Wireless Tech & Regulatory Reality: Policy & Fantasy in the 21ˢᵗ Century

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Community Media, Historically

- 1700s – Newspapers

- 1840s – Telegraph

- 1900s – Telephone

- 1920s – Radio

- Post WWII – Television/Public Access TV

- Today – Broadband (Internet) Connectivity
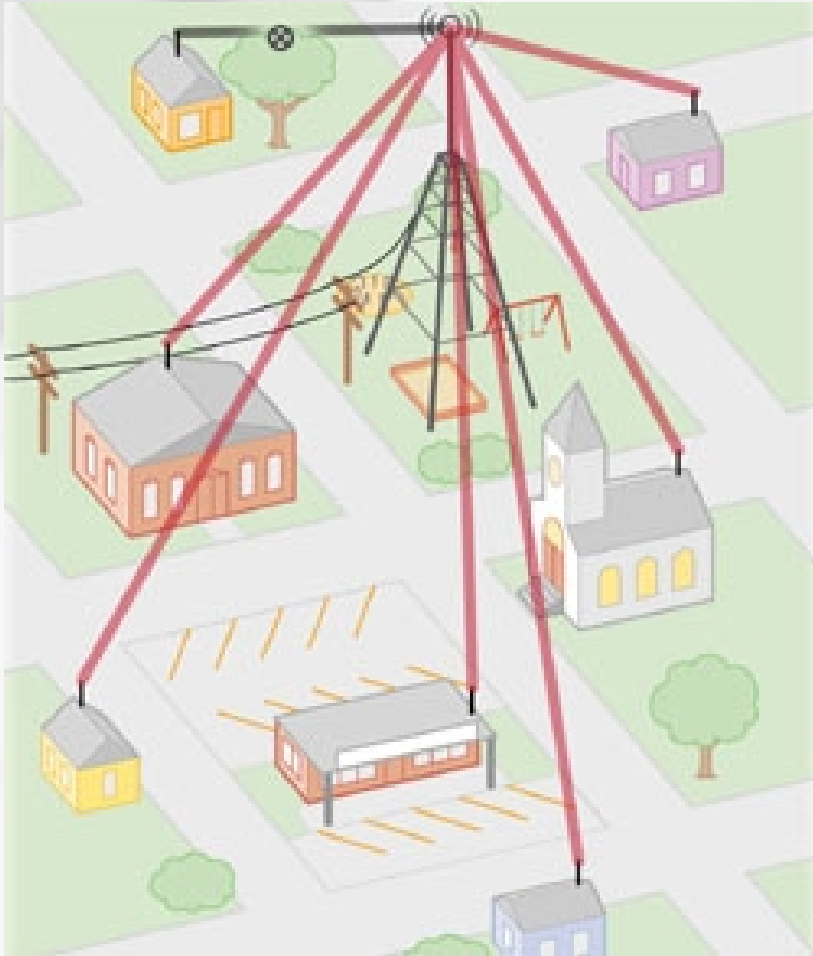
- Tomorrow – Community Intranets

Wired Networks

- 1840s technology

- Expensive

- Disruptive

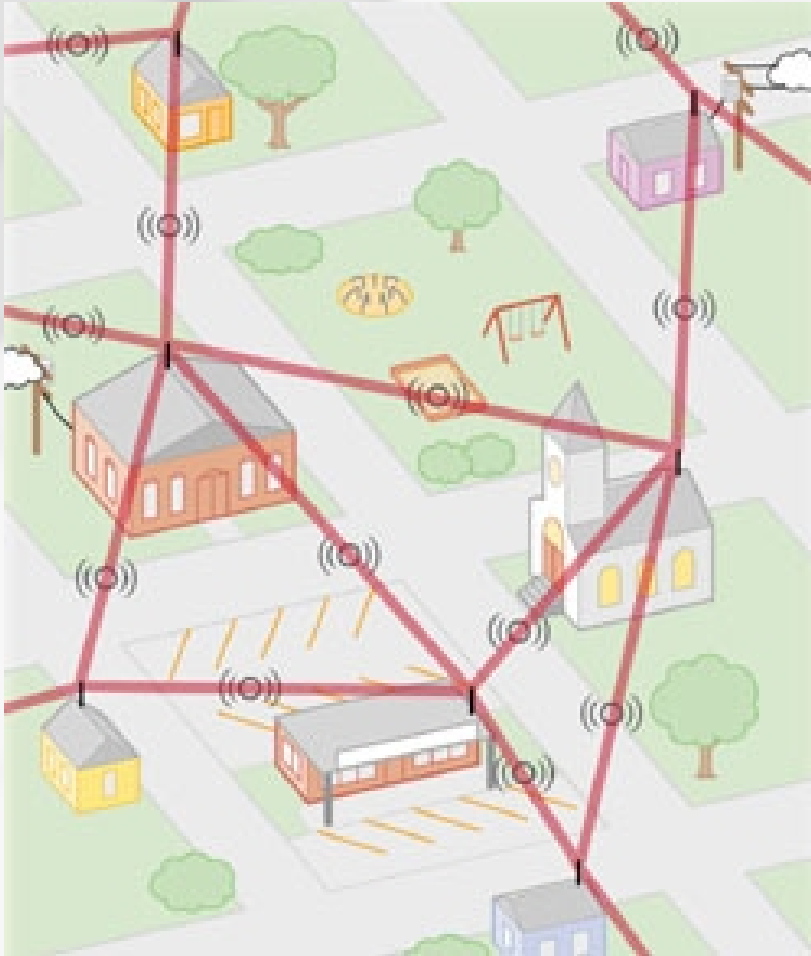- "Entrenched"

Wireless Networks

- Cheap

- Non-invasive

- Mobile/Portable
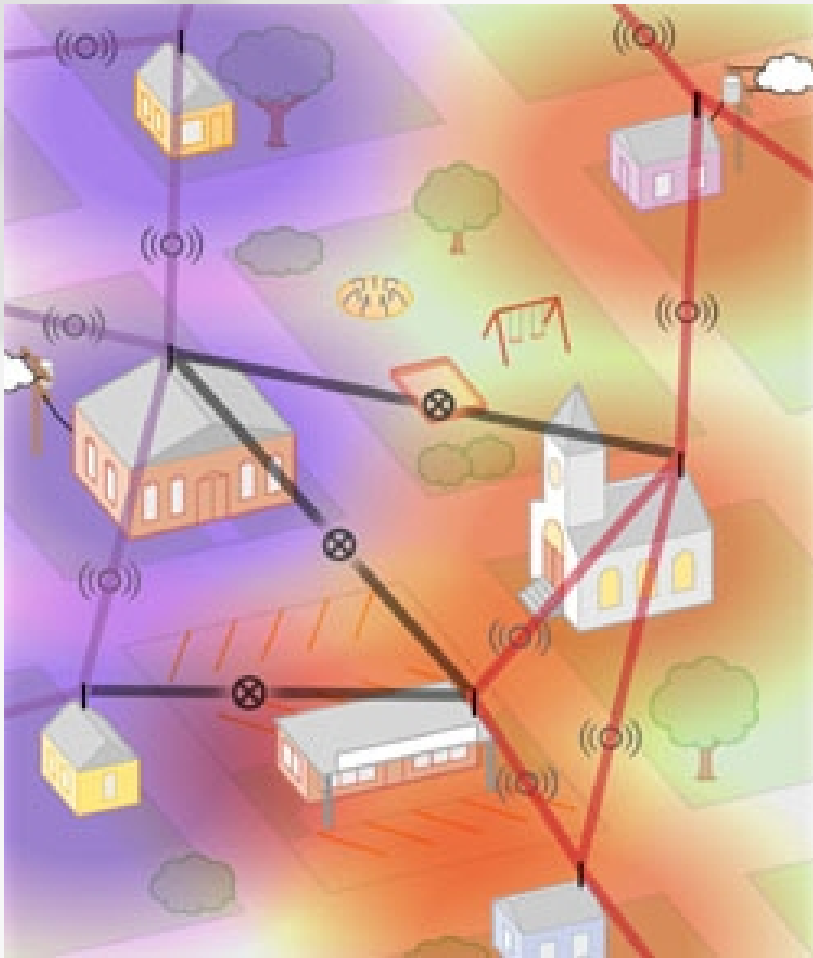
- Ubiquitous?

