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NEWS

Airgate Sees a Market for SAW

The Texas firm is distributing and deploying RFID systems that employ tags using surface acoustic wave technology for tracking assets, especially in factories and other industrial environments.

By Mary Catherine O'Connor

July 17, 2006—[Airgate Technologies](#), an Allen, Texas, provider of [RFID](#) and other wireless technologies, is taking part in a number of technology trials using tags and interrogators (readers) that employ [surface acoustic wave \(SAW\)](#) technology.

Instead of a silicon-based [integrated circuit \(IC\)](#), a SAW tag contains a piezoelectric crystal, which—like the IC in a conventional tag—is connected to an [antenna](#) that receives an [interrogator's](#) RF signal and transmits a return signal. The SAW tag, however, has a transducer that converts the inbound RF signal into an acoustic one, which travels along the surface of the crystal. The transducer then converts the acoustic signal back to RF before transmitting the tag's data to the [reader](#). As a SAW tag is being manufactured, tiny metal reflectors attach to the crystal. The arrangement of these reflectors is unique to each tag. As the acoustic wave travels along the crystal, it picks up a pattern produced by those reflectors, which is converted to a unique ID through the interrogator's [digital signal processor](#).

Temperature, torsion and pressure deform the crystal slightly, thereby changing the shape of the acoustic wave as it travels across the reflectors. Thus, by analyzing the wave deformations, the interrogators can also determine a SAW tag's temperature and the shock or pressure to which it is being subjected. Consequently, some SAW tags are used both for identification and for sensing environmental factors. Moreover, by measuring the signal strength, an interrogator can determine a SAW tags' location. (Silicon-based RFID tags can also be located using the same method.)

Airgate has become the exclusive North American distributor of SAW tags and interrogators manufactured by the Austrian firm [Carinthian Tech Research](#) (see [New Tags Use Crystal, Not Silicon](#)). CTR's SAW tags operate in the 2.45 GHz band and, according to Sheriff, can be [read](#) from as far away as 300 feet.

Mike Sheriff, president and CEO of Airgate, says he believes his company is currently the only firm selling SAW tags and readers in the U.S. for RFID applications. Amtech, however, acquired by [Transcore](#) in 2000, has sold SAW tags for monitoring railcar brake temperatures. (Non-RFID applications for SAW devices include use as signal filters in cellular phones.) Sheriff adds that Airgate is being inundated with queries from companies looking to begin testing CTR's SAW RFID technology.

Non-disclosure agreements preclude Sheriff from sharing details about the companies piloting SAW RFID technology through Airgate. He says both private companies and government agencies are testing the technology, and for most applications, the tags are being used to track temperatures and assets in harsh environments. SAW tags can withstand extreme temperatures and pressure, and are more readable in the presence of metal and liquid than silicon-based tags. Although metal and water still attenuate the RF signal coming from the interrogator to [excite](#) the SAW tag, the crystals in the tag do not consume as much of the signal's power as an integrated circuit does, allowing SAW tags to generate more [backscatter](#) than silicon-based tags in the presence of water and metal. Backscatter reflects the

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signal back to the interrogator and is what enables passive tags to be read.

Sheriff says Airgate is working with a company, unspecified by Airgate, that is placing SAW tags on components used for oil exploration. These components are deployed at depths as great as 15,000 feet below sea level, where they are exposed to extreme pressure, and to temperatures as high as 280 degrees Celsius.

SAW tags perform better in metal-heavy and highly moist or wet environments than other passive RFID tags on the market do. As such, they have a performance edge, especially in industrial environments such as manufacturing. This edge, Sheriff believes, will lead to increased demand for SAW RFID systems as word spreads about the technology.

"A lot of the companies we talk to call us because the silicon-based passive RFID tags and readers they've been testing are not performing for their applications," says Sheriff.

According to Sheriff, Airgate is shipping CTR tags and interrogators and deploying pilot tests with a handful of very large companies. "If any of these projects went live [permanent rollouts], they would be big-time deployments," he says. A typical pilot project costs approximately \$50,000 and includes one or two interrogators and 50 to 100 tags.

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