Story County

Paging System Assessment Report

January 30, 2017

Dave Kaun

John Thompson

Mike Day

Table of Contents

Problem Statement

Story County retained Elert & Associates' services to develop an analysis and assessment of the current condition of their emergency services paging system. The specific focus being the condition of the current equipment and the paging system's ability to deliver the level of service needed.

The County is experiencing an increasing number of complaints from the emergency service providers receiving a quality page and message from the dispatch center. Discussions of the issues with various equipment providers have left the County with options to replace equipment within the system at a great expense. This leaves the County to question such an investment in the present system design in support of this type of paging capability.

Executive Summary

Elert and Associates (EA) met with the Story County personnel, provided an on-site visit of the Story County paging system and visited the system control points. The present paging system design uses three sites that transmit at the same time with no regard to employing the necessary equipment to properly control frequency, phase or amplitude. Without this level of control the system infrastructure will have self-induced interference in the overlap of coverage regions. The current VHF RF station equipment used is not capable of being modified to eliminate this problem.

In addition, it was also found the FCC licensing for two of the three paging sites are not properly developed for operation and the UHF control link is not set up to operate within the parameters of its FCC license.

In EA's opinion, the present design should be abandon and a new paging design be pursued. Any new system would rely heavily on a voice system site and backhaul network to eliminate duplicate equipment. The County should begin the process of trying to identify if voice paging would still be preferred over a messaging (text) paging system. The County would also be well served to have the existing system optimized a verified at least once a year until a new system could be replaced.

Findings / Issues

Interviews

Elert met with the Story County Paging System Committee at the initial discovery meeting, and discussed issues concerning the current system and its operation. The committee provided some written background information containing historical detail of the system. During the project Elert met with the current paging system vendor and received their input on the system and recommendations they had. Elert also met with one or more representatives of the following departments or agencies in a second meeting on the visit to discuss their input on the ongoing issues.

Zearing	Colo
Collins	Nevada

The following items were discussed during meetings with the radio system committee and the emergency service providers.

- Issues of poor audio quality and noisy signals.
- Trouble with getting Motorola Minitor V pagers repaired.
- Level of use of newer paging models such as Minitor VI and Swissphone.
- Issue of pagers receiving page, but no audio message following.
- History and experience with paging system.
- Issue of being tripped by other department tones.
- Use of Active911 cellphone messaging system throughout the County.
- Voice vs Messaging (digital) paging solutions.

Story County Paging Systems

Overview

The Story County paging system is only slightly expanded from what would be considered a common paging system in the State of Iowa. Most County's in the State of Iowa use the standard county fire channel assigned to them from the State plan as the common channel to provide paging encode and standard voice operation of their fire and EMS services. Systems commonly consist of operating a single high powered (100 watt) base radio transmitter at a central point in a county to provide best service operation to the emergency providers. The capability of this type of system has been impacted throughout the years by various factors such as narrowbanding, building construction materials, and additional radio frequency noise.

Story County is built from that design model. However; not unlike a lot of counties in Iowa, Story County has attempted to improve some trouble areas of their coverage using what would be considered a low-tech approach. Story County has chosen a localized transmitter in the areas of Zearing and Story City, and linked them to the main transmitter (Nevada) operation. These three (3) sites make up the total radio transmitter capabilities of the system to deliver a page.

The paging system is operated on the VHF Fire Channel (154.340 MHz) from either the Story County or City of Ames dispatch center locations. Pages originate from either location using the dispatch radio console which activates an onsite UHF link transmitter (453.9875 MHz) to send out the message to the main and secondary transmitters. This UHF link message is received at each site via a link radio which is hardwired into the paging transmitters at the sites. The received message causes the paging transmitter to key up and repeat the message on the VHF Fire Channel.

Pages are transmitted at the same time by all sites on the VHF paging frequency once activated over the UHF link. Each transmitter operates independently and there is no coordination of transmit frequency, phase or modulation between transmitter sites. Thus, self-interference is generated in areas of signal overlap. Self-interference will distort the signals received by pagers in the overlap areas and prevent the ability to decode the paging signals.

Since the County operates all emergency radio operations on a commercial 800 MHz trunked network this paging system is only used for one way communication to the paging devices. The only exception being the dispatch center responds to 800 MHz channel traffic using a multi-select operation to provide pager users the ability to monitor half of the conversation when responding to a service call. In areas of interference pagers will have difficulty decoding these transmissions on the paging channel due to the described self-interference.

Observations:

- Keying up multiple transmitters on the same VHF frequency will cause distortion in the overlap areas without simulcast system equipment. These areas must certainly be present today in the coverage zones of the transmitters.
- Link operation needs to provide a higher quality signal level of the message to the paging base, or any poor link signal will be repeated on the VHF page message.
- Correct FCC licensing operation of the current system is in question.
- Voice paging vs message (digital) paging on newer systems would need to consider the loss of using pagers to monitor voice traffic.
- There is no preventive maintenance plan for current paging infrastructure equipment.

Equipment Detail

A physical inspection of each of the County's paging sites and dispatch areas was performed by Elert to visually inspect and document the current state of equipment.

The County provided a documented system operational detail from the equipment vendor detailed below. It is Elert's opinion these descriptions represent a general overview of the early implementation of the system and not as much the current state. They have been included in this assessment for reference only.

Main Site - Key Cooperative

The main high powered paging transmitter is located on top of the Key Cooperative grain elevator just west of Nevada. The antenna placement is at the top of the metal support structure on the East elevator. Equipment is housed in a plastic outdoor cabinet at the base (50' below) of the metal structure on top of the concrete elevator. The cabinet in located outside and power is provided by a local electrical outlet. Link and power alarm antennas are located on a railing above cabinet.

Due to the support structure surrounding the housing Elert was unable to physically inspect equipment inside. Photos provided detailed inside of cabinet taken when equipment was replaced in 2010. The paging base is made up of standard Motorola radio using a power amplifier to boost the output level. Link and alarm radios also show standard Motorola radio models, but picture shows non-narrowband capable units. Thus if narrowbanding was completed it cannot be confirmed,

Location 1-Key Cooperative Formerly the Heart of Iowa Cooperative

On site there is a radio Alarm that sends a tone to the Story County Dispatch that alerts dispatchers that the power is off at the site. The alarm network consists of a 40 watt UHF base radio with power supply that is connected to a UPS unit connected to an outside Yagi directional antenna.

