Sending Out an S.O.S.: Public Safety Communications Interoperability as a Collective Action Problem

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I. INTRODUCTION

On September 11, 2001, officers from the New York City police and fire departments responded to the attacks on the World Trade Center. That

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morning, police and firefighters entered each of the Twin Towers in an effort to help those inside. Shortly after the South Tower collapsed, an officer in a police helicopter hovering over the scene radioed to his colleagues, "About 15 floors down from the top, it looks like it's glowing red. It's inevitable."[1] Then another police pilot reported, "I don't think this has too much longer to go. I would evacuate all people within the area of that second building."[2]

Police officers inside the building and on the ground heard those warnings and proceeded to evacuate.[3] Most got out. However, because their radios were not compatible with those of the police, firefighters inside the tower could not hear the message.[4] One hundred and twenty-one firefighters died inside the North Tower when it collapsed twenty-one minutes after the first warning was issued over police radio.[5]

This anecdote from 9/11 is perhaps the best way to encapsulate the problem of public safety communications interoperability. Plainly put, if police officers are not able to talk to firefighters in their own city when they both respond to the same event, the results can be disastrous. And it is not just police officers and firefighters who need to talk to each other. Emergencies can overflow to neighboring jurisdictions, requiring cooperation between neighboring agencies. Also, everyday emergencies elicit responses from many actors: police, fire, and Emergency Medical Services ("EMS"), as well as local, state, and federal agencies of every stripe. The attack on the Pentagon on 9/11 saw "900 personnel representing 50 secondary agencies responding to the scene just minutes after the attack [and they] had no means of direct radio communications with first responders."[6] This happens because jurisdictions often overlap. For example, one emergency can take place within the geographical jurisdiction of a police department, a sheriff's office, the state police, and the Federal Bureau of Investigation ("FBI"). All must communicate in order to coordinate an effective response.

Unfortunately, however, the agencies and jurisdictions that should be able to talk to each other often cannot. The reason is that their communications systems are not interoperable. That is, because they use

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1. Jim Dwyer et al., *9/11 Exposed Deadly Flaws in Rescue Plan*, N.Y. TIMES, July 7, 2002, at A1. *See also* THE 9/11 COMMISSION REPORT 309 (2004), http://www.gpoaccess.gov/911/pdf/sec9.pdf [hereinafter 9/11 REPORT].

2. Dwyer et al., *supra* note 1, at A1.

3. *Id*.

4. *Id*.

5. *Id*. *See also* Editorial, *Continuing Lessons of 9/11*, N.Y. TIMES, May 20, 2004, at A26.

6. Douglas Page, *Internet Protocol May Solve Communications Interoperability*, FIRE CHIEF, Mar. 1, 2003, at 14.

different frequencies or transmission standards, one agency's radios cannot receive or transmit messages to another agency's radios. A 2004 survey by the U.S. Conference of Mayors found that about a quarter of cities polled did not have a communications link between their police and fire departments.[7] More than eighty percent reported that they did not have the capability to communicate with the Federal Emergency Management Agency ("FEMA"), the FBI, and other federal agencies.[8] Forty-nine percent of cities said they are not interoperable with the state police, and forty-four percent reported an accident within the preceding year in which a lack of interoperable communications made response difficult.[9]

Lack of interoperability among local public safety organizations was nothing new on the morning of September 11, 2001. Eight years earlier, police could not communicate with firefighters just one floor away during the response to the first attack on the World Trade Center.[10] Incompatible emergency communications also handicapped the responses to the Columbine High School shootings in 1999[11] and the Oklahoma City bombing in 1995.[12] Little has changed since 9/11.

Cross-jurisdictional interoperability also remains a problem to this day. While Shreveport, Louisiana's fire department radio system allows it to communicate with police, EMS, and fifty other agencies in its region, when the Shreveport firefighters traveled to New Orleans to lend a hand in the aftermath of Hurricane Katrina, their radios were useless.[13] Police in the area used a different system that was incompatible with Shreveport's radios.[14] Similarly, destroyed infrastructure and the lack of interoperable communications systems forced the Mississippi National Guard and other first responders along the Gulf Coast to exchange information through paper relays and face-to-face meetings, delaying emergency responses.[15]

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7. THE UNITED STATES CONFERENCE OF MAYORS, INTEROPERABILITY SURVEY 6 (2004), http://www.usmayors.org/72ndAnnualMeeting/interoperabilityreport_062804.pdf.

8. *Id*. at 7.

9. *Id*. at 8.

10. PUB. SAFETY WIRELESS ADVISORY COMM., FINAL REPORT OF THE PUBLIC SAFETY WIRELESS ADVISORY COMMITTEE TO THE FCC AND THE NTIA 5 (Sept. 11, 1996) [hereinafter PSWAC REPORT].

11. Viktor Mayer-Schönberger, *Emergency Communications: The Quest for Interoperability in the United States and Europe*, 7 INT'L J. COMM. L. & POL'Y 1, 2 (2002/2003), *available at* http://www.ijclp.org/7_2003/pdf/mayer-sch-ijclp-artikel.pdf.

12. PSWAC REPORT, *supra* note 10, at 5.

13. Jennifer C. Kerr, *Lack of Interoperability Hampers Agencies*, EWOSS NEWS, Oct. 16, 2005, http://news.ewoss.com/articles/D8D985LO1.aspx.

14. *Id.*

15. H. R. REP. NO. 109-377 (2006), *reprinted in* A FAILURE OF INITIATIVE: THE FINAL REPORT OF THE SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA 173–74 (2006), *available at* http://katrina.house.gov/full_katrina_report.htm [hereinafter KATRINA REPORT].

Not only is the interoperability problem not novel, but it also seems that each time a major emergency exposes the lack of interoperability, a new blue ribbon commission is convened to study the issue. Following the communications failures that affected the first responders during the Oklahoma City bombing, the Federal Communications Commission ("FCC") and the National Telecommunications and Information Administration ("NTIA") jointly formed the Public Safety Wireless Advisory Committee to study emergency communications.[16] That committee studied the issue for a year and issued an 800-page report, which concluded that "unless immediate measures are taken to alleviate spectrum shortfalls and promote interoperability, Public Safety agencies will not be able to adequately discharge their obligation to protect life and property in a safe, efficient, and cost effective manner."[17] Ironically, that report was issued on September 11, 1996. After 9/11, the Department of Justice's ("DOJ's") National Institute of Justice created a National Task Force on Interoperability, which has issued a series of reports.[18] And after Hurricane Katrina, the FCC convened the Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks.[19] Information about the interoperability problem is therefore not lacking.

Federal funding aimed at alleviating the problem has also not been lacking. The Digital Television Transition and Public Safety Act of 2005 allocated $1 billion to public safety grants to be administered by NTIA for the deployment of interoperable communications systems.[20] In addition, the Department of Homeland Security estimates that it has spent $5.6 billion on interoperable communications equipment grants between 2003 and 2005.[21] Not surprisingly, the House select committee investigating Katrina explained in its report that "[a]lthough some New Orleans and Louisiana state officials attribute the lack of true interoperability for first responders in the region to financial limitations, this explanation flies in the

16. *See* PSWAC REPORT, *supra* note 10, at 7.

17. *Id*. at 2.

18. National Task Force on Interoperability, The AGILE Program, http://web.archive.org/web/20040604163924/www.agileprogram.org/ntfi (last visited Mar. 28, 2007). *See, e.g.*, National Institute of Justice, Publications, http://www.ojp.usdoj.gov/nij/pubs-sum/204348.htm (last visited Mar. 28, 2007).

19. Press Release, FCC, Chairman Kevin J. Martin Names Nancy J. Victory as Chair of the Federal Communications Commission's Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks (Nov. 28, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-262451A1.pdf.

20. Deficit Reduction Act of 2005, Pub. L. No. 109-171, § 3006, 120 Stat. 4, 24 (2006).

21. *See* U.S. DEPARTMENT OF HOMELAND SECURITY, OFFICE OF GRANTS AND TRAINING PREPAREDNESS DIRECTORATE, INTEROPERABILITY COMMUNICATIONS TECHNICAL ASSISTANCE PROGRAM 3 (2006), *available at* http://www.search.org/conferences/2006interop/agenda/presentations/Keith%20Young%20- 20DOJCOPS-AUSTIN.ppt.

face of the massive amounts of federal grants to Louisiana."[22]

Despite the resources that have been dedicated to it, the interoperability problem persists. To find a long-term solution that enables completely interoperable communications between all necessary emergency responders, we cannot be limited in our thinking by the current system of public safety spectrum allocation, funding, or acquisition. Conventional approaches to interoperability include patching two or more incompatible radio systems using a gateway[23] or simply encouraging agencies to better coordinate their radio deployments without clear incentives for them to do so. These approaches are born out of practicality and encompass eminently sensible steps that can and should be taken immediately to improve interoperability.

This Article, however, aims to identify the root causes of the existing lack of interoperability and then address those causes. While there is a pressing need to address the short-term demands of first responders, another task that is just as important is a "wholesale assessment of long-term spectrum needs" and policy.[24] The goal is not to suggest how existing systems can be tweaked to allow a modicum of increased compatibility, but rather to rethink public safety spectrum policy so as to achieve national universal interoperability.[25]

Part II of this Article explains that the lack of public safety interoperability is the result of what economist Mancur Olson calls a collective action problem, and it is the result of the national policy of public safety spectrum segregation and balkanization. Part III explores how market forces can be employed to solve collective action problems and also surveys several successful commercial interoperable communications networks shared by public safety users and private customers. Part IV applies the lessons from the case studies and suggests an outline for a spectrum policy that could harness market forces to alleviate the collective action problem responsible for lack of public safety interoperability.

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22. KATRINA REPORT, *supra* note 15, at 174 (citations omitted).

23. In telecommunications, a gateway is a network node that allows interfacing with another network using different protocols. In essence, two networks are patched together at a gateway, which translates the differing protocols.

