

individual components and not to the sum of all components at the entire base station, provided the maximum EIRP radiated by the base station in any given direction on any given channel does not exceed 1640 watts. This interpretation is consistent with our application of similar rules in the cellular service. We believe that this statement is of itself sufficient interpretation of this provision of the rules, and no amendment to the rules is needed.

63. Licensed Service, Out-of-band Emission Levels. Omnipoint Corporation (Omnipoint) requests that an emission mask, similar to the one specified for isochronous unlicensed PCS devices, be adopted for licensed PCS out-of-band emissions using a resolution bandwidth on the measurement instrument approximately equal to one percent of the emission bandwidth of the device under test.<sup>115</sup> Omnipoint states that the Commission should specify out-of-band emissions separately from spurious emissions, arguing that out-of-band emissions are dependent on the PCS system's modulation techniques and modulation rates. Omnipoint also states that the Commission's ability to measure and monitor out-of-band emissions would be greatly simplified by the use of a modulation mask. Omnipoint states that a modulation mask, which permits constant envelope digital modulations to operate in the band, would ensure that low cost equipment could be deployed in both the licensed and unlicensed bands. Finally, Omnipoint suggests that the current rule for emission limits<sup>116</sup> applies only to spurious emissions.<sup>117</sup>

64. Celeritek Incorporated (Celeritek) strongly supports adoption of an out-of-band emission mask that allows the use of constant envelope modulation formats. MCI, however, opposes these limits stating that Omnipoint's proposed rule contains a series of definitions that have the effect of allowing Omnipoint, or another operator using a similar wideband signal, to cause harmful interference to the users of adjacent frequency blocks. Accordingly, MCI recommends that the Commission not adopt these limits prior to a thorough industry review, such as through a Joint Technical Committee. MCI agrees that the Commission might authorize Omnipoint to use these limits on a waiver basis, subject to the submission of evidence that it has obtained the prior written consent of all potentially affected parties,

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<sup>115</sup> Omnipoint Petition at p. 6-8 and Figures 1,2. An out-of-band emission is an emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, excluding spurious emissions. See 47 C.F.R. § 2.1. See also § 15.323(d) of the Commission's Rules for the isochronous devices' modulation mask.

<sup>116</sup> See § 24.238 of the Commission's Rules.

<sup>117</sup> A spurious emission is an emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions. Necessary bandwidth is, for a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions. See 47 C.F.R. § 2.1.

including those operating, or requesting authorization to operate, in adjacent frequency bands. Motorola notes that the Errata to the MO&O<sup>118</sup> provides additional clarification and flexibility and may already accommodate Omnipoint's concerns by allowing use of alternative resolution bandwidths for measuring out-of-band emissions. Motorola adds that the clarification requested by Omnipoint may eliminate any uncertainties with respect to the proper measurement standards and that this matter is being addressed in ANSI/IEEE C63-SC7 and the WINTest group of WINForum.

65. Reply comments on this portion of the Omnipoint petition were filed by AT&T Corp. (AT&T), Motorola, and Omnipoint.<sup>119</sup> Omnipoint states that it has modified its proposals for the measurement of out-of-band and spurious emissions in order to directly address MCI's concerns with adjacent channel interference.<sup>120</sup> It argues that industry can not wait to have this rule clarified at some later date since no PCS technology can pass the existing rule within the 5 MHz bands associated with the 10 MHz licenses. Omnipoint adds that its proposal attempts to enable all PCS technologies by including a realistic spectrum emissions mask and a realistic resolution bandwidth measurement.<sup>121</sup> AT&T agrees with Omnipoint's position, and Motorola's comments in support of that position, regarding the procedures for measuring out-of-band emissions and supports the efforts of WINForum and ANSI/IEEE C63-SC7 in addressing this matter. Motorola, while supporting the intent of the Omnipoint proposal in its comments, now expresses concern that it is premature to adopt specific testing language in the rules. Instead, Motorola supports continued consultation with industry groups such as TIA, T1, ANSI/IEEE C63-SC7, and the WINTest group of WINForum before specific testing requirements are detailed. Motorola and Omnipoint subsequently made ex parte presentations proposing specific measurement methods for

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<sup>118</sup> See n.1, *supra*.

<sup>119</sup> See Replies of AT&T at 6, Motorola at 4-5, and Omnipoint at 1-5.

