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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

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

SECOND NOTICE OF PROPOSED RULEMAKING

Adopted: October 9, 1997; Released: October 24, 1997

Comment Date: **December 22, 1997**
Reply Comment Date: **January 12, 1998**

By the Commission:

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I. INTRODUCTION

1. In this Second Notice of Proposed Rulemaking (Notice) we make a range of proposals relating to public safety communications in the 746-806 MHz spectrum band and in general. First, we discuss goals for establishing a plan to ensure the efficient and effective use of spectrum to meet critical public safety communications needs. We then propose and seek comment on service rules for the 24 megahertz of spectrum that we have proposed to allocate for public safety needs, and that Congress, in the Balanced Budget Act of 1997, has committed to public safety services.[1] Second, in response to a Petition for Rulemaking filed by the National Communications System, we seek comment relating to the establishment of wireless priority access services on commercial systems for use in meeting communications needs in emergency and disaster situations. Finally, we propose technical requirements to protect broadcast licensees operating in the 746-806 MHz band from interference.

2. Congress, in the Balanced Budget Act of 1997, committed 24 megahertz of the radio spectrum between 746 MHz and 806 MHz to public safety services, and the remaining 36 megahertz to commercial use.[2] The Commission, in its *Allocation Notice*, proposed to reallocate this spectrum in this manner.[3] The proposals contained in the Notice we adopt

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[1] Reallocation of Television Channels 60-69, the 746-806 MHz Band, ET Docket No. 97-157, Notice of Proposed Rulemaking, FCC 97-245, released July 10, 1997 (*Allocation Notice*), at para. 12; Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 (1997).

[2] *See* Section 337(a) of the Communications Act, 47 U.S.C. § 337(a), as added by the Balanced Budget Act of 1997, § 3004.

[3] TV Channels 60-69, comprising the 746-806 MHz band are currently allocated to the Broadcasting Service. We recently adopted a Table of Allotments for digital television (DTV). Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service, MM Docket No. 87-268 (*DTV Proceeding*), Sixth Report and Order, FCC No. 97-115, released Apr. 21, 1997, 62 Fed. Reg. 26684 (*DTV Sixth Report and Order*), *recon. pending*. This Table provides all eligible broadcasters with a second 6 megahertz channel to be used for DTV service during the transition from analog to digital television service, and also facilitates the early recovery of channels 60-69. In providing for early recovery of spectrum, the Commission observed that an urgent need exists for additional spectrum to meet important public safety needs, including voice and data communications, and to provide for improved interoperability between public safety agencies. *Id.* at para. 79.

In the *Allocation Notice* we proposed to allocate 24 megahertz at 764-776 MHz and 794-806 MHz to the fixed and mobile services, for public safety use, and stated our belief that this allocation would help to meet the additional spectrum needs of public safety. We also proposed to allocate the remaining 36 megahertz at 746-764 MHz and 776-794 MHz to the fixed, mobile, and broadcasting services, stating that this allocation would allow for the maximum diversity in service offerings and the broadest licensee discretion, consistent with international allocations. We reiterated our policy that existing analog and DTV full-service broadcast operations will be fully protected during the DTV transition period, including any additional DTV allotments made in Channels 60-69 as

today will help us formulate the service rules that are essential to make this spectrum available for licensing. We wish to emphasize that we do not in this Notice intend to indicate prematurely our decisions regarding the issues raised in the *Allocation Notice*. Whether the allocation proposals are adopted in their entirety or are modified in some manner, the inquiries of this Notice will provide necessary information for further action by the Commission. We note that the Balanced Budget Act of 1997 directs the Commission to complete the allocation of this spectrum by December 31, 1997, and also to commence assignment of licenses for public safety services by September 30, 1998.[4] We intend to have service rules for the public safety spectrum in place by that date, so that the Commission will be prepared to comply with this directive.

II. PUBLIC SAFETY COMMUNICATIONS

A. Overview; Goals for Public Safety Communications

1. Vision for Use of New Spectrum

3. In this Notice we continue the task of building a framework to improve the Nation's public safety wireless communications. Over the past decade, police, fire, emergency medical, and other public safety providers have been confronted by a number of problems that threaten their ability to fulfill their mission of protecting the public. Frequencies have become congested in many areas. Interoperability (the ability of different agencies to communicate across jurisdictions and with each other) has been difficult because of multiple frequency bands and incompatible equipment. In addition, public safety agencies have been hampered in their attempts to upgrade their equipment to take advantage of new technologies by the lack of funds for equipment. These problems must be solved quickly, if the public safety community is to meet the changing demands of the 21st century.

4. We believe that the Nation's public safety agencies need additional spectrum to meet their immediate and future needs, and that dedicating this 24 megahertz to public safety use will allow agencies to develop the advanced capabilities, such as data and video communications, that will allow them to more effectively fulfill their missions. Every public safety officer should have access to a communications system that is reliable, of high quality, and allows him or her to communicate with colleagues in other jurisdictions or from other agencies during emergencies as well as on a day-to-day basis. Public safety agencies should

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the result of petitions for reconsideration in the DTV proceeding. *Allocation Notice*, at paras. 11, 13, 17, 21.

[4] Section 337(b)(1) of the Communications Act, 47 U.S.C. § 337(b)(1), as added by the Balanced Budget Act of 1997, § 3004.

be able to procure advanced technologies and equipment in a competitive market that promises reasonable prices and continual innovation over time.

5. In order to realize this vision, which we believe we share with the public safety community, we must work with that community to define goals for the use of this new spectrum, and to begin crafting a framework to promote their achievement. In general, we believe that promoting technological innovation and a competitive market is critical to ensure that this spectrum is used efficiently. The proposals we make today are intended to achieve these objectives. The specific goals — which we seek to pursue in cooperation with the public safety community, and which we discuss in greater detail in the following paragraphs — are summarized as follows:

- Define present and future public safety communications needs, such as interoperable communications.

