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04/05/2016

Who are we ?

Portugal

Portal | Chat | Wiki | Forum | Bugtracker | Podcast | Meshmap | Firmware | Downloads | Português

Who are we?

Wirelesspt.net is a mesh network project in which all routers and or routing devices that are added to it, will automatically communicate between themselves in a similar fashion how the Internet works, creating this way and identical system like the Internet but without cables or wires. This kind of network concept allows us to create a network and expand it every time we activate another router nearby.

Aside it's very low cost of development and implementation, another advantage of this type of network is that it cannot be completely shutdown since no one controls all routers or access points and there is no central control point.

The router or routing device used is exactly the same type of router that we can obtain in any regular computer store in which we will a very specific type of software/firmware developed by the wirelesspt.net and known as mvwrt. This software will make the router automatically detect the rest of the nearby mesh network, add itself to it while simultaneously help expanding it.

The more routers the network has the wider will be it's coverage. Some of these routers can be or will be connected to the Internet as desired and this way all wirelesspt.net users will also have Internet access.

How does it work?

Wirelesspt.net is a mesh network development project that is not dependent of central infrastructure, corporation or entity which is done by the ordinary citizen with the aim to provide free, open and democratic access to the highways of information technologies for it's users at any given time or situation through the share of technological resources within it's community, helping people and organizations implementing wireless networks that will benefit their communities.

The project also invests in investigating free, open source, digital, information and telecommunication technologies as well as to promote, educate and supply technological information to teach and educate it's surrounding social environment about the importance of online privacy and security.

How to participate?

Join us and become a member, participant or collaborator!

Register in our forum and use the international section, enter our chartroom, read our wiki or visit our social network pages to know more about what you will need to get your router working in mesh mode. Is there anyone else around you that wants to start or join a mesh ? If not, you can be the first one with the opportunity to manage and administer it. In time, others will follow you. Click here to know more and use the provided translation functionality for the documentation.

Objectives, mission and vision

Objectives:

- Create & develop mesh networks
- Built by the ordinary citizen
- Independent of central infrastructure or entity
- Provide free, open and democratic access to the highways of information technologies
- Investigating free, open source, digital, information and telecommunication technologies
- Establish connectivity to other places, regions and countries

Mission:

- Helping people and organizations implementing wireless networks that will benefit their communities
- Promote, educate and supply technological information to teach and educate it's surrounding social environment about the importance of online privacy, security and democracy

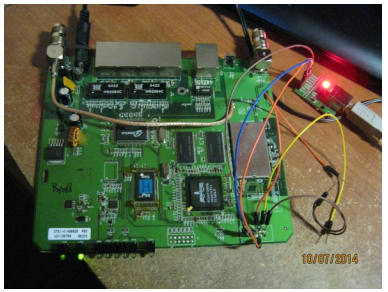
Vision:

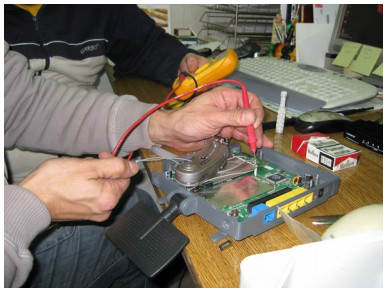
- Unify all Portuguese wireless networks
- Be the largest Portuguese independent, free and open wireless mesh network built by it´s users and for it´s users

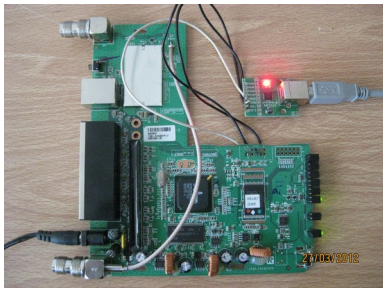
- http://wirelesspt.net/wiki/Objectivos_wirelesspt

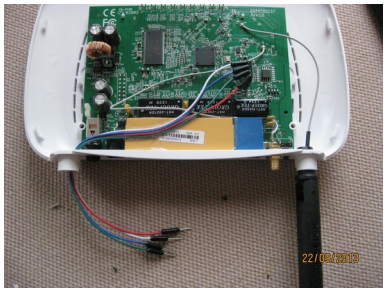
How, where and with what ?

