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Yamano et al.

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[54] **METHOD AND APPARATUS FOR REDUCING SIGNAL PROCESSING REQUIREMENTS FOR TRANSMITTING PACKET-BASED DATA WITH A MODEM**

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[51] Int. Cl.⁷ **H04B 1/38**

[52] U.S. Cl. **375/222; 455/574**

[58] Field of Search **375/222, 223; 370/311, 318; 455/557, 574, 343**

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,234,952	11/1980	Gable et al. .	
4,680,773	7/1987	Amundson .	
4,691,314	9/1987	Bergins et al. .	
4,756,007	7/1988	Qureshi et al. .	
4,856,030	8/1989	Batzer et al. .	
4,868,850	9/1989	Kaku et al. .	
5,463,661	10/1995	Moran, III et al.	375/222
5,491,721	2/1996	Cornelius et al.	375/222
5,544,082	8/1996	Garcia-duarte et al.	364/707
5,625,651	4/1997	Cioffi .	375/354
5,636,209	6/1997	Perlman .	370/281
5,745,860	4/1998	Kallin .	455/574

FOREIGN PATENT DOCUMENTS

WO 86/03642	6/1986	WIPO .	
91 07038	5/1991	WIPO .	H04L 29/06

OTHER PUBLICATIONS

R. Aber: "XDSL Supershares Copper. DSL schemes promise multimegabit rates over local phone lines—and carriers and vendors are nearly ready to deliver"*Data Communica-*

tions, vol. 26, No. 3, Mar. 1997, pp. 99–100, 102, 104/105 XP000659545.

Alvarez et al.: "Data-Pump Implementation for Automatic Interworking Between Automode Modems and other CCITT & Bell Modems"*Signal Processing Theories and Applications*, Brussels, Aug. 24–27, 1992, vol. 3, No. CONF. 6, Aug. 24, 1992, pp. 1645–1648, XP000356561.

F. Gao: "DSP Algorithms and Software for Modem, Fax, and Telephony"*Electronic Design*, vol. 44, No. 11, May 28, 1996, pp. 123/124, 126 XP000623737.

"Digital Signal Processor Modem for Multiple telephone Lines"*IBM Technical Disclosure Bulletin*, vol. 39, No. 4, Apr. 1, 1996, pp. 263/264 XP000587492.