- Promote efficient and effective use of new public safety spectrum to meet these needs through the development of technical standards, and the provision of operational flexibility where appropriate.

- Ensure that the communications capabilities made possible by this new spectrum are affordable for public safety agencies. Creating incentives for competition and exploring sources of funding are examples of ways that this may be accomplished.

6. Establishing a framework for the use of this new public safety spectrum is extremely important. If we are not successful in working with the public safety community to map an appropriate and effective course, then we face the risk of perpetuating difficulties that the public safety community has faced in the past. Public safety communications continue to be plagued by inefficient spectrum use, by the absence of a competitive market for public safety communications equipment and services that meet public safety agency needs, and by difficulties in building a structure for interoperable communications among public safety agencies. For example, as the Public Safety Wireless Advisory Committee (PSWAC) has noted, the ability of officials from different public safety agencies to communicate with each other is limited in today's environment — "[i]nteroperability is hampered by the use of multiple frequency bands, incompatible radio equipment, and a lack of standardization in repeater spacing and transmission formats."[5]

[5] PSWAC, Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission and the National Telecommunications and Information Administration, Sept. 11, 1996 (*PSWAC Final Report* or *Final Report*), at 2. The *PSWAC Final Report* is in two volumes. Volume One contains pages 1-72. Volume Two, which contains the reports of the individual subcommittees, is paginated twice: once by each section, and a second time to indicate the page's sequence in the entire report. Thus, for example, the

7. As we work with the public safety community in developing a framework for the use of the 24 megahertz of new public safety spectrum, we need to ensure that this spectrum is used effectively and that the necessary incentives exist to provide nationwide public safety interoperability. As we discuss in the following paragraphs, we recognize that the success of the framework we seek to build with the public safety community will also depend on how the public safety equipment market develops — we need to foster competition in order to spur innovation and bring down costs faced by public safety agencies. The success of the framework will also depend on the availability of adequate public safety funding to purchase upgraded equipment. In order to work cooperatively with the public safety community to build a framework for public safety communications, we define our goals in this Notice. In the comments on our specific proposals and the responses to specific questions raised in this Notice, the public safety community and other interested parties are asked to relate their suggestions and arguments to the broad goals we seek to define here.

2. Public Safety Communications Goals

8. In the Budget Act of 1993, Congress required the Commission to develop a framework to ensure that public safety communications needs are met through the year 2010.[6] We subsequently issued a report and also found a need for additional information on the needs of public safety agencies.[7] Together with the National Telecommunications and Information Administration (NTIA), we sponsored PSWAC, to provide advice and recommendations regarding the specific needs of public safety agencies.

9. We continued our efforts to examine and address these spectrum and communications needs of public safety agencies by adopting the *Public Safety Notice*.[8] In seeking to evaluate public safety needs through 2010, we sought comment on a wide variety of public safety communications needs and options. PSWAC completed its Final Report in September

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Interoperability Subcommittee Final Report, page 12, is also numbered "285." Throughout this Notice, we cite to the numbers begun in Volume One and carried through to the end — page 285 in the example above.

[6] *See* Section 309(j)(10)(B)(iv) of the Communications Act, 47 U.S.C. § 309(j)(10)(B)(iv), as added by the Omnibus Budget Reconciliation Act of 1993 (Budget Act of 1993), Pub. L. No. 103-66, Title VI, § 6002, 107 Stat. 312 (1993).

[7] Report and Plan for Meeting State and Local Government Public Safety Agency Spectrum Needs Through the Year 2010, Report and Plan, 10 FCC Rcd 5207 (1995) (*1995 FCC Public Safety Report*).

[8] The Development of Operational, Technical, and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010, WT Docket No. 96-86, Notice of Proposed Rulemaking, 11 FCC Rcd 12460 (1996) (*Public Safety Notice*). For a list of comments and reply comments in this proceeding, with corresponding short title references, see Appendix B.

1996,[9] and that report was submitted to the Commission as comments in response to the *Public Safety Notice*. We applaud the members of the public safety community for the countless hours of effort and commitment they put forth in the development of the *PSWAC Final Report*, and for the important role they played in helping us begin to explore public safety communications needs in the *DTV Sixth Report and Order*.

10. Before turning to our discussion of goals that we seek to forge with the public safety community and other interested parties, we note that this Notice does not intend to address all the issues raised in the *Public Safety Notice* or the *PSWAC Final Report*. As we have indicated,[10] this Notice takes the first step toward developing and implementing a framework for public safety communications. To the extent that important issues remain, they will be addressed in future proceedings.

a. Defining Public Safety Communications Needs

11. Our first goal is to arrive at a consensus with the public safety community and other interested parties regarding the nature of problems faced by public safety agencies in their efforts to use spectrum for public safety communications. What do public safety agencies need in order to achieve efficient and reliable communications, both in emergencies and in connection with day-to-day operations? Defining these needs is the starting point for the development of a communications framework for public safety. We believe there are three principal public safety communications needs:

- Immediate spectrum shortages must be addressed.
- A system for interoperable communications must be established.
- Technologies that will enhance public safety communications capabilities must be made available in the public safety communications market.

12. The *PSWAC Final Report* sounded an alarm regarding the extent to which spectrum shortages are hampering the mission of safety and rescue personnel. The *Final Report* stressed that public safety agencies are in critical need of more channels for voice communications. The new spectrum made available by Congress in the 746-806 MHz band provides the opportunity to ease this problem. Thus, a major component of the communications framework must be to clear the path for the provision and use of this spectrum as expeditiously as possible.

[9] *See* note 5, *supra*.

[10] *See* para. 7, *supra*.

13. Public safety agencies commonly operate their own wireless systems, using frequencies, modes, and equipment incompatible with those used by other public safety agencies, with the result that public safety agencies often are unable to communicate with one another by radio. This inability to communicate across agency and jurisdictional lines can hamper efforts to provide mutual aid in emergencies, to conduct pre-planned task force or emergency-preparedness operations, and to maintain the normal day-to-day inter-agency communications that form an important part of the public safety community's mission to protect life and property.