<sup>120</sup> In its petition for reconsideration, Omnipoint proposed use of the unlicensed PCS isochronous out-of-band emission mask, which calls for 30 DB suppression for signals up to 1.25 MHz from the band edge, 50 dB suppression between 1.25 MHz and 2.5 MHz from the band edge, and 60 dB suppression beyond. In responding to MCI's concerns, Omnipoint proposed a linear roll-off between 30 dB at the band edge and 50 dB at 1.25 MHz beyond the band edge, and between 50 dB at 1.25 MHz and 60 dB at 2.50 MHz from the band edge.

<sup>121</sup> The changes recommended by Omnipoint to the regulations on emission limits retain the existing standards as applied to spurious emissions. See Omnipoint Reply at 4-5. Omnipoint further described its proposed changes in its *ex parte* presentation to the Commission on September 30, 1994.

out-of-band emissions.<sup>122</sup> Omnipoint asserts that the current limits are effectively more severe than the levels permitted for out-of-band emissions for unlicensed PCS devices.

66. Discussion In adopting standards for wideband licensed PCS systems, the Commission declined to specify a modulation or channelization scheme within a licensee's frequency block. Further, the Commission attempted to adopt technical standards that did not intentionally favor one technology over another. We continue to believe that this flexible approach encourages and facilitates the broadest range of PCS services and devices by permitting licensees to determine the most economic and effective methods of using the spectrum. We also indicated that most parties recognize that PCS is at a nascent stage in its development and that imposition of a rigid technical framework at this time could stifle the introduction of important new technology.<sup>123</sup> Our concern regarding technical standards was to ensure that PCS licensees did not cause harmful interference to existing microwave facilities or to each other.

67. The Commission specified that all emissions appearing outside of the licensee's frequency block must be attenuated by  $43 + 10 \log (P)$  dB below the transmitter power.<sup>124</sup> This requirement must be met by licensees and is not specifically aimed at the design of radio equipment. We did so because we sought to provide maximum flexibility to both licensees and equipment manufacturers as to how they might control emissions outside the licensee's frequency block. For example, a licensee could choose to use equipment that is not designed to meet a stringent out-of-band emissions mask, yet still ensure compliance with our emissions limits by leaving a guard band near the edge of the frequency block.<sup>125</sup> With regard to Omnipoint's assertion that equipment will be made unnecessarily costly by the current requirement, we observe that this is not necessarily the case. The equipment can be designed so that it does not operate right up to the edge of a frequency block. We believe

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<sup>122</sup> See letters dated September 30, 1994, from Mr. David E. Hilliard of Wiley, Rein & Fielding to Mr. Julius Knapp, Chief, Authorization and Evaluation Division, OET, and to Mr. William F. Caton, Acting Secretary, FCC. In these letters, Motorola proposes that out-of-band emissions be measured using a resolution bandwidth of approximately one percent of the emission bandwidth of the device under test and integrating the energy over a measurement bandwidth of 1 MHz. Motorola also requests that, during emission measurements, the center of the PCS transmission be displaced from the edge of the channel block by an amount equal to its occupied bandwidth. Omnipoint submitted an ex parte filing, dated October 4, 1994, from Mr. Mark J. O'Connor of Piper & Marbury to Mr. William F. Caton, responding to Motorola's proposals. Omnipoint objects to the complexity of the Motorola procedure.

<sup>123</sup> See PCS Second Report and Order, 8 FCC Rcd at 7755-56 (paras. 135-137).

<sup>124</sup> See 47 CFR Section 24.238; see also Broadband PCS Reconsideration at paras. 194-201.

<sup>125</sup> Equipment manufacturers would need to locate fundamental emissions, based on whatever method of channelization is employed, a sufficient distance within a licensee's frequency block to ensure that only spurious emissions, meeting this limit, appear outside of the frequency block.

that any reduction in capacity of the spectrum by avoiding close proximity to the band edges will be negligible. With regard to Omnipoint's assertion that the unlicensed PCS rules are not as stringent with regard to spurious emissions, and the implicit suggestion that emissions standards for out-of-band emissions by licensed services should be correspondingly eased, we note that standards for unlicensed PCS are only 3.5 dB less stringent within 1.25 MHz of the band edge, an insignificant difference. We find that our basic standard of  $43 + 10 \log(P)$  dB is necessary and appropriate to control interference between licensees.<sup>126</sup> Accordingly, we are retaining the current emissions standard. To this extent, Omnipoint's petition is denied.

