

# Improving Commercial Radio Traffic Reports in the Chicago Area

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An operational computerized traffic report network based on electronic freeway surveillance and designed to improve commercial radio traffic reports is described. The report network was implemented after a comprehensive home-interview survey was conducted in the Chicago area to determine motorists' attitudes toward driving information. An analysis of that part of the survey related to the commercial radio traffic report is presented. Questions were analyzed to determine the potential of radio reports, the effect of radio reports on diversion, and the importance of various types of information. Expressway drivers found commercial radio traffic reports slightly more useful than did nonexpressway drivers. Information was more important for the trip to work than for the trip home. Also drivers indicated that they diverted to alternate routes because of radio traffic reports.

A driver information system is an integral part of an urban corridor traffic management system. The ideal information system should be able to provide the driver with pertinent information at any point in time and space from origin to destination. An existing means that can provide the urban driver with continuous information at practically any point along a journey is the commercial radio.

In 1969, the Chicago Area Expressway Surveillance Project, Illinois Department of Transportation, conducted a home-interview survey to determine driver behavior and attitudes toward driving information (1, 2, 3, 4). The analyses in this report are based primarily on two series of questions from the survey pertaining to radio traffic reports. The specific objectives were to determine

1. The potential of commercial radio traffic reports as a workable component of a driver information system;
2. The effect of commercial radio traffic reports on the driver's choice of route, time of trip, and the like;
3. The importance and kind of information drivers

should receive from commercial radio reports; and

4. The difference in attitude toward commercial radio between expressway and nonexpressway drivers.

In the overall home-interview survey, 732 usable interviews were obtained; 417 of the respondents were expressway drivers (drivers making some portion of their trip on an expressway) and 315 were nonexpressway drivers. The survey was primarily concerned with the home-to-work commuting trip. Frequency of certain behavior, or the importance of some aspect of driver information, was obtained by using the scales shown in Figure 1.

A chi-square analysis was conducted to find whether there was a significant difference between the responses of expressway drivers and the responses of nonexpressway drivers to 34 questions from the survey (5). Where a statistically significant difference was found, expressway and nonexpressway drivers are identified; otherwise, the term "drivers" is used.

In addition to analyzing survey questions, the report concludes by describing an operational computerized traffic report network implemented to improve commercial radio traffic reports.

## COMMERCIAL RADIO USAGE

### Coverage

Ninety-nine percent of the drivers interviewed responded that they have radios in working condition in their homes. Ninety-four percent have radios in working condition in the cars that they drive to and from work.

The following tabulation shows that, most of the time, drivers choose a route even before leaving home or work (ranges are due to data grouping in analyses):

Time	Average Frequency (%)
Before leaving home	80 to 85
After leaving home	15 to 17
Before leaving work	77 to 81

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Furthermore, as shown in Figure 2, more than two-thirds of the drivers always choose their routes to work before leaving home, and only 7 percent always choose their routes after they are on the road system. For the trip home from work, 64 percent of the drivers always choose routes before leaving work and 11 percent always choose routes after they are on the road system.

The evidence indicates that most drivers make route choices at the beginning of a trip. Research by Dudek, Messer, and Jones (6) reported that 42 percent of the Texas drivers interviewed prefer to receive real-time freeway information at the beginning of a trip and that 92 percent prefer the information before they enter the freeway.

For the trip home from work, the availability of radios at work is definitely less than that at home. However, 94 percent of the drivers could theoretically receive information from their car radios before entering the road system.

#### Degree of Listening to Traffic Reports

Table 1 gives the frequency for expressway and nonexpressway drivers at which a driver is expected to have his or her radio on or is expected to be intentionally listening to traffic reports while at home before leaving for work, driving home from work, or driving to work. In general, expressway drivers listen to more of the traffic reports than the nonexpressway drivers do. This is probably because most traffic reports by Chicago area stations are primarily concerned with expressway conditions. The same reasoning accounts for the fact that more of the expressway drivers always intentionally listen to the reports as shown in Figure 3. When drivers who never listen to radio traffic reports were asked why, 66 percent of the drivers indicated that the reports did not provide information concerning their routes to work and 62 percent indicated a lack of information concerning their routes to home. No data were available on how many of those that listen hear what they want and need to hear.

The data also indicate that drivers listen to more traffic reports during the trip to work than either before leaving home or during the trip home. Before starting the trip to work, most drivers want the most timely information that can be obtained and therefore intentionally listen to the traffic reports broadcast just before they leave their homes. While on the road, drivers want to be aware of any new developments in traffic conditions. Conditions are not so important on the way home because arrival times at home are not so critical as arrival times at work. On a scale of 100 (Figure 1b), drivers indicated an average importance of 68 for arriving at work at specific times and an average importance of only 35 for arriving at home at specific times.