24. *See* FCC, REPORT TO CONGRESS ON THE STUDY TO ASSESS SHORT-TERM AND LONG-TERM NEEDS FOR ALLOCATIONS OF ADDITIONAL PORTIONS OF THE ELECTROMAGNETIC SPECTRUM FOR FEDERAL, STATE, AND LOCAL EMERGENCY RESPONSE PROVIDERS, para. 2 (2005), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-262865A1.pdf [hereinafter NEEDS REPORT].

25. One of the findings contained in the FCC's recent report to Congress on the communications needs of public safety is that "[e]mergency response providers would benefit from the development of an integrated, interoperable nationwide network capable of delivering broadband services throughout the country." *Id*. *See also id*. at paras. 12, 17, 19.

II. WHY DO WE LACK INTEROPERABILITY?

Lack of interoperability exists when first responders who need to communicate with each other are using either different frequencies, or the same frequencies but with different communications standards. There would be no interoperability problem if, before each public safety licensee built its own communications system, it consulted and coordinated with every other public safety agency to ensure that the system it built would be interoperable with every other licensee's system. Better yet, there would be no interoperability problem if public safety agencies agreed to share use of the same network.

The armed forces, like first responders, have also faced severe interoperability problems. During the invasion of Grenada in 1983, Army Rangers invading the south of the island could not speak to Marines taking the north because their respective communications systems were not interoperable.[26] But this wasn't always so. The United States did not have a large standing army before World War II. As it entered that war, the U.S. procured all its military equipment essentially at the same time.[27] By default, then, the military was completely interoperable.[28]

In the decades after the War, each branch of the military proceeded to independently purchase communications systems that best suited its own needs at particular times without coordinating with the other branches.[29] This was not a problem at first, because until recently the services operated independently.[30] Once joint operations became more prevalent in the 1980s, the lack of interoperability that resulted from individual uncoordinated decisions became painfully apparent.[31] Like the military services, individual public safety agencies make decisions about their communications systems in an independent and uncoordinated manner.[32]

In contrast to police officers and firefighters, the average consumer has access to fully interoperable national advanced mobile communications

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26. STEPHEN E. ANNO & WILLIAM E. EINSPAHR, COMMAND AND CONTROL AND COMMUNICATIONS LESSONS LEARNED: IRANIAN RESCUE, FALKLANDS CONFLICT, GRENADA INVASION, LIBYA RAID 36 (1988).

27. ANTHONY W. FAUGHN, INTEROPERABILITY: IS IT ACHIEVABLE? 2 (2002), *available at* http://pirp.harvard.edu/pubs_pdf/faughn/faughn-p02-6.pdf.

28. *Id*.

29. *Id*.

30. *Id*.

31. *Id*.

32. Edwin Daley, *Wireless Interoperability: A Key Element of Public Safety*, PUB. MGMT., May 2003, at 6, 6. "In the past, local and state public safety agencies functioned independently of each other, with little need for coordination. When a field officer found it necessary to communicate with personnel from other agencies, it could be done through a dispatcher, who would relay information between them." *Id*.

systems. A Nokia cell phone user on Verizon's CDMA network operating on the 1900 MHz band can communicate seamlessly, by voice, text, or video, with someone using a Motorola phone on Cingular's GSM network on the 900 MHz band. Our mobile phone networks are not suitable for public safety communications,[33] yet by their very existence they demonstrate that there is no *technical* reason why public safety users cannot achieve a high degree of interoperability among frequencies and standards.[34]

The first question we must answer is: why have public safety agencies not banded together to form a universal interoperable communications network? Part II.A suggests that the failure of public safety agencies to achieve interoperability is grounded in policy and is fundamentally the result of a collective action problem fueled by a national system of public safety spectrum balkanization. Given that public safety agencies have failed to create a national interoperable public safety network, the second relevant question is: why has the private sector not successfully sought to create and market such a network to first responders? Part II.B makes the case that it would be difficult, if not impossible, for a commercial communications network to compete with the current balkanized system because public safety agencies are subsidized with spectrum and therefore face artificially low operation costs. Finally, Part II.C shows that the policy of balkanization also results in economic and spectral inefficiency.

A. Collective Action Problem

The term "collective action" refers to activities that, in order to be successful, require two or more persons or entities to coordinate their efforts.[35] Collective action is therefore group action meant to further the interests of the group.[36] A collective action problem is simply a situation in which the rational course of action for the individual members of the group does not coincide with the group-oriented course of action necessary to obtain the "collective good."[37] As a student of the collective action problem has summarized, "individual rationality is not sufficient for collective rationality."[38]

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33. *See* RACOM Wireless, Why Can't We Just Use Cell Phones?, http://www.racom.net/Downloads/Why%20Not%20Cell%20Phones.pdf; NEEDS REPORT, *supra* note 24, at para. 32.

34. The military's historical interoperability also demonstrates that there is no technical reason why interoperability cannot be achieved. *See supra* notes 27–29 and accompanying text.

35. TODD SANDLER, COLLECTIVE ACTION: THEORY AND APPLICATIONS 1 (1992).

36. *Id*.

37. *Id*. at 1–2.

38. *Id*. at 3.

In his seminal work, *The Logic of Collective Action: Public Goods and the Theory of Groups*, economist Mancur Olson demonstrated that large groups will not act collectively absent outside compulsion or an independent inducement to individual group members.[39] The problem of public safety interoperability is a classic example of the collective action problem that Olson described.[40] This Part will apply Olson's theory of groups to public safety communications to show that although interoperability might be in the common interest of all public safety entities, individual entities have little incentive to assume the costs of achieving it.

We often assume that if a group of individuals has a common interest, they will work together to achieve their common goal. One of Olson's greatest insights was that the size of a group determines whether its individual members will act collectively. Small groups have a better chance of acting collectively for two reasons. First, an individual member of a small group may be better off if the collective good is provided even if she has to bear its entire cost.[41] That member will therefore undertake to provide the good herself even if she cannot exclude others from its benefits. Olson called such groups "privileged."[42] Second, in a sufficiently small group, if one member stops contributing for the collective good, the cost to the other members will rise noticeably such that they might refuse to continue making contributions themselves, and the collective good would no longer be provided.[43] Realizing that this would be the outcome, a member of a small group that values the collective good more than his contribution will likely continue to contribute. Olson called these groups "intermediate" groups.[44]

Members of a large group, however, may share a common interest in the collective good but nevertheless fail to coordinate. Olson called these large groups "latent" groups because they have the potential to be spurred to collective action either through compulsion or individual incentive. He explained:

> [The "latent" group] is distinguished by the fact that, if one member does or does not help provide the collective good, no other one member will be significantly affected and therefore none has any reason to react. Thus an individual in a "latent" group, by definition, cannot make a noticeable contribution to any group effort, and since no one in the group will react if he makes no contribution, he has no

39. MANCUR OLSON, JR., THE LOGIC OF COLLECTIVE ACTION 2 (1965).
40. Mayer-Schönberger, *supra* note 11, at n. 89 and accompanying text.
41. OLSON, *supra* note 39, at 50.
42. *Id*. at 49–50.
43. *Id*. at 44.
44. *Id*. at 50.

> incentive to contribute. Accordingly, large or "latent" groups have no incentive to act to obtain a collective good because, however valuable the collective good might be to the group as a whole, it does not offer the individual any incentive to pay dues to any organization working in the latent group's interest, or to bear in any other way any of the costs of the necessary collective action.[45]

The group for our purposes is the universe of all potentially interoperable public safety entities. The collective good is interoperability. This means that every member of the group—i.e., every public safety agency—would presumably benefit from interoperability, and it is thus a goal they all share. However, the group is very large and thus latent. There are about 50,000 potentially interoperable public safety agencies in the United States[46] comprising an estimated 2.2 million personnel.[47] Applying Olson's theory, we see that no single public safety agency can make a noticeable contribution to a group effort to achieve interoperability, and since no one in the group will react if another agency makes no contribution, public safety agencies have no incentive to contribute. Olson also pointed out that the larger a group is, the higher the cost of organizing the group will be, and therefore "the smaller the fraction of the total group benefit any person acting in the group interest receives, and the less adequate the reward for any group-oriented action[.]"[48]

We can therefore see that the collective action problem exists because there are about 50,000 public safety agencies independently building their own communications networks. This balkanization of public safety networks is a result of federal spectrum policy.

All wireless communications systems—from cell phones to television broadcasts to Wi-Fi networking to public safety communications—rely on radio spectrum, colloquially known as "the airwaves." Generally speaking, two uncoordinated transmissions cannot take place at the same time over the same spectrum frequency. This is why one radio station will transmit over 89.3 MHz, while another local station will use 90.1 MHz. If they both transmitted over 89.3 MHz, you would not be able to hear either. So how

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45. *Id*. at 50–51.

46. The number of public safety agencies in the U.S. has been estimated to be around 50,000, although an exact number is not available. *See* Sen. John McCain, *Floor Speech on Interoperable Communications for Public Safety Officials* (Sept. 13, 2005), *available at* http://mccain.senate.gov/press_office/view_article.cfm?ID=139 (estimating the number at 50,000); WILLIAM L. PESSEMIER, TOP PRIORITY: A FIRE SERVICE GUIDE TO INTEROPERABLE COMMUNICATIONS 11 (International Association of Fire Chiefs 2006) (estimating the number at over 50,000); Mayer-Schönberger, *supra* note 11, at 18 (estimating the number at almost 60,000).

47. PUBLIC SAFETY WIRELESS NETWORK, A PRIORITY INVESTMENT FOR AMERICA'S FUTURE SAFETY 5 (1999).

48. OLSON, *supra* note 39, at 48.

do radio stations go about coordinating so that they do not transmit over the same frequencies?

The FCC controls all public spectrum in the United States, and it doles out licenses to use the spectrum. One cannot legally use a radio frequency without a license,[49] and the FCC takes care not to license two interfering transmissions on the same frequency. The FCC, however, does more than just ensure that interference does not take place. It also decides to what uses a frequency can be put and who will get the license to it.[50] This is a process known as allocation and assignment.

