### **Basic Network Configuration**

#### **TCP/IP Configuration**

| Static          | DHCP                 |
|-----------------|----------------------|
|                 |                      |
| Assign Manually | Assign Automatically |
| Not change      | Does change          |
|                 | Need DHCP server     |

### **Network Connections**

#### ncpa.cpl



#### Bluetooth Network Connection Disabled

Bluetooth Device (Personal Area ...



#### Local Area Connection Network cable unplugged TAP-Windows Adapter V9



VMware Network Adapter VMnet8 Enabled

VMware Virtual Ethernet Adapter ...



#### TurboVPN

Disconnected WAN Miniport (IKEv2)



V5EBD Realtek RTL8821CE 802.11ac PCIe ...



Ethernet 2

Kaspersky Security Data Escort Ad... VMware Network Adapter VMnet1 Enabled

Network cable unplugged

VMware Virtual Ethernet Adapter ...

# **IP Addressing**

#### • Static IP Addressing

| Internet Protocol Version   | 4 (TCP/IPv4) Properties  | × |  |
|---|--|---|--|
| General   |  |   |  |
| You can get IP settings assigned autom<br>this capability. Otherwise, you need to<br>for the appropriate IP settings. | natically if your network supports<br>ask your network administrator |   |  |
| Obtain an IP address automatical  | у  |   |  |
| • Use the following IP address:   |  | 1 |  |
| IP address:   | 192 . 168 . 1 . 57   |   |  |
| Subnet mask:  | 255.255.255.0  |   |  |
| Default gateway:  | 192.168.1.1  |   |  |
| Obtain DNS server address automatically   |  |   |  |
| Use the following DNS server addr   | resses:  |   |  |
| Preferred DNS server:   | 8.8.8.8  |   |  |
| Alternate DNS server:   | 8.8.4.4  |   |  |
| Validate settings upon exit   | Advanced   |   |  |
|   | OK Cancel  |   |  |

#### • DHCP Addressing

| nternet Protocol Version 4 (TCP/IPv4  | ) Prope   | erties |      | ? X    |
|---|-----------|--------|------|--------|
| General Alternate Configuration   |           |        |      |        |
| You can get IP settings assigned automatically if your network<br>supports this capability. Otherwise, you need to ask your network<br>administrator for the appropriate IP settings. |           |        |      |        |
| Obtain an IP address automatical  | lly       |        |      |        |
| — Use the following IP address:   |           |        |      |        |
| IP address:   |           |        |      |        |
| Subnet mask:  |           |        |      |        |
| Default gateway:  |           |        |      |        |
| Obtain DNS server address autor   | natically |        |      |        |
| — Use the following DNS server add  | fresses   |        |      |        |
| Preferred DNS server:   |           |        |      |        |
| Alternate DNS server:   |           |        |      |        |
| Validate settings upon exit   |           |        | Adva | anced  |
|   | 0         | OK     |      | Cancel |

### **Common Command Utility**

 The command is **ipconfig** to see ip addresses of all network connections on device and used with options

| Ipconfig options   | Description  |
|--------------------|--|
| ipconfig /all      | Display additional network configuration information         |
| ipconfig /release  | Release the IP address learned from the DHCP server (No      |
|                    | longer having an IP address)                                 |
| ipconfig /renew    | Forces DHCP client to renew its <u>dhcp</u> address from the |
|                    | server   |
| ipconfig /flushdns | Clears the DNS resolver cache on the host                    |

 The command is **ping** and the user-defined argument is the *ip-address* of the destination device.



 The command is tracert/traceroute and the user-defined argument is the *ip-address* of the destination device.

```
traceroute ip-address
```

# Network Services (DHCP & DNS)

- To send data on the network, a host needs two important IP address services\_ static IP or dhcp and dns
- DHCP is the service used by ISPs, network administrators, and wireless routers to automatically assign IP address
- DNS is the method computers use to translate domain names into IP addresses

# Dynamic Host Configuration Protocol (DHCP)



### **Basic DHCP Characteristics**

- Use four messages between client and server
  - Discover
  - Offer
  - Request
  - ACK
- Use fixed ports for client and server (UDP 67, 68)
- Use broadcast in Network Layer (255.255.255.255)
- Use IP Pool, Lease time (Day/Hours/Minutes)



| Source        | Destination     | Protocol | Stage    |
|---------------|-----------------|----------|----------|
| 0.0.0         | 255.255.255.255 | DHCP     | Discover |
| 192.168.3.249 | 255.255.255.255 | DHCP     | Offer    |
| 0.0.0         | 255.255.255.255 | DHCP     | Request  |
| 192.168.3.249 | 255.255.255.255 | DHCP     | ACK      |

