

EXPERIMENT: BC

Simultaneous transmission of information and power

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Equipment:

MATLAB

Aims and outline:

The problem of communication is usually cast as one of transmitting a message generated at one point to another point. Therefore, electricity in the wires became merely a carrier of messages, not a source of power. Although quite reasonable, many engineering systems actually deal with both energy and information.

Are there scenarios where one would want to transmit energy and information simultaneously over a single line? If there is a power-limited receiver that can harvest received energy, then one should want both things. Modern communication systems that operate under severe energy constraints may also benefit from harvesting received energy. A powerful base station, may effectively be used to recharge mobile devices.

This experiment deals with the trade-off between transferring energy and transmitting information over a single noisy line, with two goals:

- 1) large transferred energy per unit time, and
- 2) large transmitted information per unit time.

References:

- [1] D. Tse and P. Viswanath, *Fundamentals of Wireless Communication*. Cambridge University Press, 2005.
- [2] S. Boyd and L. Vandenberghe, *Convex optimization*. Cambridge University Press, 2004.
- [3] P. Grover and A. Sahai, "Shannon meets Tesla: Wireless information and power transfer," in *IEEE Int. Sym. Inf. Theory*, Jun. 2010, pp. 2363–2367.