



T2+2™ Market Overview

Interoperable Communication Tools for First Responders

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After the events of September 11, 2001 and Hurricane Katrina in 2005, there has been a surge of interest in developing and implementing interoperable communication systems for first responders.¹ Such voice, data and radio interoperability is a critical need for first responders (police, fire, emergency medical technicians (EMTs), etc) at the scene of an emergency or disaster,² whether of natural or manmade origin. The use of properly planned, established, and applied communication tools can enable the dissemination of information among command and support elements and cooperating agencies and organizations.³ There are a number of ways in which first responders can work collaboratively in terms of communication but this report will focus primarily on hardware and radio-based methods (such as patching, cross-band repeaters, gates, terminals and others).⁴ Our research indicated however that specific publically available market data on first responder communication technologies to be lacking except for funding data for grants by the Department of Homeland Security. Additionally we have also provided market data for revenues generated by communication terminals in first responder applications as they are an integral component in the overall first responder communication market. While market sizes are hard to estimate, the following describes how we arrived at a figure for the overall funding to improve communications interoperability. We estimate this funding size to be approximately:

<i>Market Niche Size</i>			
<i>Market Size in Dollars</i>	<i>Growth Rate</i>	<i>Base Year</i>	<i>Detailed Basis for Estimate</i>
\$4.3 billion	n/a	2004-2008	<p>From 2004 to 2008 (the only years which detailed figures are publically available) the U.S. Department of Homeland Security has approved more than \$4.3 billion in grant money to improve communications interoperability among first responders. As of 2008, 75% of this funding has gone to hardware development.⁵</p> <p>No forward looking growth rates or future funding dollar amounts were provided in this source; however funding is expected to continue to be strong in the near term with additional support from the economic stimulus package.⁶</p>

¹ Lascow, Sarah. "Are Americas First Responders Better Off Following Billions of Dollars?" February 2010. Daily Estimate web site. <http://www.dailyestimate.com/article.asp?id=27768> (accessed May 5, 2010).

² "Data Interoperability." COMCARE web site. <http://www.comcare.org/Interoperability.html> (accessed May 5, 2010).

³ "Communications and Information Management." Federal Emergency Management Agency web site. <http://www.fema.gov/emergency/nims/CommunicationsInfoMngmnt.shtm#item1> (accessed May 5, 2010).

⁴ "Public Safety Radio Interoperability Progress and Issues Assessment Markets and Technologies." March 2008. *PracTel Inc.* Research and Markets web site. http://www.researchandmarkets.com/reportinfo.asp?report_id=596463 (accessed May 5, 2010).

⁵ Lascow, Sarah. "Are Americas First Responders Better Off Following Billions of Dollars?" February 2010. Daily Estimate web site. <http://www.dailyestimate.com/article.asp?id=27768> (accessed May 5, 2010).

⁶ Ibid.

\$200 million (European first responder communications market)	4.61%	2009	In Europe, revenues generated from communications equipment in first responder applications were estimated to be \$200 million in 2009. This market is expected to reach nearly \$300 million by 2018, ⁷ a compound annual growth rate of 4.61%.
\$1 billion (global first responder communications terminal market)	23.8%.	2007	A 2008 report by ABI research on the global market for communication terminals (which receive process and transmit signals ⁸) used by emergency first responders estimates the market to grow significantly over the next five years from slightly more than \$1billion in 2007 to more than \$3.6 billion in 2013, ⁹ a compound annual growth rate of 23.8%.
100,000+ emergency response agencies in the U.S.	n/a	2010	This estimate was derived from the COMCARE – Emergency Response Alliance. ¹⁰ Although not a dollar estimate, this figure provides an idea as to the actual scale of the market in terms of end user agencies.

