Setting up the AP-Client link

1. Boot the Cisco AP. Ensure that your laptop/PC is booted in Linux, and that you are logged on as the root user.
2. Ensure that the eth0 interface of your laptop/PC is up, and configured with the correct IP address. Command: `ifconfig eth0`
3. Open a browser (mozilla) on your laptop/PC and connect to your Cisco AP's configuration interface through <u>http://a.b.c.d/</u> where `a.b.c.d` is your AP's IP address.
4. Configure your Cisco AP with an SSID, as given in configuration slip. You have to use the configuration interface through the web browser (click on "Setup" followed by "Hardware" under "Network ports" and "Root radio").
5. Make sure that your wireless client card driver is loaded. Type `iwconfig`. You should observe `wlan0` on laptops, and `eth1` on PCs.
6. Configure the IP address of the wireless interface.
   Command: `ifconfig <dev> <ip-addr> netmask 255.255.128.0`
   where `dev` is `wlan0` on laptops and `eth1` on PCs, and ip-addr is as given in your configuration sheet.
7. Make sure that your wireless client is in managed mode. Command:
   `iwconfig <dev>`
   If needed, you can change the mode of your client by typing:
   `iwconfig <dev> mode managed`
8. Configure your client card with the same SSID as your AP. Command:
   `iwconfig <dev> essid <your-APs-essid>`
9. Now bring down your ethernet interface by either physically plugging out the ethernet wire, or by typing `ifconfig eth0 down`
10. You can change the default route to be through your wireless card:
   `route add default gw 172.28.1.254 dev <your-dev>`
11. Test the wireless link by typing `ping <APs-ip-addr>`
12. You can also try downloading a website, say `http://www.iitk.ac.in`

Observing the wireless parameters

1. Type `iwconfig <dev>` to find out the set of wireless parameters. In particular, note down: the essid, mode, frequency, the AP's ethernet address, the bit-rate, the received signal level, and the noise level.
2. Verify that the AP's ethernet address as given in the bottom of your AP matches what you find through the iwconfig command.

Changing the channel of operation

1. Using the web interface in the Cisco AP, change its channel of operation. Use any of the channels 1 to 11. This is also under the same configuration page as the SSID you set earlier.
2. Observe using iwconfig that your client's channel also changes.

Observing other APs

1. You should be able to observe the APs which other groups by using:

```
iwlist <dev> scan
```
2. You should be able to see the SSIDs `group01` to `group12`. Note down their channels of operation, their SSIDs, and the received signal strength from each. Do you see any other APs when you scan? Note down their details also.

Measuring the throughput of the AP-Client link

1. Change the channel of operation of your AP to your working channel, as per your configuration sheet.
2. Ensure using `iwconfig` that your client is still associated to your AP.
3. An iperf server is running the IP address given in your configuration sheet.
4. Run the iperf client on your laptop/PC and measure the achived throughput: `iperf -c <iperf-server-IP-addr>`
5. Note down the observed throughput

Changing the rate of operation

1. Change the rate of operation of the Cisco AP to 5.5Mbps. You can do this by choosing `basic` for 5.5Mbps, and `no` for every other option. This is in the same configuration page as the SSID and the channel.
2. Observe that the bit-rate has changed using: `iwconfig` or using `iwlist <dev> scan`.
3. Now repeat the above throughput measurement.
4. Repeat the measurement by changing the rate of operation to 2Mbps, and then 1Mbps.

Changing the transmit power

1. Change the transmit power in the Cisco AP, in the same configuration page as the SSID and the channel. Observe the change in received power using the `iwconfig` command. Also observe the same using `iwlist <dev> scan`.