

5 WAYS NETWORK-BASED PAGING IS IMPROVING HOSPITAL OPERATIONS



CREATING SMART SYSTEMS.....	4
REDUCING NOISE	6
ENSURING SAFETY AND SECURITY	7
INCREASING INTELLIGIBILITY.....	7
MAKING DEPLOYMENTS FLEXIBLE.....	8

INTRODUCTION

For the IT and facility teams at a Southern California hospital, ensuring their paging system was always functional was a high priority, but extremely challenging. The old system was built from a hodge-podge of various components; wiring was difficult to maintain, hard to troubleshoot, and impossible to enhance for new standards or user requirements. Sometimes the paging system was inoperable for up to a week before IT and facilities tracked down the problem, such as broken wire to an amplifier no one even knew existed.

When the hospital upgraded to a networked-based paging system, IT and facilities teams gained complete system supervision—exceeding previous system limitations—and could identify every circuit. Finally they could correct problems before patients and staff noticed. They were also able to add priority paging zones, which future-proofed the system against changing standards.

Despite issues with maintenance and voice intelligibility, legacy paging systems were the best the market had to offer 5 to 10 years ago. These systems gave hospitals the ability to deliver messages through overhead paging. Today, an emphasis on healthcare information technologies (health IT) is expanding the role of IT departments and bringing new awareness to network-based solutions. From Electronic Health Records (EHR) to unified communications (UC) initiatives, technology is changing healthcare—making information more accessible and communication easier.

Traditional overhead paging technology has evolved into advanced network-based paging systems that feature decentralized processing and superior intelligibility.

These proven networked solutions allow hospitals to take giant strides forward in paging, public address systems, and emergency communications. By putting paging on the network, IT and facilities managers gain visibility into—and control over—a critical communication system. Networked paging systems also reduce maintenance costs and vastly enhance staff and patient experience.

This guide examines industry trends that bring network-based paging to the forefront. Five ways that networked paging can improve hospital operations and the overall communication experience are highlighted.

INDUSTRY TRENDS

Today, several industry trends shape hospital priorities: the role of IT departments in leading technology initiatives; an increase in hospitality or concierge-type services that cater to patients and visitors; and changes in guidelines that govern noise levels and emergency voice communications. Each trend contributes to the criteria all department leaders use to evaluate new paging and emergency communications systems.

HEALTH INFORMATION TECHNOLOGY

The Health Information Technology for Economic and Clinical Health (HITECH) Act is increasing the focus on new and innovative technology solutions. HITECH provides incentives to hospitals that implement health IT solutions such as EHR, and is increasing the number of technology-savvy healthcare professionals who understand and expect technology solutions to their work challenges.

The Most Wired Survey 2010, conducted by Hospitals and Health Networks, recognizes the top hospitals that are leading the industry in health IT implementation. The survey also shows the growing prevalence of health IT measures, from electronic medication orders to system-wide safety alerts.ⁱ The “Most Wired” hospitals are establishing themselves as leading edge facilities—a definite competitive advantage.

As hospitals look to technology to further business objectives and solve problems, the number of network-based solutions is on the rise. Network-based medical devices, wireless systems, smart phones, and VoIP telephone systems are all becoming common place. According to Spyglass Consulting, a research firm focused on healthcare, 66 percent of the hospital-based nurses interviewed reported their organizations had deployed VoIP-based communications.ⁱⁱ

Just as VoIP has made PBX telephone systems obsolete, network-based paging will eclipse traditional analog paging. Migrating legacy systems to the network provides the same benefits obtained through VoIP telephony: network management and control, cost savings, and increased quality and scalability.

PATIENT-CENTERED CARE

In the highly competitive healthcare market, it is increasingly important for hospitals to create programs and services that differentiate them from the competition. The trend towards a hospitality environment is a natural progression for hospitals. Patient amenities like private rooms, wireless access, and concierge services let hospitals replicate the experience of a quality hotel—all to increase patient satisfaction and facilitate the healing process.

A partnership between the Rosen College of Hospitality Management and Orlando Regional Medical Center (ORMC) is an interesting study in applying customer service techniques used by hotels to improve overall patient satisfaction and communication.

Matt Boseo, a doctoral student working at ORMC, says that people rarely think of customer or patient satisfaction until competition or ranking comes into play. “Some might think the hospitality industry has nothing to do with healthcare, but there is a certain overlap,” says Boseo. “Hospitals are still a business and concerned with approval ratings. More heads in beds means more revenue just like hotels.”ⁱⁱⁱ

One significant source of patient complaints is hospital noise. Not only does noise impact patient satisfaction, it impacts their health. According to the American Journal of Nursing, “studies in adult patients have linked excessive noise to sleep disturbance, and increased blood pressure, heart rate, and stress.”^{iv} Providing calm and quiet through zoning and controlling paging volume can help hospitals minimize noise levels, creating a better environment for healing.

