Radio Silence

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Despite the fact that communication is a key element of effective and safe emergency response operations, the fire service has experienced the effects of communications breakdowns in almost every major incident within recent memory. As a result, resources are underused and personnel safety is jeopardized.

Communications problems are clearly recognized in after-action reports. For example, reports on the Columbine High School shootings recognized the problems created by units self-dispatching and the congestion and eventual overload of radio channels. Five years later, the same problems occurred during the attacks on the World Trade Center. Many units self-dispatched to the scene, creating resource management problems for commanders who were unable to determine which units were operating where. The one main radio channel quickly became congested and overloaded, thus limiting the commanders' ability to provide direction and exchange information. As a result, critical command-and-control decisions had to be made with limited knowledge.

Major incidents involving large numbers of units and personnel require extensive communications system planning from a strategic perspective. Without a comprehensive communications plan developed specifically for large-scale operations, communications systems become overloaded and inoperative, which in turn jeopardizes command and control. Because communications system planning continues to be problematic for the fire service, it may be beneficial to look outside the fire service to learn new ways to strategically manage communications systems.

FEDERAL AVIATION ADMINISTRATION LESSONS

Communication between air traffic controllers and aircraft operating in their airspace is critical for effective operations and the safety of air crews and passengers. Air traffic controllers have absolute authority over the airspace they manage. While the pilot has absolute authority over the safety of the aircraft, the air traffic controller has authority over where the aircraft goes and how it will communicate with another.

When an aircraft approaches the boundary between one airspace sector and another, the air traffic controller contacts the receiving sector and confirms that they are able and willing to accept the aircraft. Once permission is granted, the air traffic controller of the sending sector notifies the aircraft to contact the air traffic controller of the receiving sector on a specific frequency. The control and transfer of resources from one sector to another follows a specific procedure, as does the practice of changing radio frequencies. In addition, the air traffic controllers and pilots use standardized terms and phrases to minimize radio traffic and ensure that each communication is clearly understood by all.

What can we learn from these practices? Fire dispatch and communications centers are similar in operation to Federal Aviation Administration air route traffic control centers. They're responsible for the movement of resources through their “groundspace” in the same way that

air traffic controllers are responsible for the movement of aircraft through airspace. Dispatch and communication centers must have positive control, or at least positive awareness, over the movement of resources through their groundspace.

Control over resources is essential for an effective and well-organized response. When automatic or mutual aid resources respond to an incident, the communications center of the sending jurisdiction should contact the center of the receiving jurisdiction and confirm that they are prepared to take responsibility for these units. In addition, the method these units will use for communicating with the receiving center must be established clearly.

The sending communications center then notifies the responding units to contact the receiving communications center and confirm their location and destination. The receiving communications center now has positive control over those resources, and can direct them to the appropriate destination, whether that's to a base area, staging area or directly into the incident.

A few other air traffic control practices also may be useful for the fire service. During busy travel times, as many as 20 aircraft are directed by one air traffic controller on one frequency. When the number of aircraft exceeds 20, the frequency becomes congested with radio traffic so the sector is split into multiple frequencies. Experience in the context of air traffic control indicates that more than 20 people talking on one frequency creates communications problems.

During the course of an emergency incident, when the number of units on scene exceeds 20, consider splitting the incident into multiple frequencies to prevent congestion and overload. While changing frequencies creates its own set of problems, the alternative is eventual communications breakdown. Congestion and overloading of frequencies or channels eventually can cause communications systems to become totally inoperative.

The establishment of a regional situation display is another practice that may be useful for the fire service. In order to anticipate workload and be aware of what's going on around their airspace, each air traffic control center can monitor activity in the regional sectors with which they share a jurisdictional boundary. Each center is aware of what's going on around it so controllers can anticipate any possible impact on their airspace. Most fire dispatch centers focus on their own jurisdiction and know nothing of what is occurring around them in other jurisdictions.

