

ISART 2010

# Overview Panel

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# Detection

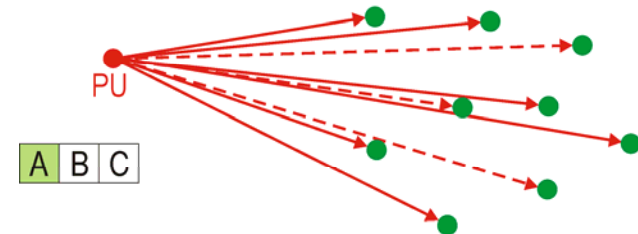
Reliable and fast detection of primary signals by secondary systems is of paramount importance for the application of overlay concepts.

Reliability and promptness act in opposite directions. Therefore, the detection has to be adapted to the situation:

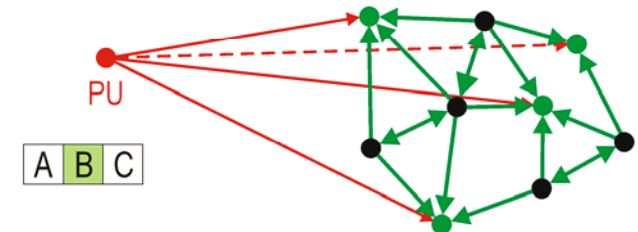
- Energy
- Matched Filter
- Pattern Recognition
- Spectrum
- Modulation Mode
- Coding
- Protocol Structure
- Distributed Detection



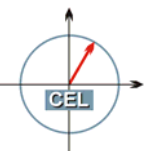
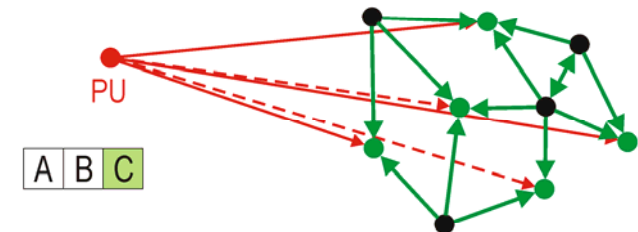
a) Detection



