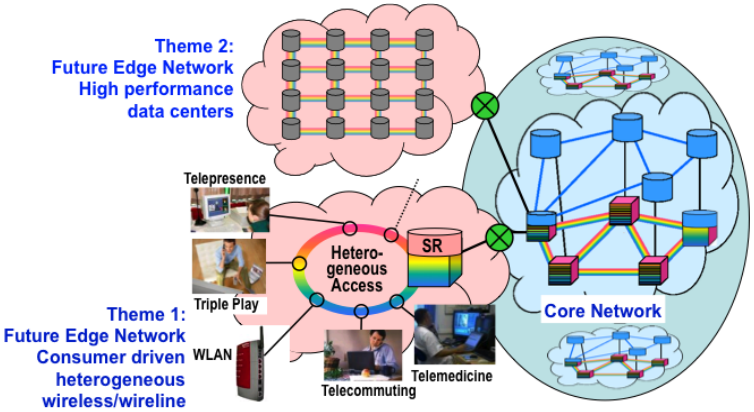
Center for Integrated Access Networks (CIAN)

University of Arizona (lead institution) and its partner institutions, the University of California at San Diego, the California Institute of Technology, Stanford University, the University of Southern California, University of California at Los Angeles, University of California at Berkeley, Columbia University, Norfolk State University and Tuskegee University

---

Creating transformative optoelectronic telecom technologies enabling optical access networks where virtually any application requiring any resource can be seamlessly and efficiently aggregated and interfaced with existing and future core telecom/datacom networks in a cost effective manner.

The National Science Foundation has awarded a five-year, $18.5 million grant to establish an Engineering Research Center based at The University of Arizona. This research center entitled Center for Integrated Access Networks (CIAN) is focusing on removing one of the last bottlenecks in the Internet by developing optoelectronic technologies for high-bandwidth, low-cost, widespread access networks. The vision of CIAN is to create the "PC" equivalent for the optical access network. Transforming the costly discrete optoelectronic technologies of today's network into affordable, highly integrated optoelectronic subsystems that demonstrate novel optical network functionalities and infrastructure that enable heterogeneous services. CIAN's ultimate goal is to provide the technological foundation for an advanced optical access network that simultaneously achieves efficient high data rate aggregation, to amortize the cost for end users, while providing the necessary flexibility to support diverse end user requirements. The development of these technologies is essential for delivery of single user data rates approaching 10 Gb per second and provision of the associated services to a broad population base regardless of the "last-mile" technology. Attainment of these goals will enable affordable, flexible access to any type of service to anybody, anywhere, at anytime.



Research

The research of the CIAN Engineering Research Center will advance upon three major thrusts wherein interoperability of components will be proven via state-of-the-art testbeds, which will provide for cross-collaboration among system, sub-system, and device research efforts.

Thrust 1: *Optical Communication Systems and Networking* will act as the "top-down" driver for the development and integration of components and devices that will enable integrated subsystems, co-optimized to cost-effectively provide high-data rate services to the "curb." This thrust includes issues such as aggregation and access networks, cross-layer optimization, wavelength multicasting and

ubiquitous monitoring. The projects in this thrust will enable and demonstrate numerous new network applications including ultra high-bandwidth data centers and immersive telepresence.

Thrust 2: *Subsystem Integration and Silicon Nanophotonics* will explore signal conditioning, processing, reconfiguration, and control functions realized with various platforms including CMOS compatible nanostructures and silicon nanophotonics, and multifunctional integrated subsystems exploiting monolithic and heterogeneous integration.

Thrust 3: *Materials and Devices* will act as the scientific and technological foundation by conducting research on new materials, device technologies, processing and integration methods for chip-scale integrated optoelectronics.

Education

CIAN's Education and Outreach will include: (1) creating vertically integrated (from pre-college to post-graduate) curricula which are team-based, research-inspired and industry-oriented, (2) promoting cross-disciplinary, diversity-oriented approaches to education for university researchers, college students, K-12 students, teachers, and the general public, (3) educating a skilled and diverse workforce to lead the next-generation communications industry, and (4) integrating engineering, technology and business education into the knowledge base of CIAN's students to stimulate technology transfer. The center will be developing new programs of outreach, creating internship/mentoring programs, as well as development of assessment and tracking processes for the education program.

Industry Collaboration and Technology Transfer

CIAN's Industrial Collaboration and Technology Transfer Program will be involved in all aspects of the ERC: strategic planning, supervision of and collaboration in research projects, operation of testbeds, mentoring of students and post-doctoral fellows, and education. The goals of the Industrial Collaboration and Technology Transfer Program are to provide: (1) an industrial voice in the management of the Center, (2) industrial guidance in the selection and emphasis of research projects, (3) an avenue for technology transfer from the Center to industry, and (4) a path for industrial support of and participation in educational programs. To accomplish these goals, the CIAN ERC encourages the participation of large and small companies as collaborators in the areas such as research, product development, education, and commercialization. Industry sectors expected to be most interested in CIAN's technologies are telecommunications, network equipment, aerospace, semiconductor, test & measurement, and optical component manufacturers and developers.

