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Next Generation Internet Overview

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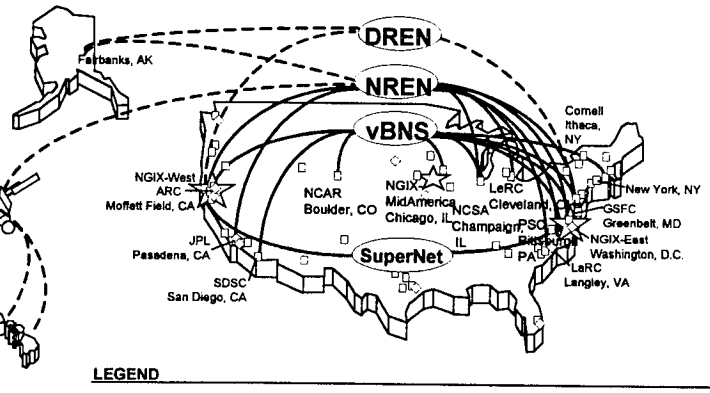
NGI Overview

Next Generation Internet Architecture

Goals:

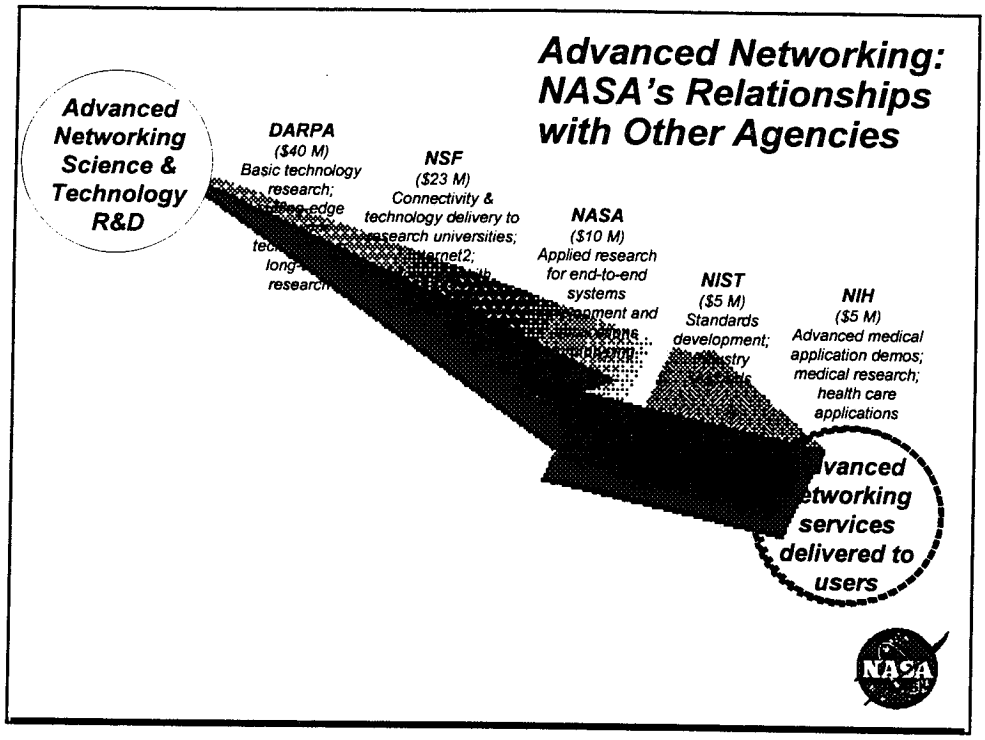
- Promote experimentation with the next generation of network technologies
- Develop a next generation network testbed to connect universities and federal research institutions at rates that are sufficient to demonstrate new technologies and support future research
- Demonstrate new applications that meet important national goals and missions



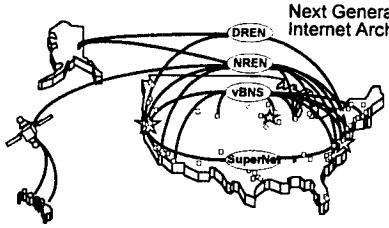
LEGEND

DREN - Defense Research & Engineering Network
NREN - NASA Research and Education Network
vBNS - Very High Speed Backbone Network Service (NSF)
NOTE: vBNS will support initial Internet 2 community
SuperNet - Terabit Research Network (DARPA)

◇ - NREN Application Partner
□ - vBNS Partner
☆ - Next Generation Internet Exchange



NGI/I2 Comparison

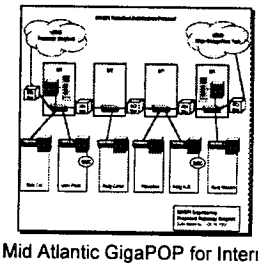


Next Generation Internet

- Federal funding
- Agency mission driven
- R&D in advanced networking technologies, and demonstrations on a wide-area scalable testbed which connects to academic (including some Internet 2 universities) and industry networks
- Develop general-purpose and agency-specific applications

Internet2

- Funded by research universities and communications and computing companies
- Education and research driven
- State-of-the-practice connectivity deployed at universities and GigaPOPs and interconnected using NSF's vBNS as the backbone
- Deploy networking technologies and develop a wide range of applications (many funded by Federal initiatives such as NGI)



