

Design of Multi-band Receiver with Pre-FFT Beamformer for Wireless Communications

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Abstract—Because of the limitations of the sampling speed and power consumption in the very high frequency several bands of the wireless communication systems, the current receiver cannot directly sample the incoming signals at the Nyquist rate just after a RF stage process. Instead, using the sub-sampling technique can convert multi-band signals from RF band to IF band without oscillators. But Due to the filter performance in RF bands, signals converted into low bands cause interference and degrade performances. In this paper, we like to propose a sub-sampling method and the pre-FFT beamformer for the multi-band receiver, and a new approach for the synchronization and compensation of the STO (sampling time offset) and CFO (carrier frequency offset) are proposed to avoid interference by TDM method. The purpose of designing the pre-FFT beamformer is to coherently combine the desired signals and suppress the undesired signals so that it is able to provide medium to high gains in a mobile environment. Simulation results show that after compensating the Doppler effects and timing offset the approach works effectively and we can get optimal performances in the multi-band receiver.

Keyword—Sub-Sampling, TDM, Multi-band receiver, Offset compensation, timing Synchronization, Beamforming, LMS



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