#### Lab-1

#### **Configure DHCP and Assign IP address Automatically**

Step 1: Add a wireless router, switch and five PCs

- Step 2: Connect PCs to switch (Choose FastEthernet)
- Step 3: Connect switch to router (Choose FastEthernet)
- Step 4: Connect to Wireless Router
- a. Connect Admin to Wireless Router
- (i) Assign IP address to one PC with 192.168.0.10/24

In the **Desktop** tab, choose **IP Configuration**, enter **192.168.0.10 with subnet mask 255.255.255.0** 

- (ii) Choose **Command Prompt**, check IP with the command **ipconfig**
- (iii) On the Command Prompt, check connection to WR with the command ping 192.168.0.1
- (iv) Choose Web Browser, Enter 192.168.0.1 in the URL.
- (v) Use **admin** for both the username and password.

#### **Step 5: Configure DHCP on the Setup**

- a. Navigate to **Setup > Basic Setup**.
- b. Scroll down the page to **Network Setup**.
- c. The IP address assigned to **Router IP** is 192.168.0.1. Change it to 192.168.50.1. There are 50 available IP addresses in the DHCP pool.
- d. Add **8.8.8.8** as the DNS server with the DHCP settings.
- e. Scroll to the bottom of the window and click **Save Settings**.
- f. Note that the DHCP range of addresses has been automatically updated to reflect the interface IP address change. The Web Browser will display a **Request Timeout** after a short time.

#### Step 6: Check DHCP IP on PCs

- a. PC2, on **Desktop tab**, Click **Command Prompt**, Type **ipconfig /renew** to force to reobtain IP
- b. Check IP again on PC2, Type **ipconfig**
- c. Type **ipconfig /release** to force to release DHCP
- d. Type **ipconfig /renew** to force to re-obtain IP and type **ipconfig** to check the IP again
- e. Do the same steps on PC3, PC4, PC5

#### Step 7: Check Ips on all PCs and check the connectivity

Type command ipconfig

Type command **ping I92.168.50.101** 

### Wireless Channels

- Two unlicensed frequency band
- 2.4GHz
- 5GHz
- > There are fourteen channels between the range of frequency.



#### Possible two issues

- Channel Overlapping
- Adjacent–Channel



- One channel to another to avoid nonoverlapping, it is needed to set the range of 25MHz.
- The frequency difference is 5MHz between channels
- If we use Channel 1, we need to set Channel 6 (1 + 5) for another AP. So 2.4GHz Frequency Band can have up to 3 non-overlapping channels. Channel 1, 6 and 11

#### Lab-2

Configure wireless network with DHCP

Step 1: Configure wireless router SSID

- a. From PC1, connect to wireless router at **192.168.50.1** in a web browser on **Admin**.
- b. Go to Wireless > Basic Wireless Settings.
- c. Change **Network Name (SSID)** to **IAC\_Center** for 2.4 GHz.
- d. Choose the Standard Channel to 1 2.437GHz.
- e. Disable 5GHz frequencies settings
- f. Scroll to the bottom of the window and click **Save Settings**.

Step 2: Configure wireless security

- a. Go to **Wireless > Wireless Security**.
- b. Under the 2.4 GHz heading, select **WPA2 Personal** for the Security Mode.
- c. For the Encryption field, keep the default **AES** setting.
- d. In the Passphrase field, enter **IAC123456** as the passphrase.
- e. Click Save Settings.

Step 3: Add wireless devices (laptops) and connect to wireless network with SSID

#### Lab 3

Download packet tracer file lab3 and instruction document.

Follow the instructions.



# File Sharing

File Sharing in Windows

- Microsoft Windows and other network operating systems contain built-in features for file sharing across either a local area network (LAN)
- Microsoft proprietary SMB (Server Message Block) protocol, network file sharing protocol that can access files or other resources at a remote server
- Security access restrictions can be set up to control that can be obtained the shared files

