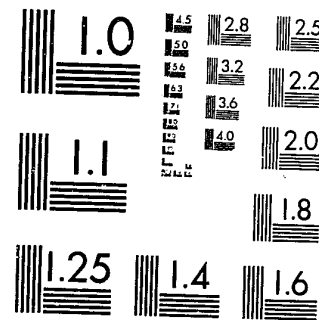


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COMMUNICATIONS STUDY - TASK 79005D

by

Bernard A. Kellner

for

Dakota County Law Enforcement Association

February - 1979

U.S. Department of Justice
National Institute of Justice

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MF-1

A. INTRODUCTION

IN-3113
JUN 6 1979
ACQUISITION'S

In 1977 a study by Ralph Wight proved the feasibility of consolidating the Dakota County communications into a single serving agency. Since that study, a County Government Center has been built.

The Dakota County Law Enforcement Association asked for technical assistance from the Associated Public Safety Communications Officers, Inc. (APCO) to consider the recommended consolidation of services into the new county facility. This report is submitted in response to the request.

B. PROBLEM STATEMENT

The task assigned was to determine the current status of consolidation and provide advisory recommendations towards completion of this consolidation.

1. Agencies

Within Dakota County it appears there are 14 active law enforcement agencies in operation. For communications, eight different frequencies are employed. In some cases two or more police departments share a frequency. Some municipalities use a single channel for police, fire, and/or other municipal agencies and are licensed in the local government radio service. Most are police only systems, however, and licensed in the police radio service.

Within the county there are ten separate police dispatching facilities, including the Sheriff's facility. Six are in operation 24 hours a day, while four are part-time operations and depend upon the Sheriff's facility for dispatch during the remainder of the day. The part-time facilities counted for purposes of this task were those manned at least eight hours a day. Not included were base stations only occasionally operated on an unscheduled basis as need arises.

The Sheriff's radio channel (the Sheriff's radio system employs a two-frequency mobile relay operation; however, for purposes of this task it shall be referred to as a "channel") is installed in virtually all law enforcement radios within the county. For some agencies, including the Sheriff's department, this channel is the primary dispatch channel. Other agencies consider this channel secondary. and use it where

coordination with the Sheriff or other departments is needed.

Those agencies who use their own channels for dispatching also have a Sheriff's channel base station capability in their dispatch facilities. Conversely, however, there is no provision in the Sheriff's dispatch facility for monitoring or transmitting on the radio channels of departments assigned their own unique channel.

The current Sheriff's radio system employs a high band VHF mobile relay station located at Hastings. A backup mobile relay station is installed in Rosemount and is available should the station at Hastings fail.

Although the time available and scope of this task did not permit a field survey, it was evident that the present Sheriff's radio system does not provide adequate radio coverage of the county, particularly over those areas to the northwest. This coverage limitation has prevented the effective use of hand-held radios in much of the county.

The Sheriff's dispatch facility is located at the Sheriff's office and county jail in Hastings. One control console operating position is available, with a backup position available at a second console. This facility, adjacent to the public access areas of the Sheriff's office, is enclosed by glass picture windows. The area is small and appears overcrowded. It is evident there is no room for expansion in the immediate area of this facility.

2. Status of Consolidation

The Sheriff's dispatch facility is currently acting as a consolidated dispatch operation for seven police agencies. There is no written

agreement for allocating costs for these services.

Two communities in the county, Mendota Heights and West St. Paul, have entered into a consolidated operation which involves, but is not limited to, dispatching. A written agreement details cost sharing based upon a formula involving population. In this operation a dispatch facility located in and operated by West St. Paul serves both communities. This arrangement was originally established in 1970.

Other countywide measures of cooperation that have been instituted include a universal radio identification system assigning blocks of unit numbers to each department, the installation of the Sheriff's radio channel in virtually all police vehicles and dispatch facilities in the county, and the installation of the nationwide police emergency radio channel in most police vehicles in the county.

