

**Patent Owner's Demonstrative**  
**U.S. Patent No. 7,848,439**

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**Oral Hearing**

# U.S. Patent No. 7,848,439

US 7,848,439 B2

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a parameter deciding section that decides modulation parameters and coding parameters per subband group comprised of a plurality of the subbands based on a result of the channel estimation per subband.

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a parameter deciding section that decides modulation parameters and coding parameters per subband group comprised of a plurality of the subbands based on a result of the channel estimation per subband.

**United States Patent**  
**She et al.** (10) Patent No.: **US 7,848,439 B2**  
 (45) Date of Patent: **Dec. 7, 2010**

(54) **COMMUNICATION APPARATUS, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD**  
 (75) Inventors: Xiaoming She, Beijing (CN); Jifeng Li, Kanagawa (JP)  
 (73) Assignee: **Panasonic Corporation**  
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 (58) Field of Classification Search: See application file for complete list of U.S. Patent Office classification numbers.  
 (56) References Cited: U.S. PATENT DOCUMENTS: 6,351,499 B1 \* 2/2002 Paulraj et al. 375/327

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

**(10) Patent No.: US 7,848,439 B2**  
**(45) Date of Patent: Dec. 7, 2010**

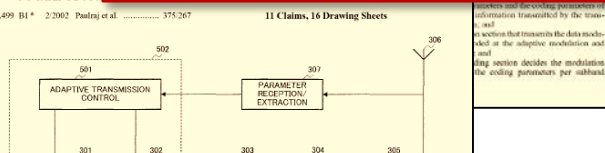
**(54) COMMUNICATION APPARATUS, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD**

6,836,484 B2 12/2004 Suzuki  
 7,505,529 B2 \* 3/2009 Kwak et al. ....  
 2003/0231706 A1 12/2003 Hwang  
 2006/0008020 A1 \* 1/2006 Blankenship et al. ...

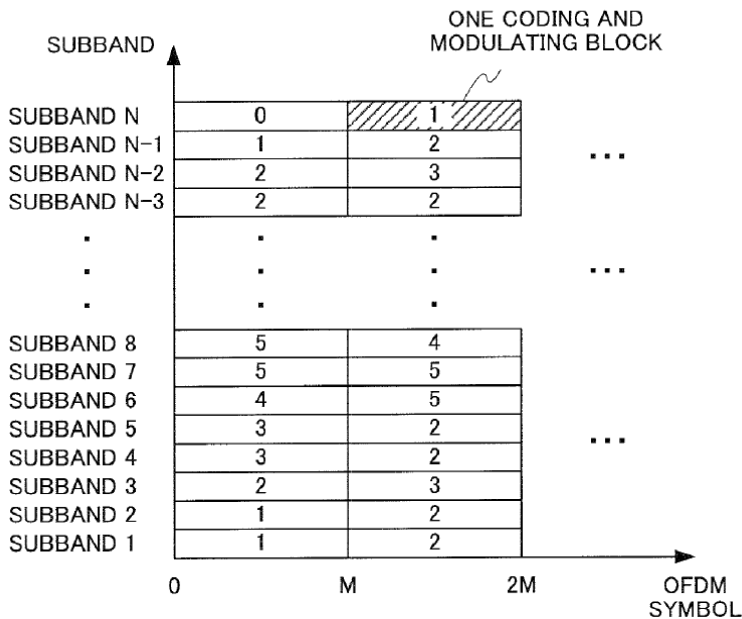
**(75) Inventors: Xiaoming She, Beijing (CN); Jifeng Li, Kanagawa (JP)**