14. In order to promote the safety of life and property in every part of the Nation, we need to join with the public safety community in working to achieve seamless nationwide communications interoperability among Federal, State, and local public safety agencies. This interoperability must be available for use in national or other emergencies, in pre-planned task force and emergency preparedness operations, and in routine, day-to-day communications. Moreover, interoperability must be available for transmission of voice, data, and video communications. We agree with PSWAC that "present [communications] limitations can be eased by establishing bands of frequencies for interoperability purposes, encouraging the development and use of shared systems, and building gateways between technically incompatible systems."[11] The framework developed in this rulemaking must determine the amount of spectrum necessary to meet these interoperability needs, and must take the steps necessary to ensure that public safety personnel can depend upon reliable, affordable, and efficient interoperable communications. One of the possible steps that we intend to examine in this proceeding is the use of commercial services as a source of spectrum to meet public safety communications needs.[12]

15. We note that PSWAC and others have suggested we make available 2.5 megahertz of spectrum for interoperability purposes. We have serious concern about whether this is sufficient to ensure efficient communications between officials in various agencies and jurisdictions. We are concerned that designating only about 10 percent of the spectrum that has been made available for public safety purposes will tend to perpetuate the current balkanization between agencies and jurisdictions that exists today in public safety communications. Thus, we intend to work closely with the public safety community and other interested parties to examine the issue of the amount of spectrum that may be necessary to ensure effective and efficient interoperability.

16. Finally, we must look to the future as we work with the public safety community in devising an overall framework for public safety communications. Public safety agencies

[11] *PSWAC Final Report* at 3.

[12] *See* Section III, *infra*, paras. 172-227.

have a critical, ongoing need to incorporate technological advances into their communications networks so that they are better equipped to accomplish their missions. Success in providing help in emergencies, saving lives, and protecting the Nation's citizens is often measured in minutes and seconds — the use of enhanced wireless communications technologies can reduce the number of ticks of the clock before safety and rescue personnel can minister to those most critically in need of help. Our framework must ensure that public safety agencies are not frozen in antiquated or inefficient communications technology.

b. Ensuring Efficient Spectrum Use

17. We believe that public safety agencies currently are hampered by inefficient use of most of the spectrum allocated for public safety communications, in part, because of a lack of the proper incentives for its efficient use and the *ad hoc* manner in which that spectrum originally became available. An effective public safety framework will require planning, cooperation, and efficient administration of the public safety spectrum. With regard to interoperable communications, the goal of this proceeding must be to develop operational standards, common baseline technical standards, and eligibility ground rules that make seamless nationwide interoperability work. For example, certain technical standards may be needed to ensure effective interoperable communications. We also believe that current inadequacies in interoperable communications may be a product of the inability to reach agreement on the protocols that must be in place to enable agencies to talk across jurisdictional lines. Thus, a key goal for this proceeding is to solve this problem.

18. Another key to efficient spectrum use is accommodating local, State, and regional needs in connection with the use of spectrum for general service public safety communications. The effectiveness of public safety agencies is tied to their ability to communicate. Due to their special obligations, public safety agencies often have unique communication needs. In addition to voice communications, public safety officials also have a need to transmit video and data. PSWAC has found that radio frequencies allocated for public safety use are highly congested in many areas and, therefore, public safety agencies are not able to meet current requirements or to plan for future advanced communication needs.[13] PSWAC has also maintained that, unless immediate measures are taken to alleviate spectrum shortfalls, public safety agencies will not be able adequately to discharge their obligation to protect life and property in a safe, efficient, and cost effective manner.[14]

19. We believe that we can work with the public safety community to promote efficient, effective, and innovative use of spectrum by providing the maximum flexibility

[13] *PSWAC Final Report* at 2.

[14] *Id.*

possible, consistent with the overall objectives and goals of this proceeding. This technical, service, and equipment flexibility will enable the emergence and implementation of local, State, and regional solutions to communications problems. We tentatively conclude that one component of the framework for efficient spectrum use should be reliance on regional planning committees for the development of plans to utilize available frequencies in ways that best meet the needs of public safety agencies in the respective regions.

20. With respect to the general use public safety spectrum, we believe that the communications framework established in this proceeding should call for the regional planning committees to design plans to assist the Commission in assigning licenses to meet regional needs. The regional planning committees also may assist in deciding certain technical issues relating to operations on public safety spectrum. Regarding the interoperability channels, however, we must attempt to balance the advantages of regional planning with the goal of promoting interoperability nationwide. We recognize that, in order to achieve nationwide interoperability, it will be necessary to have uniform technical standards. We may also choose to consider, as part of the framework for public safety communications, the appointment, on an ongoing basis, of spectrum band coordinators or managers to coordinate use of public safety spectrum beyond the initial planning and authorization stages.

21. Achieving the goal of efficient and effective spectrum use also will depend upon a determination of the proper mix of spectrum for interoperable and general service communications. For example, the primary goal of this proceeding in providing interoperability spectrum is to ensure that public safety personnel are able to communicate with one another, as necessary, on a day-to-day basis or in times of emergency. To accomplish this, we will have to dedicate a sufficient amount of spectrum to enable the use of a variety of different types of desired communications (*e.g.*, voice, data, video).[15] On the other hand, in providing the general service spectrum, we must make sufficient spectrum available to enable public safety agencies to employ whatever technologies and types of communications are necessary to meet their current and future internal communications requirements. It will be necessary to balance these needs as we attempt appropriately to apportion the available public safety spectrum.

22. Finally, efficient use of public safety spectrum, in our view, can be fostered through the operation of competitive forces in markets supplying public safety communications equipment and services. As we have noted,[16] we believe that the competitive provision of public safety equipment and services will spur technological innovation, leading to enhanced capabilities for efficient spectrum use.

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[15] See the discussion in para. 15, *supra*.

