Service Challenges

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LHCC Review Meeting, March 7 2005

Why Service Challenges

To test Tier-0 ←→ Tier-1 ←→Tier-2 services

- Network service
  - Sufficient bandwidth: ~10 Gbit/sec
  - Backup path
  - Quality of service: security, help desk, error reporting, bug fixing, ..
- Robust file transfer service
  - File servers
  - File Transfer Software (GridFTP)
  - Data Management software (SRM, DCache)
  - Archiving service: tapeservers,taperobots, tapes, tapedrives, ..
- Sustainability
  - Weeks in a row un-interrupted 24/7 operation
  - Manpower implications: ~7 fte/site
  - Quality of service: helpdesk, error reporting, bug fixing, ..
- Towards a stable production environment for experiments

Network

- **GDB Standing Working Group for Networking created**
  - http://lcg.web.cern.ch/LCG/PEB/gdb/nw-grp.htm
  - Most NRENs represented (also US and AP)
  - First meeting last January in Amsterdam, next April 8
- **Network Architecture Subgroup created**
  - draft architecture document ready
  - Physical connectivity: 10 Gig and 1 Gig lightpaths
  - Logical Connectivity: IPV4 routed (layer 3) and non-routed (layer 2)
  - Every T1 responsible for (and pay) connectivity to CERN
  - CERN provides interfaces to connect T1 link termination points
  - IP addressing, BGP routing, Backup Connectivity, Security, Operations, Monitoring,

Dedicated connections for SCs

Tier1	Location	NRENs	Status dedicated link
ASCC	Taipei, Taiwan	ASnet, SURFnet	1 Gb via SURFnet, testing
BNL	Upton, NY, USA	ESnet, LHCnet	622 Mbit shared
CNAF	Bologna, Italy	Geant2, GARR	1 Gb now, 10 Gb in Sept
FNAL	Batavia, ILL, USA	ESnet, LHCnet	10 Gb, tested
IN2P3	Lyon, France	Renater	1 Gb now, 10 Gb in Sept
GridKa	Karlsruhe, Germany	Geant2, DFN	10 Gb, tested
SARA	Amsterdam, NL	Geant2, SURFnet	10 Gb, testing
NorduGrid	Scandinavia	Geant2, Nordunet	Not participating yet
PIC	Barcelona, Spain	Redlris, Geant2	Not participating yet
RAL	Didcot, UK	Geant2, Ukerna	2 x 1 Gb via SURFnet soon
Triumf	Vancouver, Canada	Canet, LHCnet	1 Gb via SURFnet, testing

Overall Milestones

- **2004**
  - November SC1: initial tests with BNL, FNAL, GridKa, SARA
- **2005**
  - March SC2: 2 weeks sustained disk-to-disk file transfers
  - July SC3: 4 weeks sustained disk-to-tape file transfers
  - November SC4: all T1's plus some T2's, full test at reduced rate
  - Sept. – Dec. : stable service for experiments' data challenges
- **2006**
  - Q1: full scale installation with all T1's and T2's
  - Q2: test at twice the nominal rate
  - Q3: first delivery, data taking with cosmic rays
- **2007**
  - Q3: final system for LHC data taking with beams

SC2: March 14 - 28

- **Participants**
  - CCIN2P3, CNAF, FNAL, GridKa, RAL, SARA concurrently
- **Tests**
  - sustained (over Easter) disk-to-disk file transfers
  - Aggregated rate out of CERN ~500 Mbytes/sec
  - Using Radiant software suite
  - Monitoring & logging prototype
- **This week**
  - CERN is setting up a 20 node service
  - Initial tests of all sites
  - Decide on monitoring and logging
- **Next week**
  - Start of SC2
  - SC Meeting in Lyon on Tuesday

For SC3: month of July

- **Participants**
  - As for SC2 plus BNL, Taipei and Vancouver
- **Tests**
  - sustained disk-to-tape file transfers
  - Tape writing speed at Tier-1's: 60 MByte/sec
- **Hardware**
  - More machines and disk arrays in Production Service at CERN
  - Tape servers at T1's
- **Software**
  - Using SRM (and DCache)
  - Monitoring & Logging infrastructure
- **Experiment involvement**
  - Using experiments specific software like FedEx (CMS)
  - Discuss at next SC Meeting in Lyon on Tuesday

Points for attention

- **Network**
  - Only 6/11 will have the required bandwidth in 2005
  - 2 sites will not participate in 2005
- **Hardware**
  - Needs to be dedicated for security
  - Network infrastructure, Data servers , Reconstruction farm, Tape servers at T1's → requires €$ investments and manpower
- **Software**
  - SRM to be developed for each site → requires manpower
  - New grid middleware needs integration and testing
  - Data catalogues and data bases integration
  - Monitoring & Logging infrastructure
- **Experiment involvement**
  - Experiments specific software needed
  - Not highest priority for physics studies

