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(c) It is acceptable for a transmitter to meet this frequency stability requirement over a narrower temperature range provided the transmitter ceases to function before it exceeds these frequency stability limits.

## Subpart E—Broadband PCS

SOURCE: 59 FR 32854, June 24, 1994, unless otherwise noted.

### § 24.200 Scope.

This subpart sets out the regulations governing the licensing and operations of personal communications services authorized in the 1850–1910 and 1930–1990 MHz bands.

### § 24.202 Service areas.

Broadband PCS service areas are Major Trading Areas (MTAs) and Basic Trading Areas (BTAs) as defined in this section. MTAs and BTAs are based on the Rand McNally 1992 Commercial Atlas & Marketing Guide, 123rd Edition, at pages 38–39 (''BTA/MTA Map''). Rand McNally organizes the 50 states and the District of Columbia into 47 MTAs and 487 BTAs. The BTA/MTA Map is available for public inspection at the Office of Engineering and Technology's Technical Information Center, 445 12th Street, SW, Washington, DC 20554.

(a) The MTA service areas are based on the Rand McNally *1992 Commercial Atlas & Marketing Guide*, 123rd Edition, at pages 38–39, with the following exceptions and additions:

(1) Alaska is separated from the Seattle MTA and is licensed separately.

(2) Guam and the Northern Mariana Islands are licensed as a single MTA-like area.

(3) Puerto Rico and the United States Virgin Islands are licensed as a single MTA-like area.

(4) American Samoa is licensed as a single MTA-like area.

(b) The BTA service areas are based on the Rand McNally *1992 Commercial Atlas & Marketing Guide*, 123rd Edition, at pages 38–39, with the following additions licensed separately as BTA-like areas: American Samoa; Guam; Northern Mariana Islands; Mayagüez/Aguadilla-Ponce, Puerto Rico; San Juan, Puerto Rico; and the United States Virgin Islands. The Mayagüez/Aguadilla-Ponce BTA-like service area consists of the following municipios: Adjuntas, Aguada, Aguadilla, Añasco, Arroyo, Cabo Rojo, Coamo, Guánica, Guayama, Guayanilla, Hormigueros, Isabela, Jayuya, Juana Díaz, Lajas, Las Marías, Mayagüez, Maricao, Maunabo, Moca, Patillas, Peñuelas, Ponce, Quebradillas, Rincón, Sabana Grande, Salinas, San Germán, Santa Isabel, Villalba, and Yauco. The San Juan BTA-like service area consists of all other municipios in Puerto Rico.

[59 FR 32854, June 24, 1994; 59 FR 40835, Aug. 10, 1994; 63 FR 68952, Dec. 14, 1998; 65 FR 53636, Sept. 5, 2000]

### § 24.203 Construction requirements.

(a) Licensees of 30 MHz blocks must serve with a signal level sufficient to provide adequate service to at least one-third of the population in their licensed area within five years of being licensed and two-thirds of the population in their licensed area within ten years of being licensed. Licensees may, in the alternative, provide substantial service to their licensed area within the appropriate five- and ten-year benchmarks. Licensees may choose to define population using the 1990 census or the 2000 census. Failure by any licensee to meet these requirements will result in forfeiture or non-renewal of the license and the licensee will be ineligible to regain it.

(b) Licensees of 10 MHz blocks except for the 1910–1915 MHz and 1990–1995 MHz, including 10 MHz C block licenses reconfigured pursuant to Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, WT Docket No. 97–82, Sixth Report and Order, FCC 00–313, and 15 MHz blocks resulting from the disaggregation option as provided in the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, Second Report and Order and Further Notice of Proposed Rule Making, WT Docket 97–82, 12 FCC Rcd 16436 (1997), as modified by Order on Reconsideration of the Second Report and Order, WT Docket 97–82, 13 FCC Rcd 8345 (1998), must serve with a signal level sufficient to provide adequate

service to at least one-quarter of the population in their licensed area within five years of being licensed, or make a showing of substantial service in their licensed area within five years of being licensed. Population is defined as the 1990 population census. Licensees may elect to use the 2000 population census to determine the five-year construction requirement. Failure by any licensee to meet these requirements will result in forfeiture of the license and the licensee will be ineligible to regain it.

(c) Licensees must file maps and other supporting documents showing compliance with the respective construction requirements within the appropriate five- and ten-year benchmarks of the date of their initial licenses.

(d) Licensees in the paired 1910–1915 MHz and 1990–1995 MHz bands must make a showing of ''substantial service'' in their license area within ten years of the date of initial license issuance or renewal. ''Substantial service'' is defined as service which is sound, favorable, and substantially above a level of mediocre service which just might minimally warrant renewal. Failure by any licensee to meet this requirement will result in forfeiture of the license and the licensee will be ineligible to regain it.

