

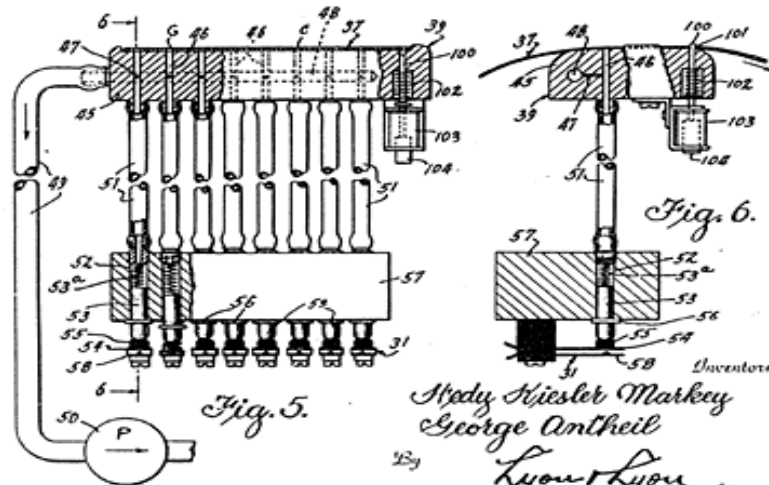
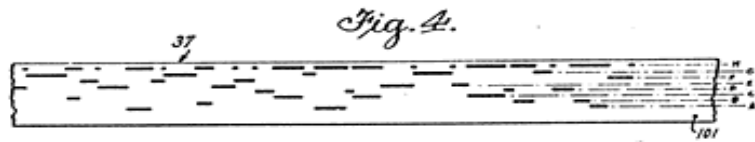
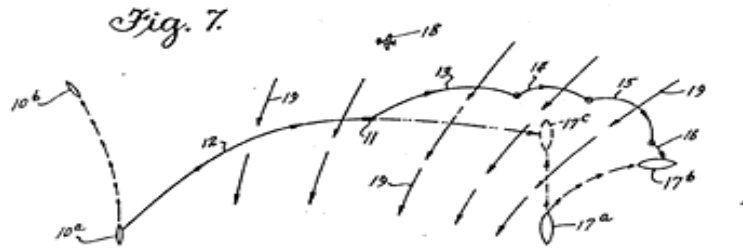
A scenic view of the ocean at sunset or sunrise. The sky is a deep blue with wispy white clouds. The sun is low on the horizon, creating a bright glow and a rainbow on the left side. The water is a deep blue with gentle ripples.

Wonderful, Wireless, Wales!

An Attainable Broadband Goal for All



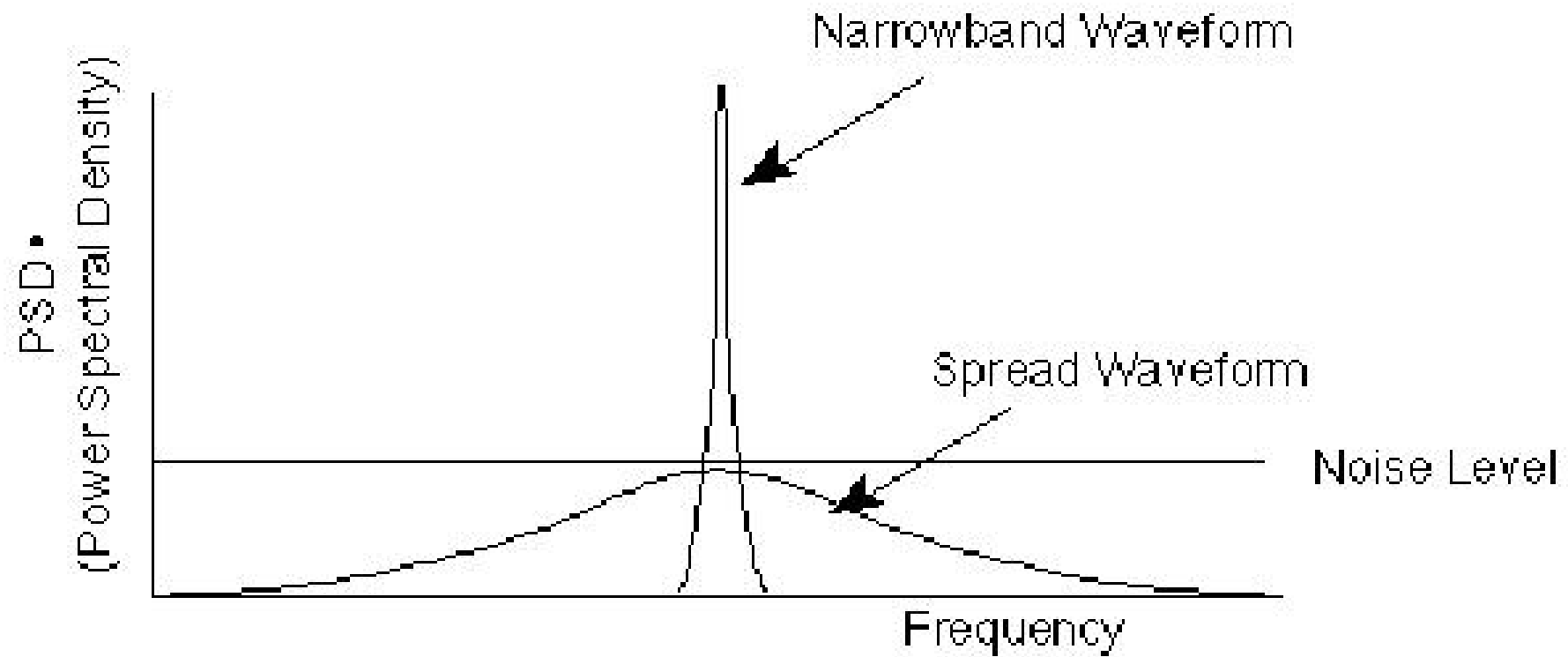
**Hedy Lamarr, Inventor of Spread
Spectrum Radio, 1941**