An RF Link base radio connected into a directional antenna receives a signal from Story County Dispatch on a UHF licensed frequency and links to a VHF base radio that is connected to a high powered (250 watts) amplifier that sends the signal out on the County Fire Channel. The VHF station is connected to a VHF Fiberglass (large) base antenna mounted on the head house of the facility.

Observations:

- Main paging antenna and coaxial system looks to be original vintage. Antenna appears to lean and cables may not be secured tight to structure.
- Link antenna quality is in question as it looks to be a simple mobile style antenna. Any noise from the UHF link would be introduced into the VHF page signal.
- The quality of the electric power provided to the equipment may contribute to system reliability, quality, and does not meet NFPA 1221 standards for this alerting method.
- System grounding is to local I-beam and may not be true electrical ground.
- Pictures of equipment indicate very simplistic level of equipment that may not provide for quality system level adjustment capabilities. With any paging operation level setting plays a role in providing quality service.

Secondary Site- Zearing

The Zearing site is located at the Johnson brothers repair shop on the west edge of the City of Zearing. The equipment is housed in a plastic outdoor box on the roof of the building. The link and paging transmitter antennas are mounted approximately 40' apart on separate rooftop mounts. This site was said to be a temporary location which ultimately became permanent.

Location 2-Zearing, Iowa

On site at Zearing (where the equipment is located at Jerry's Gas Station) is a licensed UHF base radio receiver that is linked to a 45 watt VHF base station radio that is on County Fire and is activated by the Story County Dispatch through the UHF Link. The channel that the page goes out on is the Story County Fire Channel. The UHF receive antenna is a Yagi while the transmit antenna is a base style antenna. Also note that with each base station there is a 20 amp power supply.

Observations:

- Equipment housing and location on rooftop is not recommended for quality of system operation or servicing.
- Main VHF paging antenna is in poor condition and not a recommended quality of equipment solution.
- The quality of the electric power provided to the equipment may contribute to system reliability and quality. The unit uses an extension cord for power which is not acceptable under the National Electrical Code.
- No equipment ground or lightning arrestors were identified.
- Equipment operation of standard Motorola mobile radios units serve this type of secondary low power site. However; the lack of an interface device between the link and paging transmitter does not allow for simplicity of system level adjustment.

Secondary Site- Story City

The Story City site is located at the local medical clinic in Story City. The equipment is housed inside the ambulance garage and uses the clinic's 100' tower for mounting the link and paging transmitter. The paging antenna is located half way up the tower and collated with a local base radio antenna on the tower.

Location 3-Story City, Iowa

On site at Story City is the same configuration like Zearing. There is a UHF base radio that receives the signal from Story County Dispatch and is linked to a VHF base radio that alerts the pagers and radios. The on-site equipment consists of 1-UHF base radio

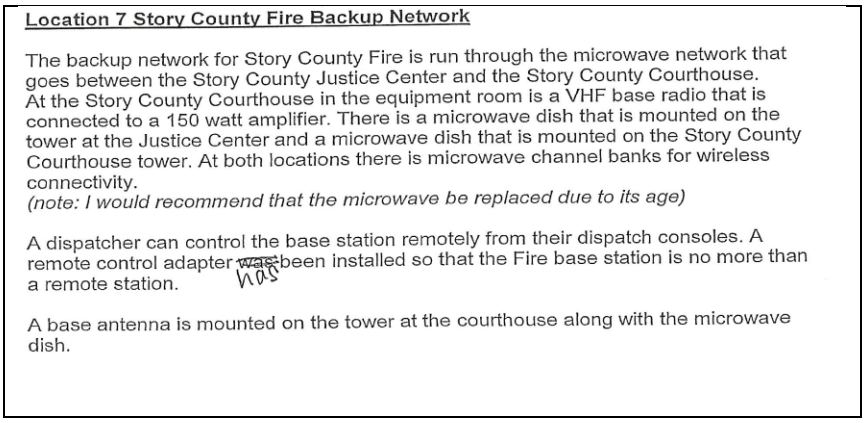
receiver and 1-45 watt VHF base station that sends out the signal on County Fire. There is a UHF Yagi located on the Ambulance tower along with a VHF base antenna to transmit the signal out. Also note that with each base station there is a 20 amp power supply.

Observations:

- Main paging antenna and link antenna appear to be older models. Quality of operation should be verified.
- Equipment operation of standard Motorola mobile radios units serve this type of secondary low power site. However; the lack of an interface device between the link and paging transmitter does not allow for simplicity of system level adjustment.
- No equipment ground or lightning arrestors were identified.
- Equipment is located indoors, but should be better secured.

Backup Site- Nevada

The backup paging transmitter is located on the Story County Courthouse in the rooftop penthouse. The antenna is mounted on the recently replaced tower structure on the roof. The paging base uses a standard Motorola mobile radio with a power amplifier booster device. This base is wireline controlled from Story County dispatch via a microwave connection.



Location 7 Story County Fire Backup Network

The backup network for Story County Fire is run through the microwave network that goes between the Story County Justice Center and the Story County Courthouse. At the Story County Courthouse in the equipment room is a VHF base radio that is connected to a 150 watt amplifier. There is a microwave dish that is mounted on the tower at the Justice Center and a microwave dish that is mounted on the Story County Courthouse tower. At both locations there is microwave channel banks for wireless connectivity.
(note: I would recommend that the microwave be replaced due to its age)

A dispatcher can control the base station remotely from their dispatch consoles. A remote control adapter ~~was~~ has been installed so that the Fire base station is no more than a remote station.

A base antenna is mounted on the tower at the courthouse along with the microwave dish.