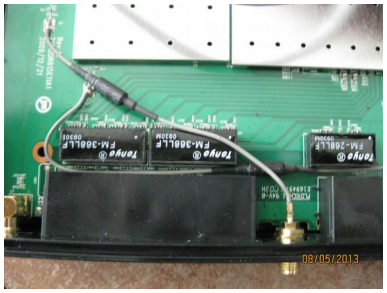
Big things often have small beginnings

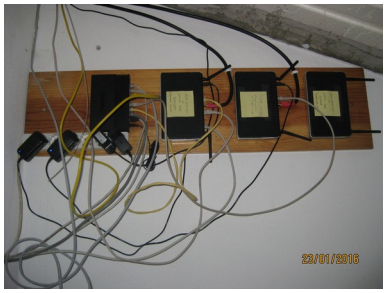



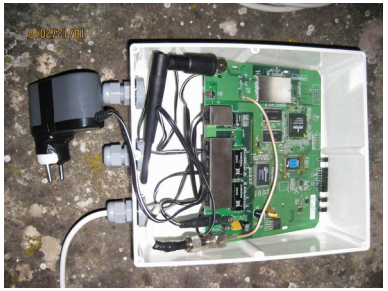
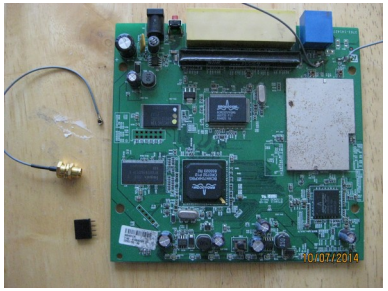






2.4 & 5 ghz off the shelf consumer wireless routers [0]

Back to basics: DIY (2008)

Against all odds: How WirelessPT.net started ...

Needs:

- Once upon a time in 2008...
- Outside the small town
- To communicate with family
- House surveillance system
- Self sufficient and uninterruptible
- Independent and off the grid
- Better infrastructure than existent
- Cheap & affordable method
- Smart house remote control system

Problems:

- Current infrastructure was limited
- How ? If i am not on location ...
- Family not computer savvy
- Not possible at the moment
- Current ISP service had fails
- Not possible at the moment
- Dependent of bad ISP service
- Low bandwidth and high costs
- No clue where to start

How about a new network ?

Joining an existent project and try ...

Year 2008-2009:

- Someone talks about about a wireless network
- Built by the user free and open
- Cheap, independent, self sufficient
- Town meets OLSR mesh network [1]

January 2009:

- Visit the town and let's join ...

Hardware I used:

- Buffalo WHR-G54S [2]
- 15 dBi omni antenna [2]
- Freifunk 1.6.37 PT Firmware [3]

First results ? How is it working ?

Old existing O.L.S.R network attempt

Year 2009:

- January I leave the town

Initial O.L.S.R results:

- Slow service & broken links
- Difficult access in most places

Infrastructure:

- Two routers per access point [4]
- ~150/200 € avg each access point [5]

Hardware:

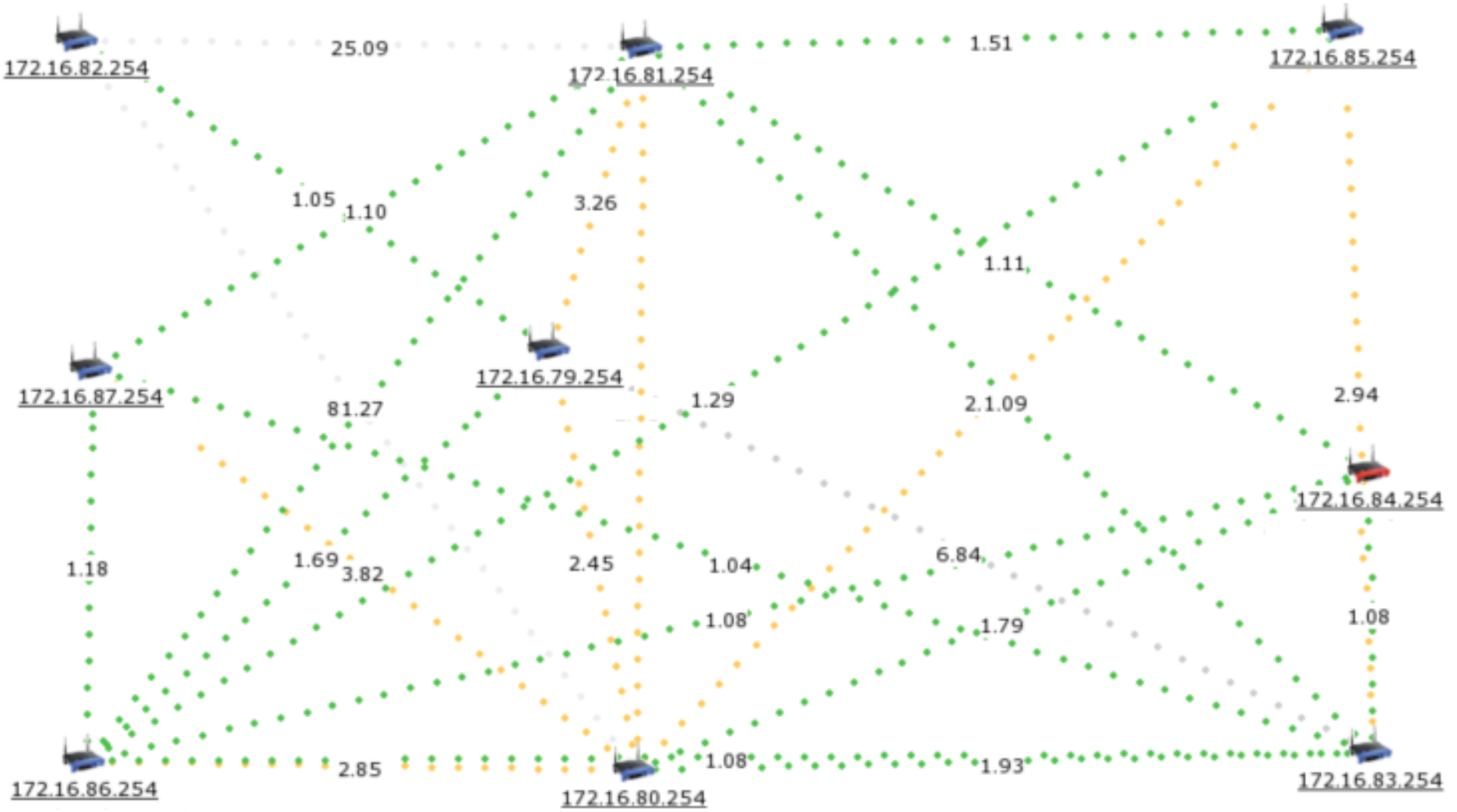
- Fonera, Buffalo, Asus (54g) [6]
- Low quality 9 dBi antennas

Administration:

- February, router passwords changed and users prevented to access their hardware and administration features
- No documentation, made available to the network users.
- Complaints from tech savvy users [7]
- Blocked downloads and only 2 weak working Internet gateways
- Low bandwidth avg. <3 mbit and no communication result in clash with the o.l.s.r network administrator
- Users left in the dark. Bad planning Network slowly degrades service
- Network & users are abandoned

December 2010, unimos network last nodes end cease to work

O.L.S.R network Map



Failed unimos.net network implementation

2011 (January): A new hope

December 2010:

- New project gets ready to reveal itself after months of work in the background. [8]
- Documentation, method, transparency & information are ready for the user

Year 2011. I return to town:

- 2 years of plans. 3 weeks to build it

Obstacles found:

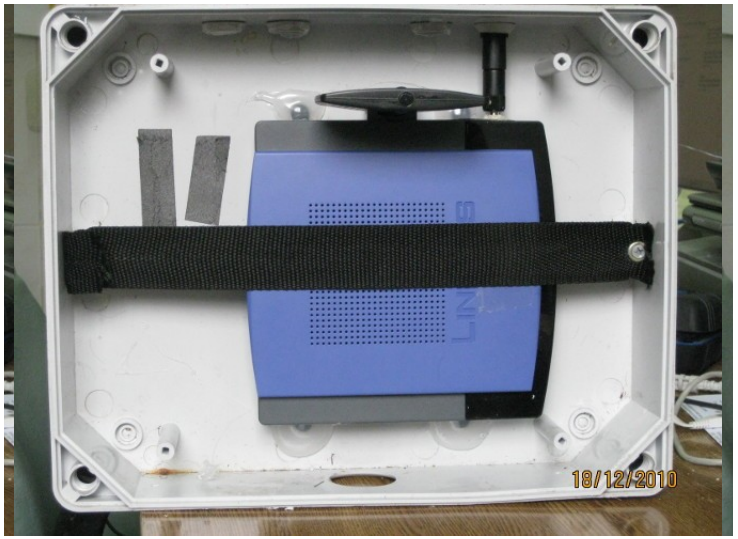
- No local tech savvy users to help
- Blocked router firmware. No login
- Population displeased with mesh networking, service and usability

More problems found:

- Broken & damaged hardware due to bad access point construction [9]
- No one wanted to spend another cent in this kind of project
- Remaining variety of routers did not facilitate to uniform and standardize the network
- Existent type of firmware was not enough user friendly for the users
- Running out of time to study possibilities, firmware usage, administration.
- Remote physical work is impossible

January 2011 WirelessPT.net starts with 9 access points [10]

Phase 1: 2011 - Hardware used



Old hardware was gradually replaced by linksys wrt54g* routers

2011-2012: WirelessPT.net survives phase 1

What was used ?

- DD-WRT firmware [11]
- Old & new omni antennas 9~15dBi

Topology:

- W.D.S routing [12]
- 5 AP/Server stations controlling the network

Hardware used:

- Mostly Linksys WRT54G

Administration team:

- 1 sysadmin, 1 electrician & 1 public relations person [13]

Results:

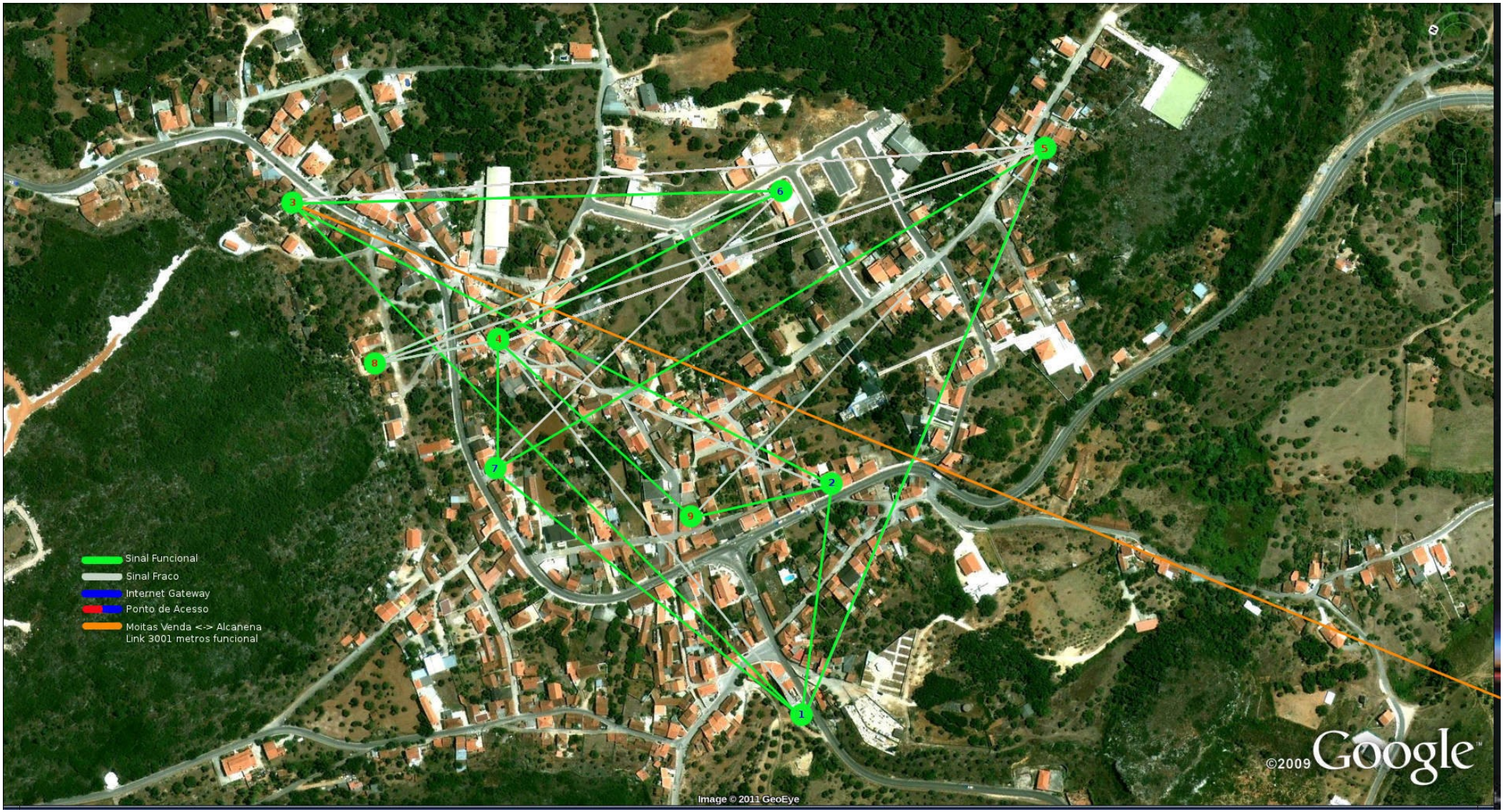
- Usable and stable
- Average bandwidth: 5 ~ 10 mbit
- Accidental 3km link provides 1 mbit [14]
- 9 Nodes. 5 Internet gateways
- Non tech savvy user friendly firmware

Problems:

- Limited routing protocol
- Firmware problems that required local physical work
- Some occasional loss of remote administration & hardware crashes

Phase 2: Ready for production

2011-2012: Wirelesspt.net WDS network



Longest link: 3 Km = 1mbit – Omni 15dBi to Laptop USB pen [14]

2013 (January): New hardware & custom firmware

What was done:

- 1 year planning
- 3 weeks to deploy
- New website, better forum & wiki
- More access points join the mesh
- Stable social media growth [15]
- Improved communication, information and documentation with and for the community users
- 14 nodes total. 5 internet gateways
- Some donations begin happen [16]
- Implemented controlled user access

Mesh changes:

- New hardware used/replaced [17]
- Birth the wireless AP KIT [18]
- Organizing the wireless spectrum [19]

  by assigning channels to everyone

Hardware:

- Single N band HT20, TP-Link & D-Link [20]
- Better omni antennas & 1st 24 dBi grid

Firmware:

- Own firmware: mvwrt (WRT based) [21]
- Batman-adv routing protocol [22]