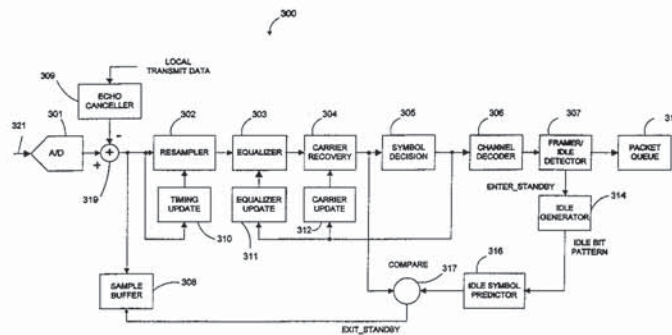
Primary Examiner—Don N. Vo

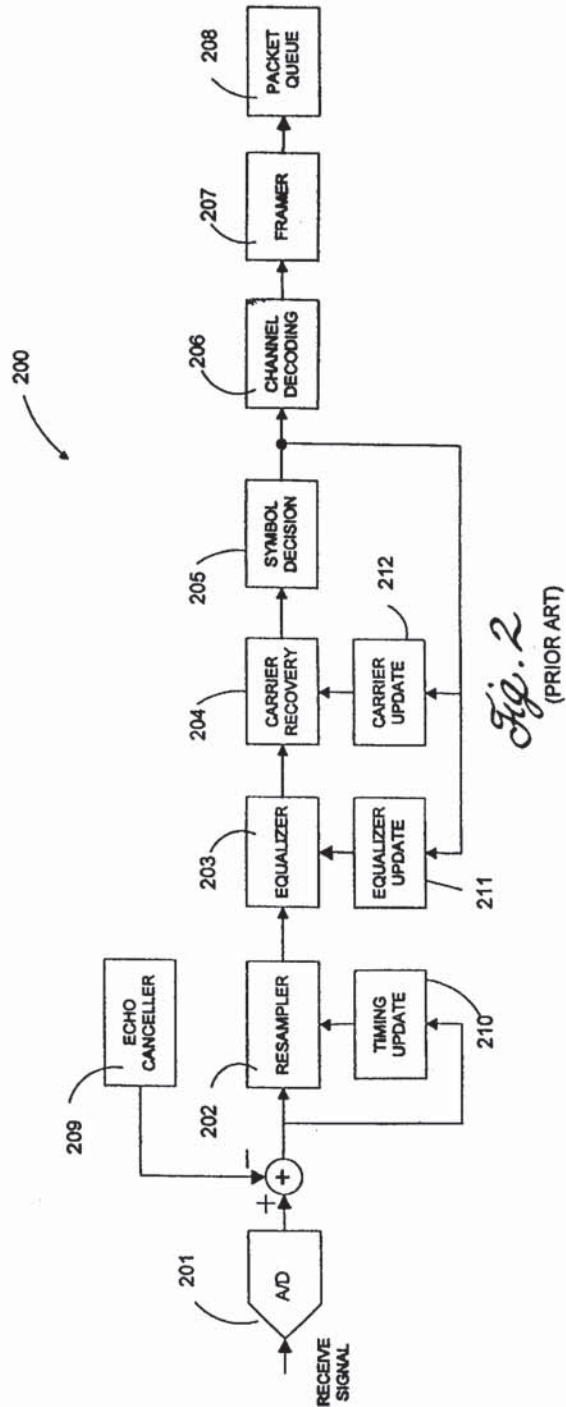
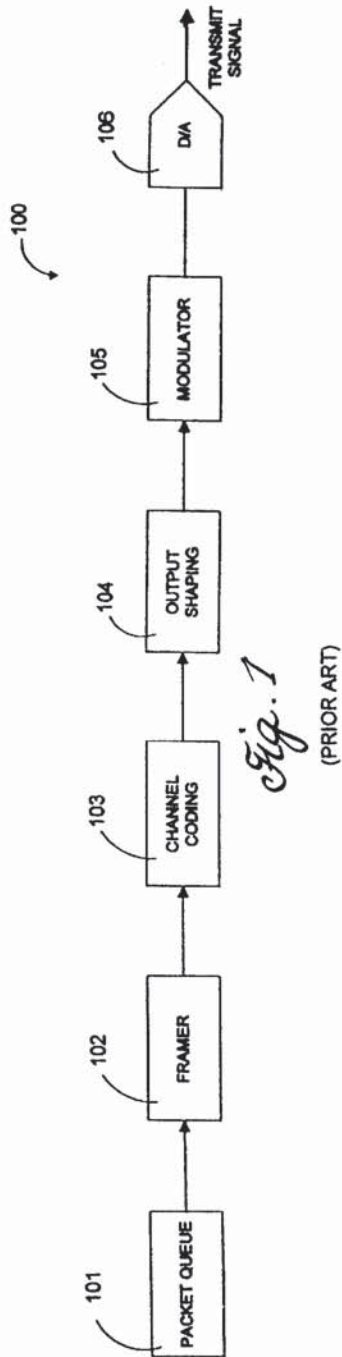
Attorney, Agent, or Firm—Christie, Parker & Hale, LLP

[57] **ABSTRACT**

A modem and method for operating same. A receiver circuit of the modem is coupled to receive a continuous analog signal from a communication channel. This analog signal includes both packet and idle information. The receiver circuit monitors the analog signal to detect the presence of idle information. Upon detecting idle information, the receiver circuit enters a standby mode in which the processing requirements of the receiver circuit are reduced. A burst mode protocol is also provided, in which packets of digital information are modulated by a transmitter circuit of the modem, thereby converting the packets of digital information into analog signal bursts of discrete duration. These analog signal bursts are transmitted from the transmitter circuit to a telephone line. However, the transmitter circuit does not generate any signals between the analog signal bursts. A receiver circuit monitors the telephone line to detect the analog signal bursts. Upon detecting the presence of the analog signal bursts on the telephone line, the receiver circuit demodulates the analog signal bursts using full processing capabilities of the receiver circuit. However, upon detecting the absence of the analog signal bursts on the telephone line, the demodulating function of the receiver circuit is disabled. The burst mode protocol enables multi-drop and multi-cast operation, as well as reducing required DSP resources.

