COGNITIVE RADIO NETWORKS

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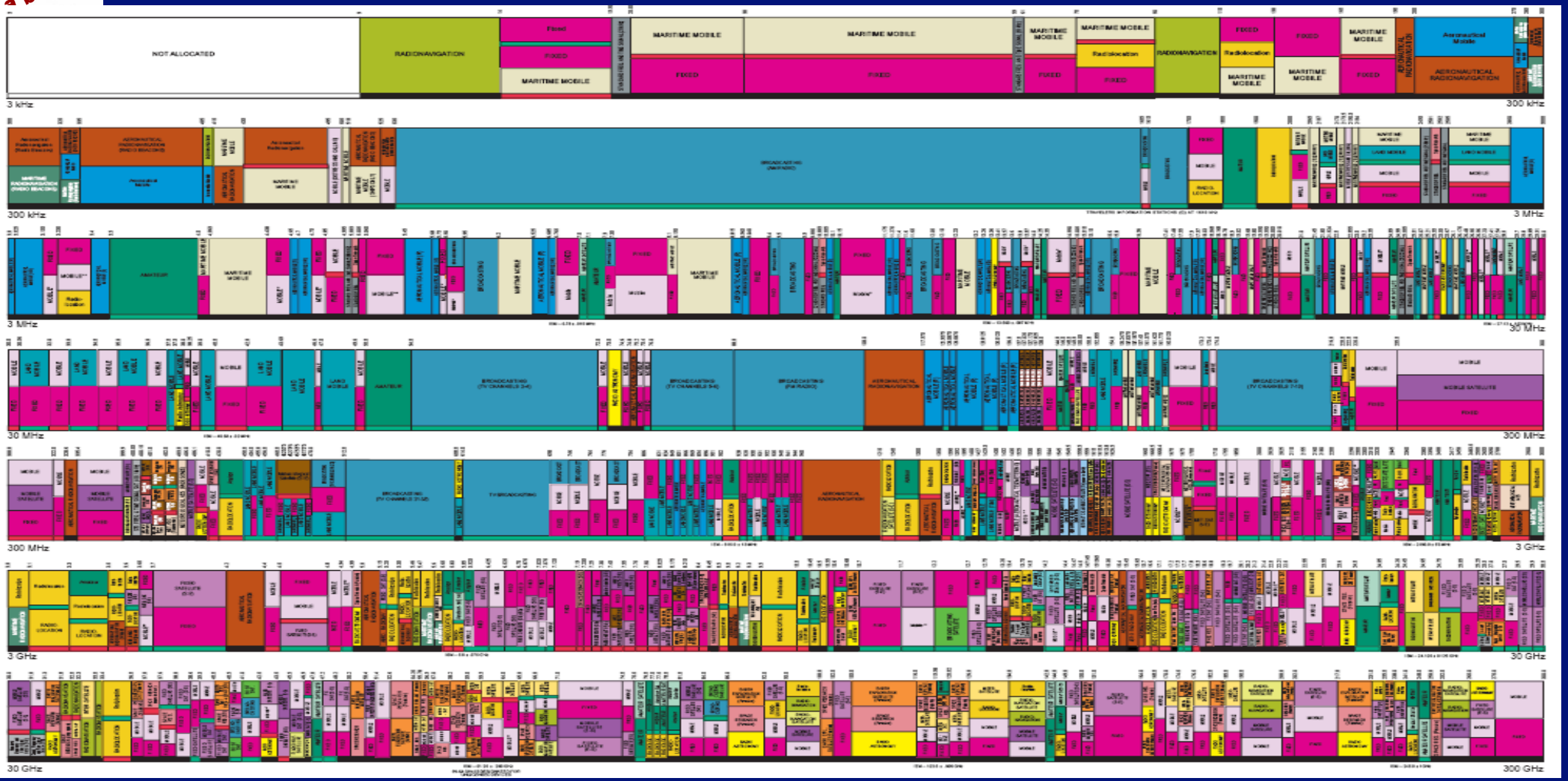
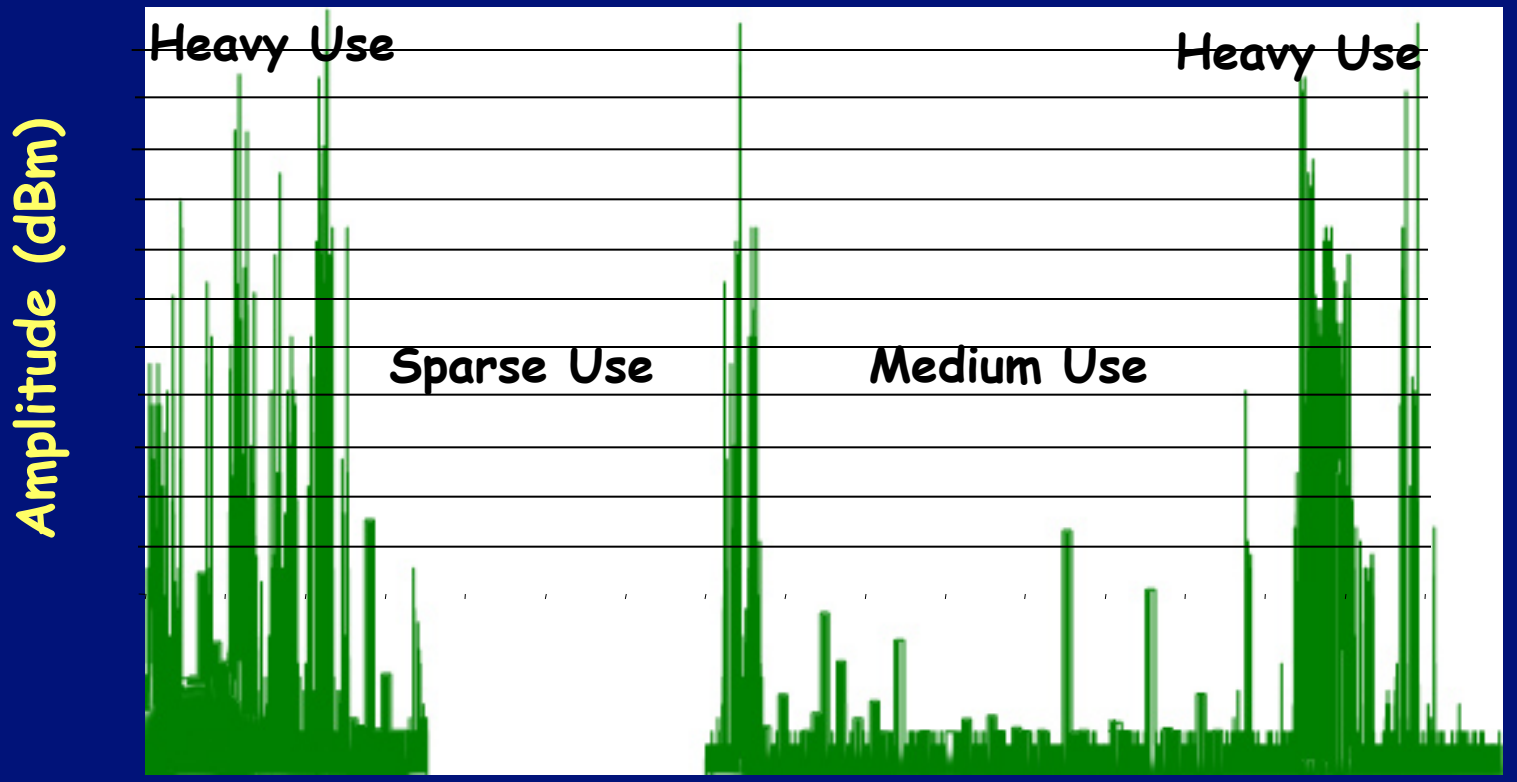
CHAPTER 1.
INTRODUCTION

