



ALICE



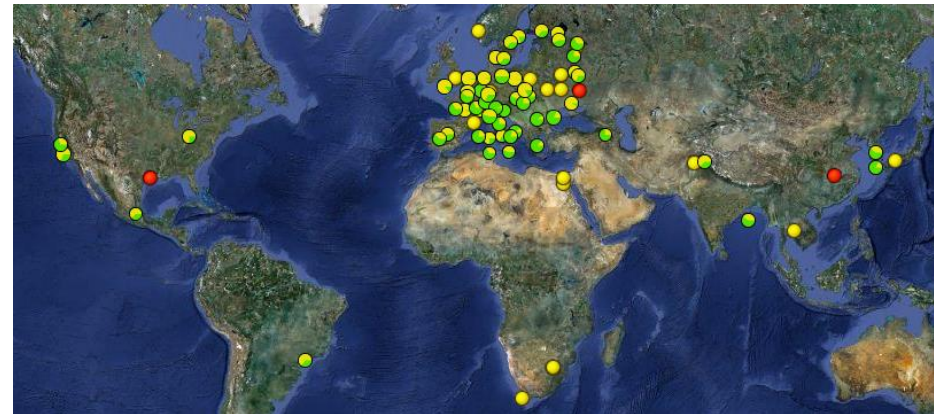
# ALICE USA Computing Project Proposal

ALICE-USA Resource Review

Apr 7-8, 2014

- Run 2 Project Proposal Context
- Complications
  - NERSC Move
  - LLNL/LC → ORNL/CADES
- Requirements & Deployment plans
  - CPU
  - Disk Storage
- Summary

- Goal: supply cost-effective Grid-enabled computing resources to ALICE
  - Fulfill MoU-based ALICE USA obligations for computing & storage resources to ALICE
  - Based on ALICE USA participation at about 7-8% of ALICE
- 2009 Project Proposal
  - Operate facilities at two DOE labs
    - NERSC/PDSF at LBNL
    - Livermore Computing (LC) at LLNL
    - 3-year procurement plan
  - LBNL as the host lab
- Fully operational since Summer 2010
- Operations defined in “Project Execution & Acquisition Plan”: PEAP
  - Organization structure
  - Procurement strategy
  - Deliverables & Milestones



