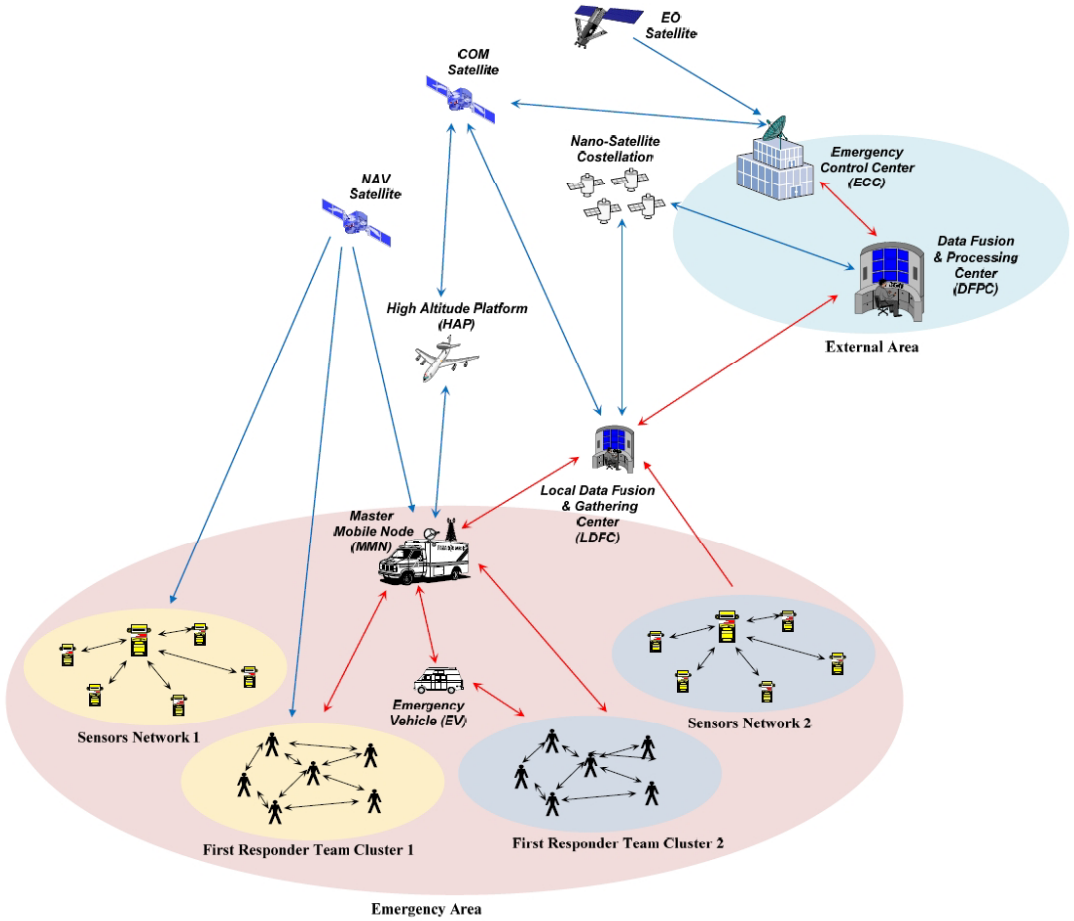
MSc. Thesis proposals about Mobile Communications Techniques

Academic year 2009/2010

Supervisor: Claudio Sacchi

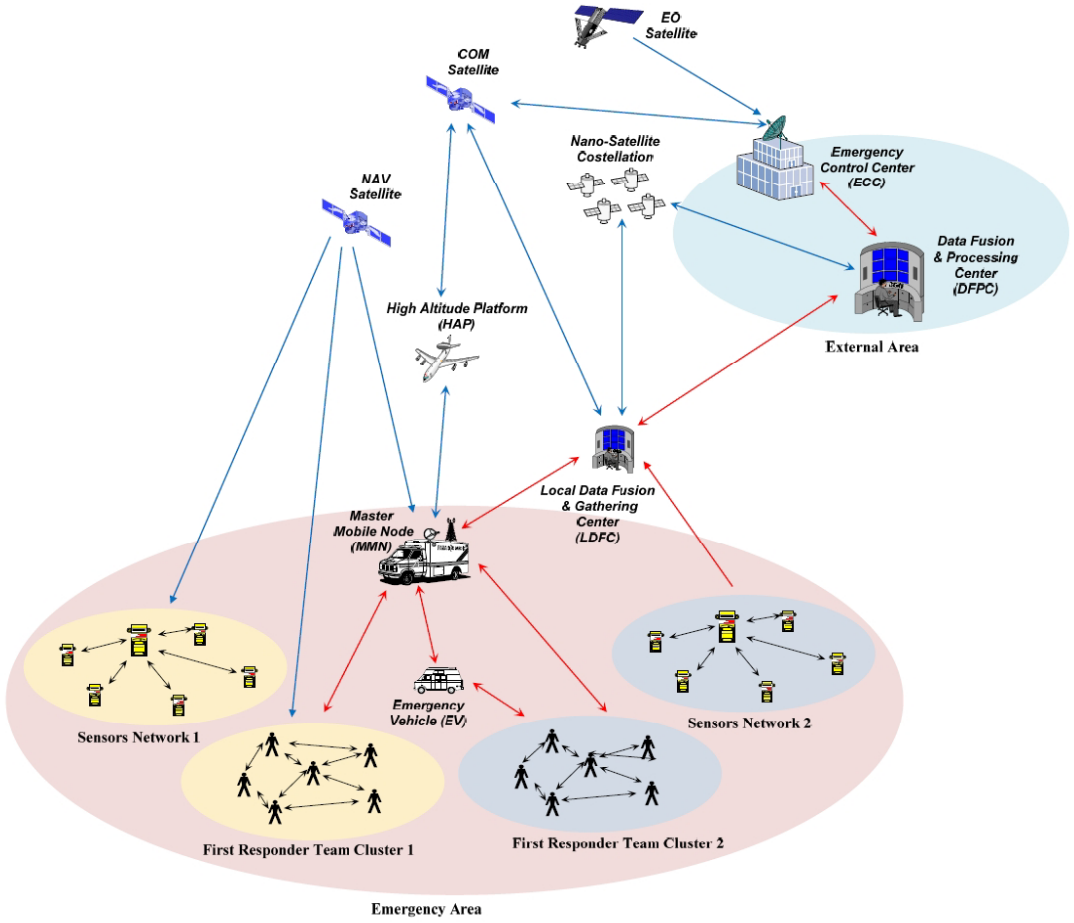
Opportunistic communications for emergency applications (1)