[16] *See* para. 7, *supra*.

c. Promoting Affordability of Communications Capabilities

23. We recognize that a continuing problem faced by public safety agencies is the lack of adequate funding to carry out their functions. Although this obviously is a problem that reaches beyond the jurisdiction and authority of this agency, we believe that it is an issue that cannot be ignored as we seek to join with the public safety community in developing a framework for the use of public safety spectrum.[17] Thus, we believe that one of the principal goals of this proceeding should be the establishment of policies and incentives that will promote the ability of public safety agencies to afford to take advantage of the latest communications capabilities.

24. Affordability depends in part on a competitive public safety communications market. As we noted earlier in this proceeding:[18]

> [A] contributing factor to the deficiencies in today's public safety communications is the lack of a vigorous competitive market for the purchase of communications equipment and services employed by public safety agencies. Subsequent to initial procurement, competition is virtually non-existent; therefore, maintenance, upgrades, and expansion are often limited to one provider. Consequently, not only must agencies pay higher prices, but also technological innovation and expanded product choice are inhibited.

25. Thus, we believe that a key approach to achieving the goal of affordable public safety communications equipment and services must be the development of a framework to ensure competitive incentives and to ensure that our public safety communications policies are neutral with respect to technologies and manufacturers. In establishing this goal, we reiterate the view we expressed in the *Public Safety Notice* that we must create a regulatory environment that fosters competition — we believe this goal can be achieved by developing a framework that enables a wide range of services and equipment to be provided using a variety of technologies, that ensures that initial equipment acquisitions do not limit choices regarding upgrades and expansion, and that encourages "manufacturers and service providers [to] accept

[17] We note that earlier this year Senator McCain introduced legislation that earmarked a portion of auction revenues for use by public safety agencies to purchase upgraded equipment. See Law Enforcement and Public Safety Telecommunications Empowerment Act. S. 255, 105th Cong., 1st Sess. (1997).

[18] *Public Safety Notice*, 11 FCC Rcd at 12494 (para. 95).

the competitive environment."[19] We request comment on this approach, and on specific mechanisms we could employ to ensure a competitive equipment market.

B. Interoperability Service Rules

26. We begin by considering service rules for the public safety spectrum in the 746-806 MHz band for interoperability. We will discuss the following issues that arise in the context of interoperability: location and amount of interoperability; types of communication; transmission technology; channel spacing; channel requirements; equipment standards; eligibility, use, and licensing; and trunking and technical standards. We then will discuss similar issues for the spectrum that is not reserved for interoperability.

27. Public safety agencies usually operate their own wireless communications systems, using frequencies, modes, and equipment that are often incompatible with the frequencies, modes, and equipment used by other agencies.[20] State and local agencies operate systems in six different radio services on frequencies scattered throughout the VHF and UHF[21] bands using various and often incompatible technologies.[22] Federal agencies, authorized by NTIA, similarly operate on non-contiguous frequencies throughout the VHF and UHF bands.[23] Consequently, local, regional, and national public safety agencies have little or no ability to communicate with each other by radio. We found that this present inability of public safety agencies to communicate with each other is one of the most critical deficiencies in today's public safety communications.[24]

28. In the *Public Safety Notice*, we observed that agencies must be able to exchange information pertaining to their daily operations, as well as during on-scene mutual aid or joint operations, and that their needs extend beyond basic voice transmission to include the transmission of video and high-speed data.[25] We also affirmed our belief that developing the capa-

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[19] *Id.* at 12494-95 (para. 97).

[20] *Id.* at 12468 (para. 21).

[21] Public Safety spectrum is designated in the VHF band between 30 and 50 MHz and between 150 and 170 MHz. In the UHF band public safety uses various frequencies between 450 and 512 MHz, and in bands at 800 MHz.

[22] *Public Safety Notice*, 11 FCC Rcd at 12469 (para. 22).

[23] *Id.*

[24] *Id.*

[25] *Id.* at 12468-69 (para. 21).

bility of public safety units to exchange information while using the radio systems of two or more different agencies is essential to our efforts to improve public safety communications.[26] We recognized that the ability of public safety agencies to operate on contiguous frequencies and use similar, or at least compatible, technologies, enhances their ability to communicate.[27]

29. As an initial matter, the *Public Safety Notice* proposed a formal definition of interoperability and related definitions as follows:[28]

- *Interoperability*: An essential communications link within public safety and public service wireless communications systems which permits units from two or more different agencies to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results.

- The communications link may be classified as either of the following two types:

  Infrastructure-independent: The communications link occurs between subscriber units over a direct RF [radio frequency] path. An example is portable-to-portable tactical communications at the scene of an incident.

  Infrastructure-dependent: The communications link requires use of some item(s) of equipment, other than a subscriber unit, for the establishment of the link and for complete subscriber operation. Some examples include a communications link for which a repeater station is required; a communications link which provides full system coverage for a visiting subscriber unit within a host trunked radio system; and a communications link which provides interconnectivity between two or more otherwise incompatible radio systems by cross-connecting the audio signals and/or appropriate signaling functions at some central point.

- The communications link, whether infrastructure dependent or independent, must satisfy one or both of the following requirements:

  Multi-jurisdictional: Wireless communications involving two or more similar agencies having different areas of responsibility. Some examples include a fire agency from one city communicating with a fire agency from another city and the Federal Bureau of Investigation communicating with a County Sheriff.

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[26] *Id.*

[27] *Id.*

[28] *Id.* at 12471-72 (para. 26). The text is quoted directly from the *Public Safety Notice*.

Multi-disciplinary: Wireless communications involving two or more different agencies. One example is a police agency communicating with an emergency medical services agency.[29]

- The communications link may involve any combination of subscriber units and fixed equipment (*e.g.*, repeaters, dispatch positions, data resources). The points of communication are dependent upon the specific needs of the situation and any operational procedures and policies which might exist between the involved agencies.

