

## Network I Lab 05

### Extending LAN using wireless Ethernet

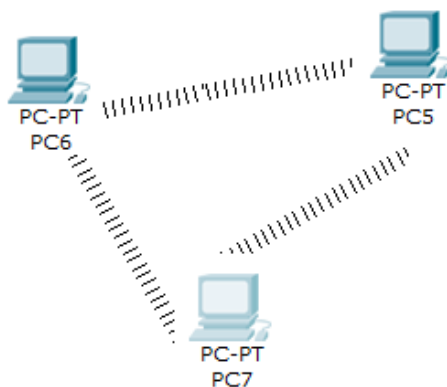
#### Introduction

Devices in a wireless network are set up to either communicate indirectly through a central place — an access point — or directly, one to the other. The first is called "Infrastructure Mode" and the other is called "Ad Hoc" mode (it's also called peer-to-peer). You may select either for your wireless network, however all devices communicating directly with each other must use the same mode. I.e, if you work in a business with an existing wireless network, the choice is already made for you.

Here are key differences between the modes.

- Because Ad Hoc Mode does not require an access point, it's easier to set up, especially in a small or temporary network.
- Infrastructure takes advantage of the high power of an access point to cover wide areas. Ad Hoc Mode connections are limited, for example between two laptops, to the power available in the laptops.
- Because the network layout (the network topology) in Ad Hoc Mode changes regularly, system resources are taken just to maintain connectivity.
- As the Ad Hoc topology changes, throughput and range will change, sometimes in unanticipated ways. New users will have an easier time learning wireless strengths and weaknesses with Infrastructure Mode.
- In an Ad Hoc network with many computers, the amount of interference for all computers will go up, since each is trying to use the same frequency channel.
- In Ad Hoc Mode, chains of computers will connect to pass your data, if your computer is not directly in range. On the other hand, you do not have control over the path your data takes. The automatic configuration routines may send your data through several computers, causing significant network delays.

#### Part1: Ad hoc wireless network



### IP Address Allocation

You need to allocate the IP address to each computer that involves in this ad-hoc wireless network. If you have 3 computers, you can simply assign 192.168.0.1, 192.168.0.2 and 192.168.0.3 to each computer with netmask 255.255.255.0. Check how to set IP here if you are not too sure.

Note: If you have Internet Connection Sharing enabled on host computer, you can just set each client computer to obtain an IP address automatically, then these computers should be able to access Internet.

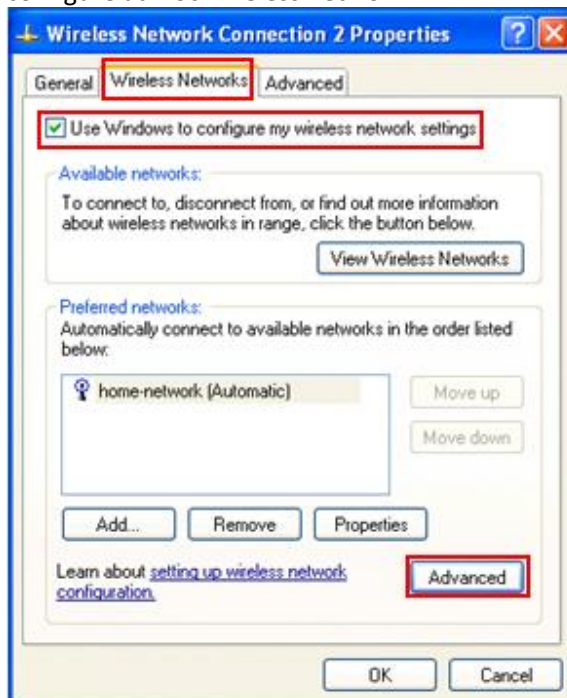
### Host Computer Configuration

1) Let's start with the configuration, here I will choose one computer to start the configuration, right click wireless adapter and then click properties.

Note: Please enable this host computer's ad hoc configuration on ICS host computer if you want to use Microsoft's Internet Connection Sharing feature.

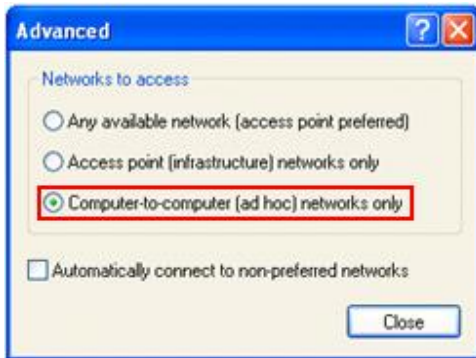
2) Wireless Network Connection Properties will appear. Click Wireless Networks tab, here I tick Use Windows to configure my wireless network settings. After that click Advanced button.

