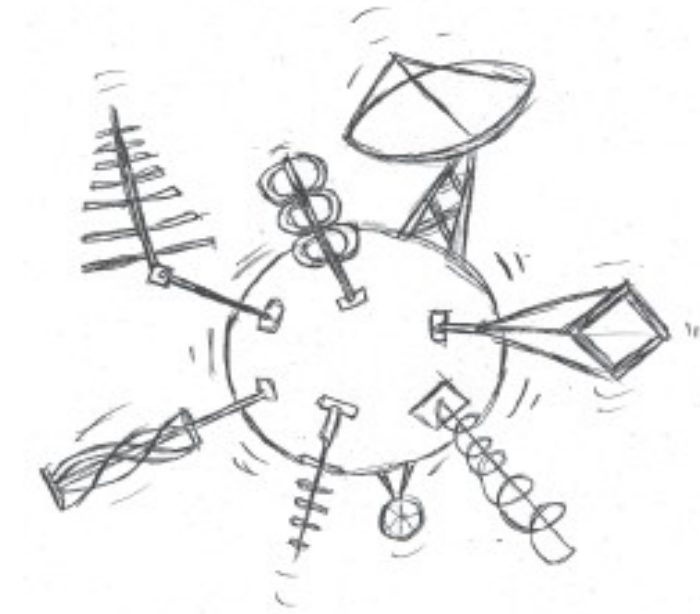


Spectrum Sensing for Dynamic Spectrum Access



Daniel Romero

Signal Processing for Communications Group (GPSC)

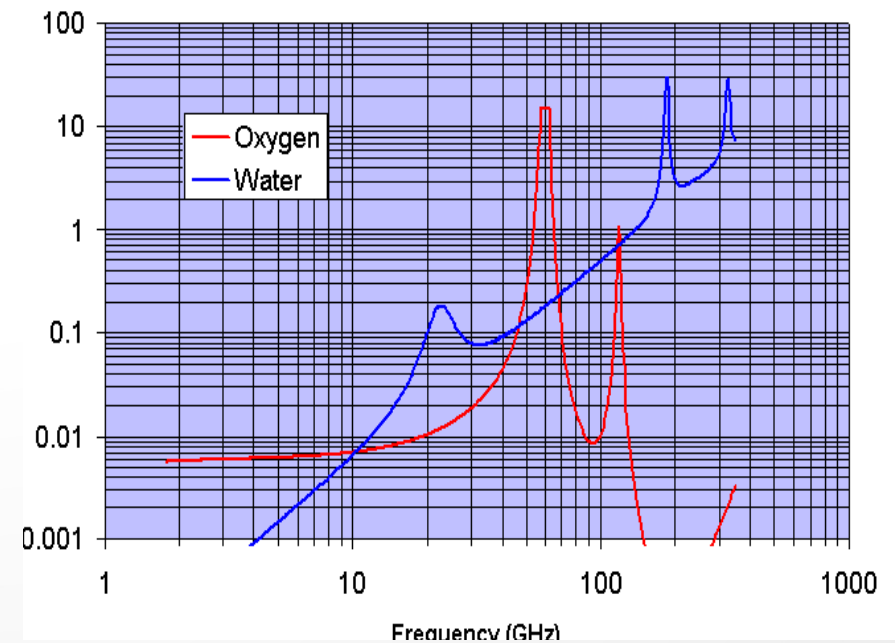
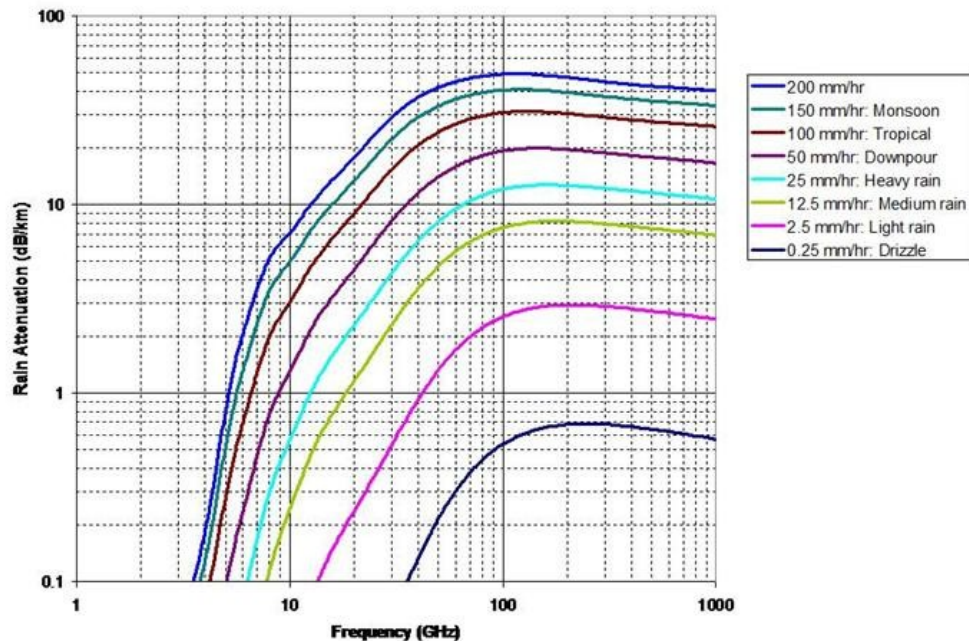
Advisor: Prof. Roberto López Valcarce

