Community Networks in Europe Guifi.net, AWMN, FunkFeuer

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Topics of this talk

- Community-owned networks in Europe
- The social impact: measurable
- The sustainability/business model
- The tech side of it: not just wireless
- The political side of it: Bottom-up broadband
- The research side of it: the CONFINE testbed
- Upcoming events, opportunities

Community-owned networks in Europe

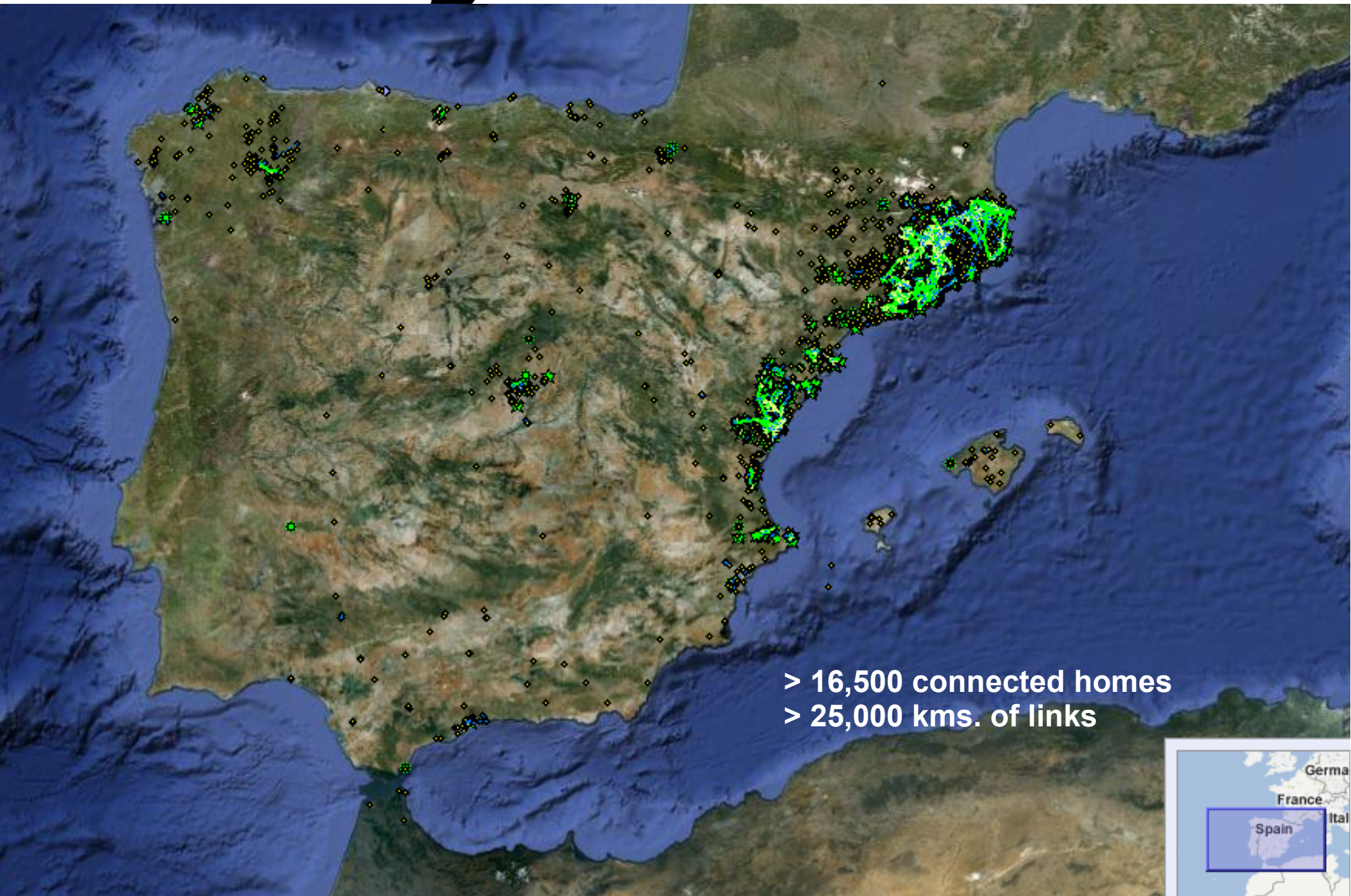
- The case of Guifi.net, AWMN, Funkfeuer
- More than 20,000 – 30,000 members
- "*Don't buy the network, be the network !*"
- Bottom-up broadband, *"break the strings that are limiting you"*

0xFF
funkfeuer freenet

freifunk.net

AWMN

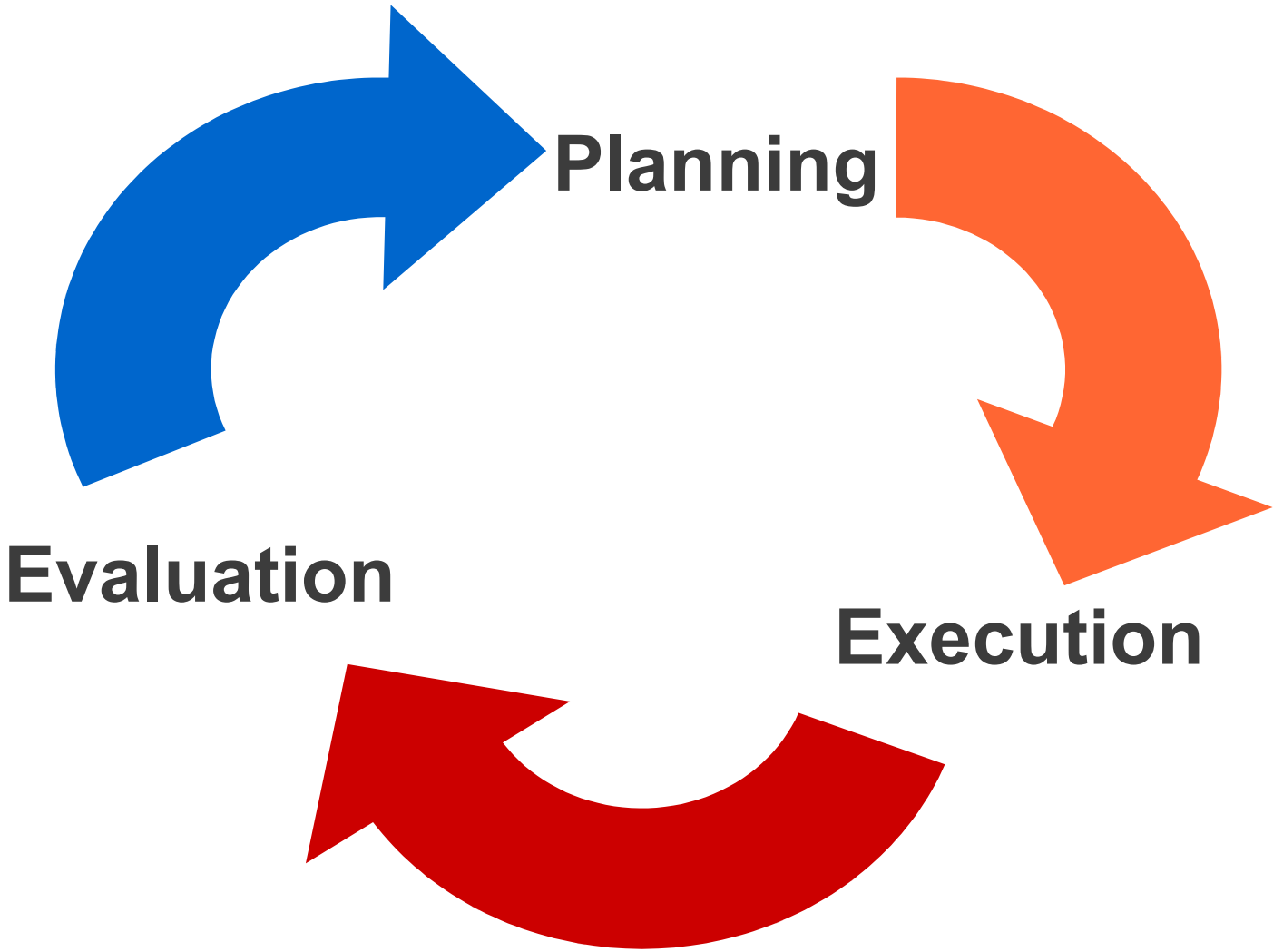
guifi·net


> 16,500 connected homes
> 25,000 kms. of links
Germa
France
Spain
Ital

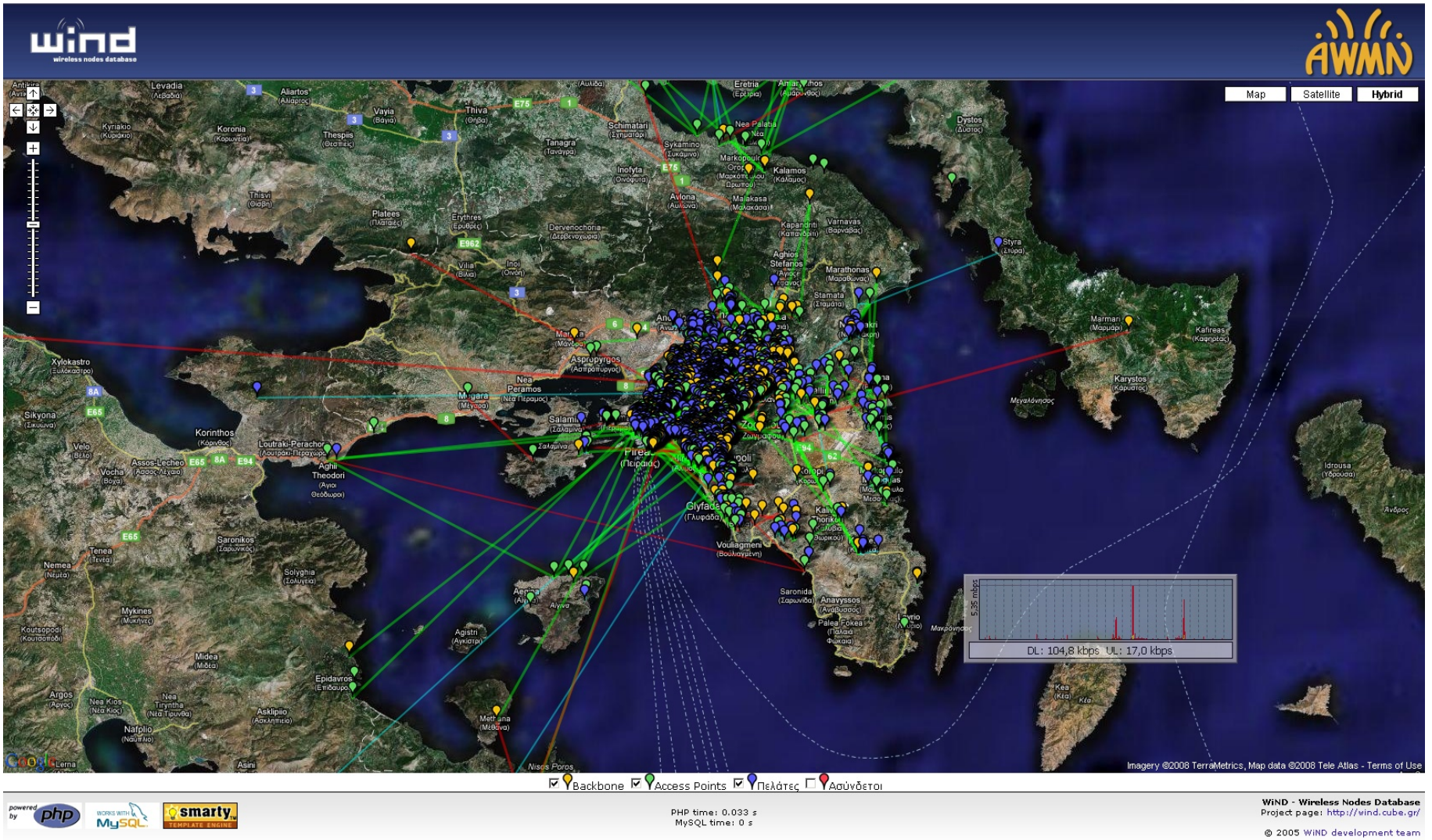
What is guifi·net ?

