Text Messaging for Dispatching Allen County Fire Departments

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ABSTRACT

The Fire Chiefs of Allen County, Ohio, have adopted a specialty team approach to provide the citizens of Allen County with the following services: hazardous materials response, rope rescue, surface water rescue, trench rescue, and confined space rescue. The Fire Chiefs of Allen County have decided that these specialty teams shall be made up of members from all Fire Departments in Allen County. Allen County has thirteen separate Fire Departments and no central dispatch. These departments operate on seven different radio frequencies.

The problem is these specialty teams need a mechanism in place for dispatching the teams. Allen County needs to be able to dispatch these specialty teams in an efficient and affordable manner. Using evaluative research, the author investigated the following four research questions.

1. Should Allen County build its own alphanumeric paging system?
2. Should Allen County fire departments lease pagers from a commercially available vendor?
3. Should Allen County fire departments activate text messaging for those members who carry a cellular telephone?
4. What are the costs involved with each option? What are the advantages and disadvantages of each option?

The author conducted a survey of Allen County Fire Chiefs to see if there was interest in using text messaging for dispatching the specialty teams in Allen County.

Results of the survey showed that there was enough interest to warrant further research. The author conducted a survey of six hundred and thirty seven fire departments from the State of Ohio to see how they notify their members of a call. Arch Wireless provided a price quote on leasing pagers and service. The author obtained a price from Verizon Wireless to add text messaging to cellular telephone service. The author conducted a side-by-side test with pager and cellular telephone to test response time and service area coverage. McAfee's Communications provided a price for building an alphanumeric paging system.

The results showed that the best most economical option was to add text messaging to cellular telephone service. The results also showed that if a member did not have cellular telephone service, the next best option was to lease service from Arch Wireless. Building a County owned alphanumeric paging system was not a cost effective option.

Adding text messaging to cellular telephone service is the recommendation of the author. For those members without cellular telephone service, leasing an alphanumeric pager and service from Arch Wireless is the best option. The idea for the County building its own alpha numeric paging system was discarded by the Fire Chief's because there is no vehicle in place to fund the project, and it would be a sizable investment in old technology.

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INTRODUCTION

The Allen County Firefighters Association has formed a committee to determine what the needs are in Allen County. All departments agree that it is impossible to fund a rope rescue team, hazardous materials team, confined space rescue team, urban search and rescue team, water rescue team, and any other team that may be needed to protect our individual communities.

Allen County tried having one department provide a hazardous materials team for the county. The problem with the concept of having one department provide the service for the whole county is that if that department is tied up on a large fire, the hazardous materials team for the County is unable to respond.

Allen County formed specialty teams that are comprised of members from every fire department in the county. The problem is these specialty teams need a mechanism in place for dispatching the teams. With the many different types of dispatching in the county, the author will conduct evaluative research to investigate the following research questions.

1. Should the County build an alphanumeric paging system?
2. Should the County lease pagers and service from a commercially available vendor?
3. Can the County use text messaging associated with cell phones that many firefighters already carry?

4. What are the costs involved with each option? What are the advantages and disadvantages of each option?

BACKGROUND AND SIGNIFICANCE

The fire departments in Allen County, Ohio, use many different means to dispatch units to the scene of an emergency. Out of thirteen departments in Allen County, three have used alphanumeric paging to dispatch calls to their departments. Two departments continue to use this process as a way to dispatch their calls. One department has gone back to using tone activated voice pagers to dispatch their calls. Many departments use tone activated voice pagers. Some departments still use the telephone (Fire Bar) where any emergency call rings into the homes of firefighters.

All of the departments that use alphanumeric paging use a commercially available system and all departments who have used alphanumeric paging to dispatch their calls agree that the commercially available system has some disadvantages. The first disadvantage is cost. Alphanumeric paging can become quite expensive. Each department has negotiated its own rate with the paging company. The second disadvantage of alphanumeric paging is the time delay.

The County Association has formed a committee to investigate the forming of specialty teams comprised of all departments in the county. The idea of the specialty teams, comprised of all departments, is that, if one department is tied up on a large incident the other departments will be able to mobilize their people and the team will still be able to respond. Another advantage of the team concept is the sharing of costs

associated with a particular team. In addition, grant money will be easier to acquire since the money will be protecting all of the citizens of the county as opposed to just one jurisdiction.

