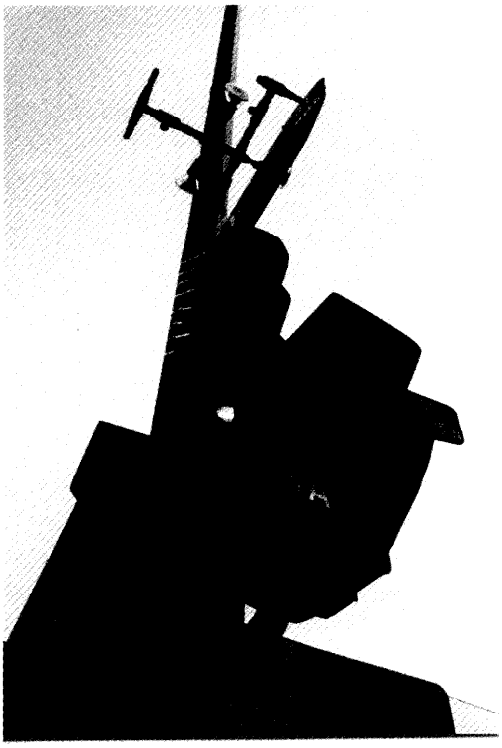
United States Department of Transportation
Federal Highway Administration
Federal Transit Administration

Technology in Rural Transportation "Simple Solution" #11

ENTER@PRISE

Emergency Vehicle Traffic Signal Pre-emption



Introduction

This application was identified as a promising rural Intelligent Transportation Systems (ITS) solution under a project sponsored by the Federal Highway Administration (FHWA) and the ENTERPRISE program. This summary describes the solution as well as opportunities for expansion into the broader context of rural ITS.

Technology Overview

Traffic signals disrupt the progress of emergency vehicles by causing them to slow or stop. Since other vehicles in cross traffic often appear to have the right of way, hazardous situations often occur at intersections. This simple solution pre-empts traffic signals to give equipped emergency vehicles the right of way. Although various types of pre-emption systems are in use in urban areas across the U.S., the solution described below is an example of a low-cost siren-activated system. As it requires minimal additional equipment, it is suitable for small communities. The example described below is a product manufactured by a particular vendor.

***Real-world Example* - Siren Activated Signal Pre-emption**

Overall goal: To improve emergency response by providing simple and cost-effective signal pre-emption capabilities to emergency service providers.

Technical approach: The Sonem 2000 Digital Siren Detector detects the sirens of emergency vehicles up to half a mile away from an equipped intersection. This activates a signal pre-emption phase, giving a green light to the oncoming emergency vehicle and switching all pedestrian crossings to the "Don't Walk" message. The green light can be held for a pre-set time, of between 5 and 45 seconds. A visual verification system, consisting of a white light and a blue light is installed next to the regular traffic signal. When the white light is activated, this confirms to the driver of the emergency vehicle that it has been given right of way. The blue light indicates that the intersection is being controlled by an emergency vehicle approaching from another direction.

Current status: The system is available for purchase.

Location / geographic scope: To date, the system produced by this vendor has been installed in the Cities of Squamish, Nanaimo, and Whistler, and the University of British Columbia campus in the City of Vancouver, all in British Columbia, Canada.

Agencies involved: The system is manufactured by Sonic Systems Corporation of Vancouver, Canada.

Cost information: The cost of equipping an intersection is approximately $4,000. Discounts for equipping multiple intersections apply. Vehicles do not need to be equipped with any additional equipment, assuming they are fitted with a siren.

Key contact: Robert Scragg, Sonic Systems Corporation. 1-800-33-SONIC.

Have goals been achieved? All the cities where the system has been installed have reported that the system meets their needs very well. The City of Nanaimo has adopted a policy that all new intersections and intersection upgrades will be equipped with the system. Most of the cities refer to Sonem 2000's cost-effectiveness and reliability as their primary reason for selecting the system.

Solution timeline: The product is being actively marketed.

Further Description of Application

Additional technologies may include:

Low powered wireless communication devices in vehicles, similar to garage door openers, could also be used to trigger receivers mounted on the signaled intersections to give oncoming emergency vehicles a green phase. In addition, systems using infra-red technology could perform this function.

Potential additional uses for this technology may include:

Traffic signals may also be pre-empted by other types of vehicles such as snow plows or street cleaners during late night or early morning operations to prevent them from stopping and restarting at intersections unnecessar-

ily. In the case of snow plows, pre-emption capabilities could also be valuable during severe weather conditions at other times of the day. However, in order not to disturb residents, a non-siren based system should be considered. Some form of pre-emption system could also be very useful for allowing public transit vehicles to be given priority at intersections, either on a general basis, or just on occasions when they are behind schedule.

Benefits of Application

	Benefits to travelers	Benefits to the community	Benefits to business / industry	Benefits to the public sector
Direct benefits	Improved safety of traffic at an intersection being approached by an emergency vehicle	Safer intersections during high-speed emergency vehicle crossings	Ambulance vehicles more secure when crossing intersections	Fire / police more secure when crossing intersections
Indirect benefits	Overall smoother flow of traffic due to the emergency vehicles controlling intersection signals	Patients transported in emergency vehicles will reach their destinations in more a timely and safe manner	More timely response to emergency calls	More timely response to 911 calls

Probable Implementation Process

Step One: Determine the number of signals requiring pre-emption control.

Step Two: Assess commercially available signal pre-emption products to determine which is most suited to the area's needs and equipment.

Step Three: Install the pre-emption system and verify that it is functioning properly.

Potential Implementation Issues

As no special equipment on the emergency vehicle is required, equipped vehicles could cross jurisdictional boundaries and activate the signals of neighboring cities or counties, if these have also been equipped with the same system.

In Guam, shortly after implementing a siren-activated signal pre-emption system manufactured by another vendor, local drivers discovered that by activating their car alarms, equipped signals could be pre-empted. Depending on the frequency of the siren technology, this may occur with other implementations as well

Solution's Contribution to Broader Rural ITS Developments

This simple solution is an example of a low-cost method for improving safety surrounding incidents and incident response. The potential contributions of this solution to the rural ITS development are described below.

Incident Management - This solution can serve as a fundamental portion of the infrastructure for delivering incident response.

Traffic Control - For coordinated traffic control systems or stand alone signal controllers, this solution can play a key role in the infrastructure delivery.

The Technology in Rural Transportation: "Simple Solutions" Project: This project was performed within the ENTERPRISE pooled-fund study program, and aimed to identify and describe proven, cost-effective, "low-tech" solutions for rural transportation-related problems or needs. "Simple solutions" studied within the project focussed on practical applications of technologies, which could serve as precursors to future applications of more advanced systems, or intelligent transportation systems (ITS).

More than fifty solutions were initially identified and documented. Of these, fourteen solutions were documented and analyzed in detail. The transportation technology applications were also categorized according to the seven Critical Program Areas (CPAs) defined within the U.S. Department of Transportation's Advanced Rural Transportation Systems Program. It is hoped to utilize the information gathered within this study to perform outreach to local level transportation professionals to introduce them to ITS and its potential benefits.

For More Information: A full report on this study is available from the FHWA R&T Report Center, telephone no. 301-577-0818. **Title:** Technology in Rural Transportation: "Simple Solutions." **Publication No.:** FHWA-RD-97-108. This research was conducted by Castle Rock Consultants, Eagan, Minnesota. For more information, contact Paul Pisano of FHWA, HSR-30, 703-285-2498. For more information about ENTERPRISE, contact Bill Legg, Washington State DOT, 206-543-3332.

Publication No. FHWA-RD-97-114