- “Network of networks” by “Comuns XOLN” agreement
  - Stakeholders: individuals, enterprises &administrations, who retain ownership
  - Aggregation of networks, extending the Internet
  - Same rules for all
- Foundation
  - Not-for-profit, Non-partisan
  - Coordination – foundation for interconnection/interop, manageability and self provisioning
  - Formal entity, becomes the formal operator
    - RIPE-NCC and CATNIX member

A repeatable & continuous process



The Athens Wireless Network



AWMN – Athens Wireless Metropolitan Network

What is AWMN?

- **Founded on 2002 in Athens, AWMN is the largest and more diverse Community Wireless Network in Greece**
- **AWMN is its Members**, it's a team of amateur enthusiasts that deliver Broadband services similar to those on the internet based on internet technologies..
- **We exist and we function even without the need of internet connection**... If the Internet seized to exist we would still have our own broadband network
- **We offer nothing more than the ability for everyone to voluntarily live our constructive broadband reality**.

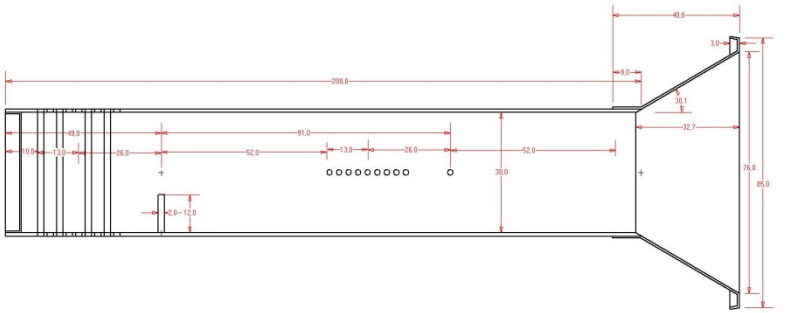
Wind Stats & Tech Facts

- Wireless network utilizing the Wifi protocols IEEE 802.11a, 802.11b and **802.11n** in the ISM Bands of 5.4 & 2.4 GHz
- Mainly operated by software routers (linux / MikroTik), Dynamic routing (bgp, ospf). Parts of the network have been operating with olsr & Confederations while more test are being curried away with more advanced protocols
- 10100 Showing interest to participate
- 2505 Active Nodes
- 1100 Backbone nodes with <u>at least</u> 2 backbone links (54Mbit or 150Mbit)
- 2900 wireless point to point links at 11,54Mbit and 150Mbit with total estimated length of over 3000Km
- 730 Access points including Freespots in central busy spots in Athens
- Over a 1000 of Active Services

The AWMN Association – Aims & Goals

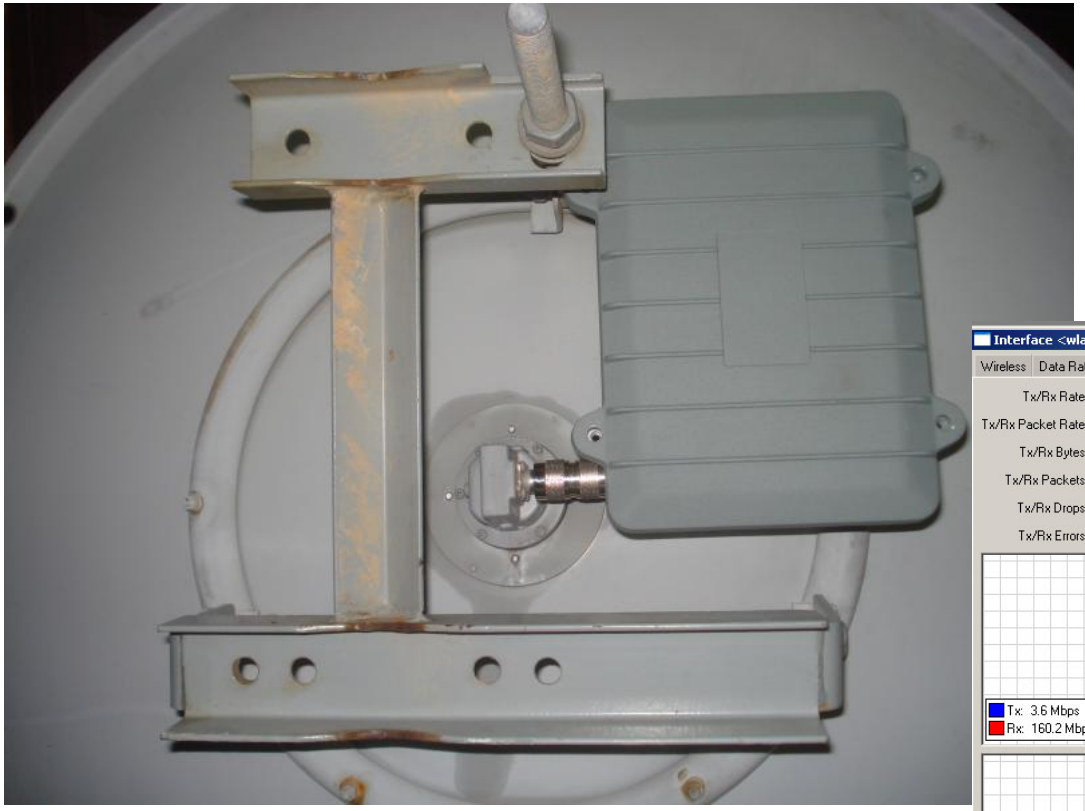
- To establish, **develop and maintain a community wireless network connecting people and services in the area of Athens And beyond**.
- **To develop technologies** based on wireless and digital telecommunications
- To **train people** in the usage of wireless technology and digital telecommunications.
- To promote and **encourage volunteerism and active participation**
- To inform the public and **promote network technologies based on wireless telecommunications**.
- **To represent users** of the community to government authorities and regulatory organizations
- **To inform the Greek and the Global Community** on the potential, the capabilities of wireless broadband services the activities of AWMN and.
- To promote radioamateurism
- To maintain the experimental structure of the Network

