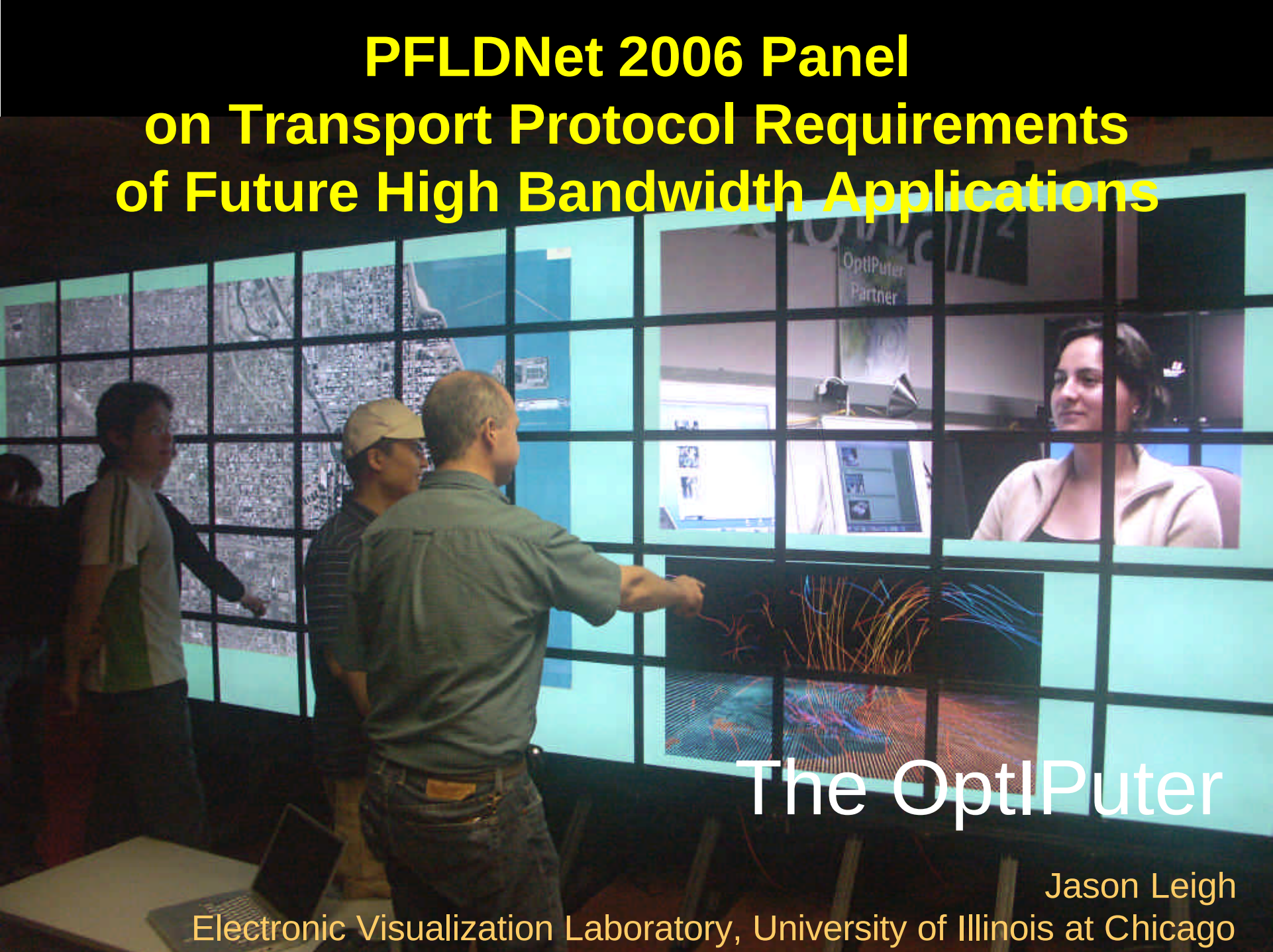
PFLDNet 2006 Panel on Transport Protocol Requirements of Future High Bandwidth Applications

