

Exhibit 1



US008467366B2

(12) **United States Patent**
Li et al.

(10) **Patent No.:** **US 8,467,366 B2**
(45) **Date of Patent:** ***Jun. 18, 2013**

(54) **METHODS AND APPARATUS FOR RANDOM ACCESS IN MULTI-CARRIER COMMUNICATION SYSTEMS**

(58) **Field of Classification Search**
USPC 370/342
See application file for complete search history.

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2010/0111017	A1*	5/2010	Um et al.	370/329

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(57) **ABSTRACT**

Methods and apparatus in a multi-carrier cellular wireless network with random access improve receiving reliability and reduce interference of uplink signals of a random access, while improving the detection performance of a base station receiver by employing specifically configured ranging signals.

24 Claims, 8 Drawing Sheets

(21) Appl. No.: **13/205,579**

(22) Filed: **Aug. 8, 2011**

(65) **Prior Publication Data**

US 2011/0292881 A1 Dec. 1, 2011

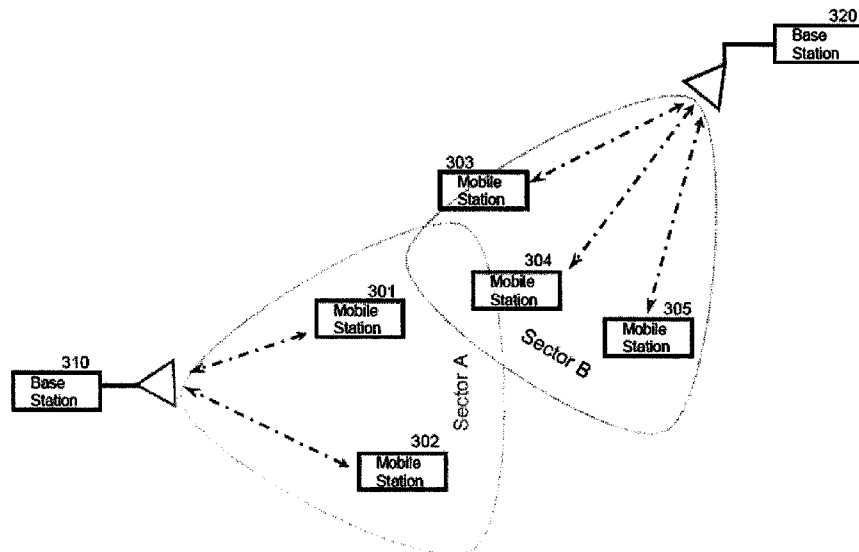
Related U.S. Application Data

(63) Continuation of application No. 10/583,158, filed as application No. PCT/US2005/008169 on Mar. 9, 2005, now Pat. No. 7,995,967.

(60) Provisional application No. 60/551,589, filed on Mar. 9, 2004.

(51) **Int. Cl.**
H04Q 7/216 (2006.01)

