

FCC MAIL SECTION  
Before the  
Federal Communications Commission  
Washington, D.C. 20554

SEP 17 3 17 PM '93

ET Docket No. 93-235  
DISPATCHED BY

Amendment of Parts 15 and 90  
of the Commission's Rules to  
Provide Additional Frequencies  
for Cordless Telephones RM-8094

**NOTICE OF PROPOSED RULE MAKING**

Adopted: August 20, 1993; Released: September 17, 1993

Comment Date: November 8, 1993

Reply Comment Date: November 23, 1993

By the Commission:

**INTRODUCTION**

1. By this action, the Commission is proposing to provide additional frequencies for operation of cordless telephones. This action should relieve channel congestion and reduce interference to cordless telephones operating in the 46 MHz and 49 MHz frequency bands under Part 15 of the rules. This proposal responds to a petition for rule making filed by the Telecommunications Industry Association (TIA).

**BACKGROUND**

2. A cordless telephone is a two-way low power radio system that is used for standard, voice-grade communications on the public switched telephone network (PSTN). A cordless telephone consists of two parts: a "base" unit that connects to the PSTN, and the handset, or "remote", unit. The base unit and the handset are connected by a radio link that eliminates the handset cord of the standard telephone, thus allowing the user to move a considerable distance from the base unit while carrying on a telephone conversation. The radio frequency components of cordless telephones operate under the provisions of Part 15 of the Commission's rules.

3. In 1983, the Commission made available ten pairs of frequencies at 46 and 49 MHz for cordless telephones.<sup>1</sup> Since that time, sales and use of cordless telephones have grown steadily. According to industry sources, approxi-

mately 18 million cordless telephones were sold in 1992, and it is estimated that more than 60 million such units are currently in use. As the market for these devices has grown, the cordless telephone industry has suggested, and the Commission has considered, various alternatives for providing relief for increasing channel crowding and interference. In 1987, the Commission declined to allocate spectrum at 800/900 MHz for such devices, due primarily to other higher-priority demands for frequency allocations in this region of the spectrum.<sup>2</sup> In 1990, TIA filed a petition for rule making seeking 25 frequency pairs for cordless telephones in the 46 MHz and 49 MHz bands. The Commission invited comment on this petition in its initial inquiry on the establishment of personal communications services (PCS).<sup>3</sup> Subsequently, the Commission decided it would be best to investigate additional 46/49 MHz spectrum for consumer cordless telephones outside of the PCS proceeding.<sup>4</sup>

4. On August 20, 1992, the Personal Communications Section of the Telecommunications Industry Association (TIA) filed a further petition (RM-8094) seeking additional frequencies for cordless telephones, referencing its earlier petition. TIA states that the continued popularity of cordless telephones and the resulting increase in market penetration threatens to cause channel-crowding problems, especially in high-density locations such as urban areas and high-rise condominiums. Further, TIA notes that five of the existing ten channels are available for other Part 15 low power transmitters.<sup>5</sup> The Part 15 devices that give rise to the greatest concern are baby monitors, which, because they tend to be active for long periods of time, render these five channels unusable for nearby cordless telephones.

5. TIA proposes that the Commission make available an additional 15 channel pairs using 30 frequencies near 44 MHz and 49 MHz for cordless telephones.<sup>6</sup> The proposed frequencies are currently allocated to the Private Land Mobile Radio Service (PLMRS). TIA asserts that use of the proposed frequencies will facilitate design of cordless telephones that use both the existing and the new frequencies. TIA states that, based on its preliminary analysis of the license data on these frequencies and some informal monitoring in selected areas, it appears that PLMRS usage is light. Moreover, according to TIA, there do not appear to be any population centers in which a sizable fraction of the 30 frequencies is assigned. TIA believes that the Part 15 rules for these new frequencies should be identical to the current rules governing 46/49 MHz channels, with the following exceptions: (1) to reduce the likelihood of interference between cordless telephones and the PLMRS, cordless telephones using the new frequencies should include a mechanism for automatically monitoring, and preventing transmitter activation on, frequencies on which

<sup>1</sup> See Report and Order, GEN Docket No. 83-325, 49 FR 1512 (1984). See also 47 CFR § 15.233. The 46 MHz and 49 MHz frequencies used by cordless telephones under Part 15 are allocated to the Federal Government for fixed and mobile services.