FIXED SPECTRUM ASSIGNMENT

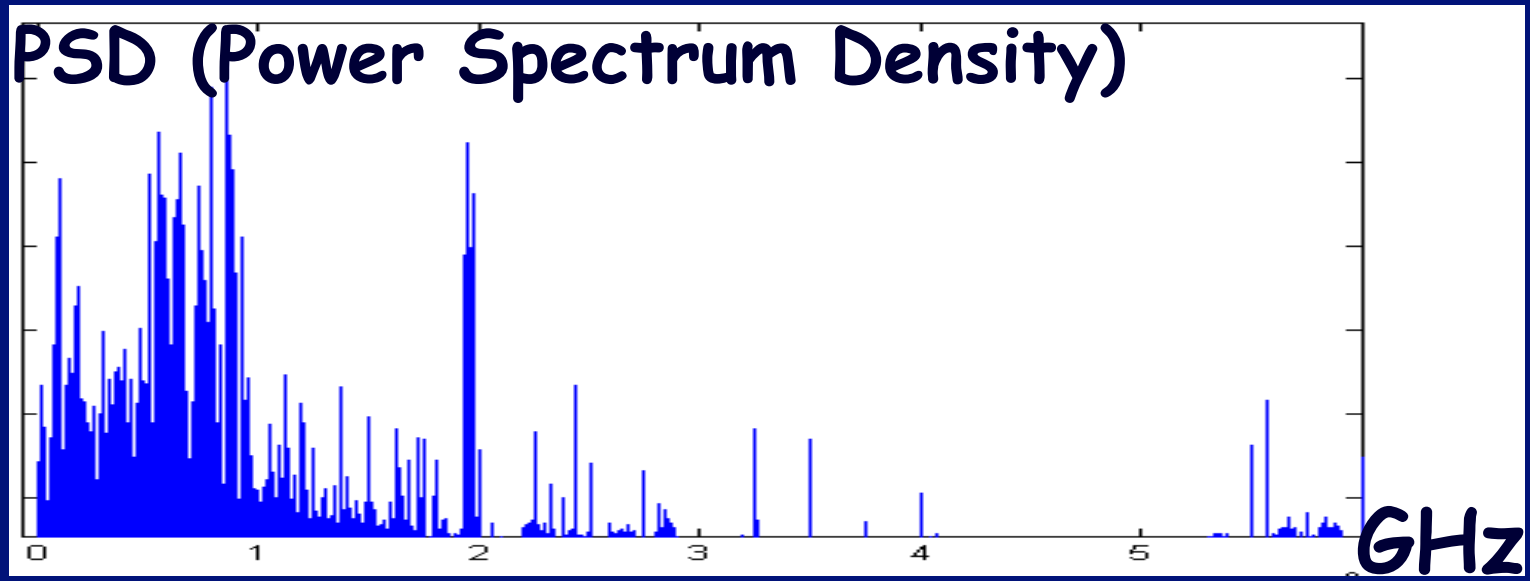


Fixed Spectrum Utilization

Maximum Amplitudes



Fixed Spectrum Utilization



Freq (GHz)	0~1	1~2	2~3	3~4	4~5	5~6
