



United States Patent [19]

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Shober

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[54] **IN-BUILDING MODULATED BACKSCATTER SYSTEM**

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Primary Examiner—Thomas Mullen

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[57] ABSTRACT

In accordance with the present invention, a radio communications system is disclosed that can operate in one of several Modes which integrate in-building security, location determination, messaging, and data communications capabilities. The radio communication system includes at least one Interrogator for generating and transmitting a radio signal. One or more Tags of the system receive the radio signal. A Backscatter Modulator modulates the reflection of the radio signal using a subcarrier signal, thereby forming a reflected modulated signal. The Interrogator receives and demodulates the reflected modulated signal. The Interrogator can also transmit a first information signal to one or more tags, specifying which tags should respond using the Backscatter Modulator. In the Interrogation Mode, the Interrogator can determine the identity of the Tags in the reading field, and can exchange data with those Tags that have been identified. In the Location Mode, the radio communications system can instruct some or all Interrogators to determine the location of a Tag or Tags within the building, regardless of whether the Tag or Tags are in radio range of the Interrogation Mode. In the Messaging, or low speed data communications Mode, the radio communications system can instruct some or all Interrogators to transmit a command addressed to a particular Tag or Tags, regardless of whether the Tag or Tags are in the reading field of the Interrogation Mode, questing that Tag or Tags perform some action. Other embodiments of the Messaging Mode allow the Interrogator to transmit data in addition to a command to the Tag or Tags, and also for the Tag or Tags to transmit a signal back to the Interrogator. This radio communications system can be interconnected with other communications capabilities such as electronic mail, voice mail, location, inventory management, and other systems.

[21] Appl. No.: **08/775,701**

[22] Filed: **Dec. 31, 1996**

[51] Int. Cl.⁶ **G08B 13/14**

[52] U.S. Cl. **340/572.4; 340/505; 340/825.34; 340/825.54; 340/572.7; 343/878**

[58] Field of Search 340/572, 505, 340/825.54, 825.34, 825.31, 825.49, 825.69, 825.72, 572.4, 572.7; 455/45, 106; 343/872, 878; 235/585, 380, 375; 705/28; 342/42, 44, 51

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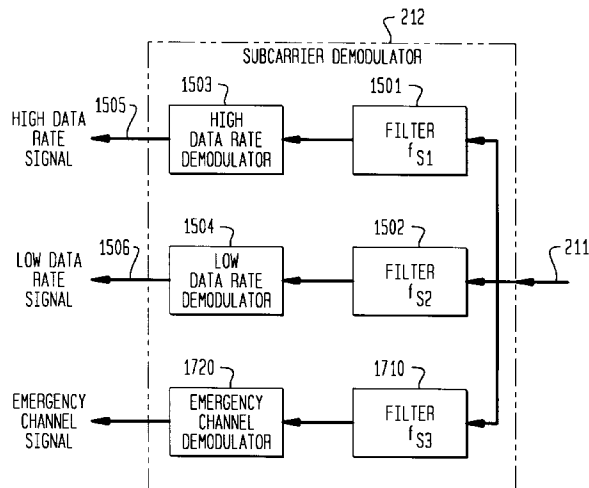
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38 Claims, 9 Drawing Sheets