(52) **U.S. Cl.**
USPC **370/342; 370/329**



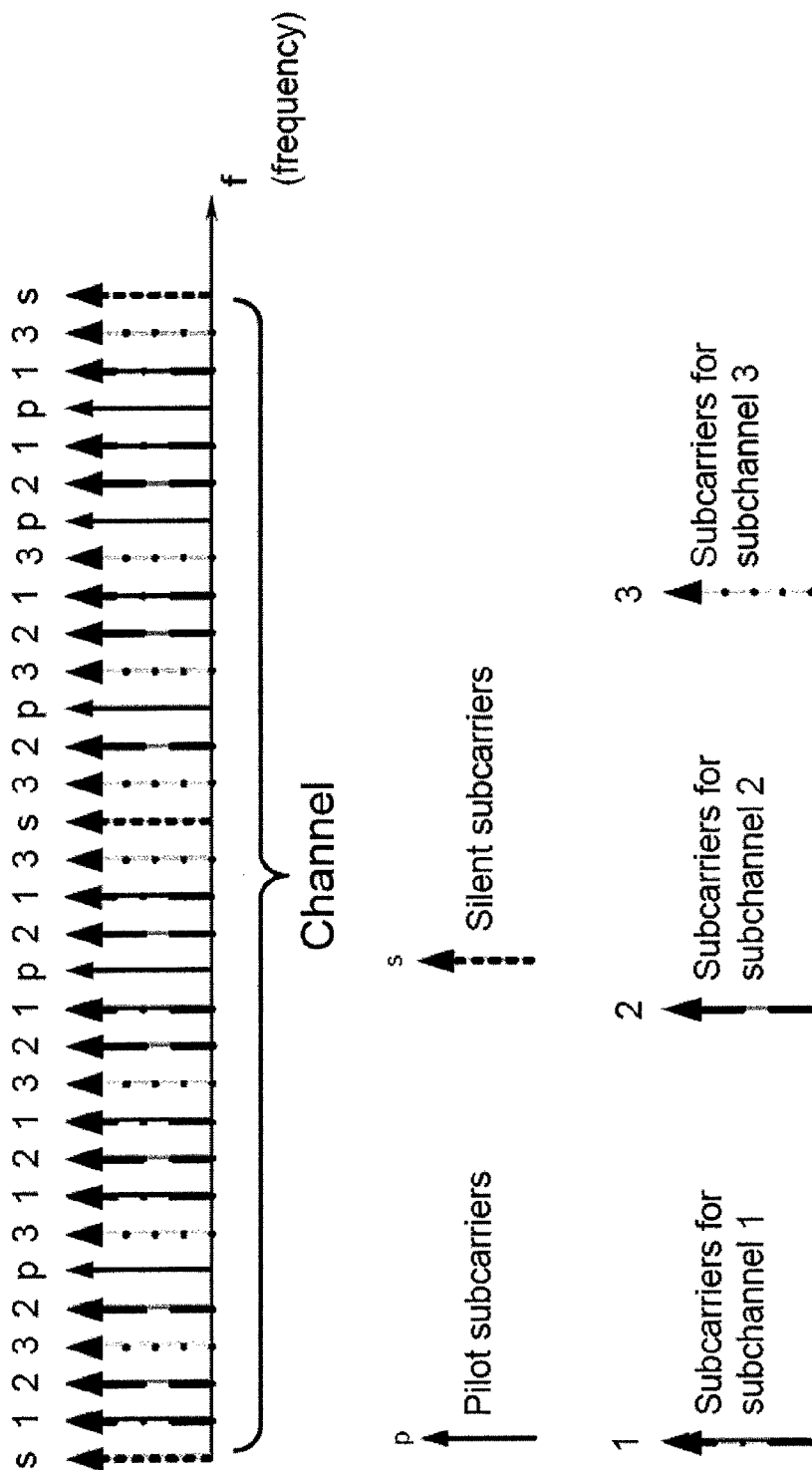


FIG. 1

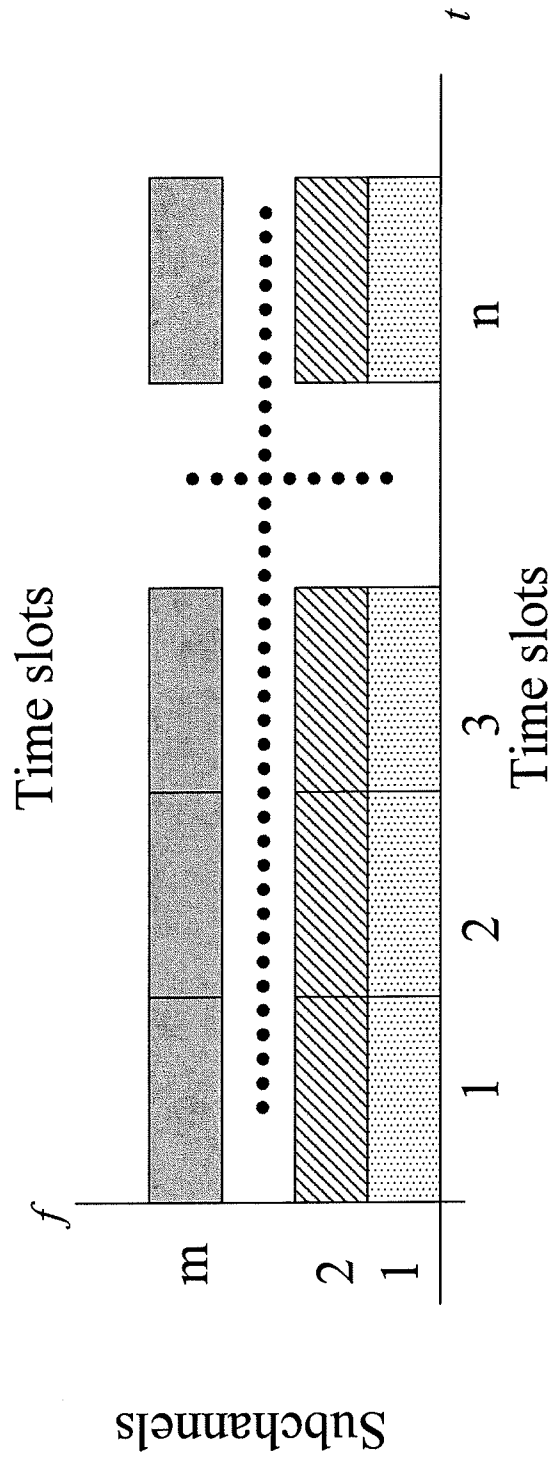