Utilization(%)	54.4	35.1	7.6	0.25	0.128	4.6

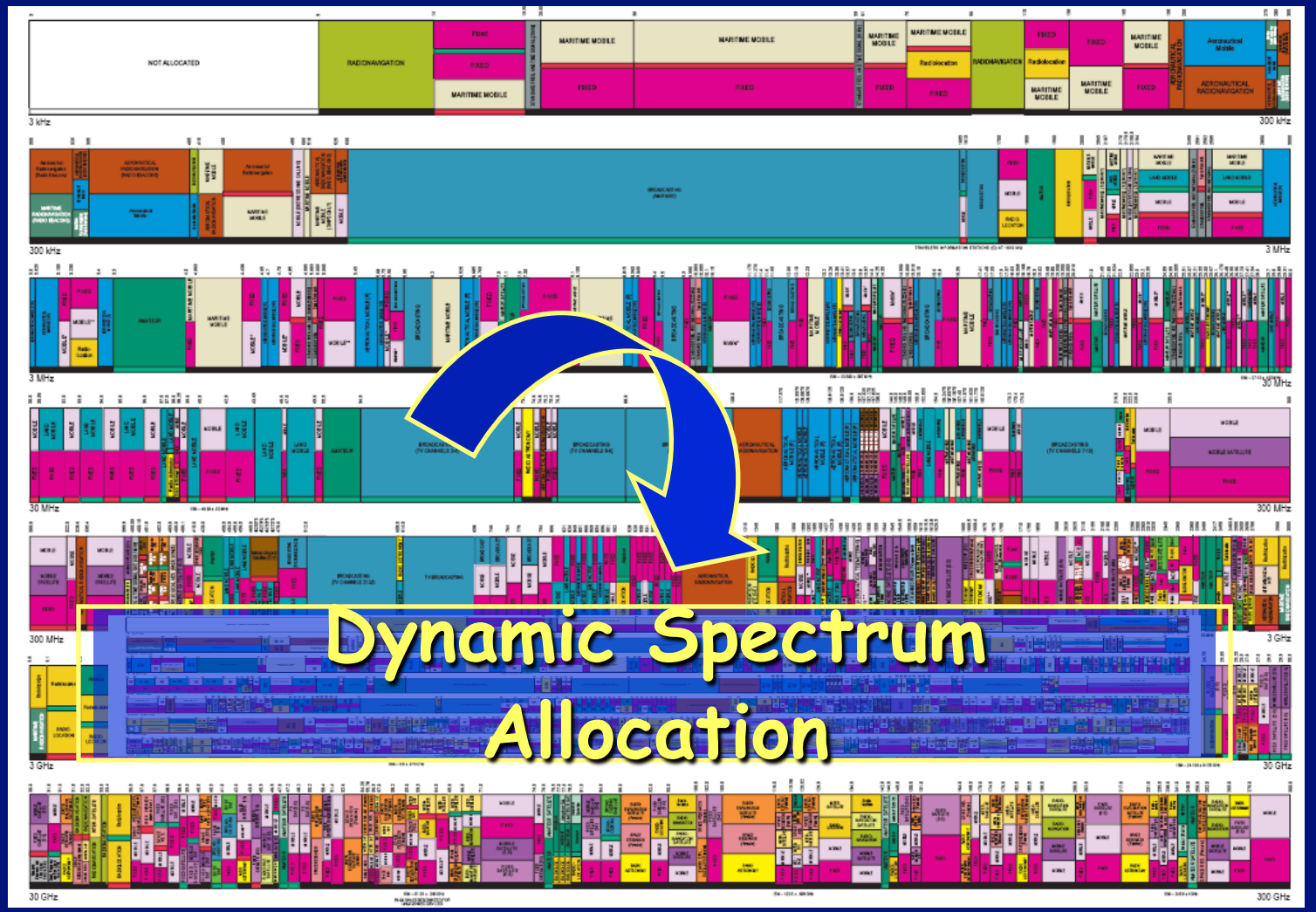
Measurements show that there is wide range of spectrum utilizations across 6 GHz of spectrum