Note: You can also use the configuration tool provided by wireless adapter manufacturers to configure ad hoc wireless network.

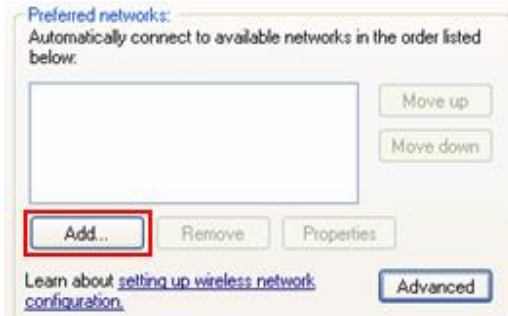


3) Advanced window will appear. Select Computer-to-computer (ad hoc) networks only option. Click Close at last.

Note: Don't tick Automatically connect to non-preferred networks in order to ease the configuration.



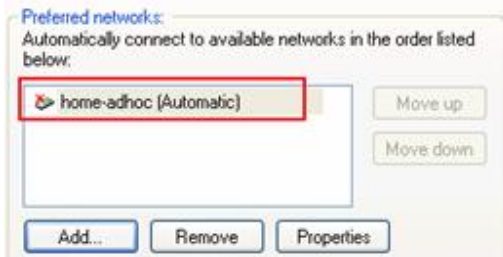
4) After that, click Add to add new ad hoc wireless network.



5) Name your ad hoc network, here I use home-adhoc. Try to use open authentication without encryption first. After tested it works well, only proceed to enable WPA or WEP encryption. Click OK at last.

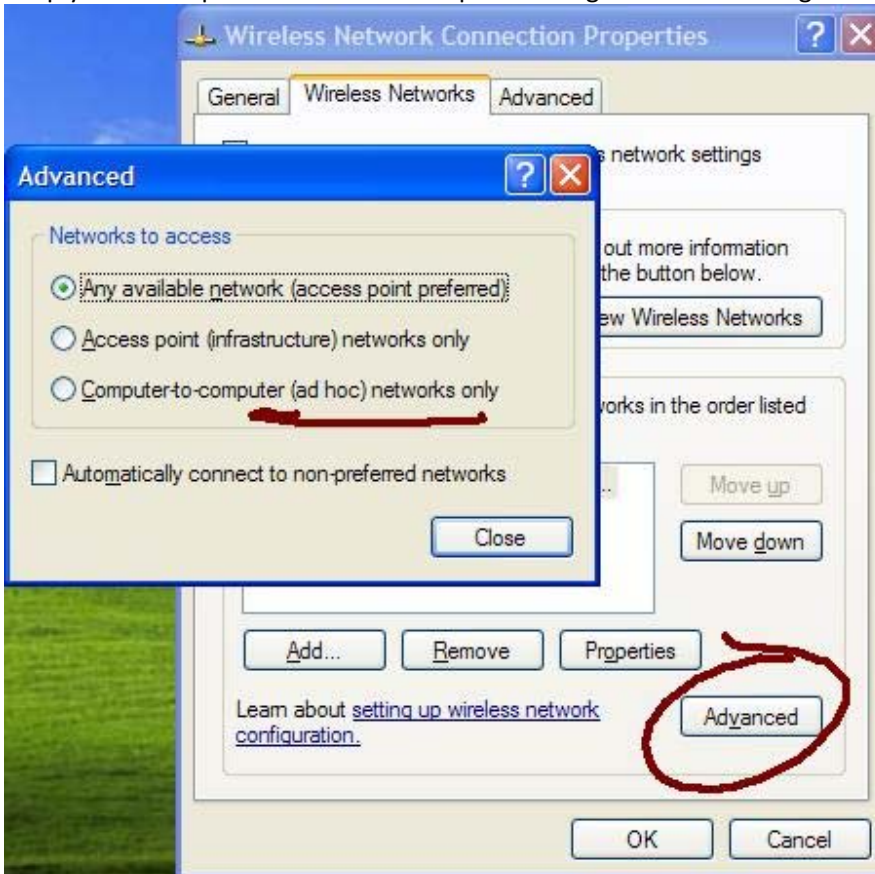


6) Now you will see your created ad hoc network (PC card icon) in preferred networks list. Woo.. You have finished configuring this host computer.

