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TOWARD CRIMINAL JUSTICE SOLUTIONS

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Communications Interoperability: Basics for Practitioners

Key Points

- Interoperability is the ability of field units and agencies to talk and share data in real time, when needed and as authorized.

- Real-time data exchange is critical to public safety.

- Communications interoperability is often a challenge because public safety agencies use radios that operate in various frequency bands.

- Different agencies (police, fire) or agencies from neighboring jurisdictions often do not use the same frequency.

- Other obstacles include frequency availability and equipment incompatibility.

- Products are available to facilitate limited interoperability.

- Achieving interoperability requires addressing operational as well as technical obstacles to include common procedures and governance agreements.

- NIJ, through its CommTech program, works to develop solutions to these problems.

COMMUNICATIONS INTEROPERABILITY CHALLENGES

Frequency incompatibility. Public safety agencies from different jurisdictions often need a coordinated response during operational activities such as critical incident response, mutual aid events, or joint task force operations. Different agencies use public safety radio communications equipment that is often incompatible, so responders may not be able to talk with each other directly via radio. Public safety radio systems are often incompatible because they operate in different frequency bands similar to the AM and FM bands of a car radio.[1] Just as an AM radio cannot pick up an FM radio station, public safety radios in one frequency band cannot pick up transmissions from those operating in another band.

Precious time can be lost while dispatchers manually relay emergency communications between radio systems. Sophisticated technology to include analog and digital radio trunking systems has compounded this issue. Even if two radio systems are operating in the same frequency band, one manufacturer's radio usually cannot successfully receive signals/transmissions from another's. This is also true of some nontrunked radio products that operate within the same band. As a result, when responding to a major incident, agencies often use inefficient, nonradio methods to indirectly relay messages, severely obstructing an immediate response.

Equipment incompatibility. Interoperability can be facilitated if all agencies throughout a region purchase compatible equipment and create an

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infrastructure that operates in a single frequency band. The cost of deploying such a system, however, is often too great, considering that system characteristics may require replacement of equipment and/or the construction of additional tower sites. Characteristics of different frequency bands are such that the best solution for one agency may not be the best for another. For example, some radio bands perform more effectively in urban areas than in rural areas, and some work better within buildings. Finally, radio channels may not be available to support all agency requirements within a single band.

Limited interoperability can often be achieved by deploying equipment that receives a radio transmission from one frequency and automatically retransmits it on another frequency. These systems fall into the general category of gateway interconnect devices.[2] Such systems can often be deployed without major changes to an existing radio system infrastructure and can vary in capability and cost.

POSSIBLE SOLUTIONS

Additional spectrum allocation. The Federal Communications Commission has allocated public safety frequencies in the 700 MHz band. As this band becomes available, it will provide opportunities for agencies or coalitions of agencies to obtain much-needed additional channels. The 700 MHz band provides additional capacity, but it also introduces another potentially incompatible band.

Standards-based equipment. A number of initiatives can help solve these interoperability challenges,[3] and standards continue to be developed. For example, Project 25 compliance allows standards-based radio equipment made by different manufacturers to interoperate. This will eliminate many interoperability challenges as more efficient and backward-compatible standards are developed. Multiple manufacturers of standards-compatible equipment facilitate an environment more conducive to a competitive procurement process.

However, neither standards nor additional spectrum will provide a complete solution to interoperability challenges. Agencies will continue to use radio systems that operate in different frequency bands, choosing the bands that best suit their needs. NIJ,

through its CommTech program, is working to help develop solutions to these problems and to provide information about this issue to the law enforcement and public safety community.

OUTLOOK

Interoperability challenges extend beyond technical and cost issues. Interagency planning and governance among participating agencies is critical. Technology can enable interoperability, but public safety executives must foster collaborative interagency relationships to utilize fully any deployed capability. Policies and procedures must be developed to determine who can authorize a link and under what circumstances and what radio protocol will be used. Plain English is recommended, but users may also need a limited set of agreed-upon codes. Multiagency training is important to provide realistic practice using radios to communicate with officers of other agencies. Finally, it is important that field officers use interoperability equipment frequently as part of their daily operations to ensure familiarity and preparedness for a major incident.

FOR MORE INFORMATION

- NIJ's CommTech Web site: http://www.ojp.usdoj.gov/nij/topics/commtech/
- Regional National Law Enforcement and Corrections Technology Centers:

  Northeast (Rome, NY) 888–338–0584

  Southeast (Charleston, SC) 800–292–4385

  Rocky Mountain (Denver, CO) 800–416–8086

  Western (El Segundo, CA) 888–548–1618

  Northwest (Anchorage, AK) 866–569–2969

  Rural Law Enforcement Technology Center 866–787–2553

NOTES

1. See NIJ InShort, *Radio Spectrum,* NCJ 212975, February 2006.

2. See NIJ InShort, *Interoperability Gateways/ Interconnects*, NCJ 212976, April 2006.

3. Global Justice XML will provide a standard for data exchange and interoperation at data level.

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