Current status and plans for Czech Grid for HEP

Outline

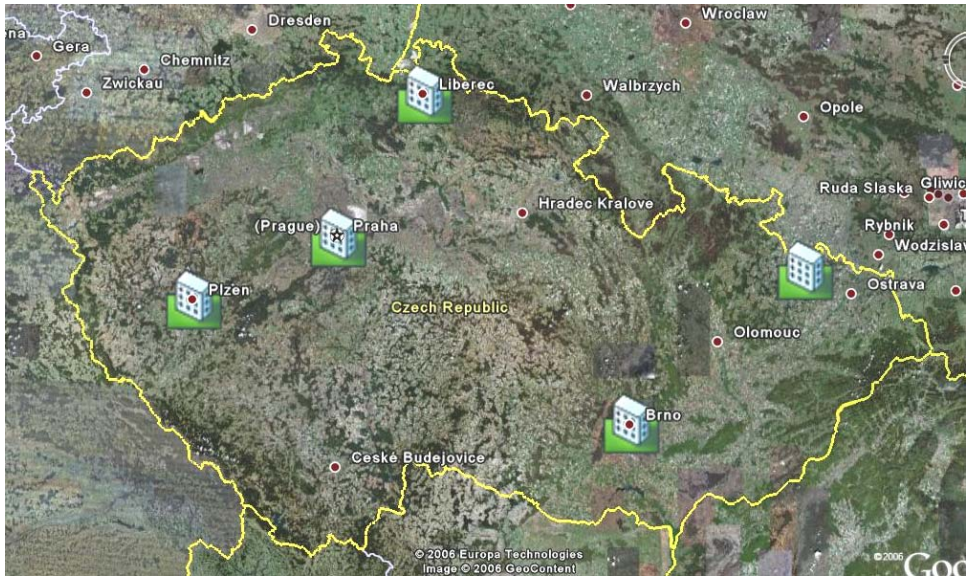
- Czech HEP Community and Contributions to Experiments
- Scientific Network and Computing
- Grid in the Czech Republic
- Plans
- Conclusion

Czech HEP Community

- High Energy and Nuclear Physics Community
  - 156 people
    - 59 physicists
    - 22 engineers
    - 21 technicians
    - 54 undergraduate and Ph.D. students

- Main HEP Collaborating Institutions
  - Academy of Sciences of the Czech Republic
  - Charles University in Prague
  - Czech Technical University in Prague
  - Masaryk University in Brno
  - Brno University of Technology
  - Technical University of Liberec
  - Silesian University in Opava
  - …

