

CHAPTER 3:

Are You Prepared?

Assessing Interoperability

What is the status of your public safety radio communications?

Consider what happens when there is a major traffic accident on one of our country's interstate highways. In most areas, multiple agencies respond, including State and local law enforcement, local firefighters, local emergency medical personnel, transportation or highway department personnel, and, depending on the circumstances, hazardous materials teams.

Unfortunately, in most areas, few if any of these agencies can share information directly with one another through their radio communication systems. They must either rely on face-to-face communication, which can waste precious seconds, or relay information through independent communications and dispatch centers.

There are assessment tools that can be used to determine the level of interoperability in your community, region, or State. At the end of this guide, there are tools for public officials to use to assess current interoperability, existing radio communications infrastructure, and financial resources.

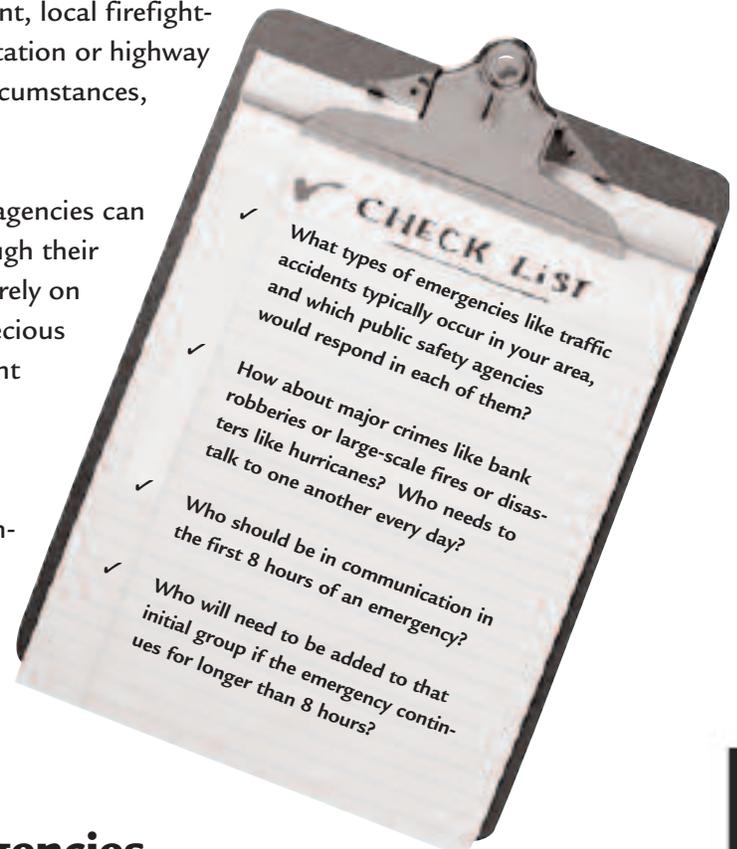
Frequently occurring emergencies

Some types of emergencies occur on an almost daily basis. These include major traffic accidents, violent crimes, hostage situations,

To develop a basic snapshot

of interoperability, ask the

following questions:



It had been 30 years since Indiana residents had been witness to a blizzard like the one that slammed into northwest Indiana in early 1998. Roads were blocked with stranded vehicles and desperate drivers inside awaited rescue. Rescue efforts were slowed when law enforcement, emergency medical services, and the department of transportation could not communicate with one another on their radios during the snowstorm.

— Les Miller, Chair,
Governance Working Group
Executive Director,
Integrated Public Safety
Commission,
Indiana State Police

industrial accidents, and similar incidents. Think about what types of incidents occur in your community, State, or region. Which agencies would be likely to respond to these emergencies? Typically, several law enforcement agencies—the police, sheriff, State Patrol, etc.—would respond to these incidents. In addition, several emergency service agencies—the fire department, EMS, and Hazmat teams—might also respond.

While often not considered part of the public safety response, public infrastructure agencies, such as transportation, public works, and the utilities, provide important services in these emergencies and cannot be overlooked.

Which of these agencies can directly communicate through voice and/or data to share information? More than likely, few, if any, of these agencies can directly communicate with one another.