[58 FR 59183, Nov. 8, 1993, as amended at 64 FR 26890, May 18, 1999; 65 FR 53636, Sept. 5, 2000; 69 FR 67835, Nov. 22, 2004; 69 FR 75171, Dec. 15, 2004]

### § 24.229 Frequencies.

The frequencies available in the Broadband PCS service are listed in this section in accordance with the frequency allocations table of § 2.106 of this chapter.

(a) The following frequency blocks are available for assignment on an MTA basis:

Block A: 1850–1865 MHz paired with 1930–1945 MHz; and

Block B: 1870–1885 MHz paired with 1950–1965 MHz.

(b) The following frequency blocks are available for assignment on a BTA basis:

Block C: 1895–1910 MHz paired with 1975–1990 MHz;

Pursuant to Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, WT Docket No. 97–82, *Sixth Report and Order*, FCC 00–313, all 30 MHz Block C licenses available for auction in Auction No. 35 or any subsequent auction will be reconfigured into three 10 MHz C block licenses as follows: 1895–1900 MHz paired with 1975–1980 MHz, 1900–1905 MHz paired with 1980–1985 MHz, 1905–1910 MHz paired with 1985–1990 MHz;

Block D: 1865–1870 MHz paired with 1945–1950 MHz;

Block E: 1885–1890 MHz paired with 1965–1970 MHz;

Block F: 1890–1895 MHz paired with 1970–1975 MHz;

(c) The paired frequency blocks 1910–1915 MHz and 1990–1995 MHz are available for assignment in the 175 Economic Areas defined in § 90.7 of this chapter. The 1910–1915 MHz block shall be used for mobile/portable station transmissions while the 1990–1995 MHz block shall be used for base station transmissions.

[59 FR 32854, June 24, 1994, as amended at 60 FR 13917, Mar. 15, 1995; 60 FR 26375, May 17, 1995; 61 FR 33868, July 1, 1996; 62 FR 660, Jan. 6, 1997; 65 FR 53637, Sept. 5, 2000; 69 FR 67836, Nov. 22, 2004]

### § 24.232 Power and antenna height limits.

(a) (1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; *see* Tables 1 and 2 of this section.

(4) The service area boundary limit and microwave protection criteria specified in §§ 24.236 and 24.237 apply.

TABLE 1—REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS, WITH EMISSION BANDWIDTH OF 1 MHZ OR LESS

| HAAT in meters | Maximum EIRP watts |
|---|---|
| ≤300 | 1640 |
| ≤500 | 1070 |
| ≤1000 | 490 |
| ≤1500 | 270 |
| ≤2000 | 160 |

TABLE 2—REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS, WITH EMISSION BANDWIDTH GREATER THAN 1 MHZ

| HAAT in meters | Maximum EIRP watts/MHz |
|---|---|
| ≤300 | 1640 |
| ≤500 | 1070 |
| ≤1000 | 490 |
| ≤1500 | 270 |
| ≤2000 | 160 |

(b) (1) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth of 1 MHz or less are limited to 3280 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(2) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, with an emission bandwidth greater than 1 MHz are limited to 3280 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; *see* Tables 3 and 4 of this section.

(4) The service area boundary limit and microwave protection criteria specified in §§ 24.236 and 24.237 apply.

(5) Operation under this paragraph (b) at power limits greater than permitted under paragraph (a) of this section must be coordinated in advance with all broadband PCS licensees authorized to operate on adjacent frequency blocks within 120 kilometers (75 miles) of the base station and is limited to base stations located more than 120 kilometers (75 miles) from the Canadian border and more than 75 kilometers (45 miles) from the Mexican border.

TABLE 3—REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS, WITH EMISSION BANDWIDTH OF 1 MHZ OR LESS

| HAAT in meters | Maximum EIRP watts |
|---|---|
| ≤300 | 3280 |
| ≤500 | 2140 |
| ≤1000 | 980 |
| ≤1500 | 540 |
| ≤2000 | 320 |

TABLE 4—REDUCED POWER FOR BASE STATION ANTENNA HEIGHTS OVER 300 METERS, WITH EMISSION BANDWIDTH GREATER THAN 1 MHZ

| HAAT in meters | Maximum EIRP watts/MHz |
|---|---|
| ≤300 | 3280 |
| ≤500 | 2140 |
| ≤1000 | 980 |
| ≤1500 | 540 |
| ≤2000 | 320 |

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of § 24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

NOTE TO § 24.232: Height above average terrain (HAAT) is to be calculated using the method set forth in § 24.53 of this part.

[73 FR 24183, May 2, 2008]

### § 24.235 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### § 24.236 Field strength limits.

The predicted or measured median field strength at any location on the border of the PCS service area shall not exceed 47 dBuV/m unless the parties agree to a higher field strength.

