

## (12) United States Patent

### Sindhushayana et al.

### (54) SYSTEM AND METHOD FOR PROVIDING AN ACCURATE ESTIMATION OF RECEIVED SIGNAL INTERFERENCE FOR USE IN WIRELESS COMMUNICATIONS SYSTEMS

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### (57) ABSTRACT

A system for providing an accurate interference value signal received over a channel and transmitted by an external transceiver. The system includes a first receiver section for receiving the signal, which has a desired signal component and an interference component. A signal extracting circuit extracts an estimate of the desired signal component from the received signal. A noise estimation circuit provides the accurate interference value based on the estimate of the desired signal component and the received signal. A look-up table transforms the accurate noise and/or interference value to a normalization factor. A carrier signal-to interference ratio circuit employs the normalization factor and the received signal to compute an accurate carrier signal-tointerference ratio estimate. Path-combining circuitry generates optimal path-combining weights based on the received signal and the normalization factor. In the illustrative embodiment, the system further includes a circuit for employing the accurate interference value to compute a carrier signal-to-interference ratio. An optimal pathcombining circuit computes optimal path-combining weights for multiple signal paths comprising the signal using the accurate interference value and provides optimally combined signal paths in response thereto. A log-likelihood ratio circuit computes a log-likelihood value based on the carrier signal-to-interference ratio and the optimally combined signal paths. A decoder decodes the received signal using the log-likelihood value. An additional circuit generates a rate and/or power control message and transmits the rate and/or power control message to the external transceiver.

### 36 Claims, 6 Drawing Sheets



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