Observations:

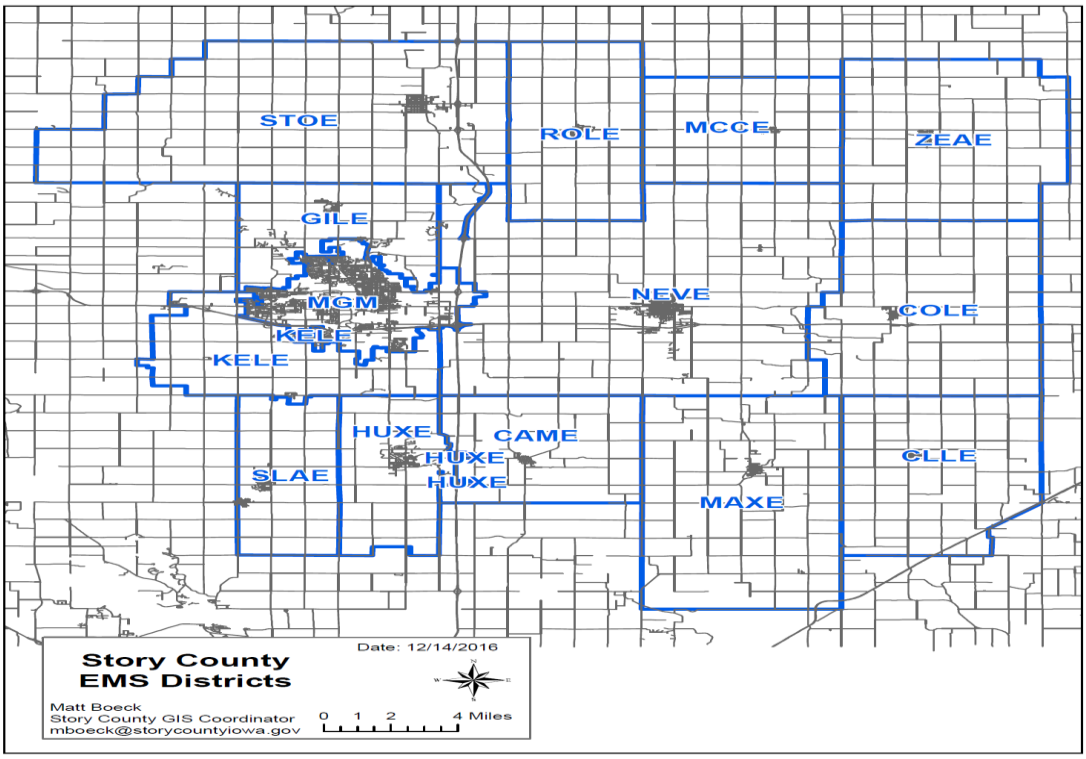
- With the recent installation of the new tower the antenna equipment is new and in good shape. This installation has a more modern professional level of grounding and installation.
- Paging base operation is done using a microwave link and remote adapter giving it a better ability for level setting. The microwave also provides a more consistent level of operation.

FIRE/EMS AGENCIES

All designated service boundaries make up Fire and EMS districts in Story County. All departments are notified using the paging system from the Story County dispatch location except for the City of Ames departments
. These departments are dispatched from the Ames City dispatch location using a fire station alerting system.

The primary FIRE/EMS agencies serving Story County are the following:

- Story City
- Roland
- McCallsburg
- Zearing
- Gilbert
- Ames
- Kelley
- Nevada
- Colo
- Slater
- Huxley
- Cambridge
- Maxwell
- Collins



System Images

The following photos were captured during the Elert site inspection as well as collected from the County's project group. This does not represent the total of all photos, but does provide images of key information about the Story County paging system for discussion.

Nevada Dispatch Site

Figure 1- Upper right radio is UHF link transmitter to all sites

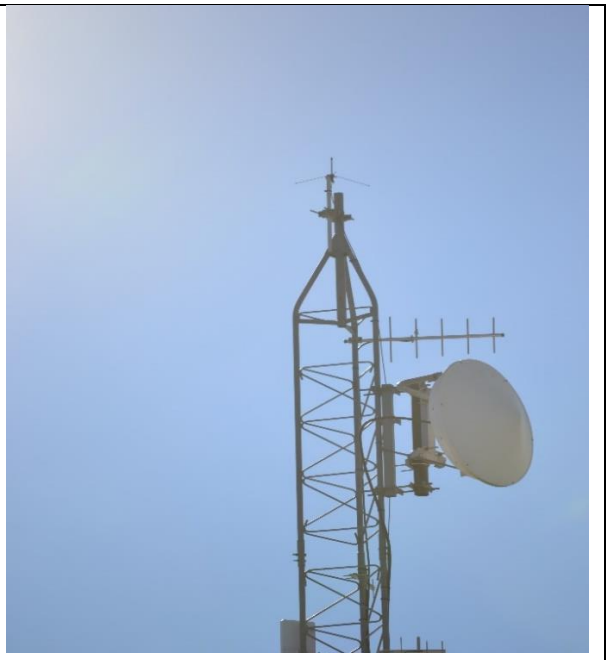


Figure 2- Antenna whip at top of tower broadcasts link signal to all sites.

Main (Key Coop) Site

Figure 3- Main paging transmitter site.

Figure 4 – Brown Plastic box in picture houses main site paging radio equipment.

Main (Key Coop) Site

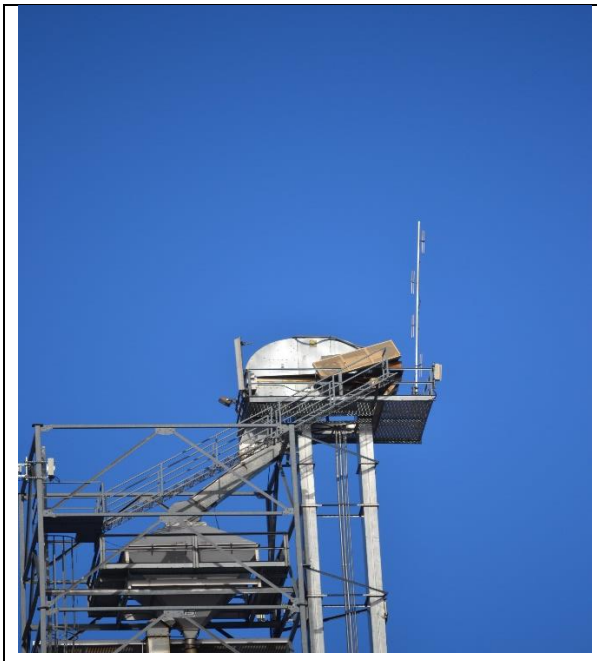


Figure 5- Antenna in upper right of picture is main site paging antenna.

Figure 6 – Cabling in center of picture and link antenna on railing.

