

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Increasing Public Safety Interoperability by	)	PS Docket No. 10-168
Promoting Competition for Public Safety	)	
Communications Technologies	)	
	)	

**REPLY COMMENTS OF ARINC INCORPORATED**

ARINC Incorporated ("ARINC") hereby submits its reply to the initial comments filed in response to the Commission's August 19, 2010, Public Notice in the above-referenced proceeding.

**I. INTRODUCTION**

In general, the comments reflect a general consensus that standardizing public safety communications equipment is critical to achieving interoperability and fostering a competitive procurement environment. There is dispute, however, about what level of success has been achieved to date. Some comments claim that there is significant competition.<sup>1</sup> Others see the world differently and lament that there still is not significant competition, concerned that the market leaders continue to use their position to stifle further competition and the benefits that

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<sup>1</sup> See, e.g., Comments of Motorola, Inc., at 8-11; see also Reply Comments of Harris Corporation, Oct. 14, 2010, *passim*, and at 10 (implying that the lack of competition in the public safety communications marketplace may only be "perceived"). All cites to Comments in this pleading are to PS Docket 10-168 comments filed on the due dates (September 20, 2010, for comments and October 18, 2010, for replies) unless noted otherwise.

competition would yield to the public.<sup>2</sup> ARINC falls within the latter group, believing that P25 is the path to both interoperability and competition, but we are far from realizing that vision.

ARINC believes that competition is in a very nascent stage in the public safety radio market, particularly within the P25 Trunked Systems market segment. The P25 Trunked Systems market segment is arguably the most technically complex and serves the portion of the market characterized by densely populated areas, including most major cities and towns.

Although the number of vendors in the market appears rather large – approximately 30—a closer review makes plain that only a few vendors effectively dominate the market. The comments reflect that these few vendors have used proprietary technology and have exploited, if not created, customer confusion to impact unduly and adversely the speed of standards development and the expected resulting gains in interoperability, competition and prices for public safety organizations that standards would promote.

ARINC encourages the Commission to develop a strategy to encourage standards development and for limiting prospectively the licensing of public safety frequencies to systems that at a minimum are in conformance with key APCO P25<sup>3</sup> standards to the extent that they are developed: the P25 Common Air Interface (CAI) (trunking and/or conventional), Digital Fixed Station Interface (DFSI) for conventional base stations, Inter Sub System Interface (ISSI) and Console Sub System Interface (CSSI).<sup>4</sup> In addition, the Commission should work with other federal agencies (such as the Department of Homeland Security) to ensure that federal grant funds for public safety radio systems are spent on solutions conforming to the same standards.

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<sup>2</sup> See, e.g., Comments of the State of Minnesota, Responses to Questions 4 and 5 in the Public Notice; Comments of RELM Wireless, at 1-2; Comments of Cellular South, Inc. at 5; Comments of Alcatel-Lucent at 3-4; Comments of APCO at 1.

<sup>3</sup> Association of Public-Safety Communications Officials – International, Project 25 (“P25”).

<sup>4</sup> Accord, Comments of Project 25 Technology Interest Group, at [8].

## II. DISCUSSION

Competition is *beginning* to develop in the P25 market space. ARINC agrees with Motorola's assertion in section II c of its comments that numerous vendors compete in the P25 marketplace.<sup>5</sup> While there were only a handful of P25 vendors five years ago, including ARINC, there are now more than 30, many entering the market in just the last two to three years as evidenced by the growing number of commercial partners with which ARINC has established and maintains relationships. While ARINC welcomes the challenge of increased competition, the competitiveness of the industry cannot be measured by the number of vendors alone. The relative market share of vendors today (particularly for trunked P25 systems) makes clear that competition is not widespread. ARINC estimates that only two vendors have more than 5% market share. The top vendor accounts for 80 % of the market, and the remaining vendors have single-digit market share.<sup>6</sup>

A simple recital of the number of vendors in the overall P25 space also obscures the lack of competition in the types of systems offered. There are currently only three vendors who offer trunked simulcast P25 networks today (Motorola, Harris, and Cassidian [formally known as PlantCML - EADS]). Trunked simulcast P25 networks represents the most lucrative portion of the market. Large cities, counties and states are increasingly turning to these types of systems. With large vendors dominating this market segment with "end-to-end" solutions, other smaller vendors have an uphill struggle to interest those customers even with niche or "best of breed"

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<sup>5</sup> Comments of Motorola, Inc., at 4.

