

- [54] **SPATIAL MULTIPLEXING IN A CELLULAR NETWORK**
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- [22] Filed: **Jul. 30, 1999**
- [51] **Int. Cl.**⁷ **H04Q 7/28; H04B 7/216; H04B 7/185; H03D 3/22**
- [52] **U.S. Cl.** **370/329; 370/342; 370/341**
- [58] **Field of Search** **370/328, 329, 370/347, 341, 342, 326, 319, 431, 464, 310; 455/13.1, 507, 509, 524, 560; 375/299**

Attorney, Agent, or Firm—Beyer Weaver Thomas & Nguyen

[57] **ABSTRACT**

The present invention provides methods and apparatus for implementing spatial multiplexing in conjunction with the one or more multiple access protocols during the broadcast of information in a wireless network. A wireless cellular network for transmitting subscriber datastream(s) to corresponding ones among a plurality of subscriber units located within the cellular network is disclosed. The wireless cellular network includes base stations and a logic. The base stations each include spatially separate transmitters for transmitting, in response to control signals, selected substreams of each subscriber datastream on an assigned channel of a multiple access protocol. The logic communicates with each of the base stations. The logic assigns an available channel on which to transmit each subscriber datastream. The logic routes at least a substream of each datastream to at least a selected one of the base stations. The logic also generates control signals to configure the at least a selected one of the base stations to transmit the selected substreams to a corresponding one among the plurality of subscriber units on the assigned channel. A subscriber unit for use in a cellular system is also disclosed. The subscriber unit includes: spatially separate receivers, a spatial processor, and a combiner. The spatially separate receivers receive the assigned channel composite signals resulting from the spatially separate transmission of the subscriber downlink datastream(s). The spatial processor is configurable in response to a control signal transmitted by the base station to separate the composite signals into estimated substreams based on information obtained during the transmission of known data patterns from at least one of the base stations. The spatial processor signals the base stations when a change of a spatial transmission configuration is required. The combiner combines the estimated substreams into a corresponding subscriber datastream.

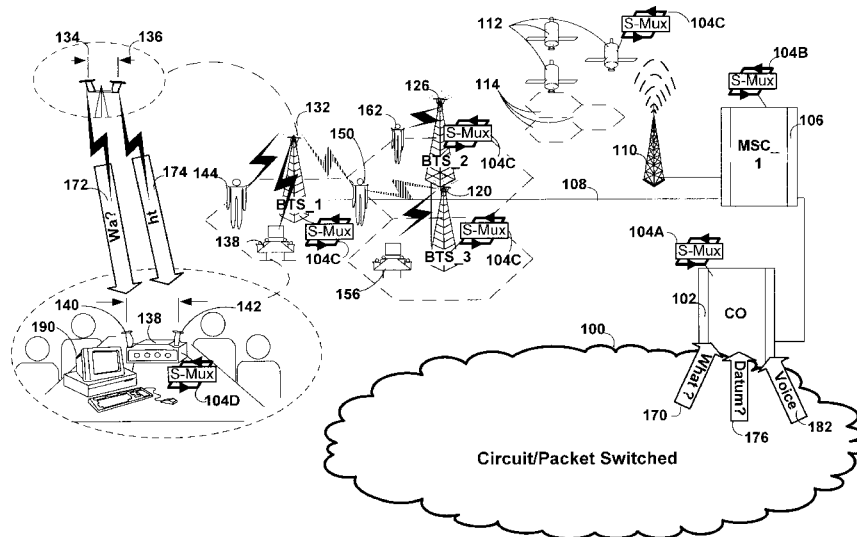
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Primary Examiner—Chi H. Pham
Assistant Examiner—Brenda H. Pham

