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An Emergency Communications Safety Net: Integrating 911 and Other Services

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Summary

The present capability and future effectiveness of America's network of emergency telecommunications services are among the issues under review by Congress and other entities. Emergency calls (911) on both wireline (landline) and wireless networks are considered by many to be part of the public safety network. As technologies that can support 911 improve, many are seeing the possibility of integrating 911 into a wider safety net of emergency communications and alerts.

One of the intents of Congress in passing the Wireless Communications and Public Safety Act of 1999 (P.L. 106-81), and of the Federal Communications Commission (FCC) in implementing the act, is to make 911 technology universally available throughout the United States. A 2002 report, known as the Hatfield Report, recognized the need to upgrade 911 infrastructure nationwide, discussed some of the difficulties encountered, and recommended the creation of a 911 bureau at the Executive level. Congress addressed recommendations from the Hatfield Report with provisions that were passed in the ENHANCE 911 Act of 2004 (P.L. 108-494). This legislation creates a federal program for 911 implementation and coordination and authorizes funds for a matching grant program. Appropriations for the program have yet to be allocated, although some funding is available through other programs. Support for the program is also promised from the "Digital Transition and Public Safety Fund," created by the Deficit Reduction Act (P.L. 109-171). Up to $43.5 million is designated specifically for 911, payable from the proceeds of spectrum auctions. The Department of Transportation is sponsoring a test of an IP-based network for 911, with funding from the Intelligent Transportation Systems program.

Legislation in the 109th Congress covering 911 or call centers includes Title III of the Communications Opportunity, Promotion, and Enhancement (COPE)Act (H.R. 5252, Representative Barton), and companion bills S. 1063 (Senator Nelson) and H.R. 2418 (Representative Gordon) — all focusing on assuring access to 911 call centers for users of Voice over Internet protocol (VoIP) telephone service and on improving the delivery of 911 services nationwide; companion bills S. 211(Senator Clinton) and H.R. 896 (Representative Bilirakis) — concerning improvements in the capacity of municipal help services provided by call centers; H.R. 214 (Representative Stearns) — providing for a new regulatory category for Internet communications and also referencing 911 access for VoIP users; H.R. 733 (Representative Weiner) — seeking to assure service in underground areas such as subway transportation systems and H.R. 4564 (Representative Thompson) — providing for the establishment of a national disaster call center network. Current transportation funding legislation (SAFETEA-LU, P.L. 109-59) has incorporated some language from companion bills S. 611 (Senator Collins) and H.R. 1240 (Representative Hefley) to establish advisory bodies that support improvements in Emergency Medical Services, including 911 systems.

This report reviews key points about the implementation of 911. It will be updated.

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There is a growing realization among public safety officials, policy makers and others that 911 services could be part of a larger solution for emergency communications that links citizens with first responders and with emergency services such as hospitals through an interconnected system of communications networks and call centers. 911 networks might be part of a nationwide capacity that provides communications interoperability; they might be linked to other networks that also receive citizen-activated calls for help or assistance; they could also be incorporated into emergency alert broadcasts. Proposals for how to provide a fully integrated emergency response system have not crystallized into a consensus. *The 9/11 Commission Report* recommended that 911 call centers — also called Public Safety Answering Points, or PSAPs — be included in planning for emergency responses.[1] Congress, which has since 1999 passed two bills to further the deployment of 911, is reviewing ways to expand 911 capabilities and make it more accessible and effective. Congress is also evaluating ways to improve emergency alerts[2] and interoperable communications for public safety.[3] Operational convergence of emergency communications seems to many to be inevitable, a question of "when," not "if." This report deals primarily with 911 and its recent history. It also summarizes some of the proposals that would improve 911 through new approaches and integration with other services.

911 and Hurricane Katrina

Testifying before Congress in September 2005 about courses of action to improve emergency communications, Federal Communications Commission (FCC) Chairman Kevin J. Martin proposed that 911 systems be made more robust, with better backup capacity and recovery capabilities.[4] From reports received, it appears that emergency communications and 911 call centers in the Gulf Coast states were overwhelmed after Hurricane Katrina and subsequent flooding took out radio

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[1] Final Report of the National Commission on Terrorist Attacks Upon the United States, Official Government Edition, 2004, p. 318.

[2] See CRS Report RL32527, *Emergency Communications: The Emergency Alert Systems(EAS) and All-Hazard Warnings*, by Linda K. Moore..

[3] See CRS Report RL32594, *Public Safety Communications Policy*, by Linda K. Moore.

[4] For example, House of Representatives, Committee on Energy and Commerce, Subcommittee on Telecommunications and the Internet, "Public Safety Communications from 9/11 to Katrina: Critical Public Policy Lessons," September 29, 2005.

systems, cell towers and back-up generators.[5] Regular landline telephone connections can function after local power is lost, if central switches maintain power and lines are not damaged; telephone switches can usually operate until their back-up generators run out of fuel or are knocked out by flooding. Similarly, cell towers that carry commercial phone service and public safety radio communications can continue to function with back-up power, usually batteries. When the batteries and the fuel run out, however, communications capability comes to an end. The erratic pattern of power outages and damaged equipment that resulted from the winds, storm surges, heavy rains, and flooding from Hurricane Katrina helps to explain why some communications links remained operational after others had failed.