12 Claims, 9 Drawing Sheets





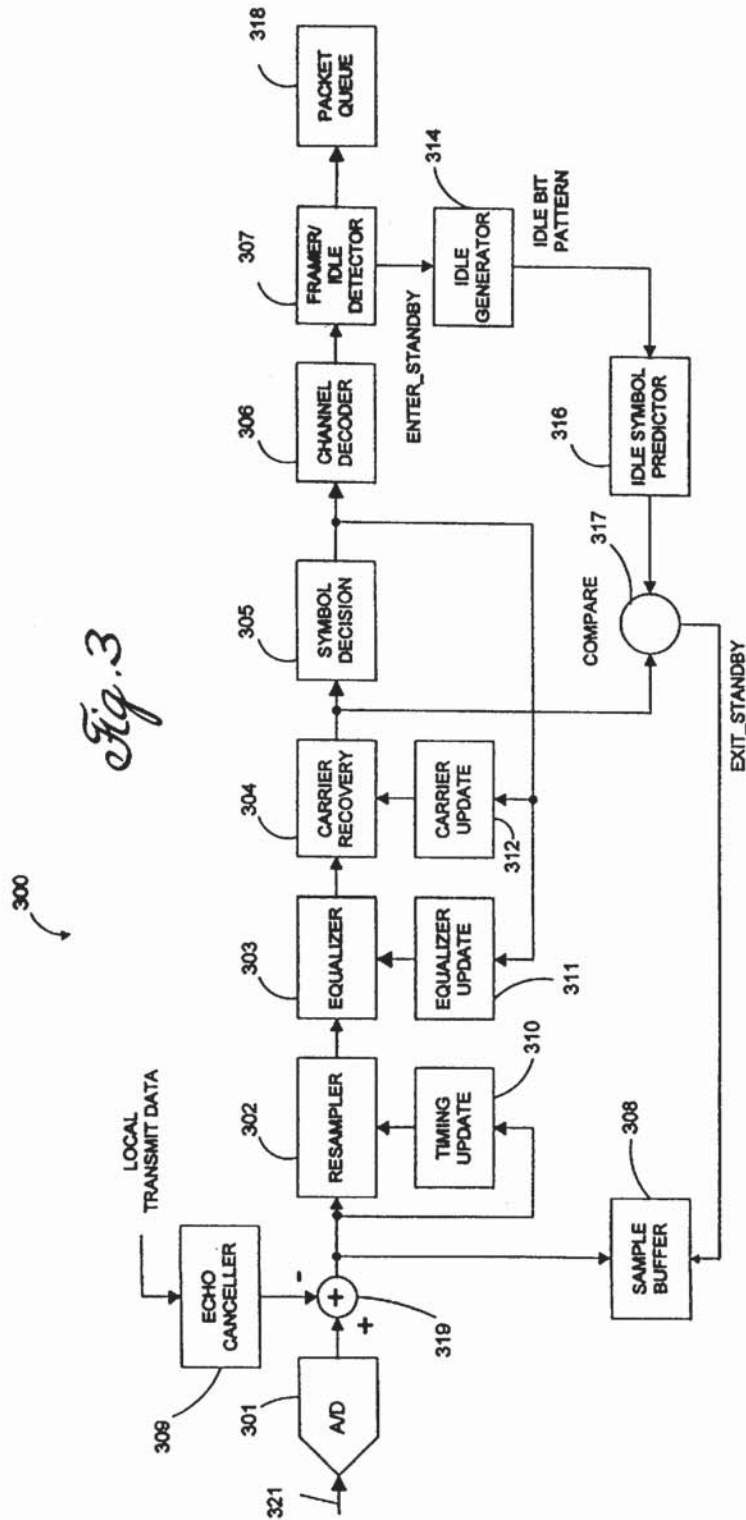
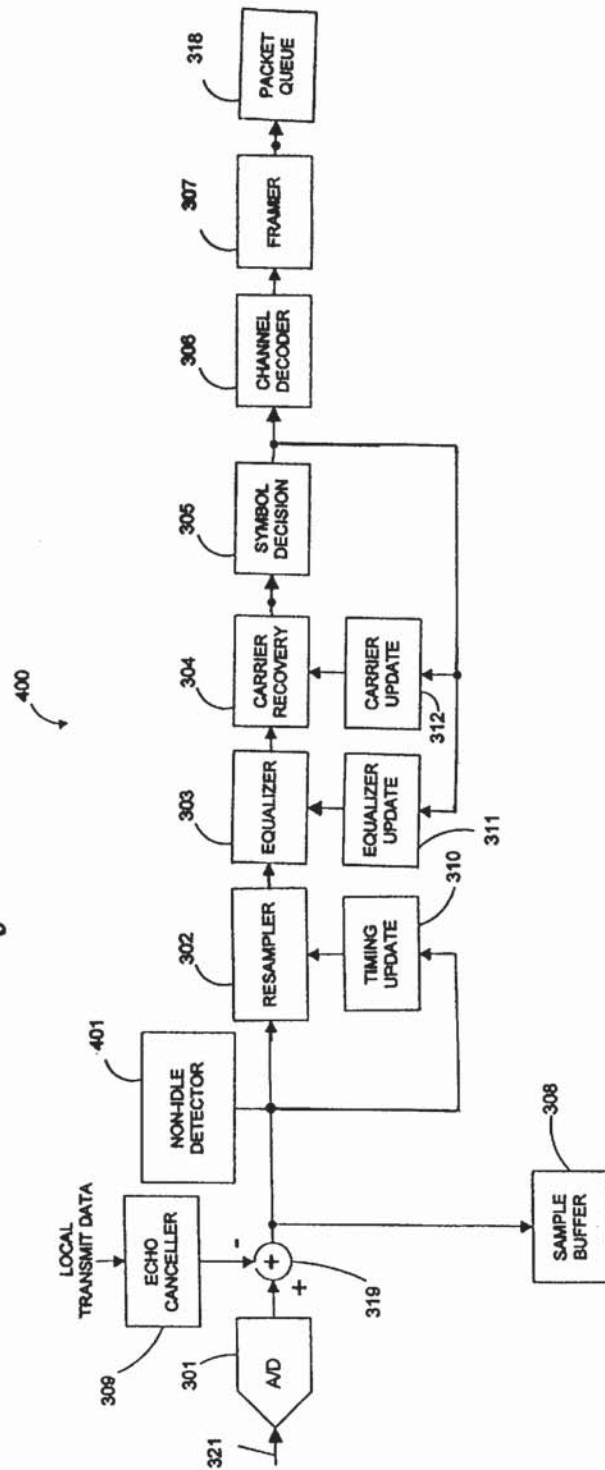