47 Claims, 31 Drawing Sheets



SPATIAL MULTIPLEX

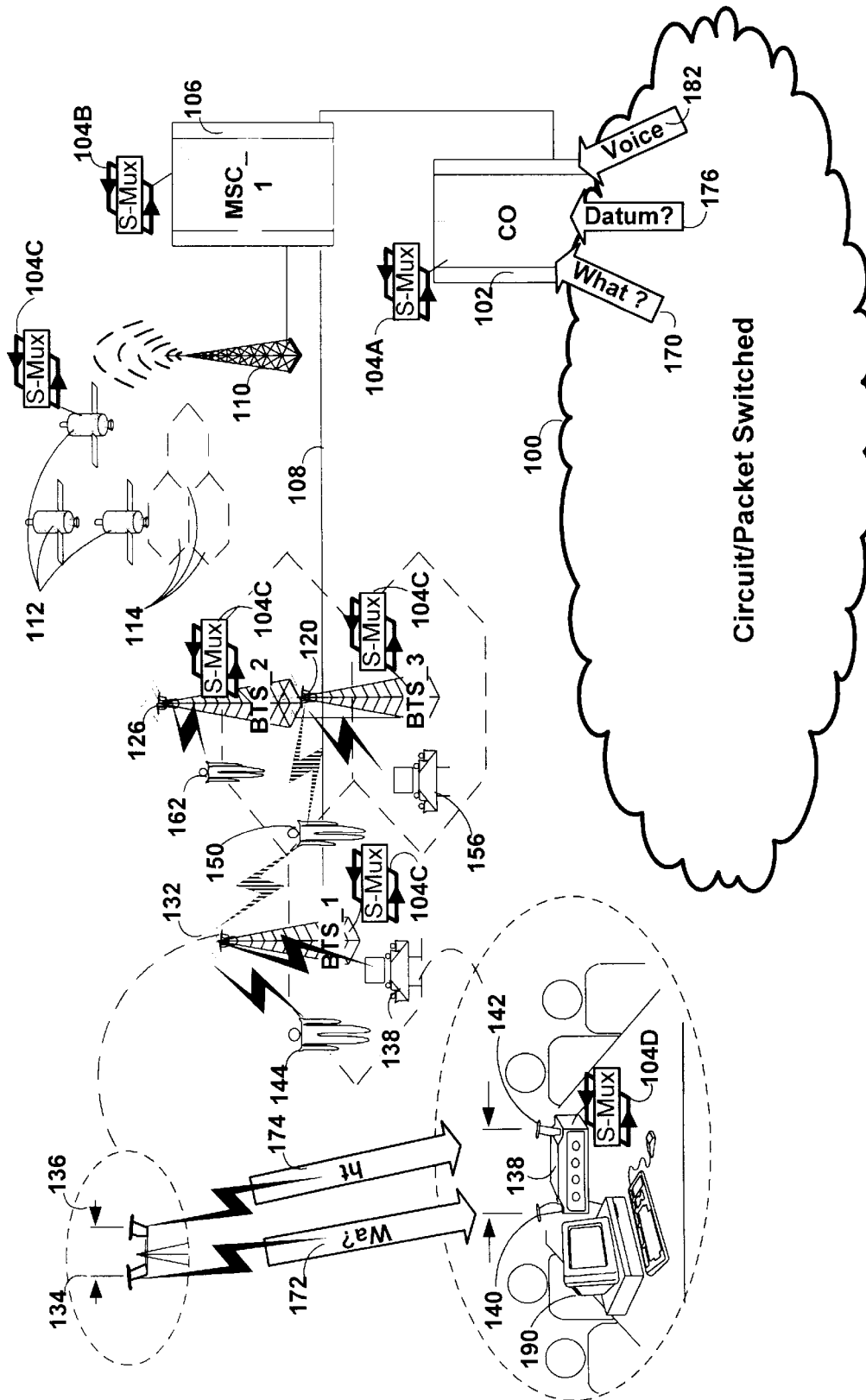


FIG. 1A

SPATIAL MULTIPLEX

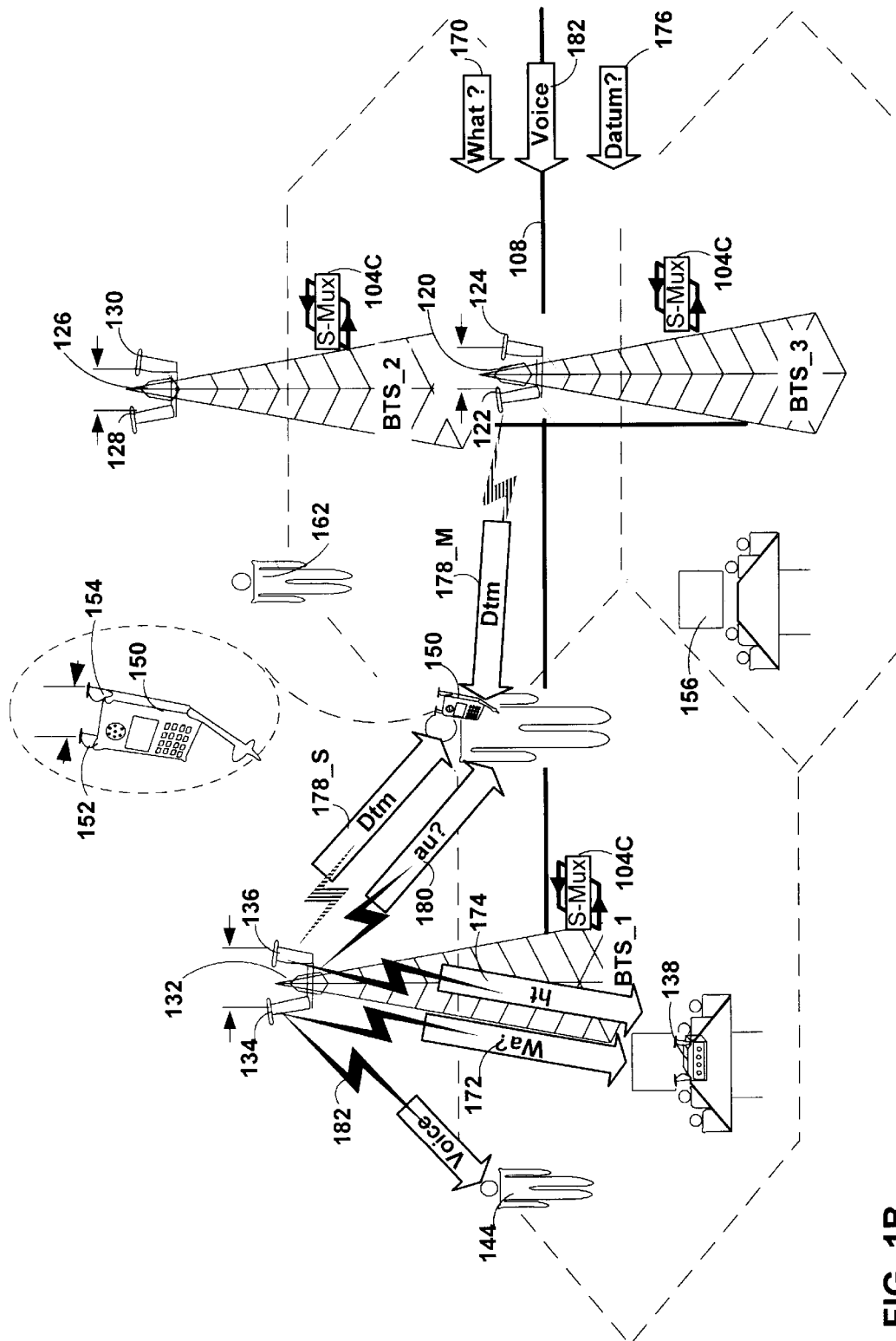


FIG. 1B

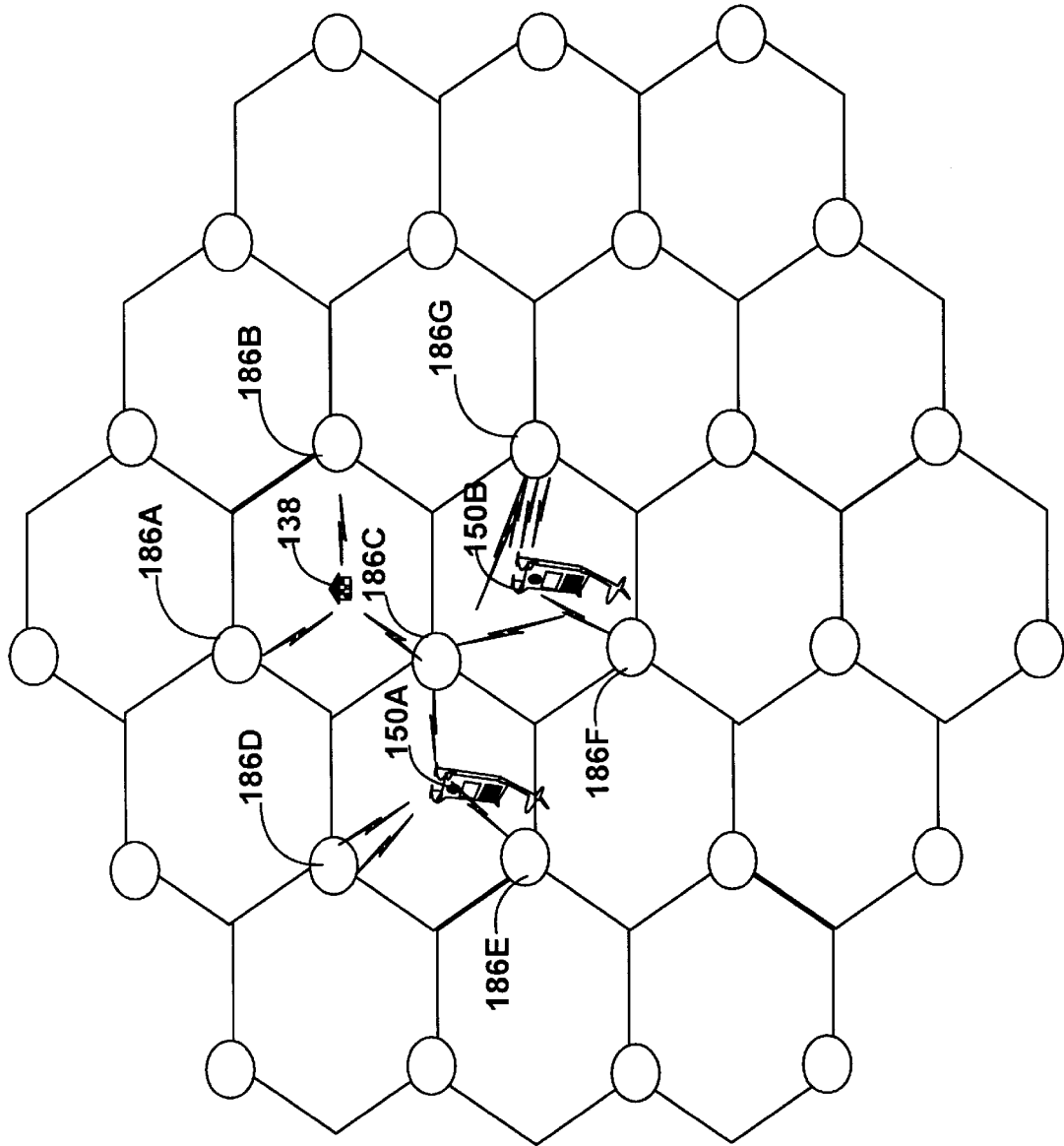


