

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

In the Matter of	)	
	)	
The Development of Operational,	)	
Technical and Spectrum	)	WT Docket No. 96-86
Requirements For Meeting Federal,	)	
State and Local Public Safety	)	
Communication Requirements	)	
Through the Year 2010	)	
	)	
Establishment of Rules and	)	
Requirements for Priority Access	)	
Service	)	

To the Commission:

**Reply Comments of Nokia Inc.**

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## **Executive Summary**

This proceeding presents the Commission with a unique opportunity to ensure that nationwide interoperability in the 700 MHz band is achieved and that public safety spectrum is used efficiently with the latest technology.

The record evidences wide-spread support for requiring in this proceeding 6.25 kHz efficiency on the general use channels. The record demonstrates that technology utilizing 6.25 kHz efficiency already is fully developed and available in other countries for public safety use from a wide array of manufacturers, including leading U.S. manufacturers. The Commission therefore can mandate 6.25 kHz efficiency for general use now, without a migration period.

Despite consensus over the need to achieve spectrum efficiency in the general use channels, some commenters propose a 5-step migration plan for both the interoperability and general use channels that effectively would enshrine 12.5 kHz technology as the standard for both interoperability and general use for 21 or more years. Such a migration plan for the general use channels is unnecessary and contrary to sound public policy. There are no grounds for contemplating a long migration plan for the general use channels given that suitable 6.25 kHz technology that can be adapted to U.S. market requirements in a relatively short time already is widely available.

There is far less agreement over the precise mechanics for adopting Phase I as the interoperability standard and the details of transitioning to 6.25 kHz efficiency for interoperability.

Nokia conditioned its support for the Commission's tentative conclusion to adopt Phase I as an interim interoperability standard upon the Commission (1) mandating 6.25 kHz voice channel efficiency for the general use channels in this proceeding and (2) establishing a reasonable transition period to allow manufacturers to integrate Phase I technology into their equipment. Nokia's proposal will permit the introduction of spectrally efficient equipment on the general use channels while ensuring the availability of Phase I equipment for interoperability.

Finally, the record indicates that there is broad interest in the 700 MHz band by multiple equipment manufacturers, and that the public safety community wants vigorous competition in order to lower prices and foster innovation. Accordingly, the Commission must ensure that its policy decisions in this proceeding not create or reinforce barriers to entry to the public safety equipment and infrastructure market. Instead, the Commission should adopt policies which affirmatively promote competition in this important market.

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To the Commission:

**Reply Comments of Nokia Inc.**

Nokia Inc. (“Nokia”) by its counsel and pursuant to Section 1.415 of the Rules of the Federal Communications Commission (“Commission”),<sup>1</sup> respectfully submits these Reply Comments in response to the Comments filed on issues raised in the *Notice of Proposed Rule Making* in the above referenced proceeding.<sup>2</sup>

**I. INTRODUCTION**

In its initial comments in this proceeding, Nokia supported the recommendation of the Public Safety National Coordinating Committee (“NCC”) to adopt Project 25 Phase I (“Phase I”) as an interim interoperability standard,

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<sup>1</sup> See 47 C.F.R. § 1.415.

<sup>2</sup> WT Docket No. 96-86, *Fourth Notice of Proposed Rule Making* (FCC 00-271) (rel. Aug. 2, 2000) (“*Notice*”).

provided that: (1) the Commission mandates 6.25 kHz voice channel efficiency for the general use channels in this proceeding; and (2) that a reasonable transition period is established before the interim interoperability standard becomes mandatory. Nokia further recommended that in 2005 the Commission consider a formal migration path to 6.25 kHz interoperability based on its evaluation of equipment deployed in the 700 MHz band and the progress of technical development.

The Comments filed to date evidence strong and wide-spread support for the Commission taking steps in this proceeding to promote 6.25 kHz efficiency on the general use channels. There is far less agreement over the precise mechanics for adopting Phase I as the interoperability standard and the details of transitioning to 6.25 kHz efficiency for interoperability. For example, several commenters suggest that the Commission reevaluate the migration to 6.25 kHz efficiency on the interoperability channels after evaluating technological and marketplace developments in the 700 MHz band, while others oppose any migration to 6.25 kHz for interoperability. Finally, the record supports the need for the Commission to ensure that a vibrant competitive market for 700 MHz public safety equipment is assured.

