GARNET Workshop Wireless Lab

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Preparation

Each group has all or at least some of these:

- Ubiquiti Bullets
- Ubiquiti Nanostation2
- Linksys WRT54GL
- Nanostation loco m5
- Nanobridge M5
- 48v passive DC injector/splitters
- 18v 1A power supplies
- rpsma male to n-female adapters
- rsma male to n male adapters
- 2.4GHz airview spectrum analyzers.

Steps

In all exercises, remember to

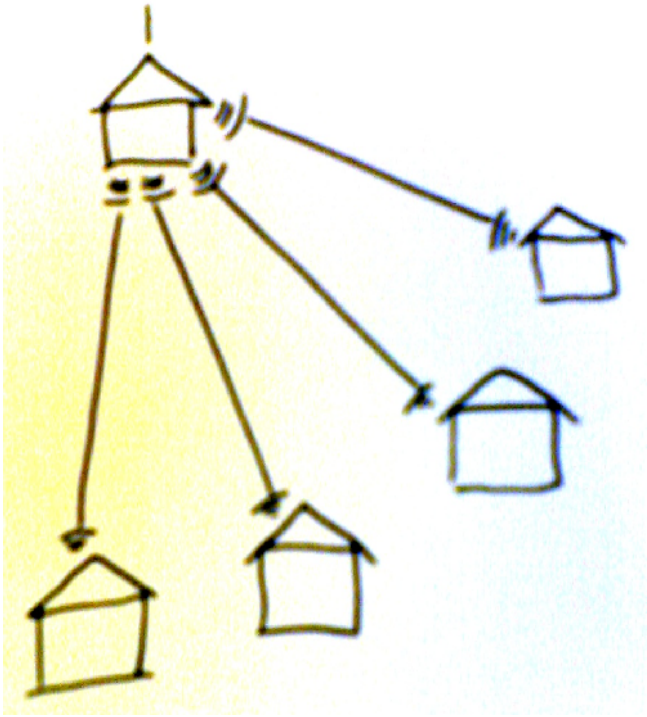
- Plan and make decisions together with your neighbours! Wireless is all about coexistence!
- Document each and every step in written form! Make device sheets and network diagrams
- When making planning and hardware choices, explain your choice
- Always fill out one config sheet for each device (see form in this document!

1. Five villages/departments

Task

Five villages or departments to be connected to one central location – e.g. an ISP, a NOC, a central building.

Computers in the villages connected by cable to the wireless device in the village.



Suggestions/Hints:

- Group 1 takes the role of central ISP/uplink and creates an Access Point. The other groups connect to this central access point.

- Make a site survey (Suggestion: AirView or APs or Laptops with Kismet/Netstumbler) and communicate with the other groups about your coexistence in frequency space!
  We will have up to 15-20 wireless devices operating in the 2.4 Ghz band in total – so we better cooperate!

- Considerations:
  - IP/network planning
  - Choice of frequencies, SSIDs, security, roaming, ...
  - Bridging/Routing?
  - DHCP? NAT?
- Build the network and connect all your PCs/laptops wired through this new infrastructure.

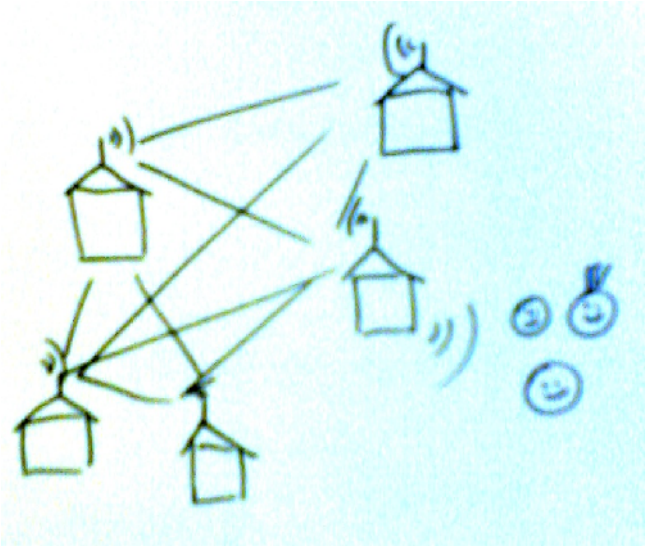
2. Distributing access in the villages

Task

- Now that we have connectivity in all villages, we build local hotspots / access points.
- Again, go through steps above – now with even more need to cooperate!
- Consider separation between backbone and access networks.

