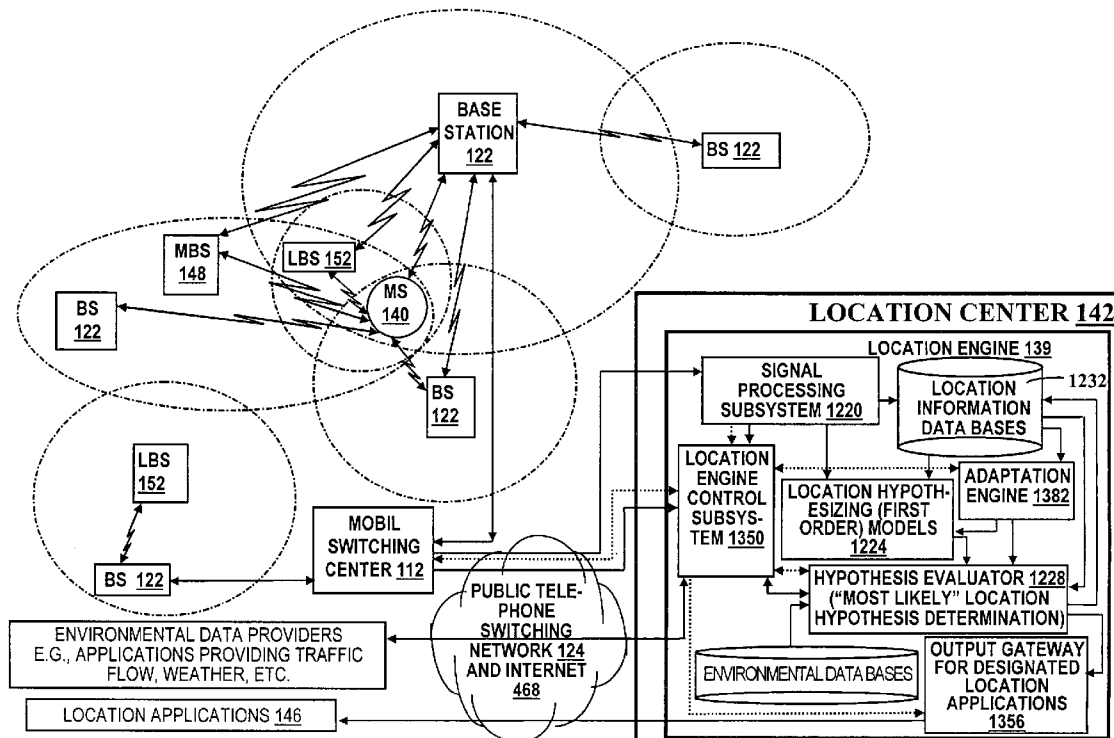(19) **United States**

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(54) **APPLICATIONS FOR A WIRELESS LOCATION GATEWAY**

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(57) **ABSTRACT**

A location system is disclosed for commercial wireless telecommunication infrastructures. The system is an end-to-end solution having one or more location centers for outputting requested locations of commercially available handsets or mobile stations (MS) based on, e.g., CDMA, AMPS, NAMPS or TDMA communication standards, for processing both local MS location requests and more global MS location requests via, e.g., Internet communication between a distributed network of location centers. The system uses a plurality of MS locating technologies including those based on: (1) two-way TOA and TDOA; (2) pattern recognition; (3) distributed antenna provisioning; (5) GPS signals, (6) angle of arrival, (7) super resolution enhancements, and (8) supplemental information from various types of very low cost non-infrastructure base stations for communicating via a typical commercial wireless base station infrastructure or a public telephone switching network. Accordingly, the traditional MS location difficulties, such as multipath, poor location accuracy and poor coverage are alleviated via such technologies in combination with strategies for: (a) automatically adapting and calibrating system performance according to environmental and geographical changes; (b) automatically capturing location signal data for continual enhancement of a self-maintaining historical data base retaining predictive location signal data; (c) evaluating MS locations according to both heuristics and constraints related to, e.g., terrain, MS velocity and MS path extrapolation from tracking and (d) adjusting likely MS locations adaptively and statistically so that the system becomes progressively more comprehensive and accurate. Further, the system can be modularly configured for use in location signaling environments ranging from urban, dense urban, suburban, rural, mountain to low traffic or isolated roadways. Accordingly, the system is useful for 911 emergency calls, tracking, routing, people and animal location including applications for confinement to and exclusion from certain areas.
