



Let's move on to wireless access technology area and try to understand technologies such as BlueTooth, Wi-fi and Wi-max at an abstract level...

Objectives

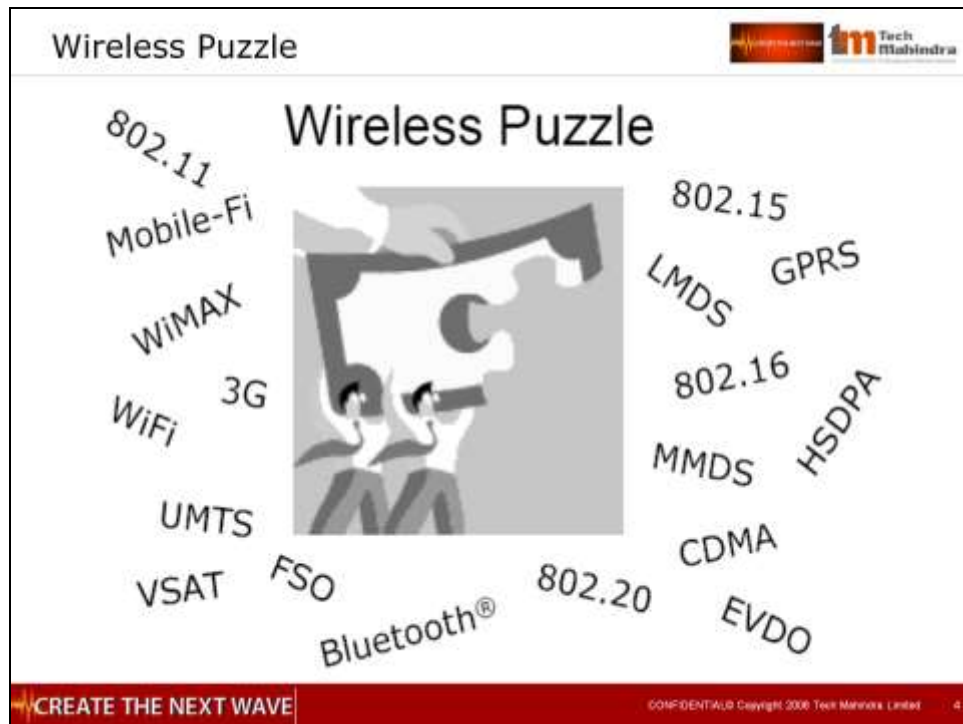


- At the end of this session, you will be able to:
 - Classify IEEE wireless standards along with their range of operations
 - Understand bluetooth network at a very conceptual level
 - Understand Wi-Fi and Wi-Max network from a perspective of network composition, working and applications
 - Compare Wi-Fi and Wi-Max network

Agenda



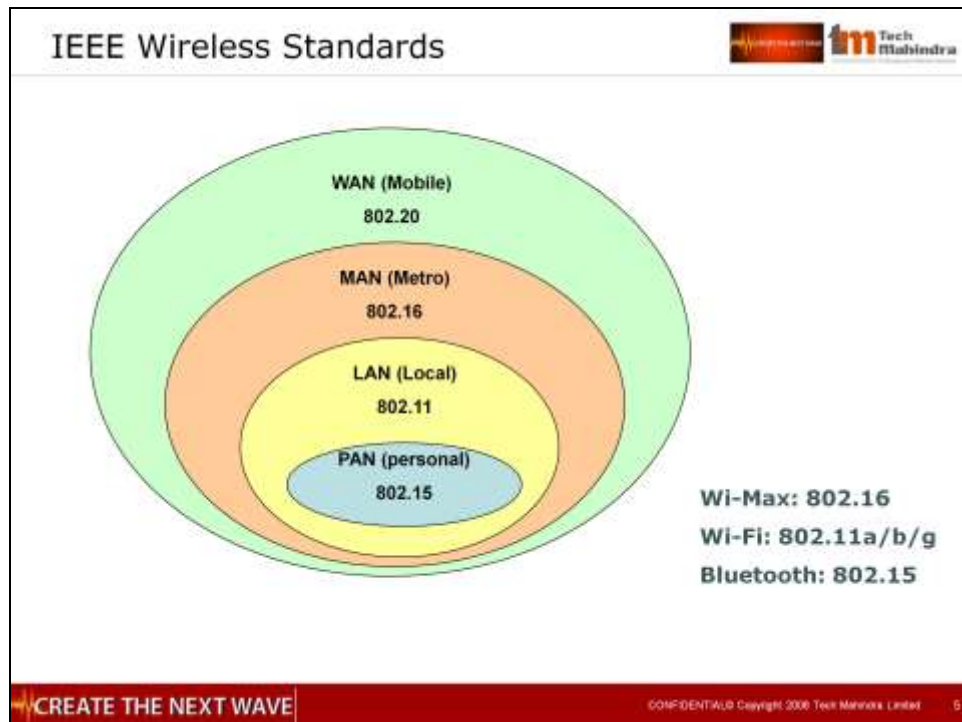
- IEEE wireless standards
- Bluetooth
- Wi-Fi
- Wi-Max
- Comparison of Wi-Fi and Wi-Max