Story City Site

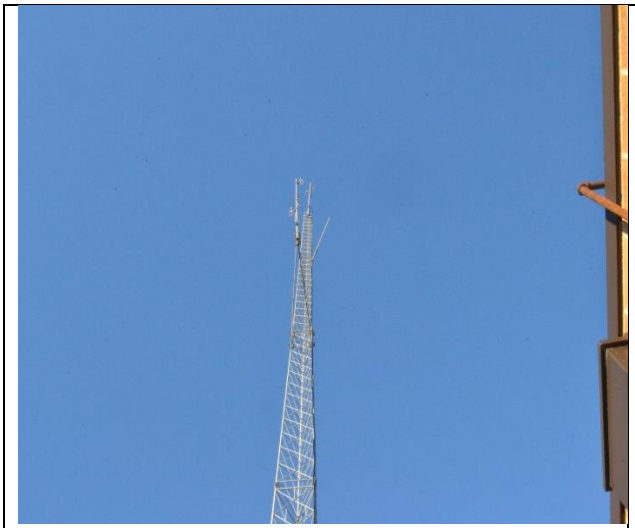


Figure 7- Story City Site antenna network.

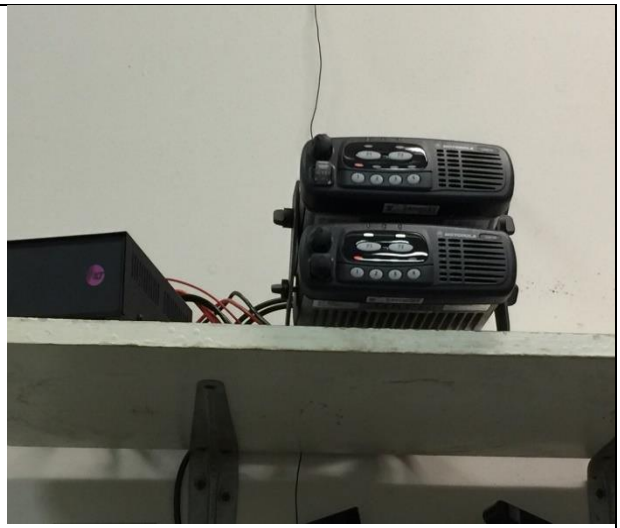


Figure 8 – Story City Site radio equipment

Zearing Site

Figure 9- Zearing City Site Antenna network

Figure 10 – Zearing City Site radio equipment

Courthouse (backup) Site

Figure 11- Courthouse back site radio equipment. Lower right radio using a power amplifier unit.

Figure 12 – Power amplifier device used to boost level.

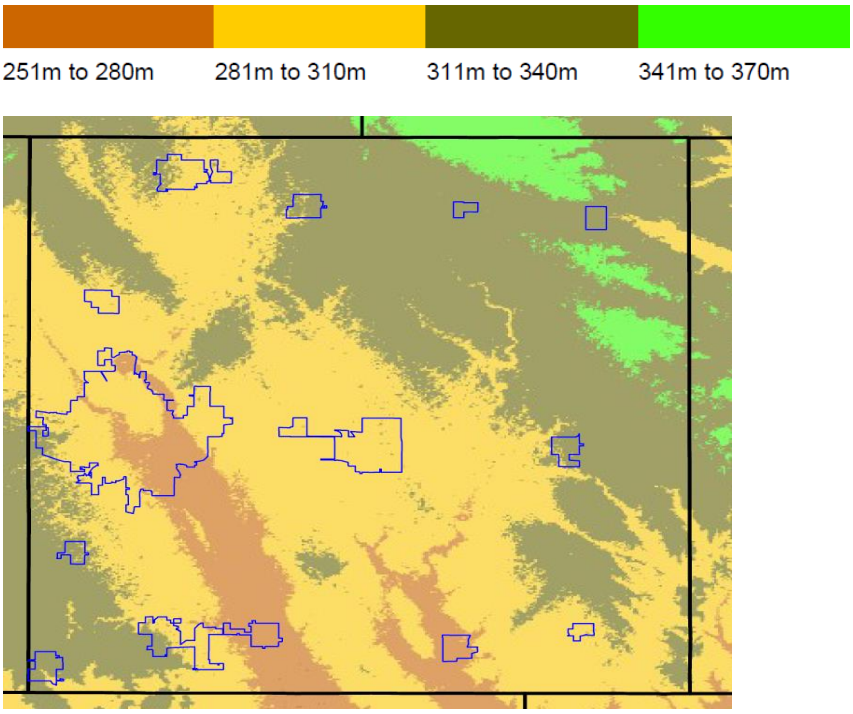
Radio Coverage

Overview

Elert and Associates use various radio coverage predictions in an analysis process to provide prediction information for how radio systems will operate. Key known specific information about the Counties system have been plugged into the analysis to detail possible system expectations.

