King Abdul-Aziz University

TIME SENSING FOR COGNITIVE RADIO SYSTEM

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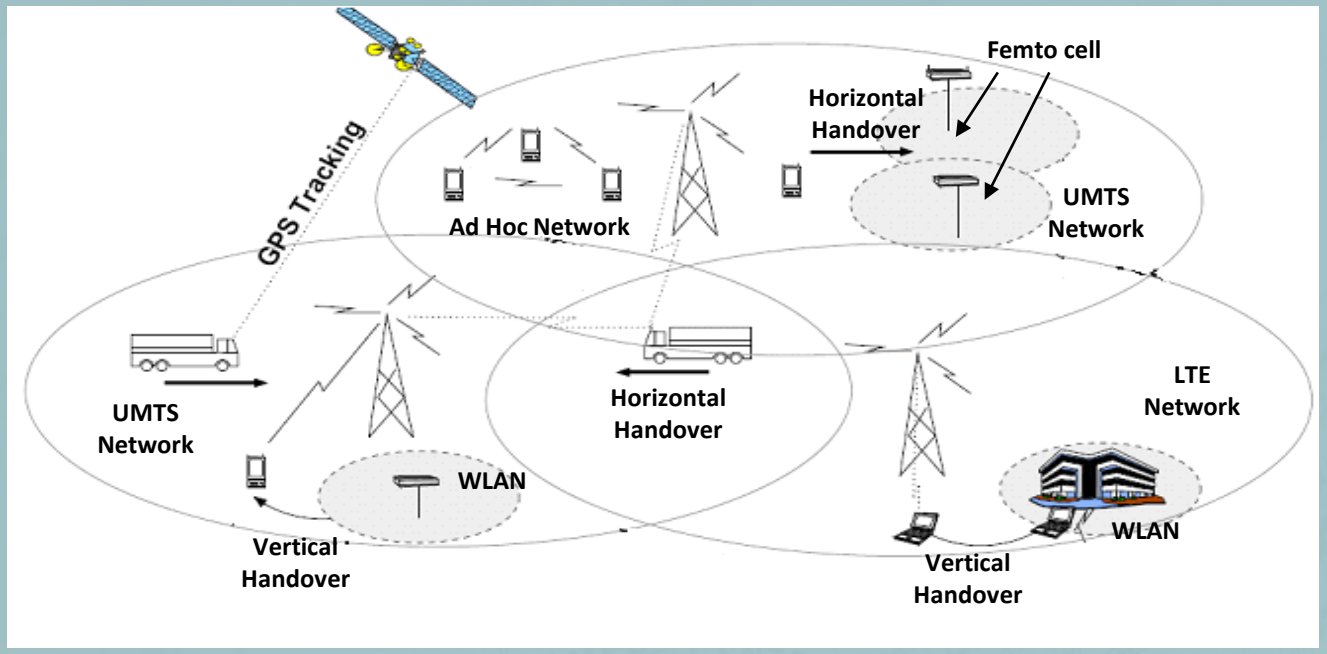
LAYOUT

- Introduction
- System Architecture
- Methodology and Analysis
- Simulation Model
- Results and discussion
- Conclusion
- Future Works

MOBILE NEXT GENERATION NETWORK



Cognitive technology is the underlying technology behind the solutions proposed to address capacity and performance improvement in MNGN

MNGN is a heterogeneous network in which different access technologies are arranged in different topologies.

SENSING (FREQUENCY) IN COGNITIVE RADIO

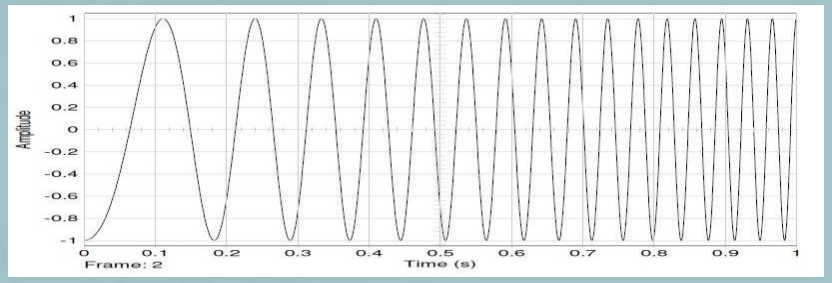
- Sensing the spectrum is the most important function in cognitive radio system.
- It is important to determine utilized/unutilized frequency within the spectrum.
- Sensing accuracy and system simplicity are inversely related
- Methods for sensing (frequency):
  - Energy detection
  - Matched Filter
  - Cyclostationary detection