The wireless Puzzle !!!

There are lot of jargens and standards in the wirelss access areaad.

Some of them have been depicted in this area like....VSAT, Bluetooth , 8o2.15 , 802.11 , gprs , wi-max , umts etc...



Wireless standards

IEEE has specified different standards in ...different access areas ...This is a pictorial representation of different wireless technology standards...

The picture shows that ...how range and ...coverage varies across various IEEE wireless standards...

The standard which works at smallest range and coverage is PAN ...I.e. personal area network...it is also called as WPAN...Bluetooth operates in this area..Technically this standard is known as eight o two dot fifteen...

Moving up the chain...wireless lan network which is also called as Wi-Fi. Where IEEE 802.11 standard flavors are operating ...

Is is also called WLAN ..Wireless LAN...

Then we have Wireless Man network ...or so called WMAN...It is also called as Wi-Max standard...and IEEE standard is 802.16 ...

And above it the WWAN I.e. Wireless WAN where IEEE standard eight o two dot twenty is present

Bluetooth Technology



- Bluetooth wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security.
- Works in unlicensed spectrum
- Standard
 - IEEE 802.15



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Blue tooth technology

Bluetooth is a wireless technology

It's a short-range communications technology...intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security.

..Used by mobiles devices such as phones , computers and PDAs

Blue tooth predominantly operates in the unlicensed spectrum of 2.45 Ghz Freq band

The diagrams shows how blue tooth enables devices such as C< laptop, PDA and handicam interact with each other

IEE Standard for blue tooth is IEEE 802.15

Wi-Fi

- Wi-Fi (Wireless Fidelity) is a generic term that refers to the IEEE 802.11 communications standard for Wireless Local Area Networks (WLANs)
- Wi-Fi Network connect computers to each other, to the internet & to the wired network
- Uses licensed & un-licensed spectrum based on range
- Standards
 - IEEE 802.11a
 - IEEE 802.11b
 - IEEE 802.11g

Wired/Wireless Combination

Broadband Internet Connection

Cable/DSL, Modem

Router

Access Point

Hub

Hub, router, and Wi-Fi Access Point/Gateway can all be combined in one device

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Now we move onto another wireless standard called Wi-Fi...

Wi-Fi is an acronym of Wireless Fidelity

Wi-Fi is a generic term that refers to the IEEE 802.11 communications standard for Wireless Local Area Networks (WLANs).

Wi-Fi Network connect computers to each other, to the internet and to the wired network.

Wi-Fi uses licensed and un-licensed spectrum based on range.

The different Standards are ...IEEE 802.11a ... IEEE 802.11b and IEEE 802.11g

Primarily, IEEE 802.11b and IEEE 802.11g are being highly used in the market...