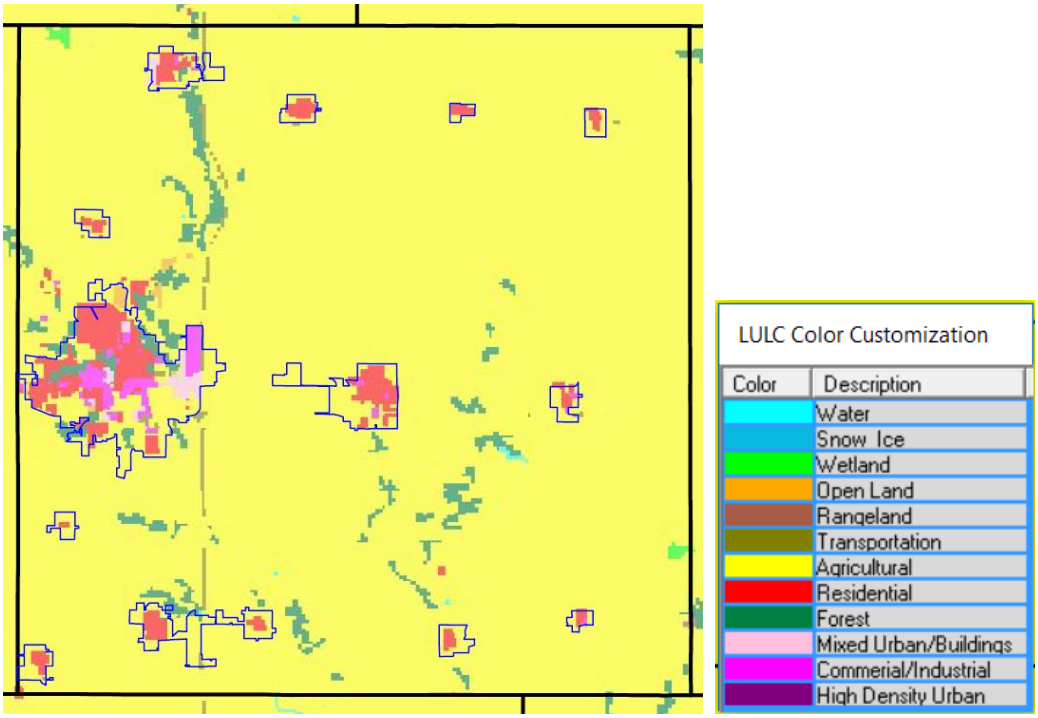
Terrain

Terrain information plays a key role in identify issues of a radio transmitter to reach locations when terrain elevation changes occur. As Story County's terrain is consistent in elevation throughout it does have a major river valley area.



Land Use

Land use information plays a role in identifying issues where objects that are man-made or natural play a role in changing radio energy. Normally this tends to reduce the levels of energy when signal encounters them.

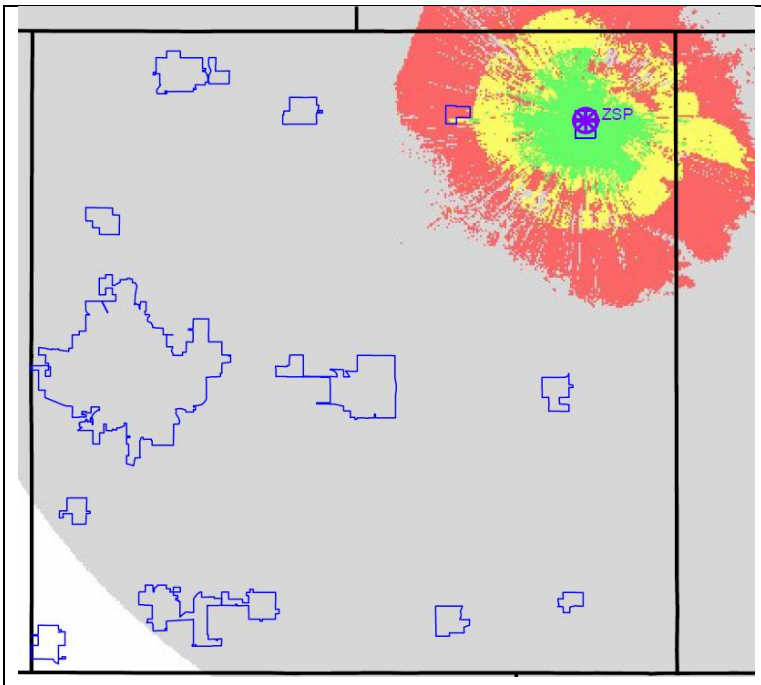


Predictions

Coverage predictions calculate an estimated signal level that would be received by a field unit from a base station antenna. Predictions use the effective radiated power level allowed by the FCC license, terrain, land use, and body losses among other attenuation factors in the calculations. Reliability and fading factors are also used in the calculation to provide a realistic map of system performance.

This chart shows the color breakdowns represented on the maps and what level of pager operation would be anticipated in the areas.

Out of Range	Unreliable	Outdoor	Small building

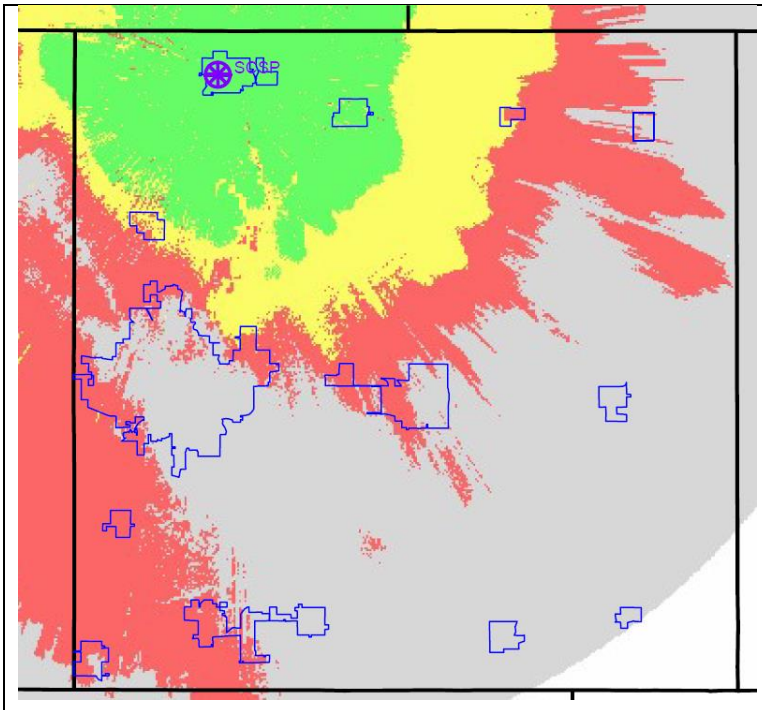


Zearing Site (Likely)

Given the base antenna location this site provides a very minimal coverage pattern.

Given the terrain to the Northeast the pattern is affected.

Not as likely to create an impact on coverage without simulcast operation.