According to the Federal Emergency Management Agency (FEMA) there are approximately 60 State Offices and Agencies of Emergency Management in the United States.¹¹ In a catastrophic disaster, FEMA coordinates the federal response, working with 28 federal partners and the American Red Cross to provide emergency food and water, medical supplies and services, search and rescue operations, transportation assistance, environmental assessment, and other services.¹² More over, a conservative estimate by the Department of Homeland Security shows that over 25.3 million individuals work or volunteer as first responders in the United States.¹³

The U.S. Department of Homeland Security’s Federal Emergency Management Agency (FEMA) assists first responders through the Commercial Equipment Direct Assistance Program (CEDAP). In 2008, \$17.6 million was provided to 1,045 emergency response agencies in 46 states for equipment and training under the CEDAP program.¹⁴

⁷ “European First Responders C3I Market Assessment: Communication.” August 2009. Frost & Sullivan web site (subscription required). <http://www.frost.com> (accessed May 5, 2010).

⁸ “First Responders Guide to Satellite Communications.” *Access Intelligence*. Satellite Industry Association web site. <http://www.sia.org/guide.pdf> (accessed May 5, 2010).

⁹ “First Responder Terminal Market to Reach \$3.5 Billion by 2013.” November 2008. ABI Research web site. [http://www.abiresearch.com/press/1289-First+Responder+Terminal+Market+to+Reach+\\$3.5+Billion+by+2013](http://www.abiresearch.com/press/1289-First+Responder+Terminal+Market+to+Reach+$3.5+Billion+by+2013) (accessed May 5, 2010).

¹⁰ “Data Interoperability.” COMCARE web site. <http://www.comcare.org/Interoperability.html> (accessed May 5, 2010).

¹¹ “State Offices and Agencies of Emergency Management.” Federal Emergency Management Agency web site. <http://www.fema.gov/about/contact/statedr.shtm> (accessed May 5, 2010).

¹² “Federal-level Partners.” Federal Emergency Management Agency web site. <http://www.fema.gov/about/fedpart.shtm> (accessed May 5, 2010).

¹³ Cellucci, Thomas A. “Commercialization: The First Responders’ Best Friend.” January 2009. United States Department of Homeland Security web site. http://www.dhs.gov/xlibrary/assets/st_first_responder_commercialization_article.pdf (accessed May 5, 2010).

¹⁴ “Commercial Equipment Direct Assistance Program (CEDAP).” Federal Emergency Management Agency web site. <http://www.fema.gov/government/grant/cedap/index.shtm> (accessed May 5, 2010).

In general few first responder scenarios are simple as most require multiple responses, such as local police, fire and ambulance. Larger incidents such as an airplane crash, large fire, or terrorist attack often require a major commitment from numerous entities including local police, ambulance, fire, state police, state and federal emergency management agencies and possibly the National Guard.¹⁵

Market size and growth rate are a function of the number of people in the market and the anticipated rate of buying. As markets transition between emerging, growth, shakeout, mature, and declining, the basis for competition and the number of competitors usually changes, along with the factors influencing adoption of innovation. The number of and growth rate for customers suggests how many units might be sold.¹⁶

<i>Our Current View on the Phase of the Market</i>	
Today	Trend
Growth/Mature	Mature

Interoperable communications for first responders was first addressed in the early 1970s;¹⁷ since then, strong growth particularly in the last five years was realized as companies have been scrambling to serve the first responder market due to increasing levels of funding and the idea that no single solution fits all needs. Given this, companies from all markets, such as software, communications, hardware, and services have found a range of revenue opportunities in the first responder communication market.¹⁸ Federal funding is likely to continue to play a strong role in the industry as in 2007 alone, the departments of Justice and Homeland Security awarded almost \$1.2 billion in grants, for new public-safety and law-enforcement communications projects.¹⁹ Continued government funding, particularly in the U.S., for interoperable first responder communications equipment is expected and as such the market will likely remain in a more growth phase.²⁰ This currently growth industry however is likely transition to a

¹⁵ “Interoperability White Paper - First Responder Communications.” *Frontier Systems Integrators*. Racom web site. <http://www.racom.net/Downloads/Interoperability.pdf> (accessed May 5, 2010).

¹⁶ For a detailed discussion of the “innovativeness dimension,” see Everett M. Rogers, *Diffusion of Innovations*, 4th ed. (New York: Free Press, 1995). For further readings related to market phases and innovation, see also James Utterback, *Mastering the Dynamics of Innovation* (Boston: Harvard Business School Press, 1996) and Vijay K. Jolly, *Commercializing New Technologies: Getting from Mind to Market* (Boston: Harvard Business School Press, 1997).