One big issue to be resolved is dispatching the teams. For this reason the author will investigate the options. Many departments use tone activated voice pagers for dispatching. Several Allen County fire chiefs have expressed concern over the cost of maintaining their current paging system. The cost of buying one tone activated voice pager is over $300.00. Many places charge a flat repair fee of $75.00. Elida Fire Department leases alphanumeric pagers for $11.00 per month. The lease includes repair, loss protection, and a state wide paging plan. The range on the tone activated voice pager is limited. The range on the alphanumeric pager is limited only by the plan to which the departments subscribe. Many companies offer a nation wide paging plan. There are many advantages for a fire department to switch to text messaging. Text messaging is secure. When used for dispatching runs, the public will not be able to hear the calls dispatched on their scanners. With the advent of the personal computer and the Internet, it is possible to send a page from any personal computer with an Internet connection and an e-mail account. All personnel are alerted at once if the pagers have a group call feature installed. This ability can dramatically reduce the time of alerting personnel. Instead of calling each pager individually, the computer Software can make one call and set off all the pagers at once. Many computer aided dispatch software programs are capable of supporting alphanumeric paging.

There are some drawbacks to using a commercially available system. Commercial systems tend to have an extremely high call load which tends to increase the amount of time it takes a message to reach a pager. If the departments in Allen County wanted to build their own system, we could limit the number of pagers on the system and keep the time lag down to an acceptable level. If we were to build our own system, we could even sell service to other users to provide a source of income.

For a reasonable cost adding text messaging to digital cell phone service is possible. The cost of adding unlimited text messages to cellular service is $2.99 a month. By adding this feature to your cellular service, the departments have added an alphanumeric pager with nationwide service. Some limitations do apply. The subscriber must have a digital phone and be in an area that receives digital service. Cellular telephone services are continually upgrading their service so that receiving a digital signal is becoming less of a problem. Cellular telephone services are also signing contracts between different services so that text messages are received when roaming or the receiver is out of the home market.

LITERATURE REVIEW

The addition of alphanumeric pagers can have a great impact on the fire service. Herzog (1991) stated that his department was able to boost staffing on his department by adding a recall plan. Members of his department were added to a recall list that is able to boost staffing on the scene of an emergency from the nine people on shift to nineteen people by recalling the off-duty crew. Everyone receiving the page at the same time can recall personnel in a timely manner.

Using alphanumeric paging is much more efficient than using voice messaging. “To transmit a 60-character voice message requires about 14 seconds of air time. The same message requires only two seconds using 512 bps POCSAG format, or even less using 1200 bps.” Mathieu (1990)

Paramedics in San Diego have shortened their response time by 45 seconds to a minute because of alphanumeric paging Tucker (1989). Use of a commercially available system may be slower; it can be effective and reasonable in cost. Mathieu (1990)

“Lake County [Ohio] evaluated the possibility of establishing its own wide area paging system... The cost of the transmitters and links needed to provide coverage over much of the state was not justified.” Lake County Ohio opted to use a commercially available system. Kanne (1988)

The fire service needs to keep in mind a back-up plan for when the paging system goes down. On May 19, 1998 the PanAmSat Galaxy IV Communications Satellite was knocked out of its orbit and the majority of pager communications in the United States were lost for a couple of days. Mogil (1998)

According to Tucker (1989) the City of San Diego uses its paging system to “print out the dispatch message, set off station alarms, and turn on station lights using special relay outputs.” This proves that alphanumeric paging can be a versatile tool for the fire service. Alphanumeric pager used to disseminate pre-designated messages is a common practice. White (1990)

"Besides alerting career and volunteer firefighters, Loudoun County's group paging system instantly informs local government officials about major emergency incidents". Marshall (1995). Marshall also stated that with the local government officials having pagers they realize how busy the department is and that it helps them get what they need a budget time. Ditzel writes the wearer of a pager can get information discreetly, and decide what action to take. Many times situations arise that do not require action, just that it informs the wearer of a situation. A pager is ideal for such circumstances.

" The Short Message Service (SMS) is a basic service allowing the exchange of short text messages between subscribers. The first short text message is believed to have been transferred in 1992 over signaling channels of a European GSM Network. Since this successful trial, SMS usage has been the subject of tremendous growth. In 2001, an estimated 102.9 billion SMS messages were exchanged worldwide. Garter Dataquest, one of the industry's main research agencies, expects the number of SMS messages to grow to 146 billion in 2002 and to peak at around 168 billion in 2003 before declining." According to Le Bodic(2003). Schneiderman (1994) states, " The cellular industry in the United States is adding an average of 9,500 subscribers a day".

Gibson (1997) states, "… a method of transmitting data over cellular frequencies is called cellular digital packet data (CDPD), in which the data, in digital form, are separated into what are called packets". The cell site will either transmit the packets of data on a frequency that is set aside to transmit data only, or it will use a vacant voice channel and if that voice channel becomes busy will automatically switch to another channel.

