



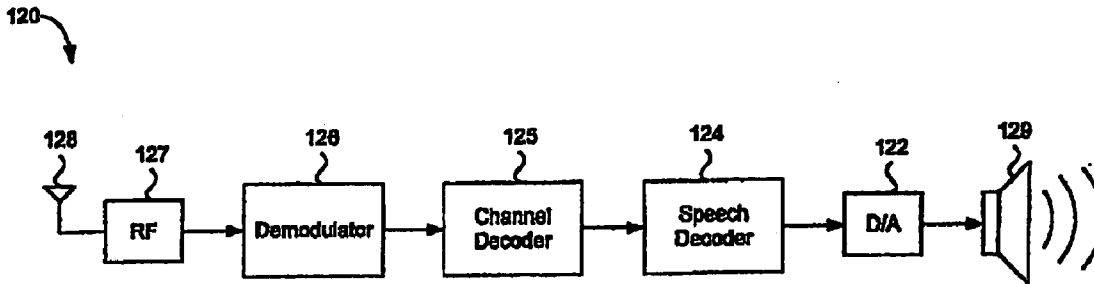
US 20060147063A1

(19) **United States**(12) **Patent Application Publication**
Chen(10) **Pub. No.: US 2006/0147063 A1**(43) **Pub. Date: Jul. 6, 2006**(54) **ECHO CANCELLATION IN TELEPHONES
WITH MULTIPLE MICROPHONES**No. 11/065,131, filed on Feb. 24, 2005, which is a
continuation-in-part of application No. 11/018,921,
filed on Dec. 22, 2004.(75) Inventor: **Juin-Hwey Chen**, Irvine, CA (US)

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WASHINGTON, DC 20005 (US)****Publication Classification**(51) **Int. Cl.**
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H04M 9/08 (2006.01)
(52) **U.S. Cl.** **381/119; 379/406.01**(73) Assignee: **Broadcom Corporation**, Irvine, CA(21) Appl. No.: **11/239,351**(22) Filed: **Sep. 30, 2005****Related U.S. Application Data**(63) Continuation-in-part of application No. 11/215,304,
filed on Aug. 31, 2005, which is a continuation-in-
part of application No. 11/135,491, filed on May 24,
2005, which is a continuation-in-part of application(57) **ABSTRACT**

The present invention is directed to a telephone equipped with multiple microphones that provides improved performance during operation of the telephone in a speaker-phone mode. For example, the multiple microphones can be used to improve voice activity detection, which in turn, can improve echo cancellation. In addition, the multiple microphones can be configured as an adaptive microphone array and used to reduce the effects of (i) room reverberation, when a near-end user is speaking, and/or (ii) acoustic echo, when a far-end user is speaking.