¹⁷ “Interoperable Communications for First Responders.” *Frost & Sullivan*. AT&T web site. <http://www.corp.att.com/stateandlocal/docs/Interop.pdf> (accessed May 5, 2010).

¹⁸ “First responder market sees a potential for growth in all technologies.” December 2005. EMS1.com web site. <http://www.ems1.com/ems-products/aeds/articles/14113-First-responder-market-sees-a-potential-for-growth-in-all-technologies/> (accessed May 5, 2010).

¹⁹ “Agencies Put Federal Funding to Use.” Radio Resource Media Group web site. <http://www.radioresourcemag.com/onlyonline.cfm?OnlyOnlineID=63> (accessed May 5, 2010).

²⁰ Lascow, Sarah. “Are Americas First Responders Better Off Following Billions of Dollars?” February 2010. Daily Estimate web site. <http://www.dailyestimate.com/article.asp?id=27768> (accessed May 5, 2010).

more mature market in the medium term as the robust funding activity enjoyed previously in the market is unlikely to be sustained in the longer term. Additionally the presence of such dominant firms like Motorola which controls nearly 80% of the U.S. market²¹ is further evidence of market with more mature market characteristics.

Markets can also be described in terms of the basis for competition (best technological performance, best value or the price/performance tradeoff that best matches the end-users' preferences, lowest cost, or best availability or the ability to get the product quickly). This dimension helps to define the context in which a commercialization strategy must be developed.

<i>Basis for Competition in the Arena</i>	
<i>Today</i>	<i>Trend</i>
Best Value	Best Value

The market appears to be driven by best value as simplicity and price vs. performance are some of the main drivers of hardware based communication systems for first responders.²² Additionally, funding can be limited for some end users to procure such equipment,²³ and as such high equipment costs can hamper adoption of new technology.²⁴ Despite these cost concerns, performance is also a critical factor as the communication devices and other tools that form an integral part of public safety and defense systems used by first responders need to be fool-proof and dependable.²⁵ Factors such as redundancy, resiliency and interoperability are some of the key technology considerations for emergency response communication systems.²⁶ Given this, new communication technology needs to be field tested by third parties before being implemented.²⁷

In each market there may be stakeholders and companies with significant market share that will influence the introduction of your technology. Some organizations or companies that will likely influence the introduction of this technology are the following:

²¹ Ibid.

²² "Public Safety Radio Interoperability Progress and Issues Assessment Markets and Technologies." March 2008. *PracTel Inc.* Research and Markets web site. http://www.researchandmarkets.com/reportinfo.asp?report_id=596463 (accessed May 5, 2010).

²³ "Call for help: for first responders, high-tech communications still out of reach." March 2008. *National Defense*. Goliath web site. http://goliath.ecnext.com/coms2/gi_0199-7628204/Call-for-help-for-first.html (accessed May 5, 2010).

²⁴ Latshaw, Greg. "New technology guides first responders." March 2008. USA Today web site. http://www.usatoday.com/tech/news/techpolicy/2008-05-19-emergencygps_N.htm (accessed May 5, 2010).

²⁵ "Homeland Security Alert: Technologies for First Responders." March 2009. Frost & Sullivan web site (subscription required). <http://www.frost.com> (accessed May 5, 2010).

²⁶ "National Incident Management System." December 2008. Federal Emergency Management Agency web site. http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf (accessed May 5, 2010).

²⁷ "Call for help: for first responders, high-tech communications still out of reach." March 2008. *National Defense*. Goliath web site. http://goliath.ecnext.com/coms2/gi_0199-7628204/Call-for-help-for-first.html (accessed May 5, 2010).

