Introduction to WiFi

By

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WiFi Fundamentals

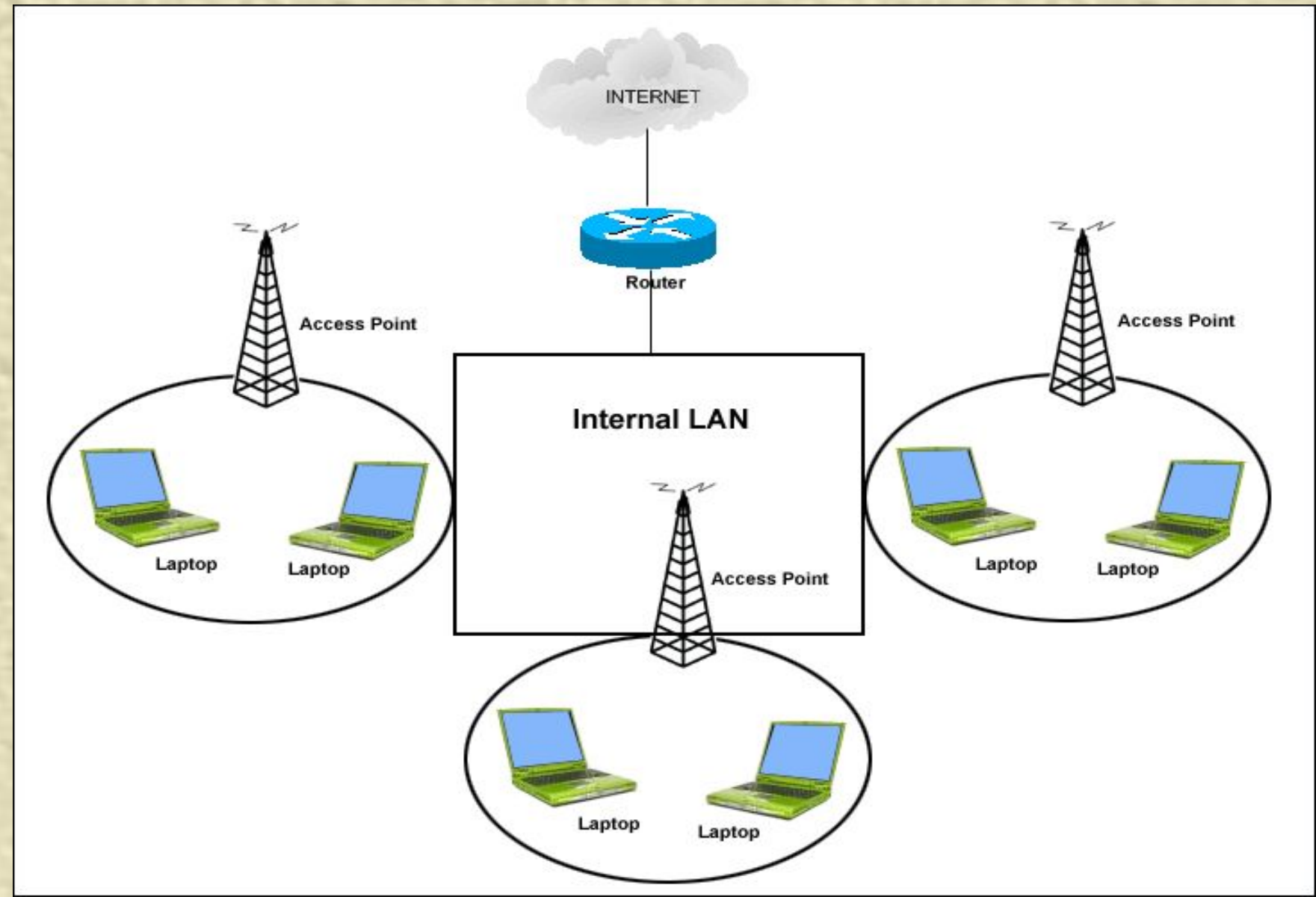
- ✔ Wi-Fi, or Wireless Fidelity, is freedom: it allows a person to connect to the Internet from your couch at home, a bed in a hotel room or a conference room at work without wires.

- ✔ Wi-Fi is a wireless technology. Wi-Fi enabled computers send and receive data indoors and out; anywhere within the range of a base station.

- ✔ Its just as fast as a cable modem connection.

- ✔ Allows you to access the Internet while on the move ; you can remain online while moving from one area to another, without a disconnection or loss in coverage.

Sample WiFi Illustration



HotSpots

What is a HotSpot?