**II. THERE IS BROAD CONSENSUS ON THE CRITICAL NEED TO ENSURE SPECTRUM EFFICIENCY IN THE GENERAL USE CHANNELS IN THIS PROCEEDING.**

In its initial comments, Nokia urged the Commission to maintain 6.25 kHz efficiency for both the interoperability and general use channels as a primary goal

of this proceeding.<sup>3</sup> Multiple commenters independently made similar proposals to include the general use channels in planning for migration to 6.25 kHz technology.<sup>4</sup> The NCC's comments are representative of those put forth by a variety of public safety entities:

The NCC shares the Commission's goal of moving channels towards more efficient 6.25 kHz operation in the 700 MHz band, but believes that such a migration should first occur in the general use channels, where capacity and efficiency are a greater concern.<sup>5</sup>

Similarly, APCO focuses on the general use channels as being most likely to benefit from a rapid migration to 6.25 kHz technology:

Focusing on a general use migration path is also consistent with spectrum use and demands that are likely to arise in the future. The general use channels constitute the largest portion of the 700 MHz Public Safety Band, but will also be the subject of the most intensive demand by public safety agencies for their growing day-to-day internal communications requirements.<sup>6</sup>

Nokia agrees with the NCC and APCO that efficiency in the general use channels is essential and should be addressed in this proceeding. In fact, given the consensus among commenters that it is not feasible to establish a hard and

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<sup>3</sup> See Nokia Comments at 3.

<sup>4</sup> See *e.g.* Comments of Association of Public Safety Communications Officers, International ("APCO") at 5; Comments of David Buchanan at 5; Comments of the State of California at 5; Comments of Com-Net Ericsson at 17; Comments of International Association of Fire Chiefs ("IAFC") at 3; Comments of City of Mesa at 7; Comments of the Public Safety National Coordinating Committee ("NCC") at 9.

<sup>5</sup> See NCC Comments at 9; Comments of IAFC at 3 ([T]he Commission should place its emphasis on spectrum efficiency on the general use channels rather than the interoperability channels).

<sup>6</sup> See APCO Comments at 5.

fast deadline for a migration to 6.25 kHz efficiency for interoperability at this time,<sup>7</sup> it is all the more critical that the Commission adopt rules that promote the highest practicable level of spectrum efficiency in the general use channels.

Nokia and others advocate eliminating the need for a decades-long migration period by using today's 6.25 kHz technology in the general use channels immediately,<sup>8</sup> instead of allowing less efficient radios to saturate the 700 MHz band. Suitable technology using 6.25 kHz efficiency is deployed by public safety organizations around the world today. There is every reason to mandate 6.25 kHz efficiency for general use now.

**III. THE COMMISSION SHOULD MANDATE 6.25 KHZ CHANNEL EFFICIENCY FOR GENERAL USE NOW, WITHOUT A MIGRATION PERIOD.**

**A. 6.25 kHz Technology Is Available Now From Multiple Manufacturers.**

There is no technical barrier to mandating 6.25 kHz efficiency for the general use channels. The record demonstrates that technology utilizing 6.25 kHz efficiency already is fully developed and available in other countries for public safety uses from a wide array of manufacturers, including leading U.S. manufacturers. In the U.S., Project 25 Phase II has standardized 6.25 kHz FDMA technology,<sup>9</sup> and while there are barriers to implementing this technology

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<sup>7</sup> See *e.g.* Comments of APCO at 5; Comments of the State of California at 14; Comments of Federal Law Enforcement Wireless Group at 7; Comments of IACP at 4; Comments of NCC at 9.

<sup>8</sup> See Comments of Nokia at 11; Comments of Com-Net Ericsson at 17.

<sup>9</sup> See Comments of Project 25 Technology Interest Group at 3.

for interoperability, it could quickly be made available for general use. The Project 25 process is also standardizing two additional Phase II TDMA solutions, both of which are 6.25 kHz efficient, and should be available in the near term.

