This talk was first given in IEEE Aerospace Conference in March 2015 titled “The Role of Margin in Link Analysis and Planning.”

Simple link budgeting approach that assumes link parameters to be deterministic values typically adopted a rule-of-thumb policy of 3 dB link margin. This has been the de facto standard in the aerospace industry in the past few decades.

JPL uses statistical link analysis that adopts the 2-sigma or 3-sigma link margin policy, which takes into account the link uncertainties. However it is still a rule-of-thumb policy that bears no direct relationship with the error rate requirements of the communication link.

In this talk, we use simple statistical techniques to explore the relationship between error rate requirement, operating SNR, and coding performance curve. We compute the “true” SNR design point that would meet the BER/FER requirement by taking into account the random nature of signal power and noise power at the receiver, and the shape of the coding performance curve. This analysis yields a number of valuable insights on the design choice of coding scheme and, “redefines” link margin as the additional SNR to compensate for the “known unknown” of a link to meet the error rate requirement. (Received August 27, 2015)