Phase 2: 2013 results exceed projected results

2013: WirelessPT.net AP kit

TP-Link/D-Link: 300N + 9 dBi omni antenna = 50~70€ [18]

2013: WirelessPT.net MvWRT firmware Batman-adv Mesh

14 nodes. Link bandwidth: 10 ~ 20 mbit [23]

2013: WirelessPT.net status

Firmware:

- MvWRT 2013 *(test version)* [23]
- Higher stability and reliability
- Better throughput and bandwidth

Links:

- Shortest with 90m
- Longest with 650m

Hardware:

- 5 x 15 dBi & 9 x 8 dBi omni antennas

Bandwidth:

- 9 mbit to 19 mbit

Link length: 90m ~ 650m

2014 (January): New & stable MvWRT firmware

What was done:

- 1 year planning. 3 weeks to deploy

Firmware:

- MvWRT 2014 [24]
- Plug & play [25]
- Zero conf & self managed [25]

Node count increases:

- Community, project & nodes grow
- 18 nodes total. 5 internet gateways

Hardware:

- Replacing TP-link by D-Link 615 [26]

Phase 3 starts: Testing new type of node

Testing New DIY Node: Active 2 years without human touch

Phase 3 in motion with mvwrt 2014

About: MvWRT firmware

Specific needs:

- Cheap ath9k single radio hardware
- Simple, basic & secure
- To fit in less than 3.5 MB
- Encrypted mesh with open AP
- Light routing proactive protocol
- Allow sustainable development
- Zero conf & self managed
- Fool proof and not easy to crash
- Improved with security mind
- Easy to maintain without humans

Solution found:

- D-Link dir 615 – (300N)
- Openwrt, routing protocol, ipv4/ipv6
- No GUI & dependencies stripped
- VAP setup & WAP/2 ad-hoc mesh
- Batman-Adv routing protocol [22]
- Compiled with minimal features
- Custom bash setup scripts
- Secure access only root/user login
- Hardened builds planed
- Build own firmware (MvWRT) [21]