Major crimes or incidents

Major crimes or incidents include bank robberies, child kidnappings, large-scale fires, chemical leaks, large-scale industrial accidents, train derailments, school shootings, airplane crashes, and similar occurrences. Have any of these incidents occurred in your area or could they? Which agencies would be needed to respond to or be used in mitigating the effects of these incidents? Multiple law enforcement, emergency services, and public safety support agencies would likely respond. On the way to the scene and after arrival, who would be able to directly communicate with one another?

Large-scale disasters or incidents

Large-scale disasters and incidents include hurricanes, tornadoes, earthquakes, terrorist attacks, and similar incidents. Which of these events have affected or have the potential to affect your jurisdiction? No jurisdiction is immune.

Response by any number of agencies, including State and possibly Federal emergency management agencies, would be needed during and after the incident. Returning to some sense of normalcy would require the total cooperation of these agencies. Cooperation requires the ability to exchange information. On-the-scene, real-time radio

communication across typical communication boundaries is a necessity. Communication is the key to minimizing loss to life and property.

What radio communications system resources do you have?

Radio communications systems are expensive. Costs will vary depending on the level at which the system is to be developed, used, and/or shared and whether systems will be upgraded, replaced, or designed from scratch. While there is no way to accurately assess the costs of such systems, they can range from a few hundreds or thousands of dollars to more than a billion dollars. At the State level, replacing basic radio systems for a single public safety agency can cost between \$100 million and \$300 million. When considering statewide systems that involve multiple agencies, the costs are in the hundreds of millions, even as much as \$1 billion for large State efforts, such as New York. Figures cited for developing interoperability nationwide have ranged from \$18 billion to three times that figure. With this financial stake, it is important that systems meet current and future needs.

Ensuring that new communications systems are not obsolete before the first radio is issued is a daunting task. Planning is critical and must begin with an assessment of existing radio communication systems to establish a baseline that includes an analysis of operational processes—how and under what conditions radio communications operate in their current state, and technical operations—the equipment and software that allow radio communication systems to work.

Where do you need to be?

In everyday events and major incidents, agencies have different communication needs and requirements. Research different past events and possible major incidents to determine the answers to the following questions.

With whom do I need to communicate?

- Local, State, and Federal public safety and transportation agencies
- Other government agencies



The Kinneola, California, firestorm drew thousands of firefighters, the U.S. Forest Service, local law enforcement, the Highway Patrol, and emergency medical services to support firefighting and rescue efforts. Also on site were the Red Cross, the Salvation Army, Los Angeles Parks and Recreation, utility companies, railroad and transportation, volunteers, and the media. As the fire raged out of control, the VHF channels used for tactical situations became overloaded and communications interoperability became increasingly difficult. Although all fire departments were supposed to be equipped with VHF radios, some did not have them and others had changed the designations of the tactical channels.

— Source: ATLAS Project Report

- State and Federal emergency management agencies
- Local, State, and Federal government officials
- Media
- Medical community
- Utilities
- Private agencies

How do I need to communicate?

- Direct voice communication
- Direct data communication with access to multiple data sources
- Cellular telephone
- Fax
- Email
- Web site

What information do I need to exchange?

- Records management information
- CAD (Computer Aided Dispatch) data
- Intelligence information
- Unit status
- Incident management information
- Traffic information
- Weather information
- Road information
- Bureau/Department of Motor Vehicle information
- Criminal history, stolen property, wants and warrant information
- Pictures, including mug shots, incident and accident scene photos
- Inventories/lists of resources available and/or needed
- Building plans
- Hazardous materials handling information
- Medical information
- Direct voice interaction
- Direct data messaging
- Other data sources

When do I need to exchange information and communicate?

- Should this communication link be available at all times?
- Should the communication link have to be connected by someone?
- How much time is acceptable to develop this communication link?

Under what circumstances does the agency need to communicate?

- Criminal investigations
- Traffic-related incidents
- Manmade and/or natural disasters
- Terrorist attacks
- Routine duties
- Special events (sporting events, civil disturbances, demonstrations, holidays, etc.)
- Other functions

Where are you now?