<sup>6</sup> Letter of FCC Chairman Julius Genachowski to Henry A. Waxman, Chairman, House Committee on Energy and Commerce, dated July 20, 2010, available at <http://energycommerce.house.gov/documents/20100726/Letter.FCC.07.26.2010.pdf>.

products<sup>7</sup>. Investment for smaller companies, to the extent it is taking place without key equipment standards being fully developed, continues to be that of a loss-leader to maintain relevance in the market in the face of the dominant players.

In the face of such odds, it is not surprising that smaller vendors are not yet “established players” in the P25 trunking market. But the wide gap in market share is not the sole, or even the primary, source of concern. The precarious position of smaller vendors is exacerbated by the lack of standards development, as ARINC explained in its opening comments.<sup>8</sup> The disparate market shares of vendors puts the market leaders in a position to slow the standards development process. And, from ARINC’s perspective, the market leaders have done so knowing that the promulgation of widely-applicable standards would increase the prospects for smaller rivals to erode their considerable market share and profit margins.

For example, the P25 Phase 2 TDMA standard is the next major milestone for vendors. Several vendors will have to replace their existing models with new hardware once the standard is finalized. The standard, expected to be complete years ago, and required in customer RFP specifications today despite the fact it is not final, has fairly recently advanced to a stage where product development can begin. It may be 18 months before many products from smaller vendors reach the market.

Smaller vendors have held their breath waiting for the P25 Phase 2 TDMA standard, not being able to risk product development funds until the standard is complete. However, some larger vendors, exploiting the delay in the completion of the P25 Phase 2 TDMA standard, have introduced a “pre-standard” proprietary solution several years ago that has effectively slowed the

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<sup>7</sup> Best of Breed – Many vendors focus only on a single component (e.g. portable radio) within the larger system. That focus allows them to build a more robust product than vendors who build all components of a system (portables, mobiles, consoles, repeaters, etc.).

<sup>8</sup> Comments of ARINC at 3-4.

completion of the standard as proposed.<sup>9</sup> Much of the delay in reaching the Phase 2 TDMA standard has revolved around which data rate and other technical aspects should be used given the introduction of other proprietary solutions with the 9.6k/sec data rate as the prospective standard.<sup>10</sup>

Even educated consumers have to make considerable effort to understand the current state of standards to avoid the pitfalls of accidentally locking themselves into a proprietary solution as evidenced by testimony before the House of Representatives on September, 23, 2010, from Tom Sorely, Deputy Director Radio Communication Services, City of Houston Information Technology Department.<sup>11</sup>

The Conventional and Trunking versions of the Common Air Interface (CAI) standard support the most basic requirements for interoperability. However, leading vendors often have added non-standard features to equipment purportedly meeting the standards. Consequently, these proprietary solutions frequently get embedded in RFP requirements issued by public safety agencies – often because they are basing their RFPs on solutions implemented by other agencies – as if they were part of the standard. Examples of such proprietary features incorporated into RFPs that ARINC has seen include Over the Air Programming (OTAP), DTMF access, proprietary encryption mechanisms, and dynamic regrouping. All of these may someday become part of a standard, and available to all vendors, but today they are not.

The slow development of standards continues to impact competition in areas beyond the CAI. Ellen O'Hara, President and CEO of Zetron testified before the House Science and

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<sup>9</sup> [http://wiki.radioreference.com/index.php/Project\\_25#Project\\_25\\_Phase\\_II](http://wiki.radioreference.com/index.php/Project_25#Project_25_Phase_II).

<sup>10</sup> [http://urgentcomm.com/mag/radio\\_fighting\\_future/](http://urgentcomm.com/mag/radio_fighting_future/). A copy is attached hereto as Exhibit A.

<sup>11</sup> [http://science.house.gov/publications/hearings\\_markup\\_details.aspx?NewsID=2912](http://science.house.gov/publications/hearings_markup_details.aspx?NewsID=2912).