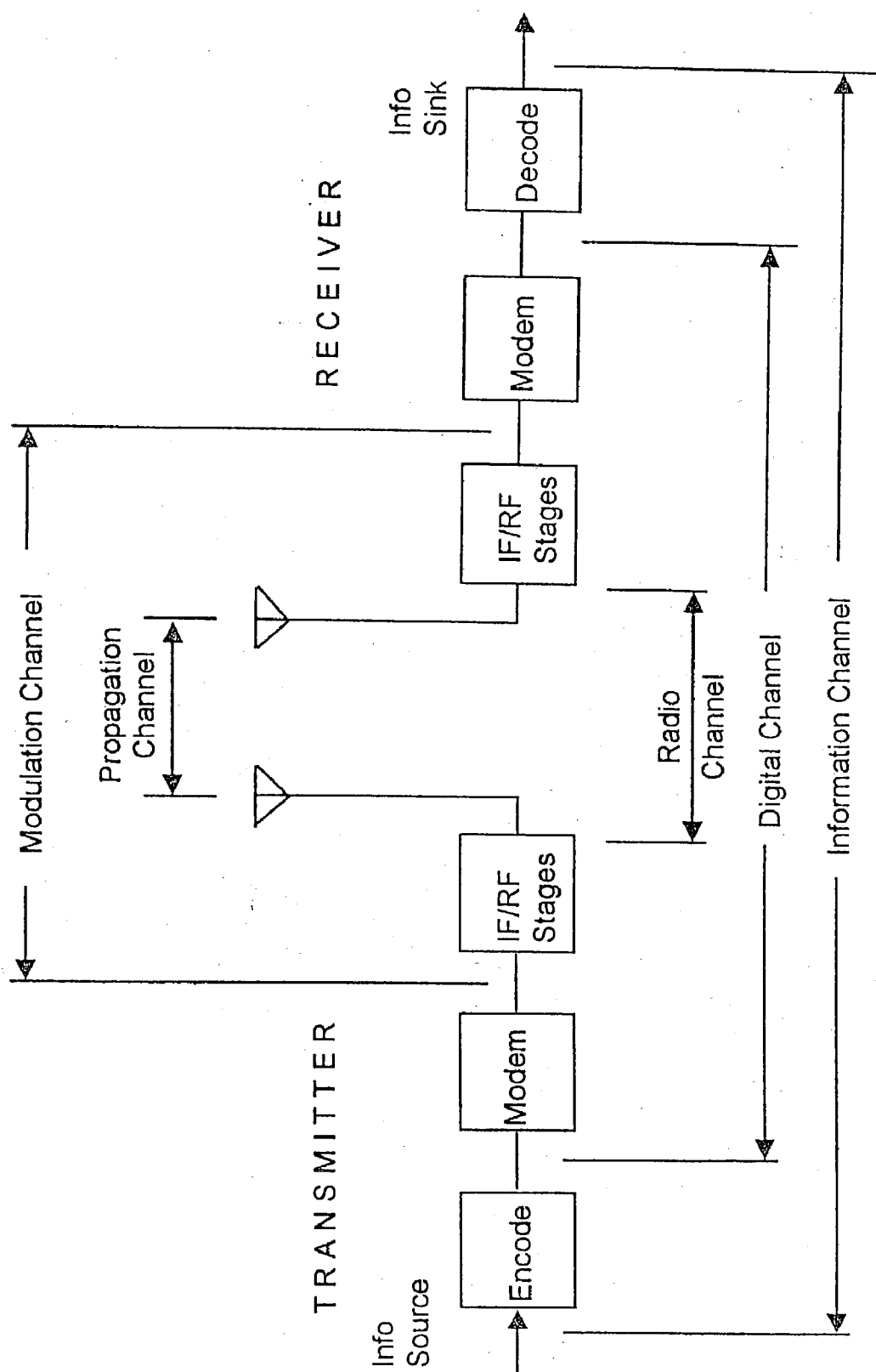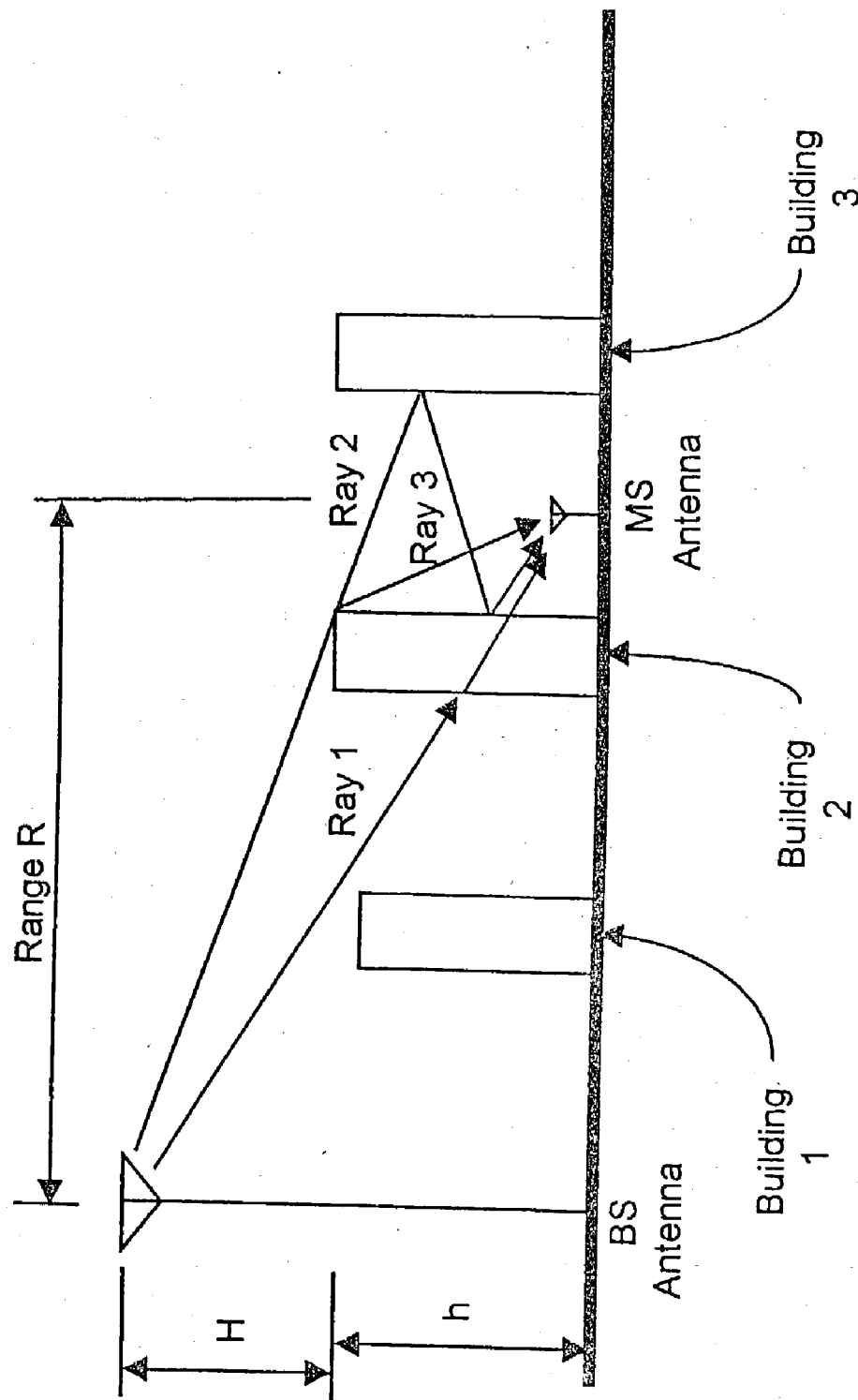