IHEP Tier-2 Computing Centre evolution

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RU-Protvino-IHEP site is the one of three biggest WLCG Tier-2 centers in Russia. The computing infrastructure serves for big four high energy physics experiments such as Atlas, Alice, CMS, LHCb. After a few years of regular investments into the center computing hardware, network infrastructure, cooling and electrical infrastructure IHEP becomes very powerful and reliable site. In 2013 new computing resources were put into operation. The computing power of the cluster was enlarged 2.8 times and the total capacity of the disk space was increased by 2.3 times. In this presentation the evolution of the computing center capacities and networking will be shown as well as its contribution to the collaboration experiments.

Introduction

- RU-Protvino-IHEP site participates in the Worldwide LHC Computing Grid from very beginning since **2003**.
- In that time were installed and configured the first grid infrastructure services like CE, SE, WNs, UI on **16** two-core Pentium III 900MHz.
- After increasing network bandwidth to 100Mb/s, then to 1Gb/s and in the end to 10Gb/s we became one of the biggest Tier-2 site in Russia with **3k CPU** (**24000** HEP-SPEC06) and **2PTB** disks space.
- In the present time our site serves for four LHC experiments (Atlas, Alice, CMS, LHCb) and many small experiments inside the Institute. We implement shared CPU schema that allows achieving 24x7 CPU resource usage.

