An introduction to community networks

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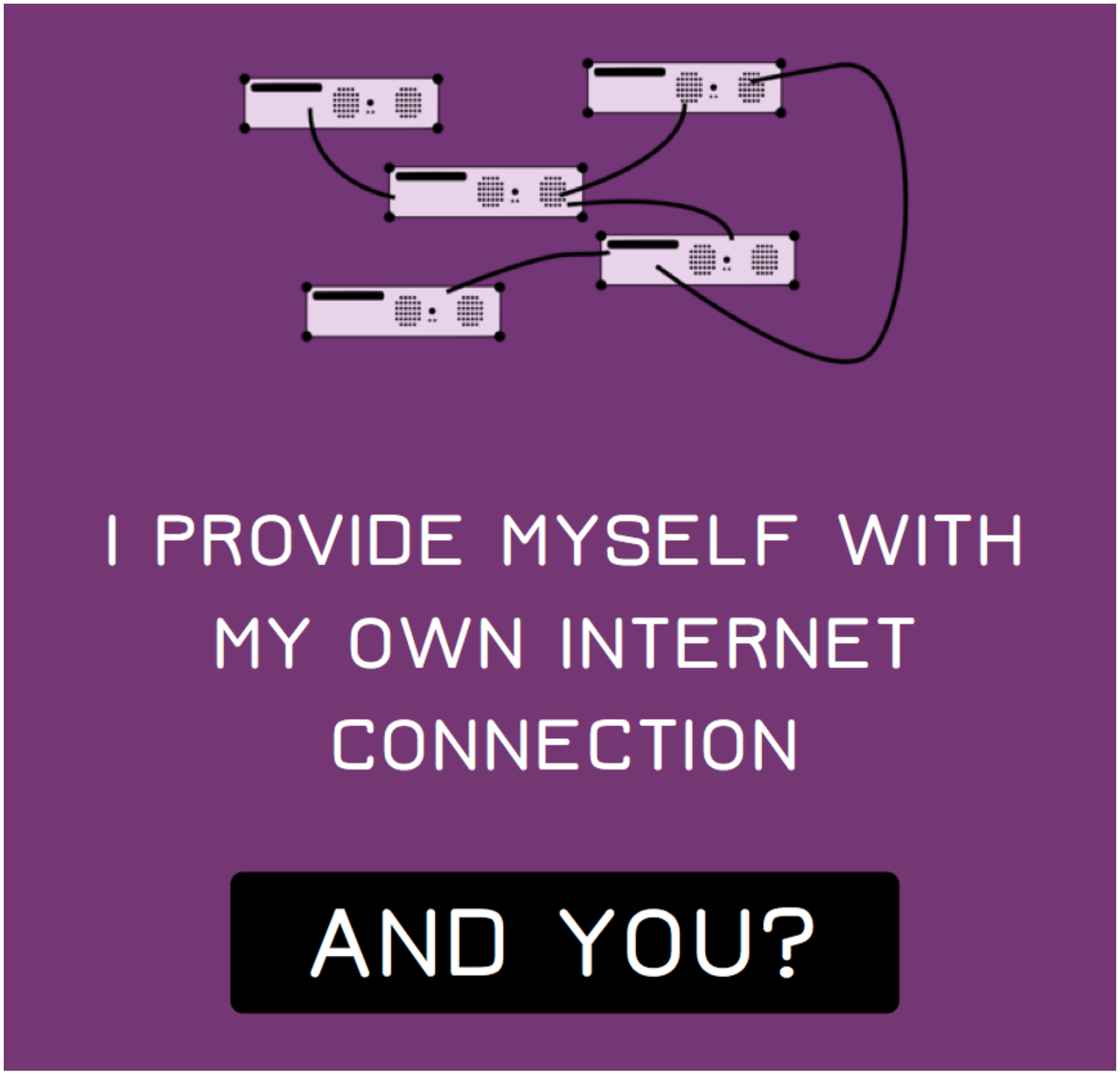
Community networks: the idea



Community networks, explained with beer

Community network: be your own ISP

- People operating an ISP, it's possible
  - Non-profit nature
  - Focused on last mile access, the local *community*
  - Sometimes even without access to the public Internet
- More than a thought experiment
  - Community networks are operational, around the world
- Community networks grow *bottom-up*
  - By experimenting with wireless mesh
  - Keep adding nodes and people to the network

How they do it: hardware and software

- Open and closed hardware
  - OpenWRT Linux routers
  - Mikrotik + Ubiquiti, …
- Wireless networks for flexibility
  - Open spectrum, works for links of tens of kilometers
  - Even fiber, deployed by people
- Open source and/or proprietary software
  - Linux, Mikrotik RouterOS, Cisco, Ubiquiti AirOS, …
  - Usually open solutions, maintained by community

