



# Center for Integrated Access Networks



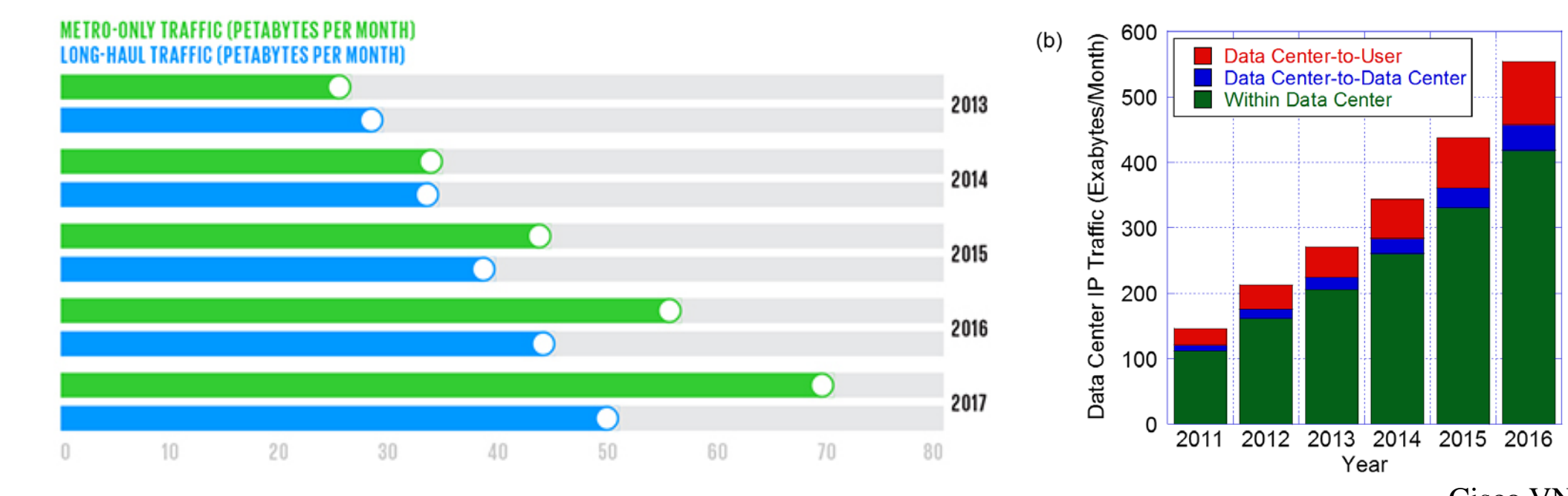
Creating transformative optical technologies to enable an affordable faster internet for the future.

University of Arizona | California Institute of Technology | Columbia University | Cornell University | Norfolk Southern University | Tuskegee | UC Berkeley | UC Los Angeles | UC San Diego | University of Southern California

