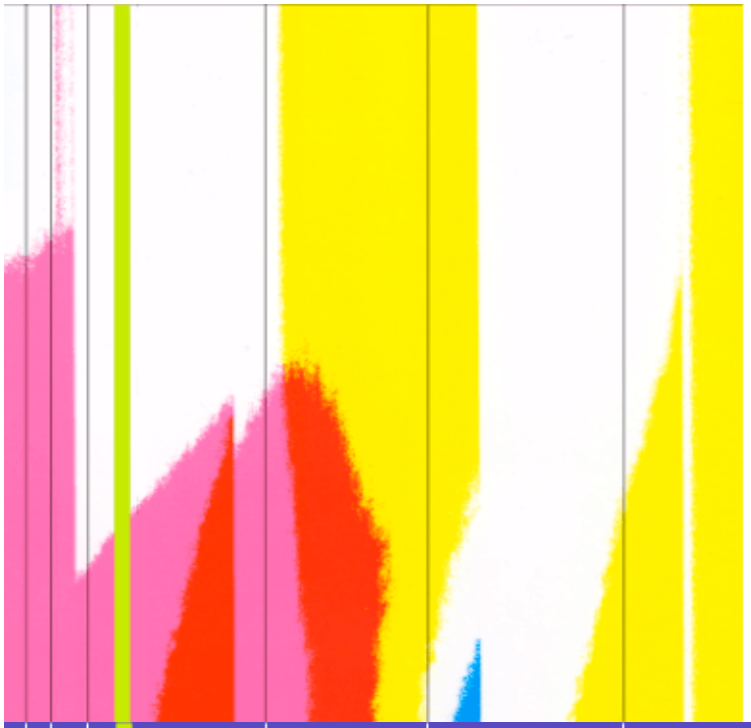

Proposals for Virtualization of the Network in G5K

INSTITUT NATIONAL
DE RECHERCHE
EN INFORMATIQUE
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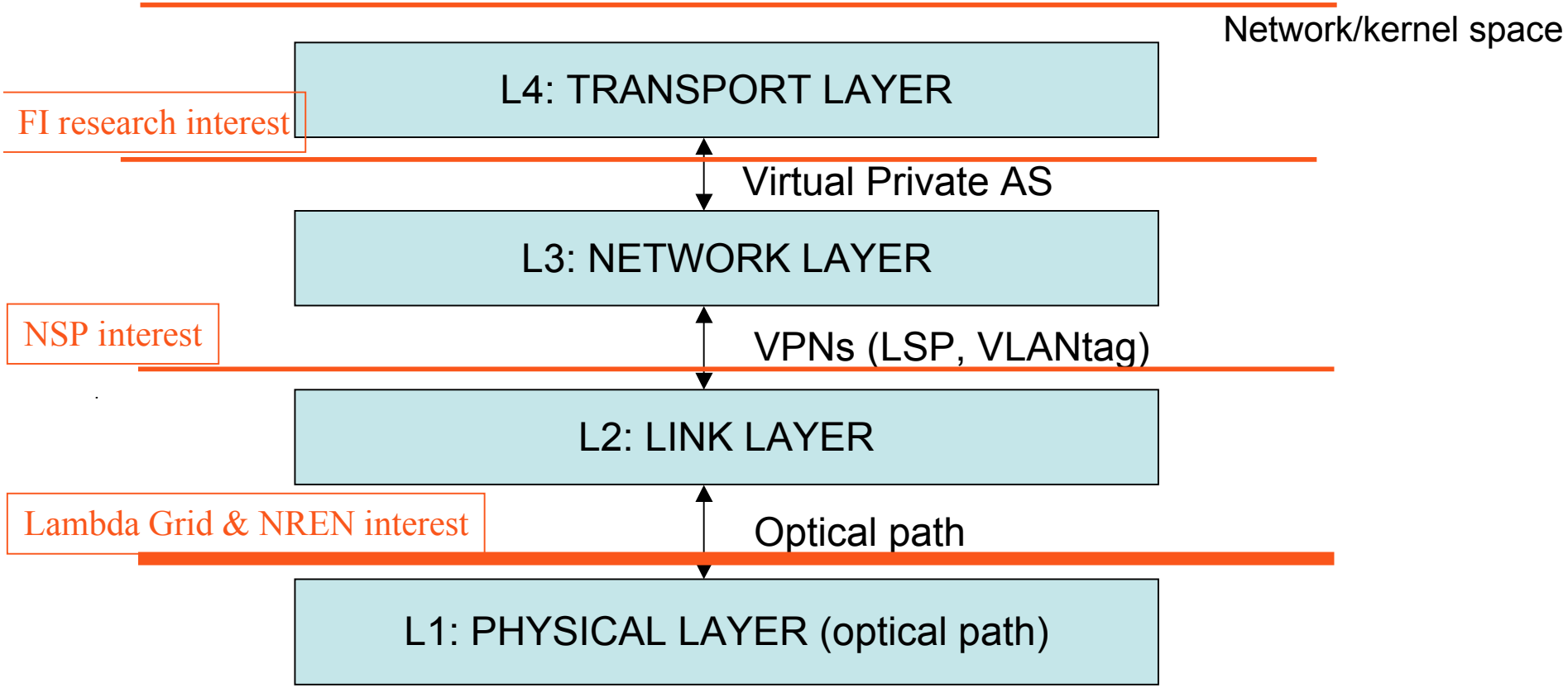
Outline