Calling for Help. Although many people lost communications, many others were able to connect to 911 centers where operators continued to take calls and provide assistance, where possible. The FCC has reported that upwards of 40 call centers in Mississippi and Louisiana were fully or partially disabled after Hurricane Katrina; by September 28, all but three were operational.[6] The most significant loss of capacity occurred in and around New Orleans. Two telephone company switches located in New Orleans that routed 911 calls for the surrounding parishes were knocked out by flooding.[7] In many cases, call centers affected by the loss of the switches were able to receive calls from people who knew the10-digit number. Some people were able to reach relatives in unaffected areas, they in turn placed calls to their own 911 call centers. The 9-1-1 Coordinator for Harris County, Texas, for example, reported receiving numerous such calls. Lacking information about what call centers were still functioning, or how to reach them, the Harris County operators passed information to the Coast Guard unit in Alexandria, Louisiana, which in turn relayed the calls for help.[8]

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[5] This section is based on news reports and comments to CRS from the public safety community. Sources used are The Wall Street Journal, The Washington Post, The Times-Picayune, Communications Daily, Associated Press Online, The Bradenton Herald, The Miami Herald, and Good Morning America. Other information came from the Mississippi Power Company, the Wireless Emergency Response Team, call center personnel, an e-mail server operated by the National Emergency Number Association (NENA 911TALK), and postings to the Times-Picayune website at [http://www.nola.com/]. Similar narratives are provided in "A Failure of Initiative: The Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina," House of Representatives, February 12, 2006 and "The Federal Response to Hurricane Katrina" Lessons Learned," report to the President, Frances Fragos Townsend, Assistant to the President for Homeland Security and Counterterrorism, February 23, 2006.

[6] Written testimony of Kevin J. Martin Chairman, Federal Communications Commission, at hearing House of Representatives, Committee on Energy and Commerce, Subcommittee on Telecommunications and the Internet, "Public Safety Communications from 9/11 to Katrina: Critical Public Policy Lessons," September 29, 2005.

[7] Switches are programmed to recognize "911" and route these calls directly to the appropriate Public Safety Answering Point.

[8] NENA 911TALK e-mail from Lisa Dodson, September 1, 2005.

When BellSouth and other communications technicians arrived, they reprogrammed local switches to reroute 911 calls, bypassing damaged switches.[9] The call centers that were able to continue operations (and many did, showing ingenuity, perseverance, and fortitude) often lost contact with first responders because of inadequate radio communications networks. Some communities overcame this problem by sharing improvised quarters with first responders — no need for radios, just walk across the room.

As in other disaster situations, the Internet proved less vulnerable to failure than other telecommunications links. Several of the area's newspapers were able to publish Internet editions and at least one local television station in New Orleans reportedly sent video feeds to its website when it could no longer broadcast. Short Message Service (SMS) communications could be completed from cell phones because SMS stores messages to forward when a radio frequency becomes available, unlike voice calls, which require an immediate signal to get through. Anyone with electrical or battery power and a computer terminal or wireless laptop could access the Internet and those with Internet telephony were often able to reach 911 operators. Cox Communications is reported to have said that it was able to maintain some Internet service for many customers in affected areas and was able to use generators to power VoIP (Voice over Internet Protocol) for local and 911calls. Cox customers in New Orleans were able to place calls until the telephone switching circuits failed. In Baton Rouge, on Wednesday, August 31, about two-thirds of Cox's customers had VoIP. Vonage, the VoIP service provider, responded to a call for assistance from a hospital in Baton Rouge by installing Internet connections and VoIP for emergency communications.

Amateur radio operators also play a role in providing communications during and after emergency situations. Radio calls for help from areas devastated by Hurricane Katrina were picked up by operators in areas where phone service was still working. In some cases, amateur radio operators were able to contact 911 call centers or rescue operations and relay the requests for help. Amateur radio volunteers also support the American Red Cross in providing communications at their shelters.[10]

Response, Rescue and Recovery. When they could, 911 call centers relayed calls for help to first responders; but as power sources failed the ability to establish contact diminished. Cell towers went dead from lack of power (typically back up power sources for public safety failed within hours) and then walkie-talkies faded away. As long as cell phone service held up, some first responders were able to use their own phones to maintain some contact. Generally unable to talk to each other, local police and rescue personnel hunted randomly for people who might need assistance.

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[9] Public Safety Answering Points, an essential service, can register for Telecommunications Service Priority (TSP), which accords them a level of priority in the restoration of service. TSP is a program of the National Communications System.

[10] See [http://www.arrl.org/].

When rescue units arrived in the Gulf area many brought communications equipment and power supplies with them — for themselves and for other emergency workers. The Federal Emergency Management Agency (FEMA), for example, has trucks that carry communications equipment for satellite, radio and landline connections — and power generators. Some state and local emergency officials have satellite phones or receive them from federal response units. The majority of first responders, however, rely on terrestrial radio. Wireless telephone companies, equipment suppliers, and various agencies bring in portable cell towers, called COWs (Cell on Wheels) and COLTS (Cell on Light Trucks), as well as extra radios to help re-establish communications at the local level. Some of the private sector supply efforts are coordinated through the National Coordinating Center, part of the National Communications System within the Department of Homeland Security (DHS).[11] By Wednesday evening, August 31, emergency radio and other wireless equipment was operational in most areas of the Gulf Coast, with more equipment arriving as fast as it could be moved from staging areas outside the disaster area. Not all areas hit by the hurricane lost cell phone service, although capacity was reduced by power outages and damage. (Wireline telephone and cable companies typically do not start work on restoring service until power lines are repaired.) Private communications network operators, when possible, made their facilities available for public safety. The Mississippi Power Company, for example, handed out 300 walkie-talkies to public safety officials to communicate with each other using the power company's fiber-optic cable backbone. Utility companies tend to have robust networks and many of them have arrangements to aid public safety; in New York City, after September 11, Con Edison, the local power company, made its network available for emergency communications.

Mutual Aid. Mutual Aid is a well-developed concept among first responders, particularly among adjacent counties. Mutual aid agreements are one of the tools for improving communications interoperability. On September 11, 2001, for example, Capital Region emergency workers arriving at the Pentagon crash site benefitted from previously established mutual aid agreements in organizing their response, sharing resources, and coordinating communications.

