# Towards Distributed Architecture for Collaborative Cloud Services in Community Networks

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6th International Conference on Intelligent Networking and Collaborative Systems (INCoS-2014)

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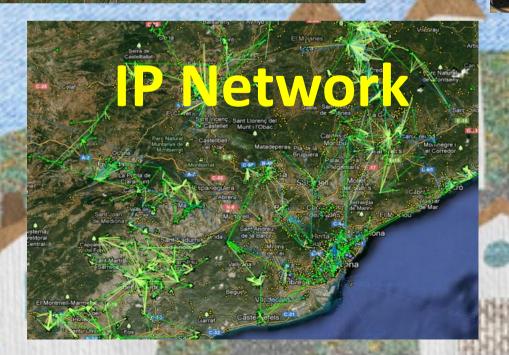


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## **Community Networks**

### Collaboration





### Heterogeneous

# 

Hardware



# Can we extend to the next level? Collaborative Cloud Services in Community Networks?

### A community cloud:

- built in community network
- hosted on community-owned computing and communication resources
- providing services of local interest
- collaborative deployment and maintenance by citizens for citizens

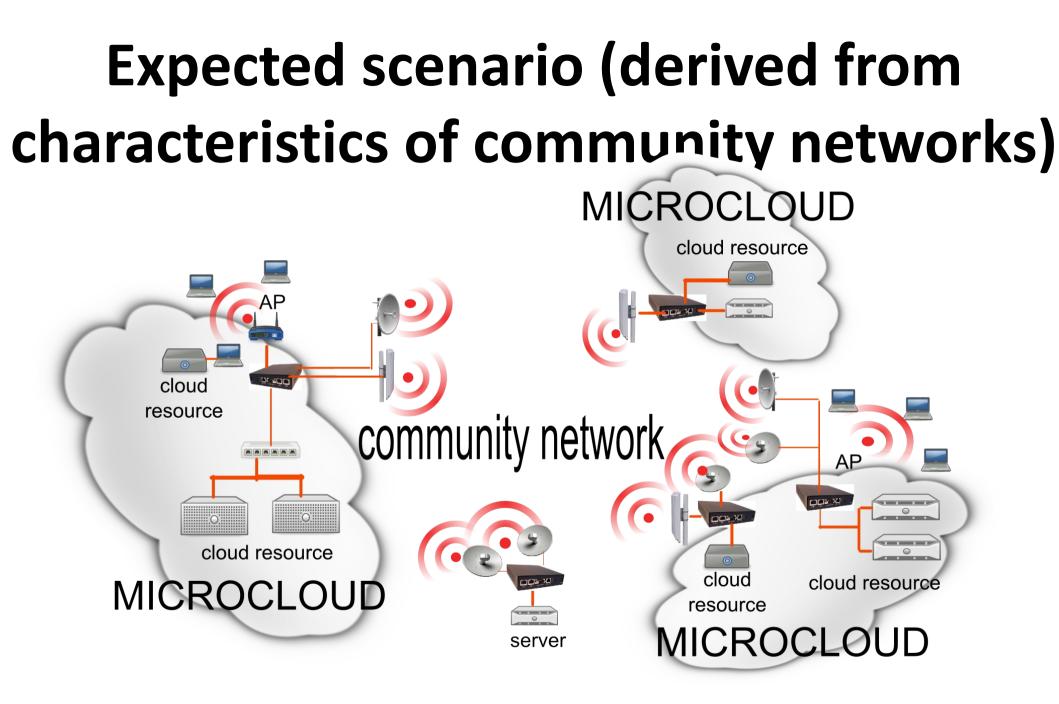
#### **NIST Definition**

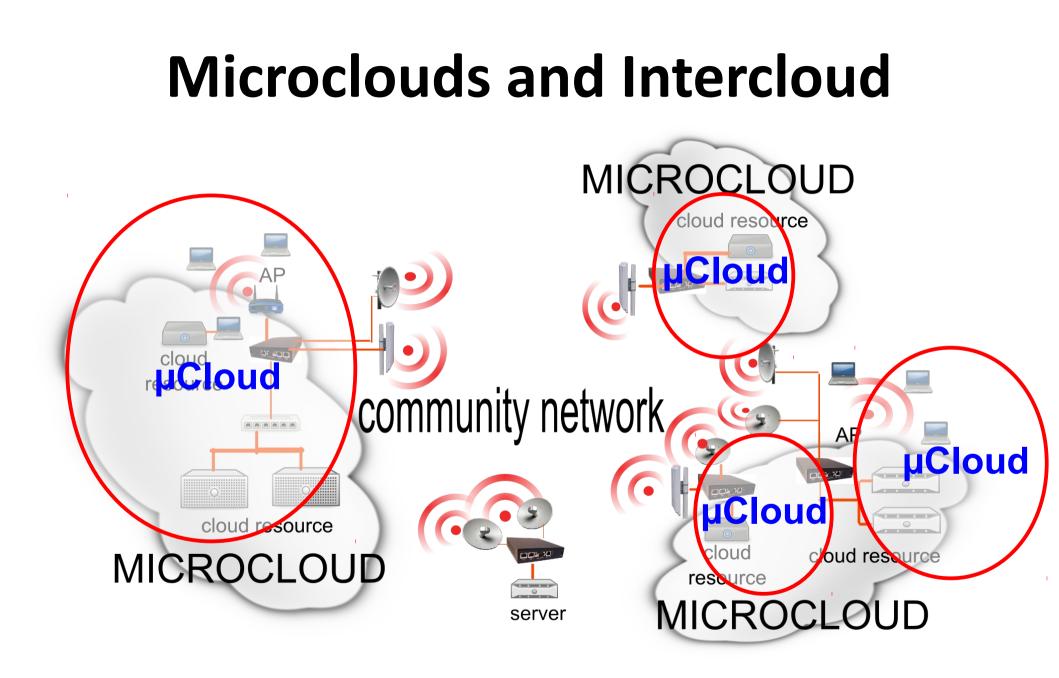
*Community cloud.* The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

# Collaborative Cloud Services in Community Networks

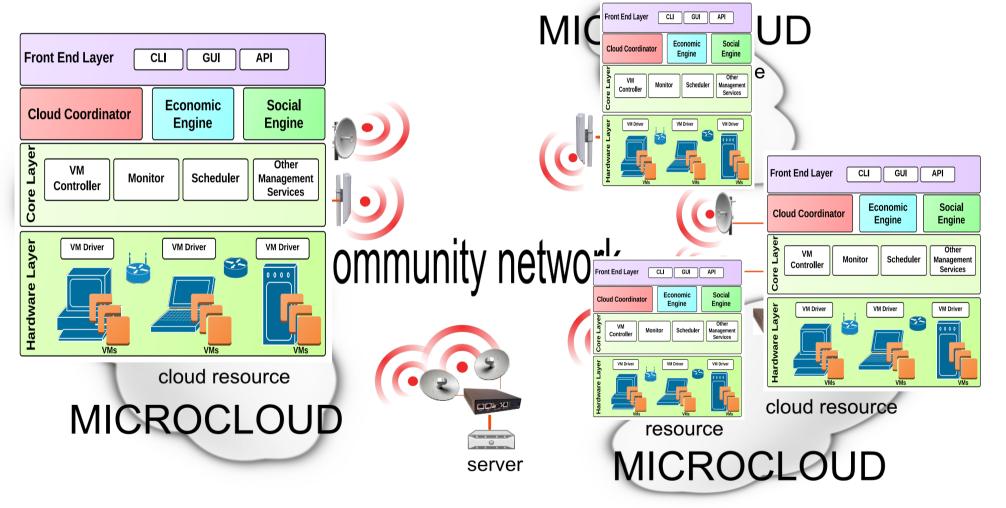
The vision of community cloud-based services

- IaaS: Popular CMP for management of the contributed computing resources
- PaaS: OS distribution, distributed services: storage, identity, communication, coordination
- SaaS: storage service, video streaming, collaborative work
- collaboratively provided and maintained.