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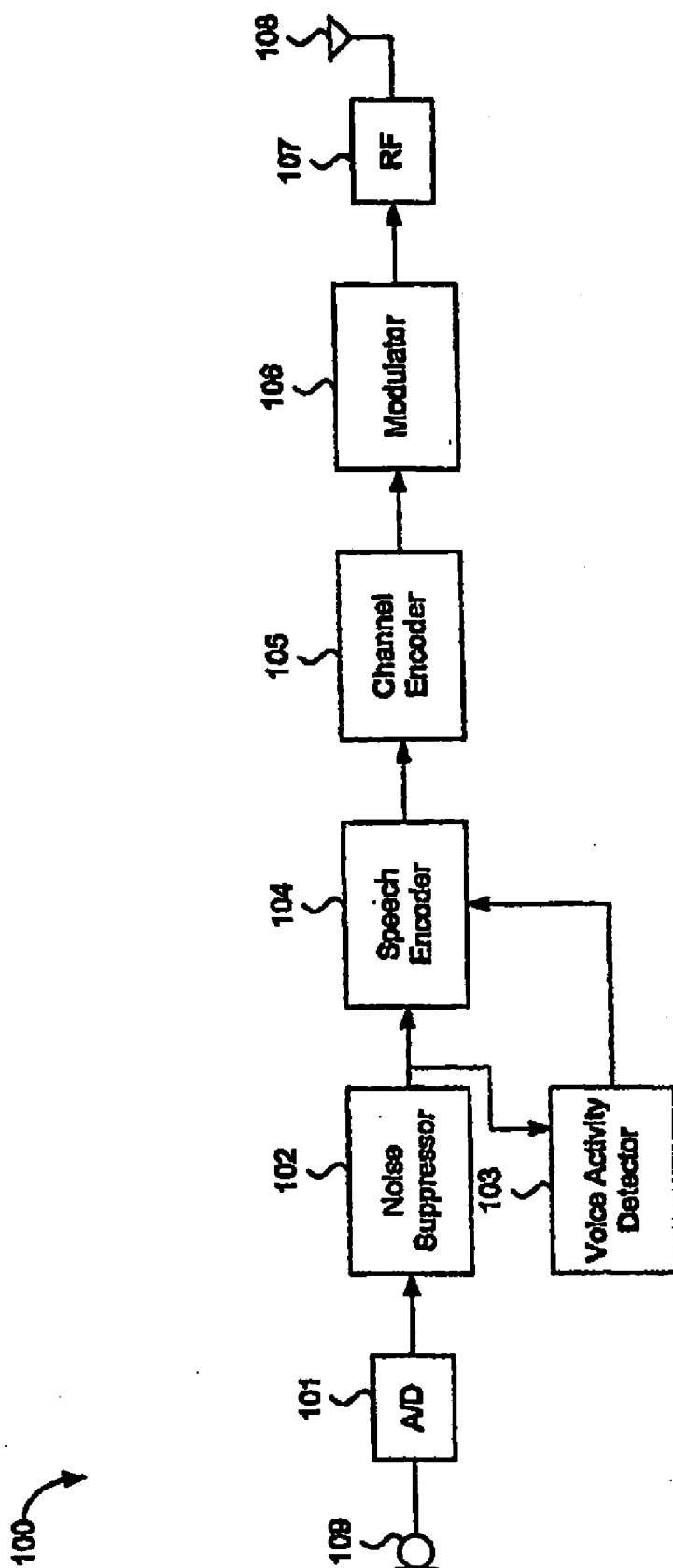