Emergency Management Association Compacts (EMACs) are a mechanism to coordinate the provision of state-to-state mutual aid for certain types of services. Emergency management authorities within each state establish agreements for deploying assistance when requested, as well as managing training and other planning decisions. A state declaring an emergency can request assistance through EMAC, which will match needs with available resources. EMAC is administered by the National Emergency Management Association.[12]

Several states have included call center personnel in their emergency planning, although it appears that, until Hurricane Katrina, PSAPs had not been authorized to be deployed through EMAC. In North Carolina, the state Office of Emergency

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[11] At [http://www.ncs.gov/services.html].

[12] Additional information at [http://www.emacweb.org/]. A discussion of the legislative parameters of EMAC is in CRS Report RS21227, *The Emergency Management Assistance Compact (EMAC): An Overview*, by Keith Bea.

Management, working with the state chapter of the National Emergency Number Association (NENA), has set up a Telecommunications Emergency Response Taskforce (TERT). Prior to Hurricane Katrina, the NC TERT had been deployed in several state emergencies to assist in 911call centers. When a group from the NC TERT proposed to send assistance to a PSAP in a devastated area of the Gulf Coast, it was learned that 911 call center personnel are not included as a category under EMAC. This oversight was rectified with the cooperation of the Louisiana Office of Emergency Management, working through EMAC. Shortly before midnight on September 4, 2005, a team of personnel from five North Carolina PSAPs set out for St. Tammany's Parish, near New Orleans, arriving the next afternoon. Shortly after arrival, the NC TERT team took over the task of responding to 911 calls — reportedly the phones were "ringing off the hook" — relieving people who had been working virtually non-stop for a week. Many in the call center had been sleeping on cots in the courthouse, which served as the parish's emergency command center; some of them had no homes to return to.[13]

Building on the experiences of the NC TERT and other state 911 teams who were able to offer assistance, NENA has created a task force to coordinate a nationwide capability for telecommunications emergency response teams.[14] The goal is to encourage states to establish TERTs, with NENA providing logistics support in setting up interstate mutual aid agreements and in working with FEMA and EMAC.

Going Forward. The balance of this report discusses the existing situation of 911's capacity to respond in emergencies, some proposals to improve the system, and recent legislative activity. Proposals include better connections between 911 call centers and emergency responders, building a more robust capacity, incorporating Internet protocols, developing the capacity to set up call centers after disasters have occurred, and coordinating 911 with other types of call centers, such as the 211 centers that provide municipal services. Although not discussed above, 211 call centers played a role in relief efforts after the recent hurricanes, for example, providing assistance in finding shelter and social services.

911: Legislation, Regulation and Leadership

To facilitate the effort to provide comprehensive 911 services nationwide, Congress in 1999 passed the "911 Act,"[15] which mandated 911 as the emergency number nationwide and made numerous provisions for its implementation. Among other provisions, the law requires the Federal Communications Commission (FCC) to work with the states and the many other affected parties to deploy comprehensive wireless enhanced 911 (W-E911) service. Enhanced 911 service provides 911 call

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[13] Information in this paragraph was provided in e-mails sent by Craig Whittington, 9-1-1 Coordinator, Guilford Metro 9-1-1, Greensboro, NC and in a telephone conversation with Woody Glover, Director, St. Tammany Parish Communications District, Covington, LA, on September 3, 2005.

[14] More information at [http://www.nena.org/Events/CIF/TERT.htm]. Viewed November 1, 2005

[15] P.L. 106-81, Wireless Communications and Public Safety Act of 1999.

centers — known as Public Safety Answering Points, or PSAPs — with Automatic Number Identification (ANI) and Automatic Location Identification (ALI).[16] Most, but not all wireline phones are automatically enabled for ANI/ALI display; an estimated 99% of the population in the United States has access to some type of 911 service and 93% of counties with 911 coverage have enhanced 911.[17] Since October, 1, 2001, wireless carriers have been expected to meet FCC guidelines for providing W-E911 to PSAPs. Most areas of the United States now have at least some wireless enhanced 911 coverage, but only 38.9% of counties have fully implemented the technology.[18]

FCC Study. Delays and complications in implementing W-E911 prompted the FCC to commission a study to examine the state of 911 capacity in general and the cause of problems with wireless 911 in particular. "Report on Technical and Operational Issues Impacting the Provision of Wireless Enhanced 911 Services," known as the Hatfield Report, was submitted to the FCC on October 15, 2002.[19] The author, Dale N. Hatfield, formerly Chief, Office of Engineering and Technology at the FCC, was assisted in his research by staff in the FCC's Commercial Wireless Division of the Wireless Telecommunications Bureau. As its title indicates, the report's focus is primarily on technical and operational issues.

Observations in the report that might be the basis for policy initiatives include

- The critical nature of location information in enhanced 911 in supporting first responders in emergencies.
- The "seriously antiquated" condition of the infrastructure that underlies 911 for both wireline and wireless emergency calls.
- The need for a national 911 office to act as a "champion" at the federal level.

Regulation. Since October, 1, 2001, wireless carriers have been expected to meet FCC guidelines for providing W-E911 to PSAPs. The FCC took an important first step toward adopting rules for W-E911 in 1996 with a first *Report and Order* (FCC 96-264) citing provisions of the Communications Act[20] as the basis for its action. To facilitate the effort to provide comprehensive 911 services nationwide,

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[16] Automatic Number Identification (ANI) recognizes and displays the telephone number from which the call is placed. Automatic Location Identification (ALI) provides — in the case of wireline — the address associated with the telephone number or — in the case of wireless — the approximate geographic coordinates of the caller.

[17] National Emergency Number Association (NENA), at [http://www.nena.org/pages/Content.asp?CID=144&CTID=22]. Viewed January 25, 2006.

[18] ibid.