According to Tisal, (1997) “The short message function manages the paging service, which enables alphanumeric messages of up to 160 characters to be exchanged (two modes are possible, connection-oriented or connectionless)”. According to Kopitz (1999), a new structuring of SMS was introduced in 1997, which allowed messages to be fragmented and reassembled. With this, up to 255 SMS messages and be concentrated into one long message.

Kuruppillai, (1997) states, by incorporating SMS with a GSM network a person will no longer need to wear two wireless devices. Instead of carrying a pager and a cell phone a person can only carry a cell phone and have that device accomplish both functions.

Louis (2000) explains that there is a difference between paging and SMS. Paging companies take the data and broadcast it across all of their towers at the same time. Cellular companies know what cell a subscriber is operating off and send the information to that cell. This difference explains why you only get one chance to receive a page, but if you are using SMS, a cellular company will attempt to deliver a message for up to three days. With SMS, a person can receive conformation that the message was delivered.

After reviewing the literature, it is apparent that text messaging could have many benefits to Allen County fire departments. Some departments may be able to boost their staffing at the scene of an emergency by instating a call back procedure. This procedure may be a very cost effective use of personnel by only having to pay personnel for time spent at the scene of an emergency and not having to pay extra personnel to sit at the station waiting on a call. Another benefit of text messaging would

be that department communications would be more secure and the public will not be able to listen to calls dispatched on their scanners.

PROCEDURES

All fire chiefs in Allen County will receive a survey form. Questions will include how does the department currently dispatch calls. Would the department be interested in using alphanumeric paging for dispatching runs? What kind of coverage is necessary (Local coverage, statewide coverage or nationwide coverage)? What is the annual budget for pagers & repairs? What is an acceptable cost to pay for alphanumeric paging? Would the department be interested in building a county paging system or using a commercially available system? (For survey form see appendix page 27).

Surveys will be hand delivered at a meeting of the Allen County Fire Chiefs to keep the cost of postage down. All Fire Chiefs not present at the meeting will receive the survey in the mail.

The author will conduct a cost analysis to break down the cost for building a county system vs. a commercially available system. Results published for each department to review.

Text messaging will not be mandatory for all departments. Each department will have the option of participating in this program if they wish. The remaining departments may elect to go together and negotiate a rate with a commercially available company or share the cost of building a county system. The author will seek a price quote from a

commercially available paging company. The author will also seek a price quote from a radio communication company on building a county owned alphanumeric paging system.

A request placed on the message board of the Ohio Fire Chief's web site seeking information from others using text messaging on their cell phones in place of alphanumeric paging could be helpful. The author will ask the individuals that respond what software are they using. The author will also ask for pricing information as well as coverage and time lag.

The author will conduct a survey of fire departments in the State of Ohio to see how they dispatch their calls. The survey will seek departments that use text messaging and alphanumeric paging to dispatch emergency calls. To keep costs down, the survey will be conducted via e-mail. (For survey form see appendix page 28).

The author will conduct a side-by-side comparison of text messaging on a cell phone and an alphanumeric pager. For the purposes of this research study, the Elida Community Fire Company, Inc. used Inforad Wireless Office software to send a text message to email address of the cellular telephone using its email server. Inforad Wireless Office software was programmed to send the text message to the alphanumeric pager using Arch Wireless WCTP Internet site. For redundancy, Inforad Wireless software is also programmed to dial up via modem both Arch Wireless and Verizon Wireless. This redundancy will assure that text messages may be sent even when the internet is down. The software in the dispatch center is programmed to page a cellular telephone and an alphanumeric pager simultaneously. The author will check cell phone versus alphanumeric pager for speed and coverage area.

The number of chiefs that responded to the survey limits this research. The author attempted to broaden the scope of this research by posting a question on the Ohio Fire Chiefs message board seeking input from other departments that use text messaging to dispatch their emergency calls. Only two departments responded to the posting on the Ohio Fire Chiefs message board. The number of companies that offer reliable service in our geographic area also limits this research. Verizon Wireless and Alltel are the only two companies to offer reliable cellular telephone service in the area. Arch Wireless is the only alphanumeric paging company to offer reliable alphanumeric paging service in the area.

RESULTS

All thirteen Fire Chiefs received a copy of the survey. Eleven of the thirteen Chief's responded to the survey. Seven Allen County Fire Departments use tone activated voice pagers while three departments use alphanumeric pagers to dispatch their calls. One department indicated that they do not use pagers to dispatch their calls.

Annual budgets for paging ranged from zero dollars to a maximum of $7,740.00. The average budget for paging is $2,350.00.