The FCC allocates spectrum by first deciding for what purpose a certain block of spectrum will be used. For example, in 1945 the FCC decided that the spectrum between 174 and 216 MHz would be used for television broadcasts.[51] No other type of transmission—cell phone, paging, satellite TV, etc.—is allowed on that frequency range. Once the allocation is complete, the FCC then assigns licenses to use the spectrum. Historically, the FCC has accomplished this through comparative hearings in which government officials examined competing suitors of the spectrum, judged one to be "in the public interest," and assigned the license to that applicant.[52] However, more recently the FCC has also assigned licenses through lottery and auctions.[53]

Spectrum used for emergency communications is similarly allocated and assigned. The FCC or Congress will allocate certain blocks of spectrum exclusively for public safety use. The FCC will then assign licenses to use the public safety spectrum to end-users. However, unlike other license assignments that can be won by anyone fit to provide the service for which the spectrum has been allocated, public safety spectrum licenses can only be assigned to qualified government jurisdictions.[54] In this way, public safety communications are segregated from commercial communications in what Thomas Hazlett calls "spectrum apartheid."[55]

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49. 47 U.S.C. § 301 (2000).

50. *Id*. § 303(b) (2000).

51. THOMAS W. HAZLETT, THE U.S. DIGITAL TV TRANSITION: TIME TO TOSS THE NEGROPONTE SWITCH, (AEI-Brookings Joint Center for Regulatory Studies, Working Paper No. 01-15, 2001) at 2–3, *available at* http://www.aei-brookings.org/admin/authorpdfs/page.php?id=179.

52. Gerald R. Faulhaber & David Farber, Spectrum Management: Property Rights, Markets, and the Commons 3 (2003) (unpublished manuscript), *available at* http://assets.wharton.upenn.edu/~faulhabe/SPECTRUM_MANAGEMENTv51.pdf.

53. FCC, SPECTRUM POLICY TASK FORCE REPORT, ET Docket No. 02-135 (Nov. 2002) at 9, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf [hereinafter SPTF REPORT].

54. *See, e.g.*, Public Safety Pool, 47 C.F.R. § 90.20 (2005) [hereinafter Public Safety Pool].

55. Thomas W. Hazlett, *Katrina's Radio Silence*, FIN. TIMES, Oct. 24, 2005, *available*

The effect of this policy is that each recipient of a public safety license—that is, each agency or jurisdiction—must build out and operate its own communications system. This arrangement has the advantage of letting each agency or jurisdiction tailor its radio system to its own unique needs.[56] At the same time, however, it has the effect of creating a large "latent" group of over 50,000 licensees. Absent coordination, these independent public safety licensees will not interoperate with the other licensees in the group. As we have seen, members of large groups lack an incentive to coordinate, and public safety agencies also often face disincentives as well.[57] As a consequence, they build custom systems independently of each other, and these systems generally do not interoperate.[58]

B. Where Are the Entrepreneurs?

There are ways that a collective action problem can be overcome or avoided altogether. Mancur Olson posited that members of a latent group could be induced to rationally act in a group-oriented way only through a "separate and 'selective'" incentive.[59] By this he meant that a new

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at http://mason.gmu.edu/~thazlett/Op-eds/Microsoft%20Word%20-%20FT.Katrina.10.26.05.pdf [hereinafter *Radio Silence*].

56. Jon M. Peha, *From TV to Public Safety: The Need for Fundamental Reform in Public Safety Spectrum and Communications Policy* 5 (New America Found., Wireless Future Program, Working Paper No. 15, Oct. 2006), *available at* http://www.newamerica.net/files/WorkingPaper15_TVtoPublicSafety_Peha_FINAL.pdf.

57. For example, agencies compete with each other for resources, power, and prestige. Police and firefighters, for example, often vie for the same municipal dollars. As a result, strained relationships between public safety agencies are typical in most American cities. New York City's "battle of the badges"—ongoing disputes over authority between the city's police and fire departments that have at times ended in physical confrontation—is a case on point. In that city, the NYPD's Emergency Services Unit, which carries out functions that in other cities would be handled by the fire department, has increasingly encroached on the fire department's ground. John Buntin, *Battle of the Badges*, GOVERNING, Sept. 2005, at 46, *available at* http://66.23.131.98/archive/2005/sep/police.txt. Both agencies have laid claim to command at emergency scenes that involve hazardous materials, and their respective unions have vigorously lobbied city officials for the brief. It is not surprising, then, that the 9/11 Commission found that the NYPD and FDNY "each considered itself operationally autonomous" and therefore "were not prepared to comprehensively coordinate their efforts in responding to a major incident [on 9/11]." 9/11 REPORT, *supra* note 1, at 285. *See also* 9/11 Commission, Staff Statement Number 13 at the Eleventh Public Hearing of the National Commission on Terrorist Attacks upon the United States (May 18, 2004), *available at* http://govinfo.library.unt.edu/911/staff_statements/staff_statement_13.pdf; Joshua Brustein, *Revisiting 9/11, Reworking 911*, GOTHAM GAZETTE, May 24, 2004, http://www.gothamgazette.com/article//20040524/200/989; William K. Rashbaum & Michelle O'Donnell, *City Police and Fire Department Pledge Cooperation in Disasters*, N.Y. TIMES, July 12, 2003, at A1, B2.

58. Peha, *supra* note 56, at 5.

59. OLSON, *supra* note 39, at 51.

incentive would be required that "operates, not indiscriminately, like the collective good . . . but rather *selectively* toward the individuals in the group."[60] Olson called latent groups that acquire a collective good through selective incentives "mobilized" because they have been stimulated into action.[61]

Consumers who want to utilize wireless communications could conceivably license spectrum and build their own radio systems. If they did this they would have to coordinate their actions in order to talk to each other. However, this is a non issue because rational consumers have an incentive to simply subscribe to an existing wireless network, both because it is cheaper than building a new system from scratch, and because subscribing to a network gives you access to everyone else on that network. Any collective action problem is thus avoided because the *individual rationality* (choosing the cheapest and most effective alternative) coincides with the *collective rationality* (interoperability). The individual incentive in this case is provided by commercial wireless carriers who themselves have an incentive to offer the right mix of price and quality to consumers.

As the case studies in Part III will show, it is technically and practically feasible for a private firm to create a network on which it leases communications capacity to public safety agencies, much like commercial wireless phone carriers sell subscriptions to consumers. A public safety agency might join such a network if it was offered a selective incentive, such as lower costs, better quality, or some other benefit that it could internalize. Public safety agencies that subscribe to the same network would be interoperable by virtue of being on the same system. If this is the case, why haven't we seen the emergence of national interoperable commercial public safety networks like we have seen in the consumer wireless market?

Spectrum allocated for public safety cannot be traded.[62] That is, agencies cannot sell their licenses to willing buyers. An entrepreneur looking to build out a national interoperable public safety network, therefore, cannot buy public safety licenses and patch them together.[63]

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60. *Id*.

61. *Id*.

62. Public Safety Pool, *supra* note 54, at § 90.20(a).

63. This is in contrast to consumer cell phone licenses. *See* Thomas W. Hazlett, *Is Federal Preemption Efficient in Cellular Phone Regulation?*, 56 FED. COMM. L.J. 155, 201–02 (2003) [hereinafter *Federal Preemption*].

> The U.S. market has gravitated to national networks because of economic efficiency, not due to regulatory constraints or path dependency. Indeed, regulators allotted thousands of local licenses, resisting any bias to impose national scope on service providers. Economic rationalization via mergers, joint ventures, and marketing agreements has driven aggregation of disparate franchise areas into nationwide systems.

Instead, an entrepreneur would have to purchase spectrum that is allocated for more flexible use and which will likely have more lucrative alternative uses.[64]

Even assuming that an entrepreneur makes a public safety offering over "private" spectrum (perhaps by also allowing commercial subscribers on the network), she must still provide a selective incentive that will induce public safety agencies to switch from their current systems. That could be a price below an agency's existing operating costs or some other sufficiently offsetting benefit. However, because public safety agencies are given spectrum that they cannot trade, their operating costs are artificially low.

The cost of spectrum to a public safety agency is measured not by what it paid for the spectrum, which is nothing, but rather by its opportunity cost—i.e., the loss of a potential benefit from other alternative uses of the spectrum, such as gaining income by selling it or leasing excess capacity.[65] As we have seen, the spectrum cannot be traded, and it can only be used for public safety communications. This policy in effect insulates public safety agencies from the true opportunity cost of spectrum.[66] It will therefore be difficult for a commercial network, which must absorb the true cost of spectrum, to compete with what are effectively entrenched incumbents that do not face the same average total costs.

Public safety agencies would face the correct costs of spectrum if they were allowed to trade it or if they were allowed to make other uses of it. Alternatively, public safety spectrum could instead be assigned by auction to commercial carriers from which agencies could purchase their communications capacity. In any of these scenarios we would expect to see greater integration. So why is it that we have a policy of balkanization and apartheid?

Although it seems logical that a police department should get the license for police radio communications—and that some spectrum should be set aside solely for public safety use—the rationale for such a policy is not entirely clear. Law firms do not get licenses for the mobile communications of their lawyers, nor is there spectrum set aside just for

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Id. at 193.

64. Alternatively, an entrepreneur might lobby government for a new no-cost commercial public safety allocation. Firms such as Cyren Call and Frontline Wireless have recently done this, and the practice will be addressed in Part III.A, *infra*.

65. *See* Mark M. Bykowsky & Michael J. Marcus, Facilitating Spectrum Management Reform via Callable/Interruptible Spectrum 10 (Sept. 13, 2002) (presented at the Telecommunications Policy Research Conference), http://tprc.org/papers/2002/147/SpectrumMgmtReform.pdf.