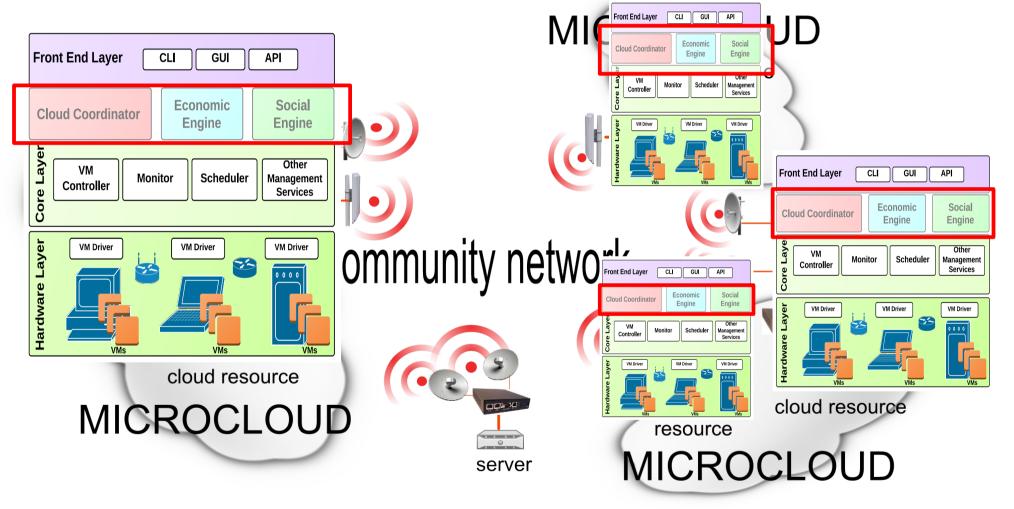




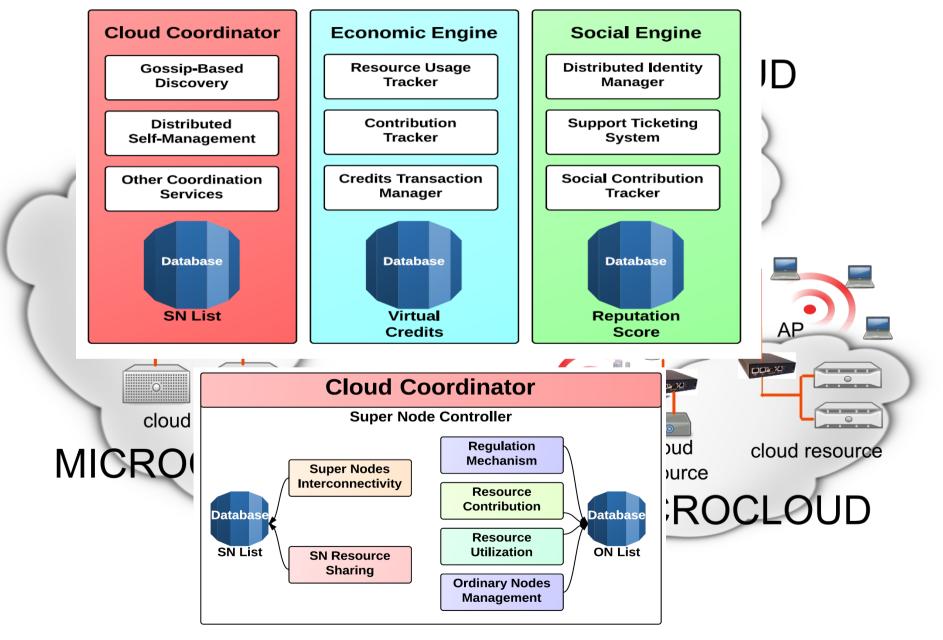
# Proposed Community Cloud Management System



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## **Specific architectural components**



