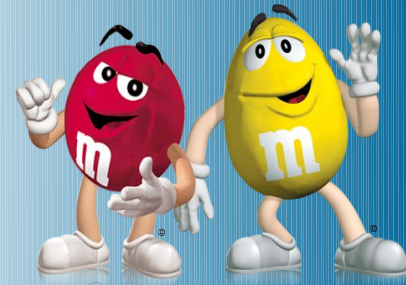


ACTL Meeting

ACTL Activities in Montpellier and Marseilles



DIRK HOFFMANN, JULIEN HOULES
CENTRE DE PHYSIQUE DES PARTICULES
DE MARSEILLE

CLAUDE ZURBACH
LABORATOIRE UNIVERS ET PARTICULES
DE MONTPELLIER

Outline

- **Camera Event Builder :**
Speedy with netmap
- **Code management, packaging, distribution**
- **Future**
 - **Data Generator (Event Building Stimulator)**
 - **Data Formats**

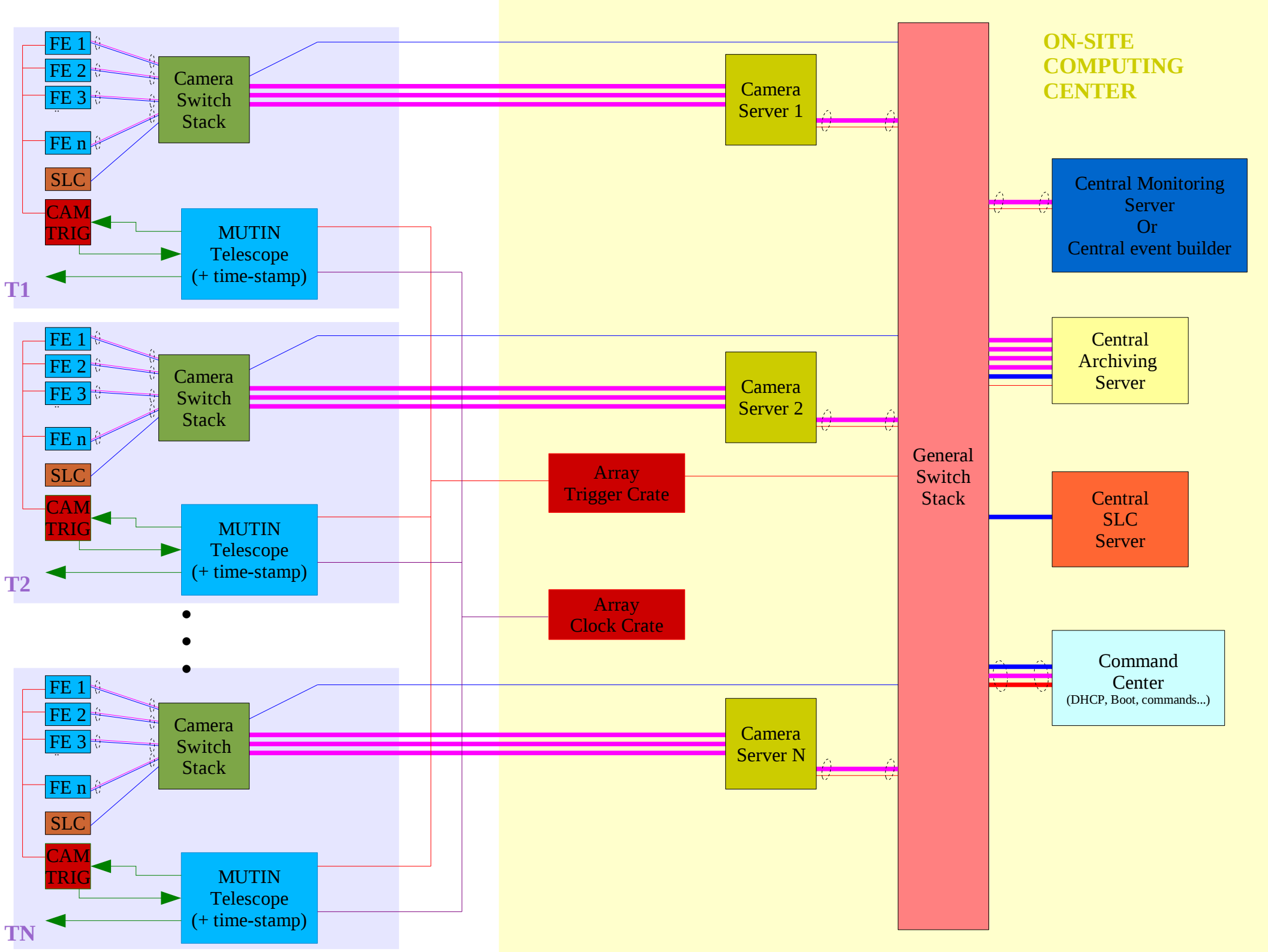


Event Building

(cont'd)