66. *See* Joshua Marsh, Secondary Markets in Non-Federal Public Safety Spectrum 8 (Sept. 2004) (presented at the Telecommunications Policy Research Conference), http://web.si.umich.edu/tprc/papers/2004/384/tprc.pdf.

lawyers. Some say that public safety spectrum is treated the way it is in order to address a perceived potential market failure that would prevent first responders from acquiring the spectrum they need.[67]

For example, in 1987 the FCC issued its Public Safety National Plan, which governs the use of public safety frequencies in the 800 MHz band.[68] One of the two objectives of the plan was "to facilitate *interoperability* between communications systems . . . ."[69] By way of introduction, the order establishing the plan stated:

> Two-way radio provides a vital component in this nation's public safety and emergency medical infrastructure. Agencies involved in the protection of life and property are able to do their jobs effectively and efficiently only by making extensive use of a wide array of mobile communications options available to them. Full use of these options requires that adequate spectrum be made available and that its use be well planned and coordinated to assure that the diverse needs of public safety entities can be satisfied. To this end, the Commission has allocated 6 megahertz of spectrum for these services and is adopting this National Plan to assure that adequate and appropriate frequencies are available to those who serve and protect our way of life.[70]

The implication seems to be that because public safety communications are so vital and important, we must therefore allocate ample spectrum solely for that use and allow only first responders access to that spectrum. However, there is no evidence that there would be a market failure in public safety communications. Patrol cars and guns are just as vital to police forces as communications systems, yet the market readily supplies these goods.

Some argue that because emergencies are by their nature unpredictable and because public safety users therefore need access to spectrum at a moment's notice, they should permanently occupy some spectrum on an exclusive basis.[71] However, Bykowsky and Marcus, two FCC staff members, have noted that such a policy treats first responders "as if they are infinitely 'risk averse:'"[72]

> The cost of such treatment is equal to the benefits society foregoes by

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67. *See id*. at 7–8 (arguing that Ronald Coase's suggestion that all spectrum be auctioned, and that public safety agencies bid for spectrum alongside private bidders, would possibly result in an unacceptable market failure in which first responders did not acquire the spectrum they need).

68. Dev. and Implementation of a Pub. Safety Nat'l Plan and Amendment of Part 90 to Establish Serv. Rules and Technical Standards for Use of the 821–824/866–869 MHz Bands by the Pub. Safety Servs., *Report and Order*, 3 F.C.C.R. 905, para. 1 (2004).

69. *Id*. at para. 3.

70. *Id*. at para. 2.

71. *See* NEEDS REPORT, *supra* note 24, at para. 11; Bykowsky & Marcus, *supra* note 65, at 15.

72. *Id*. at 15.

> not having the highest valued user employ such spectrum during periods of non-use by government users. While it is possible that these foregone benefits do not exceed the value government users place on not having to assume any risk, it is not entirely clear that this is so. Currently, there is no process that generates information regarding the size of the risk premium government users demand and society's willingness to pay that premium. If [the] latter value is greater than the former value, it would be possible to shift risk from government users to other users and, in so doing, make both parties better off.[73]

Marcus and Bykowsky give the example of the Forest Service, which has been assigned public safety spectrum covering the Rocky Mountains region to help its firefighting efforts.[74] Most, if not all, forest fires occur during the June to October dry season. Therefore, the Forest Service may be willing to give up its spectrum during the November to May wet season when there is very little risk of a fire. This would especially be the case if the Forest Service were given an option to recall its spectrum in case of emergency. Such an arrangement would transfer the risk of a wet season fire from the Forest Service to the buyer of the spectrum, who would in turn demand a risk premium in the form of a discounted price. In this way, society no longer forgoes valuable services otherwise made unavailable by treating public safety users as infinitely risk averse. As long as priority for public safety communications is built into a network, there is no reason to fear sharing that network with other users.

C. Inefficiency

The balkanization of public safety communications is not only an impediment to interoperability, but it also results in waste and economic inefficiency. This is because uncoordinated, independent communications networks use more spectrum and equipment than if a coordinated approach were employed. For example, public safety spectrum licenses can only be assigned for a particular band with a certain number of channels.[75] A small agency with only a few officers would nevertheless be given such an assignment even if they did not use all the capacity.[76] In contrast, a family or a small business can purchase only the number of mobile communications handsets it needs from a commercial provider, thereby leaving the rest of the available channels to other consumers.

Carnegie Mellon engineering professor Jon Peha has calculated that

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73. *Id*. at 15–16.

74. *Id*. at 16.

75. Jon M. Peha, How America's Fragmented Approach to Public Safety Wastes Money and Spectrum 8 (Sept. 2005) (presented at the 33rd Telecommunications Policy Research Conference), http://web.si.umich.edu/tprc/papers/2005/438/Peha_Public_Safety_Communications_TPRC_2005.pdf.

76. *Id*.

the number of antennas deployed by public safety entities nationwide correlates less with population or geographic area than with the number of political jurisdictions.[77] This means that more antennas are put up, and more spectrum is used, than is necessary to cover an area simply because local agencies and jurisdictions do not coordinate to share antennas and spectrum. Peha also points out that "the number of antenna towers, base stations, and repeaters used by a public safety agency are largely independent of the number of responders using that agency's wireless system where this number does not exceed 100, and 85% of US public safety agencies support no more than 100 users."[78]

In contrast, a commercial network operator will not employ more spectrum or equipment than necessary to produce a given amount of communications capacity at a certain quality level.[79] Commercial management of spectrum has been shown to be consistently more efficient than government management.[80] Unlike public safety users, commercial carriers have an incentive, as well as greater freedom, to combine into larger and more efficient networks.[81] Public safety agencies do not have the same incentives because they do not face the true cost of spectrum.

For example, as the price of a good decreases, its consumption increases. Because public safety agencies are faced with an artificially low opportunity cost they will be induced to use more spectrum than would otherwise be efficient and therefore waste spectrum.[82] In contrast, public safety agencies face correct opportunity costs when it comes to patrol cars and guns. Instead of direct gun or car subsidies, police departments are given budgets that they then use by weighing the money's alternative uses.[83] Faced with alternative uses for a budget, a police department will presumably not buy more guns or cars than it needs or can use.

Assigning licenses to end-user agencies also generates waste because public safety agencies do not have a comparative advantage in designing and building communications systems. Economist Thomas Hazlett has likened the current public safety spectrum policy to "shipping each police department tons of steel, plastic and rubber to make them responsible for constructing their own patrol cars."[84] More aptly, it is like shipping them the materials and then letting them contract with Ford or Toyota to build

77. *Id*.
78. *Id*.
79. Bykowsky & Marcus, *supra* note 65, at 10.
80. *See* Faulhaber & Farber, *supra* note 52, at 18.
81. *See Federal Preemption*, *supra* note 63, at 201–02.
82. Bykowsky & Marcus, *supra* note 65, at 10.
83. Marsh, *supra* note 66, at 8.
84. *See Radio Silence*, *supra* note 55.

for them a custom-tailored car. Most public safety agencies will contract with communications services firms like Motorola to build their custom system. This is inefficient because it inhibits economies of scale from being achieved. While Ford can build thousands of one car model cheaply, if it had to design and build only 300 squad cars, those cars would no doubt be much more expensive. The same applies to radio communications. While a mobile carrier such as Verizon has millions of customers on its network over which to amortize an investment in an advanced network, the typical police department has fewer than a hundred officers.

III. A POSITIVE SELECTIVE INCENTIVE

The collective action problem identified in this Article exists because there is a large latent group of over 50,000 public safety agencies, each potentially deploying its own incompatible communications system. The question is, how do we ensure that each of these actors opts for a common interoperable system? As noted earlier, Mancur Olson found that members of large latent groups will not be motivated by anything less than an incentive that appeals to their own individual interest and not to their shared interest in obtaining the collective good.[85] He further explained that such a "selective incentive" could be either positive or negative.[86] A member can be induced to act in the group interest by a threat of punishment or the promise of an individualized benefit.[87]

Examples of both approaches can be found in environmental regulation.[88] To abate pollution, government can take a command-and-control approach and issue regulatory mandates backed by the threat of fines or loss of permits. On the other hand, a market incentives approach could be employed. Tradable emission rights could be assigned in order to give polluters a financial incentive to invest in cleaner processes. In effect, market incentives are leveraged to induce members of a group to act in a group-oriented way.

In the case of interoperability, a command-and-control approach would likely mean a top-down mandate requiring public safety agencies to adopt a certain interoperable communications system. Perhaps the central government would build out one shared network and require all agencies to adopt it. While this would address the collective action problem, it would preclude the benefits of competition among rival networks. Additionally, if one standard or one firm is to be chosen by government, rent-seeking behavior will also likely arise.

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85. OLSON, *supra* note 39, at 51.
86. *Id*.
87. *Id*. at 51, n.72
88. Mayer-Schönberger, *supra* note 11, at 39.

Rather than a top-down approach, economic incentives can be employed to provide a positive selective incentive to public safety agencies in an effort to overcome the collective action problem. Such a policy change can also result in efficient use of resources, including spectrum.

A. Spectrum Integration

Earlier it was noted that a law firm wishing to equip its lawyers with mobile communications does not build out its own system, but rather simply buys capacity from a commercial network carrier. But why is this the case? In theory, a law firm *could* purchase spectrum, design a proprietary communications platform, and build towers to support it. It is a ridiculous proposition because the cost of self-providing would be outrageous relative to the alternative: sharing a network with every other consumer. A law firm—or any other business or individual consumer, for that matter—has a financial incentive to find the most cost effective solution.

As we have seen, however, public safety agencies do not consider the true costs of their communications systems because they do not face the opportunity cost of the spectrum they are given by the FCC. Unlike cars and guns—which they would never consider building themselves because they are not subsidized with glass, steel, or rubber—first responders do not give a second thought to building their own communications network.

We should therefore rethink the national policy that balkanizes public safety communications by subsidizing each agency with a spectrum license. Instead of spectrum, first responders should be given budgets with which they can purchase communications capacity from commercial providers the same way they purchase everything else they need to fulfill their missions.[89] They should also be allowed to trade their spectrum. Such a system would let public safety agencies face the true cost of their communications choices and, like the law firm in our example, they will quickly find that sharing a network is a more cost effective solution.

