"Henri Poincaré"
Group of Complex Systems
University of Havana

Mesh network assay in Havana
An OLSR network implementation

http://www.complexperiments.net

- Introduction
- Site Survey
- Fresnel Zone Clerance
- Meshing versus Manages/AP
- OLSR (freinfunk) on WRT
- Frequency allocation OLSR, routing tables
- Clients

C. Noda, J. Fernández, C. Pérez, and E. Altshuler

"Henri Poincaré: Group of Complex Systems
Physics Faculty, University of Havana

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Introduction

- Faculty moving to other buildings in Campus
  Need to create connectivity among team members' PCs at home
  To be realized on TIGHT budget

- Campus Internet channel overloaded during the day
  but much better during the night. We better live around the clock!

- Asses issues like throughput, latency, scalability using OLSR

- Create resourses to work remotely: VPN, comon file storage,
  chat/voice/ video, wiki.


200 m
Node on Building window
~20 m asl
Node on roof
~35 m asl
Node on Building window
~60 m asl
Node on roof
~50 m asl
Node on roof
<10 m asl
Node on roof
~10 m asl
N
W
E
S
© 2006 Europa Technologies
Image © 2006 DigitalGlobe
©2005 Google
Pointer 23°07'49.36" N 82°23'24.75" W elev 133 ft
Streaming 100%
Eye alt 14043 ft


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Campus
Node on roof
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Lab
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Node on roof
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© 2006 Europa Technologies
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Pointer 23°07'20.77" N 82°22'17.47" W elev 37 ft
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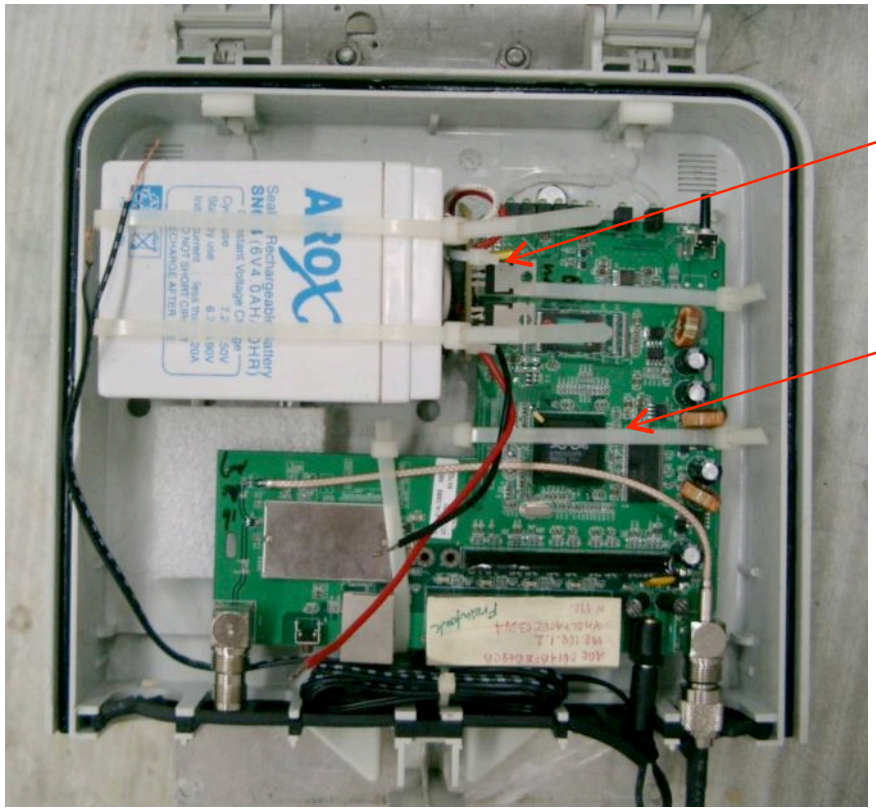