- Requirements
- Services to be exposed:
  - Edge to edge virtual path dynamically provisioned
  - Virtual (software) edge routers access
  - User configurable virtual private infrastructures
- Conclusion

Network virtualization alternatives

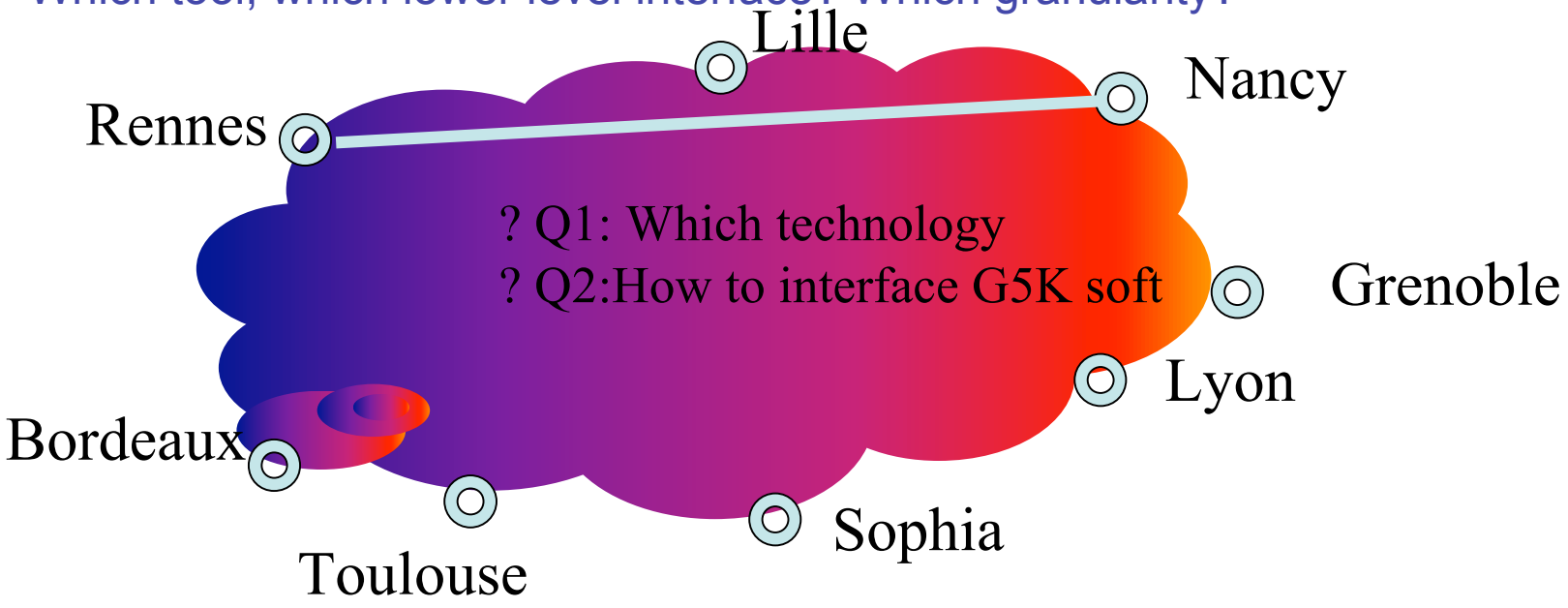


G5K users requirements

- On demand or in-advance access to dedicated bandwidth capacity
  - For QoS: experiment reproductibility, interactive applications, MPI..
- On demand or in-advance access to dedicated network equipments
  - For testing new protocols, security mechanisms, new overlay services…
- On demand or in-advance access to autonomous virtual networks
