Are Grid Standards Suitable for P2P?

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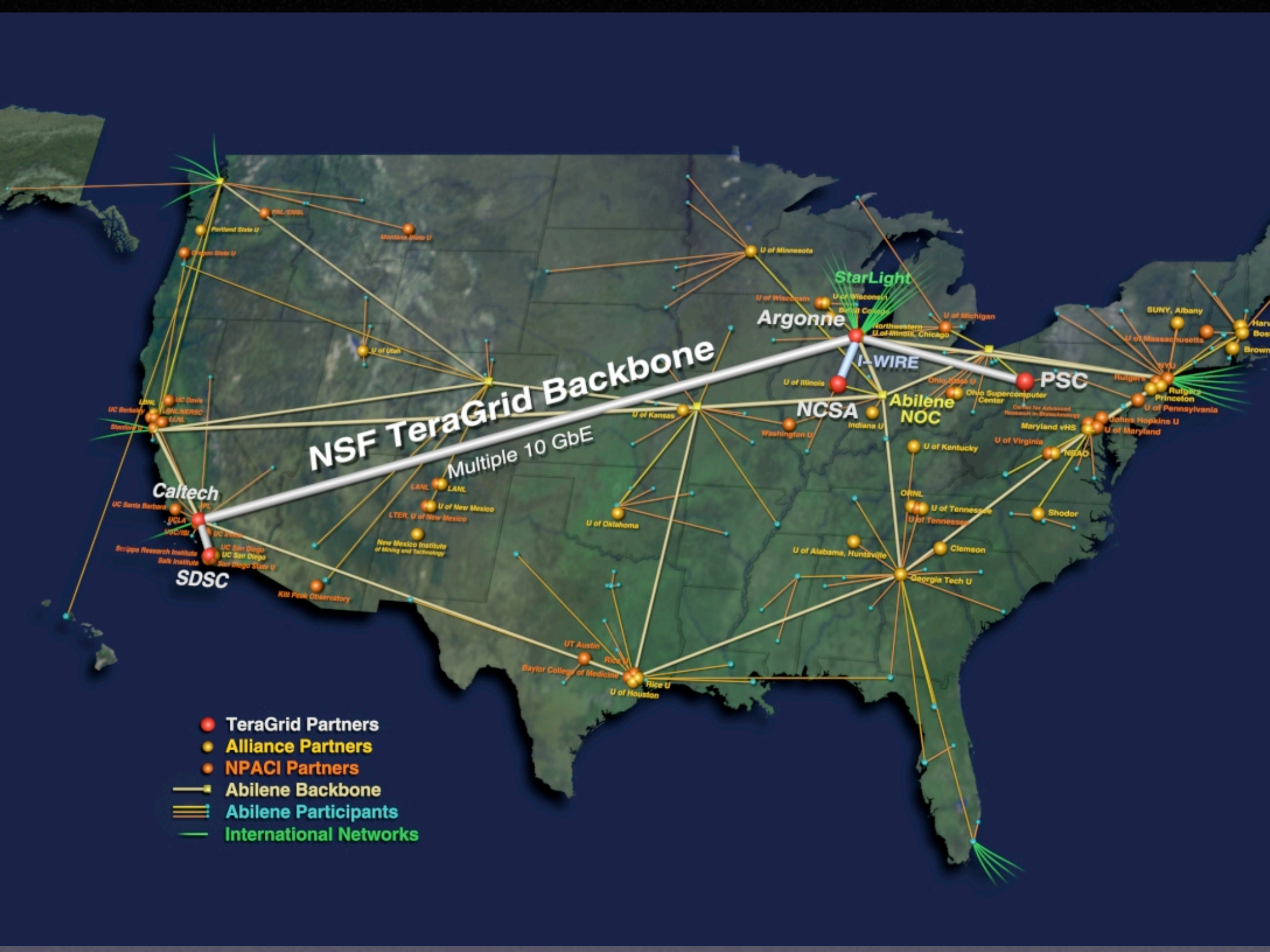

NSF TeraGrid Backbone
Multiple 10 GbE
StarLight
Argonne
I-WIRE
PSC
NCSA
Abilene NOC
Caltech
SDSC
TeraGrid Partners
Alliance Partners
NPACI Partners
Abilene Backbone
Abilene Participants
International Networks