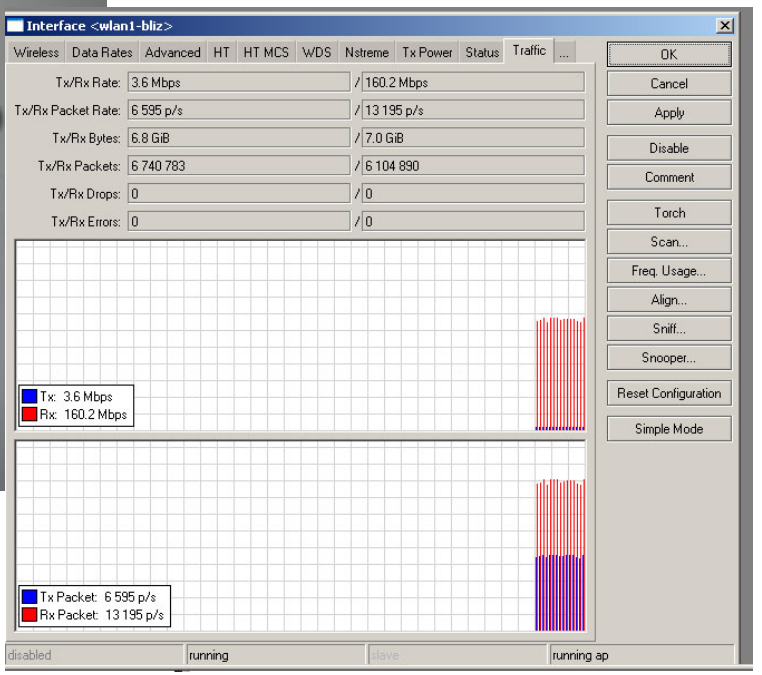
Installations & Antennas



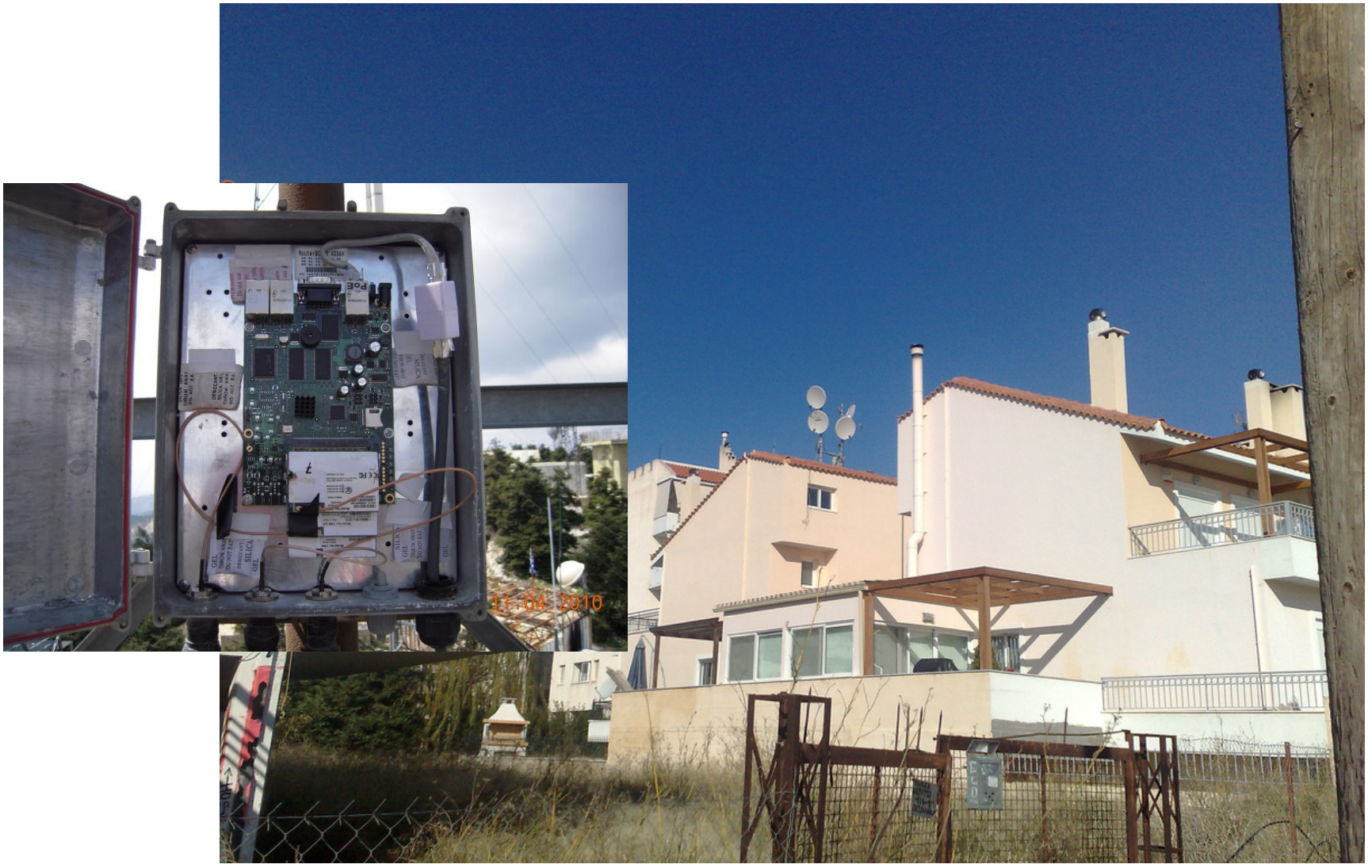
Installations & Antennas

Installations & Antennas





Installations & Antennas

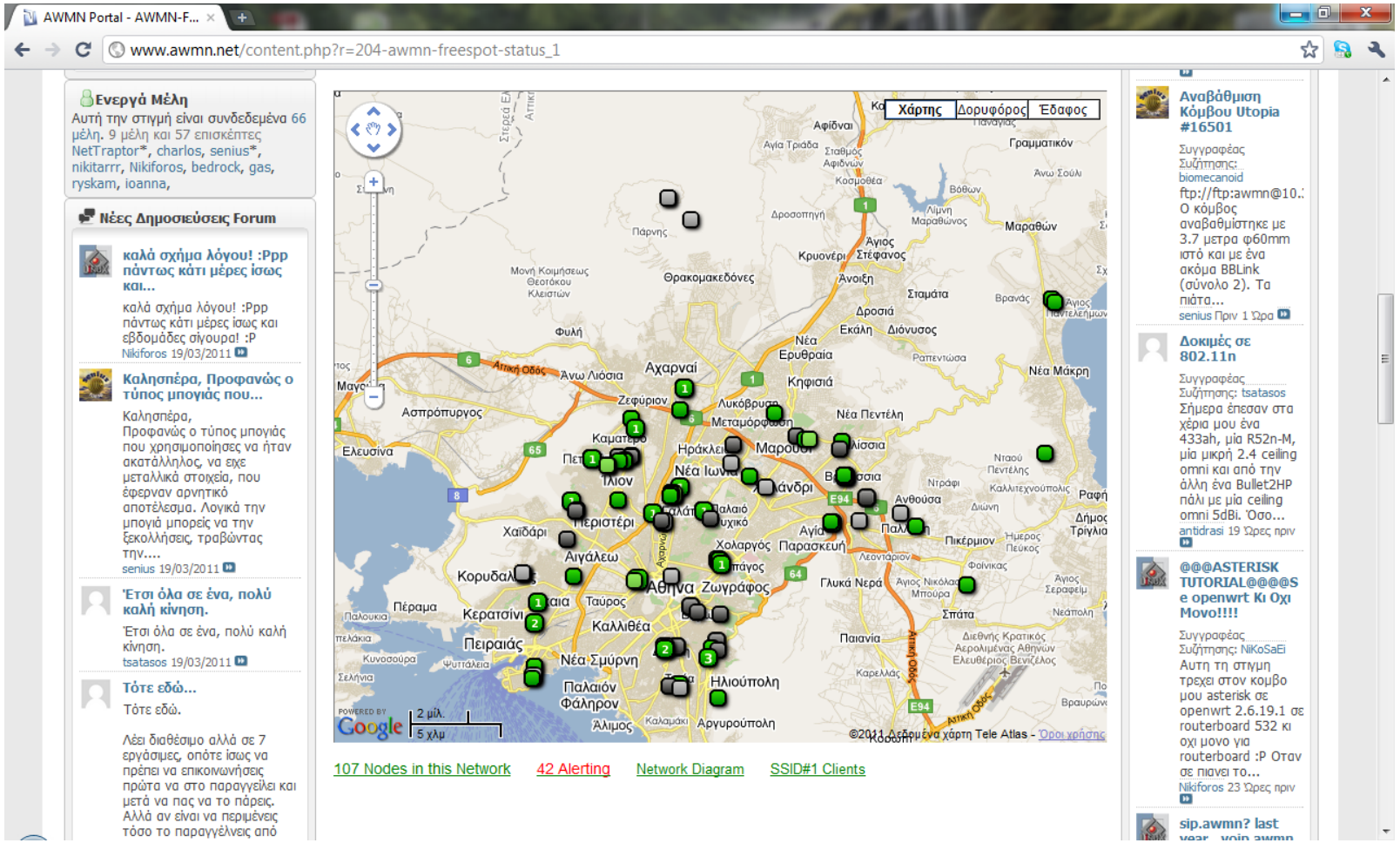


Services & Every Day Life in AWMN

High Bandwidth Services from the community:

- Portals
- Messaging Services
  - E-mail servers and
  - Instant messaging Services
- Community Forums
- Sip VoIP Gateways & Full Swing VoIP services with:
  - Caller ID
  - Answering machines
  - Time
  - Conference rooms
  - Wake up call
  - PSTN2VoIP
- Broadcasting Services
  - Music
  - Video
  - Radio Stations
  - Workshop & Fests Broadcasting
- File Transfer Services
- Hi Resolution Galleries
- Magazine Mirrors
- Intelligent Search Engines
- E-Learning Sites And Tools
- Experimental Network Monitoring and Status Tools

The Freespot Overlay network Project

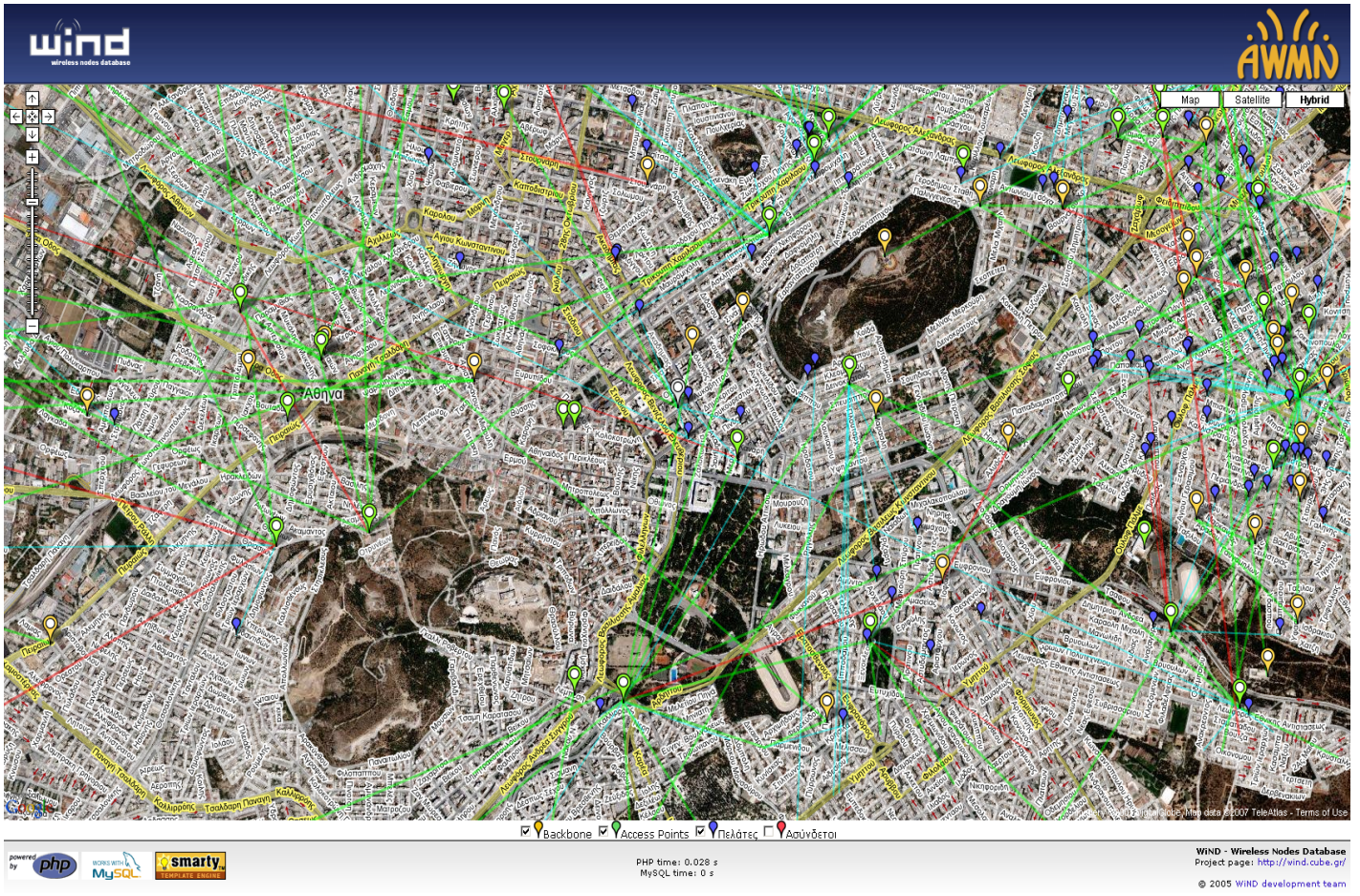


AWMN 2010

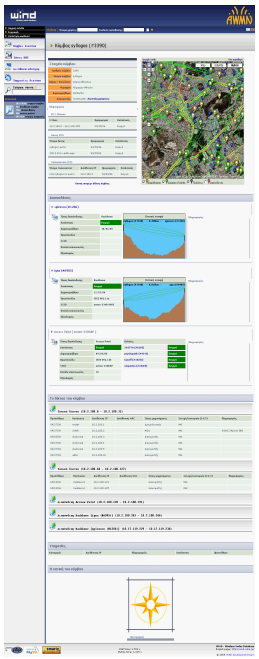
Portal & Forum – www.awmn.net

Wireless Nodes Database

- It provides Coordination
- Status Display
- Internal Messaging
- Planning
- IP Addressing
- .awmn Domains Management



Wireless Nodes Database



wind
wireless nodes database

AWMN

- Αρχική σελίδα
- Εγγραφή
- Ανάκτηση κωδικού

Σύνδεση | Όνομα χρήστη: Κωδικός πρόσβασης:

Κόμβοι δικτύου
Ζώνες DNS
Διευθυνσιοδότηση
Υπηρεσίες δικτύου
Γρήγορη εύρεση

Στατιστικά
1931/6382 ενεργοί κόμβοι
763 backbone κόμβοι
2262 διασυνδέσεις
499 access points
597/630 ενεργές υπηρεσίες

Κόμβος syllogos (#3390)

Στοιχεία κόμβου

Αριθμός κόμβου	3390
Όνομα κόμβου	syllogos
Δήμος / Κοινότητα	Δήμος Αθηναίων
Νομαρχία	Νομαρχία Αθηνών
Δημιουργήθηκε	04/06/04
Διαχειριστής	hostmaster |Αποστολή μηνύματος|

Πληροφορίες

IP C-Classes

C Class	Ημερομηνία	Κατάσταση
10.2.100.0 - 10.2.100.255	03/29/06	Ενεργό

Ζώνες DNS

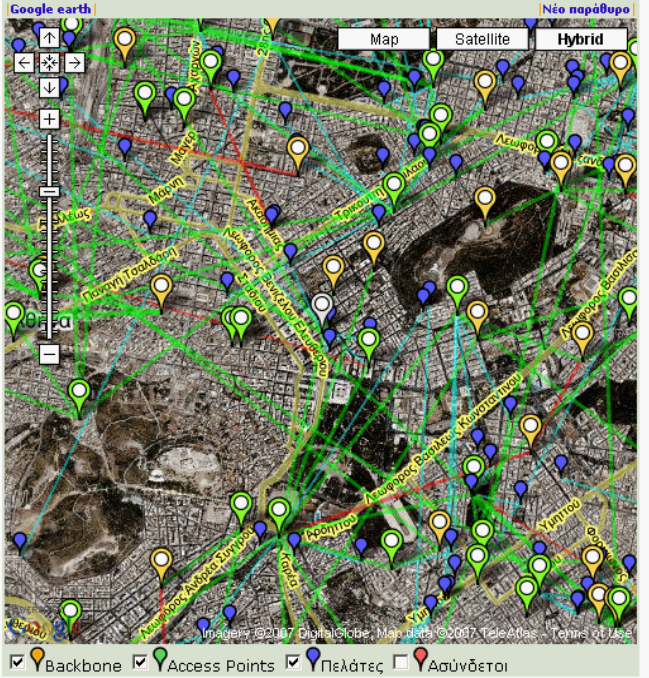
Όνομα ζώνης	Ημερομηνία	Κατάσταση
syllogos.awmn	03/29/06	Ενεργό
100.2.10.in-addr.arpa	03/29/06	Ενεργό

Nameservers (NS)