When asked if interested in using text messaging to dispatch calls, five Chief's responded yes, four Chiefs responded no, and two were unsure.

When asked what coverage area would be appropriate three Chiefs stated statewide coverage, three Chiefs stated regional coverage, three Chiefs stated local coverage, one Chief stated national coverage, and one Chief did not respond.

Eight Chiefs felt that insurance is an important option. Seven Chiefs felt that each pager should have its own telephone number as well as a group call feature. Only two Chiefs felt that each pager should have an e-mail address. Only one Chief felt that news, weather, and sports should be an option.

When the author asked whether the County should build its own system or lease from a commercially available vendor, four Chiefs said own, two Chiefs said lease, and four Chiefs were unsure.

When asked if they would be willing to participate in a group-purchasing program, six Chiefs said yes, one said no, and four were undecided.

Survey Results

Type of Pagers	Annual Budget	Interest in Text Messaging	Coverage	Options	Lease vs. Own	Group Purchase
Tone Activated	As Needed	Yes	Regional	P,G,I	Unknown	Unknown
Tone Activated	$6,000	No	Regional		Unknown	Unknown
Tone Activated	0	No	Local	I	Unknown	Yes
Tone Activated	$4,000	Unknown	Regional	P,G,I	Unknown	Yes
Tone Activated	$2,000	Yes	Local	P,G,I	Own	Yes
Tone Activated		Unknown	Local	P,I	Own	Unknown
Alphanumeric	$3,000	Yes	Statewide	P,G,I	Own	Yes
Alphanumeric	$7,740	Yes	Statewide	E,P,N,G,I	Lease	Unknown
Tone Activated	$2,500	No	National	G	Own	Yes
None	$0	No				No
Alphanumeric	$600	Yes	Statewide	E,P,G,I	Lease	Yes

Table 1

The author posted a question on the Message Board of the Ohio Fire Chief's Association web site. The author only received two replies from the message board.

In both cases, the departments stated that they use the text messaging associated with their cellular telephones and were quite satisfied with the service.

The author contacted the Ohio State Fire Marshall's Office and obtained an e-mail list of the departments in the State that report electronically. Using this e-mail list, a survey was sent to 637 fire departments in the State of Ohio. Out of 637 surveys sent only 85 responded. Sixty one percent of departments responded that they use tone-activated pagers to dispatch their calls. Thirty four percent use alphanumeric pagers to dispatch their calls, and five percent use text messaging to dispatch calls.

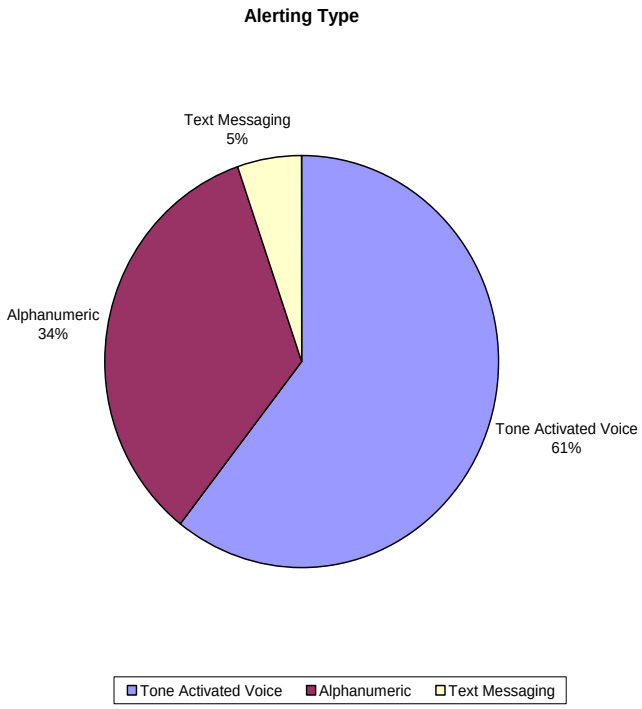

Chart 1

The survey showed that the average budget for paging was $4,155.10.

Forty four percent responded that regional coverage is adequate. Thirty two percent feel local coverage is adequate. Statewide coverage is adequate for twenty percent of respondents; while four percent feel nationwide, coverage is best.