[19] Available at [http://www.fcc.gov/911/enhanced/reports/]. Viewed January 26, 2006.

[20] U.S.C. Title 47, Chapter 5, § 151, Communications Act of 1934. The FCC's charter includes "promoting safety of life and property through the use of wire and radio communication."

Congress in 1999 passed the "911 Act,"[21] which mandated 911 as the emergency number nationwide and made numerous provisions for its implementation. Among other provisions, the law requires the FCC to work with the states and the many other affected parties to deploy comprehensive W-E911 service.

The FCC plotted a course for reaching W-E911 in two phases. For Phase I, the carriers were given a year to prepare for PSAP requests for Automatic Number Identification (ANI) and location-finder capabilities using technology existing at the time. By 2001, for Phase II, the carriers were to have identified and implemented new location-finder technologies (Automatic Location Identification, or ALI).[22] From 1997 through 2000, the FCC made several changes in its accuracy requirements, impacting the carriers' ability to develop the needed ALI technology.[23] In particular, the FCC set up different timetables for carriers using network-based technologies for supplying locations information and those using technologies that required new handsets. By December 31, 2005, for carriers using handset-based solutions, 100% of new mobile phones supplied to customers are required to be Phase II compliant and 95% of the carriers' customers must have Phase II technology. Difficulties in meeting the latter requirement will be discussed in the next section of this report.

After the publication of the Hatfield Report in 2002, the FCC undertook several new initiatives to bolster its role in supporting 911. These included creating an Enhanced 911 (E911) Coordination Initiative to bring together relevant stakeholders to foster cooperation. The FCC also supports the National Reliability and Interoperability Council (NRIC VII), a Federal Advisory Committee that provides best practices and other guidelines for telecommunications operations, including homeland security and public safety.[24] NRIC VII has four focus groups for E911 issues, including one studying interfacing PSAPs with the wider universe of public safety networks.[25]

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[21] P.L. 106-81, Wireless Communications and Public Safety Act of 1999.

[22] Automatic Number Identification (ANI) recognizes and displays the telephone number from which the call is placed. Automatic Location Identification (ALI) provides — in the case of wireline — the address associated with the telephone number or — in the case of wireless — the approximate geographic coordinates of the caller.

[23] For example, in 1997, the FCC recognized the possibility of handset-based solutions for Phase II, whereas previously it had discussed only network solutions ("E911 Reconsideration Order," December 1, 1997). Handset-based technology requires alterations to the handset and new network software. Included in this category for regulatory purposes are solutions requiring new handsets and new network hardware — sometimes referred to as a hybrid solution. Solutions that work with the installed base of existing handsets and require investments in network hardware only are considered network-based. In 1999, the FCC set criteria for handset-based technology, setting stricter standards for its accuracy than for network-based solutions ("Third Report and Order," October 6, 1999).

[24] See [http://www.nric.org/]. Viewed January 26, 2006.

[25] NRIC VII, Focus Group 1D, Communications Issues for Emergency Communications Beyond 911; Report #1 — Properties and network architectures that communications between PSAPs and emergency services personnel must meet in the near future," December

(continued...)

Leadership. In its 1996 blueprint for implementing W-E911, the FCC noted that introducing the service nationwide would require coordination and "cooperative efforts by state and local governments, PSAP administrators, wireless carriers and equipment manufacturers." The FCC has limited its leadership role to encouraging states and communities to work together in developing coordinated plans for W-E911. Charged in the 911 Act to take positive steps to address the implementation of 911 services, the FCC has primarily played the role of regulator and mediator.

The Department of Transportation (DOT) in recent years has moved forward to assist wireless E-911 as an extension of its highway safety programs. In 2002, DOT created a pro-active program to foster cooperation and dialog among key participants. Among other actions, a partnership between DOT and three public safety associations was formed in support of a Wireless Implementation Program.[26] In 2005, DOT announced plans to produce a national framework and deployment plan for a Next Generation 911 (NG911) system, to be developed over a three-year period.[27] In 2006, NG911 began the process for testing an IP-based network to support 911. The goal is to have a prototype system installed in a PSAP by 2007.[28]

The ENHANCE 911 Act. Congress responded to the issues raised in The Hatfield Report and by the 9/11 Commission and others with the ENHANCE 911 Act of 2004 (P.L. 108-494). It created a E-911 Implementation Coordination Office within the federal government. It also addressed a number of concerns that had been raised about the deployment of 911, including compliance, coverage in rural areas, and the use of fees levied by states and localities to help cover the cost of providing 911 services. The act designates the Director of the National Telecommunications and Information Administration (NTIA) and the Administrator of National Highway Traffic Safety as co-administrators of an E-911 Implementation Coordination Office. Once the office is established, the co-administrators would report to Congress annually on activities "to improve coordination and communication with respect to the implementation of E-911 services." Authorizations of up to $250 million annually for program activities and grants were established for fiscal years 2005 through 2009, with authority for authorizations expiring on October 1, 2009. Although the program has never been funded through authorizations, funding is scheduled to be provided through the "Digital Transition and Public Safety Fund," created by the Deficit Reduction Act (P.L. 109-171). Up to $43.5 million is designated specifically for 911, payable from the proceeds of spectrum auctions

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[25] (...continued)
6, 2004, pp. 12, 26-27, at [http://nric.org/meetings/docs/meeting_20041206/FG1D%20Final%20Report.pdf]. Viewed January 26, 2006.

[26] For details on DOT programs, see [http://nena.org/dot/]. Viewed January 26, 2006.

[27] Program updates are provided at [http://www.its.dot.gov/ng911/ng911_overview.htm]. See also "Summary of Responses to Next Generation 9-1-1 Request for Information," at [http://www.its.dot.gov/ng911/ng911_rfisummary.htm]. Both viewed March 14, 2006.