In addition to Nokia's comments detailing the availability of 6.25 kHz equipment,<sup>10</sup> other manufacturers state in their comments that they are prepared to commence introduction of 6.25 kHz equipment upon adoption of suitable rules by the Commission in this proceeding. For example, Com-Net Ericsson states that:

[t]echnologies existing today can be utilized in the general use and reserved portions of the band . . . [t]hese other technologies are capable of 6.25 kHz efficiency now, i.e. they provide one voice path per 6.25 kHz of occupied bandwidth today.<sup>11</sup>

Significantly, the availability of this spectrum efficient 6.25 kHz technology is known by members of the public safety community as well as by manufacturers. Comments jointly filed by five individual associations representing a wide array of different public safety user organizations point out that:

TETRA, the European Telecommunications Standards Institute ("ETSI") equipment standard which employs a 4-slot Time Division Multiple Access ("TDMA") Methodology in which 4 voice channels are realized within a 25 kHz bandwidth . . . is widely available from numerous manufacturers in Europe, most of which also serve the United States market.<sup>12</sup>

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<sup>10</sup> See Comments of Nokia at 12-13; Exhibit A.

<sup>11</sup> See Comments of Com-Net Ericsson at 17.

<sup>12</sup> See Joint Comments of Forestry Conservation Communications Association, International Association of Fire Chiefs, Inc., International Association of Fish and Wildlife Agencies, International Municipal Signal Association, and National Association of State Foresters, ("Joint Comments of the Public Safety Representatives") at 6.

The Commission should act upon the broad consensus that the general use channels are key to foster 6.25 kHz efficiency in the 700 MHz band. Given that 6.25 kHz technology suitable for use on the general use channels can be readily made available, the Commission should mandate 6.25 kHz voice channel efficiency in the general use channels effective immediately. Mandating 6.25 kHz efficiency immediately will achieve the spectral efficiency goals set for the 700 MHz band and will avoid “the specter of delay”<sup>13</sup> in achieving spectrum efficiency and the significant cost of later migration to 6.25 kHz efficiency in those channels.

**B. The “5 Step Migration Plan” Would Unnecessarily Enshrine 12.5 kHz Technology In The General Use Channels For At Least 21 Years, A Result Contrary to Sound Public Policy.**

Although APCO and several other commenters highlight the need to foster efficient use of the general use channels, some of these same commenters propose a “5 Step” migration plan for both the interoperability and general use channels that would effectively enshrine 12.5 kHz technology as the standard for both interoperability and general use for **at least 21 years** (and possibly much longer).<sup>14</sup> Such a decades long migration plan for the general use channels

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<sup>13</sup> See *Fourth Notice of Proposed Rule Making* at ¶ 47.

<sup>14</sup> See *e.g.* Comments of APCO at 7-9; Comments of IACP at 3. Under the “5 Step” migration plan, the Commission would: 1) adopt Phase I as the interoperability standard; 2) in 2006, or after the 700 MHz band is cleared of incumbent TV operations, whichever is later, cease to type-accept equipment that was incapable of providing one voice channel per 6.25 kHz; 3) ten years after the type-acceptance change, mandate that all general use channel operations in the top 50 markets be at 6.25 kHz efficiency; 4) fifteen years after

should not be considered seriously by the Commission. There are no grounds for contemplating a 21 year migration plan for the general use channels because 6.25 kHz technology suitable for use on those channels can be available in the near term.

In fact, the 5 step migration plan appears less designed to achieve 6.25 kHz efficiency for interoperability than it does to enshrine 12.5 kHz efficiency on the general use channels. For example, one commenter states that initially “all radio equipment installed in the band will be ‘pure’ 12.5 kHz radios, without any capability to operate in a 6.25 kHz channel (or provide one voice-channel per 6.25 kHz of spectrum).”<sup>15</sup> Although the 5 step migration plan does not expressly state that the Commission should bar the introduction of 6.25 kHz equipment, the inference is that only 12.5 kHz equipment will be deployed during the first stage of this migration plan. This outcome directly conflicts with the stated objectives of the Commission, as well as the record in this proceeding, regarding the need for efficiency in the general use channels and the readily available means for satisfying those efficiency objectives with technology that is available today.

Any general use migration plan would dramatically increase the cost burden borne by public safety agencies (and the taxpayers that support them) by requiring them to replace their 12.5 kHz equipment with 6.25 kHz equipment.

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the type-acceptance change, mandate that all general use channel operations in all markets be at 6.25 kHz efficiency; and 5) as of the date established in step 2, re-examine technological and marketplace developments and determine whether a migration path to 6.25 interoperability is possible. Comments of APCO at 7-9.