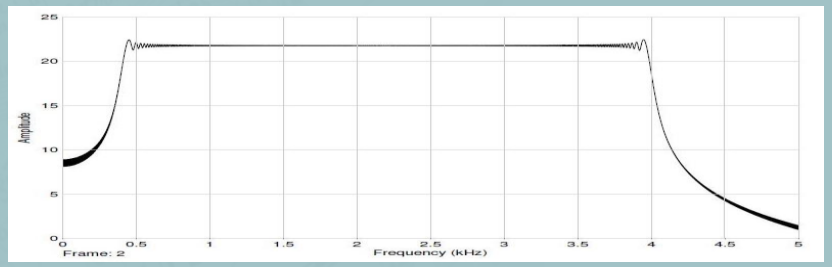
SENSING (TIME)

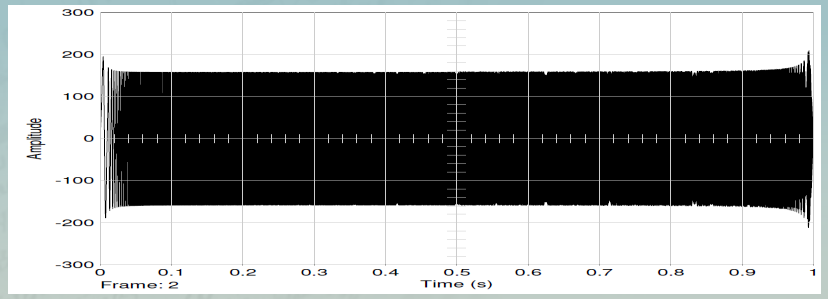
- Sensing duration (i.e. how long should cognitive radio switch to sensing mode) is a challenging aspect in spectrum sensing as primary users can claim their frequency at any time.
- Thus Sensing frequency (i.e. how often cognitive radio should perform spectrum sensing) brings about a tradeoff between time of sensing and accuracy.
- Characterizing the interference will help to resolve complexity

WIDEBAND CHIRP SIGNAL (RESOLUTIONS)