30. PSWAC adopts these definitions.[30] In addition, the PSWAC Interoperability Subcommittee (PSWAC ISC) proposes a definition for "mission critical" communications. The PSWAC ISC states that a mission critical communication is that which must be immediate, ubiquitous, reliable and, in most cases, secure.[31]

31. Most parties commenting on the *Public Safety Notice's* proposed definitions of interoperability, including the mission critical definition, endorse them, many without further comment.[32] MnDOT states the definitions "capture the essence of the interoperability issue."[33] Ohio-DAS also agrees with the definitions, and plans to incorporate them in Ohio.[34]

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[29] The *PSWAC Final Report* used examples such as a police agency communicating with a fire agency and a parks agency communicating with a medical services agency. *PSWAC Final Report* at 46.

[30] *Id.* at 46-47. *See also* Minutes of the Third Meeting of Interoperability Subcommittee of PSWAC, Dec. 14, 1995.

[31] *PSWAC Final Report* at 47. PSWAC explains the elements of "mission critical" as follows:

> An "immediate" communication must be capable of being transmitted and received instantaneously, without waiting for a system to be set up, a clear channel, or a dial tone. A "ubiquitous" communication is that which can be transmitted and received throughout the area that the mission requires. A "reliable" communication system must be designed, constructed, and maintained such that short-term disruptions are minimal. Finally, security, while not currently available in many situations, is increasingly a requirement for law enforcement and other sensitive communications. In this case, "security" is provided with voice privacy encryption.

Id.

[32] *See, e.g.*, APCO Comments at 7; Cal. Telecomm. Comments at 6; Mesa Comments at 5; Ericsson Comments at 8; FLEWUG Comments at 8; Fort Worth Comments at 3; Hennepin Comments at 3; ITSA Comments at 6; MnDOT Comments at 6; NYTC Comments at 5; Orange County Comments at 1; Owensboro Comments at 1; Powell Comments at 8; PW County Comments at 2; Transcrypt Comments at 2.

[33] MnDOT Comments at 6.

PW County and Texas-DPS support the definitions generally, and single out the "mission critical" definition for favorable comment.[35] NASTD, however, expresses reluctance to support the definitions without knowing how they will be applied.[36] Ericsson states that the PSWAC ISC report usefully distinguishes between infrastructure-independent solutions (links directly between radios using a direct radio path) and infrastructure-dependent solutions (requiring equipment other than the end users' radios).[37]

32. Based on this general support among the commenters for these definitions we tentatively conclude that the above definitions, including the definition of mission critical, should be adopted. We seek further comment on these definitions and on any proposals for different definitions.

33. The *Public Safety Notice* discussed the need for interoperability in public safety communications in three general contexts.[38] One context is mutual aid incidents. At disaster sites, public safety agencies from different jurisdictions and disciplines must communicate among themselves and with other entities, such as public utilities or transportation authorities.[39] The *PSWAC Final Report* notes that mutual aid interoperability must often be established during emergencies and under conditions that allow little opportunity for prior planning; that communications must often be established among numerous smaller groups, each with its own talk group; and that, once responders are on the scene, mutual aid interoperability usually involves the use of portable radios.[40] We note that mutual aid in emergencies is of such vital importance to public safety that the terms "mutual aid channels" and "interoperability channels" have sometimes been used as though they were

[34] Ohio-DAS Comments at 4 (unpaginated).

[35] PW County Comments at 2; Texas-DPS Comments at 3. Texas-DPS expresses the view that virtually all interoperability communications are mission critical.

[36] NASTD Comments at 5.

[37] Ericsson Comments at 12.

[38] *Public Safety Notice*, 11 FCC Rcd at 12472 (para. 28).

[39] *Id.* at 12472 (para. 29).

[40] *PSWAC Final Report* at 48.

synonymous.[41] It was particularly common for these terms to be used interchangeably prior to PSWAC identifying mutual aid as one category or context of interoperability.[42]

34. Another context is emergency preparedness and task force operations. Emergency preparedness, which involves planning for disaster relief, may include many public safety agencies from various jurisdictions.[43] Task forces also typically involve agencies from many disciplines and jurisdictions, and thus require interoperable communications systems. Task forces frequently deploy emergency operations centers, establish on-scene command posts, and dispatch units throughout a wide area.[44] The PSWAC ISC notes that, in contrast to mutual aid, such missions allow for prior planning, and that the covert nature of some task force missions can make long range transmission undesirable.[45]

35. A third context is day-to-day operations. Day-to-day operations are those requiring routine communications capabilities, as when personnel in adjoining jurisdictions, or within different disciplines in the same jurisdiction, need to exchange information. Typically, these requirements are local or regional, as when agencies with concurrent jurisdiction need to monitor each other's routine traffic.[46] Day-to-day interoperability also minimizes the need for interaction among dispatchers in exchanging information in the field.[47] Some commenters maintain that, of the three contexts, day-to-day interoperability touches the greatest number of lives.[48] In addition to the PSWAC ISC[49] and the PSWAC Steering Committee,[50] many other

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[41] *See, e.g.*, Development and Implementation of a Public Safety National Plan and Amendment of Part 90 to Establish Service Rules and Technical Standards for Use of the 821-824/866-869 MHz Bands by the Public Safety Services, GEN Docket No. 87-112, Report and Order, 3 FCC Rcd 905, 908-09 (paras. 26-34) (1987) (*NPSPAC Report and Order*); Technical Compatibility Protocol Standards for Equipment Operating in the 800 MHz Public Safety Bands, Memorandum Opinion and Order, GEN Docket No. 88-441, 4 FCC Rcd 3874, 3875 (para. 7) (1989) (*Public Safety Protocol Order*).

[42] We discuss the distinction between the terms "mutual aid channels" and "interoperability channels" in greater detail at para. 37, *infra*.

[43] *Public Safety Notice*, 11 FCC Rcd at 12472 (para. 30).

[44] *Id.*

[45] *PSWAC Final Report* at 48.

[46] *Public Safety Notice*, 11 FCC Rcd at 12472 (para. 28); *PSWAC Final Report* at 47.

[47] *PSWAC Final Report* at 47-48.

