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(54) **TIME AND FREQUENCY SYNCHRONIZATION IN MULTI-INPUT, MULTI-OUTPUT (MIMO) SYSTEMS**

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(57) **ABSTRACT**

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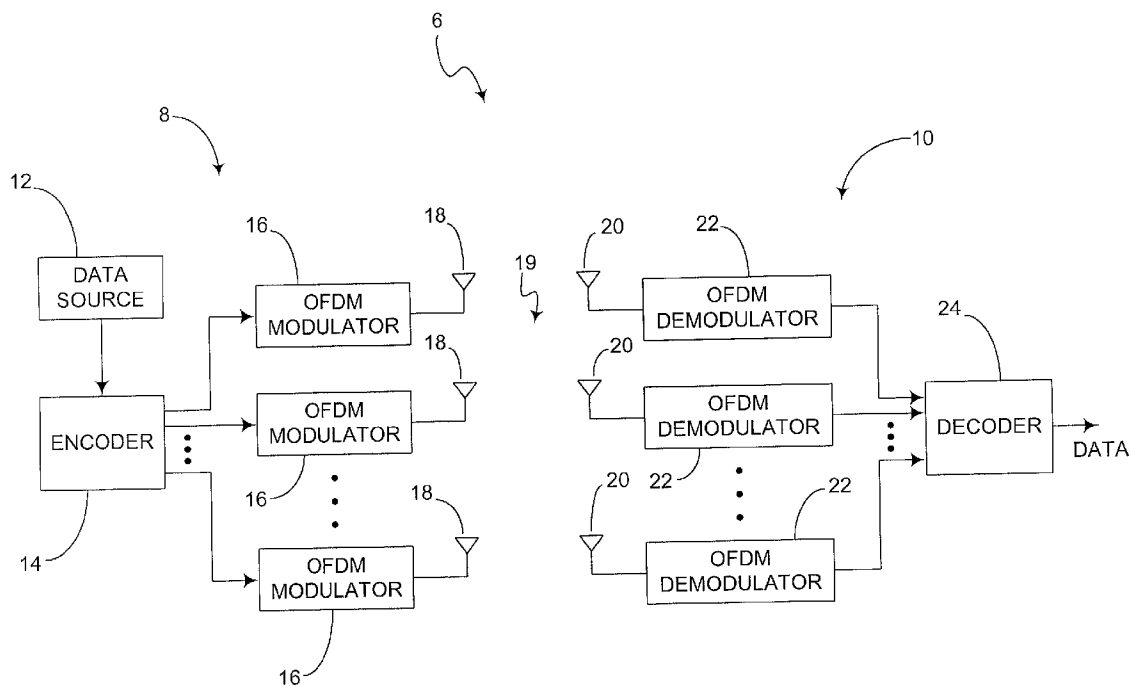
In a communication system, and in particular a wireless Orthogonal Frequency Division Multiplexing (OFDM) communication system, the present invention provides systems for synchronizing data transmitted across a channel. The present invention may be used in a Multi-Input, Multi-Output (MIMO) system in which the data is transmitted from any number of transmitting antennas and received by any number of receiving antennas. The number of transmitting and receiving antennas does not necessarily have to be the same. Circuitry is provided for synchronizing the data in both the time domain and frequency domain. Time synchronization involves coarse time synchronization and fine time synchronization. Frequency synchronization involves coarse frequency offset estimation, fine frequency offset estimation, and frequency offset correction.

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Related U.S. Application Data

(60) Provisional application No. 60/286,180, filed on Apr. 24, 2001. Provisional application No. 60/286,130, filed on Apr. 24, 2001.