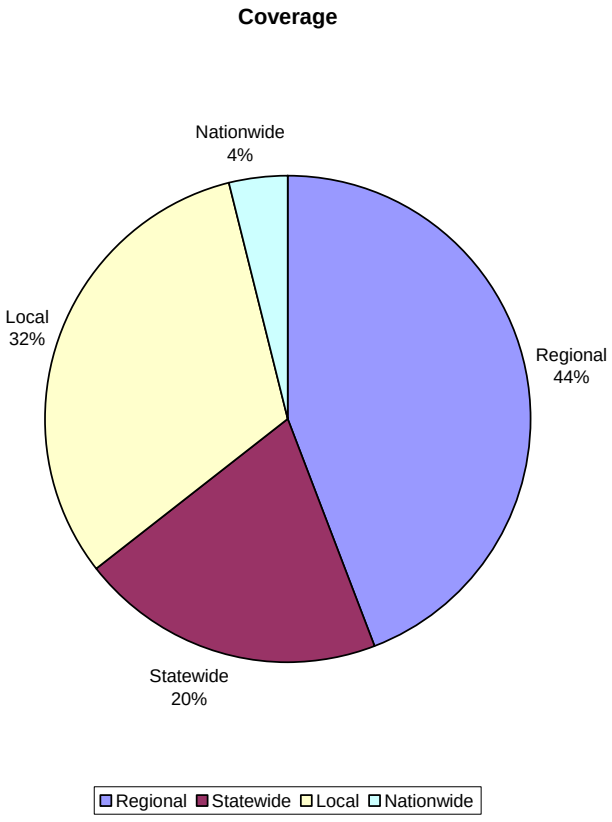

Chart 2

Twenty five percent of respondents are in favor of using alphanumeric paging/ text messaging. Twenty seven percent of respondents are unsure if they want to use alphanumeric paging/ text messaging. Thirty eight percent of respondents are sure that they are not interested in using alphanumeric paging/ text messaging.

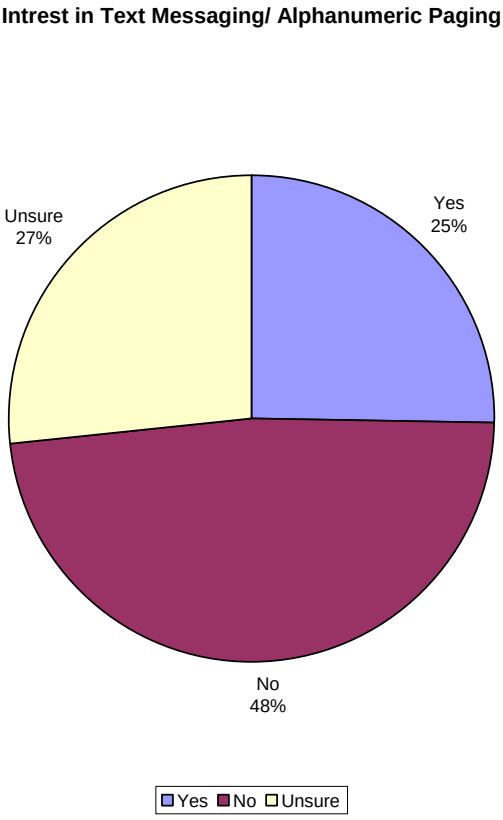

Chart 3

Sixty respondents felt that the group call option is an important feature. Forty-seven respondents feel that insurance is an important option. Forty-five respondents felt that each pager having its own phone number is an important feature. Thirty-six respondents feel that each pager having its own e-mail address is an important feature. Only twenty respondents felt that news, weather & sports is an important feature.

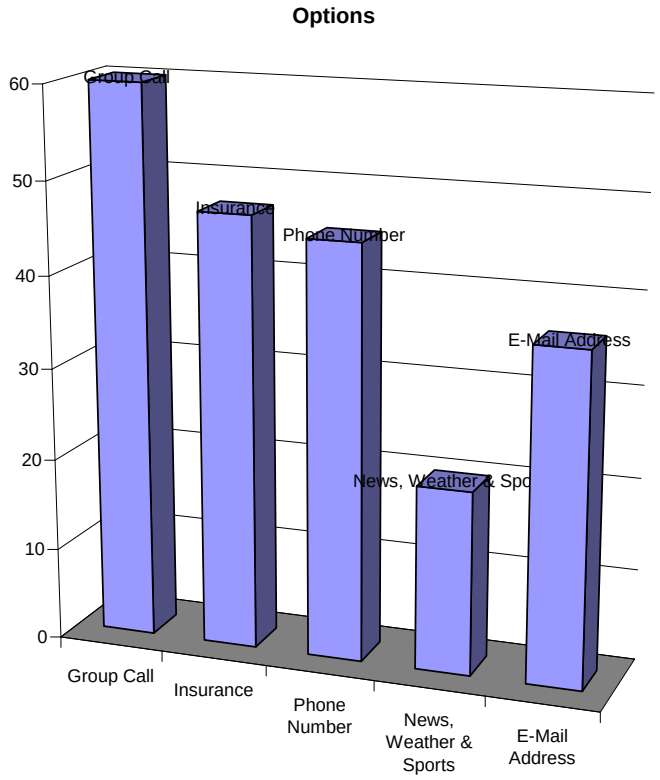

Chart 4

Thirty eight percent of respondents were in favor of leasing services from a commercially available vendor. Thirty three percent of respondents felt that owning the paging system is the best option. Twenty nine percent of respondents are unsure if leasing or owning the system is the best option.

