



White Paper

# 8 Critical Factors for FSAS\* Success

\*Fire Station Alerting Systems

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Reducing incident response time is a constant battle for fire departments across the globe. Improving the speed, efficiency and safety of teams, equipment and critical infrastructure in order to save lives and property threatened by fire—from first alert to final dispatch and acknowledgment – has never been more important. Included in this important measure is ‘turn out’ – the time from dispatcher alert to truck roll – a process most impacted by fire station alerting practices.

This paper outlines **eight critical success** factors that can be used to determine where Fire Station Alerting Systems (FSAS) deliver the most value to your fire department; to help you evaluate and select options; and implement and scale projects across multiple fire stations. These insights are drawn from PURVIS’ more than 35 years of deployment of technology and services solutions in public safety and defense organizations nationwide.

1. **Reduce Response Time.** When lives and property are at risk, every second of the emergency response cycle counts. Demand a solution that provides reliable alert delivery and streamlines the emergency response process.
2. **Minimize Firefighter Stress Levels.** Firefighting is physically exhausting, mentally demanding and highly dangerous. But often overlooked is the stress caused by alerts received in the fire station. Choose a system that provides ramped and auto-adjusting audio levels, low intensity pathway lighting and incident- or unit-specific alerts to reduce the stress of night calls.
3. **Improve communications.** Accurate and clear communications are integral to reducing turnout time. Increase accuracy of information delivery with a solution that provides a variety of devices that present critical information to the appropriate personnel.
4. **Adopt a Flexible Deployment Architecture.** One size does not fit all. Fire departments of different types and implementations of different sizes require different deployment architectures. Make sure the system you choose is modular, customizable and scalable, and that it allows for reconfiguration and expansion as needs and budgets change.
5. **Leverage Existing Systems and Devices.** Undoubtedly your fire station has some systems and devices in place. Get the most from your investment by choosing a solution that provides seamless integration with existing Computer-Aided Dispatch (CAD), Public Address (PA) and radio-based systems.
6. **Built for High Reliability and Accessibility.** Ensure the fire station is always alerted. Look for a system that offers device, server side and geographic redundancy, no single point of failure and system self-monitoring.
7. **Designed for Service First.** Downtime is not an option. Look for FSAS solutions that support a services-oriented architecture and a vendor who has a demonstrable *attitude* of service and proven experience, providing ongoing support and maintenance whenever and wherever you need it.
8. **Use a Standards-Based Approach.** Adopting a system that is standards-based and National Fire Protection Association (NFPA) 1221 compliant will keep you within guidelines for public safety and insurance purposes.

# 1. Reduce Response Time

In the world of first responders, time has always been of the essence. Responding quickly can make all the difference in saving lives, reducing injuries and minimizing property damage.

Much of the focus on reducing response time is placed on diminishing the time interval from fire station to scene. One critical element of the overall response time is referred to as “turnout time” – the time from incident receipt until the unit leaves the drive bay. Each step of the process – from incident reporting to first alert to dispatch and acknowledgement– can cost valuable time and can have pitfalls, such as:

- Unreliable communications and message integrity due to RF channel interference, signal fading, and intermodulation distortion; downed hard-link connections; and ambient noise in firehouse
- Inaccurate or ambiguous and slow delivery of critical information
- Missing or unclear incident information
- Limits of firefighting personnel to assimilate and retain verbal information while in emergency response mode.

Adopting a fire station alerting system that provides reliable alert delivery, a wide array of alerting media and devices and seamlessly streamlines and automates dispatch communications during the turnout process of the response cycle will shave valuable seconds from turnout time, and thus total response time.

## What Makes Up Response Time?

Incident Handling Time: from initial receipt of alarm to station notification.

Turnout Time: from station notification by audible and/or visual alerts until responding unit is en route.

Travel Time: from responding unit en route to arrival on scene.

Action or Intervention Time: from arrival on scene until some action or intervention is performed.

Total Response Time: from the receipt of the alarm at the primary public safety answering point (PSAP) to when the first emergency response unit is initiating action or intervening to control the incident.

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NFPA 1710 recommends that turnout time for fire incidents should take 80 seconds. Response time to an incident, by the initial arriving company, should be 4 minutes or fewer.

## 2. Reduce Firefighter Stress Levels

Occupational stress is inherent in firefighting and emergency response. But at no time in the history of the American fire service has this been more acute – as the increase in arson, acts of domestic violence, terrorist acts, automobile accidents, airplane crashes, hurricanes, tornadoes and earthquakes will attest. The rigors of firefighting, rescue and victim extrication are such that only the bravest among us need apply.

Other stresses on firefighters are more subtle, such as the effect of receiving alerts in the fire station – especially at night. Interrupted sleep, startling alarms and bright lights take their toll immediately as heart rates soar in response to alerts and again later with the onset of fatigue due to sleep deprivation.