<sup>15</sup> See Comments of APCO at 5.

Once 12.5 kHz equipment has taken hold in the general use channels, it will be exceedingly expensive and difficult to move subsequently to 6.25 kHz. For example, the Illinois State Police estimate that the cost associated with migrating its state-wide system to 6.25 kHz equipment would be \$13,000,000 for handsets alone.<sup>16</sup> More importantly, if the Commission allows 12.5 kHz technology to be deployed in the general use channels, public safety agencies likely will make significant investments not only in handsets, but also in infrastructure. This infrastructure is more expensive and has a much longer useful lifecycle, making a forced, later migration all the more difficult and expensive.

The substantial costs and the disruption associated with requiring public safety agencies to replace this 12.5 kHz equipment can be avoided by deploying 6.25 kHz equipment at the outset. Given that 6.25 kHz equipment for the general use channels can be made rapidly available, there just is no need to consider any “migration” on the general use channels, much less one that would take 21 or more years.

Therefore, the Commission should eliminate any interim steps and mandate 6.25 kHz efficiency on the general use channels immediately. As Nokia detailed in its initial comments, if the Commission permits 12.5 kHz to take hold on the general use channels, not only will the band become congested with technology that is spectrally inefficient, but inertia will set in with regard to

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<sup>16</sup> See Comments of Illinois State Police at 6. This estimate stands in stark contrast to those comments that suggest that backward compatible 6.25 kHz equipment can be implemented “without any increase in cost.” See Comments of the Public Safety Network Program at 8.

migrating to 6.25 kHz efficiency for interoperability.<sup>17</sup> The Commission need look no farther for evidence of this inertia than the 5-step migration plan for the general use channels discussed above that would defer currently available levels of spectrum efficiency for more than 20 years.

**IV. THE COMMISSION SHOULD NOT ADOPT PROJECT 25 PHASE I FOR INTEROPERABILITY UNLESS IT MANDATES 6.25 KHZ EFFICIENCY FOR GENERAL USE AND GRANTS A REASONABLE TRANSITION PERIOD BEFORE PHASE I BECOMES MANDATORY.**

In its comments, Nokia conditioned its support for the Commission's tentative conclusion to adopt Phase I as an interim interoperability standard upon: (1) the Commission mandating 6.25 kHz efficiency for the general use channels now; and (2) a reasonable transition period being adopted to allow manufacturers to integrate Phase I into their equipment.<sup>18</sup> Nokia's proposal was designed to define the basic technical parameters (*i.e.*, the interoperability standard and the baseline spectrum efficiency for general use) that manufacturers need to introduce equipment for the 700 MHz band while providing an incentive for continued technical development. Nokia's proposal will permit the introduction of spectrally efficient equipment on the general use channels while ensuring the availability of Phase I equipment for interoperability.

**A. A Reasonable Transition Period is Essential Before Phase I Capability Becomes Mandatory.**

Interoperability in the 700 MHz band will be necessary only when two systems with different technology are deployed in the same geographic region. It

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<sup>17</sup> See Nokia Comments at 13.

<sup>18</sup> See Nokia Comments at 6.

is unlikely that any two such systems will be deployed for five to nine years due to delays in the availability of spectrum related to television station incumbency and the time it will take to deploy new public safety systems in the 700 MHz band. As described in Nokia's initial comments, any limitation on the introduction of spectrally efficient equipment on the general use channels therefore is unnecessary and contrary to the public interest that favors spectrum efficiency.

Nokia's comments regarding the amount of time required to plan, design and deploy a wide area public safety system are echoed by the State of Ohio, which describe the development of Ohio's Multi-Agency Radio Communications System. Ohio states that this system "has been in development over the last 5 years with an estimated completion date of late 2003."<sup>19</sup> Using Ohio's experience as a benchmark, it will be 8 years before systems requiring interoperability are deployed in the 700 MHz band.

Given the time before widespread interoperability capability is necessary, there is no justification for not permitting a reasonable transition period before making Phase I capability mandatory. If the Commission mandates Phase I capability without a transition period, manufacturers of spectrally efficient equipment will not have an opportunity to integrate Phase I into their products, and will not be able to market currently available spectrally efficient equipment because it does not include Phase I capability. Even though the NCC states that

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<sup>19</sup> See Comments of the State of Ohio, Department of Administrative Services at 1.

the integration of Phase I “would not place an undue burden”<sup>20</sup> on competing manufacturers, this does not mean that such integration is technically insignificant. The technical considerations involved in integrating Phase I compatibility into more spectrally efficient products that can be marketed competitively involve substantial costs including investments in research and development, engineering, chip development and personnel resources, and can take a significant amount of time to accomplish.