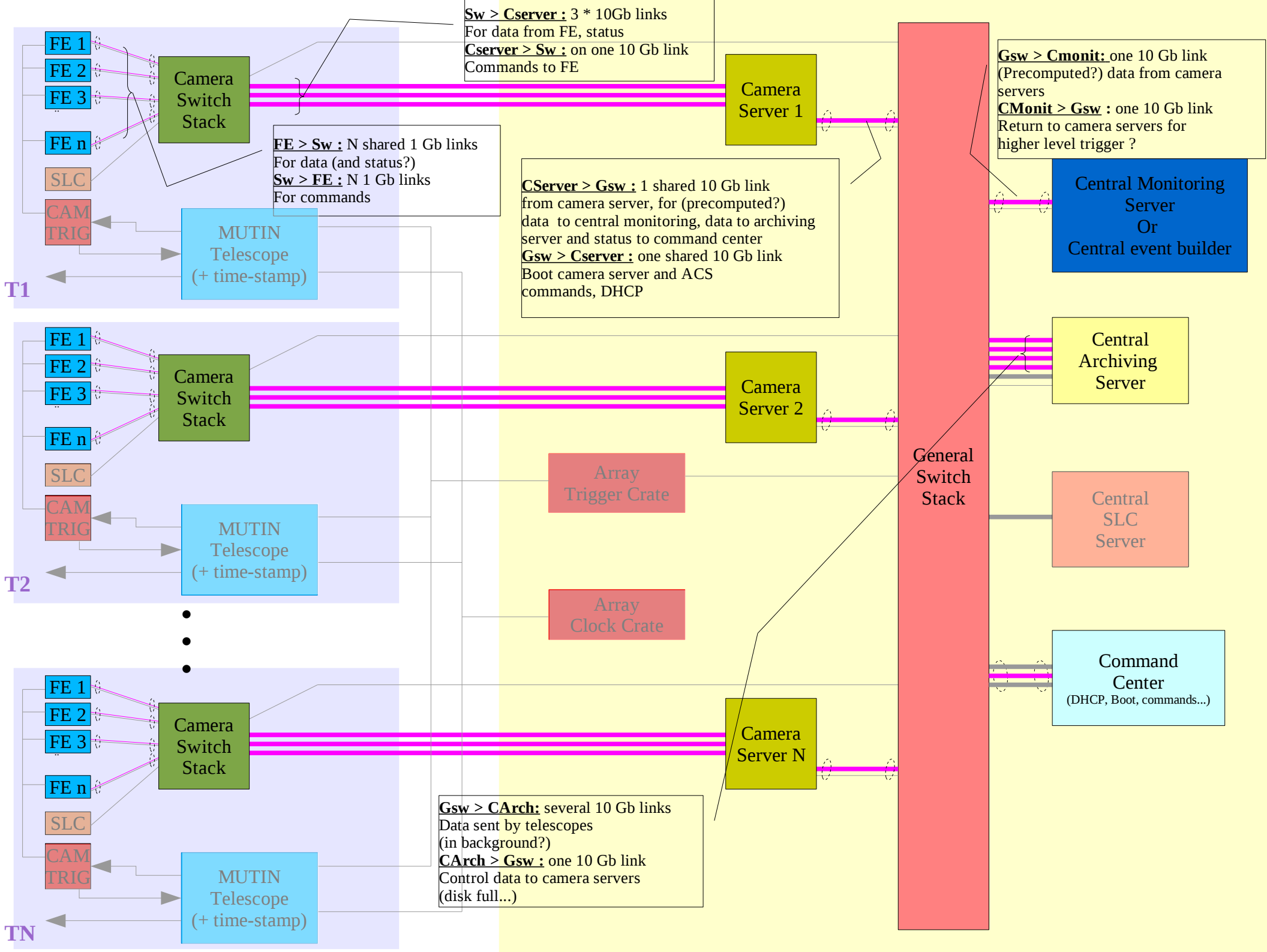
Context

- **Project influenced by NeCTArCam choices**
- **Coherent within french CTA landscape**
- **Complete DAQ+SlowControl / ACTL / CCC schema**
- **Trying (hard) to develop generally usable standards and software!**