[28] Statements by Jenny Hansen, Project Coordinator, Next Generation 9-1-1, Department of Transportation, at "Addressing the IP-Based Network," E9-1-1 Institute, February 21, 2006.

scheduled in 2008. The Congressional Budget Office anticipates payments of $18 million in both fiscal years 2009 and 2010 and the balance in 2011.[29]

911 Policy and Issues

While some key issues concerning the development of 911 have been specifically addressed by the ENHANCE 911 Act, others remain. Some could be addressed by the E-911 Implementation Coordination Office if it is created, or, independently, through the Department of Transportation. The FCC also continues to take regulatory steps to improve the delivery and availability of 911. Bills that would address specific problems have been introduced in the 109th Congress.

Compliance and Location Accuracy. Wireless carriers must meet standards for accuracy (ability of the technology to locate the caller within a specified number of meters); market penetration (for example, all new handsets); and timeliness (for example, complying with a PSAP request within six months). To avoid penalties, carriers that cannot comply with W-E911 requirements must request waivers. For enforcement purposes, the FCC has divided wireless carriers into three tiers. Small (Tier III) and mid-sized carriers (Tier II) are treated as one group with its own administrative schedule for compliance. Tier I carriers are the largest carriers (Verizon, Cingular,T-Mobile, and Sprint Nextel) that collectively have over 80% of the wireless market nationwide. These are considered as a separate group and closely monitored by the FCC for compliance.

A coalition of Tier III companies asked the FCC to ease standards for location accuracy for Tier III carriers, especially those in rural areas.[30] Wireless carriers face specific problems in implementing location-finding technology in rural areas. These include the use of analog as opposed to digital cellular services (digital technology provides significantly better location-finding capability), the difficulty of installing a sufficient number of cell towers to provide "triangulation" for location technologies; and the predominance of cell towers placed along major highways (sometimes referred to as a "string of pearls"), also a complication for proper triangulation. For these and other reasons, location identification in more densely-populated areas provides a greater degree of accuracy than for rural areas. The FCC rules permit a wireless carrier to meet location-accuracy requirements by averaging location performance systemwide. Carriers that specialize in meeting the niche market needs of rural customers do not have the option of averaging their system's accuracy with better-performing data from urban/suburban areas. As a consequence, many are struggling to meet the FCC's requirements for accuracy in location identification. Reflecting concerns that some carriers would stop serving remote areas rather than invest in improving location identification capabilities, the

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[29] Congressional Budget Office Cost Estimate, S. 1932, Deficit Reduction Act of 2005, January 27, 2006, page 21, [http://www.cbo.gov/showdoc.cfm?index=7028&sequence=0].

[30] See submitted comments, Tier III Coalition for Wireless E911, December 3, 2002, on the FCC Electronic Comment Filing System (ECFS), proceeding "02-46"; available online at [http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513390405]. Viewed January 26, 2006.

ENHANCE 911 Act directed the FCC to grant waivers in situations where strict enforcement would decrease access to emergency services.[31]

The ENHANCE 911 Act also required the FCC to study the situation of Tier III wireless carriers regarding the waiver process and providing information on effective technologies for implementing Phase II of W-E911.[32] The FCC submitted a detailed report in April 2005 but made no recommendations regarding technology.[33] In the same time frame, the FCC granted a blanket waiver to Tier III companies regarding coverage of their customer base (see next section).

The Association of Public-Safety Communications Officials International, Inc. (APCO) received $750,000 from the Public Safety Foundation to conduct an independent test of the accuracy of location information received by PSAPs.[34] APCO has petitioned the FCC to apply a uniform standard for location accuracy in areas served, disallowing national averaging used by large carriers to measure compliance with W-E911.[35] APCO recommends that accuracy requirements be set at the level of Metropolitan Statistical Areas and Rural Statistical Areas.[36] The FCC's Advisory Council, NRIC VII, has recommended that accuracy requirements be measured at the state level.[37] A tightening of accuracy rules would force improvements in the quality of location information but would not solve all the problems of getting useful location information to PSAPs. High rise buildings, for example, pose another set of problems; even though X-Y coordinates might accurately identify a street corner, it does not identify whether the caller is on the fourth floor or the fortieth.[38] The debate regarding tighter requirements for location accuracy is ongoing.[39]

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[31] P.L. 108-494, Section 107 (a).

[32] P.L. 108-494, Section 106.

[33] Amended report submitted April 1, 2005. The FCC concluded that technologies currently in use were all suitable and that the choice depended on a variety of factors. "FCC Amended Report to Congress on the Deployment of E9-1-1 Phase II Services by Tier III Service Providers" at [http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-257964A1.pdf]. Viewed January 26, 2006.

[34] "PSFA Awards $750,00 for Wireless Accuracy Testing," Press Release, August 5, 2005, [http://www.apcointl.org/news/2005/20050808ProjectLocateToConductWirelessAccuracyTesting.html]. Viewed August 15, 2005.

[35] Letter from APCO International to public safety officials, March 3, 2005, at [http://www.apcointl.org/news/2005/20050303CallToActionOnWireless9-1-1Accuracy.html]. Viewed August 15, 2005.

[36] APCO filing with FCC, Supplement to Request for Declaratory Ruling, FCC Docket 94-102, February 4, 2005.

[37] NRIC VII, Focus Group 1A Report #1, Revised, March 29, 2005 at [http://www.nric.org/meetings/docs/meeting_20050329/FG1A%200205%20Report%201%20Revised.pdf]. Viewed August 15, 2005.

[38] "Tests Show Many Cellphone Calls to 911 Go Unlocated," by Anne Marie Squeo, *Wall Street Journal*, May 19, 2005, page B1.

[39] See FCC Electronic Comment Filing System (ECFS) at [http://www.fcc.gov/cgb/ecfs/].