<sup>2</sup> See Order, 2 FCC Rcd 7278 (1987).

<sup>3</sup> See Notice of Inquiry on Personal Communications Services (PCS), GEN Docket No. 90-314, 5 FCC Rcd 3995 (1990).

<sup>4</sup> See Notice of Proposed Rule Making and Tentative Decision, GEN Docket No. 90-314 & ET Docket No. 92-100, 7 FCC Rcd

5676 (1992), n.3.

<sup>5</sup> See 47 CFR Section 15.235. All ten channels may be used by extremely low power transmitters pursuant to 47 CFR Section 15.209; however, such transmitters are unlikely to cause interference to cordless telephones.

<sup>6</sup> Specifically, TIA proposed use of the following frequencies in MHz: 43.72, 43.74, 43.82, 43.84, 43.92, 43.96, 44.12, 44.16, 44.18, 44.20, 44.32, 44.36, 44.40, 44.46, 44.48, 48.76, 48.84, 48.86, 48.92, 49.02, 49.08, 49.10, 49.16, 49.20, 49.24, 49.28, 49.36, 49.40, 49.46, and 49.50.

co-channel PLMRS signals are present; (2) there is no need to designate specific frequency pairs for each channel; and (3) "offset frequency" operation should not be permitted.<sup>7</sup>

6. The TIA petition was put out for comment on October 1, 1992 and seven parties submitted comments in response to the TIA petition requesting additional frequencies for cordless telephones.<sup>8</sup> All the comments support the petition and urge the Commission to move forward as soon as possible. However, some of the comments differed on the particular implementation of the new rules.

## DISCUSSION

### Proposed Frequencies

7. We recognize that the existing ten channels identified for cordless telephones have become inadequate. We agree with TIA that this has occurred as a result of the enormous popularity of these devices. Further, we are aware that five of the existing ten channels are virtually unusable in some areas due to shared use with baby monitors.

8. We observe that alternative frequency bands exist that can be used by cordless telephones. For example, several models of cordless telephones have been introduced under Part 15 rules at 915 MHz and one at 2450 MHz. However, units that use these alternative frequencies, due to the increased design costs associated with higher frequencies, are priced at the upper end of the market. We also note that wireless telephones with improved performance and increased functionality are expected to be included in future personal communications services. While we believe that many consumers may eventually be attracted to alternative cordless telephone technologies and future personal communications services, it appears there will continue to be a demand for the current low-priced 46/49 MHz cordless telephone technology for the foreseeable future.

9. The 30 new frequencies (15 duplex channels) proposed by TIA for use by cordless telephones are allocated to the PLMRS for use by the Land Transportation, Petroleum, and Forest Products Radio Services. It appears that the risk of interference to the PLMRS from cordless telephones would be negligible. According to our license data base, there are fewer than 30 assignments, covering less than 800 mobiles, on each of the proposed 44 MHz frequencies and fewer than 200 assignments, covering less than 2000 mobiles, on each of the proposed 49 MHz frequencies. We note that cordless telephones use extremely low power and are likely to cause interference only when located in close proximity to a PLMRS receiver.<sup>9</sup> It appears that most PLMRS operations on these frequencies are transient or located away from residential areas, where cordless telephones are typically located. The risk of interference can be mitigated by requiring cordless telephones using these frequencies to include a channel selection mechanism to prevent establishment of a link on an occupied frequency, as proposed by TIA and discussed below. In any

event, under the Part 15 rules, operation of a cordless telephone must cease if it is found to cause harmful interference.