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FIG. 1

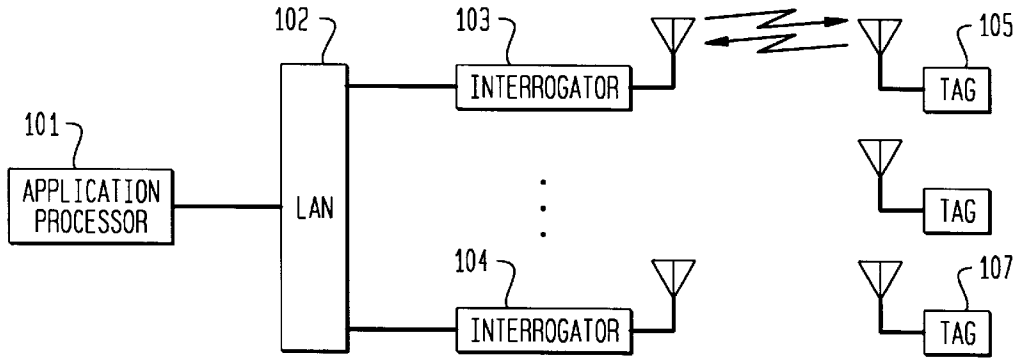


FIG. 2

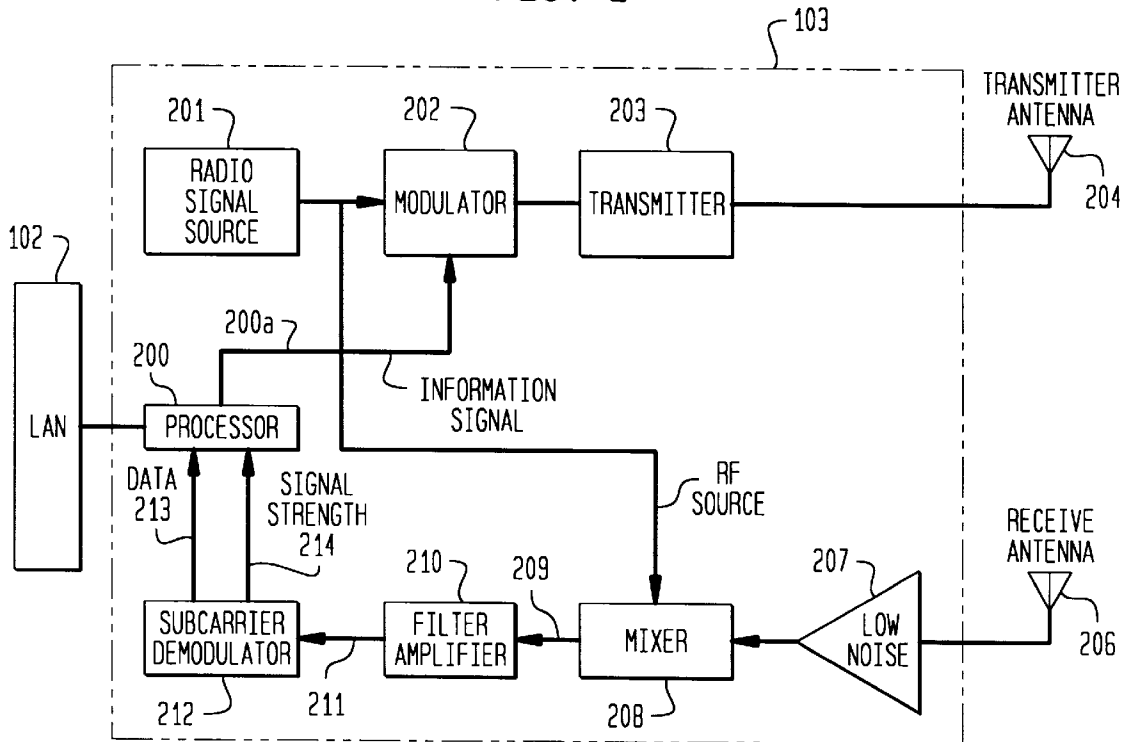