(continued...)

Coverage of Customer Base. In addition to meeting standards for accuracy of location information, carriers using handset solutions for location identification must meet levels of distribution of Phase II compliant handsets to their customer base. By December 31, 2005, all new mobile phones provided to customers must have Phase II location information technology and 95% of a carrier's customer base must be using Phase II compliant phones.

A petition filed with the FCC by the Cellular Telecommunications & Internet Association (CTIA) and the Rural Communications Association (RCA) summarizes the difficulties being met by carriers depending on handset technology to comply with Phase II. These include (1) lower replacement rate for phones than anticipated by the FCC; (2) lowered churn rates as more customers remain with existing wireless carriers, keeping the phones they already have; and (3) unwillingness to replace phones for location technology capabilities. Customers apparently are satisfied with the current features in their cell phones and are reluctant to replace them with a phone in order to gain location-identification technology. In rural areas, the primary reason might be a desire to keep an analog cell phone because it provides better local coverage; analog signals travel greater distances than digital ones, which is significant in areas with a limited number of transmission towers. (Phase II location technology requires a digital phone.) Among other possible reasons are consumer awareness of low penetration rates of Phase II capabilities at local PSAPs — rendering the location technology ineffective for 911 purposes — and privacy concerns; many citizens are uninformed about how location technology works and some fear that anyone will be able to know where they are, at any time, without their consent.[40] The petition requests the FCC to suspend the 95% market penetration rate for carriers that are meeting compliance rules for new phones. Alternatively, the FCC could set up a streamlined waiver process for companies falling short of the 95% requirement. Some Tier III companies have received waivers from this requirement.[41] As reported by the press, the CTIA/RSA petition is echoed by statements and requests for waivers from some of the wireless companies that use handset technologies for location identification. Carriers that use network technology to meet Phase II requirements are not affected by the deadline.

Reflecting the difficulties reported by carriers, some analog telephone users have encountered service problems when they have switched from analog to digital

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[39] (...continued)
Search for filed comments under Docket No. 94-102.

[40] The latter explanation was not included in the CTIA/RSA petition but it is a concern that the CTIA is aware of and has addressed by supporting voluntary standards. See CTIA, "Consumer Code for Wireless Service" [http://files.ctia.org/pdf/The_Code.pdf]. Viewed August 15, 2005. The evolution of wireless location technology and privacy concerns is reviewed, for example, in "Can You Be Found Anywhere, Anytime?" by Gregory M. Lamb, *Christian Science Monitor*, July 14, 2005, page 13. For a discussion of wireless customer concerns about privacy, see CRS Report RL31636, *Wireless Privacy and Spam: Issues for Congress*, by Marcia S. Smith.

[41] Joint Petition for Suspension or Waiver of the Location-Capable Handset Penetration Deadline, Rural Cellular Association and CTIA - The Wireless Association, FCC, Docket No. 94-102, June 30, 2005.

phones. An undetermined number of customers in suburban and rural areas find that their new digital phones place them out of range of towers that can receive digital signals. Calls — including 911 calls — that went through on their analog phones can no longer be completed. Because of compliance requirements, carriers do not want to provide new analog phones, nor replace broken ones. The protection of rural customers that Congress intended by urging relief for Tier III carriers does not apply to rural customers of larger companies, including locally-operated subsidiaries.

911 Funding. The bulk of the costs for implementing wireless E911 is covered by the telecommunications industry and by consumers, primarily as taxpayers at the state and local level but potentially also as purchasers of wireless handsets and subscriber services, since some of the carriers' costs for E911 technology may be passed along as price increases. One common source of funds is a surcharge on telephone bills collected at the local or state level, or both. Most states have some form of 911 fund that receives revenue from a surcharge on telephone bills.[42] Another source at the local or county level is an increase in property taxes with the additional monies going to an E911 fund. In 2003, the CTIA was among those alerting Congress to concerns that collected funds were being misapplied. It collected data that indicated that millions of dollars were being collected by states for 911 and then used for other purposes.

Table 1. E911 Funds Diverted to General Funding

State	Amount(s)	Year(s)
California	$50 million	2001
District of Columbia	$9.45 million over three years	2000-2003
Maryland	$1 million	2002
North Carolina	$2.5 million; $5 million	2001; 2002
New York	$45 million; $162 million	2001; 1991-2000
Oregon	$7 million	2002
South Carolina	$5 million	2003
Texas	$40 million	2001
Virginia	$30 million	2002

Source: CTIA, March 2003

According to the CTIA, of the 18 states known to have wireless E911 programs funded at the state level, nine transferred these funds to a general fund. The table above was prepared in early 2003 and is not comprehensive. California, for example,

[42] An overview of surcharges, by state, is available on the NENA website at [http://www.nena.org/DOT/Surcharges%209-1-1.pdf]. Viewed January 18, 2005.

borrowed $63.1 million from its 911 fund in 2003.[43] On a smaller scale, the Maine Legislature voted to transfer $123,301 to the 2003 General Fund from the state's Emergency Services Communication Bureau's E-911 Fund.[44]

The act provides a mechanism for funding 911 with a program of matching grants.[45] To penalize states and other jurisdictions that use 911 fees for other purposes, the act would deny grants to entities that diverted funds.[46] For this legislative response to be effective requires appropriations for the programs that the act authorizes.

The act also required the General Accountability Office to study the imposition of taxes and fees for 911 services and the use of these fees.[47] In its final report,[48] the GAO provides an overview of state-by-state implementation of Phase I and Phase II for E911 and the collection of fees to fund these services. The report identified some states that reported using 911 fees for other purposes;[49] six states and the District of Columbia did not respond to the survey.