<i>Examples of Major Competitors in the Arena</i>		
Competitor	Relevance	Web site
Motorola	Motorola is a leading developer of mission-critical communication solutions for first responder applications. ²⁸	http://business.motorola.com
BAE Systems	BAE Systems' First InterComm™ is a vehicle mounted system that allows first responders to utilize existing radios and frequencies and links all radios at an incident scene and enables talk-groups without the need for towers or infrastructure. ²⁹	http://www.baesystems.com/
Raytheon	Raytheon's TRP-1000 Transportable Radio Interconnect System enables radio interoperability for situations requiring communications between diverse organizations using different radios and different frequencies. ³⁰	http://www.raytheon.com/
Advatech Pacific, Inc.	Advatech Pacific's uGATE-ICN provides a portable communication interface that enables a satellite interface as well as connectors for up to three radio networks in up to two talk groups, or sub-networks. ³¹	http://www.advatechpacific.com/
Mutualink	Mutualink provides interoperability solutions including portable interoperable workstations that act as the point of communication between entities on a network for voice, text and sharing of data files. ³²	http://www.mutualink.net
Impact Technologies	Impact Technologies has developed a platform product called DAKS which is a high-performance, high-availability telecommunications system that delivers	http://www.impacttech.com/

²⁸ "Mission Critical Design." Motorola web site.

<http://business.motorola.com/publicsafety/missioncritical/index2.asp> (accessed May 5, 2010).

²⁹ "First InterComm™ - First Responder Interoperable Communications." Responder Knowledge Base, Federal Emergency Management Agency web site.

https://www.rkb.us/contentdetail.cfm?content_id=168851 (accessed May 5, 2010).

³⁰ "Raytheon JPS Communication TRP-1000 Transportable Radio Interconnect." Antenna Systems and Solutions web site. <http://www.antennasystems.com/JPSRadio/TRP1000.html> (accessed May 5, 2010).

³¹ "Advatech Pacific's uGATE-ICN." Responder Knowledge Base, Federal Emergency Management Agency web site. https://www.rkb.us/contentdetail.cfm?content_id=189986 (accessed May 5, 2010).

³² "Our Architecture." Mutualink web site. <http://www.mutualink.net/OurArchitecture.asp> (accessed May 5, 2010).

	mission-critical collaboration and alerting solutions. ³³	
Catalyst Communications	Catalyst Communications offers solutions for Primary Dispatch, Back-up Dispatch, and Interoperability solutions based on Radio control over IP (RCoIP) technology. ³⁴	http://www.catcomtec.com/

<i>Examples of Key Stakeholders or Networking Channels with Contact Information</i>		
Stakeholder	Relevance	Contact Information
Department of Homeland Security (DHS)	In 2004, the DHS directed the development of the National Incident Management System (NIMS) which provides a standard nationwide template to enable Federal, State, tribal, and local governments, nongovernmental organizations (NGOs), and the private sector to work together to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity. ³⁵	12th & C Street SW Washington, DC 200024 Tel: 202-282-8000 http://www.dhs.gov
Federal Emergency Management Agency (FEMA)	Part of the Department of Homeland Security, FEMA's mission is to support first responders and improve the capabilities to prepare, protect, respond and recover from all types of hazards. ³⁶	500 C Street S.W. Washington, D.C. 20472 Tel: 202-646-2500 http://www.fema.gov
Association of Public-Safety Communications Officials (APCO)	APCO International is a leading organization dedicated to public safety communications and has more than 15,000 members. ³⁷	351 N. Williamson Blvd. Daytona Beach, FL 32114 Tel: 386-322-2500 http://www.apco911.org/
COMCARE - Emergency Response Alliance	COMCARE is a non-profit national advocacy organization with over 100 members that is dedicated to advancing emergency communications. ³⁸	1701 K Street, NW Fourth Floor Washington, DC 20006 Tel: 202-429-0574 http://www.comcare.org/
Telecommunications Industry Association (TIA)	TIA is a trade association representing the global information and communications technology (ICT) industries with efforts including standards development, government	2500 Wilson Boulevard, Suite 300 Arlington, VA 22201 Tel: 703-907-7700 http://www.tiaonline.org/

³³ "Mission Critical Collaboration & Notification." Impact Technologies web site. <http://www.impacttech.com/index.php?p=34> (accessed May 5, 2010).

³⁴ Catalyst Communications web site. <http://www.catcomtec.com/> (accessed May 5, 2010).

³⁵ "National Incident Management System." December 2008. Federal Emergency Management Agency web site. http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf (accessed May 5, 2010).