#### Use of Comparable Alternative

Any alternative to commercial radio must be capable of providing traffic information at the beginning of a trip before drivers enter the road system. Information provided at the beginning of a trip will produce the best results in aiding the drivers in route choices and is therefore most effective in redistributing road demand.

When asked how often they would phone a traffic information center that could provide information about their routes to or from work, only 6 percent of the expressway drivers and 4 percent of the nonexpressway drivers indicated that they would always call the information center before starting their trips to work as shown in Figure 4. Even less would always call before leaving work. The following tabulation shows that non-

expressway drivers would call the information center about once every 5 days before going to work and about once every 7 days before leaving work (ranges are due to data grouping in analyses):

Time	Average Frequency (%)	
	Expressway Drivers	Nonexpressway Drivers
Before leaving for work	18 to 29	12 to 21
Before leaving for home	12 to 21	7 to 15

Expressway drivers indicated that they would phone more often—about once every 4 days before going to work and about once every 6 days before leaving work.

#### EFFECT OF TRAFFIC REPORTS ON DIVERSION

Because one of the main purposes of a driver information system is to redistribute the demand on the road system when warranted, the diversion characteristics of the drivers are necessary elements for an evaluation of the information system.

#### Diversion Due to Observation of Congestion

Drivers who encounter congestion on the way to work divert once out of five times as shown by the data given in Table 2. Figure 5 shows that 64 percent of drivers divert at least some of the time. Thirty-six percent of the drivers never divert and 6 percent always divert. For the trip home, the frequency of diversion is slightly less than that while traveling to work because arrival times at home are not as critical as arrival times at work.

#### Diversion Due to Radio Reports of Congestion

A radio traffic report of congestion causes 10 percent of the expressway and 8 percent of the nonexpressway drivers to always change routes before they encounter congestion on their routes to work. Figure 6 shows that 54 percent of the expressway drivers and 32 percent of the nonexpressway drivers indicate that they divert some of the time.

For the trip home from work, 6 percent of the expressway drivers and 7 percent of the nonexpressway drivers always change routes because of a congestion report. Expressway drivers are expected to divert once every four times while going to work. Nonexpressway drivers divert once every six times.

#### Diversion Due to Radio Reports of Accident

A radio report of an accident causes 12 percent of the expressway drivers to always change routes on the way to work. Expressway drivers are expected to divert once out of three times because of radio reports while on the way to work. Nonexpressway drivers are expected to divert once every four times while on the way to work.

When drivers were asked why they did not divert more often, 28 percent indicated that they did not know of any acceptable alternate routes and 22 percent indicated that they did not know the conditions on other routes.

#### IMPORTANCE OF INFORMATION

The respondents were asked to indicate how important it is for them to know traffic and road conditions to help them decide which routes to drive and what times to start their trips. The data given in Table 3 show that,

Figure 1. (a) Frequency and (b) importance scales.

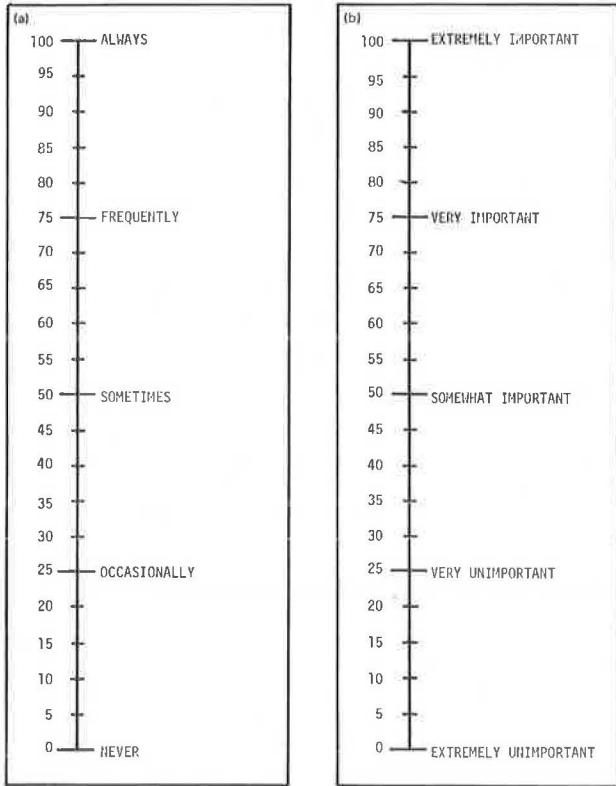


Figure 2. Drivers who choose a route before or after starting a trip.

