



The Not-So-Secret Life of Paging

Introduction:

The State of Paging Is Definitely Not What You Think

When smartphones debuted some predicted paging would fade away rapidly. As it turns out though, these folks were wrong, which was no surprise to those who've relied on paging for years. In fact, paging is still very much a staple in healthcare. In a 2013 study of more than 400 hospitals, 66% of these organizations use wide-area paging and 59% use in-house paging.¹ The fact is that paging isn't *old* technology; it's simple, reliable technology. This is especially true in disaster situations when cellular communications may struggle to handle the volume of traffic and stop working.

There's no argument that smartphones have changed the game. In August 2013 mobile reference materials company Epocrates found that of 1,063 physicians and mid-level practitioners surveyed, 86% use smartphones professionally². They have an important place in healthcare with the ability to hook into your organization's directory for contact information and then text updates and pictures securely. And of course physicians and many others use medical reference apps and EMR access on a daily basis via their smartphones and tablets.

But while some physicians and other clinical staff have migrated to using smartphones for time-sensitive communications, pagers remain key for many personnel. Leading hospitals are definitely keeping their trusty, affordable paging systems around while adding many other device types to the mix. In this paper we'll explore why paging remains a communications mainstay and how NOTHING beats paging when it comes to disaster communications. We'll look in depth at the technologies at play and how they actually work in different ways to provide coverage.

Paging Is Tried and True

Paging has been integral to hospital workflows and critical response processes for many decades. Its value remains high for critical messaging. Additionally, paging is highly reliable and also cost effective. There is still nothing even close to paging from a cost-effectiveness perspective. If someone loses a pager, the replacement cost isn't an issue. But if that smartphone goes missing....

Not everyone needs a smartphone to do his or her job. While a physician may use a smartphone and/or a pager, housekeeping, transport, and certain members of code teams will likely rely fully on pagers. Paging's survivable architecture provides advantages over broadband, especially in crisis and disaster scenarios. There are two types of paging, wide-area and onsite. With wide-area paging, transmitter towers provide service to all pagers in the area. Onsite paging means that a particular hospital operates the transmitters and terminals and functions as a standalone paging system where devices work just at that facility.

¹ The Role of Mobility Strategies in Healthcare: 2013 Survey Results. Amcom Software.

² 47% Of Doctors Use Smartphone, Tablet And PC. InformationWeek HealthCare. Aug 14 2013.

<http://www.informationweek.com/healthcare/mobile-wireless/47-of-doctors-use-smartphone-tablet-and/240159974>

Cellular Networks Work Well - Except When the Worst Happens

Cellular networks have a well-documented history of failing in emergency response scenarios:

- 9/11 in 2001
- Hurricane Katrina in 2005
- Minneapolis Bridge Collapse in 2007
- Southern California earthquakes in 2007 and 2008
- Virginia's 5.8 magnitude earthquake in 2011
- Hurricane Sandy in 2012
- Boston Marathon Bombing in 2013



The 2007 Minnesota Bridge Collapse

In all these crisis scenarios, congestion rendered cellular phones nearly useless for emergency responders. During these situations, people are often discouraged from using their cell phones:

- Authorities issued televised pleas to residents in the immediate aftermath of the Southern California earthquake: *"The big message now is don't use telephones or cell phones in Southern California."*
- This from Reuters: *"The Federal Communications Commission ... is assessing a significant disruption to cell service (as major cellular providers) all reported higher call volumes and network congestion in affected areas, making it difficult to reach out to family and friends after the quake over cell phones."*
- FEMA & FCC issued a joint press release stating *"In the minutes and hours that followed, mobile networks experienced significant network congestion, temporarily making it harder for millions of people to reach loved ones and emergency services."*

Why Do Cellular Networks Congest and Fail?

When disaster strikes, people get on their cell phones to talk about it.

*"Where are you?"
"Are you safe?"*

*"I'm just calling to let you know I'm alright."
"Have you seen the news?"*

Cellular is a mobile consumer and enterprise business. Cellular networks were not designed to handle the amount of traffic that happens all at once during a disaster. Under normal circumstances, these design parameters are not an issue. When disaster strikes, however, network failure is almost a foregone conclusion.



The Survivable Architecture of Paging

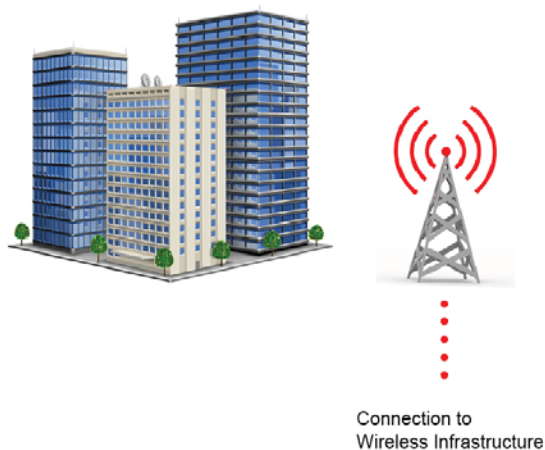
Paging, on the other hand, is not subject to the same consumer demand and congestion issues as cellular phone service. The reasons are simple: Paging networks are built to accommodate a high percentage of users at times of congestion. Both one-way and two-way paging are sequential in nature, with the first message in being the first message out. Paging also has fixed message lengths, which, in contrast to the unlimited connection time for cellular, allows for more equal sharing of bandwidth. With cellular, one person can monopolize a channel for a particular cell site for a long period. In paging, your message is handled and done, with the system moving on to process the next message.

