

OneLab and PlanetLab: Federation

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Outline

- Introduction to OneLab
- Federating OneLab and PlanetLab



The OneLab Project

A Europe-wide project

European Commission funding
under the FP6 funding program

Budget and time-frame

approx. 2 M€

two years, starting September 2006

Aims

Extend, deepen, and federate PlanetLab



The OneLab Consortium

Project leader

Université Pierre et Marie Curie

Technical direction

INRIA

Partners

Universidad Carlos III de Madrid

Université Catholique de Louvain

Università di Napoli

France Telecom

Università di Pisa

Alcatel Italia

Telekomunikacja Polska

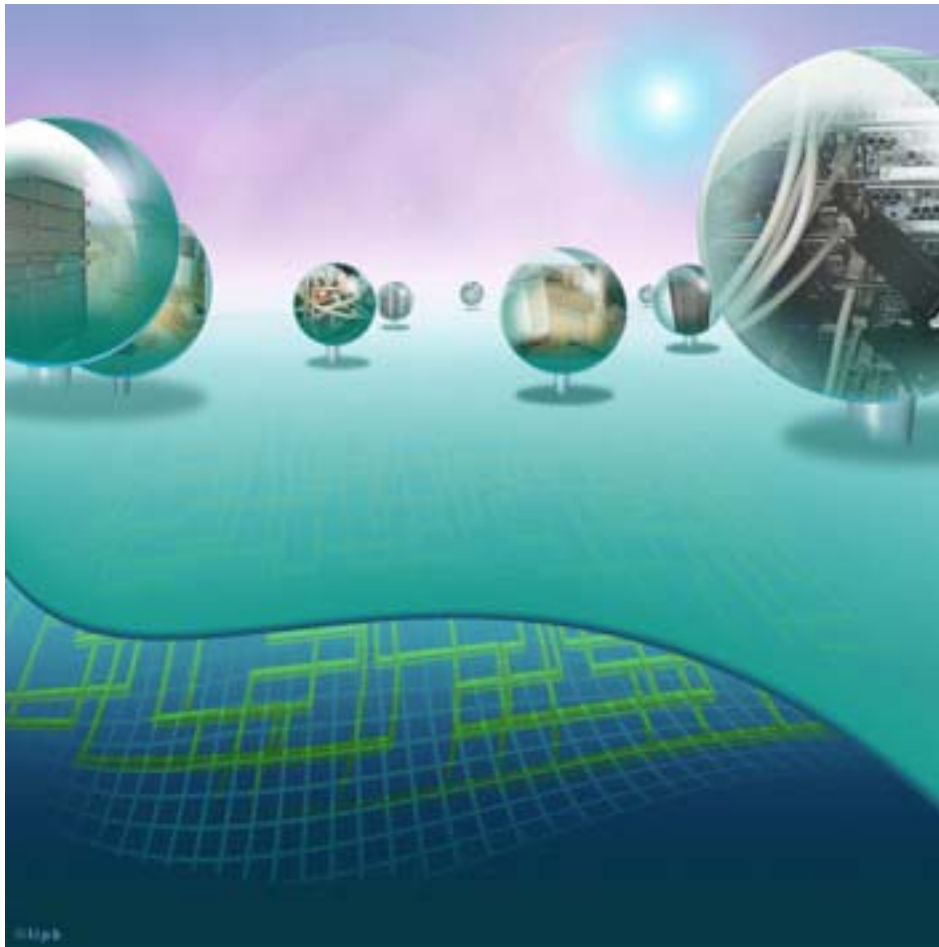


OneLab's Goals

- Extend
 - Extend PlanetLab into new environments, beyond the traditional wired internet.
- Deepen
 - Deepen PlanetLab's monitoring capabilities.
- Federate
 - Provide a European administration for PlanetLab nodes in Europe.