END

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backup slides

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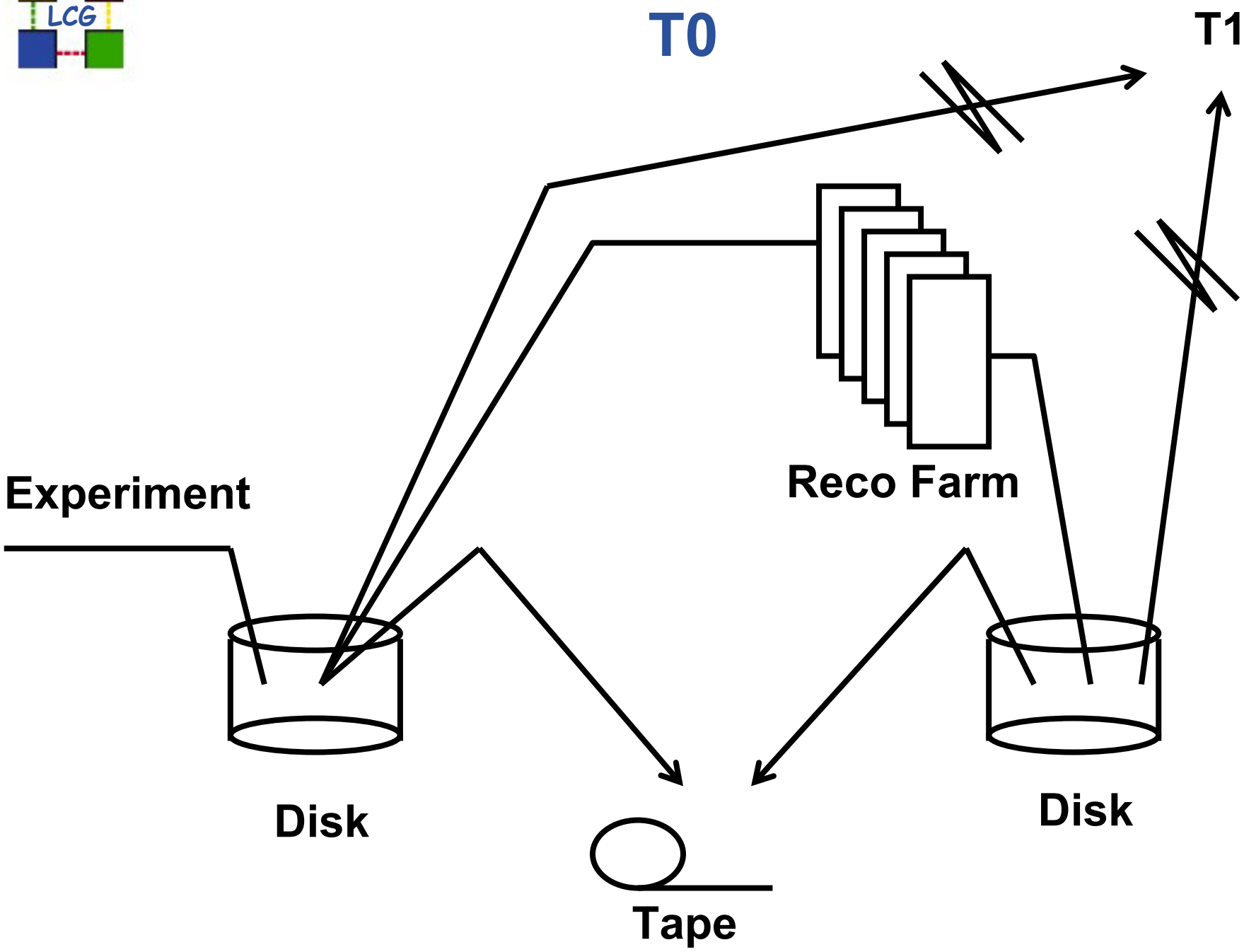
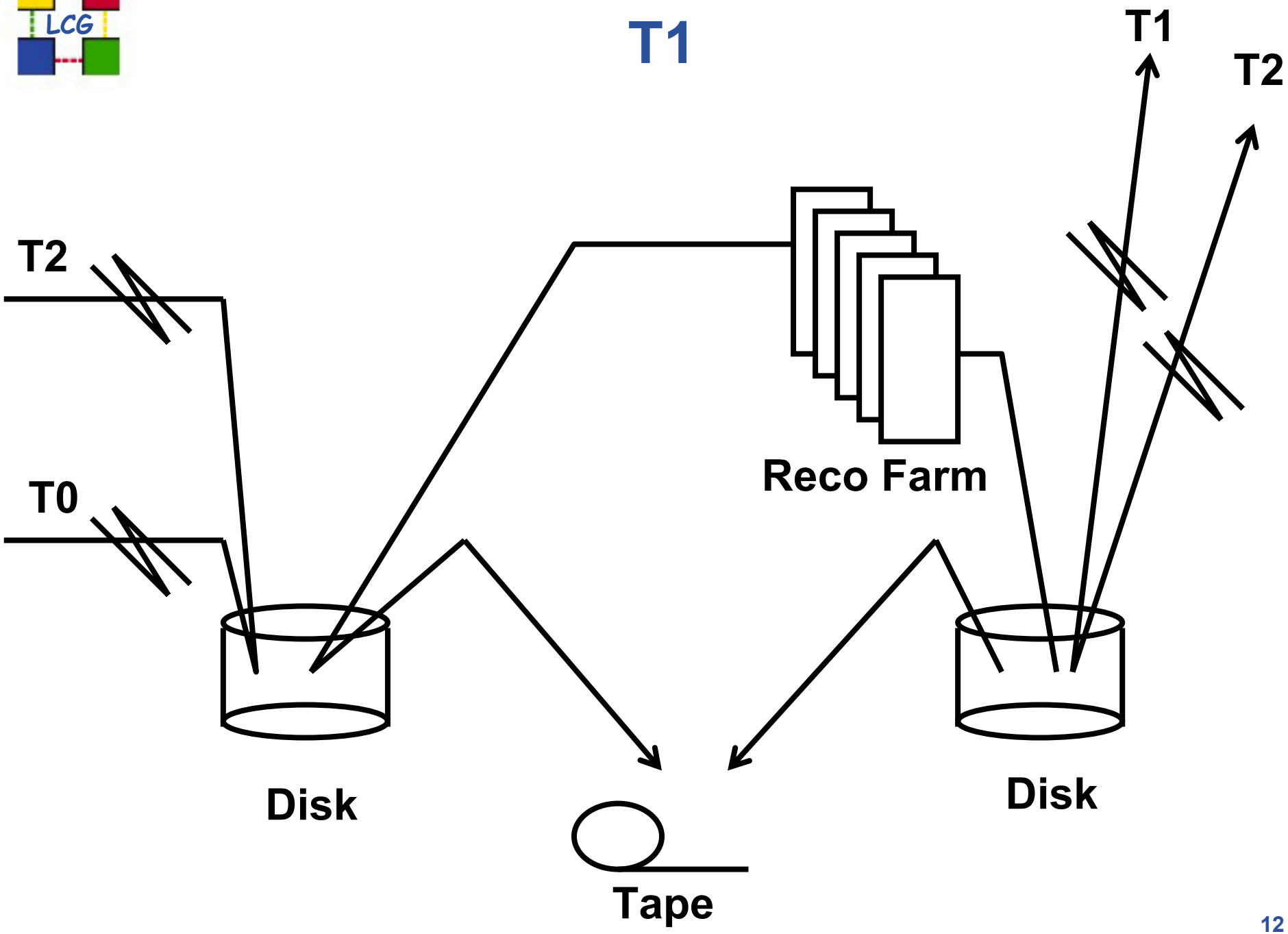

