

LOW POWER FREQUENCY-HOPPED SPREAD SPECTRUM
ACKNOWLEDGEMENT PAGING SYSTEM
ABSTRACT

An acknowledgement paging system is described which fits within the existing infrastructure of a paging network and which provides low cost manufacture and low power operation while still enabling the

5 acknowledgement paging over long distances. The acknowledgement paging system consists of a standard paging transmitter and a plurality of remote paging units which respond to a page using frequency-hopped spread-spectrum differential bi-phase shift keying communications. The plurality of pagers are assigned to groups with each group being assigned a separate starting location

10 in a common, repeating pseudo-random noise code which determines the frequency hops. The grouping of pagers minimizes the collisions of acknowledgment transmissions between groups and the enables a large number of paging units to operate within a single geographic area. The pagers include a special double loop PLL synthesizer to produce an accurate

15 narrow band frequency and to change or hop frequencies in a rapid fashion. The base receiving unit employs special algorithms for retrieving very low power acknowledgement paging messages in a noisy environment by using data redundancy, data interleaving, soft decoding and error correction codes to strip the bi-phase-modulated, frequency-hopped spread-spectrum digital data

20 transmitted from the remote pocket pagers. A history of the frequency and phase drift is used during reception of the acknowledgement messages to predict the phase and frequency drift of the encoded digital information to further reduce decoding error. Signal to noise ratios are determined for each frequency hop and relatively noisy hops are discarded or minimized in a soft

25 decoding process based redundancy of data bits.

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