Further progress toward consolidation has been requested by the Dakota County Board of County Commissioners through Resolution No. 7, enacted December 28, 1978, requesting the Dakota County Law Enforcement Association to recommend to the county a fair share charge for dispatch services provided by the county to the municipalities.

In addition, the county has conducted a survey of the various police agencies within the county as to their opinion on advisability of centralizing dispatch facilities. Of the 13 respondents, 8 favored centralized dispatch, 3 were against, and 2 had no opinion at this time; 20 municipalities did not respond.

The City of West St. Paul, which did not respond to this survey, has passed a resolution urging the charging of those communities using the county dispatch facilities, or reimbursing communities providing their own dispatch facilities.

C. ANALYSIS

Some steps towards consolidation have occurred. For example, in several cases two or more agencies are sharing a common radio channel. In other cases two or more municipalities are sharing common dispatch facilities. The most significant example of consolidation is the use of the Sheriff's channel and dispatch facilities by a number of agencies within the county.

The Sheriff's radio channel has been recognized by all law enforcement agencies within the county as a common channel as evidenced by the fact that it is available on virtually all police radio units in the county and at all dispatch facilities. Although it is available, the use of this channel for communications is optional to many departments.

Another example of consolidation has occurred within some communities where a common channel is used for police, fire, or other municipal services. This provides for excellent coordination of services within that community, but would be difficult to integrate into a police-only centralized dispatch facility. Cross-service communications of this type, by FCC regulation, must be conducted on a local government radio service frequency as opposed to police radio service frequencies on which only police-related communications are permitted. Some consideration must be given to this problem if this close community relationship is to be maintained.

The fact that the Sheriff's department employs a mobile relay station has made it

simple for municipalities to install base stations in their dispatch facilities to control the mobile relay station. The mobile relay station negates the need for either high power or high antenna to provide extensive community communications. The reliance on these control stations for inter-agency communications has apparently caused some departments to fail to provide for communications for this purpose on the nationwide point-to-point channel. The mobile relay type of system as employed by the Sheriff's department is a popular method for police communications. It allows mobile-to-mobile communications through the relay over distances much greater than that obtained with direct communications; however, the entire system fails should the mobile relay station become inoperative. This problem has been addressed with provision for a backup mobile relay station and for an alternate car-to-car channel in some radios.

With the mobile relay station being the heart of the system, therefore, the quality of communications within the county is only as good as this station permits. The system in Dakota County does not provide adequate area coverage due to siting and design of the mobile relay station.

The mobile relay station is located at Hastings in the far eastern portion of the county. Major areas of coverage difficulty in mobile-to-base communications occurs in the area of the bluffs along the river on the northern border of the county. This area has a higher population density and concurrent higher radio service needs. Low power hand-held and portable radios cannot communicate in many areas of the county due to the inability of the unit's transmitter to reach the mobile relay station.

The backup mobile relay station location at Rosemount, although more centrally located, also provides inadequate coverage of the county.

Based on this information, using the Sheriff's current system as a model, it can be determined that additional system planning and design is necessary to provide adequate radio coverage of the county. Some additional tests have been made to determine coverage from various locations in the county. These have shown a site atop the water tower at West St. Paul to be effective.

Satellite receivers are the most popular and effective means to provide improved talk-back coverage to the mobile relay station. These should be considered as a possible solution to the radio coverage problems. A properly designed satellite receiver system should provide more effective use of portable radios over the county.

The output frequency 155.595 MHz of the Sheriff's mobile relay is 15 kHz removed from the output of Hennepin County 155.610 MHz. These frequencies should not be operated near each other due to a potential for mutual interference. This proximity effect occurs along the northwestern border of Dakota County, the area where coverage improvements are most needed. A new frequency compatible with the surrounding agencies/users should be obtained for the Dakota County mobile relay to reduce potential interference problems in the metropolitan area.

There is no charge made by the Sheriff's department for providing dispatching services to client communities. By resolution, the county Board of Commissioners has requested an equitable program for cost sharing be established.