50th anniversary

1965 – Минск-2, Минск-22, М-220, БЭСМ-4, БЭСМ-6, Минск-32, ЕС-1040, ЕС-1045

1972 – ICL

1977 – DEC 10

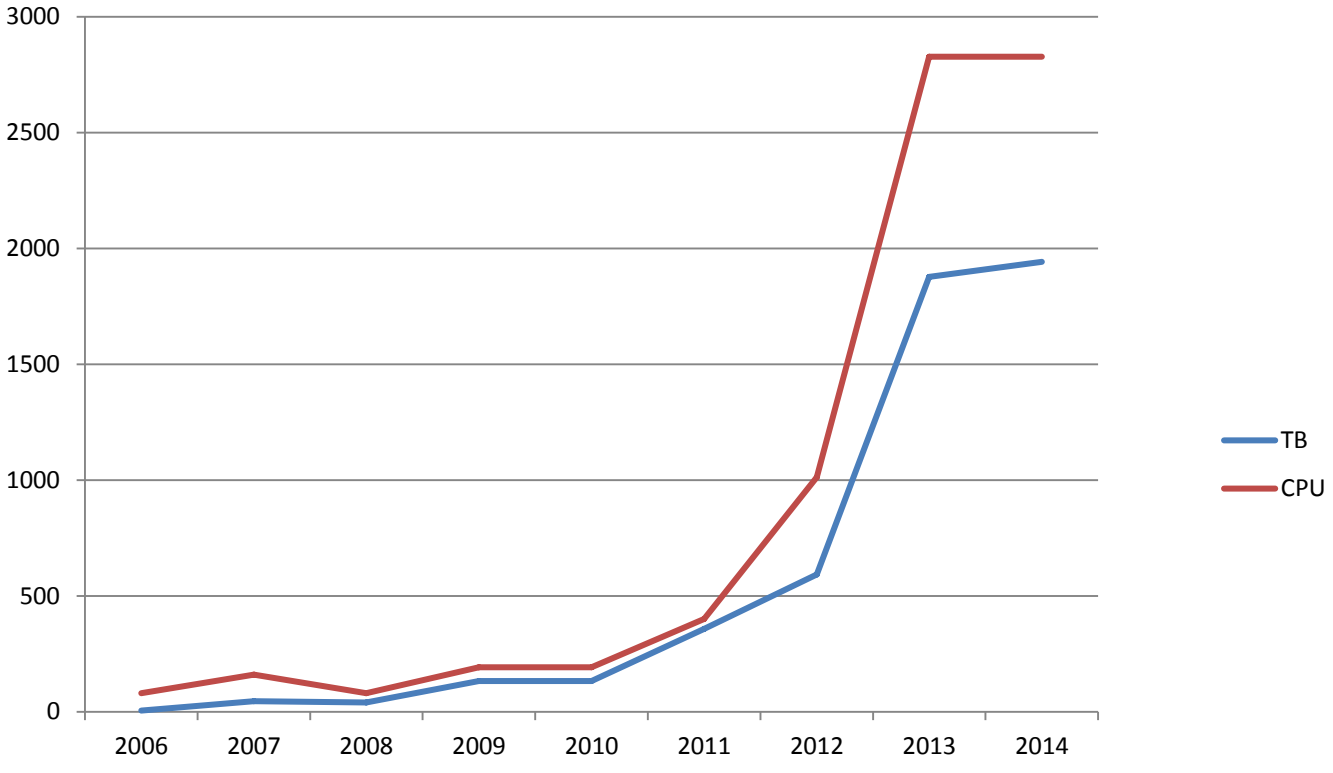
1991 - mVAX-II – mail

1993 – Internet

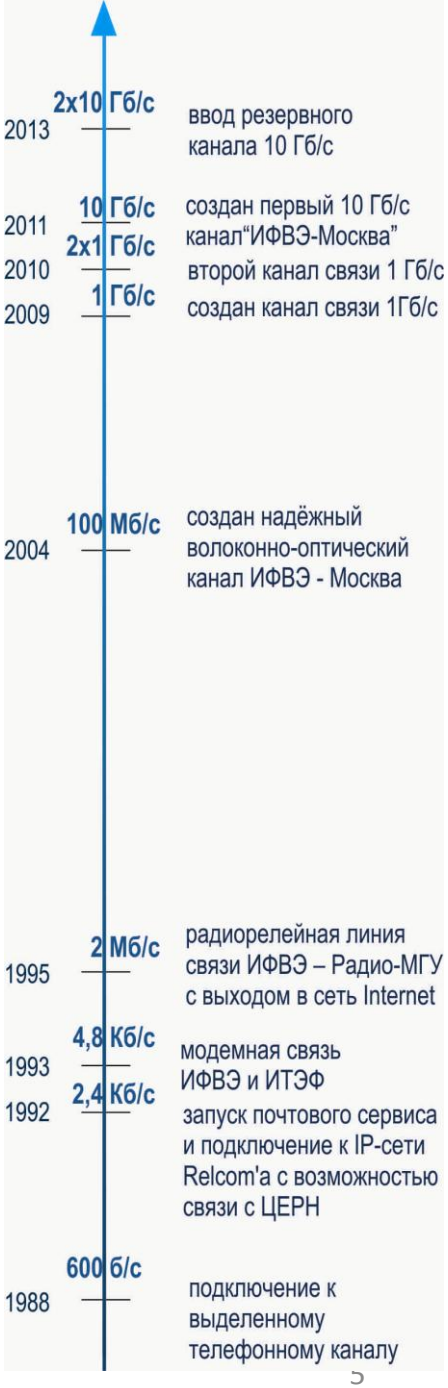
2003 – Grid-cluster

2011 – 10Gb/s

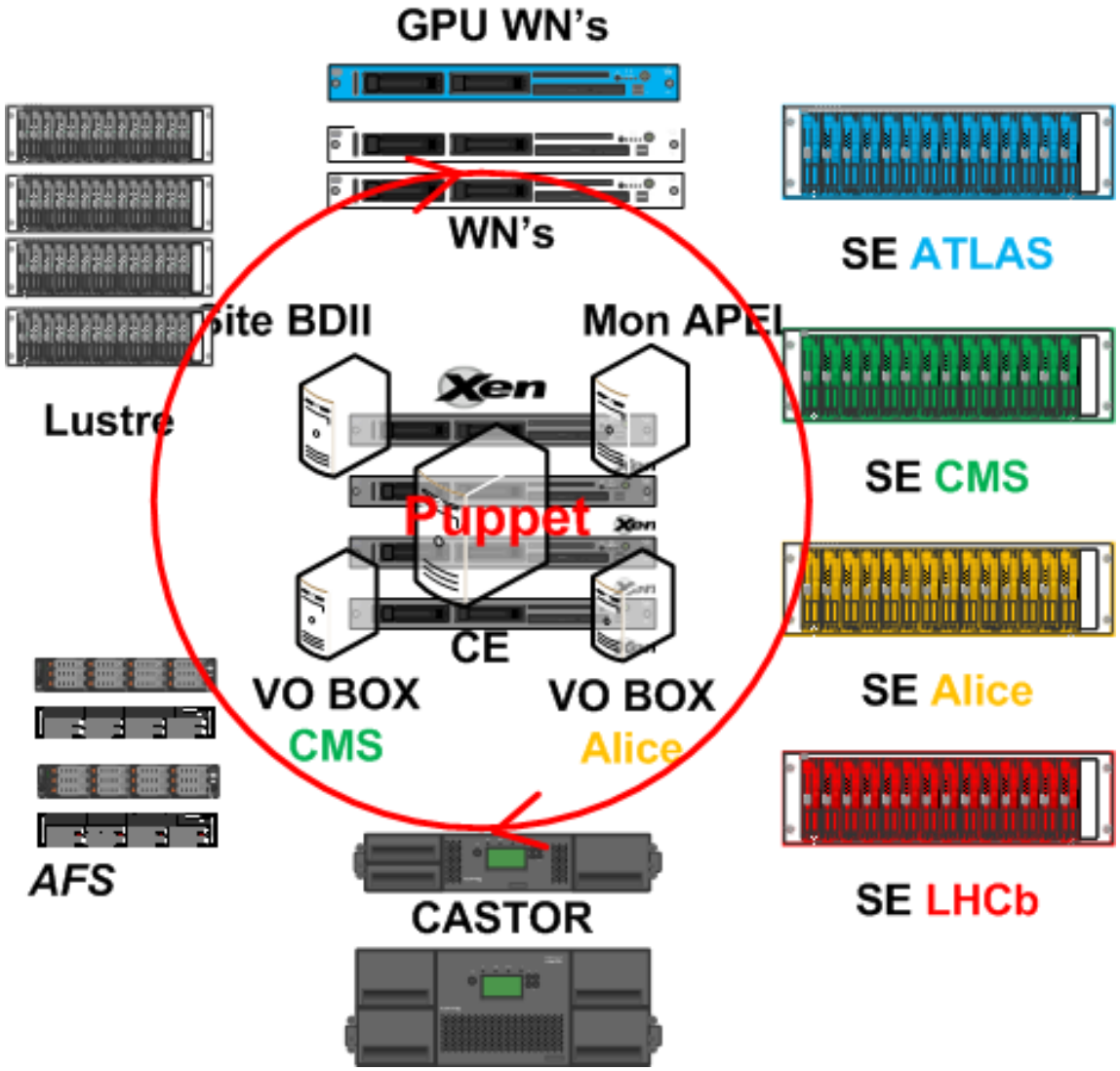
IHEP resources evolution



growth of the IHEP grid resources by year in TB and CPU



IHEP cluster

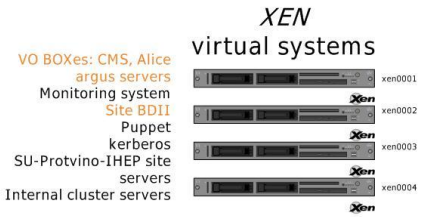


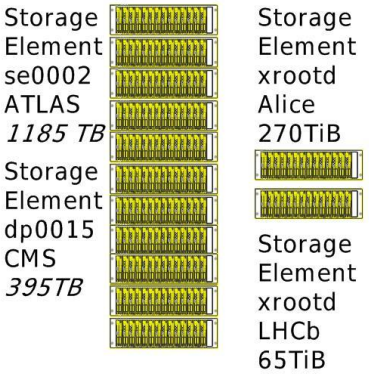
site structure

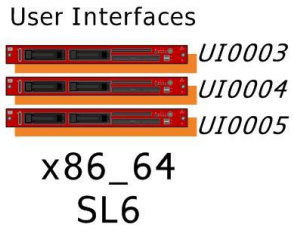
Structure of the RU-Protvino-IHEP
Linux PC farm
20140626

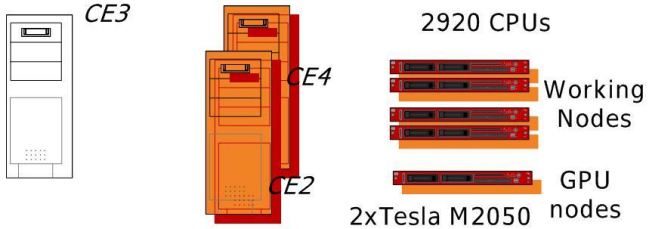
- grid software EMI3
- Base OS SL6 64bit