  - For testing new routing, overlay, P2P algorithms, policies, virtual infrastructure concept…
- Dedicated =
  - The user has an exclusive access to the allocated capacity
  - The user has a full control of the allocated capacity
  - He is free to use allocated capacity as he wants during the session
- Generic required mechanisms:
  - Discovery & Allocation/scheduling
  - (Re)-Configuration

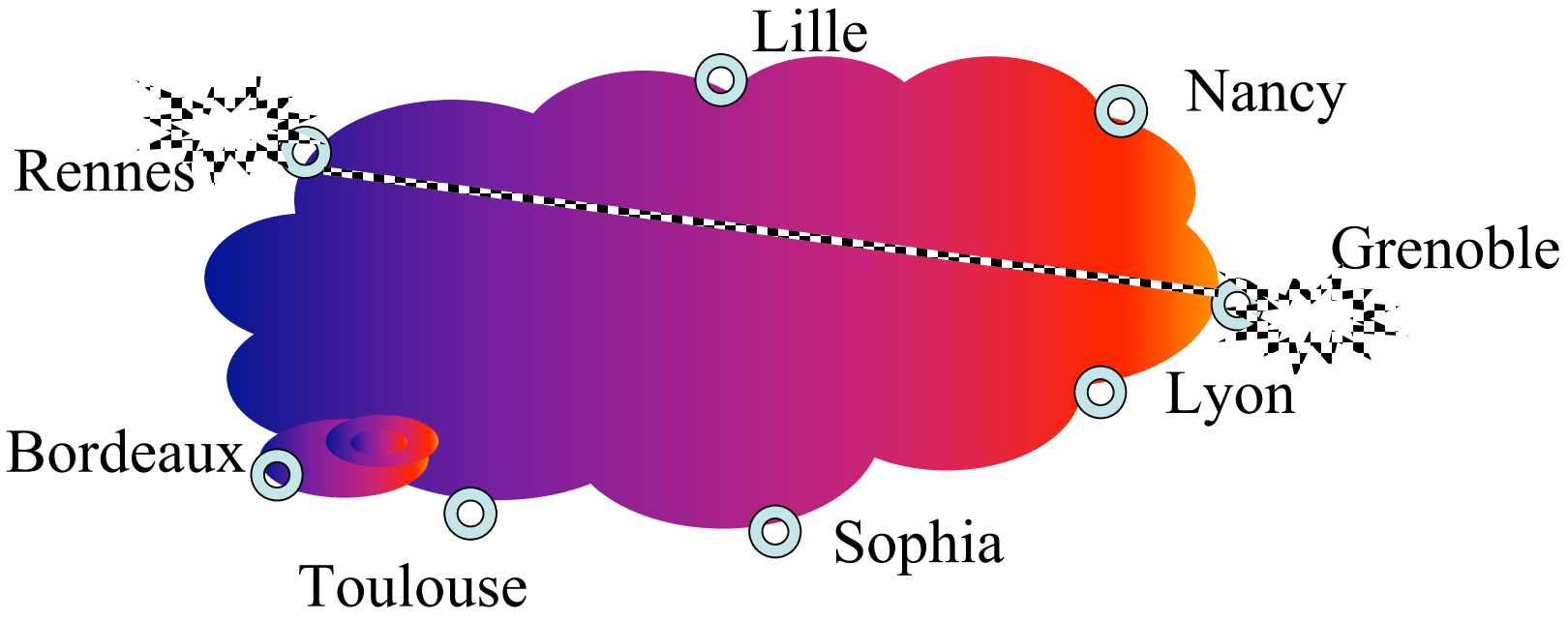
VXNet1
Dedicated Dynamic bandwidth provisioning

- Allocate dynamically edge to edge reserved bandwidth from the static 10Gb/s capacity
- And/or access to dynamic WAN capacity.
  - L1 (lambda path) or L2 (Ethernet path) ?
  - Which tool, which lower level interface? Which granularity?



