Incentive-based Resource Assignment for Clouds in Community Networks

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Outline

Community Networks
Community Clouds
Architecture and Design
Prototype
Evaluation
Conclusions

Community Networks

What's this? A cooperative development of a network
Where: Local, community (city, region, area)
Who: You, and your neighbors, …
"Don't buy the network, be the network!"
Scalable, self-organized and decentralized IP networks and services built and operated by citizens for citizens

But what services are in the network?
What do you use it for?

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Community Clouds

The vision of cloud-based services in community networks

We are talking about a *specific community cloud*:

- built in community network
- hosted on community-owned computing and communication resources
- providing services of local interest

Cooperative deployment and maintenance of clouds by citizens for citizens

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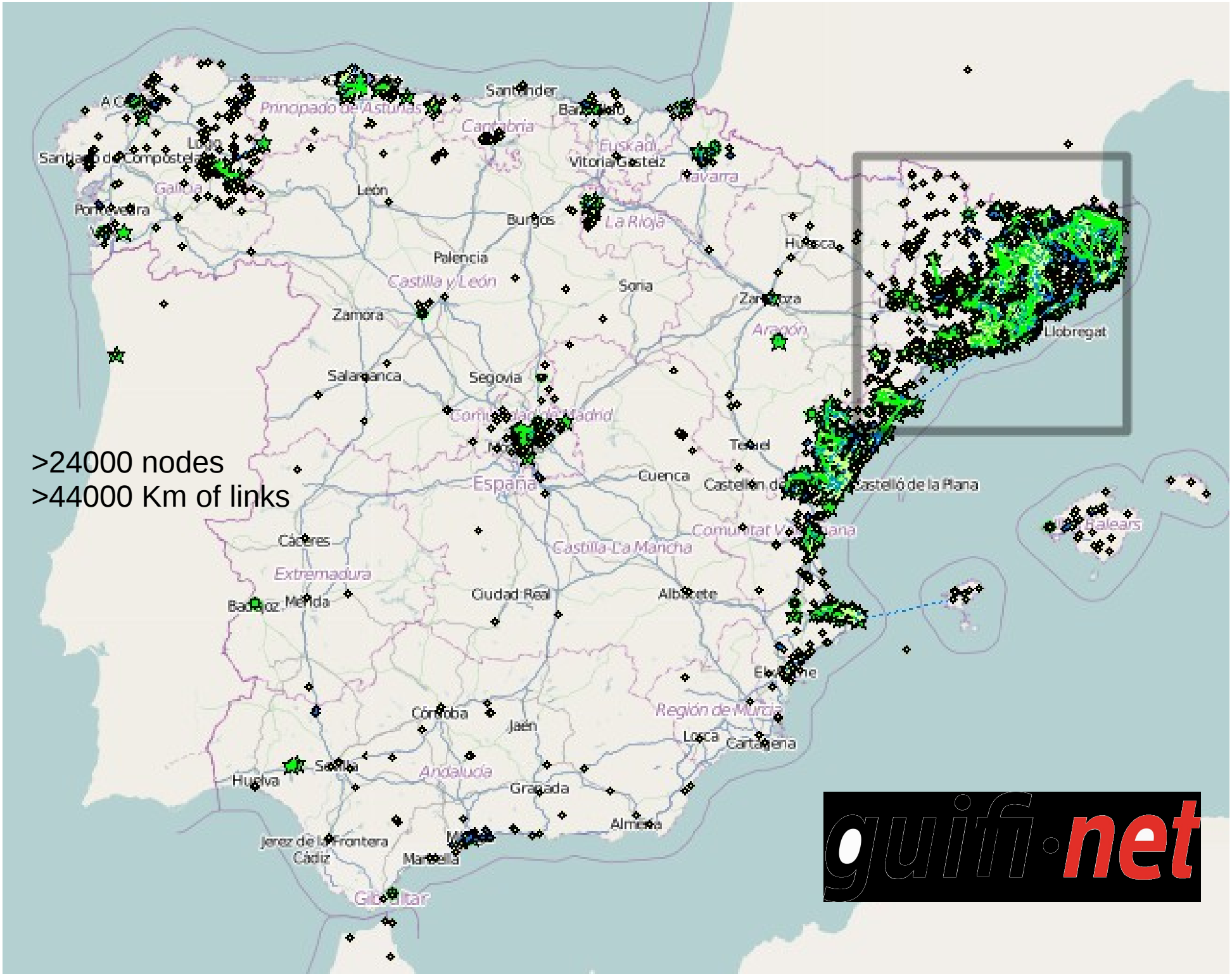
>24000 nodes
>44000 Km of links
Principado de Asturias
Cantabria
Euskadi
Navarra
La Rioja
Castilla y León
Aragón
Galicia
Extremadura
Castilla-La Mancha
Andalucía
Región de Murcia
Illes Balears
Llobregat
Castelló de la Plana
Santander
Burgos
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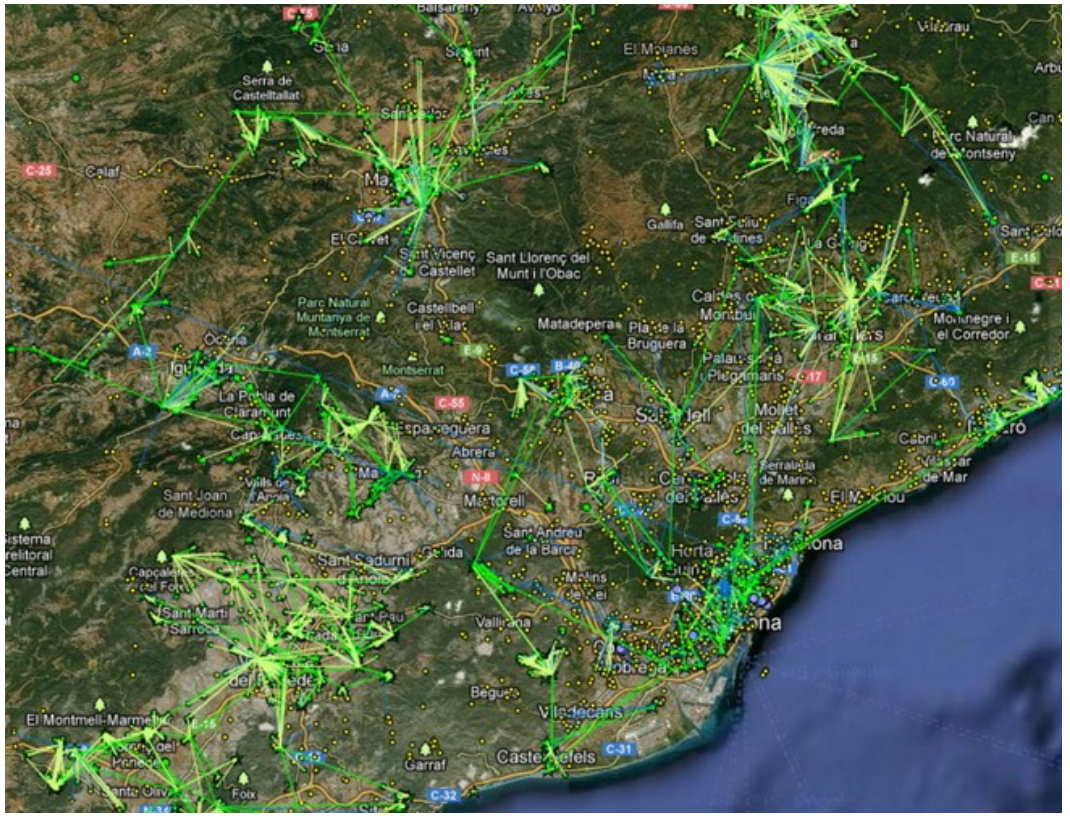
Granada
Almería
Cádiz
Jerez de la Frontera
Lorca
Cartagena
Gibraltar
guifi·net