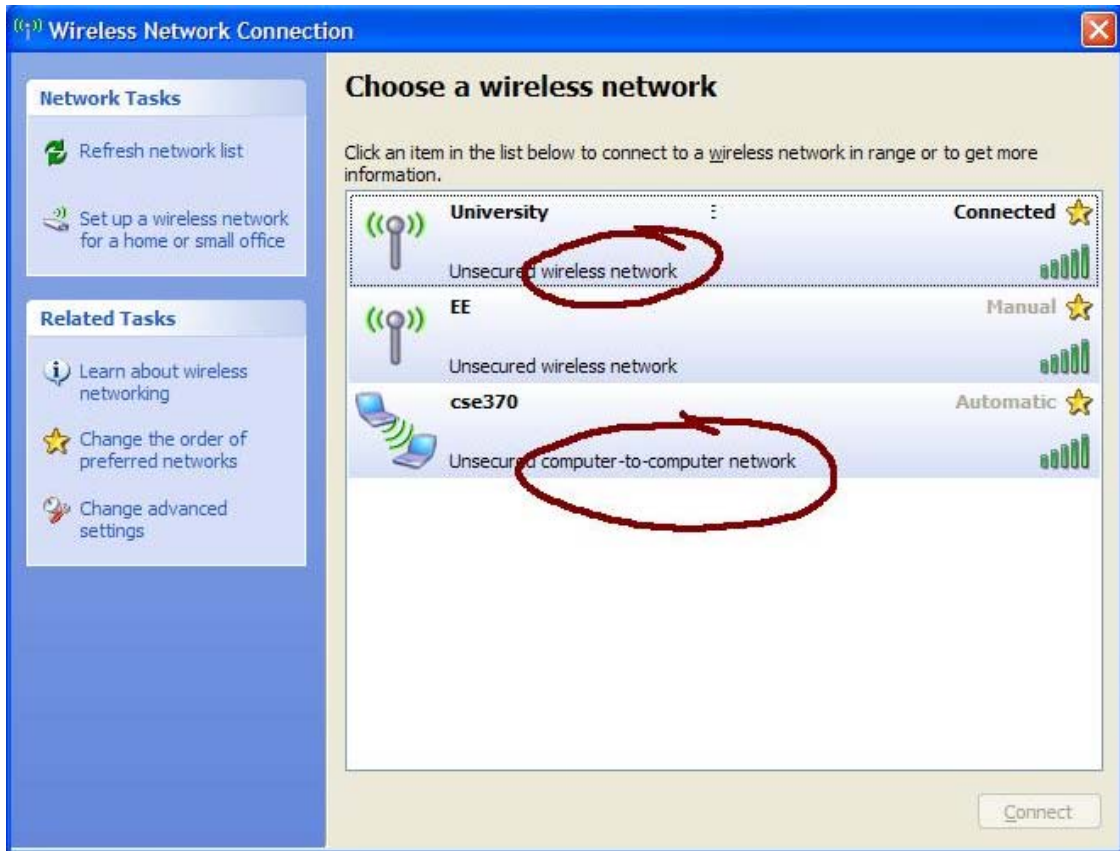


### Client Computer Configuration

1) On other client computers, you only need to set its wireless adapter to use Windows to configure its network settings and enable Computer-to-computer (ad-hoc) networks only. Simply follow step 2 and 3 on host computer configuration above to get it done.