As the diagram depicts ... wired network connected to Internet is connected to the wireless wi-fi world through Access Point which is as if acting like a bridge between wireless and wireline network

...Wi-fi enabled network can access other wi-Fi devices or wired network devices through this Access Point...

Elements of a WI-FI Network



- Access Point (AP) - A wireless LAN transceiver or "base station" that can connect one or many wireless devices simultaneously to the Internet
- Wi-Fi cards - Accept wireless signals & relay information. They can be internal and external. (e.g PCMCIA Card for Laptop and PCI Card for Desktop PC)
- Safeguards - Firewalls and anti-virus software protect networks from uninvited users and keep information secure.

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Elements of Wi-Fi network

There are primarily three elements of Wi-Fi network ...First one amongst them is an access point

Access Point or AP is a wireless LAN transceiver or "base station" that can connect one or many wireless devices simultaneously to the Internet

Second element is a Wi-Fi card ...They accept the wireless signal and relay information....They can be internal and externale.g PCMCIA Card for Laptop and PCI Card for Desktop PC

Then the third element is SafeguardsFirewalls and anti-virus software protect networks from uninvited users and keep information secure.

How a Wi-Fi Network Works?



- Basic concept is same as Walkie talkies
- A Wi-Fi hotspot is created by installing an access point to an internet connection
- An access point acts as a base station
- When Wi-Fi enabled device encounters a hotspot the device can then connect to that network wirelessly
- A single access point can support up to 30 users and can function within a range of 100 – 150 feet indoors and up to 300 feet outdoors
- Many access points can be connected to each other via Ethernet cables to create a single large network

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Now let's try to understand 'How a Wi-Fi network works' ?

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Wi-Fi Applications



- Home
- Small Businesses or SOHO
- Large Corporations & Campuses
- Health Care
- Wireless ISP (WISP)
- Travellers




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Different Wi-fi applications are mentioned here...

We can use it at home.. Small Businesses or SOHO ...Large Corporations & Campuses ...Health Care

Wireless ISP (WISP) ...Travellers

Wi-Max



- **Worldwide Interoperability for Microwave Access**
- IEEE 802.16 standards-based wireless technology poised to be the next best thing
- Aims to provide high-throughput wireless broadband connections over long distances
- Fixed last-mile broadband access as a replacement or substitute for wired DSL, cable, or T1/E1 connections
- Hotspot subscriber and backhaul provider connections supported
- High-speed enterprise connectivity for business
- IEEE 802.16-2000, fixed subscriber and provider backhaul standards; racing to production
- IEEE 802.16e, mobility for subscribers, finalizing standards; racing to prototypes

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Now we move on to the third wireless access technology called Wi-Max...

Wi max stands forWorldwide Interoperability for Microwave Access

It uses IEEE 802.16 standards-based wireless technology poised to be the next best thing

It Aims to provide high-throughput wireless broadband connections over long distances

Fixed last-mile broadband access as a replacement or substitute for wired DSL, cable, or T1/E1 connections

