

Performance Evaluation of Radio Frequency Interference Measurements from Microwave Links in Dense Urban Cities

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Abstract

Radio frequency interference (RFI) constitutes a significant problem in achieving a good quality of service in radio links. Several techniques have been proposed to identify and mitigate RFI in wireless networks. However, most of these techniques are not generalized for all propagation environments due to their varying geographical features. The need for extensive frequency scan measurements on the links to identify the available channels, evaluate the performances of the links, and detect RFI in the channels becomes imperative. In this study, performance evaluation of frequency scan measurements from active microwave links comprising eighteen base stations is presented. The measurements equipment comprises a spectrum analyzer and a 0.6-meter antenna dish. The frequency scans were taken at 6GHz, 7GHz, and 8GHz with full azimuth coverage of the horizontal and vertical polarization. Measured data were processed to determine the available frequencies and RFI in the channels. The histogram and probability density function of the frequency scans were computed. The cumulative distribution functions were determined, and the statistical error characteristics of the frequency scans for the estimated normal distribution and the estimated fitness curve were derived. The short-time Fourier transform of the noisy signal was obtained, and the signal without noise was recovered using the inverse short-time Fourier transform. Analysis of the scanned signals before and after the noise removal is demonstrated. The denoised signals compare favorably with related results in the preliminary literature. Overall, the frequency scans would be highly useful in evaluating RFI measurements and spectrum planning.

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