

MODELLING AND OPTIMIZATION OF ALGORITHMS FOR MULTI-USER MULTI-CARRIER SYSTEMS

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On this thesis, a multi-user multicarrier model was adopted to define the spectrum management problem over DSL systems and thus focusing on defining and testing algorithms that maximize the bitrates at different noise scenarios, conditions and constraints; the spectrum coordination algorithms developed on this thesis are mainly focused on crosstalk mitigation so as to maximize physical layer line rates. The main focus is thus on the (practical) development of low-complexity algorithms that achieve near-optimal performance. We covered this objective along the chapters of the thesis by:

- 1) Modelling of DSL (particularly VDSL2 systems) such that accurate predictions on VDSL2 performance were determined over practical DSL networks
- 2) Studying different scenarios and manners to protect downstream and upstream performance when VDSL2 is rolled out
- 3) Developing and implementing algorithms to solve the near-far effect problem in upstream DSL system and validate them in a lab environment such that was ready for roll-out, establishing clear policy guidelines in the way this should be deployed in a specific country.
- 4) Taking a different (metaheuristic) approach to solve the spectrum management problem whilst reaching near-optimal performance and reducing convergence time.
- 5) Developing two bitloading efficient algorithms: greedy removal and parallel greedy removal algorithm.