
UNIT 2: CREATING A WI-FI LAN

Unit Structure

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2.0 Learning Objectives

After learning this unit, you will be able to understand:

- About Wi-Fi Technology.
- About Wi-Fi based LAN.
- About AP and client Machines.
- About data from File Server.

2.1 Introduction to Wi-Fi Technology

Wi-Fi is a technology that has revolutionized the way we tend to network computers and electronic devices together, making wired connections

unnecessary. Wi-Fi allows networking of computers and digital devices without the need for wires. Data is transferred over radio frequencies, allowing Wi-Fi capable devices to receive and transmit data after they are in range of a Wi-Fi network. The widespread use of the technology and its availability in both residential homes and public places – as well as parks, gathering spots, and coffee shops – have made it one of the most popular information transmission technologies out there nowadays.

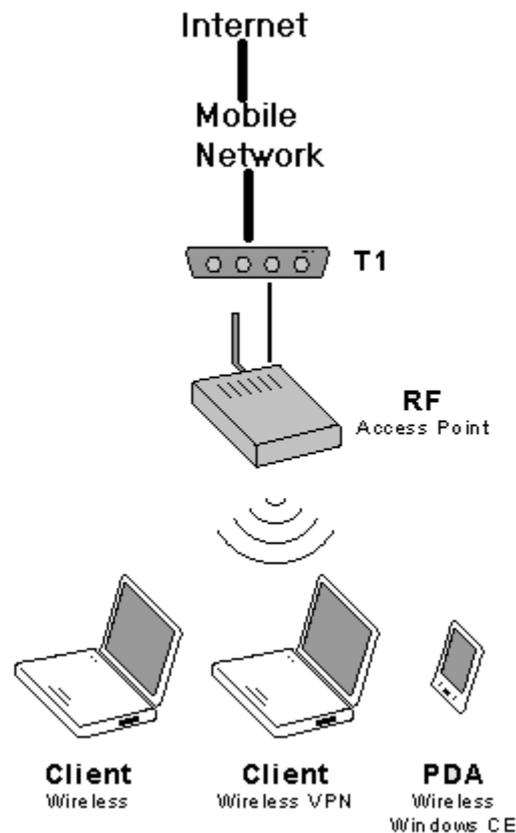


Fig 2.1 WiFi arrangement

Currently there are four major types of Wi-Fi which are:

- 802.11a
- 802.11b
- 802.11g
- 802.11n

Out of this the two most common and oldest types of Wi-Fi are:

- 802.11b
- 802.11g

Which operate at frequency of 2.4GHz.

It is seen that Wi-Fi 802.11b has theoretical maximum transmission speed of about 11Mbps while 802.11g will be able to transmit data at speeds up to 54Mbps. 802.11a was the next version of Wi-Fi developed, and it operated on a frequency of 5GHz and allowed data transmission at speeds of up to 54Mbps. It is not backwards compatible with 802.11b or g, due to its operation on a different frequency, thus limiting its use. 802.11n is the newest version of the technology and it is backwards compatible with devices running 802.11b or g. It operates at speeds up to 450Mbps on either 2.4GHz or 5GHz, either on a single channel or two channels. On dual channel devices, data transmission can theoretically exceed 450Mbps limit.

2.2 How to Provide Wi-Fi capability to a PC

Generally, PCs do not usually come with built-in Wi-Fi, especially older models. So if you need to get wireless connectivity you have options like- you can use either USB Wi-Fi adapter, a PCI-E Wi-Fi card, a new motherboard with built-in Wi-Fi.

USB Wi-Fi Adapters: It is plug and play device. The plug-and-play convenience means that you can remove it if it isn't needed, and use it in another PC.

Wi-Fi PCI Cards: If you have limited USB ports on your PC already, the Wi-Fi PCI card helps.

Wi-Fi Enabled Motherboard: If you're looking to upgrade your PC anyway, it might make more sense to upgrade your motherboard than buy an adapter.

Check your progress 1

1. What is the full form of Wi-Fi?
 - a. Wired fidelity
 - b. Wireless Fidelity
 - c. Wireless files
 - d. None of these

2.3 Creating an ad-hoc Wi-Fi based LAN

An ad-hoc network is a local area network (LAN) that's built impromptu as devices connect. Rather than relying on a base station to coordinate the flow of messages to each node within the network, the individual network nodes forward packets to and from one another.

