Report on "Noncoherent capacity of underspread fading channels" by Giuseppe Durisi. Ulrich Schuster. Helmut Bolcskei, and Shlomo Shamai for the 2011 IT Paper award. The paper appeared in the IT Transactions in December 2010.

This paper considers communicating over a time and frequency selective fading channel (WSSUS model) where neither the transmitter nor the receiver has a-priori channel state information (non-coherent model). The problem studied is very relevant and has been considered by many in the past using some of the assumptions of this paper: wideband, peak power constraints, time and/or frequency selectivity. The main contribution of this paper is in providing a nice extension to the prior art by studying the general (underspread) WSSUS model under both time and frequency peak power constraints. The results are in the form or capacity upper and lower bounds for arbitrary bandwidths and limits for infinite bandwidth. The underspread channel assumption allows the authors to use a somewhat tractable discrete-time discrete-frequency approximation to the general channel model.

The paper is very well written. The authors make a significant effort in tying their channel models and results to practical systems; in this regard I believe the paper will be a valuable resource for researchers. However, I don't think it makes enough of a quantum leap compared to the existing literature to be considered for the IT paper award.