



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

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(54) **MIMO TRANSMISSION AND RECEPTION METHODS AND DEVICES**

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(73) Assignee: **Kabushiki Kaisha Toshiba**, Tokyo (JP)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 647 days.

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(21) Appl. No.: **11/016,808**

(22) Filed: **Dec. 21, 2004**

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(30) **Foreign Application Priority Data**

Jan. 9, 2004 (JP) 2004-004848

(51) **Int. Cl.**

H04K 1/10 (2006.01)
H04L 27/28 (2006.01)
H04L 1/02 (2006.01)
H04B 7/02 (2006.01)

(52) **U.S. Cl.** **375/260; 375/267**

(58) **Field of Classification Search** None
See application file for complete search history.

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Primary Examiner—Shuwang Liu

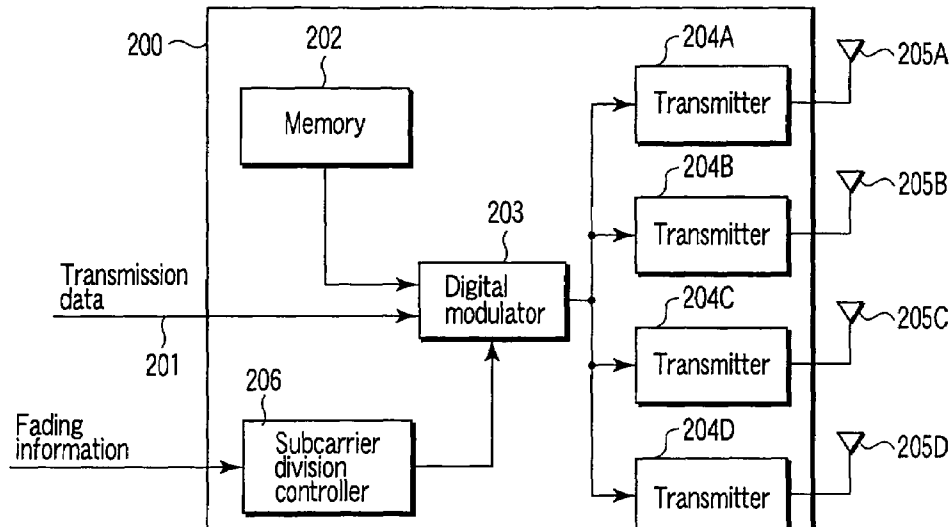
Assistant Examiner—Gina McKie

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(57) **ABSTRACT**

In a wireless transmitting device which performs transmission by an OFDM using a plurality of subcarriers orthogonal to each other, a plurality of preambles to which a plurality of different subcarrier groups selected from a plurality of subcarriers within an OFDM signal band are allocated are transmitted by using a plurality of transmit antennas, and data is transmitted by using the antennas after the preambles are transmitted.