68. We are persuaded that further clarification is needed with regard to the measurement of emissions immediately outside the necessary bandwidth of the transmitted signal. The current rule states that measurement instrumentation employing a 1 MHz resolution bandwidth shall be employed; however, where emissions within the licensee's frequency block influence the levels of the signals measured outside this block in such a manner to make it appear that these emissions are not in compliance with the standards, alternative measurement techniques may be employed. The commenting parties generally agree that the use of a resolution bandwidth of approximately one percent of the bandwidth of the device under test is appropriate for measuring emissions immediately outside of the frequency block. We are specifically noting this as an appropriate test procedure in the rules. To this extent, Omnipoint's petition is granted. We believe that this action should satisfactorily resolve much of Omnipoint's and the commenters' concerns. The Commission's staff may provide further guidance on this and other measurement matters that may arise, consistent with our current practice.

69. Unlicensed Devices. Omnipoint requests that the unlicensed isochronous<sup>127</sup> frame period<sup>128</sup> be changed from 10 milliseconds/X to 20 milliseconds/X where X is a whole number.<sup>129</sup> They argue that this will allow for use of advanced vocoders and promote interoperability between licensed and unlicensed PCS systems that are expected to use advanced vocoder technology. Omnipoint states that the latest generation of vocoders require

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<sup>126</sup> We note that several industry technical and standards groups are addressing matters relating to technical standards for PCS both domestically and internationally. At such time as these groups agree upon standards, we may consider appropriate limits on out-of-band emissions also could be considered.

<sup>127</sup> Isochronous devices transmit at a regular interval, typified by time-division voice systems.

<sup>128</sup> Frame period is a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source. Currently, our rules provide that the frame period of an intentional radiator operating in the 1920-1930 MHz sub-band will be 10 ms/X where X is a positive whole number. See § 15.323(e) of the Commission's Rules.

<sup>129</sup> See Omnipoint Petition at 3-6.

a 20 millisecond frame period in order to significantly improve throughput and slot time efficiency. Omnipoint states more specifically that in these respects, its 8 kbps codebook excited linear predictive (CELP) type of vocoder meets or exceeds the performance of 32 kbps adaptive pulse code modulation (ADPCM) types that have commonly been promoted for unlicensed equipment. Omnipoint claims their vocoder technology provides a 4:1 improvement over the 32 kbps vocoder ADPCM technology in throughput efficiency.

70. Comments. Motorola opposes Omnipoint's request to change the frame period from 10 milliseconds/X to 20 milliseconds/X and argues that this change would disadvantage narrow band technologies.<sup>130</sup> Motorola contends this disadvantage arises from the relationship between the current "listen before talk" monitoring period of 10 milliseconds and the current frame period definition of 10 milliseconds/X that were chosen to accommodate different technologies and promote spectrum efficiency. Increasing the frame period to 20 milliseconds/X and the monitoring period to 20 milliseconds would double the time required to monitor each frequency/time window. Motorola asserts that performance would be degraded significantly when systems must search a large number of channels. Battery life of portable units would also be reduced. Motorola also asserts that the current frame period will support vocoders that utilize analysis intervals longer than 10 milliseconds. Motorola provides an example of current technology (GSM) that utilizes a vocoder analysis interval longer than its frame period interval.

71. Replies. Omnipoint replies that extending the frame period and monitoring period from 10 to 20 milliseconds would result in an additional delay of only one hundredth of a second when accessing a time and spectrum window.<sup>131</sup> They also disagree that extending the frame period and monitoring period will greatly and adversely affect the time required to find an open frequency slot or reduce battery life. AT&T opposes extending the frame period and monitoring period to 20 milliseconds and supports Motorola's arguments.<sup>132</sup> AT&T, however, presents a compromise approach that it believes addresses the concerns of all parties. AT&T proposes that we delete the requirement for systems with 40 or more defined channels to monitor all channels at an access level of 30 dB above thermal noise power. This would relieve large systems of the requirement that they perform repetitive listen before talk monitoring to determine if a clear channel is available, thereby negating the increased access time and battery life issues for larger systems.

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<sup>130</sup> See Comments of Motorola at 13-15. In an *ex parte* filing dated September 30, 1994, Motorola suggested that we clarify the rules regarding the random interval waiting period as it applies to isochronous transmissions. Specifically, Motorola requests that we clarify that any interruption in transmission require application of the uniform random distribution waiting interval before the same time and spectrum window may be reaccessed. We believe this issue can be handled as an interpretation of the rules and no change is necessary in the wording of the requirements.

<sup>131</sup> See Reply of Omnipoint at p. 5-8 and Figure 1.

<sup>132</sup> See Reply of AT&T at p. 1-6.