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ORMC

REGULATORY GUIDELINES

Several new standards are currently being developed that address noise levels and voice intelligibility. How and when these guidelines will impact hospitals remains to be seen. However, strong indicators show that the healthcare industry is moving towards these standards.

In July 2010, the National Fire Protection Agency (NFPA) held a summit with 100 healthcare and government leaders in Baltimore. The purpose of the summit, as described by Kathleen Almand, executive director, Fire Protection Research Foundation, was to “discuss topical issues that will influence the next generation of safety codes and standards that safety professionals working in or with the health care industry count on to do their jobs well.”^v

The NFPA (2010) standards provide guidance for integrating in-building fire emergency voice/alarm communications with other communication systems such as mass notification systems, public address systems, and paging systems. Previously, integrating different systems was not allowed. However, an integrated system that handles all paging and emergency communications is a clear cost savings and greatly simplifies installation and maintenance.

NFPA 72 brings new attention to the issue of intelligibility in emergency communications. These requirements ensure that vital emergency messages transmitted through a voice evacuation system in a building are heard clearly and understood. NFPA 72 defines intelligibility and describes tests and standards.

NFPA standards recommend using more speakers and less sound intensity from each speaker. Not only does this approach improve the intelligibility of the message, it minimizes the sound level based on ambient noise, or how noisy it is in a particular area. It also reduces audio annoyance to building occupants and lessens the likelihood of system tampering because the speakers are too loud.

These types of standards and guidelines help hospitals achieve current goals, including noise reduction, intelligibility, and patient satisfaction. Naturally, any hospital considering upgrading a paging system wants to protect its investment as well as accommodate future regulatory changes.

5 WAYS NETWORK-BASED PAGING IS IMPROVING HOSPITAL OPERATIONS

Trends in the hospital industry are pushing hospitals towards advanced technology that may yield significant benefits to business and patients. Legacy paging systems can't keep pace with new demands. Networked paging systems offer hospitals a new way to respond to today's demands—and the demands of the future—by benefiting hospitals in five ways.

