BREAKING THE CLOUD

Energy-Efficient & Network-Aware Distributed Cloud Infrastructure

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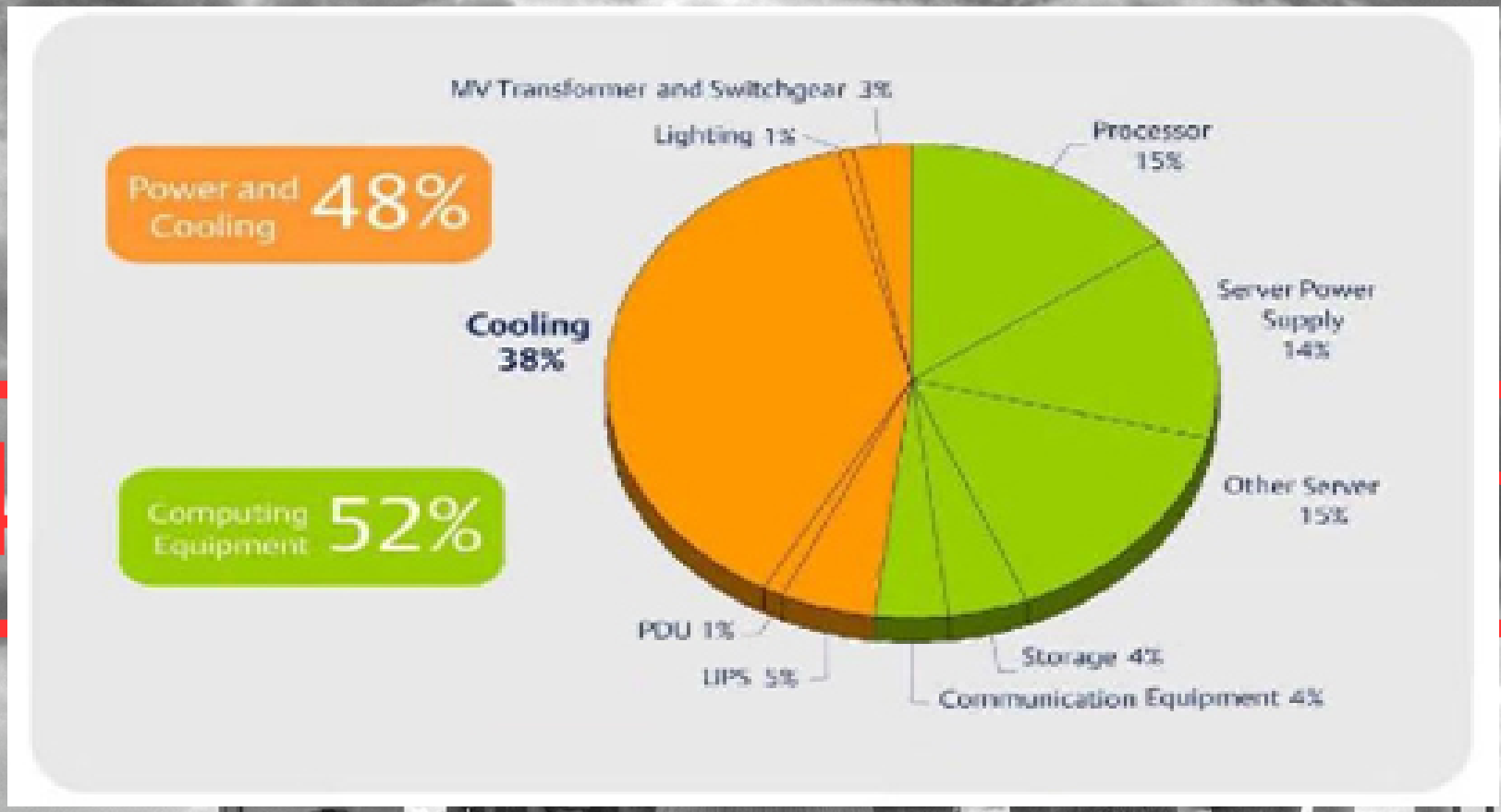
Introduction



Is all this energy well spent?