Technology Subcommittee on Technology and Innovation<sup>12</sup> that the lack of a Console Sub System Interface (CSSI) has limited her company's ability to sell Zetron consoles in the P25 marketplace. Only three vendors, none of the market leaders, will even test prototypes of the CSSI interface. This limits their participation in the marketplace to conventional (non-trunked) systems until the CSSI standard is complete and vendors include the interface as part of their product line. During the same hearing, Tom Sorely, Deputy Director Radio Communication Services for the City of Houston confirmed that while he liked the features the Zetron system offered (particularly some features not related to P25 directly), the City could not purchase it because the radio system the City has does not support CSSI.

The consequence of these developments is that the interoperability promised by P25 equipment may be illusory for many public safety agencies who think they have invested in interoperable equipment. As PlantCML/EADS's observes in its comments, "many of the issues and concerns that arise regarding perception of P25 interoperability are actually due to features that are not Project 25 (not codified in the standards)."<sup>13</sup> Tait, in its comments, underscores the same problem and that vendors themselves can be a large part of the solution: "Vendors and purchaser must take care to differentiate between standardized interoperable features and the value added features that are specific to one vendor. Getting this wrong can lead to unrealistic interoperability expectations [on the part of public safety agencies]."<sup>14</sup> ARINC submits that the rapid completion of the standards process will minimize, if not eliminate, the potential for similar situations arising in the future. With the long lifecycle of public safety radio systems, once interoperability is disrupted, it takes a long time to get back on track.

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<sup>12</sup> [http://science.house.gov/publications/hearings\\_markups\\_details.aspx?newsid=2912](http://science.house.gov/publications/hearings_markups_details.aspx?newsid=2912).

<sup>13</sup> Comments of PlantCML-EADS, at 2.

<sup>14</sup> Comments of Tait North America, September 17, 2010, at [4].

In its comments, RELM Wireless' suggests holding licensees of public safety narrowband spectrum to using equipment with open P25 standards.<sup>15</sup> ARINC submits that this proposal has some level of merit and presents the potential of vastly improving interoperability. Notably, the ISSI and CSSI portions of the P25 standard are nearing completion. It is contrary to the public interest to have additional public safety organizations acquire new systems that do not conform to the P25 standard (trunked or conventional) or that utilize traditional FM communications. Systems must be able to and indeed should be required to connect to each other via the ISSI interface. Otherwise, each system may be an island unto itself defeating the objective of interoperability.

In light of the foregoing discussion, it is plain that the comments of Motorola significantly overstate the extent of deployment of P25 systems today that support true interoperability. Motorola claims that "To Motorola's knowledge, 36 states have deployed statewide P25 networks across the public safety bands."<sup>16</sup> In fact, the number is no higher than 22, and even that is an overstatement. Several of the states that Motorola claims are statewide P25 are proprietary as evidenced in Motorola's own presentation to the State of Ohio, Department of Administrative Services on the Ohio MARCS system.<sup>17</sup> On slide 7 of this presentation they outline 22 states that are P25 and an additional 14 that are "Pre-project P25". The list of Pre-project 25 systems include 14 statewide systems that are 100% proprietary, many with no upgrade path at all to P25 and therefore no easy path to interoperability.

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<sup>15</sup> Comments of RELM Wireless, at 2, 3.

<sup>16</sup> Comments of Motorola, Inc., at 18.

<sup>17</sup> <http://das.ohio.gov/LinkClick.aspx?fileticket=6tONWBFDN9A%3d&tabid=124>. An excerpted p. 7 of the presentation is attached hereto as Exhibit B.

Motorola's assertion that "... nearly 70% of the U.S. population is covered by a P25 public safety network."<sup>18</sup> is similarly misleading, even if all of the Statewide systems above were P25. All locations in the United States are supported by a multi-level network of public safety agencies (Federal, State, County, Municipal, and Volunteer). Use of P25 by just one of those agencies does not imply ALL first responders are P25 interoperable, yet it appears that Motorola is making this claim. Simply because a jurisdiction has coverage from one P25 system does not mean that interoperable communications are available among the agencies required to respond in an emergency in that jurisdiction. As an example, there is a P25 system covering the military bases in Washington DC (called the NCR system), but the DC Police and DC Fire have independent, non-P25 systems. The population is technically "covered by P25", as far as Motorola would have the Commission believe, but no Washington DC first responders are using P25 today. Interoperability is lacking in the nation's capital.

