



# ServiceWave 2010 CONFERENCE

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## OneLab: Federation and Testbeds

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# Future Internet Characteristics

- World scale
- Edge apps wait for no man
  - The AppStores are their testbeds
  - But many fail because core services, fast reliable networks, coverage of LBS aren't adequate or appropriate
- All need to adapt/respond to growing expectations.

# Federation

- Basic technique for world scale management of Internet testbeds
- Over geography:
  - PlanetLab(s) – PLC, PLE, PLK,...
- Over heterogeneous technologies
  - NITOS wireless building testbed, others...
  - DTN and autonomous networks with non-IP protocols
- Testing that joins the edge to the clouds is key

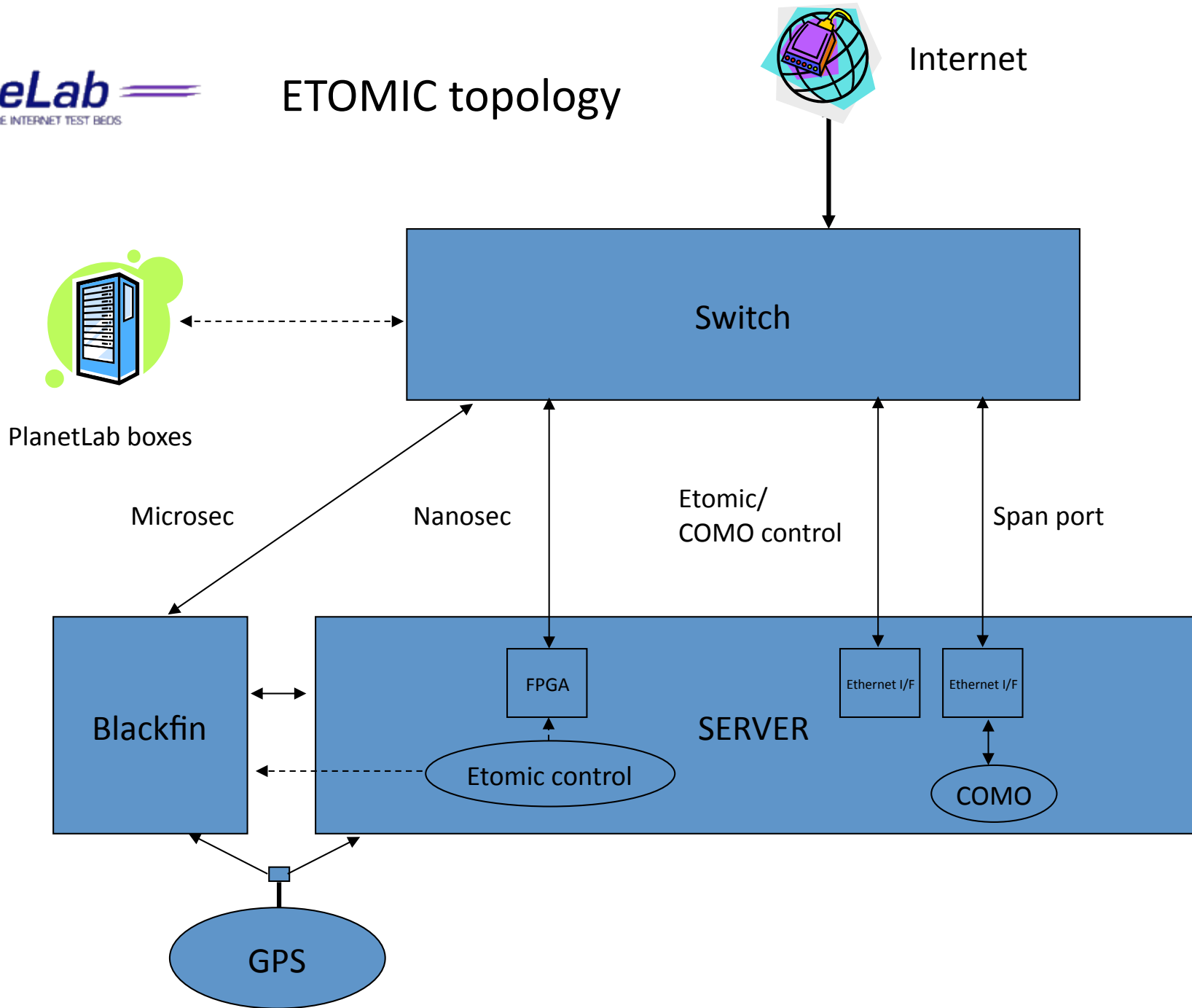
# Where do we go next?