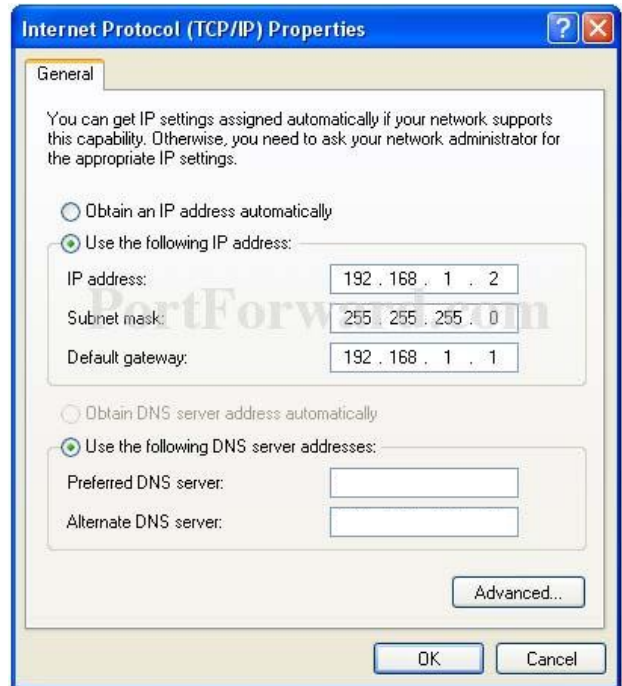
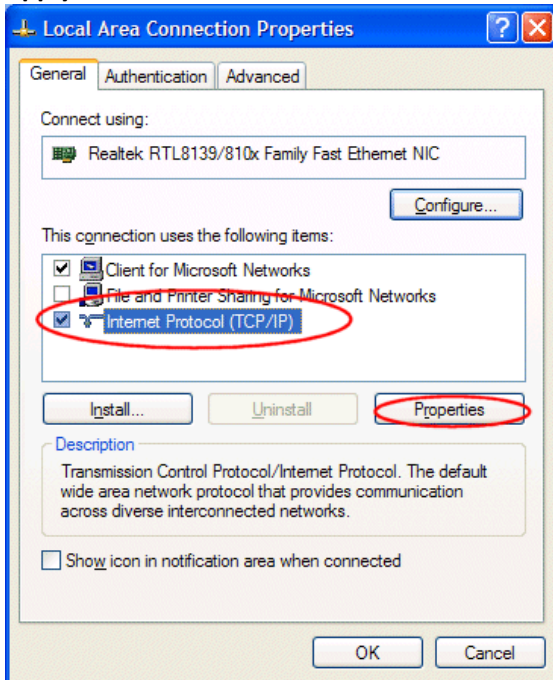


2) You then right click wireless adapter to view available wireless networks, you will see your ad hoc wireless network, proceed to connect to it. At this stage, you should be able to connect to this ad hoc wireless network!!!



Note: If you have Internet Connection Sharing enabled on host computer, you can just set each client computer to obtain an IP address automatically, then these computers should be able to access Internet.