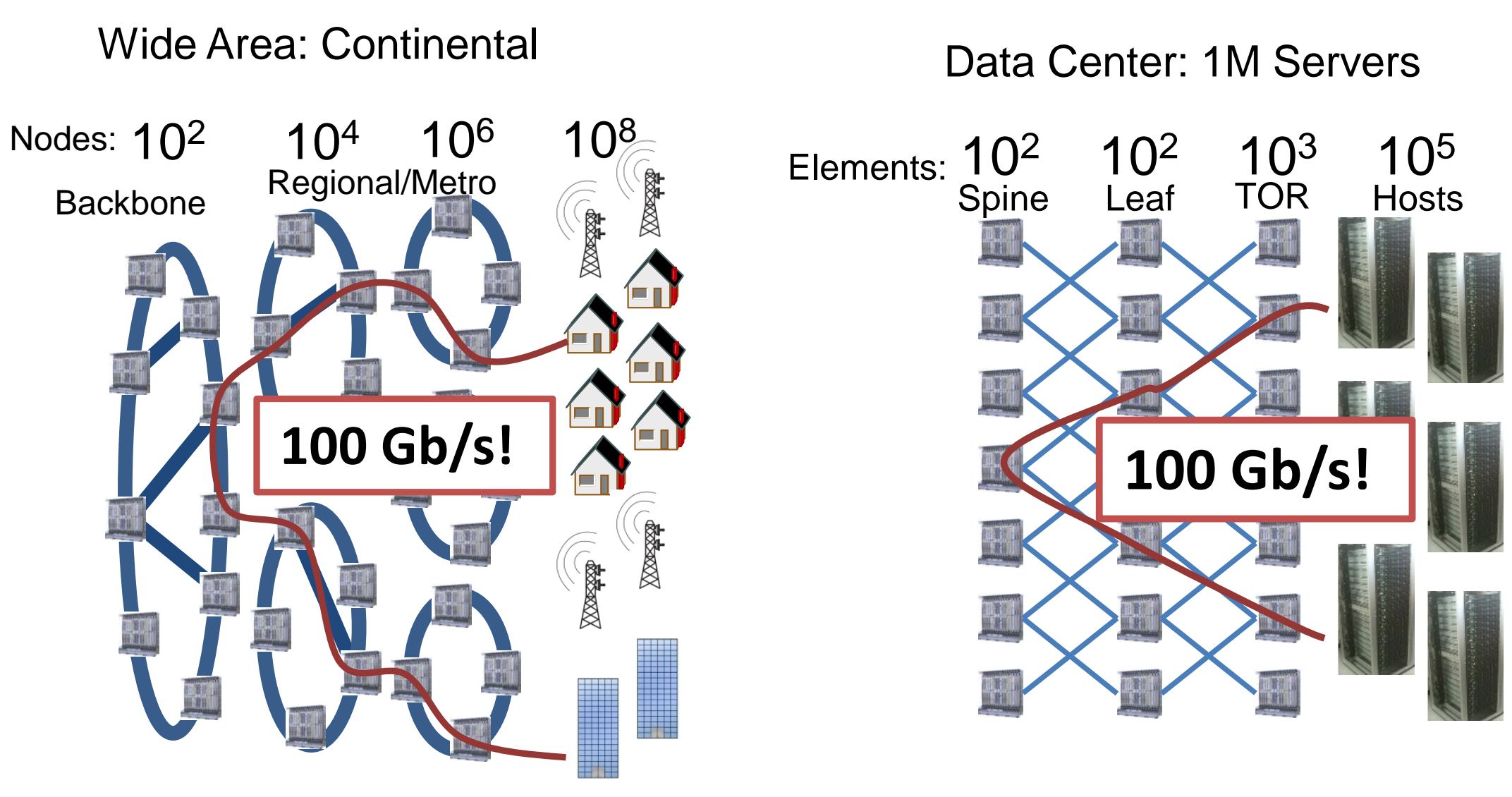
## Executive Priority

"President Obama Announces Launch of New Integrated Photonics Manufacturing Innovation Institute Competition"  
www.manufacturing.gov

## Metro Traffic Overtakes Long Haul, Datacenters on Rise



## Electronic Access & Aggregation Bottlenecks



**Vision:** A transformed Internet that would enable **end-user** access to emerging **real time, on-demand**, network services at data-rates up to **100Gbps, anywhere at anytime, at low cost** and with **high energy efficiency**

**Anytime/ Anywhere:** Converged wire-line and wireless service aware networking [C1-2, C1-3, C1-6]

**Low Cost:** Integrated OE chips, integrated end-to-end platform, minimization of OEOs [C1-1, C1-2, C2-1, C2-2, C2-3, C2-4]

