

Written Testimony of  
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Submitted to the  
House Committee on Energy and Commerce  
Subcommittee on Telecommunications and the Internet

March 22, 2007

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to enter written testimony into the record of the Committee's hearing on first responder communications. I am a research fellow with the Mercatus Center, a 501(c)(3) research, educational, and outreach organization affiliated with George Mason University.<sup>1</sup>

As part of the Mercatus Center's ongoing program to assess the costs and outcomes associated with regulation, we recently held a symposium on public safety communications interoperability. The full proceedings of the symposium, including video of the event and copies of the four papers presented, are available at the Mercatus Center website. The papers that were presented will be published in a forthcoming edition of the *Federal Communications Law Journal*. I am the author of one of the studies and it is the basis for much of my testimony.

## **I. Introduction**

In an ideal world all first responders should be able to communicate with one another whenever the need arises. Unfortunately, however, 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 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.<sup>2</sup> More than 80 percent reported that they did not have the capability to communicate with FEMA, the FBI, and other federal agencies.<sup>3</sup> Forty-nine percent of cities said they are not interoperable with

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<sup>1</sup> This testimony reflects only my views and does not represent an official position of George Mason University.

<sup>2</sup> THE UNITED STATES CONFERENCE OF MAYORS, INTEROPERABILITY SURVEY: A 192-CITY SURVEY 6 (2004).

<sup>3</sup> *Id.* at 7.

the state police, and 44 percent reported an accident within the preceding year in which a lack of interoperable communications made response difficult.<sup>4</sup>

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,<sup>5</sup> 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. However, while there is a pressing need to address the short-term demands of first responders, a more important is the “wholesale assessment of long-term spectrum needs” and policy.<sup>6</sup> Our common goal should not be to determine 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.<sup>7</sup>

## II. Causes of the Problem: Balkanization

To its great credit, the FCC recently acknowledged that the current system of assigning spectrum licenses to individual jurisdictions helps create an environment of balkanized and incompatible radio systems.<sup>8</sup> In fact, that policy is the root cause of the interoperability problem because it causes a collective action problem.<sup>9</sup>

The term collective action refers to activities that, in order to be successful, require two or more persons or entities to coordinate their efforts.<sup>10</sup> Collective action is therefore

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<sup>4</sup> *Id.* at 8.

<sup>5</sup> 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.

<sup>6</sup> FEDERAL COMMUNICATION COMMISSION, REPORT TO CONGRESS ON THE STUDY TO ASSESS THE SHORT-TERM AND LONG-TERM NEEDS FOR ALLOCATIONS OF ADDITIONAL PORTIONS OF THE ELECTROMAGNETIC SPECTRUM FOR FEDERAL, STATE, AND LOCAL EMERGENCY RESPONSE PROVIDERS 3 (Dec. 19, 2005) [hereinafter Needs Report].

<sup>7</sup> 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.” Needs Report at ¶ 2. *See also* Needs Report at ¶¶ 12, 17, & 19.

<sup>8</sup> *Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010*, Ninth Notice of Proposed Rulemaking, 21 FCC Rcd 14837 (2006) [hereinafter “Ninth NPRM”] at 6.

<sup>9</sup> Jerry Brito, *Sending Out an S.O.S: Public Safety Communications Interoperability as a Collective Action Problem*, FED. COMM. L.J. (forthcoming 2007), available at <http://papers.ssrn.com/abstract=960769> (explaining that the interoperability problem is a collective action problem).

<sup>10</sup> TODD SANDLER, COLLECTIVE ACTION: THEORY AND APPLICATIONS 1 (1992).

group action meant to further the interests of the group.<sup>11</sup> 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.”<sup>12</sup> As a student of the collective action problem has summarized, “individual rationality is not sufficient for collective rationality.”<sup>13</sup>

In his seminal work, *The Logic of Collective Action: Public Goods and the Theory of Groups*, economist Mancur Olson showed that large groups usually do not act collectively absent outside compulsion or an independent inducement to individual group members.<sup>14</sup> The problem of public safety interoperability is a classic example of the collective action problem that Olson described.<sup>15</sup> We can 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.<sup>16</sup> That member will therefore undertake to provide the good herself even if she cannot exclude others from its benefits. Olson called such groups “privileged.”<sup>17</sup> 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.<sup>18</sup> 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.<sup>19</sup>

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:

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<sup>11</sup> *Id.* at 1.

<sup>12</sup> *Id.* at 3-4.

<sup>13</sup> *Id.* at 3

<sup>14</sup> MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION* 2 (1965).