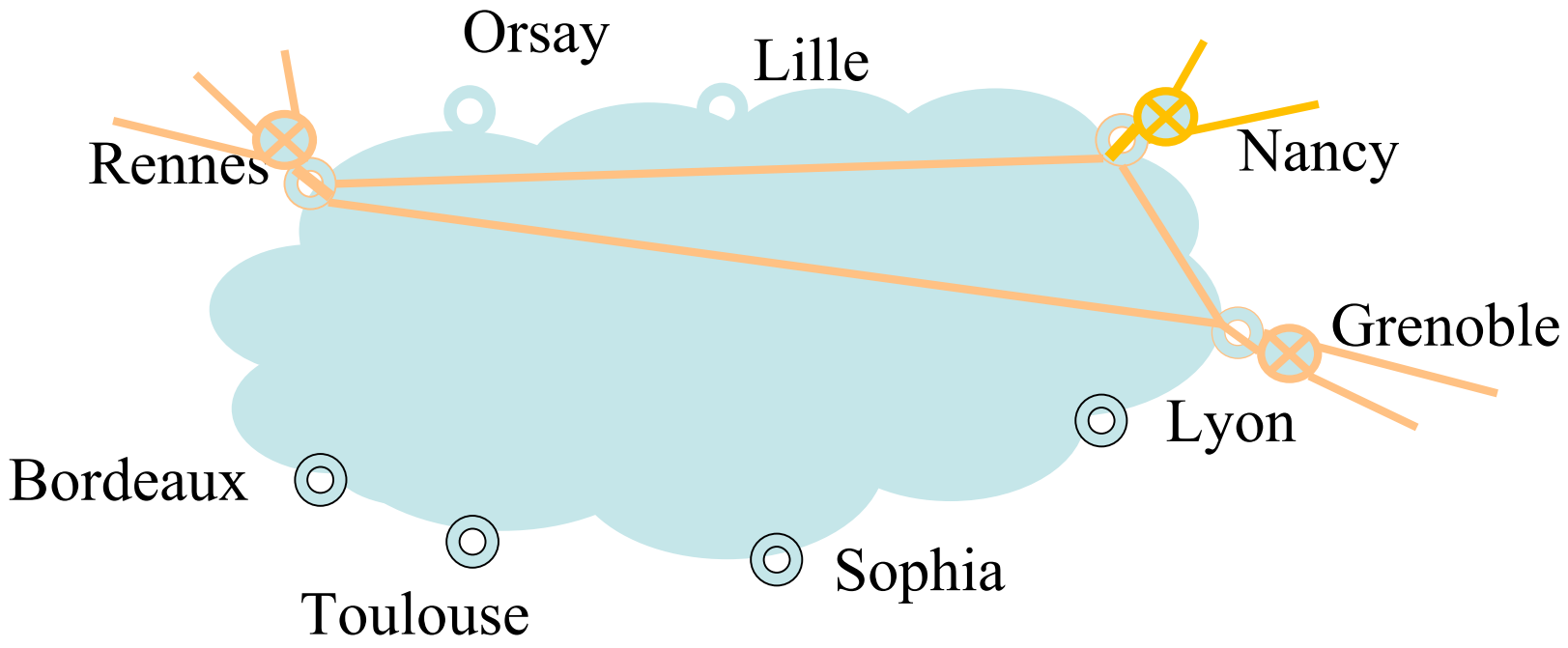
VXNetV1
Dedicated Dynamic bandwidth provisioning

- Q2: BDTS (INRIA RES0 - EC-GIN, CARRIOCAS) software provides:
  - An interface for specifying the requested bandwidth
  - An engine for managing the allocated capacity
  - Has to be interfaced with Renater tools (if dynamic bandw) & OAR