Hub & Spoke Networks

- Centralized

- Relatively expensive

- Line of site

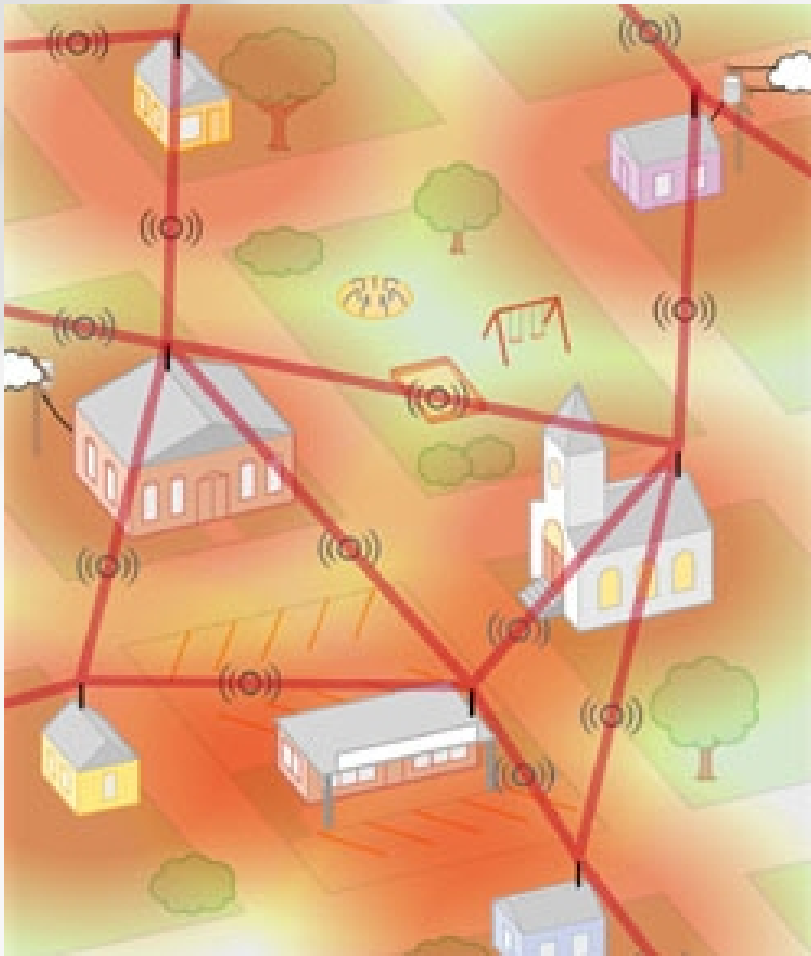- Single point-of-failure

Mesh Networks

- Decentralized

- By-passes obstacles

- Relatively cheap

- Low-power

Closed Networks

- Proprietary

- Expensive software

- Immature technology
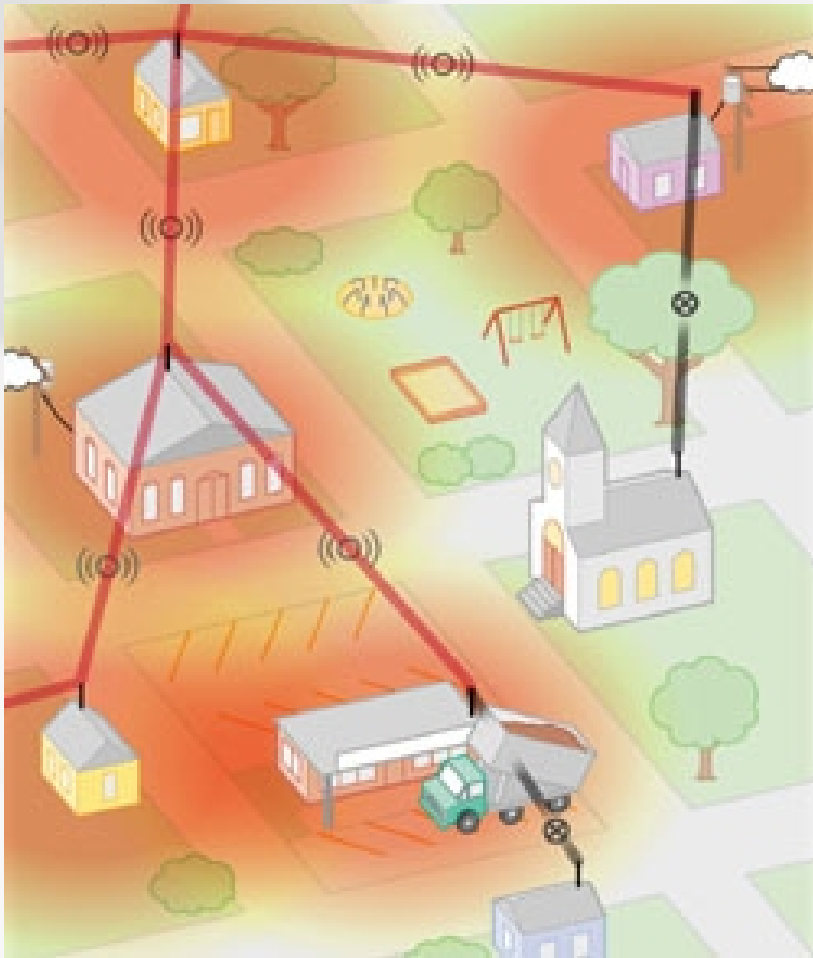
- Fractures communities

Open Networks

- More secure

- Cheap/free software

- Open source

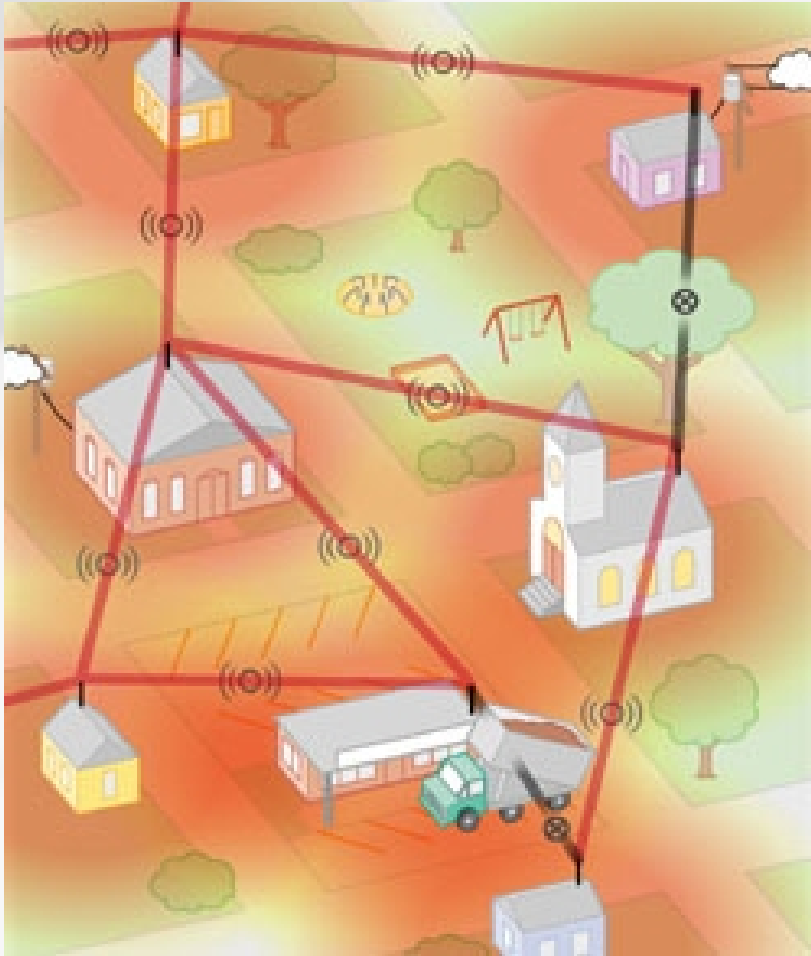- Allows community resources on the network

