PACIFIC WAVE

GOLE Update

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GLIF, Prague

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CENIC

PACIFIC NORTHWEST GIGAPOP
www.pnw-gigapop.net

Current Developments
Redundancy and Span

- 100G Denver-Chicago: To improve resiliency and to allow peering with European Networks in Chicago and other networks and entities

- Additional PW access points & redundancy
  - Denver, CO – The Front Range GigaPoP (FRGP) serves universities in Colorado as well as NOAA, UCAR and other major national facilities
  - Albuquerque, NM – The University of New Mexico operates the Albuquerque GigaPoP serving universities in New Mexico and connects to both ESnet and Los Alamos National Lab
  - El Paso, TX – Operated by University of New Mexico, El Paso is expected to be a major junction for US-Mexico connectivity
  - Hawaii – The University of Hawaii is a long time collaborator with Pacific Wave and has recently added additional capacity between Hawaii and mainland US

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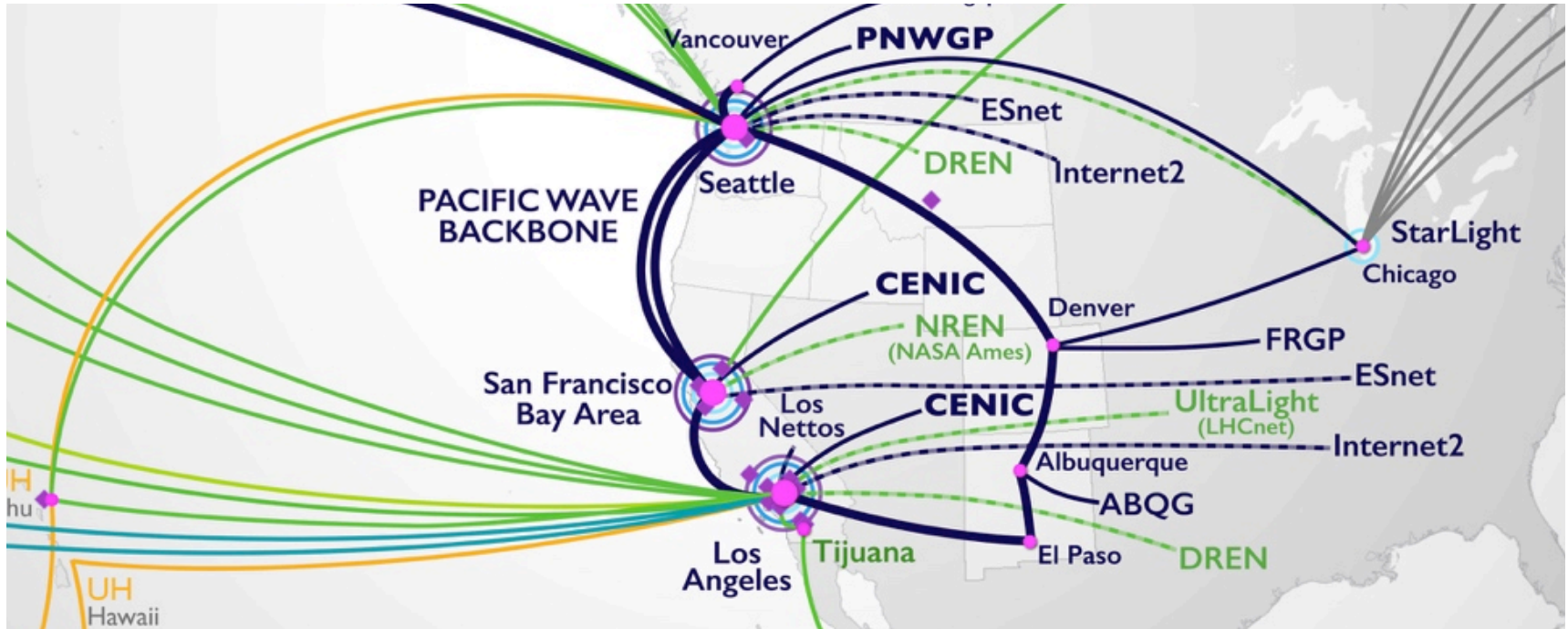
- Western Region R&E Exchange Points