10. In light of the above, we tentatively find it in the public interest to make additional frequencies available for cordless telephones in the 44 MHz and 49 MHz region of the spectrum. Specifically, we are proposing to make the 30 frequencies suggested by TIA available for cordless telephone use under Part 15. This action will relieve channel crowding and interference to cordless telephones. Because of the close proximity to the current 46/49 MHz frequencies, manufacturers could employ current designs and will only need to add the automatic channel selection feature. We, therefore, expect there would be little or no increase in the cost of the equipment. We will apply the same technical and administrative requirements that apply to the current 46/49 MHz cordless telephones. We invite comments on the proposed frequencies and whether alternative frequencies would be more suitable.

11. We recognize that the proposed 44 MHz frequencies are located within the intermediate frequencies (IF) pass-band of television receivers.<sup>10</sup> In addition, in the frequency region of the TV IF where the proposed frequencies are to be located, television receivers are somewhat more susceptible to interference than the spectrum location of the current 46 MHz cordless telephone operations. Comments are invited as to whether and to what extent the proposed 44 MHz frequencies pose a significantly greater interference risk to the reception of TV broadcasting than the 46 MHz frequencies already used by cordless telephones.

### Automatic Channel Selection Requirement

12. As noted above, TIA proposed that cordless telephones be designed to include a mechanism for automatically monitoring, and preventing activation on, frequencies on which co-channel signals are present. Several parties expressed concern regarding the cost of designing cordless telephones that satisfy this requirement. For example, Thomson states that the cost and technical effort involved in designing and implementing an automatic monitoring system would be prohibitive. To prevent activation on PLMRS frequencies when they are in use, Thomson proposes that the cordless telephone would monitor the availability of a frequency during the initial one-second transmission used for call set-up. If a signal were detected, the phone would change transmission frequency. Uniden argues that a cordless telephone system would conceivably be required to incorporate four separate receivers: two each in the base and remote units.

13. In its reply comments, TIA states that based on the comments, the potential may exist for misinterpretation of the proposed wording. TIA states that it did not intend for the requirement to necessitate additional receivers for monitoring purposes. TIA notes that cordless telephones use a short signalling burst during call set-up. TIA suggests that cordless telephone systems could monitor reception of the signalling burst for interference and switch to a different channel if interference is detected. According to TIA, such

<sup>7</sup> See 47 CFR Section 15.233.

<sup>8</sup> Tandy Corporation, US West, Inc., Uniden America Corporation, Thomson Consumer Electronics, Inc. (RCA), Telecommunications Industry, Inc., Dynascan Corporation, and GTE Service Corporation.

<sup>9</sup> The emission level under the Commission's rules for cordless

telephones equates to about 25 microwatts (See 47 CFR Section 15.233). By comparison, the primary services operate on the same frequencies with a 300 watt maximum power.

<sup>10</sup> TV receivers employ an IF amplifier having a pass-band of 41 MHz to 47 MHz.

an approach should be considered acceptable. To avoid confusion, TIA proposes the following wording for our Rules: cordless telephones using these frequencies must incorporate an automatic channel selection mechanism which will prevent establishment of a link on an occupied frequency.

14. We believe that cordless telephones using the proposed frequencies must employ a mechanism to avoid causing interference to the PLMRS. We agree with TIA that manufacturers should be afforded flexibility in the type of interference-avoidance mechanisms that are used. Accordingly, we are proposing the revised requirement suggested by TIA. At the same time, we invite comment as to whether there is a need for more specific requirements to protect against interference to the PLMRS.<sup>11</sup> We solicit information as to the cost of implementing this requirement. We also invite comment as to whether we should require any specific information to be filed with applications for equipment authorization to demonstrate compliance with this requirement.

#### Frequency Pairing

15. The current Part 15 rules assign specific pairs of 46 MHz and 49 MHz frequencies for base units and handsets for each of the ten cordless telephone channels. This was done, in part, to help reduce the likelihood of interference between cordless telephones. TIA suggests that there should be no pairing of the new frequencies. TIA suggests that pairing would constrain the ability of cordless telephones to select frequencies that avoid interference to the PLMRS.