Static Networks

- Fragile

- Non-scalable

- Time-intensive
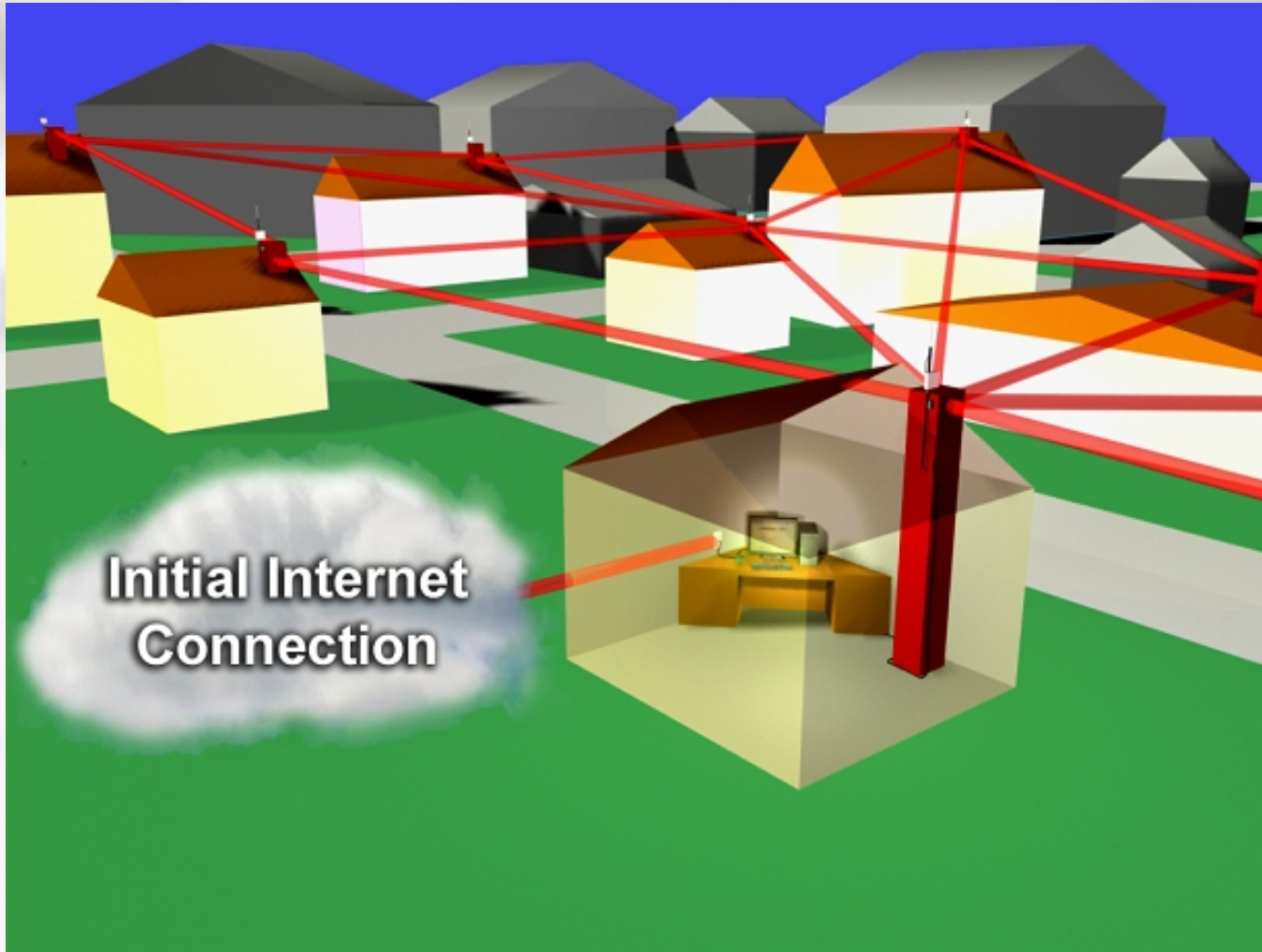
Dynamic Networks

- Robust

- Scalable

- Adaptable

Traditional Home Network

Graphic Credit: Pat Bergschneider

Muni/Community Intranet

Graphic Credit: Pat Bergschneider

Social Benefits for Residents

- Every citizen has the opportunity to be a media producer – broadcasting Internet radio, self-publishing journalism, or displaying art projects.

- Churches can offer communities webcast religious services & spiritual resources.

- Local libraries can become a hub for free, open access to information.

- Parks, swimming pools, beaches, sports facilities, airports, train stations, and other public areas can provide Internet access to users of these areas.

- Free wireless kiosks can be placed strategically around a municipality to provide information to tourists, visitors, or residents.

Social Benefits for Educators

- Universities, colleges, and K-12 classrooms can establish wireless networks – allowing for tremendous infrastructure and maintenance savings over wired networks.

- Teachers can design lesson plans collaboratively with other classrooms, track student progress, and record grades on parent-accessible websites.

- Students can publish online newspapers/blogs, create a web-radio station, or web-cast news produced in multimedia classrooms.

- Bridging the digital divide, low-cost wireless offers disadvantaged schools high-tech resources, as well as opportunities for adult education and distance learning.

Social Benefits for Public Health

- Doctors can transfer information to patients with limited mobility as well as exchange patient information with other doctors, clinics, pharmacies, and hospitals.

- Mobile home healthcare workers and social workers can more easily chart their daily rounds and retrieve and send information to better serve patients.

- Physical therapists can demonstrate specific exercises to patients watching from their homes.

- Nursing homes can provide residents with entertainment, educational opportunities, and easy communication with family and friends.

Social Benefits for Government

- Wireless networks facilitate e-government initiatives such as online voter registration, directions to polling stations, bill payment, access to tax advice, and public service announcements.

- Unemployment and social services offices can collect and disseminate information about job opportunities, job training, and child care facilities available in a community to those in need.

- First responders and law enforcement officers can send data, audio, and digital video to command centers for evaluation and rapid response.

- CWNs can serve as a local broadcaster to webcast town meetings, city council sessions, local speeches, or cultural events.

Social Benefits for Business

- Wireless infrastructures offer job creation opportunities as businesses take advantage of lower barriers to market entry and the advantages of high-speed, low-cost communications.

- CWNs promote mobile workforces with on-demand information access at all points across a town or city.

- CWNs allow for cost-effective marketing strategies and new ways to present points of sale to targeted customers.

- CWNs create opportunities to increase broadband penetration, expanding options for reaching commercial audiences.

Why FOSS mesh?

- Mesh technology is increasingly accessible.

- Meshes are a viable alternative.

- Meshes are cheap to deploy.

- Meshes offer more services to end users.

- Meshes are cheaper for end-users.

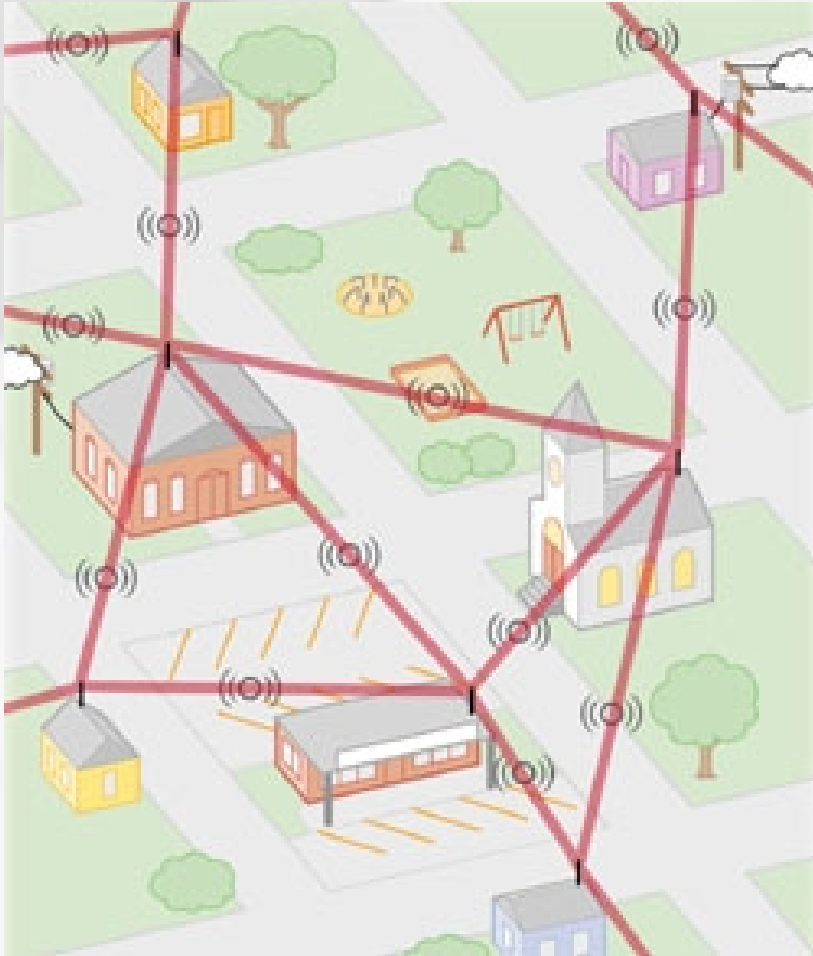- Meshes create new media production and dissemination opportunities.

