

TECHBRIEF



The national Intelligent Transportation Systems (ITS) program includes the development and application of advanced systems upon all parts of the transportation network, including rural areas. The U.S. DOT has developed the Advanced Rural Transportation Systems (ARTS) program to meet the needs of travelers in and through rural areas, as well as the agencies responsible for the operation and maintenance of the rural transportation system. The ARTS program complements the ITS efforts in metropolitan areas and commercial vehicle operations (CVO) by studying ways to best implement technologies that address transportation problems in rural areas.



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Advanced Transportation Weather Information System (ATWIS)

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Traveler Using the ATWIS #SAFE Cellular Interface

According to the U.S. Department of Transportation, 80 percent of the road mileage in the United States is located in rural or small urban areas and accounts for about 60 percent of all traffic fatalities. With these facts in mind, ATWIS was developed to enhance the efficiency and safety along these rural highways through America.

The primary purpose of the ATWIS research program is to demonstrate how current technologies in weather forecasting, weather analysis, telecommunications and road condition monitoring can be merged effectively to produce a safer and more efficient transportation system for both commercial and general travel.

Key areas of this operational study include:

- Public use and acceptance.
- Highly accurate weather forecasts.
- Information dissemination methods.
- 24-h operations.
- Telecommunications.
- Road condition monitoring.
- Efficient forecast generation.
- Commercial viability.

Using the National ITS Architecture as a guide, ATWIS teams public and private partners to meet the immediate and future needs of rural transportation. Through the use of a dynamic information system provided by the University of North Dakota (UND) and private Information Service Providers (ISP's), UND's

FIGURE 1.**Example of Exchange Between Cellular User and ATWIS #SAFE System.**

ATWIS - Welcome to the Federal Highway Administration's Advanced Transportation Weather Information System. If you have questions or comments about this service, please call (701) 777-6111. Please enter your Interstate or Highway number followed by the pound sign.

Customer - enters 94, #

ATWIS - If you are traveling east, please press 1, if you are traveling west, please press 2.

Customer - enters 1

ATWIS - Please enter your last known mile marker or last known exit number followed by the pound sign.

Customer - enters 272, #

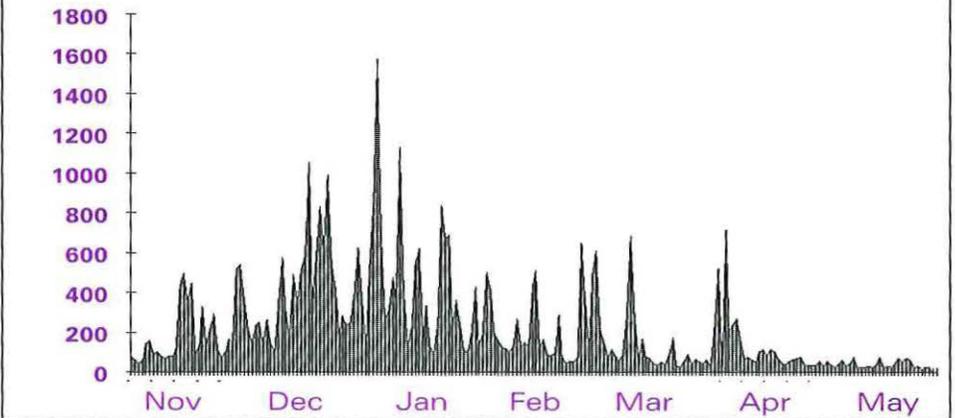
Telephone Response

For eastbound travelers on Interstate 94 in the vicinity of mile marker 272: Traffic speeds are reduced due to poor visibility. Roadway is snow-covered. The Forecast until 9:00 p.m. Central Time this Tuesday evening: Skies will be overcast, becoming mostly cloudy. Visibility will be less than one-quarter mile, changing to near zero with blowing snow. There will be frequent moderate snow ending. Winds will be 10 mi/h gusting to 15 from the north-northwest, changing to 35 mi/h gusting to 40 from the northwest. Temperatures will range from 8 to 10 degrees, decreasing to minus 2 to minus 6 degrees.

Regional Weather Information Center (RWIC) operates as a Transportation Management Center, collecting, analyzing, and providing weather and road condition information to the ISP's, the general public, and State departments of transportation in ND and SD.

Research Approach

Forecasts are developed for this project using a large quantity of current meteorological data, including surface and upper-air observations, WSR-88D Doppler radar, Geostationary Observational Environmental Satellite (GOES) satellite imagery, and lightning detection. As input to analysis tools and regional and mesoscale prediction models, this array of information produces site-specific

FIGURE 2.**Daily Transactions During First 7 Months of Cellular System Operation.**

(about 20 km²) weather "nowcasts" (current conditions) and forecasts (out to 6 h and 48 h). The forecasts are updated at least every 3 h based on continuous weather analyses and model projections.

A decision support system (DSS) combines the nowcasts and forecasts with information from road-surface sensors to improve their accuracy for specific road segments. The DSS's evaluation of complex information makes it possible to identify specific travel corridor segments and immediately assess present and forecast weather conditions.

Information Dissemination

Weather predictions must be distributed to travelers quickly and effectively. Forecasts are made available to cellular phone users across North and South Dakota through a computer telephone system that queries users on their location and direction of travel. The en route weather forecast, with appropriate road condition information, is then provided for the traveler's road segment via cellular telephone (see figure 1). This system was used extensively during Winter 1996-97 (see figure 2). In addition to the cellular system, the Internet provides regional forecasts for pre-travel planning, serving 1.3 million people across the two States. Electronic mail is used to disseminate information to State highway maintenance crews.

Future plans for a fee-for-service system (e.g., 1-900 service) and other delivery methods are scheduled for testing. As the technology for information dissemination improves, delivery methods ranging from simple highway advisory radio messaging to sophisticated in-vehicle digital data reception and display systems will be implemented. At the same time, geographical coverage will be extended to additional routes.

As the Nation's first and only rural, en route weather information system, ATWIS is breaking new ground for the Rural Intelligent Transportation Systems of today and tomorrow. ATWIS is sponsored by the Federal Highway Administration and the North Dakota and South Dakota Departments of Transportation. Private partners include: AirTouch Cellular; Cellular One; CommNet Cellular Inc.; Glacial Lakes Cellular 2000; and Surface Systems Inc.

For More Information:

ATWIS was developed by the Regional Weather Information Center, University of North Dakota. For more information, contact: Leon Osborne, Principal Investigator and Director, Regional Weather Information Center, University of North Dakota, (701) 777-2479; Paul Pisano, FHWA, HSR-30, (703) 285-2498; or Steve Busek, FHWA, North Dakota Division Office, (701) 250-4348.