# Overview

## Goals

Configure a Raspberry Pi to use a Wi-Fi connection. You will work as pairs on a single Linksys WRT54GL router. One of your Pis will be used to configure the router. Both of your Pis will be set up to wirelessly access your router. A workstation may also be connected to the routers network.

## Equipment Required

* Raspberry Pi Model B or B+ or Pi 2 Model B
  + Raspbian SD card
* Rosewill 802.11 b/g/n Wireless Adapter
  + You may use your own Wi-Fi, but you are on your own
    - Document in your lab report what was different if you did.
* Powered USB Hub
* Monitor
* Keyboard
* Mouse
* Various cables

# Wireless

## Setup

### Raspberry Pi

* Both Pis
  + Set up the Pi with the Raspbian Linux.
    - Make sure the Pi uses DHCP
  + Start the GUI interface: startx
  + Start a browser (Midori)

### Router

Set up the Linksys router:

* Get a WRT54GL router
  + L is the best but WRTs will work
* Connect the Lab Network to the Internet port on the router
* Connect the Pis to one of the switch ports on the router
  + You may optionally attach one or both of your workstations
  + Use DHCP on the workstations for now
* Reset the router to factory defaults

## Investigate the router and Pi environment

With both Pis (you should get the same results on both Pis):

* Browse 192.168.1.1
  + Userid: leave blank
  + Password: *admin*
* Check and document\*\*
  + Router
    - name
    - Internet IP address
    - Router (switch side) IP address
  + Pi’s IP address
    - Note: here the Pis should get different addresses

## Change router

This step will be done by one of the Pis. Using one of the Pis browsers browse 192.168.1.1 and use the userid and password as above. Make the following changes:

* Under Setup
  + Basic Setup
    - Change the router name to *your initials+router*
    - Set time zone to *Eastern*
    - Save changes
  + MAC Address Clone
    - Optional
      * Change the routers Internet MAC address and verify it from the Lab network side
* Under Wireless
  + Basic Wireless Settings
    - Change SSID to *your last name+ssid*
    - Change channel used
      * Make its numeric value approx your Workstation ID /2
        + This will lessen the collisions with other routers in the lab
        + Must be in the range 1-11
    - Save changes
  + Wireless Security  
    From Security Mode select:
    - WPA2 Personal
      * *TKIP+AES*
      * Key: *abc123*
      * Save settings
        + Note a weak key gives a error message\*\*
      * Key :*ThisIsAStrongerKey*
        + Case is important here!
      * Save settings
  + Advanced Wireless Settings
    - Authentication: TBD in a future lab
      * Bonus to implement and document this lab
* Administration  
  We are going to enable remote management (from the Internet or WAN side). First, try to simply click enable and note the error message. Read the message and follow its instructions.
  + Optional unsafe password suggestion: *initials+pw*
  + Don't forget to save!
    - Note: you will need the original PW to change. Sometimes you will get an error screen. If so, refresh the browser.

## Setup both Pis for wireless

Do an *ifconfig*, note the output, then plug the Rosewill wireless adapter into a powered USB hub connected to the Pi[[1]](#footnote-1). Rerun *ifconfig* and note the change. What is added? What is missing from the new entry?

### DMESG

Investigate what *dmesg* does. Wikipedia has a good article.

Execute the following command:

dmesg | grep usb

You may want to pipe the output. Look for a line that gives a hint for the type of wireless usb device attached. Document the relevant messages in dmesg\*\*.

Following is the procedure to install a driver if the driver is not already in the system:

To look for a driver for the wireless device:

apt-cache search realtek

You should get a driver listed.

To install the driver:

sudo apt-get install firmware-realtek

Next check to see if the device is working:

sudo iwlist scan | less

Scan the listing for your ssid and check that the channel was set.

Now it is time to configure the wireless.

* Run ifconfig and iwconfig and note the results\*\*.
* Check the interfaces file to see if it has a wpa connection on the wireless
  + If necessary add:
    - auto wlan0  
      iface wlan0 inet dhcp  
      wpa-conf /etc/wpa.conf
* Edit the */etc/wpa\_supplicant/wpa\_supplicant.conf* with an editor of your choice:
  + Add the following:
    - network={  
       ssid=”your ssid”  
       key\_mgmt=WPA-PSK  
       psk=”thisisastrongerkey”  
      }
  + Notes:
    - Spaces are important. Don't add any extra in the above example.
    - Replace your ssid with your *ssid* you entered for your router earlier
    - The psk key is deliberately wrong this time (lower case)
* Restart wireless:
  + sudo ifdown wlan0
  + sudo ifup wlan0
  + Note if the wireless comes up. What error do you notice?
* Fix the key in *wpa.conf* and restart the interface
  + Note the messages restarting *wlan0* this time
  + Recheck if the wireless is working with ifconfig and iwconfig
    - It may take 2 or more minutes before an IP address is assigned
    - Document above results\*\*

Last, shutdown both Pis, then remove the power and Ethernet cable from both. Then restart both Pis by reapplying the power.

* Note where the wireless starts, if you can see it.
  + Do not restart the GUI yet.
* Run *ifconfig* and *iwconfig* again and report the results.
  + You should have a *wlan0* entry on both with a valid IP address.
* Start the GUI open a browser and check the current status of the router
  + Network address
  + Is a DNS assigned to the router?

Note the Pis are now wirelessly connected to your router. Try pinging each other and report the results. If you have a workstation attached you should be able to ping it also. Try pinging the router, both the internal port (switch side) and the Internet side.

Try pinging the lab servers, by both their IP addresses and domain name. Does it work? Investigate why it does or does not work.

1. The Pi typically does not have enough power to drive a WiFi Adapter so a powered USB hub should be used to ensure stability. [↑](#footnote-ref-1)