T0
T1
Experiment
Reco Farm
Disk
Disk
Tape

T1



Tier-1 Centres *(December 2004)*

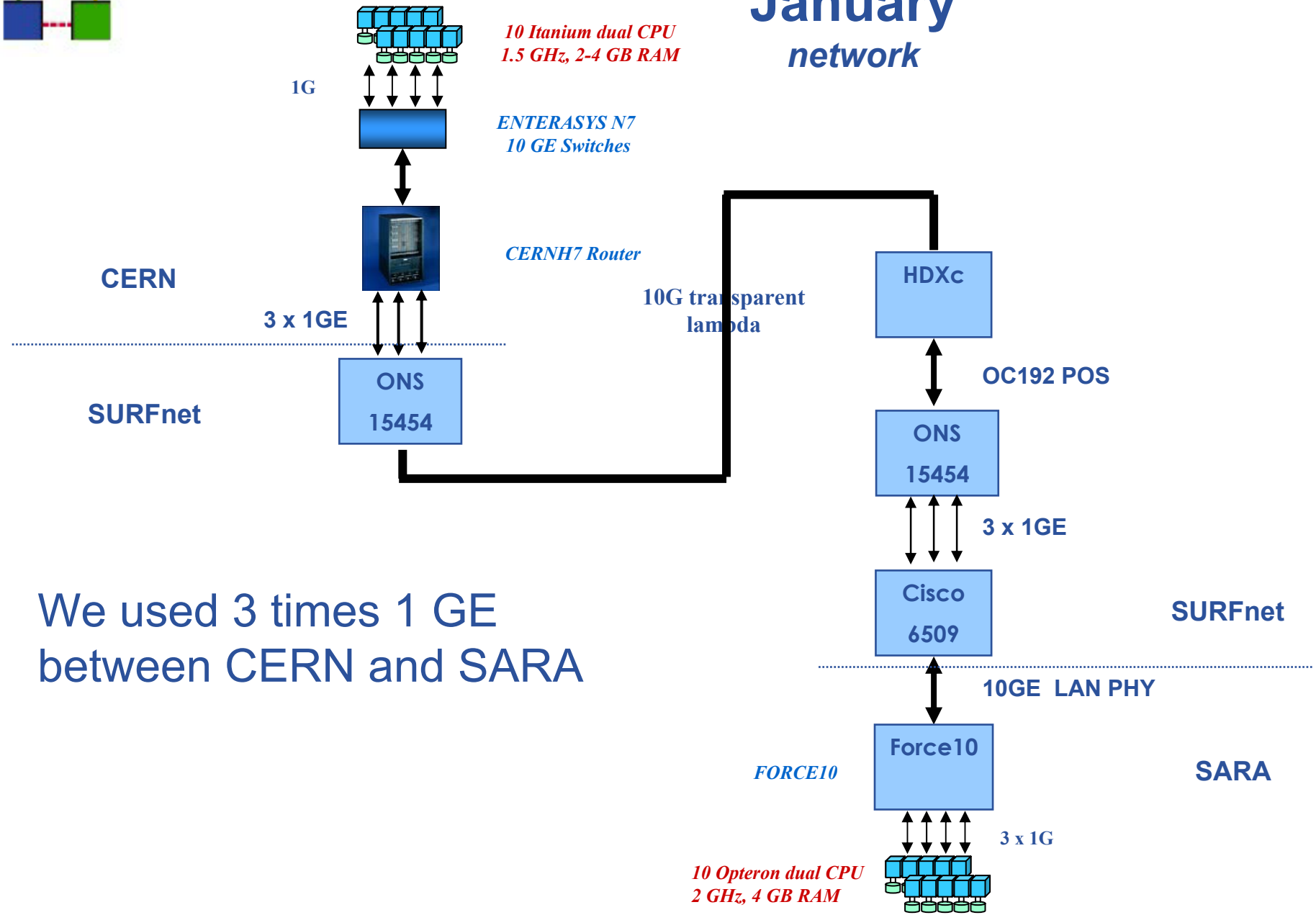
				ALICE	ATLAS	CMS	LHCb	
1	GridKa	Karlsruhe	Germany	X	X	X	X	4
2	CCIN2P3	Lyon	France	X	X	X	X	4
3	CNAF	Bologna	Italy	X	X	X	X	4
4	NIKHEF/SARA	Amsterdam	Netherlands	X	X		X	3
5	Nordic	Distributed	Dk, No, Fi, Se		X			1
6	PIC	Barcelona	Spain		X	X	X	3
7	RAL	Didcot	UK	X	X	X	X	4
8	Triumf	Vancouver	Canada		X			1
9	BNL	Brookhaven	US		X			1
10	FNAL	Batavia, Ill.	US			X		1
11	ASCC	Taipei	Taiwan		X	X		2
				5	10	7	6	28

Experiments' requirements

numbers collected by Jamie Shiers from Computing Model papers

CPU(MSI2k.yr)	***2006***	***2007***	***2008***	***2009***	***2010***
CERN	0,27	0,54	0,9	1,25	1,88
Tier-1's	1,33	2,65	4,42	5,55	8,35
Tier-2's	2,29	4,59	7,65	7,65	7,65
Total	**3,89**	**7,78**	**12,97**	**14,45**	**17,88**
Disk(TB)					
CERN	248	496	826	1095	1363
Tier-1's	730	1459	2432	2897	3363
Tier-2's	7	14	23	23	23
Total	**984**	**1969**	**3281**	**4015**	**4749**
MSS (TB)					
CERN	408	825	1359	2857	4566
Tier-1's	622	1244	2074	4285	7066
Total	**1030**	**2069**	**3433**	**7144**	**11632**

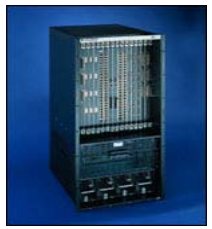
January
network



We used 3 times 1 GE between CERN and SARA

April set up

Force10



10 Gb/s

UvA cluster

1 Gb/s

Internal Gigabit Network

1 Gb/s

SAN

HSM

Shared FS

Fiber Channel

New hardware

LCG tape drives