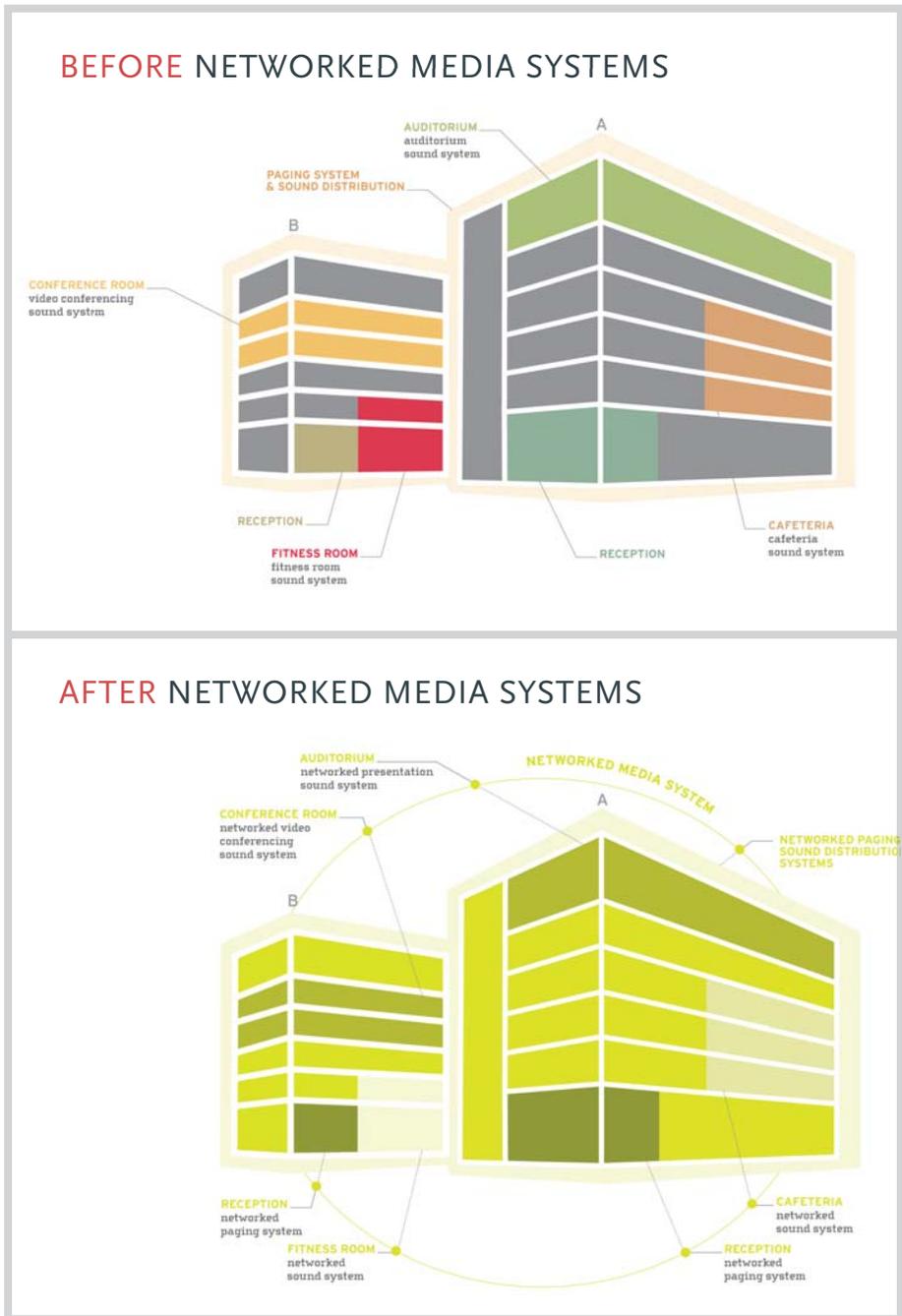
#1 CREATING SMART SYSTEMS: GET ALERTS AND QUICKLY IDENTIFY POTENTIAL PROBLEMS

System operation is the first area where network-based paging systems have a dramatic impact. If the paging system is a smart system, it continually monitors itself for irregularities and immediately send alerts if irregularities are found. Immediate notification prevents problems from developing and impacting patients and staff. This monitoring ability, coupled with decentralized processing functions, saves hospitals time and money by minimizing maintenance and eliminating the possibility of a single point of system failure taking down an entire paging system.

Most legacy analog paging systems rely on a centralized mainframe unit to route audio signals. Equipment add-ons build in some redundancy to protect legacy systems against the failure of an individual circuit, such as an amplifier. However, there is no protection against system failure. If the central unit goes down, all paging functionality goes with it.

A networked-paging system that decentralizes the processing functions and allows memory and processing resources to communicate intelligently across

the network substantially increases system reliability. If a switch fails, another path is used. A network-based paging system has redundancy not only with an individual device, but with the processing component as well. This type of system architecture does not allow a single point of system failure.



In addition to redundancy, network-based paging systems provide end-to-end, system-wide monitoring. The system continually checks the devices on the paging network and signals back their status. The ability to supervise all circuits and notify appropriate personnel when problems are detected is critical to maintaining

the integrity of the system. For example, if a power amplifier in a nursing station experiences a fault, the system notifies the appropriate personnel who can address the problem before nurses at that station have any difficulty making or hearing pages.

For hospitals dealing with critical patient care, reliable paging systems are of paramount importance. A networked paging system is built to ensure every page is broadcast, every time. Complete system-wide supervision—coupled with the ability to remotely access the paging system—helps IT managers successfully manage a networked system.

#2 REDUCING NOISE: INCREASE PATIENT AND EMPLOYEE SATISFACTION

Hospitals are noisy places. With all the electronic devices, televisions, voices, alerts, and alarms, it is hard to create a quiet, calm environment for working and healing. A 2005 study by researchers at Johns Hopkins University found that the average daytime noise level in hospitals has doubled since 1960.^{vi}

As part of a concerted effort to increase patient satisfaction and deliver “patient-centered care,” hospital staff is taking action to combat the excessive noise that patients complain about. For some hospitals, this means creating quiet hours and purchasing headphones for televisions. Others are installing noise absorbing wall panels and monitoring conversation levels at nursing stations.

Not only is excessive noise bad for patients, it’s bad for nurses and other healthcare staff. An article in the American Journal of Nursing discussed the impact of high noise levels on staff and linked it to “increased stress and annoyance, fatigue, emotional exhaustion, and burnout. And excessive noise can interfere with staff communication, increasing the likelihood of error.”^{vii}

Network-based paging systems support efforts to reduce noise in two ways. First, it allows the creation of paging zones so pages are only heard where they are needed. For too many hospitals broadcasting a page to an entire floor or building is the only available option. By using zones, it is possible to create quiet areas in the hospital.