Mid Atlantic GigaPOP for Internet2

Capability

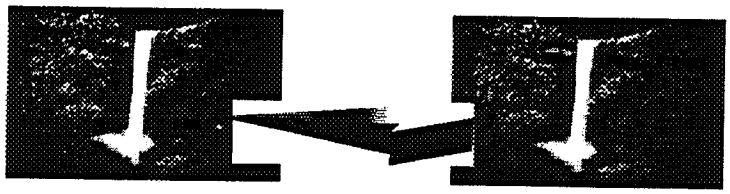
Today

- "Best Effort"
- Unicast (point-to-point networking)
- Lots of human intervention required to manage
- Security handled by host
- Router-to-router performance monitoring

Tomorrow

- Differentiated services
- Intelligent network (scalability)
- End-to-end performance management policies and tools
- Security as part of the network
- End-to-end performance measurement
- Qualities of service
- Multicast
- End-to-end service guarantees

Capacity



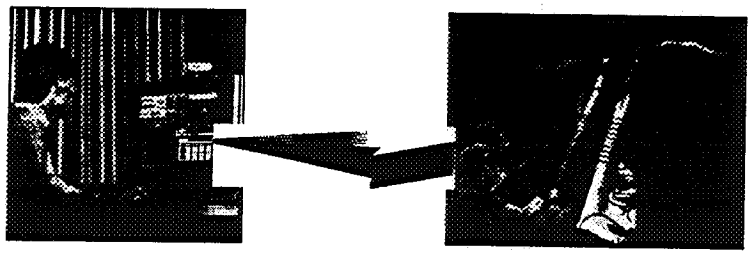
Today

- Internet exchange points are bottlenecks
- Newer applications don't have enough bandwidth
- Available bandwidth is poorly utilized
- Duplicate traffic slows growth of advanced applications

Tomorrow

- Robust internetworking exchanges move the traffic
- New technologies provide wide-open bandwidth
- Networks are unclogged by high-speed applications running over high-speed networks
- Multicast reduces traffic exponentially

Revolutionary Applications



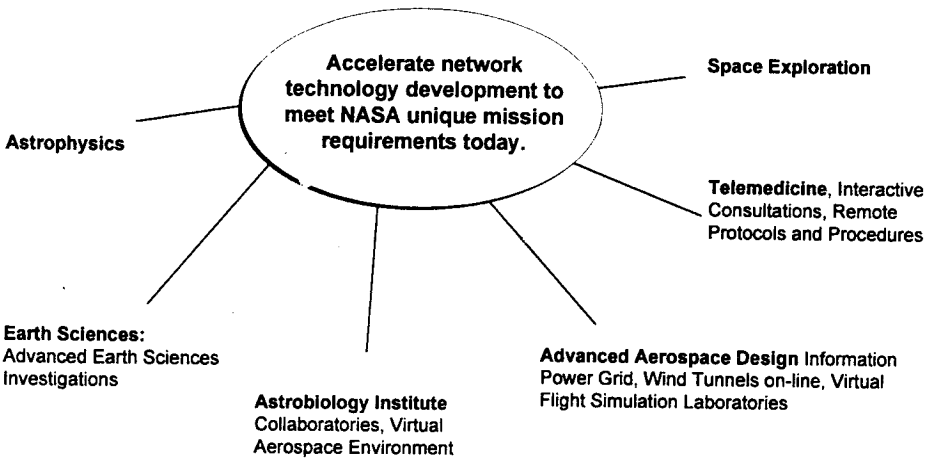
Today

- **Electronic mail**
- **File transfer**
- **World Wide Web**
- **Remote login**
- **Travel to meetings**
- **Isolated design systems**

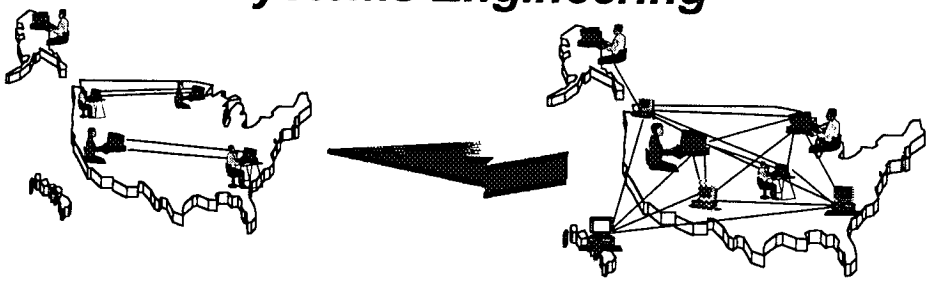
Tomorrow

- **Collaboratories**
- **Metacomputing**
- **Distance learning**
- **Telemedicine**
- **Integrated design systems**
- **Remote operation**

NASA Mission Application Partners



Systems Engineering



Today

- Isolated research
- Many autonomous systems with different architectures and policies
- Uncoordinated, duplicate technology development efforts

Tomorrow

- Collaborative research
- True end-to-end systems technology integration across heterogeneous networks
- Partnerships allow collaboration on large-scale testbeds
- Technology scalable across wide area networks

More Information

- *National Coordination Office for Computing, Information and Communications*
  - http://www.ccic.gov/
- *Internet 2 (university consortium)*
  - http://www.internet2.edu
- *NASA Research and Education Network*
  - http://www.nren.nasa.gov
- *DOE*
  - http://www.es.net
- *DARPA*
  - http://www.ito.darpa.mil/ResearchAreas.html
- *NSF's Connections*
  - http://www.vbns.net

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http://www.ngi.gov