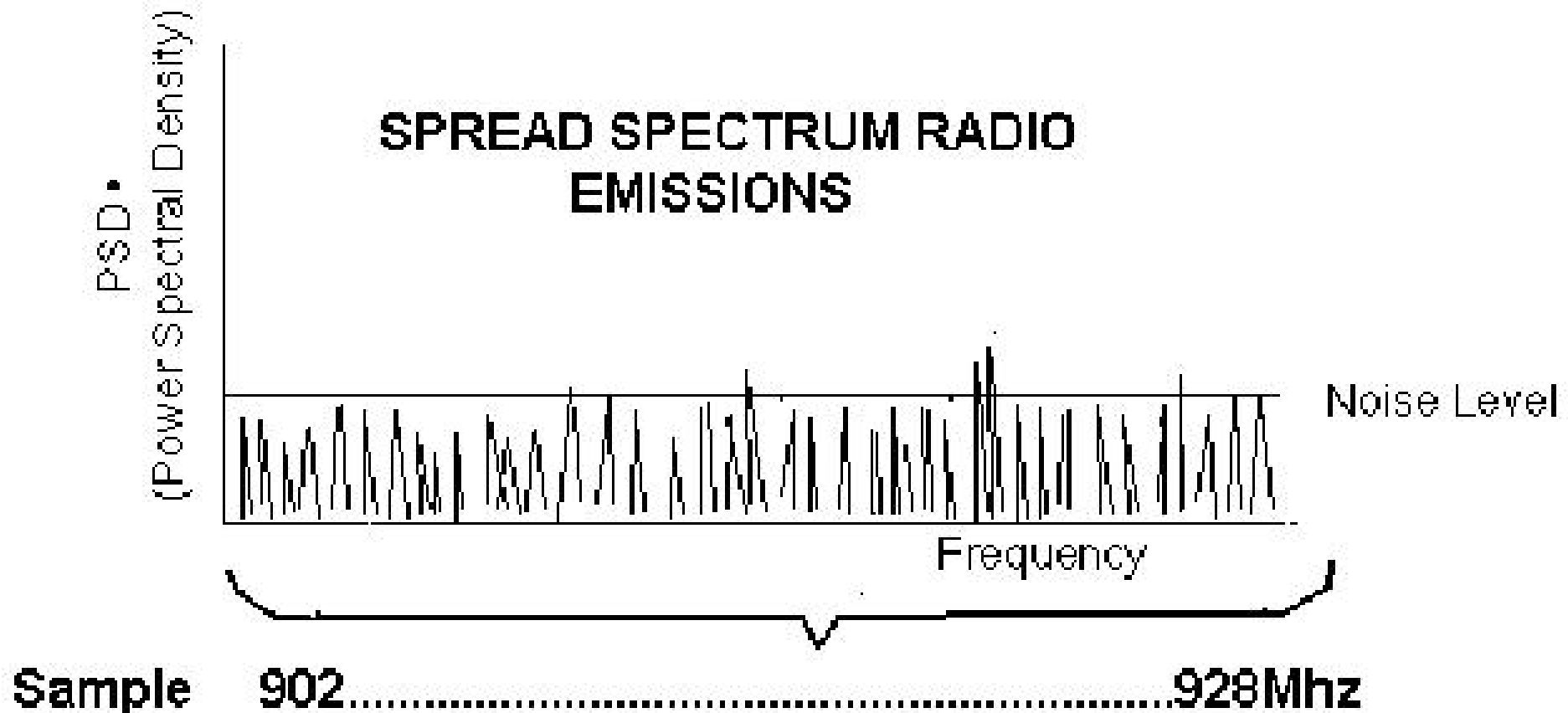
Inventors
 Hedy Kiesler Markey
 George Anthel
 By Lyon & Lyon Attorneys