PlanetLab Today

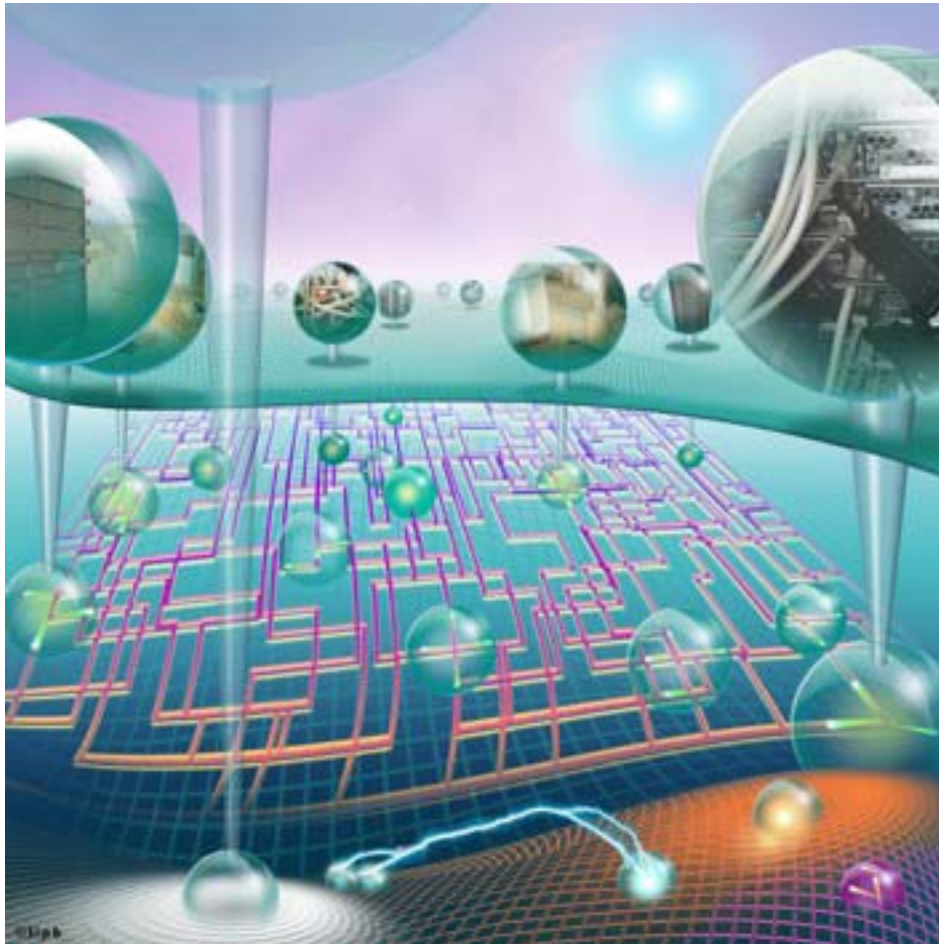


A set of end-hosts

A limited view of the
underlying network

Built on the wired
internet

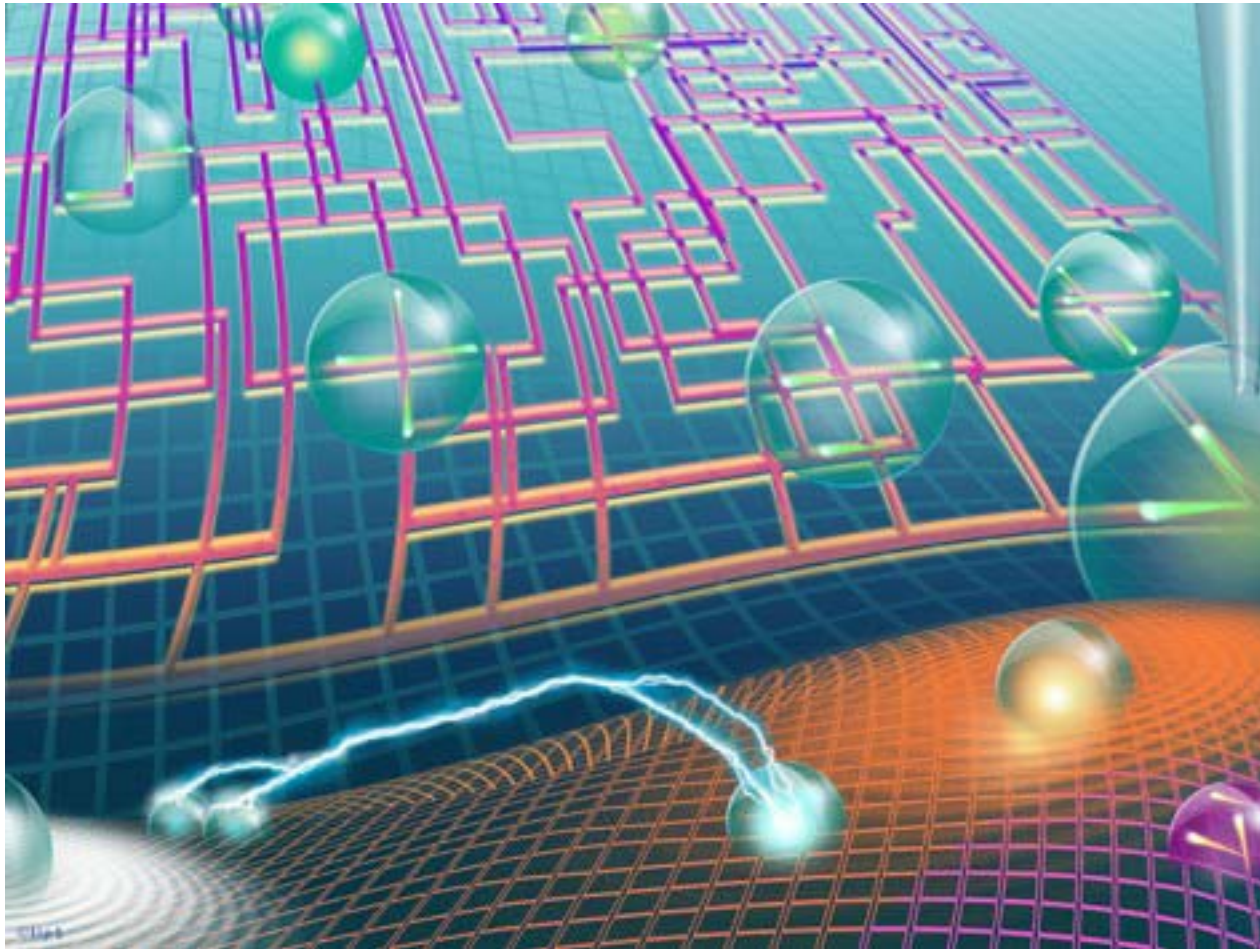
OneLab's Vision for PlanetLab



Reveal the underlying network

Extend into new wired and wireless environments

Goal: Extend



Why Extend PlanetLab?

Problem: PlanetLab nodes are connected to the traditional wired internet.

- They are mostly connected to high-performance networks such as Abilene, DANTE, NRENs.
- These are not representative of the internet as a whole.
- PlanetLab does not yet provide access to emerging network environments.



OneLab's New Wireless Environments

WiMAX (Université Catholique de Louvain)

- Install two nodes connected via a commercial WiMAX provider
- Nodes on trucks (constrained mobility)

UMTS (Università di Napoli, Alcatel Italia)

- Nodes on a UMTS micro-cell run by Alcatel Italia

Wireless ad hoc networks (France Telecom)

- Nodes in a Wi-Fi mesh network (like ORBIT)



OneLab's Other New Environments

Emulated (Università di Pisa)

