HEMERA

Challenge A.7 : Traffic Awareness

Paulo Gonçalves (RESO), K. Avrachenkov (MAESTRO)

Kick-Off meeting: October 5, 2010

Challenge: Traffic Awareness

- Context [Labo commun INRIA & Alcatel Bell Labs]

Design of traffic aware routers for high-speed networks

- Objective

Identify application classes from the behavioral (semantic) analysis of corresponding traffic

1. how does traffic behavior relate to flows semantic?
2. which traffic characteristics are capturable on high speed networks?
3. which constraints to get meaningful characteristics *on-line* ?

GRID'5000

- How do we use Grid'5000?

As controllable testbed to emulate large-scale, high speed networks

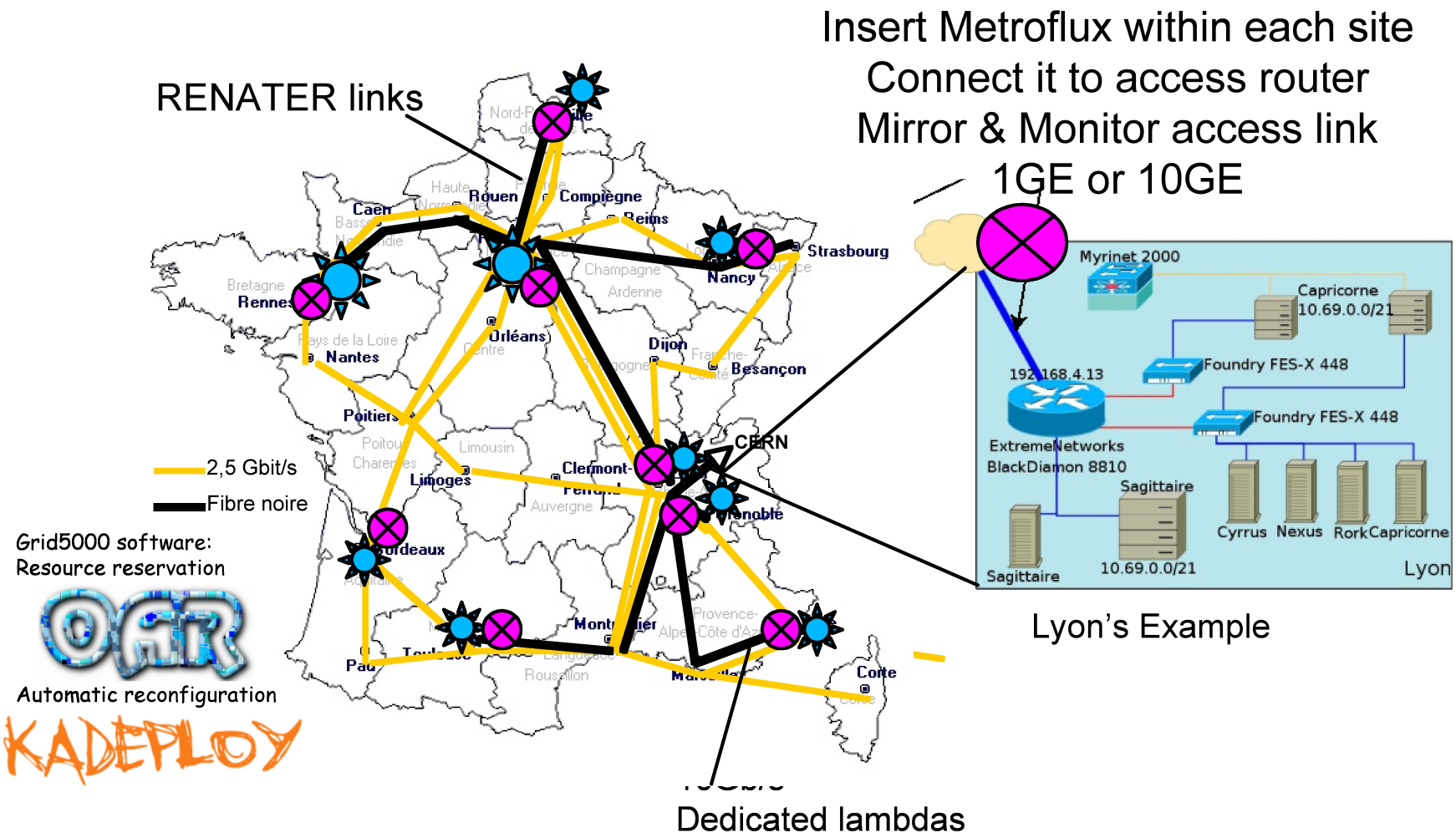
- Why do we use Grid'5000?