If you would like to share information stored on your pc with other people nearby and everyone's pc has a wireless network adapter, an easy methodology of sharing is to set up an ad hoc wireless network. In spite of the fact that members should be within 30 feet of each other, this type of network presents lots of prospects. In the Windows operating system, ad-hoc is a communication mode that allows computers to directly communicate with each other without a router.

Ad hoc networks are by definition temporary; they cease to exist when members disconnect from them, or once the computer from which the network was established moves beyond the 30-foot effective range of the others. you can share an internet connection through an ad hoc network, however keep in mind that the internet connection is then available to anyone logging on to a computer that's connected to the network, and thus is probably going not very secure

To set up an ad hoc network, follow these steps:

1. On the Start menu, click Connect To.
2. In the Connect to a network window, click the Set up a connection or network task.
3. On the Choose a connection option page, click Set up a wireless ad hoc (computer-to-computer) network, and then click Next.
4. Read the ad hoc network information, and then click Next.
5. Provide a network name, select whether the network is open or requires authentication, provide a security phrase if necessary, and then click Next.

After Windows Vista sets up ad hoc network, you can share Internet connection. If you wish to disconnect your connection from an ad hoc network, display the Connect To A Network window, click the ad hoc network, and then click Disconnect.

Advantages:

- It is easy to set up if you just want to connect two devices to each other without using central access point.

- It is possible to connect them directly with ad-hoc mode to form a temporary Wi-Fi network without router.
- The new Wi-Fi Direct standard of ad-hoc mode, allow devices to communicate directly over Wi-Fi signals.

Check your progress 2

1. An Ad-hoc network is a _____.
 - a. LAN
 2. B.WAN
 3. MAN
 4. None of these

2.4 Creating an infrastructure based LAN using Wireless Access Point

In the case of wireless networking in Infrastructure mode you're connecting your devices using a central device, namely a wireless access point. To affix the WLAN, the AP and all wireless clients should be configured to use the same SSID. The AP is then cabled with the wired network to allow wireless clients access to, for example, internet connections or printers.

Most Wi-Fi networks are deployed in infrastructure mode. In infrastructure mode, a base station acts as a wireless access point hub, and nodes communicate through the hub. The hub typically, but not always, has a wired or fiber network connection, and will have permanent wireless connections to other nodes. Wireless access points are typically fastened, and provide service to their client nodes among range. Wireless clients, like laptops, smart phones etc. connect to the access point to join the network. Typically a network can have a multiple access points, with the same 'SSID' and security arrangement. In that case connecting to any access point on that network joins the client to the network. In this case, the client software can try and choose the access point to do to give the best service, like the access point with the strongest signal.

Infrastructure mode wireless networking is the mode that you most often encounter in your work as networking professional supporting networks for clients or in an exceedingly corporate environment.

At a minimum, the sole network infrastructure component that's required for Infrastructure mode is an access point, however if an AP is all you have, you have no more than you'd have had once using ad hoc mode. However, most Infrastructure mode implementations include other components from your traditional network infrastructure.

