

Automotive RFID Gets Rolling

The Federal Highway Administration awards a contract to develop a 5.9 GHz RFID system to cut road fatalities in the U.S. by 50%.

By Jonathan Collins

Apr. 13, 2004—With government funding and access to a large swath of radio spectrum, four RFID developers are starting work on a new generation of RFID products aimed at bringing greater safety and new wireless applications to U.S. roads. The U.S. Department of Transportation's Federal Highway Administration (FHWA) has called on Mark IV Industries, Raytheon, SIRIT and TransCore—companies that supply systems for the largest RFID toll deployments in the U.S.—to jointly develop dedicated short-range communications (DSRC) technology systems for a trial as part of the agency's efforts to cut road fatalities in the U.S. by 50% within 10 years.

The goal of the group and its government backers is to use DSRC to enhance the safety and the productivity of the nation's transportation system. The DSRC prototype initiative is a prerequisite for introducing new roadway applications such as issuing alerts to drivers about impending intersection collisions, rollovers, weather-related road hazards, or warning a driver that his vehicle is going too fast to safely negotiate an upcoming curve. DSRC technology could also be used for commercial applications such as downloading driving maps.

Proponents of the technology maintain that DSRC systems will also be able to replace existing highway RFID applications such as automatic toll collection systems like EZ-Pass. "There is nothing that current systems do that DSRC systems won't be able to do in a breeze—while it's idling in fact," says Richard Schnacke, vice president of industry relations for TransCore and the chairman and spokesperson for the DSRC Industry Consortium. The group's members consists not only of the four companies selected to develop the DSRC-system prototype, but also includes Atheros and Intersil, two major suppliers of 802.11 chipsets.

The promise of DSRC, which its proponents consider a subset of RFID, is to deliver a far greater data rate and range to wireless highway applications. "Compared with existing RFID toll applications, DSRC will deliver data rates of 25 Megabits per second, instead of 250 kilobits, and a range of up to 1 km, instead of 10 meters," says Schnacke.

Key to the ability of the technology to deliver that kind of performance is the U.S. Federal Communications Commission (FCC) dedication of a large block of radio frequency spectrum, from 5.850 to 5.925 GHz (the 5.9 GHz band), to DSRC applications.

Historically, the terms RFID and DSRC have been used synonymously to describe a technology based on tags and readers. But with the advent of the 5.9 GHz band, more attention is being given to differentiating these terms. Although the 5.9 GHz DSRC system will essentially consist of tags and readers, it will be different from traditional RFID in many ways. The DSRC system will be more like a peer-to-peer system in which either end of a link can initiate a transaction; traditional RFID systems operate in a master-slave arrangement. This peer-to-peer architecture will be necessary because many planned applications are vehicle-to-vehicle ones, not involving the roadside RFID readers at all.

DSRC and traditional RFID differ in other ways: DSRC will use a modulation type that breaks data down into small parts and transmits them in parallel within a wide channel, whereas traditional RFID sends everything in series over a narrow channel. This basic difference makes it possible for DSRC to offer a much higher data transmission speed than RFID does. Because of its long read-range, DSRC must be able to operate in a condition of multiple overlapping communication zones—a condition that most RFID systems today could not meet. DSRC must also dynamically control such things as emitted power, channels and message priorities—things that current RFID systems cannot do.

The DSRC Industry Consortium, which was formed in late 1999 and held its first official meeting in February 2000, will receive \$1.3 million from the FHWA in the first phase of the DRSC prototype initiative. Designs for the first DRSC hardware should be completed within the next four months. These systems will consist of roadside monitors and sensors that can detect certain road conditions and situations and then transmit related information to DRSC transreceivers installed in vehicles. Funding for the manufacture and testing of the systems, which is expected to take an additional 11 months, has not been disclosed.

Any DRSC system would require DRSC technology to be built into new vehicles. The in-vehicle components would likely consist of a DRSC transreceiver linked to warning signals or lights to alert the driver of any impending danger. According to Schnacke, a number of major automotive manufacturers are already studying the potential for such systems.

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