



US006058150A

United States Patent [19]
Ghosh

[11] **Patent Number:** **6,058,150**
[45] **Date of Patent:** **May 2, 2000**

[54] **METHOD AND APPARATUS FOR COMBINED TIMING RECOVERY, FRAME SYNCHRONIZATION AND FREQUENCY OFFSET CORRECTION IN A RECEIVER**

5,491,726	2/1996	Cheng et al.	375/343
5,610,939	3/1997	Takahashi et al.	375/206
5,625,652	4/1997	Petranovich	375/355
5,633,898	5/1997	Kishigami et al.	
5,818,882	10/1998	Komatsu	375/344

[75] Inventor: **Biswa R. Ghosh**, Mountain View, Calif.

Primary Examiner—Stephen Chin
Assistant Examiner—Lenny Jiang
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman LLP

[73] Assignee: **Wireless Access, Inc.**, Santa Clara, Calif.

[21] Appl. No.: **08/941,598**

[57] **ABSTRACT**

[22] Filed: **Sep. 30, 1997**

A method and apparatus for combined timing recovery, frame synchronization and frequency offset correction in a digital receiver is provided. In general, the present invention provides a pair of correlators that operate on a set of samples output by a discriminator. A positive correlator generates a positive correlation value and a negative correlator generates a negative correlation value. The positive and negative correlation values are used to determine frame synchronization, frequency offset and timing recovery values so that timing recovery, frame synchronization and frequency offset correction may be performed simultaneously.

[51] **Int. Cl.⁷** **H04L 7/00**

[52] **U.S. Cl.** **375/365; 375/344; 375/355; 375/371; 370/514**

[58] **Field of Search** **375/365, 371, 375/344, 355, 334, 354, 362; 370/514**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,599,732	7/1986	LeFever	375/346
5,347,548	9/1994	Messerges et al.	375/371
5,400,368	3/1995	Cheng et al.	375/354
5,436,942	7/1995	Cheng et al.	375/229

23 Claims, 3 Drawing Sheets

