



LHC Computing Grid Project – LCG

LCG Project Status

C-RRB – 18 October 2005

Les Robertson – LCG Project Leader

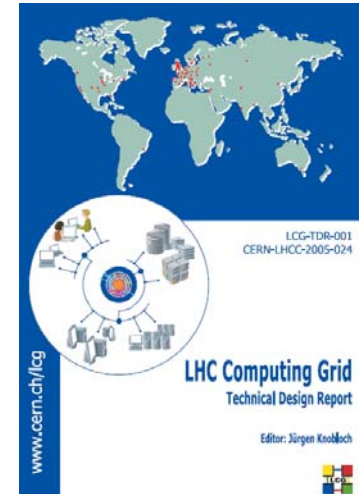




Planning for Phase 2

service commissioning → initial operation - 2006-08

- Technical Design Report - 20 June 2005
 - Review of the LCG and experiment Computing TDRs took place on 7-8 October
- Phase 2 planning
 - Phase 2 Service challenge schedule
 - Applications Area plan
 - Service Challenge 4 (March-September 2006) plan being elaborated
 - CERN fabric
 - acquisition plan completed
 - CASTOR 2 testing & migration plan
 - Detailed plan for next 18 months → service commissioned
 - Regional centre milestones
 - Service level metrics
 - DAQ - Tier-0 - Tier-1 testing
 - for completion by end of year



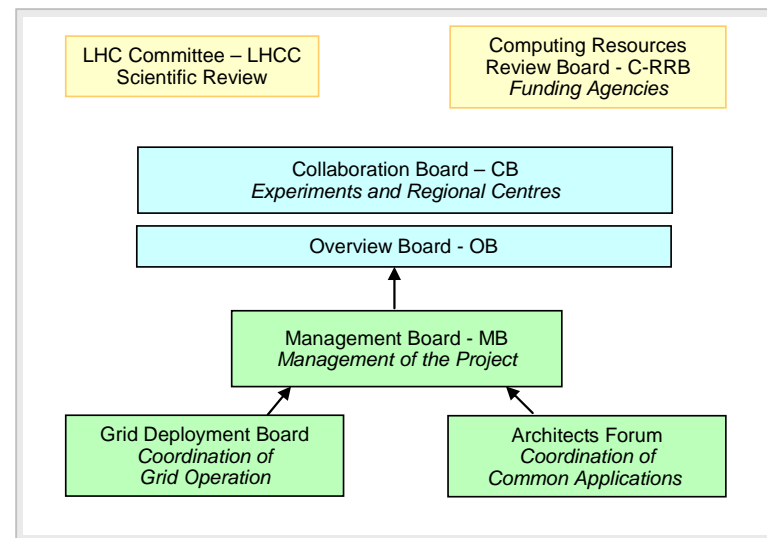


Migration to Phase 2 Management Structure

- **New → Collaboration Board**
 - Experiments plus one representative from each Tier-1 and each Tier-2 federation
- **PEB → Management Board**
 - Expanded to includes Tier-1 management

Evolution timescale

- **MB**
 - First meeting on 31 October 2005
- **CB**
 - January/February 2006 - first meeting of the CB





> 100K of today's fastest processors

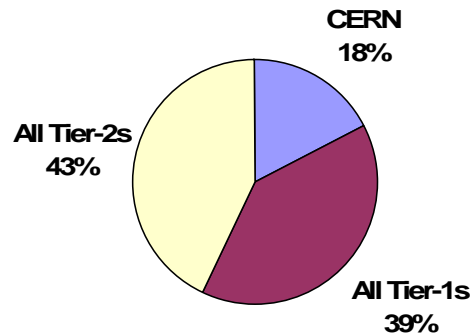
Summary of Computing Resource Requirements

All experiments - 2008

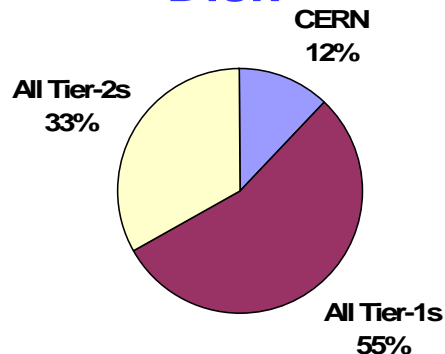
From LCG TDR - June 2005

	<i>CERN</i>	<i>All Tier-1s</i>	<i>All Tier-2s</i>	<i>Total</i>
CPU (MSPECint2000s)	25	56	61	142
Disk (PetaBytes)	7	31	19	57
Tape (PetaBytes)	18	35	0	53