[48] APCO Comments at 7; Powell Comments at 8.

[49] *PSWAC Final Report* at 47-48.

commenters discuss interoperability needs in terms of these mutual aid, task force, and day-to-day interoperability contexts outlined in the *Public Safety Notice*.[51]

36. Based on the comments we received in response to the *Public Safety Notice*, which stress the critical need for interoperability, we believe that it is appropriate to propose policies and rules that will enable interoperability to be successfully implemented among all local and regional jurisdictions, as well as by Federal entities, throughout the Nation. In that context, we seek input from public safety users, manufacturers, and others regarding the following issues to assist us in developing appropriate policies and rules for achieving interoperability among public safety entities operating in the 746-806 MHz band.

1. Interoperability Spectrum

a. Location and Amount of Interoperability Spectrum

37. The *Public Safety Notice* discussed several approaches for attaining increased interoperability among public safety agencies, including use of shared, trunked systems; relocating all public safety communications to a new band; designating universal mutual aid channels; installing cross-band repeaters or gateways;[52] and using commercial services.[53] In the *Public Safety Notice*, we also discussed the approach of designating certain channels for interoperability, which we referred to as "mutual aid channels." We used the term "mutual aid channels" for this approach, because that was the name given to the channels that were set aside for interoperability in the 1987 National Public Safety Planning Advisory Committee (NPSPAC) National Plan.[54] The *PSWAC Final Report* uses the term "interoperability channels" for the same concept,[55] and commenters appear to use the two terms interchangeably. To avoid confusion, we too will use the term "interoperability channels" for this approach because, in the years since the adoption of the NPSPAC National Plan, the

[50] *Id.* at 19.

[51] Commenters address these three contexts in considerable detail, but generally are in agreement with these categories. *See, e.g.*, APCO Comments at 7-8; Ericsson Comments at 9; Powell Comments at 8.

[52] *Public Safety Notice*, 11 FCC Rcd at 12475 (para. 37). A "gateway" is a conceptual or logical network station that interconnects two otherwise incompatible networks, network nodes, subnetworks, or devices. It performs protocol conversion operations across a wide range of communications functions or layers.

[53] *Id.* at 12492 (paras. 89-90).

[54] *See, e.g., NPSPAC Report and Order*, 3 FCC Rcd at 908-09 (paras. 26-34); *Public Safety Protocol Order*, 4 FCC Rcd at 3875 (para. 7).

[55] *See, e.g., PSWAC Final Report* at 3, 52.

term "mutual aid" has come to stand for a specific context or category within the broader concept of interoperability.[56]

38. While we recognized that there were advantages and disadvantages to each of these approaches, we tentatively concluded that establishing new interoperability channels would be an effective first step in providing inter-agency communications, and we sought comment on that tentative conclusion.[57] The *Public Safety Notice* suggested that designating new interoperability channels had the significant advantage of allowing agencies to continue operating their existing communications equipment while they acquire equipment, such as multi-band or separate dedicated radios, that will permit access to the new interoperability channels.[58] As an example, we proposed that a number of frequencies be selected in one of the band segments between 30 MHz and 800 MHz and designated for public safety communications, and that new public safety radio equipment be required, through our type acceptance process,[59] to operate on these designated frequencies.[60] We also hoped that inexpensive software programming could be used to modify much of the mobile and portable equipment currently employed by public safety agencies, thus retro-fitting them for operation on the mutual aid channels.[61] We stated our belief that this approach would require a common interoperability standard for all equipment operating on the interoperability channels.[62]

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[56] Thus, the term "mutual aid channels" in this Notice may refer either to: (1) that aspect of interoperability which has to do with communication among those responding to an emergency, as opposed to task force or day-to-day interoperability; or (2) the five channels that were designated for interoperability under the NPSPAC National Plan and which were named "mutual aid channels." In all other cases, we adopt PSWAC's phrase "interoperability channels."

[57] *Public Safety Notice*, 11 FCC Rcd at 12475 (para. 39).

[58] *Id.* at 12474-75 (para. 36).

[59] Type acceptance is a process by which the Commission authorizes equipment for conformance with the technical standards found in the rules governing a particular service. *See* Sections 2.901 and 2.905 of the Commission's Rules, 47 C.F.R. §§ 2.901, 2.905.

[60] *Public Safety Notice*, 11 FCC Rcd at 12474-75 (para. 36).

[61] *Id.*

[62] *Id.*

39. The PSWAC Steering Committee recommends the immediate identification of 2.5 megahertz of spectrum for interoperability from new or existing allocations.[63] The PSWAC ISC also supports the creation of a single common public safety interoperability service in one central band.[64] The proposal in the *Public Safety Notice* to designate interoperability channels has received widespread support, with many commenters expressly supporting the PSWAC proposal that 2.5 megahertz of spectrum be set aside for interoperability.[65] For example, Richardson supports the development of common interoperability channels, and cites its favorable experience with the use of the NPSPAC mutual aid channels in support of this option.[66] FLEWUG supports the PSWAC concept of establishing channels dedicated to interoperability, and Powell states that the Commission has correctly identified the advantages of such a system and the need for a common standard for its implementation.[67]

40. Some commenters who believe designating interoperability channels is a viable option, nonetheless perceive some potential problems, asserting, for example, that effective interoperability can only be achieved on a shared system;[68] that obtaining new equipment

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[63] *PSWAC Final Report* at 3.

[64] *Id.* at 329-30.

[65] The following commenters see merit in designating interoperability channels, without specifically mentioning the PSWAC proposal relating to the set aside of 2.5 megahertz: API Comments at 17; DOT Comments at 9-10; AAA/AICC Comments at 3; Hennepin Comments at 5: Nor. Cal. APCO Comments at 5; Nippon Reply Comments at 7; Owensboro Comments at 1; PG County Comments at 4; PW County Comments at 2; Richardson Comments at 2 (unpaginated); Transcrypt Comments at 2; Virginia State Police Comments at 1; Wisconsin State Patrol Comments at 2 (unpaginated).