How they do it: network organization

- IP for end-user connectivity
  - Often private IPv4 address space:10.0.0.0/8
  - IPv6 is starting to get adopted, members do not always see need (sounds familiar?)
- Routing protocols
  - OLSR, OLSRv2, …
  - BGP, sometimes with tweaks for wireless links
  - Custom protocols: LibreMesh, BMX6, …

How they do it: people

- Community networks are all about people
  - A community network is built and operated by people
  - Almost exclusively volunteers
  - Strong social components in the network
- Very creative community, e.g.
  - People building affordable optical link hardware
  - Crowdsourcing budget to upgrade links

They do it: the model works

- Community networks are operational worldwide
  - South Africa, Argentina, Tibet, USA, Canada, Netherlands, Italy, Spain, …
  - Meetings at Wireless Summit, strong informal relations
- Large variety of approaches
  - A central foundation (AWMN) or distributed (Freifunk)
  - Public IP space (Funkfeuer) or only local access (Guifi)
  - Complementary to commercial Internet packages (Wireless België) or sole means of access (AWMN)

They do it: operational challenges

- Similar to traditional ISP
  - Scaling, data retention, law enforcement requests, …
- Everything is distributed
  - Including e.g. address assignment and funding
- Liability for a group of volunteers
  - Foundations and formal organizations

A threat to traditional ISPs?

- Often different goals
  - Connecting people versus offering Internet access
  - Commercial-grade stability versus basic access
- Often complementary to commercial offerings
  - Popular where no or limited commercial services
- Symbiotic models are being explored
  - ISPs building on top of the network for last mile access
  - ISPs using the community network for OTT services