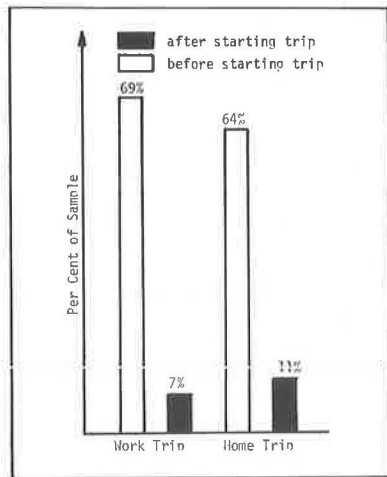


Figure 3. Drivers who always intentionally listen to radio traffic reports.

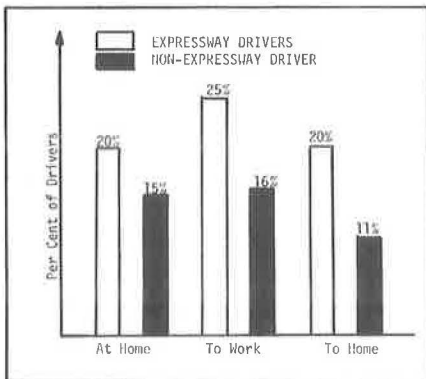


Table 1. Average frequency of radio use.

Drivers	Radio On (%)	Driver Intentionally Listening to Traffic Reports (%)
Expressway		
At home	58 to 65	32 to 39
To work	78 to 83	39 to 47
To home	76 to 81	32 to 40
Nonexpressway		
At home	55 to 62	24 to 31
To work	70 to 76	26 to 34
To home	68 to 73	20 to 27

Note: Ranges are due to data grouping in analyses.

Figure 4. Drivers who indicate that they would always phone an information center.

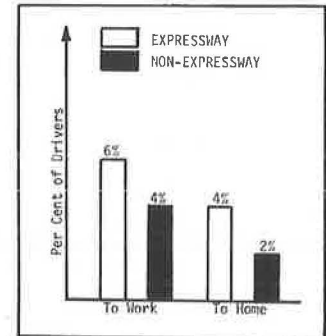


Figure 5. Drivers who divert at least some of the time on the way to work.

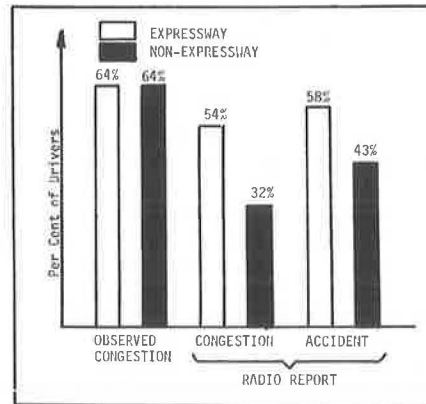


Table 2. Average frequency of route diversion.

Drivers	Observed Congestion (%)	Radio Report of Congestion (%)	Radio Report of Accident (%)
Expressway			
To work	16 to 27	21 to 30	26 to 35
To home	14 to 25	17 to 26	24 to 33
Nonexpressway			
To work	— <sup>a</sup>	14 to 19	23 to 28
To home	— <sup>a</sup>	13 to 19	19 to 25

Note: Ranges are due to data grouping in analyses.

<sup>a</sup>No significant difference.

in all cases, both expressway and nonexpressway drivers indicated that information was slightly less important for trips home from work. Expressway drivers also felt that information was slightly more important than nonexpressway drivers did.

Information about road conditions is more important than information about traffic conditions to both expressway and nonexpressway drivers. Information is equally important in aiding drivers to decide which routes to drive or what times to drive except for the nonexpressway drivers' trips to work where traffic conditions are more important for departure times than for route choices.