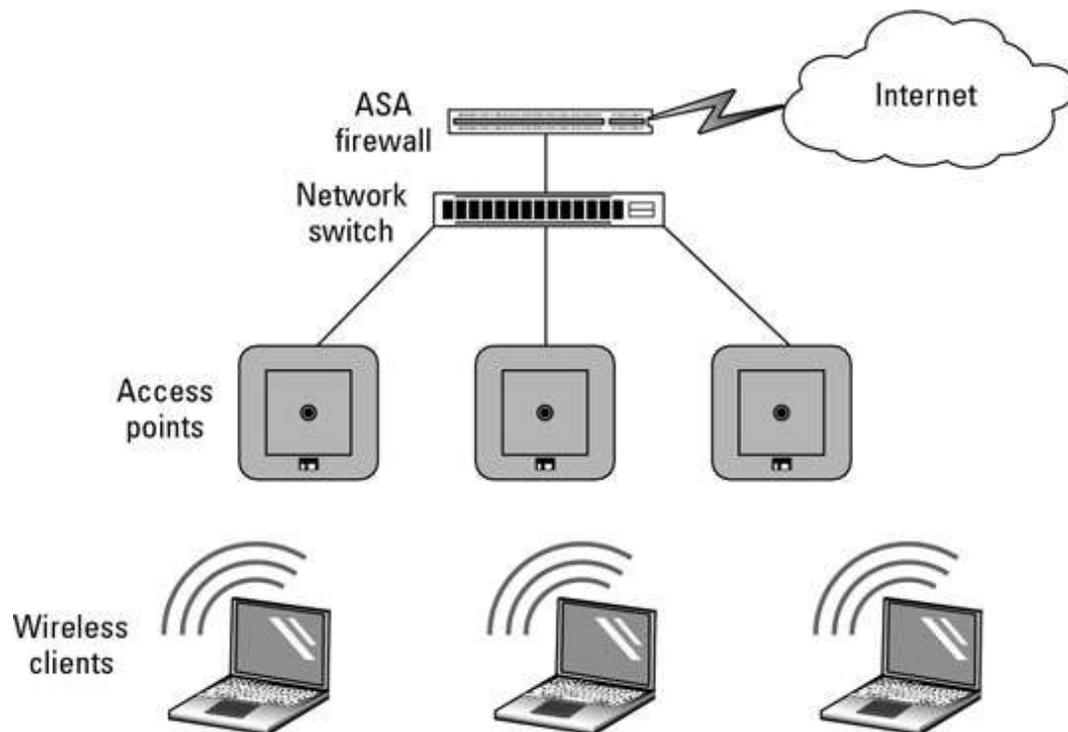


Fig 2.2 network infrastructure component

Check your progress 3

1. What are wireless access points?
 - a. Connection points
 - b. It is a is a networking hardware device
 - c. Ports
 - d. None of these

2.5 Configuration of Access Point and client Machines

You can configure the access by using the following steps:

Step 1 - Connect your computer to other LAN port by Ethernet cable and login to TP-LINK web interface by IP address on bottom label.

Step 2 - Go to Network ->LAN on the left side menu, change the LAN IP address of TP-LINK router to the same segment of the main router

Step 3 - Configure the wireless

Go to Wireless->Wireless Settings page, configure the SSID (Network name) and Channel. Then Click Save button.

Step 4 - Go to DHCP on the left side menu, disable the DHCP Server and click **Save** button.

Step 5 - Go to System Tools->Reboot page, click Reboot button to reboot the device

Step 6 - Connect the main router to the LAN port on TP-Link router through Ethernet cable.

Check your progress 4

1. Configuration of access point is a _____ installation.
 - a. LAN
 - b. WAN
 - c. WLAN
 - d. None of these

2.6 Accessing data from File Server through Wi-Fi Interface from client machine

You easily transfer information from file server using Wi-Fi technology from client machine. It is easy to use external hard drive and the router will create network storage accessibility for anyone on network. On setting up, any files stored on particular drive gets accessed by devices that are on particular network. Here's how to set it up on Windows.

Step 1: Choose your drive

The drive which you want to share is small enough or can be large as TB and put it.

Step 2: Enable USB drive sharing

On computer having Wi-Fi network, you can launch the browser and navigate your router's IP address which is at back of it or you can find it online. Now when the page gets loaded, you will be asked to log in with username and password.

It is noted that all router's interface are different, but if it is with USB port, then you can find a link written as File Sharing under Administrator settings. Here you have to enable file sharing server. Apply the settings, and exit.

Step 3: Access the drive

Now after this, you are ready to read and write the attached hard drive by opening a file explorer window and navigating on to Network folder located at left sidebar. After this, clear the path at top of explorer window and enter \\[your IP address].

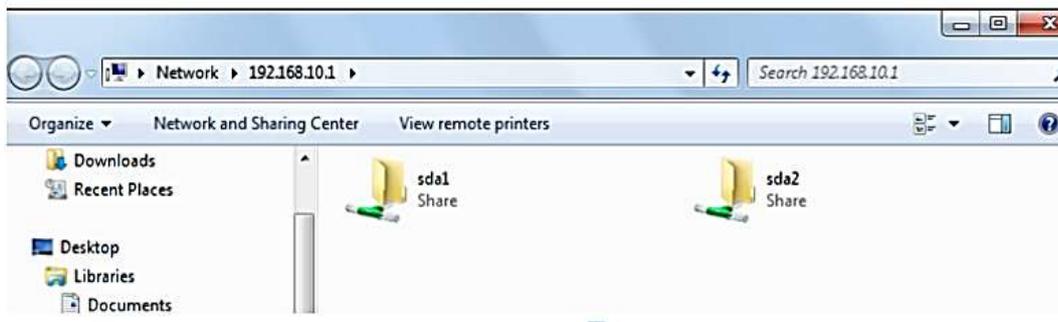


Fig 2.3 File accessing

You will find that your drive will appear. In this, open the contents which you want to transfer. If you're asked to log in, simply use your router's login details. If you wish to leave the attached hard drive so as to access from any Explorer window, you have to right-click on drive and select Map network drive.