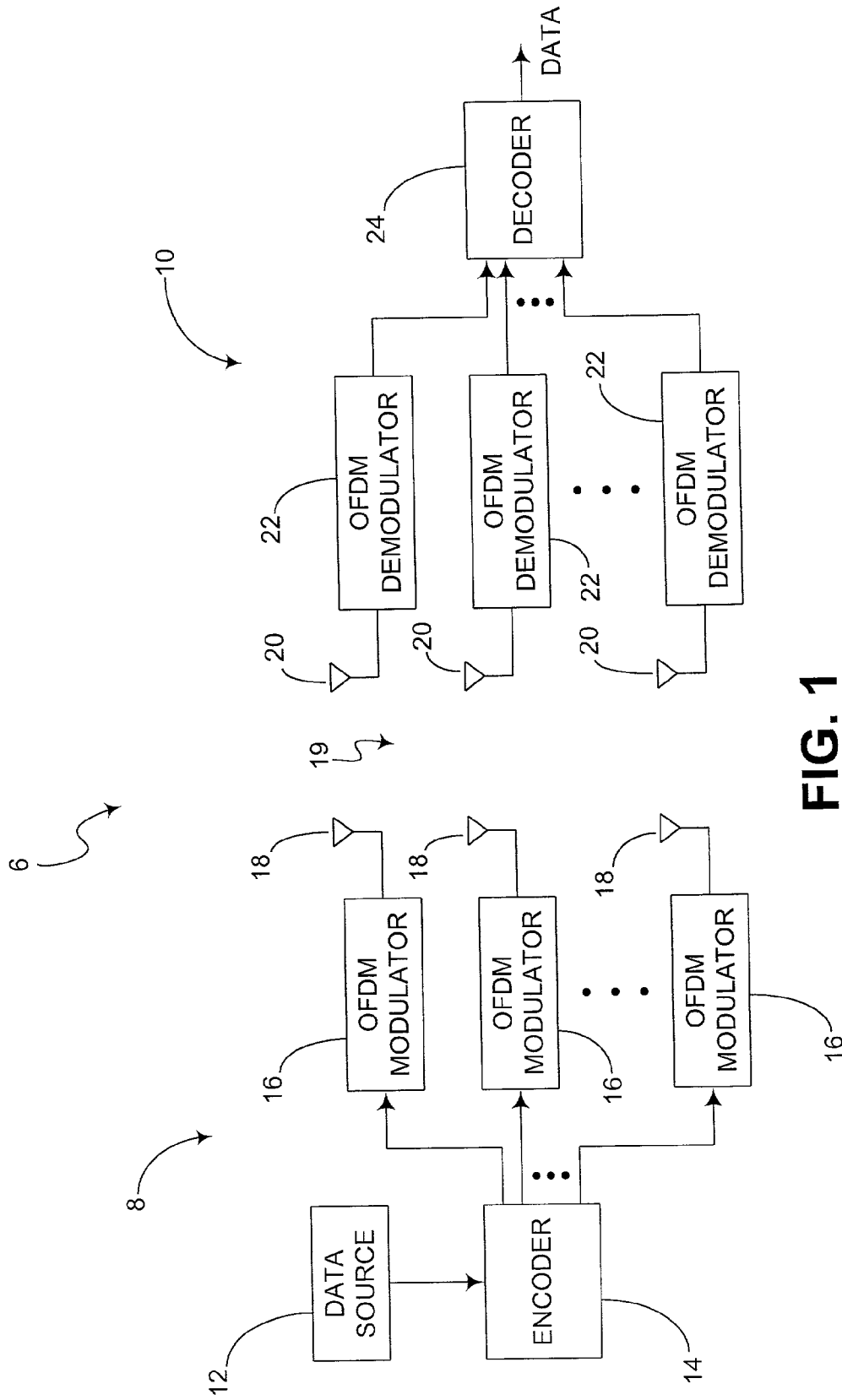


FIG. 1

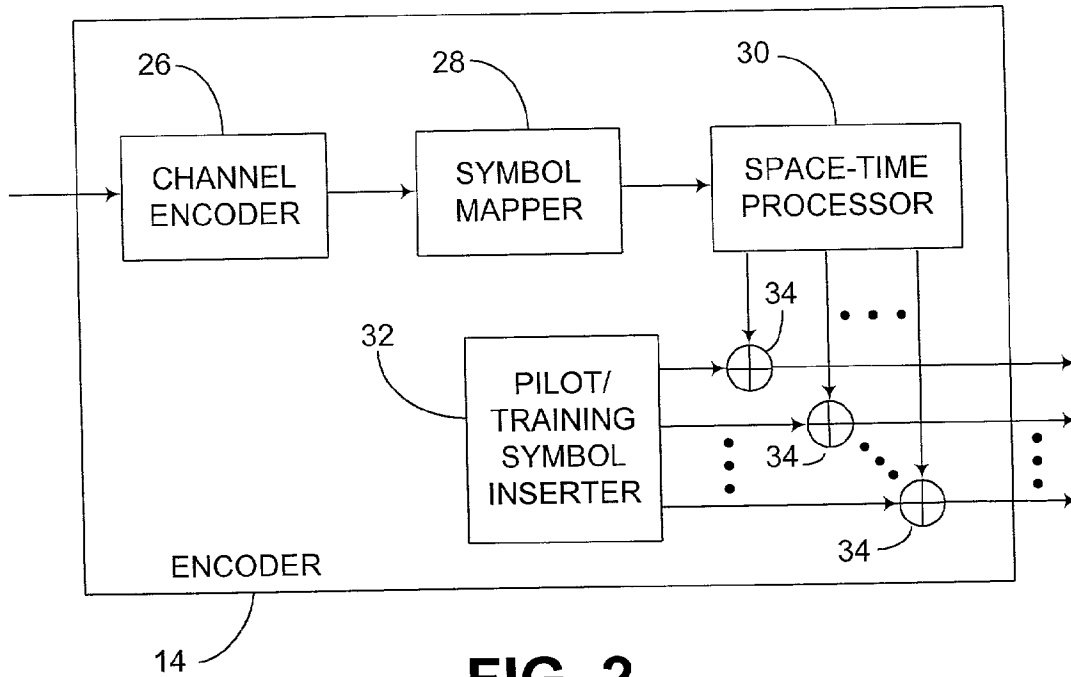