Voice Over Internet Protocol (VoIP). Voice over Internet Protocol (VoIP) does not automatically provide location information to a PSAP, unlike most wireline and an increasing percentage of wireless 911 phone calls. VoIP uses Internet bandwidth to send voice communications; these can be peer-to-peer, essentially a closed loop, or through a public switched telephone network (PSTN), communicating over telephone lines. To achieve ANI/ALI delivery to a PSAP, there must be a connection to a local telephone switch that links to the appropriate PSAP and the VoIP user must register the phone number and address of the phone line used for VoIP. As the service has become more popular, often replacing a household's wireline phone, it has become evident that the absence of automated location identification represents a serious hole in the 911 public safety net. The FCC, therefore, is pursuing actions to assure 911 access for VoIP users, particularly as regards access to PSTN lines to 911 call centers and provision of ANI/ALI data. Current requirements established by the FCC have two parts. First, VoIP providers must contact all subscribers and inform them of the terms on which 911 access is or is not available. Second, VoIP providers are to meet FCC requirements for assuring that 911 calls are delivered to PSAPs and provide ANI/ALI data.[50]

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[43] "911 Cell Phone Plan Gets a Push," by Edward Epstein, San Francisco Chronicle, August 11, 2003, page A4.

[44] Maine 2003 Legislative Service, 121th Legislature, 2003 Me. Legis. Serv. Ch. 2 (H.P. 372) (L.D. 483) (WEST), Section AA-3, West Group 2003.

[45] P.L. 108-494, Section 104, Section 158 (b).

[46] P.L. 108-494, Section 104, Section 158 (c).

[47] P.L. 108-494, Section 105.

[48] *States' Collection and Use of Funds for Wireless Enhanced 911 Services*, Government Accountability Office, March 2006, GAO-06-338.

[49] Ibid., Figure 5, page 18.

[50] The FCC has a website about VoIP, E911, and FCC actions at [http://www.voip911.gov/].
(continued...)

In response to VoIP provider concerns about how to meet the technical requirements of the FCC, the National Emergency Number Association (NENA) has prepared recommendations for developing an architecture to connect VoIP to the existing emergency network infrastructure, both for the interim and long term.[51] NENA states that VoIP is "poised to become the predominant technology used in the telecommunications industry."[52]

Static vs. Nomadic VoIP. A contentious issue revolves around differences in connectivity for static and nomadic services. Static VoIP applies primarily to cable companies that offer VoIP as part of broadband Internet, delivered by coaxial cable. The VoIP service is linked to an Internet connection that is in a fixed place. Nomadic VoIP refers to service that can be used anywhere that there is Internet access. Vonage, for example, a major provider of VoIP, can be used through any Internet Service Provider (ISP); VoIP over wireless (usually Wi-Fi) will work wherever there is a link. Static VoIP requires a one-time registration of a subscriber's phone number and address. Nomadic VoIP has a different set of operating criteria that can accommodate constant revision of location information. Nomadic VoIP is analogous to cell phones in terms of portability.

Citizen-Activated Emergency Calls. PSAPs are not the only call centers that handle requests for assistance or information in an emergency. Call centers are identified as a pivotal link in an end-to-end network of emergency communications, information, response, and post-incident care. A report by the Wireless Emergency Response Team (WERT) discusses the valuable help provided to victims of the World Trade Center attack through call center services donated by BellSouth.[53] The report urges that national planning for emergency preparedness and response include the mobilization of private-sector call centers to field calls for information and assistance for non-life-threatening needs.[54] WERT also provided communication support after Hurricanes Katrina and Rita. Citizen-activated calls for help currently go to 911, to 311, to 211, and to other call centers in both the public and private sector.[55] The 311 code was created by the FCC in 1997 to take non-emergency calls

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[50] (...continued)
Viewed January 27, 2006.

[51] *Interim VoIP Architecture for Enhanced 9-1-1Services*, NENA 08-001, December 2005 [http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA_08-001_V1_12-06-05.pdf]. Viewed January 27, 2006.

[52] Ibid., page 1.

[53] Wireless Emergency Response Team (WERT), Final Report for the September 11, 2001 New York City World Trade Center Terrorist Attack, October 2001, Section 3.14, page 18, at [http://www.nric.org/meetings/docs/wert_final_report.pdf]. Viewed March 14, 2006.

[54] Ibid., Section 1, Recommendation PCC-2, page 9 and Section 6, Public Call Center, page 40 *et seq.*

[55] For example, the automobile industry operates call centers for its services for automatic crash notification, roadside assistance and other emergency aid (telematics); operators will contact a nearby PSAP when necessary. Telecommunications companies that provide satellite telephony (Mobile Satellite Service — MSS) are required by the FCC to operate (continued...)

police calls as a means to reduce congestion on 911 lines.[56] Many cities have adopted shared-service communications hubs using 311 as a way to consolidate agency call centers.[57] The 211 dialing code is reserved by the FCC on a provisional basis as a universal number for community information and referral.[58] The 211 call centers support a variety of social service hot lines and can also be used to provide information and guidance in emergency situations.

The Next Generation of Emergency Communications. NENA is pressing for what it calls "NG-E9-1-1," referring to next generation technologies. NENA wants to address the technical, operational and policy issues associated with modernizing the E911 system and integrating new technologies, such as voice over IP, instant messaging, short message service messaging, Wi-Fi, geographic information systems and video.[59] As noted above, the Department of Transportation is seeking to develop an IP network plan for NG911 as part of the Intelligent Transportation Systems Program; and the National Interoperability and Reliability Council for the FCC has urged the development of a common platform that would link 911 to an interoperable communications network based on Internet technologies. The Alliance for Telecommunications Industry Solutions has a forum on emergency service interoperability.[60] Others, such as the Internet Engineering Task Force, are also reportedly contributing to the effort to find common platforms and standards to allow interoperability for the next generation of technology.[61]

Congress and the Emergency Communications Safety Net

Enhanced technology and heightened awareness of the public safety and homeland security benefits of emergency call centers have raised the bar of expectations both within the public safety community and of the those who need 911 services. The 9/11 Commission, among others, has urged Congress to advance on the goal of integrating 911 with emergency response programs.