Her Actual Patent, Used by US Military, classified, for 40 years. Permitted for general public use (FCC) 1985

Traditional Radio



Modern Digital Radio



Permits Shared Spectrum

- Many radios can use the same frequency band. Interference NOT a rural issue, and minor, urban
- Does not require a License to use (UK rules)
- NO COMMUNICATIONS COST between radios
- A local civic network can be 'free' yet broadband
- Can also be interconnected to the Internet, with fees. Network of radios, one access point to net
- Many companies make such radios now
- Radios dropping in price.

Current FCC Approved Rules for Spread Spectrum Radios

1 Watt at the Radio - 4 Watts EIRP

Operate only in FCC Part 15 (ISM) Bands

902 - 928 Mhz

2.4 - 2.4835 Ghz

5.725 - 5.85 Ghz

THE ABOVE ARE US STANDARDS

UK Standard is only 100mw EIRP 2.4ghz

There is no 902-928, and 5.8 is under review, but promising. Feasible for use across Wales

“Wi-Fi – 80211.b Radios”

- The most popular types
- Many Client Radios Types
- 1 Base Radio/Access Point
- And/or as Relay Radio
- 2.4ghz, no license
- \$250 to \$2,500 AP/Relay
- \$100 to \$500 Client Radios
- 10mbps – BROADBAND!
- Plug into Ethernet
- Directly into Upstream Router

4800 Series WLAN Products

- 11Mbps Ethernet like speeds
- Freedom to be mobile
- Standards Based
- Easy to use
- Complete family of solutions
- WEP encryption for high-speed LAN security

In Building

BR500/BR100

- Connect 2 or more buildings
- High speed connections
- Lower cost than wired solutions
- No monthly service fees/
- No FCC License required

Building to Building

Antennas & Accessories

- Low/ High Gain Omni & Direction Antennas
- Point to Point/Point to Multi-Point
- Wide range of mounting options
- Complete array of products & cabling

Antennas

WHAT IS 802.11?

- ONLY A TECHNICAL STANDARD! (IEEE)
- ALL RADIOS CAN TALK TO EACH OTHER, EVEN FROM DIFFERENT VENDORS
- 802.11b is for 2.4ghz Spread Spectrum Radios called 'Wi-Fi' The most popular today.
- 100 Radio Products have been Certified by WECA 802.11b Compliant. All interoperable.
- Speed - 802.11b is 11mbps, in 2.4ghz bands
- 802.11g is 56mbps, in 2.4ghz bands (new, fast) downward compatible with 802.11b radios
- 802.11a is 56mbps in 5.8ghz bands

