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## (12) United States Patent

### Vijayan et al.

#### (54) MULTIPLEXING AND TRANSMISSION OF MULTIPLE DATA STREAMS IN A WIRELESS MULTI-CARRIER COMMUNICATION SYSTEM

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- (73) Assignee: **QUALCOMM Incorporated**, San Diego, CA (US)
- (\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 61 days.
- (21) Appl. No.: 10/932,586
- (22) Filed: Sep. 1, 2004

#### (65) **Prior Publication Data**

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#### **Related U.S. Application Data**

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  2, 2003, provisional application No. 60/559,740, filed on Apr. 5, 2004.
- (51) Int. Cl.
- *H04B* 7/216 (2006.01)
- (52) U.S. Cl. ..... 370/441; 370/335; 370/342

See application file for complete search history.

# (10) Patent No.: US 7,221,680 B2 (45) Date of Patent: May 22, 2007

## (56) **References Cited**

#### U.S. PATENT DOCUMENTS

6,618,353	B2 *	9/2003	Merrill et al 370/225
2002/0085486	A1*	7/2002	Ehrmann-Patin et al 370/210
2003/0086366	A1*	5/2003	Branlund et al 370/208
2004/0266351	A1 $*$	12/2004	Chuah et al 455/62

\* cited by examiner

Primary Examiner—Chi Pham

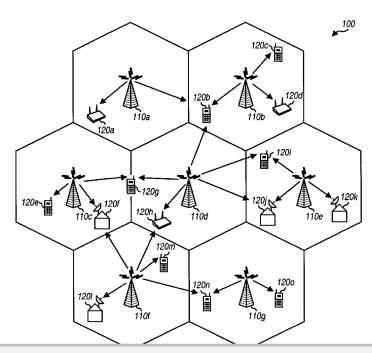
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#### (57) **ABSTRACT**

Techniques for multiplexing and transmitting multiple data streams are described. Transmission of the multiple data streams occurs in "super-frames". Each super-frame has a predetermined time duration and is further divided into multiple (e.g., four) frames. Each data block for each data stream is outer encoded to generate a corresponding code block. Each code block is partitioned into multiple subblocks, and each data packet in each code block is inner encoded and modulated to generate modulation symbols for the packet. The multiple subblocks for each code block are transmitted in the multiple frames of the same super-frame, one subblock per frame. Each data stream is allocated a number of transmission units in each super-frame and is assigned specific transmission units to achieve efficient packing. A wireless device can select and receive individual data streams.