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[55] (...continued)
call centers that can forward 911 calls.

[56] "FCC Creates New 311 Code for Non-Emergency Police Calls . . . ," FCC News, Report CC 97-7, February 19, 1997 at [http://ftp.fcc.gov/cgb/dro/311news.html]. Viewed March 14, 2006.

[57] "It Pays to Consolidate; Officials turn to shared service centers," by Aliya Sternstein, *Federal Computer Week*, March 14, 2005.

[58] More information is on the FCC website at Consumer and Governmental Affairs Bureau, Consumer Alerts and Fact Sheets, [http://www.fcc.gov/cgb/consumerfacts/211.html].

[59] "Next Generation9-1-1: Responding to an Urgent Need for Change," Initial Findings and Recommendations of NENA's NGE9-1-1 Program, at [http://www.nena.org/media/files/ng_final_copy_lo-rez.pdf]. Viewed March 14, 2006.

[60] See [http://www.atis.org/esif/missionscope.asp]. Viewed March 14, 2006.

[61] Testimony of John Melcher, Executive Director, Greater Harris County 9-1-1 Emergency Network, Committee on Energy and Commerce, Subcommittee on Telecommunications and the Internet, "How Internet-Enabled Services Are Changing the Face of Communications: A Look at the Voice Marketplace," March 16, 2005.

Some public safety associations[62] envision robust emergency communications systems that connect first responders and health facilities with emergency call centers that are also linked to all-hazard warning systems. These systems would be built on a backbone using Internet protocols. S. 1063 (Senator Nelson) and H.R. 2418 (Representative Gordon) — the IP-Enabled Voice Communications and Public Safety Act of 2005 — carry the requirement that the E-911 Implementation Coordination Office provide a plan to migrate to a "national IP-enabled emergency network capable of receiving and responding to all citizen activated emergency communications."[63]

Migration to an IP-network is also covered in the Communications Opportunity, Promtion, and Enhancement (COPE) Act (H.R. 5252, Representative Barton). This bill, described primarily as a video competition bill, was negotiated by the House Committee on Energy and Commerce. It includes a section (Title III) on access to 911 for VOIP users. Other provisions in the section provide language that bolsters the FCC's power to enforce compliance with enhanced 911 requirements already applied to wireless and wireline telecommunications. Rights and responsibilities for VOIP service providers and 911 system operators, among others, are covered in the bill. States, municipalities, and other entities are assured the right to levy 911 service fees on VOIP bills to customers in line with current practices for wireless and telephone bills. A competing bill introduced by Senator Ted Stevens (S. 2686) covers some of the same issues addressed in the COPE Act; it does not, however, contain language dealing with VOIP and 911.

Language in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, SAFETEA-LU (P.L. 109-59) provides for the creation of Federal Interagency Committee on Emergency Medical Services to coordinate emergency medical services and 9-1-1 systems.[64] This action codifies an existing Department of Transportation-sponsored committee that addresses the interdependence of EMS and 911 systems and coordinates among agencies and government services at all levels. It incorporates language from companion bills H.R. 1240 (Representative Hefley) and S. 611 (Senator Collins). A key provision of the two bills that is not included in the law is the creation and support of a community-based Advisory Council to make recommendations to the Committee.[65]

Companion bills introduced in the House (H.R. 896, Representative Bilirakis) and Senate (S. 211, Senator Clinton) would facilitate nationwide availability of 211. The Calling for 2-1-1 bills recognize the potential role of 211 call centers in providing "community preparedness and response."[66] A grants program would be

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[62] For example, NENA and the ComCARE Alliance.

[63] S. 1063, Section 3 and H.R. 2418, Section 3.

[64] P.L. 109-59, Section X, Subtitle B, Section 10202.

[65] S. 611 and H.R. 1240, Section 3.

[66] S. 211, Section 2 (10) and H.R. 896, Section 2 (10).

administered by the Department of Commerce. Applicants would have to include information about cooperation, if any, with other call centers, including 911.[67]

Problems in providing 911 access for VoIP calls are addressed in the IP-Enabled Voice Communications and Public Safety bills (H.R. 2418 and S. 1063) and also, in a limited way, by H.R. 214 (Representative Stearns).[68] H.R. 214, the Advanced Internet Communications Service Act, would establish a regulatory framework for Internet communications that is separate from telecommunications regulation.[69] The IP-Enabled Voice Communications and Public Safety bills (H.R. 2418 and S. 1063) would provide specific requirements and protections for 911 and enhanced 911 calls using VoIP;[70] the bills also permit states and communities to impose fees on VoIP billings to customers, as is commonly done for wireline and wireless phone bills.[71]

The Subway Cell Access Act (H.R. 733, Representative Weiner) would require the FCC to regulate wireless telephone providers to assure wireless connectivity to 911 call centers from underground transit stations.

The Securing Useful and Responsive Giving in Emergencies (SURGE) Act (H.R. 4564, Representative Thompson) includes a provision for the establishment of a national disaster call center network.[72] The purpose of the network would be to facilitate contact with the Federal Emergency Management Agency and the expediting of needed relief.

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[67] S. 211, Section 3 (f) (2) (C) and H.R. 896, Section 3 (f) (2) (C).

[68] H.R. 214, Section 3 (a) (1) (A).

[69] H.R. 214, Section 2 (b).

[70] S. 1063, Section 2 and H.R. 2418, Section 2.

[71] S. 1063, Section 2 (c) and H.R. 2418, Section 2 (c).

[72] H.R. 4654, Section 6.