**On-Demand:** Dynamic intelligent Hybrid switched networking, BW on demand [C1-1, C1-2, C1-5, C1-6, C1-8]

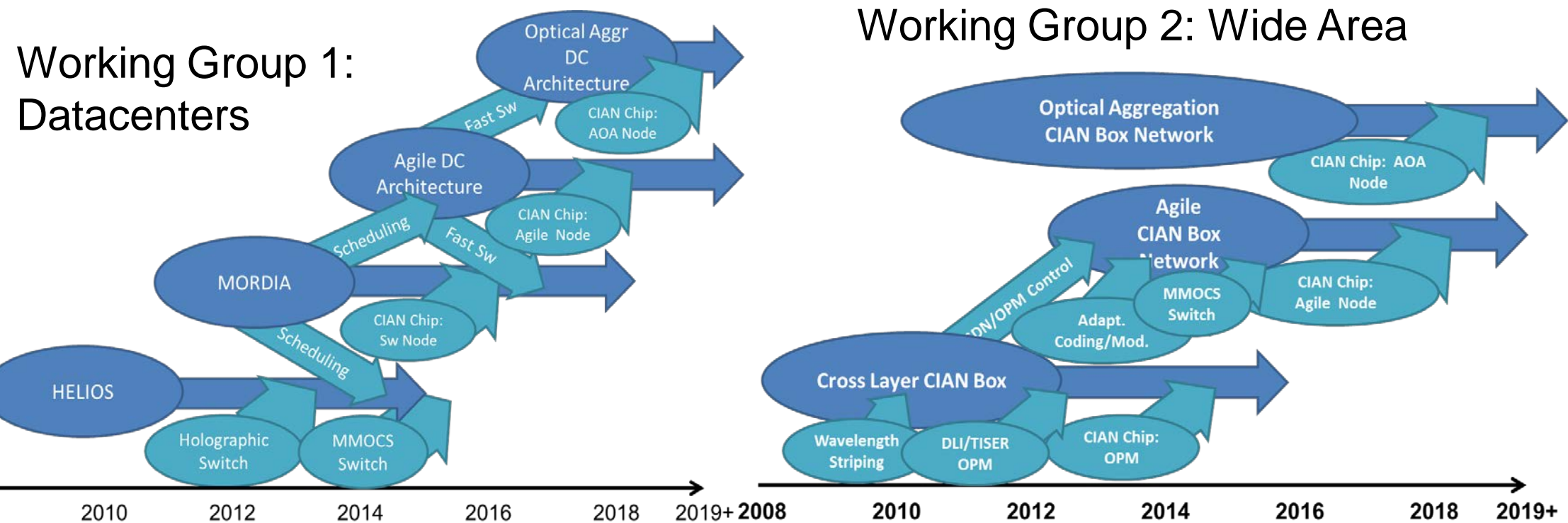
**Energy optimization:** activity in all thrusters and WGs, integrated OE chips [C1-2, C1-4, C2-3, C3-1, C3-2]

**Real-Time:** Low latency end-to-end optical connections, fast switching of very high data rate flows, minimizing OEOs [C1-1, C1-5, C1-6]

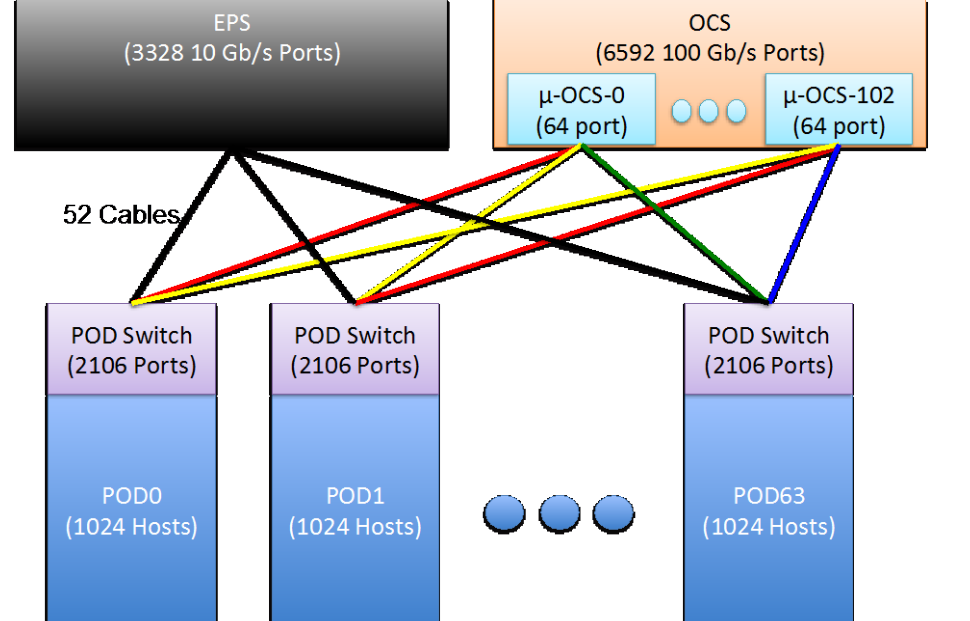
**100 Gbps:** High capacity Hybrid optical/electronic systems, 100+ Gbps hosts [C1-1, C1-2, C1-7]

**Mission:** Create integrated optoelectronic technologies for access aggregation and data centers to overcome the existing network bottlenecks