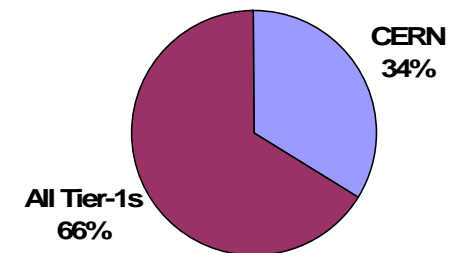
CPU



Disk

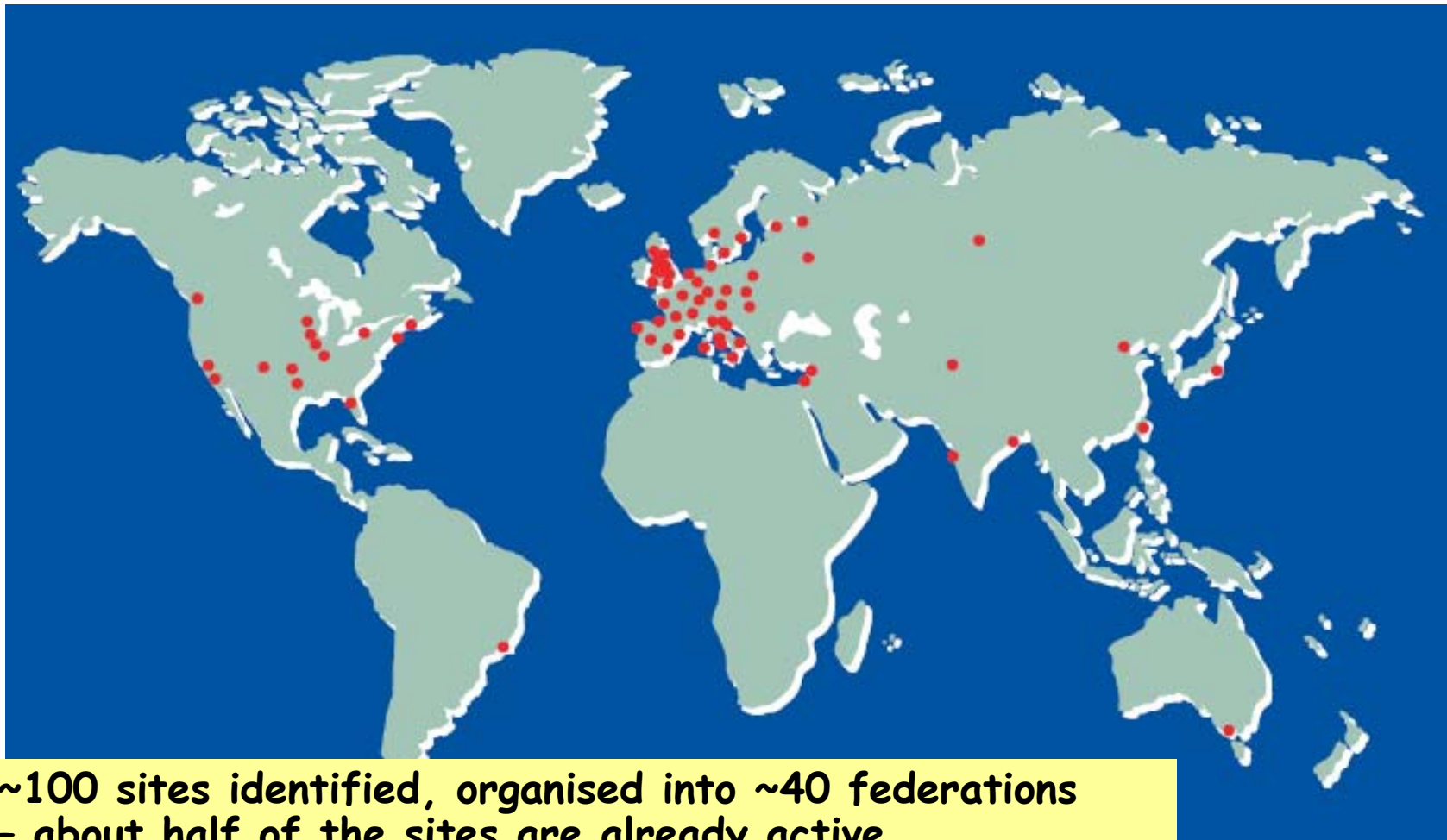


Tape





Tier-2s