<sup>15</sup> Viktor Mayer-Schonberger, *Emergency Communications: The Quest for Interoperability in the United States and Europe*, 7 INT’L J. COMM. L. & POL’Y 2 (2002/2003) at n.89 and accompanying text.

<sup>16</sup> OLSON, *supra* note 14, at 49-50.

<sup>17</sup> *Id.* at 49-50.

<sup>18</sup> *Id.* at 44.

<sup>19</sup> *Id.* at 50.

[The “latent” group] is distinguished by the fact that, if one member does or does not help provide the collective good, no other 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 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.<sup>20</sup>

The group for our purposes is the universe of all potentially interoperable public safety entities. The collective good is interoperable communications. 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<sup>21</sup> comprising an estimated 2.2 million personnel.<sup>22</sup> 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[.]”<sup>23</sup>

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 the federal spectrum policy doling out licenses to each of those agencies. 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.<sup>24</sup> At the same time, however, it has the effect of creating a large “latent” group of over 50,000 licensees. Absent

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<sup>20</sup> *Id.* at 50.

<sup>21</sup> 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* (Sep 13, 2005) available at [http://mccain.senate.gov/index.cfm?fuseaction=Newscenter.ViewPressRelease&Content\\_id=1607](http://mccain.senate.gov/index.cfm?fuseaction=Newscenter.ViewPressRelease&Content_id=1607) (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-Schoenberg, *supra* note 15, at n.33 and accompanying text (estimating the number at almost 60,000).

<sup>22</sup> PUBLIC SAFETY WIRELESS NETWORK, *A Priority Investment for America’s Future* 5 (1999).

<sup>23</sup> OLSON, *supra* note 14, at 48.

<sup>24</sup> JON M. PEHA, FROM TV TO PUBLIC SAFETY: THE NEED FOR FUNDAMENTAL REFORM IN PUBLIC SAFETY SPECTRUM AND COMMUNICATIONS POLICY 5 (New America Foundation, Wireless Future Program Working Paper No. 15, Oct. 2006).

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. As a consequence, they build custom systems independently of each other, and these systems generally do not interoperate.<sup>25</sup>

The balkanization of public safety communications is not only an impediment to interoperability, but also results in pure waste. This is because thousands of 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.<sup>26</sup> A small agency with only a few officers would nevertheless be given such an assignment even if they did not use all the capacity.<sup>27</sup> 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 the number of antennas deployed by public safety entities nationwide correlates less with population or geographic area than with the number of political jurisdictions.<sup>28</sup> 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.”<sup>29</sup>

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.<sup>30</sup> Commercial management of spectrum has been shown to be consistently more efficient than government management.<sup>31</sup> Unlike public safety users, commercial carriers have an incentive, as well as greater freedom, to combine into larger

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<sup>25</sup> PEHA, *supra* note 24, at 5.

<sup>26</sup> Jon M. Peha, *How America’s Fragmented Approach to Public Safety Wastes Money and Spectrum*, PROC. TELECOMM. POLICY RESEARCH CONF. 8 (Sep. 2005) available at [http://web.si.umich.edu/tprc/papers/2005/438/Peha\\_Public\\_Safety\\_Communications\\_TPRC\\_2005.pdf](http://web.si.umich.edu/tprc/papers/2005/438/Peha_Public_Safety_Communications_TPRC_2005.pdf).

<sup>27</sup> *Id.* at 8.

<sup>28</sup> *Id.* at 8.

<sup>29</sup> *Id.* at 8 (citing Booz, Allen & Hamilton, *Cost Study Data Characterization Report*, The Public Safety Wireless Network (PSWN) Program, Feb. 1999.).

<sup>30</sup> Mark M. Bykowsky & Michael J. Marcus, *Facilitating Spectrum Management Reform via Callable/Interruptible Spectrum*, PROC. TELECOMM. POLICY RESEARCH CONF. 15 (Sep. 13, 2002) at 9-10, available at <http://tprc.org/papers/2002/147/SpectrumMgmtReform.pdf>.

<sup>31</sup> See Gerald R. Faulhaber & David Farber, *Spectrum Management: Property Rights, Markets, and the Commons* (unpublished manuscript on file with author) available at [http://assets.wharton.upenn.edu/~faulhabe/SPECTRUM\\_MANAGEMENTv51.pdf](http://assets.wharton.upenn.edu/~faulhabe/SPECTRUM_MANAGEMENTv51.pdf).

and more efficient networks.<sup>32</sup> Public safety agencies do not have the same incentives because they do not face the true cost of spectrum. One reason they do not face the true cost of using spectrum is that they receive their spectrum for free. In addition, they cannot sell or lease it. If they could sell or lease the spectrum, they would have to take into account what economists call the “opportunity cost” of using the spectrum: the revenues they would give up by using the spectrum themselves instead of letting someone else use it.