Hub & Spoke Networks
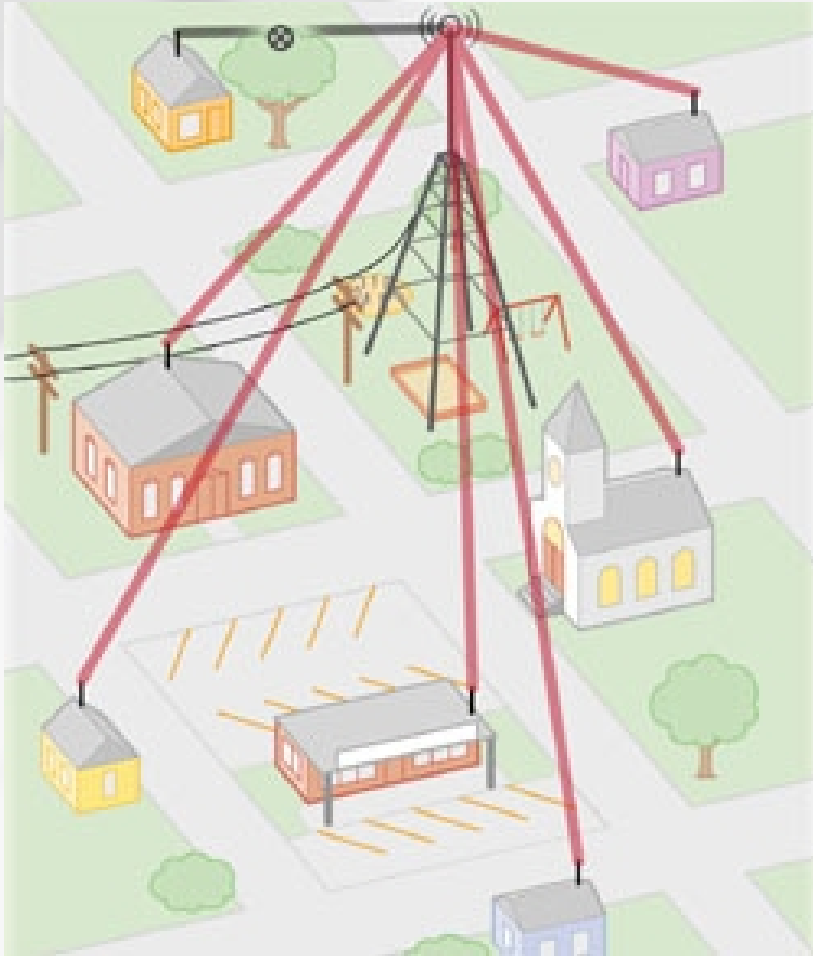
Graphic Credit: Darrin Drda

- Centralized
- Relatively expensive
- Bandwidth-intensive
- High-power
- Single point-of-failure
- Slower than P2P/Mesh
- BUT, allow one to charge for all traffic

Mesh Networks

Graphic Credit: Darrin Drda

- Decentralized
- By-passes obstacles
- Relatively cheap
- Low-power
- Very fast
- Supports P2P Services & Applications

Two Initiatives That Will:

- Challenge existing regulations.
- Foster interconnectivity.
- Increase broadband capacity.
- Lower broadband pricing.
- Disrupt the status quo.

Proposal

Cooperative Measurement and Modeling of Open-Networked Systems (COMMONS):

- **Experimentation** with different architectures & business models.

- Use strengths of **cooperation** to overcome current Internet service provision shortcomings.

- **Collaboration** offers backbone transit in exchange for privacy-respecting, participant-defined data-collection for use by network researchers and scientists.