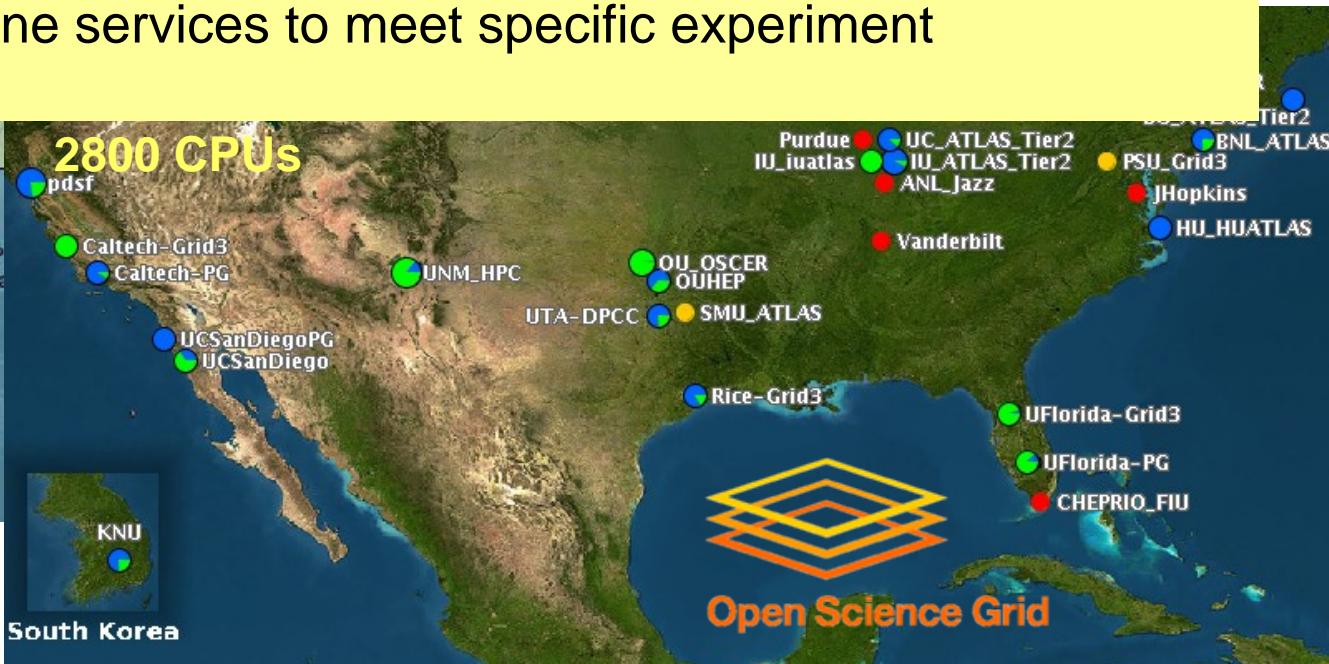
**~100 sites identified, organised into ~40 federations
- about half of the sites are already active**