Aspects of a system that minimizes these stressors include:

- **Ramped audio levels** awaken firefighters without the acute stress that abrupt ear-piercing tones can produce.
- **Low intensity lights** illuminate dorms, bunk rooms and exit corridors so that firemen don't lose precious seconds adjusting to bright lights and can safely navigate the egress while preserving their night vision.
- **Ambient noise level sensors** detect ambient background noise and automatically adjust volume levels accordingly to ensure critical audio alerts are heard, especially in noisy areas such as drive bays.
- **Zone-specific notification** provides custom tones and announcements, colored light indicators and appropriate speaker activation – by unit/incident, individual bunk or personal space, or all – so firefighters not needed for a call can continue sleeping, while those required can begin responding immediately.
- **Automated controls** open and close doors, display apparatus status, turn off appliances, control egress lighting, open bay doors and activate traffic signals, letting responding individuals concentrate on the incident.

“Overall, sudden cardiac death is the number one cause of on-duty firefighter fatalities in the U.S. and almost always accounts for the largest share of deaths in any given year. Sudden cardiac death accounted for 40 percent of the on-duty deaths in the last five years, and 49 percent in 2010 alone.”

- FIREFIGHTER FATALITIES IN  
THE UNITED STATES - 2010

Rita F. Fahy  
Paul R. LeBlanc  
Joseph L. Molis

June 2011

Choose a system that provides ramped and auto-adjusting audio levels, low intensity pathway lighting, incident- or unit-specific alerts and automated controls to reduce the physical and visual stress of night calls.

### 3. Improve Communications

When a fire or EMS unit is heading to an emergency, seconds can make the difference on whether someone lives or dies or whether a building burns to the ground. Communications clarity and accuracy are key to helping responding fire/EMS units understand the type of emergency they are responding to and where they are going the first time, without having to call the dispatcher and ask for information to be repeated.

With older bell and tone systems the only information available is what the dispatcher reads over the radio. When station personnel are moving fast it's easy to misinterpret spoken instructions about an emergency.

Fire station alerting systems can efficiently and effectively mobilize fire station staff for responding to an incident by controlling a wide array of alerting devices that present critical information to the appropriate individuals as quickly as possible in redundant configurations to ensure they can respond more quickly and more effectively:

- **Automated alerts and announcements** utilizing pre-announcement tones and text, alert tones, text-to-speech and real human recording provide the flexibility to customize and ensure clarity.
- **Audible and visual devices** provide backup to one another and present information in a way both audibly- and visually-cued personnel are most likely to retain. Bells, buzzers and sirens provide backup to PA and radio announcements, and various lighting options provide further redundancy.
- **Informational displays** such as LED, flat panel and television displays provide specific incident information including incident type; address, cross street and common name; responding units; tactical radio channel; and preplan information (such as warehoused apartments, type and length of line stretch, number of apartments per floor, unsafe conditions, standpipe conditions, etc.), if available, so that station personnel are armed with the critical information they need to respond safely and appropriately.
- **Rip-and-run printers** provide hard copy of dispatched information to responding units, eliminating the need to call back in if an alert was missed, thus saving time and clearing the dispatch channel.
- **Real time communications** and two-way messaging with acknowledgement provide live dispatcher interaction (dispatcher to station and station to dispatch) and ensure private and secure communications via touch-to-talk interface over Voice over Internet Protocol (VoIP).
- **Zoning** ensures that only those units or individuals required for response are alerted.
- **Turnout timers** make turnout time visible to responders and log timer data into the database, which can be accessed to perform turnout time analysis.

Make sure you chose a system that can efficiently provide up-to-date incident status, access to hazardous materials information, and other critical data about an incident to the appropriate personnel in multiple formats so they can quickly and appropriately respond.

## 4. Adopt a Flexible Deployment Architecture

One size does not fit all. Each fire station is unique and so are the needs of its personnel. Different deployment sizes and architectures are critical to meeting those needs.

You need to tune your FSAS deployment architecture to match your department and station needs, balancing several considerations including cost, scalability, and failover capability.

The most flexible architectures enable you to utilize a wide variety of alerting devices and transmission protocols. For example, you might choose to reduce the cost of your infrastructure by tying-in to existing equipment and deploying a combination of audio alerts and rip-and-run printers. Deployment strategies can change as your implementation grows to support more locations, companies, jurisdictions and alerting options.

### Expandable

Once installed, the FSAS can have a long lifespan. Therefore you'll want to keep the future in mind as you evaluate choices. Even if you don't have the funding to activate specific features today, you'll want to invest in a system that will be capable of supporting them later.