### § 24.237 Interference protection.

(a) All licensees are required to coordinate their frequency usage with the co-channel or adjacent channel incumbent fixed microwave licensees in the 1850–1990 MHz band. Coordination must occur before initiating operations from any base station. Problems that arise during the coordination process are to be resolved by the parties to the coordination. Licensees are required to coordinate with all users possibly affected, as determined by Appendix I to this subpart E (Appendix E of the Memorandum Opinion and Order, GEN Docket No. 90–314, FCC 94–144; TIA Telecommunications Systems Bulletin 10–F, ''Interference Criteria for Microwave Systems,'' May 1994, (TSB10–F)); or an alternative method agreed to by the parties.

(b) The results of the coordination process need to be reported to the Commission only if the parties fail to agree. Because broadband PCS licensees are required to protect fixed microwave licensees in the 1850–1990 MHz band, the Commission will be involved in the coordination process only upon complaint of interference from a fixed microwave licensee. In such a case, the Commission will resolve the issues.

(c) In all other respects, coordination procedures are to follow the requirements of § 101.103(d) of this chapter to the extent that these requirements are not inconsistent with those specified in this part.

(d) The licensee must perform an engineering analysis to assure that the proposed facilities will not cause interference to existing OFS stations within the coordination distance specified in Table 3 of a magnitude greater than that specified in the criteria set forth in paragraphs (e) and (f) of this section, unless there is prior agreement with the affected OFS licensee. Interference calculations shall be based on the sum of the power received at the terminals of each microwave receiver from all of the applicant's current and proposed PCS operations.

TABLE 3—COORDINATION DISTANCES IN KILOMETERS

| | PCS Base Station Antenna HAAT in Meters | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EIRP(W) | 5 | 10 | 20 | 50 | 100 | 150 | 200 | 250 | 300 | 500 | 1000 | 1500 | 2000 |
| 0.1 | 90 | 93 | 99 | 110 | 122 | 131 | 139 | 146 | 152 | 173 | 210 | 239 | 263 |
| 0.5 | 96 | 100 | 105 | 116 | 128 | 137 | 145 | 152 | 158 | 179 | 216 | 245 | 269 |
| 1 | 99 | 103 | 108 | 119 | 131 | 140 | 148 | 155 | 161 | 182 | 219 | 248 | 272 |
| 2 | 120 | 122 | 126 | 133 | 142 | 148 | 154 | 159 | 164 | 184 | 222 | 250 | 274 |
| 5 | 154 | 157 | 161 | 168 | 177 | 183 | 189 | 194 | 198 | 213 | 241 | 263 | 282 |
| 10 | 180 | 183 | 187 | 194 | 203 | 210 | 215 | 220 | 225 | 240 | 268 | 291 | 310 |
| 20 | 206 | 209 | 213 | 221 | 229 | 236 | 242 | 247 | 251 | 267 | 296 | 318 | 337 |
| 50 | 241 | 244 | 248 | 255 | 264 | 271 | 277 | 282 | 287 | 302 | 331 | 354 | 374 |
| 100 | 267 | 270 | 274 | 282 | 291 | 297 | 303 | 308 | 313 | 329 | 358 | 382 | 401 |
| 200 | 293 | 296 | 300 | 308 | 317 | 324 | 330 | 335 | 340 | 356 | 386 | 409 | 436 |
| 500 | 328 | 331 | 335 | 343 | 352 | 359 | 365 | 370 | 375 | 391 | 421 | 440 | |
| 1000 | 354 | 357 | 361 | 369 | 378 | 385 | 391 | 397 | 402 | 418 | | | |
| 1200 | 361 | 364 | 368 | 376 | 385 | 392 | 398 | 404 | 409 | 425 | | | |
| 1640 | 372 | 375 | 379 | 388 | 397 | 404 | 410 | 416 | 421 | 437 | | | |
| 2400 | 384 | 387 | 391 | 399 | 408 | 415 | 423 | 427 | 431 | | | | |
| 3280 | 396 | 399 | 403 | 412 | 419 | 427 | 435 | 439 | 446 | | | | |

(e) For microwave paths of 25 kilometers or less, interference determinations shall be based on the C/I criteria set forth in TIA Telecommunications Systems Bulletin 10–F, ''Interference

Criteria for Microwave Systems,'' May 1994 (TSB10–F).

(f) For microwave paths longer than 25 kilometers, the interference protection criterion shall be such that the interfering signal will not produce more than 1.0 dB degradation of the practical threshold of the microwave receiver for analog system, or such that the interfering signal will not cause an increase in the bit error rate (BER) from 10E–6 to 10E–5 for digital systems.

