

# On the Capacity of Interference Channels with One Cooperating Transmitter

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**Abstract**—Inner and outer bounds are established on the capacity region of two-sender, two-receiver interference channels where one transmitter knows both messages. The transmitter with extra knowledge is referred to as being cognitive. The inner bound is based on strategies that generalize prior work, and include rate-splitting, Gel'fand-Pinsker coding and cooperative transmission. A general outer bound is based on the Nair-El Gamal outer bound for broadcast channels. A simpler bound is presented for the case in which one of the decoders can decode both messages. The bounds are evaluated and compared for Gaussian channels.

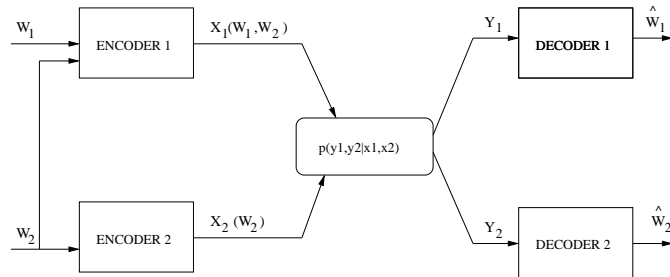


Fig. 1. Interference channel with cooperating encoder.