**(73) Assignee: Panasonic Corporation, Osaka (JP)**

FOREIGN PATENT DOCUMENTS



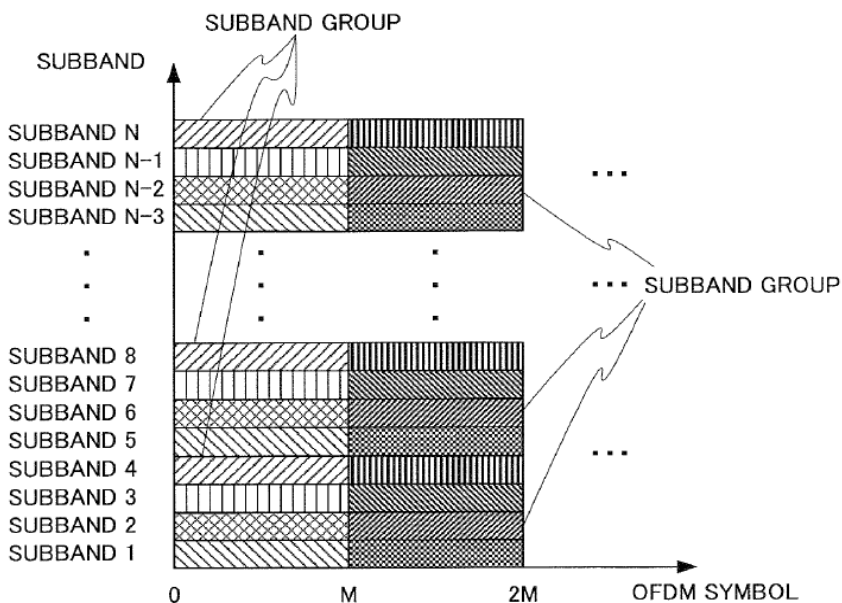
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adaptivity in this case refers to adaptivity at two time domain and frequency domain. Currently, a configuration, AMC in OFDM is divided into based on subcarriers and AMC based on subband based on subcarriers referred to here refers to transmission using a modulation method and a method that are different per OFDM subcarrier subcarrier as a minimum unit of adaptivity. However, based on subcarriers is very difficult to be implemented in addition, has the problem that feedback overhead is large. Typically, it is difficult to implement an AMC based on subcarriers in an actual system. As another configuration in OFDM, a subband adaptive modulation, namely, a subband adaptive modulation related art is, relatively, typically used.

FIG. 2 shows subband adaptive modulation and the related art.

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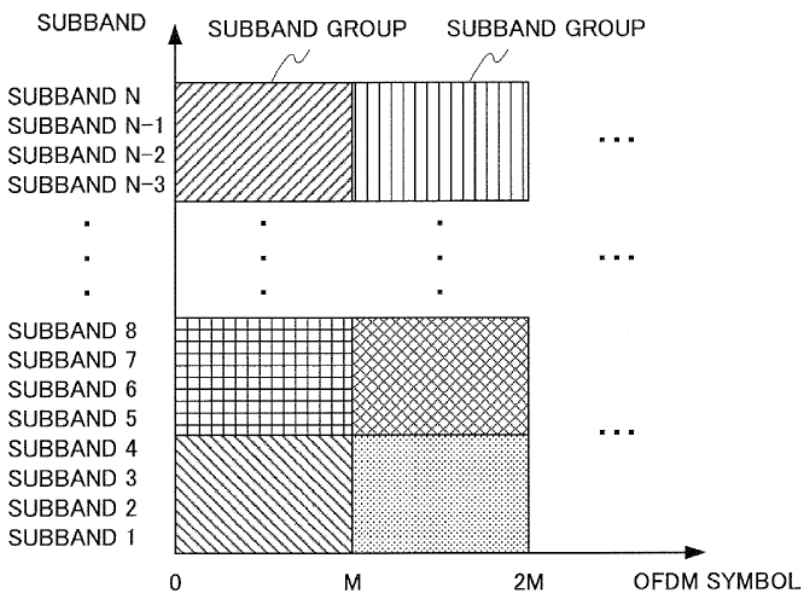


## DISCLOSURE OF THE INVENTION

### Problems to be Solved by the Invention

The object of the present invention is therefore to provide a communication apparatus, a communication method capable of increasing the utilization rate of a system and particularly increasing the utilization rate based on high-speed fading and reducing the degree of difficulty of the system and reducing the feedback overhead compared to adaptive methods of the related art by combining subbands on a frequency domain of a subcarrier in a communication system based on a fixed rule to as to give subbands into groups, and then selecting modulation and coding schemes for use during joint coding with respect to each subband group.

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## DISCLOSURE OF THE INVENTION

### Problems to be Solved by the Invention

The object of the present invention is therefore to provide a communication apparatus, a communication method capable of increasing the utilization rate of a system and particularly increasing the utilization rate based on high-speed fading and channel estimation error, reducing the degree of difficulty of channel estimation and reducing the feedback overhead compared to conventional adaptive methods of the related art by combining subbands on a frequency domain of a subcarrier in a communication system based on a fixed rule to as to give subbands to subband groups, and then selecting modulation and coding schemes for use during joint coding with respect to each subband group.

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