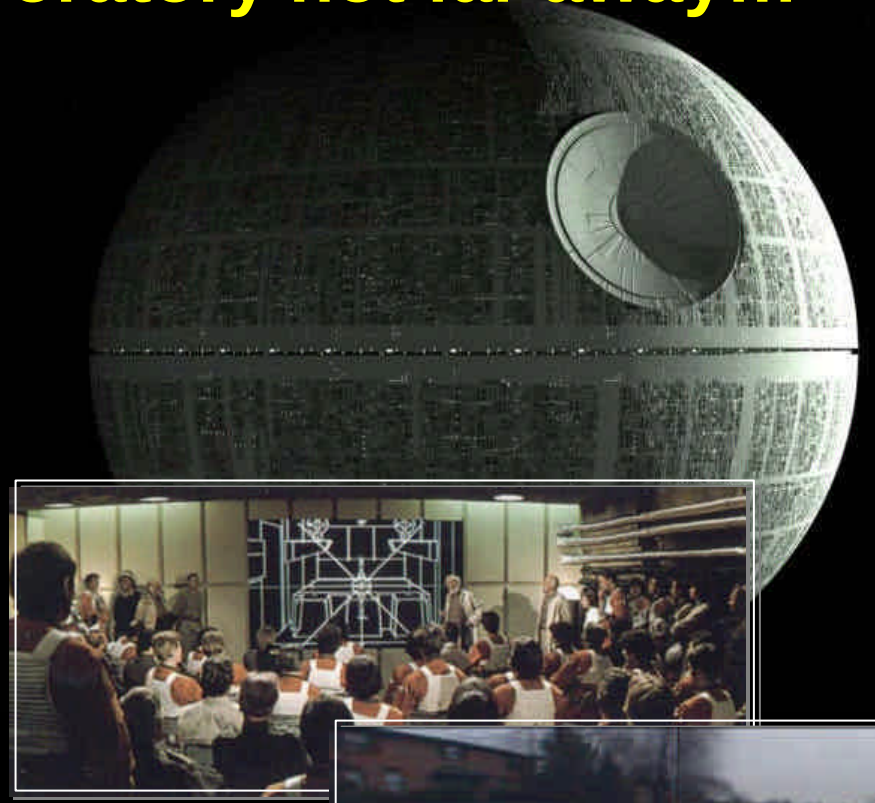


The OptIPuter

Jason Leigh
Electronic Visualization Laboratory, University of Illinois at Chicago