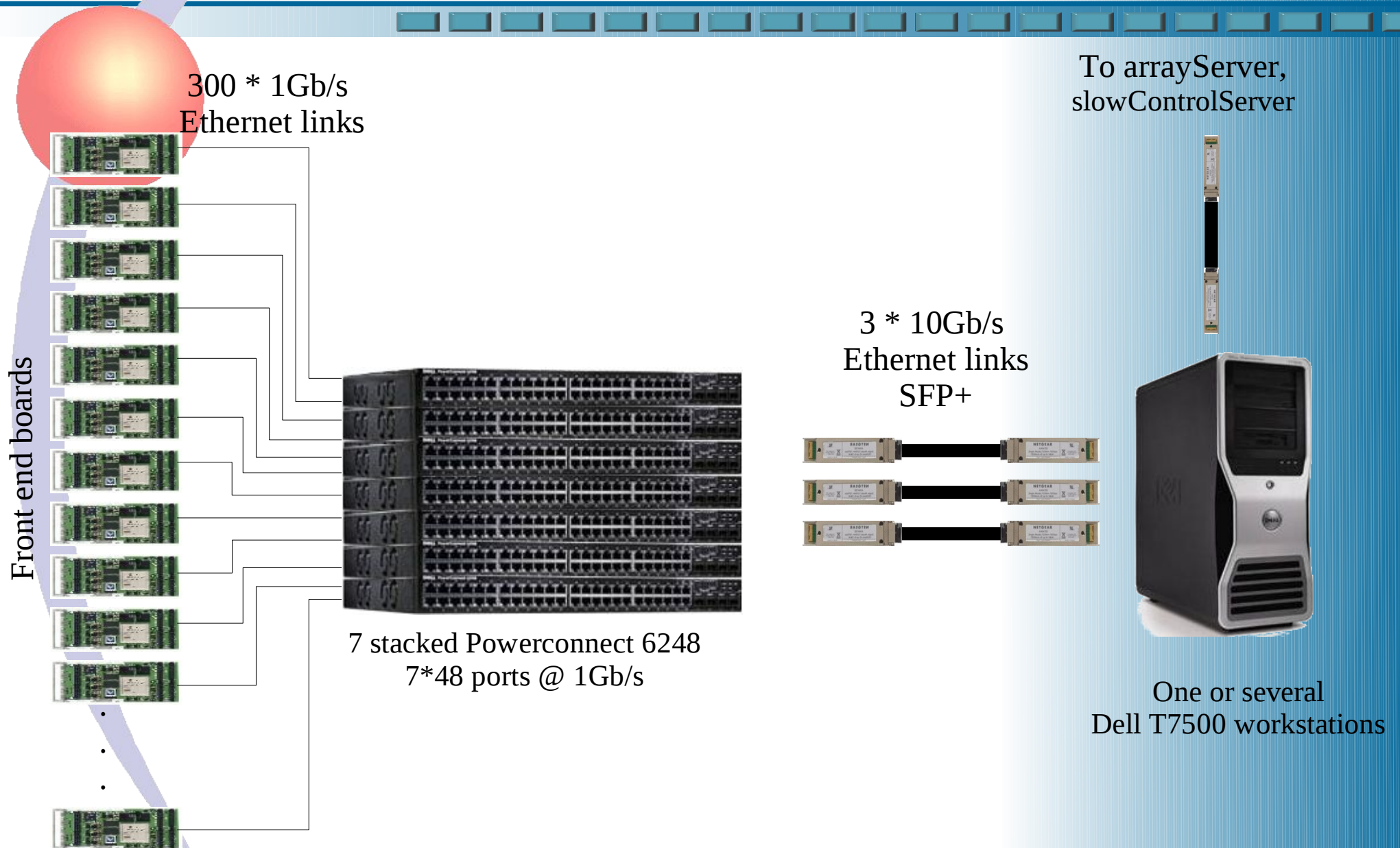


Our (M&M) scope

- **From data source to downstream**
- **For one camera (“Camera Server”)**
 - Generation (simulation) of data in place of FE for stimulation of DAQ system
 - Reception of 300 or more FE channels for 2100 pxl
 - Trigger rate 10kHz, 72 samples (16-bit words)
 - ⇒ **Camera rate $10^4 \cdot 2100 \cdot 72 \cdot 2 = 3.024$ GBps**
 - ⇒ **FE board rate 10 MBps for 300 boards à 7 pxl**
- **Reconstruct in CamSrv and send downstream**
- **Possibility of treatment in CamSrv!**



