

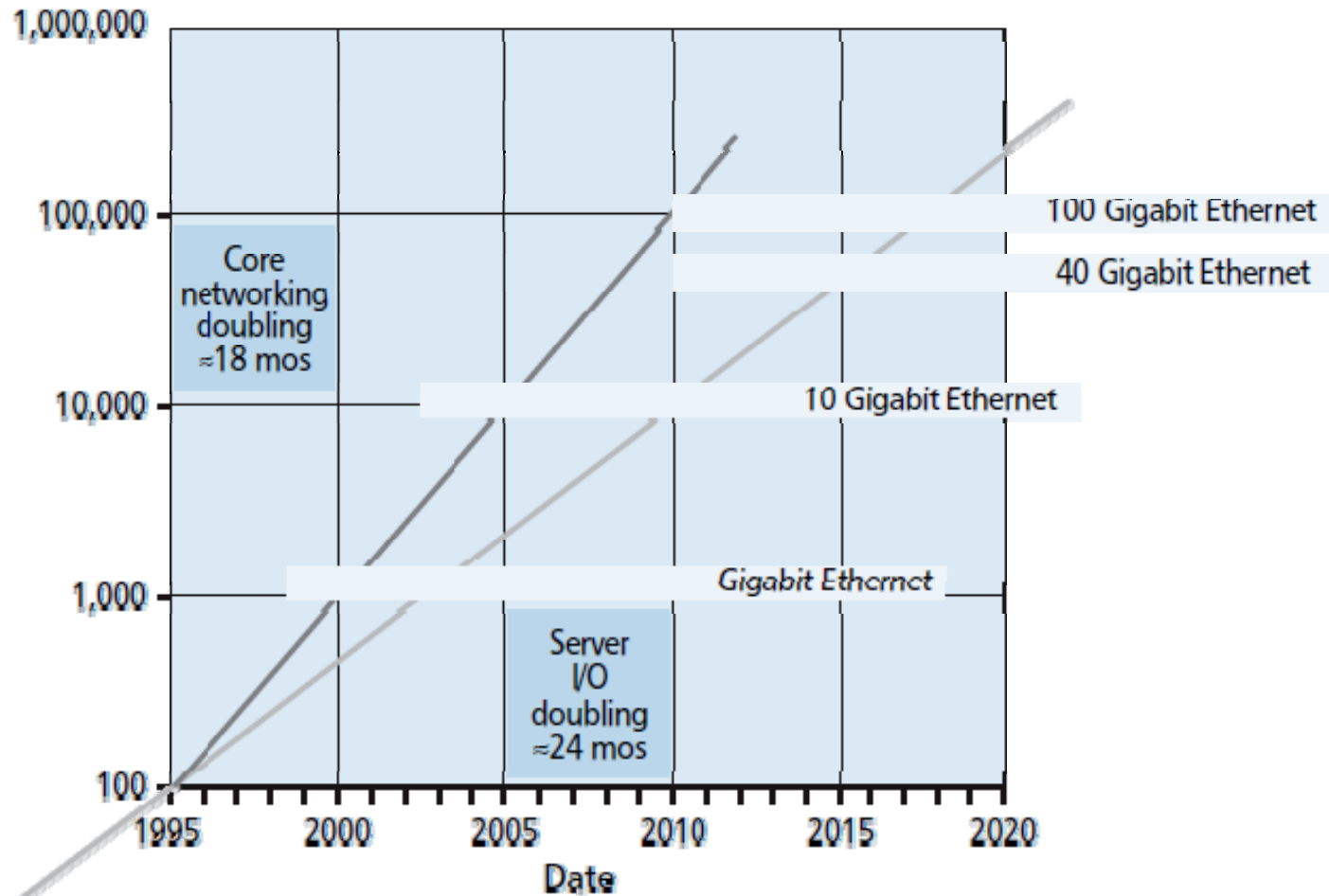
CIAN Vision

The vision of CIAN is to create transformative technologies for optical access aggregation networks where virtually any application requiring any resource can be seamlessly and efficiently aggregated and interfaced with existing and future core networks in a cost effective manner

our vision would lead to the creation of the “PC” equivalent of the optical access network to enable affordable and flexible access to any type of service including delivery of data rates approaching 10 Gb/s to a broad population base anywhere, at anytime.