A long time ago in a laboratory not far away…

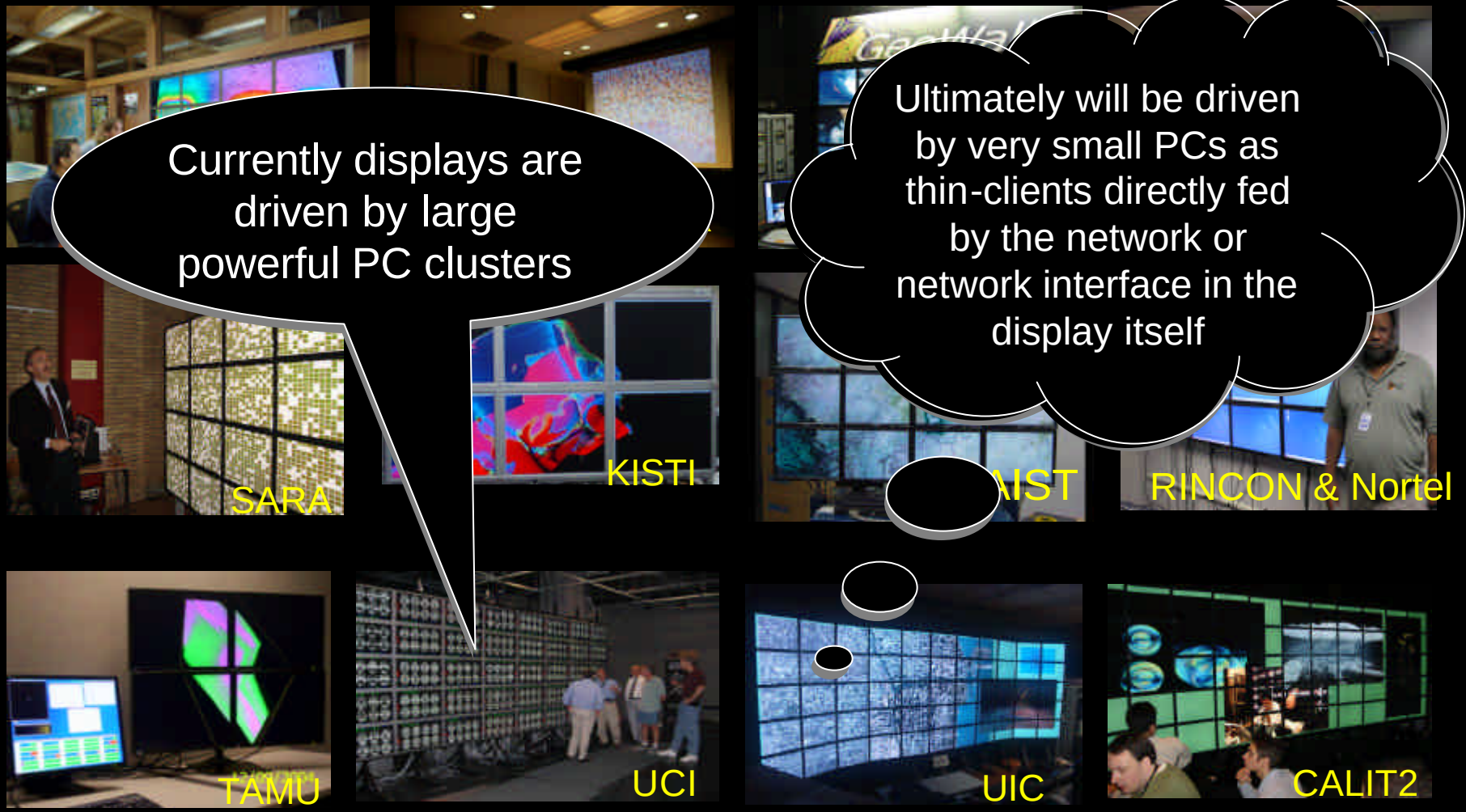
- Established in 1973
- 3 Co-directors: Tom DeFanti, Dan Sandin, Jason Leigh
- 10 full time staff
- 40 students, 30 funded students, 50% Art and CS
- Research in: advanced display systems, visualization, high speed networking, and collaboration & human computer interaction.
- 30 years of collaboration with artists and scientists to apply new computer science techniques to these disciplines.
- Funded mainly NSF, ONR, NIH, NTT, Microsoft.