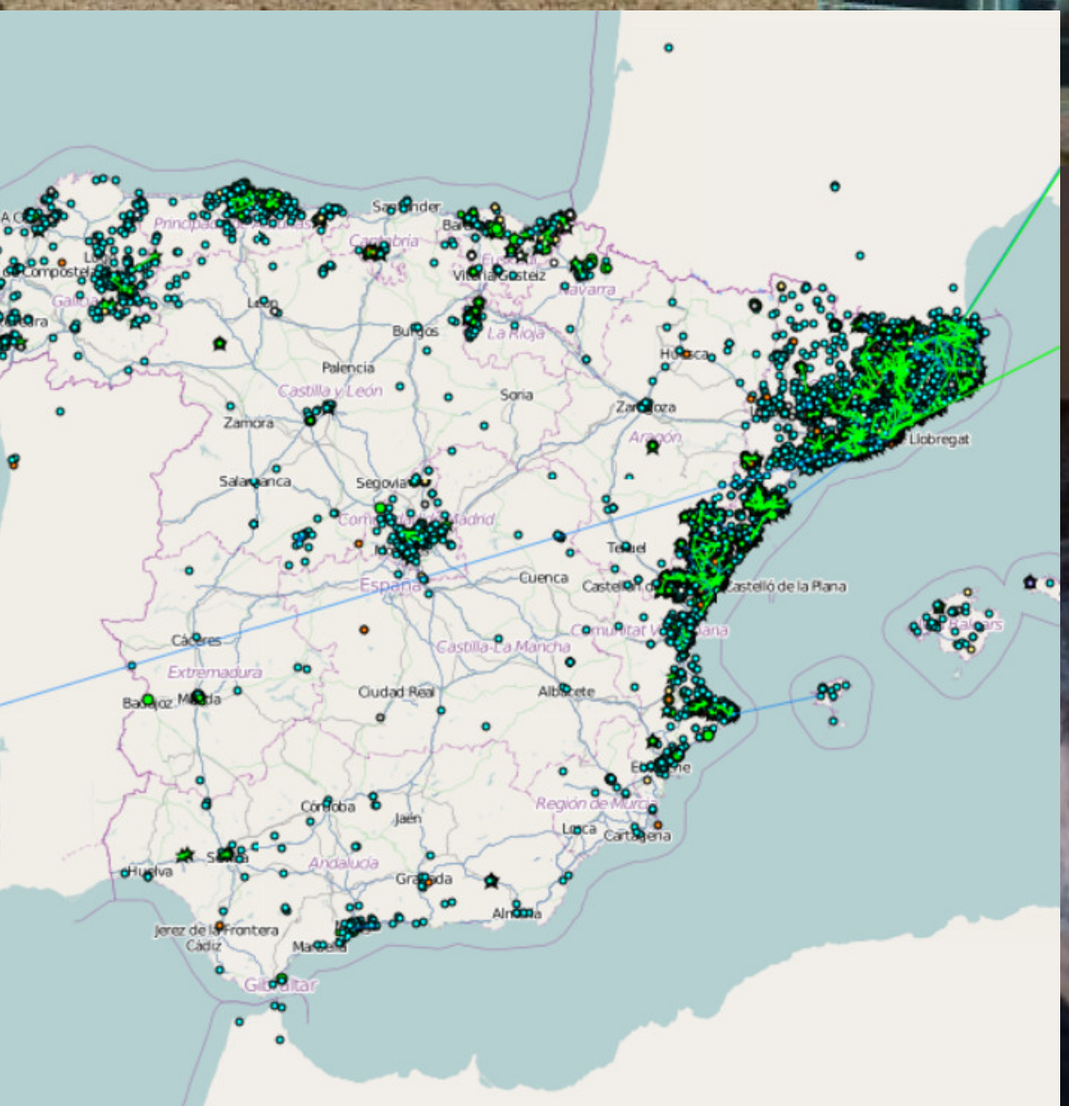
Community networks research

- EC-funded research project: CONFINE
  - Tackling a number of open challenges
  - Five community networks involved: AWMN (GR), Guifi (ES), Funkfeuer (AU), Ninux(IT), Sarantaporo(GR)
- Resulting testbed: Community-Lab.net
  - 100+ devices in community networks around Europe
  - Enables experiments inside a community network
  - Open and free access for researchers, community network members and you