How it could look in real world



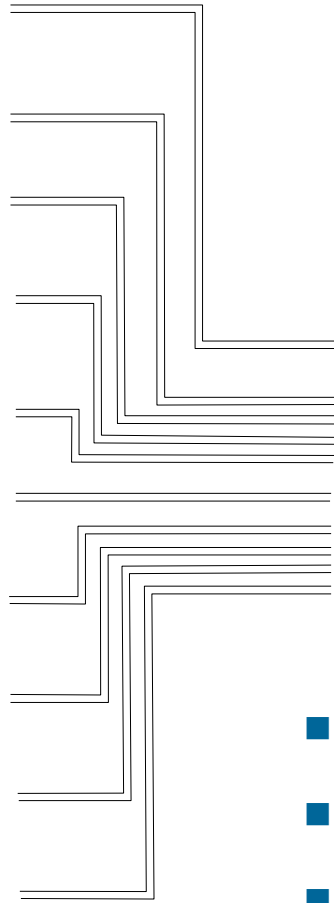
Test bench at CPPM

(soon also LUPM)

10 servers



10 * 2 * 1Gb/s
Ethernet links



2 * 10Gb/s
Ethernet links
SFP+

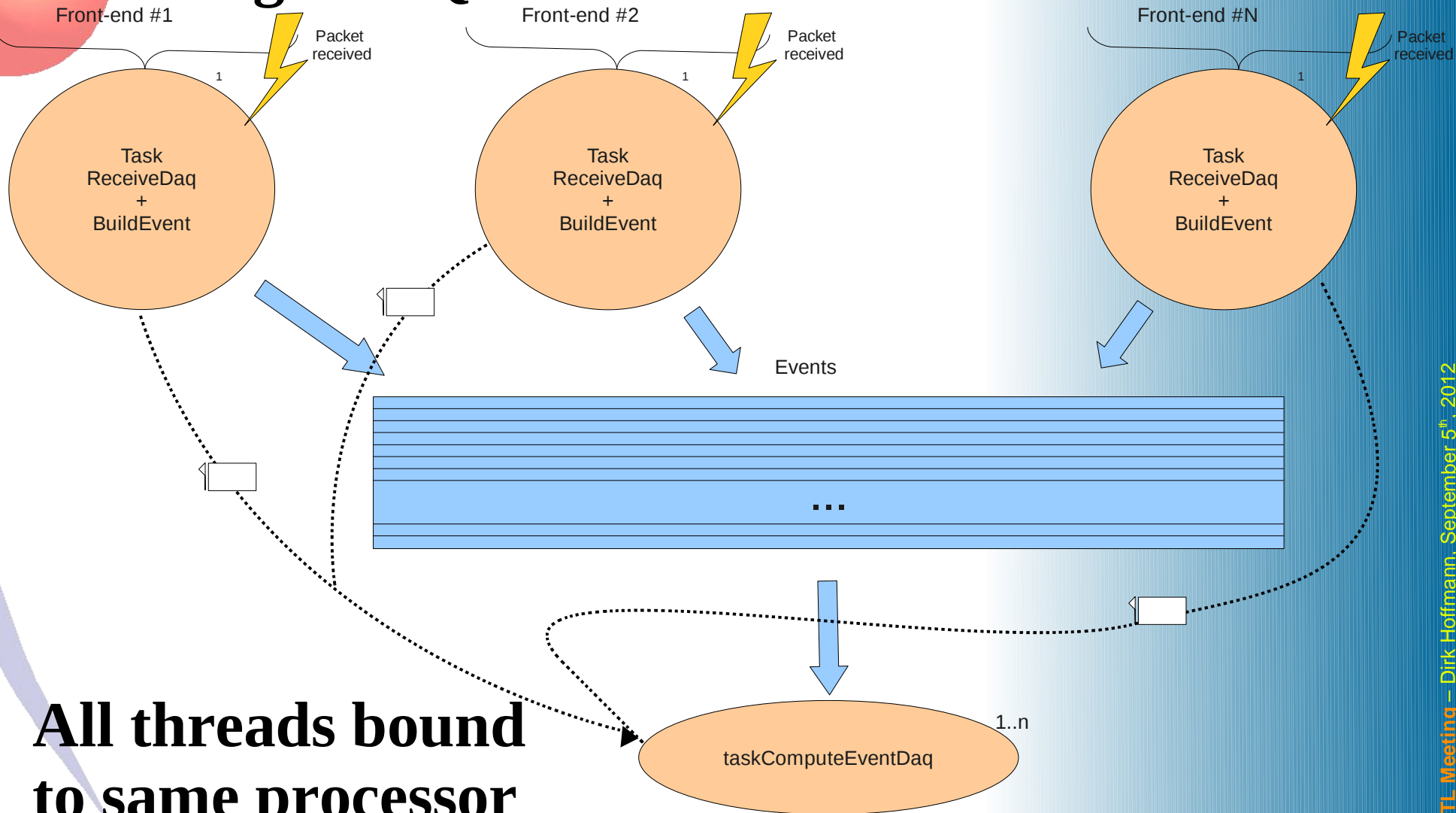


- 10 data generation servers
- 2 adapters on each
- 15 logical ports
- ⇒ 300 nodes