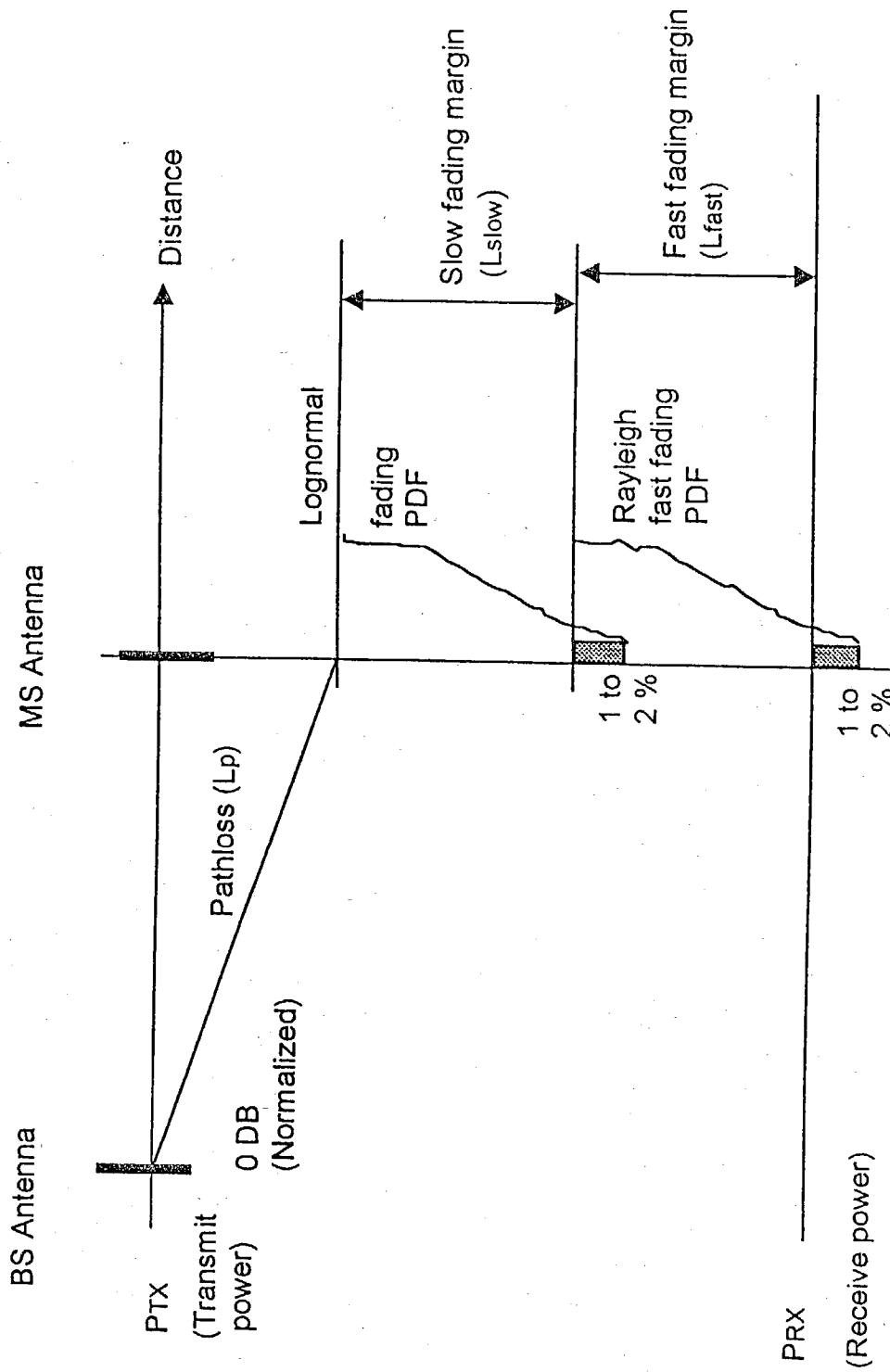