72. Extending the maximum frame period of isochronous devices from 10 to 20 milliseconds was addressed in the Broadband PCS Reconsideration.<sup>133</sup> Proponents argued at that time that this change would permit the widest range of present and future technologies to operate in the unlicensed band in the most equitable manner, and so would improve the potential for equipment capable of operating in both the licensed and unlicensed spectrum. Opponents argued that lengthening the frame period would necessitate longer channel setup and access times and decrease battery life in portable units. In making our decision to retain 10 milliseconds as the maximum frame period, we stated that a longer frame period could potentially reduce spectrum efficiency and that we were unconvinced that an increase in the frame period would improve the likelihood of compatibility with future technical standards for licensed PCS equipment.

73. Discussion. Throughout this proceeding the Commission has continued to support the concept that regulatory impact on present and future potential technologies should be minimized wherever possible in order to provide maximum flexibility for technological innovation. This is especially true when minor adjustments in technical requirements would permit additional technological innovation or alternatives without compromising other implementations. From this perspective, the compromise proposed by AT&T is flawed because it could potentially lead to greatly increased interference between systems competing for limited spectrum. However, analysis by Commission staff of isochronous device operation under the current unlicensed technical requirements has developed a compromise regarding the frame period that will provide for additional technical innovation in the unlicensed spectrum, while not affecting the operation of systems with a 10 millisecond or shorter frame period.

74. This additional flexibility can be achieved by modifying the appropriate rules to permit devices with frame periods of 20 milliseconds to access unlicensed spectrum, and also requiring systems with a 20 millisecond frame period to extend the listen before talk monitoring time to 20 milliseconds. There is little, if any, foreseeable adverse impact on systems that use a 10 millisecond or shorter frame period from systems using a 20 millisecond frame period. By continuing to permit systems with a 10 millisecond or shorter frame period to utilize a monitoring period of 10 milliseconds, they will be unaffected by this rule change. This addresses the concerns raised about channel access times and battery life by continuing to permit system operation consistent with the current rule requirements. Systems with a frame period of 20 milliseconds may be somewhat disadvantaged relative to systems with a shorter frame period because they will have longer channel set-up and access times. The changes in the rules, however, will afford relief to technologies that, because of choice or design constraints, use a frame period of 20 milliseconds and permits those technologies access to the unlicensed spectrum. We are, therefore, revising Sections 15.323(c)(1), 15.323(c)(5) and 15.323(e), that prescribe the channel access requirements, to accommodate systems that use a frame period of up to 20 milliseconds.

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<sup>133</sup> See Broadband PCS Reconsideration at para. 238.

#### E. PCS Interference to the Broadcast Auxiliary Service.

75. The Joint Broadcast Parties request that we clarify that we will, inter alia, address the potential for interference to the Broadcast Auxiliary Service in the 1990-2110 MHz band by high power PCS base stations in the subjacent 1970-1990 MHz band.<sup>134</sup> Specifically, the Joint Broadcast Parties request that we establish a guard band in the 1970-1990 MHz range, within which only low power mobile units would be allowed to operate.<sup>135</sup> In the alternative, the Joint Broadcast Parties request that we establish a minimum separation distance of two kilometers between PCS base stations and broadcast auxiliary receive sites.<sup>136</sup>

76. Comments. Five commenters addressed the Joint Broadcast Parties' petition. Commenters argue that the Joint Broadcast Parties' analysis of the likelihood of interference is premised upon worst case conditions, especially in assuming that a PCS base station will be directly between the broadcast auxiliary transmitter and receiver, that the PCS station will necessarily be operating at the maximum allowable power, and that a distance of up to two kilometers represents immediate proximity.<sup>137</sup> Further, they state that the suggested guard band would have the effect of imposing use restrictions on PCS Blocks C and F that would decrease the value of those blocks, and necessitate design of PCS handsets more complex and expensive than are necessary under the current plan. Commenters also claim that the proposed restrictions work against general design principles, which indicate that the lower power transmitter should operate on the lower frequency. Commenters also argue that the proposed guard band would create "technological islands" that would interfere with the interoperability of PCS, to the especial detriment of designated entities and entrepreneurial licensees.<sup>138</sup> Finally, our current rules on interference and out-of-band emissions are sufficient to protect broadcast auxiliary operations, according to commenters.<sup>139</sup>

77. Replies. The Joint Broadcast Parties state that those opposing its initial petition for stricter interference protections make no serious effort to quantify the actual risk of interference, and reassert that the BAS needs more protection from potential interference by

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<sup>134</sup> See Joint Broadcast Parties Petition at 5.