FIG.1C

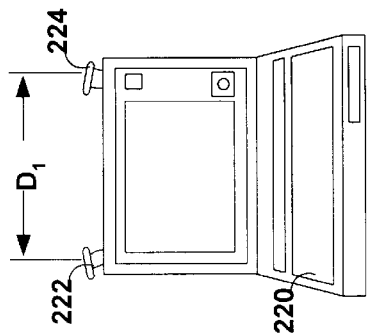


FIG. 2F

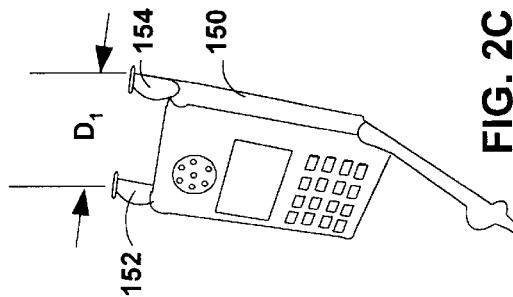


FIG. 2C

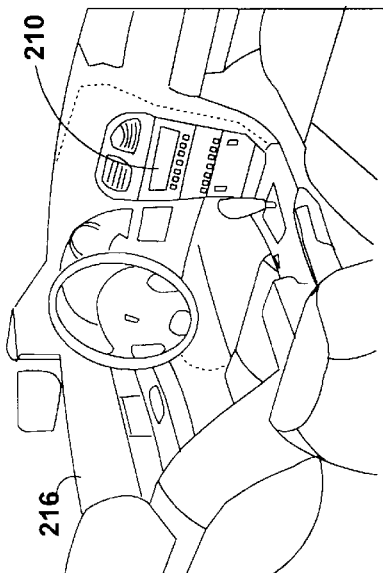


FIG. 2E

