Optimal Multi-user Spectrum Management for Digital Subscriber Lines

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Abstract: We formulate the problem of multi-user spectrum management for digital subscriber lines (DSL) as a nonlinear complementarity problem (NCP). We study conditions under which the resulting NCP belongs to the class \$P\_0\$ and its solution is B-regular. The NCP formulation makes it possible to use the Newton type smoothing methods to efficiently compute a Nash equilibrium solution. In our computer simulations, the smoothing method appears much more robust to the presence of strong interference than the existing Iterative Water-filling method. We also present a reformulation of this problem as a linear complementarity problem and use it to establish linear convergence of the Iterative Water-filling method for the case where the multi-user interferences are symmetric.

This is based on a joint work with N. Yamashita (Kyoto University) and J.S. Pang (RPI).