FIG. 2

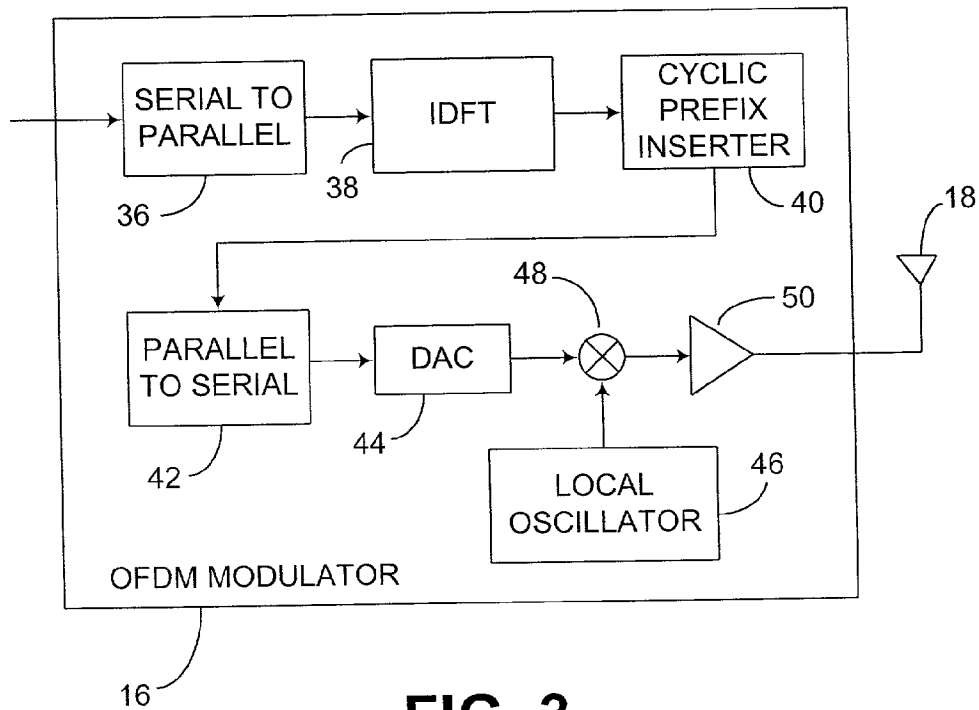


FIG. 3

