US005872808A

United States Patent [19]

Davidovici et al.

[11] **Patent Number: 5,872,808**

[45] **Date of Patent: Feb. 16, 1999**

[54] **APPARATUS AND METHOD FOR SYNCHRONIZATION OF DIRECT SEQUENCE CDMA SIGNALS**

[75] Inventors: **Sorin Davidovici**, Jackson Heights, N.Y.; **Emmanuel Kanterakis**, North Brunswick, N.J.

[73] Assignee: **Golden Bridge Technology, Inc.**, Long Branch, N.J.

[21] Appl. No.: **564,007**

[22] Filed: **Nov. 29, 1995**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 450,312, May 25, 1995, Pat. No. 5,627,855.

[51] **Int. Cl.**[6] **H04B 1/69**

[52] **U.S. Cl.** **375/207**

[58] **Field of Search** 375/206, 207, 375/343, 208, 209, 210; 364/724.11

[56] **References Cited**

U.S. PATENT DOCUMENTS

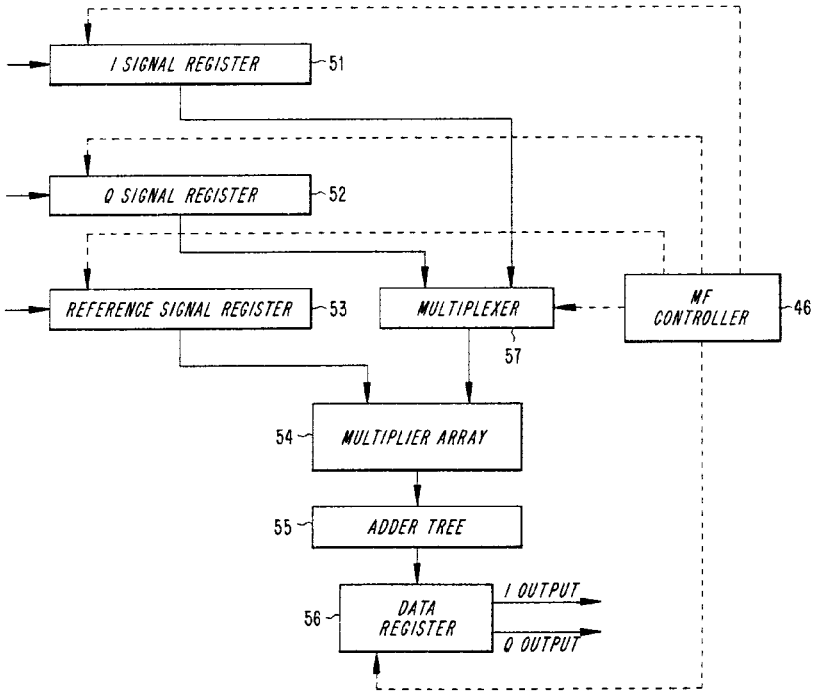
3,731,198	5/1973	Blasbalg	325/42
4,164,628	8/1979	Ward et al.	179/15
4,392,232	7/1983	Andren et al.	375/86
4,418,393	11/1983	Zscheile, Jr.	364/724
4,426,630	1/1984	Folkmann	333/174
4,538,280	8/1985	Mosley, Jr. et al.	375/1
4,583,048	4/1986	Gumacos et al.	329/122
4,621,365	11/1986	Chiu	375/1
4,630,283	12/1986	Schiff	375/1
4,653,069	3/1987	Roeder	380/31
4,755,983	7/1988	Masak et al.	370/6
4,841,545	6/1989	Endo et al.	375/1
4,860,307	8/1989	Nakayama	375/1
4,969,159	11/1990	Belcher et al.	375/1
5,031,192	7/1991	Clark	375/1
5,311,544	5/1994	Park et al.	375/1
5,583,884	12/1996	Maruyana et al.	375/207
5,627,855	5/1997	Davidovici	375/207

OTHER PUBLICATIONS

Cafarella, John H., et al., "Acoustoelectric Convolvers for Programmable Matched Filtering in Spread–Spectrum Systems," Proceedings of the IEEE, vol. 64, No. 5, May 1976, pp. 756–759.

Primary Examiner—Don N. Vo
Attorney, Agent, or Firm—David Newman Chartered

[57] **ABSTRACT**

A spread-spectrum-matched-filter apparatus including a code generator, an in-phase-symbol-matched filter, a quadrature-phase-symbol-matched filter, an in-phase-frame-matched filter, a quadrature-phase-frame-matched filter, and a controller. The code generator generates replicas of a chip-sequence signal, which are used to set the symbol-impulse responses of the inphase-symbol-matched filter and the quadrature-phase-symbol matched filter. The in-phase-frame-matched filter and the quadrature-phase-frame-matched filter detect a despread-header-symbol-sequence signal and generate a maximum output signal which may be used as a data-start signal or for synchronizing the timing of the controller as to when to trigger sampling of the A/D converter, the output of the symbol-matched filters, detection of the data-symbol-sequence signal and other time-dependent processes.

5 Claims, 11 Drawing Sheets