4 Claims, 11 Drawing Sheets



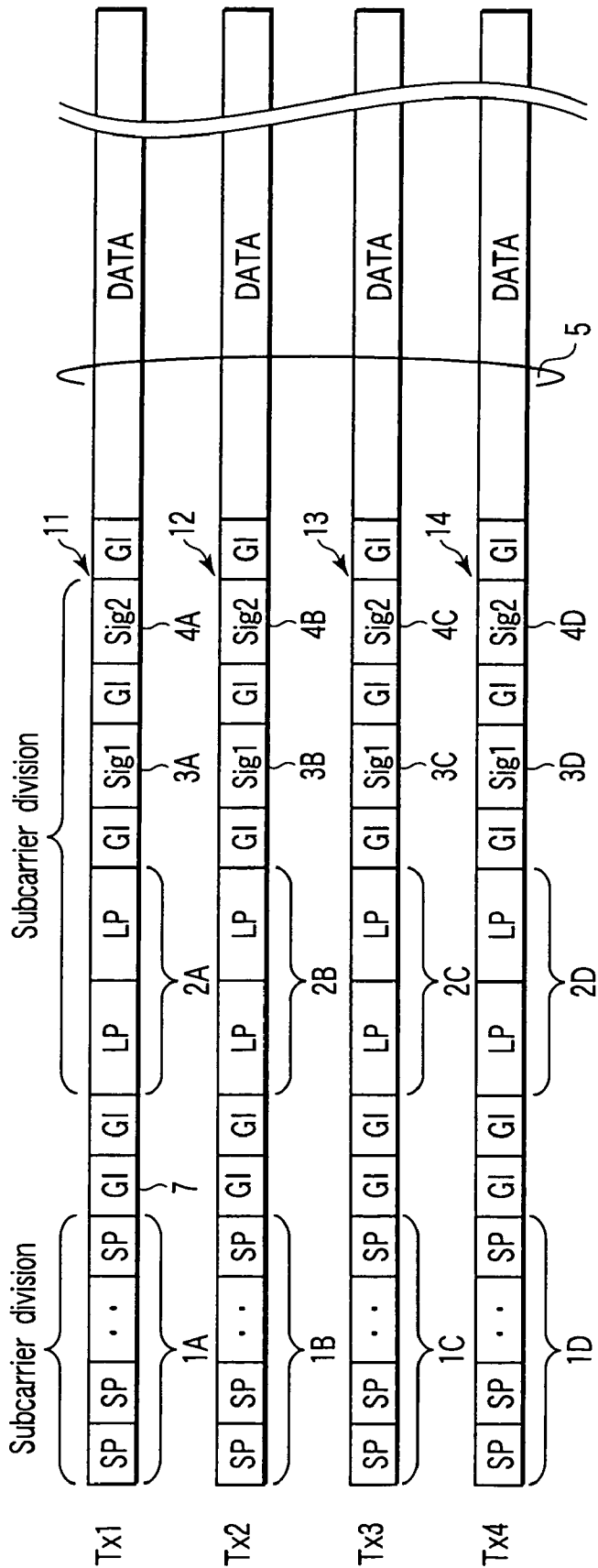


FIG. 1

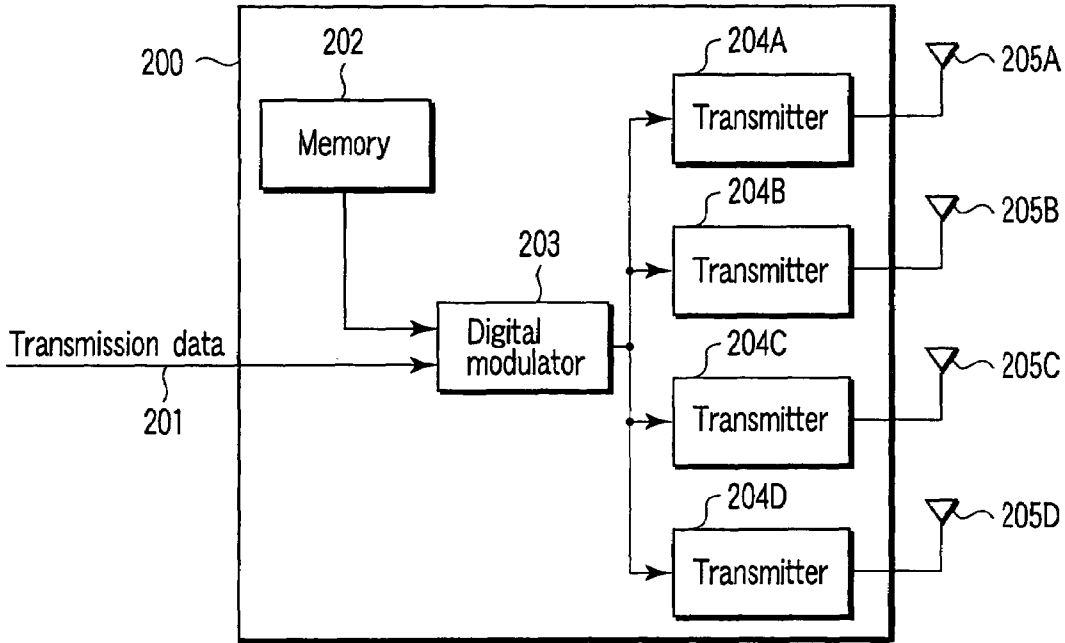


FIG. 2

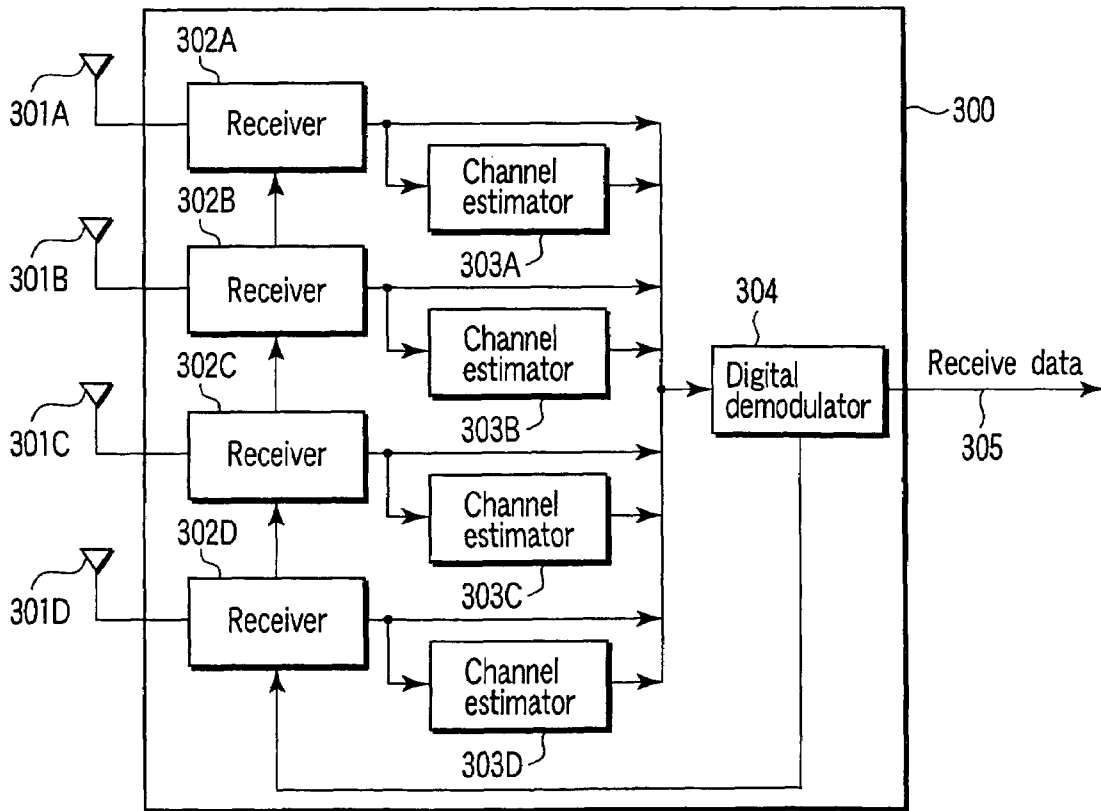


