

## **DSRC Technology in a Mobile Environment: Advanced RF Communications in the 2010 Decade**

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### **Abstract:**

Advancing radio frequencies technologies have progressed significantly from the beginnings of AM / FM radios in early 1900s to cellular phones to RF Identification (RFID) to the challenging communication devices being integrated into portable computer and vehicles proposed in 2010s. Sirit Technologies has been involved in advancing RFID and DSRC technology developments and their applications. RFID technology has segmented in five common accepted frequency bands: 134 kHz, 13.56 MHz, 915 MHz, 2.45 GHz and 5.9 GHz where each frequency provides unique properties in solving specific user applications. RFID technology provides non-line of sight identification mechanism with either a static (license plate) or a dynamic expandable data carrier in stressing environments. Currently, 915 MHz technology provides supply chain logistics solutions such as U.S.DoD and Wal-Mart initiatives and open road tolling solutions such as California's Title 21 and Colorado's E470 implementations. 5.9 GHz frequency is being developed for DSRC communication services integrated into a vehicle for next generation vehicle.

*Dedicated Short-Range Communications* (DSRC) is an emerging technology with intriguing performance and benefits that provides a critical communication link for future Intelligent Transportation Systems. DSRC technology will provide secure, reliable communication links between vehicles and infrastructure safety subsystems that can increase highway safety. Improved highway safety is the number one priority of the United States Department of Transportation (DOT). The 5.9 GHz DSRC link uses *digital radio* techniques to transfer data over short distances between roadside and mobile units, between mobile units themselves and between portable and mobile units. This link enables operations related to the improvement of traffic flow, highway safety, and other ITS applications in a variety of application environments called DSRC/WAVE (Wireless Access in a Vehicular Environment).

5.9 GHz DSRC system requires robust, fast, localized transmissions from vehicle-to-vehicle (V-V) and roadside-to-vehicle (R-V) to serve many public safety and private commercial applications (in-vehicle signage, collision avoidance, fee collection, internet access, etc). The technology draws upon the increasingly popular IEEE 802.11 "Wi-Fi" standard already widely deployed in businesses and homes. However, for high-speed vehicular applications, significant changes were required to provide latency minimization, channel switching/prioritization, authorization, prioritization and anonymity without compromising messaging integrity, correctness, privacy, & robustness attributes. This highly efficient system is complementary to existing cellular and satellite communications but does not give "2 Way Voice / Broadcast" or "Tracking" device capabilities.

This paper / presentation introduces operation / parameters, term / meaning, industry activities, service categories / applications and regulations along with their relationships to the technical challenges. Significant technology issues are being addressed while providing reliable communication link in a deployable state.

5.9 GHz DSRC is the emerging communication technology that offers standardized ITS products and benefits in national large-scale deployments. 5.9 GHz DSRC systems provide a significant enhancement in communication capabilities over all previous ITS systems. These parameters and functionalities support multiple uses in vehicle / public safety and commercial applications that cannot be achieved today. DSRC is a cost-effective communications service, especially when compared with current cellular and satellite systems. The technology can be leveraged for Open Road ETC and mobile 802.11 Wi-Fi deployments, creating nationally interoperable systems and networks. DSRC is the technology for the 2010 decade and beyond.

## **Biographies:**

### **John Freund, Vice President**

John joined SIRIT in September of 2001 as Director of Customer Operations and was appointed to the role of Vice President in April 2002 for SIRIT's Electronic Toll and Traffic Management Business Unit.

John comes to SIRIT after spending 6 years with Xerox Business Services in a variety of progressive sales and operational management positions. Prior to Xerox, John spent 12 years with Hallmark Cards managing within the Graphic Arts Division.

### **Randy Roebuck, P.E., Program Manager**

Randy Roebuck joined SIRIT in February 2004 as DSRC Program Manager having responsibilities for DSRC Technology, DIC Consortium activities and RFID standards.

Randy spent 22 years at Texas Instruments in commercial and military electronics with the last eight years in the RFID group. He held senior level technical marketing and program management roles for Mobil Speedpass<sup>TM</sup>, 3M library systems, The Gap pilot, access control product development and U.S. standard/industry activities.

Randy holds degrees in Bachelor of Science in Mechanical Engineering and MBA in General Management. Randy is registered engineer in Texas and was recognized as group member of technical staff (GMTS) at Texas Instruments. Randy resides in the Dallas area.