NPACI Grid

- Blue Horizon (sdsc)
  - 1152 IBM Power3 processors (8 procs/ node, 4GB/node)
  - 15 TB parallel GPFS file system
- Rocks Clusters (sdsc)
  - Redhat Linux-based
- HPSS Archival Storage (sdsc)
- 500 Terabyte SAN (sdsc)
- 64 cpu IBM Power4 cluster (utexas)
- 64 cpu IBM Power2-based SP (umich)
- 24 cpu IBM Power3-based SP (umich)
- 134 cpu & 256 cpu AMD Linux Cluster

NPACI Partner Sites:
Caltech
University of Texas at Austin
University of Michigan
UC Berkeley
UC Santa Barbara
University of Southern California
University of Virginia

NPACI Application Thrusts:
Molecular Science
Neuroscience
Earth Systems Science
Engineering

NPACI Alpha Projects
Monte Carlo Cellular Microphysiology
Protien Folding
Bioinformatics Infrastructure
Scalable Visualization Toolkits
Advanced Tomography
Multi-Component Models
Adaptive Computations for Fluids

GeonGrid

- Provide Data Federation
  - Ontologies and data semantics
  - Data Mediation
  - Data Replication & Caching
- Decentralized Resources (mainly data)
- Best-effort guarantees

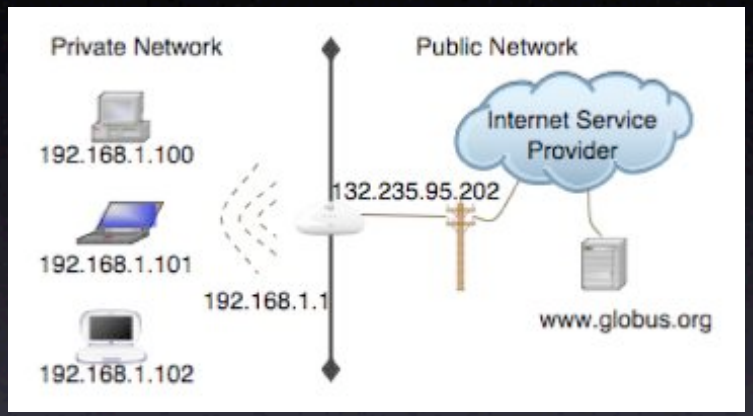
Geon Institutions:
San Diego Supercomputer Center
Penn State University
Geological Survey of Canada
San Diego State University
Arizona State University
Rice University
University of Arizona
University of Idaho
University of Missouri
University of Texas, El Paso
Univeristy of Utah
Virginia Tech
UNAVCO Inc.
DLESE
US Geological Survey
ESRI Inc.
Lawrence Livermore National Laboratory

P2P Requirements

- Connectivity
- Security
- Resource Variability
- Locality and Interactivity

Connectivity

- Support for NATs
  - no use of ipsec (checksums include headers)
  - Service Endpoint Rewrites
  - Proxy forwarding (push vs. pull mechanisms)
  - NAT identification
  - UPnP or IETF middlebox solutions?
- Support for Laptops (and other devices) as service endpoints
  - DHCP is here to stay (as are NATs)
  - Determine network characteristics (802.11 vs. cell vs. bluetooth)



Security

- Support richer trust models
  - Community-based trust (reputation models)
  - different trust domains (condor universes?)
- decentralized identity establishment
  - multi-CA management
- Support authorized, but anonymous
- Roll-based authorization
- Data Security/Trust

Resource Variability

- Even Servers crash!
  - Decentralized infrastructure services
  - Dynamic enter/exit
- Networks also crash
  - auto-reconfiguration, best effort
- Data quality and corruption

Locality/Interactivity

- Query Absolute and Relative Geographic Location
- Query Absolute and Relative Network Location
- Group Creation and Management
- Presence & Notifications

Can One Build P2P Apps on the Grid?

- Answer is ... yes, i think so.
- But, the infrastructure doesn't help to do so.
- Is this important? ... yes!
  - grids are looking more and more like P2P