Identify your current communication/information systems' status.

My agency can communicate with the following agencies:

- Local, State, and Federal public safety and transportation agencies
- Other government agencies
- Local, State, and Federal government officials
- State and Federal emergency management agencies
- Media
- Medical community
- Utilities
- Private agencies (Which ones are key to your agency?)

My agency can communicate using the following methods:

- Direct voice communication
- Direct data communication with access to multiple data sources
- Cellular telephone
- Fax
- Email
- Web site



*Which agencies need to
communicate but can't do
so using the current radio
communication systems?*

*How can you accomplish
this critical task?*

My agency can exchange the following information:

- Records management information
- CAD (Computer Aided Dispatch) data
- Intelligence information
- Unit status
- Incident management information
- Traffic information
- Weather information
- Road information
- Bureau/Department of Motor Vehicle information
- Criminal history, stolen property, wants and warrant information
- Pictures, including mug shots, incident and accident scene photos
- Building plans
- Hazardous materials handling information
- Medical information
- Direct voice interaction
- Direct data messaging
- Other data sources (list)

The communications links are available:

- At all times
- Link has to be connected by someone (e.g., physically established by dispatch personnel)
- The time is acceptable to develop this communication link

Under the following circumstances, the agency can communicate:

- Criminal investigations
- Traffic-related incidents
- Major manmade or natural disasters
- Terrorist attacks
- Routine duties
- Special events (sporting events, civil disturbances, demonstrations, holidays, etc.)
- Other functions (list)

How do you get where you need to be?

Who should be involved in developing the interoperability plan?

- Who are the stakeholders that need to be involved in the planning?
- Which decisionmakers should be involved in planning?
- What type of technical and field expertise will be needed to develop the plan?
- Will outside expertise be needed to develop this plan?

What are the roles and responsibilities of all agencies that are involved?

- Law enforcement
- Transportation
- Emergency medical services
- Fire
- Utilities
- Emergency management
- Other (list)

Will addressing this problem enhance your ability to serve and protect the citizens?

- Is the plan cost effective?
- Are goals realistic and attainable?

Who are potential partners, champions, and allies?

- Who has resources that can be shared to help agencies involved accomplish their missions?
- Who understands the communications problems faced by those involved and is willing to champion the process?
- How can the plan include shared networks and resources?
- How can trust be built into developing the plan?
- How can all parties feel ownership in this plan?
- How can more of them be enlisted to join the effort?
- What political partners, champions, and allies can be developed?
- What media partners, champions, and allies can be developed?

What are the priorities of the plan?

- What should be done in the first phase (most critical)?
- How many phases will the plan require?
- How much time is needed to accomplish the plan? (controlling expectations)

What are the technical solutions available to address the problem?

- Technical plan

What funding is available to address the problem?

- Grant funds (local, State, Federal, private)
- General funds

What can I do right now?

There are a number of interim solutions that can be implemented in the short term to improve the level of communications interoperability. Some of these solutions include the following:

Deploying second radios

In jurisdictions where there is a need to communicate with another jurisdiction with an incompatible system, one solution is to provide a second radio in patrol cars or fire or EMS vehicles. If the radio installed is a VHF or UHF unit, this can be a relatively low-cost solution. There are some disadvantages—it can be difficult for personnel to monitor different systems, especially during an emergency, and installation space for additional radios is often at a premium in modern emergency vehicles. Most important, interoperability occurs only when within the coverage of the other radio system or when talking point to point.

Channel patching

Various technologies are available to "patch" or connect different radio frequencies. The simplest form of patching is installing a radio that can access another system in the dispatch center and making an audio patch with wiring. A more technologically advanced example of patching, the ACU-1000, connects each attached radio through a switching system. The dispatch center has a computer program that allows point and click connection of various agencies. More than one patch group can be connected simultaneously to

- Special funds
- Other funds (list possible sources)

Once the answers to these questions have been carefully considered, you will have a more accurate understanding of communication system needs and how to ensure that your system meets current and future needs.

What financial resources are spent on public safety communications?