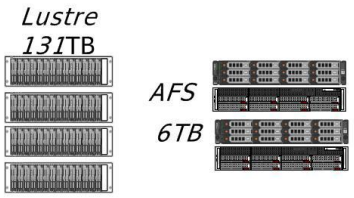
Debian 6,7 amd64

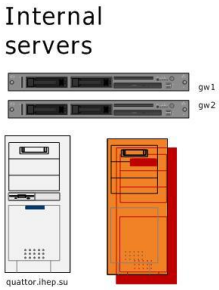




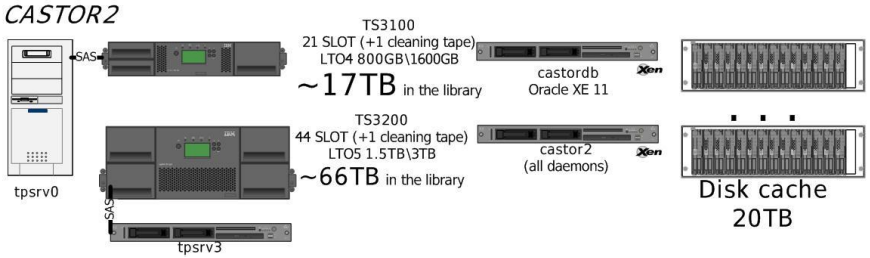






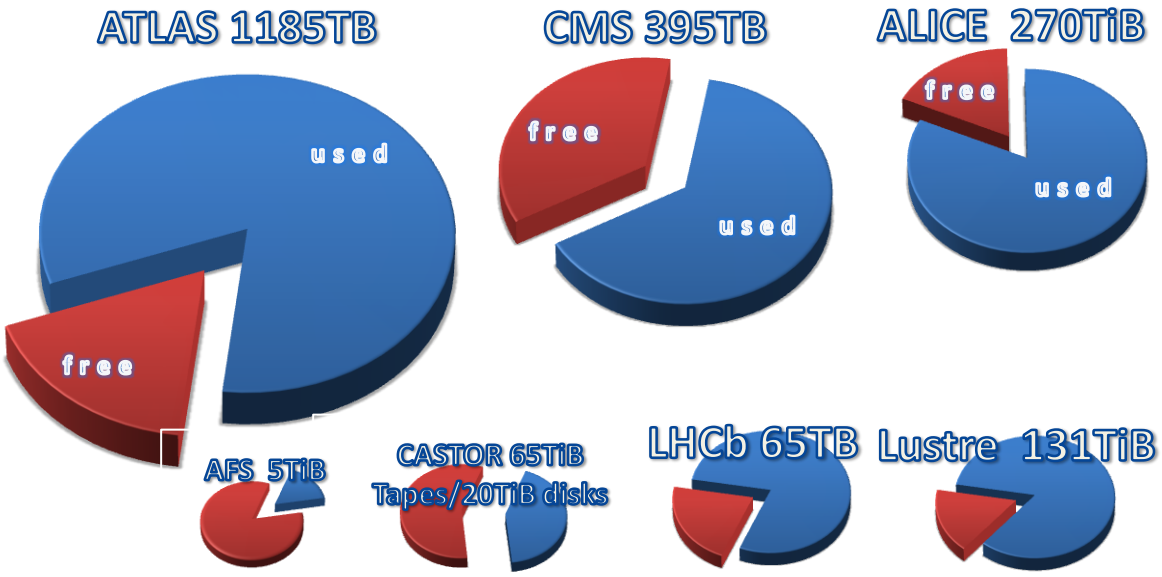


VO BOX: ATLAS

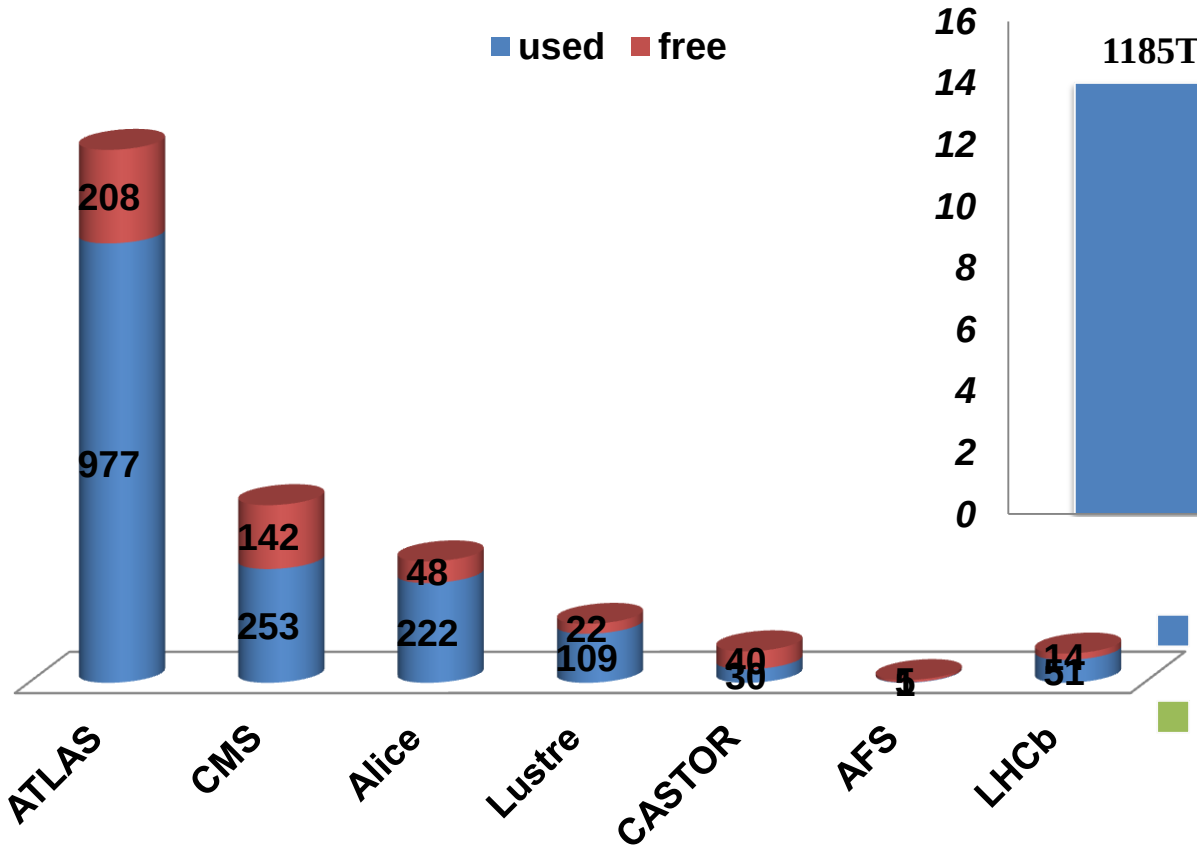


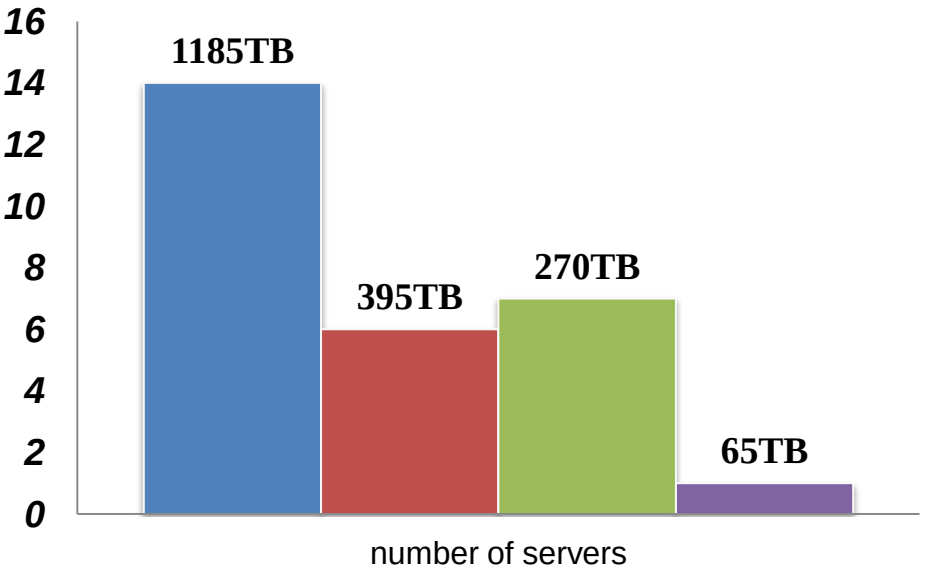