D. CONCLUSIONS

The communications consolidation efforts that have taken place within Dakota County have arisen out of need. Those communities without the need or financial means for their own dispatch facilities have depended upon the Sheriff's department to provide this service. The fact that there is no charge made is obviously attractive to these communities.

The law enforcement agencies in the county realize the need for common communications capabilities, as all have provided for and maintain the Sheriff's radio channel in their offices and vehicles. The various agencies can monitor the radio traffic of the Sheriff's department and those other communities who use the Sheriff's radio channel, taking appropriate action as necessary. This is one way of coordinating law enforcement efforts that may span more than one political boundary. However, in those cases where communities do not use the Sheriff's channel for dispatch, inter-agency monitoring and coordination is difficult and requires the relaying of traffic between vehicles of two different departments.

Consolidation of dispatching services would provide improved inter-agency communications in spite of the fact that the agencies may not be employing the same radio channel. The dispatcher would be readily cognizant of events occurring in most areas of the county and could more effectively respond in situations involving more than one community or where mutual aid is required.

Much significance should be placed on the finding that the current Sheriff's radio system is incapable of providing adequate communications capabilities throughout the county. From the information provided, it appears the location

of the mobile relay system is inadequate. Any plans to upgrade or consolidate communications should include attention to this problem as a first step.

The present dispatch facility at the Sheriff's office is inadequate in size and does not provide the physical requirements for a consolidated dispatch facility. It is extremely vulnerable. The location within the Sheriff's office is readily accessible to the public and physical security is difficult to obtain. For these reasons it must be concluded that the present Sheriff's facility could not serve as a consolidated dispatch facility. Space can be made available at the new Government Center near Hastings which would serve well as a room for construction of a consolidated dispatch facility.

Certain deficiencies are apparent in the present Sheriff's FCC license.

The number of mobile units as well as portable units does not properly reflect the actual number presently in use. Also, the usage of a police frequency in highway department units is questioned.