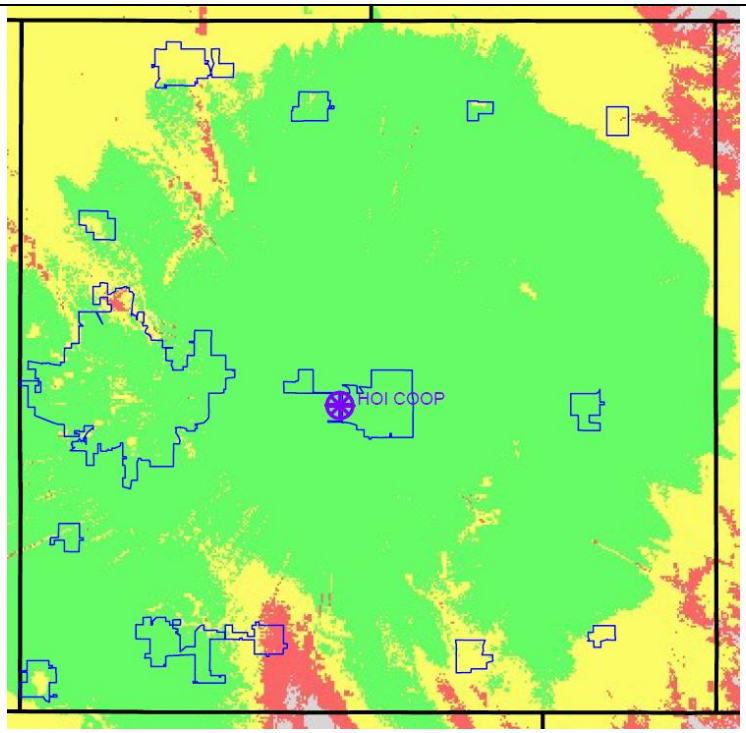


Story City Site (Likely)

Given the elevation of the base antenna this site reaches into the county.

Given the terrain coverage is affected to the southwest of the site.

Very likely to create a larger overlap area without simulcast operation especially towards the Main site coverage area.



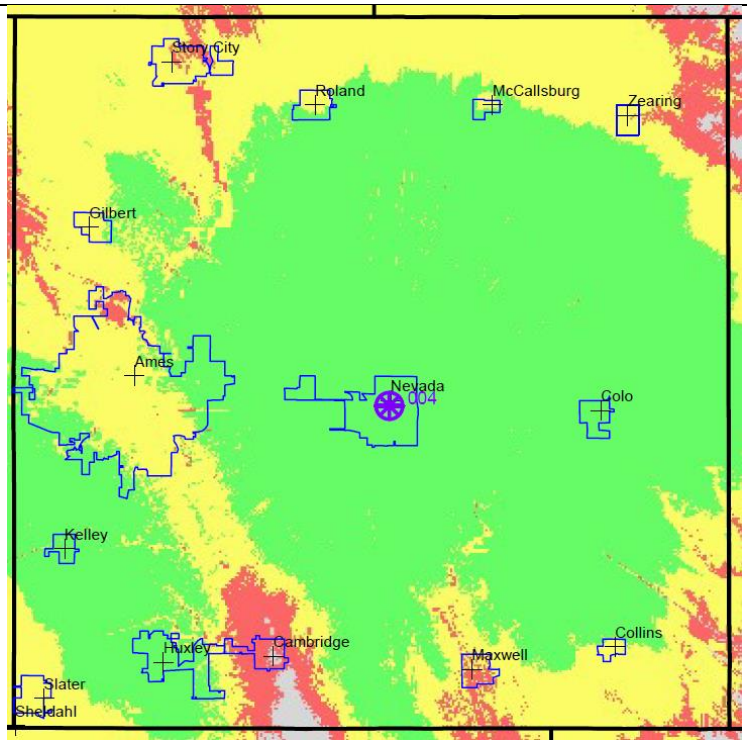
Main Site (Likely)

Difficulty in providing in-building covering the county to the northeast, northwest, and southeast.

Terrain impact throughout the Ames area and river valley.

Street level coverage difficulties in the northeast corner and to the south.

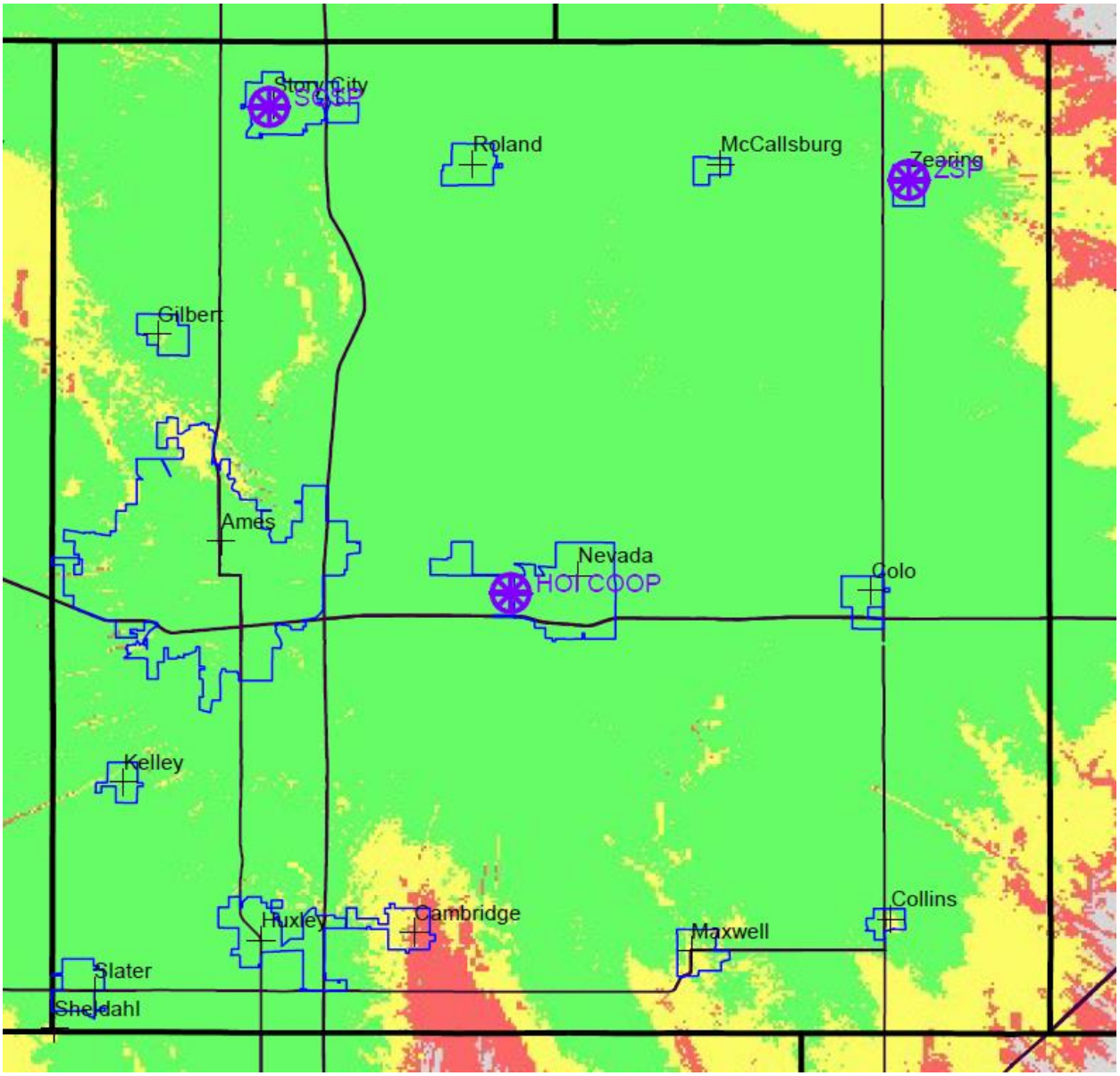
High probability of self-interference with the other two transmitter sites.