# **Cloud Deployment**



# Options

### Applications

**Support Services** 

Middleware

**Cloud Platforms and Systems** 

**Cloud Enabler** 

Storage, Video, Communication, Data Processing

Socio-Economic Context Enablers, APIs, SDKs

> Broker, Coordinator, Federation, InterCloud

OpenStack, OpenNebula, Eucalyptus, Synnefo

Hypervisor, OS, Hardware, Network

### **Solutions chosen**

Tahoe-LAFS, ownCloud, Peerstreamer, BitTorrent

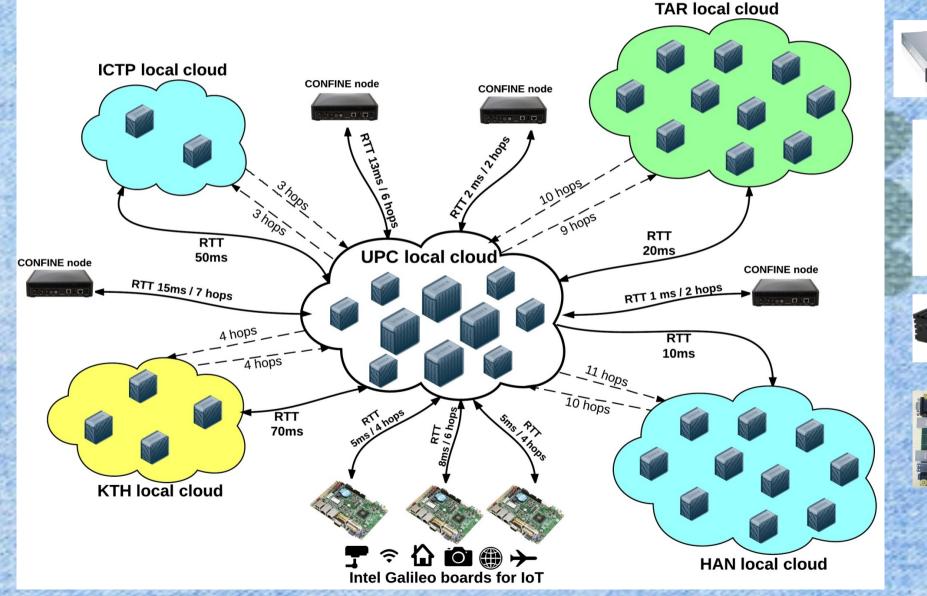
Simulations, needs working code!

**Cloudy distro** 

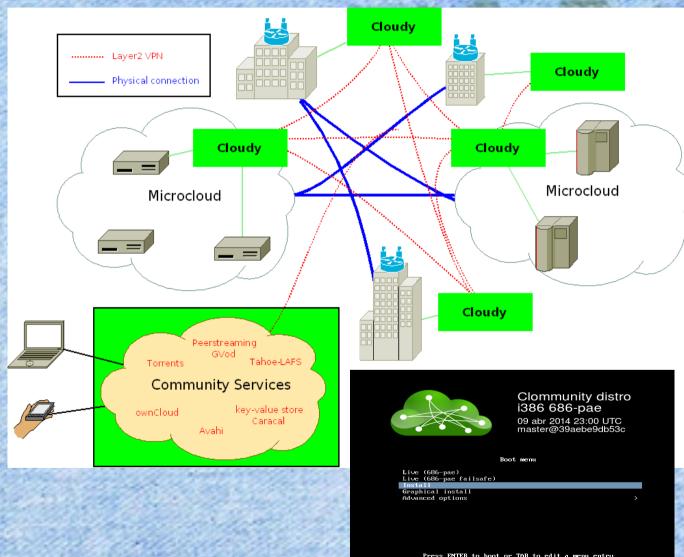
OpenStack, Eucalyptus, Proxmox, Confine

KVM, LXC

# Heterogeneous hardware, geograhically distributed cloud



# Cloudy distro approach: enforces collaboration



### **Cloudy is:**

Debian-based Linux distribution

Contains cloud services (Tinc&Avahi) and applications (Tahoe-LAFS, Peerstreamer, VoIP)

Contains some CN-specific tools

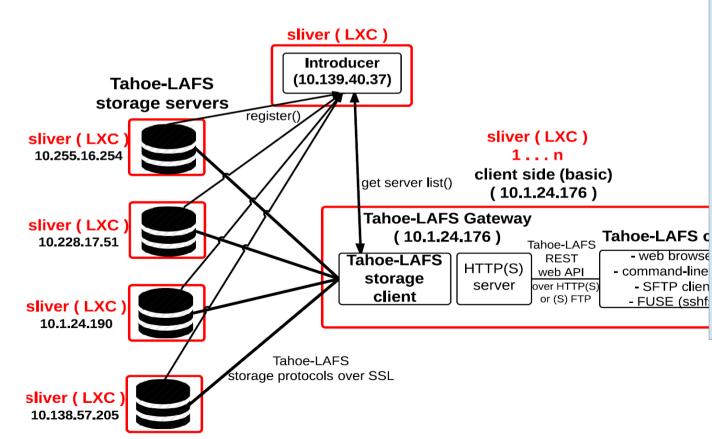
To be installed in VM or "bare metal"