One part of the cluster

Storages overview

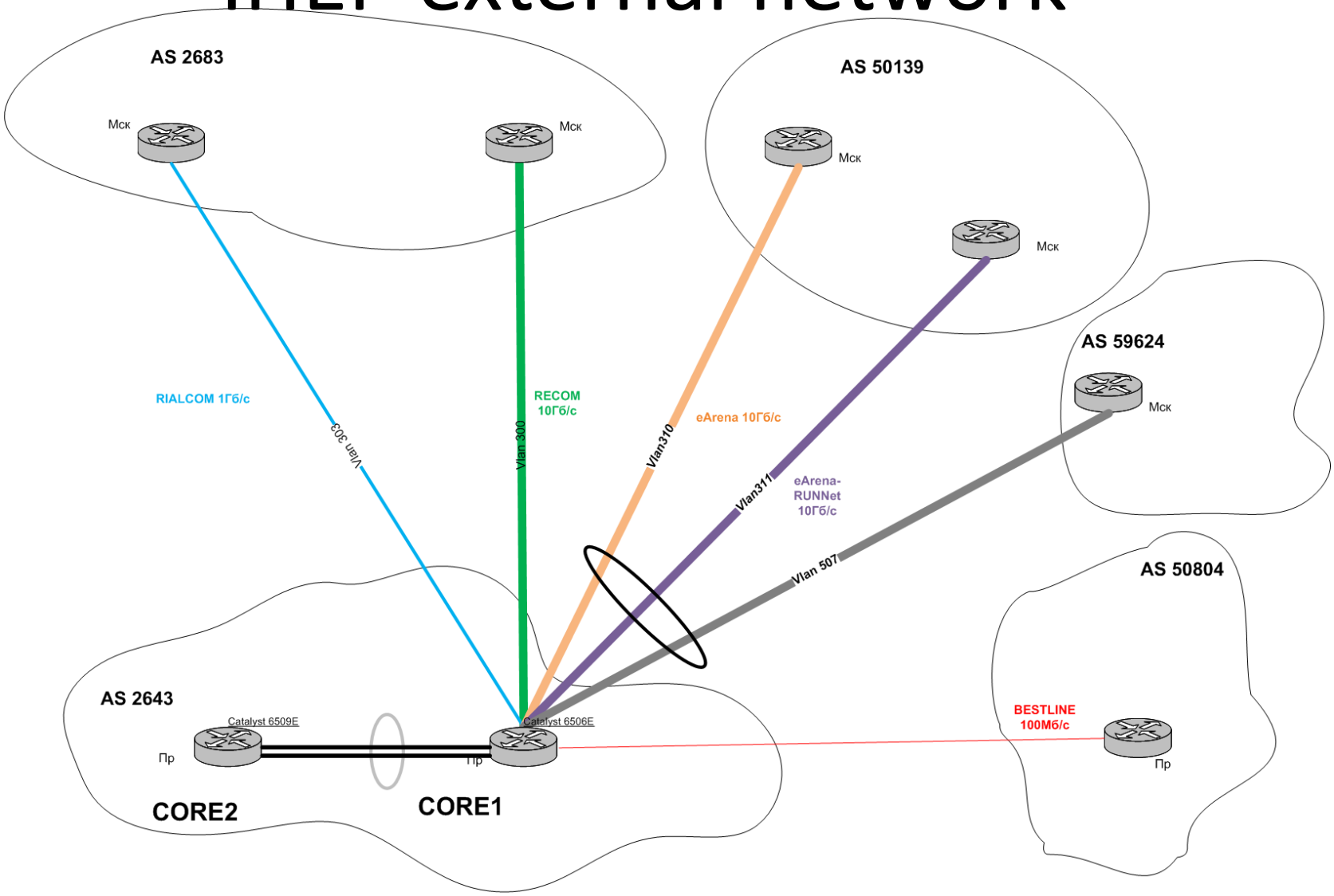


Storages overview2

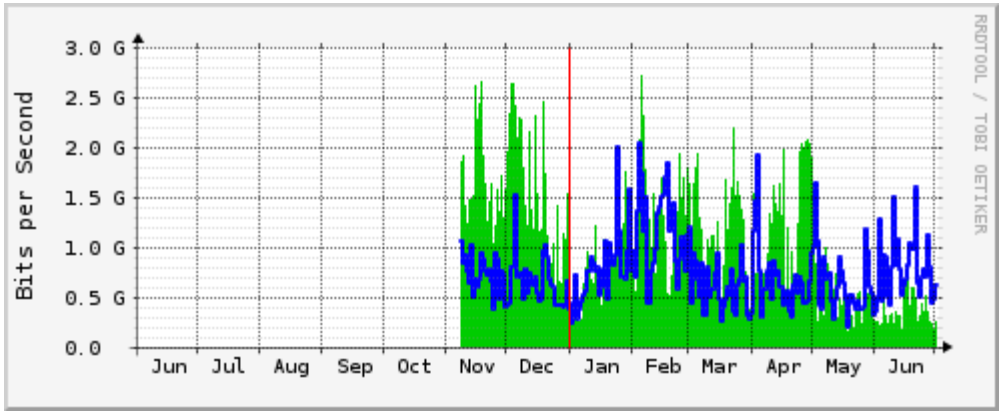




IHEP external network

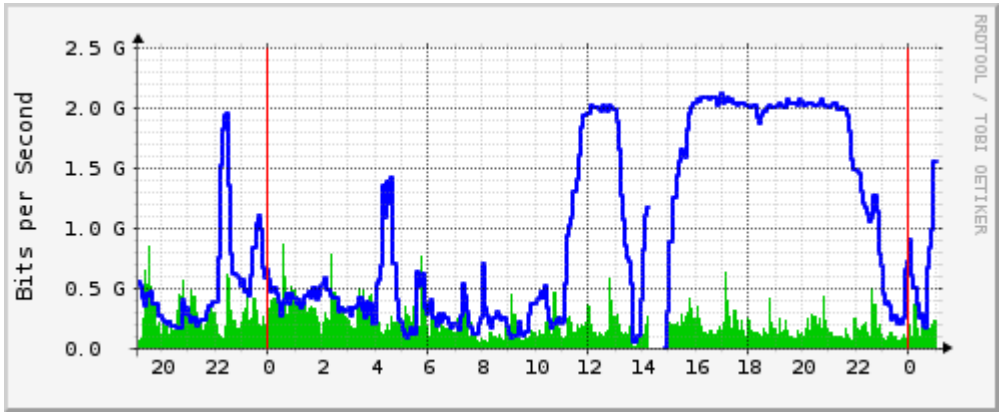


IHEP external network2

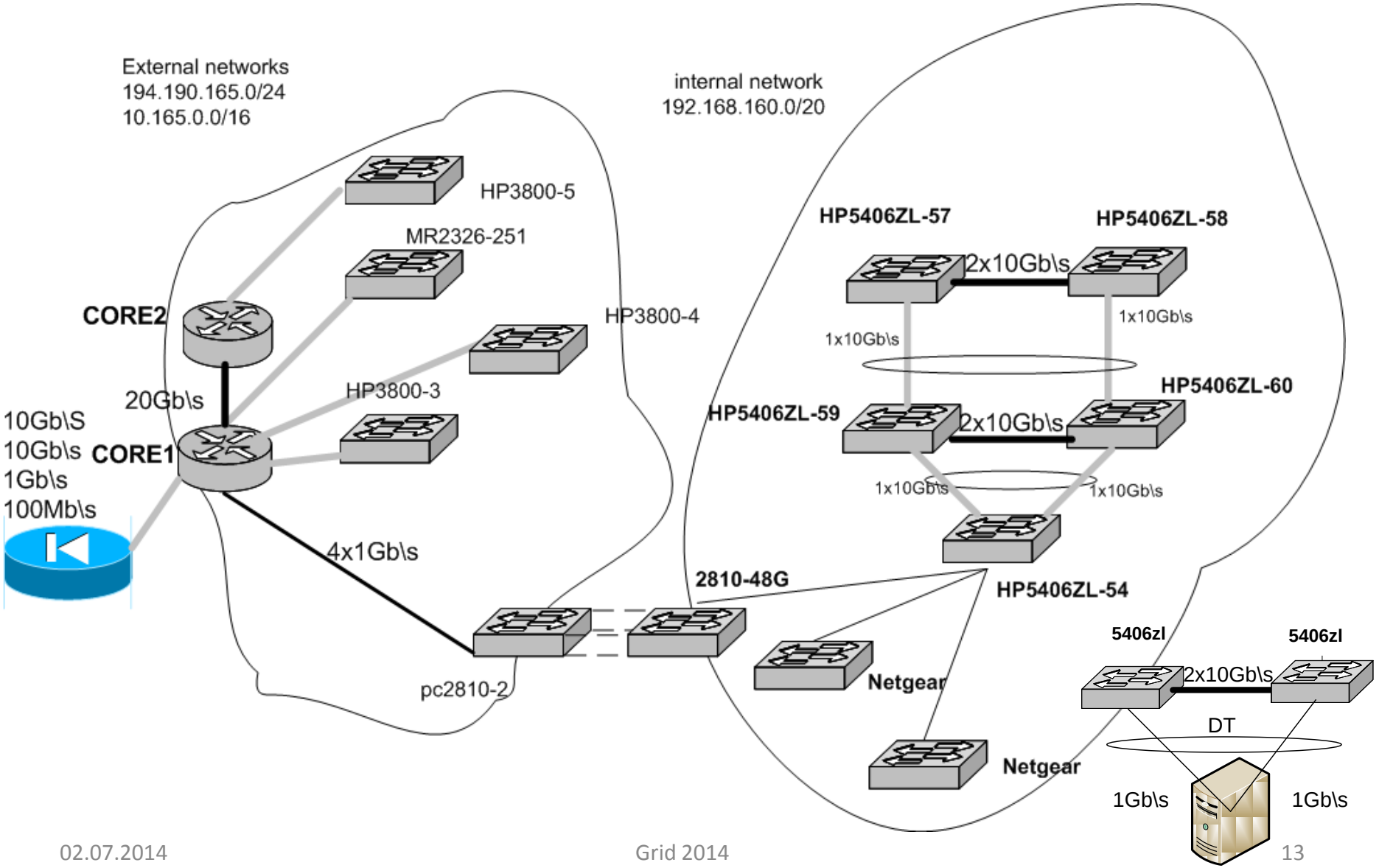


Internet channel through RUNNet