Software design #2

as presented in CHEP2012

- **Two-stage DAQ: receive + build combined**



- **All threads bound to same processor**

Reminder (A'dam, CHEP)

Online Event receiving+building speed

Jumbo frames (8192 bytes) :

19.2 Gb/s (2.4 GB/s) with no loss

Average CPU usage :
160 % (1.6 cores/12)

~ 8000 events/s reconstructed

Regular frames (1024 bytes) :

8 Gb/s (1 GB/s) with no loss

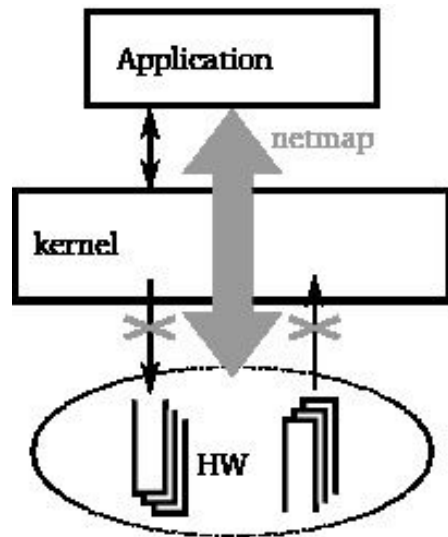
Average CPU usage :
170 % (1.7 cores/12)

~ 3300 events/s reconstructed

- Results obtained with standard libraries
- 300 stimulation nodes generate data
- Incoming data through two 10 Gb adapters
- Two « channels » used
- CPU load spread on 2 cores (on the same multiprocessor)

Problem and solution

- <50% of nominal bandwidth for small packets
- Well known problem, standard MTU=1500
- Adaptation of FE electronics not obvious (buffer)
- Attempt to adapt CamSrv with netmap
 - Important speedup for small packets expected!