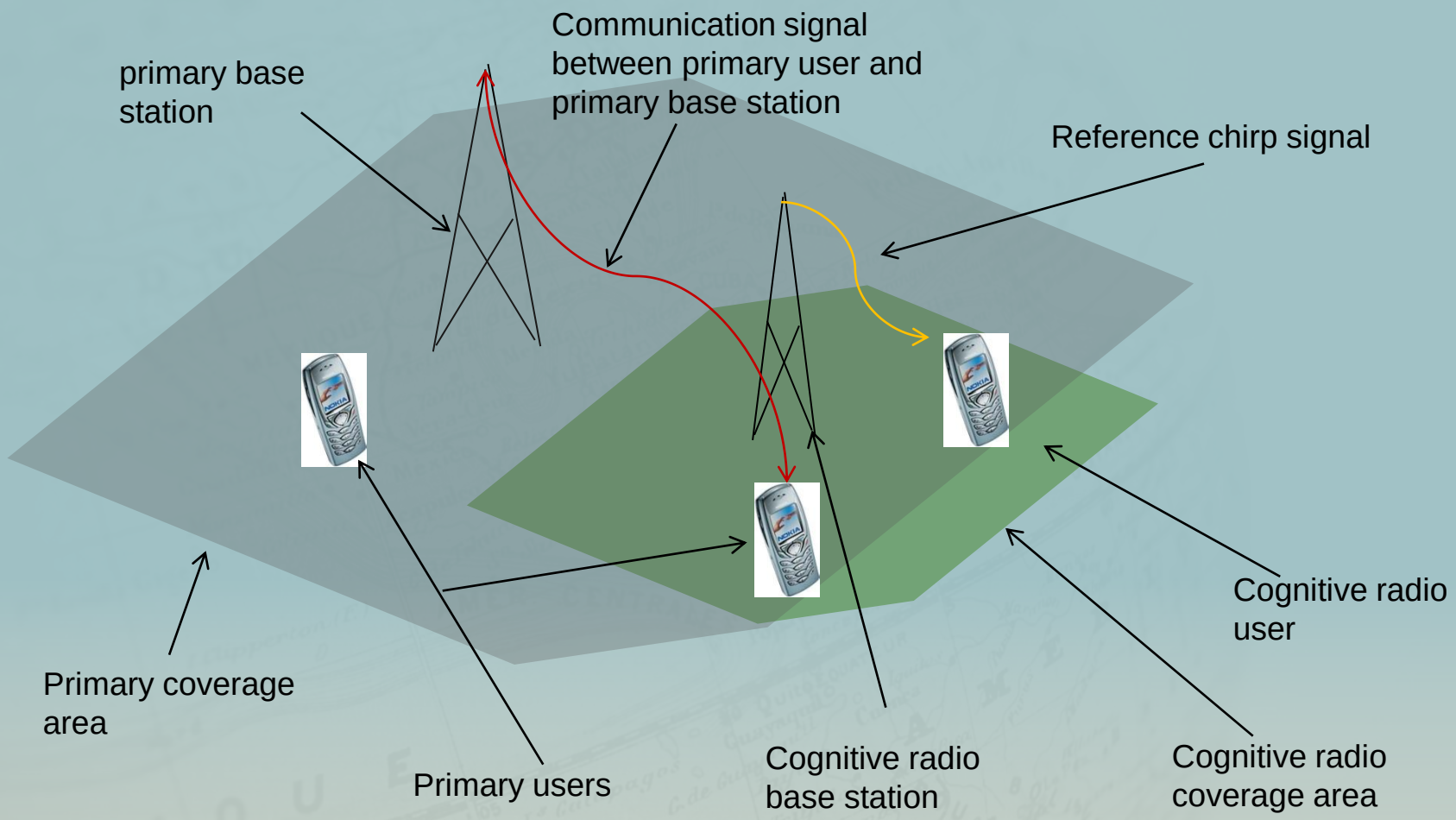
- Chirp signal is wideband signal generated by linearly sweep (increase/decrease) the instantaneous frequency of sine wave.
- Spectrum resolution is obtained by correlating the chirp with itself
- Time resolution is obtained by correlating the chirp with its conjugate



