

Lecture 1

Wireless Communication

What is Wireless Communication?

- Transmitting/receiving voice and data using electromagnetic waves in open space
 - The information from sender to receiver is carrier over a *well-defined* frequency band (*channel*)
 - Each channel has a *fixed* frequency *bandwidth* and *Capacity* (bit-rate)
 - Different channels can be used to transmit information in *parallel* and independently.

Q: What is Medium

Q: What is Wireless Communicate

Not only voice

But data : Cricket email Sms

Q: Frequency Band and its issue

The information from sender to receiver is usually carried down over a well defined frequency band

Bandwidth – Price-

Problem ? Frequency and Bandwidth is pricey.

Each channel has a fixed frequency band width and capacity

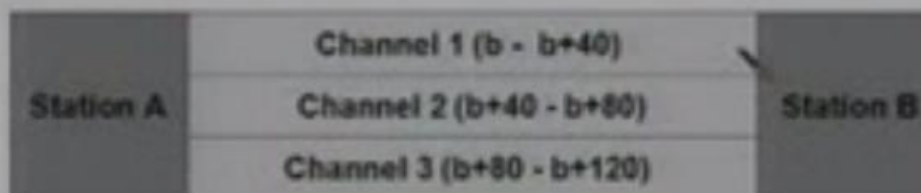
Providing services to more than one users

Different channels can be formed , as it is a multi user system , so we can accommodate more than one users at one time . Can be sent independently or Parallel

Defining Terminologies: A Simple Example

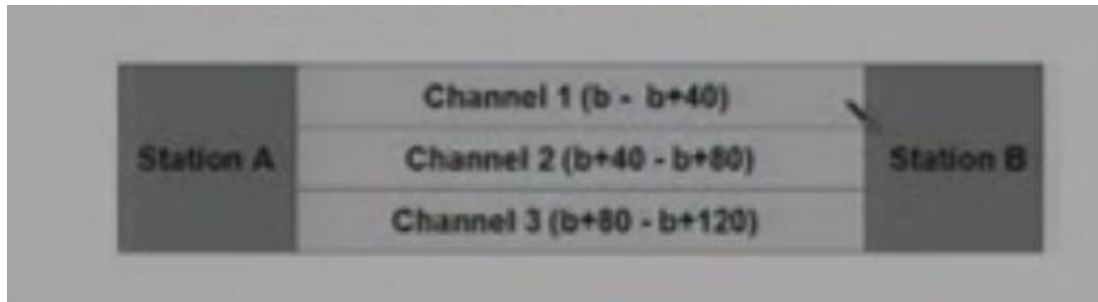
Example

- Assume a spectrum of 120 KHz is allocated over a base frequency for communication between stations A and B
- Each channel occupies 40 KHz



We have a allocation of 120 KHz bandwidth. We need to require transmit data from station A to B

A Ideal Situation



- Each channel occupies 40 KHZ
- Not practical possible to have sharp cut off
- Receiver will have filter

A lot of frequency will overlap in real life scenario , because of noise , and can cause interference .

So in this scenario, User A may start receiving or interacting with data b user

Solution : Add Guard Band

We have both type of guard bands, depending on the technique

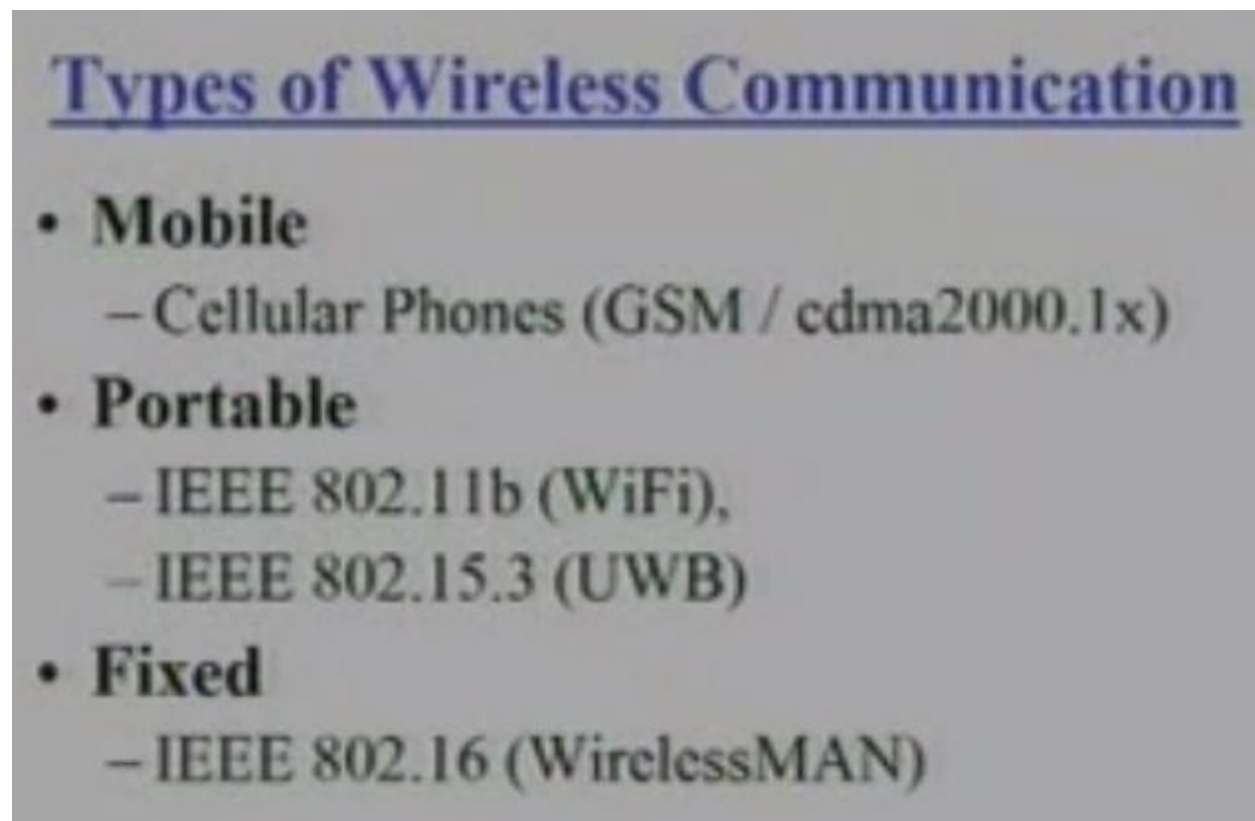
Frequency Guard Band

Time Guard Band

In this example we are having FDMA technique

- Guard band is a trait off between money and Filters
- Can not contain any data

Basic Wireless



Types of Wireless Communication

- **Mobile**
 - Cellular Phones (GSM / cdma2000.1x)
- **Portable**
 - IEEE 802.11b (WiFi),
 - IEEE 802.15.3 (UWB)
- **Fixed**
 - IEEE 802.16 (WirelessMAN)

Difference between Mobile and Portable and Fixed

- Objection : Fixed Wireless
- Advantages :
 - Freedom of wires
 - Less installation time
 - Less hardware Requirements