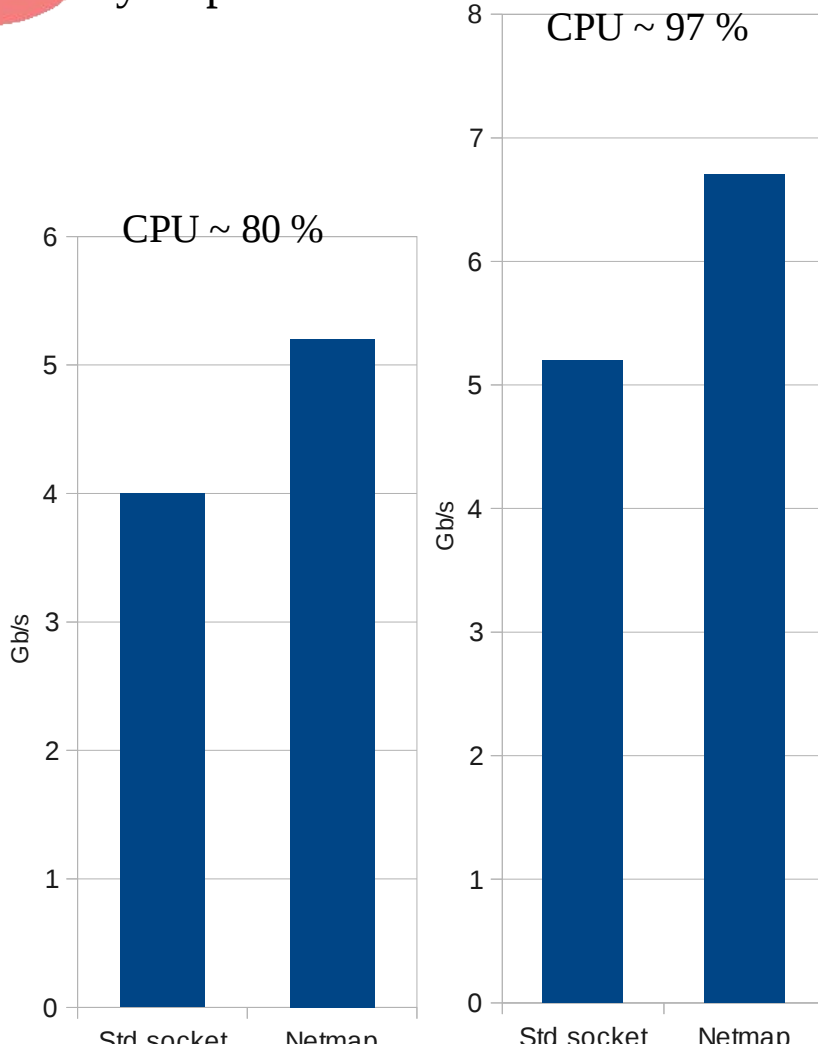


« netmap: a novel framework for fast packet I/O »,
Luigi Rizzo, Univ. di Pisa, Italy; Proceedings of the
2012 USENIX Annual Technical Conference, June 2012