³⁶ "About FEMA." Federal Emergency Management Agency web site. <http://www.fema.gov/about/index.shtm> (accessed May 5, 2010).

³⁷ "About APCO." Association of Public-Safety Communications Officials web site. <http://www.apcointl.org/new/about/> (accessed May 5, 2010).

³⁸ "About COMCARE." COMCARE web site. <http://www.comcare.org/About.html> (accessed May 5, 2010).

	affairs, business opportunities, market intelligence, certification and world-wide environmental regulatory compliance. ³⁹	
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Entry barriers are obstacles that remove customer segments from the market for some period of time. They limit the size of the addressable market in general or the market share that can be captured. These barriers must be overcome or avoided to have a successful market entry. Our work to date suggests the following entry barriers may prevent customer segments from buying this type of technology for some period of time.

<i>Market Entry Barriers</i>	
<i>Name of Barrier</i>	<i>Description/Why</i>
<i>Cyclical and Project-Driven Market</i>	The first responder market is significantly project-driven and largely cyclical, making it difficult for new entrants to compete against existing firms. ⁴⁰
<i>End User Budgetary Issues</i>	While there are many challenges to interoperability, one of the biggest obstacles is budgetary in nature. First responders have complex needs for specialized equipment and personnel and communications infrastructure is one of several critical priorities. Two-way Radio infrastructure is produced by many manufacturers with competing proprietary standards. The costs of replacing all first responder radio systems with compatible and interoperable solutions are often prohibitive. ⁴¹
<i>Decentralized Procurement Leads to Funding Challenges in the United States</i>	In the United States, public safety agencies apply for funding grants to obtain the equipment and training they need for emergency and disaster situations. This decentralized procurement means that the funding mechanisms do not make coordination easy. ⁴²

The overall cyclical nature of the market and the decentralized procurement procedures of end users are likely to remain major challenges in this industry. Although funding opportunities today appear to be favorable, budgetary issues are likely to continue to plague certain end user groups that may not have direct access to such support.

Market drivers are forces that strengthen or weaken the importance of end-user needs over time.

<i>Market Drivers</i>	
<i>Name of Driver</i>	<i>Why Significant</i>

³⁹ "About TIA." Telecommunications Industry Association web site. <http://www.tiaonline.org/about/> (accessed May 5, 2010).

⁴⁰ "European First Responders C3I Market Offers Huge Potential for Civil Security Finds Frost & Sullivan." January 2010. Newswire Today web site. <http://www.newswiretoday.com/news/62924/> (accessed May 5, 2010).

⁴¹ "Interoperable Communications for First Responders." Frost & Sullivan. AT&T web site. <http://www.corp.att.com/stateandlocal/docs/Interop.pdf> (accessed May 5, 2010).

⁴² "First Responder Terminal Market to Reach \$3.5 Billion by 2013." November 2008. ABI Research web site. [http://www.abiresearch.com/press/1289-First+Responder+Terminal+Market+to+Reach+\\$3.5+Billion+by+2013](http://www.abiresearch.com/press/1289-First+Responder+Terminal+Market+to+Reach+$3.5+Billion+by+2013) (accessed May 5, 2010).

