Energy Efficiency of Two-hop Transmission – Part II: Comparison of Two-hop and Single-hop Transmissions

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Abstract:

In Part I, we have proposed a novel transceiver power consumption model for Class A, AB and B power amplifiers, as a function of the transmit power. Then, the model is extended by using the link budget and a condition for successful reception to derive transmit power and total transmitter power consumption dependent on channel loss. In this part, using the proposed model, we derive the border, in the space of channel losses of each link, which separates the regions of higher energy efficiency for single-hop and two-hop, respectively, and analyze its dependence on the model parameters. The border, i.e. channel losses of the first and second link in two-hop, may shr ink by more than 5 dB as a result of the model non-linearity. We also evaluate energy efficiency ratios on both sides of the border.