Hot Topic Session:

Optimization Model of Internet Protocols

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Layered architecture is one of the most fundamental and influential structures of network design. Can we integrate the various protocol layers into a single coherent theory by regarding them as carrying out an asynchronous distributed primal-dual computation over the network to implicitly solve a global optimization problem? Different layers iterate on different subsets of the decision variables using local information to achieve individual optimalities, but taken together, these local algorithms attempt to achieve a global objective. Such a theory will expose the interconnection between protocol layers and can be used to study rigorously the performance tradeoff in protocol layering as different ways to distribute a centralized computation. In this talk, we describe some preliminary work towards this goal and discuss some of the difficulties of this approach.