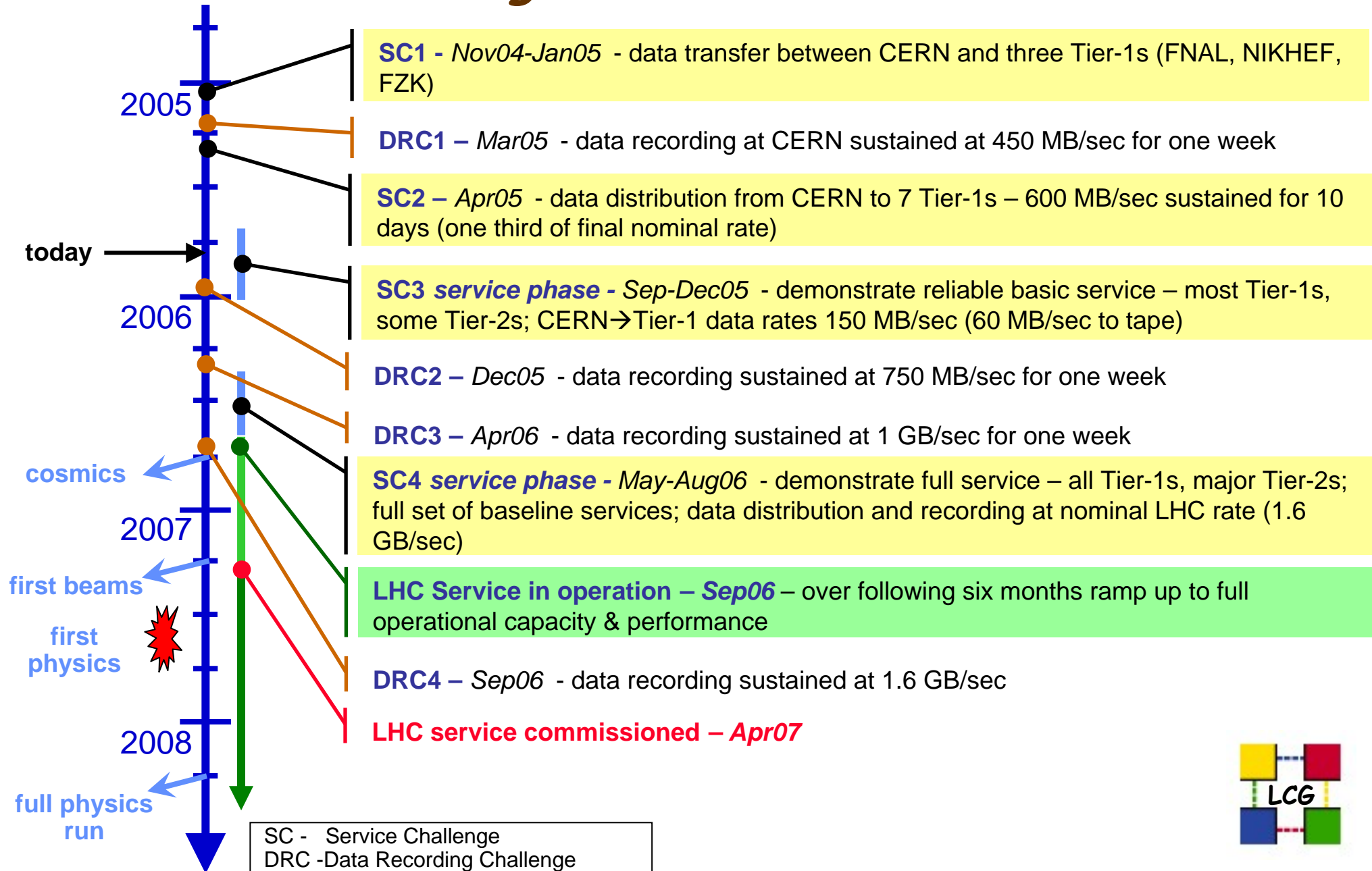
Inter-operation EGEE, Open Science Grid in the US and NorduGrid:
 → Very early days for standards – still getting basic experience
 → Focus on baseline services to meet specific experiment requirements

October 2005
 Total Sites 2062
 Total CPUs 31253
 Total TB 158
 (TB)

170 Grid sites
34 countries
14,000 CPUs



Building the Worldwide LHC Grid





Applications Support

- All products now in production use by experiments
- Plan for Phase 2 agreed
 - Agreement on the fusion and evolution of SEAL and ROOT
 - Preparing for longer term support of common products

- Persistency Framework
 - POOL
 - Conditions Database
- Core libraries and services - a merge of
 - SEAL (components for experiment frameworks) with
 - ROOT (analysis framework)
→ Common maths library, dictionary, ..
- Simulation
 - Simulation framework
 - GEANT4
 - Fluka
 - Physics validation
 - Garfield
 - MC generator services
- Software Process & Infrastructure



Interoperation - EGEE - OSG - NDGF

OSG - Open Science Grid

- formal relationship with WLCG through US-ATLAS and US-CMS computing projects
- regular LCG-US phone calls
- OSG Council has invited the project leaders of both EGEE and LCG to attend their meetings
- OSG and EGEE-II have each stated their goals of working towards inter-operation
- good technical progress on inter-operability
 - now possible to submit work from the EGEE Resource Broker to some OSG sites, and vice versa
 - working on operational monitoring - joint EGEE/OSG operations workshop in Abingdon
- → we now need to establish a formal policy and develop a deployment plan

Nordic Data Grid Facility - NDGF

- workshop at CERN at the beginning of September to understand how to implement inter-working with EGEE
- data transfer demonstrated in SC3