<sup>135</sup> See id., Attachment at 1.

<sup>136</sup> The remainder of the Joint Broadcast Parties' petition addresses issues of spectrum allocation and service relocation that do not bear on this proceeding. See id., Attachment at 1.

<sup>137</sup> See APC Comments, Exhibit 2 at 2-3; Motorola Comments at 5-7; Northern Telecom Comments at 5-6.

<sup>138</sup> See APC Comments, Exhibit 2 at 1-2; Northern Telecom Comments at 4-5; PCIA Opposition at 2.

<sup>139</sup> See Comsat Comments at 3; Motorola Comments at 7-8; Northern Telecom Comments at 6.

PCS.<sup>140</sup> Motorola Inc. (Motorola) reiterates its opposition to the establishment of a guard band.<sup>141</sup>

78. **Discussion.** MSTV's concerns arise from two actions in the PCS Broadband Reconsideration: the increased maximum permissible power approved for PCS base stations, and the allocation to PCS of a portion of spectrum that is internationally designated for MSS. The increased power limit, MSTV asserts, carries with it an increased potential for interference to BAS users in the adjacent band, while the revised allocation plan renews BAS users' concern that their operations on the 1990-2110 MHz band not be compromised by subsequent MSS allocation decisions.

79. As to the potential for increased interference to BAS users, including ENG applications, the record does not persuade us that protective action beyond the measures adopted in the PCS Broadband Reconsideration is necessary. There, we amended our rules to indicate that spurious emission limits apply to all frequencies outside the block employed by a PCS licensee, and clarified compliance testing procedures.<sup>142</sup> We also amended our rules to specify the resolution bandwidth of measuring instruments. These rules apply both to the transmitter and the operating system, as installed by the licensee, and the Commission retains the authority to require additional attenuation when emissions cause harmful interference to other users of the RF spectrum.<sup>143</sup>

80. To support its argument for measures more extensive than these existing provisions, MSTV submits an engineering exhibit premised on worst case assumptions, which provides a wholly insufficient basis from which to conclude that present interference protection measures are so inadequate as to require substantial additional safeguards. We are not persuaded that the worst case scenario MSTV presents should be the appropriate overall standard for evaluating interference protection. In this case, in addition to MSTV's failure to demonstrate more than the merest possibility of interference, commenters have identified, and MSTV does not dispute, significant technical and competitive burdens that would be imposed on PCS licensees in the 1970-1990 MHz band if use of that band were constrained as MSTV proposes. MSTV does not dispute that limiting PCS licensees in that band to mobile use would result in a system configured at odds with customary engineering practice, and so would require distinctive handsets that, moreover, would not be compatible for use with more conventionally configured PCS systems. We view such targeted constraints on licensee's flexibility to use a particular PCS spectrum block as measures to be considered only in extreme circumstances, which MSTV has not demonstrated here. We are confident

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<sup>140</sup> See Joint Broadcast Parties Reply at 3-5.

<sup>141</sup> See Motorola Reply at 1-3.

<sup>142</sup> PCS Broadband Reconsideration at paras. 197-199.

<sup>143</sup> See id. at para. 200; Appendix A at Sec. 24.238(b).

that the standards already established in this proceeding will serve to protect the broadcast auxiliary service from possible PCS base station out-of-band emissions.<sup>144</sup> We note that, apart from specific attenuation standards, we have authority under Section 24.238(b) of our rules to require any PCS base station which causes interference to other radio services to attenuate its out-of-band emissions substantially. For these reasons, we deny MSTV's petition.

81. As to the revised allocation plan, and possible allocation actions in the MSS proceeding, MSTV asks that in future proceedings the Commission place priority on a spectrum solution for MSS that does not involve relocation or impairment of BAS operations, and that if relocation is required, various measures be implemented toward a reasonable transition period and compensation to broadcasters for relocation costs. These concerns will be fully considered as part of the Commission's impending review of MSS allocation alternatives, but need not be reviewed in this further reconsideration context.