One popular, albeit mistaken, train of thought is that in the “worst case scenario,” all communications will likely be down anyway, so cellular makes good sense for emergency communications up to that point. This logic is flawed in two ways. First, cellular networks will fail due to congestion well before reaching a “worst case scenario.” Second, one communication method—paging—has a well-documented history of surviving the most dire of circumstances, including 9/11, Hurricane Katrina, the Boston Marathon bombing, and others.

An In-Depth Look at How Paging Works

Cellular Architecture:

- Transmission from a single tower
- Transmitters low to the ground (90ft)
- Weak power (100 watts ERP*)
- Connectivity via wireline telephone system



Paging Architecture:

- Messages are simulcast from multiple towers
- Transmitters high off ground (up to 300ft)
- High power (up to 3500 watts ERP*)
- Connectivity to towers via satellite



Paging technology is particularly well suited for emergency situations due to unique features that impact reliability:

Overlapping Coverage

Paging networks provide redundant wireless coverage on the ground to serve the coverage needs of its mission-critical users. As emergency events often involve physical damage to property (including wireless transmitters), having overlapping coverage is critical for continuation of service. With the paging network architecture, all messages are “simulcast” from multiple towers within a specific coverage zone at the same time, so pagers are communicating with more than one tower at once. If one tower goes down, other paging towers in the area can still receive messages. Cellular networks are not designed with such redundancies.

Height and Power

Paging transmitters are high off the ground (up to 300 feet compared with approximately 90 feet for a cellular tower), and transmissions for paging service utilize high power, resulting in superior in-building coverage. Paging transmitters operate with an effective radiating power (ERP) of up to 3,500 watts. For comparison, cellular transmissions have an ERP of approximately 100 watts.

Satellite Connection

Paging networks use satellite connections between the core messaging network and transmitter towers in the area, eliminating a critical point of failure for many wireless systems. Because data is transmitted back to the network via satellite, the local public telephone network that is often impacted by a disaster situation, as with Hurricane Katrina, is bypassed. In addition, many satellite dishes are at ground level or on building rooftops, making them easy to access if technicians need to restore power using a generator or re-point the satellite dish.

Redundancy

The core elements of a paging provider’s network can be designed with fully redundant infrastructure, including diversity on WAN/LAN, messaging switches, power sources and satellite uplinks. This redundancy is intended to help ensure operational continuity of all network systems and provide an extra layer of reliability.

What About Texting?

Traditional short message service (SMS, aka texting) is not a guaranteed technology. Cellular networks have historically been designed to give priority to voice communication first and data communications (like texting and Internet connections) second. When it comes to texting, there’s the ‘standard’ method that comes with most smartphones and delights teenagers everywhere, and then there’s secure texting. Secure texting is designed for critical healthcare communications and includes encryption, audit trails, and many other important security features. Many hospitals are now using secure smartphone texting alongside pagers to handle various types of important communications, including code calls. However, these hospitals realize that texting may not always work in the wake of a disaster, and therefore it’s important to have pagers on hand.

Conclusion: How Do You Prepare for the Worst? With Coffee and Batteries

Most hospitals have defined procedures for disaster response. With their demonstrated reliability in disaster situations, pagers should be an integral part of this plan. In fact, for the daily price of a cup of coffee, you can keep a pager on hand and ready to go. Disposable batteries mean you can easily remain operational and function independently of the power grid without needing to recharge.

Onsite paging systems are self-contained and insulated from the outside world. You can also establish connections to an existing back-up power supply to power the terminals and transmitters if mainline power is lost. In addition, wide-area paging provides many layers of protection including redundant coverage to keep communications flowing in broader emergency scenarios.

While we certainly can't predict when disasters will strike, we can definitely lay the groundwork that will give critical communications the best chance of getting through when almost nothing else can. And that is accomplished only through the reliability and survivability of paging technology.



About USA Mobility

USA Mobility is a comprehensive provider of reliable and affordable wireless communications and software solutions to the healthcare, government, large enterprise and emergency response sectors. As a single-source provider, the Company's principal focus is on the business-to-business marketplace. USA Mobility supplies wireless connectivity solutions to organizations throughout the United States, especially healthcare providers such as hospitals and medical centers and operates the largest one-way paging and advanced two-way paging networks in the United States. The Company also provides mobile voice and data services through Sprint Nextel and T-Mobile, including BlackBerry® smartphones and GPS location applications. In addition, it offers best in class mission critical unified communications on a national and international basis through its software subsidiary, Amcom Software.

About Amcom Software

Amcom Software, a subsidiary of USA Mobility, Inc. (Nasdaq: USMO), connects people to each other and to the data they need. This helps organizations save lives with communications that are faster, more accurate, and more efficient. Thousands of organizations worldwide rely on Amcom solutions for critical smartphone communications, contact center optimization, emergency management, and clinical workflow improvement. The company's products are used by leading organizations in healthcare, hospitality, education, business, and government. By continually developing its industry-leading technologies, Amcom Software has steadily grown and solidified its market leadership.



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