(g) The development of the C/I ratios and interference criteria specified in paragraphs (e) and (f) of this section and the methods employed to compute the interfering power at the microwave receivers shall follow generally acceptable good engineering practices. The procedures described for computing interfering signal levels in (Appendix I to this subpart E Appendix E of the Memorandum Opinion and Order, GEN Docket No. 90–314, FCC 94–144) shall be applied. Alternatively, procedures for determining interfering signal levels and other criteria as may be developed by the Electronics Industries Association (EIA), the Institute of Electrical and Electronics Engineers, Inc. (IEEE), the American National Standards Institute (ANSI) or any other recognized authority will be acceptable to the Commission.

[59 FR 32854, June 24, 1994, as amended at 61 FR 29691, June 21, 1996; 69 FR 75171, Dec. 15, 2004]

### § 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these rules 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). 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) *Alternative out of band emission limit.* Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) *Interference caused by out of band emissions.* If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

[67 FR 77192, Dec. 17, 2002]

## POLICIES GOVERNING MICROWAVE RELOCATION FROM THE 1850–1990 MHZ BAND

### § 24.239 Cost-sharing requirements for broadband PCS.

Frequencies in the 1850–1990 MHz band listed in § 101.147(c) of this chapter have been allocated for use by PCS. In accordance with procedures specified in §§ 101.69 through 101.81 of this chapter, PCS entities (both licensed and unlicensed) are required to relocate the existing Fixed Microwave Services (FMS) licensees in these bands if interference to the existing FMS operations would occur. All PCS entities who benefit from spectrum clearance by other PCS entities or a voluntarily relocating

microwave incumbent, must contribute to such relocation costs. PCS entities may satisfy this requirement by entering into private cost-sharing agreements or agreeing to terms other than those specified in §24.243. However, PCS entities are required to reimburse other PCS entities or voluntarily relocating microwave incumbents that incur relocation costs and are not parties to the alternative agreement. In addition, parties to a private cost-sharing agreement may seek reimbursement through the clearinghouse (as discussed in §24.241) from PCS entities that are not parties to the agreement. The cost-sharing plan is in effect during all phases of microwave relocation specified in §101.69 of this chapter. If a licensee in the Broadband PCS Service enters into a spectrum leasing arrangement (as set forth in part 1, subpart X of this chapter) and the spectrum lessee triggers a cost-sharing obligation, the licensee is the PCS entity responsible for satisfying the cost-sharing obligations under §§24.239 through 24.253.

[62 FR 12757, Mar. 18, 1997, as amended at 69 FR 77559, Dec. 27, 2004]

### § 24.241 Administration of the Cost-Sharing Plan.

The Wireless Telecommunications Bureau, under delegated authority, will select an entity to operate as a neutral, not-for-profit clearinghouse. This clearinghouse will administer the cost-sharing plan by, *inter alia*, maintaining all of the cost and payment records related to the relocation of each link and determining the cost-sharing obligation of subsequent PCS entities. The cost-sharing rules will not take effect until an administrator is selected.

[61 FR 29691, June 12, 1996]

### § 24.243 The cost-sharing formula.

A PCS relocator who relocates an interfering microwave link, *i.e.* one that is in all or part of its market area and in all or part of its frequency band or a voluntarily relocating microwave incumbent, is entitled to *pro rata* reimbursement based on the following formula:

$$R_N = \frac{C}{N} \times \frac{\left[120 - \left(T_m\right)\right]}{120}$$

(a) *RN* equals the amount of reimbursement.

(b) *C* equals the actual cost of relocating the link. Actual relocation costs include, but are not limited to, such items as: Radio terminal equipment (TX and/or RX—antenna, necessary feed lines, MUX/Modems); towers and/or modifications; back-up power equipment; monitoring or control equipment; engineering costs (design/path survey); installation; systems testing; FCC filing costs; site acquisition and civil works; zoning costs; training; disposal of old equipment; test equipment (vendor required); spare equipment; project management; prior coordination notification under §101.103(d) of this chapter; site lease renegotiation; required antenna upgrades for interference control; power plant upgrade (if required); electrical grounding systems; Heating Ventilation and Air Conditioning (HVAC) (if required); alternate transport equipment; and leased facilities. C also includes voluntarily relocating microwave incumbent's independent third party appraisal of its compensable relocation costs and incumbent transaction expenses that are directly attributable to the relocation, subject to a cap of two percent of the ''hard'' costs involved. C may not exceed $250,000 per link, with an additional $150,000 permitted if a new or modified tower is required.

(c) *N* equals the number of PCS entities that would have interfered with the link. For the PCS relocator, N=1. For the next PCS entity that would have interfered with the link, N=2, and so on. In the case of a voluntarily relocating microwave incumbent, N=1 for the first PCS entity that would have interfered with the link. For the next PCS entity that would have interfered with the link, N=2, and so on.

