

system. The patent is a continuation of a patent first applied for in 1994 and received in 1995, said Dr. Dan Schlager, president of the Mill Valley, Calif.-based company. The patent covers the combination of GPS, wireless communications and emergency buttons or other manual or automatic sensors.

The solution, which consists of a GPS receiver placed in the handset, also has its problems, Schlager said. "One of the main problems is the 40 million phones that are out there, and the question is are we going to have to retrofit those phones," Schlager said.

Boston-based Tandler Cellular's

FoneFinder system uses synthesized voice technology to send longitude and latitude along with a mayday call to the PSAP.

A stand-alone network using smart-antenna technology may be the solution for E911, according to a San Ramon, Calif.-based startup. U.S. Wireless Corp. recently fin-

ished the first phase of testing for its time space signal processing technology that will locate cellular callers within the FCC-mandated 125 meters. The company's RadioCamera technology will be offered for both E911 and value-added applications, the company said.

The intelligent database begins

forming when RadioCamera is first deployed and should be capable within days, the company said. RadioCamera, about the size of a piece of carry-on luggage, is used to take a snapshot of the multipath from the user.

The product would be collocated on cell sites or independently hung near the sites, the company said. RadioCamera can be hooked into a base station through a standard multicoupler interface. The base station is connected to a U.S. Wireless hub through one digital signal zero line.

Each hub holds a bundled box of hardware and software. The mother board holds the proprietary algorithms deciphering the caller's location through the multipath signals, the Windows NT operating system, a Pentium processor and Analog Devices Inc. digital signal processors. Four custom-designed radio boards process the data to determine the caller's location. The fifth board holds additional ADI DSPs.

Hubs are connected by a fraction of a T1 line. The location information would be relayed to the PSAP through an established PSAP network connection.

Cel-Loc Inc. of Calgary, Alberta, is beginning to push its own technology. It will not only provide E911 phase II capabilities but also add-on location services including fleet management and protection from kidnappers, said company President and co-founder Dr. Michel Fattouche.

The company will provide an AMPS-based product this year, Fattouche said. The second product, Cellocate CDMA, will be tested by the fourth quarter, he added.

The technology works on a patented TDOA technique that locates the phone within 150 meters in the AMPS mode and within 30 meters in the code division multiple access mode. A proprietary algorithm for calculating TDOA allows for what the company terms "superresolution." Xypoint provides the I0-number ANJ technology.

The technology needs one DS0 channel as its pipeline to the self-contained processing box located at the cell site, Fattouche said. In the AMPS mode, the technology only needs 4.7 milliseconds to read the phone and its location.

In addition to reading the control channel, the technology also reads the voice channel, which allows for much of the added functionality. By reading the voice channel, self-location services and security services can be offered. □

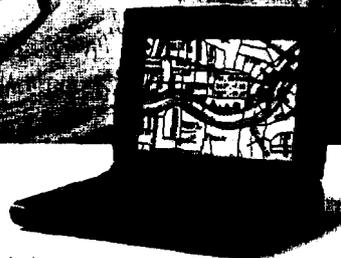


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Maura Thurman, "Lost? Doctor Prescribes Cellphone In A Satellite" Marin  
Independent Journal, August 4, 1997

## Lost? Doctor prescribes a cell phone and a satellite

By Maura Thurman  
II correspondent

**A** Mill Valley doctor hopes satellites will save lives with help from technology patented by his fledgling company.

Dr. Dan Schlager and a partner, Bill Baringer, have invented a system to turn cellular phones into emergency locators by using the government's global positioning system, a network of 24 satellites that can pinpoint items on the ground.

Schlager became interested in the problem while working as a resident at Stanford Hospital, where he often went to auto accidents by helicopter. He sometimes arrived too late to help, however, because cellular phones — unlike land-line phones — don't automatically provide the location of 911 callers to emergency dispatchers.

"It started me thinking about where the rescue system was breaking down," he said, noting there are 50,000 emergency calls daily from cellular phones in the United States. "Either they couldn't call us — which we couldn't do much about — or we couldn't find them."