Question

How much radio spectrum do we have??

Answer: Not Too Much

- How much spectrum do we have?
 - Low frequencies → low bandwidth
 - High frequencies → high attenuation



What does it mean???

What does it mean???

MONEY, MONEY, MONEY....



The Paradox

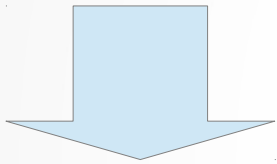


- Operators spend billions in spectrum licenses
- Measurements report that most RF spectrum is highly unused

Where to go???

Where to go???

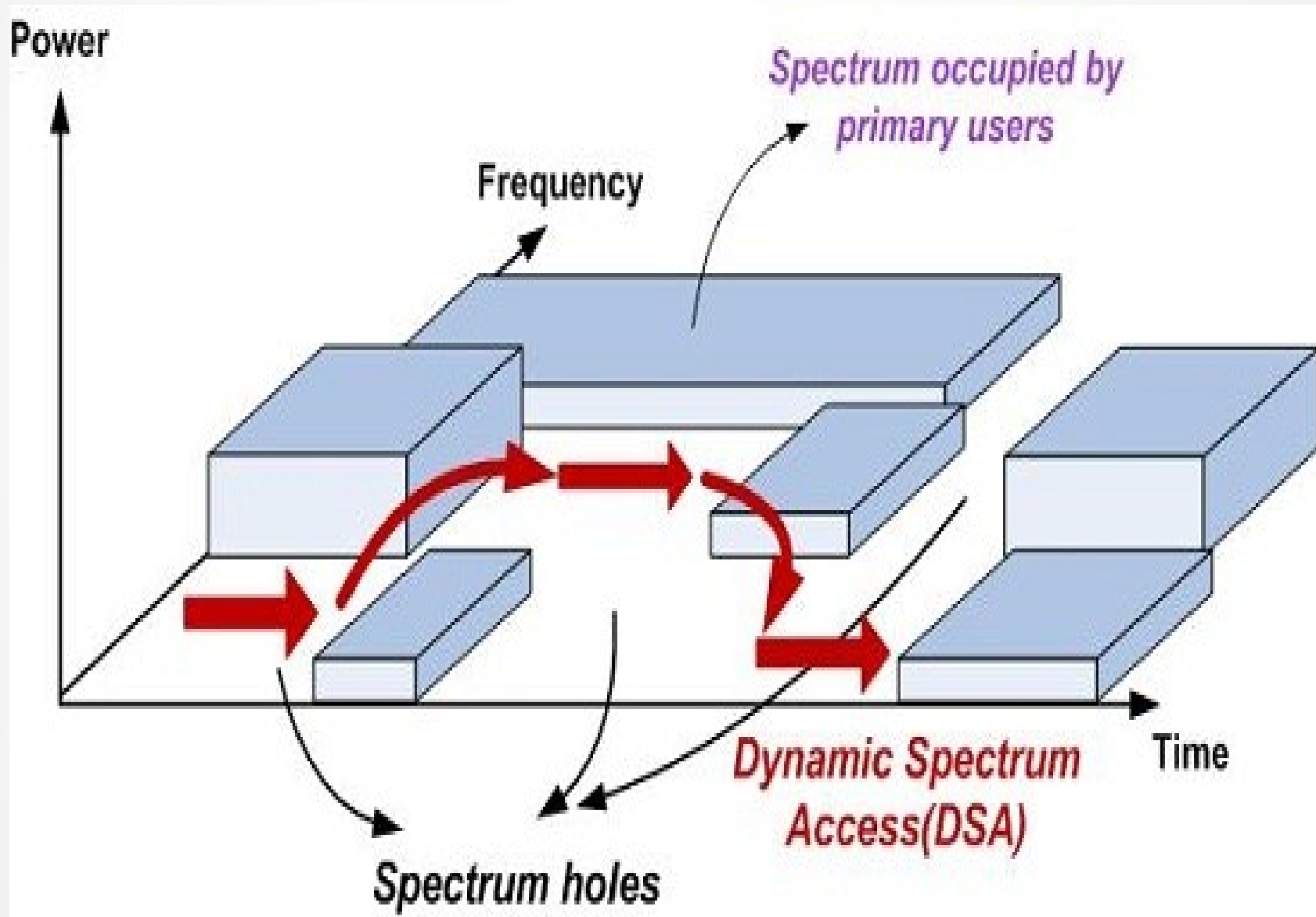
- FCC opened TV channels for unlicensed access