VXNetV2
Dedicated virtual software router allocation

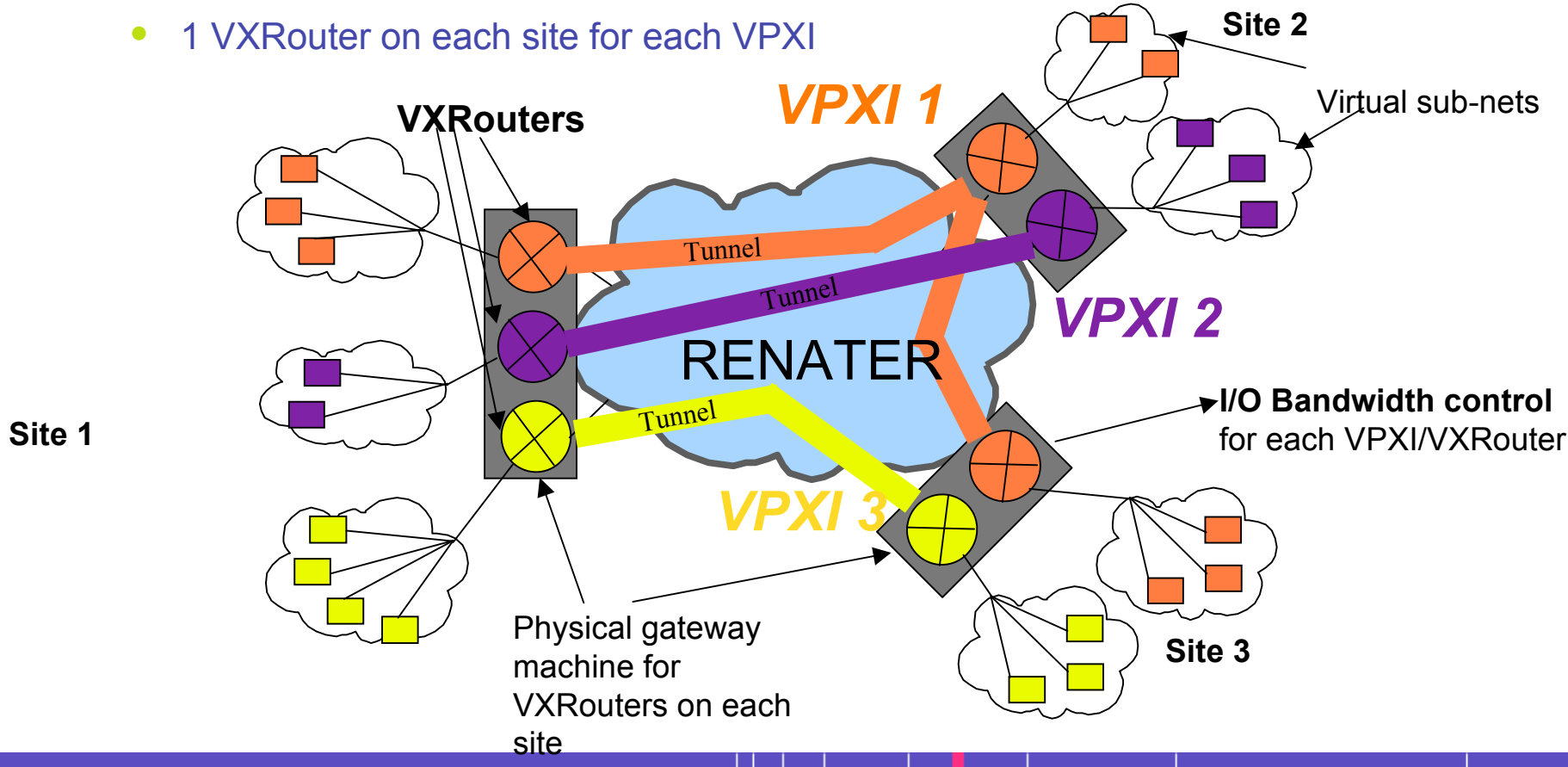
- HIPerNET v1 (INRIA RESO) software will provide (march 09):
  - An interface (VXDL-based) for specifying the requested routers
  - An engine for managing the virtual capacities (Vxrouter + vLinks)
  - An engine for configuring the routing plane