Όνομα Nameserver	Διεύθυνση IP	Ημερομηνία	Κατάσταση
ns0.syllogos.ns.awmn	10.2.100.3	04/03/06	Ενεργό

|Οπτική επαφή με άλλους κόμβους|

Google earth | Νέο παράθυρο



Backbone Access Points Πελάτες Ασύνδετοι

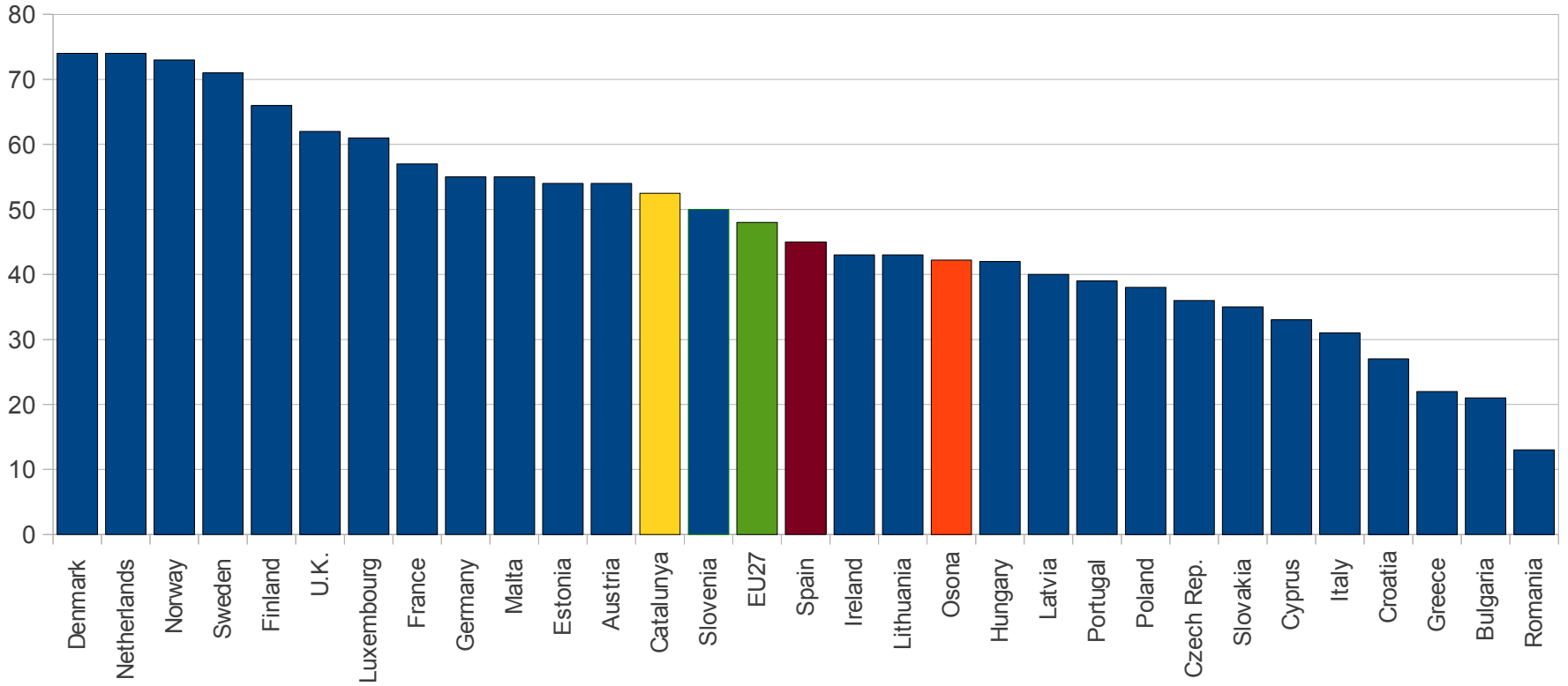
Διασυνδέσεις

The measurable social impact

- The opportunity and the right of communication
- The reality of networking
  - Commercial market
  - Communities

Impact on the Digital divide – statistics (I)

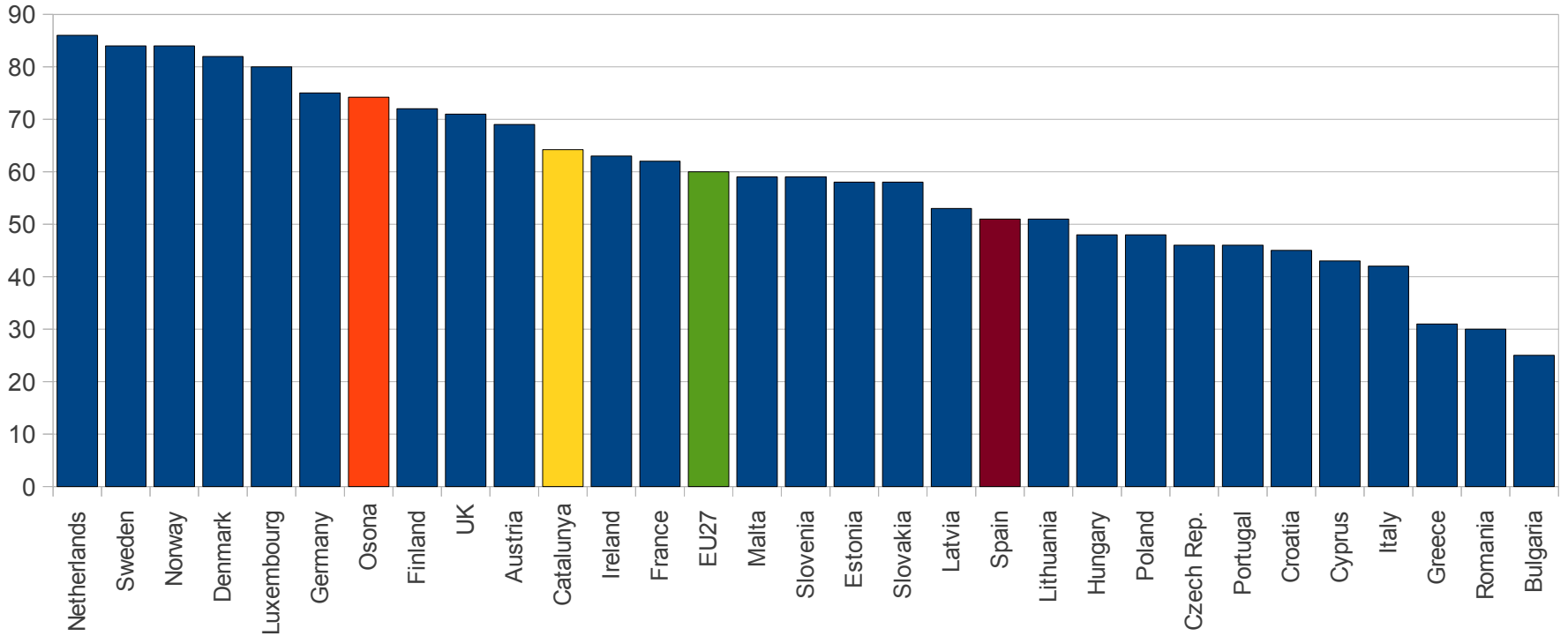
- **'Households with DSL'**
  - **Osona** *(mixed rural/urban)* **below Spain, EU27 & Catalonia**



Sources: Eurostat i FOBSIC/Idescat 2.008

Impact on the Digital divide – statistics (II)

- **'use of the internet at home'**
  Osona leads Catalonia & Spain & metreopolitan areas, above EU27 index
  - **WHY?**: Osona is where guifi.net has statistic relevance (10%-15%).
  - **EXPLANATION:** Digital inclusion depends mucho more on cost than coverage



Source: Eurostat i FOBSIC/Idescat 2.008

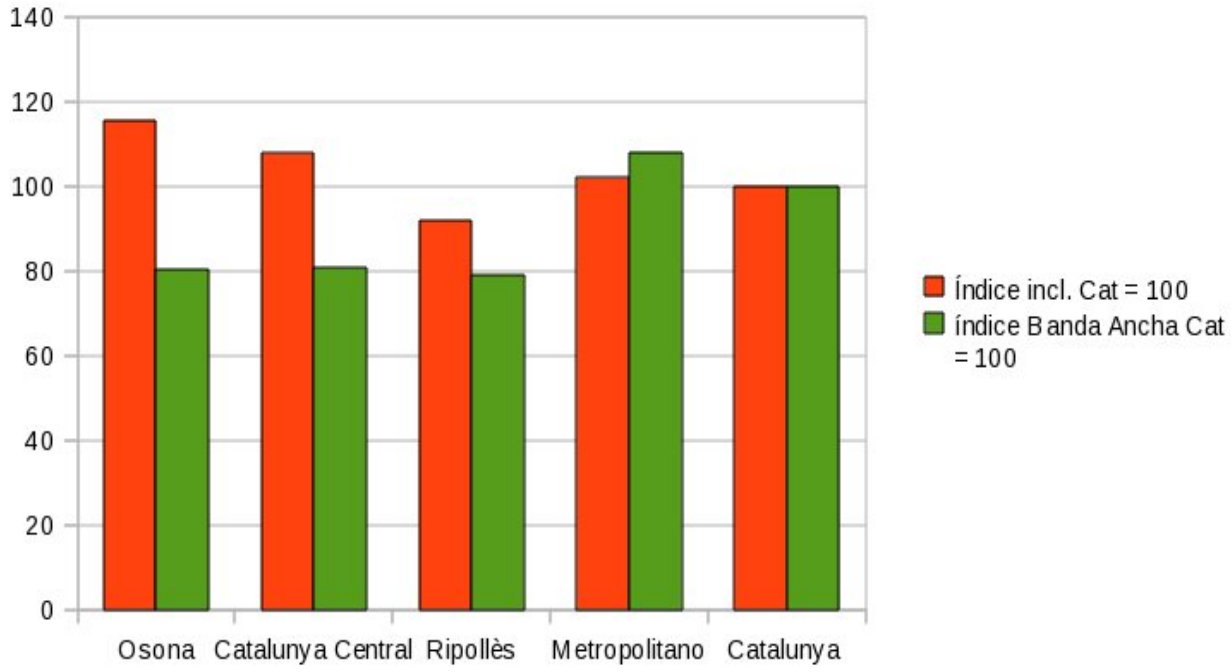
Impact on the Digital divide – Explanation

Why does Osona lead Catalonia & Spain & metreopolitan areas, above EU27 index?
Because

- Osona is where guifi.net has statistic relevance (10%-15%).
- Digital inclusion depends much more on cost than coverage

Impact on the Dig. div. – Complementary

- Similar DSL penetration in similar territories, socio-economic environments
  - No relevant impact because of shared & free internet access.
- Internet usage (digital inclusion) is much higher when Community Networks are present