FIG. 3

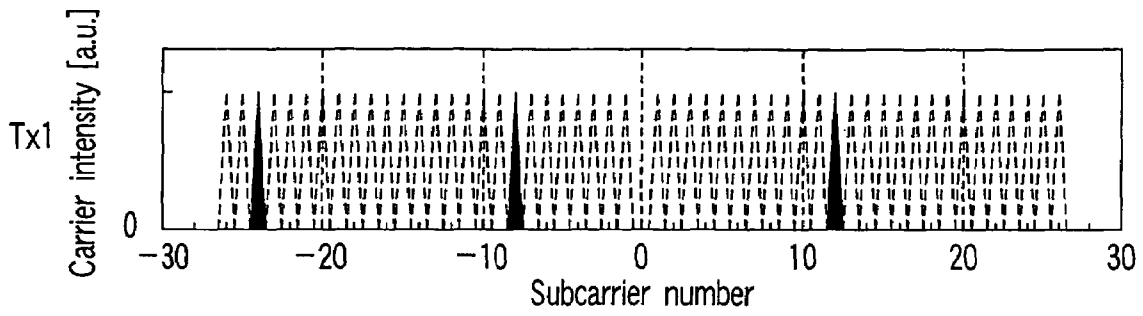


FIG. 4A

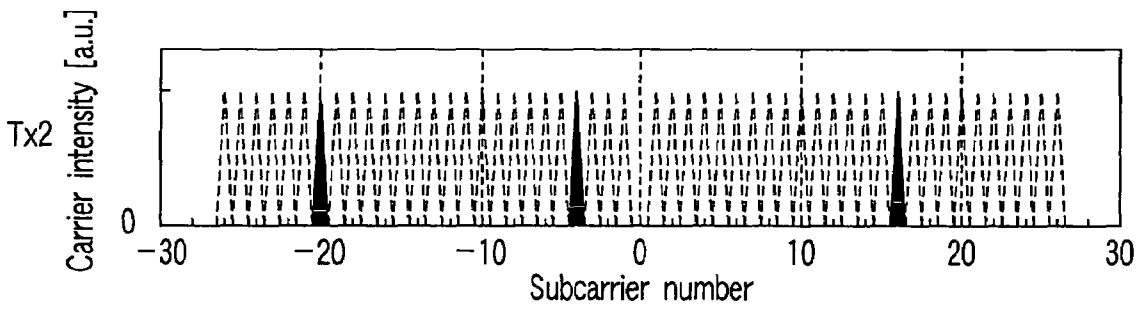


FIG. 4B

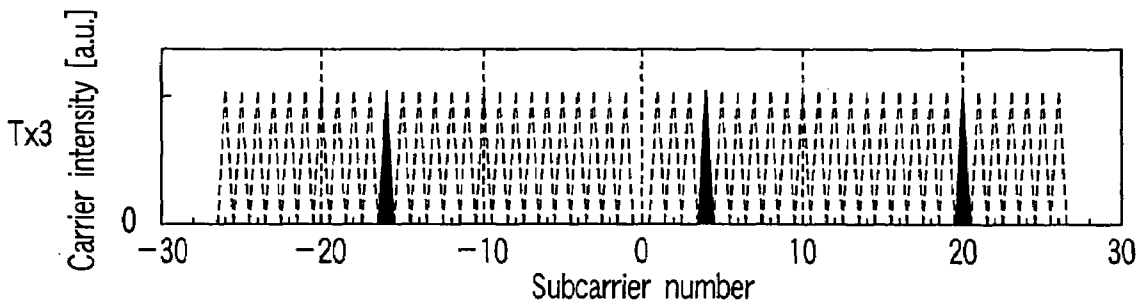