FIG. 1A

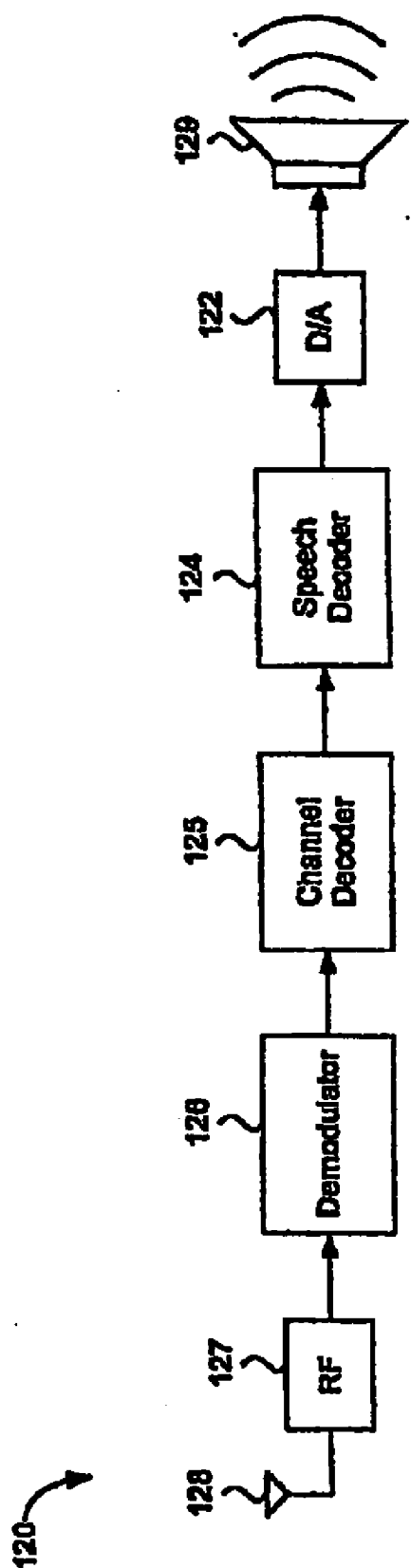


FIG. 1B

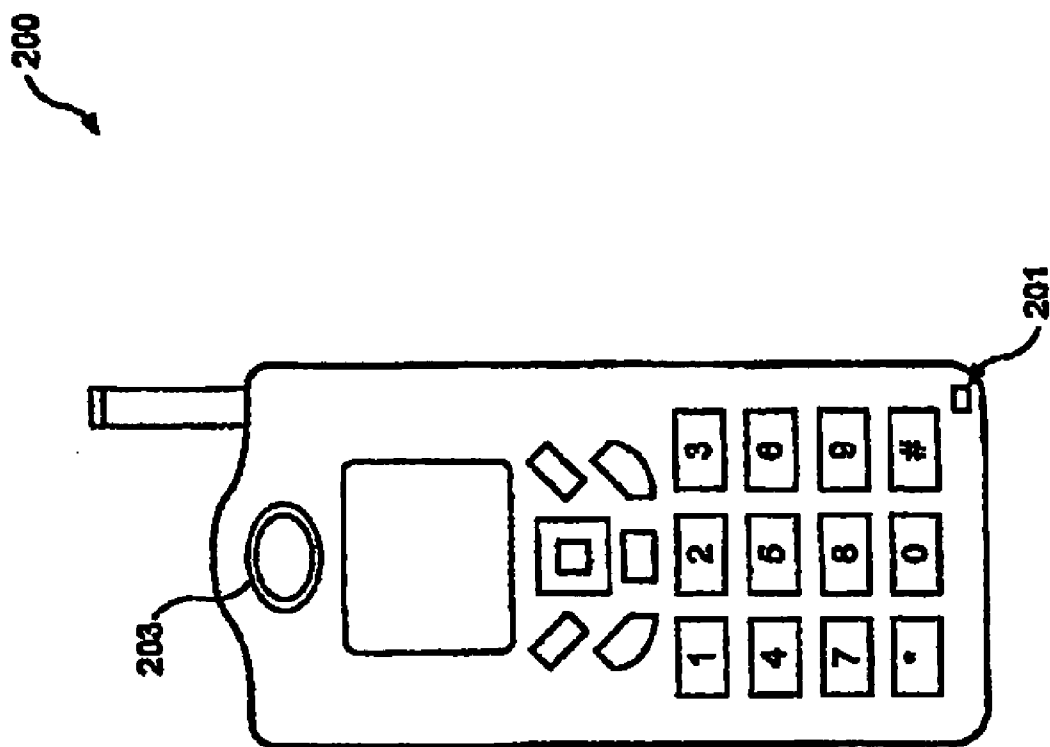


FIG. 2

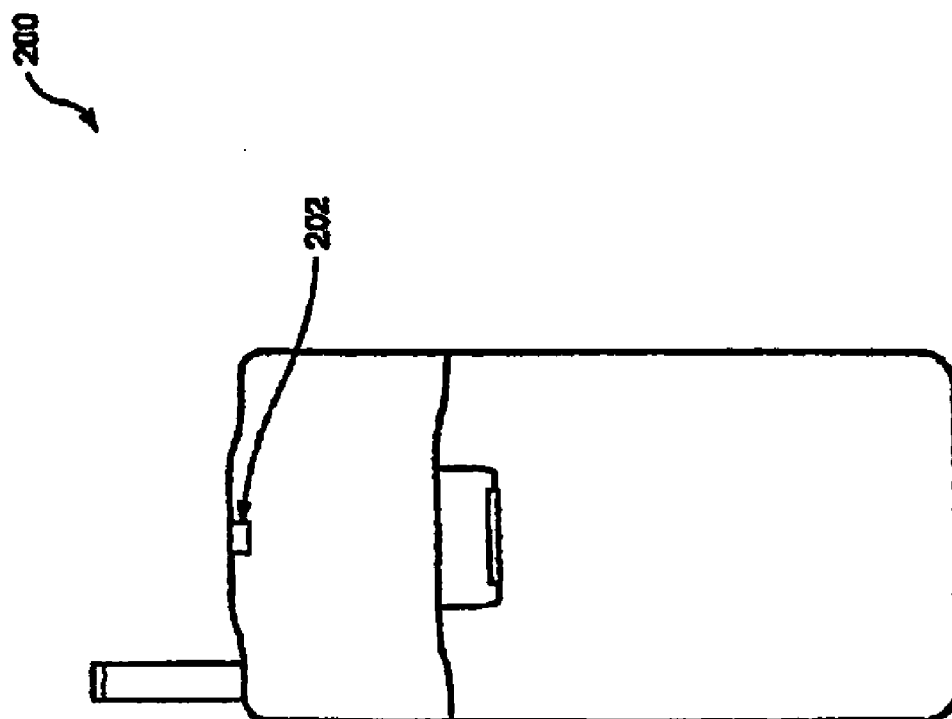


FIG. 3



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