Backup Site (Likely)

Provides identical coverage pattern as main site given closeness in location.

Does not perform as well as main site given drop in antenna height.



This figure represents a (best case) scenario of the three (3) site paging system operation as it is understood and operating today thus not showing self-interference areas. It is provided to simply show the County an understanding of the current sites and their limitations.

Some type of overlap interference issues are being experienced today without question due to the loose multi-transmitter operation being employed.

Coverage holes should exist even for on the street paging operation without improvements to the south.

The Zearing site is only providing a very localized improvement (if any).

Summary

The current system has three sites that transmit at the same time on the same frequency without regard to controlling the necessary transmission parameters to ensure that pagers can effectively receive pages. Without these controls the signals received by pagers from multiple sites will suffer phase distortion that may make it impossible to decode. Special equipment is needed to effectively employ simulcast operation which broadcasts virtually identical transmissions at multiple sites. The current RF equipment is not capable of performing in an engineered simulcast system

FCC licensing does not reflect the system operation currently in place. No licenses were found for the transmitters used in the northern part of the County and the UHF link is licensed as a low power mobile rather than a medium power base station with a fixed antenna. It is assumed these licenses were established based on the original system and never updated when the system was expanded. The County has relied on its vendor to perform FCC licensing however; it is the County who is ultimately accountable to the FCC for accurate licensing of their systems.

The current sites and antenna infrastructure do not lend themselves to what would be considered modern communication systems. If Story County chose to employ a simulcast analog pager system design changes in the equipment shelters and some site location changes would be needed. These sites would need to be connected via a more stable link system such as microwave radio and stabilized with GPS timing. A simulcast design would require some amount of environmental control which would not be possible with the facilities presently used except for the County courthouse location.

Recommendation

After review of the sites, equipment and predicted coverage it is the opinion of Elert that the Story County paging system should be re-designed. The current system sites do not provide the necessary coverage and there are significant issues in regards to the age and capabilities of the equipment, how it is sheltered, and the possibility of it being suitable to use in a tone/voice paging system with simulcast transmission going forward.

A key decision when a complete system replacement is required would be which message delivery system may work best. The choice of a voice paging system vs a messaging (text) paging system will identify what system design options are available. If digital paging operation is considered a possible solution in a new design, the first issue will be how to overcome the loss of using the pagers to monitor the radio activity. This key decision needs to be identified by the County and its stakeholder as to what technology works best.

Either system will require a multi-site approach to provide in-building coverage throughout the County and overcome modern building structure losses. Given the mostly flat topographic layout of the County it is estimated that at least 5 sites would be required and possibly more based on City of Ames building coverage. An updated system will also need to rely on a more precise link structure between sites. It is common for these types of requirements to rely on the backhaul infrastructure of the voice radio network which has also been updated and not create

separate systems. This would allow for the sharing of many of the subsystems such as power, environmental, towers, shelters and even GPS timing.

As the County is considering an update to their voice system it is the opinion and recommendation of Elert and Associates that a paging system requirement be added to the project such that Story County system sites would provide coverage for both voice and paging systems.

Elert would also recommend the County try to as quickly as possible identify the desire of the county agencies for having a voice or digital paging solution with any new system going forward. This would help clarify the desire for repairing vs replacing pager units until any new systems are completed.

Any large investment in the existing paging system may not realize a return on investment to the County and would only be recommended in a critical failure situation. However; it does make sense given the need to possibly maintain the existing system for a year or two to invest in system optimization. The County should seek a firm to provide a technical analysis of the state of the existing system to identify any equipment not performing to the specified levels and at the same time optimize any equipment operating out of tolerance. This should be completed at a minimum of once a year, but possibly twice a year if the older equipment tends to drift out of tolerance. In Iowa it would be recommended that optimization be performed in late April or May after the temperature has risen and the foliage is in bloom.

Technology moving forward

Preventive Maintenance

Given the high level of accuracy needed for a modern multisite paging system the County will encounter the need for a maintenance package with any new system. That package will include annual or biannual system alignments to assure the accuracy of the operating system. This type of performance alignment is also recommended given the age of the current paging system. As equipment ages it tends to drift away from the settings used or perform at slightly different levels. This can sometimes be easily rectified using adjustment setting built into the equipment by the manufacturers. Although the current system design does have inherent performance issues any reduction of performance is likely due to equipment degradation whether it be the station or the antenna system.

Steered Site Selection

The current system uses three transmitter sites. As well the current provider has proposed additional sites to improve other areas of the county as well. However; the proposal does not provide for a simulcast solution to operate these multiple transmitters. Whether three or more site are ultimately required for adequate operation each one could be activated independently to provide localized paging solutions. Departments requiring multiple sites would be programmed into dispatch consoles to systematically send pages serially until the page was complete. This type of service adds a layer of understanding as well as proper pager setup to minimize the responsibilities of the end user and dispatcher to operate within this type of setup. Pagers would need to be programmed to remain active while other sites become active.

