

With Bluetooth speakers serving as active RFID tags, the application notifies users when their suitcases arrive at an airport's baggage-claim area.

By Mary Catherine O'Connor

Sept. 16, 2009—As a medical industry consultant with [RBD Consulting](#), Robert B. Davidheiser does a great deal of airline travel, and has for many years. As a result, he has spent countless hours waiting for his bags to appear on luggage carousels, while jostling with other travelers for a clear view. But two years ago, when he and his family were combing through thousands of similar-looking bags after a cruise they had just completed, he alighted upon an idea of developing a baggage-tracking application that uses commercially available active RFID tags.

"But none of the vendors I approached would sell me the tags alone," Davidheiser explains. "They also wanted me to buy the tag software, which costs \$350,000 to \$750,000, plus ongoing service fees."

Therefore, Davidheiser opted to leverage technology already being purchased and used by consumers. With the iPhone growing in popularity, he decided to write an application for that device, and instead of conventional active RFID tags, Davidheiser went with off-the-shelf Bluetooth wireless speakers to act as transponders to let users know when their luggage has emerged from the bowels of the baggage-handling system.

The application, known as [Baggage Claim](#), takes advantage of the fact that each Bluetooth speaker transmits a unique ID number—a 48-bit unique media access control (MAC) address. In order for two Bluetooth-enabled devices (such as an iPhone and a speaker) to communicate with each other, they must first "pair up," so that each device can learn the other's MAC address. Davidheiser's application utilizes a portion of this ID number to identify the speaker.

To use the Baggage Claim application, a person downloads the software to his phone and can then pair that phone with as many as four separate Bluetooth speakers. Before checking in his bags at the airport, he places a speaker into each piece of luggage and sets the device to its standby power setting. At his final destination, while awaiting the bags, the user opens the application and the phone begins to scan for the speakers he selects. When any of the speakers is detected, the phone's display changes from "Standby" to "Luggage in Range," and the luggage icon moves into the animated carousel on the screen. The user then walks closer to the carousel to locate his bags.

The iPhone application works only with Bluetooth v2.0 devices complying with the Advanced Audio Distribution Profile (A2DP) standard, which specifies the protocol for streaming music over Bluetooth between speakers or headsets and mobile wireless devices. Users must purchase their own speakers, or use those they already have. Davidheiser has tested a number of different makes and models of Bluetooth V2.0 speakers, and his company's Baggage Claim Web site lists four that performed well with his application—the [LG HFB-500](#), [Motorola's](#) 89242 EQ5 and T305, and the [Jabra](#) SP7000. Currently, these speakers vary in price from approximately \$28 to \$99 on [Amazon.com](#). The Baggage Claim

iPhone application costs \$4.99.

The speaker models listed on the Bag Claim site have read ranges from 40 to 75 feet. However, Davidheiser says, some of the tested Bluetooth speakers provide a very long read range—up to 250 feet. That great a range may be more than some users want, since it would alert them that their luggage has arrived even when it is still a good distance away, and thus difficult to see immediately. But some travelers like having such a long range, he notes, because it provides them with the peace of mind of knowing their luggage has arrived even before they can quickly locate it. What's more, he adds, when using speakers with a very long range, travelers could walk over to a nearby café or restaurant and still be alerted to their bags' arrival.

According to Davidheiser, the iPhone application could also work with Bluetooth earpieces or headphones, as long as they are V2.0 and comply with the A2DP standard. But many earpieces, he notes, are not A2DP-compliant, and some headsets have a short battery life, making them undesirable for this application.

Davidheiser is now working on a new version of the application that can locate luggage more precisely, once the Bluetooth devices within the bags are in range, by taking advantage of the iPhone's cellular network. This version, he says, should be available next year.