FIG. 4C

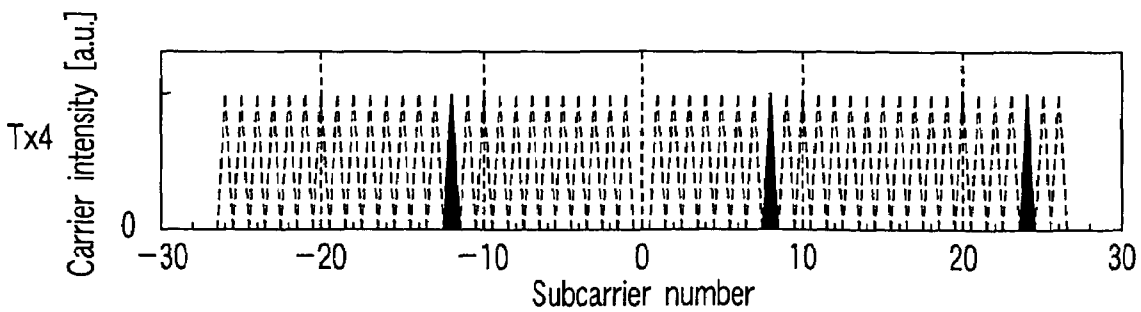


FIG. 4D

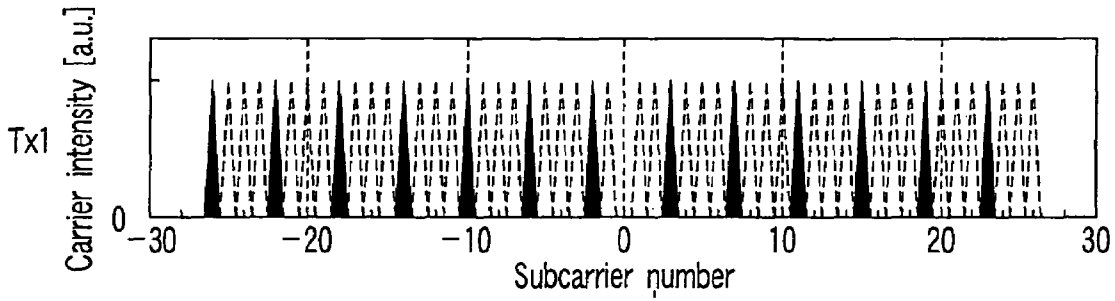


FIG. 5A

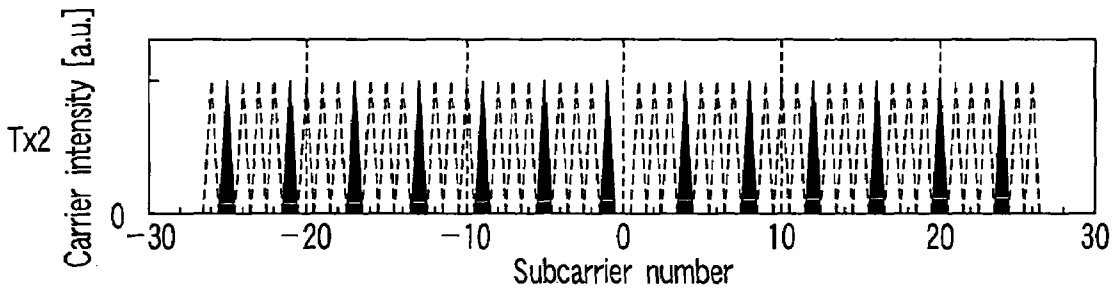