3. Village Mesh

Task



- Keeping the local hotspots, we change the infrastructure between the villages to a Mesh Network.

Suggestions/Hints

On either Linksys or Ubiquiti, we will be using OLSR.

The easiest way to start a mesh is through Freifunk Firmware on Linksys WRT54GL,

http://download.berlin.freifunk.net/ipkg/

but any OpenWRT device may also be used.

- In OpenWRT, find out how to add software (through web GUI or command line opkg)
- Note: your device needs to be on the internet for that – but you also need to be able to connect to it over ethernet.
- Add olsrd-luci and additional software as needed.

Tips for Firmware / Flashing

Some of what we are doing here will require us to flash routers.

- Take either WRT54GL, Nanostation or Bullet and find the appropriate OpenWRT firmware for it (hint: http://downloads.openwrt.org/kamikaze/8.09.2/)
- Discuss which version of the firmware you need! Look at chipsets!
- In the existing devices web interface, find the "upgrade firmware" function. If none exists, flash using tftp.
- Upgrade firmware
- try to manually flash the device back to its original firmware, or alternatively, another firmware. Keyword: tftp.

4. Build a captive portal

Note: while we suggest using Coova as a low cost Captive Portal, support for Ubiquiti devices is not fully in place yet – it was aimed at Linksys WRT54GL in the beginning.

At this point in time (March 2010), you have 3 options:

3.3.1 build it into AirOS via SDK - see: http://coova.org/node/3685 – or use a readymade AirOS with Coova binary.

since we dont have time, we use the binary:
https://www.coova.net/Controllers/UbiquitiAirOS

3.3.2 flash OpenWRT onto the Ubiquiti, add Coova to OpenWRT - see:

http://dev.coova.org/svn/coova-ap/packages/

http://sourceforge.net/apps/trac/hotcakes/wiki/yfi_setup_nas_PicoStation2

3.3.3 use open-mesh / ROBIN firmware -

see:

http://dev.open-mesh.comhttps://www.coova.net/Controllers/UbiquitiAirOS

For this lab, we recommend the CoovaAP on WRT54GL or AirOS on Ubiquiti.

5. Ipv6 on low cost routers

Build a 6to4 gateway on OpenWRT – see separate guide for instructions.

6. Wireless Planning with RadioMobile

Appendix: Wireless Device Config Sheet *WRT54 type*

Device		
Model & Hardware Version		
Serial number		
MAC address(es)		
Firmware (type, version)		
Node type e.g. AP, Bridge, Client, Mesh node, ...		
Host Name		
WLAN - Wireless		
WLAN - IP address		
WLAN - netmask		
ESSID		
BSSID		
Channel/Frequency		
Other wireless settings		
WAN		
WAN IP		
WAN netmask		
WAN gateway		
DNS		
LAN IP settings (if any)		
Antenna(s)		
Location / Lat Long, GPS		
Device History		
Comments		
Contact		

Appendix: Wireless Device Config Sheet / *Ubiquiti type*

Device		
Model & Hardware Version		
Serial number		
MAC address(es)		
Firmware (type, version)		
Node type e.g. AP, Bridge, Client, Mesh node, ...		
Wireless interface(s)		
IP address(es)		
netmask		
ESSID		
BSSID		
Channel/Frequency		
Other wireless settings		
LAN / wired		
IP		
netmask		
gateway		
DNS		
Antenna(s)		
Location / Lat Long, GPS		
Device History		
Comments		
Contact		