(d) *Tm* equals the number of months that have elapsed between the month the PCS relocator or voluntarily relocating microwave incumbent obtains reimbursement rights for the link and

the month that the clearinghouse notifies a later-entrant of its reimbursement obligation for the link. A PCS relocator obtains reimbursement rights for the link on the date that it signs a relocation agreement with a microwave incumbent. A voluntarily relocating microwave incumbent obtains reimbursement rights for the link on the date that the incumbent notifies the Commission that it intends to discontinue, or has discontinued, the use of the link, pursuant to §101.305 of the Commission's rules.

[62 FR 12757, Mar. 18, 1997, as amended at 65 FR 46113, July 27, 2000]

### § 24.245 Reimbursement under the Cost-Sharing Plan.

(a) *Registration of reimbursement rights.* (1) To obtain reimbursement, a PCS relocator must submit documentation of the relocation agreement to the clearinghouse within ten business days of the date a relocation agreement is signed with an incumbent.

(2) To obtain reimbursement, a voluntarily relocating microwave incumbent must submit documentation of the relocation of the link to the clearinghouse within ten business days of the date that the incumbent notifies the Commission that it intends to discontinue, or has discontinued, the use of the link, pursuant to §101.305 of the Commission's rules.

(b) *Documentation of expenses.* Once relocation occurs, the PCS relocator or the voluntarily relocating microwave incumbent, must submit documentation itemizing the amount spent for items listed in §24.243(b). The voluntarily relocating microwave incumbent, must also submit an independent third party appraisal of its compensable relocation costs. The appraisal should be based on the actual cost of replacing the incumbent's system with comparable facilities and should exclude the cost of any equipment upgrades or items outside the scope of §24.243(b). The PCS relocator or the voluntarily relocating microwave incumbent, must identify the particular link associated with appropriate expenses (*i.e.*, costs may not be averaged over numerous links). If a PCS relocator pays a microwave incumbent a monetary sum to relocate its own facilities, the PCS relocator must estimate the costs associated with relocating the incumbent by itemizing the anticipated cost for items listed in §24.243(b). If the sum paid to the incumbent cannot be accounted for, the remaining amount is not eligible for reimbursement. A PCS relocator may submit receipts or other documentation to the clearinghouse for all relocation expenses incurred since April 5, 1995.

(c) *Full Reimbursement.* A PCS relocator who relocates a microwave link that is either fully outside its market area or its licensed frequency band may seek full reimbursement through the clearinghouse of compensable costs, up to the reimbursement cap as defined in §24.243(b). Such reimbursement will not be subject to depreciation under the cost-sharing formula.

[61 FR 29692, June 12, 1996, as amended at 62 FR 12757, Mar. 18, 1997; 65 FR 46113, July 27, 2000]

### § 24.247 Triggering a reimbursement obligation.

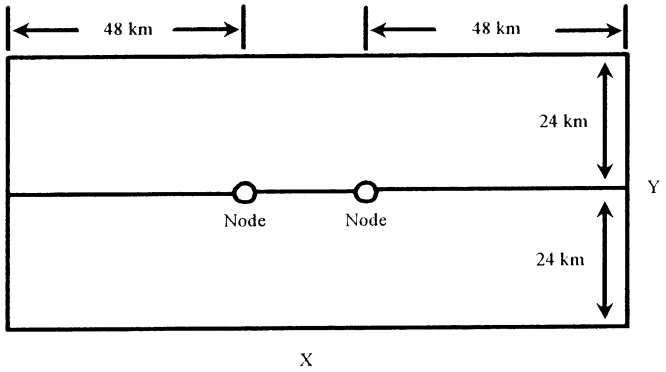
(a) *Licensed PCS.* The clearinghouse will apply the following test to determine if a PCS entity preparing to initiate operations must pay a PCS relocator or a voluntarily relocating microwave incumbent in accordance with the formula detailed in §24.243:

(1) All or part of the relocated microwave link was initially co-channel with the licensed PCS band(s) of the subsequent PCS entity;

(2) A PCS relocator has paid the relocation costs of the microwave incumbent; and

(3) The subsequent PCS entity is preparing to turn on a fixed base station at commercial power and the fixed base station is located within a rectangle (Proximity Threshold) described as follows:

(i) The length of the rectangle shall be x where x is a line extending through both nodes of the microwave link to a distance of 48 kilometers (30 miles) beyond each node. The width of the rectangle shall be y where y is a line perpendicular to x and extending for a distance of 24 kilometers (15 miles) on both sides of x. Thus, the rectangle is represented as follows:




(ii) If the application of the Proximity Threshold test indicates that a reimbursement obligation exists, the clearinghouse will calculate the reimbursement amount in accordance with the cost-sharing formula and notify the subsequent PCS entity of the total amount of its reimbursement obligation.