**B. Interoperability Standardization and General Use Channel Efficiency Cannot be Decided Separately.**

The Commission cannot effectively separate its decisions on interoperability standardization and general use spectrum efficiency. Manufacturers need to know both the general use efficiency requirements and the interoperability standard requirements when defining product development plans. Equipment to be deployed in the 700 MHz band must be designed to operate primarily on the general use channels, with interoperability capability for the less frequent requirement of interagency communications between agencies using two different 700 MHz technologies. Suggestions that the Commission adopt Phase I now for the interoperability channels, and defer all other decisions in this proceeding,<sup>21</sup> would not expedite the introduction of 700 MHz equipment. It would only increase manufacturer’s uncertainty. General use spectrum efficiency standards must be designed into backbone infrastructure, which has

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<sup>20</sup> See Comments of NCC at 10.

<sup>21</sup> See Comments of APCO at 2.

longer useful lifecycles and requires longer development times than handsets. Interoperability must be considered in the design of handsets, which have a much shorter lifecycle and are redesigned more frequently. Equipment manufacturers will be unable to design and develop equipment for the 700 MHz band until they have certainty with respect to spectrum efficiency standards for the general use channels.

The issues before the Commission can be resolved quickly. As described in detail above, there is a consensus on the need to foster spectrum efficiency in the general use channels. Likewise, there is consensus on the adoption of Phase I for interoperability – so long as spectrally efficient equipment can be introduced simultaneously on the general use channels. The Commission should act on this consensus and mandate 6.25 kHz efficiency on the general use channels at the same time that it adopts Phase I for interoperability. By deciding these issues together, the Commission will define the critical technical parameters that manufacturers need to rapidly introduce equipment for the 700 MHz band.

**V. THERE IS A CRITICAL NEED TO ENSURE COMPETITION IN THE 700 MHZ EQUIPMENT MARKET.**

One of the Commission's stated policy objectives of this proceeding is the development of competitive markets for 700 MHz public safety equipment. The record reveals that there is significant interest in this band by several equipment manufacturers. In addition to Nokia, Motorola, Com-Net Ericsson, EF Johnson Company, Kenwood Communications, AirNet Communications, and DataRadio all expressed their intent to develop equipment for this band. It is incumbent

upon the Commission to ensure that its policies do not exclude any of these potential competitors or the technologies that they offer.

Indeed, the critical need for competition and the cost relief it would provide to public safety agencies was expressed in the joint comments of the Public Safety Representatives:

From the standpoint of economical supply, certain of the Public Safety Representatives previously have expressed concern to the Commission regarding the Project 25 standard due to the apparent lack of a fully competitive marketplace in the United States for Project 25 equipment . . . The significance to the user community, and particularly to the volunteer and rural public safety agencies is the significant price differential between Project 25 equipment and TETRA equipment. A fully featured Project 25 subscriber radio ranges from \$3-4,000 compared with \$800-2,000 for a comparable TETRA unit.<sup>22</sup>

The Commission will ensure that all manufacturers are able to enter the public safety market place on fair terms by (1) adopting a minimum efficiency of one voice path per 6.25 kHz for the general use channels; and (2) establishing a transition period before Phase I capability becomes mandatory. The resulting competition will bring not only the cost benefits highlighted by the Public Safety Representatives, but higher levels of service and new innovations for all of the public safety community.

## **VI. CONCLUSION**

The record in this proceeding presents the Commission with a broad consensus to ensure that nationwide interoperability in the 700 MHz band is

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<sup>22</sup> See Joint Comments of the Public Safety Representatives at 6.

achieved and that public safety spectrum is used efficiently, while introducing the full benefits of a competitive market for public safety communications equipment. This best can be achieved by establishing a uniform standard of 6.25 kHz voice efficiency on the general use channels now; adopting APCO Project 25 Phase I as an interim interoperability standard; and establishing a transition period before Phase I becomes mandatory.

Respectfully submitted,

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