FIG. 2

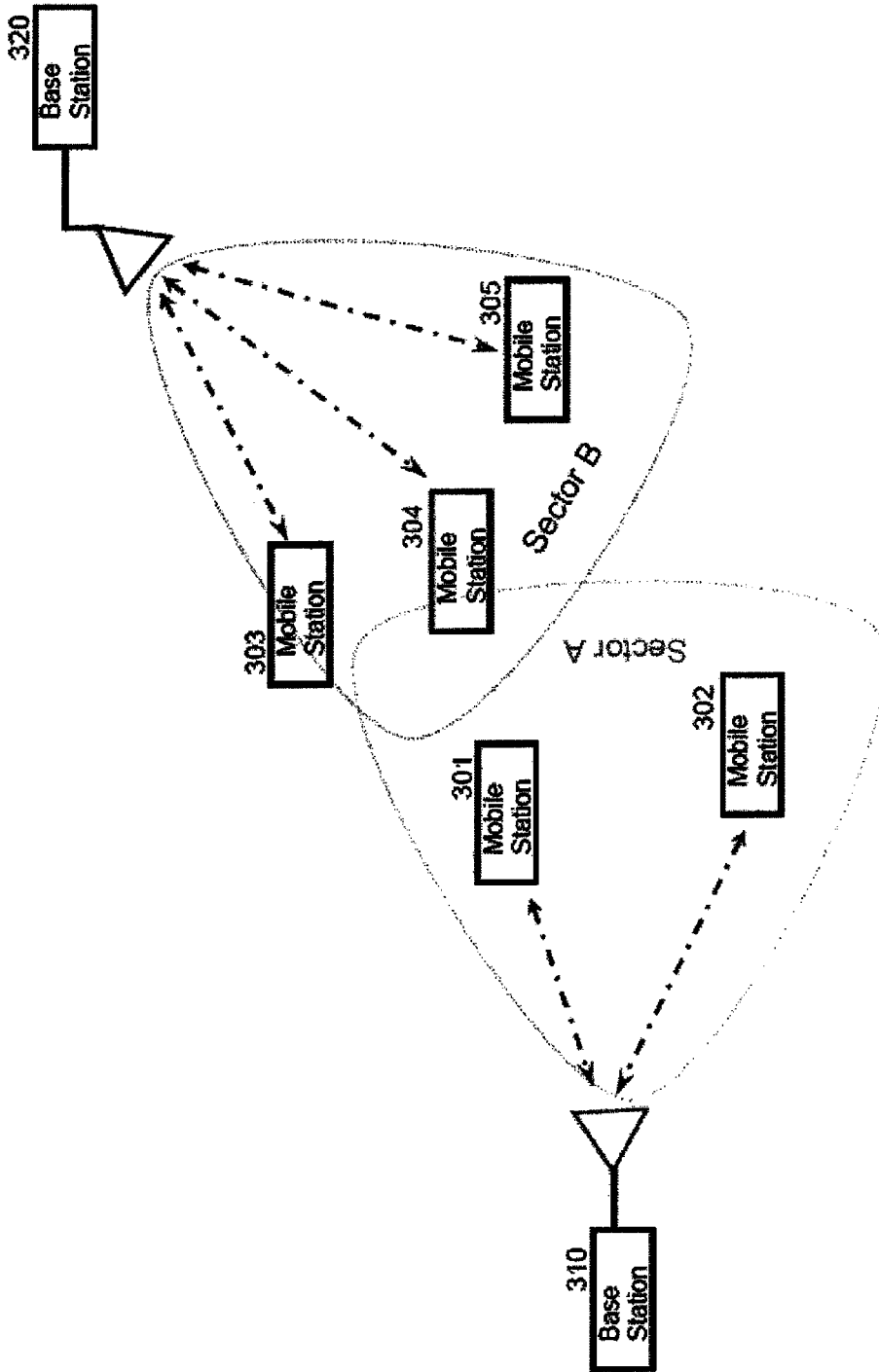


FIG. 3

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