(b) *Unlicensed PCS.* UTAM's reimbursement obligation is triggered either:

(1) When a county is cleared of microwave links in the unlicensed allocation, and UTAM invokes a Zone 1 power cap as a result of third party relocation activities; or

(2) A county is cleared of microwave links in the unlicensed allocation and UTAM reclassifies a Zone 2 county to Zone 1 status.

(c) Any new entrants granted licenses for the 1910–1915 MHz band must reimburse UTAM a pro rata share of its total expenses incurred by UTAM as of the date that the new entrants gain access to the band. The percent required by new entrants to pay shall be calculated based upon the amount of spectrum granted to the new entrant as compared to the total amount of spectrum UTAM is responsible for clearing of incumbents (20 megahertz), and must be paid before a new entrant begins operations in the band. For example, if a new entrant obtains a license for 5 megahertz of spectrum in this band, it is required to reimburse UTAM one-quarter of UTAM's total costs to date on a pro rata shared basis. New entrants will be responsible for the actual costs associated with future relocation activities in their licensed spectrum, but will be entitled to seek reimbursement from UTAM for the proportion of those band clearing costs that benefit users of the 1915–1930 MHz band.

[61 FR 29692, June 12, 1996, as amended at 62 FR 12757, Mar. 18, 1997; 69 FR 67836, Nov. 22, 2004]

### § 24.249 Payment issues.

(a) *Timing.* On the day that a PCS entity files its prior coordination notice (PCN) in accordance with § 101.103(d) of this chapter, it must file a copy of the PCN with the clearinghouse. The clearinghouse will determine if any reimbursement obligation exists and notify the PCS entity in writing of its repayment obligation, if any. When the PCS entity receives a written copy of such obligation, it must pay directly to the PCS relocator or the voluntarily relocating microwave incumbent the amount owed within thirty days, with the exception of those businesses that qualify for installment payments. A business that qualifies for an installment payment plan must make its first installment payment within thirty days of notice from the clearinghouse. UTAM's first payment will be due thirty days after its reimbursement obligation is triggered, as described in § 24.247(b).

(b) *Eligibility for Installment Payments.* PCS licensees that are allowed to pay for their licenses in installments under

our designated entity rules will have identical payment options available to them with respect to payments under the cost-sharing plan. The specific terms of the installment payment mechanism, including the treatment of principal and interest, are the same as those applicable to the licensee's installment auction payments. If, for any reason, the entity eligible for installment payments is no longer eligible for such installment payments on its license, that entity is no longer eligible for installment payments under the cost-sharing plan. UTAM may make quarterly payments over a five-year period with an interest rate of prime plus 2.5 percent. UTAM may also negotiate separate repayment arrangements with other parties.

[61 FR 29693, June 12, 1996, as amended at 62 FR 12757, Mar. 18, 1997]

### § 24.251 Dispute resolution under the Cost-Sharing Plan.

Disputes arising out of the cost-sharing plan, such as disputes over the amount of reimbursement required, must be brought, in the first instance, to the clearinghouse for resolution. To the extent that disputes cannot be resolved by the clearinghouse, parties are encouraged to use expedited ADR procedures, such as binding arbitration, mediation, or other ADR techniques.

[61 FR 29693, June 12, 1996]

### § 24.253 Termination of cost-sharing obligations.

The cost-sharing plan will sunset for all PCS entities on April 4, 2005, which is ten years after the date that voluntary negotiations commenced for A and B block PCS entities. Those PCS entities that are paying their portion of relocation costs on an installment basis must continue the payments until the obligation is satisfied.

[61 FR 29693, June 12, 1996]

## APPENDIX I TO SUBPART E OF PART 24—A PROCEDURE FOR CALCULATING PCS SIGNAL LEVELS AT MICROWAVE RECEIVERS (APPENDIX E OF THE MEMORANDUM OPINION AND ORDER)

The new Rules adopted in Part 24 stipulate that estimates of interference to fixed microwave operations from a PCS operation will be based on the sum of signals received at a microwave receiver from the PCS operation. This appendix describes a procedure for computing this PCS level.

In general, the procedure involves four steps:

1. Determine the geographical coordinates of all microwave receivers operating on co-channel and adjacent frequencies within the coordination distance of each base station and the characteristics of each receiver, *i.e.*, adjacent channel susceptibility, antenna gain, pattern and height, and line and other losses.

2. Determine an equivalent isotropically radiated power (e.i.r.p.) for each base station and equivalent e.i.r.p. values for the mobiles and portables associated with each base station. Determine the values of pertinent correction and weighting factors based on building heights and density and distribution of portables. Close-in situations, prominent hills, and extra tall buildings require special treatment.