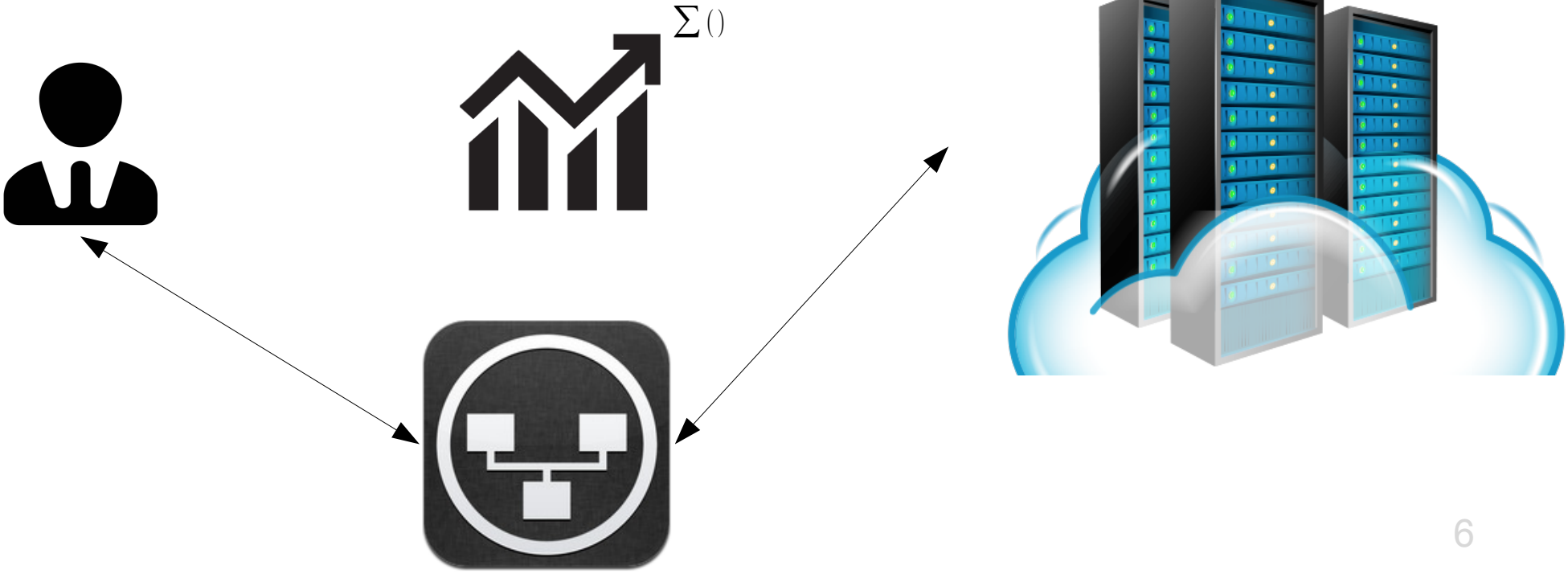
Problem def nition

Existent solutions approach

Switch OFF

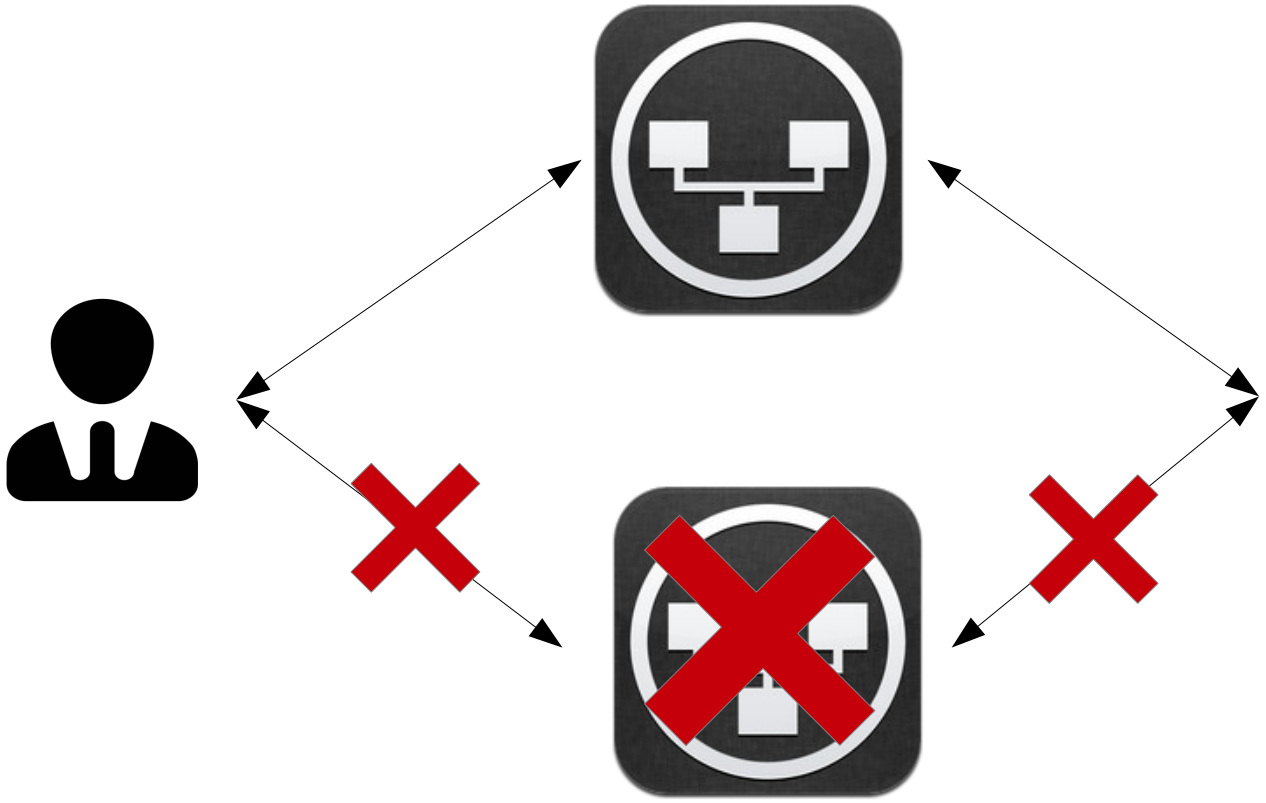
Energy = (Base_Consumption + conf guration)

- Length path
- QoS



Energy saving

Save energy by keeping the shortest path



Existing solutions

Commercial solutions

Existing solutions

Dynamic reservation based protocol

Energy-eff ciency in cloud computing networks

Issues:

- Completely **distributed**
- **Datacenters'** addressed

On the Energy Eff ciency of Centralized and Decentralized Management for Reservation-Based Networks
- Orgerie, A.-C. ; LIP, ENS de Lyon, Lyon, France ; Lefevre, L. ; Guerin-Lassous, I.

Existing solutions

Energy-eff ɔient & QoS geographic approach to clouds.