Community Networks Inside the US

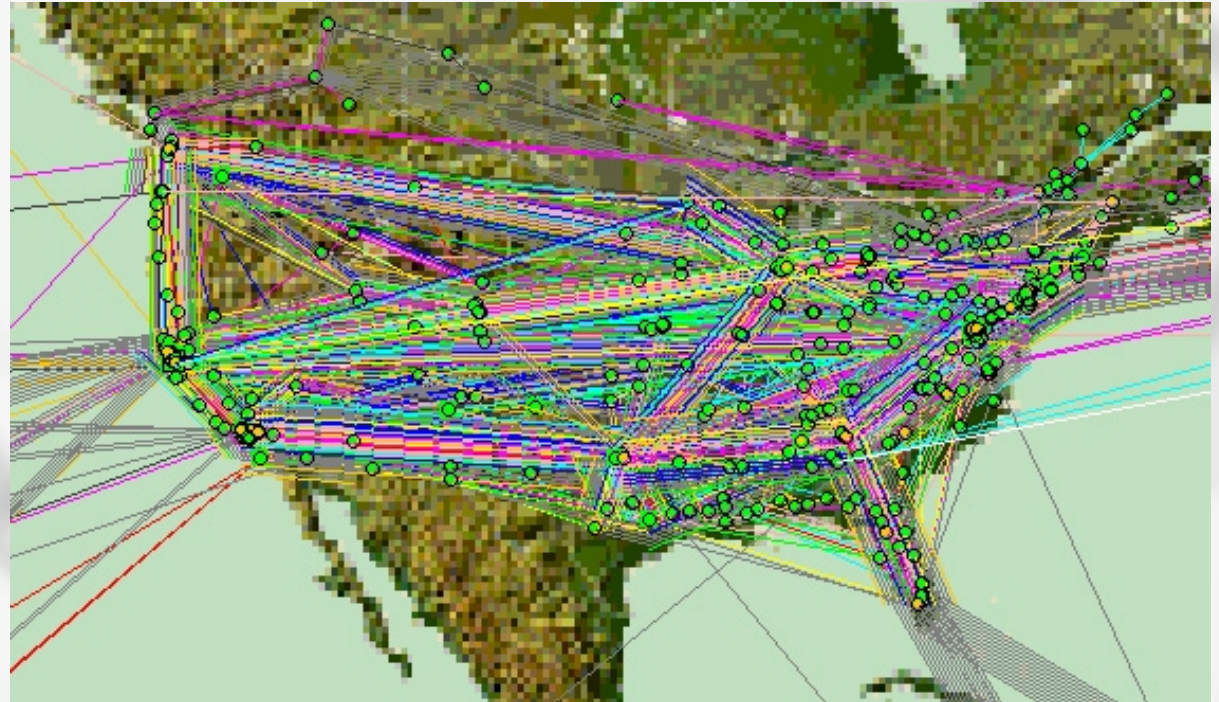Community Internet Across America
Organized By Network Status
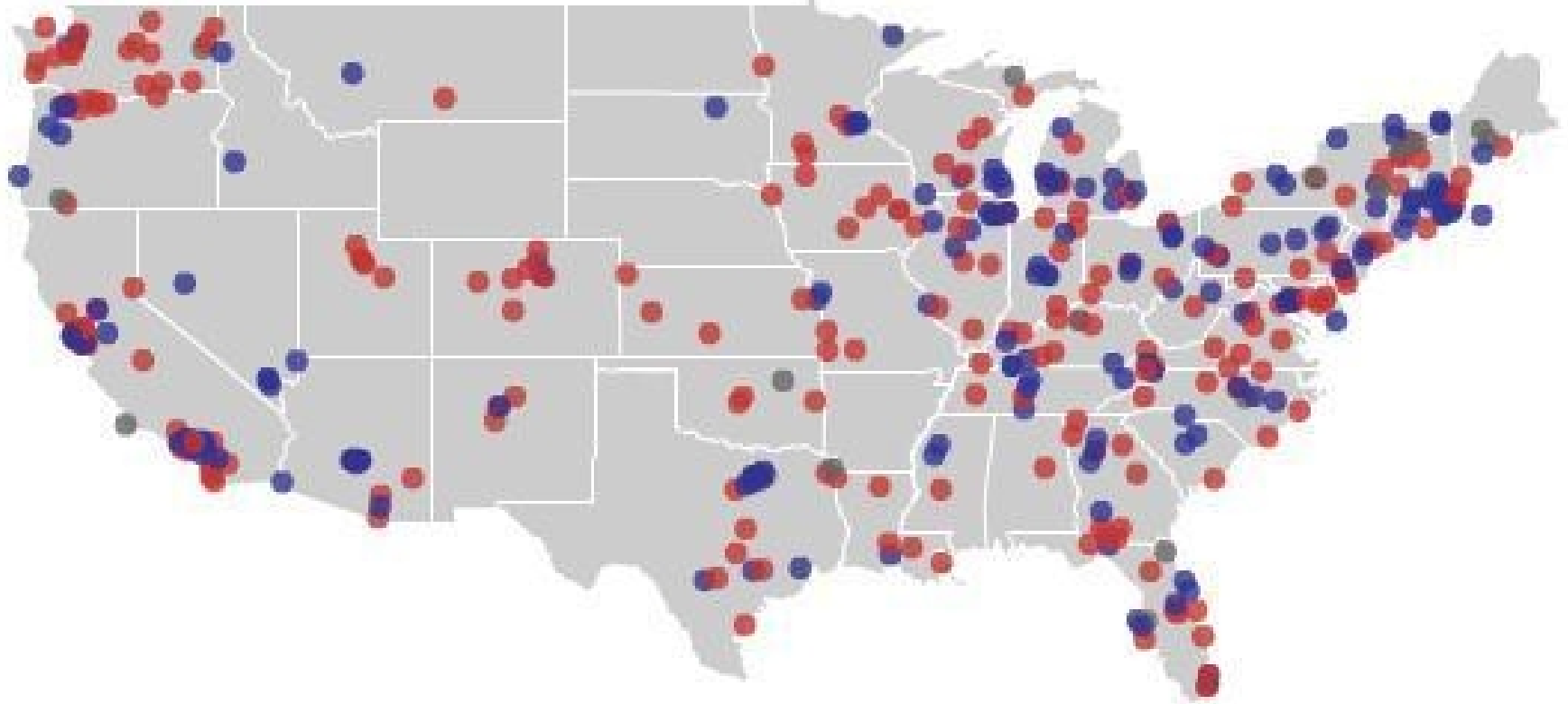
Graphic Credit: Free Press
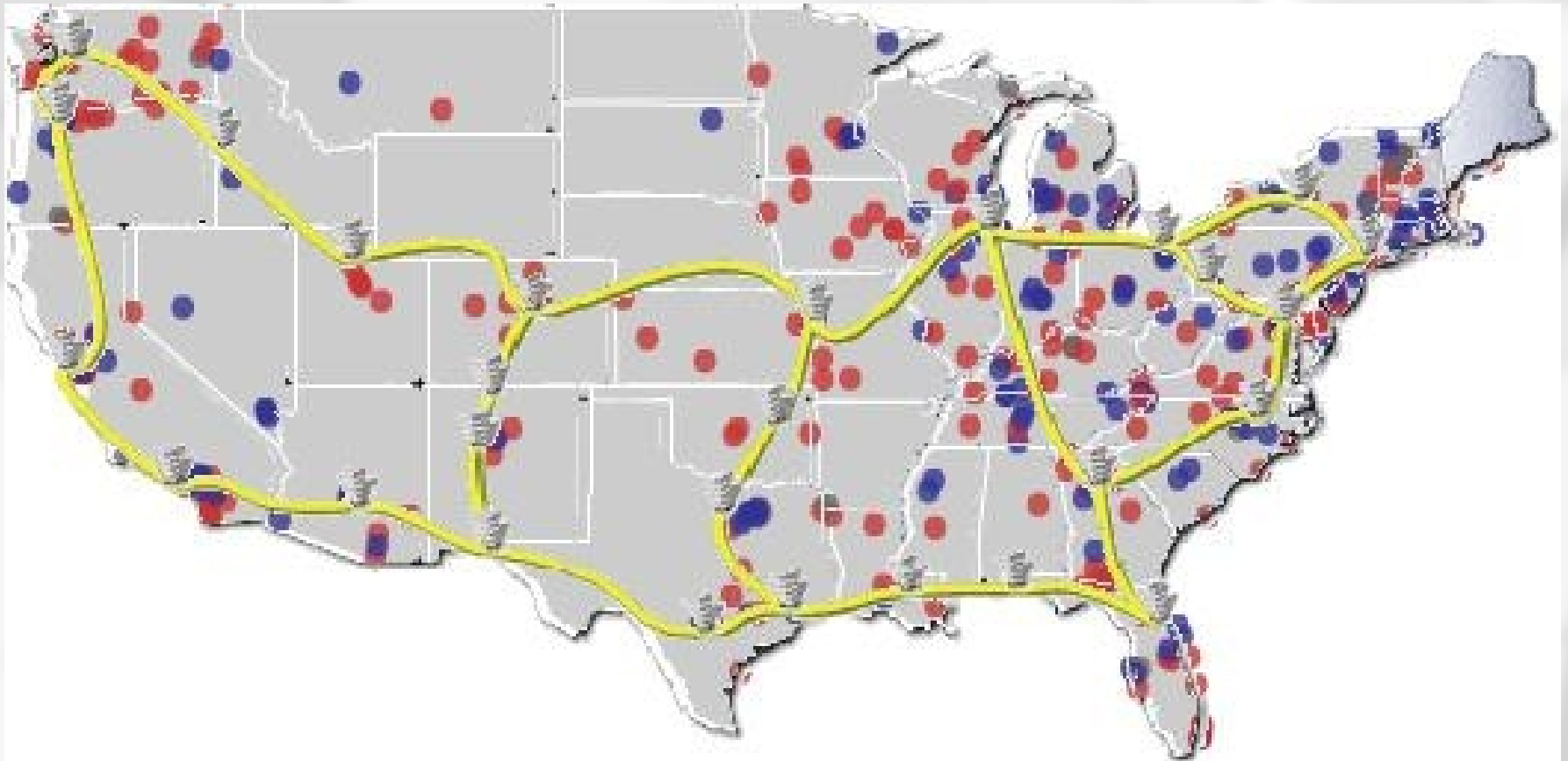
The US Broadband "Backbone"

