

# Network Protocols and Architectures

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# Research Areas

- Quantum Network
- Optical Networks
  - Switching
  - Controlling optical core
  - Packet-aware photonic networks
- Open Architecture to implement Sensor Networks
- Wireless Remote Access and Wireless Sensor Networks
- Protocols for streaming media
- High-Speed Data Transfer

# Research Areas

- Security
  - Architectures to view security environment
- Knowledge plane: network has self-knowledge, can answer questions like “what’s wrong”?
- MON on Planet Lab for querying network
- Detecting and mitigating flash crowds
- Computation resource discovery
- FPGA’s/ routing on FPGA’s

# Need from GENI

- Interfaces to real world from sensor systems
- What is the fundamental technology and how it will be allocated?
- Getting real measurements from all points of network
- Enough funding for management and planning in NSF
- How do we get real users into GENI, eg through wireless?
  - Use students
  - John: easy opt-in, quick opt-out
  - What percentage of endpoints will involve humans? For some class of apps, the sensors themselves can be the users.
  - Incentives, eg, secure email or free services
- Expect? Plan for? more intelligence into the GENI endpoints and networks

# Need from GENI

- GENI should provide enough performance
  - Need to be able to get own lambda, eg, delays from West Coast to Midwest prevent ultra-sciences application from working
  - GENI should not look at providing ultimate performance
  - Don't limit bandwidth - the appeal is that everything is flexible
  - Don't make assumptions on power of components
  - Need to support research for protocols to overcome these limitations

# Need from GENI

- Relationship to standardization -
  - Eventually has to interact with real people and Internet
- How do we get access to the GENI edge?
  - Security issues with hosting a PlanetLab node - won't have to host a GENI node to get access to GENI
  - eg How do I put high-bandwidth traffic - how do I get the pipe to GENI?
  - Limited number of GENI POPs - other research institutes will need to extend their own connectivity to get to those POPs - might be asked to host a new GENI POP
- Management and support for collaboration
  - Running one experiment over or in conjunction with another
  - Helpdesk support - when one experiment not working properly affects another
  - Collaboration is hard and requires supporting people as well as hardware

# Need from GENI

- Limitations of virtualization
  - Can get you beyond physical reality
  - But may defeat purpose of experiment - some experiments will require raw hardware
- Reproducibility