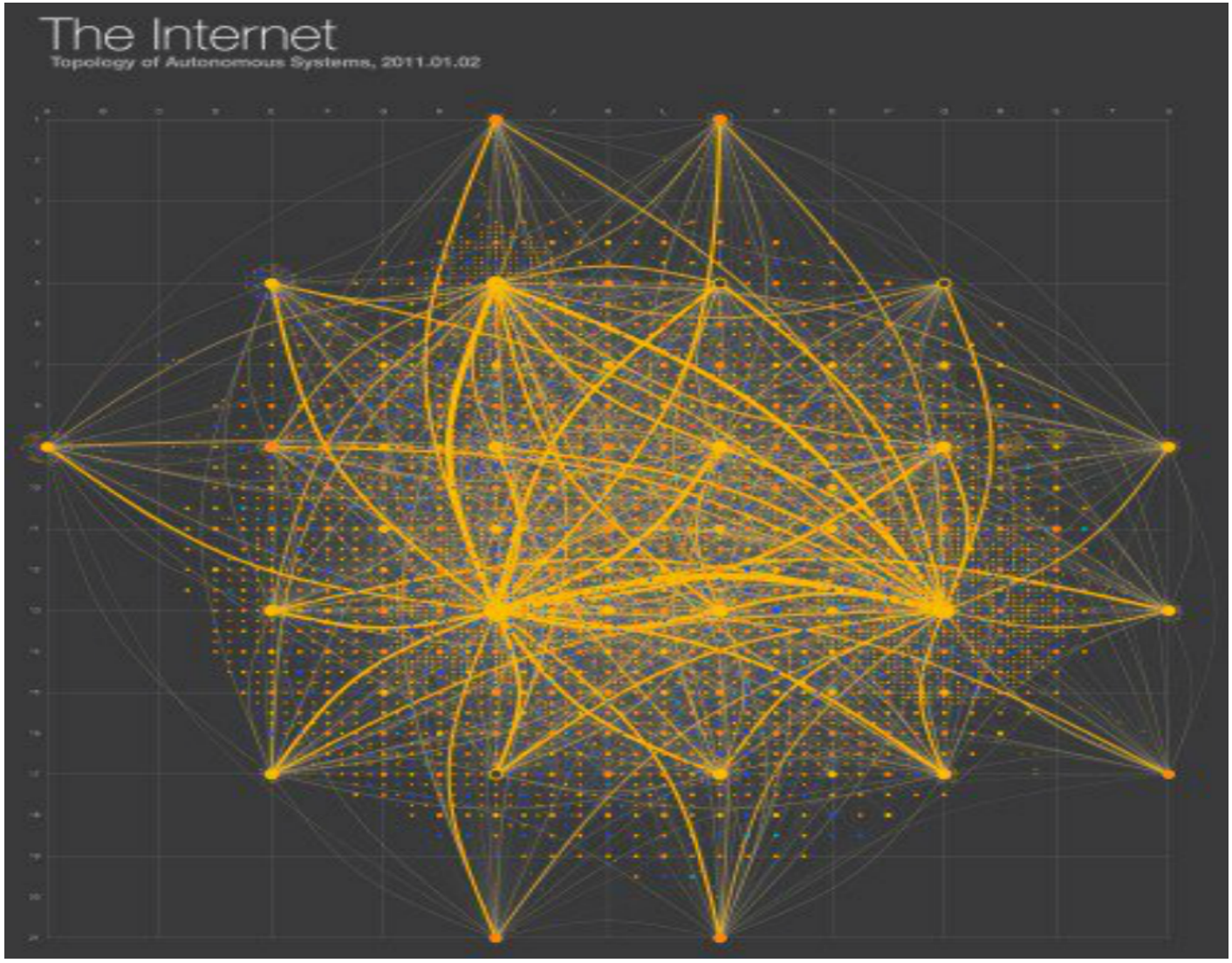
First replication of data for *energy saving in cloud* solution.

Issues:

- Specially **QoS** focused
- Imply **ISPs collaboration**

Greening the internet with nano data centers. Vytautas Valancius, Nikolaos Laoutaris, Laurent Massouli Christophe Diot, and Pablo Rodriguez.

Existing solution's problem



Existing solution's problem

Wrong cloud conception: is meant to be **everywhere**, but in reality is **centralized** (in datacenters).

- The Energy-Efficiency achieved is only **local**
- Growth of clients imply a **growth in resources needs**
- Imply the **interaction of several parties**
- We cannot build you **your own cloud** datacenter...

Existing solution's problem

Our approach

Or do we?

We propose ***breaking the cloud*** *Distribute the computation* between the clients according to **geographical** needs

A semi-decentralized **software architecture** and a **routing protocol** to manage the distribution of computation