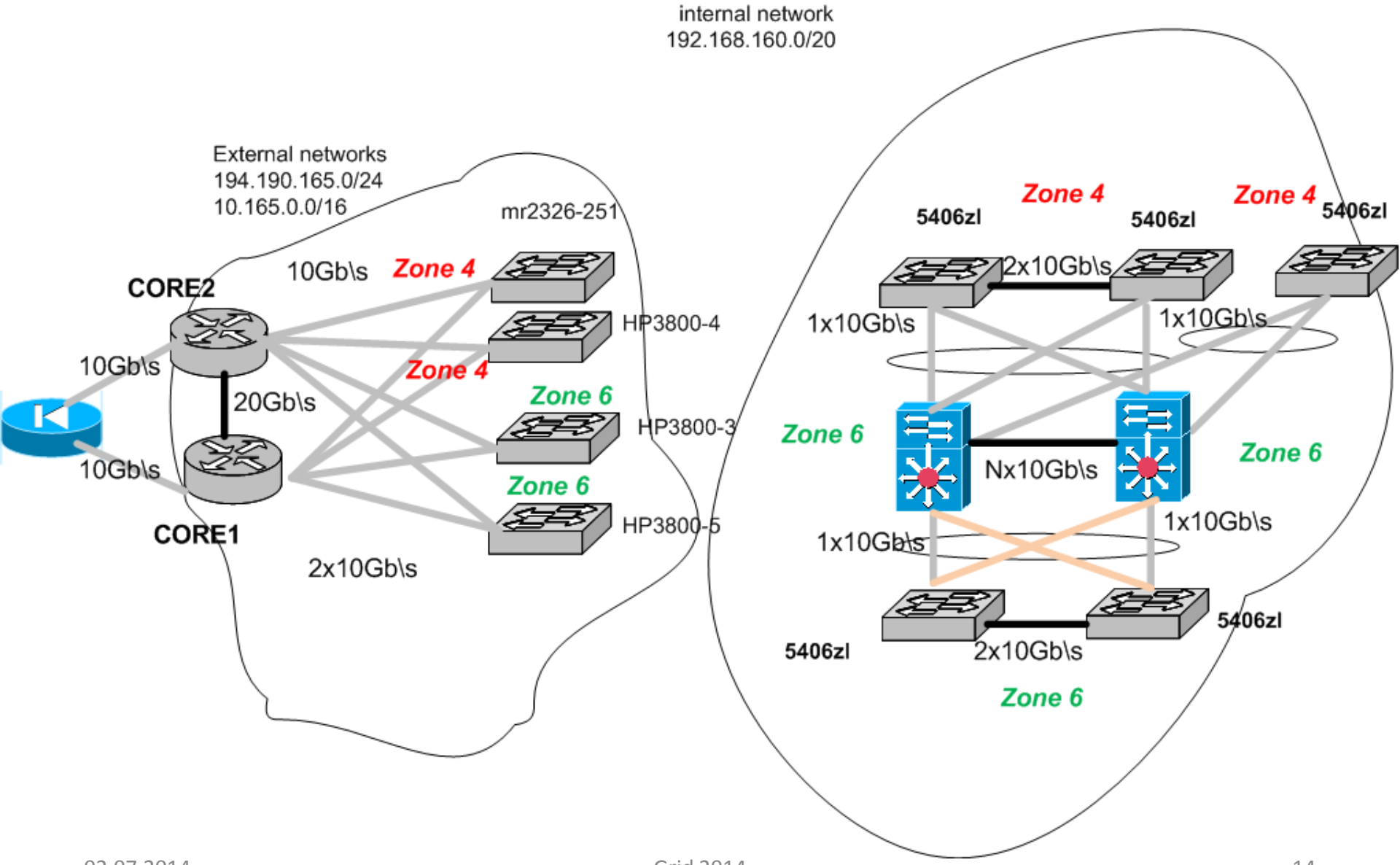
2GBs limit



site networking



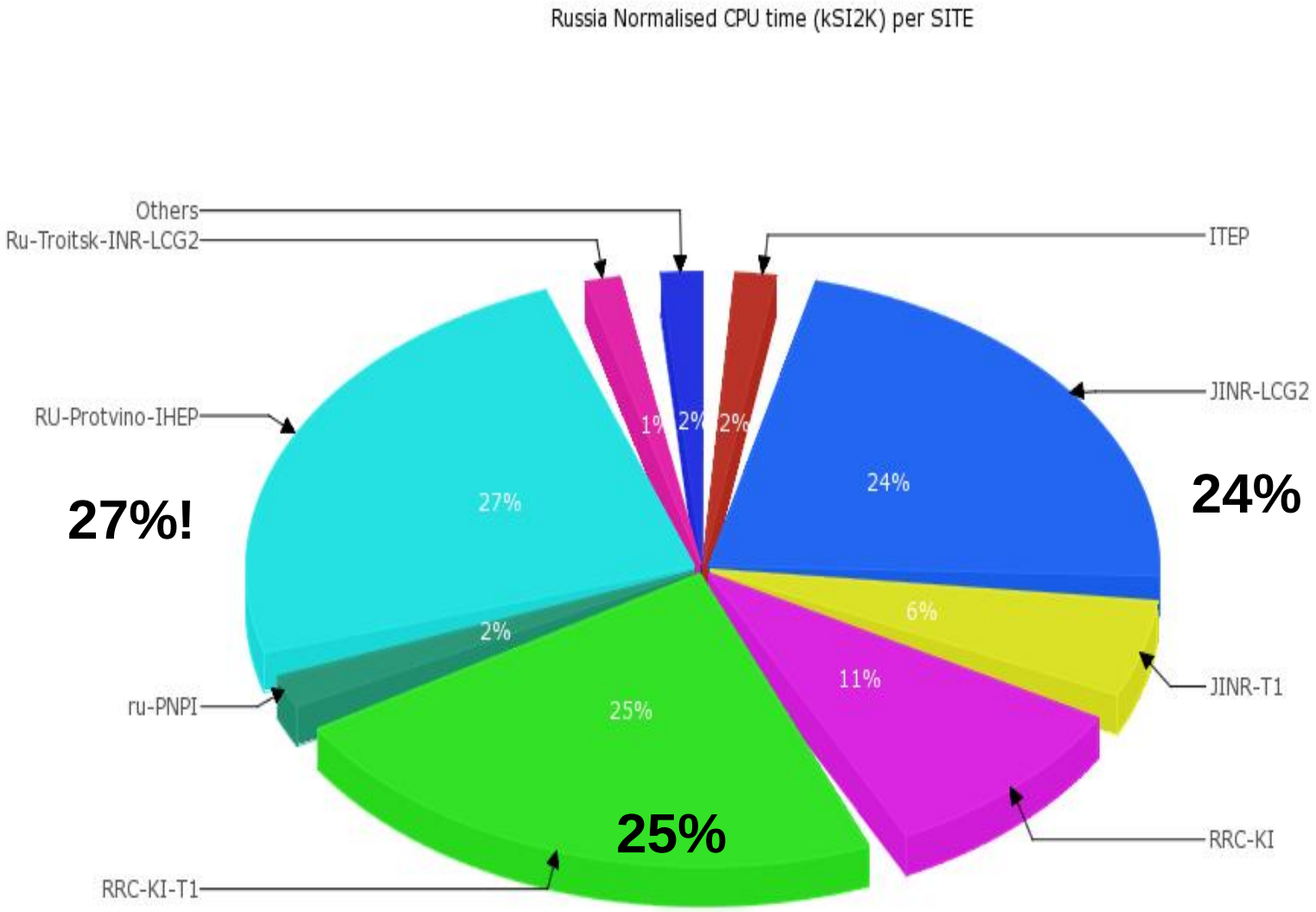
site networking plans



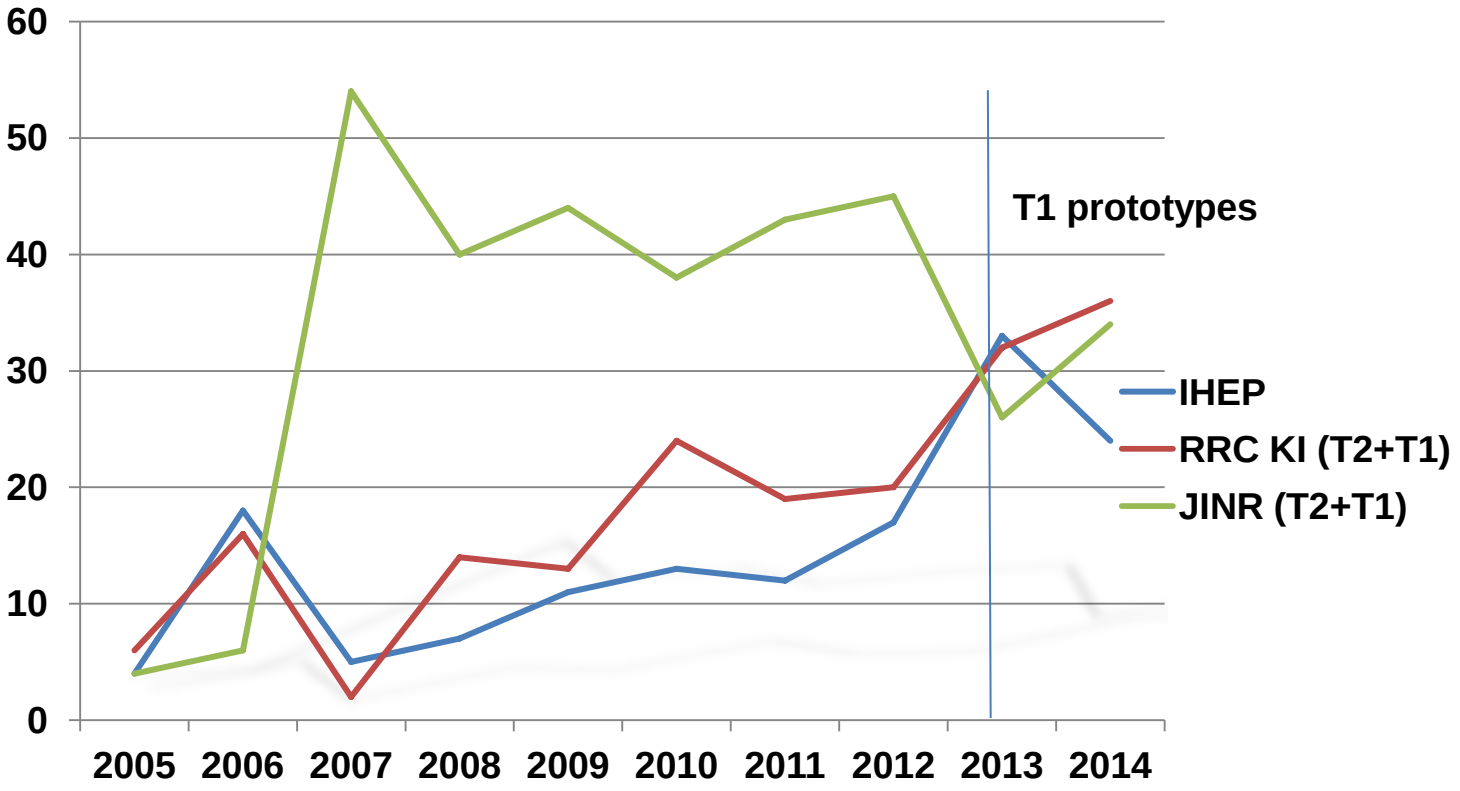
IHEP in Grid last year

Developed by CESGA 'EGI View': / normcpu / 2013:6-2014:12 / SITE-VO / lhc (x) / GRBAR-LIN / l

