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Interoperability AGILE-ity

Thirty-plus years ago, when police radios were underpowered and cumbersome, one officer voiced his frustration about his inability to communicate with fellow officers this way: "Mission Control could talk to astronauts on the moon, but we couldn't talk to our partners around the corner, less than a block away."

Today police radios are certainly smaller and much more powerful. But improvements in technology have not eliminated the issue of interoperability—the capacity of public safety agencies at all levels to communicate across jurisdictions. This country's law enforcement agencies, emergency medical services, and fire departments operate on different frequencies, use different equipment, and follow different policies and procedures, making communication and coordination between agencies and across jurisdictions very difficult.

AGILE, a National Institute of Justice (NIJ) project, is trying to make interoperability much less difficult.

"Interoperability is a complex situation that has been evolving over the years," says Tom Coty, AGILE program manager. "It's complex not only because of the sheer number of agencies, but also because they are in different points in the life cycle of their equipment. One may have a brand-new system, while another nearby agency has equipment that is 15 to 20 years old."

According to Coty, most public safety professionals would say they have experienced problems communicating with others in their field. Each agency, however, faces different interoperability issues, such as outdated equipment and no funds to buy new equipment; city police and fire department radios that operate on different frequencies; cell phones that allow different agencies to talk to one another, but have significant access problems during critical events; and existing communication links between agencies, but no policies or procedures that cover when and how to use them.

For most public safety agencies, Coty says, the biggest problems stem from incompatible radio frequencies and lack of funds to buy new equipment.

The Federal Communications Commission (FCC) licenses radio frequencies for all non-Federal users of radio spectrum, including public safety agencies, commercial radio and television stations, business radios, and more. The spectrum is a range of frequencies used for communications. It is a finite resource divided into bands, 10 of which are for public safety agencies' use. Within those bands, the FCC licenses the frequencies or channels used by each agency. Frequency is measured in terms of millions of cycles per second, or megahertz (MHz).

No commercially available radio operates in all 10 bands available to the public safety community. Some radios made by different manufacturers cannot even communicate with each other within the same band. This leads to temporary "fixes," such as installing numerous radios in ambulances and patrol cars so their occupants can talk to everyone else in an area. Another commonly used fix, the dispatch relay, uses a third party to relay messages from one agency to another. These solutions are cumbersome and expensive. They use up precious time that could allow a suspect to escape or a fire to spread.

Technology solutions to interoperability problems are becoming more common. One solution employs a cross-band repeater system, which receives a transmission on one frequency and automatically retransmits it on a different one. Unfortunately, law enforcement and other public safety agencies often do not know which new technologies can help them, or even that these technologies exist.

In 1998, NIJ's National Law Enforcement and Corrections Technology Center (NLECTC)–Rocky Mountain completed an intensive study of interoperability issues, *State and Local Law Enforcement Wireless Communications and Interoperability: A Quantitative Analysis.* NIJ used the study to launch the AGILE program, which consolidates all NIJ interoperability initiatives into a coordinated effort to help Federal, State, and local law enforcement agencies communicate and share information. AGILE originally

stood for Advanced Generation of Interoperability for Law Enforcement, but its target audience has expanded to include all public safety agencies.

"AGILE facilitates information sharing and provides support to professionals, giving them the ability to help themselves," Coty says. Nationally, that can mean providing support to public safety associations and their leaders; locally, it can mean offering one-on-one technology assistance. AGILE uses a three-part approach to implement its mission:

- Research, development, testing, and evaluation of technology solutions.
- Standards identification, development, and adoption.
- Outreach and technology assistance.

No single fix can solve complex interoperability issues for everyone, Coty says. At any point in time, AGILE has more than 30 projects and initiatives in various stages of development. One of them may provide just the solution an agency needs.

Interoperability Technology

Coty says public safety personnel often learn about new technologies by viewing a demonstration at a conference or by reading about new equipment in a journal. Agencies may not know who developed the technology, whether it will work with their systems, or where to find out more about it. They can begin their research on the AGILE website at www.agileprogram.org.