Status development: Since 2013

MvWRT firmware auto gateway demo

Status development: Since 2013

Firmware MvWRT interface & access (ssh)


```
MvWRT help menu

Fast custom config:              fastconfig

Change name:                     hostname
Change ip:                       ipchange
Change ssid:                     ap-ssid
Email setup:                     email-setup
Bat-adv setup:                   batinfo
Batman-adv:                      batctl
Reload ddns:                     ddns-reload
Ddns check:                      ddns-check
AP search:                       ap-scan
AP sniffer:                      ap-sniff
Free RAM:                        free-ram
Routing:                         route
Startup log:                     dmesg
System log:                      logread
Hardware info:                   sysinfo
Speed test:                      iperf
Mac interfaces:                  interfaces
Wireless interfaces:             iwinfo
Firmware update:                 firmware
Network L2 & L3 hosts:           hosts
Spectrum analyser:               monitor
Kernel wireless status           kernel
IP calculator:                   ipcalc.sh
DHCP clients:                    dhcp
Mesh clients:                    mesh-ap
Network activity:                wireless
Auto gateway:                    auto-gw-mode
Manual gateway:                  manual-gw-mode
Check gateway access:            wan-check
Firmware information:            version

Support at: http://forum.wirelesspt.net
Help at: http://wirelesspt.net/wiki/mvwrt2015
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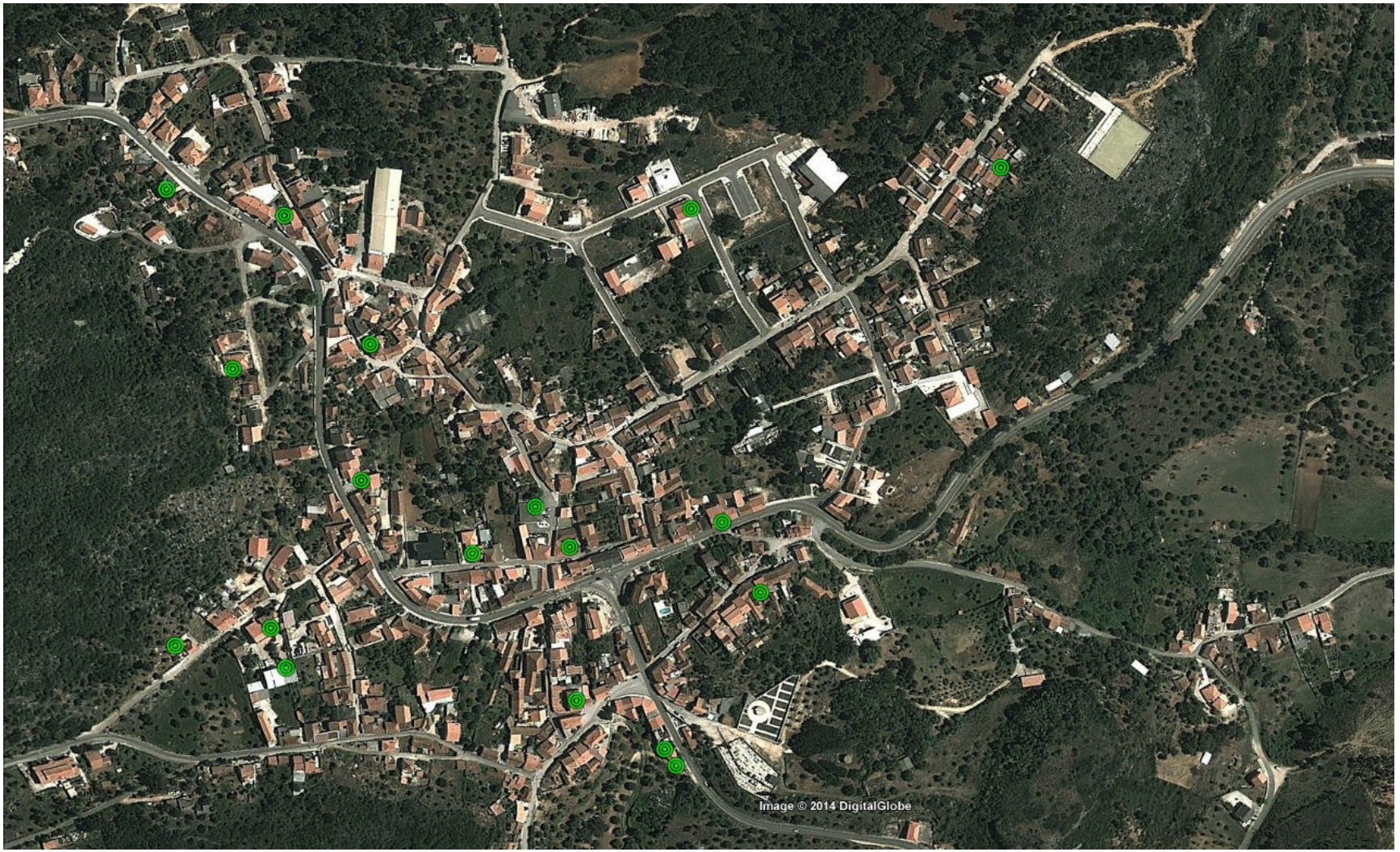
http://wirelesspt.net/wiki/mvwrt

2014-2016: WirelessPT.net MvWRT FW Batman-adv Mesh



18-20 nodes. Link bandwidth: 14 ~ 36 mbit [27]

WirelessPT.net 5 years later







2.4 & 5 ghz off the shelf consumer wireless routers [28]

2016: Expanding links outside the local mesh [29]

Hardware currently used

Routers:

- D-Link dir 615 C1 (preferred)

  (Replacing versions: E3/E4)
- D-Link dir 601A

  (Replacing by 615 C1)
- TP-Link WR 703n

  (For solar power tests)
- TP-Link WDR 3600 (Dual band)
- Ubiquity Nanostation M5 (Testing)

Depreciated 2.4 ghz routers:

- Linksys (broadcom), Generic TP-Link

Outdoor antennas in use:

- 15 dBi omnidirectional
- 9 dBi omnidirectional
- 24 dBi grid
- 14 dBi planar
- Parabolic 2.4 ghz wireless feeder

Indoor modded antennas:

- 9 dBi omnidirectional
- 12 dBi omnidirectional