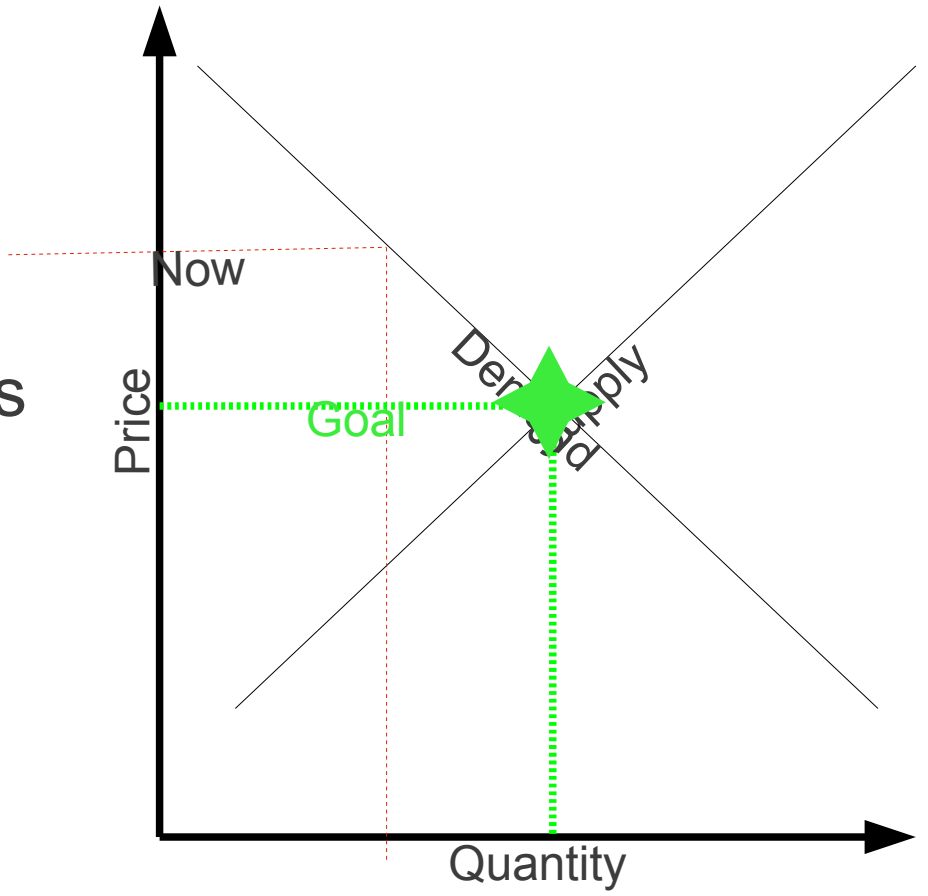
The Message to public administrations seeking to raise 'digital inclusion':

Promoting Open Community Networks is much more effective and efficient in helping to deliver coverage than subsidizing conventional service providers/operators

The sustainability/business model

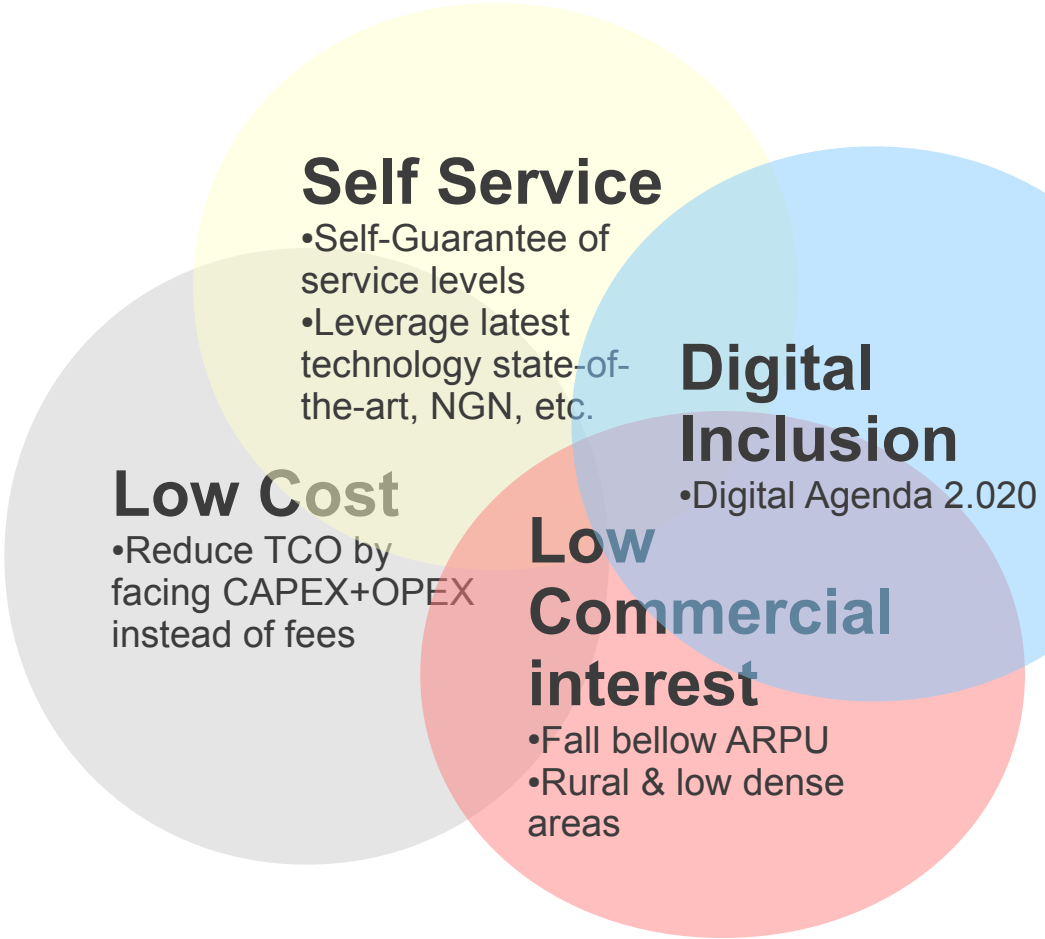
It's all about....

- In terms of market rules:
  - Raise funding & supply
  - Meet more demand
  - Cut TCO
  - By introducing new business models
- Doesn't break the market rules
  - Confirms them, is about competition



Demand

Missed demand due the lack of diversity on business models

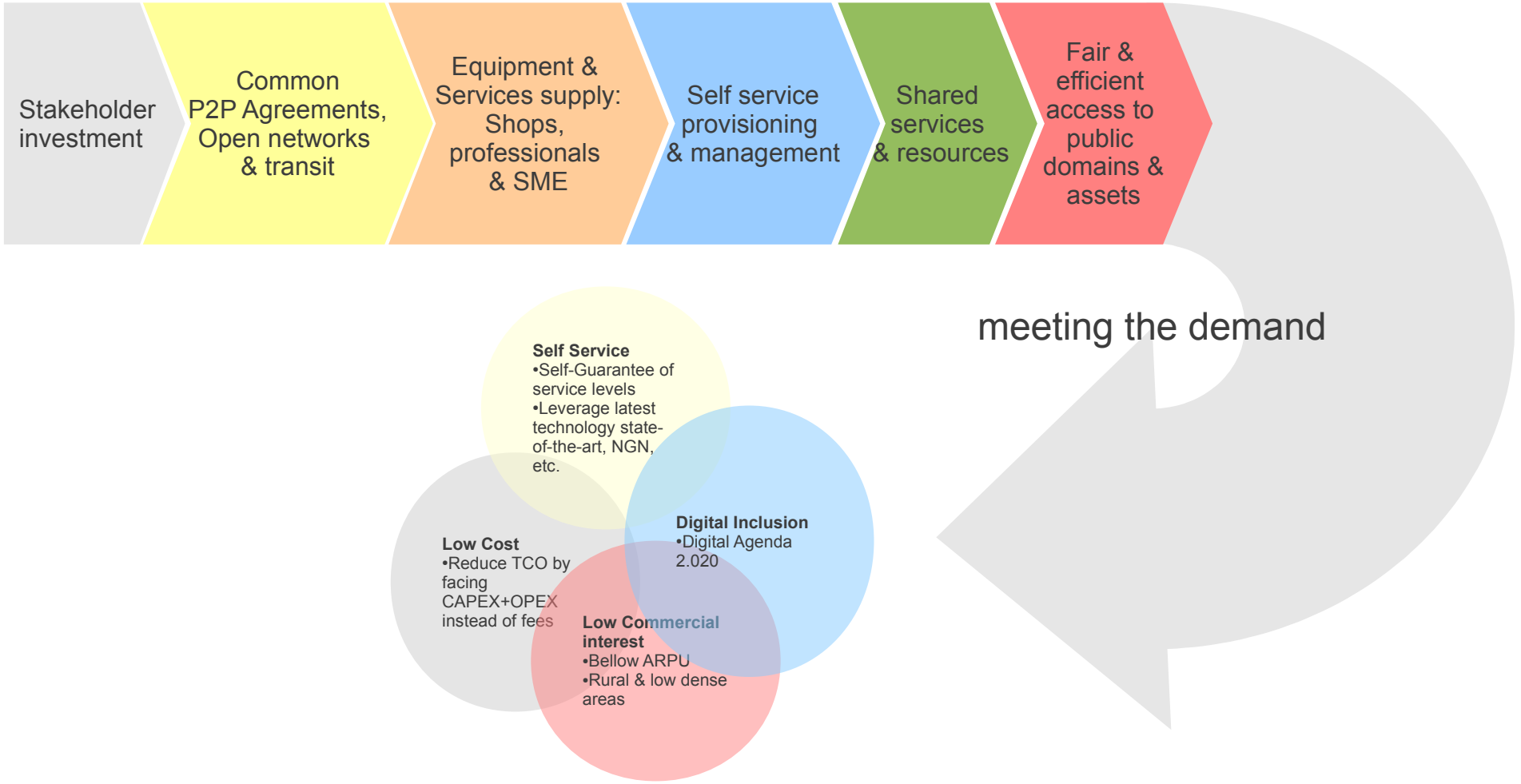


Residential & Citizens
Urban & Rural

Business
Professionals
SME
Enterprises

Public Sector
Municipalities
Government

Supply chain



Business opportunities & benefits by

Value add for local business, Shops, new jobs on services

Reliability on own resources & localized services

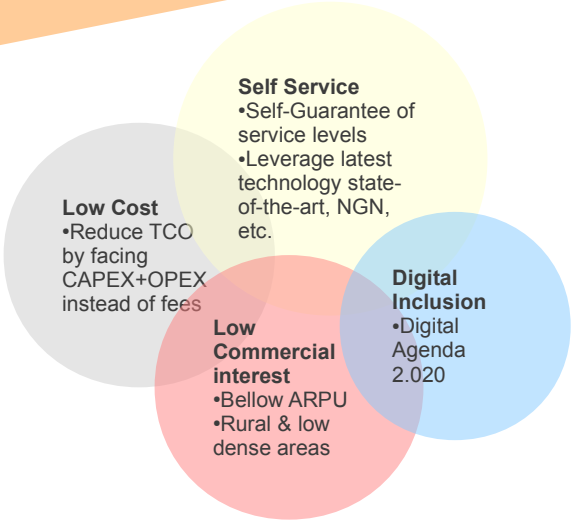
Open management of public infrastructures, Massive wholesale availability

Gain free transit to all peers

Fast ROI by decreasing OPEX through owned connection

"Cloud networking"
Efficient & flexible
Services sharing, aggregation & resource allocation

meeting the demand



Challenges & risks

Involve localized entrepreneurs & professionals

Availability of tools for Self provisioning & Network management

Uncertainty III: Access to Public domains for Open Networks

SPECs for openness & interoperability

Uncertainty on regulatory compliance I: Enable stakeholders as investors

Stakeholder investment

Common P2P Agreements, Open networks & transit

Equipment & Services supply: Shops, professionals & SME

Self service provisioning & management

Shared services & resources

Fair & efficient access to public domains & assets

Risk to unmeet the demand

Uncertainty on regulatory compliance II: Allowance of shared services & resources

Low Cost
•Reduce TCO by facing CAPEX+OPEX instead of fees

Self Service
•Self-Guarantee of service levels
•Leverage latest technology state-of-the-art, NGN, etc.

Low Commercial interest
•Bellow ARPU
•Rural & low dense areas

Digital Inclusion
•Digital Agenda 2.020

Model Comparison

	Investor	Business goal	Coverage	Service level	Competition
Proprietary	Stakeholders, owners	•Margin •Speculative	Determined by business, not interested in low density areas and low incomers.	Provided by the operator. Often seen as a frustration by the user	Only selected and authorized partners.
Open	All participants	Varied: Owned connection, avoid aggregation, shared services, real (lower) cost....	Driven by user interests.	Provided by the user, direct control if subcontrated	Open to all, including freelancers ans SME.

Which one is more open, fair, sustainable and competitive?