Further, Motorola asserts that "One-hundred-and-sixty-five cities and counties also have deployed P25 networks".<sup>19</sup> This sounds impressive, until you consider that there are more than 3000 counties and 19,000 municipal governments in the United States. ARINC asserts that only a very small percentage of public safety agencies have deployed P25 networks to date.

To achieve the goals of interoperability, ARINC submits that the Commission could play a pivotal role by encouraging the completion of key standard's development and requiring licensees as they deploy new systems to incorporate final standards which support true interoperability once those standards are complete. Moreover, as ARINC explained in its opening comments, completing standards development will promote competition among vendors which will lead to lower prices and innovation for public safety agencies, making the

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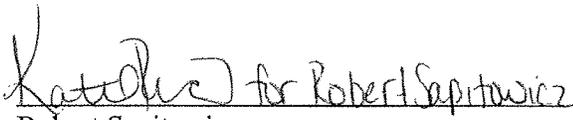
<sup>18</sup> Comments of Motorola, Inc., at 18.

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

deployment of P25 public safety systems that much more rapid. While it remains to be seen how effective the Commission can be in promoting both competition in the public safety communications marketplace and interoperability, ARINC disagrees with Motorola's assertion that increasing competition "will do nothing to achieve the goal of nationwide public safety interoperability."<sup>20</sup> ARINC is confident that one significant factor that limits more broad deployment of P25 is the cost of equipment.<sup>21</sup> Given that more than 20,000 local governments still have not bought a P25 system, robust competition within the marketplace would be a significant public benefit.

Respectfully submitted,

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October 18, 2010

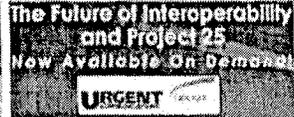
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<sup>20</sup> *Id.*

<sup>21</sup> Comments of APCO at 3-4 ("Improved competition will also lead to lower prices overall, making it possible for licensees with aging, incompatible equipment to upgrade to more interoperable, standardized equipment.").

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# **Exhibit A**



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## FIGHTING OVER THE FUTURE OF P25

Jun 1, 2005 12:00 AM, By Doug Mohney

Started more than 10 years ago, the APCO Project 25 Standards Committee is now facing a number of issues to finalize a second group of open public-safety radio specifications. In what has been simply dubbed "Phase 2," chief among them is that Motorola and the European Aeronautic Defense and Space Co., or EADS, have squared off with different technical solutions for P25 TDMA radios to enable more efficient sharing of spectrum to reduce usage from the current 12.5 kHz per channel to 6.25 kHz.

In addition, public-safety organizations are aggressively pushing for the finalization of standards for fixed base stations, digital consoles and Inter RF Subsystem Interface, or ISSI, so they can start to see more competition and lower prices from suppliers.

Motorola's proposal for P25 TDMA is relatively straightforward. "The general approach is to build off the 12.5 [kHz] FDMA standard, using the same control channel, same modulation," said Mary Pittman, Motorola's representative on the Project 25 Committee. "It's a much easier migration with currently deployed system, and you're also able to facilitate interoperability for folks who never deploy TDMA. You'll never throw out your FDMA system. TDMA is not for everyone."

She said that TDMA systems would be deployed in dense urban areas where there are a lot of users and not a lot of available spectrum. "We've seen a customer need for this increasing over time for increased capacity."

The Motorola proposal would use a vocoder that should work both with legacy P25 radios built to the Phase 1 specifications and next-generation TDMA radios. A changeover to TDMA essentially doubles the number of available channels with few hardware changes. "We like the approach using the same modulation," Pittman said. "Frequency planners, customers and vendors have the coverage area and interference patterns well-understood, so we can hit the ground running."

"The way we are incorporating the vocoder, you can essentially have mixed talk groups of legacy P25 radios and radios capable of operating on the TDMA systems. And you can integrate those two types of channels into the same system if the customer would request it and the vendor would provide."

One area of debate concerns what vocoders to use in the final implementation and how well they might actually work under real-world conditions. Both EADS and Motorola have submitted vocoders that are undergoing testing at the NTIA Institute for Telecommunications Sciences (ITS) facility in Boulder, Colo. "There's a number of different vocoder thoughts on the table," Pittman said. Motorola's half-rate vocoder has undergone testing in a controlled benign environment and is "better than the baseline [Phase 1 vocoder]," she said. The P25 steering committee has requested additional testing in non-clean conditions, introducing errors in transmissions as well as background noise.