guifi·net



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Hardware in Community Cloud

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For People, By People

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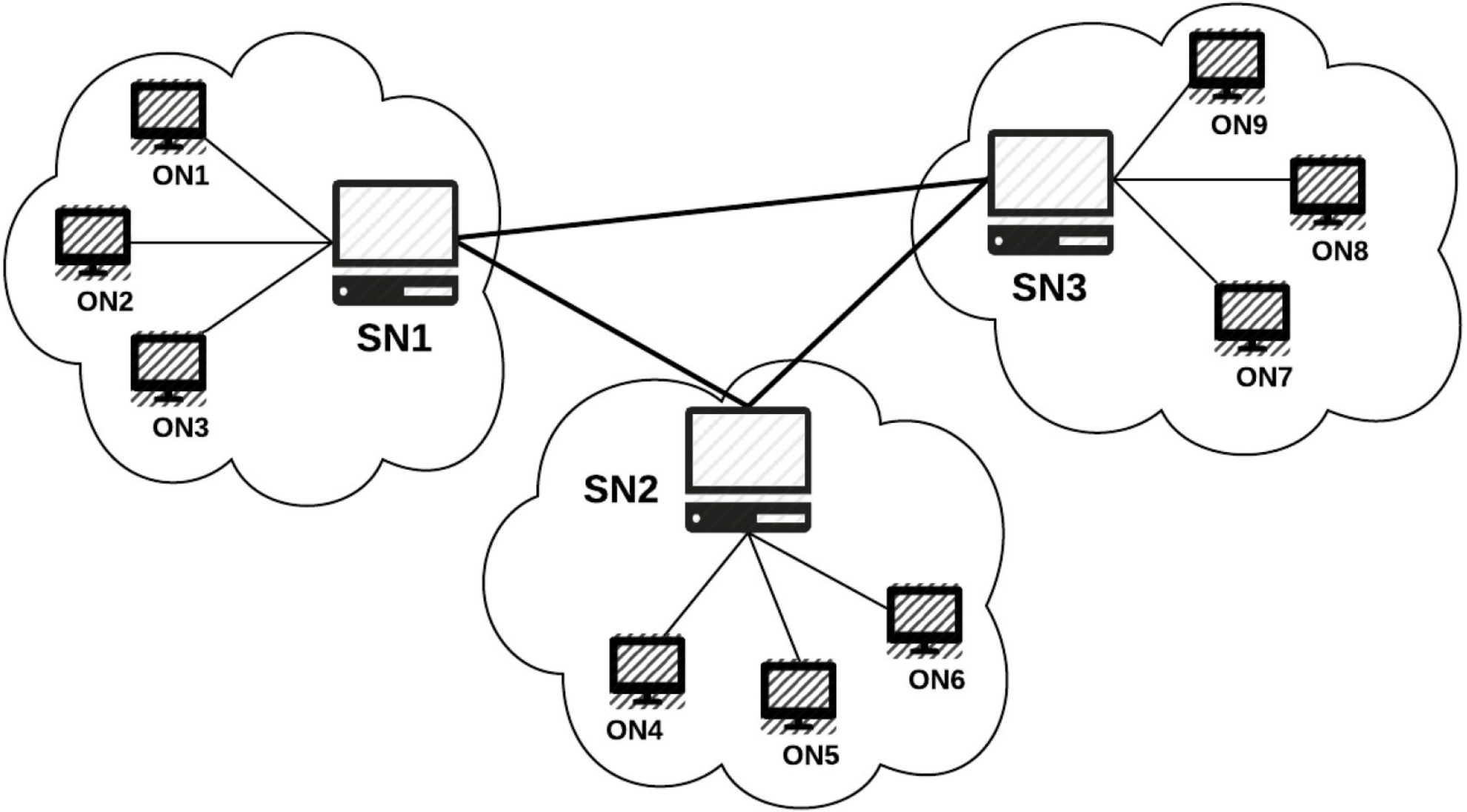
Federated Community Clouds



