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Hansen

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[54] **OPTIMIZATION OF QAM CONSTELLATION SPACE FOR AUXILIARY I-Q SIGNALING**

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[75] Inventor: **Carl Christian Hansen**, Aloha, Oreg.

Primary Examiner—Chi H. Pham
Assistant Examiner—Emmanuel Bayard
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman LLP

[73] Assignee: **Intel Corporation**, Santa Clara, Calif.

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[57] **ABSTRACT**

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A digital modulator is disclosed for handling primary and auxiliary frames of binary information as part of a two channel communication system. The modulator includes a primary frame-to-vector mapper for generating primary symbol vectors in accordance with quadrature amplitude and phase shift keying (QAM), and an auxiliary frame-to-vector mapper for generating auxiliary vectors in the In-Phase and Quadrature (I-Q) signal space. For those auxiliary vectors having endpoints lying within a given first area, the endpoints are mapped into a second area that represents an optimum auxiliary signal content given a primary symbol constellation in the I-Q plane. A mapped auxiliary vector is then added to an associated primary symbol vector. A carrier is then modulated in accordance with the sum vector.

[51] **Int. Cl.⁷** **H04L 27/36**

[52] **U.S. Cl.** **375/298; 375/295**

[58] **Field of Search** 375/261, 269, 375/279, 280, 308, 298, 260, 295; 370/522, 527, 508, 207

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17 Claims, 8 Drawing Sheets