Accounting System in Operation

The screenshot shows the 'Grid Operations Centre - Microsoft Internet Explorer' window. The main content area is titled 'GRID OPERATIONS CENTRE' and includes a navigation bar with 'News', 'Monitoring', 'Accounting', 'Operations', and 'GOC Portal'. The 'Accounting' section is active, showing a left-hand menu with 'Accounting Home', 'Accounting Plots', 'LHC View', 'Developers', and 'Regions'. The 'LHC Hierarchical Tree' shows a tree structure under 'Tier1' including sites like AsiaPacific, BNL, CERN, FNAL, FZK, IN2P3, INFN-T1, NorduGrid, PIC, RAL, SARA/NIKHEF, TRIUMF, and PPS. The 'LHC View -> Tier-1 Resources' section has filters for 'CPU Quantity' (set to 'a) Normalised WallClockTime'), 'Start year' (2005), 'Start month' (7), 'End year' (2005), and 'End month' (7). A 'Refresh' button is present. Below the filters, a text block explains that the table shows the total summed Normalised Wall Clock Time [units 1K.SI2K.Hours] for each organisational unit grouped by LHC VO for the period 7/2005 to 7/2005. The table below is the data presented.

Normalised Wall Clock Time [units 1K.SI2K.Hours]					
Tier-1	Site	alice	atlas	cms	lhcb
AsiaPacific		0	1193	4	0
BNL		0	0	0	0
CERN		0	680	13290	964
FNAL		0	0	0	0
FZK		0	7946	5090	837
IN2P3		0	37975	4222	1122
INFN-T1		4296	987	109402	2794
NorduGrid		0	0	0	0
PIC		0	5271	29278	4022
RAL		0	98632	950	1923
SARA/NIKHEF		0	28247	116	2638
TRIUMF		0	4230	545	548

[Click here for a csv dump of this table](#)

- Operated by Grid Operations Centre at RAL
- Not all sites reporting
- Partial reporting (e.g. only grid submitted work)



EGEE-II



- HEP applications support (NA4) extended to cover the full range of activities that interface to the grid - production as well as analysis
- New Activity Defined - SA3 - integration, testing, certification, support
 - combines some of the activities previously in Middleware Development (JRA1) and Operations (SA1)
 - closely linked to the deployment and operations activity (SA1)
- Proposal includes 56% of budget for operations → much of which for work at sites providing resources for LHC
- The experiments will be represented directly in the Technical Coordination Group, which is expected to be the place where decisions on the evolution of middleware developments will be prepared
- Bob Jones replaces Fabrizio Gagliardi as Project Director
- Proposal made in September -
 - entered next phase (invited for further discussion)



Service Challenge 3

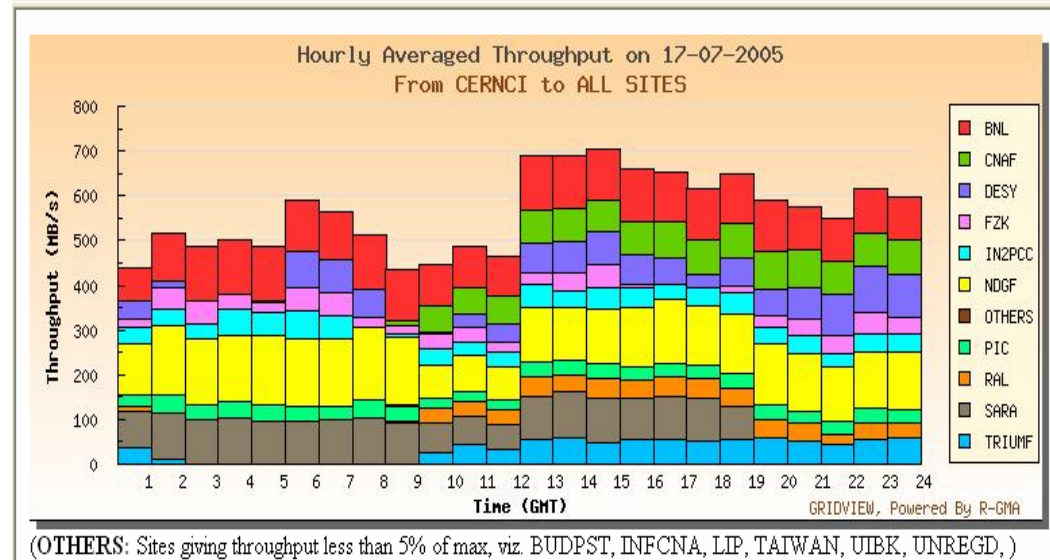
- ~15 centres active in setup phase
- First time that mass storage and tape involved
- Reliability and performance issues (being tackled)
- Questions of readiness of some centres to sustain service for extended period (staffing issues?)