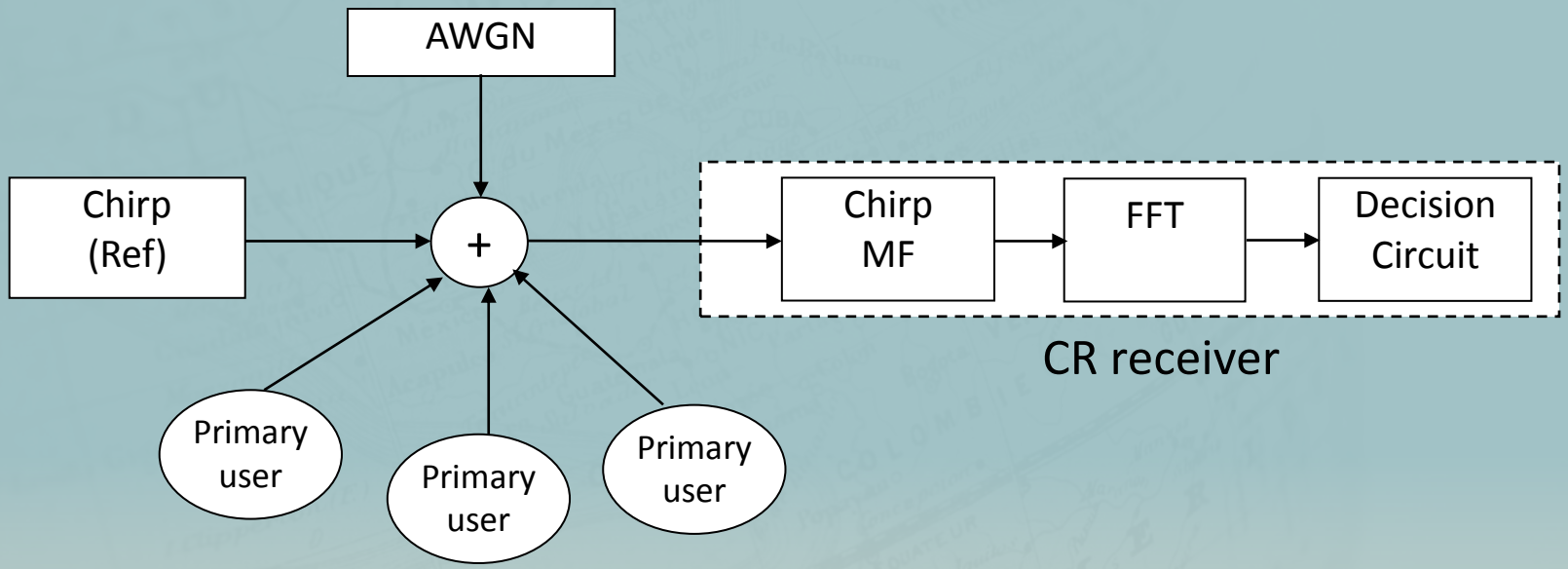




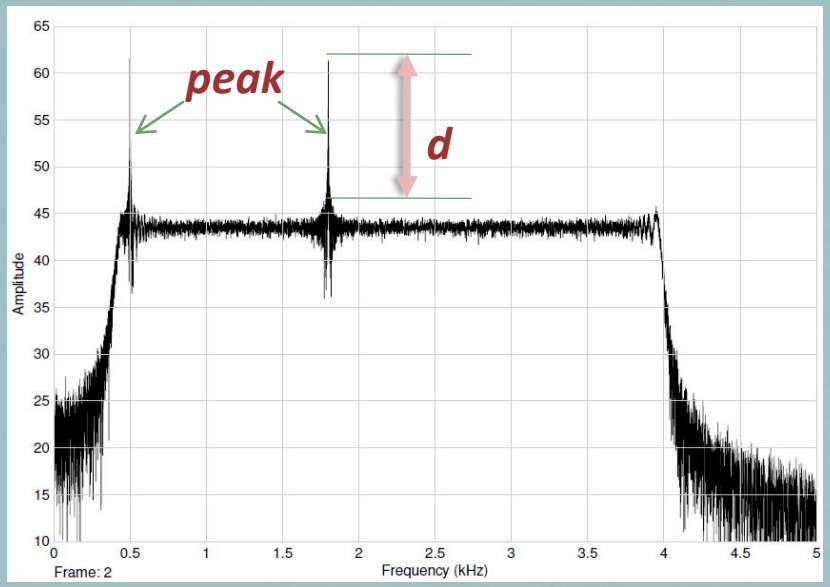
SYSTEM ARCHITECTURE



