

FORM 442

Exhibit 1: Government Project Description

ANDRO Computational Solutions, LLC

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Government Contract: DTFR5315C00015

Agency: Federal Railroad Administration (FRA)

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Project Name: Secure Positive Train Control Wireless Communications in a Limited Bandwidth Environment

The Federal Railroad Administration (FRA) advertised the need to research secure positive train control wireless communications in limited bandwidth environments under topic FRA-TC-001 of Broad Agency Announcement (BAA) 2014-2 from the FRA Office of Research and Development. The program topic defined the need as: "The Rail Safety Improvement Act of 2008 mandated the development and deployment of Positive Train Control (PTC) to improve train movement safety. The PTC system uses RF networks to convey movement authorities to locomotives, wayside equipment, and train status information using Software Defined Radios (SDRs). SDRs provide additional level of security resulting from the extensive configuration management focused on preventing software and RF based attacks. However, this added security requires additional bandwidth, which is very limited. Therefore, the FRA seeks research to advance communication security management technologies. The research objective is to increase the security of wireless message transmissions between control centers, trains, and wayside locations while maintaining reliability without increasing bandwidth use or incurring any latency in message delivery."

ANDRO Computational Solutions, LLC performs wireless communications research and development for a variety of government customers. ANDRO proposed integrating authentication tagging, also known as message authentication codes (MAC), at the PHY layer include manipulating the data transmission at the point of modulation encoding/decoding, leveraging bits used for forward error correction coding, and using code division multiplexing to assign unique signatures to specific users. We are incorporating tagging in several modulations, including QPSK, D-QPSK, and GMSK.

ANDRO is performing this research and development on Universal Serial Radio Peripheral (USRP) N210 software defined radios (SDR). We perform most of our development in the ISM

bands and desire to perform some development at the 220MHz frequency range allocated to PTC.

Development and testing will consist of stations consisting of USRP N210 transmitter and two to three N210s acting as receivers. The stations will be located at ANDRO office in Rome, NY and at our testing partner, Adirondack Scenic Railroad's facility in Thendara, NY.