Antennas can help with range



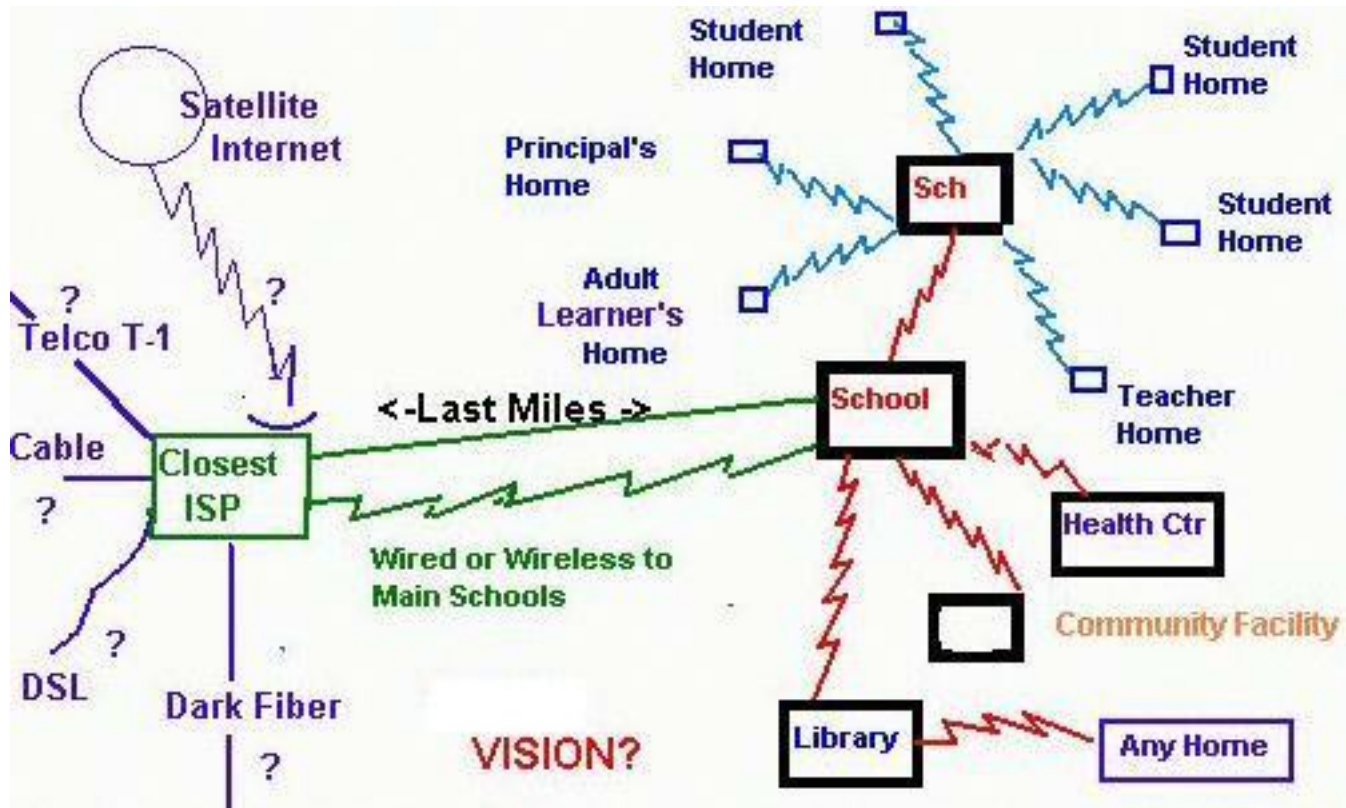
- Omnis – 360 degree, low gain (2-8db)
- Yagis – Directional, higher gain (8-36 db)
- Attached Rubber Duck or PC/Card Blade (0 db)