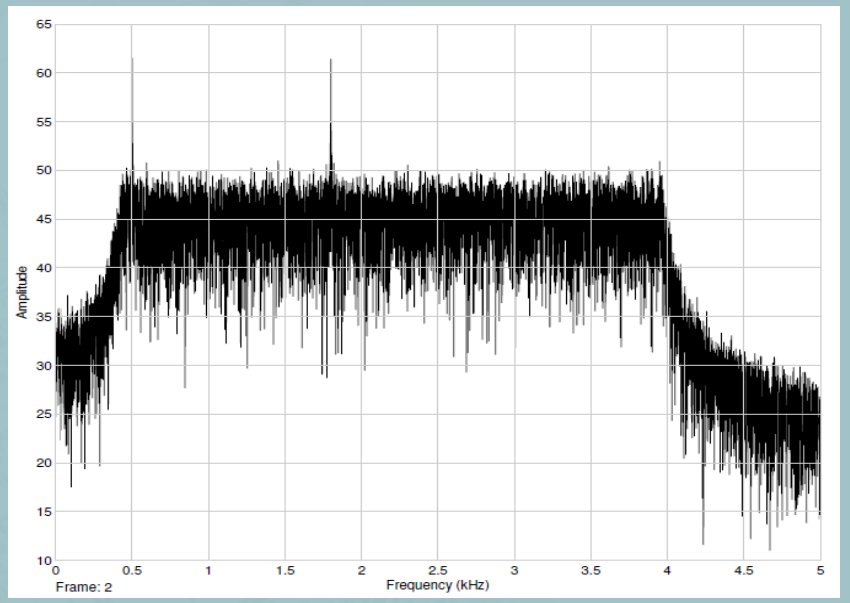
SENSING FREQUENCY



RESULTS (EFFECT OF AWGN)

