SMART ANTENNA BASED SPACE-TIME PROCESSING OF DS/CDMA MULTIPATH SIGNALS

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ABSTRACT

THIS RESEARCH PROPOSES A SPATIAL PROCESSING RAKE RECEIVER THAT JOINTLY EXPLOITS THE SPATIAL, TEMPORAL AND PATH DIVERSITY TO SEPARATE AND DEMODULATE DS/CDMA MULTIPATH SIGNALS. SPATIAL FILTERING IS A BEAMFORMING NETWORK (BFN) WITH EACH WEIGHT DETERMINED BY A MULTIPLY CONSTRAINED MINIMUM VARIANCE (MCMV) ALGORITHM. THE BFN ISOLATES SIGNALS ORIGINATING FROM DIFFERENT SPATIAL LOCATIONS SUCH THAT MULTIPLE ACCESS INTERFERENCE (MAI) IS SUPPRESSED. SINCE EACH BEAMFORMER PLACES NULLS TO ALL BUT RETAINS ONE PATH, A COHERENT COMBINER IS THEN PROVIDED TO MAXIMIZE OUTPUT SIGNAL TO INTERFERENCE AND NOISE RATIO (SINR). ALTHOUGH THE CONVENTIONAL RAKE RECEIVER IS OPTIMUM IN SINGLE USER ENVIRONMENT BUT USERS IS INCREASES THE PERFORMANCE BECOMES WORSE IN THE WORDS IT SUFFER FROM THE NEAR-FAR PROBLEM. HENCE WE PROPOSE THE SPATIAL PROCESSING RAKE RECEIVER TO IMPROVE THE PERFORMANCE OF THE CONVENTIONAL RAKE RECEIVER IN MULTIUSER ENVIRONMENT.ANALYSIS AND SIMULATION RESULTS SHOW THAT THE SPATIAL PROCESSING RAKE RECEIVER OFFERS MUCH BETTER PERFORMANCE THAN THE CONVENTIONAL RAKE RECEIVER IN THE PRESENCE OF MAI.

Keywords: BFN,MCMV,RAKE

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