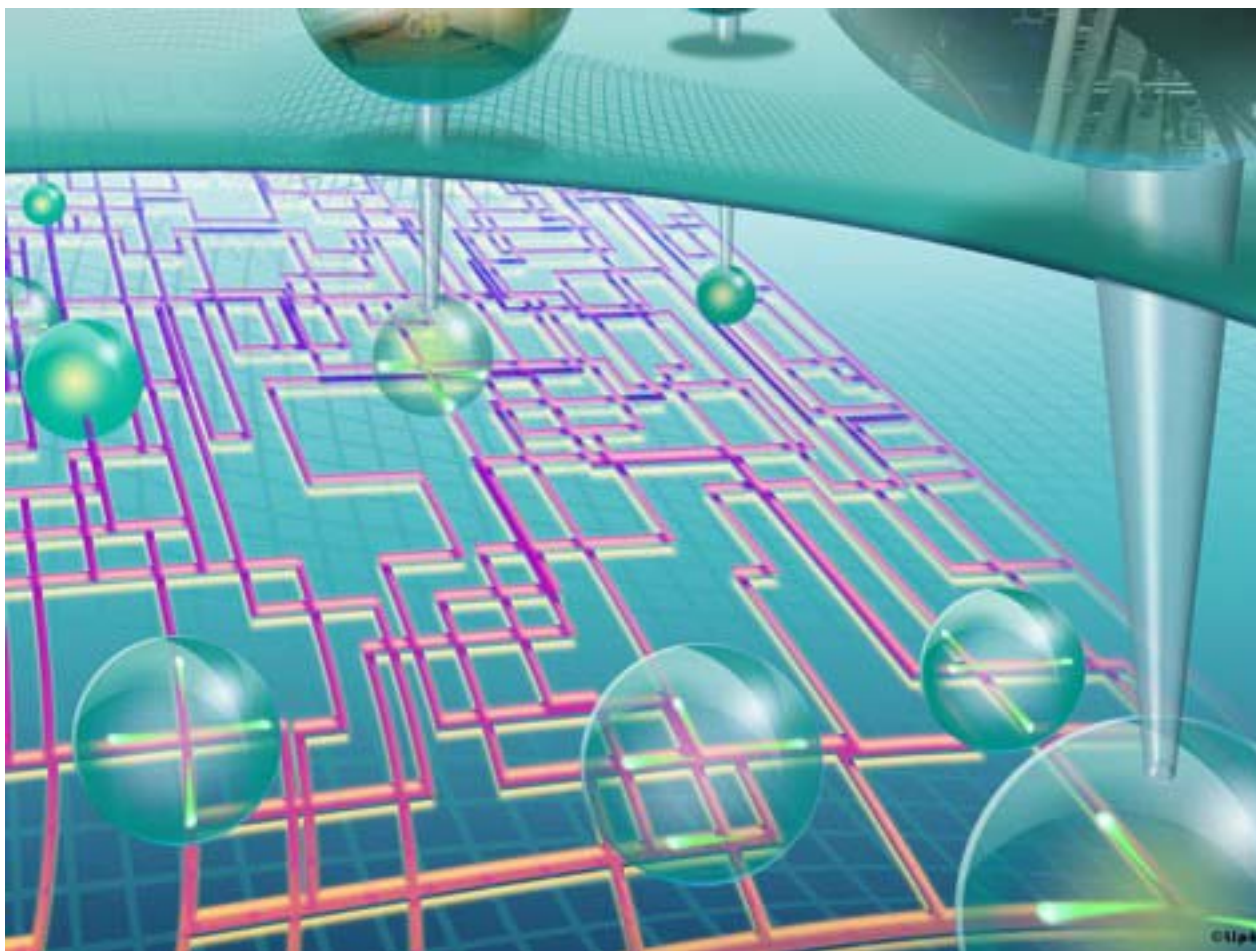
- For emerging wireless technologies
- Based on *dummynet*

Multihomed (Universidad Carlos III de Madrid)

- Allowing applications to exploit multihoming capabilities



Goal: Deepen



Expose the
underlying
network

Why Deepen PlanetLab?

Problem: PlanetLab provides limited facilities to make applications aware of the underlying network

- PlanetLab consists of end-hosts
- Routing between nodes is controlled by the internet
(This will change with GENI)
- Applications must currently make their own measurements