- Extend federation support as middleware
  - Across control plane (access, security, privacy)
  - Across “experimental plane”
    - Resource discovery, acquisition and dispatch
    - Data definitions for interchange
    - Visualization, archiving, sharing or distribution
    - Monitoring usage, trends to assure sustainability

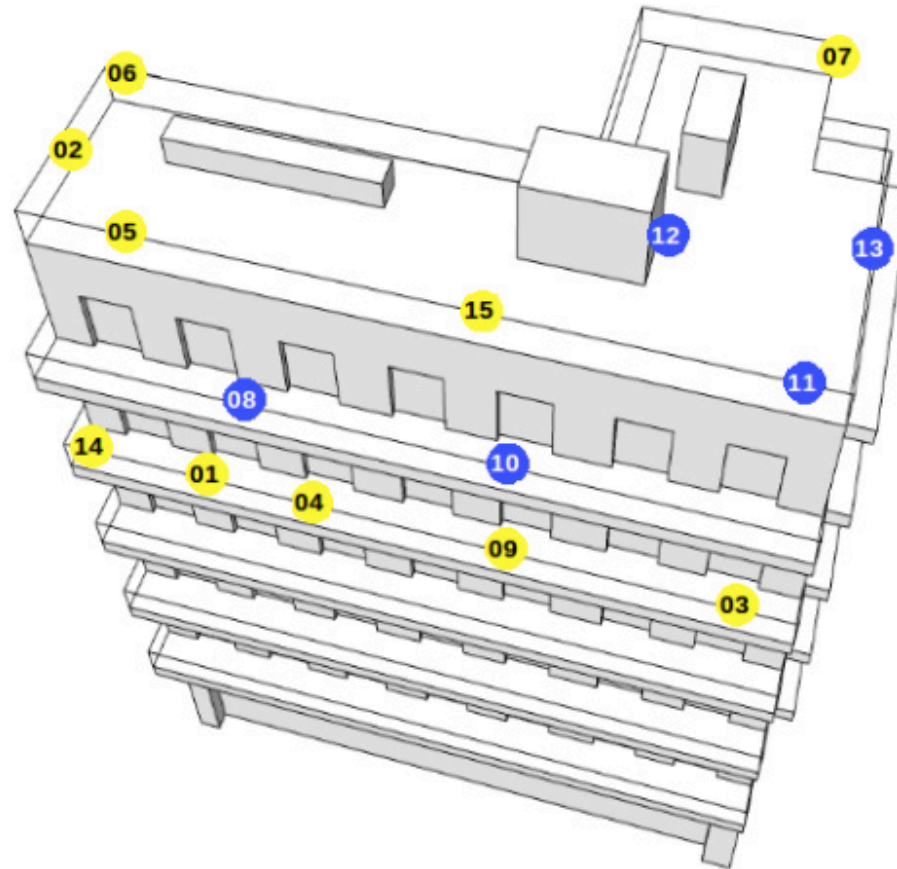
# Where do we stand today?

- Oldest resources – active measurement tools (2004+)
  - DIMES ([www.netdimes.org](http://www.netdimes.org)) volunteers, software client
    - Internet topology over time, at AS, city, POP,, IP level
    - Several thousand active agents, data public, used by ~30 academic groups
  - ETOMIC () dedicated hardware, some with hardware assist
    - Capacity measurements across Europe
    - Packet train probes
    - >100 registered users
  - SAC -- non-ip, autonomous and DTN networks
  - NITOS – wireless in-building testbed, OMF controls

# ETOMIC topology



# NITOS configurations



- Blue dots represent Diskless Nodes
- Yellow dots represent Orbit Nodes