E. RECOMMENDATIONS

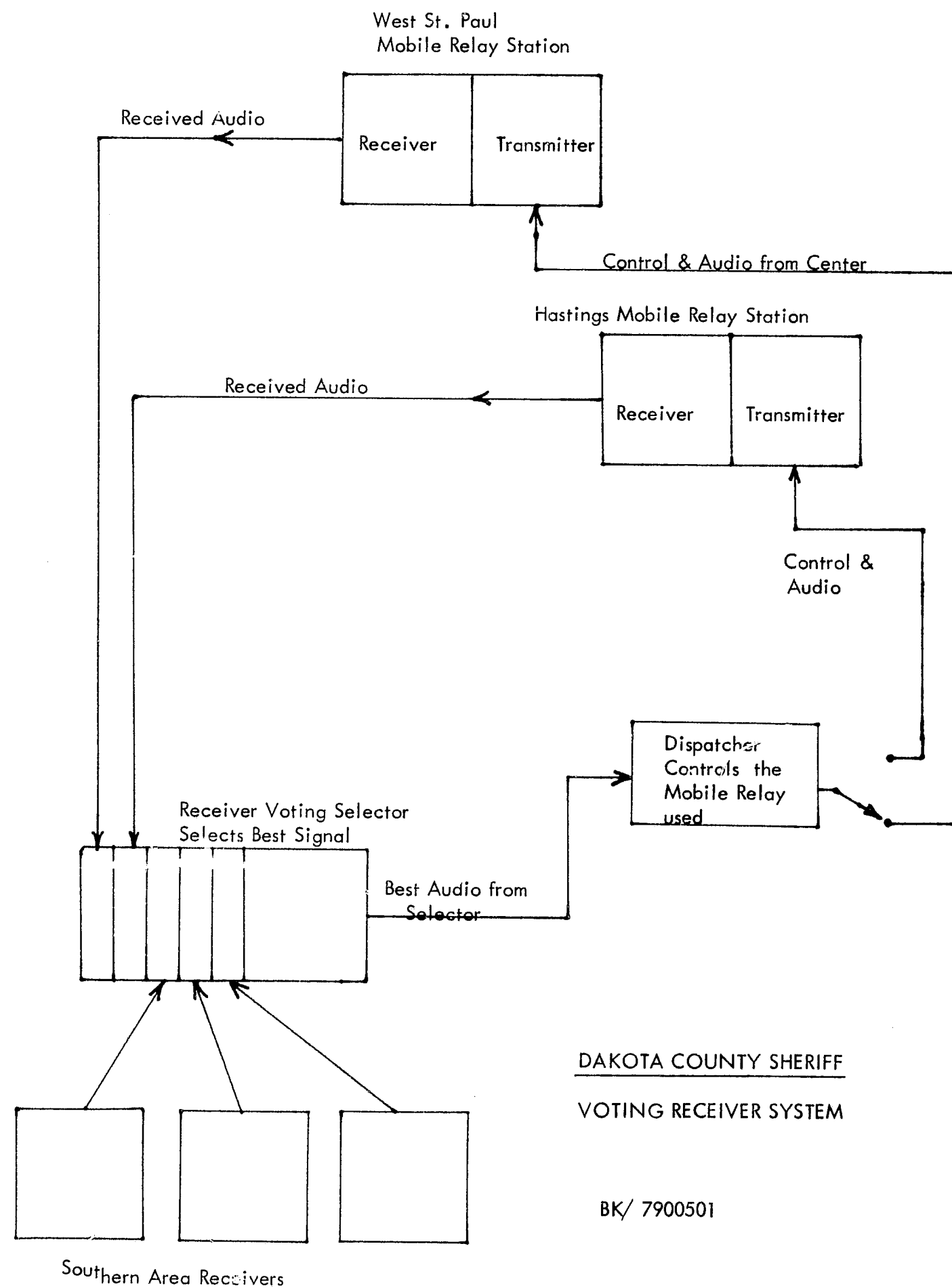
It is apparent that considerable upgrading of the Dakota County communications facility is in order before a total consolidation is possible. The following actions are recommended.

- 1) The Dakota County Sheriff's mobile relay output frequency should be changed. At present it is 15 kHz removed from an adjacent county's frequency and if not changed problems will be encountered when signal levels are increased in the northwestern part of the county, as recommended below.
- 2) Move the Dakota County Sheriff's mobile relay station from its present location at Rosemount to the water tower in West St. Paul. As this is in

the northern part of the county, an offset antenna pattern should be used to assure coverage in the southern portion of the county. Recent tests have proved the feasibility of this location.

- 3) Establish either microwave or wire line links between the Sheriff's dispatch center and the West St. Paul mobile relay station for control, and to pass the received audio signal from the relay receiver to a voting system at the dispatch center.
- 4) Establish a receiver voting system in the county which places receivers closer to the low power portables, and passes the received audio to a voting comparator where it is compared with the signals' quality from other receivers. The best quality signal is selected and presented to (a) the dispatcher, and (b) the mobile relay transmitter for broadcast to all other radios. Five sites, including Hastings and West St. Paul, should be adequate (see sketch).
- 5) The present Sheriff's dispatch center should be moved from its present location at the Sheriff's office and placed in the Government Center building. This would allow for an efficient dispatch center as well as room for expansion into a consolidated operation integrating a future 911 system and a future CAD system.
- 6) Enter into a contractual agreement with the interested entities for provision of dispatch services. It is recommended that costs be shared between the county and the utilizing agencies with costs prorated on the basis of population.
- 7) It is recommended that the Sheriff's communication center have provisions

for communication with highway department units on the highway department radio system. Certain selected highway department units would have an alerting device to indicate to the Sheriff's dispatcher a need for inter-communication. The Sheriff's dispatcher could then communicate directly with any highway unit. It is further recommended that the FCC license allow for tone signaling (15F2).