To reproduce the conditions of realistic environments (congestion, multi-scale aggregations, large size, heterogeneity...) that can alterate the flows' semantic

- Methodology

1. *MetroFlux*: fine grain capture of traffic traces under controlled situations
2. *off-line* analysis and identification of main traffic characteristics
   - study real traffic traces for characterizing and learning application semantics (off-line)
   - reproduce reliable environments to validate theoretical models, and to study classification robustness (feature parameters)
3. adapt to technical constraints for on-line capture and classification

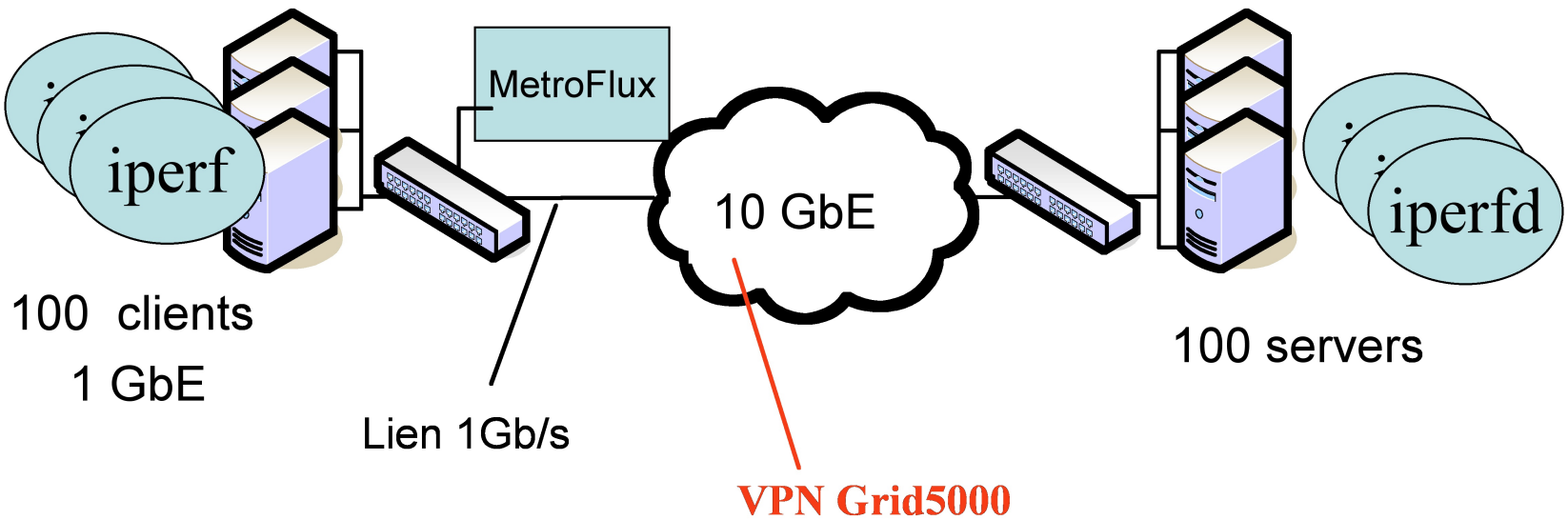
Grid5000 private network instrumentation principles