- ✔ A HotSpot is a geographic area that has a readily accessible wireless network.
- ✔ HotSpots are equipped with a Broadband Internet connection, and one or more Access Points that allow users to access the Internet wirelessly.
- ✔ HotSpots can be setup in any public location that can support an Internet connection. All the locations discussed previously are examples of HotSpots.

Typical Wi-Fi Users

Now that we know about WiFi, who are the likely users of WiFi services?

- ✔ Frequent Travelers
- ✔ Businessmen and Corporate Managers
- ✔ Scientists & Doctors
- ✔ Students and Academicians
- ✔ Administrators & Technocrats who participate in Seminars & Conferences
- ✔ Just about anybody with a laptop

What are the good places to install WiFi?

Basically, any location which caters to business users, and where people with laptops are likely to make frequent visits is an ideal choice to install WiFi.

- ✔Airports
- ✔Hotels & Resorts
- ✔Restaurants
- ✔Coffee Shops
- ✔Bookstores
- ✔Shopping Malls

Access Point (AP)

- A wireless access point connects a group of wireless devices to an adjacent wired LAN
- An access point is similar to an Ethernet Hub, relaying data between connected wireless devices in addition to a (usually) single connected wired device, most often an Ethernet hub or switch, allowing wireless devices to communicate with other wired devices.
- **Wireless Adapter**
- A wireless adapter allows a device to connect to a wireless network. These adapters connect to devices using various interconnects such as PCI, USB, PCMCIA

Wireless Router

- A wireless router integrates an AP, Ethernet switch, and internal Router firmware application that provides IP Routing, NAT & DNS forwarding through an integrated WAN interface
- It allows wired and wireless Ethernet LAN devices to connect to a (usually) single WAN device such as cable modem or DSL modem
- It allows all three devices (mainly the access point and router) to be configured through one central utility.
- This utility is most usually an integrated web server or may be an application that is run on a desktop computer

Wireless Ethernet Bridge

- A wireless Ethernet bridge connects a wired network to a wireless network
- This is different from an access point in the sense that an access point connects wireless devices to a wired network at the data-link layer
- Two wireless bridges may be used to connect two wired networks over a wireless link, useful in situations where a wired connection may be unavailable, such as between two separate homes.

Range Extender

- A wireless range extender or wireless repeater can extend the range of an existing wireless network
- It can be strategically placed to elongate a signal area or allow for the signal area to reach around barriers such as those in L-shaped corridors
- Wireless devices connected through repeaters will suffer from an increased latency for each hop. Additionally, a wireless device at the end of chain of wireless repeaters will have a throughput that is limited by the weakest link within the repeater chain.

Components required for WiFi

- ✔ A PC, laptop , running Windows 98 or above.
- ✔ A wireless PCMCIA card, or a wireless adapter. Now a days all the latest LAPTOPS are coming with in built CENTRINO
- ✔ A Network Interface Card (optional) - Only if a LAN connection is required)
- ✔ An Access Point - essentially a compact radio transmitter with an antenna that connects to a wired connection, such as an Ethernet, DSL, or Cable Network.
- ✔ A valid internet connection.

Components required – for a larger environment

- ✔ Multiple Access Points - To provide overlapping coverage throughout a site. Access points can be installed almost anywhere.
- ✔ Network switch - A device that joins multiple computers together. A set of Access Points can be connected to a single network switch.
- ✔ Wireless LAN bridge (optional) – A wireless LAN workgroup bridge enables connection between two different hotspot networks.

Components required – for a larger environment

- ✔ Authentication and Billing Server – Enables control access to the Wi-Fi hotspot network by conducting authentication checks similar to credit card or member ID authentication. Also tracks wireless usage for billing purposes and provides payment transaction services.

- ✔ Wireless Access Gateway – A device which connects wireless subscribers to the wired network. It employs one Ethernet port to interface with the router and one wireless subscriber port that supports IEEE 802.11b/g standard .