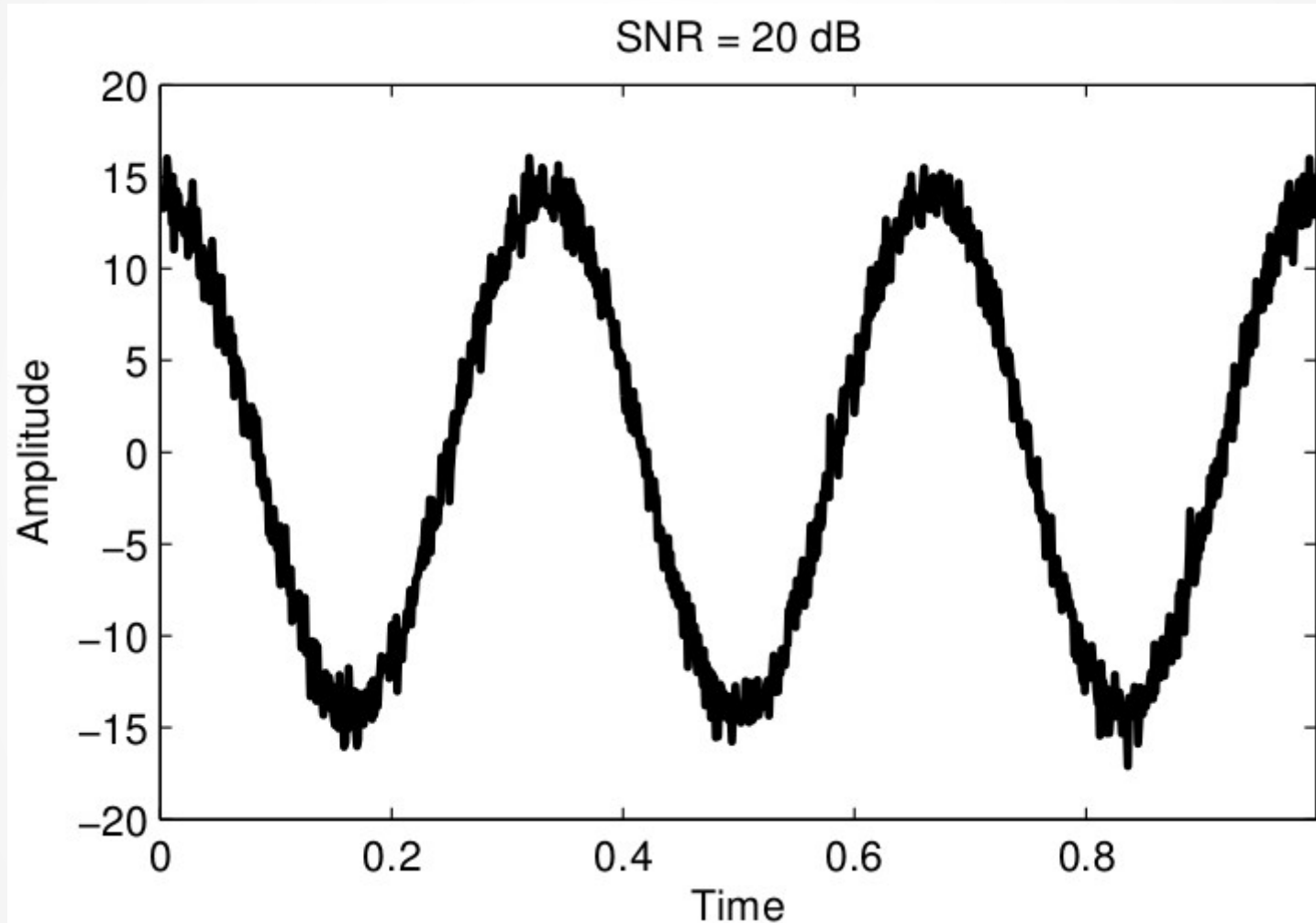
- Opportunistic Access



White Spaces