VXNetV2
Dedicated virtual router allocation

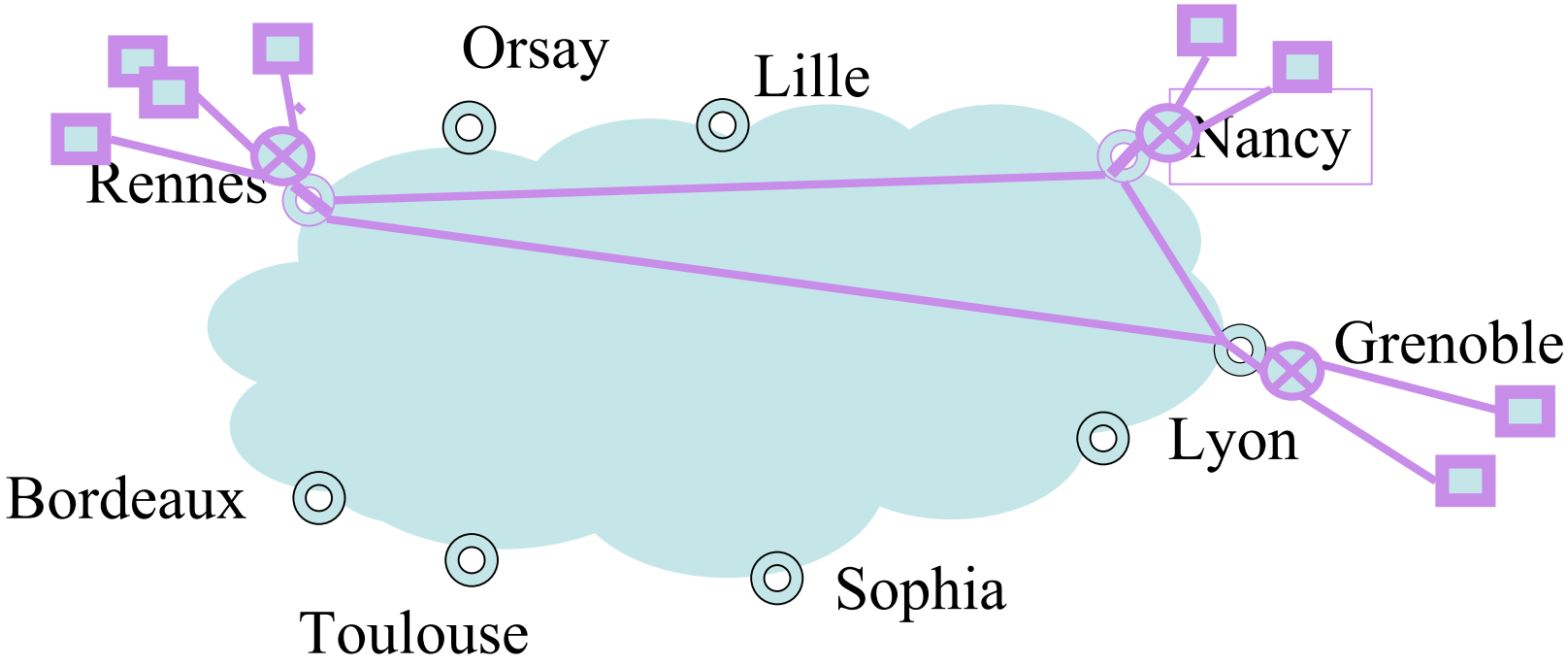
Bandwidth provisioning on Virtual execution environments (VPXI) of Grid'5000

- 1 VXRouter on each site for each VPXI



VXNetV3
Dedicated virtual infrastructure allocation

- HIPerNET v1 (INRIA RESO) software will provide (march09):
  - An interface (VXDL-based) for specifying the requested infrastructure
  - An engine for managing the virtual capacities (Vxrouter, vLinks, Vnodes)
  - Can to be orchestrated with KaVLAN & OAR



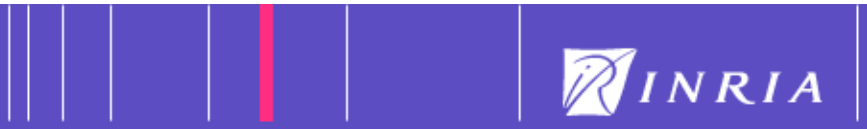
Conclusion

- Network(ed) Resource Virtualization is a « very hot topic»
- Very attractive for Grid & Network research.
- We propose
  - to adapt and deploy BDTS, Vxrouter, VPXI, HIPerNet concepts and software into G5K/Aladdin
  - the installation of enhanced edge servers to host efficient virtual network routers &brokers.
- Design & development team:
  - Fabienne Anhalt, Sebastien Soudan, Guilherme Koslowski, Olivier Mornard, Philippe Martinez, Marcelo Pasin, Pascale Vicat-Blanc Primet.
  - Oana Goga (IA in Aladdin) will integrate the tools within G5K software toolkit from september 2009 (after the Metroflux system has been developed and deployed).