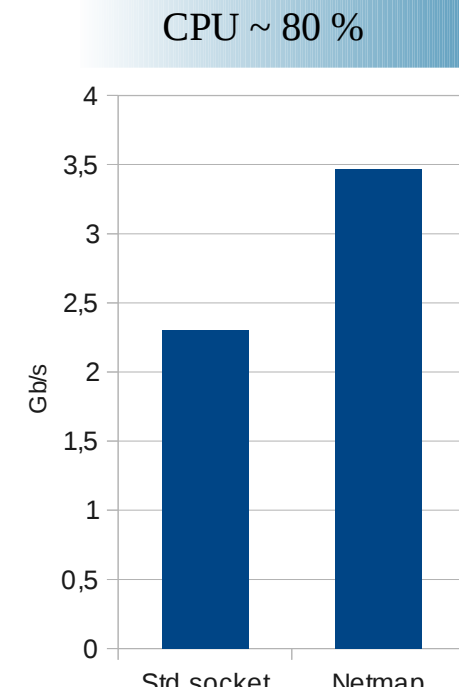
New version of netmap

■ Evaluation with single 10Gbps link

with 1024 bytes packets: + 30 %



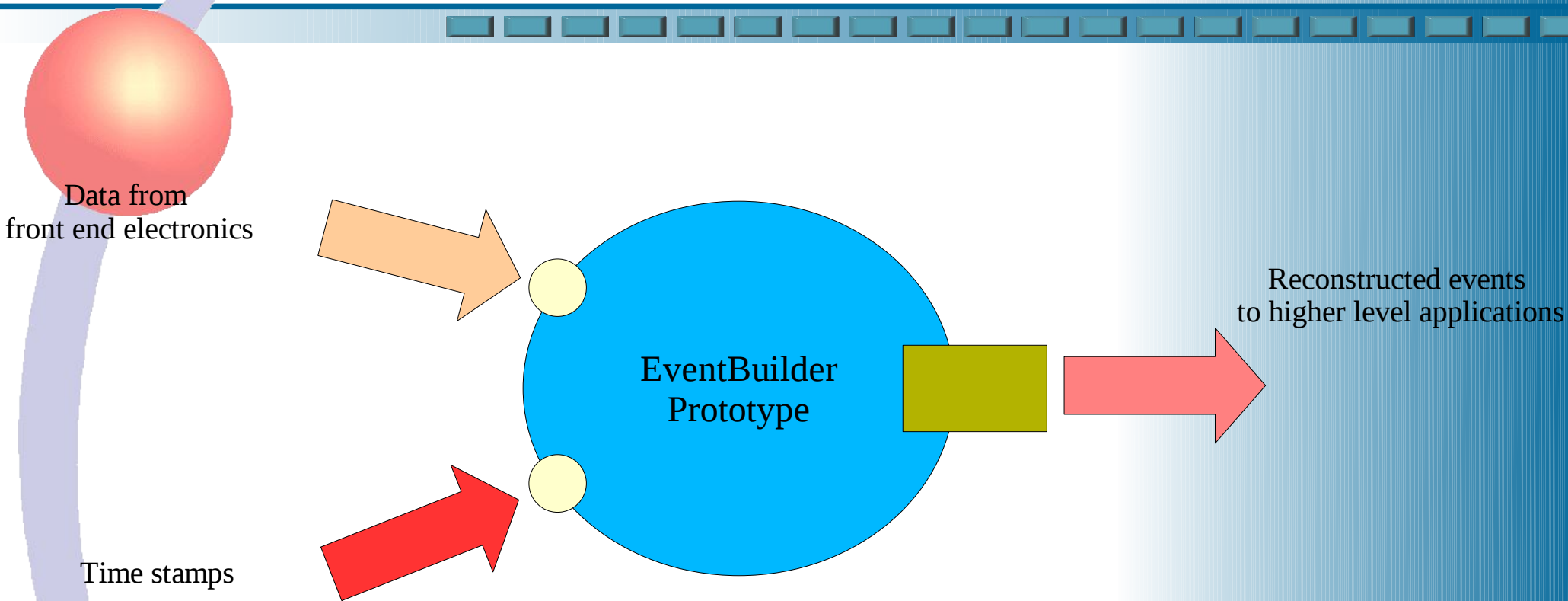
with 576 bytes packets: + 50%



netmap: First Conclusions

- **Useful for many areas (GRID, high bandwidth transfer; 40Gbps and more)**
- **Will remain a standard (SL6/OTS) solution**
- **Can improve speed, but difficult to attain nominal bandwidth with small packets**
- **Interesting results, potential for more investigations on memory placement and prefetching**

Trying to define “EB deliverable”



- receives data from front ends
- reconstructs events at telescope level
- time stamps events
- precomputes events ?
- receives higher level trigger ?
- provides events in a shared memory area to higher level applications



Software Engineering and Organisation

Software Engineering

- **Documentation: ShPt, Doxygen, ...**
Frequency of use could be improved!?
- **svn.in2p3.fr/cta repository**
Adopted by DATA+CEIN=DM group
- **Licence / legal issues!!??**
- **Distribution of**
 - **Concrete example and questions for Event Builder**

Documentation

- **SharePoint portal –
No significant changes since last time**
- **Doxygen (Berlin) – Interesting. Useful?
Not (ACTL-)public knowledge!?**
- **Attempt to make all information publicly
available (cross-link)!?
From ACTL site on CTA portal?**

SharePoint for ACTL

Site Actions Browse Page Dirk Hoffmann ▾

ACTL ▸ Home
Team site of the ACTL Work Package

Internal ▾ Consortium Bodies ▾ Working Groups ▾ Lists ▾ Helpdesk Search this site...

CTA-Observatory
InDiCo
WPC Wiki
Records Centre

Libraries
Site Pages
Shared Documents

Lists
Tasks
External Documents

Discussions
Team Discussion

Recycle Bin
 All Site Content

ACTL WP: Instrument Control and Operation

The task of the ACTL work package is described in the CTA preparatory phase application:

"Instrument control and data acquisition The CTA instrument will have to deal with a larger variety of observation modes than current instruments and will operate with a high efficiency in an automatic mode. This requires a well designed, failure-tolerant system integrating both an automatic control layer and a software layer for the control and operation of the system. The design and implementation of the software layer needed to operate CTA is the task of the ACTL work package. All software applications will be based on a common software system providing a well-tested platform that embeds standard design patterns and avoids duplication of efforts. The development and maintenance of applications ranging from the control of the different hardware components of single telescopes to the full operation of the observatory will be simplified. Evaluation of existing common software systems and the development of first test applications have already started."

For access requests (write/read) on this site, you need to be a member of the [ACTL Members](#) group. If this happens not to be the case (yet), then please contact any member of the [ACTL Owners](#) group! You can set up special permissions for the documents and contents that you submit here. By default, everything is readable by all authenticated [CTA Members](#) and not for (anonymous) public users.


Recently changed pages (click here for all)

<input type="checkbox"/>	Type	Name	Modified	Modified By	Checked Out To
		Home	31/03/2012 06:33	Dirk Hoffmann	
		How To Use This Wiki	30/03/2012 10:44	Dirk Hoffmann	
		ALMA Documentation	29/03/2012 19:36	Dirk Hoffmann	
		Data Rates	29/03/2012 13:42	Dirk Hoffmann	

Add new page

[Link to old WPC Wiki page "ACTL"](#)

[Link to old WPC Wiki page "DATA" \(until 2010\)](#)



Mailing list: cta-wp-act@cta-observatory.org

[List info](#)
[List archives](#)

Work Package Coordinator :

Christian Stegmann
Christian.Stegmann@DESY.De

ACTL Group meetings

[ACTL group meeting \(video-conference\) \(RMS\)](#)

2012-03-27 - 2012-03-27

ACTL Meeting — Dirk Hoffmann, September 5th, 2012

SVN (“subversion”)

- Central repository `svn.in2p3.fr/cta` being adopted by DATA+CEIN=DM group,
- hopefully announced officially in Rome.
- Would like to make some tests with ACTL people:
- Request SVN access from cta-support.