The following commenters expressly support the PSWAC proposal: APCO Comments at 10-11; Cal Telecom. Div. Comments at 8; CPRA Comments at 3 (unpaginated); Ericsson Comments at 14; FCCA Reply Comments at 2; FLEWUG Comments at 11; LA County Comments at 2; Motorola Comments at iii; Powell Comments at 11; Baldwin Comments at 1; Garden City Comments at 1; NYC DoITT Comments at 1; La Grande Comments at 1; Illinois Tollway Comments at 1; N. Bellmore Comments at 1; Margate Reply Comments at 1; New Hyde Park Reply Comments at 1; SNGVPD Comments at 1; Nassau County Comments at 1; VSFD Reply Comments at 1; NYFD Comments at 1; Tri-Com Comments at 1; Orlando Comments at 1; FDMS Comments at 1; NYSTA Comments at 1; Yonkers Comments at 1; Elk Grove Comments at 1; Clackamas Comments at 1; Lakeview Reply Comments at 1; Lucas Reply Comments at 1; Marin Reply Comments at 1; Massapequa Reply Comments at 1; NYC Dept. of Corrections Reply Comments at 1; Plainview Reply Comments at 1; Sherman Reply Comments at 1; Westbury Reply Comments at 1; Uniondale Reply Comments at 1; Westchester Reply Comments at 1.

[66] Richardson Comments at 2 (unpaginated).

[67] FLEWUG Comments at 11; Powell Comments at 11-12.

[68] AASHTO Comments at 8.

involves additional expense;[69] and that difficulties exist in reconciling the differing needs, resources, and demographic and geographic characteristics of public safety users.[70] Commenters suggest, however, that some of the perceived deficiencies with regard to this option can be overcome by allocating additional spectrum for this specific purpose.[71] APCO and Powell are pessimistic about using "inexpensive software programming" to modify current mobile and portable equipment for operation on the interoperability channels.[72]

41. Other commenters raise questions about the application of the interoperability channels option. Kansas-EMC expresses concern that, during an actual emergency, if too many agencies have access to the same channel it could quickly be overloaded, thus compromising its utility.[73] Texas-DPS calls the interoperability channels approach unsatisfactory and cost-prohibitive, and maintains that it would require stockpiling radios for use in emergencies.[74]

42. The *Public Safety Notice* also raised the issue of the location of the interoperability channels.[75] One approach to providing spectrum for interoperability, favored by Ohio-DAS, is to identify specific channels in each of the public safety bands for interoperability.[76] The PSWAC ISC Report, however, suggests that the establishment of a "Public Safety Interoperability Service" dedicated exclusively to interoperability applications within a single band would be both possible and practical.[77] It notes that this approach would

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[69] *See* IMSA/IAFC Comments at 12; Fort Worth Comments at 4; NASTD Comments at 6 (mutual aid channels are viable and achievable but could significantly increase costs).

[70] IMSA/IAFC Comments at 12. *See also* AASHTO Reply Comments at 7.

[71] IMSA/IAFC Comments at 12 (designating interoperability channels is "a viable solution provided that spectrum is available and it would not require users to vacate their frequencies"). *See also* ADI Comments at 3.

[72] APCO Comments at 9; Powell Comments at 10. *See Public Safety Notice,* 11 FCC Rcd at 12475 (para. 36).

[73] Kansas-EMC Comments at 3.

[74] Texas-DPS Comments at 4. Texas-DPS adds that, because disasters are unpredictable, no one could know where such a stockpile should be kept.

[75] *See Public Safety Notice,* 11 FCC Rcd at 12476 (para. 40).

[76] Ohio-DAS Comments at 5 (unpaginated).

[77] *PSWAC Final Report* at 329, 597.

provide "an absolute common technical solution to the common operating requirements of a mutual aid incident,"[78] and would not require users' "home systems" to be compatible.[79]

43. In order to provide for an appreciable amount of interoperability spectrum in the various existing public safety bands, it would be necessary to "free up" sufficient channels in those bands that would be available on a nationwide basis. Given the extensive use of such channels, this would be a difficult endeavor.[80] Moreover, clearing sufficient spectrum in these bands to provide for high data rate and video communications would be next to impossible. The 24 megahertz within the 746-806 MHz band provides, however, a large amount of relatively unencumbered spectrum that could be dedicated for nationwide interoperability.

44. We tentatively conclude that the establishment of nationwide interoperability channels will be in the public interest, and will significantly advance our goal of facilitating communication among public safety agencies. Some commenters have indicated that the 800 MHz band is not as desirable as the 150 MHz and 450 MHz bands from a propagation standpoint.[81] Others would prefer that the interoperability channels be located in these lower bands because of their proximity to current public safety operations.[82] Given the difficulty, however, of clearing sufficient spectrum in the lower bands, and in light of the proposal to make available 24 megahertz of spectrum in the 746-806 MHz band, we propose to dedicate a significant amount of spectrum in the 746-806 MHz band solely for interoperability communications.[83] The precise amount of spectrum we devote to interoperability will reflect

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[78] *Id.*

[79] *Id.* The PSWAC ISC further observes that the creation of an "interoperability service" would be a "fresh and new service which could be implemented without regard to any backward compatibility requirements." *Id.* at 331, 599.

[80] Within existing bands, we have asked the frequency coordinator to examine the possibility of reserving some channels for mutual aid. Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them and Examination of Exclusivity and Frequency Assignments Policies of the Private Land Mobile Services, PR Docket No. 92-235, Second Report and Order, FCC 97-61, at para. 23 (released Mar. 12, 1997) (*Refarming Second Report and Order*). This would have some benefit, but would not satisfy a nationwide need for interoperability.

[81] AASHTO Comments at 13.

[82] FLEWUG Comments at 12; Quantum Comments at 4; Powell Comments at 10-11.

