

Metrom Rail, LLC
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Question 7: Purpose of Experiment

Narrative Statement

a. Equipment Theory and Operation

Metrom Rail is developing a decentralized train protection system which will target mass transit and short rail entities called the AURA System. It will provide signal compliance, speed limit enforcement, collision avoidance, and worker protection capabilities by merging a variety of technologies including RFID. The top-level functions of the system are accomplished by train borne equipment which will apply the train's brake in response to detection of hazardous conditions. The AURA System will enforce established rules of operation in cases when the train operator is unable or unwilling. Once development is complete, RFID readers will be installed on trains and RFID tags will be positioned at key locations around the track. These installations will enable the train borne equipment to determine its real-time location within the system. The RFID tags also allow the AURA system to determine applicable speed restrictions and to detect when the train is approaching potentially restrictive indications, such as block signal aspects.

The request for the experimental license stems from the need to test development systems functionality prior to trialing with a customer. For experimental research near the Metrom Rail development facility, an RFID reader and antenna will be mounted to a demonstration van. RFID tags will be mounted on tripods to allow temporary deployment simulating wayside tags. The system will utilize the tag information as a lookup for current location and status changes such as new speed limit or to communicate when the system is approaching a tag that denotes a work zone (special speed restriction). All aspects of system testing will be mobile and temporary; only being deployed while developmental testing is taking place.

b. Specific Objectives

The main impetus of the testing is to analyze the effectiveness of using RFID tags with the AURA System for the purposes described earlier. This includes testing how far the tags should be from the reader, power consumption of the system, investigation of half-frame versus full-frame tags, and the number of RFID tag reads at various operating speeds.

In addition, Metrom Rail plans on testing the differences between the capabilities of the Transcore MPRX and MPRR readers, coverage differences between the Transcore AA3234 and AA3237 antennas, as well as compare the Transcore AT5413 and AT5415 tags. Tags will be temporarily set up in a variety of arrangements so that each configuration can be tested.

Metrom Rail will ensure that the experimental RFID system does not interfere with other existing wireless systems. The avoidance of interaction between systems will include operation at sufficiently spaced frequencies, differing antenna polarities, and physical separation from other RF systems. Currently, RFID is utilized for a variety of rail tasks. It is important that no interference is caused.

c. Contribution to Development

Metrom Rail is committed to developing new and innovative rail safety products. The AURA System will provide a less expensive and more robust method of ensuring rail safety for transit and short-line rails. The ability to test RFID is a principal requirement in the system. Timely grant of an experimental license would allow testing to commence and gather data that will advance development goals and bring the product to market in a timely manner.

While RFID is abundant throughout rail, using the tags to assist with location determination as well as setting speed limits and work zones is an innovative approach to the technology. RFID tags have long communicated that a station was ahead or some other piece of information. Metrom Rail plans to use tags along the entire rail line for a variety of reasons. These include communicating when a train is has cleared a junction or switch, setting a temporary speed limit such as at a work zone, and cross-checking the tag with a system map.