Working on more detailed joint planning, including increased visibility of site planning

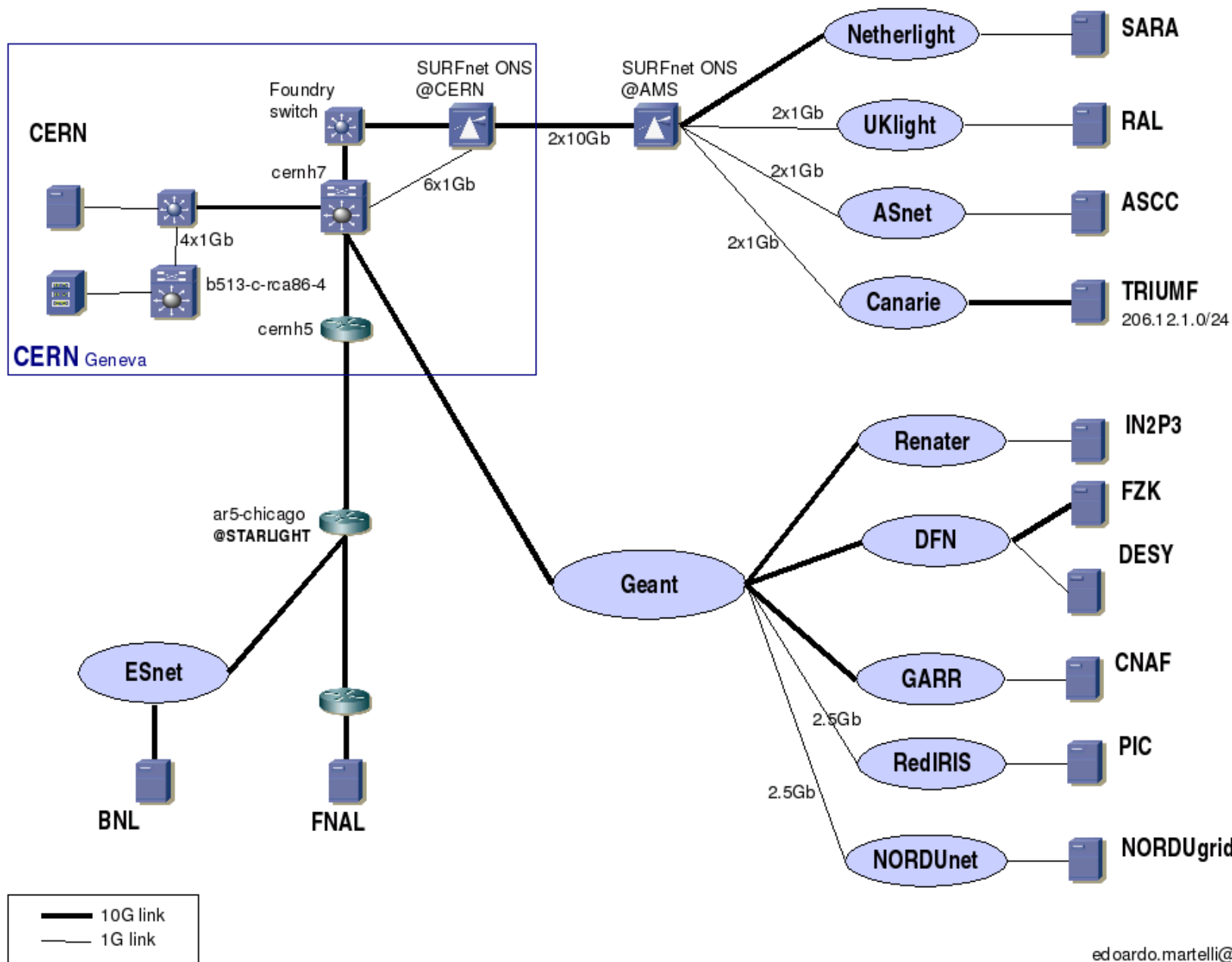
Service phase started September

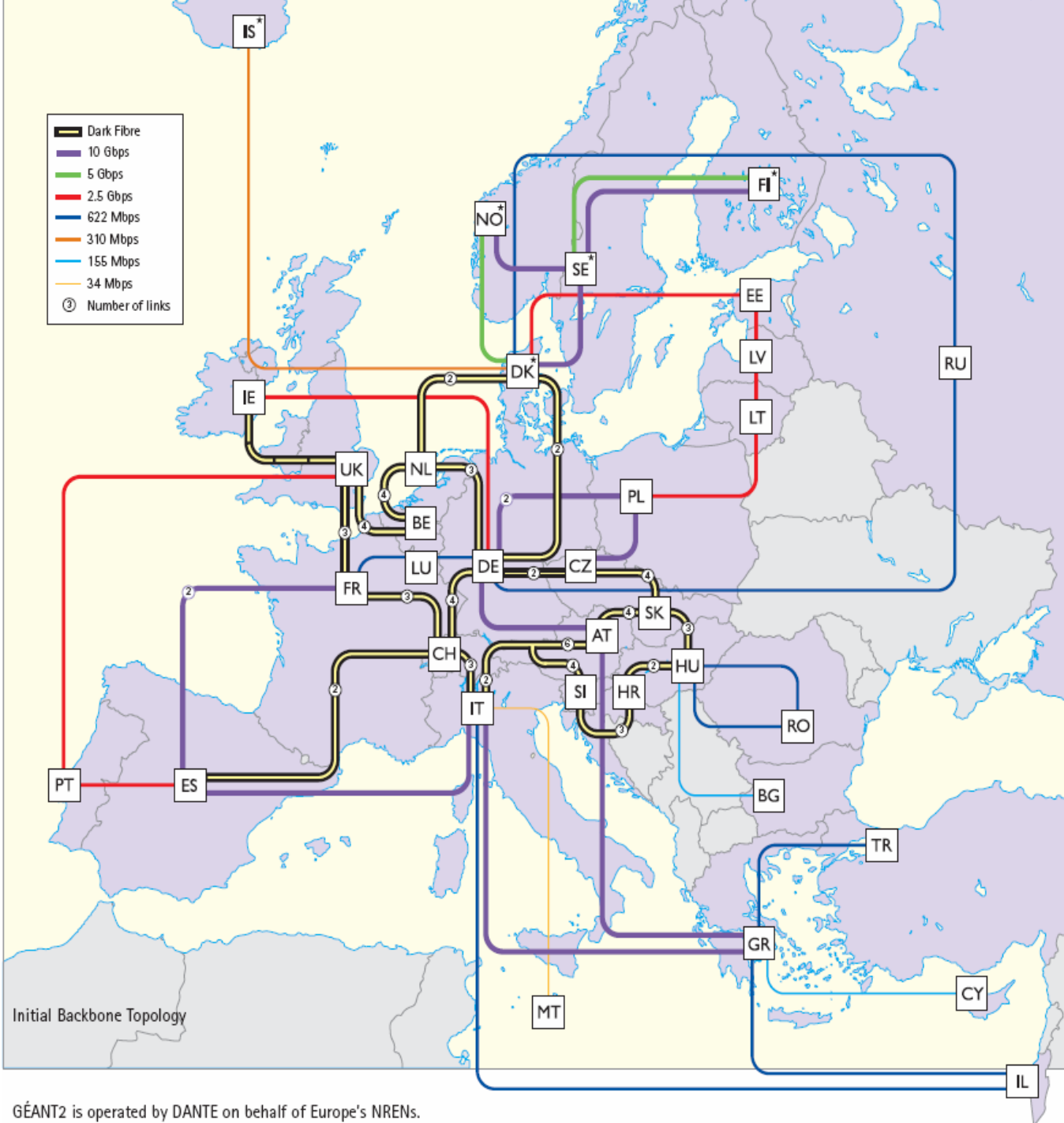
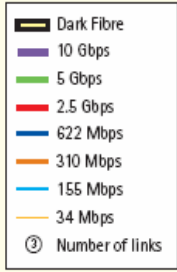
"Task Forces" starting up now
 → integrate experiment, LCG and EGEE effort in getting experiments working on SC3 (ALICE - Carminati; ATLAS - Perini; CMS - Belforte, LHCb - Tsaregorodtsev)