[83] Powell notes that the PSWAC process concluded before the release of the *DTV Proceeding*, which indicated that spectrum used for UHF television Channels 60-69 might become available for public safety. Powell Comments at 4. Powell further notes that the Channel 60-69 spectrum is adjacent to the 800 MHz bands already used by some public safety agencies, and suggests that this proximity could facilitate the development of equipment that would be capable of interoperating with some existing public safety systems. *Id.*

the comments and suggestions we receive in regard to the spacing and number of channels required.

45. We seek comment on this proposal. If commenters believe that we should attempt to allocate spectrum for interoperability from other public safety bands or elsewhere, we request that their comments indicate which bands should be used to provide such spectrum and how channels within those bands might be cleared throughout the Nation in order to realize our goal of nationwide interoperable communications. If commenters believe that interoperability channels should be designated in more than one band, they should indicate how nationwide interoperability can be achieved using channels in different bands.

b. Types of Communication

46. It is difficult to categorize the types of communication that may be transmitted over interoperability channels, and the distinctions among the various types may not always be clear. We tentatively conclude, however, that it would be useful to categorize public safety communications into four separate types: voice, data, image/high speed data (image/HSD), and video. We seek comment on this tentative conclusion. All four of these categories could be employed by public safety entities to communicate with one another in any of the situations requiring interoperability that we have described.[84]

47. For example, voice communications ordinarily involve communications between the field personnel of a particular public safety agency and that agency's dispatch center. In a situation requiring interoperability, however, voice communication could involve:

- Communications between field personnel of one agency and the dispatcher of another agency.[85]
- Communications between the field personnel of different agencies and an emergency operations center (EOC).[86]

[84] *See* paras. 33-35, *supra.*

[85] We received comments from agencies in the process of implementing "auto-aid," a concept in dispatching in which the closest available unit to an incident, regardless of jurisdiction, is sent to the scene of an incident. *PSWAC Final Report* at 65. This concept of a preplanned response, not called for by an on-scene incident commander, is beginning to take hold in the law enforcement community. According to one commenter, auto-aid is of particular advantage to fire departments and emergency medical services (EMS), which are more reliant on mutual aid than are police operations. *See* Mesa Comments at 12.

[86] We are using the term "EOC" generically, recognizing that various agencies have different terminology for the center (physical place or personnel) responsible for coordinating communications.

- Communications between dispatchers of different agencies, or between dispatchers and an EOC.

- Communications among field personnel of different agencies.

In this latter scenario, voice communications may be either *direct* (mobile/portable-to-mobile/portable), using only mobile transmit frequencies; or through a repeater, which requires the use of both base and mobile transmit frequencies.[87]

48. Data communications, as referred to in this proceeding, involve communications to and from field personnel using mobile/portable data terminals. The PSWAC Operational Requirements Subcommittee (ORSC) anticipates enormous growth in the demand for data applications.[88] Situations involving the need for data communications include:

- The transmission of written instructions from the dispatcher of one agency to the field personnel of another.

- The transmission of written instructions between an EOC and the field personnel of different agencies.

- The transmission and receipt of various forms of informational data between field personnel of different agencies and a dispatcher or EOC (*e.g.*, license plate and registration information, or fingerprint identification).

The PSWAC ISC emphasizes certain advantages of using data networks, such as field agents on travel being able to access data from their home agency as well as from national data sources; field personnel responding to a large-scale mutual aid event being able to be briefed and receive field instructions before arrival on the scene; and the possibility of "Internet-like" communications between individual users and groups of users.[89]

49. Image/HSD communications, as referred to in this proceeding, involve the transmission of non-moving, visual media and the transmission of large amounts of information at high data rates. This category includes transmissions of:

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[87] *PSWAC Final Report* at 30-31 (noting that, especially during emergency response situations, voice is the primary method of communication).

[88] *See generally id.* at 31.

[89] *Id.* at 417.

- Snapshots of an emergency scene from field personnel to a dispatcher.[90]
- Blueprints of burning buildings transmitted to fire-fighting personnel.
- Written documents (*i.e.*, facsimiles) to and from field personnel.[91]
- On-line manuals, statutes, and enforcement regulations.[92]
- Fingerprints, mugshots, and, potentially, retinal prints.
- Information from large data bases,[93] such as NCIC 2000.

Another potential use of image/HSD communications between agencies might involve the transmission of a still picture taken from a videotape of a bank robbery from one police department to neighboring police departments.[94]

50. Video communications may be described in two formats: *slow motion* video and *full motion* video. Full motion video employs the transmission of 24 or more frames/sec to reproduce a moving scene accurately; slow motion video employs the transmission of fewer frames/sec (as few as 1 frame/sec) to reproduce the moving scene with somewhat less accuracy. Full motion video might be used by public safety entities when transmitting video of a disaster, wildfire, or emergency taken from a helicopter, or for video surveillance of high crime areas or accident sites.[95] Slow motion video could be used to transmit images of patient

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[90] Several jurisdictions want to implement this capability in the future. *See* Ohio-DAS Comments at 7-8 (unpaginated); NYCT Comments at 8; Hennepin Comments at 6; PG County Comments at 6.

[91] Access to written documents is considered a desirable application by many commenters. *See* NASTD Comments at 8-10; APCO Comments at 12; Ohio-DAS Comments at 7-8 (unpaginated); NYCT Comments at 8; Hennepin Comments at 6; AMSC Comments at 4.

[92] MnDOT Comments at 9.

[93] NASTD Comments at 8-10.

[94] Many of the Working Groups of the PSWAC Operations Subcommittee noted mission-specific applications involving the transmission of mugshots and other still photographs. *PSWAC Final Report* at 90, 96, 99, 101, 103-04, 106, 112, 130, 133-34.

[95] One commenter anticipates many uses for full-motion video involving vehicles. These include: closed circuit, full scan video surveillance of vehicles in motion; closed circuit video scanning of vehicle tags while a vehicle is in motion for checking records before the vehicle is stopped; real time full scan video surveillance of vehicle stops in high crime areas; ability to transmit real time crime scene video for future analysis and use in