Project for code repository (SVN)

The ACTL, ELEC and CTA-web activities in France are using (partially) an SVN server hosted at the IN2P3/IRFU Computing Center (CC) in Lyon.

This document is a work document to propose unified usage of a single SVN repository in CTA.

It's SVN URL is `svn+ssh://svn.in2p3.fr/cta`. See [svn.in2p3.fr manual pages](#) for instructions how to obtain read/write access.

It can be browsed (read only) with its present contents online at the address <https://svn.in2p3.fr/cta/>. You need to register your personal certificate for access. This WEBDAV option has been disabled on the server.)

Directory Structure (proposal, future)

This structure serves as an example and is not exhaustive. Check the up to date structure at <https://svn.in2p3.fr/cta/>, it can be updated any time.

- ACTL/ - Activities within ACTL (DAQ and Slow Control code)
 - Attic/ - archives, as they were named in CVS
 - simuCam/ - Camera simulator
 - eventBuilder/ - Event builder
- ELEC/
 - Nectar/ - source code for electronics design and standalone control of NeCTAr camera
 - FlashCam/ -
 - Dragon/ -
- Meca/ - versioned source files for the mechanics structures of the telescope types
 - SST/
 - MST/
 - LST/
- NeCTArControl/ - Control software for NeCTAr R&D (can go into ACTL/?)
- WWW/ - Code for CTA web
 - InDiCo/ - CTA specific code for InDiCo system
 - Registry/ - Code for CTA web registry
 - ShPt/ - Code for CTA developments in SharePoint2010
- User/ - user specific code, including "private" versioned data, drafts and tests. Should not be used as a **Sandbox!**
 - hofmann/ - sub-directory for user with SVN-uid=hoffmann
 - Talks/ - reserved name for directories with source files, assets and auxiliary files of the user to draft (and share) presentations.

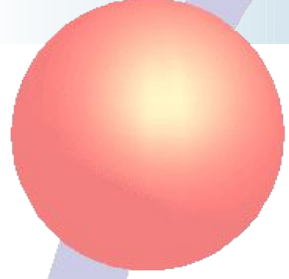
Licence

- **We (everyone of us) are not owners of our work.**
- **“We always did it like that.” does not work in modern context of software patents, quality, ...**
- **Proposal for a standard disclaimer**
- **See SVN for full example**

```
** -----*
* Copyright:
* CNRS / Institut de Physique des Particules et de Physique Nucléaire.
* Contributors:
* Julien Houles -CPPM-, 2012 <houles@cppm.in2p3.fr>
*
* [ADD OTHER INSTITUTES AND CONTRIBUTORS HERE. (RESPECT SAME FORMAT PLEASE.)]
*
* This file is part of computer software, which has been developed within
* the CTA consortium for Control and Readout of the Telescope Arrays.
*
* Use of the software, access to the source code and rights to copy,
* modify and redistribute are restricted to the CTA consortium, unless
* a general memorandum of understanding states otherwise. Users are provided
* only with a limited warranty and the software's author, the holder of the
* economic rights (usually the employers of the contributors), and the
```

Distribution

- **Distribution of ACS software very successful with DESY-provided (S. Wiesand) RPMs**
- **Can only be topped by yum ☺**
- **WHAT and HOW do we distribute our products?**
 - **Define deliverables** – src to svn to start with
 - **Define format** – exe, lib, rpm
 - **Define repository** – subversion OK for src, [portal.]cta-observatory.org available for binaries



Future

Internal organisation

- **Split of “Data Generator” (Montpellier) and “Event Builder” (Marseilles)**
 - “soft” boundaries and polyvalent actors
- **Extend Data Generator for stimulation of DAQ up to “mobile” device (camera dummy)**
- **Funding requested, but not obvious in France**
- **Explore Event Builder for local data treatment**
 - Partial reconstruction (GPU), 2nd level trigger,
- **Multiple cameras / Event Builder housed by one Camera Server?**

Future steps

- **Event Builder Prototype package**
 - Should be deliverable for Rome
- **Further work (before Rome)**
 - Implement time stamping (trigger) protocol
 - Module configuration and component interfacing
 - Documentation
 - Improve netmap usage (performance)
- **Further work (after Rome)**
 - Interface documents, data formats
 - Integration with other contributions (dnstream, ctrl)
 - Completion and Extension of Event Builder
 - Distribution, Test



Summary

Summary

- **Testbench for Event-Builder in CPPM, soon also at LUPM**
- **Can exploit full bandwidth with large packets, looking for improvement of performance with small packets**
- **Lacking concrete collaboration with other labs, proposal for organisation of exchanges**