Bandwidth Growth Forecast

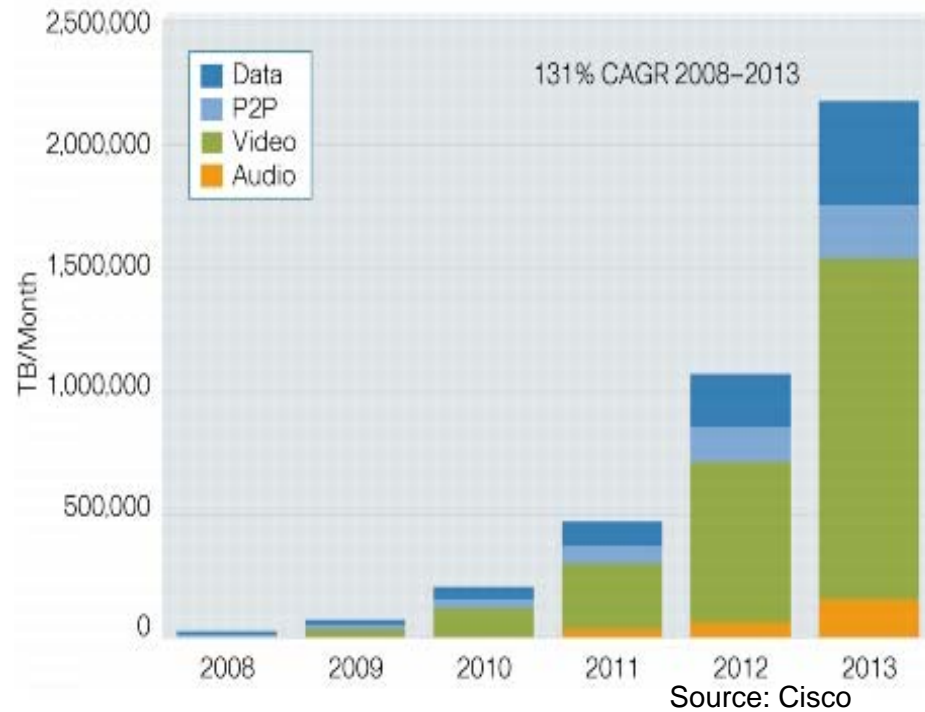


J. D'Ambrosia, "40 gigabit Ethernet and 100 gigabit Ethernet: the development of flexible architecture," *IEEE Comm. Mag.*, vol. 47 (no. 3), pp. S8-S14, 2009