### Modular

Make sure the system you choose is modular, allowing for reconfiguration and expansion as needs and budgets change – without requiring extensive hardware changes. Choose the best and most cost-effective technology within your financial limitations.

### Customizable

You'll want to tailor a fire station alerting system specific to your department. Make certain you select a system that is highly configurable and can be tailored to meet your unique needs

### Scalable

Even a very large organization may start by installing FSAS in a single station or a subset of the department, before deploying more broadly across multiple stations and departments; or they may choose to start with fewer alerting options and expand to more over time. A flexible deployment architecture can help ensure a streamlined initial project while enabling the implementation to scale to any size needed.

Be sure the system you install can meet your current and future needs.

One department might use several different types of alerting devices - even for a single station. Even if you are starting with a basic FSAS implementation you need to be able to choose the best devices for your application, and to know that as your device requirements change, your FSAS solution will adapt and grow with you.

For this reason it's appropriate to expect that the application you choose will support a broad range of non-proprietary devices from different manufacturers.

## 5. Leverage Existing Systems and Devices

Most fire departments have an alerting system and/or some alerting devices in place; however many of the systems and associated equipment have been used for some time. Some systems or devices may be reaching the end of their useful life and need to be replaced; some may need modernizing, and some are fully operational.

Your day-to-day department processes are supported by your existing CAD, radio, public address, phone and lighting systems. With the substantial time and money you have spent analyzing, selecting and implementing these systems and developing the processes they support – and the challenge of obtaining new funding – you need to be able to incorporate a FSAS without costly retooling, or replacing existing systems and devices whenever possible. An FSAS should add value to, and enhance, the systems and processes you have in place.

Utilizing existing systems, cable plants, networks and equipment eliminates yet another potential cost and could mean fewer changes in operations for dispatch personnel.

Minimize your investment by choosing a solution that seamlessly integrates with existing Computer-Aided Dispatch (CAD), public address and radio-based systems. Further, by utilizing non-proprietary equipment you can make purchasing and maintenance more cost-effective.

## 6. Built for High Reliability and Accessibility

For people who put their lives on the line every day, reliable communication is vital. Reliable fire station alerting depends on crucial alerts reaching their destination every time. When a communications or device failure occurs and fire station personnel are not made aware of it, responders are delayed in responding to emergency calls.

### Automated Self-Monitoring

Automated fire station monitoring allows designated personnel to quickly determine equipment problems within the fire station such as failed communication hardware, downed lines and backup power system operation. Look for a system with sophisticated self-monitoring that provides in-station visual and audible notification and that can tie into text messaging or email servers for real-time notification of a network or alerting system malfunction. This enables fire service personnel and the system vendor to begin proactive correction of the problem, thus maximizing system uptime and reducing the chance of a missed call.

### Redundant Architecture Design

Take a fully redundant and "layered approach" to your FSAS plans. Look for a system that provides:

- **Device redundancy** – visual and audible devices
- **UPS (Uninterruptable Power Supply)** backup that powers the system when the electricity in the station is out
- **Clustered or redundant servers** on site with automatic failover
- **Geographic redundancy** with support for multiple dispatch locations and the option for geographically separated backup servers with near-instantaneous switchover (automatically or manually)

You'll want to implement a system with no single point of failure. Redundant equipment, communication paths and backup sites can take over for damaged parts of the network, ensuring uninterrupted communications. Backup power supplies ensure your critical systems stay up during power failures.

### Voice over Internet Protocol (VoIP)

IP-based solutions are highly secure, highly reliable and won't clog existing radio networks. They allow for private two-way communications and promote better dispatching between dispatchers or Emergency Operation Centers and responding units for seamless and immediate response.

### Software-Based System

In addition to providing more flexibility to customize a solution to meet your unique needs, software-driven technology is easier to upgrade than traditional hardware-based systems. Because they are digitally programmed, customers can make easy, on-the-go changes to the configuration.



## 7. Designed for Service First

Because FSAS systems are used in life-safety environments you should have an expectation of service performance. Downtime is not an option. Look for FSAS solutions that feature a service-friendly architecture – serviceability should be designed into the technology. The alerting system should offer robust self-monitoring that provides in-station visual and audible notification and that can tie into text messaging or email servers for real-time notification of a network or alerting system malfunction.

The FSAS should also be designed for remote administration so that updates and other fixes can be installed from a central location, such as the department's communications facility or fire headquarters, and pushed out to all fire stations. This eliminates costly and time-consuming trips to the individual fire stations throughout the city or county for normal service calls.

As importantly, partner with a vendor who has a demonstrable *attitude* of service. One who will do whatever it takes – from providing preventative maintenance and repair maintenance to supporting you whenever and wherever you need it – to ensure your systems operate seamlessly 24/7 so you can focus on priority #1: protecting the lives and property of the communities you serve.