PCMCIA wireless card

Used For Portables:

PCI and USB adapters

Used For Desktops:

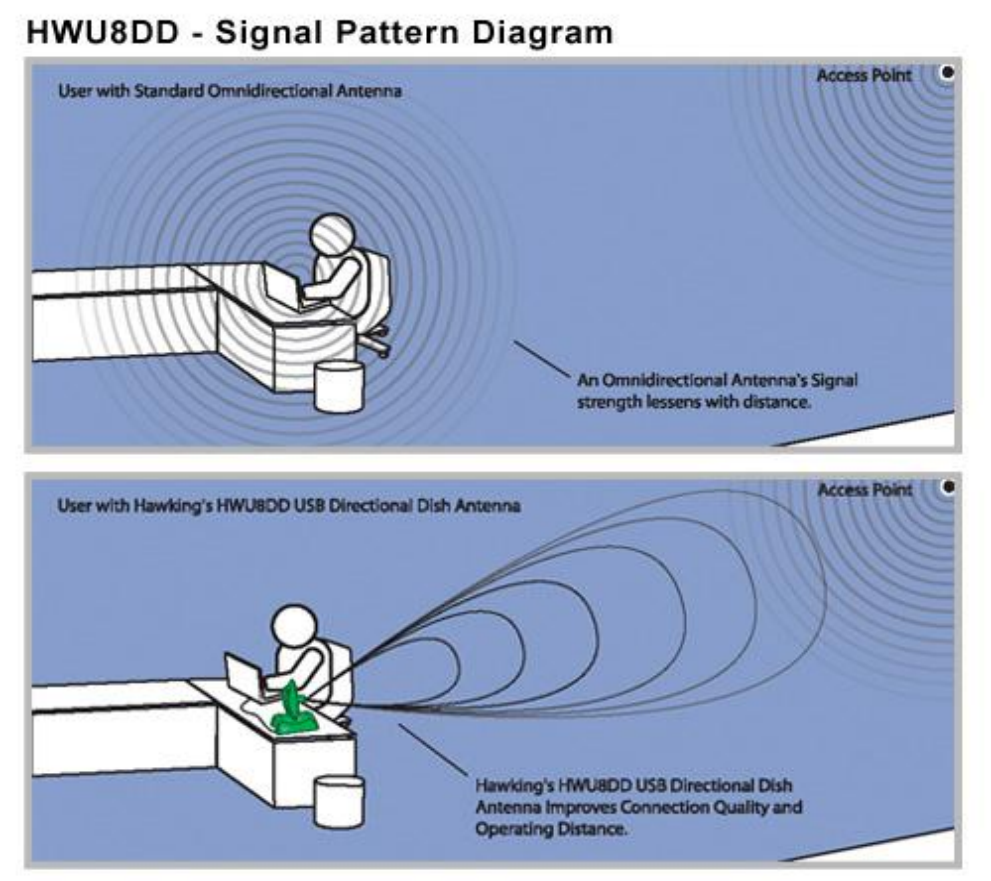
PCI adapter
(inside)

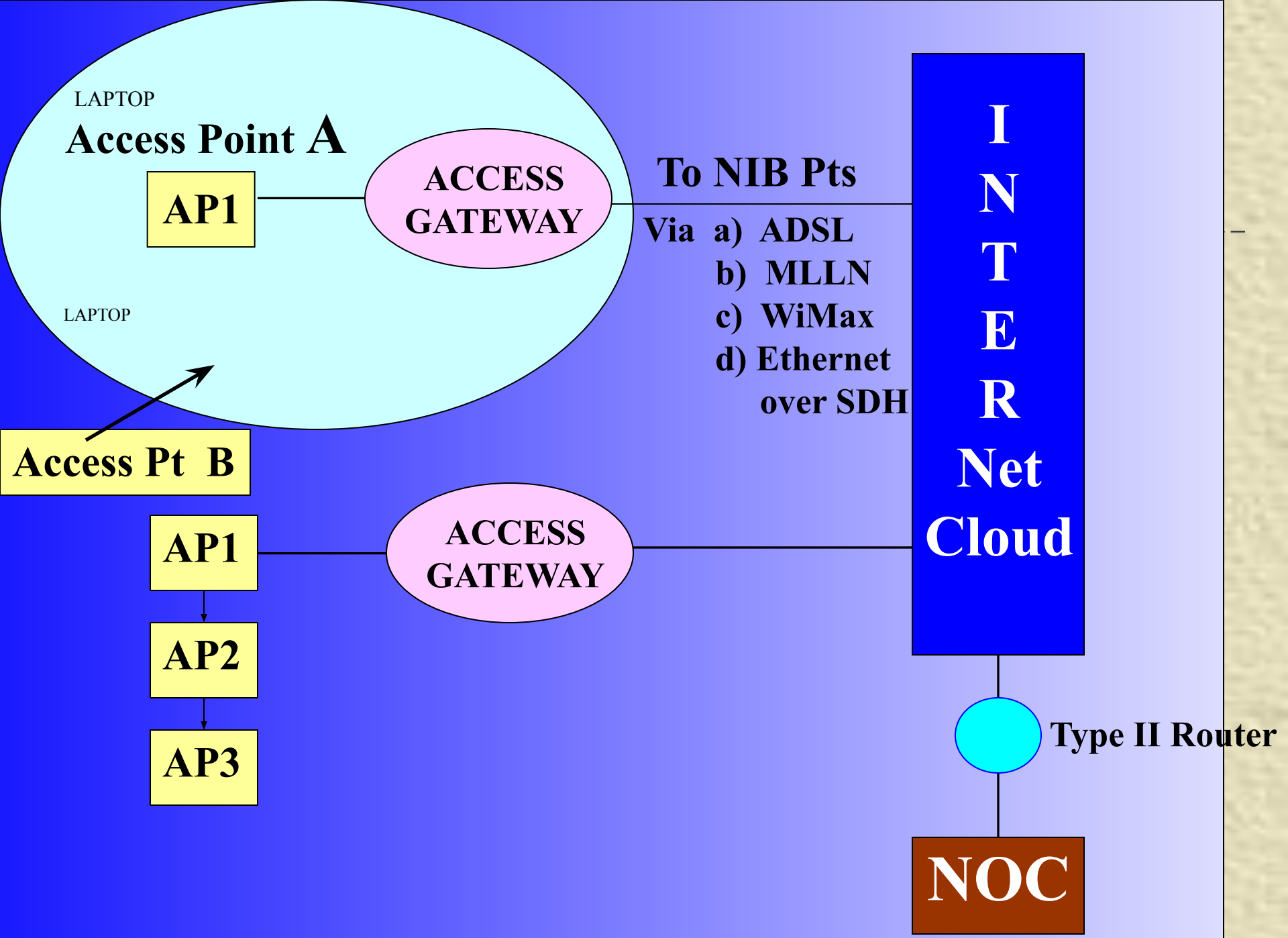
USB adapter
(outside)