The AGILE site includes a section that lists site updates and the latest interoperability news. The site provides access to AGILE reports and printed materials and offers information on grants and funding, interoperability standards, the National Task Force on Interoperability, and a list of related links. It also provides updates on AGILE research projects, including the following:

- **ACU–1000 Testbed Program.** The City of Alexandria (Virginia) Police Department has served as a testbed for several potential interoperability communications solutions, including the ACU–1000, an audio gateway system that ties together incompatible radio systems. The ACU–1000 provided coverage at the inauguration of President George W. Bush, linking the U.S. Secret Service, the U.S. Capitol Police, the Federal Bureau of Investigation, and other agencies. Alexandria will soon test two new systems: Lyric, a Motorola product to link Motorola technology, and Incident Command Radio Interface (ICRI), a Communications Applied Technology product. Although similar to the ACU–1000, the portable ICRI system can run its briefcase-sized unit on AA batteries for up to 24 hours.
- **CAPRAD.** In the Balanced Budget Act of 1997, Congress directed the FCC to reallocate 24 MHz of spectrum in the 700 MHz band for public safety use. Now used by UHF television channels 60 to 69, this spectrum will become available within the next several years. In anticipation of the release of this spectrum, the National Public Safety Telecommunications Council (NPSTC) and the Public Safety Communications Council requested the development of a Computer-Assisted Precoordination Resource and Database (CAPRAD) to facilitate interregional coordination in the allotment of frequencies. NLECTC–Rocky Mountain recently completed this database, which will have secure Internet access, and is now working on database distribution and orientation.
- **CAPWIN.** Several years ago, a man threatened to commit suicide by jumping from the Capital Beltway's Woodrow Wilson Bridge. Agencies from Maryland, Virginia, and the District of Columbia ran into numerous interoperability problems while trying to coordinate rescue efforts and untangle a rush-hour traffic jam. This incident, among others, triggered the request to create the Capital Wireless Integrated Network (CAPWIN). CAPWIN will integrate existing data and voice communication systems into the Nation's first multistate integrated wireless data network devoted to transportation and public safety. Research and development are now under way at the University of Maryland, the University of Virginia, and George Mason University. The goal is to make this network a model that can be replicated in other regions of the country.
- **COPLINK.** Developed through a joint effort between the University of Arizona and the Tucson Police Department, COPLINK Knowledge Management System software uses the Internet to link member databases. The COPLINK Connect module allows real-time information sharing across a network of records management systems that use different software and parameters. The COPLINK Detect module provides advanced data analysis. For example, one can search for information on white two-door cars and information on sex offenders known to frequent school playgrounds, then search for matches between the two.
- **INFOTECH.** INFOTECH, an NIJ research and development project completed in FY 2001, developed tools and technologies to tie together disparate legacy systems to permit information sharing with appropriate security/privacy. Software and data models from this project are freely available. INFOTECH uses Java™ software and encryption to allow searching with a simple Internet browser and offers real-time access to criminal history information, motor vehicle registration information, driver's license information, and local agency data. Participating agencies decide what information to make available to other members. Sheriff's

departments in Monroe, Broward, and Brevard Counties in Florida provided an early demonstration of this system. Virginia's Tidewater region; the Charleston, South Carolina, region; the State of Oregon; and the cities of San Diego and Los Angeles all have deployed INFOTECH-based solutions for their information-sharing needs.

- **Software-Defined Radios.** AGILE staff are helping to develop and evaluate a new generation of communications devices known as Software Defined Radios (SDRs). SDRs, which can be quickly reprogrammed to transmit and receive on multiple frequencies in different transmission formats, could change the way users communicate across wireless services and promote more efficient use of the radio spectrum. In SDRs, functions that were formerly carried out solely by hardware, such as the generation of the transmitted radio signal and the tuning of the received radio signal, are performed by software. Because these functions are carried out by software, the radio is programmable, allowing it to transmit and receive over a wide range of frequencies and to emulate virtually any desired transmission format.