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.<sup>33</sup> 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.<sup>34</sup> 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.”<sup>35</sup> More aptly, it is like shipping them the materials and then letting them contract with Ford or Toyota to build 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 firms from achieving economies of scale. 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 T-Mobile 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. Solutions: Commercial Provision, Shared Use, and National Provision**

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.<sup>36</sup> By this he meant that a new incentive would be required that “operates, not indiscriminately, like the collective good, but rather *selectively* toward the individuals in the group.”<sup>37</sup> Olson

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<sup>32</sup> Thomas W. Hazlett, *Is Federal Preemption Efficient in Cellular Phone Regulation?*, 56 FED. COMM. L.J. 155, 201-202 (2003).

<sup>33</sup> Bykowsky & Marcus, *supra* note 30, at 10

<sup>34</sup> Joshua Marsh, *Secondary Markets in Non-Federal Public Safety Spectrum*, PROC. TELECOMM. POLICY RESEARCH CONF. 8 (Sep. 2004) at 8, *available at* <http://web.si.umich.edu/tprc/papers/2004/384/tprc.pdf>.

<sup>35</sup> Thomas W. Hazlett, *Katrina’s radio silence*, FINANCIAL TIMES (Oct. 24, 2005).

<sup>36</sup> OLSON, *supra* note 14, at 51.

<sup>37</sup> *Id.* at 51.

called latent groups that acquire a collective good through selective incentives “mobilized” because they have been stimulated into action.<sup>38</sup>

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 nonissue because 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.

Commercial provision of first responder communications is therefore a viable solution to the collective action problem that results in a lack of interoperability. 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. An interconnection requirement could ensure interoperability among the subscribers of different networks.

A private sector national network for public safety is not an untested idea. In the U.K., the national network that supports police, fire and over a hundred other public safety services is owned and operated by O2, a private firm.<sup>39</sup> Many of Iowa’s first responders, including the Polk County Sheriff’s Office—which serves Des Moines—subscribe to the RACOM Network, a privately owned wireless network.<sup>40</sup> 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. 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. Utilities, such as gas, water, and electric, also subscribe to the RACOM network. Today, the RACOM network carries traffic from about 10,000 radio units, 70 percent of which belong to public safety users. Fifteen percent of the users are utilities, and the other fifteen are private enterprises. The network handles over 50 million voice calls a month over 100 individual tower sites.

Several start-up companies, including Cyren Call and Frontline Wireless, have proposed plans to deploy national public safety broadband networks along these lines. The

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<sup>38</sup> *Id.*

<sup>39</sup> General information about this venture is available at <http://www.airwaveservice.co.uk>.

<sup>40</sup> General information about RACOM and its network is available at <http://www.racom.com>.

FCC has also begun a proceeding to 12 of the 24 MHz of public safety spectrum in the 700 MHz band for a national public-private broadband network. All of these plans should be commended for leveraging the private sector to solve the interoperability problem. Each proposal has similar features:

- Each would create a national network rather than balkanized local services.
- Each would allow private companies to build and operate the network.
- Each would allow the resulting network to be shared by first responders and commercial users, with public safety having priority access.

This is exactly the approach that will help overcome the interoperability problem. Any successful policy will embrace those market-oriented characteristics in order to provide the right incentives to both commercial carriers and first responders. However, each of the individual proposals has certain drawbacks that should be noted.

Cyren Call's proposal, for example, asks Congress to allocate half of the spectrum now slated for auction in the 700 MHz band to public safety. The plan then calls for a National Public Safety Broadband Trust to purchase a license to the spectrum, not at auction, but for a flat rate and backed by government loan guarantees. The trust would then contact a private network manager who would in turn subcontract build-out of the network. Under this plan, not only would the federal treasury lose out on the likely greater revenue an auction would generate, but, more importantly, consumers would do without the new services and lower prices that commercial carriers would offer if that portion of the spectrum were sold at full market value.

As we have seen, however, public safety does not need more spectrum, what it needs is reform that changes how the spectrum already allocated to it is used. As Jon Peha's studies have shown, public safety agencies severely underutilize the spectrum now assigned to them. What's more, one recent study calculated that public safety has almost 100 MHz of spectrum allocated to it nationwide—more than any of the national cell phone carriers—much of it now unused.<sup>41</sup> Rather than halve the amount of spectrum that will be available for flexible use as a result of the digital television transition, Congress should consider allowing private sector development on *existing* public safety spectrum.