The nationwide investment in radio systems and supporting infrastructures for most public safety and public service interoperability is already substantial. As agencies replace aging equipment and adopt new technologies, the amount of money invested in telecommunications equipment will continue to grow. What existing radio communi-

Interim solutions to improve interoperability

a number of operations, and cell phones can also be connected to other radio frequencies. Unless the ACU-1000 serves as a transmission site, it and other forms of patching work only in those areas where system coverage overlaps. Other similar products exist.

Radio cache

In areas where day-to-day and first response mutual aid interoperability is good, a cache or stored supply, of portable radios can be used to provide interoperability to second-echelon mutual aid. As an incident develops, new personnel arrive at the staging area. As assignments are made, personnel are given portable radios with the channels necessary to communicate with incident command. Portables are multi-channeled and on-the-spot programmable so that additional channels can be added as needed for tactical operations.

Use of commercial services

In some circumstances, cell phones, and other commercial services, can bridge an interoperability gap. The applicability of these solutions for general public safety communications is limited by cost and lack of flexibility. The Federal government is working with the commercial services industry to provide priority access services over cellular phone systems to a limited number of public officials across the country.



Emerging Technologies

Technology is changing at a rapid, almost exponential rate. Future communication systems may be web based or use satellite technology. As you plan, consider how technology development may affect your long-term interoperability solutions.

Software defined radios

Not yet universally available or optimized, software defined radios are a different concept than the traditional radios that are limited by their design to operate in a narrow portion of the radio spectrum. A software defined radio is a universal radio that can talk to many different types of radios. It uses software to perform all of its signal processing, allowing a single communications device to communicate with many different wireless systems by simply running different software. For example, a device can be re-programmed to be an analog cellular phone, a digital PCS phone, a cordless home phone or even a garage door opener, baby monitor, or television. In addition to incorporating multiple communication devices into one, a software radio can be upgraded to enable new standards and services. Technical and regulatory hurdles must be overcome before software defined radios become a reality.

cations infrastructure do you already have? What financial resources are budgeted for public safety communications? What are you already spending on public safety communications? Developing interoperability does not necessarily require new spending—planning for interoperability can be incorporated into the process of replacing and upgrading radio communication systems.

Change is difficult and when change comes with a price tag, it becomes even more difficult. Prior to looking outside of the community, jurisdiction, region, or State for possible solutions, a complete assessment of the resources—both the existing public safety communications system infrastructure and financial resources—that already exist must be conducted. Once this list is developed, then appropriate actions can be determined to fill in the gaps. Each community, region, or State has a reservoir of hidden or untapped resources. Conducting this assessment avoids the duplication of existing resources and unwise expenditures of time and money.

Agencies with similar needs may be duplicating each other's purchases or could benefit by working together to achieve economies of scale. How much could you ultimately save if you coordinated planning and spending with other agencies or jurisdictions in your community, region, or State? For example, the cost to procure equipment for a 5-channel digital trunked radio system with 500 users and a single base station site, as would be found in a medium-sized community with a population of 75,000 to 100,000, has been estimated by industry to cost around \$2,700 per user. If this community could consolidate with surrounding communities to implement a 20-channel digital trunked radio system with approximately 2,400 users and 2 base station sites, as would commonly serve a population base of 375,000 to 500,000, the cost per user drops to \$2,400—a savings of about \$300 per user or a savings to the original community of 500 users totaling about \$150,000.

It should be noted that this cost analysis example highlights the costs of standalone versus consolidated systems, based upon the cost reductions that can be obtained through large purchases and the efficiencies obtained with larger trunked radio systems. This example is based on implementing new technology, digital trunked radios in the radio bands most commonly used by today's first responders, primarily fire and law enforcement departments.

With annual radio system maintenance costs of about 10 percent of equipment costs, this same community of 500 users would double this savings over the typical 10-year life of this radio system. Importantly, this savings is for equipment costs only. Ongoing personnel and equipment savings from the consolidation of dispatch centers can easily exceed this equipment savings each year. A major advantage of consolidation is that interoperability among the users of the consolidated system is inherent in the design of the system, assuming proper operational guidelines are developed by the participating agencies.