Towers and High Points

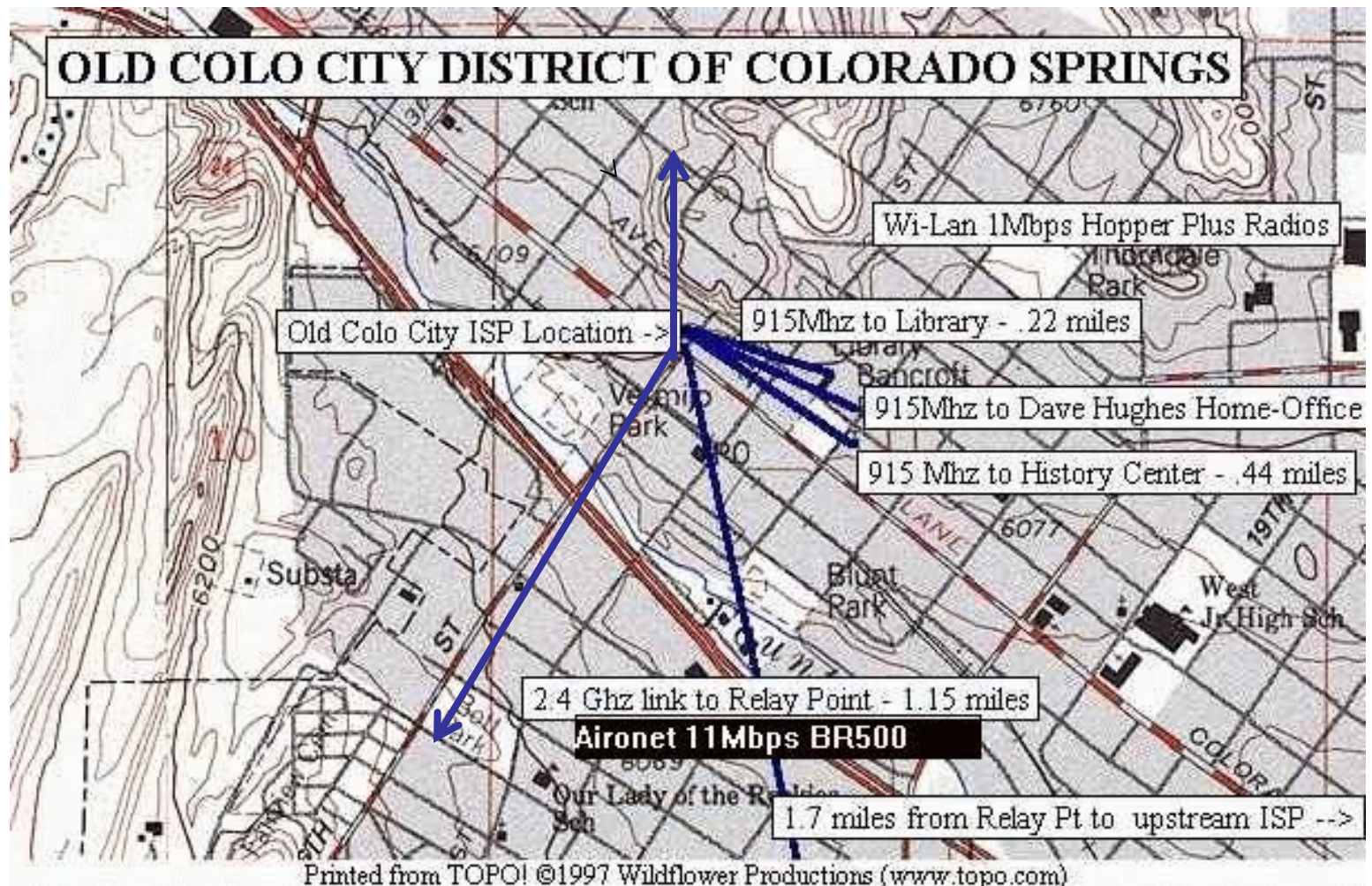
- For more than 2-3 miles
- Also can use tall buildings
- Or television towers
- Or tall trees
- Or small tripods on small
Welsh Hills, solar/battery
- Radios on high points can
'relay' over hills
- 10 mile ranges practical



One Community Network Vision



My Own Wireless Neighborhood



The Situation in Wales, Today

- Pending better rules for no-license at 2.4ghz, and in the 5.0-5.8ghz bands
- 802.11b limited to 100 milliwatts EIRP
- But distances are short in Wales
- 3-5 miles can cover ALL towns from a central point
- 5.8 'Hyperlan' Radios can do 1 watt – for linking nets
- 'Commerce' will be permitted at last.
- A National Commitment to Broadband
- The Telcos (BT?) can't do it affordably, wired
- Lots of Grass Roots Wireless Activists/Doers ready to get going. Already several networks up now in UK

The Value of Two-Way Internet

- Everyone a PRODUCER not just CONSUMER of Information/Knowledge!
 - Writers, Poets, Reporters, Thinkers, Inventors
 - Community Teachers as well as Learners
 - Art, Music, Self-Publishing, Entertainment, Historians
 - <http://history.oldcolo.com>
 - Storytellers WELSH ONLINE BARDS!
 - Programmers, engineers, web designers, technicians, installers, accountants, marketers
 - New forms of Medicine and Health Care
 - ‘Citizen’ Science
 - [WERC Caribou Poker Creeks Meteorological Stations](#)

So think 'Community Wireless!'

- Local (town/neighborhood) Wireless ISPs
- 802.11b/g to the residence , farm, club business, school, agency, hosp from ISP
- 802.11 OR 5.8 from ISP to 'Upstream' Provider - BT fiber, or already Connected Business, ISP in the next town, College
- Local (ISPs) Web, Email, File Space for all
- A local Server for every 'community!'
- Let the 'Community' own and decide how!