To build a shared public safety-commercial network, Frontline Wireless's plan would pair the 12 MHz of public safety spectrum in the 700 MHz band that the FCC is now considering for a national broadband network with an adjacent block of 10 MHz now slated for auction. To its credit, Frontline proposes that the 10 MHz block be auctioned as scheduled. An auction is preferable to an outright grant of a license or sale at a flat rate (as Cyren Call has proposed for the spectrum it seeks) because it helps ensure that the license is awarded to the company that values it the most and that can generate greatest economic

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<sup>41</sup> PETER CRAMTOM ET AL., IMPROVING PUBLIC SAFETY COMMUNICATIONS: AN ANALYSIS OF ALTERNATIVE APPROACHES (Criterion Economics, LLC, Feb. 6, 2007) *available at* [http://criterioneconomics.com/docs/Improving\\_PublicSafetyComm\\_020507.pdf](http://criterioneconomics.com/docs/Improving_PublicSafetyComm_020507.pdf).

benefit. Auctions are also a fair and transparent means of spectrum allocation that avoids wasteful “beauty contests.”

However, Frontline’s plan calls on the FCC to reallocate the 10 MHz block in question to include a public safety obligation to build out a national first responder network. Such an obligation would doubtless depress the price the spectrum block would otherwise fetch at auction without such restrictions. Again, why give more spectrum to public safety when it already has a large amount it does not use efficiently? Instead, Congress should consider auctioning licenses, with conditions like those proposed by Frontline, for spectrum already allocated for public safety use. At the very least, if spectrum now slated for commercial auction is reallocated for public safety use in the manner suggested by either Cyren Call or Frontline, the government should identify an equal amount of existing public safety spectrum that can be auctioned commercially once the new public safety networks are built.

The plan the FCC has proposed in its recent rulemaking proceeding would license 12 of the 24 MHz of public safety spectrum in the 700 MHz band to a non-profit entity that would build out a national broadband network and offer service to first responders on a fee-for-service basis. The licensee would also be allowed to offer commercial services over excess capacity on a preemptible basis. Again, this proposal is laudable because it embraces the ideas of creating a national license and allowing spectrum to be shared by public safety and commercial users. However, the FCC proposes “that no commercial interest may be held in the national license or licensee, and that no commercial interest may participate in the management of the national license.”<sup>42</sup> This is similar to the Cyren Call plan, which would make a “public safety trust” the licensee. This feature of the FCC’s plan is odd since there are several commercial communications companies with the comparative advantage and expertise in designing, building-out, and maintaining wireless broadband networks. A for-profit mission and quality service to first responders should not be considered mutually exclusive ideals. As we have seen, private firms such O2 in the U.K. and RACOM in Iowa successfully provide first responder communications over private networks.

Finally, all of the proposed plans suggest building a single national broadband network for public safety. A single provider will not face the same incentives to provide quality service or to innovate that it would if it was competing with other carriers for first responder subscribers. A centralized network means a single choice for first responders. If they are unhappy with service or prices, unlike consumers, they will not have the option to take their business to another network.

## V. Recommendations

Instead of a “centralized”<sup>43</sup> monopoly licensee, we should consider *competing* commercial public safety licensees. Competition among two or more national public safety broadband networks would not only give first responders a choice of provider, it would spur

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<sup>42</sup> Ninth NPRM at ¶ 27.

<sup>43</sup> The FCC’s plan calls for a “centralized national approach” to first responder communications. Ninth NPRM at ¶ 3.

technological innovation and would ensure that prices are kept in check. Competition among the national wireless phone networks has conferred these benefits on consumers, so it is only right that first responders benefit from the same forces.

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 RACOM, O2, and their subscribers make evident, public safety agencies can effectively purchase the communications capacity they 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—demonstrate, public safety users can successfully share a network with private commercial users thereby broadening economies of scale.

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. Instead of creating one centralized national network, we should consider issuing two or more spectrum licenses subject to certain public safety obligations, including interconnection and prioritization. Issuing two or more licenses—perhaps using all 24 MHz of public safety spectrum in the 700 MHz band—would avoid the establishment of a strong incumbent monopolist. Ideally, these licenses would be assigned by auction to avoid rent seeking, as well as to potentially raise funds for public safety to use to pay for service.

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.<sup>44</sup> 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. This can be achieved either by a term in the spectrum license, or through terms in a contract for service. Because the spectrum at issue is allocated for public safety, a license term would be more appropriate.

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<sup>44</sup> Gerald W. Brock, *Interconnection Policy and Technological Progress*, 58 FED. COMM. L.J. 445, 452 (explaining that the Internet is unregulated but interconnected).