A few thoughts on next generation Internet R&D...

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EDUCAUSE Net@EDU
Tempe, Arizona – February 11, 2008
One view of GENI...

- GENI must happen!
  - Represents federal reengagement/reinvestment in strategic Internet R&D
  - Necessary step function in the evolution of the network research community
  - Can help this community refocus on innovation and international leadership

- What GENI has to do at a minimum
  1. Create a framework for development and deployment of new layer-3 protocol
     - Address known deficiencies of IPv4 ecosystem
  2. Enable virtualization (‘slices’) at all layers of the stack
  3. Support the full range of optical, wired, and wireless technologies
  4. Enable large, nimble interdisciplinary collaborations
  5. Incorporate computational science apps and technologies at start
     - Cloud computing, MPI, storage, visualization, ...

- GENI has made significant headway in the last year
  - NSF has outsourced most of GENI mgmt to GPO (BBN)
  - GPO views process as a nimble, competitive development effort (explicitly not a research program)
Terrain assessment

- **Opportunities**
  - Research facilitation role for U.S. RONs and NRNs
    - Diverse optical/fiber/control systems
      (Internet2 DCN)
    - Middleware
    - Catalyst for collaboration?
  - Rx for CIOs: take your network researchers to lunch...
    - Network slices (circuits & switches)
    - Colocation
    - Clusters
Network Slice proto-Capability: Internet2 DCN Support for LHC

Source: John Vollbrecht & Rick Summerhill, Internet2
Terrain assessment - II

- Caveats
  - GENI is not a networking project as many of us know it
    - Lots of software development (protoGENI, PlanetLab)
    - Clusters, wireless & optical technologies
  - GENI is not a sure thing
    - Stiff competition with other disciplines for MRE funding
    - Operational funding must come from discipline
    - Need for other federal, corporate, and international support
    - Needs a unified CS community
  - Sense of urgency?
    - Case study of IPv6 (China and U.S. DoD)
Emulab provides a rich system for managing experimentation in networks and distributed systems – across diverse hardware.

Source: Jay Lepreau & Rob Ricci, School of Computing, University of Utah
Gedanken play

Premise

What if we had to develop a next generation network system under crash conditions like the Manhattan Project?

Cast of characters

- Leó Szilárd.................................................Larry Peterson
- Albert Einstein...........................................Vint Cerf
- President Franklin Roosevelt..........Mike Huckabee
- General Leslie Groves.................................???
- Robert Oppenheimer.................................???
- Niels Bohr................................................???

Scenario

Catches

Interoperability & commercial uptake (domestic & int’l)