Second, through a feature called ambient noise compensation, networked paging systems automatically detect the ambient or background noise in an area and adjust the page volume accordingly. For example, a busy waiting area may require the pages to be louder in order for patients and staff to hear them. However, when the waiting area is no longer crowded, the volume required for pages is substantially lower. By automatically adapting to the room noise, patients aren’t subjected to excessively loud pages when the room is quiet.

Creating a calm, quiet environment where employees can work and patients can heal shows a hospital’s commitment to safety, comfort, and health.

#3 ENSURING SAFETY AND SECURITY: MINIMIZE RISK TO HOSPITAL AND INDIVIDUALS

Every organization has the responsibility to ensure the safety and security of the people in its facilities. Nowhere is that expectation greater than in hospitals—the sanctuary for the sick and injured. In the event of an emergency situation, hospital administrators need to get a large number of people to follow instructions. The inability of emergency notification systems to provide voice instructions may have catastrophic consequences.

NFPA guidelines recommend that, in the event of emergency, notification be made by voice announcement through a voice communication or public address system. According to the Fire Protection Research Foundation, “The use of voice communications as an emergency management tool has greatly expanded. In the past, systems that relied on simple, repeating, prerecorded messages allowed less intelligible communication systems to still be effective. However, changing threats and the use of voice communication systems for a variety of emergencies in a dynamic fashion requires that the systems have an end-to-end communication path that does not hamper intelligible communication between those in command and the target audience.”^{viii}

Network-based paging systems can integrate with a hospital’s emergency or fire alarm system through a single interface. In the event of a natural disaster, security incident, or fire, the emergency or fire alarm system alerts the networked paging system, which then broadcasts the appropriate warning over the speakers on every floor of the hospital. Integrating a networked paging system with an emergency system, significantly improves overall safety and ensures that voice instructions accompany every alarm notification.

A message server further enhances an emergency paging system. This type of device stores and plays back pre-recorded messages automatically. This setup eliminates any chance of human error in the event of an emergency. It ensures critical messages are broadcast when needed.

Emergency messages are also stored in amplifier onboard memory. Even during a catastrophic event, emergency messages continue to play as long as the amplifier receives power. The advanced features of a network-based paging system help hospitals better provide for the safety and security of patients and staff.

#4 INCREASING INTELLIGIBILITY: MAKE SURE MESSAGES ARE HEARD AND UNDERSTOOD

NFPA defines intelligibility as the “capability of being understood or comprehended (distinguishable and understandable).” The NFPA 72 (2010) standard requires that voice alarm systems be intelligible. This requirement ensures that vital emergency messages transmitted through a building’s voice evacuation system are clearly heard and understood.

Changes to the NFPA 72 code include:

- Intelligibility testing is required
- Required for all voice communication systems
- Some areas may not require testing
 - Hard surfaces
 - Acoustically acceptable
- Will use the “STI” scale
- 90% of ADSs must pass
- Minimum of 0.45 STI
- Average of 0.50 STI to pass

Poor-quality pages that cannot be understood are a common occurrence in many hospitals. Not only does this create risk for staff and patients, it's also frustrating. If a page cannot be understood, most people hope that whatever was missed wasn't important or meant for them.

In a life or death situations, the right people must get to the right place as quickly as possible. There is no room for uncertainty. Whether it is a doctor page, a Code Blue, a security incident, or a fire, people count on the paging system to broadcast clear messages that everyone understands—every single time.

A networked paging system with scalable distributed digital signal processing (DSP) facilitates improved audio clarity and intelligibility. Pristine, uncompressed digital audio is delivered irrespective of systems size, while distributed DSP provides localized fine-tuning of audio parameters to match challenging acoustic environments. DSP may also further improve intelligibility through an adaptive response to ambient noise variations—adjusting paging volume in real time commensurate with the background noise and acoustics in a space. These technologies ensure clear and intelligible paging in all ambient conditions.

Not only does improving paging intelligibility increase the safety of both patients and staff, it supports hospital goals of creating a hospitable and comfortable environment.

#5 MAKING DEPLOYMENTS FLEXIBLE: FUTURE-PROOF A HOSPITAL'S PAGING INFRASTRUCTURE

Any time hospital administrators consider making investments to improve infrastructure the question of how easy systems are to upgrade and expand needs to be answered. It is a significant expense to rip out and replace old systems. When new technology can overlay or make use of existing systems, it saves considerable time and money.