- Military
- Private Corporations
- Educational Institutions
- Not-for-profits
- States
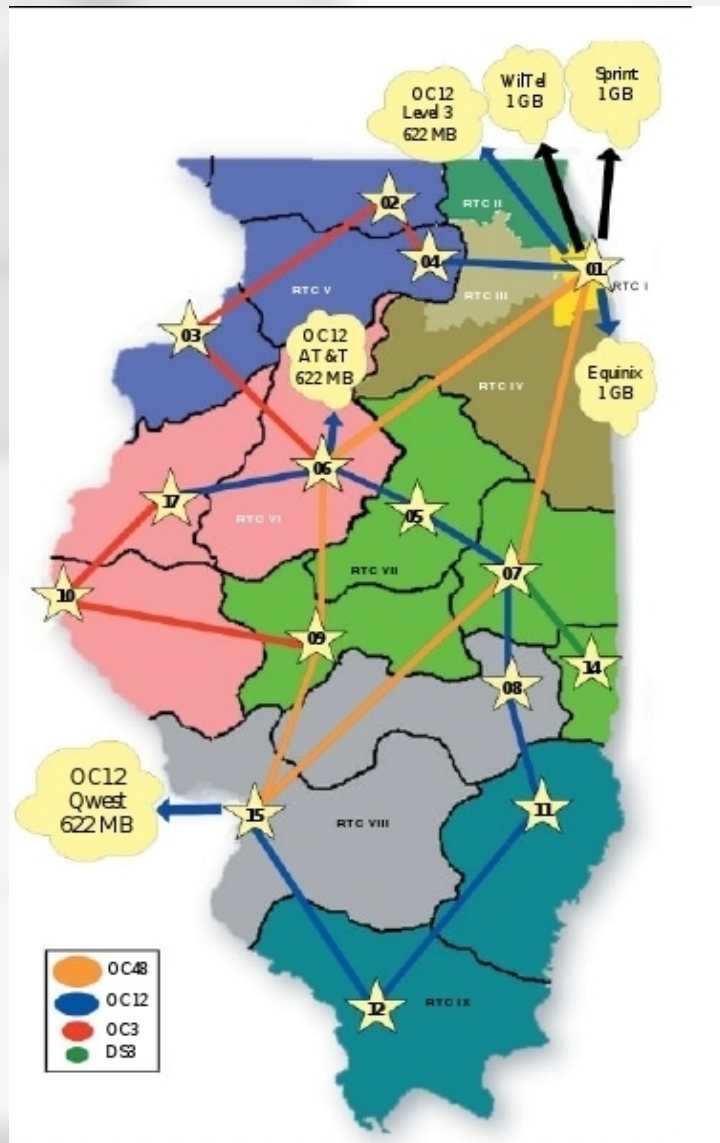- Cooperatives

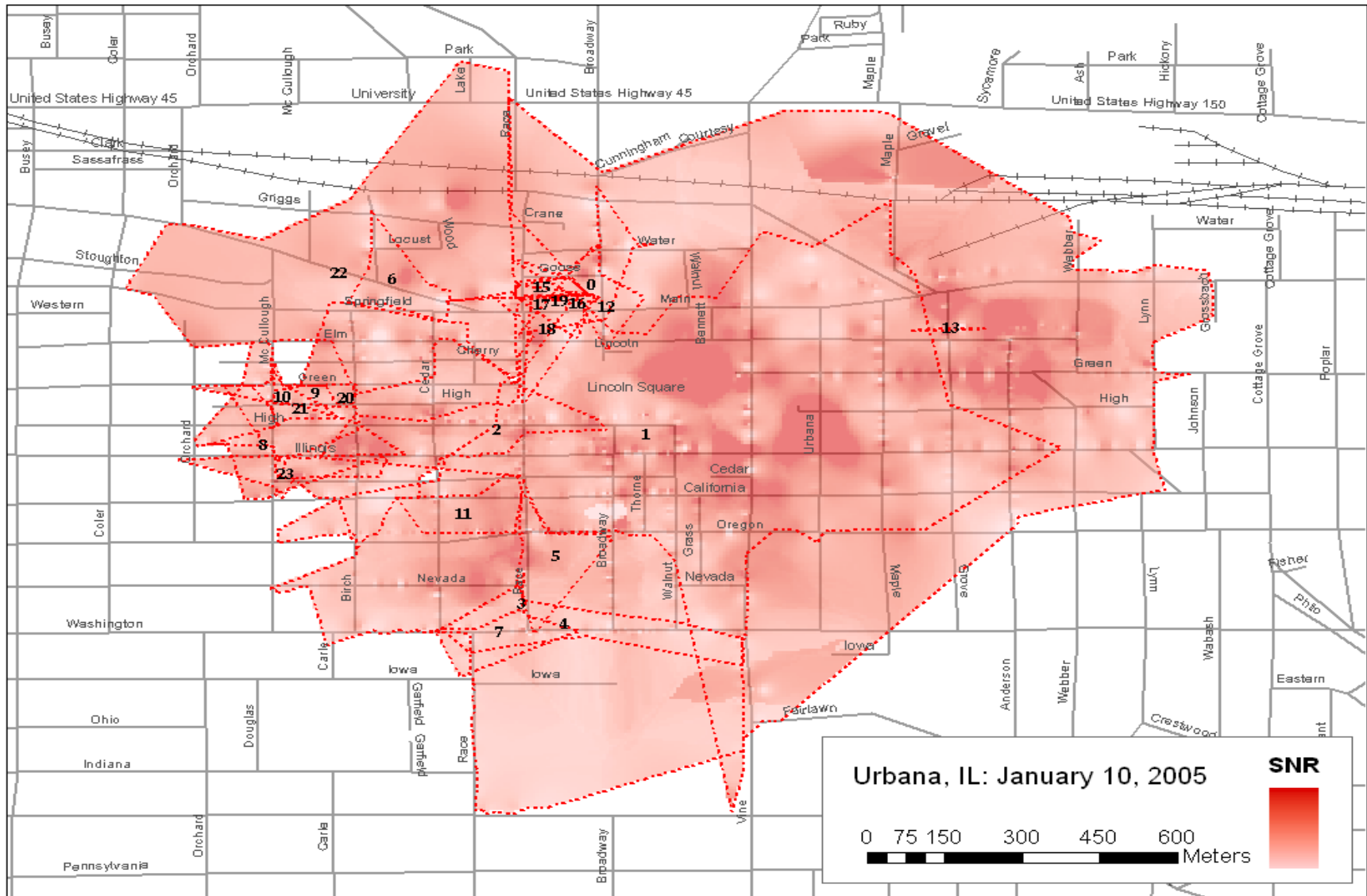Graphic Credit: CAIDA

CAIDA COMMONS Project

Graphic Credit: Free Press/NLR

The Illinois Century Network

- 4,911 K-12 Schools
- 322 Colleges & Universities
- 492 Libraries & Museums
- 67 Healthcare Facilities
- 2,092 Municipal Governments
- 131 "Others"

8,015 Clients (Jan '07)

CUWiN (Urbana, IL)

Urbana, IL: January 10, 2005

Economic Imperatives

1Mbps symmetric costs:

- $10/month in San Francisco
- $80-90/month in Chicago
- $320/month in Urbana
- $1300/month in Greenup

- Peering ratio costs.

Potential Partners

- Internet2

- QUILT

- NLR

- Regional Optical Networks

- Educause, NATOA, & Other Coalitions

- State Networks

- Municipalities and Community Wireless Implementors (cities, WISPs, NGOs, etc.)

- CRACIN & Other Innovative Organizations

Immediate Problems Solved:

- Alleviates commercial sector of so-called "**impossibly low margin customers**".

- **Secures our rights** of free speech and expression.

- Provides emerging community networks with a **level playing field**.

- Gives science a chance – creates **a resource for network research** for the public good.

Long-Term Solutions

- Creates opportunities for sound **measurement and analysis** – the key to telecommunications policy that serves the public good.

- Helps achieve the goal of **universal, affordable service** – which the "free market" has failed to deliver.

- **Accountability and local control** –– facilitates a solution that pushes control over the network as far to the edge as possible.

- Fosters **new generation of innovation** in services, applications, hardware, & software.

The Problems Solved:

Internet Video — Includes all these and more, over 60 websites, including popular on-line email and instant messaging services
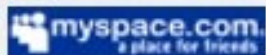
Internet Basic Service High Speed
$29⁹⁹
over 60 websites

Includes more search engine options, over 200 websites in all!

Advanced Internet Service High Speed
$39⁹⁹
over 200 websites

Be a publisher! Blog! Over 2000 website included in this package so you can see it all!

Blogger Internet Service High Speed
$49⁹⁹
over 2000 websites!

Full internet access available on request. Prices subject to change at any time. (Full Access does not include access to illegal materials)

WSDs – White Space Devices

- Reuses unused TV frequencies.

- Contains scanner/receiver & transmitter.

- Must successfully identify used channels.

- Cannot cause harmful interference.

- Has far better propagation than WiFi.