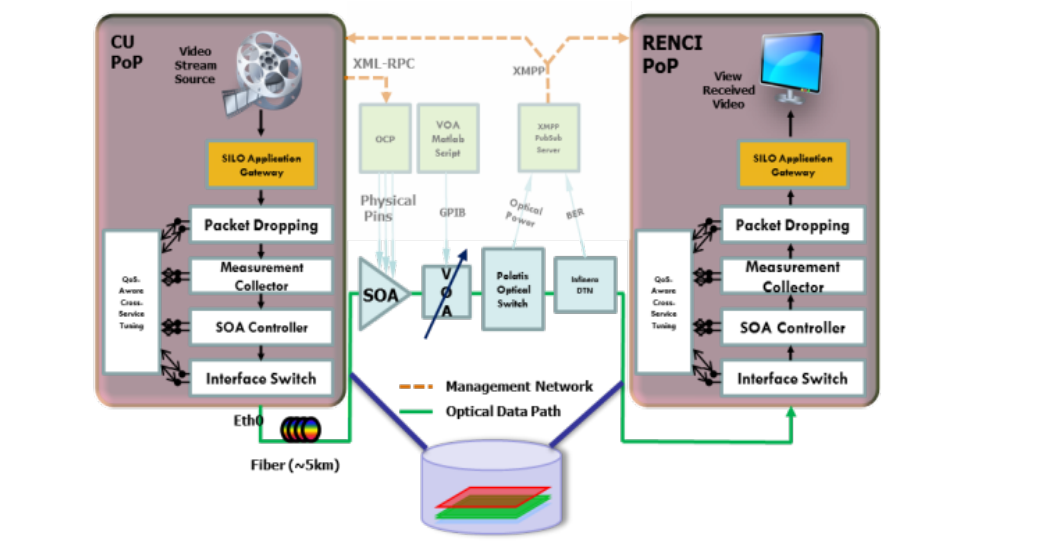
## Network Roadmap to the Future Internet