Problems of Fixed Spectrum Utilization

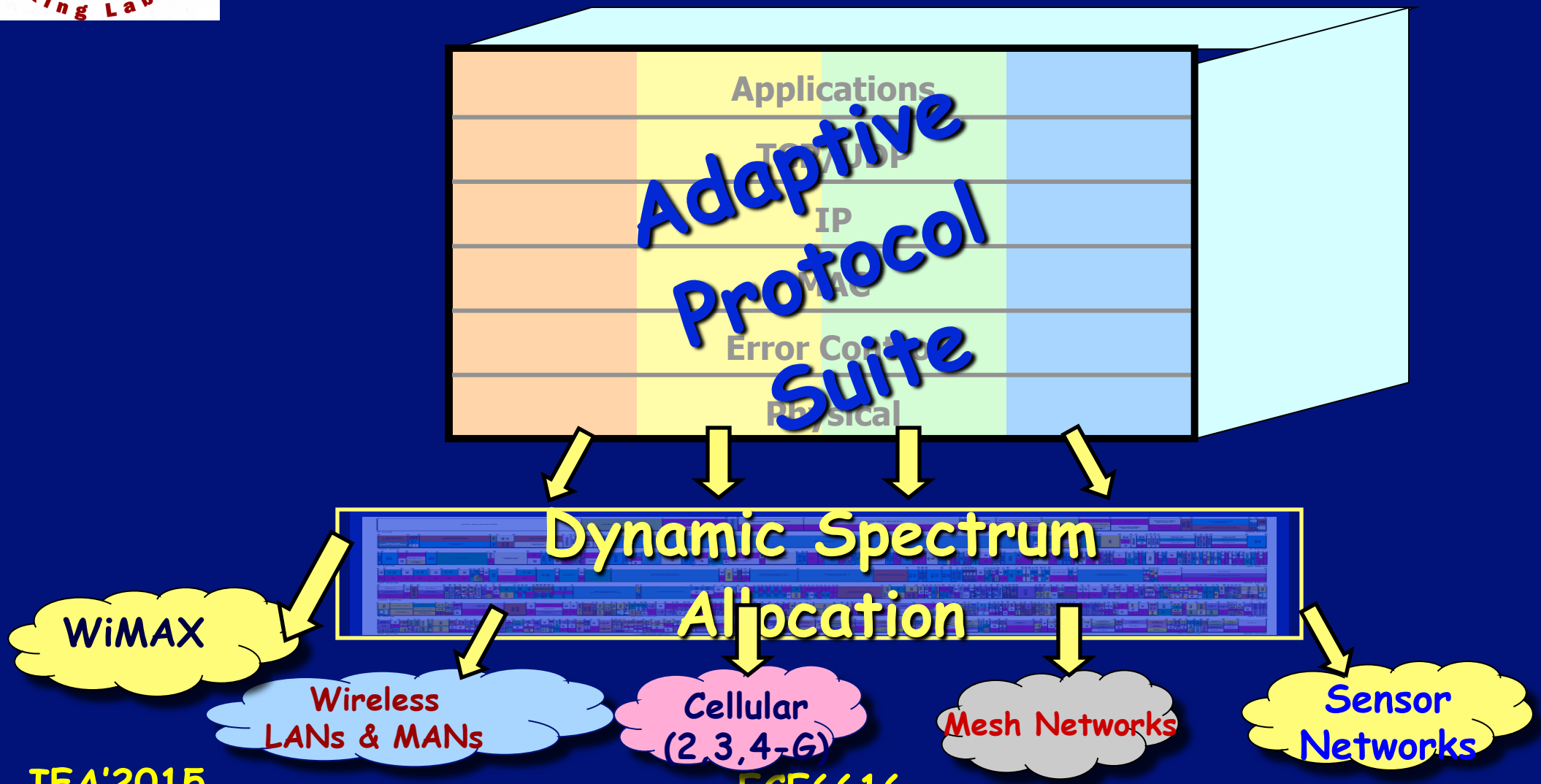
- Spectrum usage is concentrated on certain portions of the spectrum
- A significant amount of the spectrum remains unutilized.
- According to FCC (Federal Communication Commission):
  Utilization of the fixed spectrum assignment is approx.
  15-85% based on temporal and geographical variations

→ Limited Available Spectrum and Inefficient Spectrum Usage!

COGNITIVE RADIO NETWORKS; DYNAMIC SPECTRUM ALLOCATION NETWORKS (DSANs); xG INITIATIVE



OVERALL VIEW



COGNITIVE RADIO

- A "Cognitive Radio" is the key enabling technology for Dynamic Spectrum Access!!
- Capability to use or share the spectrum in an opportunistic manner. "BANDWIDTH HARVESTING"
- Dynamic spectrum access techniques allow the CR to operate in the best available channel.

SPECTRUM MANAGEMENT FRAMEWORK

1) Determine which portions of the spectrum is available and detect the presence of licensed users when a user operates in a licensed band *(Spectrum Sensing)*

2) Select the best available channel (*Spectrum Decision*)

3) Coordinate access to this channel with other users (*Spectrum Sharing*)

4) Vacate the channel when a licensed user is detected *(Spectrum Mobility).*

COGNITIVE RADIO NETWORK COMMUNICATION FUNCTIONALITIES