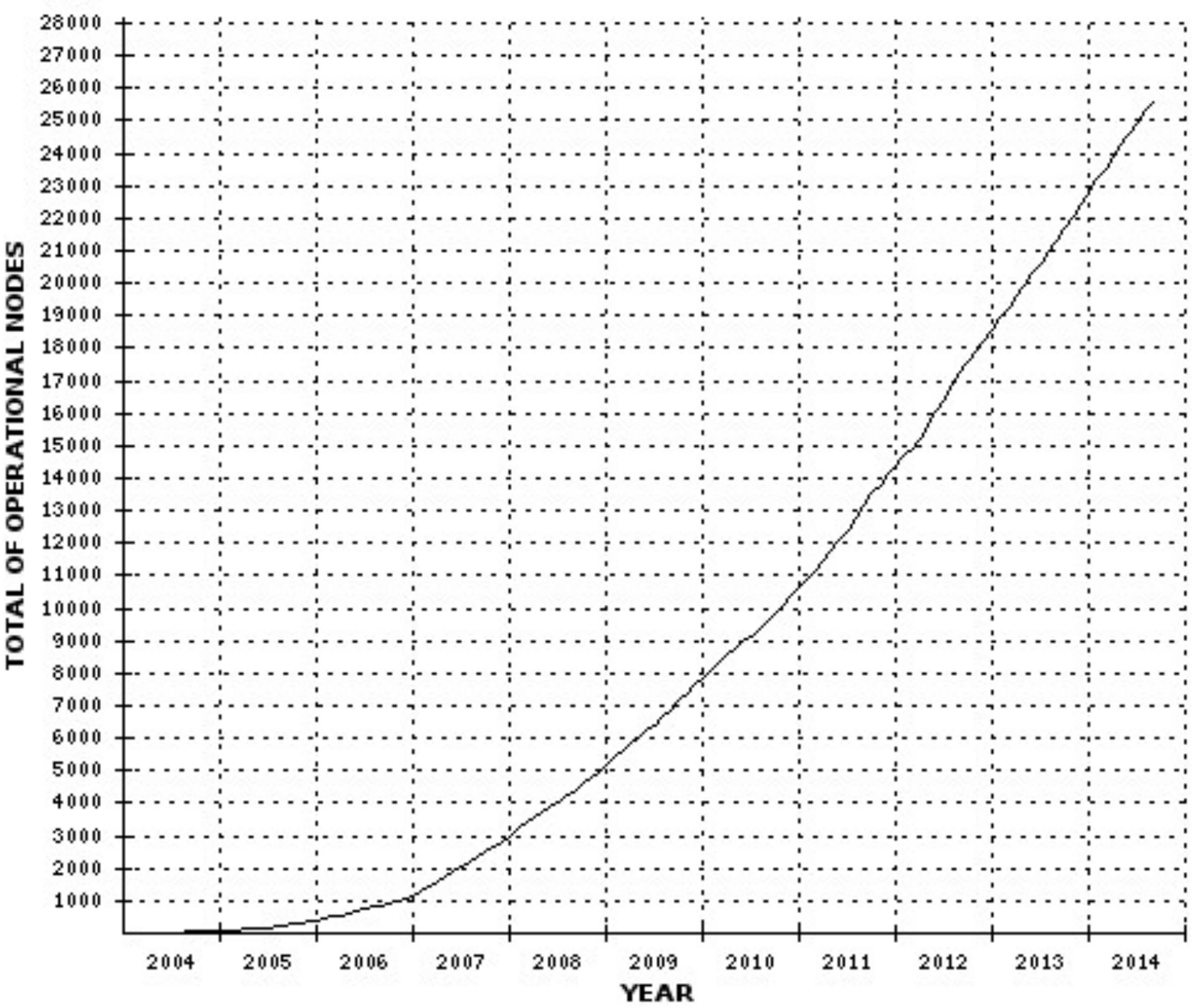
Example: Guifi.net

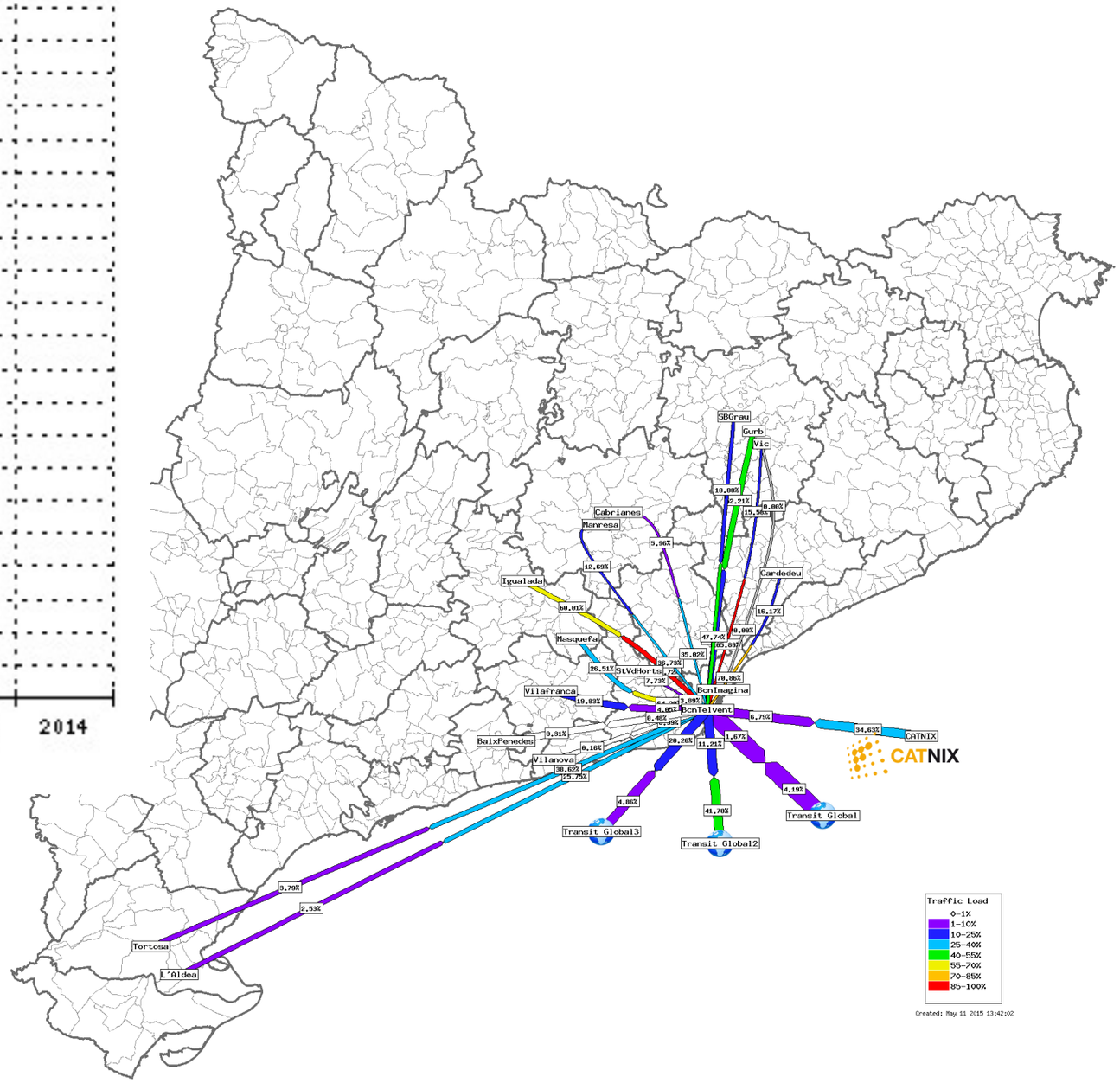
- Started on 2003 as a consolidation of existing wireless communities
  - Neutral, Free, Open
- Established a Foundation in 2007
  - Not governmental, not for profit, non-partisan
- Current situation: OF (since 2009) & WiFi, 20 ISPs


