

This paper presents a polar coding scheme to achieve secrecy in block fading binary symmetric wiretap channels without the knowledge of instantaneous channel state information (CSI) at the transmitter. For this model, a coding scheme that hierarchically utilizes polar codes is presented. In particular, on the polarization of different binary symmetric channels over different fading blocks, each channel use is modeled as an appropriate binary erasure channel over fading blocks. Polar codes are constructed for both coding over channel uses for each fading block and coding over fading blocks for certain channel uses. In order to guarantee security, random bits are introduced at appropriate places to exhaust the observations of the eavesdropper. It is shown that this coding scheme, without instantaneous CSI at the transmitter, is secrecy capacity achieving for the simultaneous fading scenario. For the independent fading case, the capacity is achieved when the fading realizations for the eavesdropper channel are always degraded with respect to the receiver. For the remaining cases, the gap between lower and upper bounds is analyzed. Remarkably, for the scenarios where the secrecy capacity is achieved, the results imply that the instantaneous CSI does not increase the secrecy capacity.