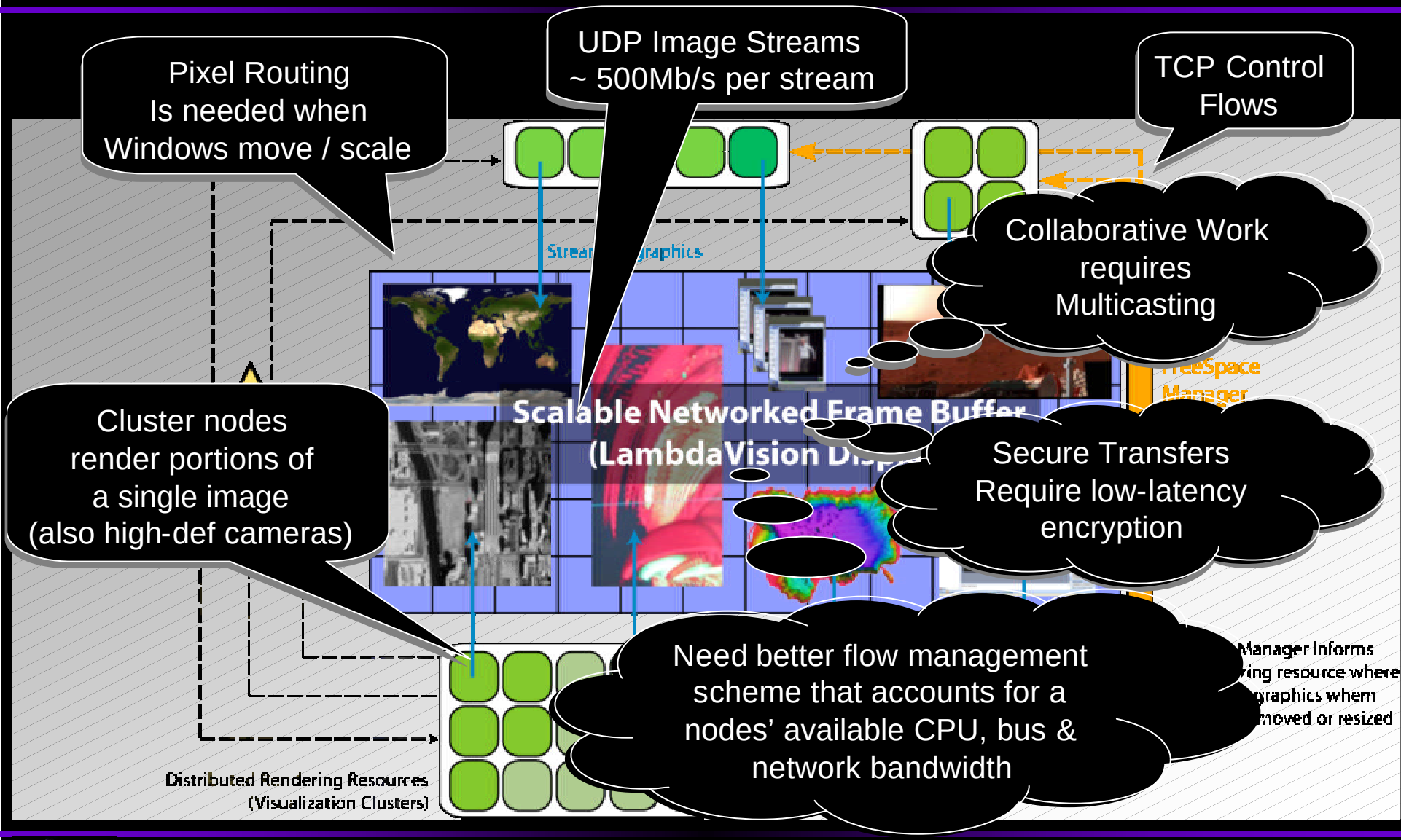
The OptIPuter

- The Optiputer is an NSF Information Technology Research project to examine a new model of computing whereby ultra high speed networks form the backplane of a, planetary scale computer.
- The projects partners include UCSD, UIC, NU, SDSU, TAMU, UCI, UIUC/NCSA, USC/ISI; affiliate partners are USGS EROS Data Center, UvA, NASA, SARA, KISTI, AIST, RINCON.
- OptIPuter research focuses on developing technology to enable the real time collaboration and visualization of very large time-varying volumetric data-sets for the earth sciences and the biosciences.
- We achieve this by building: A *virtual* computer from clusters of computers that act as giant storage/compute/visualization peripherals attached to a backplane that consists of ultra high speed deterministic networks.