Project due for a 3 year DOE Review  
& originally planned for 2/2014

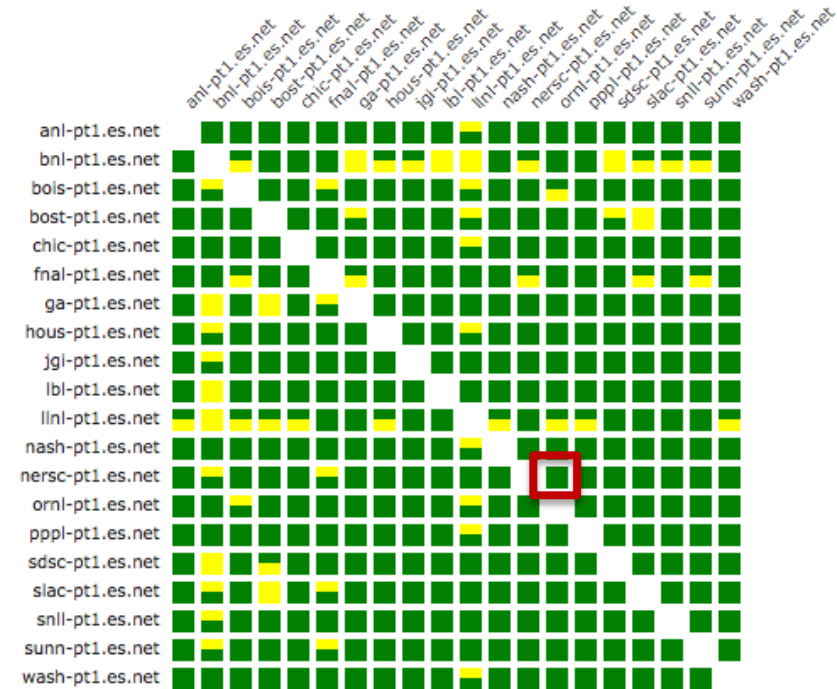


ALICE

# Recommendation for Two Facilities NERSC/PDSF and ORNL/CADES



- **NERSC/PDSF + ORNL/CADES**
  - Scientific Computing strength
  - High-bandwidth connection: ESNet
  - Favorable cost structure
  - Proximity to HPC Resources
    - Oak Ridge Leadership Class Facility
    - NERSC Flagship facility
    - Strategic alignment with O<sup>2</sup> project

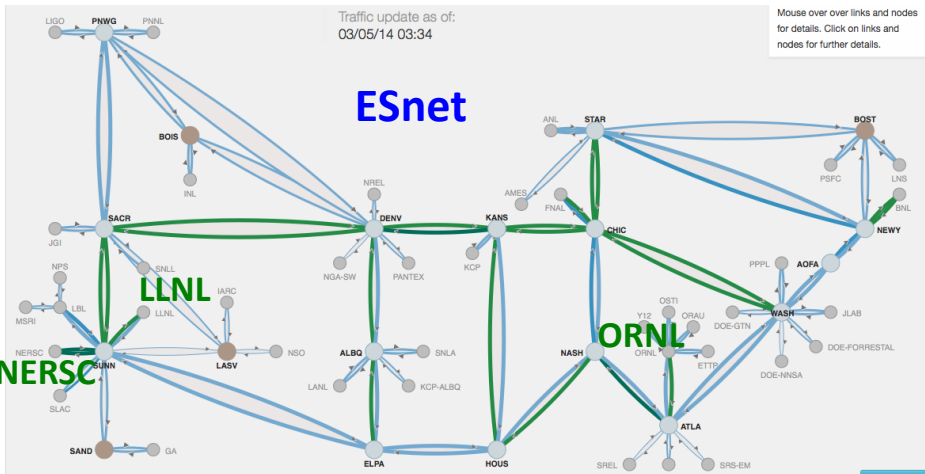


ESnet - ESnet Hub to Large DOE Site Border Throughput Testing

■ Throughput >= 2000Mbps
 ■ Throughput < 2000Mbps
 ■ Throughput <= 500Mbps

## ESnet Monitoring

LLNL/LC → ORNL/CADES  
demands a new proposal



- **Develop a new Project Execution and Acquisition Plan (PEAP)**

- Schedule new resources for NERSC/PDSF and ORNL CADES to:

- Adequately meet new ALICE requirements in FY15
- Fill all ALICE-USA obligations estimated through Run 2

- Establishes operational milestones

- Stable grid operations @ORNL CADES
  - AliEn VO box & SE
  - OSG Services (TBD)
- WLCG MoU with ORNL CADES

Year	FY14	FY15	FY16	FY17
<b>ALICE Requirements</b>				
CPU (kHS06)	300	320	400	480
Disk (PB)	22.9	37.5	45.4	50.7
<b>ALICE-USA Participation</b>				
ALICE Total-CERN Ph.D.	555	555	555	555
ALICE-USA Ph.D.	42	42	42	42
ALICE-USA/ALICE (%)	7.6	7.6	7.6	7.6
<b>ALICE-USA Obligations</b>				
CPU (kHS06)	22.8	24.3	30.4	36.5
Disk (PB)	1.7	2.8	3.4	3.8

**ALICE Run-2 Requirement Estimates**

- **Aggressive timeline:**

- Draft in progress - working document by end of April
- April 7<sup>th</sup>-8<sup>th</sup>: host ALICE Offline at LBNL to review proposal and plan

➤ DOE Chaired External Review of project proposal is being scheduled ~ June 2014

- **NERSC new building in early 2015**
  - More details Tuesday, in NERSC Report
  - No new hardware will be installed in the current building
  - Operate in both buildings for ~1 year
    - Most of PDSF CPU nodes will move
      - Duration of move/downtime is unclear
      - Will attempt to mitigate with other cpu
    - Storage will remain in old building
    - New storage → new building
- **LLNL/LC will continue into 2015**
  - Allows us flexibility to meet obligations