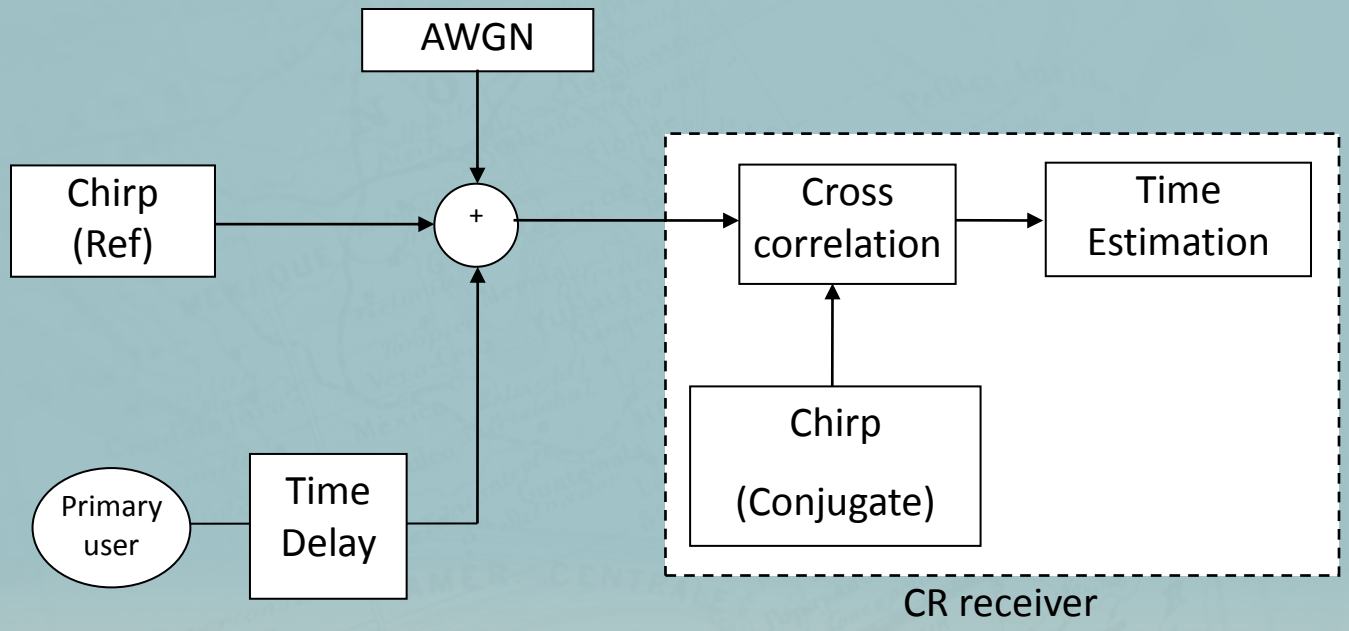


SINR = 10 dB

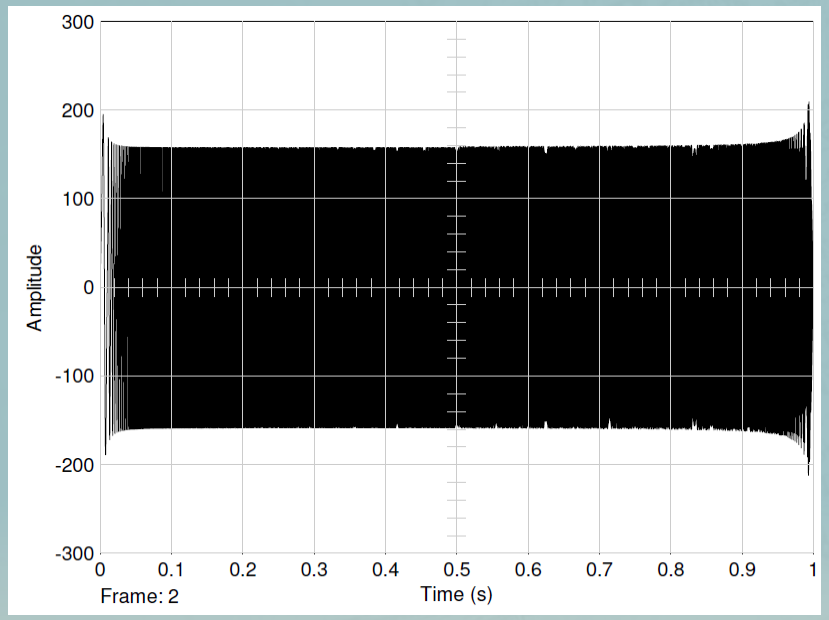


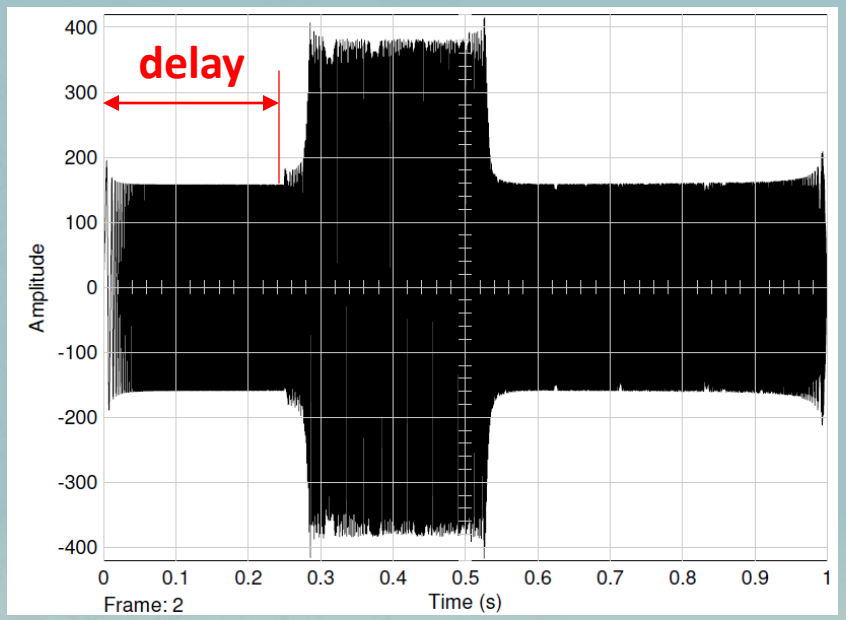