Our experience: Cost sheet, 1 Gbit circuit

€/km

				Now		Goal	
1Gb circuit	Kms.	Activation	€/Month (*)	mo. fee	%	% Share	mo. fee
Wholesale(**)	40.000	5.000	1.034,72	0,03	0	0,01	0,08
Barcelona - Vic	70	2.000	41.710,75	595,87	96,13	9,99	2,66
Gurb/Vic – FFTF	1,60	3.000	23,96	23,96	3,87	90	23,96

- What happens?
  - Internet wholesale & Gurb/Vic – FFTF(***) are multipurpose and interoperable IP networks
  - Barcelona-Vic is closed and private (dark fiber/adif), so becomes 96,12% of the cost

- Conclusions
  - Need for creating open, multipurpose and interoperable networks across territories
  - Cost for regional wholesale network is around €2,67/mo., not more
  - €30/year per final F.O. connection would be a reasonable levy for access to those infrastructures

(*) Amortization 12 years
(**) Traffic, aggregated
(***) FFTF = **F**iber **F**rom **T**he **F**arm

Final costs for the users

There is no “price list”, costs might vary on circumstances, but typical cases below

User profile	Last mile connection cost	Monthly fee	Technology, bandwidth
“low cost”, shared / public access	€50 - €1,000 (avg €200) One time	€0 (free)	Radio, from 2 to 20 Mb, incl. symmetric
Paying internet access, aggregated	€200 to €2,000 one time or €0 financed	€10 €30 or €40 financed	Radio or F.O., from 20Mb to 1 Gbit, symmetric
“premium” / guaranteed access, enterprises, ...	€1,000-2,000	From €100	“n” Gbits, complete

The technical side of it: not just fibre

The “FFTF” initiative

- FFTF = “**F**iber **F**rom **T**he **F**arms”, 100% “Bottom-up broadband initiative”, triggered by the users
  - Goals:
    - Create self-sustainable models. Any help might be appreciated as a facilitator or speed-up, however the network needs to be viable by itself, therefore:
      - Need to get rid from intermediaries with no real interest, or just looking for grants.
    - By developing new business models, enabling new stakeholders & “self service” operation
    - Room for innovation & cooperation by addressing today's unmet challenges

Already going on

- Mature, real, launched on 2,009, finished first iteration
- Sponsored by guifi.net Foundation, an independent & non-for-profit NGO

1st FFTF cycle: What & Where I

- Fiber Optic deployment connecting Farms in rural areas (2,009)

What & Where II

- Access to regional ring to enable access to wholesale bypassing intermediaries with no value add or conflict of interest
- Ideally: Regional Ring should be an open & public network to avoid conflict of interest and ensure non-discrimination

Farms in country-side rural areas

What & Where III

- Carrier House for International transit & Interchange for peering w/local operators
- Enables an aggregated & cost oriented wholesale access where small initiatives are very welcome

How

- Pictures taken in Summer'09 deployments

Project scope

- Building a complete end to end solution for NGN networks

When	Where	Milestone	Status
Feb-Mar'09	n/a	Notification to ANR (Spain: CMT)	**done**
Apr-Jun'09	Rural last mile	Project definition & preparation	**done**
Jul-Aug'09	Rural last mile	Network deployment	**done**
Jun-Dec'09	City	Membership RIPE & Local IX (for wholesale)	**done**
Dec'09	Rural last mile	Network operational (between farms)	**done**
Jan-Jul'10	Regional link	Negotiations with authorities, public administrations...	**done**
Aug-Nov'10	Regional link	Project definition & preparation	**done**
Dec'10	Regional link	Connection works (fiber fusions)	**done**
2011	All	Full operation FFTF <---> Internet	**done**

The research side of it: the CONFINE testbed

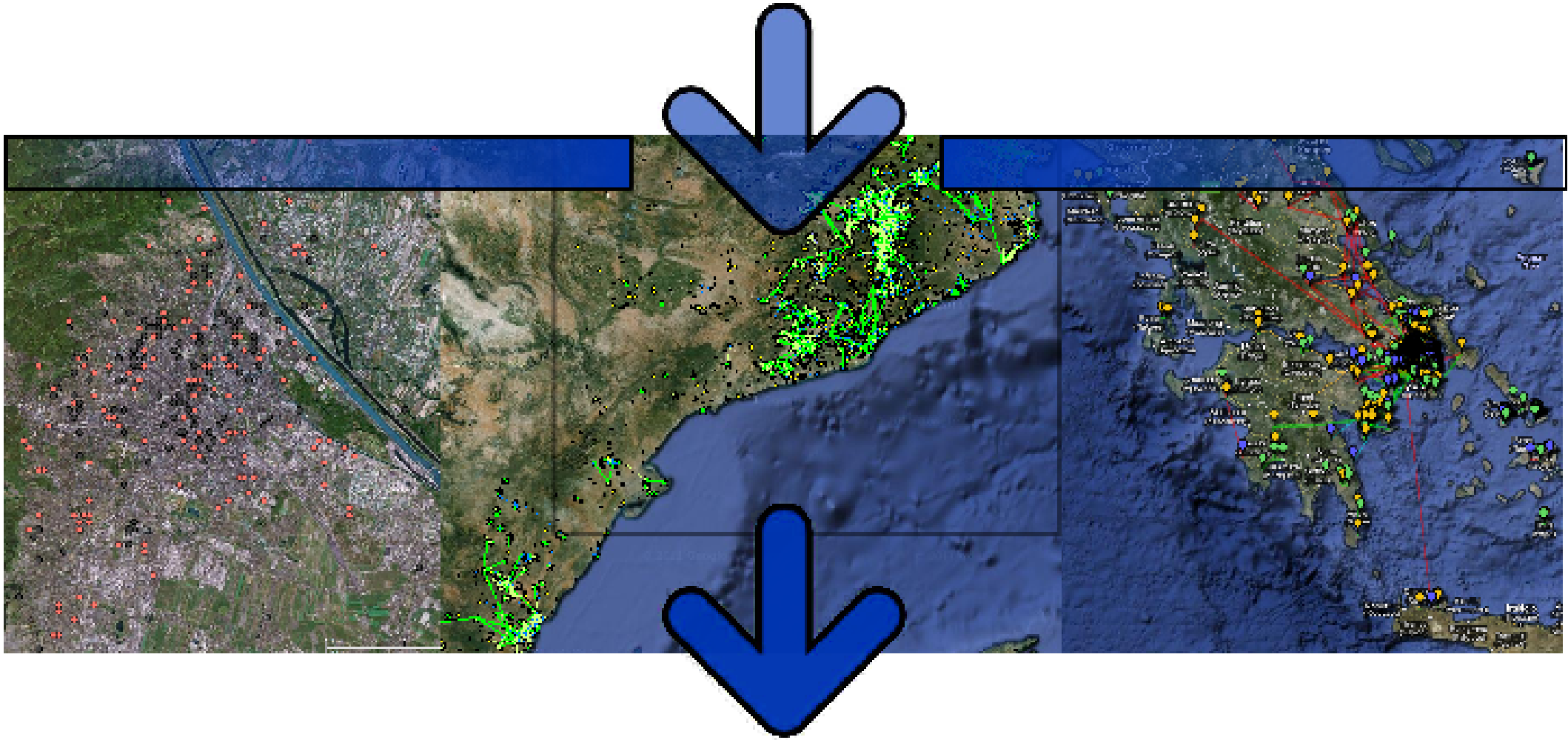
CONFINE
Community Networks Testbed for the Future Internet

http://confine-project.eu/

Pangea 

Oplan foundation

Community Networks Testbed



Concept: Community-owned Open Local IP Nets (COPLAN)

- Experimental Facility for experimentally-driven research in COPLAN

  (Bottom-up broadband, FFTF)

- **Scenario:** on the edge, but not small ...
  - Commoditization of tech, open spectrum, open fibre
  - Community-owned, bottom-up, open channels, self-managed (self-owned, self-growing, self-served),
  - Not just local “access”: network, services, content
- COPLAN vs traditional telecom, underserved people
- **Challenges:** large scale, dynamic (low cost, self-man)

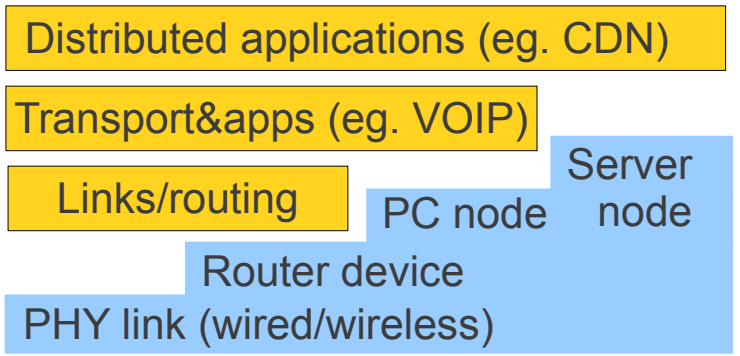
Digital Agenda 2020

What is CONFINE

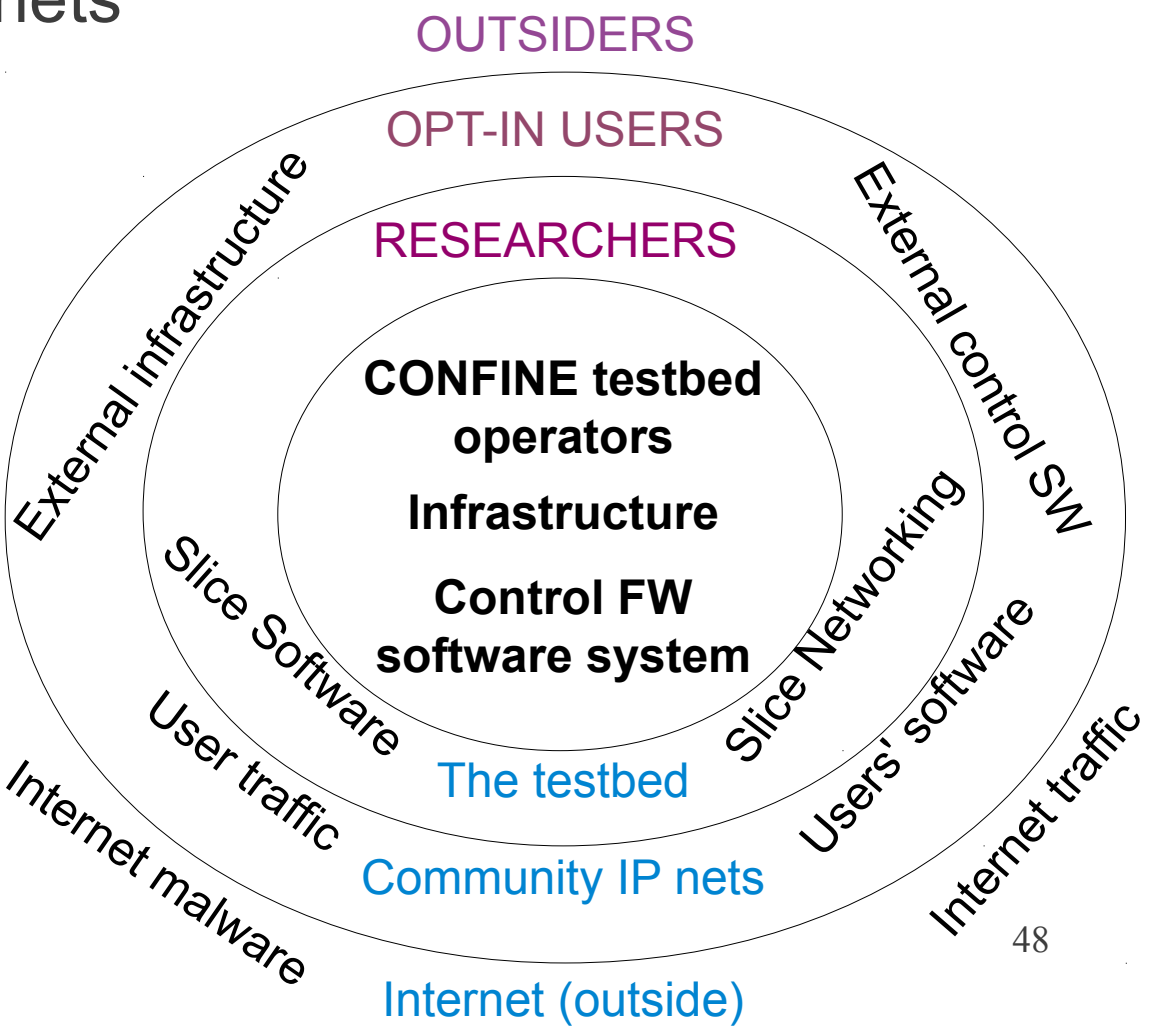
- Construction and operation of a new “experimental testbed” for research in Community Networking
- Uses:
  - Experimentally-driven research on CN
  - Evaluation of the CN model for the Future Inet
- Dissemination
- Socio-technical-economic-legal evaluation of the testbed and model → sustainability