### Apply static IP for PCs



Host PC

IP	192.168.0.1
mask	255.255.255.0

Client PC 1

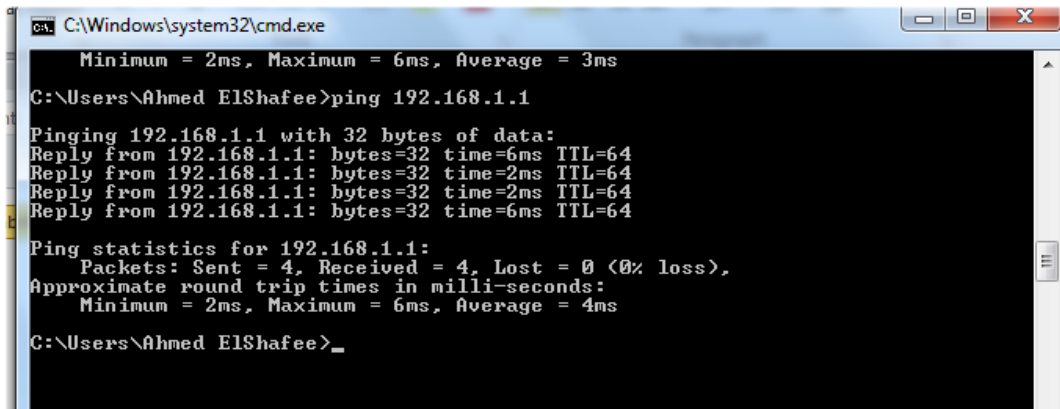
IP	192.168.0.2
Mask	255.255.255.0

Client PC 2

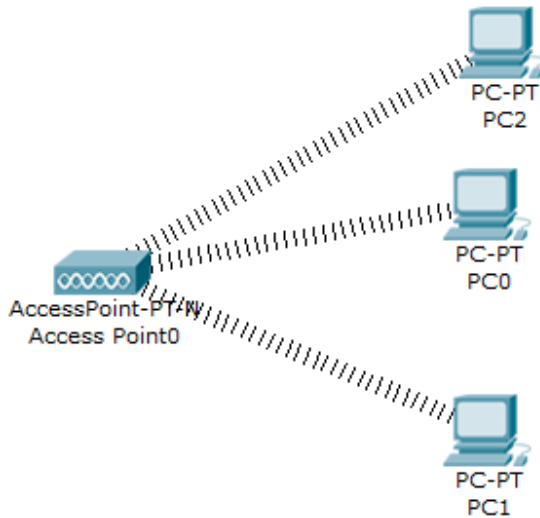
IP	192.168.0.3
mask	255.255.255.0

### Test Connectivity

Use ping command to test connectivity between host and clients PCS

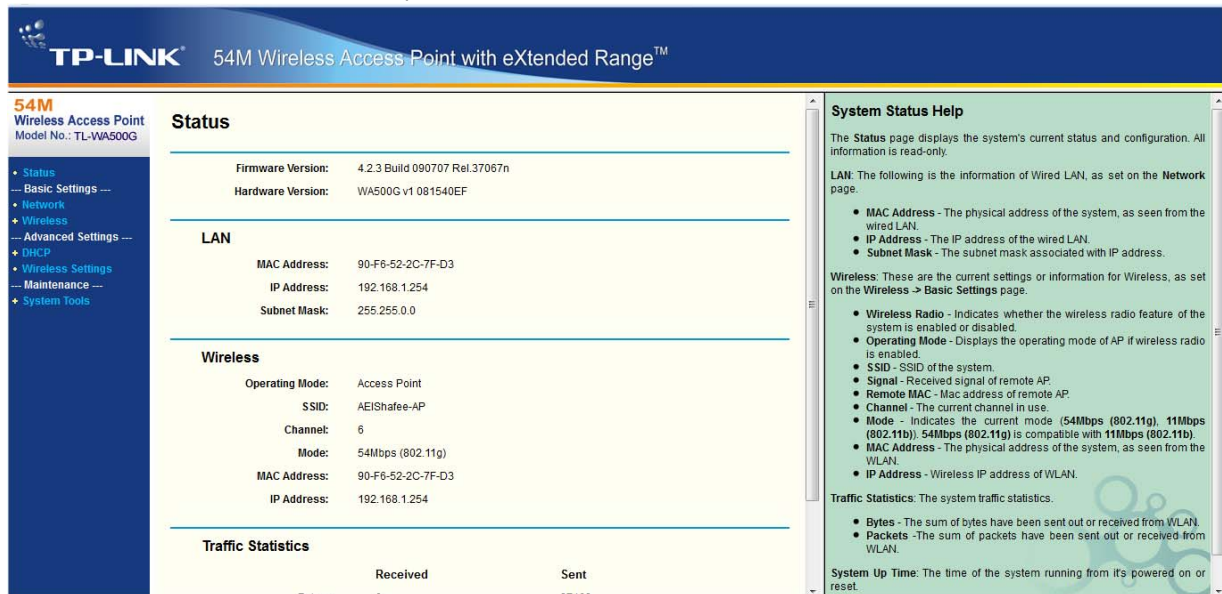


## Part2: Infrastructure Wireless Network



### Configuring Access point

1. restore default configuration of access point by pressing reset button till all leds in the access point front panel become off
2. connect access point to your PC using cross over cable
3. open access point configuration page on your web browser using it default IP address 192.168.1.254, username: admin, password: admin



The screenshot shows the web interface for a TP-LINK 54M Wireless Access Point. The page title is 'TP-LINK 54M Wireless Access Point with eXtended Range™'. The main content area is divided into several sections:

- Status:**
  - Firmware Version: 4.2.3 Build 090707 Rel.37067n
  - Hardware Version: WA500G v1 081540EF
- LAN:**
  - MAC Address: 90-F6-52-2C-7F-D3
  - IP Address: 192.168.1.254
  - Subnet Mask: 255.255.0.0
- Wireless:**
  - Operating Mode: Access Point
  - SSID: AEIshafee-AP
  - Channel: 6
  - Mode: 54Mbps (802.11g)
  - MAC Address: 90-F6-52-2C-7F-D3
  - IP Address: 192.168.1.254
- Traffic Statistics:**

	Received	Sent
Bytes	0	27182

On the right side, there is a 'System Status Help' section with the following information:

- System Status Help:** The Status page displays the system's current status and configuration. All information is read-only.
- LAN:** The following is the information of Wired LAN, as set on the Network page.
  - MAC Address - The physical address of the system, as seen from the wired LAN.
  - IP Address - The IP address of the wired LAN.
  - Subnet Mask - The subnet mask associated with IP address.
- Wireless:** These are the current settings or information for Wireless, as set on the Wireless -> Basic Settings page.
  - Wireless Radio - Indicates whether the wireless radio feature of the system is enabled or disabled.
  - Operating Mode - Displays the operating mode of AP if wireless radio is enabled.
  - SSID - SSID of the system.
  - Signal - Received signal of remote AP.
  - Remote MAC - Mac address of remote AP.
  - Channel - The current channel in use.
  - Mode - Indicates the current mode (54Mbps (802.11g), 11Mbps (802.11b), 54Mbps (802.11g) is compatible with 11Mbps (802.11b)).
  - MAC Address - The physical address of the system, as seen from the WLAN.
  - IP Address - Wireless IP address of WLAN.
- Traffic Statistics:** The system traffic statistics.
  - Bytes - The sum of bytes have been sent out or received from WLAN.
  - Packets - The sum of packets have been sent out or received from WLAN.
- System Up Time:** The time of the system running from it's powered on or reset.



4. go to wireless/basic settings page and update SSID, Region fields, press save

The screenshot shows the configuration page for a TP-LINK 54M Wireless Access Point. The page title is "54M Wireless Access Point with eXtended Range™". On the left, there is a navigation menu with "Wireless" expanded to show "Wireless Mode", "Security Settings", and "MAC Filtering". The main content area is titled "Wireless Settings" and contains the following fields:

- SSID: 1255-networklab
- Region: Egypt
- Warning: Ensure you select a correct country to conform local law. Incorrect settings may cause interference.
- Channel: 6
- Mode: 54Mbps (802.11g)

A "Save" button is located at the bottom of the form.

5. go to DHCP page update its field as shown, press save

The screenshot shows the configuration page for a TP-LINK 54M Wireless Access Point. The page title is "54M Wireless Access Point with eXtended Range™". On the left, there is a navigation menu with "DHCP" expanded to show "DHCP Settings", "DHCP Clients List", and "Address Reservation". The main content area is titled "DHCP Settings" and contains the following fields:

- DHCP Server:  Disable  Enable
- Start IP Address: 192.168.1.101
- End IP Address: 192.168.1.199
- Address Lease Time: 120 minutes (1~2880 minutes, the default value is 120)
- Default Gateway: 0.0.0.0 (optional)
- Default Domain: (optional)
- Primary DNS: 0.0.0.0 (optional)
- Secondary DNS: 0.0.0.0 (optional)

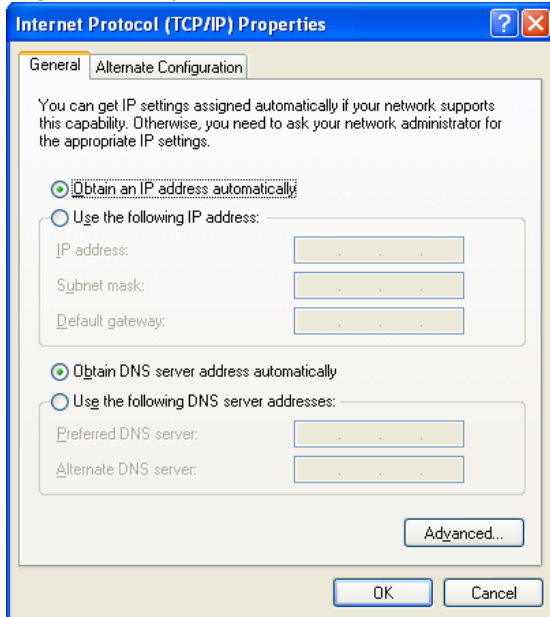
A "Save" button is located at the bottom of the form.