2014-06



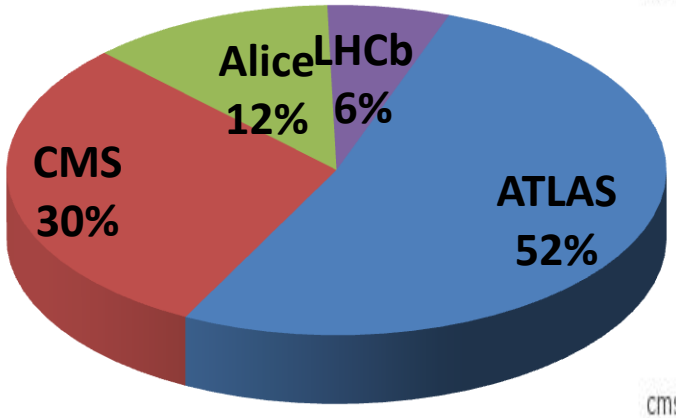
IHEP in Grid 2

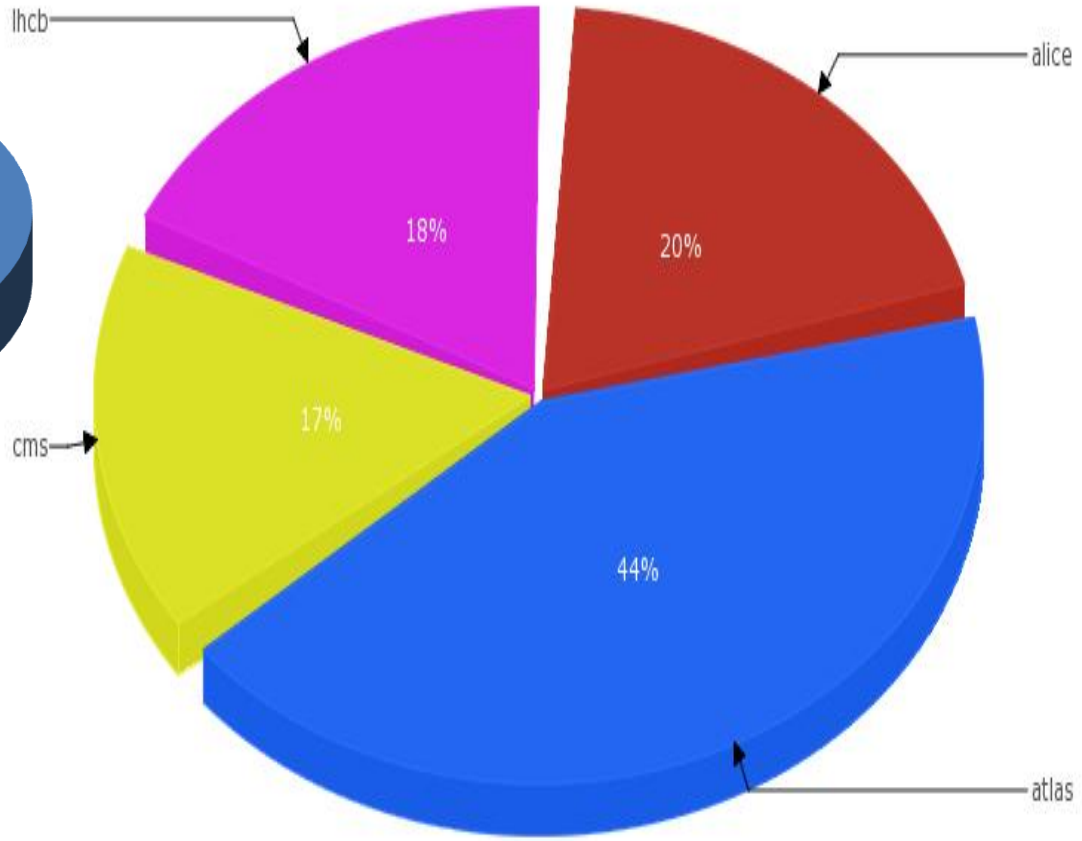


Contibution in % to RDIG by normalised CPU time

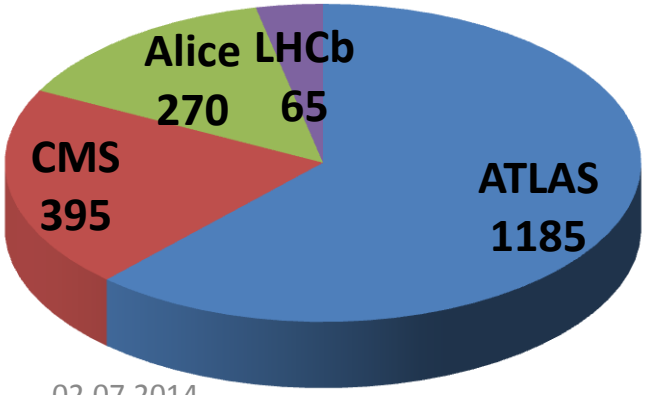
Site resources and usage last year

VO fair share, %

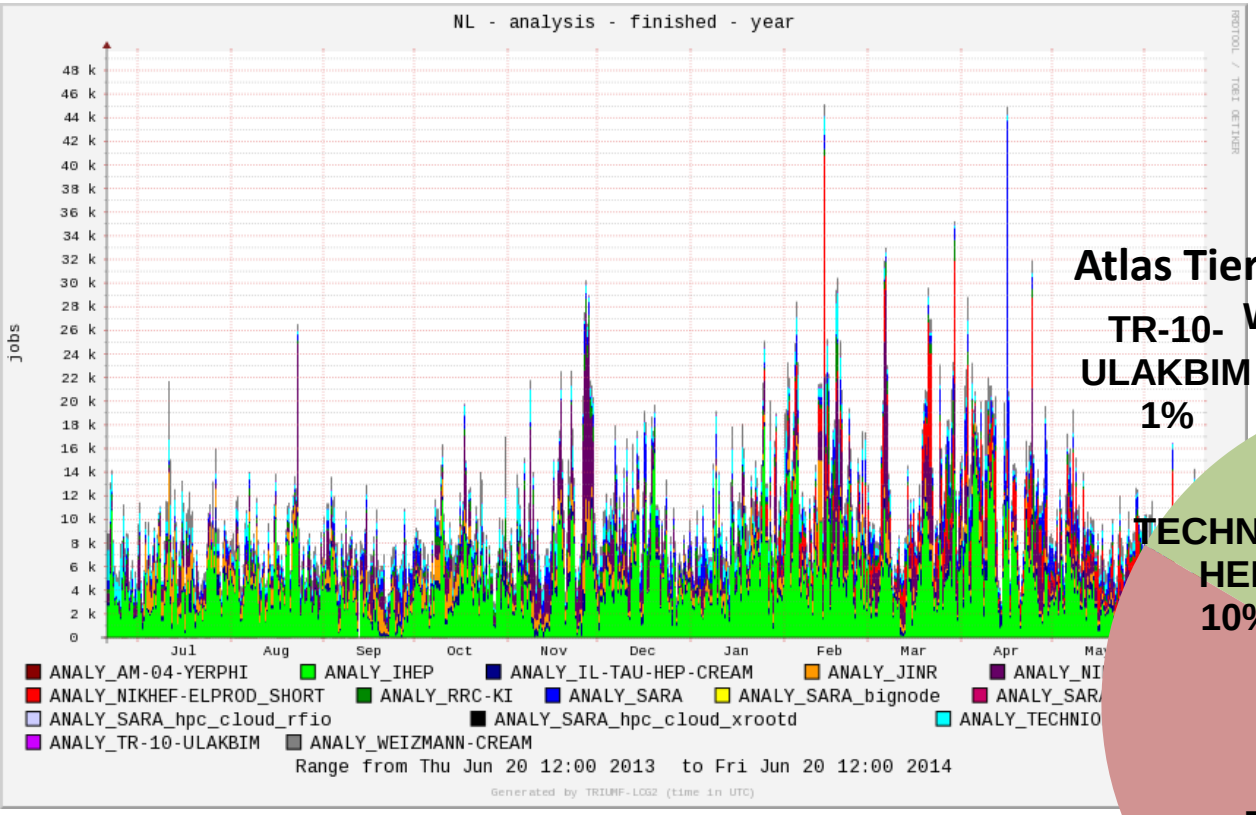


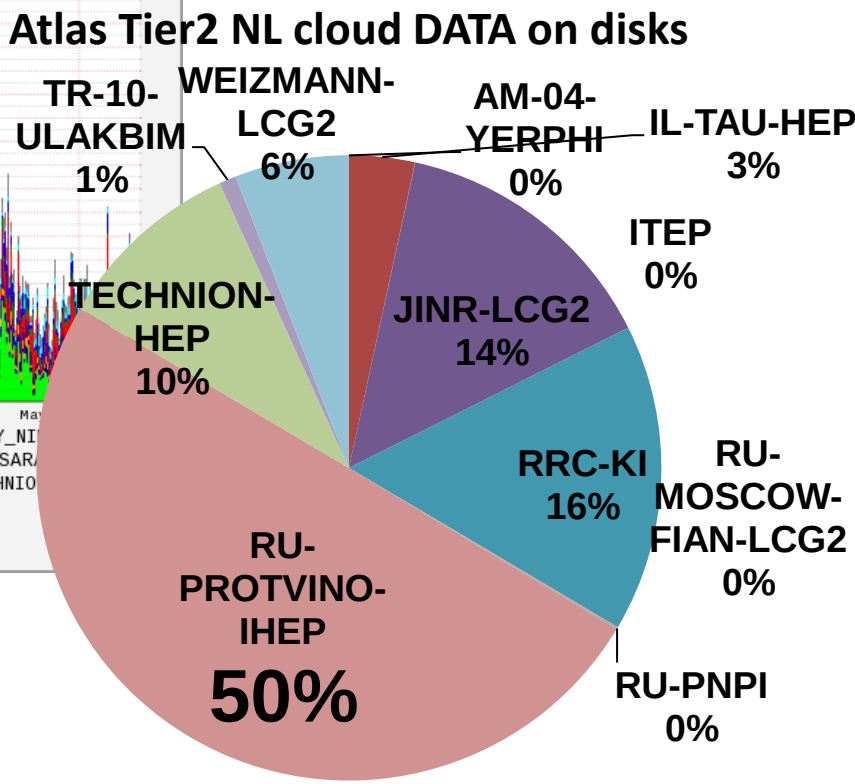


VO disks ,TB



