Terrestrial and Aerospace Broadband Radio Transmissions (Tera-BIT)

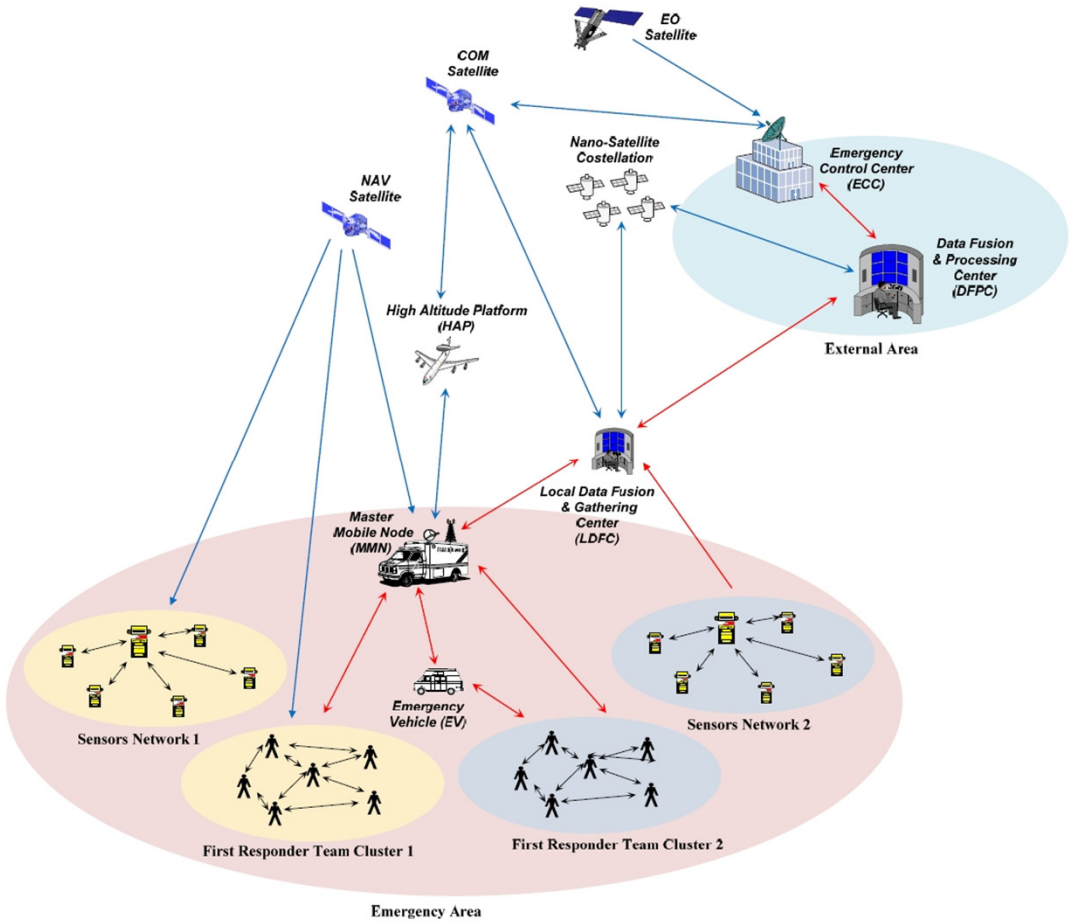
MSc. Thesis proposals about Mobile and Satellite Communications Techniques

Academic year 2010/2011

Supervisor: Claudio Sacchi

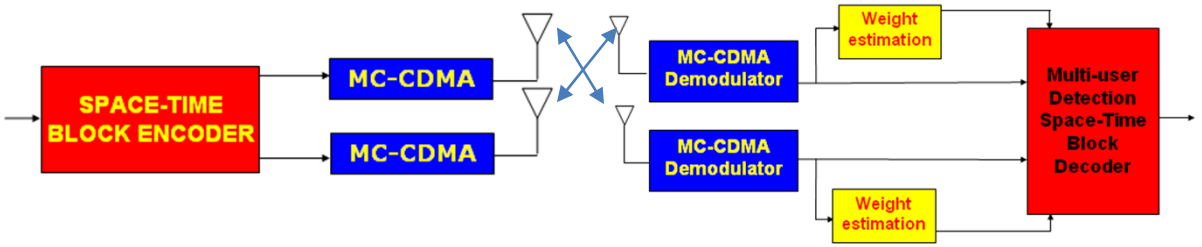
Opportunistic communications for emergency applications (1)

