

# A Real-Time Traffic and Weather Reporting System for Motorists

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## Abstract

*It is estimated that the economic cost of traffic congestion costs our nation \$63 billion in 2002. The Federal Highway Administration (FHWA) has employed several strategies in an effort to mitigate traffic congestion in urban areas. According to the FHWA, key to any traffic mitigation strategy is providing traveler's location specific and current traffic information in real time. We have developed a novel traffic and weather communication system that can be used by travelers to send and receive location specific traffic and weather information in real time. Our system uses wired and wireless ad hoc networks and personal data assistants (PDA).*

## 1. Introduction

Traffic congestion has continued to increase over the last several decades. [1] reported the economical impact of traffic congestion in 2002 was an estimated \$63 billion annually. Key to any traffic mitigation strategy is providing travelers with up to date traffic conditions in real time [2]. We propose a novel method for providing travelers with urgent and emerging traffic condition in real time. Our method uses a collection of networks to both broadcast and receive location specific emerging traffic and weather information to roaming or mobile travelers.

Present methods for providing travelers with current traffic information include electronic Display Messages Signs (DMS) [3], radio broadcasted traffic reports and traffic and weather web sites [4] to name a few. The above-mentioned systems vary in the timeliness of the information and relevance of the information to a specific area. For example, radio broadcast traffic reports are provided ever 10 minutes during peak highway traffic. However, it can take as much as 25 minutes before a highway incident is acknowledged and reported [5].

## 2. Real-Time Traffic and Weather Communication System

We propose a new communication system that can be used to both send and receive location specific urgent or emerging traffic and weather information in real time. We call our system Real-Time Information for Travelers (RTIT).

### 2.1 RTIT Base Station

RTIT is a communication system for providing real-time traffic and weather information to travelers. RTIT is comprised of two separate components; a bases station and mobile receivers.

The base station is a stationary installation that includes a computing platform (e.g. a personal computer), custom RTIT base station software and two networking cards. The base station maintains a queue of messages, which are continuously broadcasted. The base station uses a wired networking card to retrieve location specific traffic and weather information from a designated command and control center. The second networking card in the base station is a wireless IEEE 802.11 compatible networking card and this card is used to continuously broadcast messages in the broadcast queue. The broadcast range of the base station is approximately a quarter mile for clear line of site.

Messages in the broadcast queue have a time to live (TTL) value, which is used to determine the lifetime of a message. When the TTL value expires, the message is purged from the system and is no longer broadcasted. In addition to retrieving traffic and weather messages from a command and control center, the base station can also receive traffic and weather messages from mobile users. This additional capability can help reduce the latency in reporting traffic incidents and improve the response time of highway incident managers in handling traffic incidents. Figure 1 is a representation of a base station located along a highway.

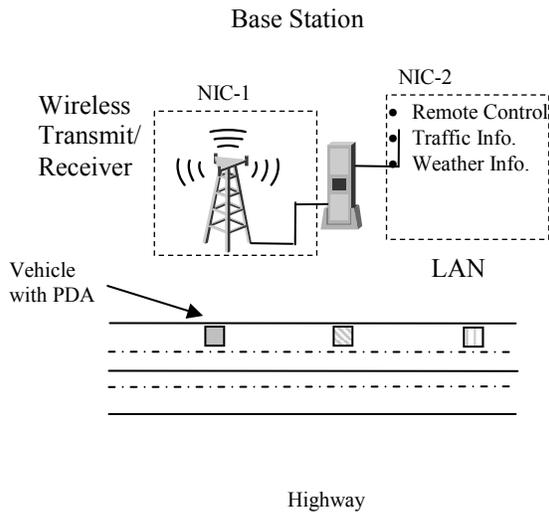


Figure 1. RTIT Base Station Setup

## 2.2 RTIT Mobile Unit

The second component of our system is the mobile unit. The mobile unit is a personal data assistant (PDA) device with wireless capability. We used a pocket pc® for our prototype.

The mobile unit is used to communicate traffic and weather information to mobile travelers, for example travelers in a car. The mobile unit supports two primary modes of interaction; a graphical user interface (GUI) or voice controlled. Figure 2 shows the digest screen of the mobile unit in GUI mode.

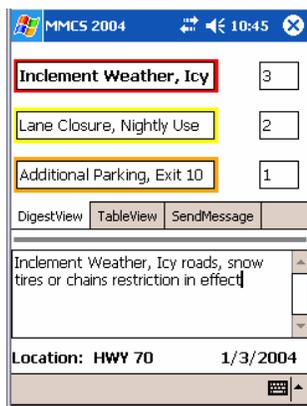


Figure 2. RTIT Messages Digest Screen Shot

The mobile unit runs custom software which controls the communication between the mobile unit and the base station, manages incoming traffic and weather messages and provides users with the ability to transmit messages to the base station for further processing.

## 3. Summary

Traffic congestion cost our nation billions of dollars annually. Key to any traffic mitigation strategy is providing timely and current traffic conditions to travelers. We proposed a new system that provides location specific traffic and weather information in real time. Our system uses ad hoc wireless networks to broadcast urgent or emerging traffic and weather information to travelers with wireless capable PDA devices. Our implementation used wireless communication, but we are investigating using other means of communication, such as general packet radio service (GPRS) or direct short range communication (DSRC).

## 4. References

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