Abstract

Power line has been proposed as a solution to deliver broadband services to end users. Various studies in the recent past have reported the decrease in channel capacity with increase in number of branches for a given channel type (indoor channel or access (low voltage) channel or medium channel) [1- 4]. Those studies however did not provide a clear insight as to how the channel capacity is related to the number of distributed branches along the line. This paper attempts to quantify and characterize the effects of channel capacity in relation to number of branches and also with different terminal loads for a given type of channel. It is shown that for power spectral density (PSD) between -90dBm/Hz to -30dBm/Hz, the channel capacity decreases by 20-30Mbps/branch, 14-24Mbps/branch and 20- 25Mbps/branch for medium voltage channel, low voltage channel and indoor channel respectively. In additional, it is shown that the channel capacity is minimum when the load impedance is terminated in characteristic impedances for any type of channel treated here. It is shown that there could be significant loss in channel capacity if a ground return were used instead of adjacent conductor return. The analysis presented in the paper would help in designing appropriate power line communication equipment for better and efficient data transfer.