Wireless Demand

Cisco Forecasts 2 Exabytes per Month of Mobile Data Traffic in 2013



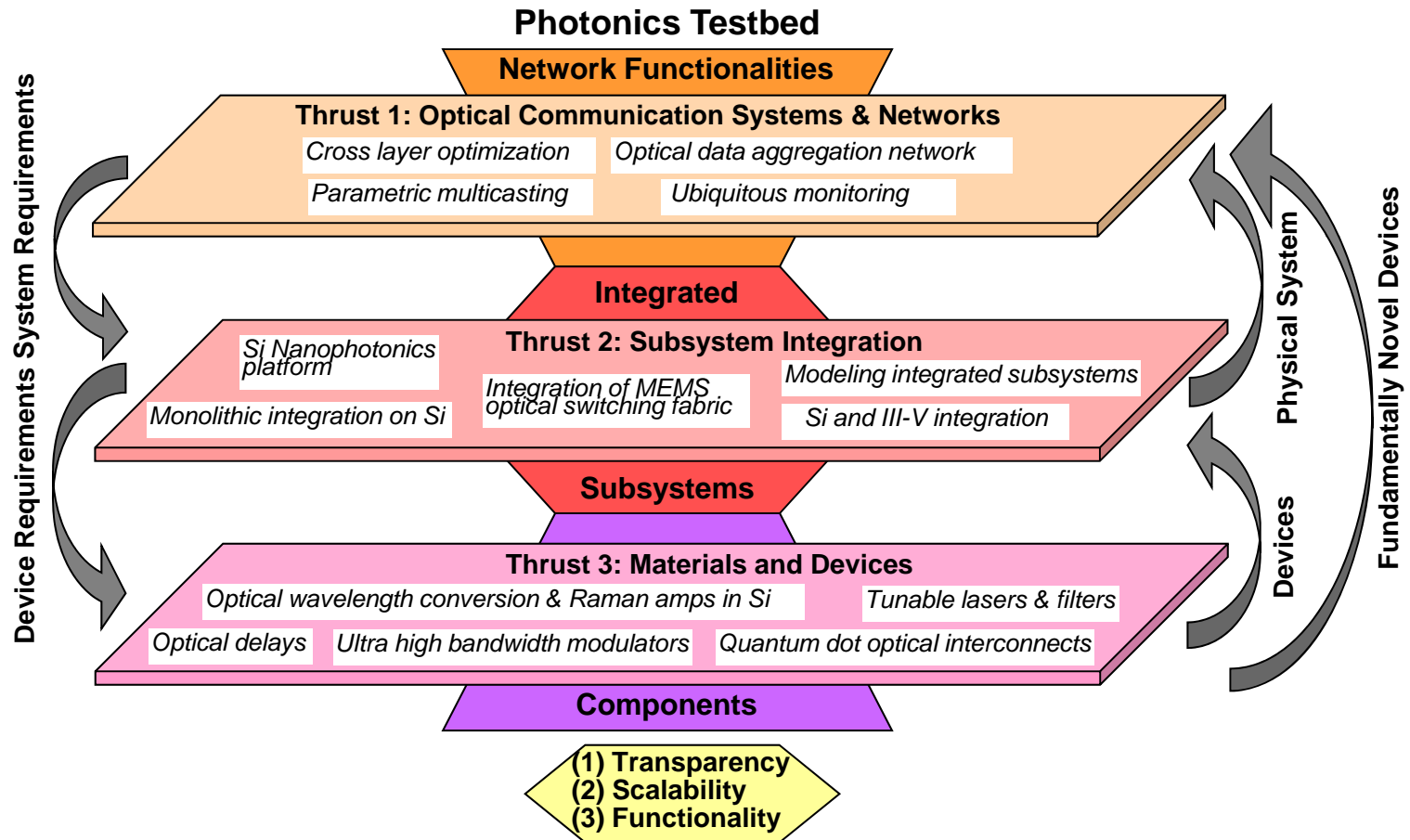
Three Primary “Thrusts”

- **Thrust 1: Optical Communication Systems and Networking**
 - E.g. Cross Layer Optimization, Data Centers, Wireless-Fiber Interface
- **Thrust 2: Subsystem Integration and Silicon Nanophotonics**
 - E.g. Monolithic integration of optics and electronics, wireless optics, nanophotonic circuits for integration with optoelectronic subsystems
- **Thrust 3: Materials and Devices**
 - E.g. Tunable VCSEL based sources, 100 GHz modulators, quantum information technologies