OLPC Mesh

Photo Credit: techfreep.com

OpenMoko Mesh

Photo Credit: gadgetblog.it

The WSD Battle:

- The Public Interest
  - Consumers Union, New America Foundation, Public Knowledge, Consumer Federation of America

- High Tech Industry
  - Google, Dell, Philips, Samsung, Microsoft

- National Association of Broadcasters

- Shure (wireless microphone manufacturer)

- Voldemort

The Ammunition

On our side:

- Public support
- Research and working prototypes
- Physics

On their side:

- Money
- Lobbying
- HUGE Public Relations & Misinformation Campaign

Example of this Battle:

"Moreover, as the FCC's own tests confirmed, the proponents of unlicensed devices in the digital television spectrum have not shown that their "sensing" technology is at a stage where it would effectively prevent interference in the television band. Therefore, the FCC should not allow these portable devices to enter the TV band at this time." -- Disney, News Corporation, CBS, NBC

"Currently, feasibility testing is being done and documentation collected on the viability of WSD technologies. Prototype testing has demonstrated that WSDs can and do work. The next step will be for the FCC to determine the necessary technical specifications for WSDs based upon empirical data collected during feasibility testing and regulatory precedent." – Public Interest Spectrum Coalition

The FCC Test (NAB View):

WSD PROTOTYPE B DTV SENSING/SCANNING SENSITIVITY
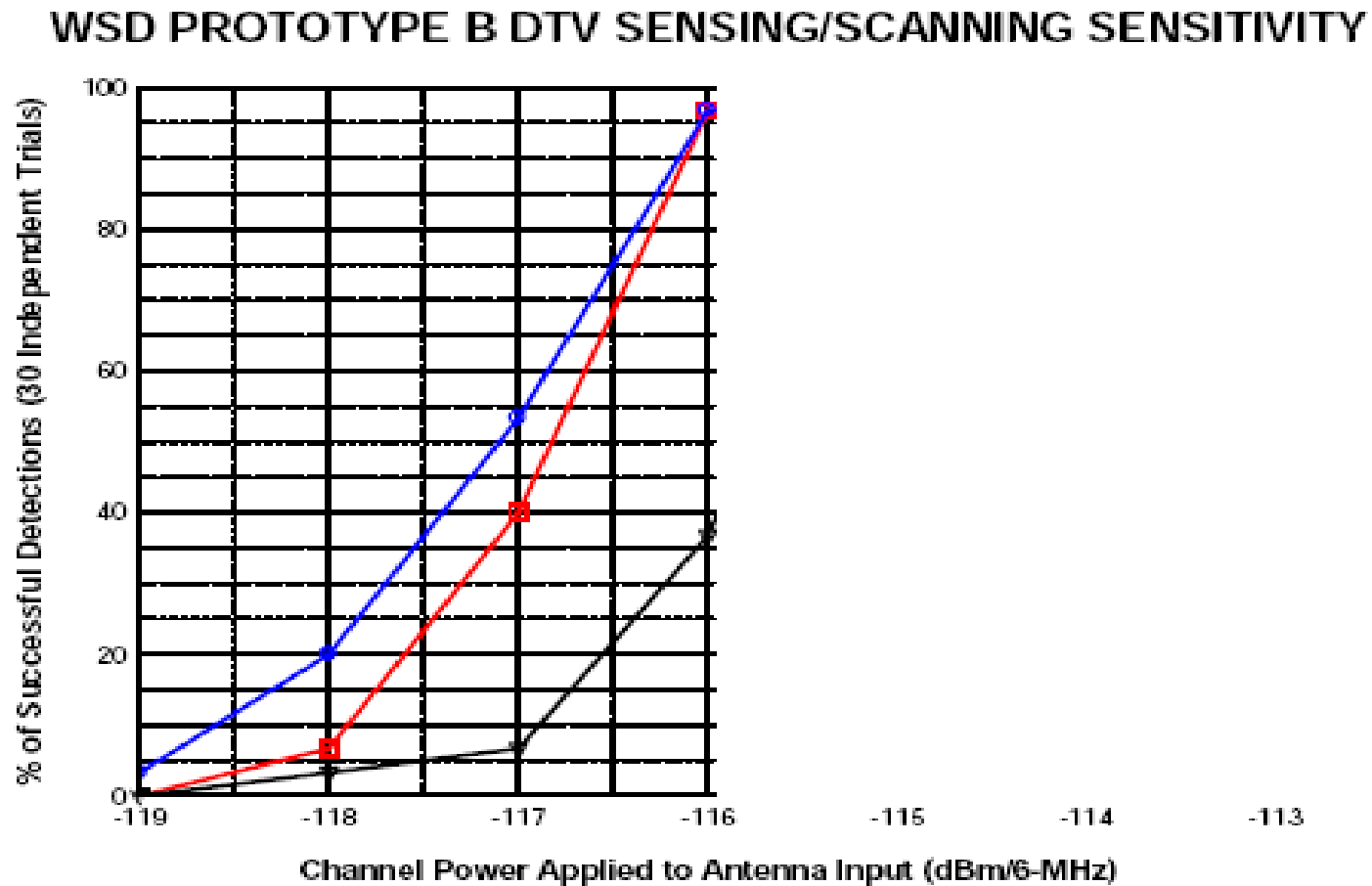
Figure 3-4. Baseline Detection Threshold Results for Prototype B.