Fig. 4



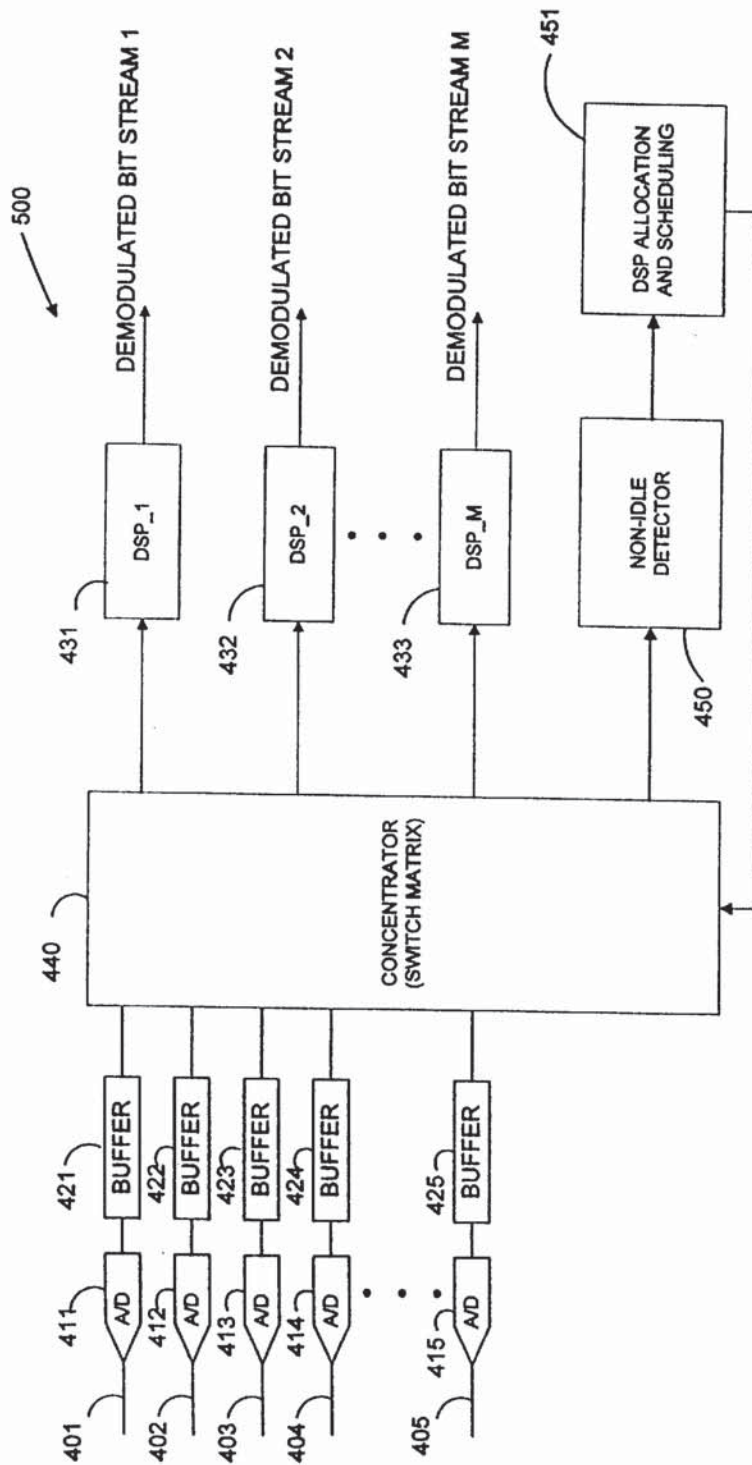


Fig. 5

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