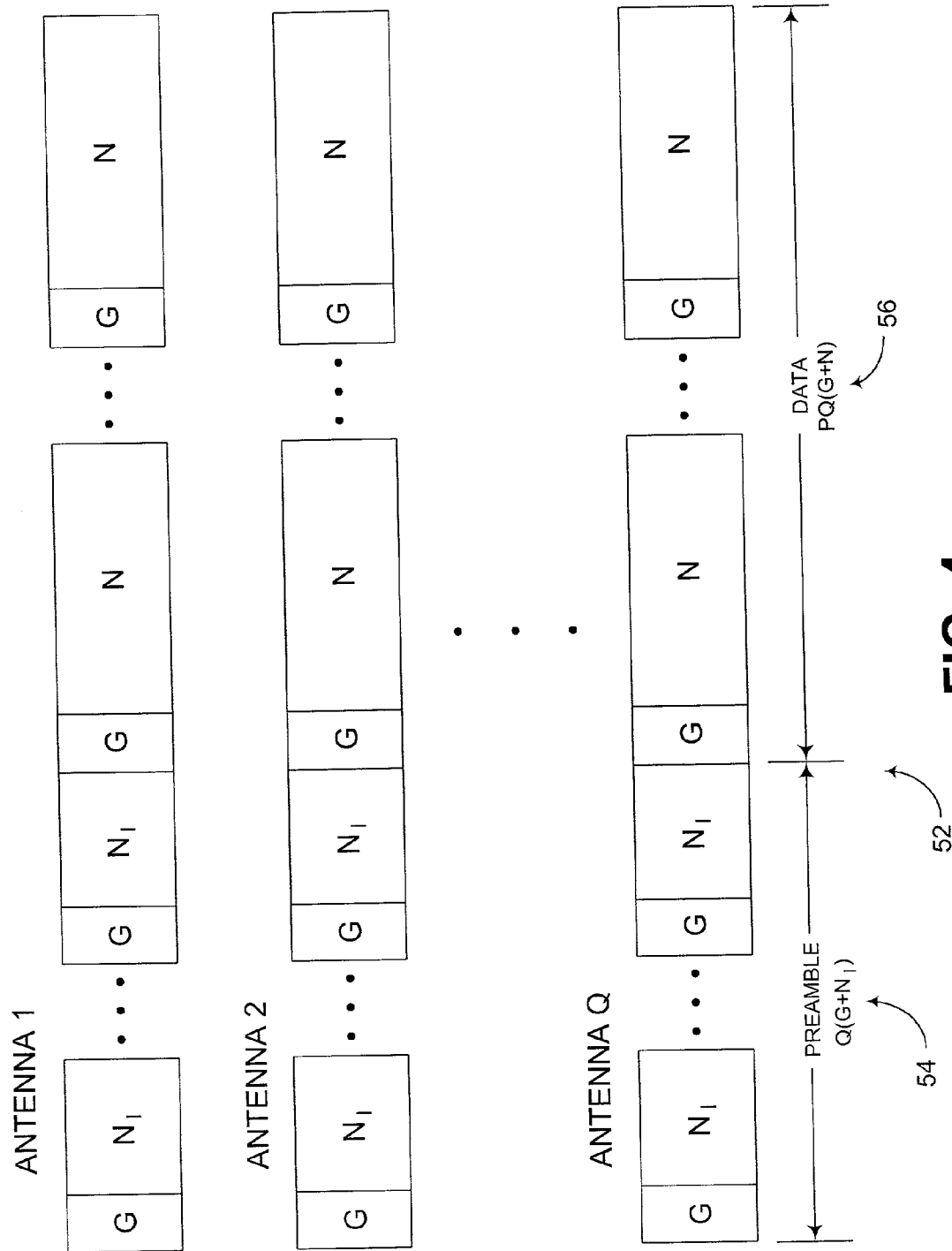


FIG. 4

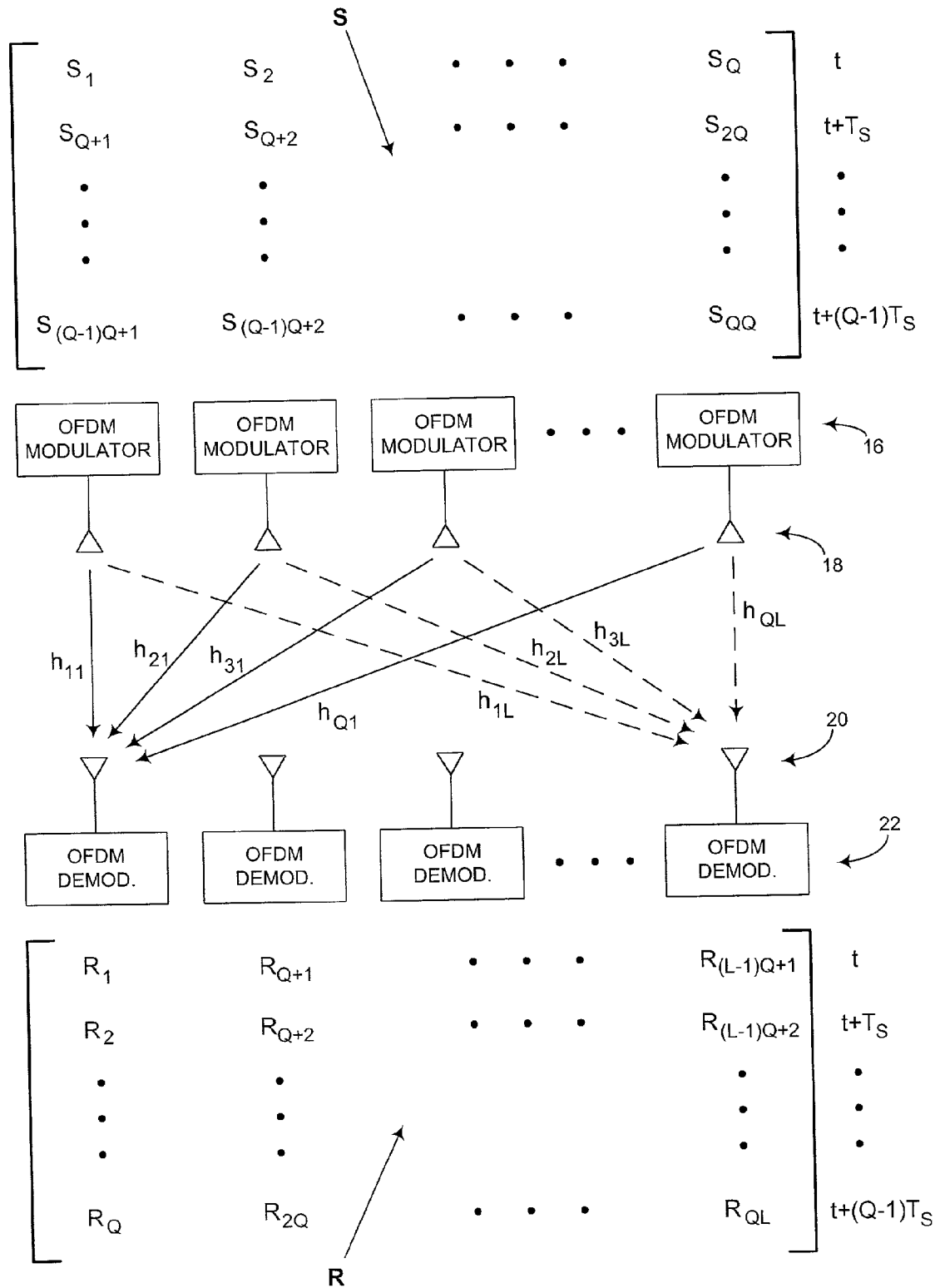


FIG. 5

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