Commercial communications networks, by their nature, are interoperable—at least among the subscribers of the same network. A commercial carrier that builds out a network over unsubsidized spectrum will want to maximize revenue from its investment.[90] This means utilizing

89. How public safety agencies should be funded is beyond the scope of this Article. However, one obvious solution is to take the advice of Ronald Coase, who suggested that all spectrum frequencies be auctioned and made fully tradable, including those of government agencies. Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 21–22 (1959). Revenues from the auction of public safety frequencies could be used to fund public safety communications.

90. Marsh, *supra* note 66, at 11.

its network to its full capacity (i.e., signing up as many subscribers as the network can handle).[91] Subscribers on the same network will be using the same communications platform and will therefore have the ability to communicate with each other.

Consider a police department that purchases cell phones for its detectives from a commercial carrier such as Verizon. The department may only want its detectives to communicate with other members of the department—and it may even ask Verizon to block calls to or from unauthorized phone numbers—but the ability to communicate with every other of Verizon's millions of customers is built-in to the network.[92]

By not handing out spectrum to each agency, but rather expecting them to purchase however much communications capacity they need from a commercial provider, public safety agencies are given a positive selective incentive that overcomes the collective action problem. The large latent group of public safety agencies will be mobilized to acquire the collective good of interoperability, but only because they are seeking their own cost effective communications solution. At the same time, many of the inefficiencies of the current spectrum policy are also addressed. Writing about a commercial public safety network in Europe, Victor Mayer-Schönberger explained:

> Having a private company construct and maintain the network infrastructure required for a shared communications system provides a number of advantages over public financing of a shared network. First, it requires no initial investment from the public sector. The network is built by a private-sector actor that arguably has better financing expertise than a public sector organization and a keener desire to keep expenses in check. Agencies are charged a flat monthly fee per radio handset for using the network. This permits them to budget sensibly and to switch to the new network without having to pay up front for all, or even a portion, of the initial investment. Agencies have to purchase handsets . . . . The network provider calculates the fixed monthly fee it charges agencies based on the volume it thinks it can attract, hence not penalizing early adopters. As with all network infrastructures, the setup offers strong incentives to the network provider to sign up agencies to use the service. Although this does not solve the collective-action problem [immediately], it shifts it to the network provider, which arguably has better expertise than agencies in how to overcome it. For example, as with other telecommunication markets, fee structures are possible that provide incentives for agencies to switch, and the earlier the switch, the cheaper.[93]

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91. *Id*.

92. Of course, to achieve true universal interoperability, we would want competing commercial networks to interconnect. Interconnection in the public safety context will be addressed in Part III.B, *infra*.

93. Mayer-Schönberger, *supra* note 11, at 35.

Additionally, such an approach would also address some of the inefficiencies that result from the balkanized system. For one thing, economies of scale will be improved. Unlike public safety agencies, which are limited to the number of users on their force, a commercial network will be able to spread the cost of the network over all of its subscribers, perhaps encompassing several agencies and jurisdictions. In this way, agencies that would otherwise not coordinate will share the same network and not only achieve interoperability, but also use spectrum more efficiently.[94] In large part this is possible because commercial carriers design their networks to maximize revenue.[95] That means making the most efficient use of the spectrum at their disposal by eking out from it all the possible communications capacity, while maintaining a level of quality acceptable to their customers.[96] Unlike public safety licensees,[97] a commercial carrier will not deploy more towers or spectrum than it needs to adequately serve a geographic area or population. Finally, public safety agencies will be freed from having to design and deploy their own systems and will instead be able to rely on a professional provider with a competitive advantage in interoperable communications systems.[98]

We should also reconsider the national policy that allocates some spectrum to solely public safety use.[99] In order to induce commercial carriers to provide the types of communications networks suitable for first responder operation—as well as to address inefficiency in the current system—carriers should be allowed to sell communications capacity not

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94. *Id*. at 36. The article states:

> Sharing network infrastructures among public safety agencies . . . will at least permit agencies to share the cost of building and maintaining the infrastructure. It will still be underutilized outside of emergencies, but at least every agency will not have to operate its own overprovisioned and underutilized network and instead will share with other agencies.

Id.

95. Marsh, *supra* note 66, at 4 (citing SPTF REPORT, *supra* note 53, at 10). "Recent studies have shown that bands in use by CMRS providers (as well those used by television providers) are highly utilized, while surrounding land mobile bands—notably, public safety and others—have lower, more variable use." *Id*.

96. *See* Bykowsky & Marcus, *supra* note 65, at 9–10.

97. *See supra* Part II.C.

98. Today, public safety agencies contract with communications firms to deploy their communications systems. However, they ultimately build custom systems at the direction of the agency. Also, it is in the financial interest of these firms to service as many custom installations as possible.

99. *See, e.g.*, Jon M. Peha, *Protecting Public Safety with Better Communications Systems*, IEEE COMMS. MAG., Mar. 2005, at 10, 11, *available at* http://www.ece.cmu.edu/~peha/protecting_public_safety.pdf. "[T]he US should reevaluate the traditional separation between public safety systems and commercial systems . . . . [It] should also reconsider spectrum management policies that force commercial systems and public safety systems to operate in different spectrum bands." *Id*.

only to public safety agencies, but also to private users who would share the spectrum with first responders. Desegregating public safety spectrum would further improve economies of scale by allowing a network's pool of users to grow to many times the number that would be achieved if only public safety users were allowed on the network. While there are only an estimated 3 million public safety communications users today, there are over 80 million cell phone users in a comparable amount of spectrum.[100]

In a paper proposing secondary markets in public safety spectrum, Joshua Marsh explained that in fact, public safety and commercial mobile use of spectrum is opposite and therefore complementary:

> Public safety wireless communications systems and [Consumer Mobile Radio Service] CMRS systems are designed to meet very different traffic patterns. These differing traffic patterns, interestingly, may lead to compatibilities due to their complimentary[sic] nature. In other words, the most compatible systems for sharing are those with completely opposite usage patterns. While CMRS and public safety do not form perfect opposites, their traffic patterns are somewhat complimentary[sic].[101]

Spectrum bands used by consumer wireless services are highly utilized, while surrounding public safety bands have a lower and more variable use.[102] This is because public safety wireless communications systems are designed to be able to cope with large-scale emergencies.[103] However, such catastrophes are rare, and on a day-to-day basis public safety agencies use only a fraction of their capacity, thus wasting spectrum.[104] In contrast, commercial wireless networks are designed to maximize the number of possible connections within a band given certain quality parameters.[105] By allowing spectrum to be shared, public safety bands that now lie largely fallow can be put to productive use. Also, by allowing full use of spectrum now limited to public safety use, economies of scale can be further enlarged. As is apparent in the consumer mobile market, larger economies of scale result in efficiencies in research and development, management, and other functionalities that lead to greater innovation and more advanced networks.[106]

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100. James Jay Carafano, *Talking Through Disasters: The Federal Role in Emergency Communications*, BACKGROUNDER (Heritage Found., D.C.), July 17, 2006, at 5, *available at* http://www.thebreakingnews.com/files/articles/heritage-found-government-communiation-report.pdf.

101. Marsh, *supra* note 66, at 10–11.

102. *Id*. at 4 (citing SPTF REPORT, *supra* note 53, at 10).

103. Marsh, *supra* note 66, at 11.

104. *Id*.

105. *Id*.

106. *See Federal Preemption*, *supra* note 63, at 202.

B. Case Studies

A public-private partnership that encourages for-profit commercial networks selling communications capacity on a shared basis to first responders and private parties might sound radical. It should not. The fact is that it has already been done successfully. This Part looks at several successful implementations of private provision of public safety communications,[107] as well as commercial networks shared by first responders and private customers.

1. Walky-Talky

Europe has been more willing to embrace private solutions for public safety communications. Mayer-Schönberger writes about Walky-Talky, a company in Austria that provides communications to public safety in the Burgenland. That state's thirty-year-old EMS analog radio system was deteriorating and often failed.[108] A group of entrepreneurs proposed building a new network based on the European TETRA standard and to lease use of the network to public safety agencies for a fee.[109] Burgenland's EMS agency became Walky-Talky's first customer in 1999, and by 2000 the network covered over ninety percent of the entire state and supported 600 radios, including those of firefighters and law enforcement agencies.[110]

Walky-Talky quickly realized, however, that it was not making the most effective use of its network's capacity:

> [It found that] EMS agencies have base-level traffic all day as they tend to routine tasks and smaller accidents. Communication traffic swells in the case of a larger accident. In contrast, the traffic pattern for local firefighter units, consisting mostly of volunteers, is quite different: Ordinarily there is almost no communication traffic, but once there is a fire, dozens and dozens of users have to be contacted at once. Whereas EMS agencies use a communications network continuously, firefighters essentially pay for it being provided in case of an emergency. This leaves a typical public safety network, over provisioned to accommodate even heavy traffic in case of a large emergency, underutilized. Adding user groups with more continuous communication needs, like EMS or law enforcement agencies, may somewhat balance the load in times of no or only small emergencies.

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107. In Part II.B., *supra*, the case was made that it would be difficult for a new commercial network to compete given the entrenched system of public safety spectrum subsidization. In the case studies that follow, note that in each case the government was not making a choice between staying with its existing system and switching to a new one. Instead, the commercial networks were replacing an outmoded radio system and the choice, therefore, was between a new commercial system and a new public system. Additionally, note that in each case the government acquired its spectrum by assignment, not purchase.

108. Mayer-Schönberger, *supra* note 11, at 34.

109. *Id*. at 34–35.

110. *Id*. at 35.

> But the benefits of such a balance are lost once a large emergency requires all agencies—firefighters, police, and EMS—to use the radio network very actively. What Walky-Talky needed, as a supplement to its public safety usage base, were public-sector users that would want continuous, but not time-critical, communication.[111]

To that end Walky-Talky took on new government customers that did not require continuous time-critical communications.[112] These included roadwork crews, park rangers, and environmental protection officers. For example, "[t]he TETRA network was used to transmit street temperature and other weather data along the interstate to central command and to control ice-warning signals."[113] However, there is no reason why such a commercial network must limit itself to public sector users when private customers would also be eager to buy access.