Geography

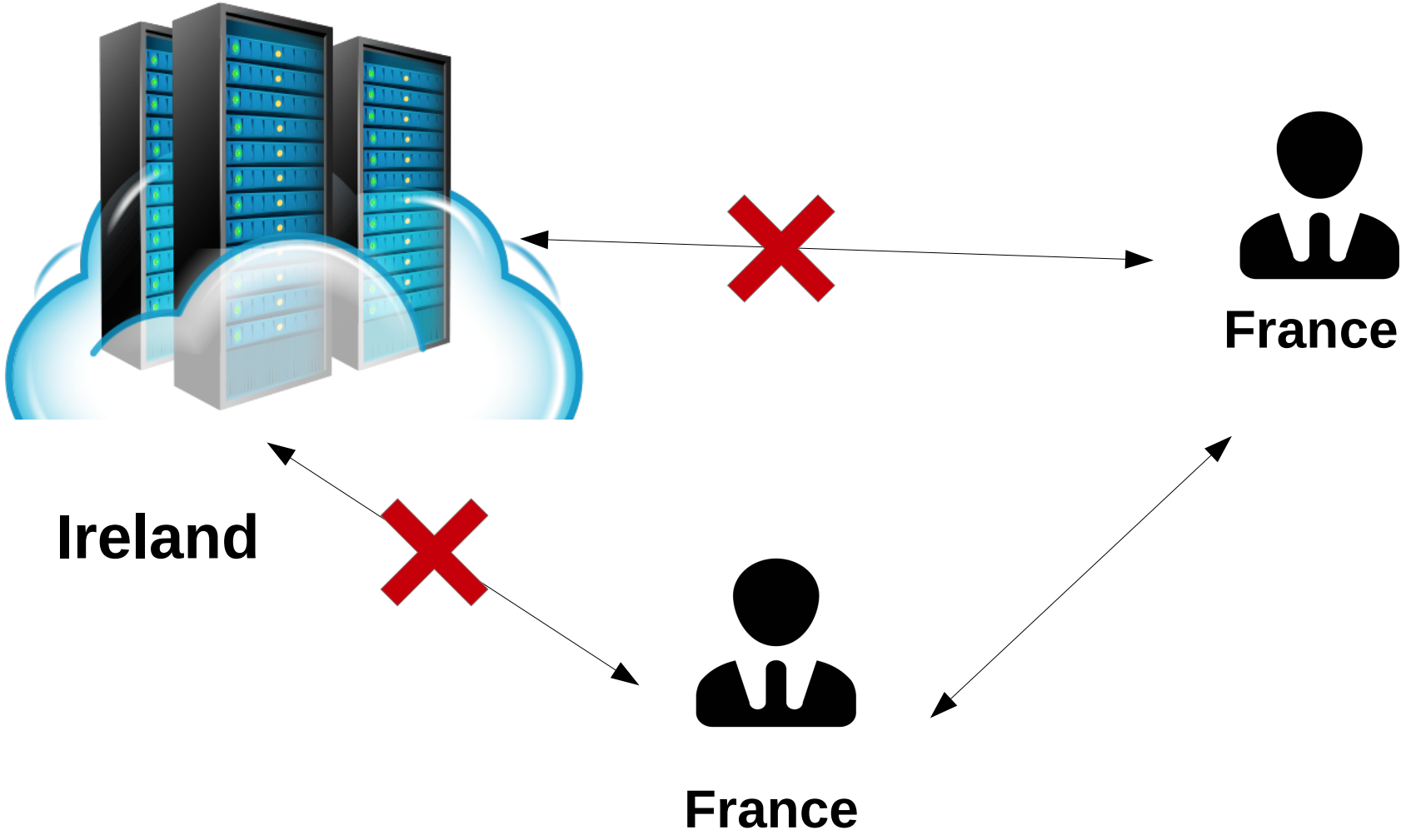
Current path

Ireland

France

France

Our Solution



Break the cloud

Microcloud

Ireland

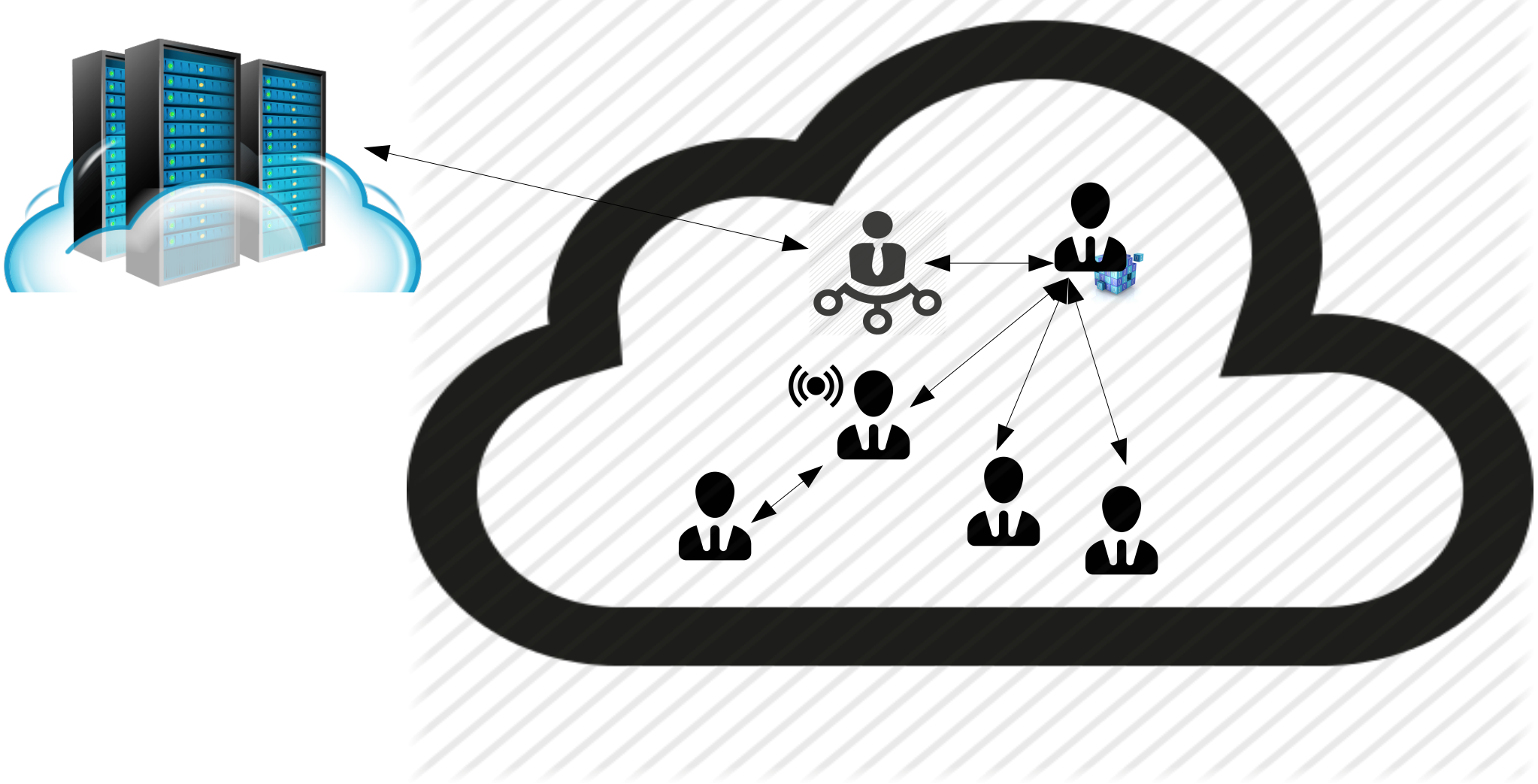
France

France

France

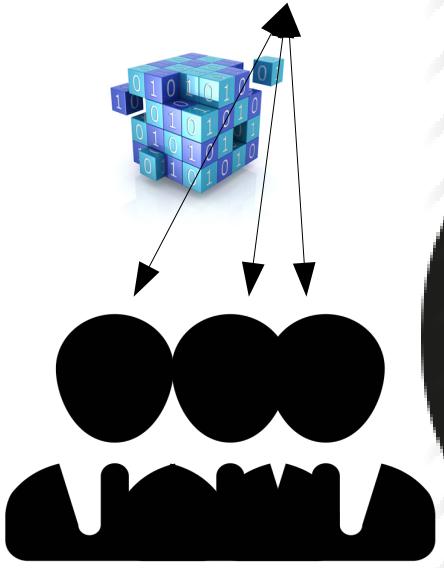
Microcloud

Participants



Use case

Architecture



Architecture

Architecture

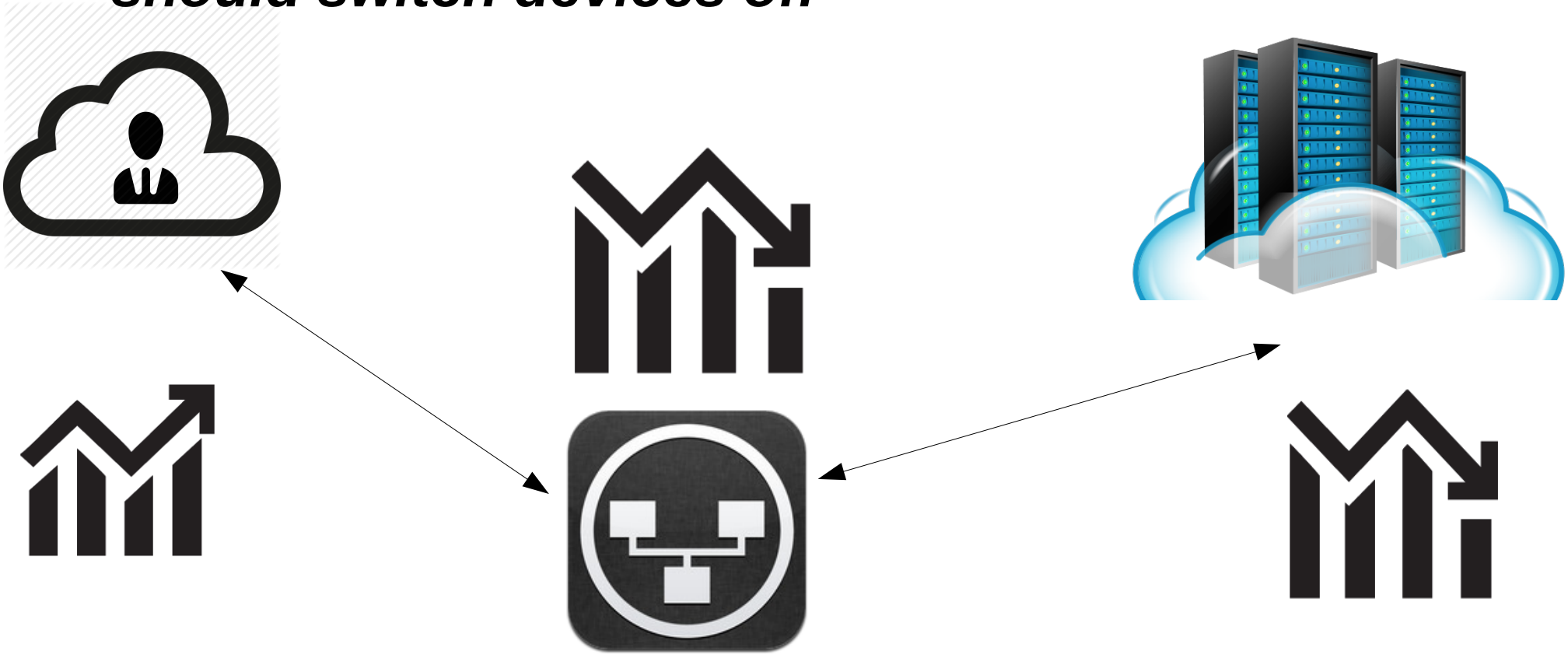
Dynamic green protocol

DEEPACC

Energy efficiency

We save energy by keeping the traffic local

AS should switch devices off



Benefits

- Energy consumption **adapted to needs** (the smallest the cloud, the less nodes consuming)
- Decentralization of the system **independence** of the cloud datacenter
- Consumption reduction for **datacenters**
- Better **QoS**