- Target next heavy ion run → Fall 2015
  - Both NERSC and CADES meeting all ALICE-USA obligations
- LLNL/LC should assumed to be decommissioned → Oct 2015
  - Regardless of flexibility
- NERSC CRT building ready for new HW → Spring 2015
  - NERSC Oakland Facility assumed to be decommissioned → Fall 2015
- ORNL/CADES ready for deployment as needed
  - Current target for new hardware is by April 2015



- ALICE PhD & ALICE-USA PhD Counts are estimates

- Columns are US FY:

- By DOE request

- ALICE Disk puzzle:

- 63% jump in 2015

- 21% increase in 2016

- 10% increase in 2017

- Data rate 2015 = 2016 ?

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**ALICE**

# Deployment plan by site



Year	FY14 Installed	FY15	FY16	FY17
<b>LBNL HW &amp; Costs</b>				
CPU change (+/- kHS06)		-4.0	-4.0+6.5	+6.0
CPU installed (kHS06)	13.0	9.0	11.5	17.5
Disk change (+/- PB)		-0.35+0.4	-0.37+0.4	+0.5
Disk installed (PB)	0.72	0.77	0.8	1.3
<b>ORNL HW &amp; Costs</b>				
CPU change (+/-kHS06)		+18.0	0	0
CPU installed (kHS06)		18.0	18.0	18.0
Disk change (+/-PB)		+0.6	+0.4	+0.4
Disk installed (PB)		0.6	1.0	1.4
<b>LLNL HW &amp; Costs</b>				
CPU installed (kHS06)	11.5	11.5	0.0	0.0
Disk installed (PB)	0.68	0.65	0.0	0.0



