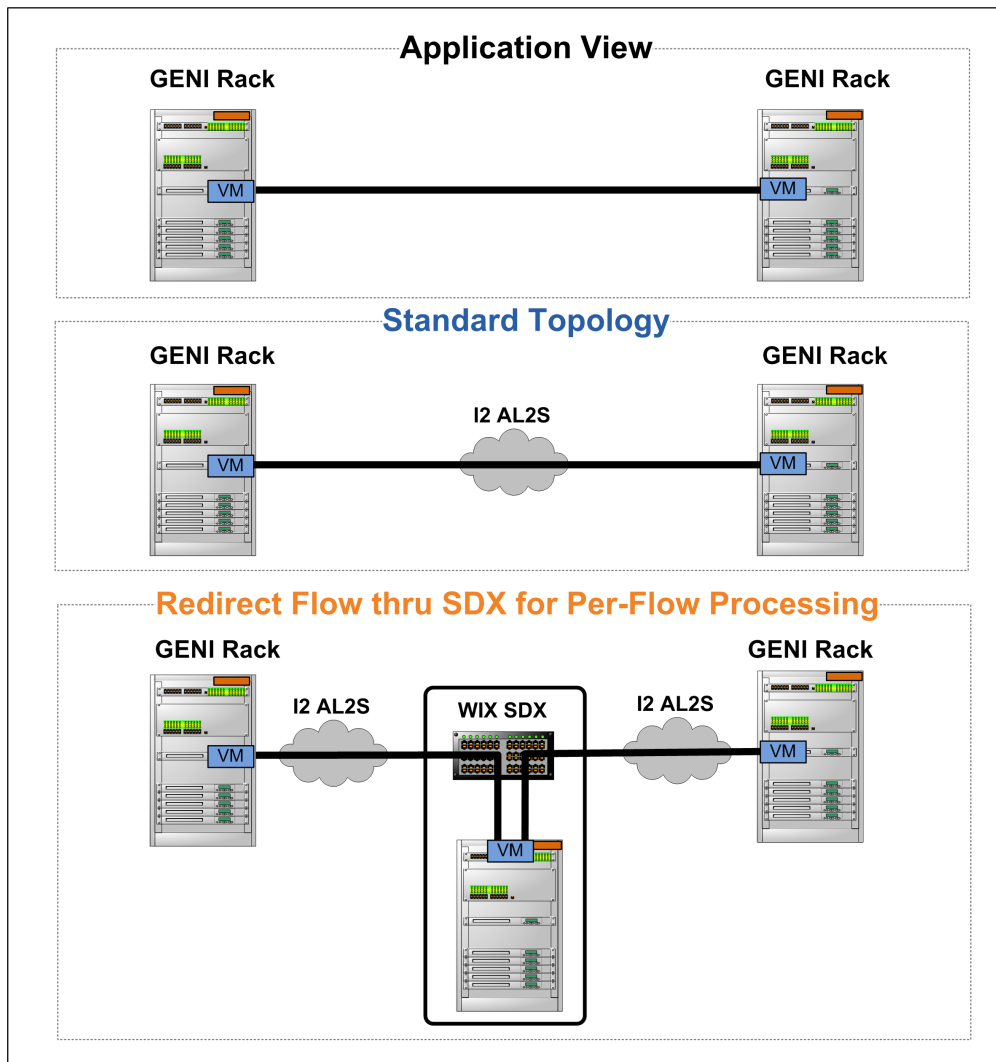
Exchange Point Connector
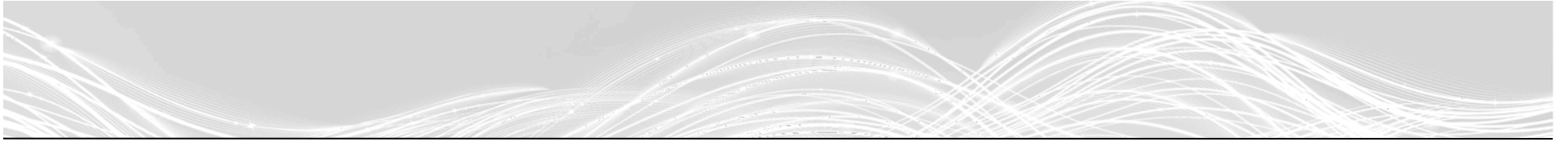
Ecosystem of Distributed SDXs

- Automated Policy Driven control of Exchange Points could be used to coordinate actions and flows along an end-to-end path

SDX Enabled Flow Based Services

Application View

GENI Rack   GENI Rack

VM   VM

Standard Topology

GENI Rack   GENI Rack

I2 AL2S

VM   VM

Redirect Flow thru SDX for Per-Flow Processing

GENI Rack   GENI Rack

I2 AL2S   WIX SDX   I2 AL2S

VM   VM

VM

- **GENI mechanisms can be utilized to "redirect" flow thru an exchange point where "value added" processing can be accomplished**
- **With a distributed infrastructure of SDXs this can be done in much more dynamic and open manner then what is possible today.**
- **This type of capability can be used for single flow focus, or to build specialized service topologies**

Thank-you