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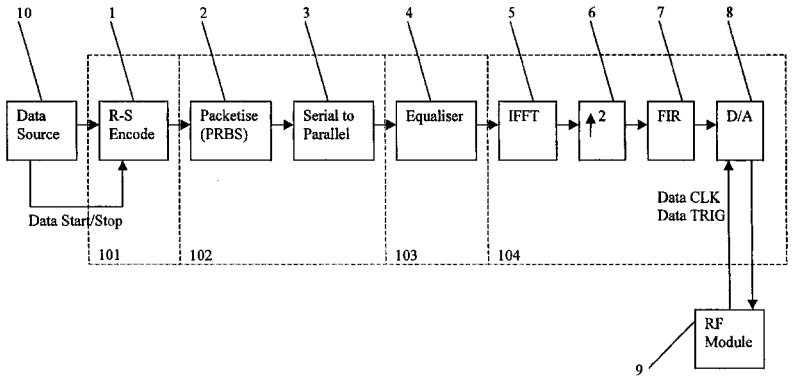
(54) Title: COMMUNICATION SYSTEM USING OFDM



(57) Abstract: An OFDM communications system for wireless networks is provided. The OFDM communications system includes at least one transmitter and at least one receiver. Each transmitter of the OFDM communications system includes a signal source arranged to provide data, a transmit modulator arranged to arrange the data into data packets and append a pilot symbol to the start of each data packet, a multiplexer arranged to convert the data packets from serial data to parallel data, an inverse fast Fourier transform operator arranged to convert the multiplexed data from the frequency domain to the time domain, an up-sampler arranged to sample the time domain data at a rate greater than the nominal data rate, a digital low pass filter arranged to remove out-of-band noise from the sampled data, a digital to analogue converter arranged to convert digital data to analogue data, and an RF module arranged to modulate an RF carier with the transformed data thereby transforming the data to a higher frequency band for transmission. Each receiver of the OFDM communications system includes an RF module arranged to demodulate an RF carrier from the received signal thereby transforming the data to a lower frequency band, an analogue to digital converter arranged to convert analogue data to digital data and further arranged to sample the data at a rate greater than the nominal data rate, a digital low pass filter arranged to remove out-of-band noise, a down-sampler (decimator) arranged to reduce the sample rate to the nominal data rate, a frame detector arranged to search for significant pilot symbol correlations within the digital data stream and make initial estimates of at least one signal parameter, a digital phase locked loop arranged to remove estimated frequency- and phase- offsets from the low pass signal, a fast Fourier transform operator arranged to transform the data outputted from the phase locked-loop from the time domain to the frequency domain, a linear phase corrector arranged to remove estimated sub-sample timing errors from the Fourier transformed data stream, a decision block arranged to decide to which allowable data point each bit in the transformed data is assigned to produce noise free data, and a demultiplexer arranged to convert the noise free data from parallel data to serial data. In the OFDM communications system the pilot symbol is a repeated pseudo random binary sequence.

WO 02/23781 A1