LESSONS FROM THE FOREST SERVICE

Wildland fire operations require an extensive communication system spread over a wide geographic area. Communications are considered critical enough that every Type 1 Incident Management Team has a Communications Unit Leader, or COML, who is responsible for establishing and maintaining effective communications for the duration of the incident. The COML also manages radio frequencies, requesting and assigning those used during the incident.

National frequencies also are used during fire operations. These are pre-assigned for general incident communication purposes, as well as for communicating with various air support resources. Policy and procedures establish separate frequencies for command, tactical ground and aviation operations.

Wildland fire attack operations are defined by type. Initial-attack operations are smaller incidents that require only local resources and are contained within a relatively short period. Extended-attack operations require significantly more resources, a more extensive command structure and longer periods to contain.

Initial-attack operations are expected to be more dynamic and chaotic, with some communications system congestion as the command-and-control structure begins to form and resources are organized. When an incident moves from the initial attack to the extended attack, communications are moved from the local communications system onto the U.S. Forest Service communications system. Units and personnel that don't have the capability to communicate on this system are issued radios by the COML.

As a fire incident develops into an extended attack, the communications system is extended based on the Incident Command System and documented using ICS Form 205, Incident Radio Communications Plan. Command and tactical communications are assigned their own set of frequencies to separate tactical from logistical communications. Separating these operations reduces the possibility of overloading the tactical operations network.

Within this tactical network, separate frequencies also may be assigned for each division or group. As an incident expands, more than one division or group may be assigned to a frequency. Each engine or crew is assigned a radio, and up to 20 or 30 units may be operating in each division. While separate frequencies on the VHF system are used for command and tactical operations, an entirely different system may be used for logistical functions, such as UHF or satellite or cellular phones.

Using multiple frequencies or channels requires certain positions within the communications network to scan more than one frequency or channel. For example, division supervisors must scan the operations channel as well as their assigned division channel. If a task force assigned to a division doesn't have the division channel, then the task force leader must scan both the task force and division channels. The priority channel for division supervisors is the division frequency, while the priority for command staff is the command frequency. Multiple channel operations and scanning add a level of complexity to incident communications that requires comprehensive training and strict discipline.

To maximize the effectiveness of communications system resources, communications units have the capability to reprogram radios in the field and are responsible for setting up and maintaining mobile repeaters. In addition, communications units carry standardized radio communications kits for field deployments. For example, the Command Radio Kit contains 16 portable radios for use in command and tactical operations. The Starter System — ICS Command/Logistics Radio System consists of two repeaters, three remote base station kits, one ground-to-aircraft link kit, three Command Kits (48 radios) and one Logistics Kit (16 radios). These kits are standardized across the nation and are part of the National Incident Radio Support Cache.

Communications to and from the incident command post are conducted by radio operators, not the incident commander. During wildland fire operations, the incident commander rarely talks on the radio. Instead, the IC is involved in planning and decision-making. Tactical issues that require a decision go to operations or command through the tactical network. Logistical issues go through the logistics network to the appropriate support or supply unit.

In either case, the radio operator takes the message and forwards the decision or resource request to the appropriate command staff. This allows command staff time to think through the decision rather than be distracted by having to talk on the radio. Command staff must have time to consider alternative incident action plans and the impact of different strategic and tactical options to make the best possible decisions.

LESSONS FROM THE ARMED FORCES

The military has long recognized that radio communications resources are limited. If communications aren't managed properly, their systems become saturated and overload. When this occurs, operational performance and personnel safety are seriously degraded. The lives of soldiers and the success of the battle depend on a communications plan that is uncomplicated, reliable, flexible and responsive. Firefighters depend on the same factors in fire combat operations.

The primary purpose of communications is to provide the ability to direct resources and exchange information in support of command-and-control functions. To ensure command and control, the military uses a combination of communications systems, such as VHF, UHF, 800MHz and cellular systems. Because each system uses a different pathway for transmitting communications, the probability that at least one of the systems will work properly at any given time is increased. A primary and secondary means of communications, using different systems, is essential to provide redundancy and reliability.