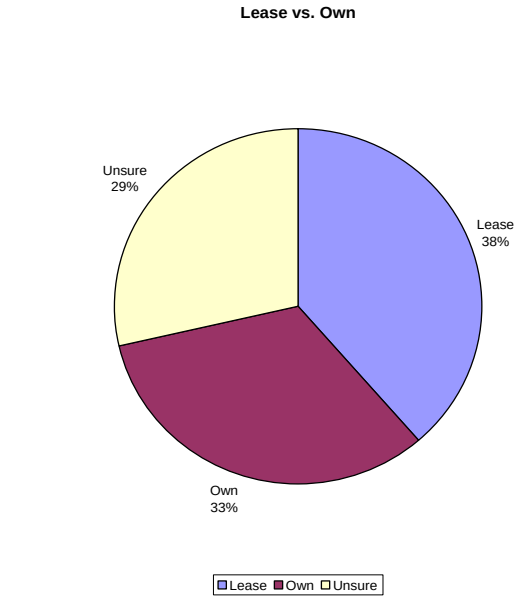

Chart 5

Fifty seven percent of respondents do not participate in a group purchase plan. Only forty three percent of respondents participate in a group purchase plan to save money.

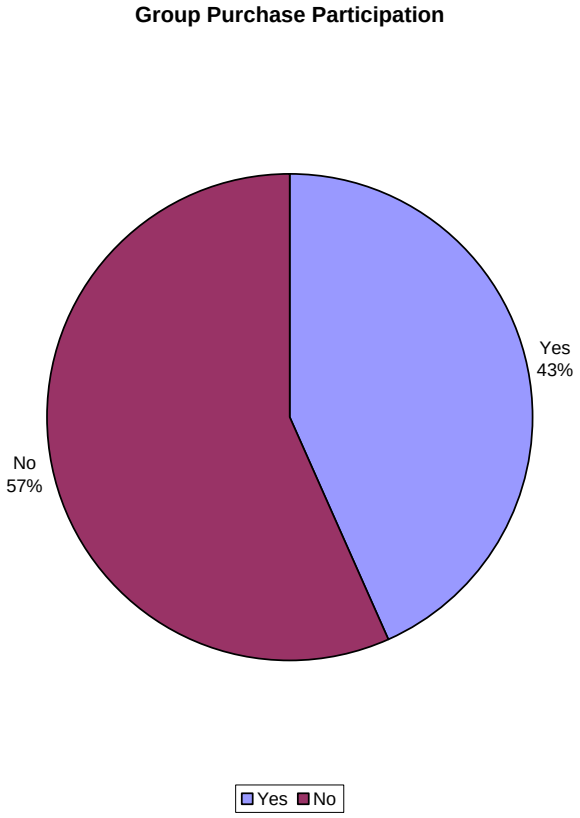

Chart 6

The author conducted a study to see which device would activate first, cellular telephone or alphanumeric pager. The author also tracked which station dispatched the page, the date, and the time of day to see if any comparisons occur. This study occurred over a period of five months and consisted of six hundred pages. The paging software was set to send the page to the alphanumeric pager first and then to the cellular telephone. Results showed that the cellular telephone received the page first ninety one percent of the time. Results also showed that the time of day and the station dispatching the page did not make a difference.

