



US009014243B2

(12) **United States Patent**  
**Tzannes**

(10) **Patent No.:** **US 9,014,243 B2**  
(45) **Date of Patent:** **Apr. 21, 2015**

(54) **SYSTEM AND METHOD FOR SCRAMBLING USING A BIT SCRAMBLER AND A PHASE SCRAMBLER**

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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 0 days.

(21) Appl. No.: **13/718,016**  
(22) Filed: **Dec. 18, 2012**

(65) **Prior Publication Data**  
US 2013/0136160 A1 May 30, 2013

**Related U.S. Application Data**

(60) Continuation of application No. 13/439,605, filed on Apr. 4, 2012, now Pat. No. 8,355,427, which is a continuation of application No. 13/284,549, filed on Oct. 28, 2011, now Pat. No. 8,218,610, which is a  
(Continued)

(51) **Int. Cl.**  
*H04L 27/26* (2006.01)  
*H04L 25/03* (2006.01)  
*H04B 1/40* (2006.01)  
(52) **U.S. Cl.**  
CPC ..... *H04L 27/2627* (2013.01); *H04L 25/03866* (2013.01); *H04L 27/2614* (2013.01); *H04L 27/2621* (2013.01); *H04B 1/40* (2013.01)

(58) **Field of Classification Search**  
USPC ..... 375/222, 340, 341  
See application file for complete search history.

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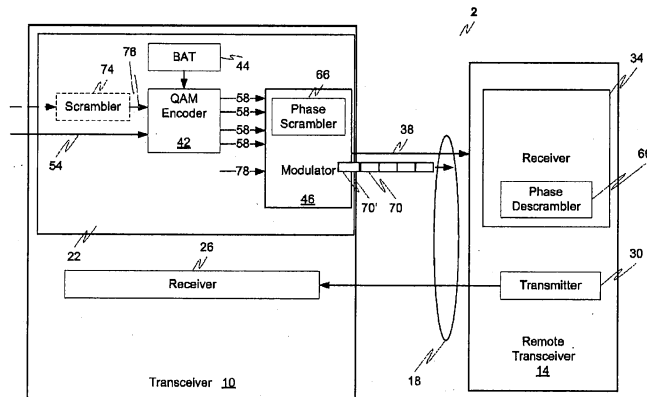
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(57) **ABSTRACT**

A system and method that demodulates the phase characteristic of a carrier signal are described. The scrambling of the phase characteristic of each carrier signal includes associating a value with each carrier signal and computing a phase shift for each carrier signal based on the value associated with that carrier signal. The value is determined independently of any input bit value carried by that carrier signal. The phase shift computed for each carrier signal is combined with the phase characteristic of that carrier signal so as to substantially scramble the phase characteristic of the carrier signals. Bits of an input signal are modulated onto the carrier signals having the substantially scrambled phase characteristic to produce a transmission signal with a reduced PAR.

**25 Claims, 2 Drawing Sheets**



**COMCAST-1001**

**Comcast Cable Communications LLC, et. al. v. TQ Delta**  
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**Related U.S. Application Data**

- continuation of application No. 11/860,080, filed on Sep. 24, 2007, now Pat. No. 8,073,041, which is a division of application No. 11/211,535, filed on Aug. 26, 2005, now Pat. No. 7,292,627, which is a continuation of application No. 09/710,310, filed on Nov. 9, 2000, now Pat. No. 6,961,369.
- (60) Provisional application No. 60/164,134, filed on Nov. 9, 1999.

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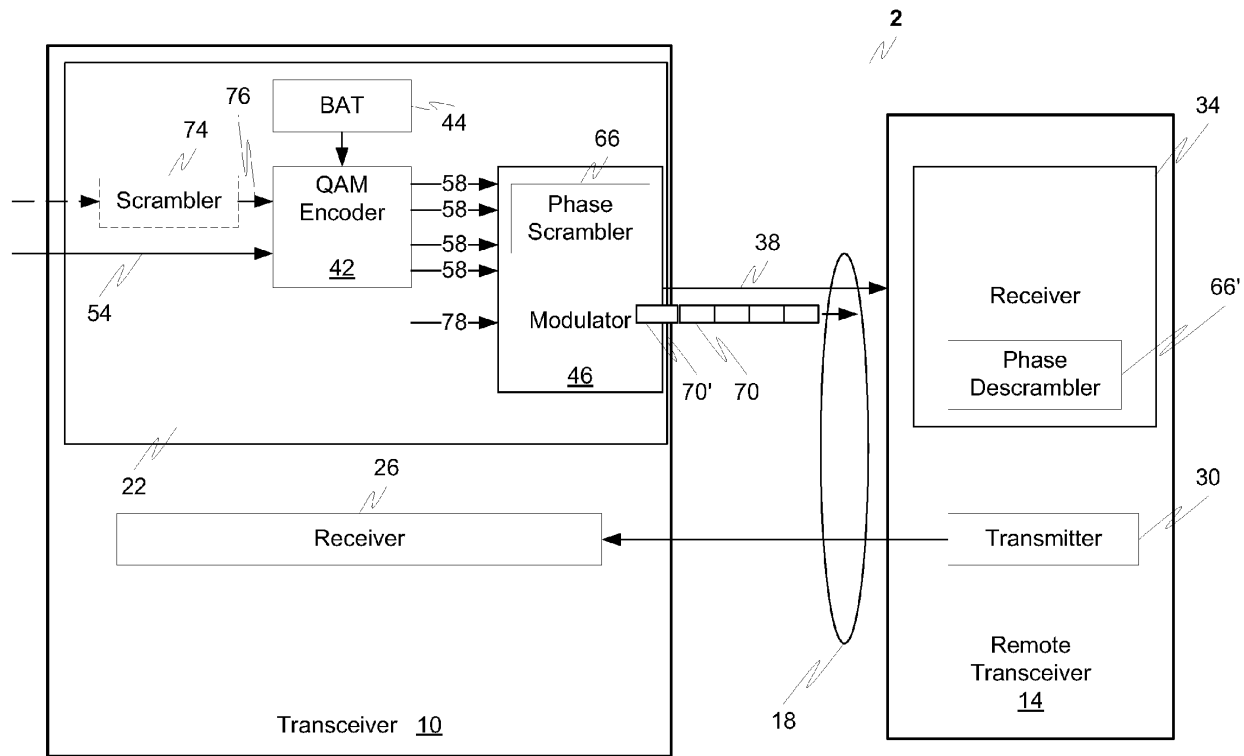


FIG. 1

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