16. We agree that pairing of frequencies is inappropriate in this case. We are, however, proposing to designate the lower frequencies at 44 MHz for base units in order to minimize potential interference to TV broadcasting.<sup>12</sup> This is consistent with the designation of the 46 MHz frequencies for base units under the current rules.

#### Channel Offsets and Bandwidths

17. The original rules for cordless telephones required each channel to be centered in a 20 kHz bandwidth. The Commission subsequently proposed and ultimately amended the rules in GEN Docket 89-269 to permit manufacturers to place two (or more) signals inside the 20 kHz bandwidth by narrowing signals to 10 kHz and offsetting them from the center of the channel. Thus, a manufacturer could design equipment that divided the existing ten channels into twenty channels. This became known as the "channel offset" rule.<sup>13</sup> TIA and Uniden America Corp. (Uniden) petitioned for reconsideration of the offset channel rule.<sup>14</sup> These petitions remain pending. In its petition for additional frequencies, TIA references its petition for

reconsideration of the offset channel rule and states that offset channels should not be used for the proposed new frequencies.

18. TIA and Uniden argue that offset channel operation would require narrowing of the FM signals used by current cordless telephones. They contend that this will degrade the FM capture ratio, which in turn will reduce the ability of cordless telephone receivers to reject interference. TIA submitted a detailed technical analysis showing that the increased vulnerability of cordless telephone receivers to interference would negate any increase in spectrum efficiency gained by dividing the current 20 kHz channels. Several parties filed comments in support of the petitions for reconsideration.<sup>15</sup>

19. We believe that the matter of channel offsets should be considered concurrently for both the existing and proposed cordless telephone channels so that our rules will be consistent. Accordingly, we will hold TIA's and Uniden's petitions for reconsideration in GEN Docket 89-269 in abeyance pending our determination on providing additional cordless telephone channels in this proceeding. The petitions for reconsideration will be dealt with in connection with that decision, or subsequent there to.

20. We note that alternative narrowband technologies exist that may not suffer the same performance degradation as 10 kHz FM signals. However, we are unaware of any narrowband technologies that can satisfy consumer demand for low-cost equipment. Accordingly, we invite comment as to other ways we can provide for future low-cost spectrum-efficient cordless telephones that may seek to use the existing and proposed frequencies. In particular, we invite comment as to whether 20 kHz is the appropriate bandwidth for the new frequencies.

#### Other Matters

21. The text of the proposed new rules is shown in the Appendix. We propose to make these rules effective within 30 days after publication of the final Report and Order of this proceeding in the Federal Register. We do not plan to permit modification (e.g., change of crystals) of existing cordless telephones to operate on the new frequencies due to the need to include automatic channel selection capability to avoid interference to the PLMRS.

<sup>11</sup> We recognize that TIA's revised automatic channel selection mechanism might not be able to determine whether interference is being caused to a PLMRS station. In this aspect, TIA's original proposal to require monitoring of the channel before transmitting might be preferable, although more costly. If such a monitoring requirement were adopted, it might also be necessary to specify a minimum receiver sensitivity level.

<sup>12</sup> Interference to TV receiver IFs from cordless telephones is minimized by limiting use of frequencies in this spectrum to base units for two reasons: (1) the user can locate the cordless telephone base unit away from his or her television receiver; and (2) the base unit is likely to have the greatest separation from a neighbor's TV receiver.

<sup>13</sup> See *Notice of Proposed Rule Making*, GEN Docket No. 89-626, 5 FCC Rcd 309 (1990), and *Report and Order*, GEN Docket No. 89-626, 6 FCC Rcd 4434 (1991).

<sup>14</sup> Uniden's petition also included a Motion to Stay the rule's effectiveness. Uniden's Motion to Stay, because it was not filed as a separate pleading, failed to comply with the requirements of 47 CFR Section 1.44(e). Pursuant to that rule, it was not considered.

<sup>15</sup> Comments in support of the two petitions were filed by American Telephone and Telegraph, GTE Service Corporation (GTE), and the Cobra Electronics Group of Dynascan Corporation (Dynascan). A reply was filed by the United States Telephone Association (USTA).