<p><i>On Going Communication Issues</i></p>	<p>Currently there are more than 100,000 emergency response agencies and the vast majority of these agencies are not able to rapidly, accurately and easily communicate data with each other or the public. Except at the highest levels of government (e.g. state Emergency Operation Centers with DHS), there is also no regional or national emergency data communications capability. Given this, the on going lack of capable communications tools remains a critical homeland security and emergency response problem.⁴³</p>
<p><i>Ongoing Standards Implementation and Manufacturer Cooperation</i></p>	<p>In March 2010, leading mission critical communication vendors successfully completed interoperability testing using Project 25 Inter-RF Subsystem Interface (P25 ISSI) gateways to communicate using different equipment. This milestone is an example of the growing trend of manufacturers continuing to work together to advance interoperability for public safety, enabling first responders to communicate effectively in emergency situations.⁴⁴</p>
<p><i>Rolling Out of New Networks</i></p>	<p>A recommendation from the Federal Communications Commission (FCC) National Broadband Plan is for the proposed creation of a nationwide interoperable public safety broadband wireless network (“public safety broadband network”) for first responders and other public safety personnel. To meet this ambitious goal, public safety agencies could leverage the deployment of 4G (fourth generation) commercial wireless networks to greatly reduce the overall costs of constructing this nationwide broadband network.⁴⁵ Such developments are likely to open up a wide range of new opportunities for first responder communication equipment developers to tap these new developments.</p>
<p><i>Continued Push for Interoperability and Continuity of Operations Drives Funding Opportunities</i></p>	<p>There has been a surge in emergency communications planning and deployments since Hurricane Katrina as first responders are interested in solutions that can accommodate new technologies and applications as well as higher data rates to support increasing demand for videoconferencing and streaming video from a disaster scene. This area is growing in importance as the current agenda is to promote interoperability and real-time switchover between primary and stand-by communications and there is a real push to make continuity of operations a reality.⁴⁶ This on going emphasis on interoperability has garnered more grant support from the DHS than to any other initiative and it is expected to continue to gain support in the near term, particularly from the economic stimulus package.⁴⁷</p>

The U.S. House of Representatives estimates that over 70% of public safety communications equipment is still analog, outdated, and incompatible with

⁴³ “Data Interoperability.” COMCARE web site. <http://www.comcare.org/Interoperability.html> (accessed May 5, 2010).

⁴⁴ “Motorola and Five Leading Emergency Communications Equipment Manufacturers Demonstrate Project 25 ISSI Interoperability.” March 2010. Yahoo Finance web site. <http://finance.yahoo.com/news/Motorola-and-Five-Leading-prnews-2750890594.html?x=0&v=1> (accessed May 5, 2010).

⁴⁵ Manner, Jennifer. “Bringing Nationwide Interoperable Communications to America’s First Responders.” April 2010. Broadband.gov web site. <http://blog.broadband.gov/?entryId=391557> (accessed May 5, 2010).

⁴⁶ Kusiolek, Richard. “Alternative Uses Of Emergency Communications Networks Driving New Market.” June 2008. Satellite Today web site. http://www.satellitetoday.com/via/features/Alternative-Uses-Of-Emergency-Communications-Networks-Driving-New-Market_23236.html (accessed May 4, 2010).

⁴⁷ Lascow, Sarah. “Are Americas First Responders Better Off Following Billions of Dollars?” February 2010. Daily Estimate web site. <http://www.dailyestimate.com/article.asp?id=27768> (accessed May 5, 2010).

communications systems in neighboring local jurisdictions.⁴⁸ Based upon our research it is apparent that a comprehensive interoperable solution for first responder communication is still elusive. Given this, there are likely to be a number of opportunities to meet this vital need. It is important to note however that technology alone is not likely to solve this problem entirely, as proper planning and cooperation on behalf of both industry and the first responder community is essential.⁴⁹ In the near term ongoing funding opportunities are likely to continue to be major drivers of growth for such tools and in the longer term, the full roll out of new fourth generation networks may also prove to be beneficial for new product offerings in this space.

Here are some additional data and sources that can help you better understand the market.

<i>Name</i>	<i>Description</i>
National Incident Management System Report	This report, published by the Department of Homeland Security in 2008, details the National Incident Management System and the many factors and procedures that are involved in implementing such an initiative. For more information please see the following URL: http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf
Responder Knowledge Base – List of Bridging/Patching/Gateway Products	The FEMA web site’s Responder Knowledge Base provides an extensive listing of products and technologies used in emergence communication applications. For more information please see the following URL: https://www.rkb.us/search.cfm?action=filter&typeid=2&subtypeid=421

⁴⁸ “Interoperable Communications for First Responders.” *Frost & Sullivan*. AT&T web site. <http://www.corp.att.com/stateandlocal/docs/Interop.pdf> (accessed May 5, 2010).

⁴⁹ Lascow, Sarah. “Are Americas First Responders Better Off Following Billions of Dollars?” February 2010. Daily Estimate web site. <http://www.dailyestimate.com/article.asp?id=27768> (accessed May 5, 2010).