Not only should your vendor provide reliable, redundant solutions, but they should have proven experience supporting the most complex and vital systems during times of extreme crisis, on a daily basis, to ensure your systems perform to their maximum capacity – always.

Look for a vendor who provides:

- 24/7 infrastructure and capabilities
- Proven record of high-value support
- Fully equipped maintenance facilities
- Site activation, outfitting and post-construction build out

### Reliable Solutions, Proven Experience, Attitude of Service, Steadfast Results

- Skilled team with deep client relationships, domain knowledge and skills
- Time-tested approach, sustainable processes & exceptional customer service
- Breadth of capabilities, including system integration, software and hardware development, defense expertise, engineering, field services, call center and more.

## 8. Use a Standards-Based Approach

The NFPA has many standards – most voluntary and some mandatory – that affect fire departments. These standards protect fire and rescue personnel from unnecessary workplace hazards and establish the standard of care that may be used in civil lawsuits against fire and rescue departments. Accordingly, fire and rescue departments should pay close attention to applicable standards. You need an alerting system that won't cause your department to fall short of NFPA compliance – one that meets NFPA 1221 standards and helps you meet the requirements of NFPA 1710 and 1720.

In addition, in the interest of interoperability and cost justification, many first responders are being asked to participate in citywide, countywide, statewide, or national shared communications systems.

Fire departments have established mutual aid agreements with nearby communities and with local, state and Federal agencies, which places critical importance on networks that can interoperate with other departments and jurisdictions. Communities are recognizing the benefits of sharing one system across multiple departments in order to share costs and ensure reliable and available communication when events require a joint response.

Deploying a modern, standards-based FSAS and related technologies to facilitate the dispatch of fire and EMS first responders to a call puts your department in a better position from a compliance, interoperability and cost perspective.

Fire departments wishing to take advantage of modern FSAS technology should look for hardware and software products that adhere to NFPA and other standards for several reasons:

- Compliance protects the health and well-being of first responders and the community it serves.
- Observance minimizes liability exposure for the fire department.
- Standards incorporate best practices for architecting scalable FSAS solutions.
- When multiple vendors adhere to a vendor-neutral standard, customers benefit from products that can interoperate easily.
- As standards evolve compliant products will keep pace with technological advances.
- Standards compliance can ultimately translate to lower risk of property loss in your community, which the insurance standards board will recognize in setting lower community insurance rates.

### National Fire Protection Association (NFPA) 1221 Recommendations

- Redundant dispatch circuits
- Switch-over operation
- Self-monitoring
- Back up time during power loss
- Alert tones
- Automatic recording of system activity
- Alarm alert acknowledgment from the fire station to the dispatcher
- Manual GUI alerting backup to Computer Aided Dispatch (CAD) for added level of redundancy

## Conclusion

The world of first response is not static. Fire departments constantly review and revise their processes in response to community needs, organizational changes, new locations, compliance and interoperability requirements and/or new technologies. Because a FSAS is a critical part of your overall response processes, your FSAS implementation will need to be tailored to your department.

Whatever your objective – replacing or upgrading an existing system, expanding your FSAS alerting options or building out a new FSAS – the factors discussed in this white paper are critical to your success. To review, implement a complete FSAS solution; one that:

- **Reduces response time.** Demand a solution that provides reliable alert delivery and streamlines the emergency response process.
- **Minimizes firefighter stress levels.** Choose a system that provides ramped and auto-adjusting audio levels, low intensity pathway lighting and incident- or unit-specific alerts to reduce the stress of night calls.
- **Improves communications.** Deploy a solution that provides a variety of devices that present critical information to the appropriate personnel.
- **Adopts flexible deployment architecture.** Invest in a system that is modular, customizable and scalable, and allows for reconfiguration and expansion as needs and budgets change.
- **Leverages existing systems and devices** and minimizes your investment. Select a solution that provides seamless integration with existing Computer-Aided Dispatch (CAD), Public Address (PA) and radio-based systems.
- **Is built for high reliability and accessibility.** Opt for a system that offers redundancy, no single point of failure and system self-monitoring, backed by a committed team that provides ongoing support and maintenance whenever and wherever you need it.
- **Is designed for service first.** Look for FSAS solutions that support a services-oriented architecture and a vendor who has a demonstrable *attitude* of service and proven experience.
- **Use a standards-based approach.** Adopt a system that is standards-based and NFPA 1221 compliant to keep you within guidelines for public safety and insurance purposes.

Innovative fire departments recognize the strategic value of Fire Station Alerting Systems and are expanding early deployments to include a broader range of capabilities. By following the eight critical success factors outlined here, your fire department will be well-positioned to integrate FSAS into its operations, reducing operating costs, and improving the speed, efficiency and safety of teams, equipment and critical infrastructure to save lives and property.