SINR = -5 dB

SENSING TIME

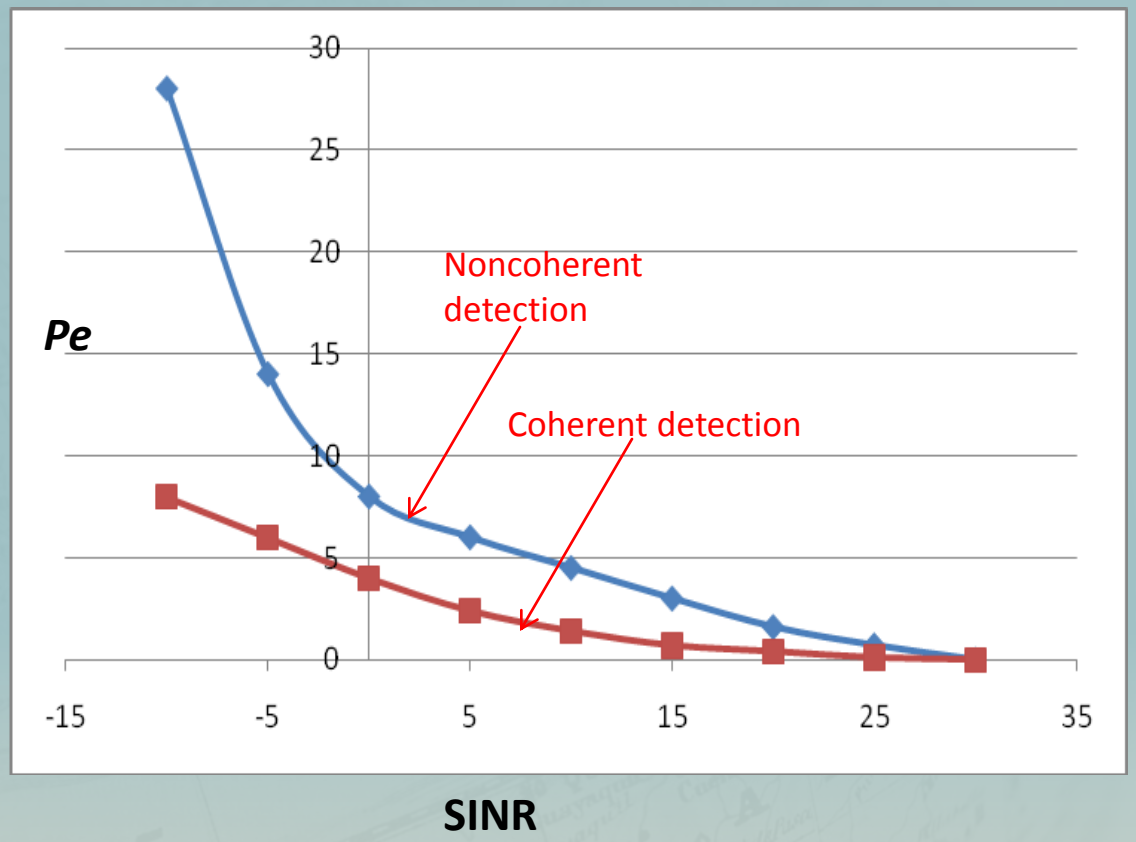


RESULTS (CHIRP TIME RESOLUTION)