2. RACOM

That is exactly what RACOM Wireless, a small company in Marshalltown, Iowa, has been doing for the past twelve years. It has built a private advanced wireless network on nonpublic-safety spectrum licensed to it. Communications on the network are interoperable, and subscribers include not just public safety agencies but private businesses as well.

Gregg Miller started the company in 1972 and first offered wireless communications to farmers.[114] It used G.E. analog wireless telephone technology over 800 MHz spectrum that the FCC licensed to RACOM.[115] As cell phones became more prevalent in the 1980s, Miller transitioned RACOM to the public safety communications business. In 1994, the Polk County Sheriff's Office—which serves Des Moines—solicited bids to build a new radio communications system for the police force. RACOM, Motorola, M/A-COM, and others submitted proposals. RACOM won the contract contingent on voter approval of a bond issue to fund the new network. Before the election, however, RACOM's competitors engaged in a successful public relations campaign against the bond issue, which failed at the polls.

The communications system at the sheriff's office was about twenty years old and needed at least an interim replacement. City Council members spoke with Miller and together they came up with a plan. RACOM had its existing 800 MHz commercial network. The Council could raise enough money to buy radios to work on that network, and

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111. *Id*. at 36.

112. *Id*.

113. *Id*.

114. Telephone Interview with Michael Miller, President and CEO, RACOM Corp. (Nov. 7, 2006).

115. *Id*.

RACOM could just charge them a monthly access fee. Miller soon had the next obvious thought: Why should this only be an intermediate solution?

The Polk County Sheriff's Office became the first public safety subscriber to the RACOM network, and to this day it is that agency's primary means of voice communications. The network is completely interoperable, which means that any user on it can talk to any other user. Most public safety agencies in RACOM's service area—such as the Sioux City police and fire departments—use RACOM's network for their communications.[116] However, the network also carries communications from many commercial customers, such as private roadwork contractors and industrial plants, including those of John Deere and Rockwell Collins.[117] Utilities, such as gas, water, and electric, also subscribe to the RACOM network.[118] Today, the RACOM network carries traffic from about 10,000 radio units, seventy percent of which belong to public safety users. Fifteen percent of the users are utilities, and the other fifteen percent are private enterprises. The network handles over 50 million voice calls a month over 100 individual tower sites.

Day-to-day, police, fire, and other agencies keep to their own private channels.[119] It is not a free-for-all in which everyone can hear everyone.[120] However, in case of emergency, first responders do have the ability to switch to each others' channels or to predetermined "incident channels" to coordinate.[121] They can also talk to commercial users of the network to coordinate response to an emergency.[122] For example, firefighters often have to radio their dispatchers to request that they telephone the gas utility's dispatcher who in turn will radio a technician to ask her to turn off service to a building.[123] This communications daisy chain is avoided on the RACOM network because firefighters can communicate directly with utility technicians.[124]

RACOM subscribers can also use their radios peer-to-peer.[125] This means that even if the network is down, one handset can communicate

116. Telephone Interview with Gregg Miller, Former President and CEO, RACOM Corp. (Aug. 11, 2006).

117. *Id*.

118. *Id*.

119. *Id*.

120. *Id*.

121. *Id*.

122. *Id*.; Telephone Interview with Michael Miller, *supra* note 114.

123. Telephone Interview with Gregg Miller, *supra* note 116; Telephone Interview with Michael Miller, *supra* note 114.

124. Telephone Interview with Gregg Miller, *supra* note 116; Telephone Interview with Michael Miller, *supra* note 114.

125. Telephone Interview with Gregg Miller, *supra* note 116.

directly with another. This is an invaluable feature in emergency situations, as well as inside buildings and in other places where network coverage does not extend. However, if each of a pair of radios belonged to a disparate custom-built public safety network, then the chances that the two radios will communicate directly are slim.

Charges for use of the network are negotiated with each subscriber. Customers purchase their own radio units and pay a monthly charge for each handset they use. That charge depends on the capacity required by the customer. For example, a prison on RACOM's network that only needs localized communications pays $3 to $4 per month per handset, while other public safety agencies requiring better service pay about $15 to $25.[126] Network usage is unlimited.[127]

RACOM was, and still is, in the business of deploying and maintaining custom-built communications systems for public safety agencies. However, most of its customers have become subscribers of the network.[128] RACOM president, Gregg Miller, explained in an interview: "The proposition we made to our clients was, 'Use our network or, if you insist, we'll build you your own and we'll do our best to make it interoperate with ours.'"[129] That is an attractive value proposition because joining the RACOM network is cheaper than building a custom system. Given this positive selective inducement, most local public safety agencies in its coverage area joined.

Miller explains that what often happens is that an agency not on the network, such as a police department, will purchase access to the network for one radio to be held by the chief. This is often done to ensure at least a modicum of interoperability with neighboring agencies and jurisdictions that are on the RACOM network.[130] According to Miller, after using the radio for some time, the chief will realize how useful and cost effective the network is and will purchase more and more radios for the department—

126. Telephone Interview with Michael Miller, *supra* note 114.

127. Extra charges apply for special services such as interconnecting with the telephone network or GPS applications. *Id*.

128. *Id*.

129. Telephone Interview with Gregg Miller, *supra* note 116.

130. *See* Steve Worrall, An International Study of Radio Interoperability 22 (Dec. 2005) (unpublished manuscript), http://www.bapco.org.uk/?page=BAPCObursary2005%20report .pdf (explaining that the simplest level of interoperability is achieved when different agencies exchange radios); NATIONAL TASK FORCE ON INTEROPERABILITY, WHY CAN'T WE TALK? WORKING TOGETHER TO BRIDGE THE COMMUNICATIONS GAP TO SAVE LIVES: A GUIDE FOR PUBLIC OFFICIALS 7 (Feb. 2003), http://www.ncjrs.gov/pdffiles1/nij/204348.pdf (explaining that "law enforcement, emergency medical services (EMS), and firefighters sometimes have to juggle as many as five different radios because each agency communicates on different systems[.]").

each unit interoperable with every other on the RACOM network.[131]

"Interoperability happens on the RACOM network because it is part of the package; it is a take it or leave it proposition . . ." Miller says. "If you're an agency in the area and want to buy [communications capacity] from RACOM, you have to be interoperable with everyone."[132] In this way, the public safety agencies on RACOM's network become interoperable unintentionally by simply opting to pursue their own self-interest.

The novelty of joining a commercial network certainly put off some public safety agencies. But as Gregg Miller would point out to them, the alternative was for a private company—often RACOM itself—to build and maintain a custom communications network. If an agency can trust a private company to be responsible for its proprietary communications network, why distrust a private network that is serviced by the same technicians?

The Iowa Department of Public Health's Health Alert Network ("HAN") was RACOM's first statewide customer.[133] HAN is responsible for communications, and it is an alert system for all hospitals, labs, county emergency managers, state veterinarians, and several other public health users of communications. Before switching to the RACOM network, there was no interoperability between hospital radio communications.[134] Today, HAN encompasses ninety-nine local public health agencies and 117 local hospitals across Iowa, all of which can communicate with each other and with anyone else on the RACOM network.[135] Taking a cue from HAN's success with the RACOM network, the Iowa Department of Agriculture and the state's law enforcement intelligence system have also switched to using RACOM's private network.[136]

"I am totally convinced now that we may be better off with the private-public partnership [with RACOM] than just [a] public [solution]," says Tom Boeckmann, HAN's chief. "If a tower is down, the company's reputation is on the line. They're not going to put it off to Monday morning. It's cheaper for us to contract with them for maintenance and just as stable if not more than if the state was running it itself."[137]

The main concern expressed by skeptical public safety agencies about

131. Telephone Interview with Gregg Miller, *supra* note 116.

132. *Id*.

133. Telephone Interview with Tom Boeckmann, Chief, Health Alert Network, Iowa Dept. of Pub. Health (Sept. 15, 2006).

134. *Id*.

135. *Id*.

136. *Id*.

137. *Id*.

the RACOM network—and likely the main concern about any private system—is the reliability of a system that is shared with commercial customers. For his part, Boeckmann says HAN's users barely ever notice that private customers are on the same network.[138] However, he says, he did discuss prioritization when he first contracted with RACOM.[139] On the RACOM network, private users are preempted by public safety whenever necessary.[140] Priority for public safety is a feature that will be necessary in any commercial shared public-private network and will be discussed in Part IV.B, *infra*.

3. O2 Airwave

Another European private venture is the UK's Airwave public safety communications network.[141] It is a nationwide interoperable network that is privately owned and maintained by the telecommunications firm O2 Wireless. Like the RACOM service, public safety agencies purchase radio units and subscribe to the network for a monthly fee.

Before the Airwave initiative, most public safety radios in the UK had been deployed in the 1970s and were becoming obsolete.[142] Much like the U.S. system, public safety agencies there had been historically assigned different bands of the spectrum and had the autonomy to develop their own communications systems.[143] "This . . . led to disparate technology evolution and procurement cycles within each agency, making pragmatic levels of interoperability difficult to achieve."[144]

In 1993, following a major review of public safety radio communications, the UK's Home Office decided to develop a new system.[145] It further decided that the new system would be procured on a national—rather than local or agency-by-agency—basis.[146] The

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138. *Id*.

139. *Id*.

140. Telephone Interview with Gregg Miller, *supra* note 116. PSWAC REPORT, *supra* note 10, at 28, app. E. "[RACOM's] [l]aw enforcement radios have 'ruthless preemption' privileges and can immediately preempt business user channels if law enforcement needs another channel." *Id*.

141. *See generally* Airwave O2 Limited, O2 Airwave Service, http://www.airwaveservice.co.uk (last visited Apr. 7, 2007).

142. Worrall, *supra* note 130, at 8.

143. *Id*.

144. *Id*.