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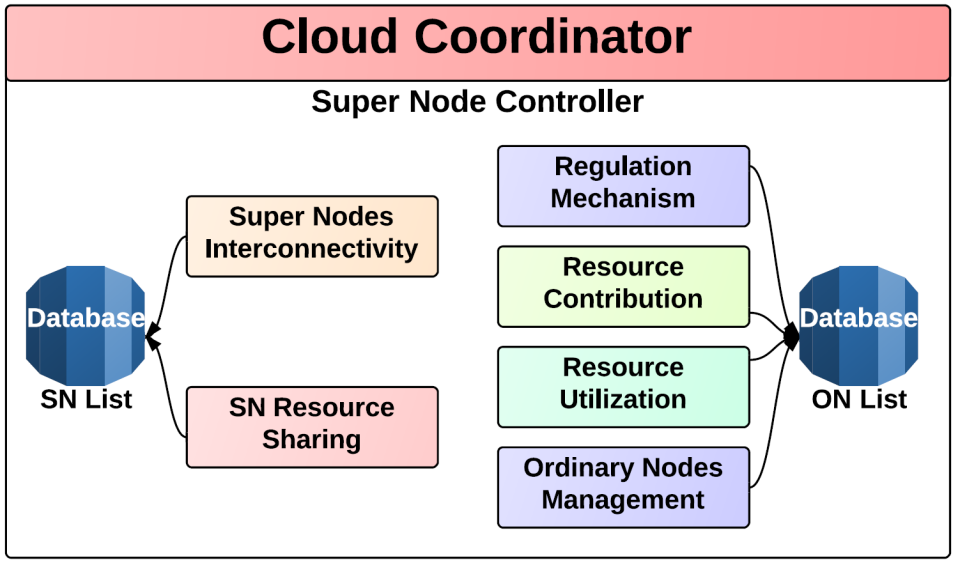
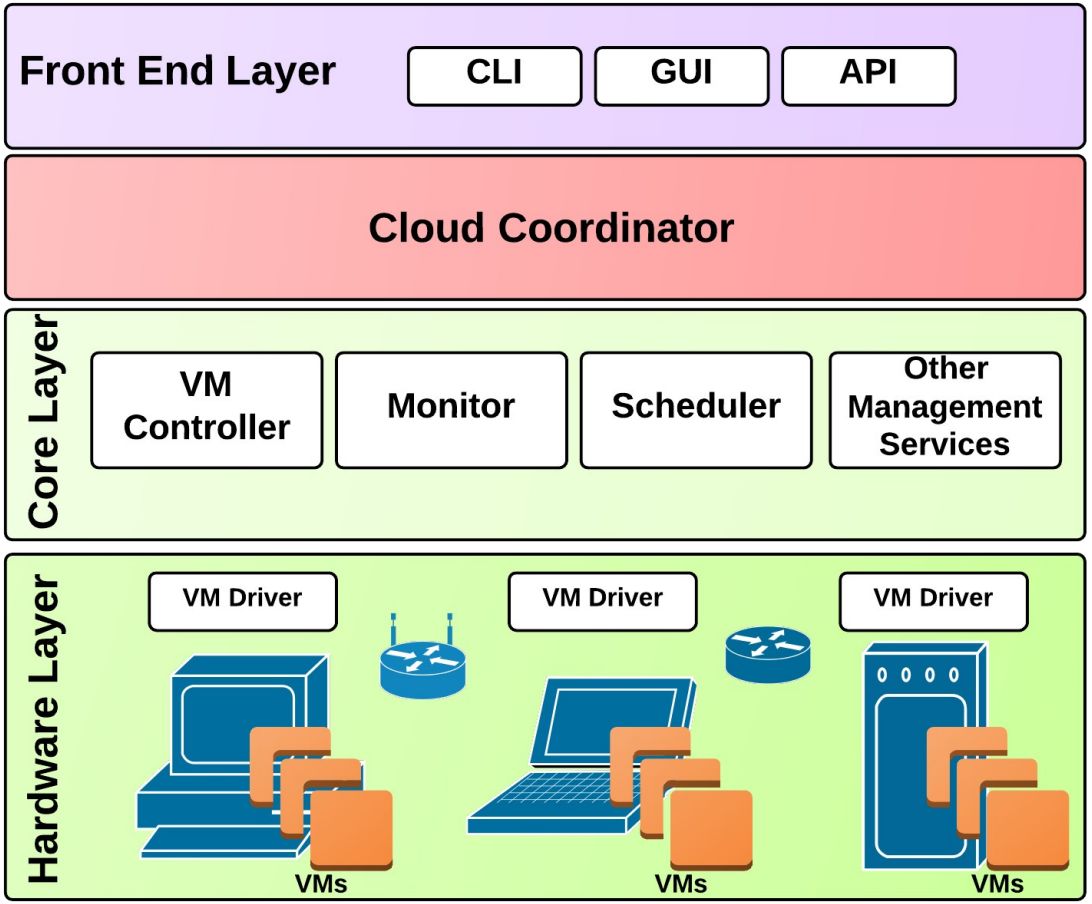
Architecture proposal





