Attainable Error Exponents for the Poisson Broadcast Channel with Degraded Message Sets

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ABSTRACT

The Poisson broadcast channel with degraded message sets models a bandwidth unlimited optical broadcast network over which a sender communicates a common message to a pair of terminals and a private message to just one of them. The capacity region of this channel is determined by the Körner-Marton result [1], which in turn is expressed via an auxiliary random variable U. For the case $|\mathcal{U}| = 2$ we present explicit code construction and practical decoding rules which attain the corresponding capacity region. This is accomplished by computing the error exponents attainable by the suggested decoding rules, using the technique developed by Wyner [3] and further extended in [7]

Index Terms – Poisson broadcast channel, error exponents, optical CDMA.