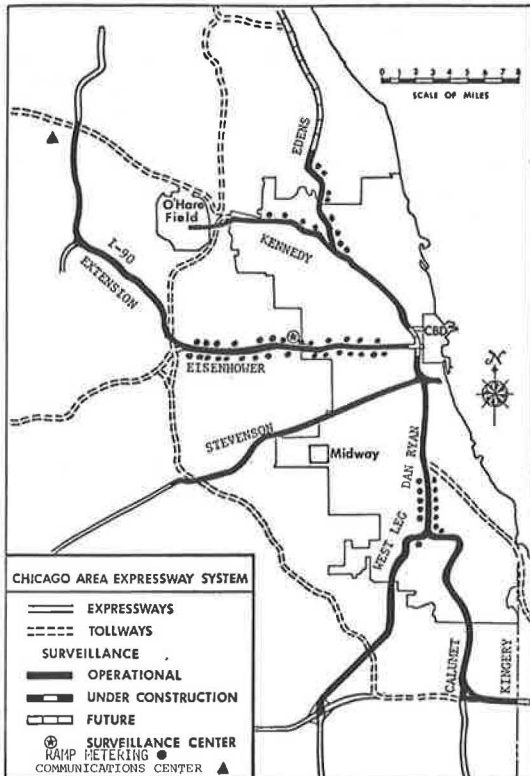
Commercial radio reports are usually consistent in the manner in which road condition information is given to drivers. However, inconsistencies do exist in conveying traffic conditions. Research has indicated that most drivers prefer to know the location, length, and degree of congestion as an indicator of traffic conditions (3,6). Maximum effects can probably be achieved if

Table 3. Average importance of road and traffic conditions for route choice and starting time decisions on commuting trips.

Drivers	Traffic Conditions		Road Conditions	
	Route to Take	Time to Leave	Route to Take	Time to Leave
Expressway				
To work	40 to 52	37 to 48	51 to 61	55 to 66
From work	30 to 42	27 to 39	42 to 54	40 to 52
Nonexpressway				
To work	28 to 38	31 to 41	41 to 50	54 to 63
From work	20 to 30	17 to 28	33 to 43	35 to 45

Note: Values are from importance scale in Figure 2. Ranges are due to data grouping in analyses.

Figure 6. Electronic surveillance and control network for Chicago area expressways.



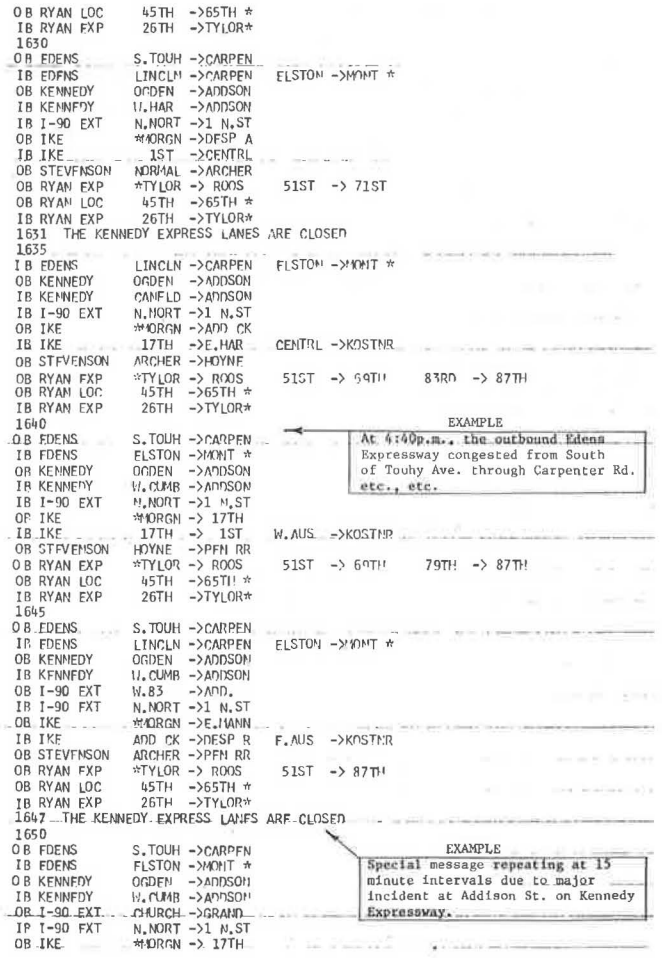
commercial radio reports consistently convey that kind of information.

SUMMARY OF RESEARCH FINDINGS

This research was concerned with the analysis of attitudinal survey data to determine the potential of the commercial radio traffic report and the effect of the radio report on drivers' behavior. The results from the analyses of questions, which reflect the prevailing conditions in the Chicago area at the time of the survey, are as follows:

1. Commercial radio can reach almost all potential users of an information system;
2. Commercial radio can provide information when and where drivers want information;
3. Most drivers make route choices at the beginning of a trip;
4. Many drivers always listen to traffic reports, and most listen some of the time;
5. Drivers listen to radio traffic reports more often than they would telephone for traffic reports;
6. Radio traffic reports cause many drivers to divert all of the time and most drivers to divert some of the time;
7. Drivers regard both traffic conditions and road conditions as important in helping them decide what time to start a trip and which route to drive;

Figure 7. Typical traffic congestion report provided on computerized network.