145. NAT'L AUDIT OFFICE, PUBLIC PRIVATE PARTNERSHIPS: AIRWAVE 1 (Apr. 11, 2002), *available at* http://www.nao.gov.uk/publications/nao_reports/01-02/0102730.pdf [hereinafter NAO REPORT].

146. *See id*. at 1, 10. "Local procurements were discounted, since they were unlikely to achieve any economies of scale in the costs of procurement or in the prices to be paid for the new systems." *Id*. at 10.

government, in consultation with equipment manufacturers, also determined that the new network would employ the TETRA radio communications standard.[147] Once built, the Police and Fire Services, as well as any other public safety agency that wished to opt-in, would share the new national network.[148]

The government produced an outline business case for the network and sought bids from the private sector to build and operate it.[149] Several firms competed for the contract, which was ultimately awarded to British Telecommunications ("BT") in 2000.[150] In 2001, BT spun off its public safety communications business into a separate company called O2.[151] O2 completed deployment of the network, called Airwave, in 2005.

Unlike the RACOM network, which is shared by public and private users, terms of O2's spectrum license require that only organizations with a public safety mission be allowed to subscribe to Airwave.[152] Ofcom, the UK's telecommunications regulator, publishes a list of "eligible sharers" that now includes almost 200 organizations.[153] To become an "eligible sharer" an organization must apply to Ofcom and demonstrate a public safety mission.[154] However, an organization need not be a government agency to be approved. For example, the Royal Society for Prevention of Cruelty to Animals ("RSPCA"), a charity that serves much the same purpose as the American Humane Society, joined the Airwave network in 2006.[155] Utilities have also been allowed to join the network.[156]

Additionally, O2 is not obligated to serve an agency simply because that agency is on the list, nor is an agency on the list obligated to contract with O2 for its communications needs.[157] Agencies are free to deploy other

147. *See id*. (describing the Terrestrial Trunked Radio ("TETRA") as a standard four digital mobile radio communications developed by the European Telecommunications Standards Institute and designed primarily for public safety use). *See also* European Telecommunications Standards Institute, TETRA, http://portal.etsi.org/radio/TETRA/tetra.asp (last visited Apr. 7, 2007).

148. *See* NAO REPORT, *supra* note 145, at 1, 10.

149. *Id*. at 1, 10–12.

150. *See id*. at 1.

151. *Id*. at 1, n.a.

152. *See id*. at 16; O2, Airwave O2 Limited, Using Airwave, http://www.airwaveservice.co.uk/airwave13.asp (last visited Apr. 7, 2007) [hereinafter Using Airwave].

153. Ofcom, List of Sharer Organizations (Aug. 2006), http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/business_radio/emergency/airwave_list.pdf.

154. *See* NAO REPORT, *supra* note 145, at 3; Using Airwave, *supra* note 152.

155. Press Release, Airwave O2 Limited, RSPCA Signs up to the Airwave Service (July 3, 2006), *available at* http://www.airwaveservice.co.uk/airwave14_1002.asp.

156. Telephone Interview with Donna Ralston, Head of Civil Contingencies, O2 Airwave (Sept. 12, 2006). *See also* Ofcom, *supra* note 153.

157. Using Airwave, *supra* note 152.

communications solutions, including building custom networks.[158] O2 therefore has an incentive to induce potential subscribers to become its customers and, in fact, it actively markets to public service agencies that are not subscribers.[159] Public safety agencies continue to solicit bids from several companies to provide their communications systems. If O2 succeeds in persuading an agency to join its national interoperable network, it is only because it provided a positive selective incentive. The ever-increasing number of interoperable agencies on the Airwave network is itself, no doubt, a consideration that makes the network selectively attractive to public safety agencies.

To allow for local flexibility, O2 was required to offer tiered levels of service. It offers a "Core Service" of interoperable voice communications that all subscribers receive, and several "Menu Exclusive Services" that are optional.[160] Agencies can choose locally which, if any, of the additional services they wish to add to their package (RACOM offers similar optional services, such as GPS and data applications).[161] Finally, there are "Menu Competitive Services."[162] These are products and services that can be provided by O2 or competing firms. There is a competitive market for all equipment—including handsets, vehicle-mounted radios, and dispatch terminals—as well as installation, maintenance, and repair.[163] O2 also guarantees that the network will be available 94.3% of the time and will pay compensation to its subscribers if it is not.[164] There are also guarantees for coverage area and "Menu Exclusive" options to extend coverage if an agency desires.[165]

IV. ACHIEVING INTEROPERABILITY

Private commercial provision of public safety communications is not only possible, but also efficient and, most importantly, addresses the collective action problem that is the main impediment to interoperability. As Walky-Talky, RACOM, O2, and their subscribers make evident, public safety agencies can effectively purchase the communications capacity they

158. *Id*.

159. Telephone Interview with Donna Ralston, *supra* note 156.

160. *Id*.; NAO REPORT, *supra* note 145, at 11. Optional menu services include extra capacity for "high risk locations such as football stadia . . . guaranteed handheld coverage... and guaranteed in-building penetration." *Id*. at 12.

161. Telephone Interview with Michael Miller, *supra* note 114.

162. NAO REPORT, *supra* note 145, at 11; Telephone Interview with Donna Ralston, *supra* note 156.

163. *Id*.; NAO REPORT, *supra* note 145, at 11.

164. Telephone Interview with Donna Ralston, *supra* note 156; NAO REPORT, *supra* note 145, at 34.

165. *Id*.

need from private networks without having to build and maintain their own custom systems. Users of a shared network are interoperable by default. Additionally, as RACOM—and to a lesser extent O2 and Walky-Talky—demonstrate, public safety users can successfully share a network with private commercial users, thereby broadening economies of scale. Spectrum segregation is not only unnecessary, but likely harmful as well.

A. Applying the Lessons

The RACOM and O2 approaches address the collective action problem through positive selective incentives. RACOM's competitive pricing—as well as the effortless interoperability with other agencies, utilities, and private parties that it provides—serves as a selective incentive that induces individual public safety agencies to act in their own self-interest and, at the same time, become interoperable. O2 also induces public safety agencies to join its network by offering competitive prices, interoperability, and service guarantees. However, the European model has some disadvantages.

Although public safety organizations are free to contract with other communications providers, O2 has an advantageous position as Britain's largest public safety network. Rather than encourage competing and interconnecting carriers, the UK instead chose to back one interoperable network that it subsidized with spectrum. It therefore created a single incumbent in the market. A new entrant wishing to compete on an equal footing by building out a competing nationwide interoperable communications network would first have to acquire the spectrum over which to do it. Unless the new entrant was given the spectrum just as O2 was, it may face a barrier to entry in the form of higher average costs relative to the incumbent.[166]

Additionally, the spectrum license given to O2 restricted the service it could provide. It specified the technical standard that the new network

166. *See* WILLIAM J. BAUMOL ET AL., CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE (1982). One explanation of this barrier to entry states:

> When economies of scale are present, average costs decrease as units of output increase over a certain range of production. Within that range, even if incumbents and entrants have the same cost curves, the incumbent may be able to operate at higher output levels where costs are lower than they are at a potential entrant's expected level of output, given likely differences in demand. If that is the case, then as long as it holds its prices even slightly below the entrant's expected cost, the incumbent can earn supra-competitive profits while ensuring that entry will be unprofitable. Furthermore, even if the incumbent is pricing at a level high enough to allow an entrant to earn a profit when new entry occurs, the level of post-entry competition may increase as a result of the entry, driving prices below the point where new entrants can survive.

ORG. FOR ECON. CO-OPERATION & DEV., BARRIERS TO ENTRY 29 (2006).

would employ, TETRA, rather than simply requiring interoperability and allowing it to choose or develop a suitable standard.[167] As noted earlier, the license also limits network subscription to public safety agencies and therefore curbs possible economies of scale.

In the U.S., Nextel founder Morgan O'Brien's new venture, Cyren Call, has proposed creating a nationwide interoperable network run by regional commercial carriers and shared by public safety and private users.[168] Cyren Call advocates the establishment of a "Public Safety Broadband Trust" to which the FCC would assign 30 MHz of spectrum.[169] This Trust would be charged with establishing the technical parameters of a new national network.[170] It would also have the authority to lease the spectrum to commercial carriers that would build the network to the Trust's specifications in exchange for the right to deliver commercial broadband service to urban and rural communities using excess capacity not being utilized by public safety.[171] Both consumer and public safety subscribers would pay access fees.[172] Between the Broadband Trust and the lessee carriers there would be a technically proficient network manager, a role Cyren Call aspires to fill.[173]

The spectrum block that Cyren Call seeks is currently slated for auction.[174] As part of the digital television transition, broadcasters will return spectrum they currently use in the 700 MHz band to the federal government.[175] Congress decided that 24 MHz of that returned spectrum will be given to public safety agencies and the rest—about 60 MHz—will be auctioned.[176] Cyren Call, however, insists that the 24 MHz of spectrum set aside by Congress for public safety is unsuitable for its nationwide interoperable network, and it must instead have 30 MHz of the spectrum

167. Walky-Talky in the Burgenland was similarly limited to the TETRA standard. Government standards-setting can be troublesome because it invites rent-seeking behavior from the backers of competing standards.

168. Reallocation of 30 MHz of 700 MHz Spectrum (747–762/777–792 MHz) from Commercial Use, *Petition for Rulemaking*, FCC Docket No. 06-2278 (Apr. 27, 2006), http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=651833480 [hereinafter *Cyren Call Petition*].

169. *Id*. at v.

170. *Id*. at vi.

171. *Id*.

172. *Id*. at 23.

173. *Id*. at 34.

174. *See* Thomas W. Hazlett, *The Wireless Craze, The Unlimited Bandwidth Myth, The Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's "Big Joke": An Essay on Airwave Allocation Policy*, 14 HARV. J.L. & TECH. 335, 462–82 (2001) (explaining why auctions are preferable to other methods of spectrum license assignment).

175. Deficit Reduction Act of 2005, Title III – Digital Television Transition and Public Safety, Pub. L. No. 109-171, § 3003, 120 Stat. 21.