openstack™

OpenNebula.org
The Open Source Toolkit for Cloud Computing

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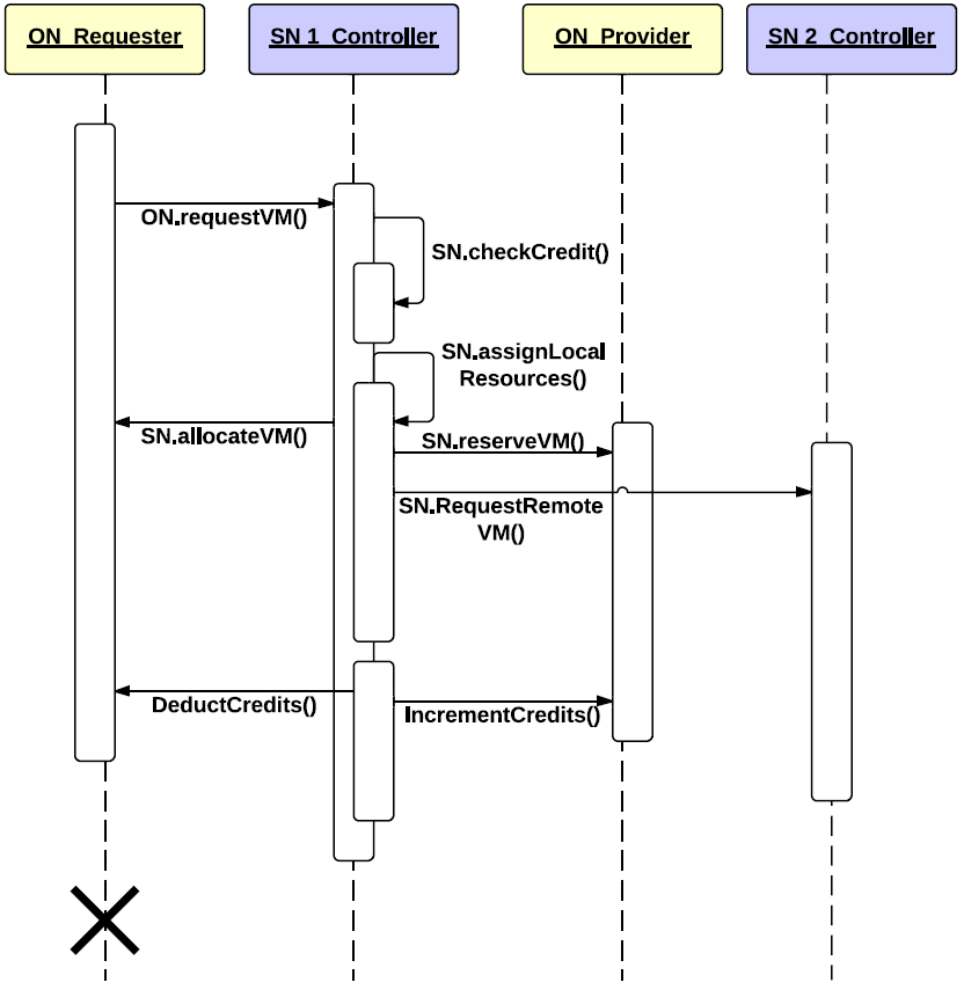
Prototype

Implementation of **incentive mechanism in cloud coordinator**

- CouchDB
- Python
- deployed in slivers of Community-Lab[1] nodes



[1] http://community-lab.net/

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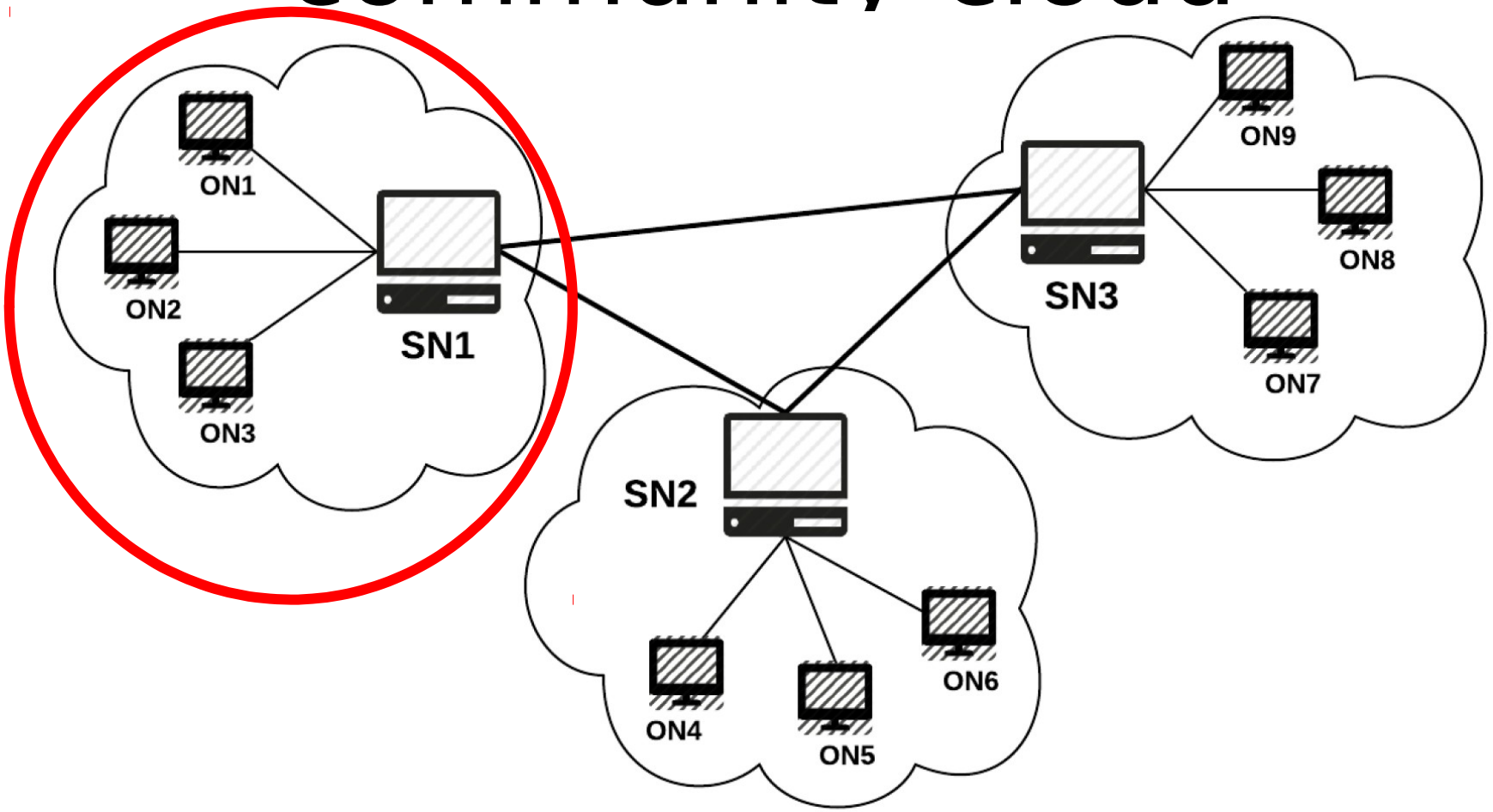
1st Exp: Resource assignment in local community cloud