Supports Revolution in Education

- Lifelong learning/teaching
- Interactive & Distance Education
- Distributed Teachers/Students
- Access by all to World Resources, Experts
- Entirely new way to teach/learn Welsh – multi-media, at student's pace.
- Eventual REDUCTION in physical school size and cost? (won't need a seat for all students!). (controversial but real)

(A Modest (but Radical) Proposal)

- Every school/college should put up roof/tower antenna and wireless Access Points
- LOAN (or sell, like textbooks) a powerful Palm Computer with 802.11b card to use at school, but ALSO from home to connect! ALL students, rich or poor,.Rural or Urban.
- Let every student be connected, nights, weekends, holidays TO their school servers (for homework) and TO the world wide net! (which school is paying for 24/7!)
- Let all children learn to study/work/socialize remotely from young ages. PREPARE them for their Digital Future, where much work will be remote, collaborative, collegial, fun, self paced. Let them develop individually.

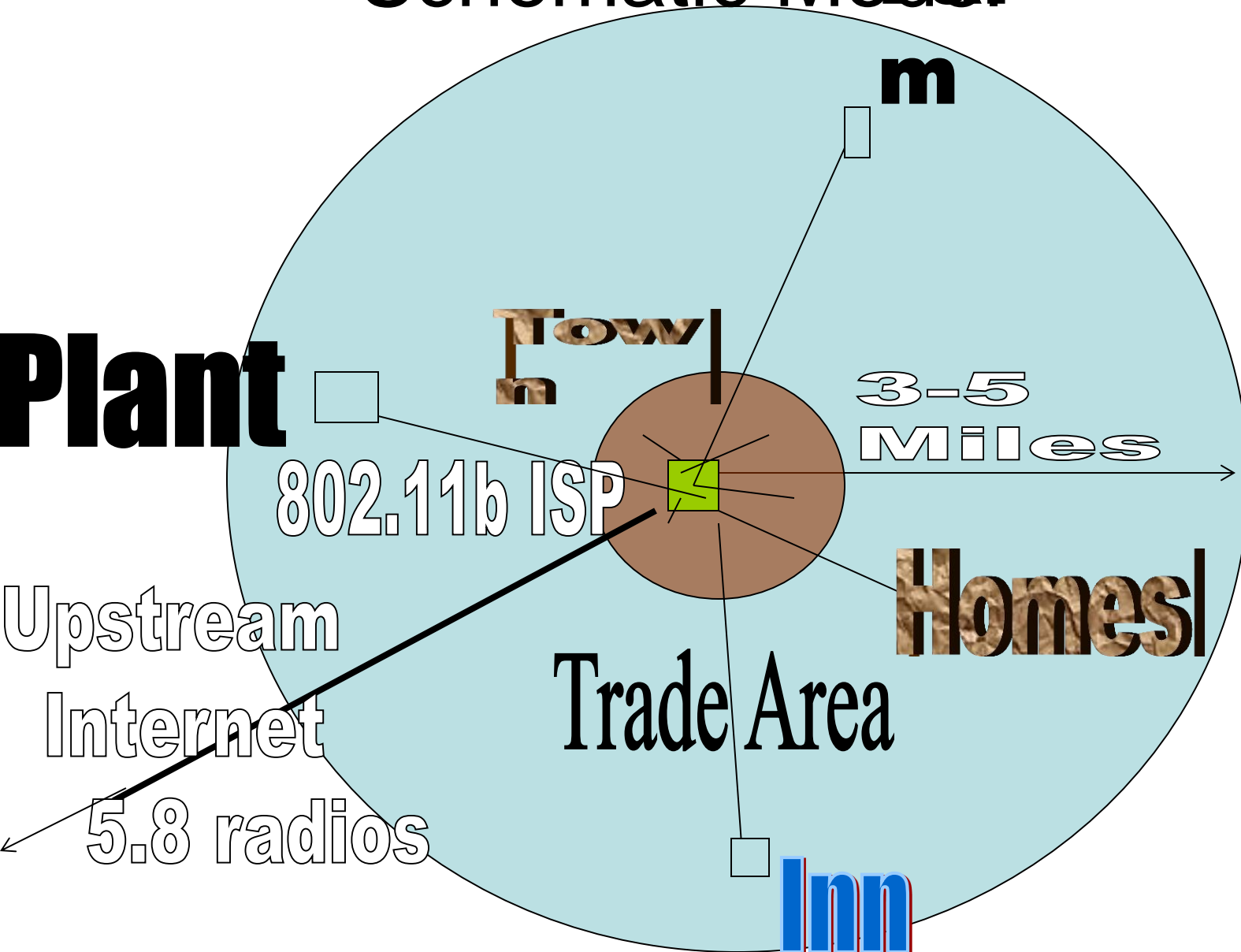
Supports The Digital Economy

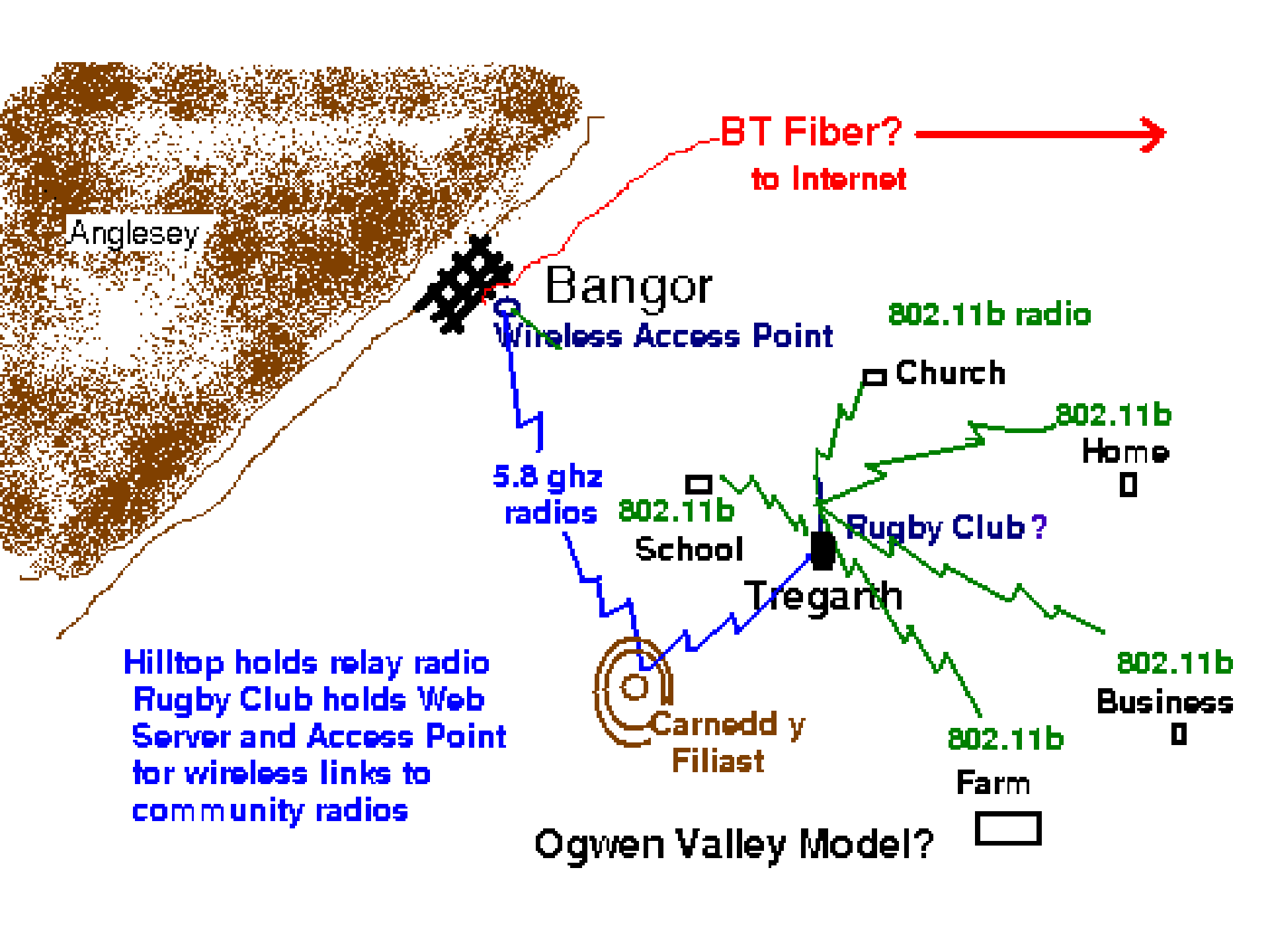
- Work from Anywhere (incl home) part, full time
- Use Computer as one 'Means of Production'
- Use Wireless/Net as a 'Means for Distribution'
- Start, Sustain, SMALL low capital enterprises
- Work smarter – get answers via net
- Work 'virtually' – cut lost travel time
- Market Globally, from smallest farm/shop/home
- Increase Productivity of Large Companies
- ' Knowledge' as the Strategic National Resource

Supports Community where there are 'Community' Web Servers

- Place locals can 'meet,' dialogue digitally
- Place of local identity and pride – history in maps, pictures, voices, text, music!
- Permits cross-community dialogue
- 'Anyone' can put up personal web site
- Local Server as Teleport to the world
- Place of local debate on local issues
- The local Server as Digital 'Commons'

Connected Welsh Community – Schematic Model





What Will it Take?