| 2                                    | Network and Sharing Center                                      | er                              |                             | ×                 |
|--------------------------------------|---|---------------------------------|-----------------------------|-------------------|
| 🔄 🏵 🔻 🕈 騹 « All Contr                | ol Panel Items 		 Network and Sharing Center                    | ✓ C Sear                        | rch Control Panel           | Q                 |
| File Edit View Tools Help            |   |                                 |                             |                   |
| Control Panel Home                   | View your basic network information ar                          | nd set up connection:           | S                           |                   |
| Change adapter settings              | View your active networks                                       |                                 |                             | —                 |
| Change advanced sharing settings     | dlink<br>Private network  | Access type: In<br>HomeGroup: R | iternet<br>eady to create   |                   |
| 5                                    | • Advanced sharing settings                                     | 1                               |                             | ×                 |
|                                      | $\leftarrow \  ightarrow \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$ | ng settings 🗸 🗸                 | ර Search Control Panel      | م                 |
|                                      | Change sharing options for                                      | ar difforant natwork r          | vrofiles                    |                   |
|                                      | Windows creates a separate netwo                                | ork profile for each network    | you use. You can choose spe | cific options for |
|                                      | each profile.   |                                 |                             |                   |
| See also                             | Private   |                                 |                             |                   |
| HomeGroup                            | Guest or Public (current profile) _                             |                                 |                             |                   |
| Internet Options<br>Windows Firewall | All Networks  |                                 |                             |                   |
| 0 items                              |   |                                 |                             |                   |

| Step 2  | • Advanced shat $\leftarrow \rightarrow \checkmark \uparrow$ | aring settings ••• •• Advanced sharing settings  | ē         | Search Control Panel                |
|---|--|--|-----------|-------------------------------------|
|   |  | Change sharing options for different networ<br>Windows creates a separate network profile for each netwo<br>each profile.<br>Private | k prof    | iles<br>use. You can choose specifi |
|   |  | Network discovery<br>When network discovery is on, this computer can<br>visible to other network computers.                          | i see oti | her network computers and           |
| O Public  |  | <ul> <li>Turn on network discovery</li> <li>Turn on automatic setup of network</li> <li>Turn off network discovery</li> </ul>        | connec    | ted devices.                        |
| Your PC is hidden from other devices on the network used for printer and file sharing.  | and can't be   | File and printer sharing<br>When file and printer sharing is on, files and prin<br>be accessed by people on the network.             | ters that | t you have shared from this         |
| Private     For a network you trust, such as at home or work. You     discoverable and can be used for printer and file above | ur PC is   | Turn on file and printer sharing Turn off file and printer sharing   |           |                                     |
| it up.<br>Configure firewall and security settings  | ing it you set   | All Networks   |           |                                     |
|   |  |  |           |                                     |



| Home Share View           |                     |   |  |
|---------------------------|---------------------|---|--|
| * 个 ニ > This PC > Windows | (C:)                | ~   | ن المعام المع<br>معام المعام المع |
| 0211226                   | ^ Name              |   | - 0  |
| 0220102                   | AMD                 | A Retwork access     A Retwork access |  |
| 0220108                   | Intel               |   |  |
| Vetwork                   | PerfLogs            | Choose people to share with   |  |
| Penrive - Personal        | PhotoshopPortable   |   |  |
|                           | Program Files       | Type a name and then click Add, or click the arro   | ow to find someone.  |
| is PC                     | Program Files (x86) |   |  |
| D Objects                 | Student-5-Share     | Evenyone  | bbA v  |
| Desktop                   | Users               |   | - Auu  |
| Documents                 | Windows             | Name  | Permission Level   |
| Downloads                 | Eula.txt            | 3 HP  | Owner  |
| Ausic                     | Zoomit.exe          |   |  |
| Pictures                  | 200mit.zip          |   |  |
| /ideos                    |                     |   |  |
| Nindows (Ci)              |                     |   |  |
| vinuows (C:)              |                     |   |  |
| Jata (D:)                 |                     | I'm having trouble sharing  |  |
| JSB Drive (E:)            |                     |   |  |

| me.             |                             |   |
|-----------------|-----------------------------|---|
|                 | -                           | Add   |
| Permissi        | on Level                    |   |
| Read T<br>Owner | ✓ Re<br>Re                  | ad<br>ad/Write                                  |
|                 | Re                          | move  |
|                 |                             |   |
|                 | Permissi<br>Read T<br>Owner | Permission Level<br>Read V Re<br>Owner Re<br>Re |

| Step 5 | - 0   | × |
|--------|---|---|
| ~      | a Network access  |   |
|        | Your folder is shared.  |   |
|        | You can <u>e-mail</u> someone links to these shared items, or <u>copy</u> and paste the links into another app. |   |
|        | Individual Items  | ^ |
|        | Student-5-Share \\DESKTOP-UKHV6TO\Student-5-Share   |   |
|        |   |   |
|        |   |   |
|        |   |   |
|        | Show me all the network shares on this computer.  | ] |

Done

#### **Accessing Shared Files**

#### **From Remote Clients**



Step 1: Sharing a printer on a networked computer (Windows 7)

Control Panel > Folder Options > View

Unclick (deselect) > Use Sharing Wizard (Recommended)



Control Panel > Network and Sharing Center

(OR)

Network icon on menu bar > Open Network and internet setting > Network and Sharing Center