  - PW has exchange points in the Western United States at Seattle, SF Bay Area (Sunnyvale), Los Angeles, Denver, Albuquerque and El Paso

  - Includes a diverse ring fabric to allow participating networks to peer across that fabric with any other participant

- 22 major R&E networks directly connect to the Pacific Wave fabric

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CENIC/Pacific Wave NSF Award

- Pacific Wave Expansion Supporting SDX & Experimentation (ACI-1451050, September 2015)

  - Continued enhancement, upgrade and evolution of Pacific Wave to support more 100G connections

  - Additional 100G capacity between exchanges points along West Coast

  - SDN/SDX deployment on parallel infrastructure to enable experimentation while maintaining production use of the Pacific Wave exchange

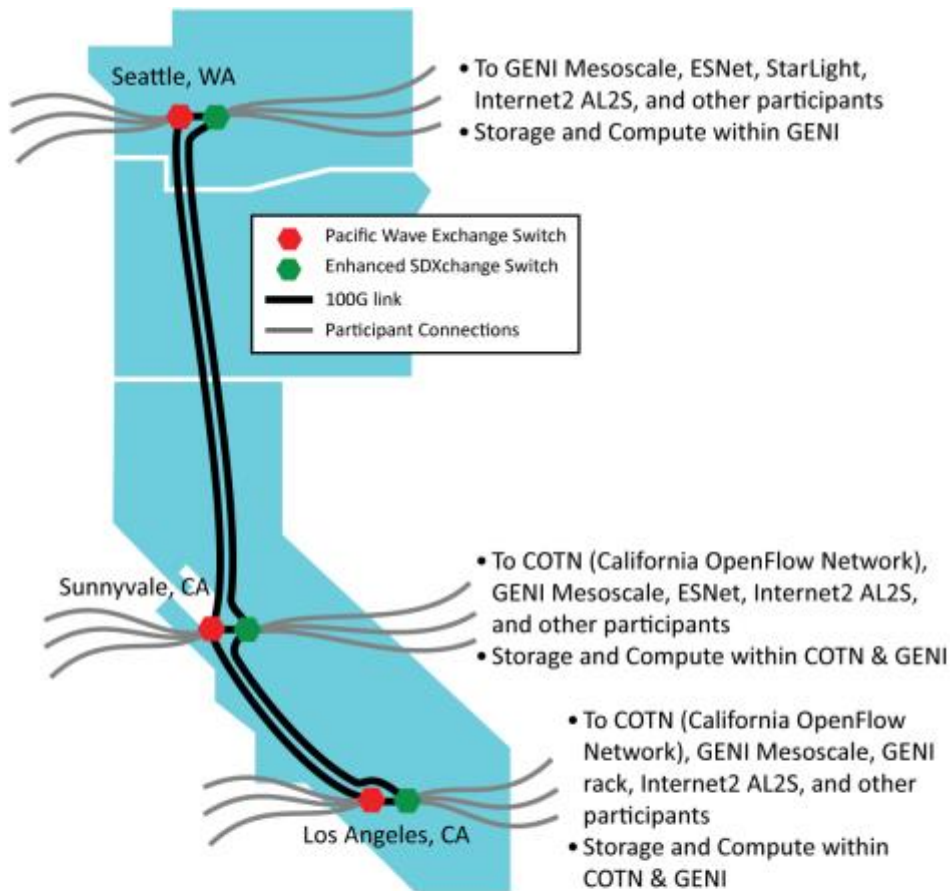 - Collaboration with other IRNC awardees on SDX development, measurement and monitoring.

perfSONAR

- **100G perfSONAR**
  - Seattle, Los Angeles in year 1
  - Sunnyvale, Denver, Chicago in year ?

