United States Department of Transportation
Federal Highway Administration
Federal Transit Administration

Technology for Rural Transportation "Simple Solution" #14

ENTER@PRISE

Public Service Weather Radio

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: Information on road and weather conditions is of interest to all travelers. In extreme conditions, such as winter snow storms, the timely receipt of accurate information enables maintenance personnel to proactively treat road surfaces, to remove ice or snow, or even to close roads where conditions are most hazardous. Access to appropriate weather information has the potential to improve operations, prevent damage to property and save lives. Increasingly, agencies are looking to improve the sophistication of weather and road condition information collection and dissemination, and to provide reports specific to local areas. This solution is an existing service, which could form the basis of added-value services provided by local agencies to broadcast weather information to travelers and other interested users in a cost-effective manner.

***Real-World Example* - NOAA Weather Radio**

Overall goal: To improve safety for the general public by providing current and forecasted weather conditions.

Technical approach: The National Oceanic and Atmospheric Administration (NOAA) Weather Radio information is broadcast from 400 FM transmitters operating on seven frequencies in VHF range, ranging from 162.400 to 162.550 megahertz (MHz). The broadcasts are provided on a continual basis, with information being supplied from local National Weather Service (NWS) offices. The information contained in the broadcasts is tailored to local user needs in the transmitter area. Routine weather updates can be interrupted by NWS personnel to insert special warning messages.

Current status: The system is active, with NOAA Weather Radio available to approximately 70 to 80 percent of the U.S. population. A new alerting system, Weather Radio Specific Area Message Encoding (SAME), is currently being deployed. SAME will use digital coding to activate special receivers which have been programmed for emergency conditions in a specific area, usually a county. As the frequencies are outside the range of normal radio receivers, special radios are required to obtain the information.

Location / geographic scope: The system is operational in fifty states, Puerto Rico, the Virgin Islands, and Guam. It was designed to limit coverage to within 40 miles of a transmitter. This allows for more site specific information to be provided. For example, in coastal areas, information of interest to mariners is provided.

Agencies involved: The National Weather Service is the primary support agency, with responsibilities for system operations and maintenance.

Cost information: No information is available regarding system development and deployment costs. However, weather radios are commonly available, and can be purchased for under $75.

Key contact: The National Weather Service, Warning and Forecast Branch (attn: W/OM11)1325 East-West Highway, Silver Spring, MD 20910.

Have goals been achieved? The system is fully operational. SAME deployments are continuing, and this will be the primary activator for the new Emergency Alert System planned by the Federal Communication Commission.

Solution timeline: The NWS is currently working on a White House mandated resolution to increase system coverage to 95 percent of the population in the U.S. by the year 2000

Further Description of Application

Additional technologies may include: The provision of a basic level of service for road and weather condition information can be considered a public good. Dissemination via some broadcast technology may be the most effective means of ensuring that the widest possible audience is exposed to the information. Although various alternative technologies could be used to transmit information to users, the principle of making the information widely and easily available may be an overriding concern of agencies wishing to implement a service. Therefore, other systems utilizing wireless data broadcast, using AM, FM, or HAR subcarriers, could be the most appropriate mechanisms. Messages could either be provided to travelers using roadside signs or in- vehicle devices, including regular radios. For weather forecasts, information should be available to radios used in the

home or at work also. Information could also be provided at kiosks installed at rest areas, parks, or gas stations, for example.

In addition to these broadcast systems, supplementary technologies such as weather-related Internet sites or dial-in telephone services could also be provided in order to widen further the availability of this information.

Potential additional uses for this technology may include: There is a very wide range of additional information types that could be broadcast via radio subcarriers to in-vehicle or other units, including information on congestion, road construction and maintenance, road or lane closures, incidents, or speed advisories, for example.

Benefits of Application

	Benefits to travelers	Benefits to the community	Benefits to business / industry	Benefits to the public sector
Direct benefits	Ability to plan or reschedule trips based on timely receipt of information	Ability to proactively prepare for severe weather conditions, e.g. planning school closures	Ability to plan shipments based on up-to-date information on road and weather conditions	Low-cost dissemination of information, potentially to a very wide audience
Indirect benefits	Safer travel and transportation		Reduced costs and greater reliability of services that rely on transportation or movement of goods	Increased traveler safety and awareness

Probable Implementation Process: As the NOAA weather radio service is already available to much of the U.S. population, in many areas users can access the information immediately by purchasing a standard weather radio. However, should a public agency be interested in disseminating information based on the NOAA service or related messages to travelers, the following steps should be taken.

Step One: Interested agencies should deterrnine the extent of the area for which information will be disseminated for example, a region or state. This will be deterrnined in part by the relevant data collection mechanisms which are in place, whether these be publicly or privately owned or operated systems. In addition, and depending on the type of broadcast system to be used, the availability of suitable broadcast coverage should be assessed. A public or private agency may even decide to establish new broadcast systems, although this will have major cost implications on the overall solution.

Step Two: If the services of private vendors are to be sought by a public agency, the cost implications of purchasing these services should be assessed and detertnined to be reasonable.

Step Three: Agencies must decide in what format information will be disseminated, taking advantage of established message sets and messaging protocols such as the International Traveler Information Interchange Standards (ITIS). Adherence to the appropriate standards should enable efficient system expansion and transferability in the future.

Step Four: Depending on the broadcast system and receiver units to be used, agencies should determine how fees, if any, will be levied for access to the system and also determine fee levels. If a fee is charged, the amount will depend on the numbers of users willing to pay for the system and what amount they are prepared to pay.

Step Five: The appropriate systems and services should then be specified, procured, and installed or established.

Step Six: In parallel with earlier stages of system development, agencies should market the proposed service and enroll users in the service, if appropriate, or publicize a freely available service.

Step Seven: Once the data collection and delivery system are in place and operating satisfactorily, delivery of traveler information can begin in accordance with the plans and procedures established during previous stages.

Potential Implementation Issues: One potential implementation issue was described above. This is the issue of whether a road and weather information service should be freely available to the travelling public and other users. If a value-added information provision service is to be offered, it may be necessary to delineate what information will be freely available and what information can be sold in order to protect the commercial service.

The adherence to any appropriate standards is an additional implementation issue. Although conforming to standards may require additional investment in the initial stages of system implementation, the benefits of doing so must be promoted.

Solution's Contribution to Broader Rural ITS Developments: This solution is an example of a region-wide weather information collection, processing and dissemination system that currently provides weather information to a large percentage of the nations' population. This solution can contribute to rural ITS developments in the following ways:

Regional Traveler Information - The information can be an integral part of a regional information system, with increased effectiveness when combined with other traveler information.

Incident Management - The emergency warnings provided by the NWS, a part of these broadcasts, are key pieces of information that alert incident managers to potential problems.

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.

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