176. *Id*.

now set for auction.[177] Although Cyren Call's argument is a technical one beyond the scope of this Article, the fact is that if Cyren Call is successful, then the amount of spectrum available for efficient market allocation will be substantially decreased.

Verizon Wireless is also apparently proposing a national public safety network.[178] It has reportedly presented a plan to public safety officials that would roll out a network over 12 of the 24 MHz set aside for public safety from the digital television transition.[179] The subscription-based network would be based on Verizon's existing wireless network, but, like Airwave, would not be open to private customers.[180] Unlike Cyren Call's proposal, this scheme would not affect the planned spectrum auctions. However, it still depends on a no-bid spectrum assignment and would not leverage the economies of scale made possible by sharing the network with private users.

Both of these proposals represent a welcome new way of thinking about interoperability. They recognize the collective action problem inherent in the balkanization of public safety communications,[181] and attempt to employ market forces to address it. However, the proposals depend on no-bid grants of spectrum to one provider and thus the creation of a single incumbent, possibly raising a barrier to competitive entry.[182] Even though Cyren Call's plan envisions contracting with several regional commercial carriers, there would nevertheless be only one incumbent in each region.

Verizon's plan, which would employ spectrum already allocated for

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177. *See Cyren Call Petition*, *supra* note 168, at 10–15.

178. Heather Forsgren Weaver & Jeffrey Silva, *Industry Pitches Public-Safety Alternative*, RCR WIRELESS NEWS, Sept. 11, 2006, at 1, 41.

179. *Id*.

180. *Id*.

181. *See Cyren Call Petition*, *supra* note 168, at 5.

182. Reallocation of 30 MHz of 700 MHz Spectrum (747–762/777–792 MHz) from Commercial Use, *Order*, 21 F.C.C.R. 13,123, para. 4 (2006) (rejecting Cyren Call's petition on the grounds that it lacks authority to make the assignment sought). After its petition was rejected by the FCC, Cyren Call took its plan to Congress. Its plan now calls for the proposed Public Safety Broadband Trust to purchase the spectrum. The purchase would not be at auction, but instead for a flat $5 billion price, and it would be backed by federal loan guarantees. *Current and Future Public Safety Communications: Hearing Before the S. Comm. on Commerce, Science, and Transportation*, 110th Cong. (2007) (statement of Harlin R. McEwen, Chairman, Communications and Technology Committee, International Association of Chiefs of Police), *available at* http://commerce.senate.gov/public/_files/Testimony_HarlinMcEwen_ChiefsofPolice_SenateTestimonyWrittenMcEwen020807.pdf; *Current and Future Public Safety Communications: Hearing Before the S. Comm. on Commerce, Science, and Transportation*, 110th Cong. (2007) (statement of Morgan O'Brien, Chairman, Cyren Call Communications), *available at* http://commerce.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1813&Witness_ID=6484.

public safety use, would not decrease the amount of spectrum available on the market. However, because its planned network would be limited to public safety users, it would decrease the amount of spectrum potentially available to consumers. That is, by forgoing shared use, the Verizon plan precludes new competition in the commercial market, which the Cyren Call proposal would provide.

Both the Verizon and Cyren Call plans feature commercial provision of public safety communications, which is key to addressing the collective action problem. However, how would competition—and thus lower prices, higher quality, and sustained innovation—be ensured? One source of competition to the incumbent created by either plan might be the continued availability of custom-built systems. However, this would negate any interoperability gains. Additionally, to the extent we move toward a policy promoting private provision of public safety communications, local agency licenses should be redeployed directly or indirectly to private providers.[183] To have a true comparable competing network, a new entrant would have to acquire a spectrum assignment from government on similar terms as the incumbent. Alternatively, it could employ valuable flexible use spectrum purchased at market prices. However, as noted earlier, an incumbent who did not have to pay for its spectrum could pose a barrier to entry.

Theoretically, if agencies were not subsidized with spectrum licenses, and if flexible use spectrum was freely available on the market, we would expect to see commercial providers supply public safety's demand for communications capacity. However, given the existing regulatory environment, other competing uses of spectrum are likely to be more profitable than a public safety network. For this reason, we must ensure through policy that some spectrum be used for public safety. However, as we will see, we need not allocate spectrum exclusively for public safety use.

B. Competitive Public Safety Licenses

Putting technical constraints aside, the structure of an ideal commercial shared-use public safety communications system would be much like today's wireless telephone network, with multiple competing national carriers that all interconnect. One way to achieve this would be to auction two or more spectrum licenses subject to certain public safety obligations, including interconnection and prioritization.[184] Creating two or

183. This could be done either by a gradual process in which the federal government reclaims public safety spectrum as agencies transition to commercial services or by allowing agencies themselves to lease or sell their licenses in secondary markets.

184. *See, e.g.*, *supra* Part III.B.2; Weaver & Silva, *supra* note 178 and accompanying text (detailing Verizon Wireless' DTV transition plan).

more licenses would avoid the establishment of a strong incumbent monopolist. Auctioning the licenses would avoid rent-seeking and could also potentially raise funds for public safety to use during a transition.

An ideal public safety communications network would also be national in scope. This would help establish interoperability between federal, state, and local agencies. It would also help first responders who travel to other jurisdictions. As Gregg Miller has pointed out, while a firefighter from California can jump behind the wheel of a fire truck in Louisiana and drive it with no new instruction, the same cannot be said about public safety radio systems.[185] To this end, as much as possible, licenses should be national in scope. This would not only address a policy goal, but, as Hazlett has noted about wireless communication, national markets are efficient.[186]

From a radically fragmented initial system of thousands of individually held local licenses, the consumer mobile market consolidated into six national networks by 2000.[187] "The emergence of nationally integrated networks and calling plans demonstrated that consumers were demanding services most economically provided on a broader scale. As larger networks formed, prices plummeted and demand skyrocketed."[188] The comparison is apt because commercial users of shared networks will likely demand similar economies of scope.

If achieving interoperability is the ultimate goal, then requiring interconnection among competing carriers is crucial. It is conceivable that shared use networks would voluntarily interconnect, if only because commercial users of the network might demand the benefits of increased network effects.[189] However, because interoperability will be the prime objective of a new policy, interconnection should be required between all licensees.

Another key requirement to which competitive public safety licenses should be subject is prioritization—giving public safety users priority over commercial users in shared networks. Bykowsky and Marcus point out that a network in which private subscribers were subject to preemption by public safety might look much like interruptible gas or electricity, which are priced lower than noninterruptible service.[190] Users not sensitive to random interruptions in power, such as industrial processing facilities, can

185. Telephone Interview with Gregg Miller, *supra* note 116.

186. *See Federal Preemption*, *supra* note 63, at 193.

187. *Id*. at 193–94.

188. *Id*. at 196.

189. Gerald W. Brock, *Interconnection Policy and Technological Progress*, 58 FED. COMM. L.J. 445, 452 (2006) (explaining that the Internet is unregulated but interconnected).

190. Bykowsky & Marcus, *supra* note 65, at 18.

subscribe to the cheaper service and reduce their payments enough to compensate for the risk.[191] Additionally, they can insure against outages by having generators on standby or by making only a portion of their energy consumption interruptible and, in case of outage, switching to a slower processing method that uses noninterruptible energy.[192]

In a shared network, a public safety user will not preempt a private call unless every other channel on the network is being used—a rare situation. For example, our existing public switched telephone network has prioritization and preemption built in.[193] The Department of Homeland Security runs the Government Emergency Telecommunications Service, which, in case of emergency, gives priority to certain federal, state, local, tribal government, industry, and nongovernmental organization telephone calls.[194] The wireless companion of this program, the Wireless Priority Service, applies to cellular networks.[195] These programs are only used when the network becomes unforeseeably congested, such as during the aftermath of Hurricane Katrina, the 9/11 attacks, and the Northeast blackout of 2003.[196] Other times of heavy public service use—such as the 2000 Winter Olympics in Salt Lake City—are predictable and can thus be planned for.[197]

V. CONCLUSION

As we saw on 9/11, the lack of public safety communications interoperability has serious consequences. Current public safety spectrum policy creates about 50,000 independent licensees, which causes a collective action problem. Because public safety communications users are balkanized into such a large group, they individually have little incentive to act in a group-oriented way to achieve interoperability. Additionally, because public safety agencies are subsidized with spectrum (rather than budgets that they could use to acquire their communications needs), and because they are not allowed to sell or lease their spectrum to willing commercial buyers, it is unlikely a private firm will be able to provide a competing wireless communications network.

If our goal is a national interoperable public safety communications

191. *Id*.

192. *Id*. at 18–19.

193. Marsh, *supra* note 66, at 14.

194. *See* GETS Eligibility Criteria, http://www.gets.ncs.gov/eligibility.html (last visited Apr. 7, 2007).

195. *See* NATIONAL COMMUNICATIONS SYSTEM, WIRELESS PRIORITY SERVICE, http://gets.ncs.gov/docs/WPS%20Brochure.pdf.

196. *NCS Priority Telecommunications Services: Your Insurance Policy for Critical Communications,* PUB. MGMT., Nov. 2005, at 30–31.

197. Marsh, *supra* note 66, at 12.

network with the economies of scale and standardization that such a network entails, we should reconsider the policies of spectrum balkanization and apartheid. Public safety agencies should be made to face the true cost of the spectrum they use, either by allowing them to sell or lease their spectrum, or through a gradual process of reclamation by the federal government. At the same time, spectrum should be allocated for commercial provision of public safety communications. Licensees would be required to interconnect, and first responders must have priority on shared networks. At least two competing licensees would help prevent the establishment of a strong incumbent monopolist.

Walky-Talky and O2 show us that the private provision of interoperable public safety communications is possible and can act as a selective incentive that helps evade the collective action problem. In addition to this, RACOM shows us that first responders and commercial parties can share such a network, increasing economies of scale, spectral efficiency, and providing another financial incentive for entrepreneurs to offer a network. Entrepreneurial firms like RACOM have showed us the way to interoperability, we only need to change policy to achieve it.