FIG. 3

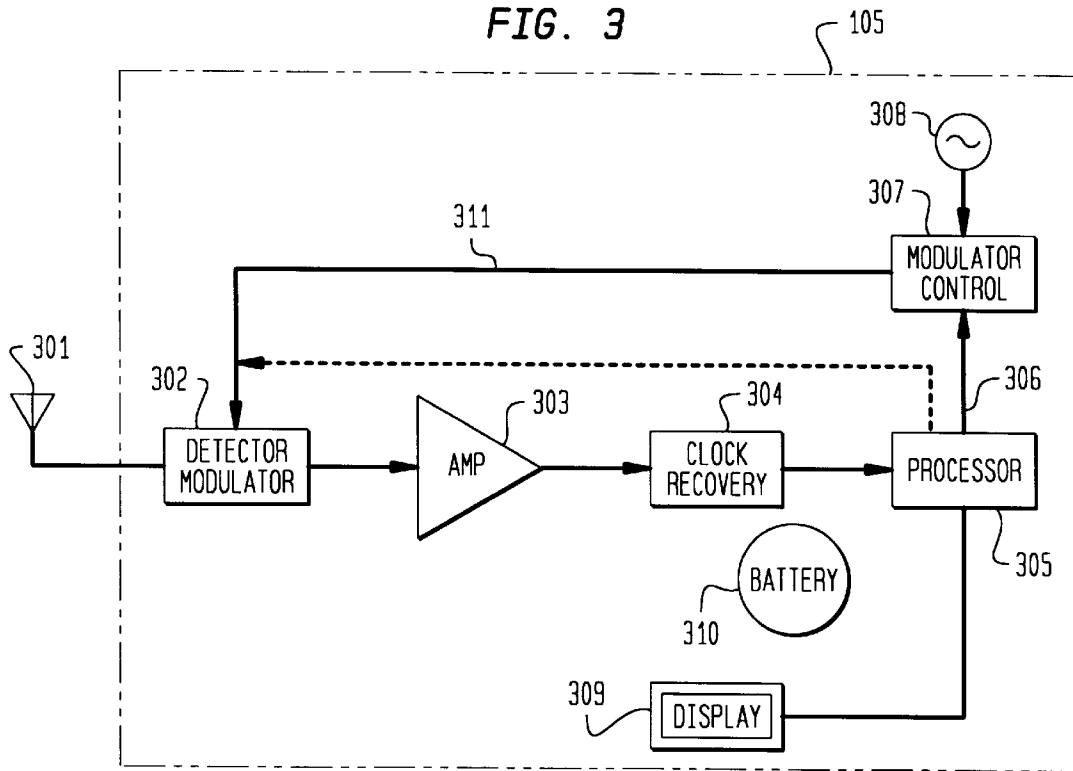


FIG. 4

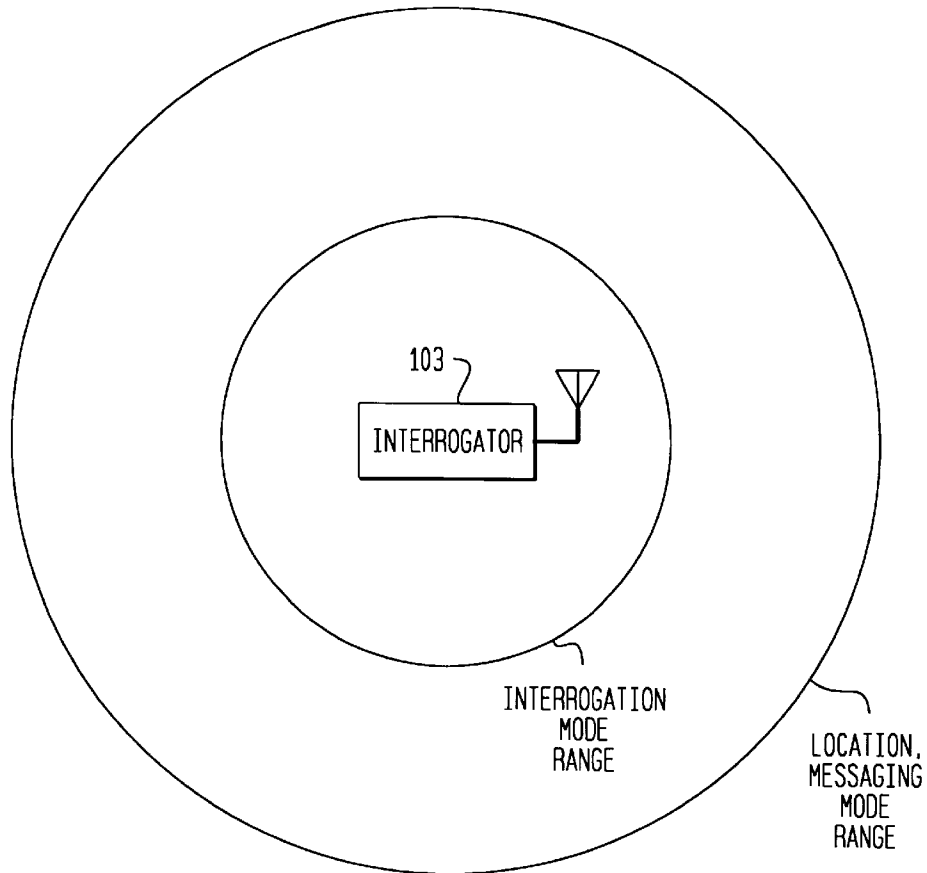


FIG. 5