Digital Messaging

A key decision with any new paging system is the voice vs message (text) paging operation of the system. These two styles represent complete different operational system equipment and possible design choices. If the County wishes to remain a voice paging provider it will be faced with the decision at the implementation of a new radio network of using a separate voice paging system design (simulcast conventional), or possibly using a P25 style pager thus eliminating the need of a separate system. Deciding to move to messaging type service the County may wish to begin looking at the delivery methods available with that style. New procedures would need to be developed by dispatch and departments to change this operation style. Along with that would be the choice of either a simulcast operational type system that should rely on the backhaul network of a new voice radio system, or employing a store and forward operation of the digital message using localized transmitters. With the small size of a digital message receive and rebroadcast type systems can be used to quickly repeat a message without simulcast operation. This model would allow the County to move forward on paging system improvements without the need for a voice backhaul network if they feel this to be the right type of operation.

Simulcast

The current system simultaneously activates transmitters at multiple sites on the same frequency to provide paging coverage and as a result creates distortion zones within the service area as the modulation parameters of the transmissions are not controlled. Simulcast is used to improve transmit performance over a wide service area such as a county. To use simulcast the infrastructure sites must be interconnected via a data connection such as microwave or fiber optics. Simulcast operation also requires transmitter equipment that is designed to produce virtually identical modulation characteristics. Most simulcast systems use a GPS clock reference as well to control timing. All transmitters must be able to maintain identical frequency, phase, and modulation such that field units detect little difference in signals transmitted from different site locations. In actual operation, the distance from the transmitter sites and receive signal levels dictate the quality of the received signal. During installation adjustments are be made to these parameters to create an environment that provides an optimal level of overall performance.

Appendix 1 – FCC Licenses

WPQH280 Story County

Federal Communications Commission
Public Safety and Homeland Security Bureau

RADIO STATION AUTHORIZATION

LICENSEE: STORY, COUNTY OF

ATTN: DINA MCKENNA
STORY, COUNTY OF
900 6TH ST
NEVADA, IA 50201

Call Sign	File Number
WPQH280	0006873202

Radio Service
PW - Public Safety Pool, Conventional

Regulatory Status
PMRS

Frequency Coordination Number

FCC Registration Number (FRN): 0002560720

Grant Date	Effective Date	Expiration Date	Print Date
07-14-2015	07-14-2015	07-14-2025	07-15-2015

STATION TECHNICAL SPECIFICATIONS

Fixed Location Address or Mobile Area of Operation

Loc. 1 **Address:** RR 2 HEART OF IOWA COOPERATIVE
City: NEVADA **County:** STORY **State:** IA
Lat (NAD83): 42-01-00.0 N **Long (NAD83):** 093-29-00.8 W **ASR No.:** N/A **Ground Elev:** 303.0

Loc. 2 **Area of operation**
Operating within a 32.0 km radius around fixed location 1

Antennas

Loc No.	Ant No.	Frequencies (MHz)	Sta. Cls.	No. Units	No. Pagers	Emission Designator	Output Power (watts)	ERP (watts)	Ant. Ht./Tp meters	Ant. AAT meters	Construct Deadline Date
1	1	000154.34000000	FB	1	180	11K2F3E	150.000	300.000	72.0	74.0	
2	1	000154.34000000	MO	250		11K2F3E	90.000				

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

Page 1 of 2

FCC 601-ULSHS1
August 2007

KD39278 Story County

Federal Communications Commission
Public Safety and Homeland Security Bureau

RADIO STATION AUTHORIZATION

LICENSEE: STORY, COUNTY OF

ATTN: DINA MCKENNA
STORY, COUNTY OF
COUNTY COURTHOUSE
NEVADA, IA 50201

Call Sign	File Number
KD39728	0006080729

Radio Service
PW - Public Safety Pool, Conventional

Regulatory Status
PMRS

Frequency Coordination Number

FCC Registration Number (FRN): 0002560720

Grant Date	Effective Date	Expiration Date	Print Date
01-04-2014	01-04-2014	02-09-2024	01-04-2014

STATION TECHNICAL SPECIFICATIONS

Fixed Location Address or Mobile Area of Operation

Loc. 1 **Area of operation**
Countywide: STORY, IA

Antennas

Loc No.	Ant No.	Frequencies (MHz)	Sta. Cls.	No. Units	No. Pagers	Emission Designator	Output Power (watts)	ERP (watts)	Ant. Ht./Tp meters	Ant. AAT meters	Construct Deadline Date
1	1	000453.98750000	MO	2		11K2F3E 20K0F3E	2.000	3.000			

Control Points

Control Pt. No. 2

Address: 900 6TH ST

City: NEVADA **County:** STORY **State:** IA **Telephone Number:** (515)382-6566

Associated Call Signs

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

FCC 601-ULSHS1
August 2007

Page 1 of 2

KNS202 Story County

Federal Communications Commission
Public Safety and Homeland Security Bureau

RADIO STATION AUTHORIZATION

LICENSEE: STORY, COUNTY OF

ATTN: DINA MCKENNA
STORY, COUNTY OF
900 6TH ST
NEVADA, IA 50201

Call Sign	File Number
KSN202	

Radio Service
PW - Public Safety Pool, Conventional

Regulatory Status
PMRS

Frequency Coordination Number

FCC Registration Number (FRN): 0002560720

Grant Date	Effective Date	Expiration Date	Print Date
03-26-2005	08-10-2011	06-02-2015	

STATION TECHNICAL SPECIFICATIONS

Fixed Location Address or Mobile Area of Operation

Loc. 1 **Address:** 900 6TH ST CTY COURTHOUSE
City: NEVADA **County:** STORY **State:** IA
Lat (NAD83): 42-01-13.0 N **Long (NAD83):** 093-27-15.8 W **ASR No.:** N/A **Ground Elev:** 299.0

Loc. 2 **Area of operation**
Operating within a 32.0 km radius around fixed location 1

Antennas

Loc No.	Ant No.	Frequencies (MHz)	Sta. Cls.	No. Units	No. Pagers	Emission Designator	Output Power (watts)	ERP (watts)	Ant. Ht./Tp meters	Ant. AAT meters	Construct Deadline Date
1	1	000154.28000000	FB	1		11K2F3E 20K0F3E	90.000	240.000	35.0	36.0	
1	1	000154.34000000	FB	1		11K2F3E 20K0F3E	90.000	240.000	35.0	36.0	
2	1	000154.28000000	MO	250		11K2F3E 20K0F3E	90.000				

Conditions:
Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

FCC 601-ULSHS1
August 2007

Page 1 of 2