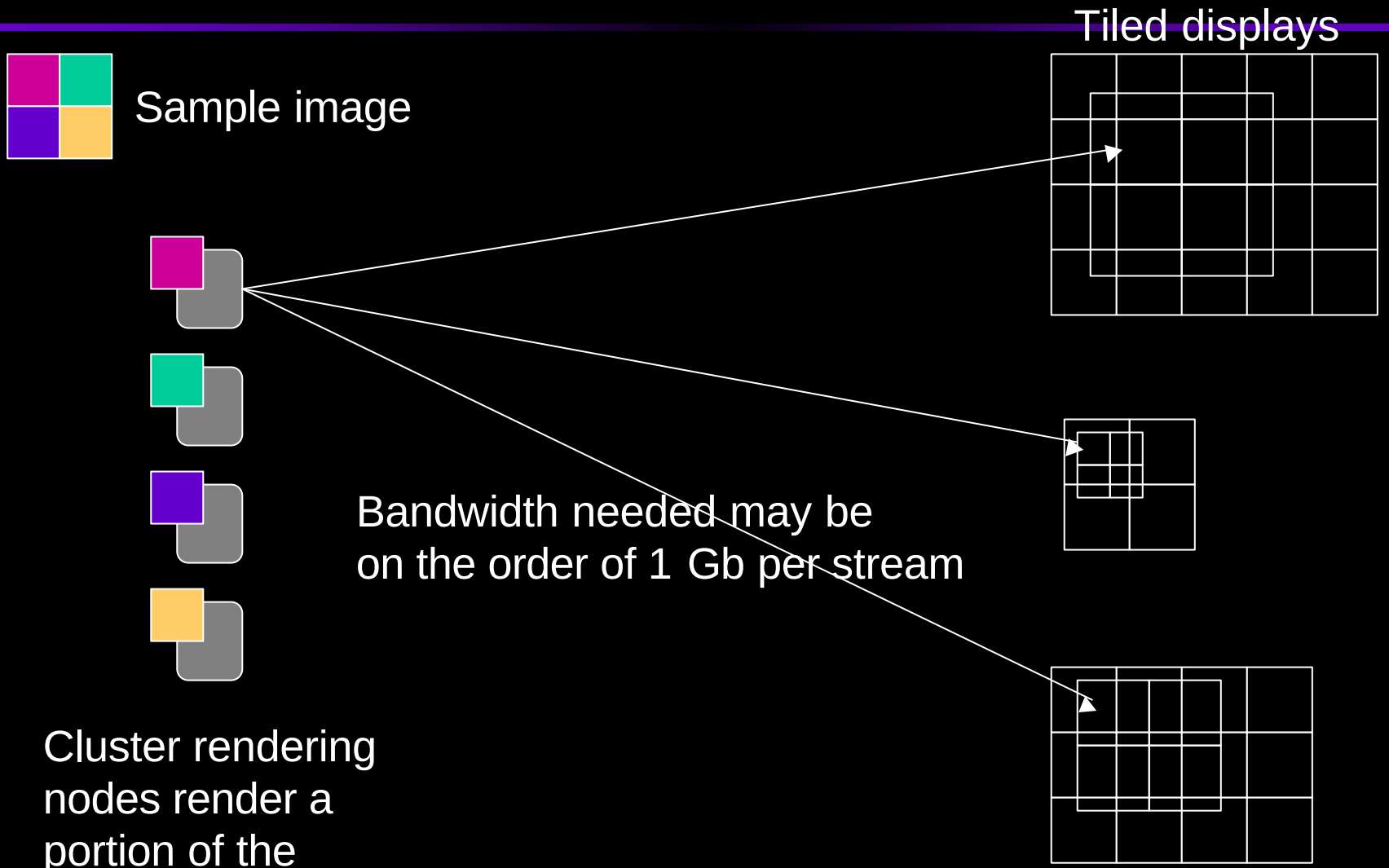
OptIPuter Scalable Display Appliances



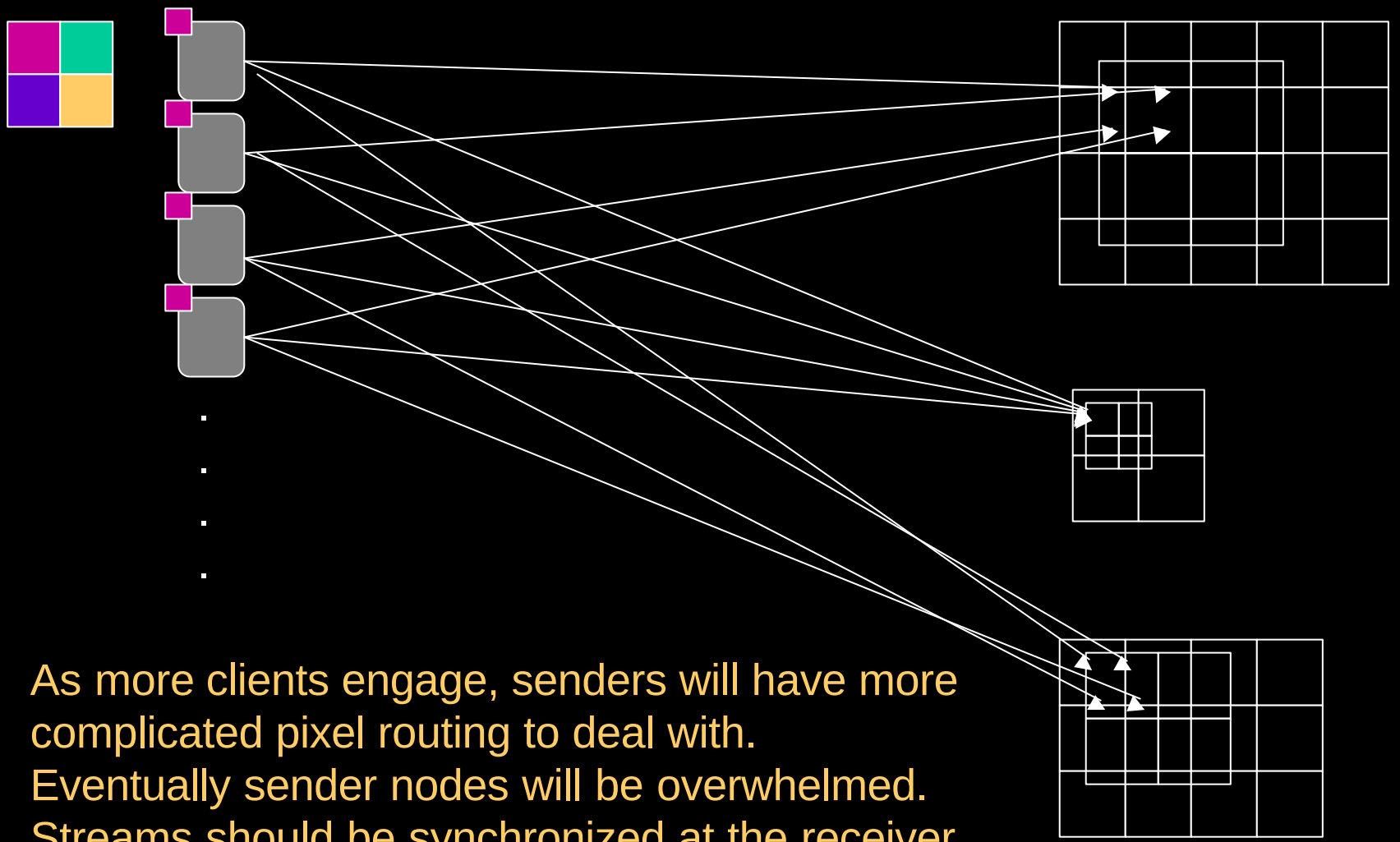
Scalable Adaptive Graphics Environment



The Multicasting Problem