- Strong Wireless commitment from Assembly and more ACTION, less talk by its government officials
- Support for building local, wirelessly connected, ISPs in EVERY community across Wales. There are about 600.
- Training support for would-be ISPs/End Users
- Get UK Government/Parliament to require BT to permit/enable local wired/fiber INTERCONNECTION to local nets. CAPITALIZE ON INSTALLED DARK FIBER!
- Open up Spectrum Use Rules, permit more radio power in Rural than Urban! Make rules support public (people) connectivity, not just corporate, government, the big.
- EDUCATE, ENCOURAGE, SUPPORT the Public to get connected wirelessly at lowest cost, highest bandwidth!

600 e-fro Councils!

- 600 Local 'Virtual Electronic Community' action Councils across Wales. 'fro' old Welsh for 'Community'
- Each representing/taking leadership within an average 3 mile (radius) of small towns and surrounding trade areas, or cohesive neighborhoods of larger cities.
- Comfortably within range of central 802.11b Severs, Access Points
- E-fro Council owns, builds, manages, community networks to the upstream point of interconnect with BT dark fiber, ADSL, cable, whatever...

Ways Government Can Help

- Encourage, help educate, the people
- Educate Government Agencies and Departments
- Seed-money fund e-fro start up Councils
- Support technical and net use training
- Review, update laws and rules
- Analyze, publicize successful Digital Economy enterprises, small as well as big
- Educate the skeptical Press
- Help develop foreign e-markets
- Use the Technology yourselves!
- Don't be part of the problem!

An Online Guide for Wireless ISPs

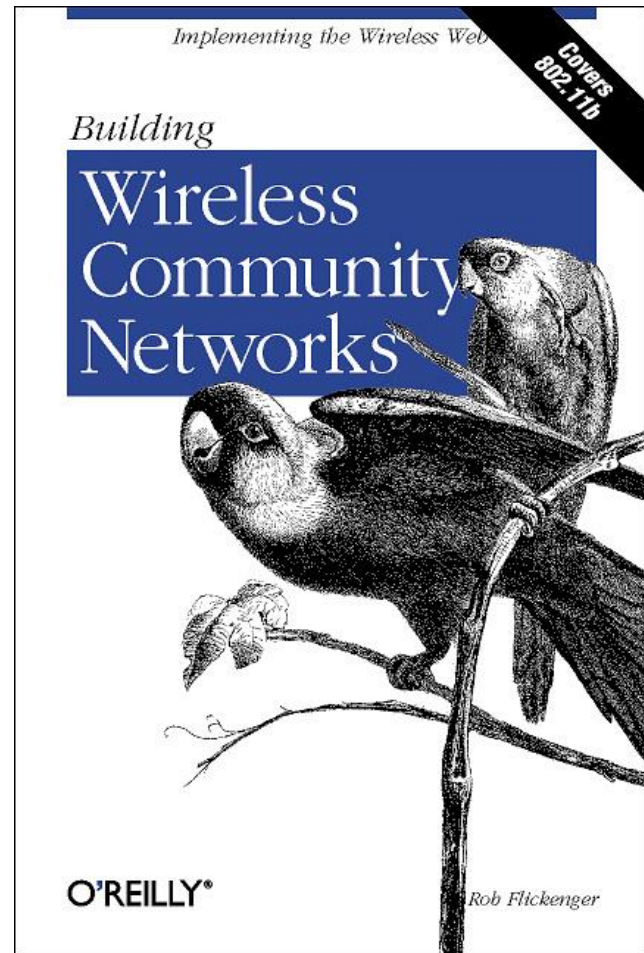
- Here is a complete online guide for Wireless ISP wanna-be's! (URL)

[isp-](#)

planet.com/resources/isp_guide/index.html

The Best Paper Book

- Building Wireless Community Networks
- By Rob Flickenger
- November 2001
- ISBN 0-596-00204-1, 125 pages, \$24.95
- order@oreilly.com
- 1-800-998-9938
- <http://www.oreilly.com>



For more information
**Old Colorado City
Communications**

(Who has been telecommunicating
for 25 years, practicing what I here
preach)

NSF Wireless Field Tests

<http://wireless.oldcolo.com>

Dave Hughes

dave@oldcolo.com

Wireless is the Way
JUST DO IT, WALES!

**Dafydd, the Wireless American
Warrior, Hughes – who cares about the
future of his ancestral lands**