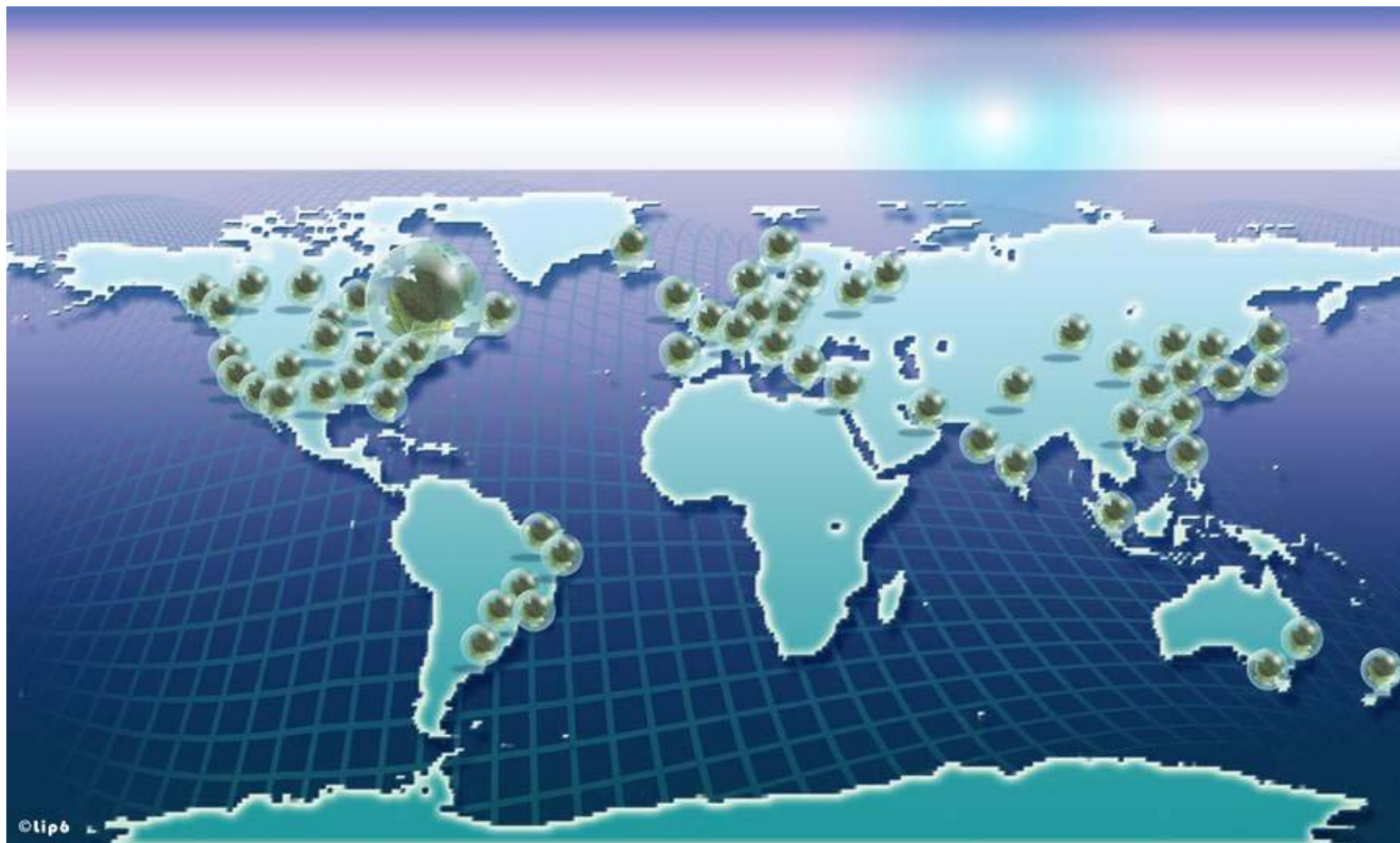


OneLab Monitoring Components

- Passive monitoring (partner TBA)
 - Track packets at the routers
 - Use *CoMo* boxes placed within DANTE
- Topology monitoring (U. P. & M. Curie)
 - Provide a view of the route structure
 - Build on *Scriptroute* to provide scalable active measurements



Goal: Federate



Before:
a homogeneous system

Goal: Federate



After:
a heterogeneous set of systems

Why Federate PlanetLab?

Problem: Changes to PlanetLab can come only through the administration at Princeton.

PlanetLab in the US is necessarily focussed on US funding agencies' research priorities.

- What if we want to study a particular wireless technology, and this requires changes to the source code?
- What if we wish to change the cost structure for small and medium size enterprises (currently \$25,000/yr.)?



OneLab and Federation

OneLab will create a PlanetLab Europe.

- It will federate with PlanetLab in the US, Japan, and elsewhere.
 - Eventually federate with “Private PlanetLabs” as well
- The federated structure will allow:
 - PlanetLab Europe to set policy in accordance with European research priorities,
 - PlanetLab Europe to customize the platform, so long as a common interface is preserved.



The Path to Federation

- Joint Access
 - Administrators in Paris log in to machines at Princeton
- Management Authority
 - PlanetLab machines in Europe boot from Paris rather than from Princeton
- Slice Authority
 - Paris can create slices across PlanetLab, becoming a second global slice authority, alongside Princeton
- Peering
 - With an agreed interface, Paris and Princeton code bases can diverge



Some Federation Issues

- A Private PlanetLab might have a rare resource
 - e.g., a node behind a wireless link
 - What are the right incentives to...
 - encourage the Private PlanetLab to share the resource
 - discourage over-subscription by other users?
- A Private PlanetLabs might wish to customize the source code
 - What are the right abstractions (APIs) that will allow both...
 - inter-operability
 - flexibility?