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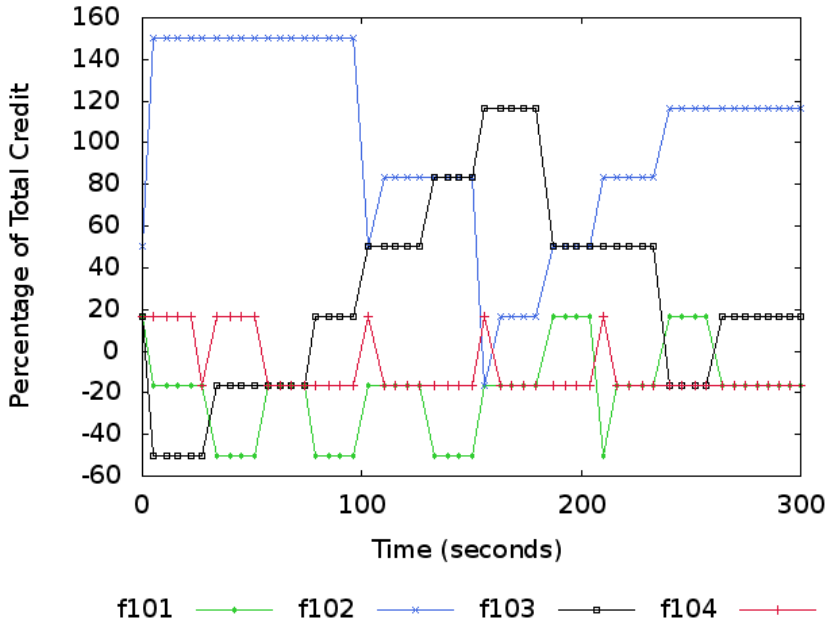
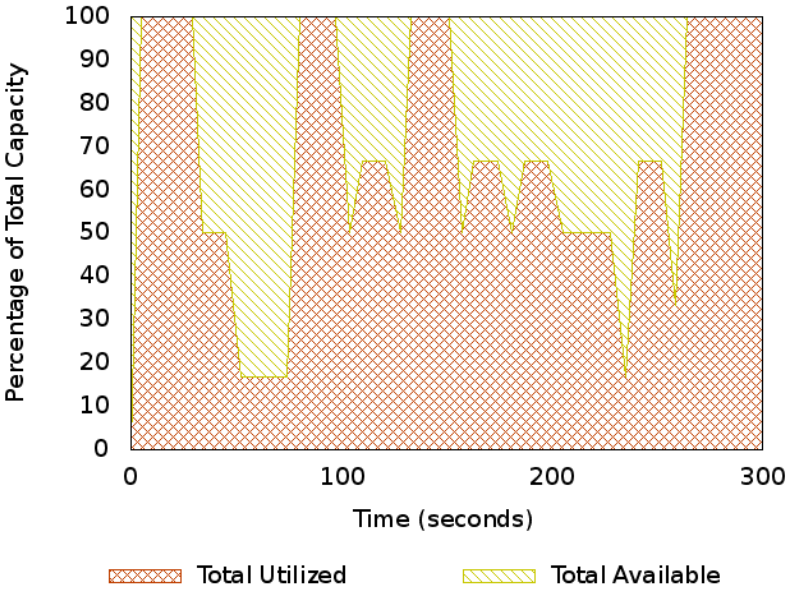
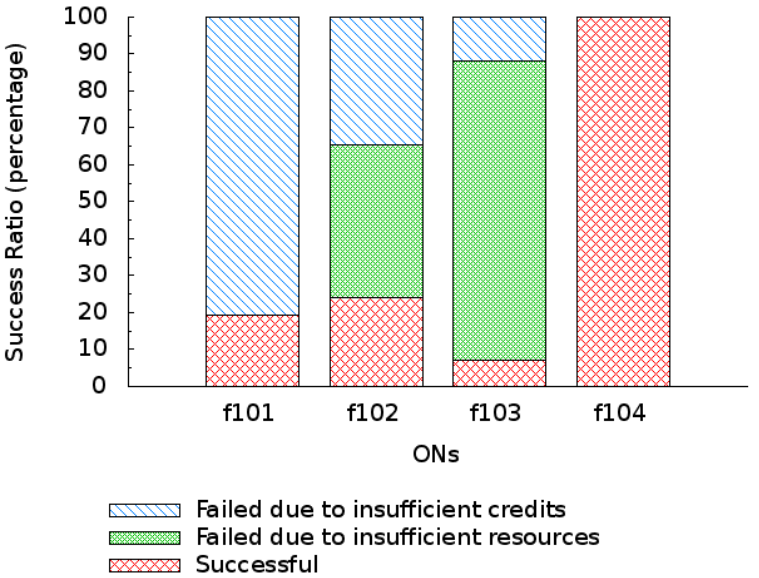
1st Exp: Results