"I'd say there is a concern with the vocoder, and something that is a milestone [when finalized]," Pittman said. "[P25 committee members] are from Missouri, they all need to see test results. We would like to see the testing move quickly so the committee can move forward with test results. The work they yet have to do is the half-rate vocoder in less than ideal conditions with background noises."

While relatively new to the radio world, EADS poses a unique challenge to Motorola's historic leadership in the public-safety arena and is one of the few companies in the world with both the technical expertise and corporate resources to give Motorola a good workout, as EADS is a global leader in aerospace, defense and related services. Last year, the company generated revenues of 31.8 billion euros with a staff of 110,000 worldwide employees, manufacturing everything from Airbus commercial passenger aircraft to earth observation satellites. It used its financial strength this year to acquire Nokia's Professional Mobile Radio business consisting of 325 employees, adding more than 130 customers in 56 countries to its portfolio.

Operating in North America since 2001, EADS Public Safety has sold two radio systems, based on the European TETRAPOL standard, one to the U.S. Army Training Center at Ft. Irwin, Calif., and the other to an undisclosed public-safety organization in Canada. "TETRAPOL is similar to P25," said Peter MacLaren, president and CEO of EADS Public Safety. "It has similar signal reach and capacity, but with richer features."

MacLaren is not sure when the P25 community will finally choose between the EADS and Motorola approach. "I think they hope for a miracle to occur, and there'll be a compromise. But there's no magic solution."

EADS has proposed a different modulation scheme under its TDMA implementation that would provide more throughput, 16 kb/s, whereas the existing modulation scheme only delivers 9.6 kb/s. "The main implication is we can support two channels with today's [existing] codecs and just add to that [EADS'] enhanced full rate codec available today, whereas Motorola has to change codecs," he said.

Motorola's proposal keeps the same 9.6 kb/s throughput, but introduces other problems. "The

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enhanced half-rate codec doesn't provide the same quality and makes internetworking difficult. You can't have a half-rate codec talk to a full-rate codec," McLaren said.

According to McLaren, EADS' proposal provides a full-rate codec that won't break current encryption methods. It also would open the door to introducing improved vocoders for better voice quality in the narrower bandwidth.

One industry executive, not wanting to be named because of his company's work with both companies, said that the choice between Motorola's and EADS' solutions was a toss-up. "The stakes are big for both of them. Motorola's proposals are easier to implement and don't require as much work. EADS' would require more work overall, but is more elegant and offers some extras," he said. "From a commercial point of view, Motorola is more attractive. From the user perspective, EADS is more the APCO for the future."

He went on to assert that the APCO Project 25 Committee had slowly lost patience with Motorola for having dragged out the decision on a new air interface and that EADS had come to meetings prepared to challenge Motorola. "EADS is, technically, extremely competent, extremely well-prepared. They are well-prepared for critics. Motorola finds this hard to deal with. Motorola has had to engage far more actively than it intended."

Pittman believes that the P25 committee will agree on a single TDMA solution next year. "I'm hoping for sometime in 2006," she said. "Based on the current rate of progress, it is unlikely that there'll be anything in 2005."

Once the standard is published, there is no clear timetable for vendors to produce equipment that meets it. "It's anyone's guess," Pittman said. "The steering committee members use the figure of 18 months. I know from a company perspective, we're making strategic decisions so we can get to the market with the right product. Everyone has to make their own gamble."

Regardless, both vendors and the P25 Committee are going to face increasing pressure from public-safety users and the government to finalize other parts of the Phase 2 specifications. "I wouldn't say we're comfortable with things the way they are today," said Don Pfohl, co-director of APCO Project 25. "The U.S. Congress has gotten concerned enough to pass legislation to see what can be done to speed up the ISSI specification."

Pfohl believes that development of the console interface and fixed system interface have been slowed down because of the delay in the ISSI.

**on the web:**

To follow the APCO Project 25 specification debate, visit our Web site.  
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**Project 25**

**P25 Phase I Common Air Interface (CAI) standards**

Bandwidth	12.5 kHz
Channel bit rate	9.6 kb/s
Modulation	QPSK-c
Channel Access	FDMA
Frame Format	Includes error correction
Vocoder	IBME

Phase I standards were formalized in 1995 and published under the ANSI/TIA 102 series of documents.