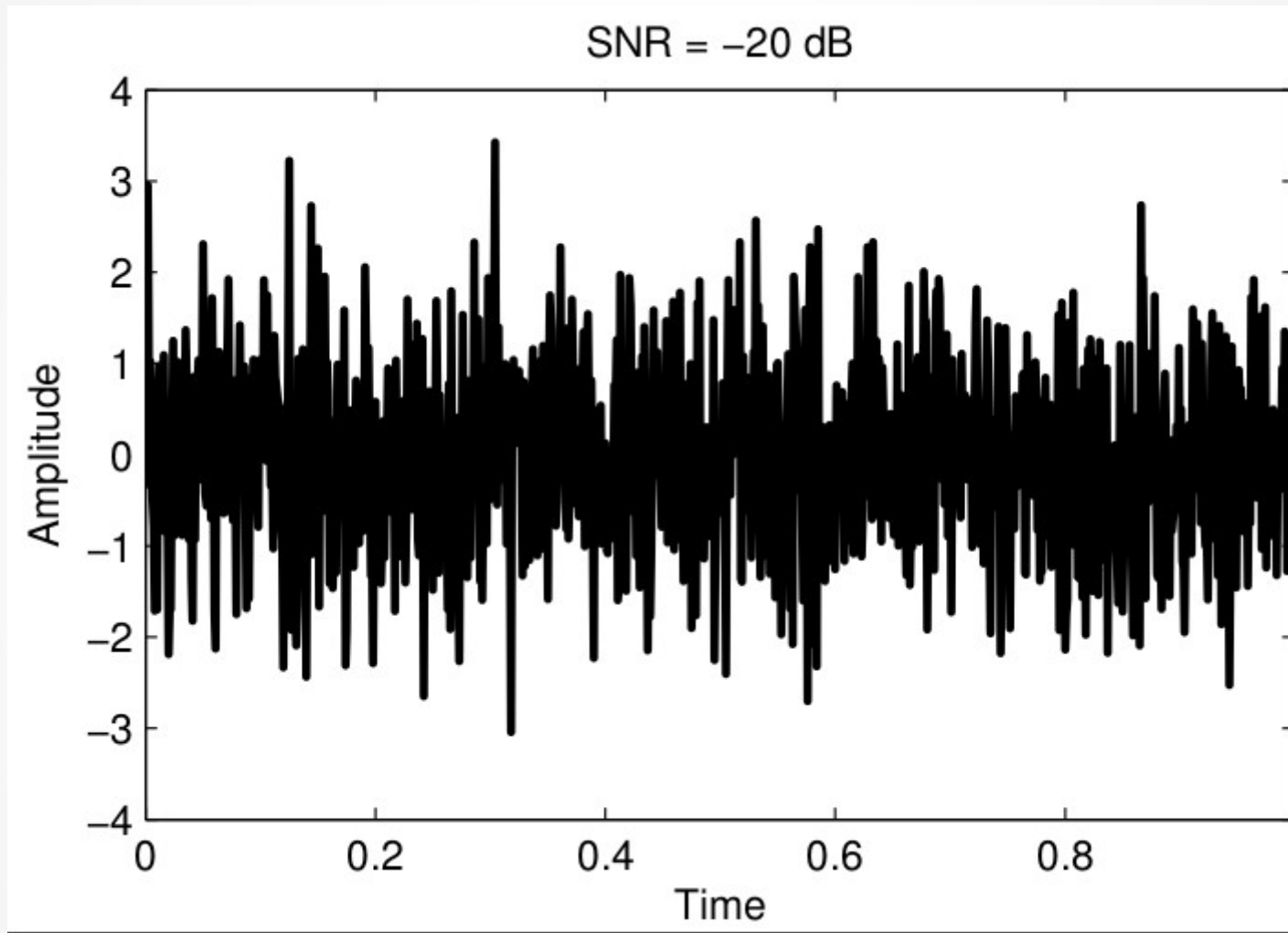


Spectrum Sensing



High SNR → easy!!

