OPERA
Local Operational Research Assistance Program

# GPS/AVL Tracking and Mapping

**Project Title** GPS/AVL Tracking and Mapping

**Project Number** 2009-08

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**Problem** The ability to track mobile assets is becoming a general best practice in fleet management. However, the cost of implementing a GPS-enabled automated vehicle location (AVL) system is often prohibitively high for most medium or small communities. Even off-the-shelf systems have expenses associated with implementation and upkeep that in many cases are not cost-effective. There are also no options for building out a GPS/AVL tracking system for medium- or lower-level developers that allow for user customization while remaining stable and easy to use.

**Solution** The City of St. Paul developed a low-cost, flexible alternative to traditional AVL systems using Nokia N900 cellular phones, off-the-shelf Linux-based hardware, and open source tools. The Nokia N900s have a lower base price than traditional AVL systems and do not need to be hardwired into the vehicles.

**Procedure** Design criteria included using Linux-based smart phones as the AVL recorder as well as the end user mapping/tracking visualizer. The Nokia N900 was chosen for its portability as well as its many pre-integrated devices, including GPS and an accelerometer. A central Internet-based service, which uses the same software stack as the field devices, was used for syncing the captured AVL tracking data.

**Results** The mapping display on the field devices appeared clearly, and the operation of the mapping interface in standalone mode functioned well. The hardware worked out of the box, with tools readily available for developing and installing custom software on the Nokia N900s for reading and processing GPS data. Extra effort was required, however, in making the open source mapping interface work in a handheld form. The interface was made simpler by removing some of the software's capability options.

**Approximate Cost** $10,000 ($5,000 approved for project)

**Implementation** Test units are currently being evaluated by city staff in various public works divisions. Tracking methods are being implemented, and the process is undergoing continual revision and evaluation for speed, efficiency, and automation. Long-term analysis will be applied closer to the end of the testing phase.

**Status** Complete

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