- **Subject:** study and development of opportunistic multiple-access and transmission techniques for reliable “emergency data transmission” (sensor data, voice, data, multimedia data) in emergency scenarios;
- **Keywords:** opportunistic frequency reuse, opportunistic signal processing, controlled QoS perceived by users, OFDMA, SC-FDMA;
- **Typology of thesis:** algorithmic and simulative (MATLAB-SIMULINK)



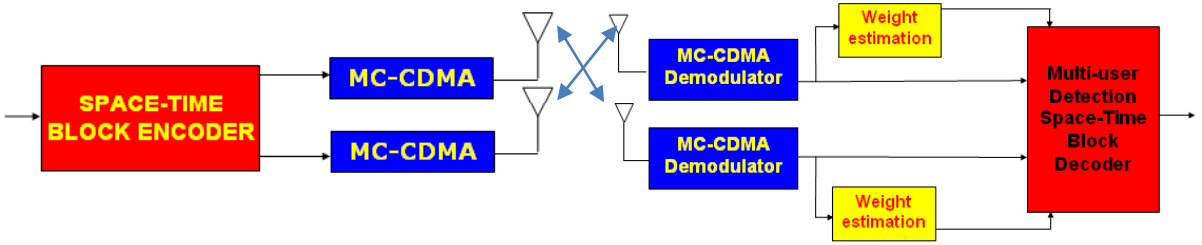
Opportunistic communications for emergency applications (2)

- **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

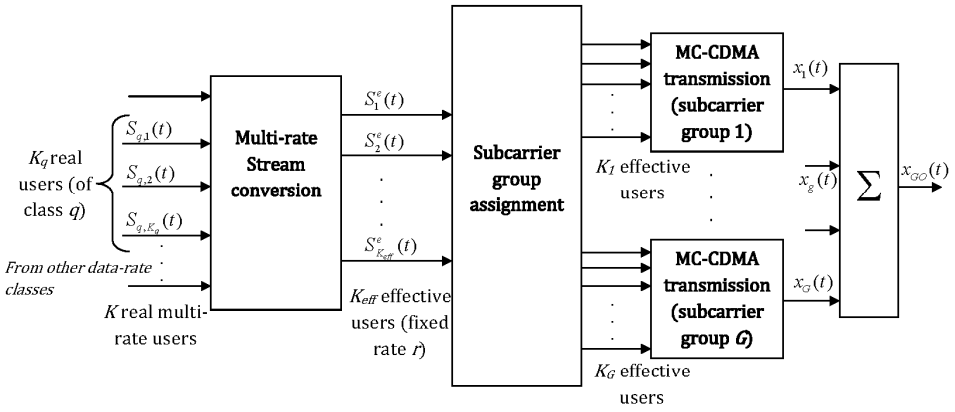
- **Subject:** study and development of novel algorithms for iterative decoding of MIMO OFDM (OFDMA) transmission techniques;
- **Keywords:** MIMO systems, OFDM (OFDMA) channel estimation and ST coding/decoding, turbo MIMO coding;

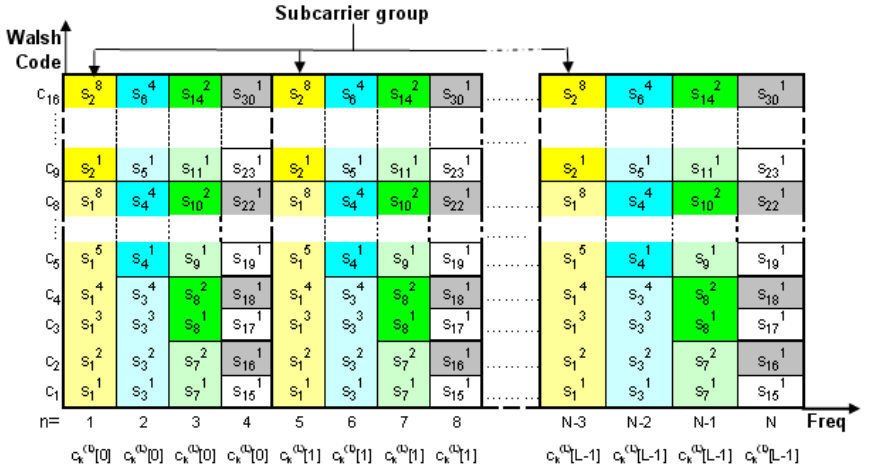


Typology of thesis: algorithmic and simulative (MATLAB/SIMULINK environment);
Possible cooperation with University of Alberta (Canada)

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;
- **Keywords:** OFDMA/CDMA, group orthogonalization, multi-user detection, radio resource allocation;
- **Typology of the thesis:** algorithmic and simulative (in MATLAB-SIMULINK environment)





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)