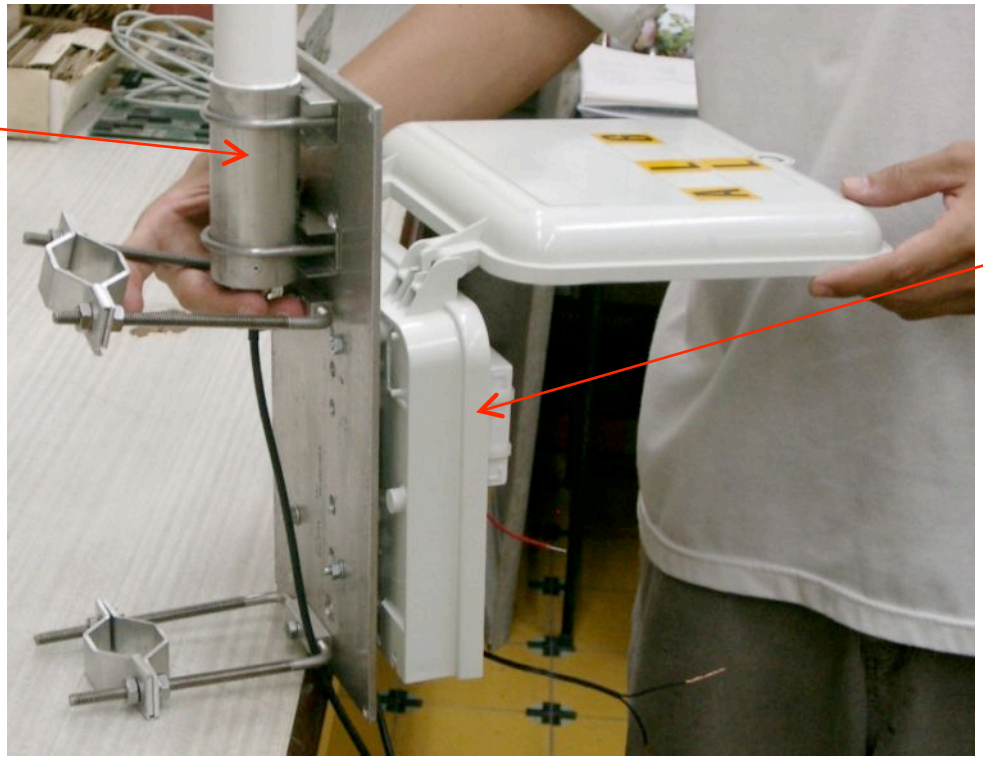
Battery Pack
6V-4Ah Lead-Acid w/
Smart Battery Monitor
1-Wire DS2438