Node IDs	Capacity	Shared VMs
f101	2	1
f102	3	3
f103	3	1
f104	1	1







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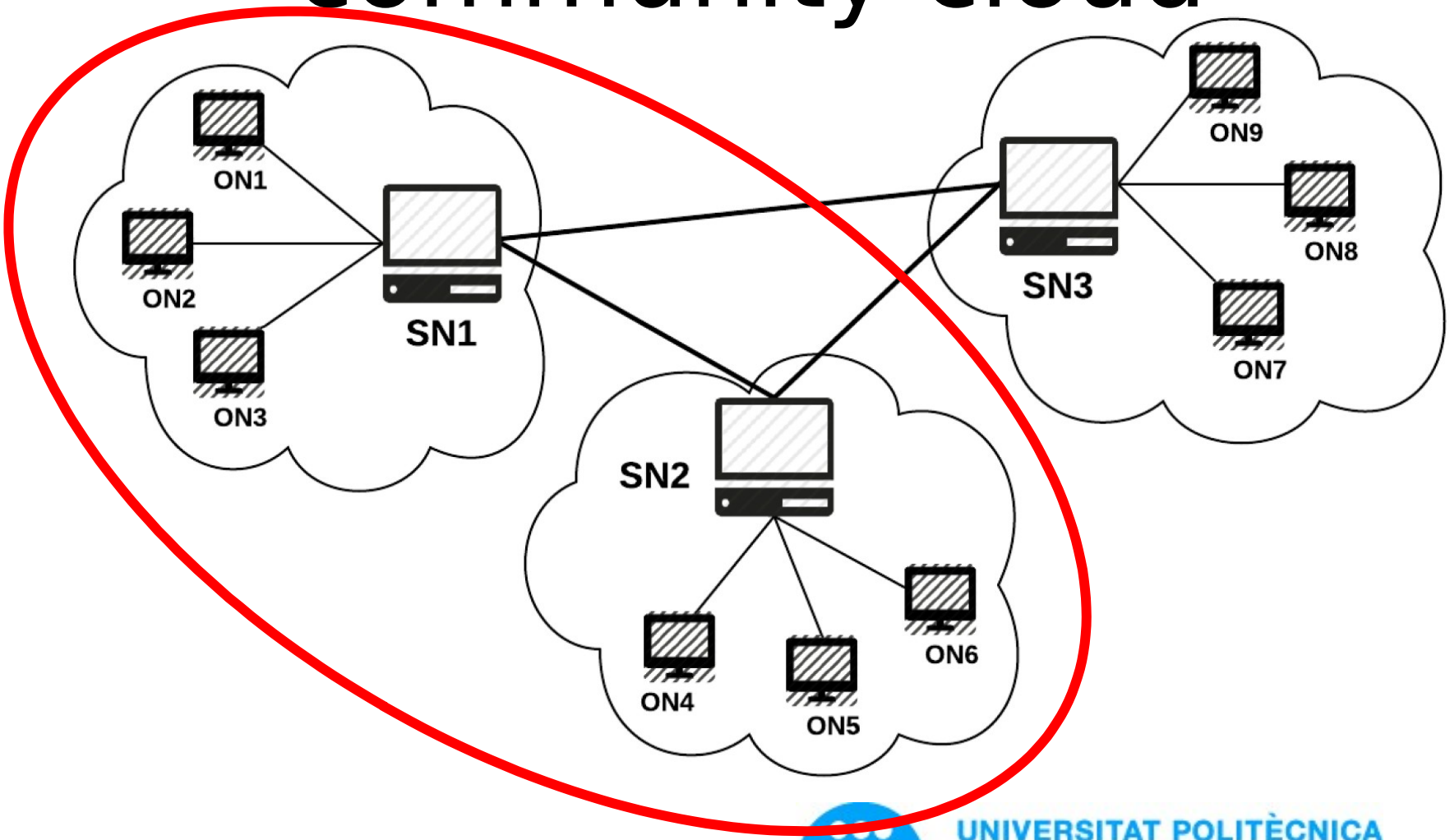
2nd Exp: Resource assignment in federated community cloud