b) Boosting and Collection



c) Collection and Boosting

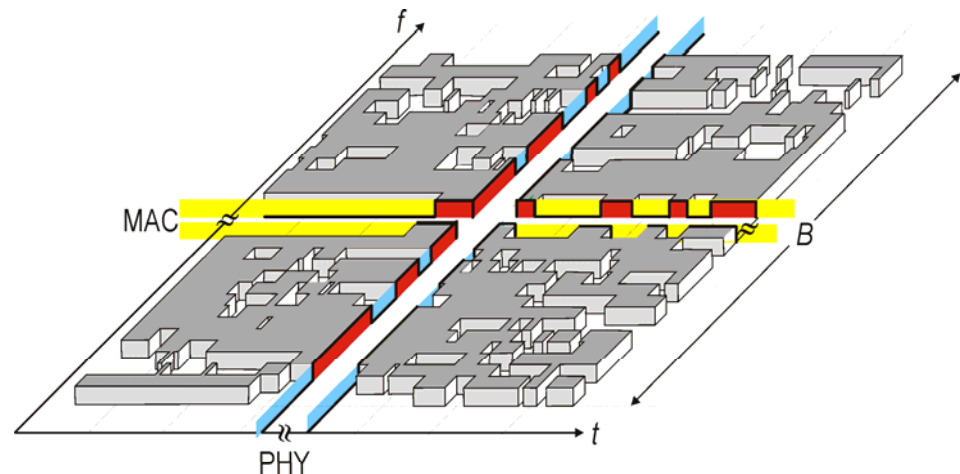


# Radio Environment Maps (REM)

## Situation Awareness

Space, Time, Frequency, Power

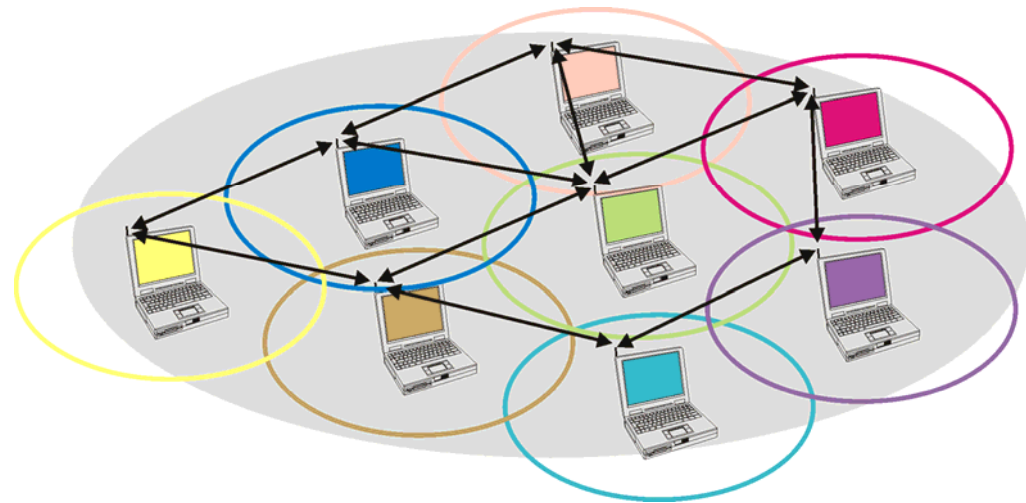
- Construction of **appropriate data bases** (REM)  
Information to be stored?  
How to keep the information up to date?
- Strategies to acquire **frequencies currently idle**  
Fallback to information stored in REM  
Verification by actual measurements
- Technologies to **minimize disturbance**  
Directional antennas  
MIMO  
Intelligent antennas  
Power control



# Pilot Channels

Connecting **ad-hoc networks** to infrastructure

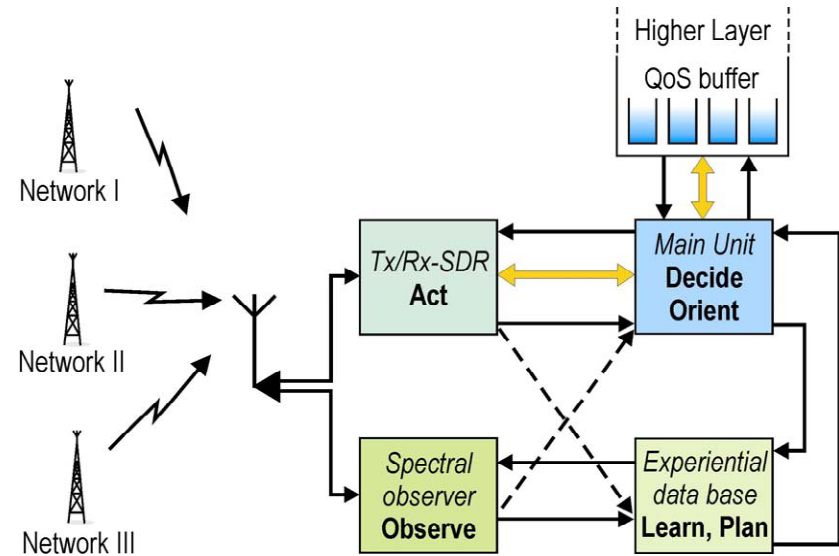
- physical pilot channels
- logical pilot channels  
local control
- Influence of  
Protocols  
Spectrum efficiency



# Cognitive Manager

Realization of Mitola's **cognition cycle** through introduction of a modular scalable structure of four main components

- SDR based **transceiver**
- **Main Unit** for terminal control and for processing the QoS requirements posed by upper layers
- **Data base** to store REM
- **Spectral observer** to carry out measurements of current utilization



# Testbed for Overlay Systems

## Overlay systems

- Central (access point) or distributed organization
- Connection to internet
- Well understood from academic point of view
- Experiments are necessary

## Goal

- Enhance efficiency in spectrum utilization (spectrum efficiency) through secondary use

## Scenario

- In house systems (wireless networking, monitoring, control, ...)



# Concluding Remark

- Academics and practicing engineers should come closer together:

There is no Cognitive Radio without mathematical modeling and there is no Cognitive Radio without wave propagation!



Thank you for listening!