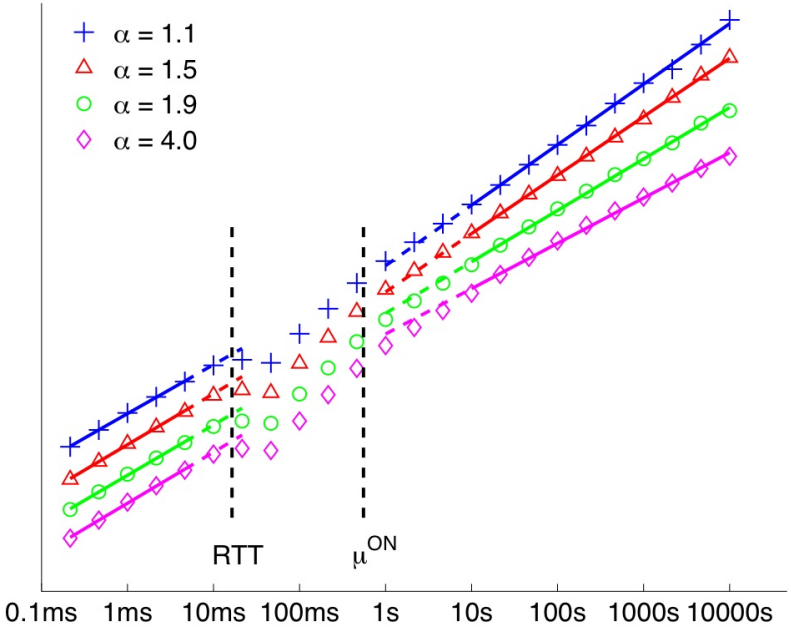
Analysis and identification of traffic characteristics

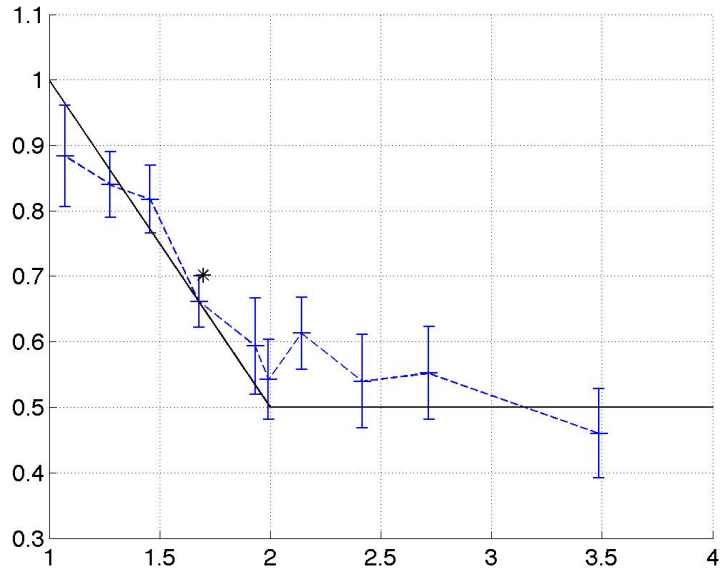
An example of controlled experiment

- experiment between 2 G5K sites
  e.g. Lyon $= \{sources\}$ & Rennes $= \{destinations\}$
- involves 100 nodes per site
- 8 hours of TCP / UDP independent random connections
- flow sizes drawn at random from a heavy-tailed distribution
- aggregated traffic at the output port of LYON access router
- metroFlux is inserted (port mirroring) at this point



Controlled experiments – Validation of a theoretical model





- Experimental studies under more realistic conditions
- Flexible testbed for protocols and control policies development
- Influence of the protocol and of the source rate limitation

Undertaken actions and needed support

- **Distributed metrology system**: Equip several Grid'5000 sites with the *MetroFlux* platform
- Design an **application dependent traffic generator** to simulate heterogeneous load conditions on Grid'5000 (test and validation of proposed classification models)
- Integrate **traffic aware prototypes** (Alcatel-Lucent Bell Labs) to Grid'5000 for real time tests and performance evaluation
- Manpower for developing, maintaining our **Grid'5000 based experimental research**