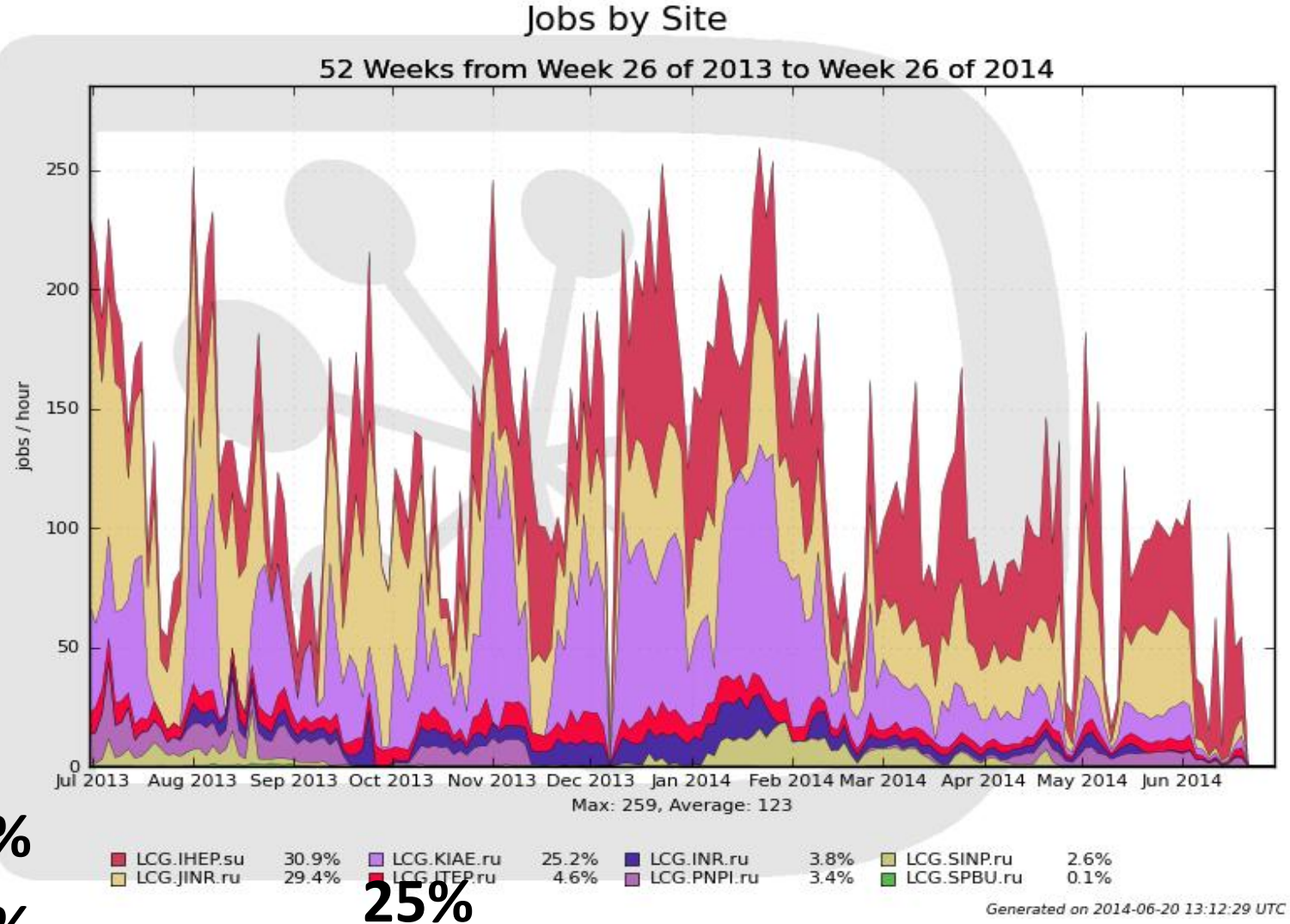
Sites usage by ATLAS last year





IHEP has status of Tier-2D alpha site in ATLAS with availability more than 95%

T2 sites usage by LHCb last year



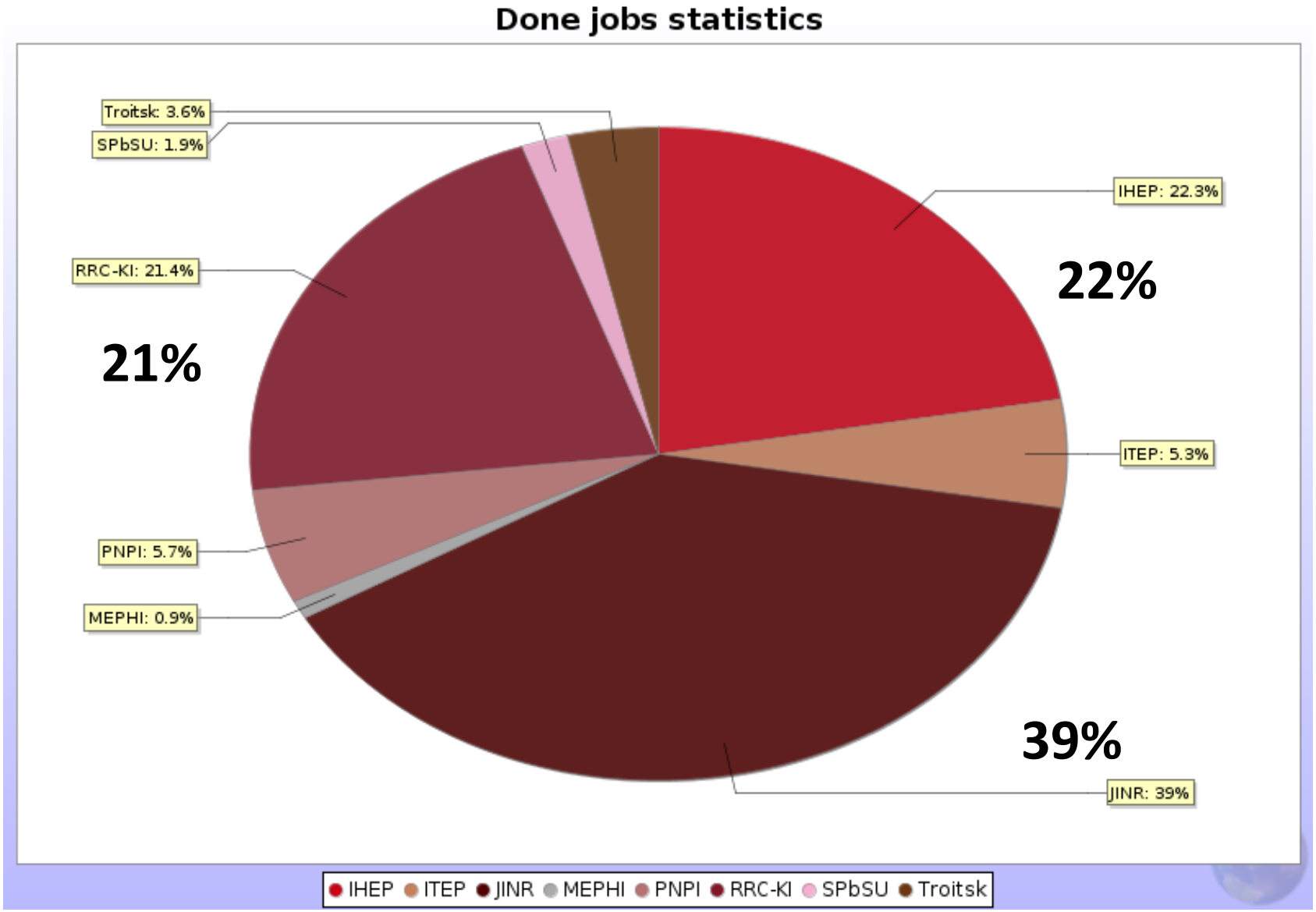
31%

30%

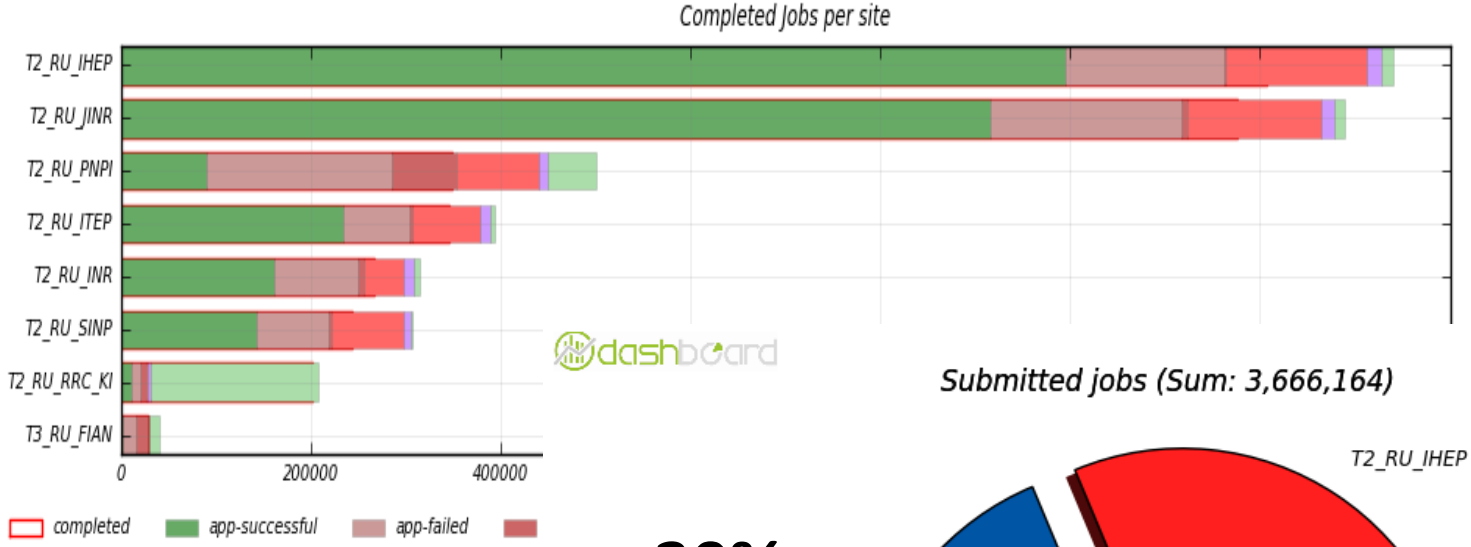
25%

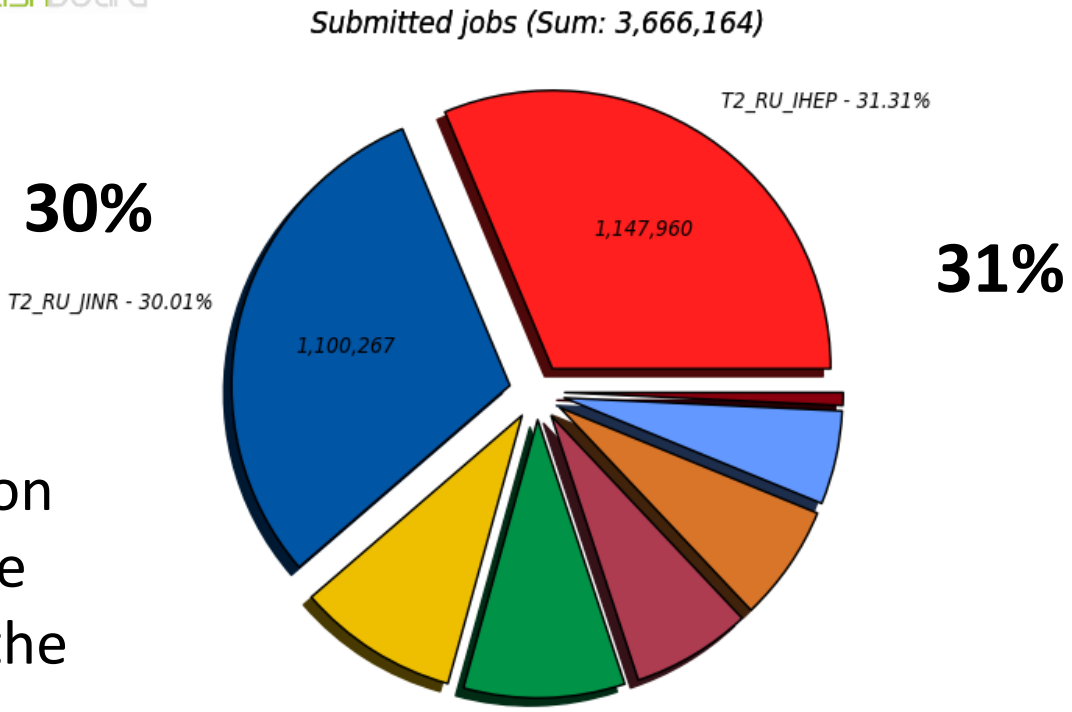
IHEP has status of Tier-2D site in LHCb! One from 10 World Wide

