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EBRAHIMZAD et al.(10) **Pub. No.: US 2023/0231649 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **BIT-CHANNEL COMBINER AND COMBINED
PROBABILISTIC CONSTELLATION
SHAPING AND POLAR ENCODER**(52) **U.S. CL.**
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Zhuhong ZHANG, Kanata (CA)(21) Appl. No.: **17/576,123**(22) Filed: **Jan. 14, 2022****Publication Classification**(51) **Int. CL.**
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H04L 27/34 (2006.01)(57) **ABSTRACT**

A polar encoder comprises an input, an output and a processor operatively connected to the input and to the output. The input either receives first, second and third codewords, or receives information bits used by the processor for generating first, second and third probabilistic constellation shaping codewords. The processor combines the first and second codewords, to produce a first modulation symbol bit, combines the first and third codewords to produce a second modulation symbol bit, and combines the first, second and third codewords to produce a third modulation symbol bit. The output forwards the modulation symbol bits to a bit to symbol mapper. The polar encoder may be included in a transmitter that further comprises the bit to symbol mapper receiving the modulation symbol bits and generating modulation symbols, and a modulator modulating a carrier using the modulation symbols.

