

RED DNET

Data Logistics for Wide-Area Collaboration

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Infrastructure for Data Intensive Collaboration

- **REDDnet:** Research and Education Data Depot Network

- NSF funded 

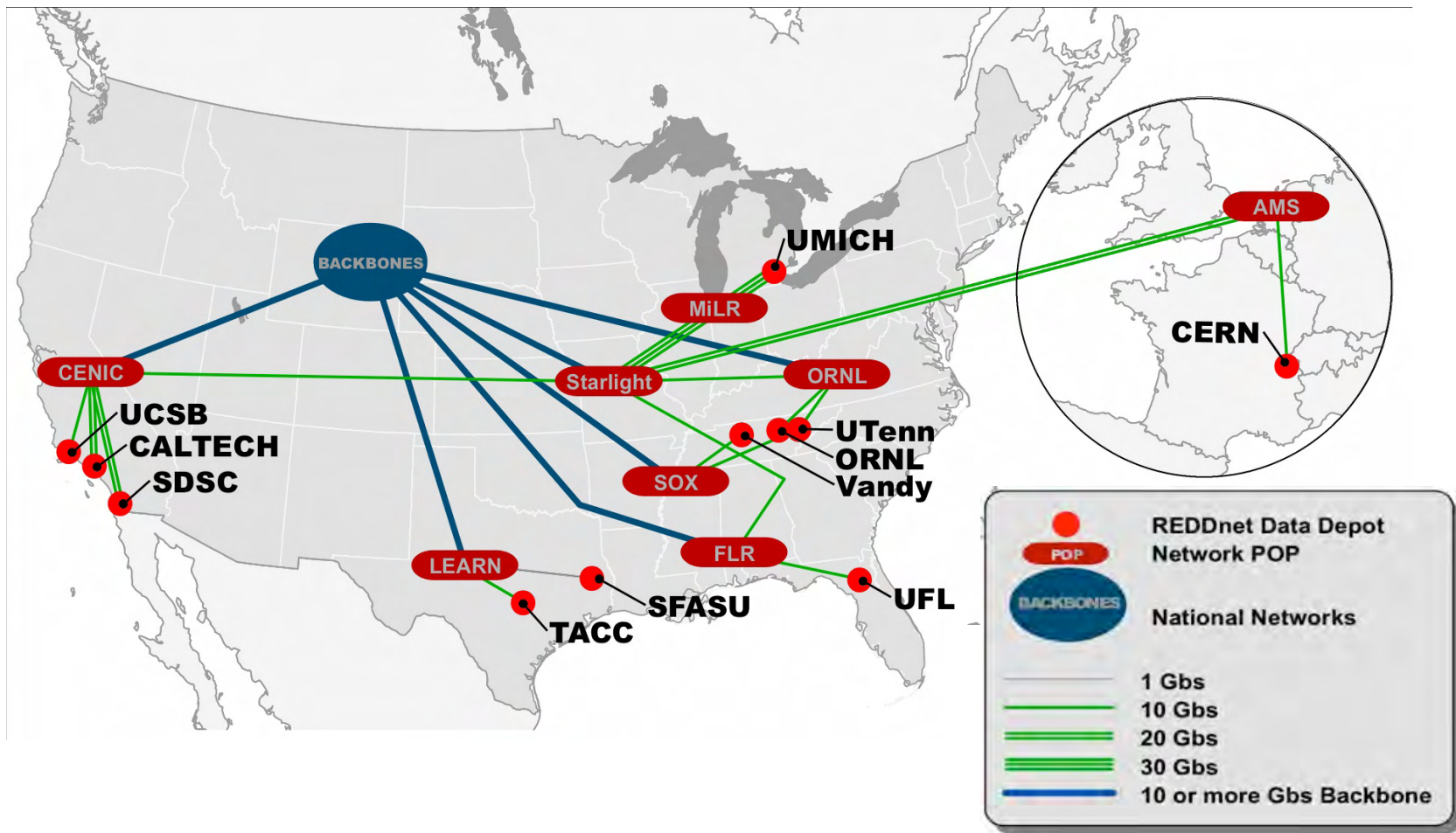
- “Working storage” to help manage the logistics of **sharing, moving and staging** large datasets **across wide areas** and **distributed collaborations**.