2010/02/04

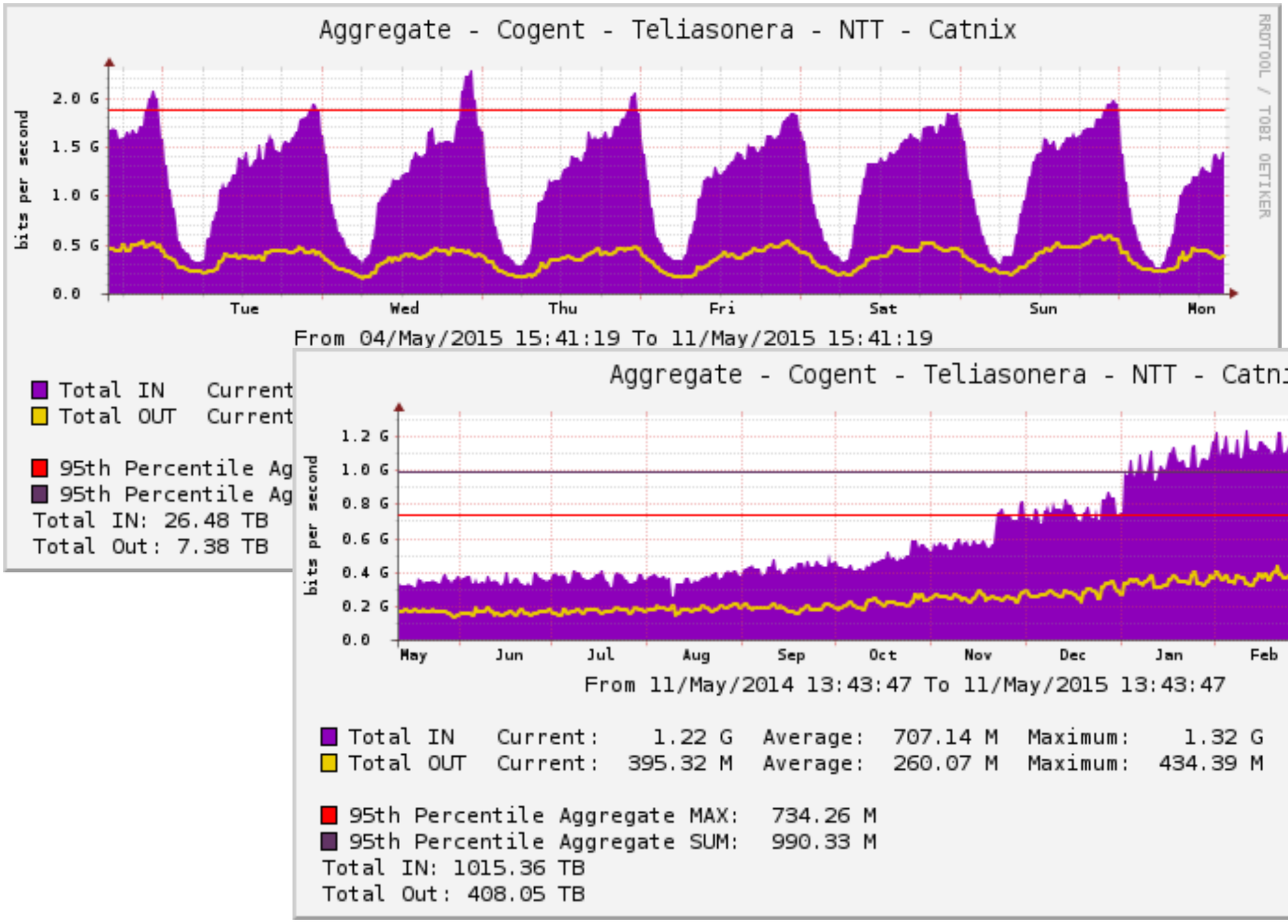

Santander
Burgos
Palencia
Soria
Zamora
Salamanca
Segovia
Cuenca
Cáceres
Ciudad Real
Albacete
Córdoba
Jaén
Huelva
Sevilla
Granada
Almería
Cádiz
Jerez de la Frontera
Lleida
Castelló de la Plana
Cartagena
Lugo
Huesca
Zaragoza
Teruel
Navarra
La Rioja
Castilla y León
Extremadura
Castilla-La Mancha
Andalucía
Región de Murcia
Illes Balears

Growth & regional connections (distrib. IXP)





Aggregated Internet traffic



CAPEX

Table 2: guifi.net CAPEX estimation (Sep. 2014)