**Project 25 Phase I and Phase II Interface standards  
a comparison\***

	<b>Phase I</b>	<b>Phase II</b>
Bandwidth	12.5 kHz	6.25 kHz
Modulation	QPSK-c	To be determined
Channel Access	FDMA	TDMA
Vocoder	IBME	To be determined

\*The three other parts of Phase II currently in process of definition are: Inter RF subsystem interface (ISSI), console interface and fixed station interface

**Project 25 Phase 2 TDMA Operation proposals**

	<b>Motorola</b>	<b>EADS</b>
Bandwidth	6.25 kHz	6.25 kHz
Channel bit rate	9.6 kb/s	16 kb/s
Modulation	QPSK-c/C4FM	F4FM
Channel access	TDMA	TDMA
Vocoder	Half-rate EIBME	EIBME

A single-Phase 2 TDMA specification may not be finalized until 2006 at the earliest.

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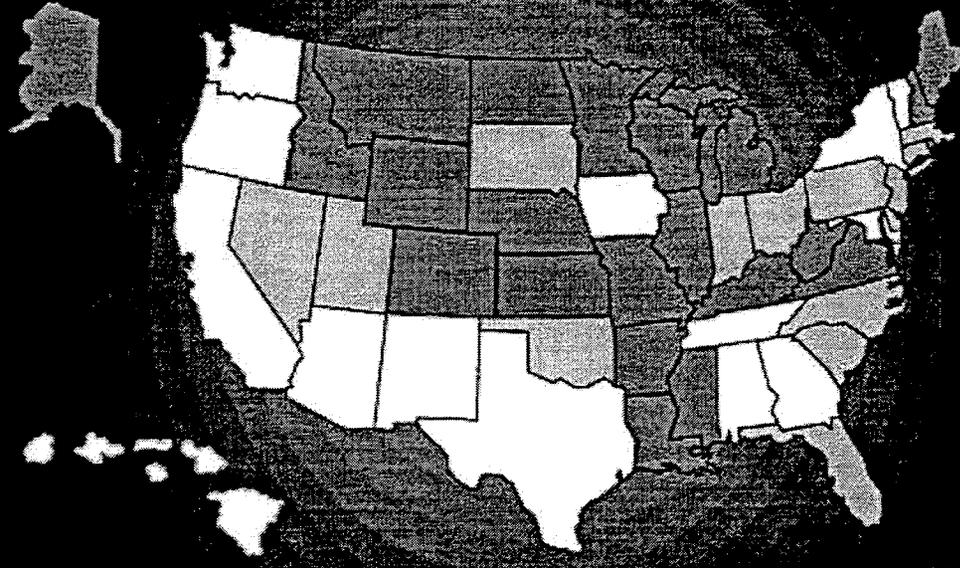
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# **Exhibit B**

# Public Safety Statewide Systems – P25 Breakout



- |                 |                  |                  |  |
|-----------------|------------------|------------------|--|
| ▲ Alaska        | ▲ Michigan       | ▲ Rhode Island   | ▲ Blue – Pre-Project 25 Statewide System |
| ▲ Arkansas      | ▲ Minnesota      | ▲ South Carolina |  |
| ▲ Colorado      | ▲ Mississippi    | ▲ South Dakota   | ▲ Green – Project 25 Statewide System    |
| ▲ Connecticut   | ▲ Missouri       | ▲ Utah           |  |
| ▲ Delaware      | ▲ Montana        | ▲ Virginia       |  |
| ▲ Idaho         | ▲ Nebraska       | ▲ West Virginia  |  |
| ▲ Illinois      | ▲ New Hampshire* | ▲ Wyoming        |  |
| ▲ Indiana       | ▲ New Jersey     | ● Florida        |  |
| ▲ Kansas        | ▲ North Carolina | ● Maine*         |  |
| ▲ Kentucky *    | ▲ North Dakota*  | ● Nevada         |  |
| ▲ Louisiana     | ▲ Ohio           | ● Pennsylvania   |  |
| ▲ Massachusetts | ▲ Oklahoma       | ● Wisconsin      |  |

**Motorola is the vendor of choice in 31 of 36 statewide systems**

*\* Project 25 Conventional*