- **Institutions:** Vanderbilt, Tennessee, Stephen F. Austin, Oak Ridge, NC State, Nevoa Networks, Delaware



- **Host Sites:** Caltech, CERN, Florida, Michigan, SDSC, TACC, UCSB, ORNL, SFASU, UTK, VU. *Soon: Texas Tech, Stanford, NCSA, Florida Intl.*

REDDnet Depot Map



REDDnet Faces



New Discoveries... And New Headaches

- **Data Intensive Science** offers rich, new discoveries...
- Researchers need to develop a **strategy for data logistics: *management of time-related positioning & movement of data***
- Often collaborators are strongly interested in a data set for a brief period – a month or so – shifting to a new set after.
- Stage very large data sets (100 TB or more) where they need it when they need it – distributed researchers & resources!
- move it and share it in a fault tolerant, automated, policy-driven way (maybe with access controls)
- Continuous xfers: must be robust against network issues

Core Elements: Logistical Networking

- **Logistical Networking (UTK)** storage technology
- Virtualize storage resources: no technology or vendor lock in
- Generic – not application specific – only support widely used features
- Provide for: caching, pre-staging, replication, distribution, temporary (“working”) storage
- Multiserver striping and transfer – transfer performance
- Multiple replicas – fault tolerance and transfer performance
- Designed for scalability (generic low level software,...)

Core Elements: Network

- We have to continuously monitor network connections
 - Asymmetric routes, misconfigured local switches,...
- Networks atrophy with time! Must remain vigilant!
- perfSONAR has been incredibly useful! ➔
(Portion of our mesh)
- Integrated **Phoebus**: improves performance!

| | Vanderbilt University BWCTL (Nashville TN, USA) | University of Tennessee BWCTL (Knoxville TN, USA) | University of Michigan BWCTL (Ann Arbor MI, USA) |
|---|---|---|--|
| Vanderbilt University BWCTL (Nashville TN, USA) | | 57.79 Mbps / 2009-12-03 19:03:19UTC | 1000 Mbps / 2009-12-03 19:03:19UTC |
| University of Tennessee BWCTL (Knoxville TN, USA) | 7000 Mbps / 2009-12-03 20:53:43UTC | | 79.07 Mbps / 2009-12-03 20:53:43UTC |
| University of Michigan BWCTL (Ann Arbor MI, USA) | 1000 Mbps / 2009-12-03 20:53:43UTC | 36.32 Mbps / 2009-12-03 20:53:43UTC | |

Example: CMS Tier 3 Analysis

- **CMS currently has a “data-tethered” analysis model.** A copy of the data must be local to the computing used.
- **Use REDDnet to break the tether,** transparent to users.
- Upload data using **standard CMS data movement tools** (PhEDEx and gridFTP)
- Special gridFTP backend that **uploads into REDDnet**
- **Data then replicated** to depots to make sure **copies are near users** and CPU resources they can use (local, OSG, ...)
- Plug-in for **CMS Software – reads directly** from REDDnet...

Concluding Remarks

- **Sample other applications using or planning use:**
 - **Vanderbilt TV News Archive:** worlds largest archive of US network news broadcasts
 - **AmericaView:** USGS sponsored, promoting remote sensing technology through education, research, and technology transfer.
 - **Large Synoptic Survey Telescope:** large, data-intensive international astronomy project in planning/development stage
 - **Temporal Dynamics of Learning Center:** one of six NSF Science of Learning Centers, international project. Working with iRODS team at RENCi to integrate iRODS policy-management.

- **DLT: data logistics toolkit** – coming soon... a “bootable” distribution of our core tools to allow others to build their own “REDDnets” — or to join ours.