## PROCEDURAL MATTERS

22. *Initial Regulatory Flexibility Analysis.* Pursuant to the Regulatory Flexibility Act of 1980, 5 U.S.C. 603, the Commission's initial analysis is as follows:

I. **Reason for Action:** The Commission is establishing additional frequencies for cordless telephones. The existing rule provisions that these devices have been operating under are considered by manufacturers to be inadequate to meet the growing consumer demand for these devices.

II. **Objective:** The objectives of the proposed rules are to improve the ability of cordless telephones to meet the needs of consumers and to promote more effective use of the radio spectrum.

III. **Legal Basis:** Action is proposed in accordance with Sections 4(i), 302, 303(e), 303(f), and 303(r) of the Communications Act of 1934, as amended.

IV. **Description, potential impact and number of small entities affected:** The proposed changes in the regulations would affect a number of entities both large and small. The estimate of the number of such parties affected is 50 or less. There is no additional required costs mandated to existing manufacturers. The manufacturers have the option as whether or not to manufacture devices operating on the new frequencies.

V. **Recording, record keeping and other compliance requirements:** To receive equipment authorization to operate on the new frequencies, applicants would have to demonstrate that their cordless telephone complies with the automatic channel selection mechanism requirements, in addition to demonstrating compliance with the existing equipment authorization requirements.

VI. **Federal rules which overlap, duplicate or conflict with this rule:** None.

VII. **Any significant alternative minimizing impact on small entities and consistent with stated objectives:** None.

23. *Comment Dates.* Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 CFR Sections 1.415 and 1.419, interested parties may file comments on or before **November 8, 1993**, and reply comments on or before **November 23, 1993**. To file formally in this proceeding, you must file an original and four copies of all comments, reply comments, and supporting comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, DC 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room of the Federal Communications Commission, 1919 M Street, N.W., Washington, DC 20554.

24. *Ex Parte Rules - Non-Restricted Proceeding.* This is a non-restricted notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission rules. See generally 47 CFR Sections 1.1202, 1.1203 and 1.1206(a).

## ORDERING CLAUSES

25. ACCORDINGLY, IT IS ORDERED THAT, pursuant to the authority contained in Sections 4(i), 302, 303(e), 303(f), and 303(r) of the Communications Act of 1934, as amended, this Notice of Proposed Rule making IS IS-SUED.

26. IT IS FURTHER ORDERED that the Secretary shall cause a copy of this Notice to be sent to the Chief Counsel for Advocacy of the Small Business Administration.

27. For further information on this proceeding contact George Harenberg, Technical Standards Branch, Office of Engineering and Technology, 202-653-7314.

FEDERAL COMMUNICATIONS COMMISSION

*William F. Caton*  
William F. Caton  
Acting Secretary

## APPENDIX

Title 47 of the Code of Federal Regulations, Parts 15 and 90, are proposed to be amended as follows:

## PART 15 -- RADIO FREQUENCY DEVICES

1. The authority citation for Part 15 continues to read as follows:

**AUTHORITY:** Sections 4, 302, 303, 304, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, 304, and 307.

2. Section 15.233 is amended by revising the section heading and paragraph (b) to read as follows:

**Section 15.233 Operation within the bands 43.71 - 44.49 MHz, 46.60 - 46.98 MHz, 48.75 - 49.51 MHz and 49.66 - 50.0 MHz.**

\* \* \* \* \*

(b) An intentional radiator used as part of a cordless telephone system shall operate centered on one or more of the following frequency pairs, subject to the following conditions:

(1) Frequencies shall be paired as shown below, except that channel pairing for channels one through fifteen may be accomplished by pairing any of the fifteen base transmitter frequencies with any of the fifteen handset transmitter frequencies.

(2) Cordless telephones operating on channels one through fifteen must incorporate an automatic channel selection mechanism that will prevent establishment of a link on an occupied frequency.