Device First Activated

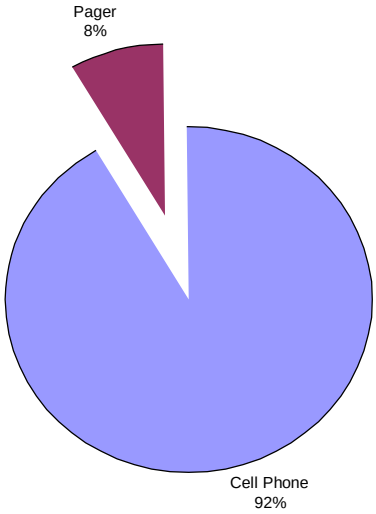

Chart 6

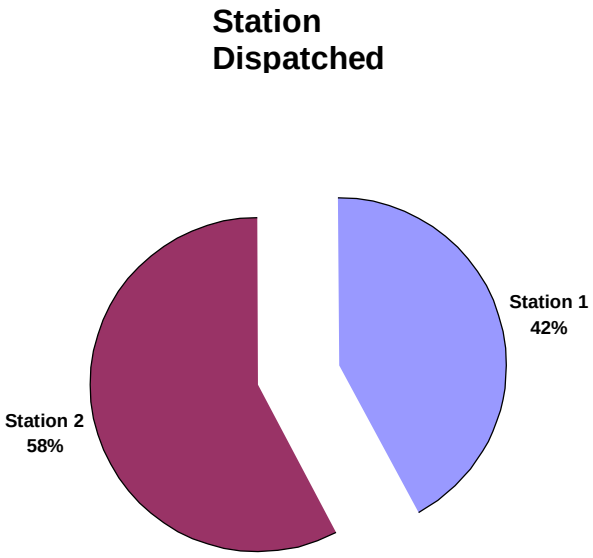

Chart 7

Arch Wireless can provide alphanumeric paging service for $11.00 a month per pager. This service includes unlimited pages, statewide coverage, and pager insurance. Pager insurance covers loss, theft, and breakage. Arch service also includes an e-mail address and unique phone number for each pager.

Allen County can build its own paging system for a cost of $81,151.00. The county owned system only provides for local coverage. The county owned system does not provide an e-mail address for each pager. The $81,151.00 cost does not include monthly charges for telephone lines and tower rent. (See appendix page 19.) With the county owned system, the county would be liable for loss, theft, and breakage.

Text messaging added to Verizon cellular telephone service for a cost of $2.99 per month for unlimited text messages. Text messaging with Verizon cellular telephone service has nationwide coverage.

DISCUSSION

The results of the study are consistent with the findings from the respondents from the message posted on the message board of the Ohio Fire Chief's web page. The Para Heights Fire Department is using text messaging on their cellular telephones. Alltel is providing service to the Parma Heights Fire Department. In most cases Parma Heights receives, a text message in five to seven seconds from the time the text message is sent. Parma Heights is using Outlook Express to send its text messages via email. For a back up, Parma Heights can use a modem and dial up service to access Alltel. Parma Heights is saving $3,600.00 annually by using text messaging with Alltel as opposed to using alphanumeric pagers. The Elida Community Fire Company, Inc. can expect a savings of $2,808.00 annually by adding text messaging to cellular telephone service as opposed to renting alphanumeric paging service from Arch Wireless. At the same time, the coverage area expanded to nationwide coverage as opposed to statewide coverage.

The results of the side-by-side comparison of cellular telephone vs. alphanumeric pager prove that adding text messaging to cellular telephone service is a viable alternative to an alphanumeric pager.

In comparing costs for adding text messaging to cellular telephone service vs. alphanumeric paging, it is more cost effective to add text messaging to cellular telephone service.

Due to the current financial conditions in Allen County, building a County owned system is not feasible. Not all fire departments in Allen County are interested in building a County owned system. Many departments would not be able to make the financial commitment to make the County owned system a reality. The idea for the County building its own alpha numeric paging system was discarded by the Fire Chief's because there is no vehicle in place to fund the project, and it would be a sizable investment in old technology.

RECOMMENDATIONS

The author recommends that any fire department in Allen County that would like to incorporate text messaging for dispatching their calls should add text messaging to cellular telephone service of its members. If members of a department do not have cellular telephone service available, they should lease alphanumeric pagers from Arch Wireless. Building a county owned alphanumeric paging system is cost prohibitive to the type of services required of the Fire Departments in Allen County.

Adding text messaging to cellular telephones allows Allen County fire departments to dispatch their calls in a reliable secure manner. Adding text messaging to cellular telephones, allows the fire departments in Allen County to dispatch specialty teams to the scene of an emergency in a timely and cost efficient manner.

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APPENDIX

Alphanumeric Paging Survey Form

Instructions: Please complete the enclosed survey form and return to Asst. Chief Scott Fessler in the enclosed postage paid envelope. Please return no later than Dec. 6, 2002. Thank you for your help.