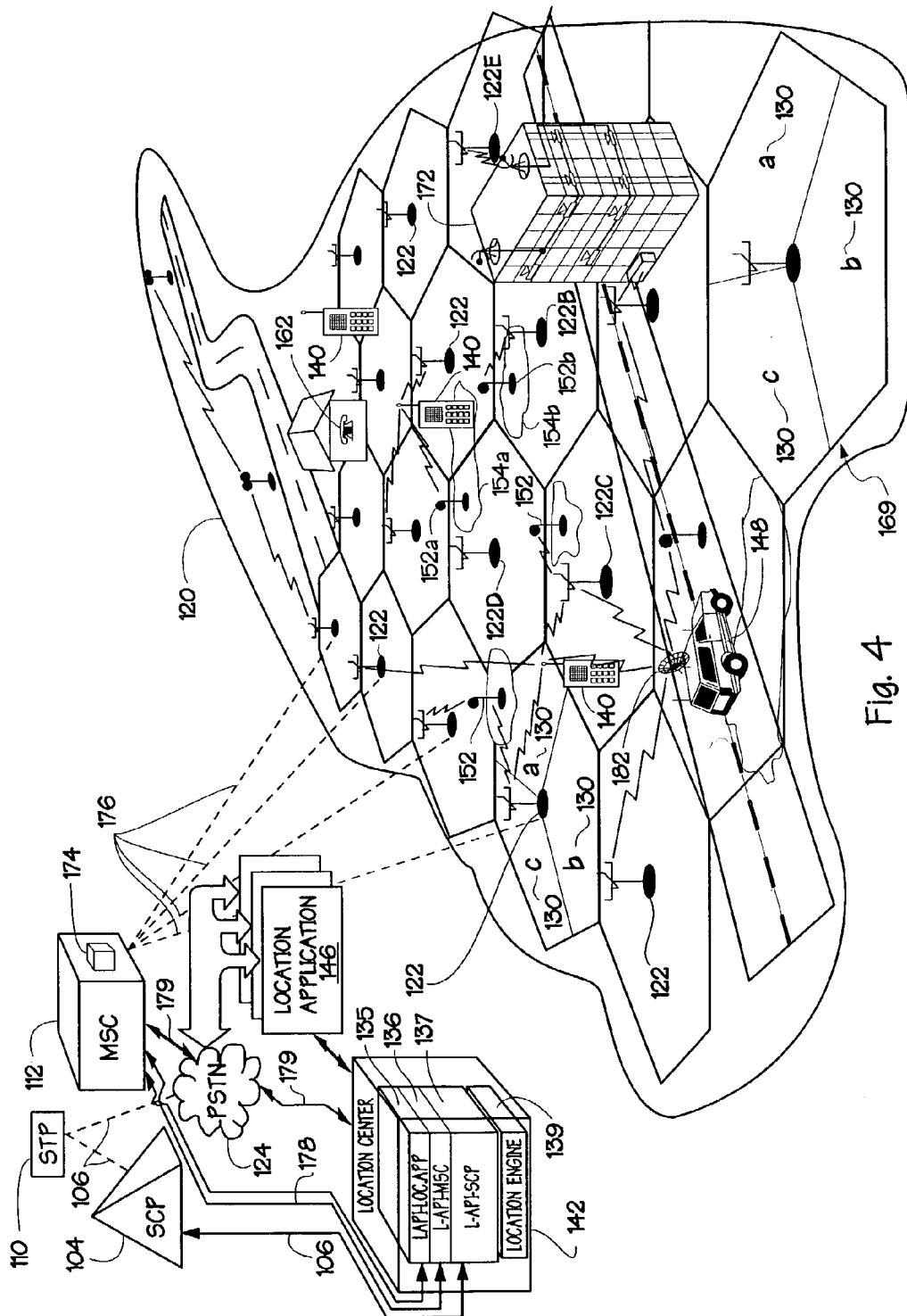
FIG. 1

FIG. 2

FIG. 3

Fig. 4

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