Computing Facilities Breakout

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5 Year Technology Baseline Assumption

- Individual PI Resources
  - 100 GF compute, 10 TB disk
  - 1-10 GigE connection to local computing infrastructure
- Center Resources
  - 100 TF- 1 PF compute, 10-50-100's PB disk
  - 100 Gbps- 1 Tbps WAN interconnect

Issues

- Connectivity Model
  - Who is connected at what speeds and why?
  - What are the principles we should employ?
- Technology Model
  - What technology base do we build on?
  - How are new networking technologies injected into the environment?
- Business Model
  - Do we contract with a vendor for services?
  - Do we build a private network?
- Governance Model
  - Who manages the process and how are decisions made?

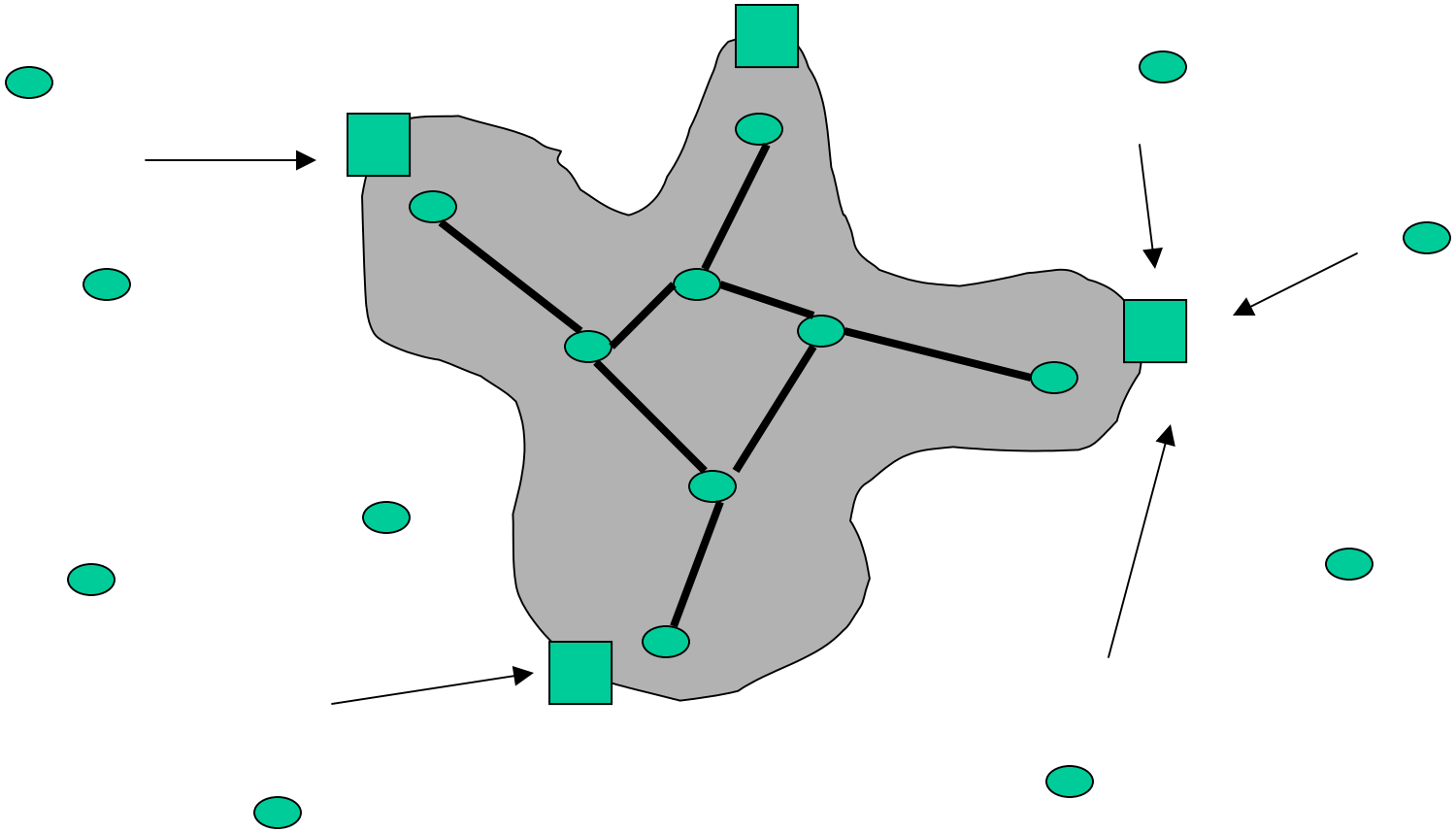
Three Scenarios Discussed

- Scenario A
  - High-speed backplane connecting few sites
  - Gateway access to edges of the backplane connected resources
- Scenario B
  - Business as usual with a backbone and multiple speed connections to sites based on $$ or needs
  - Evolution of current ESnet model
- Scenario A+B
  - Some combo of above

Network Services will be Needed

- Our discussions implied significant progress in common adoption of advanced network services including for example:
  - Security
  - Grid Middleware
  - Resource Management

Model A (Amoeba Backplane)



Scenario A: The National Backplane

- A few “supersites” connected via a very high bandwidth backplane and a way for people who can connect to it in an “industry standard” way.
- Assumes anyone who may need to access the resources within the Amoeba can get access through another network to an access gateway
- Relies on Scenario B existing and being robust.
- Not clear this is IP based. It is IP or something better. This is different than the standard internet.

Features of Model A

- Tight coupling of core facilities
  - Compute, data, etc.
- Well defined security perimeter and common services perimeter
- Enables core facilities to be co-allocated and co-managed as a systemic resource
- Common goal, with well defined mission
  - Multiple Virtual Organizations with

Amoeba Principles

- Make, as well as possible, all the points equal within the core amoeba – peer points should be about equivalent. Risk is that people may try to connect "cheaply" and therefore default to Scenario B. Equality means at least the following:
  - Bandwidth is the same (backplane)
  - Common security model and perimeter
  - Grid services deployment

Amoeba Principles Part II

- All Amoebas are not created equal
  - There may be differences in characteristics based on the scientific need
- Amoebas are production networks
  - but there is a range of production expectations
- Access Gateways to the amoeba have to be defined and work well.
  - A set of tools is created/incorporated (they may be standard) to allow easy and robust access through the gateway
- Amoebas can include a non-DOE sites – or high speed access thru the gateways
- Amoebas may overlap at one or more sites/resources – but only thru gateways

Potential New Capabilities Enabled

- Real time mirroring of data bases
  - e.g. Proteomic Databases would be 2-10-100 TB databases
  - Off-site replication/caching of an entire archive
- Real time supercomputing and instrument computation and on demand analysis
  - e.g. Fusion and ARM
- Computational Science
  - Lattice QCD (distributed QCD machine would be an Amoeba)
  - Earth systems grid scaled to earth simulator size
- A DOE wide global file space that is high speed access to systems (80-90% of the speed of a file system on a particular machine)