- **Subject:** study and development of signal processing techniques to detect signals coming from “missed uplinks” (e.g.: buried terminals);
- **Keywords:** mode identification, weak signal detection, decoding of standard transmission flows (voice packets, data packets, etc.);
- **Typology of thesis:** algorithmic and simulative (MATLAB-SIMULINK)



MIMO Multicarrier techniques

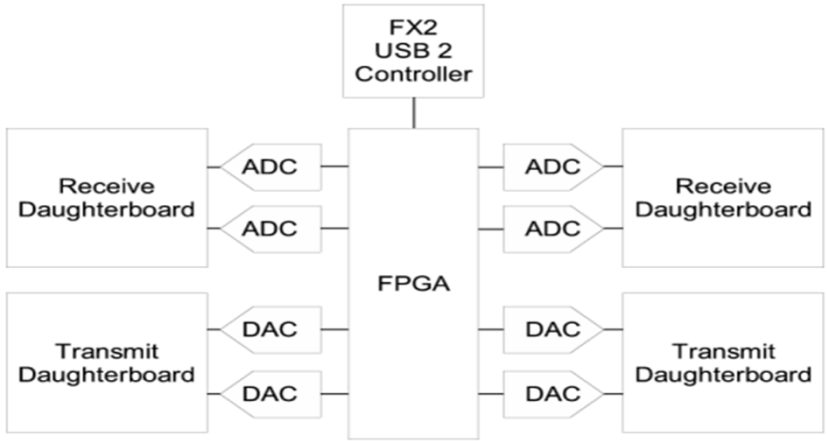
- **Subject:** study and development of novel algorithms for iterative decoding of MIMO OFDM (OFDMA) transmission techniques;
- **Keywords:** MIMO systems, OFDM (OFDMA) channel estimation and ST coding/decoding, turbo MIMO coding;

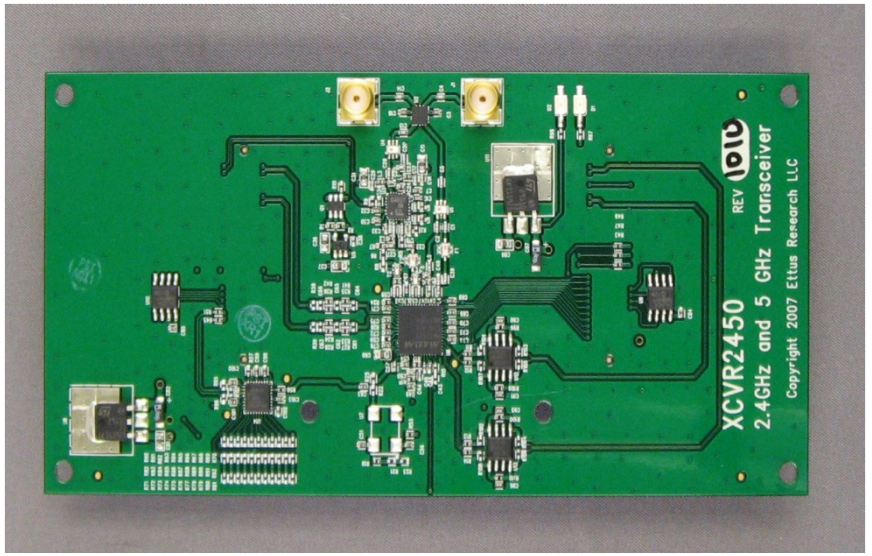


Typology of thesis: algorithmic and simulative (MATLAB/SIMULINK environment);
Possible cooperation with University of Alberta (Canada)

Software radio and OFDM

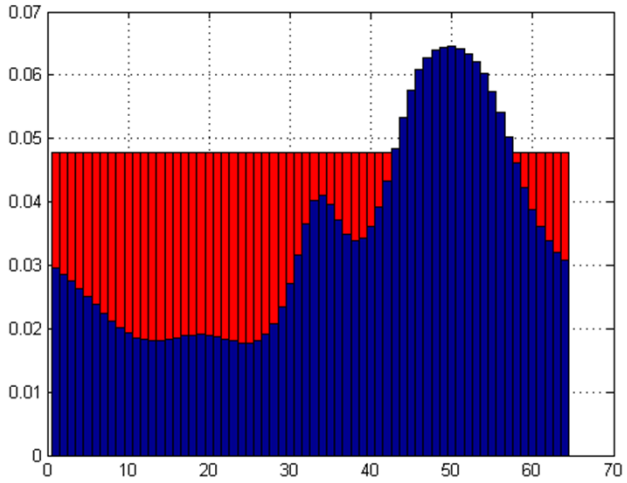
- **Subject:** development of software radio algorithms for efficient detection of OFDM signals transmitted by means of ETTUS programmable devices;
- **Keywords:** synchronization, channel estimation, equalization, efficient radio resource assignment, waterfilling;
- **Typology of the thesis:** development and testing in-lab (C development and PHYTON compiler). Use of alternative open-source platforms (GNU-radio, OSSIE)