Change advanced sharing settings > Password protected sharing Turn off password protected sharing



Control Panel > Devices and Printers > Right-click the printer > Printer properties Sharing tab > Share this printer (Give the share name)

| Secur                    | rity Device Settings                                  |   | Device Settings   |   | _ Device Settings Abou |  |
|--------------------------|---|---|---|---|------------------------|--|
| ieneral                  | Sharing   | Ports   | Advanced  | Color Management  |                        |  |
| If pr<br>th              | you share this<br>inter will not k<br>ese settings, u | printer, any u<br>be available w<br>se the <u>Netwo</u> | ser on your netwo<br>hen the computer<br><u>rk and Sharing Ce</u> | ork can print to it. The<br>r sleeps. To change<br><u>nter.</u> |                        |  |
| Share                    | this printer  |   |   |   |                        |  |
| Share na                 | me: ELC-2   | Printer   |   |   |                        |  |
| Rende                    | er print jobs or                                      | n client comp   | uters   |   |                        |  |
| Drivers                  | 80 05 55  | 37 37572  | 10 200  | 2 2   |                        |  |
| If this<br>Wind<br>users | printer is shar<br>ows, you may<br>do not have to     | ed with users<br>want to instal<br>o find the prin      | running different<br>I additional driver<br>t driver when the     | versions of<br>rs, so that the<br>y connect to the              |                        |  |

Step 2: Adding the shared printer and printing on remote computers

On Remote Computers Control Panel > Devices and Printers > Add a printer Add a network, wireless or Bluetooth printer

What type of printer do you want to install?

Add a local printer

when you plug them in.)

printer is turned on.

Add Printer



When printers are discovered, select a right printer.

We can also find the printer by name or TCP/IP address by selecting "The printer that I want isn't listed"

| 🚱 🖶 Add Printer   |   |  |
|---|---|--|
| Select a printer  |   | 🚱 📾 Add Printer                          |
| Printer Name HP LaserJet P2015 Series (Hewlett-Packard)  The printer that I want isn't listed | Address<br>192.168.1.99<br>Search again | Find a printer by name or TCP/IP address |

Step 3: Print a test page

Control Panel > Devices and Printers > Right Click on shared printer > Printer properties > General > Print Test Page

| Security          |                                | Device Settings |                  | About             |  |
|-------------------|--------------------------------|-----------------|------------------|-------------------|--|
| General           | Sharing                        | Ports           | Advanced         | Color Management  |  |
|                   | ELC-2 Pri                      | nter            |                  |                   |  |
| ocation:          | IP=192.168.1.113,Host=HPF19C91 |                 |                  |                   |  |
| Comment:          |                                |                 |                  |                   |  |
| Model:            | HP Photosi                     | mart C7200 s    | eries            |                   |  |
| Features          |                                |                 |                  |                   |  |
| Color: Yes        |                                |                 | Paper available: |                   |  |
| Double-sided: Yes |                                |                 | Letter           | *                 |  |
| Staple: No        | D                              |                 |                  |                   |  |
| Speed: Ur         | nknown                         |                 |                  |                   |  |
| Maximun           | n resolution: 12               | 200 dpi         | 12               | •                 |  |
|                   |                                | Prefer          | ences            | Print Test Page 🕟 |  |
|                   |                                |                 |                  | 1                 |  |
|                   |                                |                 | 3605             | NE                |  |

### **Network Troubleshooting**

- Identify the problem
- Find causes of network problems
- Test the theory to determine the cause
- Document the findings, actions and outcomes

### **Common Problems for Networking**

| Identify the Problem   | Possible Cause  |  |
|--|---|--|
| Network Card light isn't on  | Network cable is unplugged or damaged                     |  |
| Windows computer has an IPv4 address   | The network cable is unplugged                            |  |
| (169.254.x.x)  | The network card is damaged                               |  |
|  | The gateway device is power-off                           |  |
|  | The gateway device is improperly connected to the network |  |
| Device doesn't obtain or renew IP address<br>on network OR detect the wireless network | The NIC in the device is disable                          |  |
| Remote device does not respond to a ping   | Windows firewall disables ping by default                 |  |
| request  | The link is broken between two networks                   |  |
| The device can access the local network but cannot access the internet                 | The gateway address is incorrect or not configured        |  |
|  | Uplink connection is down                                 |  |
|  | DNS service is failed or incorrect setting.               |  |

### Troubleshooting

#### **Other Cable Issues**

- Choosing the wrong cable category type
- Damaged wiring/cables
- Running the cable too close to electro magnetic environment (eg. Near electrical motor)
- RJ-45 cable connectors issue
- Bending the fiber cable too small