# Preliminary summary plan

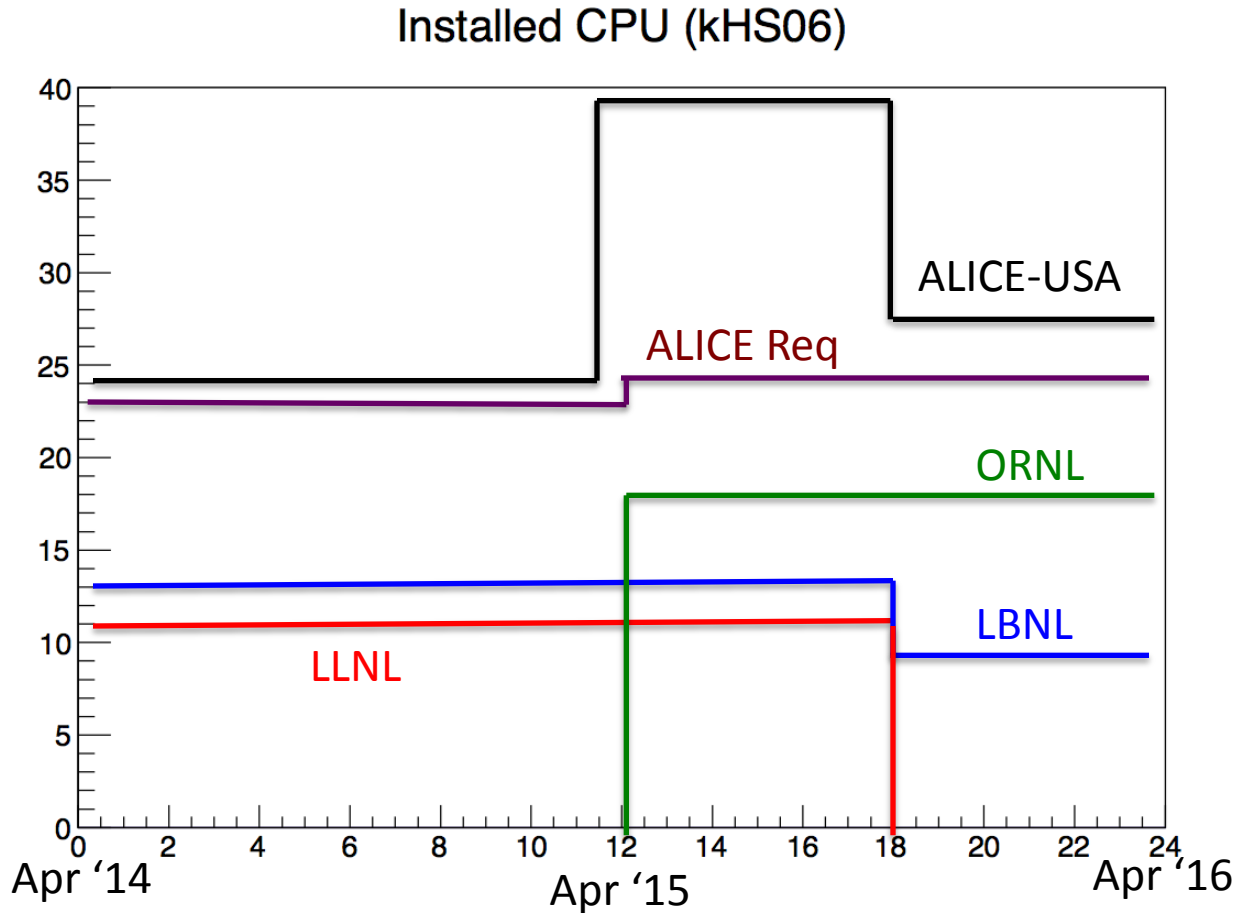


- Meets CPU targets at ~100%
- Falls well short of disk obligation
  - Need to better understand year-to-year requirements
  - Expect that we will catch up ~FY17 or if need arises from ALICE

Year	FY14 Installed	FY15	FY16	FY17
CPU (kHS06)	24.5	27.0	28.5	36.5
% CPU obligation	107%	111%	95%	100%
Disk (PB)	1.4	1.37	1.8	2.7
% disk obligation	82%	49%	53%	71%
Disk deficit (PB)	0.3	1.43	1.6	1.1