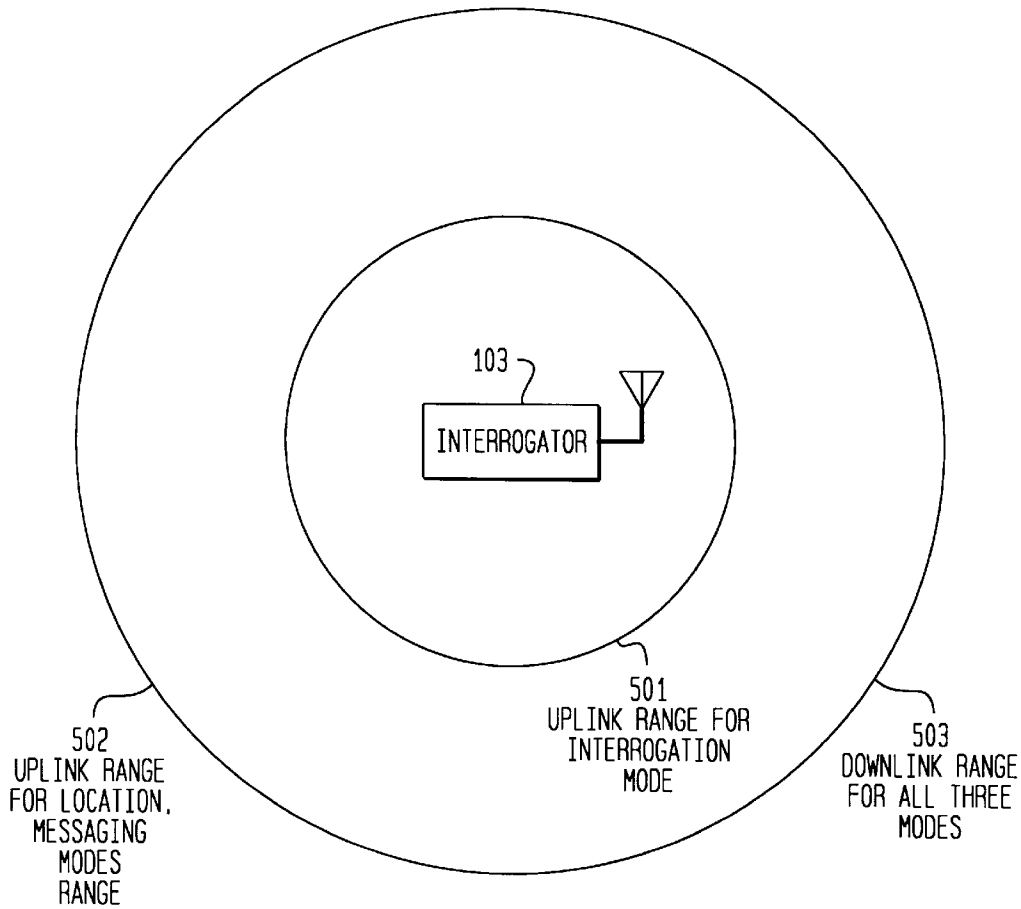
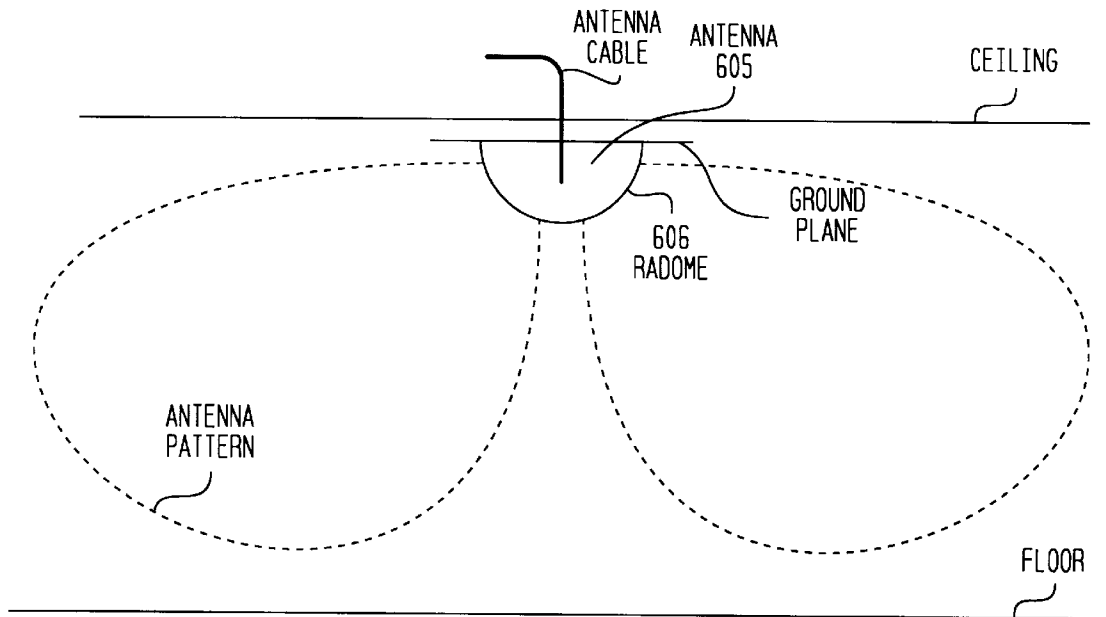


FIG. 6



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