#### Cloudy download:

: http://repo.clommunity-project.eu/images/

## **1st Exp: ownCloud and Tahoe-LAFS**

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### **Experimental setup**

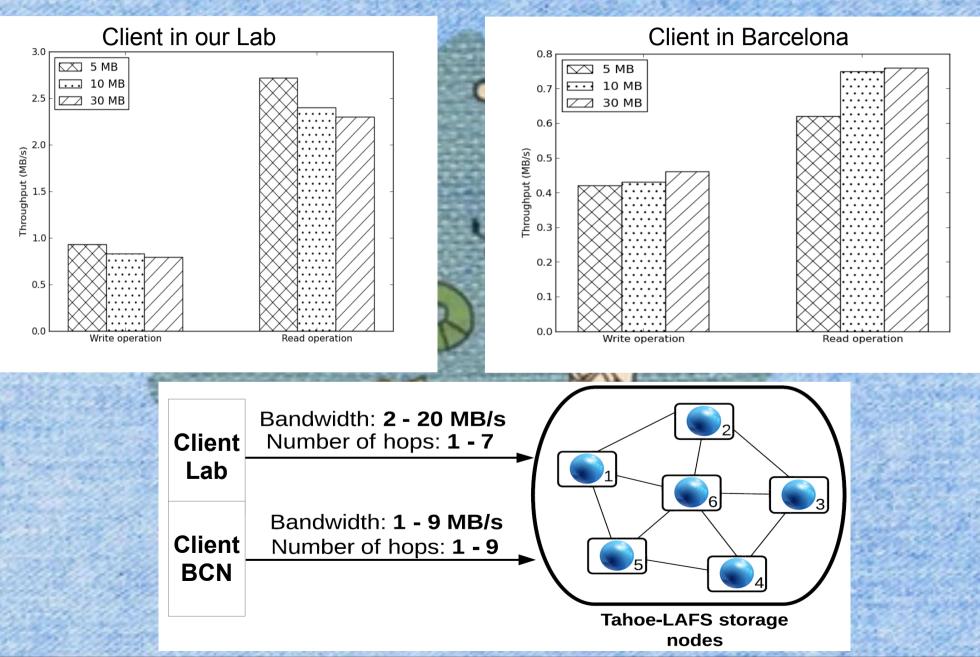
**12 nodes** in the community cloud: 4 nodes in Guifi.net,4 nodes in UPC campus,4 nodes in lab.

1 Tahoe-LAFS introducer on separate node.

2 Tahoe-LAFS clients: 1st in lab, 2nd in Barcelona.

Evaluate **read and write operations** with different file sizes.

## **1st Exp: Results**



## 2nd Exp: BitTorrent

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### **Experimental setup**

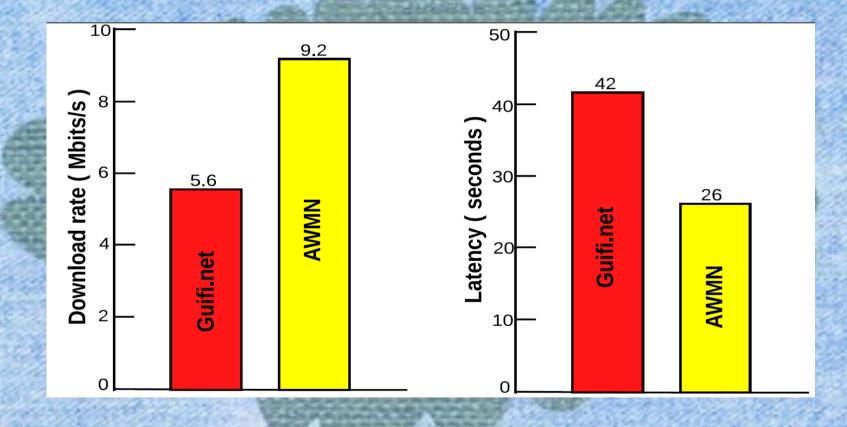
20 nodes BitTorrent system: 10 nodes in Guifi (Spain) and 10 nodes in AWMN (Greece), deployed in LXC containers. Tunnel Between CNs.

**Transmission** BitTorrent client.

#### Opentracker in Guifi.

Initial seeder node in AWMN.

Evaluate 30 MB **file download** with clients in Guifi and AWMN. **2nd Exp: Results** 



All clients successfully obtained the shared file.

## **Conclusions and Future Work (I)**

Architecture with specific components to enable clouds for communities.

Cloudy distro approach to integrate services.

Community cloud deployed, geographically distributed and heterogenous.

Experiments show feasibility and performance of applications in community cloud.

## **Conclusions and Future Work (II)**

Looking for contributions from the research community and joint work.

Encourage real users.

Create community cloud eco-system.



## A Community networking Cloud in a box

### CLOMMUNITY CLOMMUNITY CLOMM

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### clommunity-project.eu

CLOMMUNTTY

se this short video that explains you Community Clouds.

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