1. What type of pagers does your department use?

   _____ Alphanumeric
   _____ Tone activated voice Ex. Motorola Monitor III
   _____ Other Please List_____

2. What is the annual budget for paging in your department? _____

3. Would your department be interested in using alphanumeric paging?
   _____ Yes
   _____ No
   _____ Unsure
4. What type of coverage do you feel will be adequate?
   _____ Local
   _____ Regional
   _____ State Wide
   _____ National

5. What options would you like to have?
   _____ E-mail address for each pager
   _____ Phone number for each pager
   _____ News, Weather, & Sports for pager
   _____ Group call
   _____ Pager insurance (covers loss & repair)

6. What option would best suit your department's needs?
   _____ County owned and operated system
   _____ Lease from commercially available vendor
   _____ Unsure

7. Would your department be interested in participating in a group purchase plan to bring cost down?
   _____ Yes
   _____ No
   _____ Unsure

As a student in the Ohio Fire Executive Program, I am required to conduct a research project. The topic of my research project is alphanumeric paging/ text messaging for dispatching Allen County, Ohio fire departments. Please take a couple of minutes to answer a few questions to help me with my research project. To answer the questions just click on your reply button and fill out the short survey. Thank you for your help.
Asst. Chief Scott Fessler Elida Fire Dept.

1. What type of pagers does your department use?
_____ Alphanumeric
_____ Tone activated voice
_____ Text messaging on cellular telephone
_____ Other Please List_____

2. What is department's annual budget for paging?
_____

3. Would your department be interested in using alphanumeric paging for dispatching calls?
_____ Yes
_____ No
_____ Unsure

4. What coverage do you feel will be adequate?
_____ Local
_____ Regional
_____ State Wide
_____ National

5. What options would you like to have?
_____ E-mail address for each pager
_____ Phone number for each pager
_____ News, Weather, & Sports for each pager
_____ Group call
_____ Pager insurance (covers loss & repair)

6. What option would best suit your department's needs?
_____ County owned and operated system
_____ Lease services from a commercially available vendor
_____ Unsure

7. Does your department participate in a group purchase plan to keep costs down?
_____ Yes
_____ No

McAfee's Communications, Inc.

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Office: (419) 586-3413 Fax: (419) 586-5245
e-mail: iTicafee@bright.net

Quote For: BUDGETARY COUNTY WIDE PAGING SYSTEM
Eiida Fire Dept. For Allen County Emergency
Paging system
105 West Main
Elida.OH 45807
Phone: (4l9)339-0119 or (419)339-3921
Fax: (419) 339-0109
Attn: Scott Fessler
Date: O4/11/03
Sales Consultant: Benjamin McAfee

MOTOROLA
Authorized Two- Way Radio Dealer

' All Quotes Good For 30 Days.'

Part#	Qty.	Description	Unit Price	Extnd Price
		MOTOROLA QUANTAR BASE RADIO		-
T5365	1	Motorola Quantar VHF Base Radio	$ 7,115.00	7,115.00
X530	1	125 Watt VHF Option	$ 4,197.00	4.197.QC
X597A	1	Conventional! Analog Operation	$ 1,050.00	1,050,00
X622	1	Base Station Operation (N/C)	$	-
X371	1	Antenna Relay VHF	$ 250.00	250.00
X52	1	30" Indoor Cabinet-Holds 3 Quarter Stations	$ 360.00	360.00
		ZETRON MODEL 640 DAPT XTRA		-
901-9229	1	Model 640 DAPT XTRA	$ 6.900.0D	6,900.00
950-S469	1	Dual Serial Card	$ 1,400,00	1,400,00
950-0311	1	Dual Input Card	$ 1,600.00	1,500,00
950-9334	1	Installation Interface Assembly	$ 150-00	-150.00
SOFTWARE	1	Paging Software NotePage—?—?-—?—	$ 1,000.00	1.000,00
RDD4484A	1	ASP685 VHF 5dB Gain Antenna	$ 640.00	640-00
59.C46	1	Side Mount Bracket For Tower	$ 305.00	305.00
RDN55Q2A	200	1/2" LDF4-50A Coax (200 Foot)	$ 2.65	S30.00
		(Actual Length Needed Is Unknown-)		-
CONNECTORS	2	*112"* Coax Connectors	$ 32.00	64.00
RRX4025	1	PolyPhaser (Lightning Protection)	$ 65.00	65.00
JUMPER	1	Jumper	$ 25.00	25.00
		LIBERTY PAOER CO		-
PAGER	500	Eagle Liberty Alphanumeric Pager	$ 98.00	49,500.00
		VHF. Pocsag. 1200 Baud, 4 Line Alpha		-
CONSUMABLE	1	Misc. Parts That May Have Been Over Looked	$ 1,000.00	1,000.00
INSTALL	1	Tower Crew & McAFee's Install ESTIMATED	$ 5.000.00	5,00000
Mode! 640 DAPT XTRA is a dedicated paging terminal, includes two telco trunk interfaces equipped with modems for remote alphanumeric message entry and remote programming access.				$ 81,151 00 N/'C N/C $ 81,151.00