#### F. Secondary Allocation for MSS

82. CELSAT, INC. (Celsat) petitions for review on spectrum allocation issues. Celsat requests that the 1970-1990 MHz band be allocated on a secondary basis and that the 2160-2180 MHz band be allocated on a primary basis for domestic Mobile-Satellite Service (MSS) use, arguing that its technology would allow it to share these bands with both fixed microwave systems and new terrestrial PCS systems.<sup>145</sup>

83. Celsat proposes a domestic MSS or hybrid satellite system that would be licensed to provide space-based PCS services nationwide as long as it did not interfere with the operation of any terrestrial PCS system licensed in either PCS Frequency Blocks F or C.<sup>146</sup> Celsat states that its proposal would be spectrum efficient, and that a single handset could access both terrestrial PCS service in served areas and MSS service in areas not served by

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<sup>144</sup> We note that the standard for attenuation of out-of-band emissions to which PCS base stations must adhere is currently stricter than the standard for microwave licensees in the same band. See 47 C.F.R. § 94.71.

<sup>145</sup> See Celsat Petition at 1-4. Because the MSS system would be transmitting to its mobiles in the 2160-2180 MHz band, there would be no interference to the PCS mobiles from MSS satellite transmissions. Celsat claims that the potential interference from MSS mobile transmissions received at PCS base stations would be prohibited by not assigning a potentially interfering frequency to a mobile user whenever it is within range of a microwave or PCS system.

<sup>146</sup> PCS Block F is 1890-1895 and 1970-1975 MHz; PCS Block C is 1895-1910 and 1975-1990 MHz.

terrestrial PCS.<sup>147</sup> Celsat states that participating PCS licensees would attain nationwide coverage upon the launch of a single MSS satellite and that this coverage would provide these licensees an immediate competitive advantage over other PCS and cellular licensees.<sup>148</sup> It states that these bands are the only spectrum that is earmarked both domestically and internationally for both ground and space mobile services and thus are ideal for a hybrid space/ground PCS system.<sup>149</sup> Celsat further states that its proposal would cause no interference if licensees in Blocks C and F use the 1970-1990 MHz band for mobile unit transmission. It therefore requests a secondary MSS allocation of this band, and urges PCS licensees in this band to choose the CDMA multiplexing scheme so that MSS and PCS services can efficiently share the band.<sup>150</sup> Celsat's proposal requires not only the secondary MSS allocation at 1970-1990 MHz, but also a primary MSS allocation at 2160-2180 MHz.<sup>151</sup>

84. The 1992 World Administrative Radio Conference (WARC-92) adopted the following allocations for MSS: Region 2 -- 1970-1980 and 2160-2170 MHz primary, 1930-1970 and 2120-2160 MHz secondary; Worldwide -- 1980-2010 and 2170-2200 MHz primary. In the Second Report and Order in the instant proceeding, we allocated the 1850-1970 MHz, 2130-2150 MHz and 2180-2200 MHz bands to terrestrial PCS and reserved the 1970-1990 and 2160-2180 MHz bands for possible MSS use. On reconsideration, we decided to allocate 1850-1990 MHz for PCS, and to reserve 2110-2150 MHz and 2160-2180 MHz for emerging technologies, including MSS.

85. Comments. Two commenters addressed the issues raised by Celsat and the Joint Broadcast Parties, generally opposing any change to our current rules.<sup>152</sup> As an initial matter, COMSAT Corporation (Comsat) argues that the petition of Celsat is not within the scope of this proceeding, because we have indicated that we will address this issues in an upcoming MSS allocation proceeding.<sup>153</sup>

86. With regard to Celsat's proposed allocations for MSS, commenters assert that this proposal would add uncertainty to the quality of PCS services in this band, to the

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<sup>147</sup> This ability to use a single handset to access both PCS and MSS systems assumes that PCS licensees would employ a handset using a CDMA multiplexing scheme compatible with Celsat's design.

<sup>148</sup> See Celsat Petition at 6.

<sup>149</sup> See id. at 2.

<sup>150</sup> See id. at 5-6.

<sup>151</sup> See id. at 7.

<sup>152</sup> Commenters on Celsat's petition were APC and COMSAT Corporation (Comsat).

<sup>153</sup> See Comsat Comments at 2.

disadvantage of designated entities and entrepreneurial licensees,<sup>154</sup> and would interfere with the ongoing international negotiations regarding MSS issues.<sup>155</sup> Commenters state that the place to consider this issue is the upcoming MSS proceeding.<sup>156</sup>

87. Replies. American Mobile Satellite Corporation (AMSC) joins Comsat in urging the Commission to address spectrum issues in an upcoming MSS proceeding, and urged us to begin this proceeding as soon as possible.<sup>157</sup>

88. Discussion. We agree with commenters who state that this proceeding is not the appropriate place to consider the multiple implications of spectrum allocations for MSS. The Commission is scheduled to release a Notice of Proposed Rule Making in a separate MSS proceeding prior to the December 1994 broadband PCS auction, and that order will consider the issue of authorizing satellite operations in conjunction with broadband PCS.