Diversity

CIAN's aim is to provide comprehensive diversity programs to ensure that the gender, race, ethnicity, and disabilities composition of the leadership, faculty, students, and staff will exceed the national averages in engineering and increase every year. Each core partner institution is committed to the diversity goals of CIAN. CIAN's long-term goal is to create legacy initiatives at each of our core campuses that have a lasting impact to improve diversity in engineering.

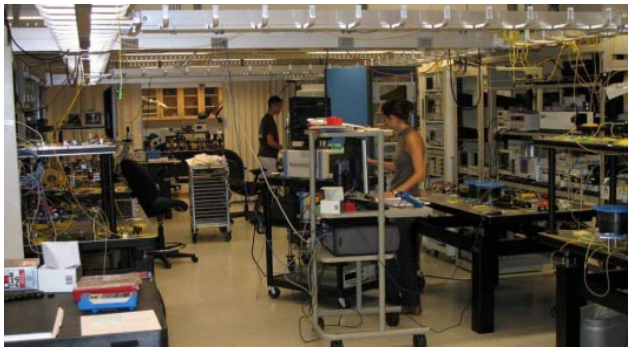
Facilities

CIAN's main operations are located at The University of Arizona's College of Optical Sciences, which provides resources for both theoretical and applied research programs in all areas related to optics and the optical sciences. The center headquarters is on the 5th floor of a new 47,000 square-foot West Wing addition, completed in 2006.

The CIAN Grand Challenge Testbed, located on the campus of UCSD, is a shared research facility where CIAN's research from the various thrust is integrated, enabling collaborative research among CIAN participants and with the wider research and industrial community. UCSD's CalIT2 information technology facilities including contiguous laboratory space and unique test capabilities are at hand in order to achieve CIAN's testbed vision:

- Provide a vertically integrative cross-thrust platform for testing CIAN technologies in a more system-driven environment than individual academic laboratories;
- Enable measurements of key metrics for potential applications;
- Identify to CIAN researchers the key limitations and technology specifications that require improvement;
- Foster collaborations with industry and showcase CIAN technologies;
- Provide a unique educational environment for training graduate, undergraduate and K-12 students.

CIAN testbed allows for measurement of device specific parameters. Moreover, the CIAN testbed allows system level testing of data transmission impairments, power penalty, polarization effects, bit error rate, aggregate capacity, reconfiguration time, network outage probability, and data blocking statistics. Equipment infrastructure that enables the detailed testing listed above is available.



Center Headquarters and Contact Information

Center for Integrated Access Networks (CIAN), an NSF Engineering Research Center, est, 2008
University of Arizona; 1630 E. University Blvd.; Tucson, AZ 85721
Tel: 520/621-0157; Fax: 520/626-6219; Homepage: www.cian-erc.org

Director	Dr. Nasser Peyghambarian	520/621-4649	nnp@u.arizona.edu
Deputy Director	Dr. Yeshaiahu Fainman	858/534-8909	fainman@ece.ucsd.edu
Managing Director	Dr. Eugene Cochran	520/626-0157	ecochran@optics.arizona.edu
Education Director	Dr. Meredith Whitaker	520/626-3985	mwhitaker@optics.arizona.edu
Supercourse Development Co-Lead	Dr. Joseph Simmons	520/621-6071	simmons@aml.arizona
Supercourse Development Co-Lead	Dr. Kelly Simmons-Potter	520/626-0525	kspotter@ece.arizona.edu
Pre-College Education Director	Dr. Supapan Seraphin	520/621-6075	seraphin@u.arizona.edu
Diversity Program	Dr. Arlene Maclin	757/823-2843	apmaclin@nsu.edu
Industrial Collaboration and Innovation Director	Dr. Robert Norwood	520/626-0936	rnorwood@optics.arizona.edu
Thrust 1 Lead	Dr. Alan Willner	213/740-4664	willner@usc.edu
Thrust 1 Co-Lead	Dr. Keren Bergman	212/854-2280	bergman@ee.columbia.edu
Thrust 2 Lead	Dr. Axel Scherer	626/395-4691	etcher@caltech.edu
Thrust 2 Co-Lead	Dr. Ming Wu	510/643-0808	mingwu@berkeley.edu
Thrust 3 Lead	Dr. Connie Chang-Hasnain	510/642-4315	cch@eecs.berkeley.edu
Thrust 3 Co-Lead	Dr. Hyatt Gibbs	520/621-2941	gibbs@optics.arizona.edu
Testbed Lead	Dr. Franko Kueppers	520/626-1778	franko.kueppers@optics.arizona.edu