#### 35 Claims, 15 Drawing Sheets

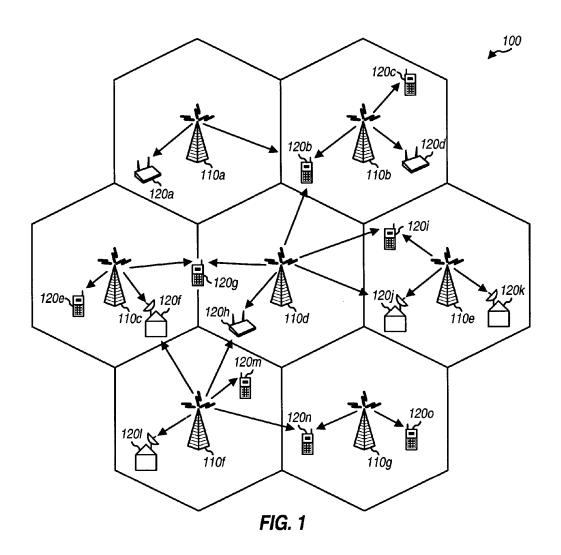


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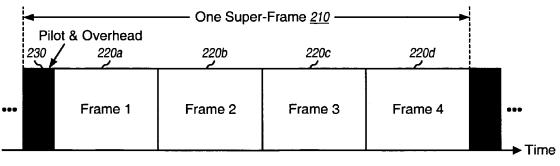
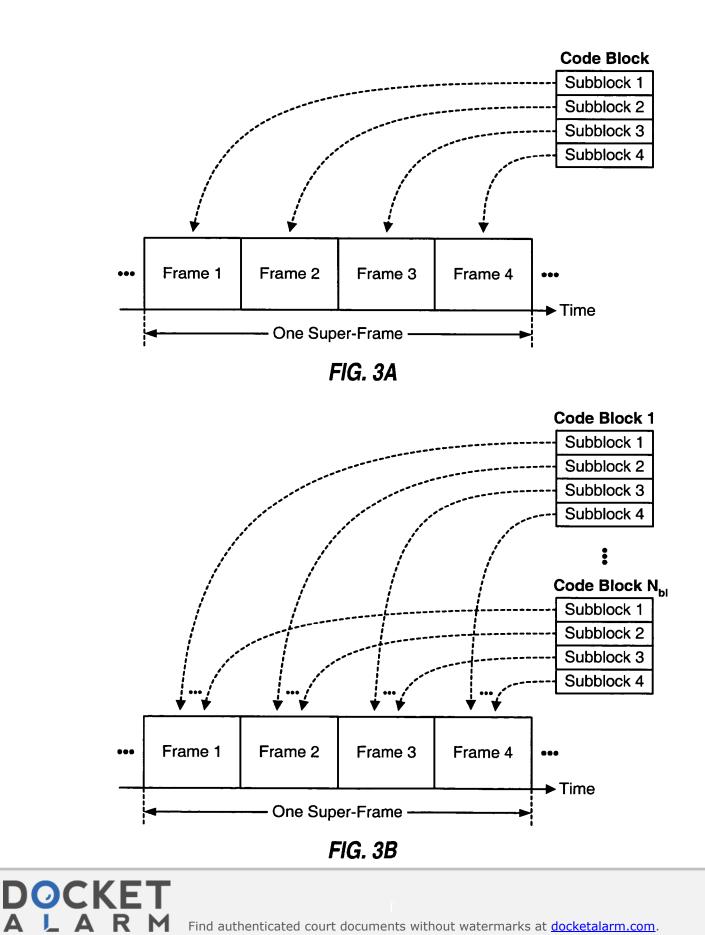


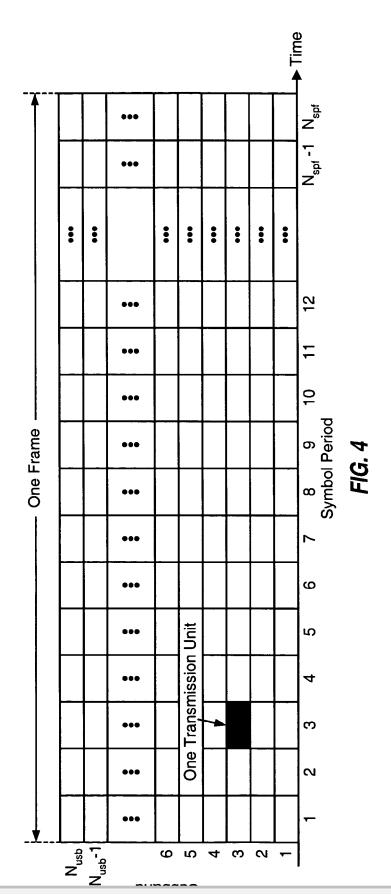
FIG. 2

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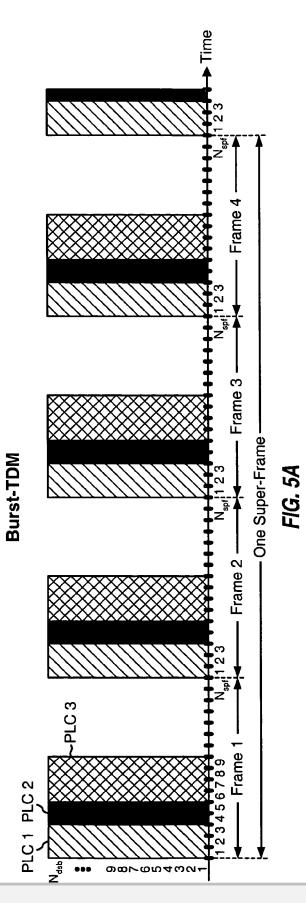


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