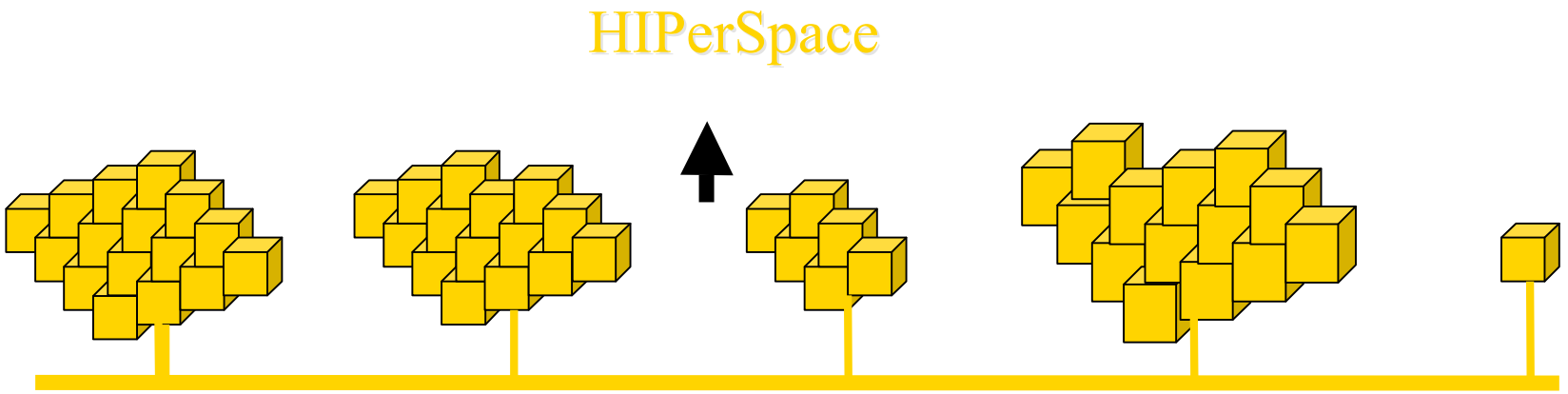
The HIPerNet software for on-demand Virtual Private Infrastructures over the Internet