FIG. 5B

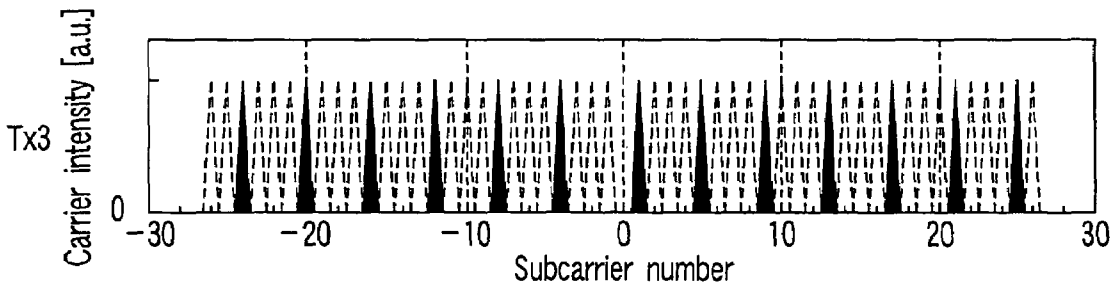


FIG. 5C

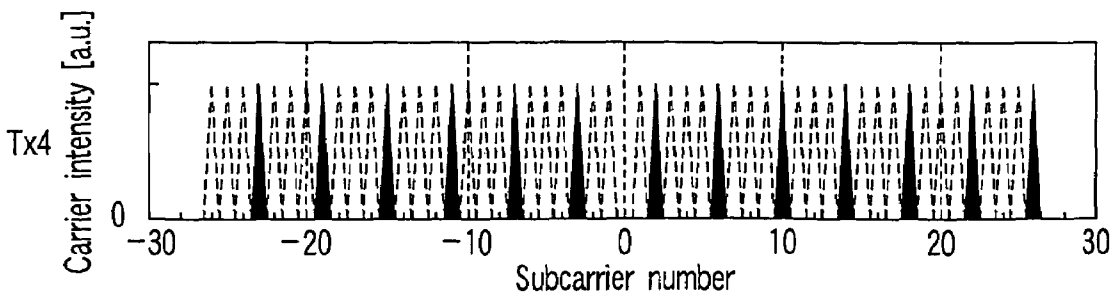


FIG. 5D

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