Because the use of multiple channels or systems makes communications more complex, communications system planning must be completed before resources are deployed to ensure that communications systems are completely operational and interoperable. At the operational level, communications planning requires

Identification of command structures and relationships
Understanding of communications operating instructions by field units
Evaluation of assets to determine any interoperability problems
Determination of frequency management methods
Development of communications support plan

The communications operating instruction used in the military is similar to ICS Form 205 but provides more detailed information. If used by the fire service, a communications operating instruction would be established for each incident that provides general instructions; call sign designations; frequency, channel or system assignments; radio communications system designations; and warning signals.

Military operations generally require three different categories of communications networks: command/control, administrative/logistics and intelligence. Command-and-control networks are further divided into functional areas such as fire support, aviation, air defense and artillery. Dividing the communications system into operational networks supports command and control of resources and minimizes communication traffic loading.

Units assigned to command-and-control networks are also “subscribers” to at least one other network. For example, artillery units also must be able to communicate with the command-and-control network. As in the case of the Forest Service operations, this requires that units be able to scan and switch channels as necessary during the course of the operation.

Separating the command-and-control network, or C2, from the administrative/logistics network prevents congestion and overloading of the C2 network during operations. When the C2 network is further divided into functional areas of operation, each functional element must be able to coordinate and communicate with the higher, lower and adjacent elements involved in the operation.

Managing and coordinating the frequency or channel assignments of these functional elements is a critical task. Frequency assignment involves the following functions:

Determine frequency requirements
Obtain required frequency resources
Match resources to requirements
Distribute resources to users
Evaluate and optimize frequency use

All of the radios assigned to a particular network must be able to operate on the same frequency. If units are not able to communicate on the operational frequency, then they should be reassigned to an operational function that includes a radio frequency or channel that they are able to use.

Communications involving the exchange of information flows between units or companies as well as to and from higher and lower echelons or command levels. Units engaged in operations must be able to make requests for support and receive tactical direction from upper levels of command. They also must be able to provide information and operational progress reports to upper levels of command. If units can't participate in command-and-control interactions or tactical communications, they are of little value as an operational resource.

BEST PRACTICES

Strategic communications should include the following practices:

Communications centers must have the authority to establish and maintain positive control over responding resources within their groundspace. The terminology, phraseology and procedures for handing over resources and changing frequencies or channels must be established on a regional basis.

Provide redundancy in communications by establishing a primary and secondary communications system. Complete the communications system planning process before units are deployed on a major or extended operation. Anticipate and plan on the use of multiple frequencies, channels or systems for major operations involving large numbers of resources from multiple jurisdictions and disciplines.

Command communications should be separated from logistical communications by using a completely different system. Logistical communications can be placed onto a cellular phone service, but these systems can also become overloaded and stop functioning. Another option is to use the push-to-talk radio capability provided by several cellular service providers. Use the systems that operate on a separate network from the cellular phone services, as these systems will continue to operate if the cellular services become overloaded.

Divide command-and-control networks into functional areas of operation. Assign no more than 20 radios to one frequency or channel. Manage the allocation, distribution and assignment of communications systems resources by filling the communications unit leader position for any major event. The communications unit should use ICS Form 205 for tracking frequencies, channels and systems.

Establish procedures for changing frequencies and scanning multiple channels. Of course, personnel must be trained in multiple frequency operations. In addition, communications kits should be established on a regional basis to provide the capability of overcoming the problems associated with a lack of communications resources and assets that may be available to any one jurisdiction.

Keep the incident commander off the radio. As difficult as this may be to actually accomplish, the IC needs to be involved in planning and decision-making.

If units aren't able to communicate, reassign them or send them home. If we look outside of our own past, the methods and practices for improving the strategic management of fire service communications systems present themselves for our consideration. Ideally, fire departments will experiment with some of these ideas and begin to move the fire service out of the cycle of communications system breakdown.

For more assistance in improving communications within your fire department, download "Top Priority: The Fire Service Guide to Interoperable Communications" at .

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