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APPENDIX DAKOTA COUNTY RADIO/TONE FREQUENCIES

APPLE VALLEY

Mobile units

Receive	
155.595/3B	F-1
	F-2
155.415/3B	F-3
155.475	F-4

Transmit	
154.890/3B	
155.415/3B	
155.475	

Base

Receive	Transmit
155.475	
155.595/3B	154.890/3B
155.415/3B	155.415/3B

DAKOTA COUNTY SHERIFF 30 Units

Mobile Units

Receive	
155.595/3B	F-1
155.595/3B	F-2
	F-3
155.475/3B	F-4

Transmit	
154.890/3B	
155.595/3B	
155.475	

Base

Receive	Transmit
155.595/3B	154.890/3B
155.475	155.475
155.370	155.370
154.890/3B	

~~FAIRBANKS~~ EAGEN

Mobile Units

Receive	
155.595/3B	F-1
	F-2
154.785/3B	F-3
155.475	F-4

Transmit	
154.890/3B	
154.785/3B	
155.475	

Base

Receive	Transmit
155.595/3B	154.890/3B
154.785/3B	154.785/3B
155.370	155.370

FARMINGTON 4 Units

Mobile Units

Receive	
155.595/3B	F-1
	F-2
155.415/3B	F-3
155.475	

Transmit	
154.890/3B	
155.415/3B	
155.475	

Base	
Receive	
155.595/3B	
155.415/3B	
155.475	

Transmit	
154.890/3B	
155.415/3B	

HASTINGS 5 Units

Mobile Units

Receive	
155.595/3B	F-1
155.595/3B	F-2
	F-3
155.475	F-4

Transmit	
154.890/3B	
155.595/3B	
155.475	

Base	
Receive	Transmit
Uses Dakota Sheriff facilities via remote control.	

INVER GROVE HEIGHTS
7 Units

Mobile Units		Base	
Receive		Transmit	
155.595/3B	B-1	154.890/3B	
	F-2		
154.785/3B	F-3	154.785/3B	
155.475	F-4	155.474	
		Receive	Transmit
		155.595/3B	154.890/3B
		155.475	
		154.785/3B	154.785/3B

LAKEVILLE
8 Units

Mobile Units		Base	
Receive		Transmit	
155.595/3B	F-1	154.890/3B	
	F-2		
155.415/3B	F-3	155.415/3B	
155.475	F-4	155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		155.415/3B	155.415/3B
		155.475	

LILYDALE
2 Units

Mobile Units		Base	
Receive		Transmit	
155.595/3B	F-1	154.890/3B	
154.965	F-2	154.965	
155.520/3B	F-3	155.520/3B	
155.475	F-4	155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		155.475	
		155.520/3B	155.520/3B

MENDOTA HEIGHTS
4 Units

Mobile Units		Base	
155.595/3B	F-1	154.890/3B	
154.965	F-2	154.965	
155.520/3B	F-3	155.520/3B	
155.475	F-4	155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		154.965	154.965
		155.520/3B	155.520/3B
		155.475	

ROSEMOUNT
3 Units

Mobile Units		Base	
Receive		Transmit	
155.595/3B	F-1	154.890/3B	
	F-2		
154.785/3B	F-3	154.785/3B	
155.475		155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		154.785/3B	154.785/3B
		155.475	

SOUTH ST. PAUL

Mobile Units		Base	
Receive		Transmit	
155.595/3B	F-1	154.890/3B	
	F-2		
158.820/3B	F-3	158.820/3B	
155.475	F-4	155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		155.370	155.370
		158.820/3B	158.820/3B

WEST ST. PAUL
7 Units

Mobile Units		Base	
Receive		Transmit	
155.595/3B	F-1	154.890/3B	
	F-2		
155.520/3B	F-3	155.520/3B	
155.475	F-4	155.475	
		Receive	Transmit
		155.595/3B	154.890/3B
		155.370	155.370
		155.520/3B	155.520/3B

END