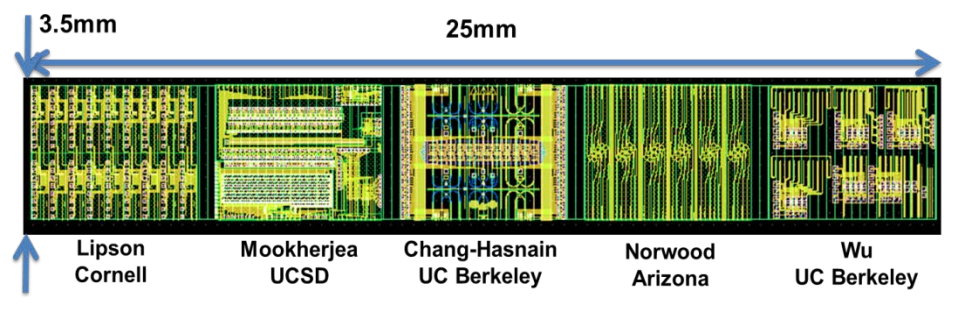
## Hybrid Switching



## Cross-Layer Service Awareness

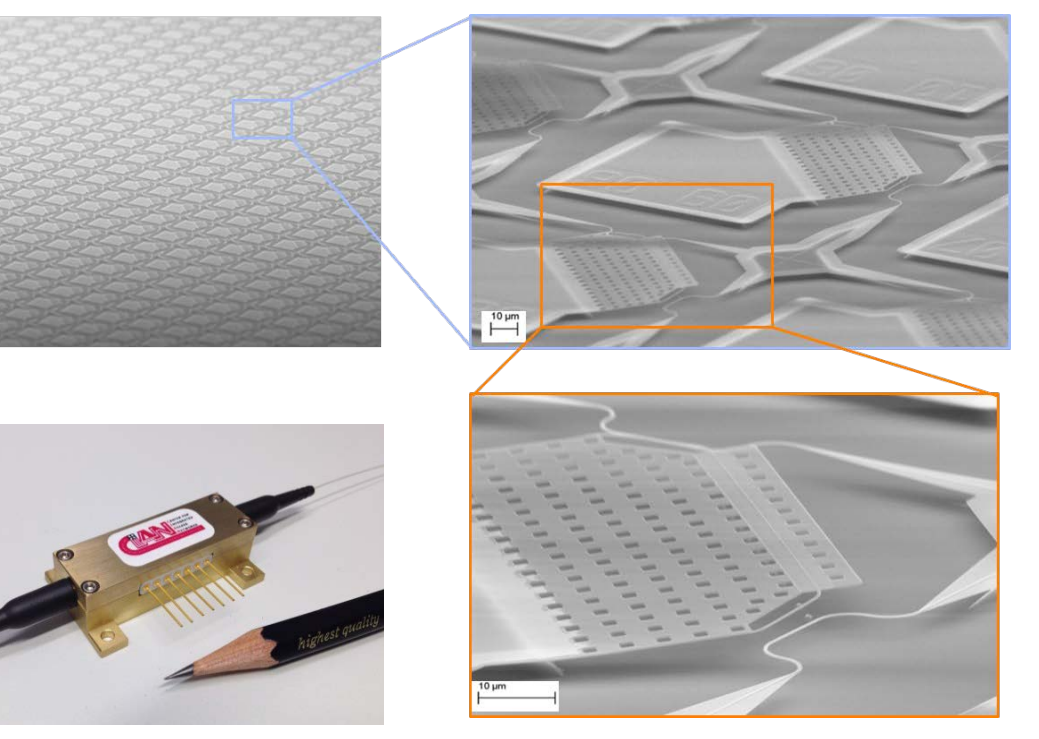


## Si Photonics: CIAN Chip



A new paradigm in integrated photonics research & innovation

## Scaling from Nano to Macro



## Industry Affiliates and Innovation Eco-System



- Bandwidth 10: Small-Business ERC Collaborative Opportunity (SECO)
- Four startups founded by CIAN faculty and students
- CIAN-OIDA metrics/roadmapping workshops
- NSF ICORP: NxN holographic switch, CIAN IAB member, FNE, was the mentor
- Innovation Workshop
- Market Innovation Training
- Course on Entrepreneurship, IP, Startups

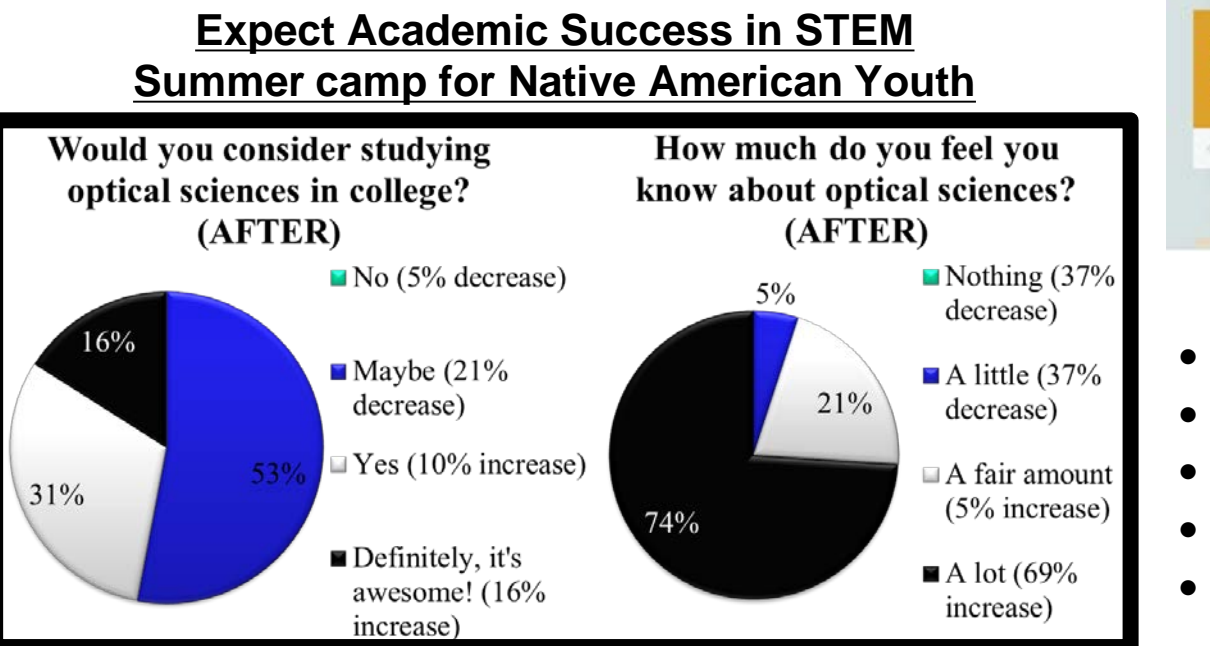


## Education, Outreach & Diversity

- IOU-NA REU Program**  
8 Native American undergraduate participants from 7 tribes nationwide: Assiniboine, Tohono O'odham, Navajo, Apache, Comanche, Blackfoot, and the Colorado River Indian Tribes.
- Four student publications
  - Two conference presentations at AISES in Florida
  - One conference presentation at the Dark Skies Conference in Arizona.



- ROKET RET Program**  
40 K-14 teachers of Native American youth nationwide. Outcomes include teacher-led programming such as research-inspired lesson plans, after-school programming, & school-university partnerships



**CIAN Supercourse**

**Photonics Hub**

**OPTICS ADVENTURES**

**The Road to Discovery**

- MS PCE
- Certificate PCE
- University & Precollege Modules
- Optics Adventures Precollege Comic Book
- OPTI 500 PCE

## Organized for Impact: From Devices to Networks