Main HEP Institutions



app. 500 km

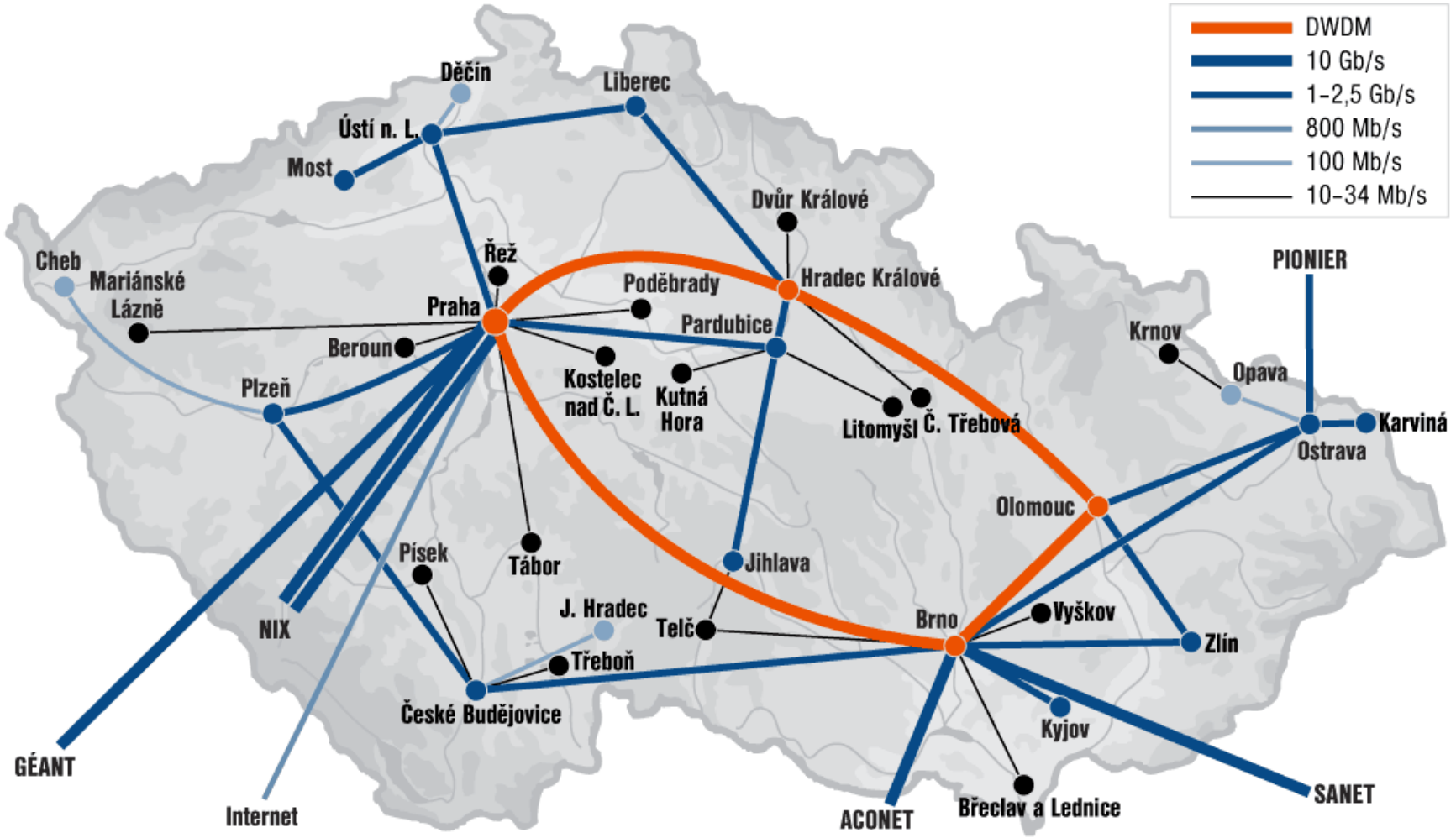
Contributions to HEP and NP Experiments

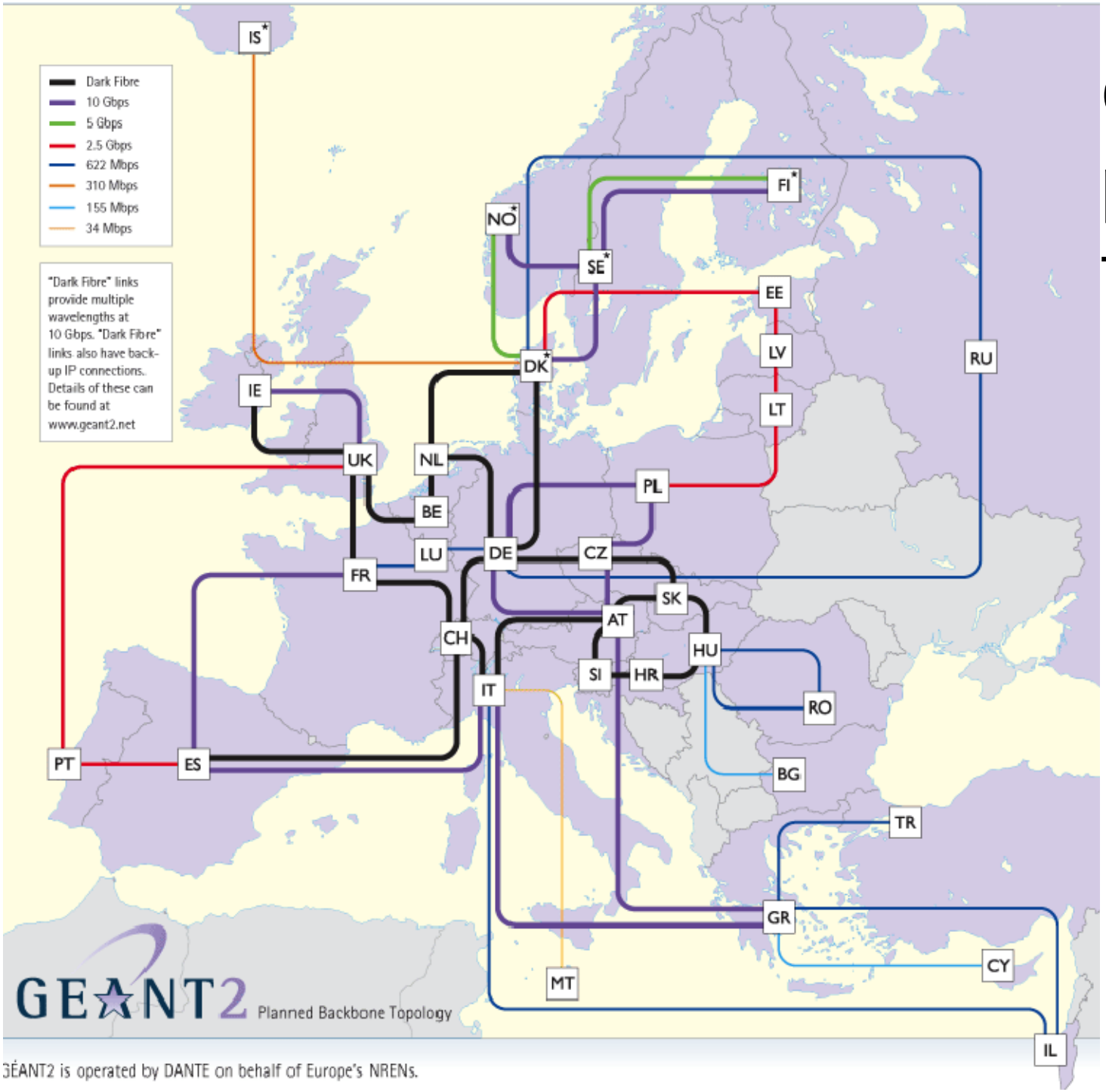
- Past experiments
  - DELPHI, NA4, OMEGA, UA4-2, NA45, NA57, PIXEL(RD-19), GAS Microstrips (RD-28), TILECAL (RD-34), ROSE (RD-48), RADTOL (RD-49)
- Current experiments
  - ATLAS, ALICE, TOTEM, AUGER
  - D0, H1, STAR
  - COMPASS (NA58), DIRAC (PS212), ISOLDE/IS381, RADHARD (RD50), nTOF, NEG, MEDIPIX
  - HADES and CMB (GSI Darmstadt), Cyclotron U-120M in NPI (max 40 MeV protons)
  - ENLIGHT (hadron therapy)
- Detector development
  - Silicon pixels and strips, calorimeters, crystals, electronics
- Computing
  - EDG, EGEE, EGEEII, WLCG
- Theory

Czech Scientific Computer Network

- CESNET
  - Czech National Research and Education Network provider
  - Association of legal entities formed by all universities of the Czech Republic and the Academy of Sciences of the Czech Republic
  - Operation and development of the Czech NREN (CESNET2 network)
  - Research and development of advanced network technologies and applications