He learned about the global positioning system during the 1991 Gulf War, when soldiers used it to navigate in the Iraq desert, and took the idea from there with help from Baringer, a friend with a doctorate in telecommunications technology. Both graduated from



II photo/Pratt Photo

**HOUSE CALL:** Dr. Dan Schlager hopes his Mill Valley company, Zoltar, will be a pioneer in turning cellular phones into emergency locators. His company and his dog are named after the wish machine in 'Big,' a Tom Hanks movie.

Redwood High School in 1977.

His patent covers the technology to integrate satellite receivers into a host of devices besides wireless phones, including systems to alert boaters when someone goes overboard, allow smoke detectors to signal the location of fires and warn parents when children stray from electronically defined areas.

The company, Zoltar Satellite Alarm Systems, may offer timely help to cellular phone companies, which face a mandate by the Federal Communications Commission to develop a system to locate emergency callers by the year 2001.

"We didn't come to it from the idea of solving the FCC ruling. We were going

### Zoltar Satellite Alarm Systems

**Principals:** Dr. Dan Schlager and partner Bill Baringer

**Patent:** Covers technology to integrate satellite receivers into a host of devices including wireless telephones, overboard alerts for boaters, and smoke detectors.

**Headquarters:** Mill Valley

to make some personal safety devices," Schlager said. "Once again, timing is everything."

The GPS World Newsletter commented in its Dec. 12, 1996, issue that Zoltar has "a solid grasp of GPS capabilities, the fluid telecommunications environment, and the opportunities presented by combining the two."

It also noted the technology has promise for developing countries that lack widespread land-based phone systems.

Some in the industry say Zoltar, named for the wish machine in "Big," the movie that starred Tom Hanks, may not have the answer to the FCC mandate.

"One of our concerns is how quickly we could roll out a solution in the required time frame," said John Boyer, director of network for GTE Mobilnet. To include a new technology like GPS receivers in cellular phones could take five to six years, he said.

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# Zoltar

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"Every carrier in the country would have to adopt the same thing for the phone to be effective outside the region. All the old phones would have to be changed out, which would cost the consumer money," he said.

GTE Mobilnet has begun trials of a system to locate 911 callers by tracking their signals from three different cell sites, which Boyer said could be just as reliable though perhaps not quite as accurate as a GPS-based system.

Another wireless communications company, Qualcomm in San Diego, sees no quick answer to the FCC mandate.

"Right now there is nothing commercially deployed or available that would get us to that point,"

spokesman James Lee said.

The question of whether wireless communications companies adopt a single method for meeting FCC requirements probably will depend on what develops, he said.

"That will be dictated by the technological solution," Lee said. "If the solution is simple and elegant, the industry may grasp it as a whole."

"We're evaluating all the possibilities," said Susan Rosenberg of AirTouch Communications in San Francisco. "Whatever it is, it has to be at reasonable expense."

Schlager contends that Zoltar's technology provides a good way for cellular companies to standardize their emergency technology.

"The wireless companies now are in total disarray," Schlager said. "If they all do it a different way, all you're going to have is a Tower of Babel. That's a concern to me from

an emergency medicine standpoint."

The Zoltar system would locate callers only when they hit a panic button or dial 911, Schlager added, while the system being tested by GTE would allow continuous tracking of cell phones. "That's a privacy issue for some people," he said.

To encourage companies to choose the Zoltar system as a standard, Schlager said, he is prepared to license the technology "at a reasonable rate" to a number of manufacturers instead of giving exclusive rights to a single company.

A similar device has been produced in prototype form by a Massachusetts inventor, but Schlager said they have not discussed their work or any patent conflicts.

The project has prompted him to cut back to four or five shifts a month in emergency rooms at Kaiser hospitals in Terza Linda and Santa Rosa and the California Pacific Medical Center in San Francisco. Schlager focuses the rest of his time on patent law, licensing strategy and other business.

Since the patent was issued July 22, Schlager said, he has been contacted by Qualcomm in San Diego

and by agents claiming to represent a multinational communications company in Silicon Valley.

His career shift, while not producing income, has paid dividends in letting him spend more time at home.

"I have a soft spot for emergency medicine, but I don't have a soft spot for late nights and overnight shifts," said Schlager, who has children ages 5, 3 and three months. "I'm enjoying a little more regular schedule."