Goal

Targeted Clouds:

- **High distribution** clients/**small interaction**
  - Streaming platforms, videocalls...
- **High interaction/ small** clients **distribution**
  - GDocs

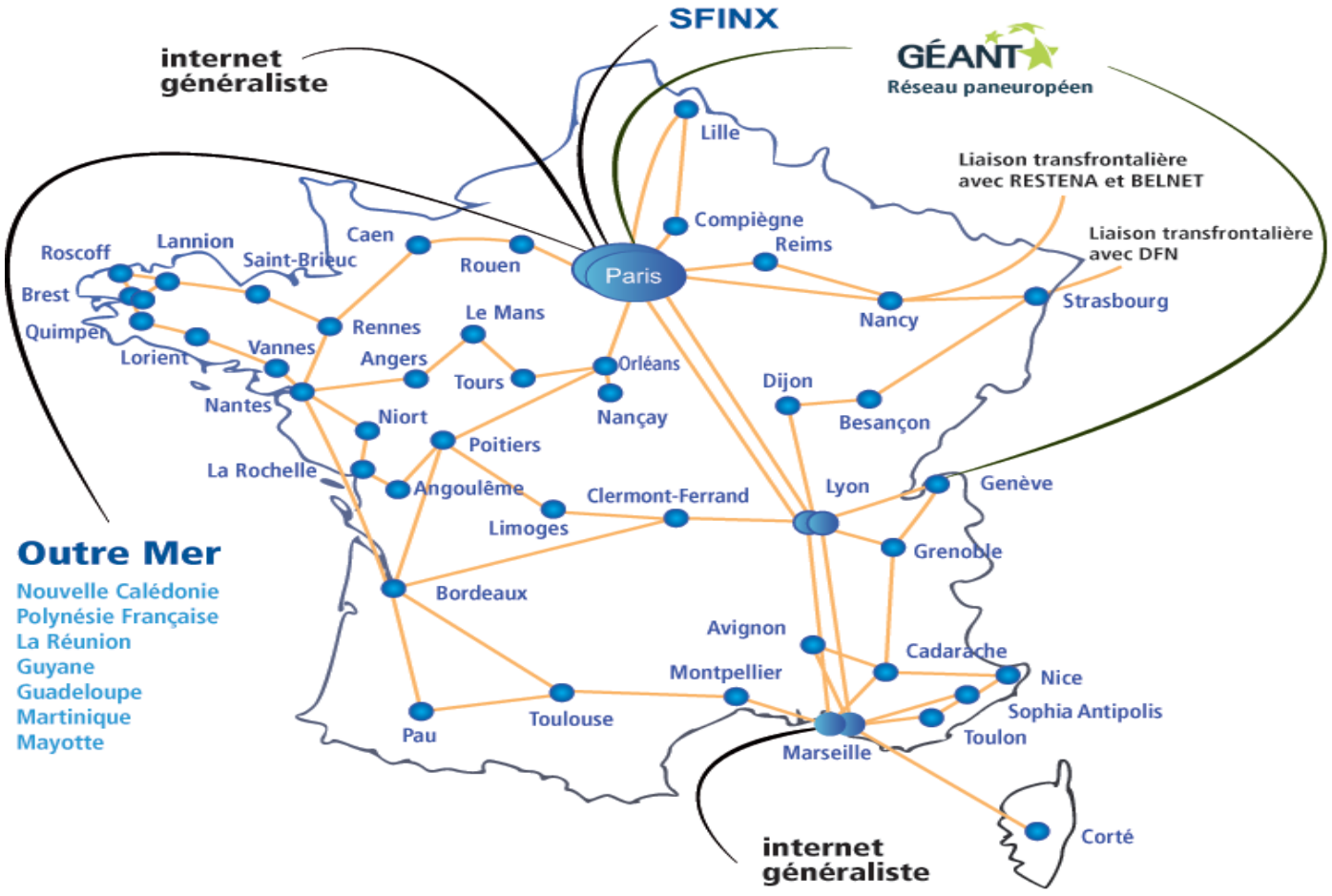
Limitations

Not meant to:

- **Strong computation** clouds
  - **VHPC**
- **High** clients **distribution/ high interaction**
  - **GWave, sharedDBs systems...**