CESNET2 topology



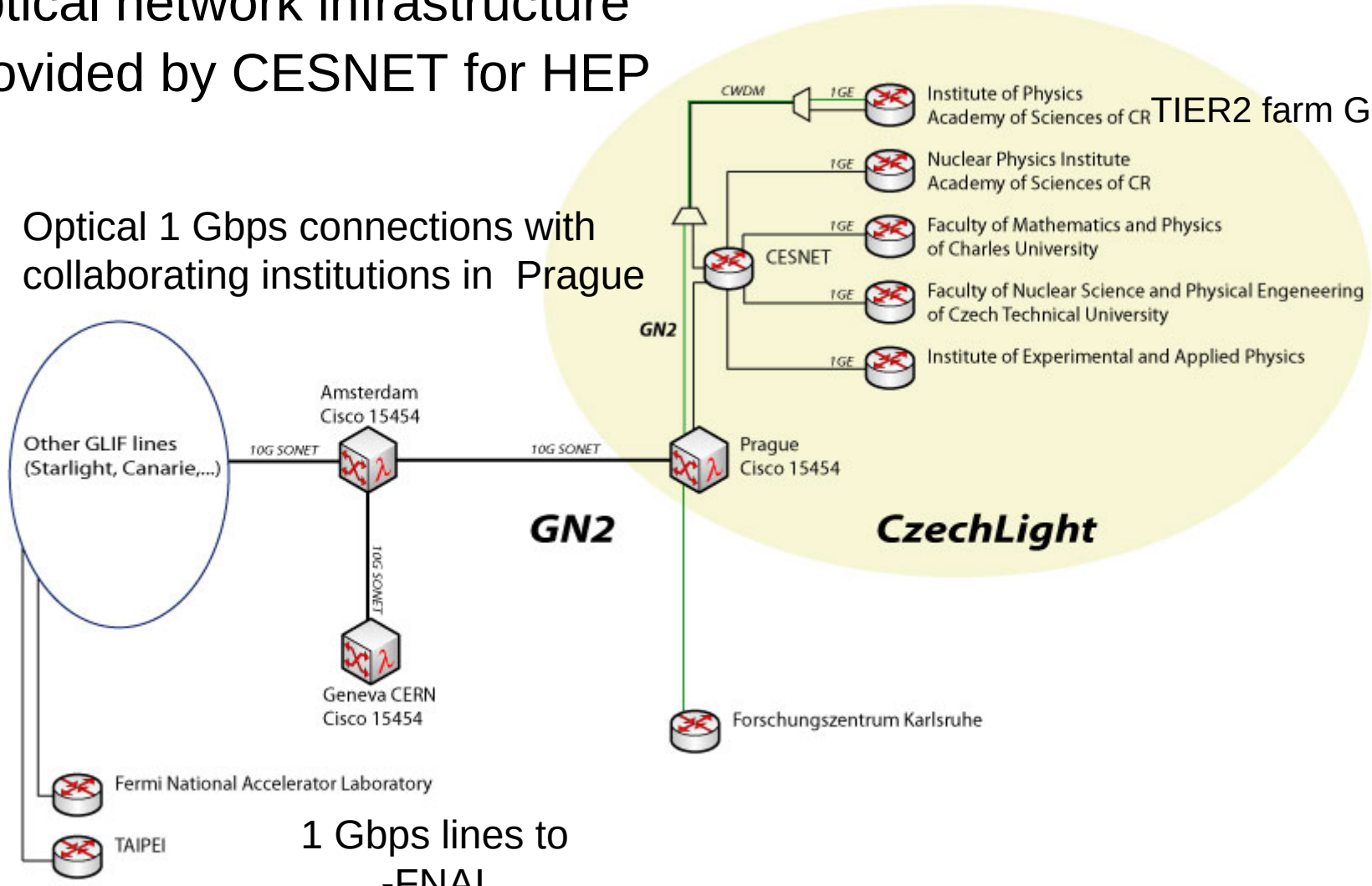


GEANT2 planned topology May 2006

Optical network infrastructure
Provided by CESNET for HEP

TIER2 farm GOLIAS

Optical 1 Gbps connections with collaborating institutions in Prague

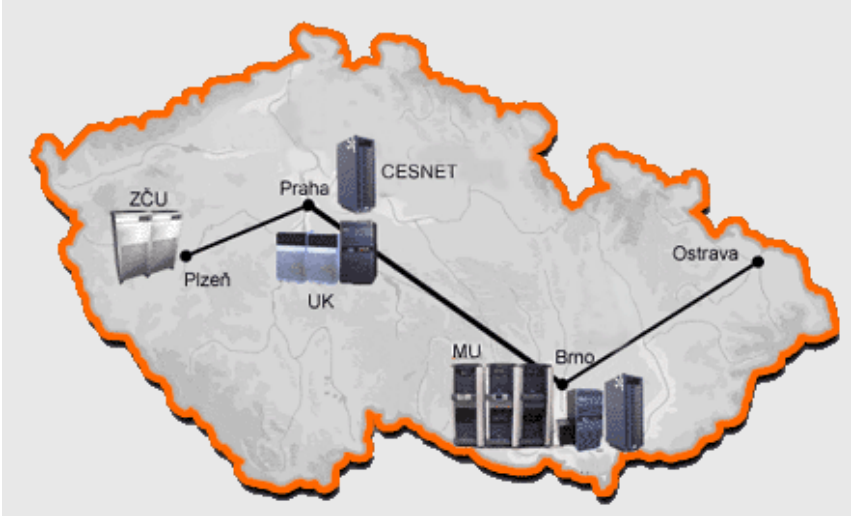


1 Gbps lines to
- -FNAL
- -TAIPEI
- -FZK (very new)

13.9.2006
http://www.particle.cz/farm/czechlight/dokumenty/CL_net.pdf

GRID Computing

- Pre – GRID experience from 90th
  - METACentrum project of CESNET
    - Interconnection of supercomputers at Czech Universities
    - AFS, single login and common job submission, user support, application SW
    - 400 linux processors + few special “supercomputers”
    - GRID-like project
- No real national GRID project
- Participation to international GRID projects via CESNET METACentrum project
  - EDG (from 2001), EGEE, EGEEII
  - GRIDLAB, CoreGRID
  - WLCG (from 2002)



High Energy Physics
WLCG GRID

- WLCG Tier 2 centre
  Two separate farms
  - CESNET_EGEE – farm SKURUT located at CESNET
    - 30 processors, storage on GOLIAS, used for ATLAS
    - Part of CE ROC, support of VOCE
  - Prague – farm GOLIAS located at
    FZU (Institute of Physics ASCR)

Prague T2 center GOLIAS

- Prague – GOLIAS
  from 2004
  - Heterogeneous hardware, due to irregular HW upgrades (from 2002)
  - total 121 nodes (including Blade servers), 250 cores
  - ~150k SpecInt2000

