

## **2008 NASCIO Award Submission**

**Title: Mobile Disaster Recovery Communications System (MDRCS)**

**Category: Business Continuity and Disaster Recovery**

**State: Nebraska**

## Mobile Disaster Recovery Communications System (MDRCS)



### Executive Summary

In the shadow of disasters both natural and man-made, the public holds an ever increasing expectation for Government assistance from Federal, State, County, and local agencies. Many times that assistance requires us to operate from locations away from the comfort of our offices. Sometimes those operations take place in areas where public utilities are damaged beyond use. In the years following the 9-11 attack on America, government agencies assumed a greater responsibility to prepare for disasters. Continued COOP planning and development brought state agencies to the realization that all disaster recovery centered around effective communications.

While communication may rank high on the list of elements necessary for recovery, it is also one of the most vulnerable during the disaster itself. To better prepare for this contingency, the Nebraska Office of the Chief Information Officer (OCIO) outlined the communication needs during a disaster and examined the potential vulnerabilities to existing infrastructure. From there a plan was developed to meet those needs assuming the absence of those resources.

In June of 2007, the OCIO completed construction of a Mobile Disaster Recovery Communications System (MDRCS). The final cost of the MDRCS was \$70,000, completely funded by homeland security grants. The system remains on standby and can be operational in as little as 20 minutes after arriving at an emergency site. Basic communications can be set up enabling coordination of emergency responders.

## Description of Business Problem and Solution

In the wake of a disaster, the key to recovery is coordination, and coordination requires communication. Many times a disaster will leave a community without the commercial network necessary to communicate with the outside world. Central offices can be under water, fiber and copper infrastructure can be damaged, and cellular towers can be destroyed leaving responders with little means to coordinate their efforts. Restoration or installation of commercial telecommunication services could take days or weeks. Emergency workers need a place to gather, plan, and coordinate their activities with personnel at other locations. If they are to communicate, we must bridge the gap between the moment a disaster strikes and the point at which commercial telecommunications service becomes available.

The State of Nebraska has approached this problem with a mobile solution that not only provides voice communications, but internet access, State E-mail, State network and mainframe access, video conferencing, as well as interoperability between VHF, UHF, and 800MHZ radio frequencies.

Voice Communications: The heart of the MDRCS is a hybrid telephone system with the following capabilities:



- 48 analog telephones
- 16 digital telephones
- 32 IP telephones
- 24 analog trunk ports
- 16 IP trunks
- Voicemail/automated attendant

The telephone system is completely installed, wired, configured, and ready for service by simply powering up. All equipment, wire distribution, and associated peripherals are permanently mounted in 19 inch racks. Each rack is secured to the trailer floor, walls, and ceiling using rubber isolation mounts. Analog trunk ports are wired to a trunk distribution patch panel where cross connects can be made using RJ-11 patch cables. Each analog and digital station is wired to a station patch panel for distribution via 25 pair cable. 25 pair station cable can be run to multiple buildings and cross connected to existing cable plant or distributed via RJ-11 breakout boxes.

Analog PSTN Connectivity: The MDRCS was engineered with the assumption that wireline trunks or lines from the commercial telecommunications carrier would not be available. The system uses 16 fixed cellular devices and eight fixed satellite units to convert cellular and satellite signals into 2-wire analog circuits. The circuits are wired to a PSTN trunk distribution panel where they can be cross



connected into the telephone system trunk ports using RJ-11 patch cords. By terminating all resources into clearly labeled patch panels and cross connecting with patch cords, stations and trunks can be easily and quickly rearranged if necessary by non-technical personnel. This solution also allows for easy troubleshooting and fault isolation. The first eight fixed wireless devices utilize a local CDMA wireless carrier and the second eight utilize the GSM wireless network. Each GSM line has Wireless Priority Service (WPS). All 16 fixed wireless devices are rack mounted and operate on 120 volt AC power. Fixed wireless device antennas are connected to a concentrator that allows all 16 devices to use two outdoor antennas mounted on the trailer roof. Each roof mount antenna gains the benefit of a signal amplifier. Amplification allows the fixed wireless units to operate from commercial cellular towers that are far out of reach from handheld cellular phones in the event that local towers are damaged. The final eight analog system trunks are serviced by fixed satellite units also mounted on 19 inch racks and AC powered. The satellite units use the same wire distribution method as the fixed wireless devices. By spreading these resources across three different technologies and three different service providers, the system gains a certain level of redundancy, and call egress options are expanded considerably.

**IP PSTN Connectivity:** During emergencies local portions of the PSTN could be congested and hamper the system's ability to send and receive calls. The State maintains a network of IP enabled PBXs in six different communities trunked to three different local exchange carriers. By connecting the MDRCS to this network via SIP trunks, the system can be programmed to terminate voice traffic through a PBX in a community that is unaffected by the current emergency, thus achieving a greater probability of call completion. Directory and Toll Free numbers can be pre-assigned and terminated by the PSTN at any one of a dozen different PBX locations in the network. From there the PBX can route those calls directly to the MDRCS via IP trunks. This allows numbers to be pre-assigned to the system and distributed as part of agency business continuity plans.

**Wireless Broadband:** Private broadband wireless connectivity provides a rapidly deployable option for data connectivity. The MDRCS is equipped with 3 pairs of antenna/dish endpoints. Each pair is capable of extending a 10 megabit Ethernet connection over 30 miles. Combined with a router/VPN appliance this combination can create a tunnel back to the State network backbone via an ISP or carrier aggregation point. Broadband wireless antennas can also be used to extend the reach of the MDRCS by several miles and provide IP voice and data services to alternate operations centers in the disaster vicinity.