#### G. ONA Implementation for PCS

89. Point asks that the Commission require PCS networks to utilize Open Network Architecture, asserting this would guarantee competition among equipment suppliers and reduce the cost of constructing networks.<sup>158</sup> MCI in its comments characterizes Point's request as a plea for the Commission to assert authority over equipment manufacturers, and asserts that the marketplace can best determine the desirability of ONA or other network architecture schemes.<sup>159</sup> No reply comments were filed.

90. The elements of an Open Network Architecture regulatory system necessarily reflect the characteristics of the network environment in which those elements are applied. Apart from Point's very general request and a few sentences of MCI's response, the record in this proceeding is nearly devoid of any discussion of the complex technical and operational issues involved. Such a record provides a wholly inadequate basis for assessing the merits of ONA in the wireless telecommunications marketplace. We will therefore deny Point's request, but this action does not preclude Point or other interested parties from filing a more specific and well developed ONA proposal in the form of a petition for rulemaking.

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<sup>154</sup> See APC Comments, Exhibit 2 at 4-5.

<sup>155</sup> See Comsat Comments at 5-6.

<sup>156</sup> See APC Comments, Exhibit 2 at 5; Comsat Comments at 8.

<sup>157</sup> See AMSC Reply.

<sup>158</sup> See Point Petition at 5-6.

<sup>159</sup> See MCI Comments at 4-5.

#### IV. CONCLUSION

91. The adoption of a Memorandum Opinion and Order in the Emerging Technology proceeding a month ago advanced our consideration of transition issues.<sup>160</sup> Today we have amended our service rules in this order to better facilitate the introduction of broadband PCS services to the public. Additionally, we are conducting ongoing consultations with foreign governments to ensure that international coordination requirements for this service will be completed as rapidly as possible. As previously announced, we intend to begin auctioning broadband PCS licenses on December 5, 1994.<sup>161</sup>

#### V. ORDERING CLAUSES

92. ACCORDINGLY, IT IS ORDERED, that the petitions for reconsideration addressed in this order ARE GRANTED to the extent described above, and DENIED in all other respects.

93. IT IS FURTHER ORDERED, that Parts 2, 15, and 24 of the Commission's Rules ARE AMENDED as specified in Appendix A, effective 30 days after publication in the Federal Register, except that amendments to 47 C.F.R. Section 24.204 as specified in Appendix A SHALL BE EFFECTIVE immediately upon publication in the Federal Register.<sup>162</sup> This action is taken pursuant to Sections 4(i), 7(a), 302, 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 157(a), 302, 303(c), 303(f), 303(g), and 303(r).

FEDERAL COMMUNICATIONS COMMISSION

*William F. Caton*

William F. Caton  
Acting Secretary

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<sup>160</sup> See Memorandum Opinion and Order, ET Docket No. 92-9, 9 FCC Rcd 1943 (1994).

<sup>161</sup> See Public Notice, Commercial Mobile Radio Service Information: Auction Notice and Filing Requirements for 99 MTA Licenses Located on the A and B Blocks for Personal Communications Service in the 2 GHz Band, Report No. AUC-94-04, Auction No. 4, released September 19, 1994.

<sup>162</sup> Amendments to Section 24.204 ease existing regulatory restrictions on entities with non-controlling, attributable cellular interests by providing them an opportunity to participate in broadband PCS auctions from which they previously were barred, and provides all parties with greater certainty about the post-auction divestiture requirements of our cellular/PCS cross-ownership rules. These benefits will be compromised unless the Section 24.204 amendments become effective immediately upon publication in the Federal Register, as the deadline for filing applications to participate in the initial broadband PCS auction is October 28, 1994, less than two weeks from the adoption date of the instant order. Thus, there is good cause to order the amendments to take effect upon Federal Register publication. See 5 U.S.C. §§ 553(d)(1), (d)(3).

## Appendix A: Final Rules

Parts 2, 15, and 24 of Chapter I of Title 47 of the Code of Federal Regulations are amended as follows:

### **PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS**

1. The authority citation for Part 2 continues to read as follows:

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

2. Subpart B is amended by revising Section 2.106, the Table of Frequency Allocations, as follows:

- a. In Column (4) of the 1850-1990 MHz band, add US331.
- b. In Column (4) of the 2110-2200 MHz band, delete US331.
- c. In Column (7) of the 1850-1990 MHz band, delete EMERGING TECHNOLOGIES.