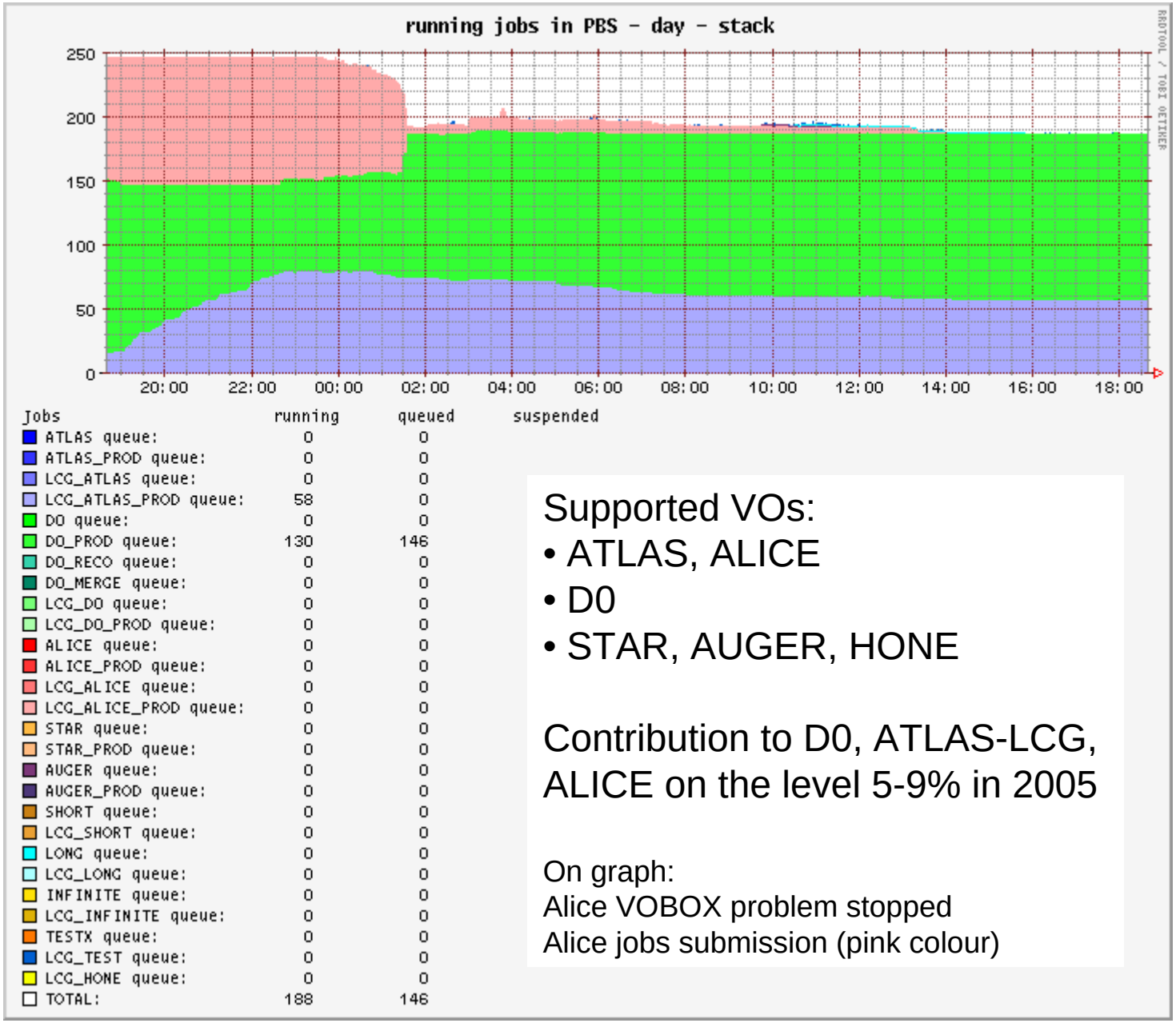
Prague T2 center

- 41 TB of raw disk space;
  3 disk arrays
  - 1 TB array (RAID 5)
  - 10 TB array (RAID 5)
  - 30 TB array **(RAID 6)**
- Tasks 150/100 D0/LHC
- Network Connections
  1 Gbps lines
  - GEANT standard infrastructure
  - FNAL, p2p, CzechLight/GLIF
  - Taipei, p2p, CzechLight/GLIF
  - FZK Karlsruhe, p2p over GN2, from 1 September 2006
- 150 kW total electric power for computing, UPS, Diesel

Personnel

- 4 persons to run WLCG Tier-2
  - Jiri Kosina – middleware, Storage (FTS), monitoring
  - Tomas Kouba – middleware, monitoring
  - Jan Svec – basic HW, OS, storage, networking, monitoring
  - Lukas Fiala - basic HW, networking, web services
  - Jiri Chudoba – liaison to ATLAS and ALICE, running the jobs and reporting errors, service monitoring

(more personnel on EGEEII)



Supported VOs:

- ATLAS, ALICE
- D0
- STAR, AUGER, HONE

Contribution to D0, ATLAS-LCG, ALICE on the level 5-9% in 2005

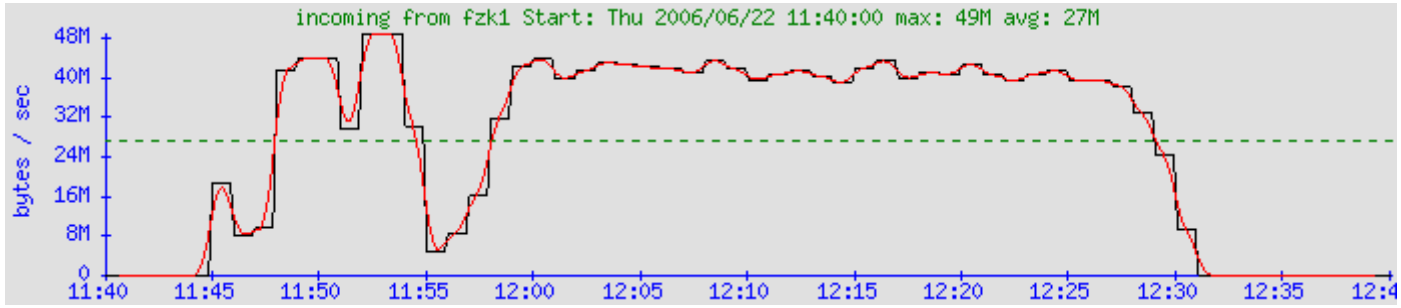
On graph:
Alice VOBOX problem stopped
Alice jobs submission (pink colour)

SERVICE CHALLENGE 2006
FTS tests FZK - FZU

J. Chudoba

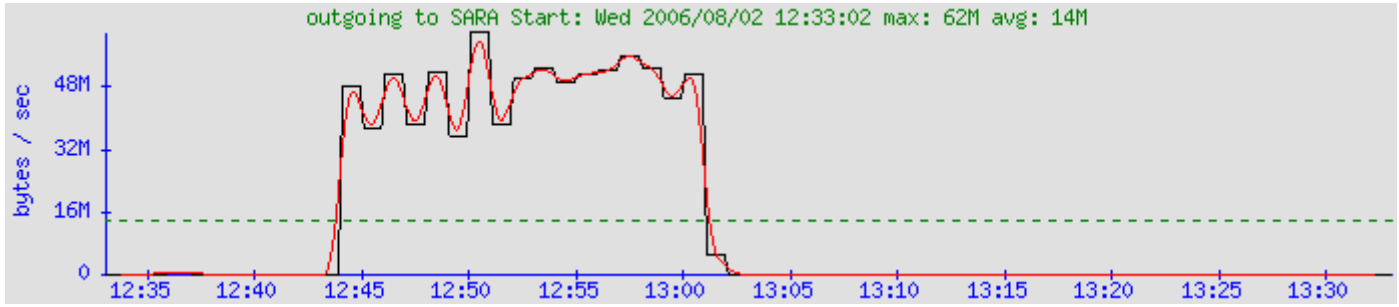
- **FZK – FZU,** standard GEANT internet connection
- Transfer of 100 files, each file 1GB

48 MB/s



- **FZU – SARA,** standard GEANT internet connection
- Transfer of 50 GB

48 MB/s



Service planning

- Proposed plan for WLCG Grid resources in the Czech Republic

	2007	2008	2009	2010
ATLAS + ALICE				
CPU (MSI2000)	0.4	1.9	2.9	4.7
Disk (TB)	202	904	1 420	2 354
MSS (TB)	120	562	1 013	1 652

- Table based on WLCG TDR for ATLAS and Alice and our anticipated share in the LHC experiments
- We submit project proposals to various grant systems in the Czech Republic
- Prepare bigger project proposal for CZ GRID together with CESNET
  - For the LHC needs
  - In 2010 add 3x more capacity for Czech non-HEP scientists, financed from state resources and structural funds of EU
- All proposals include new personnel (up to 10 new persons)
- No resources for LHC computing, yet

Conclusion

- GRID for HEP in the Czech Republic
  - Has good grounds to be built-up
    - Excellent networking
    - Existing infrastructure of specialists contributing to international GRID projects
    - Pilot installation exists and is fully integrated into WLCG/EGEE and can be enlarged
  - Projects proposals for
    - HEP GRID regularly proposing
    - National GRID proposal (with CESNET) prepared
  - No adequate financial resources for GRID infrastructure, yet