WRT54GL

Mesh network assay in Havana
First OLSR Node in Town

Battery equiped WRT Mesh Node

Antenna
12 dBi Omni



PSTN
Connexion Box

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Sealed Biquad for Mesh Node

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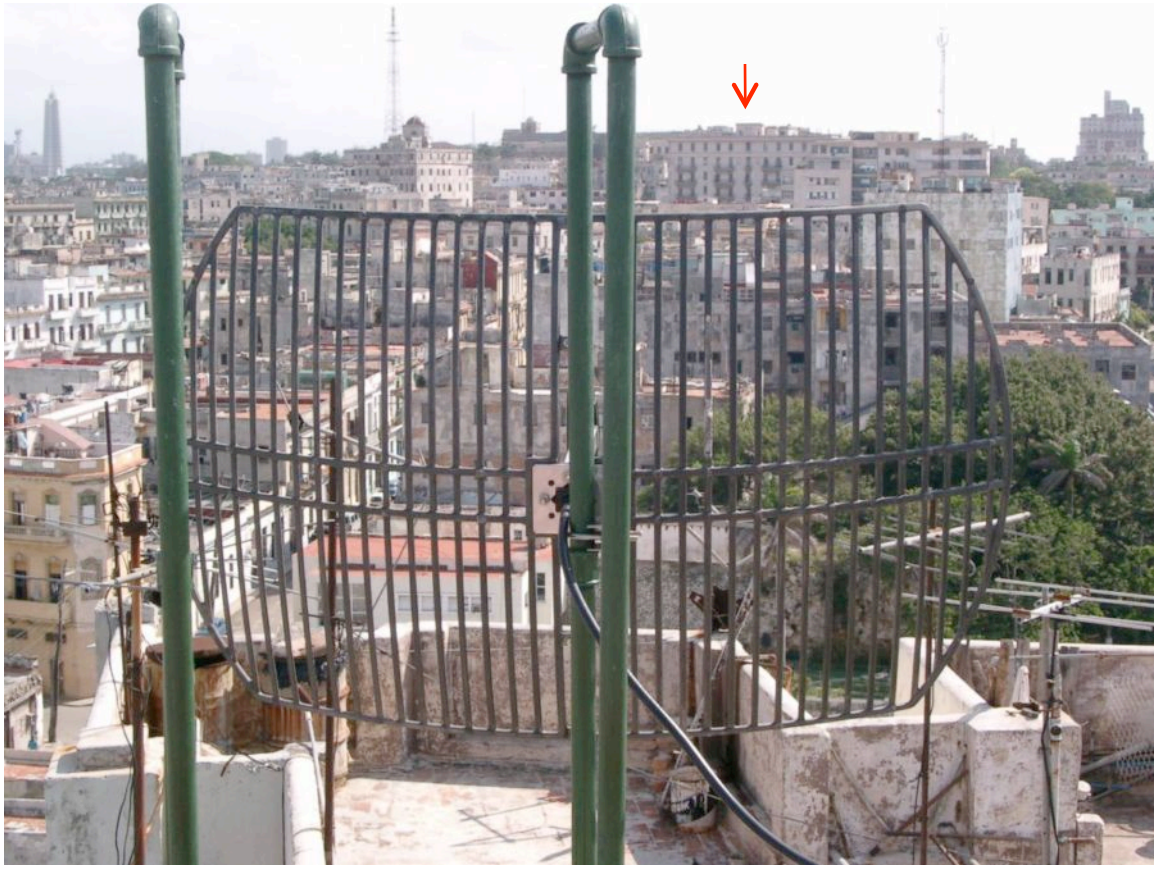

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Frequency Allocation for Meshing

Might become very challenging in electromagnetically poluted environments

Lesson1: the more directional antena should be collocated higher, omni's at lower height, as possible.

We found the following busy channels along the extension of the network: 11, 6, 8 and 1 [in order of intensity].

We could choose channel 4 or 5 for our network

Signal levels as per freifunk firmware (v 1.2.5)

Claro-Campus Link (1Km)

channel 11 : omni side (wrt ant A) -80 dBm signal, noise **-99dBm**
parabolic side (wrt ant B) -84 dBm signal, noise -98dBm

---- couple of hours later ---

channel 11: omni side (wrt ant A) -82 dBm signal, noise **-83dBm**
parabolic side (wrt ant B) -84 dBm signal, noise -98dBm

Let's switch channel:

channel 4: omni side (wrt ant A) -75 dBm signal, noise -93dBm
parabolic side (wrt ant B) -80 dBm signal, noise -96dBm

Now hopefully stable for couple of weeks.
oh well until another network is installed somewhere.

Two network solution, each on an available channel. Two WRT bridged

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Meshing versus Manages/AP

Network configuration

OLSR IP distribution

Network Latency

Sharing resources

HAN4 gateways

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Conclusions

Meshing can potentially reduce cost at the expense of bandwith

Interference avoidance and channel allocation can turns challenging

Using high gain Omnis exacerbates the above

Meshing solutions will continue to evolve,
Protocols will become smarter and there will be a standard soon.
802.11s ~ 2008.

Maintenace efforts are shared by node owners, provided some literacy exist among users.