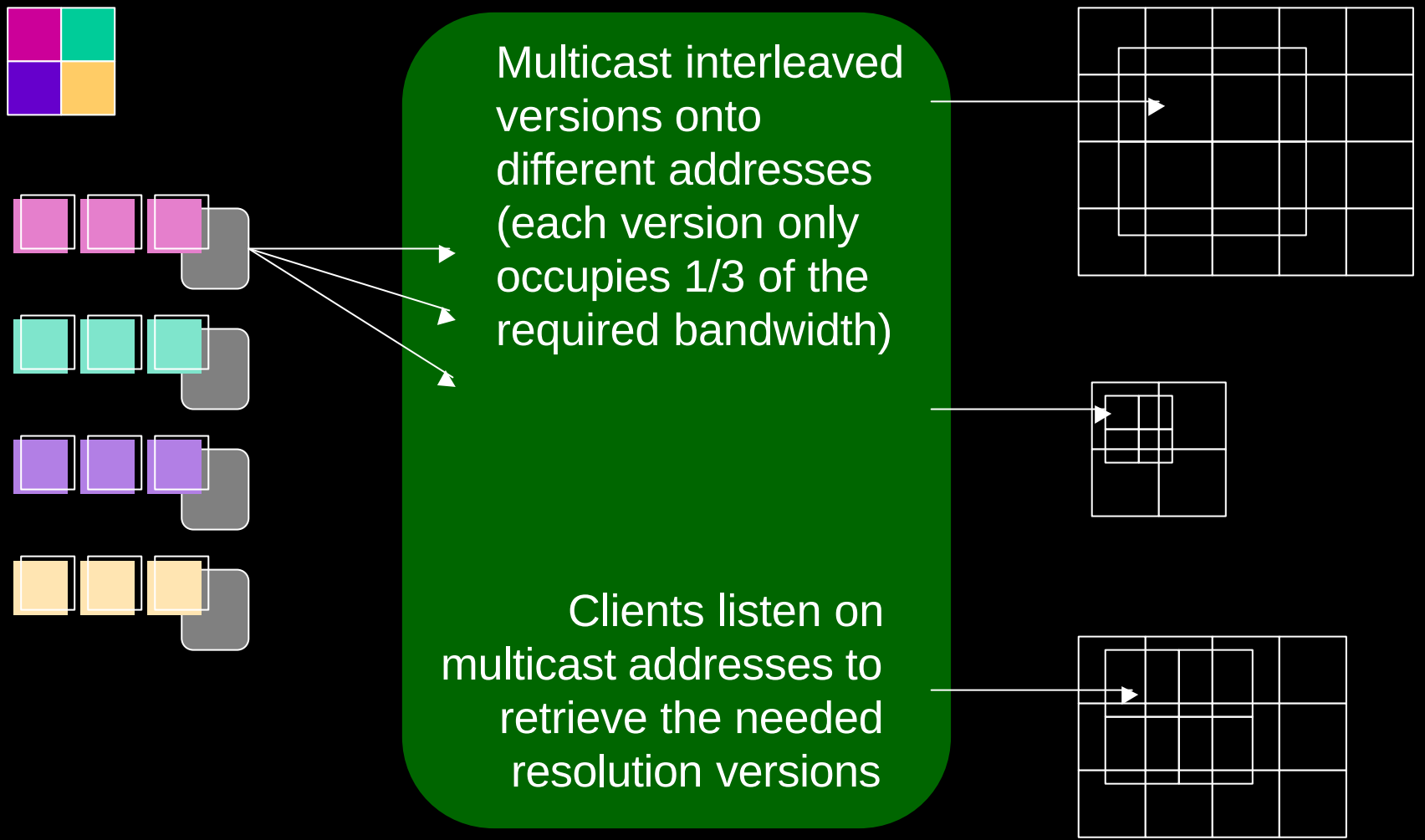


Broadcast Solution: Partition Image Into Smaller Pieces



1. As more clients engage, senders will have more complicated pixel routing to deal with.
2. Eventually sender nodes will be overwhelmed.
3. Streams should be synchronized at the receiver.

Layered Multicasting Solution



How to support IP multicast on the order of tens of Gb/s?