8. Information is required more and used more for the trip to work than for the trip to home;

9. Expressway drivers find commercial radio traffic reports slightly more useful than nonexpressway drivers do;

10. Currently, only commercial radio can and does provide information to most drivers before they begin a trip; and

11. The commercial radio traffic report is an effective component of any driver information system.

Even though the questionnaire survey indicated that the commercial radio traffic report is a useful and effective component of a driver information system, motorist responses also identified where improvements could be made in the Chicago area reports available at the time of the survey.

#### More Routes Could Be Covered

Sixty-two to 66 percent of those drivers who never listen to traffic reports do not listen because reports do not provide information about their routes. Forty-two to 50 percent do not change routes because of a lack of information about alternate routes. Increasing the route coverage could attract more listeners and increase diversion and spread traffic demands.

#### Reports Could Be More Accurate and Timely

Eight to 11 percent of the drivers never listen to reports because previous experience has led them to believe that reports are either inaccurate or not current. Reporting traffic conditions in a consistent manner could decrease the possibility of driver misinterpretation of information and would improve driver opinion of accuracy. Supplementing regular traffic reports with traffic bulletins to keep drivers informed of new developments could help improve the timeliness of traffic reports.

#### More Radio Stations Could Provide Traffic Reports

Although most drivers listen to radio stations that report traffic conditions, more drivers could be reached if additional stations provided traffic reports.

### IMPROVING CHICAGO AREA TRAFFIC REPORTS

For the past several years, the preceding three potential areas for improving traffic reports have been affected by the expressway driving information obtained by the Illinois Department of Transportation particularly through its growing electronic surveillance network. Historically, several Chicago area radio stations have provided public service traffic reports based either on private ground and helicopter surveillance (since 1958) or on information obtained through the department or from various other sources and techniques (7).

With expansion of the electronic expressway surveillance network (Figure 6), several radio stations regularly requested the current traffic conditions depicted on the traffic status displays located in the Illinois Department of Transportation Surveillance Center in Oak Park as well as those in the Illinois Department of Transportation Communications Center in Schaumburg (8). The surveillance center prepared for directly outputting basic computer-generated traffic information on a remote teleprinter network serving commercial radio stations or other interested users (9, 10, 11). Such com-

munications appeared to have a great potential for improving the timeliness, accuracy, and quality of expressway traffic reports particularly because the electronic surveillance covers major routes [currently operational for 360 directional roadway km (224 miles) at 0.8-km (0.5-mile) intervals in real time] and is not limited by the frequency and constraints of other coverage methods.

In March 1974, the department notified Chicago area radio and television stations of the availability of a teleprinter service consisting of receive-only, computer-generated traffic reports as often as every 5 min when applicable that listed only the significant expressway congestion areas. On a continuous 24-h/day basis, this report prints out the location limits when two or more adjacent, or once-removed, expressway main-line surveillance stations are congested, based on 5-min average lane occupancy readings of 30 percent or more (Figure 7). Special messages can be added to the computer-generated report through cathode ray tube keyboard entry at the surveillance center. Each radio station or other user provides its own teleprinter or other compatible terminal, modems, and leased phone line for hookup with the expressway surveillance computer.

Thus far, four of the major regional AM radio stations are using the computerized traffic report service as a continual source of motorist information. Some of these users relay traffic information to affiliated FM or television stations. Some nonusers phone either of the two department locations for the information particularly if their traffic report broadcasts are infrequent or if their broadcast range is highly localized. (There are nearly 40 AM radio stations, nearly 40 FM stations, and 8 TV stations in the Chicago metropolitan area.) Other nonusers monitor reports broadcast by radio stations with direct information sources.

Each radio and television station providing traffic reports adapts the information base to suit its particular programming format and audience. Some read the latest computerized printout; others modify or expand the information. One uses two helicopters to cover additional routes or to concentrate on special problems. One provides supplementary travel times and airs a minimum of 33 daily rush-period reports.

The Chicago area experience demonstrates that large-scale, real-time, freeway surveillance systems can be used to supply timely and accurate traffic reports to commercial radio stations and other users. The degree to which the availability of current commercial radio traffic reports affects driver attitudes and behavior could be the subject of a follow-up study.

#### ACKNOWLEDGMENT

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