Interoperability Standards

Just as the research and development portion of AGILE includes many components, its Standards Project reviews and analyzes standards related to all of the many facets of interoperability. The project's goal is to identify and create comprehensive interoperability standards for NIJ adoption. Coty says that although some new standards may need to be developed, most interoperability standards already have been created by such organizations as the Telecommunications Industry Association (TIA) through the development work of the Association of Public Safety Communications Officers (APCO) and the Institute of Electrical and Electronics Engineers. AGILE is supporting several standards development projects, including—

- **Project 25,** an APCO effort that developed an interface standard for digital radios with backwards compatibility to analog and manufacturers' legacy systems.
- **Project MESA,** a TIA/European Telecommunications Standards Institute initiative to create specific requirements for broadband transmission. Increased use of broadband transmission could allow rapid streaming of videos and images to law enforcement personnel in the field.
- **XML-Based Standards for Integrated Justice,** jointly supported by the Bureau of Justice Assistance and AGILE, is a project of the Infrastructure and Standards Working Group of the Global Advisory Committee to facilitate the sharing of justice information and integration of justice information systems among Federal, State, and regional jurisdictions; establish ground floor information standards; guide and assist justice and public safety information systems developers; and further other efforts to share justice information.

Interoperability Outreach and Assistance

AGILE outreach, like research and development and standards development, encompasses many elements. Outreach components include the website, conference presentations, and telephone assistance. Additionally, in response to requests from public safety agencies, AGILE dispatches experts to assess agencies' capabilities and propose solutions, Coty says. "Often, a lot of the solutions are fairly simple. For example, the agency may be dealing with vendors who sell new equipment. We send out an engineer who will sit at the table with them during vendor discussions. This expert has only their interests in mind."

Technical experts also visit sites once the equipment is in place, Coty says. After the equipment is set up, it is important that the agency work out agreements with other nearby units, develop a policy on use of the new equipment, and practice and train for its use. Outreach and assistance projects include—

- **National Task Force on Interoperability.** In an effort to improve public safety radio communications, NIJ, supported by 17 national associations, cosponsored the 2001 National Public Safety Wireless Interoperability Forum in October 2001. Forum participants were predominantly State and local elected and appointed officials and representatives from the public safety community. Its goals were to raise public safety wireless interoperability issues to the national level and to give participants the opportunity to develop a list of actions that could be taken to overcome the policy barriers to improving public safety wireless communications.

  The forum received such a positive response that NIJ continued the effort by funding the creation of a National Task Force on Interoperability (NTFI). NTFI's vision is to foster cooperation among Federal, State, regional, and local public safety agencies through the development and use of interoperable communications systems. Its mission is to help public safety agencies achieve communications interoperability. NTFI serves as a conduit between State and local officials, their representative associations, Federal officials, and public safety and industry representatives to create a unified policy front and facilitate resulting actions. To accomplish this, NTFI will educate State and local officials and their representative associations about the benefits of interoperability, assist them in addressing the policies needed to overcome current barriers, and provide a forum for policymakers to work with the public safety community to address interoperability issues.

- **NPSTC Support Office.** AGILE also funded the creation of the NPSTC Support Office (NSO) in FY 2000. NSO fills the role of secretariat for NPSTC, a federation of 17 associations that represents the national public safety community in wireless communications.
- **Interoperability Assessment for the State of Texas.** In conjunction with the Sheriffs' Association of Texas and the State of Texas, AGILE is surveying the existing infrastructure and proposing solutions to interoperability issues. In addition to building partnerships among associations throughout the State, this project will develop a how-to guide for interoperability projects statewide.

Technology, standards, and outreach and assistance add up to AGILE's mission to solve the problems related to interoperability, problems that also include a lack of available spectrum and funding for new equipment. "Technology isn't the stumbling block," Coty says. "You can overcome technology issues. The really hard task is working out the policies and their day-to-day execution."

For more information on AGILE, visit the AGILE website at www.agileprogram.org.

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