Does not include LLNL/LC

# CPU Deployment Profile





# WLCG Resource Pledge Guidance

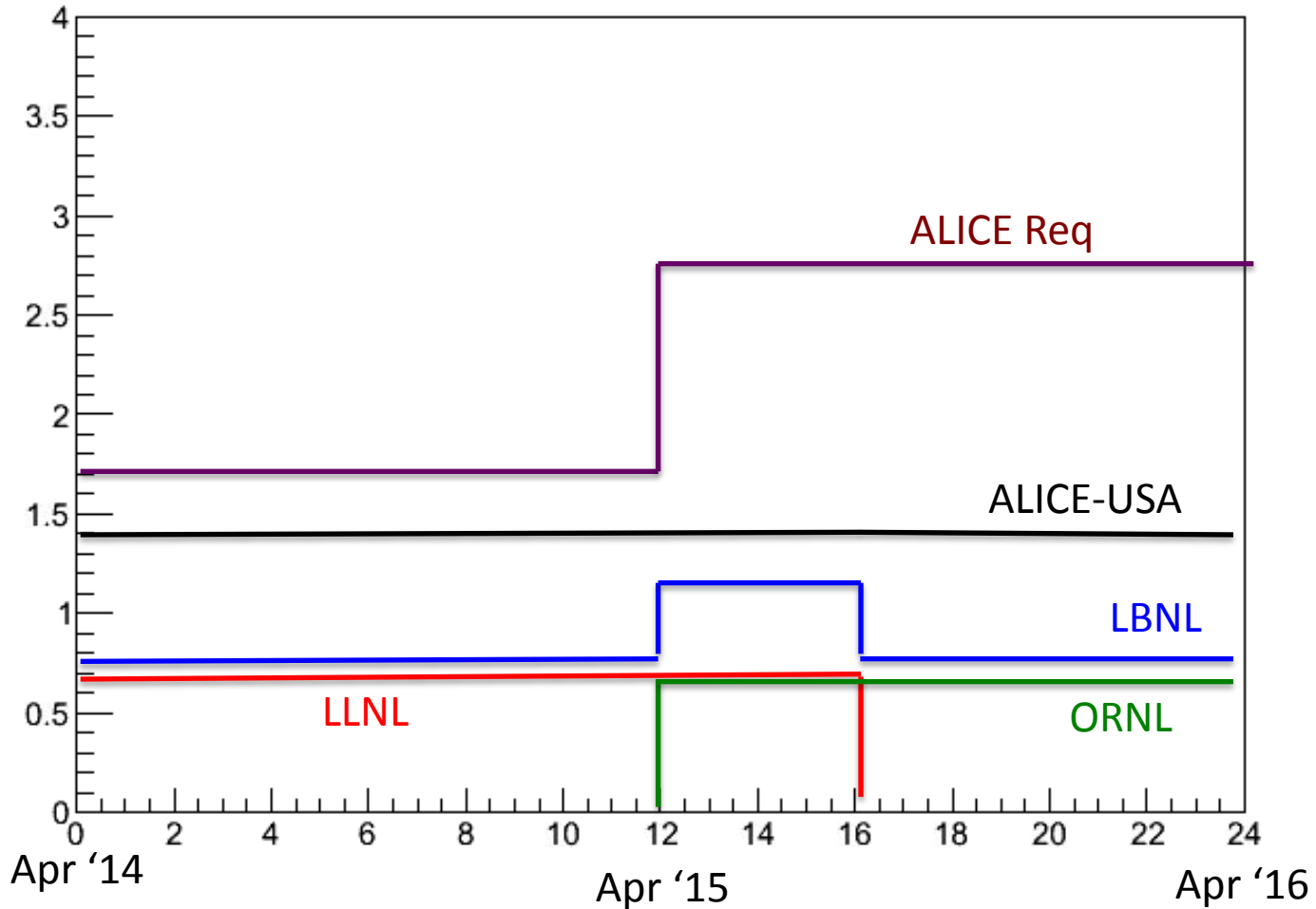


- LLNL/LC will operate for  $\frac{1}{2}$  of RRB 2015
  - Assume to continue with current pledge & then remove pledge mid-year
    - should verify with WLCG
- ORNL/CADES available to make pledges after MoU
  - Targets MoU signed by Oct 2015
- LBNL/PDSF will lose resources mid-2015 RRB year
  - Will pledge to the lower value

- Storage is or will be out of warranty:
  - LLNL/LC
    - 680TB ended ~Aug 2013
  - NERSC/PDSF:
    - 144TB ended June 2013
    - 288TB ends Apr 2014
    - 288TB ends Oct 2014
  - Project plans to operate ~1.4PB storage at LLNL & LBNL into 2015
- Replacement storage will be new SE at both LBNL and ORNL
  - Requires migrating >700TB data between new and old SEs
    - LLNL::SE → ORNL::SE --- WAN transfer
    - LBL::SE → LBLEOS::SE --- local high bandwidth transfer
  - Migration will take time
    - How to operate during migration?
      - Do we make source SE readonly?
    - Does ALICE know how to do this?

# Disk Deployment Plan

Installed Disk (PB)



- **New ALICE-USA Computing project proposal required for Run 2**
  - Two US based ALICE Tier-2 facilities, ORNL/CADES & LBNL/NERSC
  - Subject to DOE review in early June
- **Hardware deployment plan is preliminary**
  - Will satisfy CPU requirements
  - Needs to understand disk requirements, year-to-year changes
- **The project plan is made complicated**
  - Movement of NERSC to new building in 2015
  - Replacement LLNL/LC resources with new resources at ORNL/CADES
    - Particularly transfer of ~400TB of data over WAN