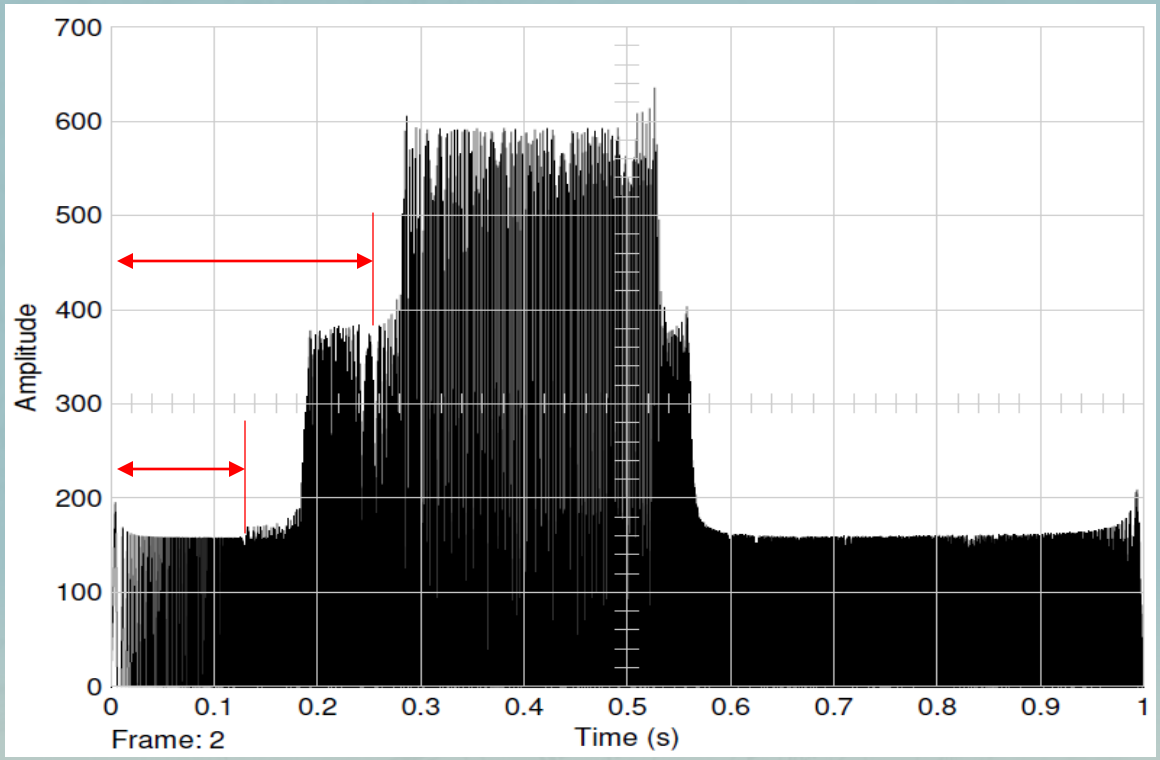




RESULTS (SINR VERSUS P_e)



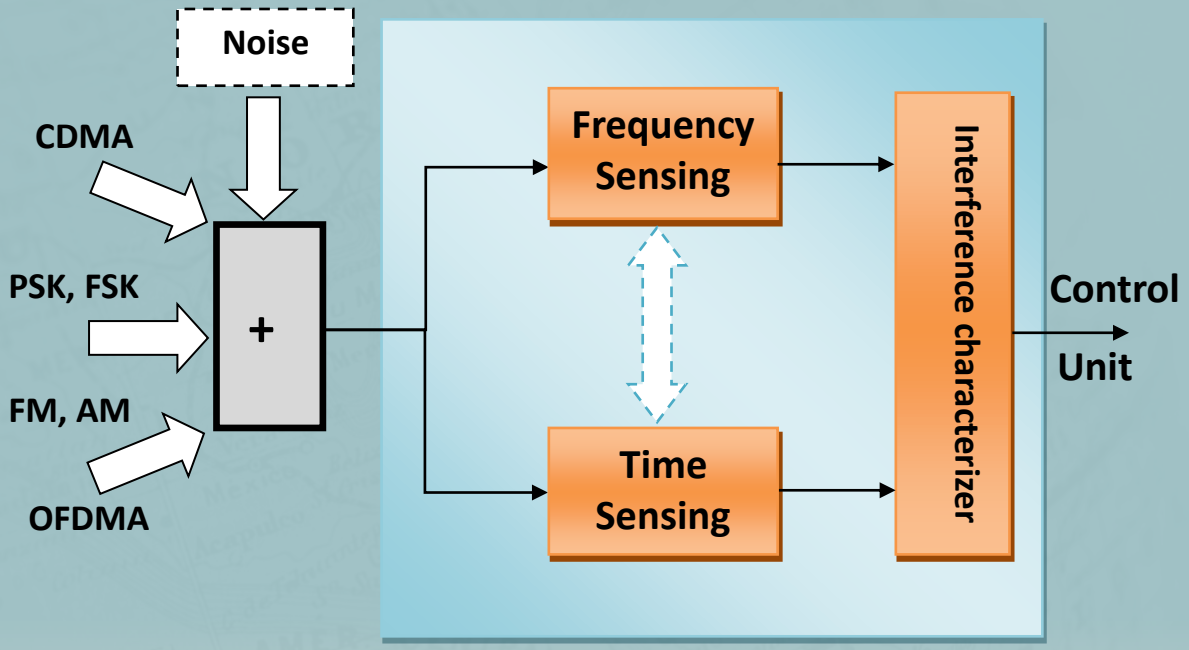
RESULTS (RECEIVING 2 TONES)



CONCLUSIONS & FUTURE WORK

- Sensing cognitive radio environment using chirp signal is tested
- Time resolution of chirp signal is used to determine user temporal behaviour
- As SIR decreases *Pe* of delay estimation increases
- Coherent detection of the carrier improves Pe
- In future work we will look into network level simulation to study the limitations of the suggested strategy. We will also work on testbed implementation.

FUTURE WORK


Noise
CDMA
PSK, FSK
FM, AM
OFDMA
+
Frequency Sensing
Time Sensing
Interference characterizer
Control Unit

Q&A

Thank you


MEXIQUE
CUBA
VENEZUELA
COLOMBIE
AMER. CENTRALE
Courant
Froid