THE EFFECT OF RECEIVER DIVERSITY COMBINING ON OPTIMUM ENERGY ALLOCATION AND ENERGY EFFICIENCY OF COOPERATIVE WIRELESS TRANSMISSION SYSTEMS

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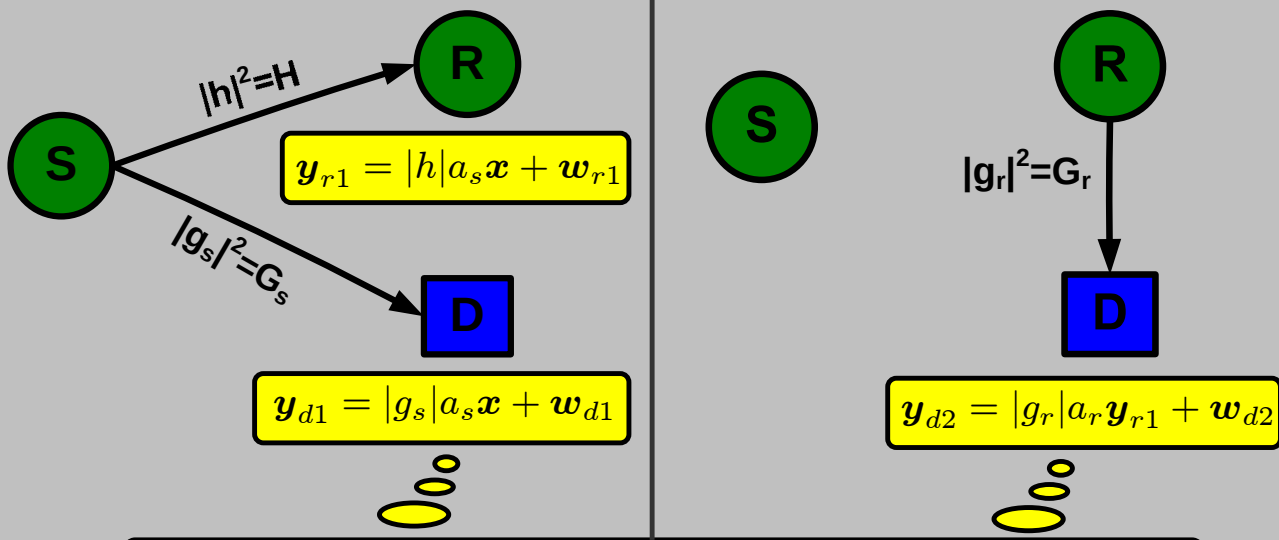
Scenario



Destination receives two observations of the same information

Problem Statement

- Optimum energy allocation strategy to minimize the total energy
- Effect of diversity combining techniques on energy efficiency and energy allocation

System Model

- Amplify & Forward Protocol
- Rayleigh fading channels with AWGN
- Destination uses MRC or EGC
- Channel amplitudes are known

Related Work

[1] D. Gündüz and E. Erkip. Opportunistic Cooperation by Dynamic Resource Allocation. To appear in *IEEE Transactions on Wireless Communications*, 2007.

[2] J. Yang and D.R. Brown III. The Effect of Channel State Information on Optimum Energy Allocation and Energy Efficiency of Cooperative Wireless Transmission Systems, CISS 2006 NJ.

SNR Analysis

$$\mathrm{SNR}_{\mathrm{mrc}} = G_s\mathcal{E}_s + \frac{H\mathcal{E}_s G_r \mathcal{E}_r}{1 + H\mathcal{E}_s + G_r\mathcal{E}_r}$$

$$\mathrm{SNR}_{\mathrm{egc}} = \frac{G_s\mathcal{E}_s}{2} + \frac{\mathcal{E}_s G_r \mathcal{E}_r (H - \frac{G_s}{2}) + 2\mathcal{E}_s (G_r G_s \mathcal{E}_r H (H\mathcal{E}_s + 1))^{1/2}}{2(H\mathcal{E}_s + 1) + G_r\mathcal{E}_r}$$

$\mathcal{E}_s$ denotes the source energy, $\mathcal{E}_r$ denotes the relay energy