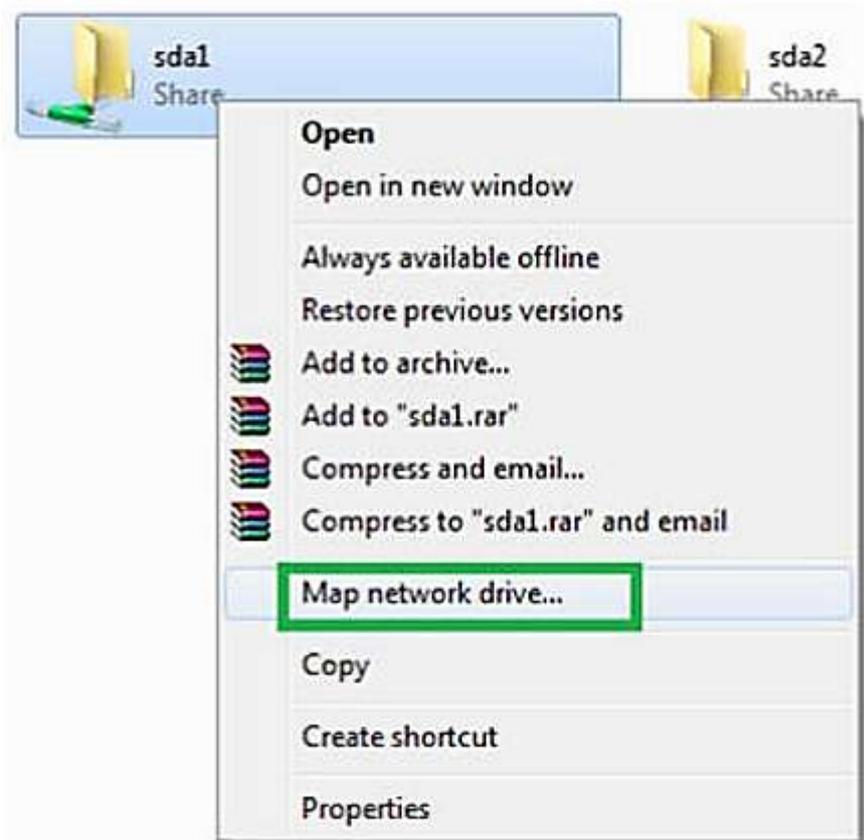


Fig 2.4. File transfer

Check your progress 5

1. Transferring of data from client machine can be done by:
 - a. Configuring The Machine
 - b. Configuring The Data
 - c. Configuring The Files
 - d. All Of Above

2.7 Let Us Sum Up

In this unit we have learnt that Wi-Fi is a technology that has revolutionized the way we tend to network computers and electronic devices together, making wired connections unnecessary. An ad-hoc network is a local area network (LAN) that's built impromptu as devices connect. Rather than relying on a base station to coordinate the flow of messages to each node within the network, the individual network nodes forward packets to and from one another.

Wi-Fi networks are deployed in infrastructure mode. In infrastructure mode, a base station acts as a wireless access point hub, and nodes communicate through the hub.

2.8 Answers for Check Your Progress

Check your progress 1

Answers: (1 –b)

Check your progress 2

Answers: (1 –a)

Check your progress 3

Answers: (1 –b)

Check your progress 4

Answers: (1 –c)

Check your progress 5

Answers: (1-a)

2.9 Glossary

1. **Wi-Fi** - A network technology used in computing devices to connect to internet.
2. **Ad-hoc network** - It is a LAN network which is built in and depends on base station to arrange message flow.

2.10 Assignment

Explain infrastructure based LAN using Wireless Access Point

2.11 Activities

Create an ad-hoc Wi-Fi based LAN for your college

2.12 Case Study

How does Wi-Fi play an important role in accessing internet?

2.13 Further Readings

1. Distributed Systems, Principles and Paradigms by Tanenbaum.
2. Distributed Systems, Concepts and Design by Coulouris, Dollimore, Kindberg.