Analysis of GridFTP Log for Service Challenge 3



Service Challenge 3 – T0-T1 Network

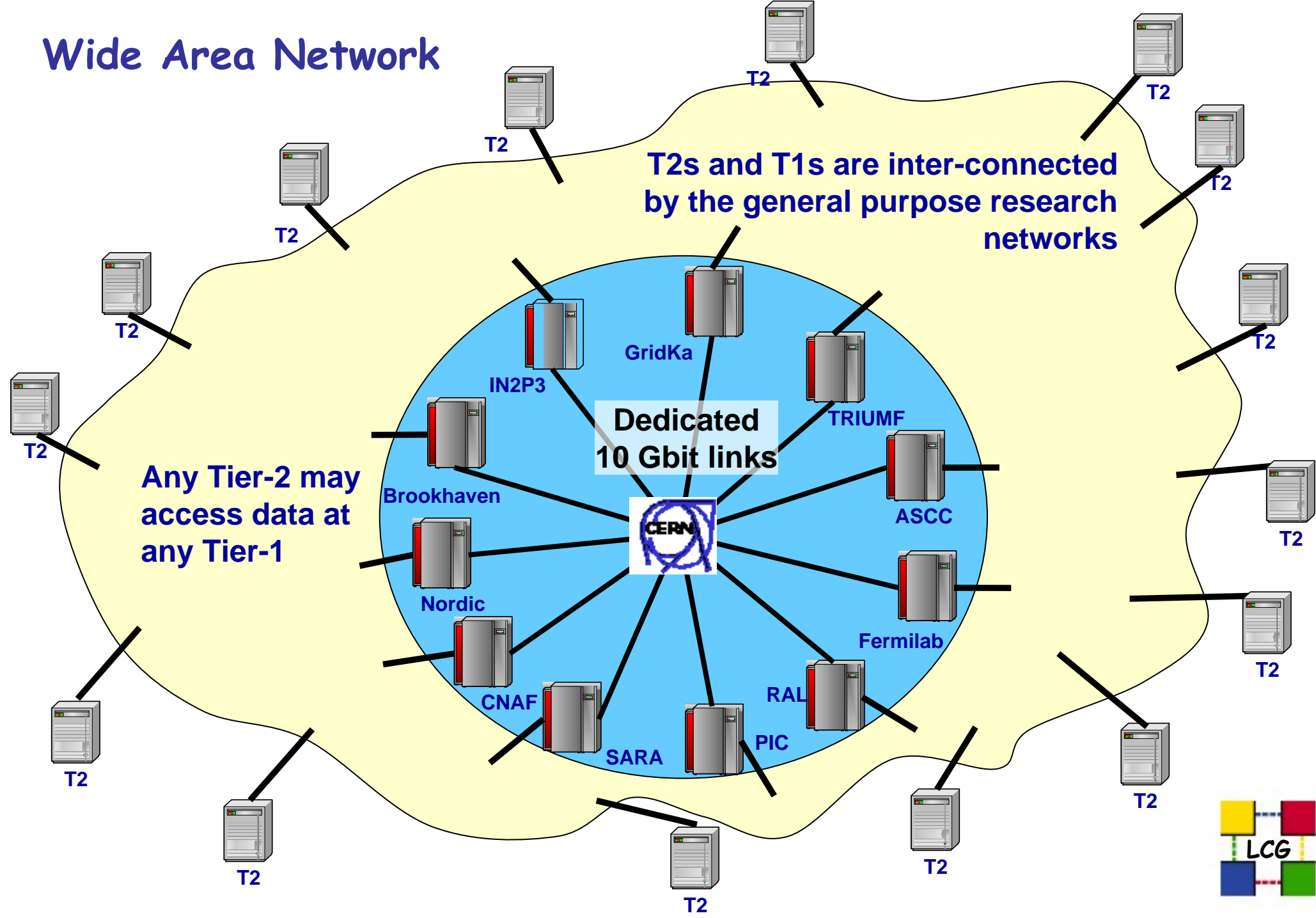




GÉANT 2 research network backbone

**strong
correlation
with
European
Tier-1s**

Wide Area Network





Summary - Current Status

- Scale of underlying grids already at/beyond target level
- Basic operational environment established
 - good and growing collaboration between operations centres
- Baseline services agreed
 - implementation by start of next year realistic
- Service challenges have progressed
 - from 4 sites last November
 - through 7 sites in April
 - to ~20 sites in SC3 - *including all major centres*
 - lots of *problems being identified - and solved*
 - reliability metrics being defined - for SC4
 - end-to-end performance below targets - some problems understood, more experience needed
- Applications medium term plan agreed
- Database services still to be decided and deployed
 - Workshop end of October



First data in less than 2 years

- CERN + Tier-1s must provide an *integrated and reliable* service for the bulk data from first beams
- *NOT an option to get things going later*
- Priority must be to concentrate on getting the basic service going
 - modest goals
 - pragmatic solutions
 - collaboration

