PAGING: A VITAL LINK FOR PUBLIC SAFETY
ANALOG AND DIGITAL PAGING TECHNOLOGIES ENABLE PUBLIC SAFETY ALERT SYSTEMS

THE IMPORTANCE OF PAGING

Paging technology has continuously served as an integral part of normal public safety operations. This technology has evolved from simplistic, one-way tonal notification to more complex, two-way forms of communication that enable more immediate and appropriate response through the sharing of critical information.

All paging technologies offer their own unique benefits and challenges, and this document will promote a basic understanding of paging technology usage in emergency communications. The document describes the value of paging to public safety operations, outlines considerations when implementing paging technology (positives and negatives), explores best practices surrounding paging technology use, and suggests considerations to be addressed as technology evolves.

2018 SAFECOM NATIONWIDE SURVEY RESPONSE FACTS

- According to results from the *SAFECOM Nationwide Survey (SNS)*[1], 58% of responding public safety organizations use a paging system

- Paging systems were used more than twice as frequently by organizations located outside of metro counties

- Paging systems used by public safety organizations have proven to be reliable, even after communications systems reach an advanced age

- 69% of responding public safety organizations described their paging system as vital for mission function

INTRODUCTION TO PAGING TECHNOLOGY

→ One-Way Paging

Paging technology has been in use for many years but started with simple one-way radio transmissions first used by hospitals and law enforcement. The first consumer pager alerted users with an audible tone, which is how they came to be known as "beepers." Varied length single tones or a series of varying tones would indicate different message meanings to the receiver. Early pagers had limited range and were commonly used in hospitals and buildings on a local area network. In-building voice paging and numeric paging also offered small and limited pager display capacity.

As the technology evolved, wide area network paging enabled the transmission of pages via radio waves across wide distances and expanded the popularity of the technology. Eventually, alphanumeric pagers allowed dispatchers or pager callers to enter a text message. As the name suggests, one-way paging does not allow the receiver of the message to respond to any message via the paging device. In addition, the one-way pager system does not provide any mechanism for the

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[1] For additional information, visit *2018 SAFECOM SNS Results*.

sender of a message (alerting authority) to be notified that the message was received, and action was taken, as needed.

⇄ Two-Way Paging

Two-way paging involves a mass emergency notification system (ENS) that uses software to provide an organization the ability to send messages to different devices using multiple communication channels and devices (and receive a response from the recipient, as needed). The software used for an ENS uses data points to determine who will receive a message. These data points can be drawn from personal information provided by voluntary subscribers to the system who have opted to receive notifications. In addition, the ENS may use data points such as geographic location to determine the population set that may need to receive an alert. When an alert is transmitted, the ENS will draw on the required data and can target a message over multiple platforms such as voice, email, social media, television and radio broadcasts, text, digital signs, and sirens. Most current paging is analog and the pager receivers are opened by a transmitted tone code that precedes the voice message.

THE VALUE OF PAGING TECHNOLOGY TO PUBLIC SAFETY OPERATIONS

Situational Awareness

Paging brings value to public safety operations and public alerting because it facilitates immediate situational awareness. Because of the two-way nature of alerts, alerting authorities can immediately determine the effectiveness of a message based on the response(s) received from a recipient(s). In the case of public safety personnel and officials, paging enables instantaneous and simultaneous notification of an event that requires a response to the event by the recipient. The reliability of current paging technology is particularly valuable to rural personnel who may not have access to consistent communication due to coverage issues.

Wide area paging uses existing, high-frequency radio transmitters and towers that can broadcast a message over a large area. Wide area paging is less likely to be impacted by signal interference the way a cellular network could be impacted and is often employed by emergency responders and volunteer personnel who are likely to be dispersed across a large area which may lack consistent cell service.

Redundancy and Accountability

Paging systems that enable messaging to be sent across multiple communications channels and devices help ensure alerts and messaging are received through built-in redundancy. An ENS that allows the recipient to provide a response supports accountability. Unlike with one-way paging systems, a two-way ENS that allows recipients to respond and acknowledge messages helps the alerting authority to track the responses of personnel. This supports incident management, personnel safety, and ensures the message recipient(s) is responding as appropriate.

BEST PRACTICES FOR EFFECTIVE USE OF PAGING

Technology Equipment Usage

Given that many public safety officials and first responders operate a variety of communications tools and equipment such as radios, pagers, and cell phones, this can result in information overload. Public safety network users can be inundated with crosstalk on different radio channels and messages across multiple devices. For example, with fire department alerting, multiple tones can be used to indicate incident response types and an alert can tie up 10 talk groups instead of one that is specific to the first responders who are managing the response. Equipment can be programmed to use sequencing to limit traffic to one channel, thus freeing up other channels. This can be achieved by establishing priority levels or using trunked radio system talkgroups to manage communications traffic. Additionally, manufacturers may be able to set up multiple trunk channels that include paging to increase spectrum efficiency.

With the abundance of conventional paging systems still in use and being installed, the correct use of talkgroups or channels can help avoid information overload and fatigue, mitigate key messaging being missed during a response effort, and help ensure the security of the information being shared.

Programming and Training

Communications system owners/managers must ensure the equipment that allows paging tones are appropriately programmed, both from an operational and security perspective. Incorrectly programmed equipment impacts interoperability and diminishes the ability to send out proper alerting tones to the right personnel and may transmit the wrong alert or sensitive information to the wrong party. This also relates to the proper use of talkgroups. Because of paging's ability to establish different talkgroups, system owners/managers must ensure there is proper user training on how to effectively administer alerts and use talkgroups to avoid miscommunication, information overload, and to maintain information security.[2]

MANAGING THE EVOLUTION OF PAGING TECHNOLOGY

Maintenance and Modernization: Public safety alerting technology will continue to evolve and it is necessary to maintain and upgrade existing equipment and infrastructure to sustain interoperability. In strategic planning, system owners must factor in the costs and technical needs required to successfully maintain and modernize an ENS and all associated technology receiving the alerts. System maintenance also requires diligence to ensure interoperability, security, and resiliency during system upgrades and outages, as well as minimize impacts to communications.

Programming, Usage, and Training

As new technology is introduced by a system owner/manager, training to ensure proper programming and use of the new technology is critical to the continuity of operations. Continuing to train personnel on legacy technology is also important for maintaining operational capacity in the event of an outage or during integration of new technology.

Implementation Planning

During the process of planning for new technology integration, system owners/managers should work closely with vendors to ensure proposals address the inclusion and maintenance of existing technology to verify interoperability, address security, and support operational capacity and redundancy.

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[2] For additional information, visit *Public Safety Communications: Ten Keys to Improving Alerts, Warnings and Notifications*.