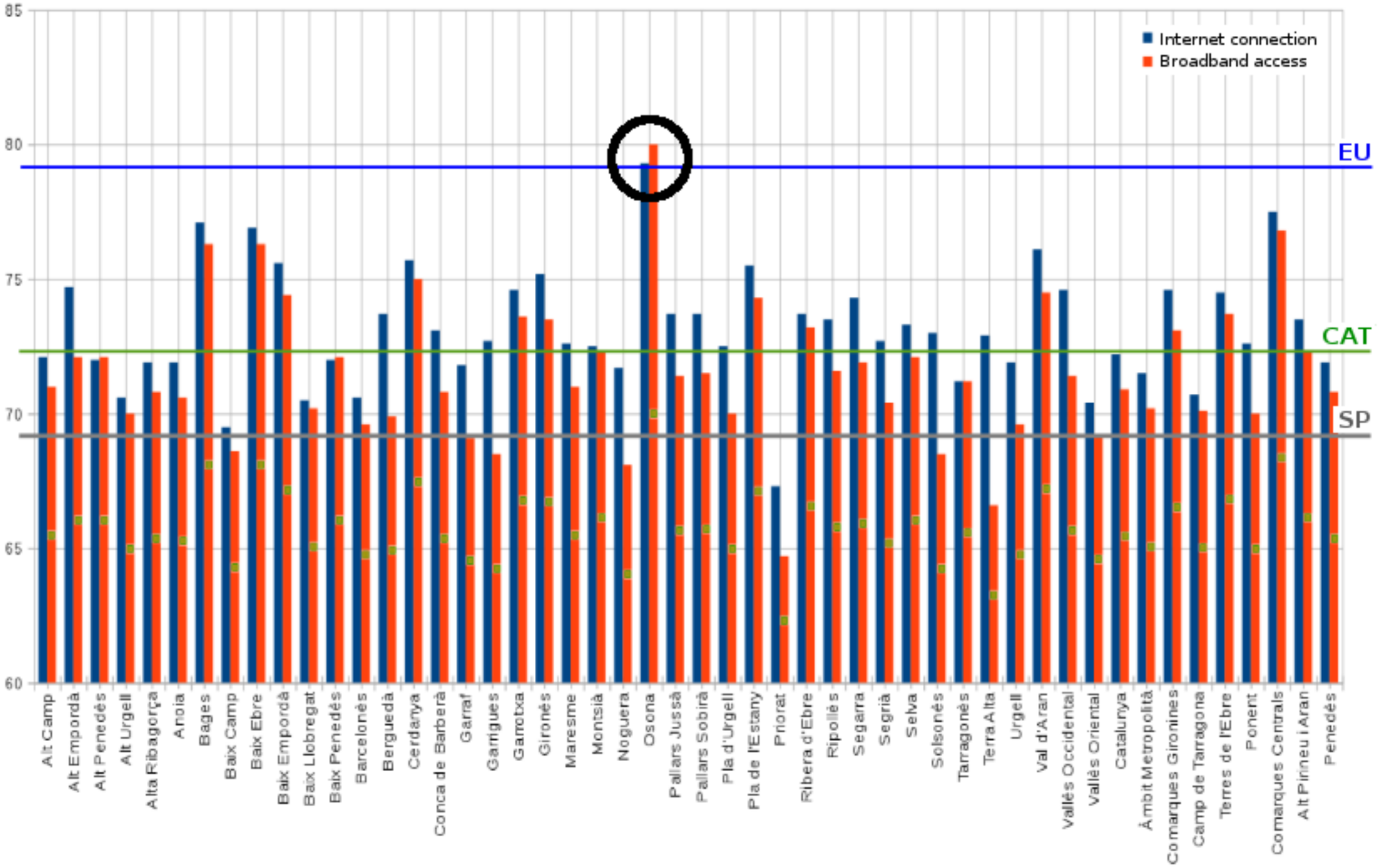
		Quantity [u.]	**Estimated average cost [€/u.]**	**Total [€]**
	WiFi node	25,500	250	6,375,000
	OF node	100	250	150,000
	PoPIX	12	2,750	33,000
Commons				**6,558,000**
	PoPIX	12	2,750	33,000
Interconnection				**33,000**
TOTAL				**6,591,000**

OPEX

Table 3: guifi.net OPEX estimation (Sep. 2014)

		Quantity [u.]	Estimated average cost [€/u./month]	Total [€/month]
	WiFi node	25,500	8	204,000
	OF node	100	8	800
	PoPIX	12	300	3,600
Commons				**208,400**
	Proxies	100	60	6,000
	PoPIX	12	300	3,600
	CATNIX	1	600	600
	Uplink	2	1,000	2,000
	Colo Bar	1	1,500	1,500
	Colo Vic	1	200	200
	RIPE-NCC	1	150	150
	Provi.	1	4,000	4,000
	admin.	1	1,500	1,500
	techn.	1	1,500	1,500
	Insura.	1	70	70
Interconnection				**11,050**
TOTAL				**228,650**