- **10G perfSONAR**
  - Seattle, Sunnyvale, Los Angeles in year 1
  - Denver, Chicago, El Paso in year ?
  - May be allocated to private VLANs
 - Considering availability on SDX platform

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Seattle, WA

- To GENI Mesoscale, ESNet, StarLight, Internet2 AL2S, and other participants
- Storage and Compute within GENI

Legend:
- Pacific Wave Exchange Switch
- Enhanced SDXchange Switch
- 100G link
- Participant Connections

Sunnyvale, CA

- To COTN (California OpenFlow Network), GENI Mesoscale, ESNet, Internet2 AL2S, and other participants
- Storage and Compute within COTN & GENI

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- Storage and Compute within COTN & GENI

Los Angeles, CA

Traditional Peerings between all Pacific Wave participants can remain on the Pacific Wave Exchange Switches.

SDX Services can be accessed via direct connection to Enhanced SDXchange Switches *OR* via connections to the Pacific Wave Exchange Switches.

Mixed connections can also take place between participants where one is connected to the Pacific Wave Exchange Switch and the other to an Enhanced SDXchange Switch.
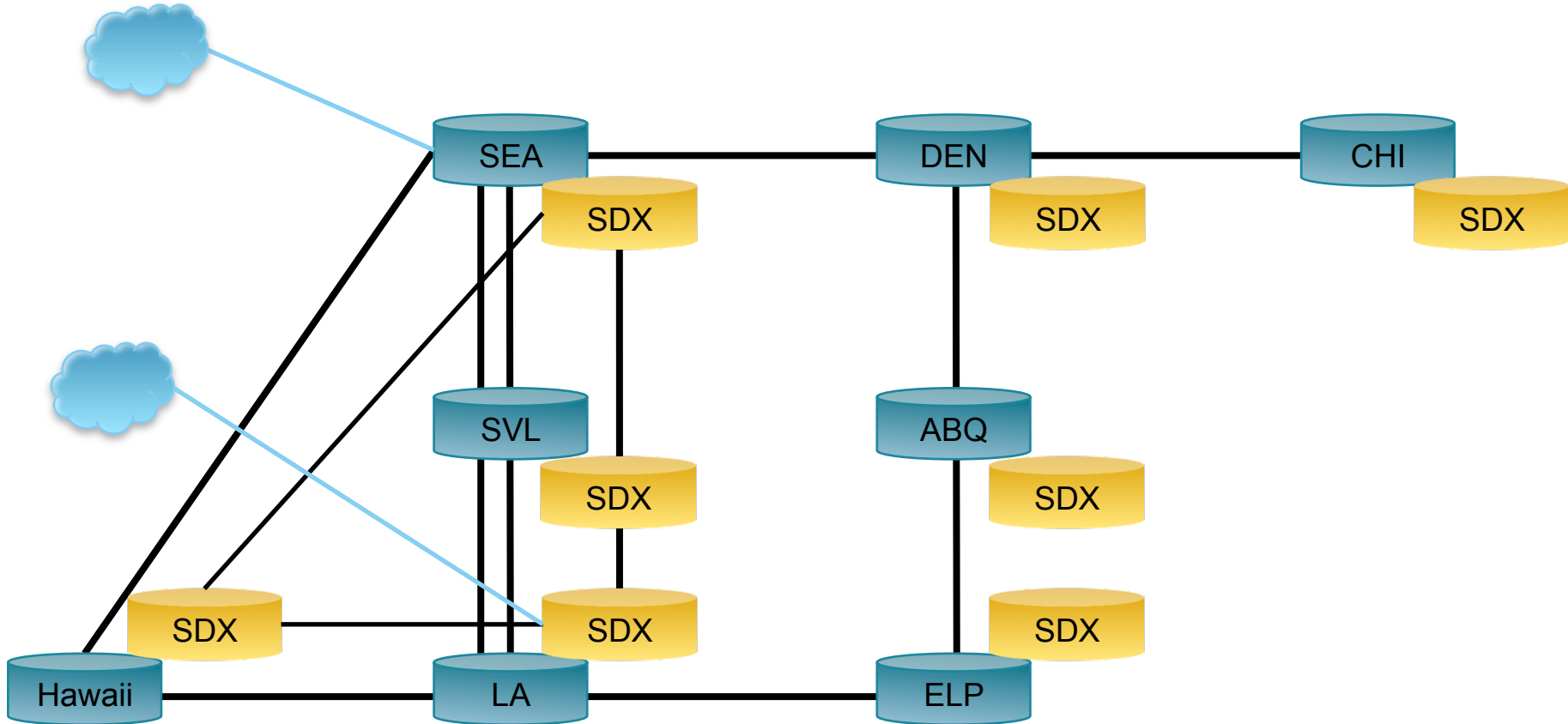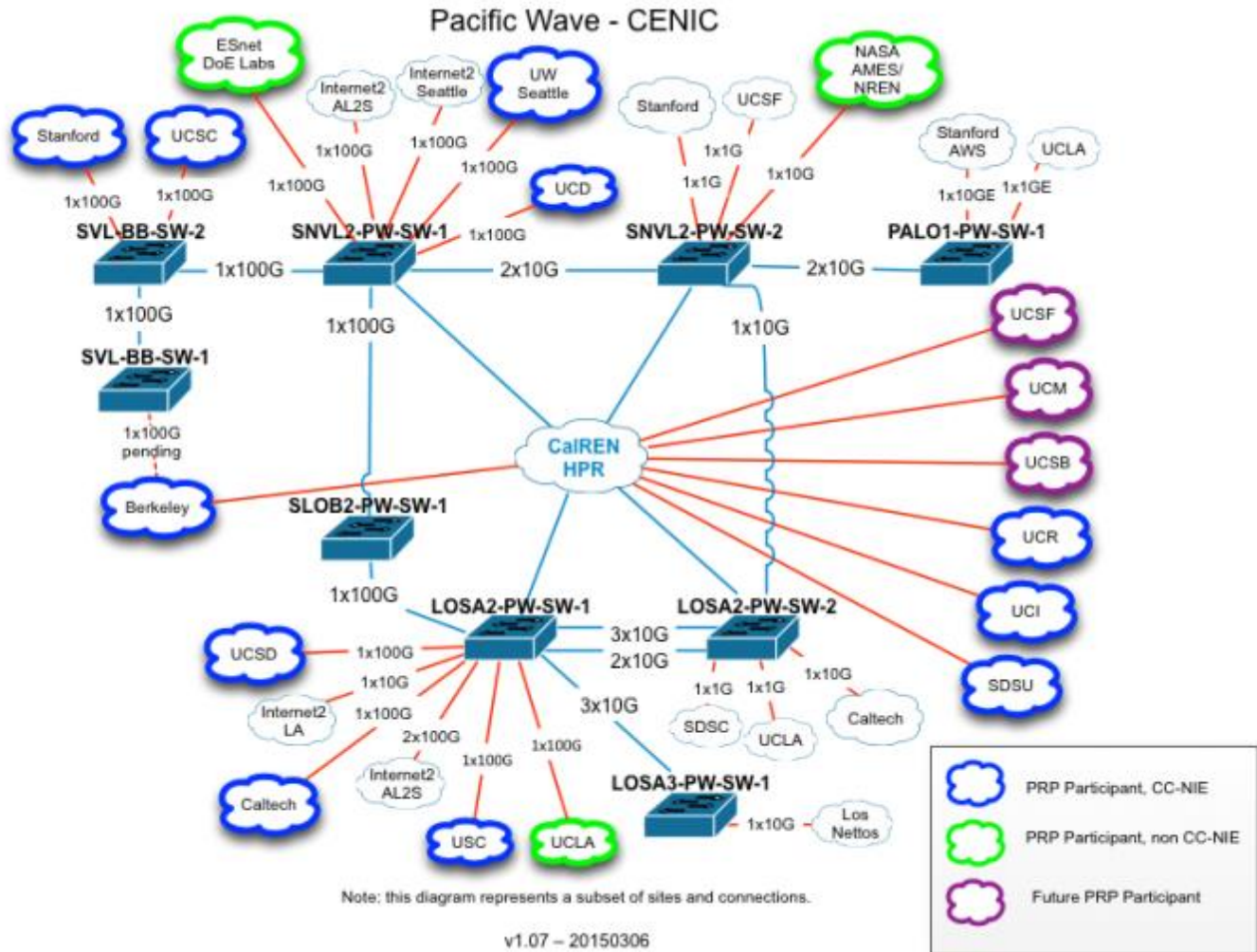
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Pacific Wave SDX – Year One
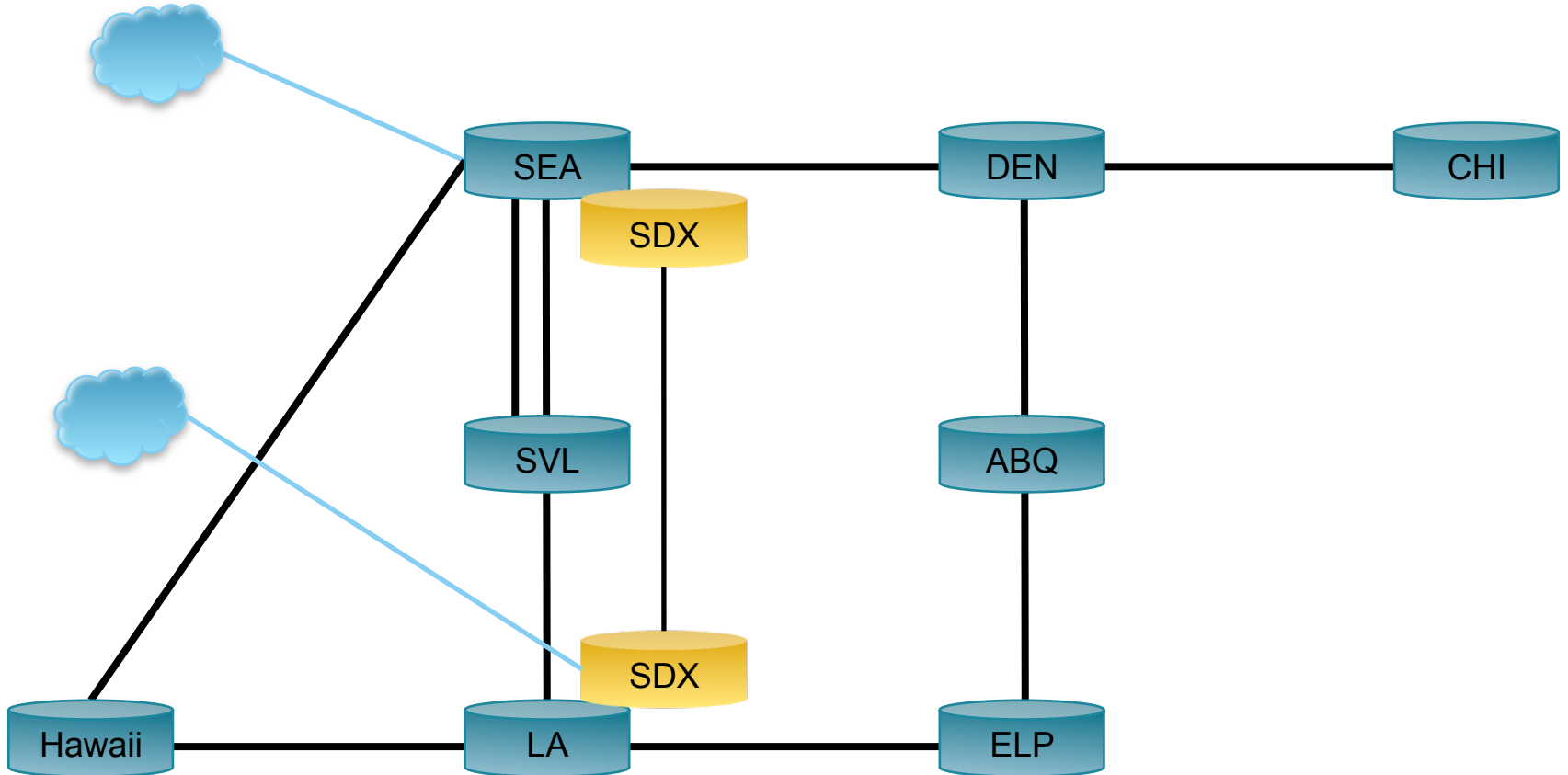
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Pacific Wave SDX – Year Two
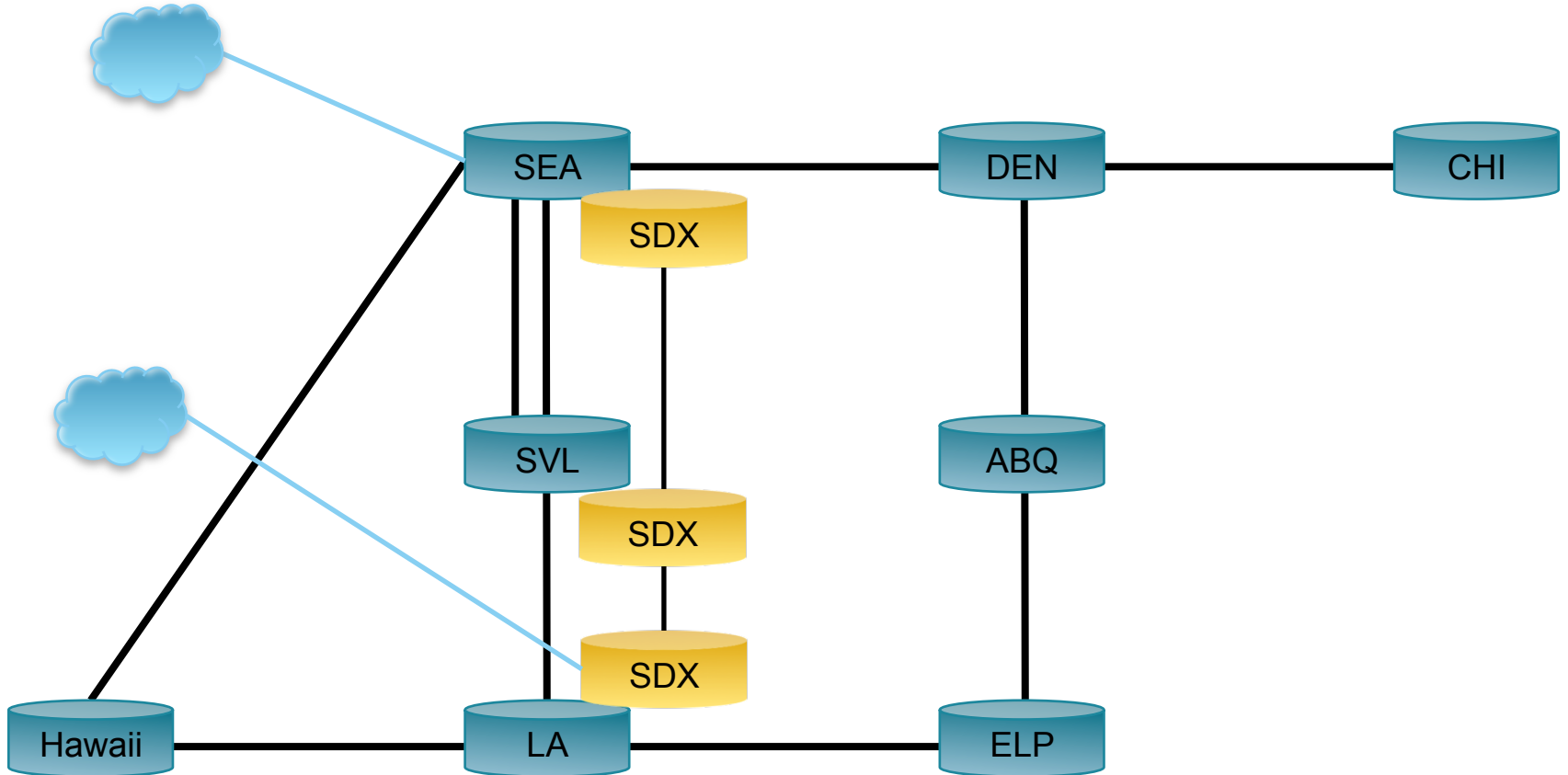
Pacific Wave SDX – Year ??

CENIC/Pacific Wave Network supporting PRP prototype demo

Thank you!