



Praktikum RouterLab SS 2009 Work Sheet 6: Mesh your home network

The main topic in this worksheet is to set up a Linksys wireless router and have it working within a wireless mesh network with OLSR routing. Each group of you received a Linksys WRT54-GL home router to work with. We will refer to it as WRT also in your upcoming assignments. There is not support from us for loading and storing your configurations, so take care about that.

In this worksheet you will install an open, Linux based firmware on your WRT, configure it and perform some tests. We will use *Freifunk OpenWRT*, Version 'FF 1.6.36 and White Russian 0.9'.

You can find more information about those at [http://wiki.freifunk.net/Freifunk_Firmware_\(English\)](http://wiki.freifunk.net/Freifunk_Firmware_(English)) and <http://wirelessafrika.meraka.org.za/wiki/index.php/HowTos> respectively.

Question 1: (40 Points) *Install Freifunk mesh firmware*

Each WRT runs the default Linksys Firmware with IP=192.168.1.1 and DHCP=on. You need to change this firmware to the current Freifunk OpenWRT version, that you have to download before connecting to the WRT box. Therefore direct your browser to the web server: http://download.berlin.freifunk.net/ipkg/_g+gl/ and download the image `openwrt-g-freifunk-1.6.36-en.bin`. Connect a LAN cable from your laptop to one of the four LAN ports on the back of the WRT. Open the web-interface of your WRT <http://192.168.1.1> and after login go to “Firmware Upgrade” and upload the Freifunk image file. (default credentials login=root password=admin) **The flashing process takes at least 5 minutes, do not switch off power!**

Redirect your browser to `192.168.1.1` after the power LED of the WRT stopped flashing and you should see the Freifunk web interface. If you are not able to load the Freifunk config page, just reboot your router once by switching the power on and off.

- Under “Admin - Password” change the default root password.
- Configure the following settings to establish a wireless connection between your WRT and the one on the teacher’s desk in room TEL 103. All settings are adjustable under the Admin tab and need to be confirmed with the “Apply” button, followed by a final normal reboot after you have set everything up like in the table below.
- SSH into your WRT box. What is the IP of the default gateway on the teacher’s desk? How did you get this information? From you laptop, use a web browser and go to the following web page of the default gateway: <http://??.??.?/?/cgi-bin-dev-zero.bin>. What is the maximum download speed?

Admin submenu	Parameter	Value
System	hostname	whatever you want
Wireless	WLAN Protocol	static
	WLAN-IP Address / netmask	10.10.10.X /8 (where X =group no)
	WLAN Mode	Ad Hoc
	ESSID	routerlab.tu-berlin.de
	BSSID	02:ca:ff:ee:ba:be
	Channel	1
	Card Type	802.11 b/g
	RX & TX Antenna	Antenna B
	Tx power	35
	Radio Mode	G Mode Performance
	Broadcast SSID	Enable
	Multicast Rate	6 Mbit/sec
	CTS Protection Mode	Disabled
LAN	LAN Protocol	static
	LAN IP / netmask	192.168.1.X / 24 (where X=group no)
	default / static routes	leave it empty
	NAT / Firewall	not disabled

Question 2: (30 Points) *Analyze the wireless environment*

- (a) The OLSR radio scanning tool we want to use is called “HORST”. To install additional software on your WRT, the package manager “IPKG” is used. Get a bit familiar with this tool from a SSH session. The Horst package needs two additional packages installed in the right order. All these 3 packages are on the web server of the gateway node. So use the IP of the gateway, that you have determined in the previous question. Within a SSH session type:

1. `ipkginstallhttp://?.??.?/horst/libpcap_0.9.4-1_mipsel.ipk`
2. `ipkginstallhttp://?.??.?/horst/libncurses_5.2_mipsel.ipk`
3. `ipkginstallhttp://?.??.?/horst/horst_2.0-rc1_mipsel.ipk`

Start the HORST tool and give the SSID of all networks you are able to monitor. What is the used airtime of your node?

- (b) How would you describe the impact of the beacon packets and what are they for?

Question 3: (30 Points) OLSR: Open Link State Routing

- (a) Install `tcpdump` on your WRT via “`ipkg install http://?.??.?/horst/freifunk-tcpdump_2007.03.26-1_mipsel.ikg`”. Run `tcpdump` and analyze the OLSR specific packets. What is a Hello and a TC message? What is the Hello and the TC interval of our gateway ?
- (b) Find out from theory: What are the pros and cons about the OLSR protocol and give a short summary. Are there any other wireless mesh routing protocols, used in practice?

Submission details: read the FAQ

http://www.net.t-labs.tu-berlin.de/teaching/ss09/RL_labcourse/faq.shtml

Submit the following:

- The answers to the questions and outputs of the `tcpdump`, screenshot of the horst tool, the routing table of OLSR.

Due Date: June 12th, 2009, 8:00am