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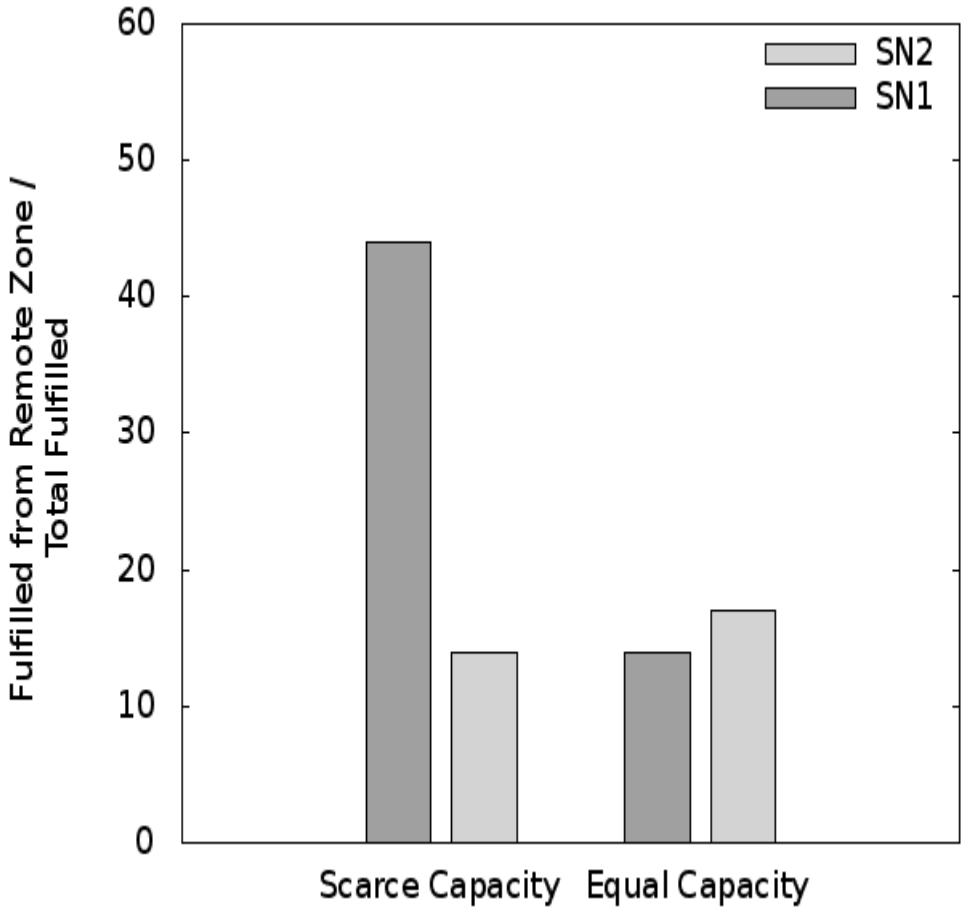
2nd Exp: Results

		Case 1: Scarce Capacity		Case 2: Equal Capacity	
SNs	ONs	Total VMs	Shared VMs	Total VMs	Shared VMs
SN1	ON1	3	1	3	2
	ON2	3	1	3	3
	ON3	3	1	3	2
	ON4	1	1	1	1
SN2	ON1	3	2	3	2
	ON2	3	3	3	3
	ON3	3	2	3	2
	ON4	1	1	1	1



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Future Work

Address inter-SN communication (gossip, DHT…)

Explore broker between federated clouds

Integrate into current cloud deployments that we undertake in Guifi.net

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Conclusion

Federated local cloud scenario for community network

Resource provision and usage regulated by incentive mechanisms built upon a credit system

Experiments showed the effects of incentive-based resource assignment in local and federated cloud scenario

Regulation potentially key element for community network clouds to be sustainable

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A Community networking Cloud in a box

Thank you

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