Creating a simple Local Area Network (LAN) With a Switch and DHCP server

This exercise is group work. The group will create a simple Local Area Network for sharing resources, e.g. printer or storage. The following guide applies to Windows 7. Improvise if you have another OS or version.

Equipment

Linksys LRT224 Router
PC for each group member
UTP Patch Cable for each PC

1. Automatic IP address

Setup the connections

The Router has some additional features build-in. This makes it very useful for small networks. Some of these are; 4-port Switch, DHCP (Dynamic Host Configuration Protocol) server, NAT (Network Address Translation).

1. Connect the WAN port on the LRT224 to the Multilab network.
2. Switch off the wireless network in your PC.
3. Connect all PCs in the group to the Switch, using UTP Patch cables. The Switch ports are the ones with the numbers 1-4. It is not important in which order you plug them in, but notice if the corresponding light comes on when a PC is connected.
4. Check that the network icon in the status bar of your PC indicates that the network is ready.

Write down your IP address and Subnet Mask:_____

5. Test the network by pinging all computers in your group (one by one)
6. By use of the **ipconfig** command find the IP address for the *Default Gateway*.

Can you ping this host?_____

What is the Round trip time?_____

What is the value of TTL?_____

2. Switch only LAN

In the previous exercise, your PC got an IP address from a DHCP server, that is inside the LRT224 device. This server is neither a part of the Switch nor the Router, but an extra build-in feature that gives the device plug-n-play functionality.
Now you will investigate how to configure the LAN without this server.

Disable DHCP

On one of the PC's connected to the router, open a browser and type 192.168.1.1 in the URL.
A page similar to fig. 1 should appear.
Log-on with:
Username: admin
Password: admin

After login click the *configuration* fan, and in the menu to the left click DHCP.
In *DHCP mode*, select *Disable*.
Scroll to the bottom of the page and click *save*.
Close the Browser.

1. At the command prompt (on all PCs) write: ipconfig /release
   (to make your PC forget the IP address it had from previous steps)
2. Unplug all patch cables from the Switch
3. Switch off the wireless network adapter in your PC.
4. Connect all PCs in the group to the numbered ports on the Switch, using a UTP Patch cable. It is not important which number you use but notice if the light comes on when a PC is connected.

In the LRT224 user manual, lookup the meaning of these lights.

System:_____

DIAG:_____

1-4:_____

Which lights are on for your connection, and what colour?_____

_____

5. Since no DHCP server is present the PC's must either configure themselves using APIPA or you must configure them with static IP addresses. For now just wait until address negotiation is done. This could take a few minutes.

Write down your IP address and Subnet Mask:_____

6. Test the network by pinging all computers connected (one by one)
7. Next, configure one of the computers on the LAN with static IP addresse. Choose one in the range 172.16.1.10-172.16.1.99. Set the Subnet Mask to 255.255.0.0

Can you ping the other hosts?_____

Explain the reason?_____

8. Now, configure all the computers on the LAN with static IP addresses. Choose addresses in the range 172.16.1.10-172.16.1.99. Set the Subnet Mask to 255.255.0.0 on all computers.

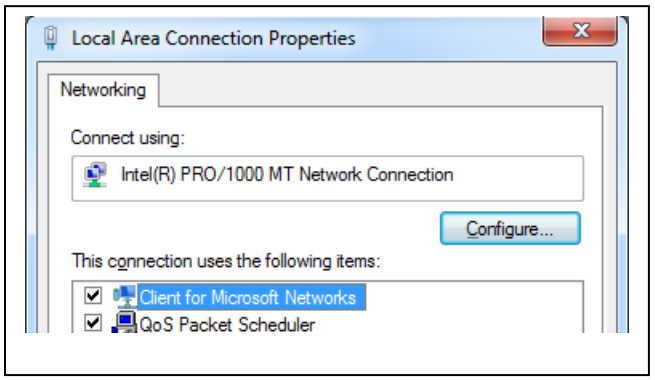
Write down your IP address:_____

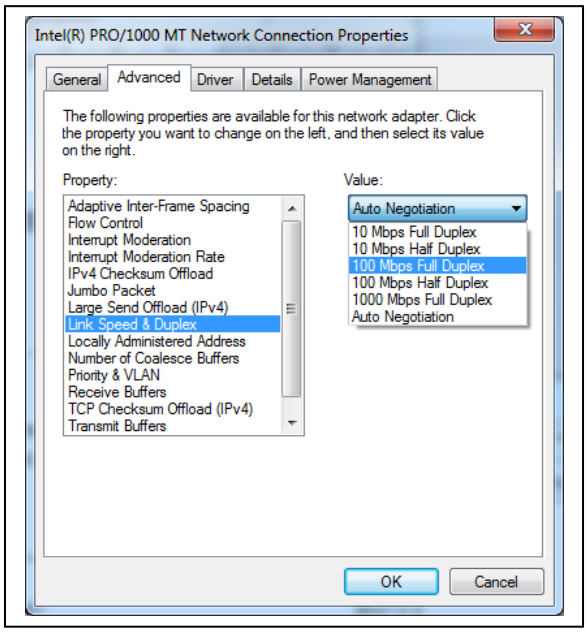
9. Test the network by pinging all computers connected (one by one)

Playing with the LEDs

You can try to change the Network Adapter settings in your PC and observe the LEDs on the Switch. The success of this experiment depends on your hardware.

10. Open *Network and Sharing Center* and click on *Change adapter settings*.
11. Right-click on *Local Area Connection* and select *properties*.
12. Click the button *Configure…* and in the *Network Connection properties* window select the *Advanced* tab (see fig.)
13. Find the property *Link Speed & Duplex*.
14. Try to change the value to different settings and observe the LEDs on the Switch. Note that you must click the OK button each time you have made a change to activate it.





LED Value	1/2/3/4 colour	Blink or steady	
10 Mbps Full Duplex			
10 Mbps Half Duplex			
100 Mbps Full Duplex			
100 Mbps Half Duplex			
1000 Mbps Full Duplex			

Clean-up

15. After you are done, make sure that you set back the value to *Auto Negotiation*.
16. Also in the *Internet Protocol Version 4 (TCP/IPv4) properties* window, switch back to: *Obtain an IP address automatically* and *Obtain DNS server address automatically*.
17. If you had to disable firewall or other security software to be able to ping, remember to re-enable it.
18. Enable the DHCP server again, either by logging-in to the management page again, or by performing a factory reset of the device by holding the reset button for more than 20 seconds (until DIAG blinks fast).