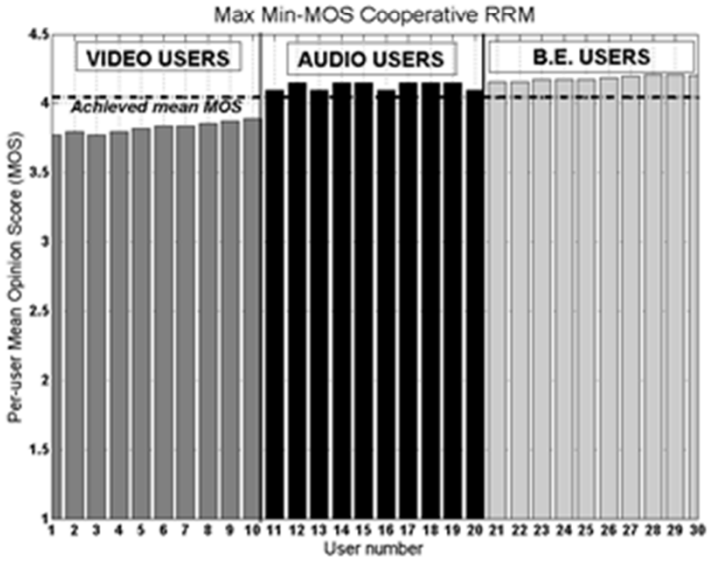




«Green» OFDMA and Game Theory

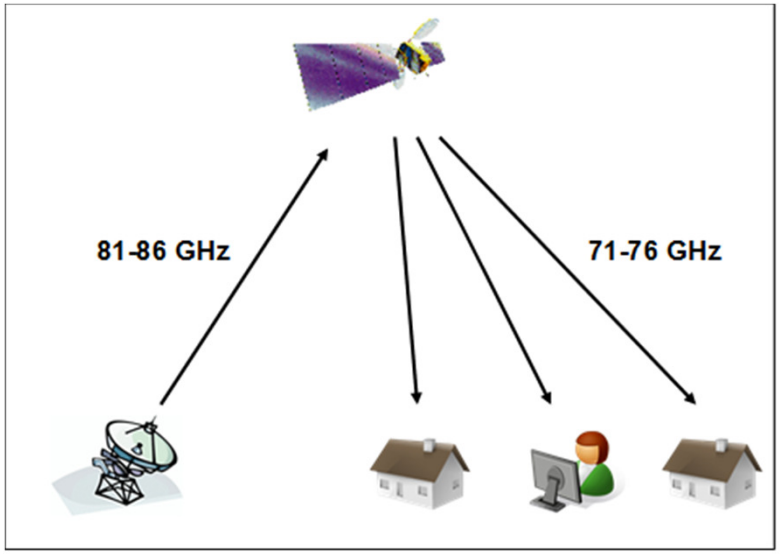
- **Subject:** development of efficient RRM techniques able at solving tradeoffs between fairness, Quality of Experience and Energy Saving (may OFDMA become “green”?) Cooperative approaches based on Game Theory are proposed;
- **Keywords:** OFDMA, Radio Resource Management; Quality of Experience, Green
- **Typology of the thesis:** development and testing in-lab (MATLAB-SIMULINK)
- **In cooperation with:** Networking area of DISI (Prof. Fabrizio Granelli)





Multiple Access Techniques for Terabit Satellite Communications

- **Subject:**
  - Use of EHF (Q-V band, W-band) will pave the road to terabit satellite communications;
  - To achieve this goal, efficient multiple access techniques, efficient and flexible radio resource management (OFDMA?, SC-FDMA?) are required in order to exploit the enormous bandwidth available in EHF domain;
  - Single-beam and multi-beam satellite scenarios will be considered;
- **Keywords:** satellite communications radio resource management, multiple access;
- **Typology**: in-lab (MATLAB-SIMULINK)



Multi-rate OFDMA/CDMA

- **Subject:** multi-rate OFDMA/CDMA with selective radio resource allocation in terms of selective subcarrier grouping, power allocation to subcarrier groups – application to Mobile WiMax scenarios
- **Keywords:** OFDMA/CDMA, group orthogonalization, multi-user detection, radio resource allocation, rate adaptation;
- **Typology of the thesis:** algorithmic and simulative (in MATLAB-SIMULINK environment)