Channel	Base Transmitter (MHz)	Handset Transmitter (MHz)			
			48.92	do	10, 44
1	43.720	48.760			
2	43.740	48.840			
3	43.820	48.860			
4	43.840	48.920			
5	43.920	49.020			
6	43.960	49.080	49.02	do	10, 44
7	44.120	49.100			
8	44.160	49.160			
9	44.180	49.200			
10	44.200	49.240	49.08	do	10, 44
11	44.320	49.280	49.10	do	10, 44
12	44.360	49.360			
13	44.400	49.400			
14	44.460	49.460			
15	44.480	49.500			
16	46.610	49.670			
17	46.630	49.845	49.16	do	10, 44
18	46.670	49.860			
19	46.710	49.770			
20	46.730	49.875			
21	46.770	49.830			
22	46.830	49.890			
23	46.870	49.930	49.20	do	10, 44
24	46.930	49.990			
25	46.970	49.970			

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49.24 do 10, 44

**PART 90 -- PRIVATE LAND MOBILE RADIO SERVICES**

1. The authority citation for Part 90 continues to read as follows:

**AUTHORITY:** Sections 4, 303, and 332, 48 Stat. 1066, 1082, as amended; 47 U.S.C. Sections 154, 303, and 332, unless otherwise noted.

2. In Section 90.65, the table in paragraph (b) is amended, to add a new limitation "44" to fifteen frequencies, and a new paragraph (c)(44) is added, to read as follows:

**Section 90.65 Petroleum Radio Service.**

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49.46 do 10, 44

(b) Frequencies available. \*\*\*\*\*

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**Petroleum Radio Service Frequency Table**

Frequency or band	Class of Station(s)	Limitations
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49.50 do 10, 44

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Megahertz:

(c) \*\*\*

(44) This frequency is also used on a secondary basis for cordless telephones under part 15 of this chapter.

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48.76	do	10, 44
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48.84	do	10, 44
48.86	do	10, 44

3. In Section 90.67, the table in paragraph (b) is amended, to add a new limitation "38" to fifteen frequencies, and a new paragraph (c)(38) is added, to read as follows:

**Section 90.67 Forest Products Radio Service.**

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(b) Frequencies available. \*\*\*\*\*

49.40 do 2, 38

**Forest Products Radio Service Frequency Table**

49.46 do 2, 38

Frequency or band Class of Station(s) Limitations

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49.50 do 2, 38

Megahertz:

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48.76 do 2, 38

(c) \*\*\*

(38) This frequency is also used on a secondary basis for cordless telephones under part 15 of this chapter.

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48.84 do 2, 38  
48.86 do 2, 38

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48.92 do 2, 38

4. In Section 90.89, the table in paragraph (b) is amended, to add a new limitation "23" to fifteen frequencies, and a new paragraph (c)(23) is added, to read as follows:

**Section 90.89 Motor Carrier Radio Service.**

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49.02 do 2, 38

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(b) Frequencies available. \*\*\*\*\*

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**Motor Carrier Radio Service Frequency Table**

49.08 do 2, 38  
49.10 do 2, 38

Frequency or band Class of Station(s) Limitations

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Megahertz:

49.16 do 2, 38

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43.72 do 4, 23  
43.74 do 4, 23

49.20 do 2, 38

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49.24 do 2, 38

43.82 do 4, 23  
43.84 do 4, 23

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49.28 do 2, 38

43.92 do 5, 6, 23

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49.36 do 2, 38

43.96 do 5, 23

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44.12 do 5, 23

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44.16 do 5, 23  
44.18 do 5, 23  
44.20 do 5, 20, 23

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44.32 do 5, 23

\* \* \* \* \*

44.36 do 5, 6, 23

\* \* \* \* \*

44.40 do 5, 6, 23

\* \* \* \* \*

44.46 do 1, 23  
44.48 do 1, 23

\* \* \* \* \*

(c) \* \* \*

(23) This frequency is also used on a secondary basis for cordless telephones under part 15 of this chapter.

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