3. Based on PCS e.i.r.p. values, correction and weighting factors, and microwave receiving system characteristics determined above, calculate the total interference power at the input of each microwave receiver, using the Longley-Rice propagation model.

4. Based on the interference power level computed in step 3, determine interference to each microwave receiver using criteria described in Part 24 and EIA/TIA Bulletin 10–F.

The interference from each base station and the mobiles and portables associated with it is calculated as follows:

$P_{rbi}=10Log\ (p_{tbi})-L_{bi}-UC_i+G_{mwi}-C_i-BP_i$

$P_{rmi}=10Log\ (n_{mi}\times p_{tmi})-L_{mi}-UC_i+G_{mwi}-C_i$

$P_{rpsi}=10Log\ (n_{psi}\times p_{tpsi})-L_{psi}-UC_i+G_{mwi}-C_i$

$P_{rpbi}=10Log\ (n_{pbi}\times p_{tpbi})-L_{pbi}-UC_i-(BP_i-BH_i)+G_{mwi}-C_i$

$P_{rpri}=10Log\ (n_{pri}\times p_{tpri})-L_{pri}-(UC_i-BH_i)+G_{mwi}-C_i$

where:

P refers to Power in dBm

p refers to power in milliwatts

$P_{rbi}$=Power at MW receiver from ith base station in dBm

$p_{tbi}$=e.i.r.p. transmitted from ith base station in milliwatts, which equals average power per channel × number of channels × antenna gain with respect to an isotropic antenna − line loss

$L_{bi}$=Path loss between MW and base station site in dB

$UC_i$=Urban correction factor in dB

$G_{mwi}$=Gain of MW antenna in pertinent direction (dBi)

$C_i$=Channel discrimination of MW system in dB

$P_{rmi}$=Power at MW receiver from mobiles associated with ith base station

$p_{tmi}$=e.i.r.p. transmitted from mobiles associated with ith base station

$n_{mi}$=Number of mobiles associated with ith base station
$L_{mi}$=Path loss between MW and mobile transmitters in dB
$P_{rpsi}$=Power at MW receiver from outdoor portables (s for sidewalk)
$p_{tpsi}$=e.i.r.p. transmitted from outdoor portables associated with ith base station
$n_{psi}$=Number of outdoor portables associated with ith base station
$L_{psi}$=Path loss between MW and outdoor portables in dB
$P_{rpbi}$=Power at MW receiver from indoor portables (b for building)
$p_{tpbi}$=e.i.r.p. transmitted from indoor portables associated with ith base station
$n_{pbi}$=number of indoor portables associated with ith base station
$L_{pbi}$=Path loss in dB between MW and base station site (using average building height divided by 2 as effective antenna height)
$P_{rpri}$=Power at MW receiver from rooftop portables (r for rooftop)
$p_{tpri}$=e.i.r.p. transmitted from rooftop portables associated with ith base station
$n_{pri}$=Number of rooftop portables associated with ith base station
$L_{pri}$=Path loss in dB between MW and base station site (using average building height as effective antenna height)
$BP_i$=Building penetration loss at street level in dB
$BH_i$=Height gain for portables in buildings dB=2.5×(nf–1), where nf is number of floors

NOTE: where $C_i$ varies from channel-to-channel, which often is the case, the summation process is more complex, requiring summation at a channel level first.

Finally, the total PCS interference power at a given microwave receiver from all the base stations in a given frequency band is found by summing the contributions from the individual stations. Likewise, the total interference power at a given microwave receiver from all mobiles and portables operating in a given frequency band is found by summing the contributions from the mobiles and portables associated with each cell.

$$p_{rb} = \sum_i p_{rbi} \text{ milliwatts}$$

$$p_{rm} = \sum_i \left( p_{rmi} + p_{rpsi} + p_{rpbi} + p_{rpri} \right) \text{milliwatts}$$

$$P = 10 \text{ Log}(p) \text{ dBm}$$

*Base Stations.* Interference from each base station to each microwave should normally be considered independently. A group of base stations having more or less (within ±50 percent) the same height above average terrain, the same e.i.r.p., basically the same path to a microwave receiving site, and subtending an angle to that receiving site of less than 5 degrees, may be treated as a group, using the total power of the group and the average antenna height of the group to calculate path loss, L.

*Mobile Stations.* The e.i.r.p. from mobile transmitters is weighted according to the number of base station channels expected to be devoted to mobile operation at any given time. The antenna height of mobiles used in calculating path loss, L, is assumed to be 2 meters.