INRIA RESO

ANR CIS grant - French Ministry of Research

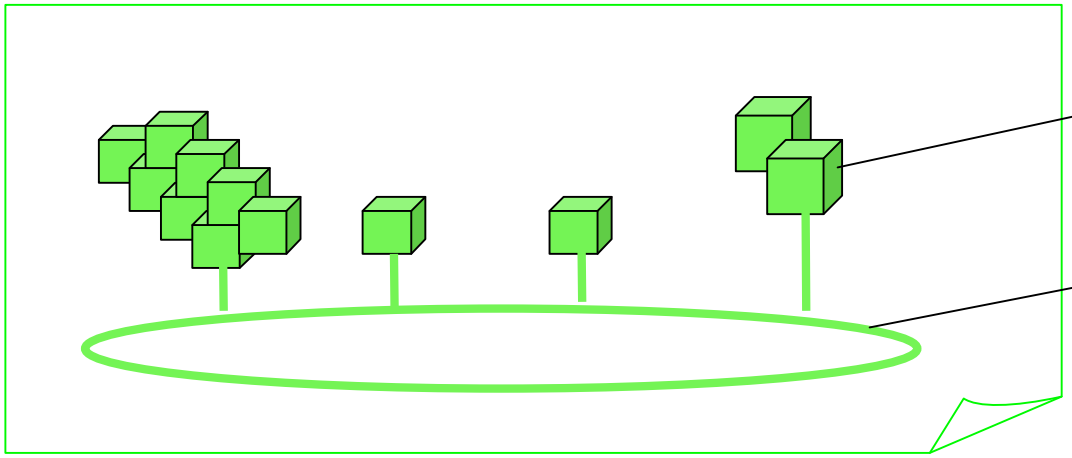


HIPerNet software principle: step 1



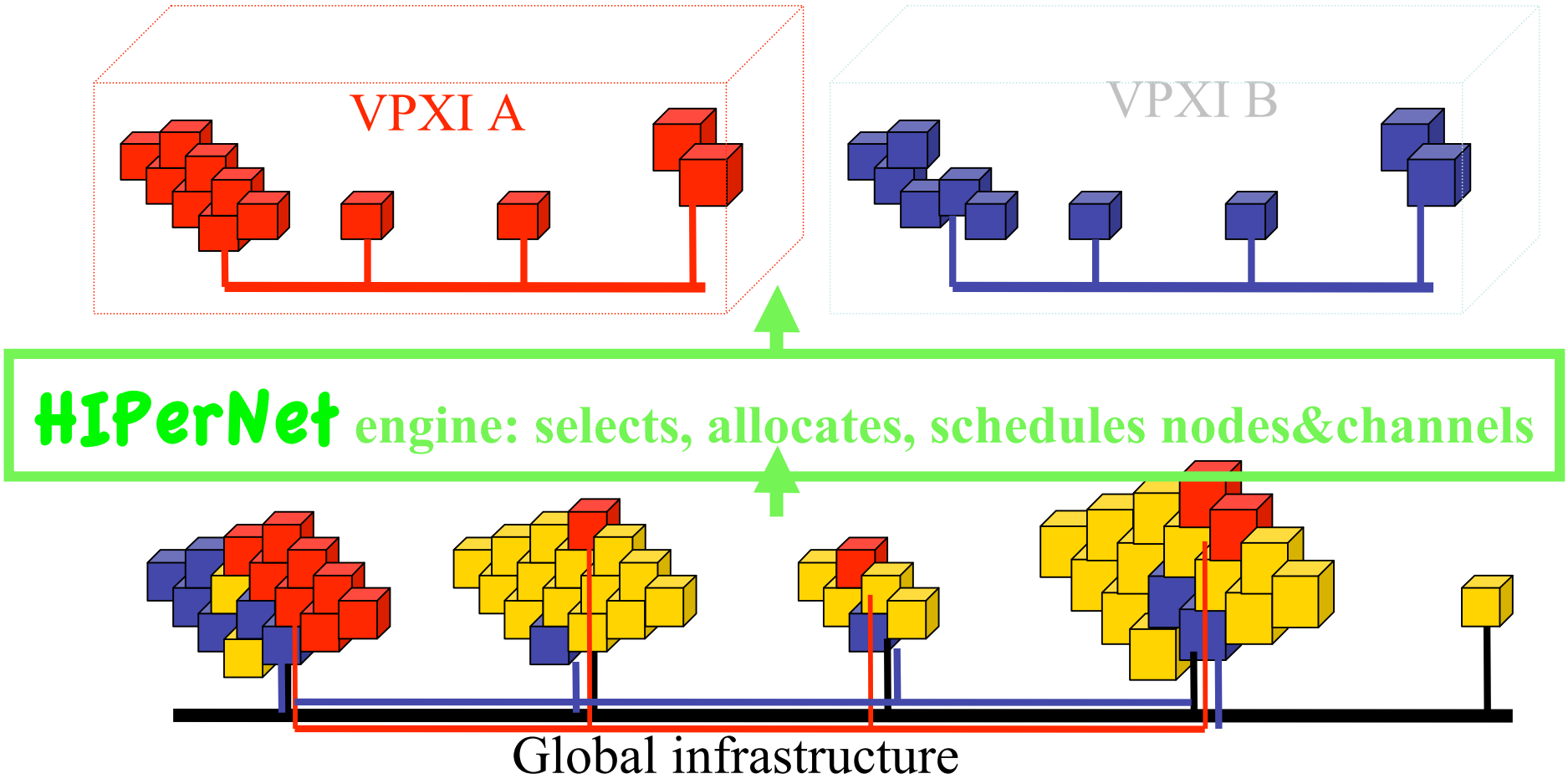
Step 1: Transform the Global infrastructure into an HIPerSpace: collection of HIPerNodes and HIPerLinks (virtualized resources) registered in an HIPerNET registrar (P2P)

HIPerNet software principle : step 2



Step 2: A client send an **VPXI request** to compose a Virtual Private Execution Infrastructure (virtual cluster) : a set of HIPernodes interconnected with dedicated & differentiated overlay channels (specified in VXDL language)

HIPerNet software principle



Questions?

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http://www.ens-lyon.fr/LIP/RESO