Replacements to do:

- Omnidirectional antennas by sectorial

How to find us online ?

Social media presence

- ***Youtube:*** https://youtube.com/wirelesspt
- ***Twitter:*** https://twitter.com/wirelesspt
- ***Facebook:*** https://facebook.com/wirelesspt
- ***Pinterest:*** https://pinterest.com/wirelesspt
- ***Github:*** https://github.com/wirelesspt
- ***Redit:*** https://reddit.com/user/wirelesspt

Links and info next

Resource information

1. http://wirelesspt.net/wiki
2. http://wirelesspt.net/forum/viewtopic.php?f=7&t=45&sid=6b312c9a28e117e4f8b71a403ab2faf6
3. https://youtube.com/watch?v=MTr0ihcWPAE
4. http://wirelesspt.net/forum/viewtopic.php?f=23&t=548&sid=b1209379eff04ea08bab067bdabd7ce9
5. http://wirelesspt.net/forum/viewtopic.php?f=7&t=61&sid=387fadab8d07a2304136505192fec7f3
6. http://wirelesspt.net/forum/viewtopic.php?f=7&t=592&sid=a0483ac7ce154109312c55b17e543502
7. http://wirelesspt.net/forum/viewtopic.php?f=32&t=209&sid=28e7993729f98a3039ec1544884c2474
8. http://wirelesspt.net
9. http://wirelesspt.net/forum/viewtopic.php?f=7&t=538&sid=afb6f95b6a694657242c0c6e6dc98d29
10. http://wirelesspt.net/wiki/images/5/59/Wireless.moitasvenda.net.jpg
11. http://wirelesspt.net/wiki/Openwrt_vs_ddwrt
12. http://wirelesspt.net/wiki/wds
13. http://wirelesspt.net/wiki/Contactos_wirelesspt
14. http://wirelesspt.net/forum/viewtopic.php?f=23&t=607&sid=6b312c9a28e117e4f8b71a403ab2faf6
15. http://wirelesspt.net/wiki/Wirelesspt_meetup

Links and info

Resource information

16. http://wirelesspt.net/wiki/donativos

17. http://wirelesspt.net/forum/viewtopic.php?f=7&t=486&sid=90a7735d727c1322b378ecd1d36dcd84

18. http://wirelesspt.net/wiki/Kit_wirelesspt

19 http://wirelesspt.net/forum/viewtopic.php?f=23&t=570&sid=90a7735d727c1322b378ecd1d36dcd84

20. http://wirelesspt.net/forum/viewtopic.php?f=7&t=718&sid=90a7735d727c1322b378ecd1d36dcd84

21. http://wirelesspt.net/wiki/mvwrt

22. http://wirelesspt.net/wiki/Batman-adv

23. http://wirelesspt.net/wiki/Moitas_Venda#2013

24. http://wirelesspt.net/wiki/mvwrt2014

25. http://www.youtube.com/watch?v=NzK4bnYRGXg

26. http://wirelesspt.net/wiki/dlink

27. http://wirelesspt.net/wiki/Moitas_Venda#2014

28. http://wirelesspt.net/wiki/Custos_e_equipamento_para_rede

29. http://youtube.com/watch?v=yKAbbX2dY58

Thank you Battlemesh v9

WIRELESS BATTLE OF THE MESH v9 PORTO

1st -7th May 2016 @FEUP, Porto, Portugal

http://battlemesh.org

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