**PART 15 -- RADIO FREQUENCY DEVICES**

1. The authority citation continues to read as follows:

**AUTHORITY:** Sec. 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. Paragraphs 15.323(c)(1) and (5) and 15.323(e) are revised to read as follows:

**§ 15.323 Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band.**

\* \* \* \* \*

(c) \* \* \*

(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of time equal to the defined frame period for the device but in no event less than 10 milliseconds to determine if the access criteria are met.

\* \* \* \* \*

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify within a period of time equal to twice the defined frame period, but in no event less than 20 milliseconds, immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of cooperating devices located within 1 meter of each other shall occupy more than three 1.25 MHz channels during any period of time less than twice the frame period or 10 milliseconds whichever is greater. Devices in an operational state that are utilizing the provision of this section are not required to use the search provisions of (b) above.

\* \* \* \* \*

(e) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be equal to or greater than 10 milliseconds /X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame

repetition rate with a frequency stability of at least 50 parts per millions (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

## **PART 24—PERSONAL COMMUNICATIONS SERVICES**

1. The authority citation for Part 24 continues to read as follows:

**AUTHORITY:** 47 U.S.C. Sections 154, 301, 302, 303, and 332, unless otherwise noted.

2. Section 24.204 is amended by revising text immediately following the semi-colon in the end of the first sentence of paragraph (f), and by adding new sentences at the end of that paragraph and of paragraph (f)(3)(ii) to read as follows:

### **§ 24.204 Cellular eligibility.**

\* \* \* \* \*

(f) \* \* \* Provided, however, that these divestiture procedures shall be available only to:(i) parties with controlling or attributable ownership interests in cellular licenses where the CGSA(s) covers 20 percent or less of the PCS service area population; and (ii) parties with non-controlling attributable interests in cellular licenses, regardless of the degree to which the CGSA(s) covers the PCS service area population. For purposes of this paragraph, a "non-controlling attributable interest" is one in which the holder has less than a fifty (50) percent voting interest and there is an unaffiliated single holder of a 50 percent or greater voting interest.

\* \* \* \* \*

(3)(ii) \* \* \* The trustee must divest the property within six months from grant of license.

\* \* \* \* \*

3. Section 24.238 is amended to read as follows:

**§ 24.238 Emission limits.**

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

(e) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

## **Appendix B**

### **PARTIES**

#### **Petitioners**

1. Association for Maximum Service Television, Inc. and Capital Cities/ABC, Inc., CBS Inc., Fox, Inc. & Fox Broadcasting Stations, Inc., the National Association of Broadcasters, Inc., National Broadcasting Company, Inc., Public Broadcasting Service, the Radio-Television News Directors Association, and the Society of Broadcast Engineers (collectively, "MSTV")
2. Association of Independent Designated Entities (AIDE)
3. CELSAT, INC. (Celsat)
4. Cellular Telecommunications Industry Association (CTIA)
5. Comcast Corporation (Comcast)
6. Omnipoint Corporation (Omnipoint)
7. Personal Communications Industry Association (PCIA)
8. Point Communications Company (Point)
9. Puerto Rico Telephone Company (PRTC)
10. Spatial Communications, Inc. and ArrayComm, Inc. (SCI/ArrayComm)

#### **Opposing and Commenting Parties**

1. American Personal Communications (APC)
2. BellSouth Corp., BellSouth Telecom. Inc., BellSouth Cellular Corp. (BellSouth)
3. Celeritek, Incorporated (Celeritek)
4. COMSAT Corporation (Comsat)
5. McCaw Cellular Communications, Inc. (McCaw)
6. MCI Telecommunications Corporation (MCI)
7. Motorola, Inc. (Motorola)
8. Northern Telecom Inc. (Northern Telecom)
9. Pacific Bell Mobile Services (PacBell Mobile)
10. Pegasus Communications, Inc. (Pegasus)
11. Personal Communications Industry Association (PCIA)
12. Rural Cellular Association (RCA)
13. Utilities Telecommunications Council (UTC)
14. Sprint Corporation (Sprint)

**Replying Parties**

1. American Mobile Satellite Corporation (AMSC)
2. Ameritech
3. APC
4. AT&T
5. CTIA
6. GTE Service Corporation (GTE)
7. Motorola
8. MSTV
9. Omnipoint
10. PacBell Mobile
11. PCIA
12. PRTC
13. UTAM, Inc. (UTAM)