The testbed

- **Challenge**: build and operate the testbed, running in the community nets



Resources: hundreds nodes, links large end-user community
Slices of resources: virtual labs

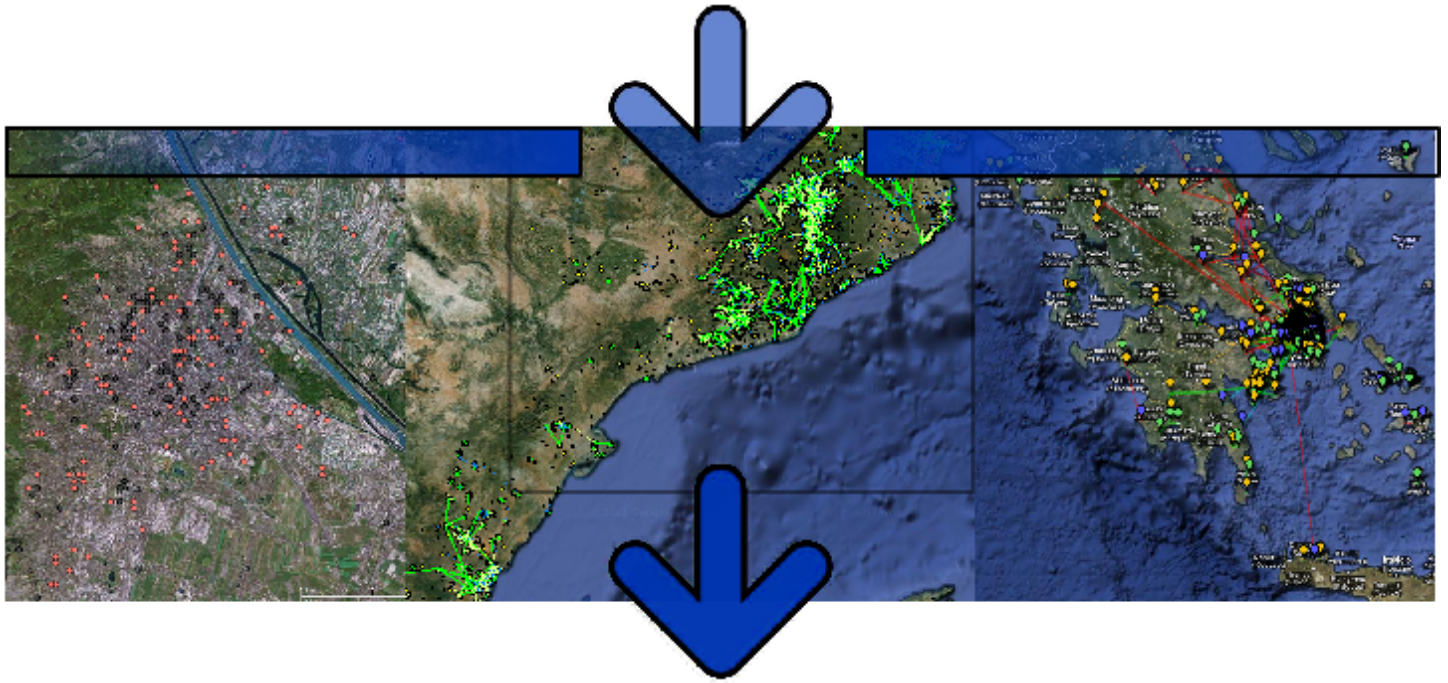


About Community Networking

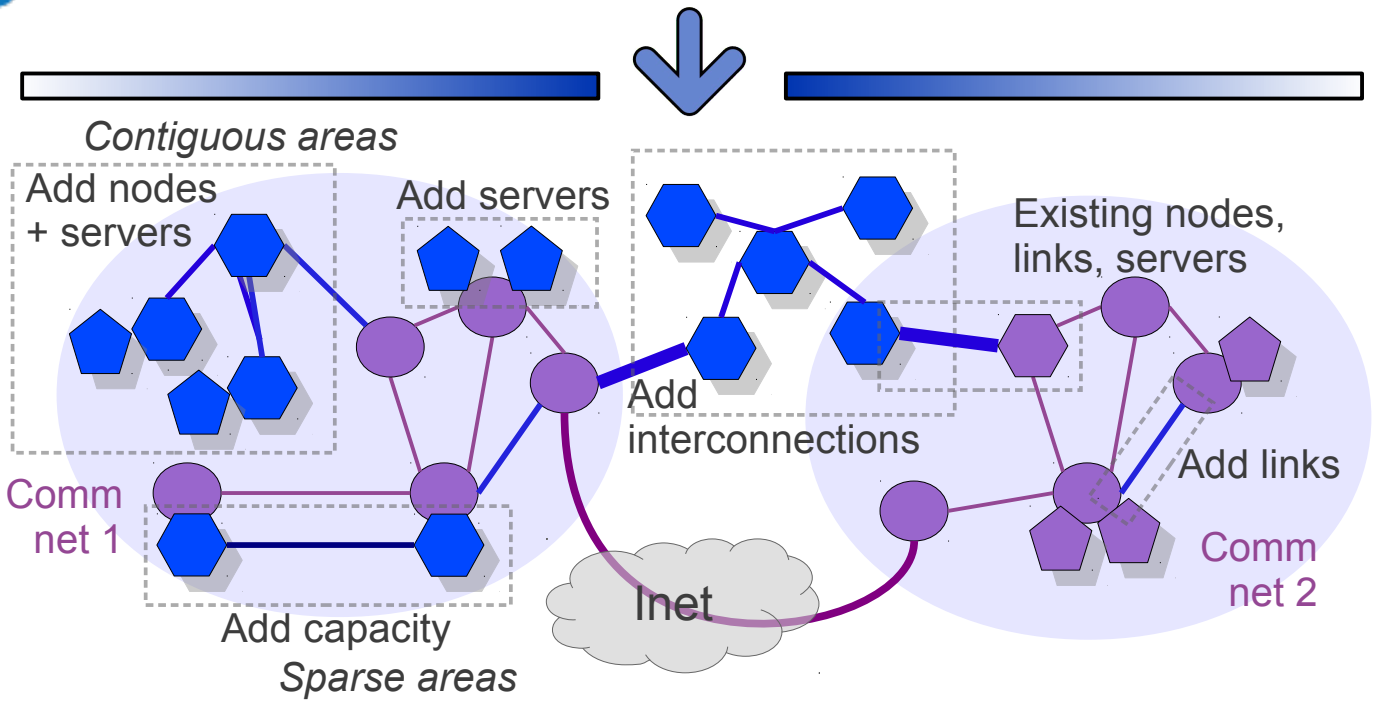
- Among other, from the tech side:
  - Scale (size), heterogeneity (nodes, links, hosts), decentralized
  - Inter-dependency, limited resources (need for cross-layer optimizations)
  - Dynamics: need for self-config, self-healing, self-optimization, self-protection
- Open-up networks for researchers, federation

The testbed

- Unified access to a list-of→federation of CN
- Principles: federation, virtualization, decentralization, openness, unified access



The testbed



The project brings in additional users (researchers) with a common entry point and additional resources (nodes, servers, links) in contiguous and sparse areas

Additional resources

- New links, new nodes, new hosts
- 4 yearly iterations
  - Year 1: Initial set-up 
  - Year 2: open call round 1
  - Year 3: open call round 2
  - Year 4: improvements, stabilization of operation

The testbed resources

- Nodes:
  - Hosts (“normal” PC) w/Ethernet
  - Net devices (router-class computer, low specs)
    - Interfaces: WiFi (one or several), Fibre, Ethernet, etc
    - CPU/Storage
    - Other requirements: Outdoors, no fan, PCU, …
- The links: very diverse
  - Wireless, wired tech
  - Link characteristics and conditions

Testbed and experiments

- Realistic conditions (realism)
- Access at different levels (from phy up to apps)
- A large and representative sample of community networks (realistic)

Experiments

- Nearly passive: working with traces or logs
- Active experiments
  - Intensive: explore limits
  - Disruptive: Testing a new allocation mechanism for frequencies, IP addresses, routing, service overlay
  - “Normal” traffic: Testing an application under realistic conditions
  - Long-term running services (crowdsourcing)
- Even social experiments

  (Collective awareness and action)

The net

- So diverse …
- Additional capacity:
  - New (sparse) nodes and links (extending coverage)
  - New (dense) regions (extending coverage)
  - Dup links and nodes (extending capacity)
- New additions
  - Researchers as remote members (net friendliness)
  - Remote uses need new features:
    selection, deployment, management, logging, isolation
  - Federation …

Testbed: responsibility

- Software development: UPC
- Operation and support: Pangea
- Addition of new nodes: Guifi.net
- Research uses: IBBT
- Dissemination: OPLAN