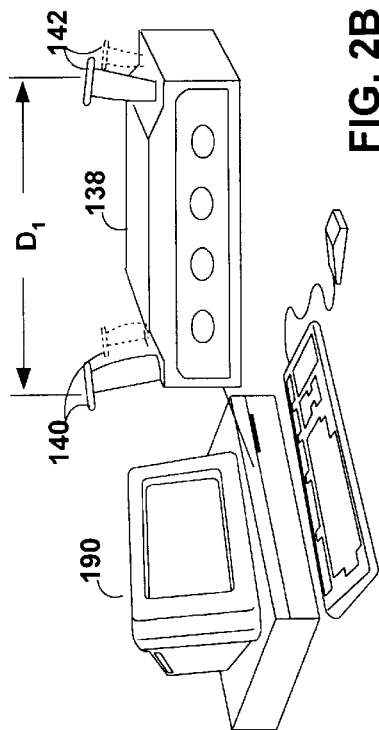


FIG. 2B

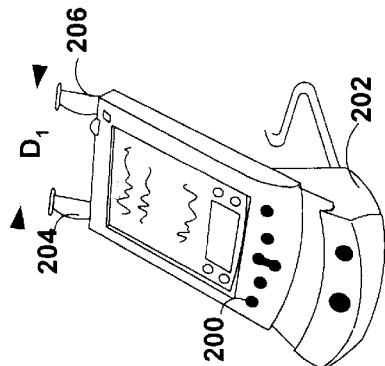


FIG. 2D

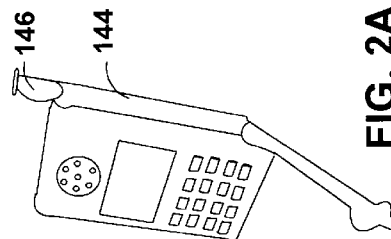


FIG. 2A

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