Wi-Fi Router

Wireless Bridge

Range Extender




LAPTOP
Access Point A
AP1
ACCESS GATEWAY
To NIB Pts
Via a) ADSL
b) MLLN
c) WiMax
d) Ethernet over SDH
LAPTOP
Access Pt B
AP1
AP2
AP3
ACCESS GATEWAY
INTER Net Cloud
Type II Router
NOC

IEEE Wireless Standards

Wireless Standard	**802.11b**	**802.11g**	**802.11a**
Frequency Range	2.4 – 2.4835 GHz	2.4 – 2.4835 GHz	5.725 - 5.850 GHz
Max Speed	11 MBPS	54 MBPS	54 MBPS
Max Encryption	128 bit WEP	128 bit WEP	152 bit WEP 256 bit AES
Discrete Channels	3	3	8
Natively Compatible	802.11b, 802.11g	802.11b, 802.11g	802.11a
Potential user	Entry level and home networks	Larger networks, small business	Large business concerned with security

FEATURES

- Advantages-
- Unlike packet radio systems, Wi-Fi uses unlicensed radio spectrum and does not require regulatory approval for individual deployers.
- Allows LANs to be deployed without cabling, potentially reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.
- Wi-Fi products are widely available in the market. Different brands of access points and client network interfaces are interoperable at a basic level of service.
- Competition amongst vendors has lowered prices considerably since their inception.
- Wi-Fi networks support roaming, in which a mobile client station such as a laptop computer can move from one access point to another as the user moves around a building or area.
- Many access points and network interfaces support various degrees of encryption to protect traffic from interception.
- Wi-Fi is a global set of standards. Unlike cellular carriers, the same Wi-Fi client works in different countries around the world

- Disadvantages-
- Power consumption is fairly high compared to some other low-bandwidth standards, such as ZigbeePower consumption is fairly high compared to some other low-bandwidth standards, such as Zigbee and Bluetooth, making battery life a concern.
- Many 2.4 GHz 802.11bMany 2.4 GHz 802.11b and 802.11g Access points default to the same channel on initial startup, contributing to congestion on certain channels. To change the channel of operation for an access point requires the user to configure the device.
- Wi-Fi networks have limited range. A typical Wi-Fi home router using 802.11b Wi-Fi networks have limited range. A typical Wi-Fi home router using 802.11b or 802.11g with a stock antenna might have a range of 45 m (150 ft) indoors and 90 m (300 ft) outdoors. Range also varies with frequency band. Wi-Fi in the 2.4 GHz frequency block has slightly better range than Wi-Fi in the 5 GHz frequency block. Outdoor range with improved antennas can be several kilometres or more with line-of-sight.

END OF SLIDES

THANK YOU