Networked paging systems can be designed to enhance, expand, or replace traditional analog systems. This solution provides the flexibility hospitals require to meet current and future needs. Networked paging systems can start small, expanding as funding or construction schedules allow and can easily retrofit to an existing infrastructure without pulling additional cable.

And, since network paging uses a standard network infrastructure, it's easy to install and has a low entry cost. Hospitals can expand a networked paging system as the facility grows, even connecting multiple buildings.

To further protect a paging system investment, make sure the paging system can adapt to changing regulations. A paging solution that is built on a core platform can be easily upgraded to accommodate new requirements. Network paging systems built with standards and codes in mind can support needs for today and well into the future.

CONCLUSION

Network-based paging systems let hospitals address current issues with system maintenance, audio intelligibility, and noise, while offering a solid platform for future growth and expansion. When evaluating network paging options, consider:

- How the system handles system monitoring and alerts
- Whether the system can automatically adjust paging volume based on room noise
- Whether the system supports priority paging zones
- How redundancy is built in to eliminate single-point system failure
- The quality of microphones, amplifiers, and other system components
- Whether the system uses advanced digital processing technology to increase intelligibility
- Ease and cost of maintenance
- How the system is expanded or upgraded to meet future needs and standards

ABOUT VOCIA® FROM BIAMP SYSTEMS

Biamp Systems is a wholly owned subsidiary of Rauland-Borg, the industry leader in Nurse Call systems. The Rauland-Borg organization understands the demands on hospitals in the operational areas of nurse call and paging like no other. The Biamp part of the equation is advancing healthcare operations by bringing innovative solutions for paging to the network with Vocia, the critical paging and voice evacuation system. Built with advanced audio technologies, perfected by Biamp's more than 30 years of professional audio experience, Vocia delivers a level of intelligibility that is unsurpassed.

As the world's most advanced, decentralized, networked paging system, Vocia is built to meet current and future standards. Biamp is committed to helping hospitals understand the codes and requirements that impact healthcare.

Vocia provides a number of advantages to healthcare facilities:

- Automates system-wide monitoring of all critical circuits, event logging, and automatic notification of system status
- Increases intelligibility with digital signal processing and ambient noise control
- Uses distributed processing and a highly flexible system design to eliminate single-point system failure
- Provides multiple paging options that include live paging, remote paging, delayed paging, and recorded message release (storage and playback for eight simultaneous messages)

- Facilitates compliance with numerous code standards, is ADA compliant
- Integrates with VoIP telephones, PC workstations, digital signage, and nurse call systems
- Leverages network-based architecture to simplify installation and reduce ongoing maintenance costs
- Offers low entry costs so hospitals can start with small installations but expand and grow as needed”

NEXT STEPS

Whether you’re expanding, retrofitting or planning new construction, you need a reliable network-based paging system to ensure the safety and comfort of patients and employees. See how Vocia empowers hospital management by delivering the highest quality monitored audio system.

For more information about Biamp’s Vocia critical paging and voice evacuation system, please visit www.biamp.com.



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GLOSSARY

AMBIENT NOISE: The level of total noise in an area. In acoustics and specifically in acoustical engineering, background noise or ambient noise is any sound other than the sound being monitored. Background noise is a form of noise pollution or interference. Background noise is an important concept in setting noise regulations.

AMBIENT NOISE COMPENSATION: The use of adaptive algorithms to adapt to the ambient conditions within an area (background noise, changing acoustics with more or less people in a space).

DSP (DIGITAL SIGNAL PROCESSING): Techniques that analyze audio signals and convert them into digital data for use within a networked system.

FUTURE PROOFING: The process of anticipating and planning for future developments and needs, so appropriate action can be taken to minimize possible negative consequences and to seize opportunities.

INTELLIGIBILITY: The quality of language that is comprehensible; a measure of how comprehensible speech is, or the degree to which it can be understood.

LEGACY PAGING SYSTEMS: Existing paging systems and applications with which new paging systems and technology must exchange information.

NFPA: The world's leading advocate of fire prevention and an authoritative source on public safety. The NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks.

NFPA 72: The most extensive Code revision since 1993, the 2010 NFPA 72's scope and organization have expanded beyond the core focus on fire alarm systems to include requirements for mass notification systems used for weather emergencies; terrorist events; biological, chemical, and nuclear emergencies; and other threats.

PBX TELEPHONE SYSTEM: Private Branch Exchange. A private telephone network used within an organization. PBX users share a certain number of outside lines for making telephone calls external to the PBX.

VOIP: Voice over Internet Protocol (VoIP). A general term for a family of transmission technologies that deliver voice communications over IP networks such as the Internet or other packet-switched networks.