The FCC Test (PISC View):
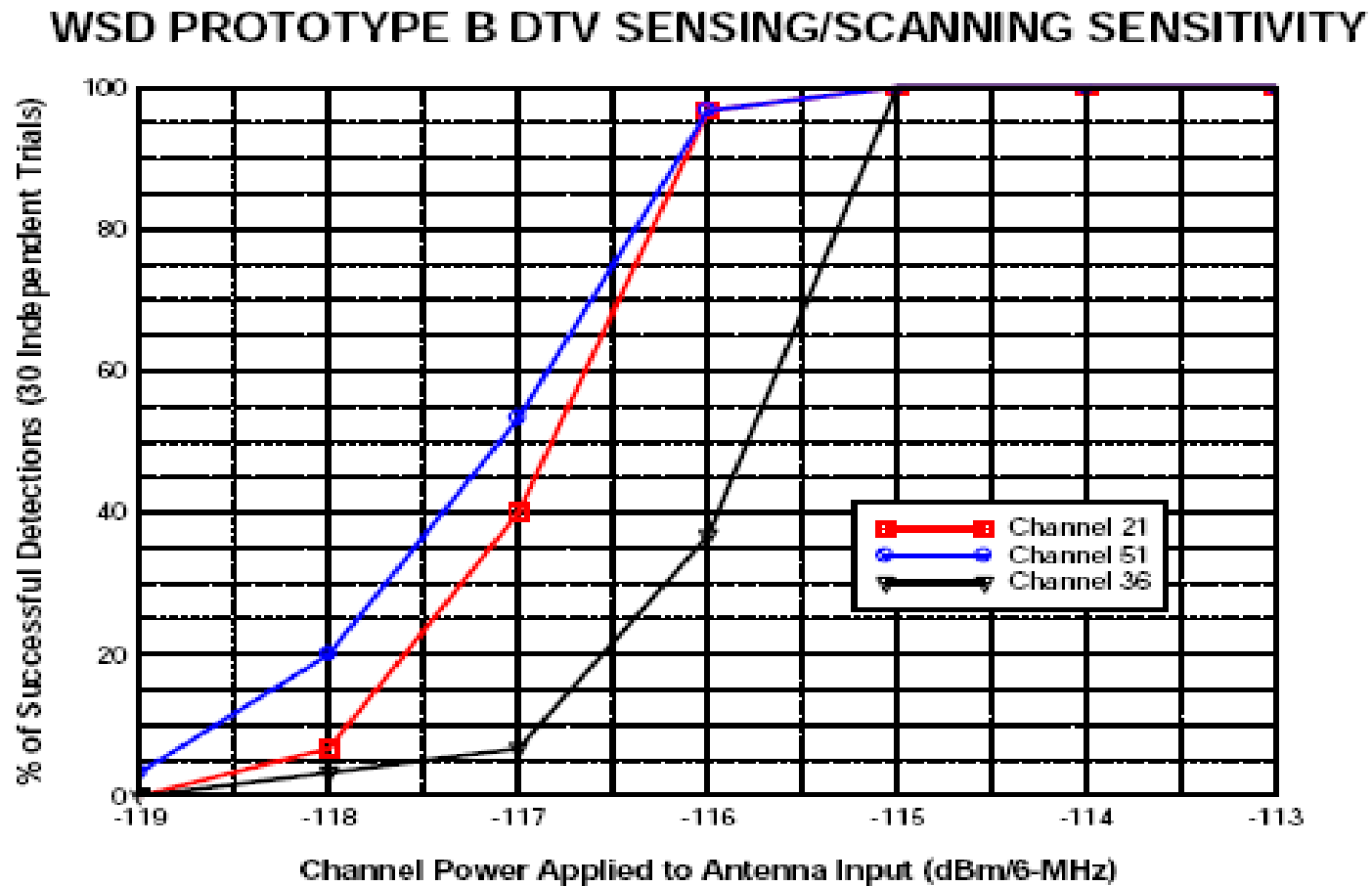
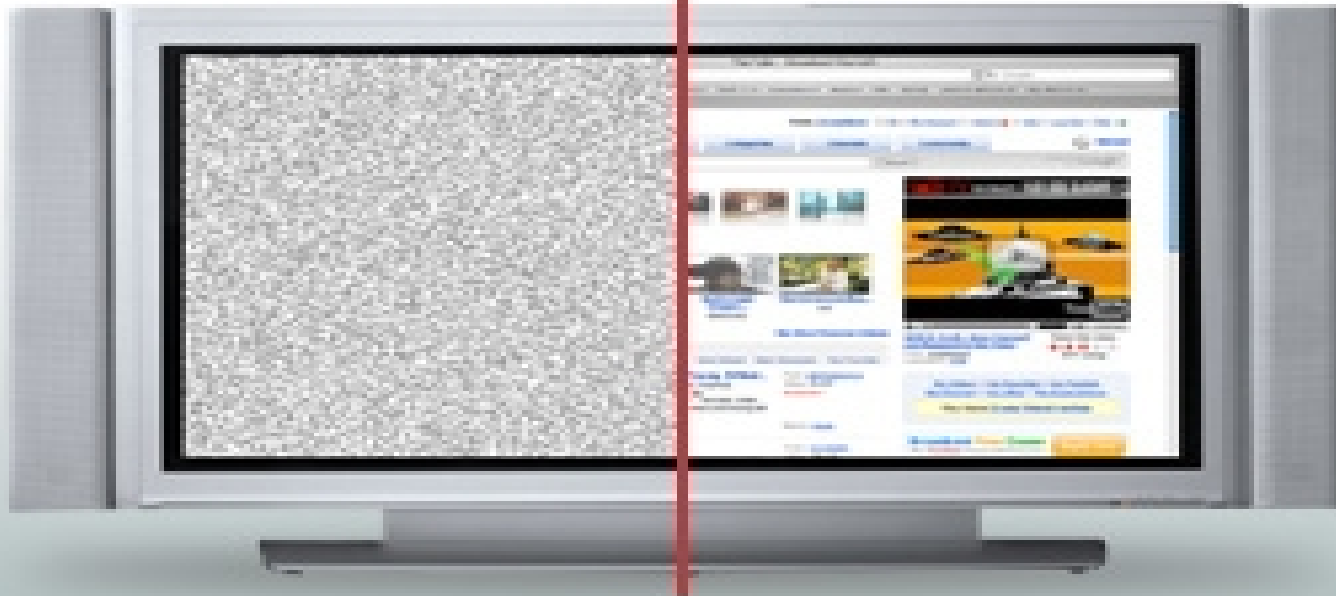Figure 3-4. Baseline Detection Threshold Results for Prototype B.

The Real Question:

Conclusion

- FOSS mesh wireless is here.

- Interconnection efforts among community networks are underway.

- New hardware can support new distributed, decentralized, P2P infrastructures.

- Regulatory policy is decades out of date.

- Powerful interests are working to stop these efforts.

- The Public Interest is beginning to win key battles, but the outcome is far from determined.

More Information

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Open Source Wireless Coalition: oswc.net

Community Wireless Summit: wirelesssummit.org

Sascha's Blog: saschameinrath.com

COMMONS: caida.org/projects/commons

Presentation online @ www.saschameinrath.com

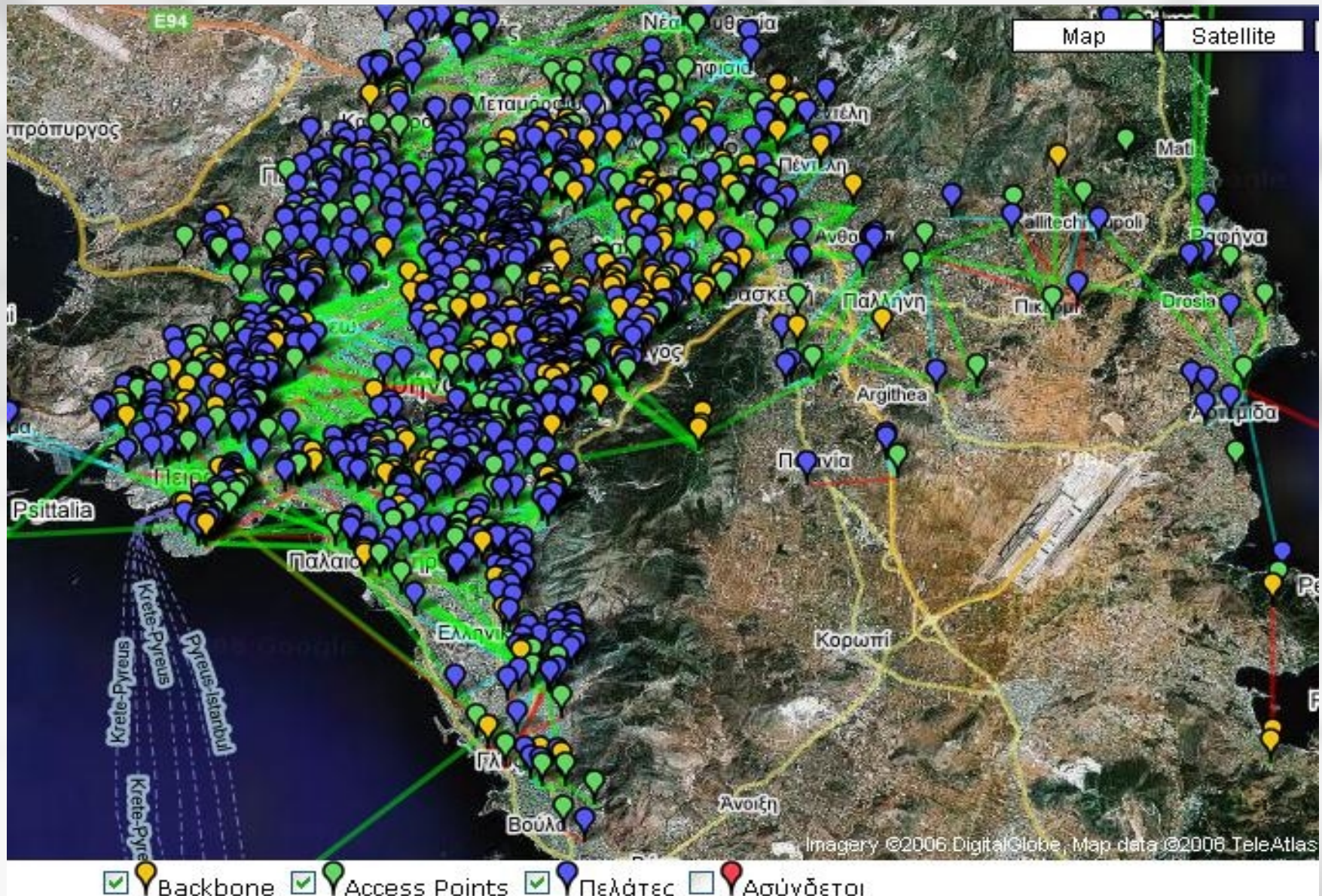# Some Lessons Learned That Support Social and Economic Justice

- Share bandwidth – buy bulk wholesale.

- Distribute information storage.

- Integrate community intranet services.

- Foster mobile uploading & universal access.

- Support anonymous usage and downloading.

- Create immediate community-wide broadcasting & media production opportunities.

- Open Source, Open Architecture, Open Spectrum Solutions.

Djursland, Denmark

Athens, Greece

Graphic Credit: WiND

Guifi, Spain

Katrina Disaster Response