T2 sites usage by Alice last year



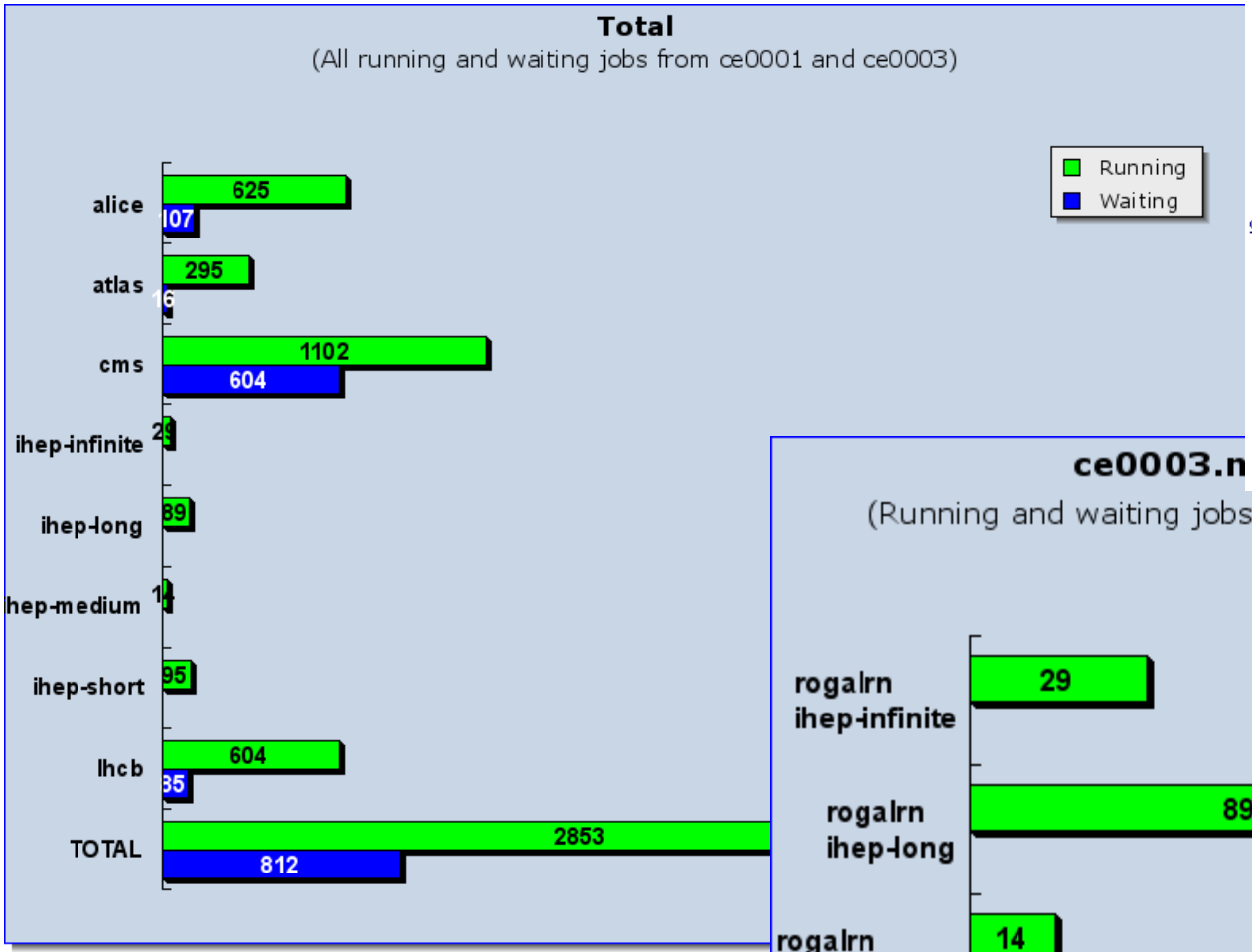
T2 sites usage by CMS last year

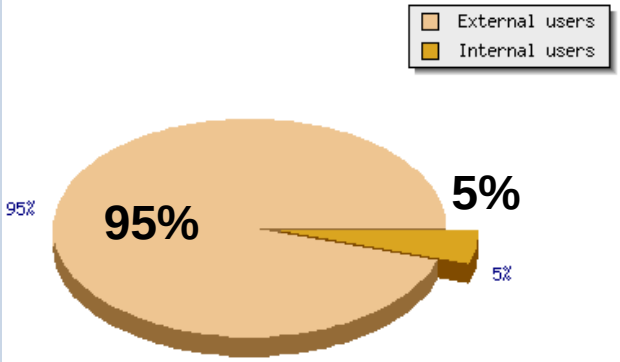


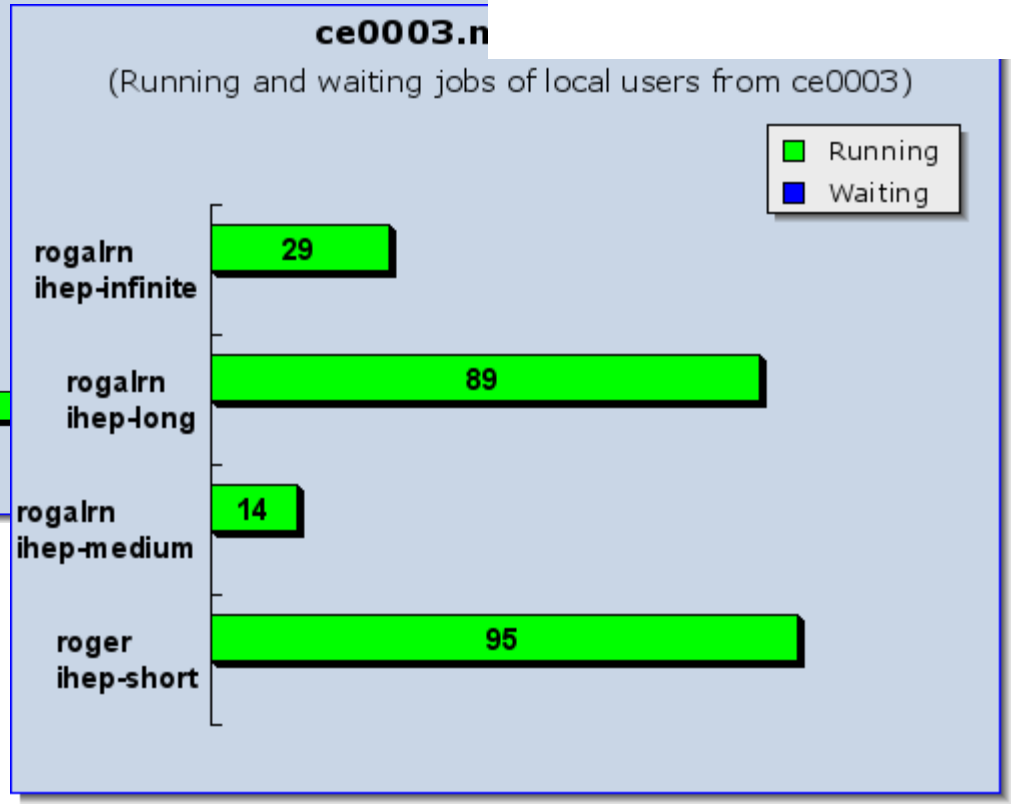


January 2014
associated with CMS diffraction group and respectively to store CMS diffraction data at IHEP the Forward and Small-x QCD PAG

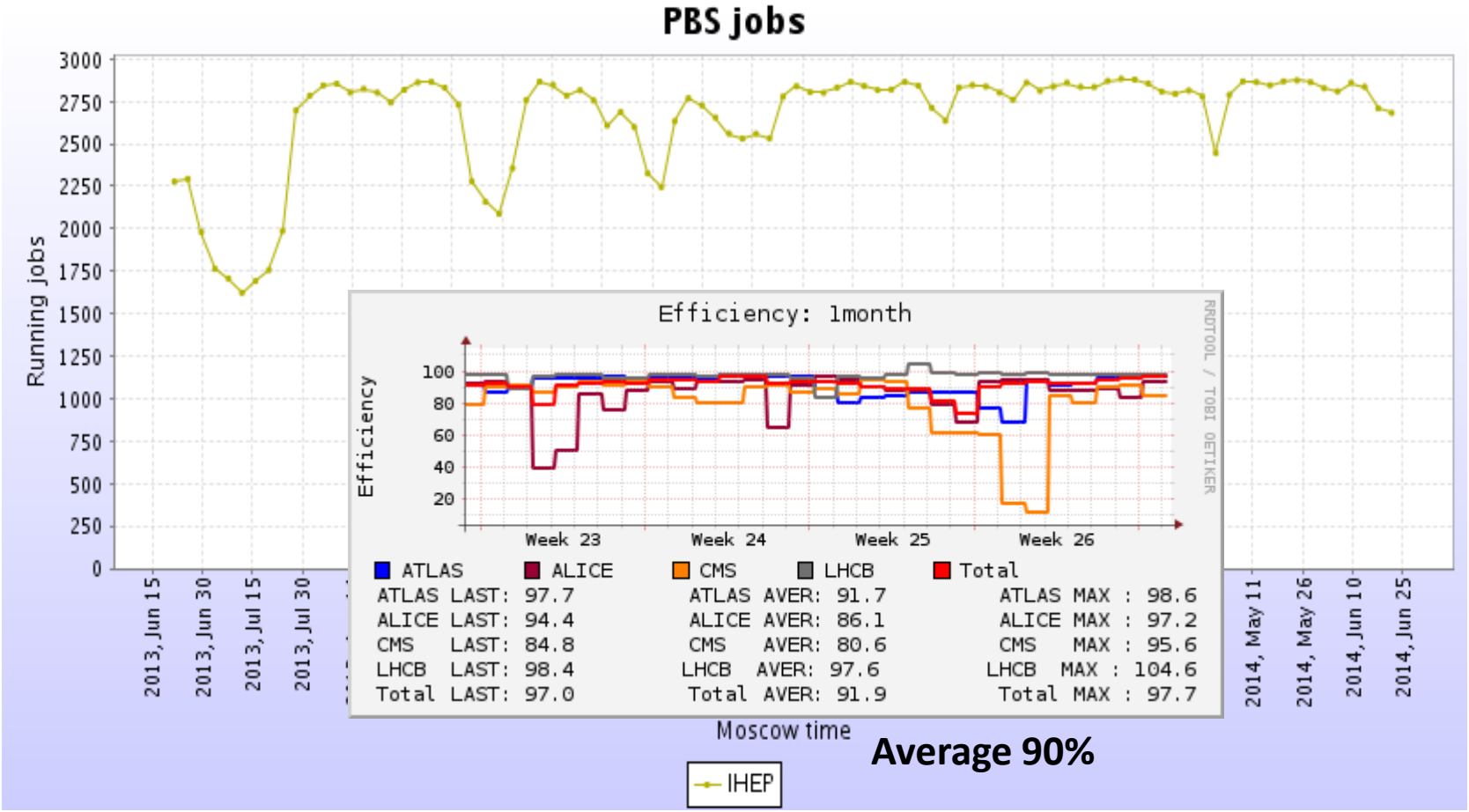
T2 sites usage by IHEP users







IHEP 24x7 cluster with high reliability and availability and efficiency



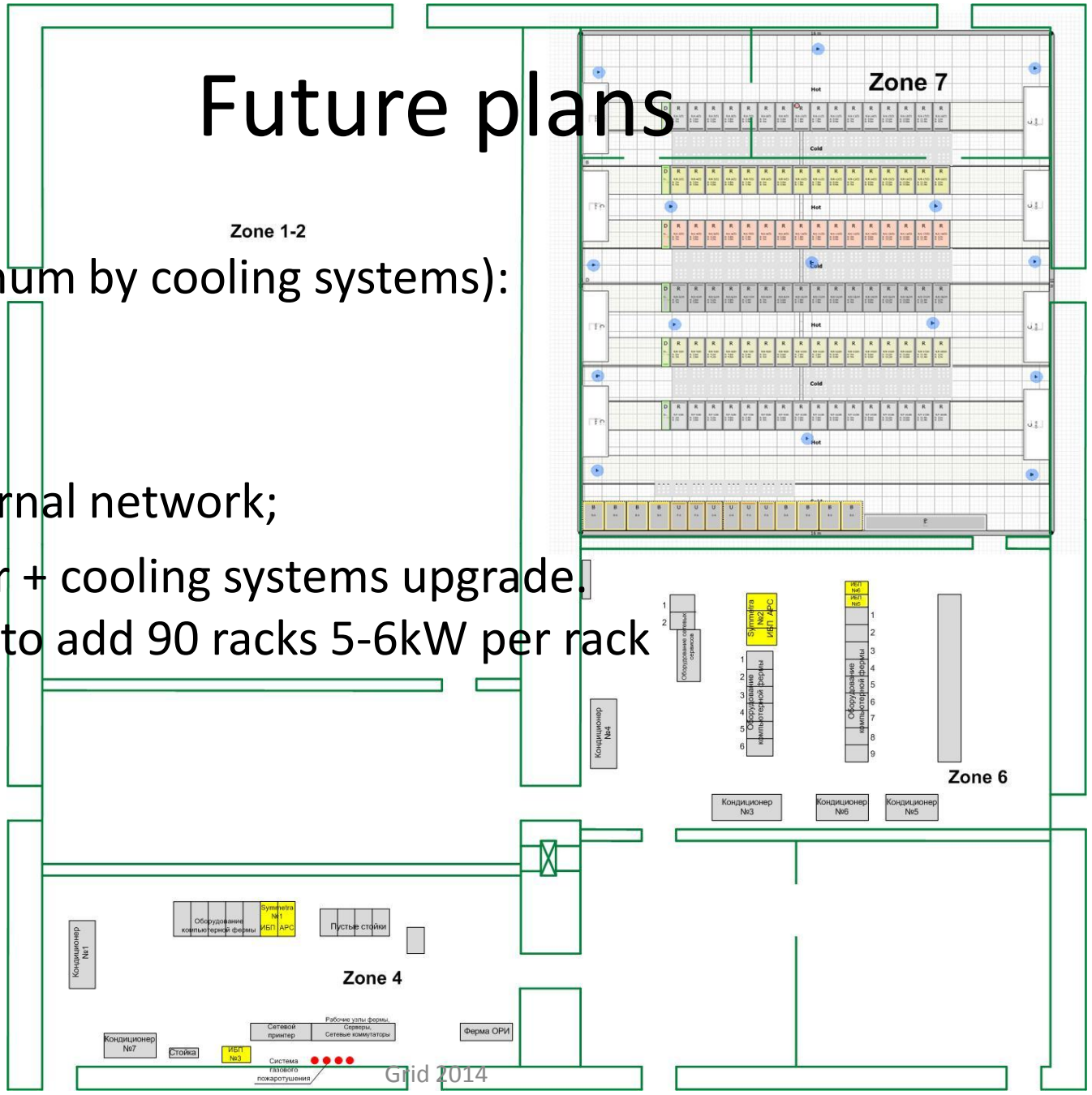
Future plans

Achieve (maximum by cooling systems):

- 5000Cores ;
- 6000TB;
- 8x10Gb external network;

Electrical power + cooling systems upgrade.

Maximum is to add 90 racks 5-6kW per rack



Thank you!

Any questions?