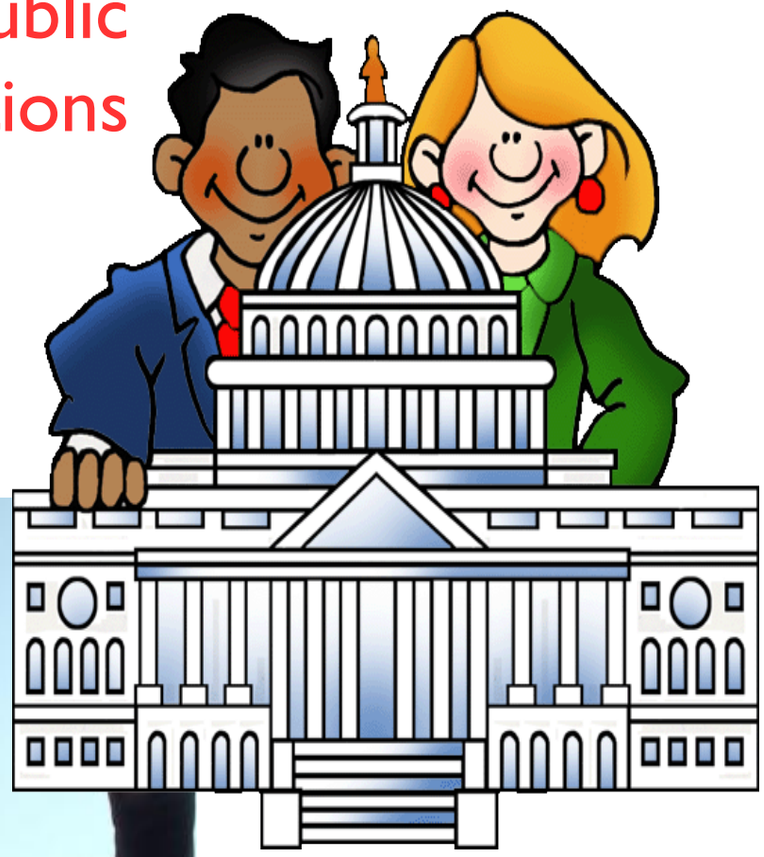
Impact


85
80
75
70
65
60
Internet connection
Broadband access
EU
CAT
SP
Alt Camp
Alt Empordà
Alt Penedès
Alt Urgell
Alta Ribagorça
Anoia
Bages
Baix Camp
Baix Ebre
Baix Empordà
Baix Llobregat
Baix Penedès
Barcelonès
Berguedà
Cerdanya
Conca de Barberà
Garraf
Garrigues
Garrotxa
Gironès
Maresme
Montsià
Noguera
Osona
Pallars Jussà
Pallars Sobirà
Pla d'Urgell
Pla de l'Estany
Priorat
Ribera d'Ebre
Ripollès
Segarra
Segrià
Selva
Solsonès
Tarragonès
Terra Alta
Urgell
Val d'Aran
Vallès Occidental
Vallès Oriental
Catalunya
Àmbit Metropolità
Comarques Gironines
Camp de Tarragona
Terres de l'Ebre
Ponent
Comarques Centrals
Alt Pirineu i Aran
Penedès

3 Key Pillar Ecosystem

People, Collaborative Public Administrations & «Km 0» Self-employed Professionals & Small/Medium Enterprises

Government & Public Administrations



Enterprises

ebrecom

Código Sur
www.codigosur.org

delanIT

CurbTec

eticom
som connexió

iguana comunicacions

priona.net

GAUFIX

delinternet

SGElectrònics
TELECOMUNICACIONS & SEGURETAT

altercom21
alternatives en comunicació

Ticae

kouten

RIPE

Economic Model & Sustainability

Expenses
Income

Type	Shared?	Business mainstream	Speculative?
Proprietary	No. Reseller	Infrastructure + Services	Yes. Sometimes a stronger driver than the business mainstream
Commons	Always	Services	**NO**

Total Cost of Ownership (over 12 years)

	Service specs	Setup	Initial fee	Duration	Final fee	**TCO 12 years**
Movistar ES	100/10	0€	53,58€	1 year	65,68€	**10.889,03€**
Orange FR	200/50	299€	39,9€	0	39,9€	**6.168,92€**
guifi.net CAT	Max.(1G Sym.)	300€	53,00€	5 year	24,2€	**6.093,60€**

The challenge: sustainability and governance

Commons Governance

Based on "FONN Compact"

- **Users free to choose services & providers**
- **Concurrency of services & providers**

operating on he same infrastructure

- Providing services & contents
- Building & Maintaining infrastructure

How?

(proprietary operators argue that this is not possible...)