Strategic Research Plan

System-Driven top-down research

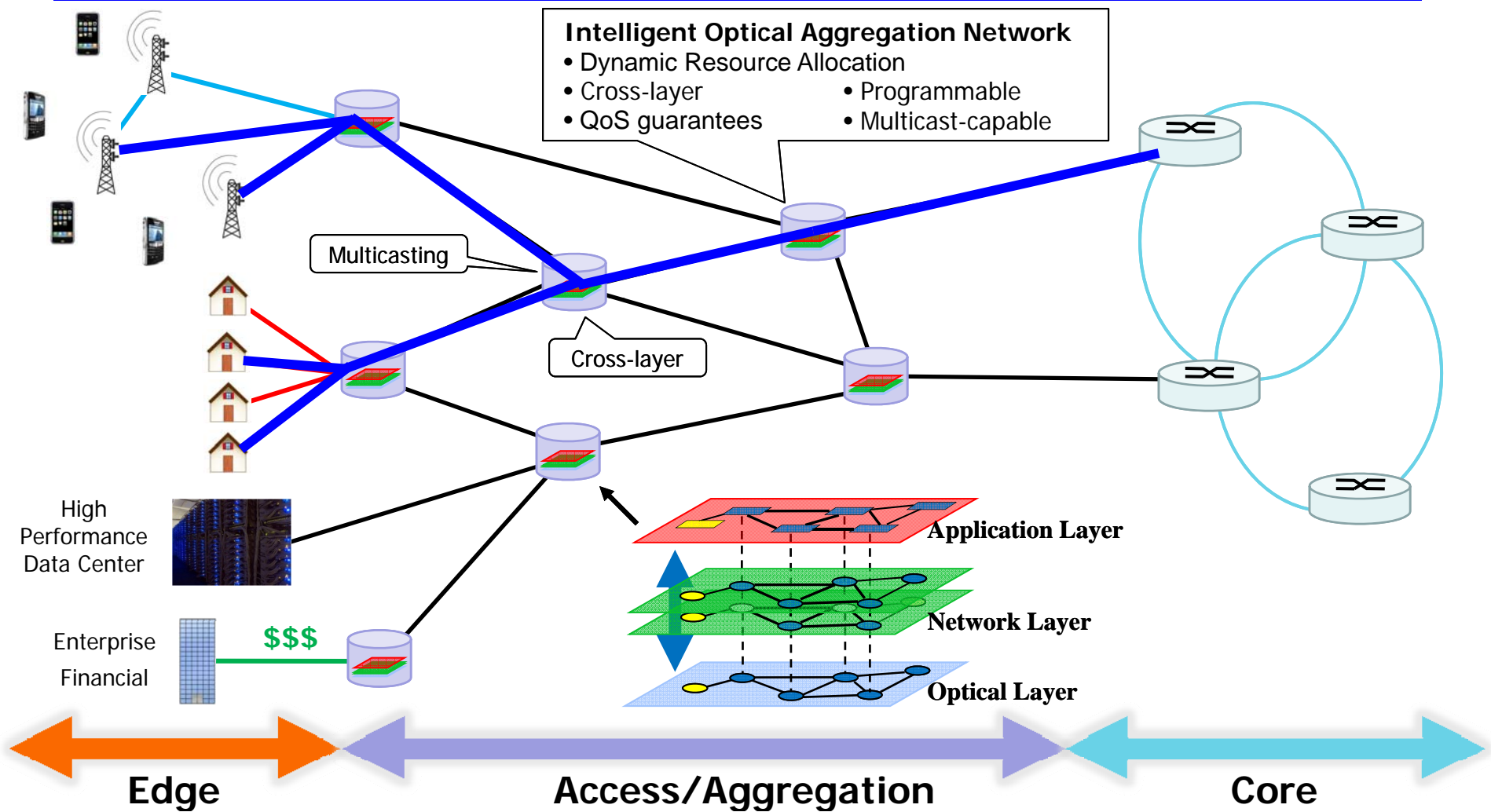


Working Groups – Filling in the Gaps

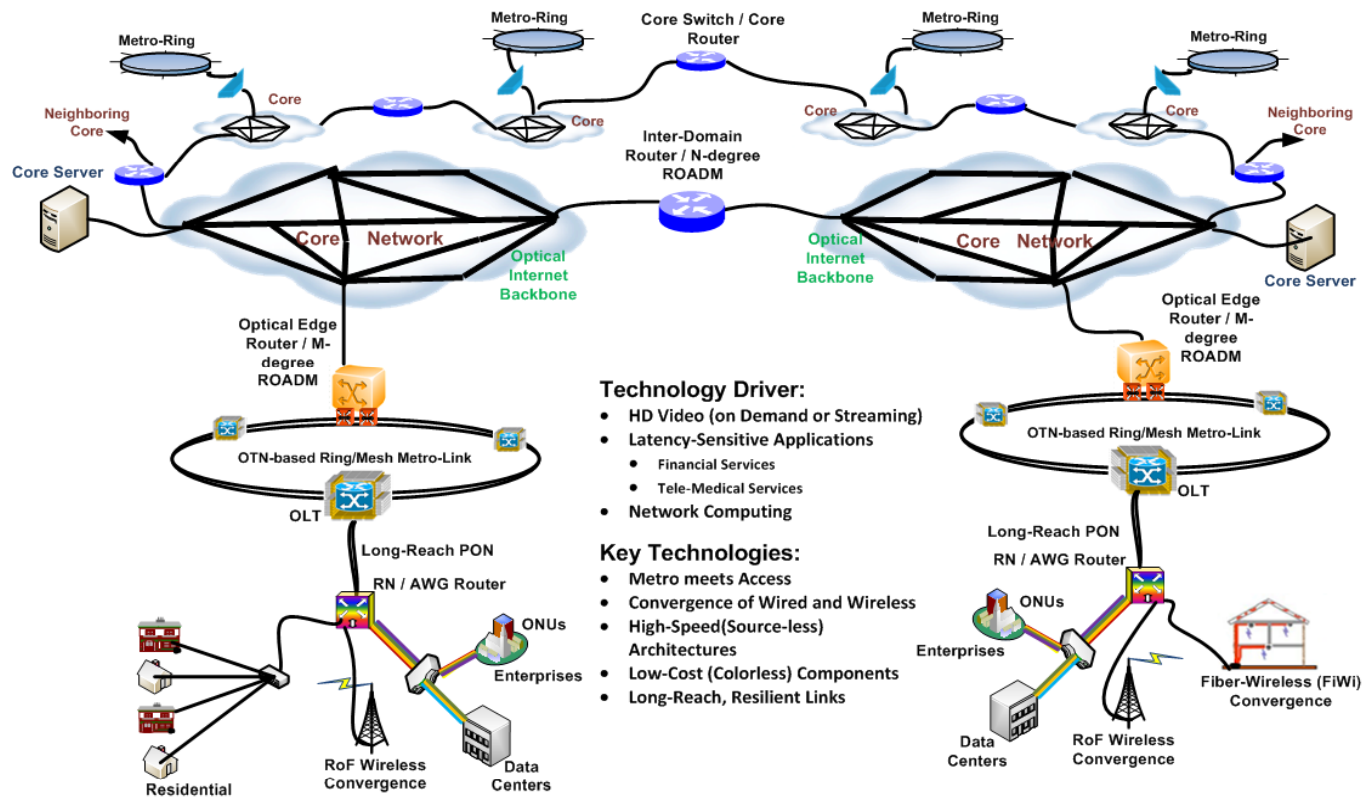
- Working Group 1: Cross-Layer Enabled Access/Aggregation Networks and Integrated Transport Platforms
- Working Group 2: Scalable and Energy Efficient Data Centers (SEED) project



WG 1A: Cross-Layer Enabled Access/Aggregation Network



WG 1B – Integrated Transport Platforms



- Develop a CIAN “Reference Model” of an horizontally and vertically integrated Access/Aggregation Network.
- Identify “bottle necks” and “problem areas” of current approaches and define high-impact CIAN research tasks.
- Focus on the horizontal integration access, aggregation, and core network domains including seamless network interfaces, network functionalities, signal conditioning, performance monitoring, etc., primarily within the physical layer
- In order to cover the vertical (cross-layer) dimension of all topics mentioned before WG III jointly works with WG I

WG2- Data Centers

- Goal: Generate system level drivers for research in Thrusts 2 and 3 based on datacenter requirements
- Issues Raised
 - Optical TX/RX is 80% of the cost of a scalable “standard solution”
 - Next gen datacenter can have >100k servers each with >40 Gb/s (> 4 petabit/s aggregate data rate)
 - These requirements change technology - trade space for data rate/energy
- Dominant Subsystem Device Driver
 - Low cost CMOS compatible array TX/RX technology (WDM on chip, high port count space arrays etc.)



Introduction to the Testbed



- **The Testbed** is to be the first research facility to target cross-disciplinary research on integrated access/aggregation networks spanning from fundamental devices to (sub-) systems to network functionalities.
- **The Testbed** will be a literal 'common ground' where all three CIAN research thrusts intersect, stimulating effective research collaborations among CIAN participants (including the Industrial Affiliates) and the wider research community.
- **The Testbed** acts as a physical and metaphoric center to CIAN efforts, supporting the multi-directional information flow essential to connect researchers across disciplines.



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UCSD, Co-Lead



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Keren Bergman
Columbia, Satellite



Partnering Universities



- University of Arizona
- University of Southern California
- California Institute of Technology
- Columbia University
- U.C. Berkeley
- U.C. Los Angeles
- U.C. San Diego
- Norfolk State University
- Tuskegee University