Now your access point is ready

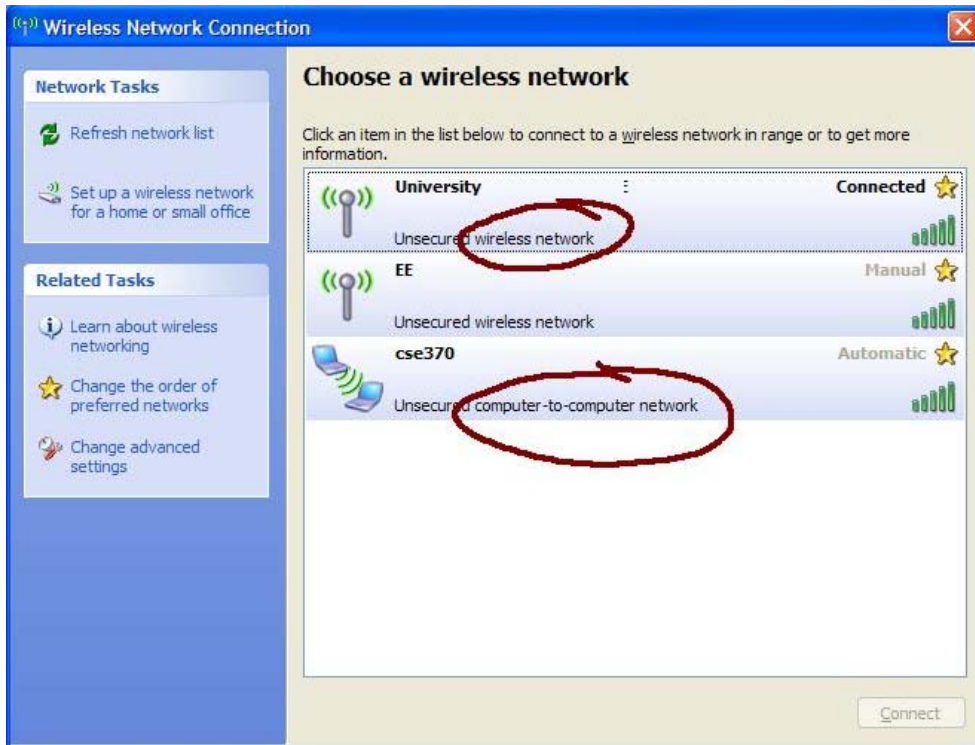


### Configuring client

1. go to client pc make sure wireless network connection/TCP/IP settings in automatic mode



2. Go to client PC brows the available wireless networks





3. get ip address of connected hosts using ipconfig command

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Ahmed ElShafee>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection* 20:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Ethernet adapter Bluetooth Network Connection 3:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

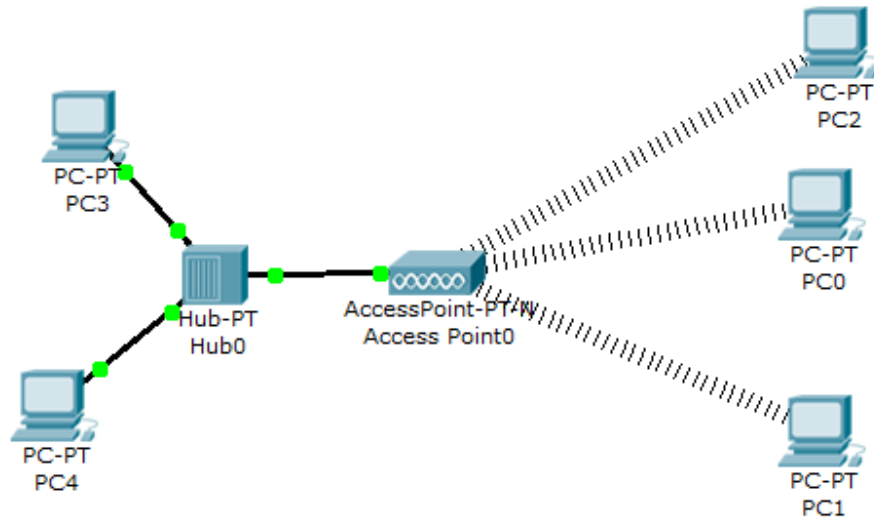
Wireless LAN adapter Wireless Network Connection:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::5d5d:1de3:52cc:6c29%15
    IPv4 Address. . . . . : 192.168.1.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Local Area Connection:
```

4. test connectivity between clients and access point using ping command

### Part3: Wired Ethernet and Wireless Ethernet Integration (Extended service set)



1. connect Access point to 8 ports hub using straight through cable
2. connect 2 PCs to hub using straight through cables too
3. make sure that the wired network connection tcp/ip configuration in automatic mode.
4. check IP of wired clients using ipconfig command
5. check connectivity between wired and wireless clients using ping command