Hotspot subscriber and backhaul provider connections supported

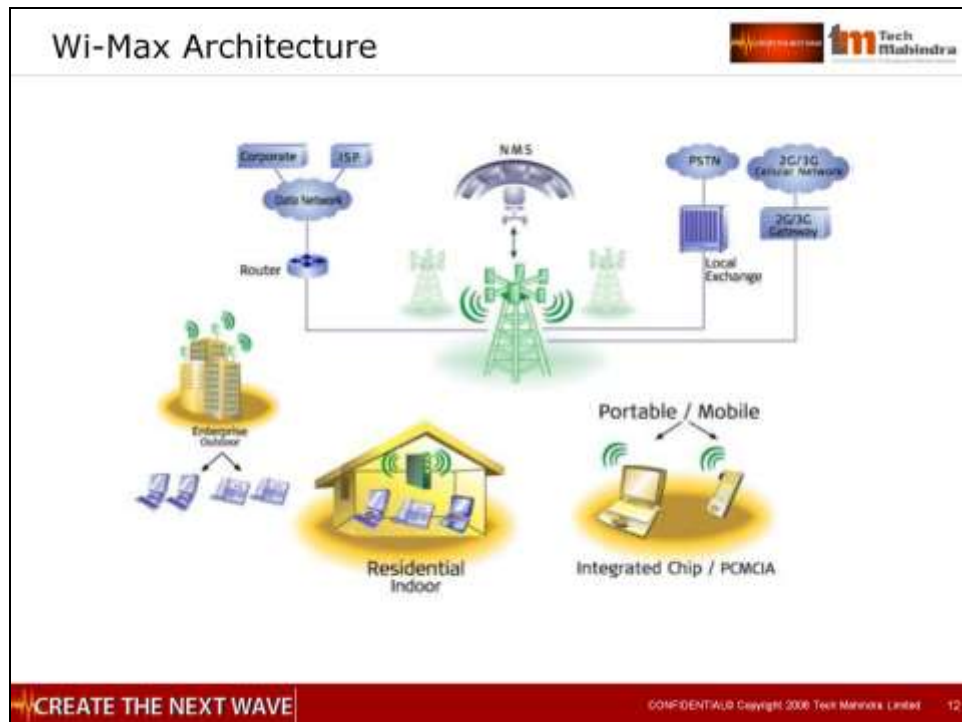
High-speed enterprise connectivity for business

There are two different standards in Wi-max...

IEEE 802.16-2000 A standard for fixed subscriber and provider backhaul standards; racing to production

Then IEEE 802.16e, it is formobility for subscribers, finalizing standards; racing to prototypes

These are two broad standards...



Wi-Max architecture and different components involved in a Wi-Max network...

The core component of Wi-Max system is a subscriber station or otherwise known as CPE i.e. Customer Premises Equipment..

In this diagram CPE is shown

Second component is a base station..Base station and one or more subscriber stations or CPEs can form a cell...with point to multi-point structure...

Base station in this diagram is shown with the green tower present at the center of the diagram...

Apart from this different elements of network are shown over here...like ...The network management system or so called NMS which is used to monitor the whole wi-max network...the Local exchange to which Wi-max base station can be connected ...


Then 2G/3G gateway to which wi-max network is connected ...

And wi-max network is connected to ISP Internet Service Provider through a router which is part of data network like TCP/IP ...

So a typical Wi-Max architecture is represented in this diagram...

Wi-Max Features

- Long Range, High Data Rate
- Less susceptible to interference
- Very viable mobile alternative to DSL and cable
- Subscribers receive wireless broadband data delivery to the home
- Plug and Play installation



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Let's have a look at Wi-max Features...

It provides long Range, High Data Rate...the range can be maximum upto maximum of 50 kms in a frequency range of 2 –11 GHz...

And data rate can reach upto 280 megabytes/per second...

Wi-max provides less susceptibility to interference...

Very viable mobile alternative to DSL and cable...

Subscribers receive wireless broadband data delivery to the home

And Plug and Play installation

Wi-Fi and Wi-Max Comparison



	WiFi	WiMAX
Standard	802.11b/g	802.16
Frequency band	2.4GHz (unlicensed)	2-11GHz* (both)
Speed (bps)	11M/54M	up to 75M
Max Distance	300 ft	>10 miles
QoS	NO	YES
Multiple Access	CSMA/CA	TDM/TDMA/OFDMA
Connection type	Connectionless	Connection-oriented
Full Duplex	NO	TDD/FDD

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Here goes a comparison between Wi-Fi and Wi-Max network....
Just read the table...

With this we come towards an end of the module 'Wireless Access technology
– Bluetooth , Wi-fi and Wi-Max'

Summary



- In this session, we have learned:
 - Classification IEEE wireless standards along with their range of operations
 - Bluetooth network at a very conceptual level
 - Wi-Fi and Wi-Max network from a perspective of network composition, working and applications
 - Comparison of Wi-Fi and Wi-Max network



Thank You