*Portable Stations.* The e.i.r.p. from the portable units associated with each base station is weighted according to the estimated portion of portables associated with that cell expected to be operated inside buildings at any given time and the portion which could be expected to be operating from elevated locations, such as balconies or building rooftops. For example, in the case of service intended for business use in an urban area, one might expect that perhaps 85 percent of the portables in use at any given time would be operating from within buildings and perhaps 5 percent might be operating from rooftops or balconies. The remaining 10 percent would be outside at street level.

Calculation of an equivalent e.i.r.p. for cells in suburban areas will involve different weighting criteria.

*Urban Correction Factor.* The urban correction factor (UC) depends on the height and density of buildings surrounding a base station. For the core area of large cities, it is assumed to be 35 dB. For medium size cities and fringe areas of large cities (4- to 6-story buildings with scattered taller buildings and lower buildings and open spaces) it is assumed to be 25 dB; for small cities and towns, 15 dB, and for suburban residential areas (one- and two-story, single family houses with scattered multiple-story apartment buildings, shopping centers and open areas), 10 dB.

The unadjusted urban correction factor, UC, should not be applied to base station antenna heights that are greater than 50 percent of the average building height for a cell.

*Building Height and Building Penetration Factors.* The building height correction, BH, is a function of the average building height within the nominal coverage area of the base station. It is used in conjunction with the building penetration loss, BP, to adjust the expected interference contribution from that portion of the portables transmitting from within buildings. The adjustment is given by:

BP=20 dB in urban areas
BP=10 dB in suburban areas
BH=2.5×(nf–1) dB

where nf is the average height (number of floors) of the buildings in the area.

(Note that this formula implies a net gain when the average building height is greater than 8 floors). All buildings more than twice the average height should be considered individually. The contribution to BH from that portion of portables in the building above the average building height should be increased by a factor of 20Log(h) dB, where h is the height of the portables above the average building height in meters.

*Channel Discrimination Factor.* A factor based on the interference selectivity of the microwave receiver.

*Propagation Model.* The PCS to microwave path loss, L, is calculated using the Longley-Rice propagation model, Version 1.2.2., in the point-to-point mode. The Longley-Rice [1] model was derived from NBS Technical Note 101 [2], and updated in 1982 by Hufford [3]. Version 1.2.2 incorporated modifications described in a letter by Hufford [4] in 1985. Terrain elevations used as input to the model should be from the U.S. Geological Survey 3-second digitized terrain database.

*Special Situations.* If a cell size is large compared to the distance between the cell and a microwave receiving site so that it subtends an angle greater than 5 degrees, the cell should be subdivided and calculations should be based on the expected distribution of mobiles and portables within each subdivision.

If terrain elevations within a cell differ by more than a factor of two-to-one, the cell should be subdivided and microwave interference calculations should be based on the average terrain elevation for each subdivision.

If a co-channel PCS base station lies within the main beam of a microwave antenna (±5 degrees), there is no intervening terrain obstructions, and the power at the microwave receiver from that base station, assuming free space propagation, would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

If any part of a cell or cell subdivision lies within the main beam of a co-channel microwave antenna, there is no intervening terrain obstructions, and the accumulative power of 5 percent or less of the mobiles, assuming free space propagation would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

If a building within a cell or cell subdivision lies within the main beam of a co-channel microwave antenna, there is no intervening terrain obstructions, and the cumulative power of 5 percent or fewer of the portables, assuming free space propagation, would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

REFERENCES:

1. Longley, A.G. and Rice, P.L., ''Prediction of Tropospheric Radio Transmission Loss Over Irregular Terrain, A Computer Method-1968'', ESSA Technical Report ERL 79–ITS 67, Institute for Telecommunications Sciences, July 1968.

2. Rice, P.L. Longley, A.G., Norton, K.A., Barsis, A.P., ''Transmission Loss Predictions for Tropospheric Communications Circuits,'' NBS Technical Note 101 (Revised), Volumes I and II, U.S. Department of Commerce, 1967.

3. Hufford, G.A., Longley, A.G. and Kissick, W.A., ''A Guide to the use of the ITS Irregular Terrain Model in the Area Prediction Mode'', NTIA Report 82–100, U.S. Department of Commerce, April 1982. Also, Circular letter, dated January 30, 1985, from G.A. Hufford, identifying modifications to the computer program.

4. Hufford, G.A., Memorandum to Users of the ITS Irregular Terrain Model, Institute for Telecommunications Sciences, U.S. Department of Commerce, January 30, 1985.

## Subpart F—Competitive Bidding Procedures for Narrowband PCS

SOURCE: 59 FR 26747, May 24, 1994, unless otherwise noted.

### § 24.301 Narrowband PCS subject to competitive bidding.

Mutually exclusive initial applications for narrowband PCS service licenses are subject to competitive bidding. The general competitive bidding procedures set forth in part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

[67 FR 45367, July 9, 2002]