Early experimentation

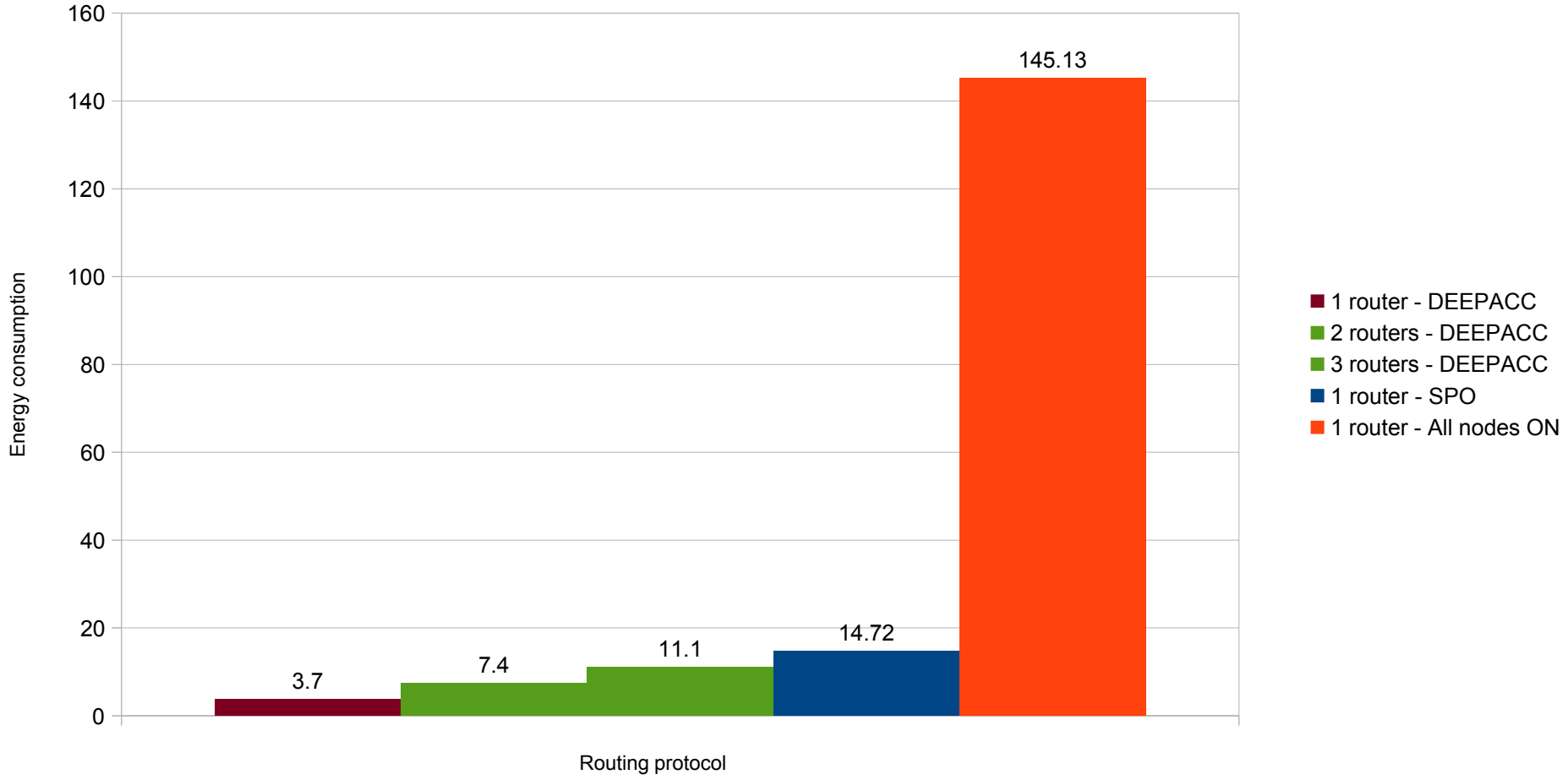
Experimentation testbed



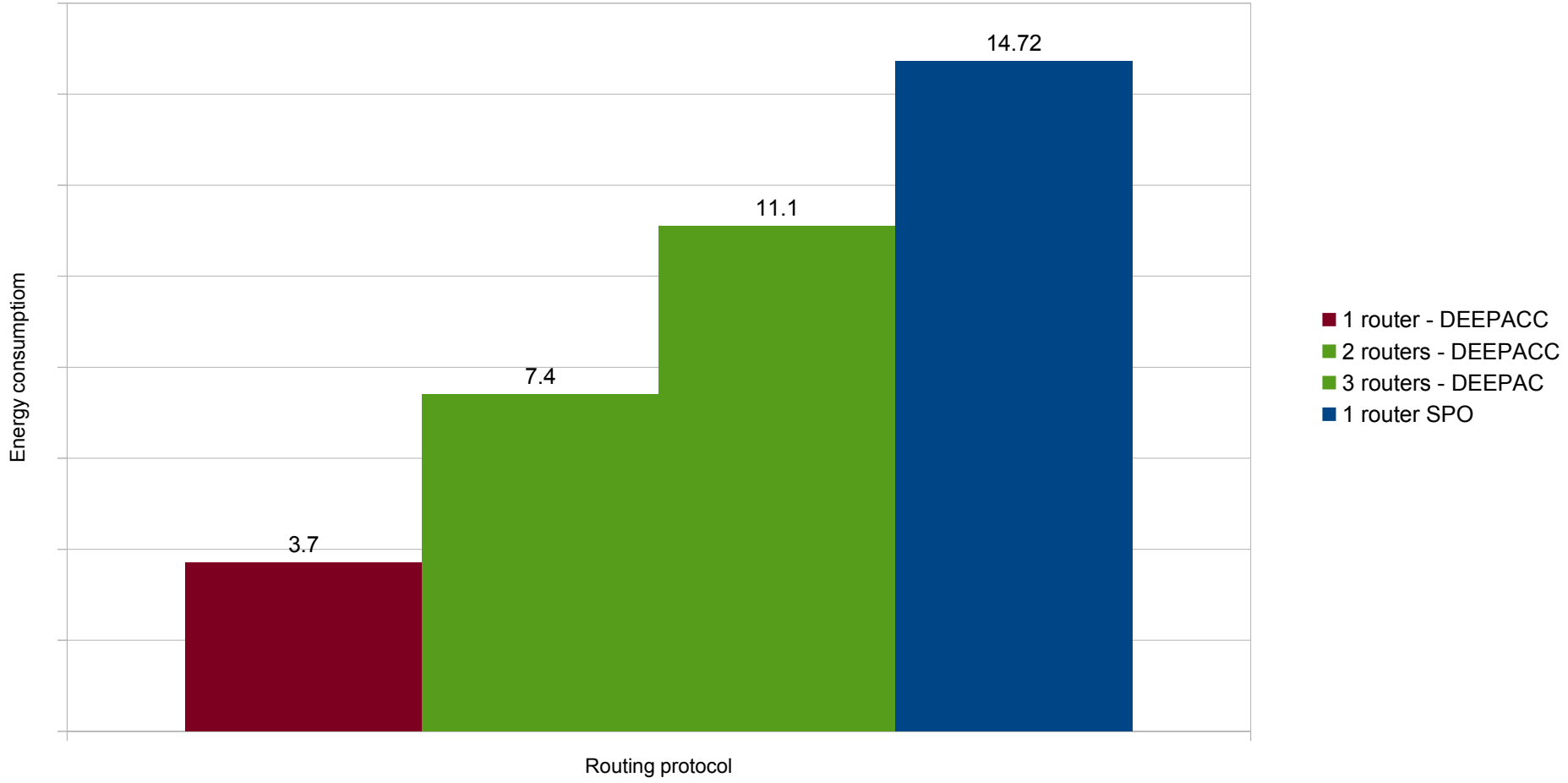
ns-3 NETWORK SIMULATOR

ECOFEN

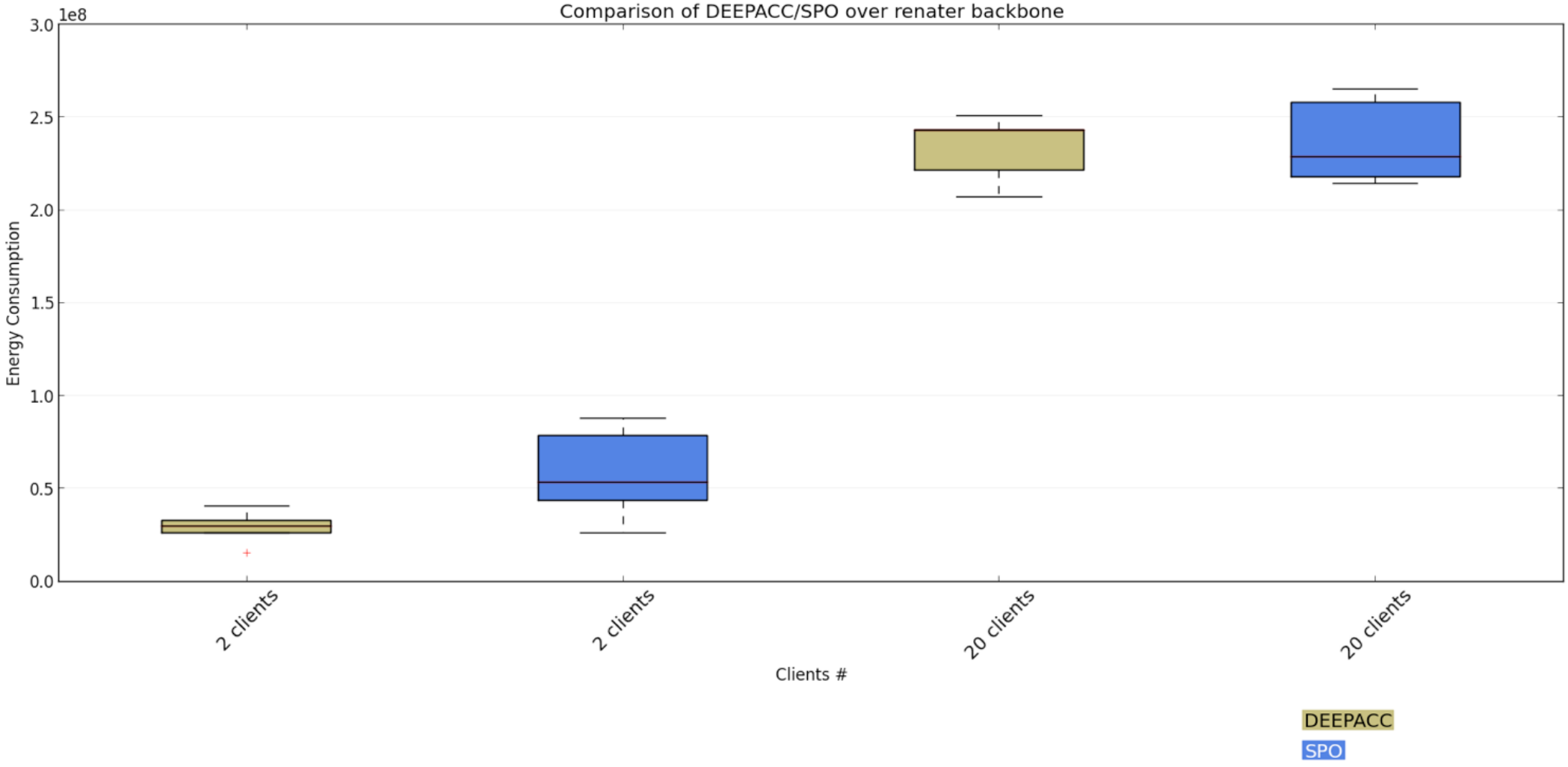
Experimentation results



Experimentation results



Experimentation results



Ongoing work

Experimentation:

- **Energy** consumption
- **Overhead** computation time (Overall)
- **Response time** (On new customer)
- **Microcloud** size

Future work

- **Internet**
- **Experimental** determination of microcloud size
- **Prediction**