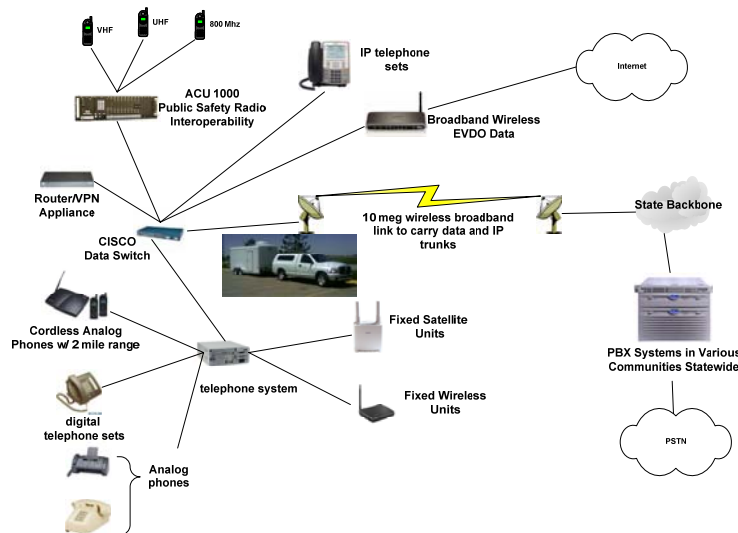
**Public Safety Radio Interoperability:** Another feature of the MDRCS is the ability to bridge 800MHZ, UHF, and VHF frequencies using an onboard ACU-1000. Not only will public safety entities be able to communicate across frequencies and bands, they can be linked to other ACU-1000 systems across the State or country over the IP network. The ACU-1000 can also originate and terminate voice calls

thru the MDRCS telephone system giving emergency responders an almost unlimited reach.

**Trailer/Power/Environmental:** The system is housed by a tandem axle 7' x 16' enclosed bumper pull trailer. The MDRCS trailer interior is wired with multiple AC power outlets which are connected to a main power distribution panel. This panel can be fed by 110 volt shore power or an onboard 5,000 watt gasoline generator. Two additional 1,850 watt gas generators are also available for other miscellaneous power needs. All equipment power is filtered through a 3,000 VA uninterruptible power supply. To keep equipment cool there is a 9 amp air conditioner mounted to the trailer roof. The entire system is fully self-contained and all equipment is installed, wired and configured.

**Training, Education, awareness and availability:** OCIO staff routinely deploys the MDRCS for training purposes. Repeated training assures that the system components remain operational and that staff maintain the expertise necessary to deploy when needed. Agency heads have been briefed on the capabilities of the MDRCS and are aware that it is available to them in a crisis.

### The Big Picture



### Significance to the Improvement of the Operation of Government

The MDRCS represents the future of mobile enterprise emergency communications. It brings a wide range of telecommunications resources together into a single mobile package capable of responding at a moment's notice. The capabilities of this system provide emergency responders with the tools to communicate to others via voice, radio, e-mail, and video. Immediately available communications allows responders to coordinate efforts on a scale much broader than otherwise available and to place people and resources where they need to be, when they need to be there. Prior to the MDRCS, OCIO staff would order landlines, circuits, and equipment from local carriers to support these efforts. Assuming an infrastructure was available, time spent during the order and install process was time lost on recovery efforts. Today the MDRCS can

deploy to emergencies alongside first responders and provide communications immediately upon establishment of command and control or operations centers. Now law enforcement, firefighters, medical and government personnel can arrive at a disaster site and begin their coordination efforts immediately because they have the means to communicate with their peers, the media and the public in general.

In May of 2008, the MDRCS was deployed to a community in central Nebraska to support multi-agency recovery and damage assessment teams after multiple tornados touched down. Late on the evening of May 29, OCIO response was requested and the MDRCS arrived onsite before sunrise the following morning. Once the MDRCS was deployed desktop telephone sets were operational within minutes and broadband connectivity to the internet and state network resources was available within two hours. The speed of this mobile deployment allowed incident managers to operate from a central location and begin coordinating their staff and resources within hours of the disaster.

Many times emergencies happen at inconvenient locations and the expedited installation of temporary commercial communications is costly. Installation charges and overtime labor alone typically cost more than the actual service itself. Aside from the time saved, this single investment in a standby mobile solution represents a considerable cost savings over time. The MDRCS is effective in non-emergency situations as well. When upgrading or replacing large PBX systems the MRDCS can be used to provide continued communications during planned outage periods, and it serves as a test bed for new technologies and technical methods.

### **Benefit of the Project**

The MDRCS provides communication capabilities to emergency responders who may include local, county, state and federal law enforcement, state and federal emergency management agencies, Health and Human Service divisions, departments of the military and emergency aid organizations. The mobile nature of this system allows emergency responders to place their operations centers at strategically convenient locations without regard to power, fiber, or cable plant previously necessary to support up to 80 people from a communications perspective. The MDRCS performs well posted next to a college dormitory and is equally at home deployed in a corn field.

The rapid deployment capabilities of the MDRCS will lead to faster response from public safety officials and increased coordination between those in the field and support personnel in other areas of the State or country. This allows stakeholders to focus on their own individual core missions. When government officials are able to more effectively perform their individual duties during a crisis, there is generally a direct impact to the taxpayers whom they serve in terms of property protection, crime prevention, damage control and preservation of life.