Inspiration

- **Elinor «Lin» Ostrom** (1933-2012)
- Political Economist
- **2009 Nobel Prize in Economics 2009**

- *The whip against the «tragedy of the commons»* :-)

Design principles for CPR institutions

① Clearly defined boundaries (effective exclusion of external un-entitled parties);

② Rules regarding the appropriation and provision of common resources that are adapted to local conditions;

③ Collective-choice arrangements that allow most resource appropriators to participate in the decision-making process;

④ Effective monitoring by monitors who are part of or accountable to the appropriators;

⑤ A scale of graduated sanctions for resource appropriators who violate community rules;

⑥ Mechanisms of conflict resolution that are cheap and of easy access;

⑦ Self-determination of the community recognized by higher-level authorities; and

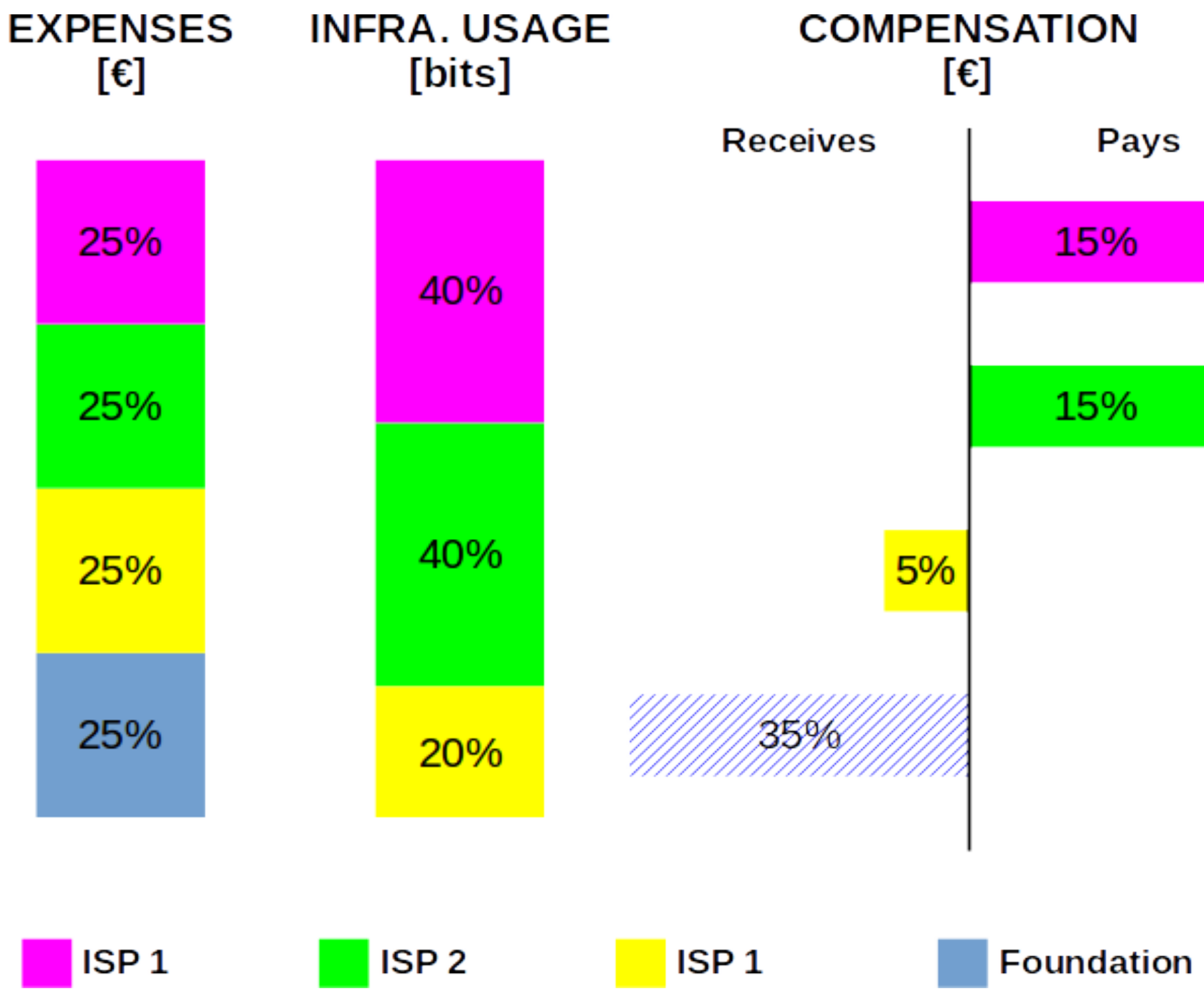
⑧ In the case of larger common-pool resources, organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level.

CPR and networks as a commons

- Open Network Assets Listings, Open Provisioning & Open Monitoring Apps. 1 4
- Foundation as horizontal Layer in absence of conflicts of interest 2 7 8
  - Localization & delegation, collaborative (regular meetings, web site, mailing lists, social networks...)
- Agreements & Service Level Commitments 2 3
  - FONN Compact (Global) & Specific
- Compensation Systems and Investments Recognition 2 5
- Mediation & Conflict Resolution 6
- Best Practices & anti-corruption 2 5

Key to ensure non-discrimination & ethics in business practices

Compensation system simplified example



Questions?