Spectrum Sensing



Low SNR → not so easy!!

Spectrum Sensing: How To

- yeah... but... how to distinguish signal from noise?

Spectrum Sensing: How To

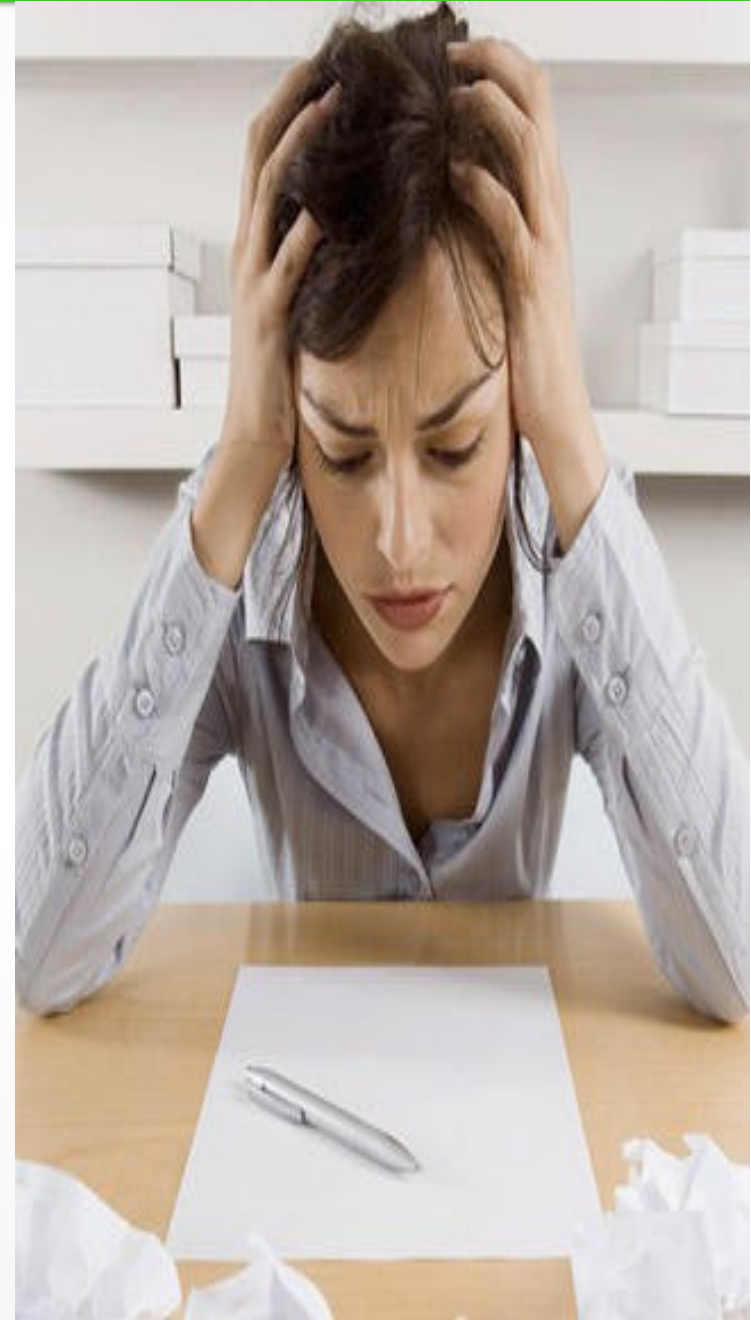
- yeah... but... how to distinguish signal from noise?



→ We need to exploit features
(prior information)

Spectrum Sensing: How To

- What we have done:
 - Bandlimited Signals
 - Constant Magnitude Signals
 - Signals with Known Power Spectrum
 - Time-varying Channels
 - Multiple Antennas
 - Multiple Sensors



Thank You