- Open calls: opportunities for joining the project

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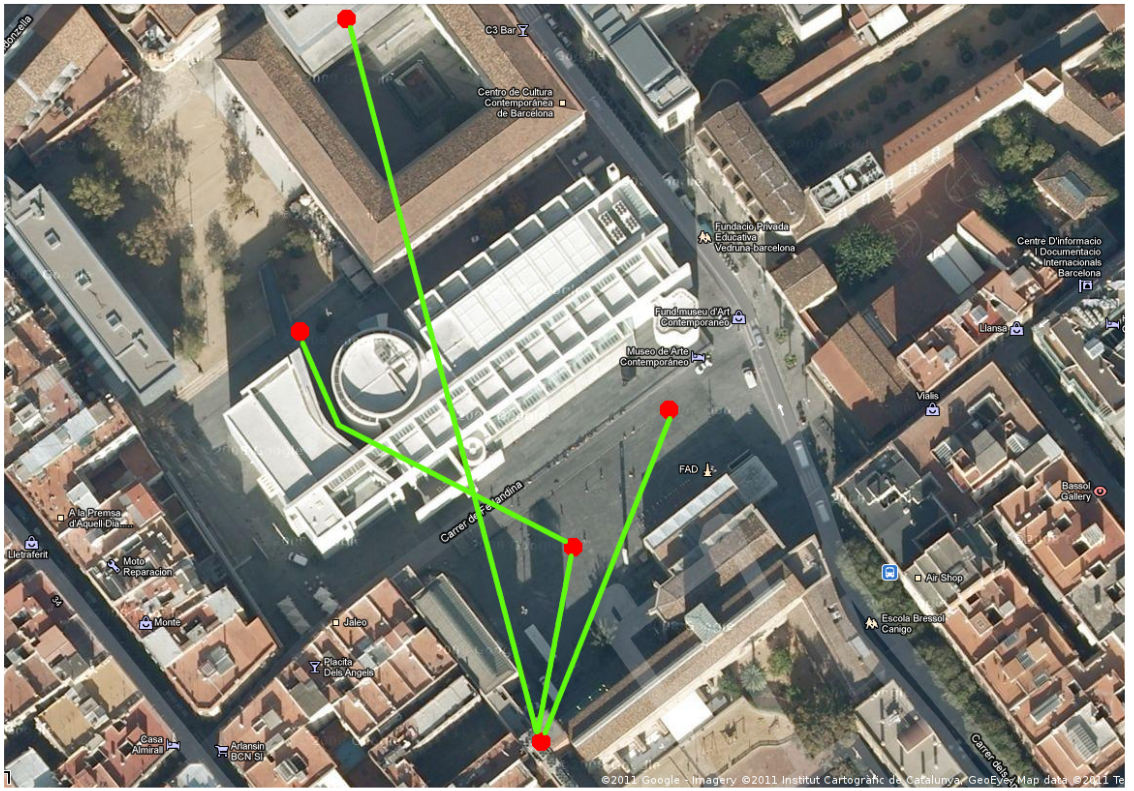
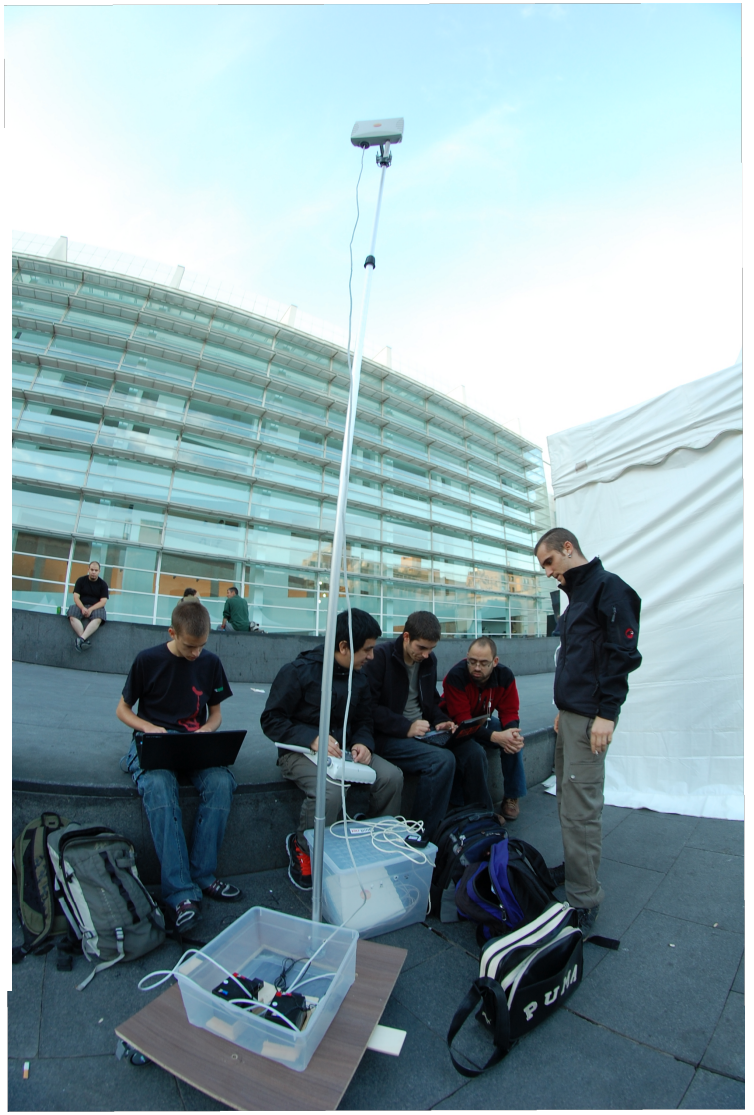
Upcoming events

- Wireless BattleMesh (battlemesh.org)
  23/3 in Greece
- International Summit for Community Wireless Networks,
  October 4-7 2012 in Barcelona (http://wirelesssummit.org)
  - Org: New America Foundation, Guifi.net, the CONFINE project
- Community Wireless workshop, October 8 2012 in Barcelona
  (http://conferences.computer.org/wimob2012)
  - As part of the IEEE WiMob conference, organized by UPC.
- CONFINE Open call for additional partners
  (http://confine-project.eu)
  - Around September 2012 (tbd)

Mozilla Drumbeat Festival





Quick Mesh Project / Kit (http://qmp.cat)

- Two “products”
- The operating system (firmware)
  - QMP: Quick Mesh Project
  - Basat en OpenWRT Linux
- The complete hardware/software solution
  - QMK: Quick Mesh Kit
  - To rent, borrow, … to entities with a need (for events, as a service)
  - To sell as a product

Nodes with QMP

QMP MonsterBox:

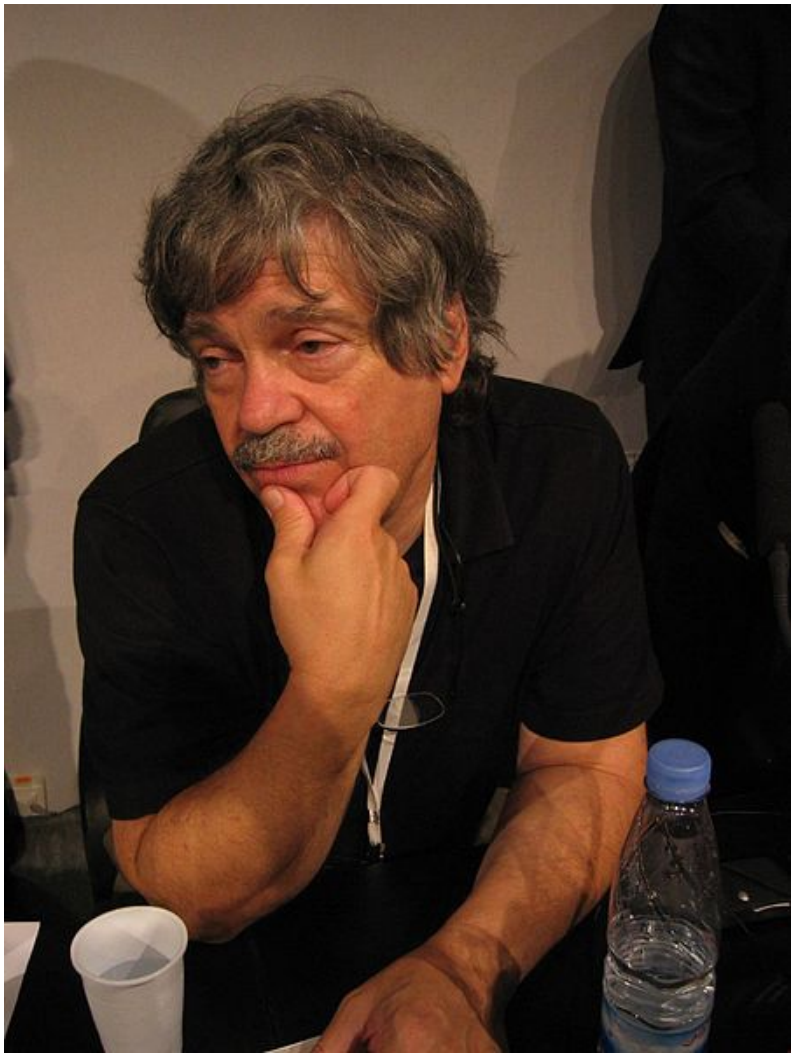
- routerstation pro (MIPS 680MHz)
- 3 radios 802.11abgn
- 6 antenes (2x 5GHz, 4x 5/2.4GHz)

Learning opportunities

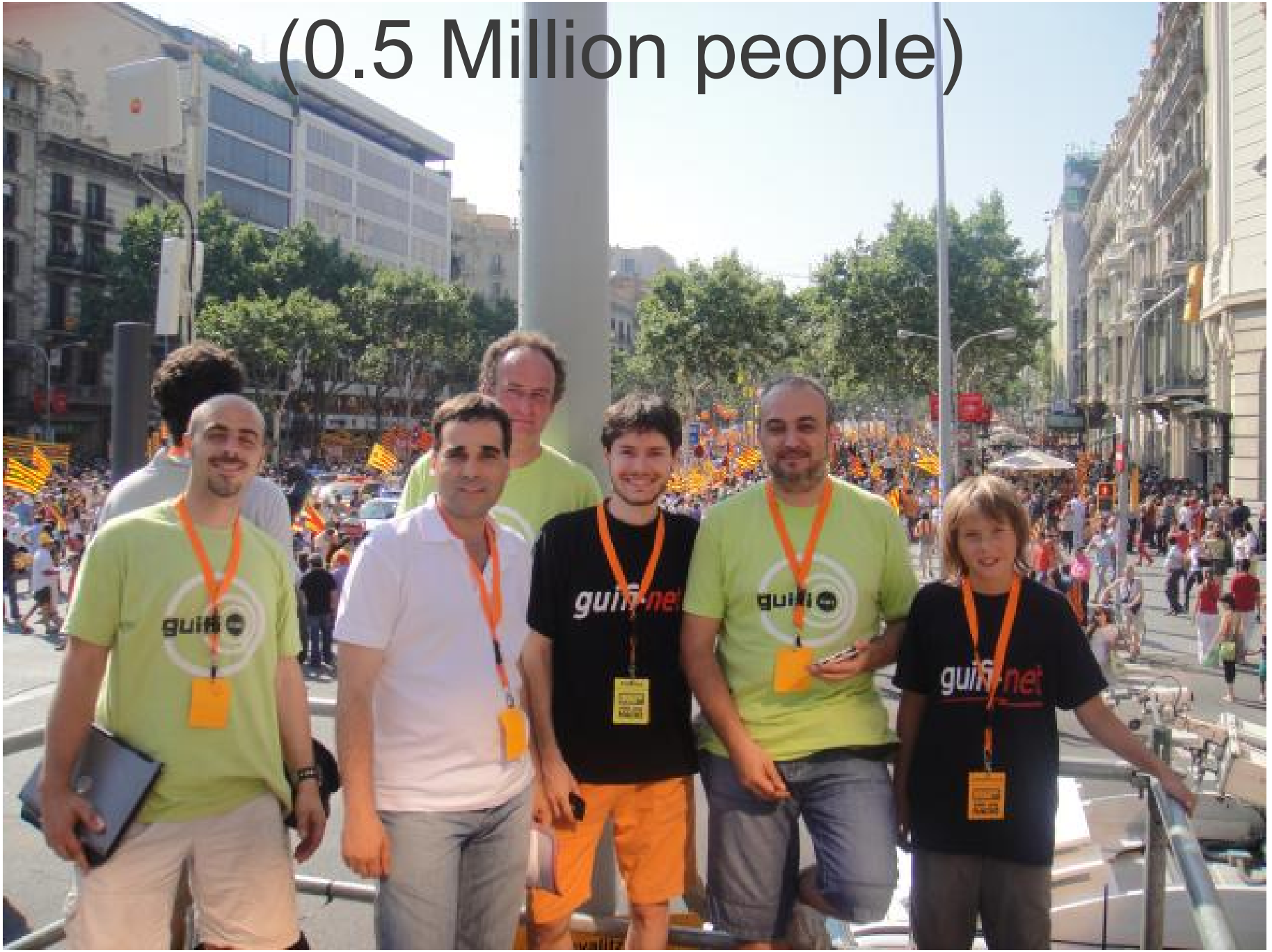
- Erasmus Mundus Programme (EACEA from EC)
  - Support students with fellowships from any country
  - World-class Master and Doctoral programmes
  - Built-in mobility (2+ countries)
- Master in Distributed Computing (http://kth.se/emdc)
  - KTH (SE), UPC (ES), IST (PT) + Industry
  - 2 year programme: IST/UPC – KTH
  - Around 14 fellowships
- Doctorate (http://emjd-dc.eu)
  - UPC (ES), KTH (SE), UPC (ES), IST (PT), UCL (BE) + Industry
  - 3-4 year programme
  - Around 9-10 fellowships (a contract)

“The best way to predict the future is to invent it”

- Alan Kay, 1971
- Dennis Gabor, Inventing the Future (1963): "The future cannot be predicted, but futures can be invented."
- What's going to be your contribution?
- Now you know !!



We're a nation demonstration (0.5 Million people)



Community Networks in Europe Guifi.net, AWMN, FunkFeuer

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