

II. Part 15 of Chapter I of Title 47 of the Code of Federal Regulations is amended as follows:

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. The Table of Contents of Part 15, Subpart D, is revised to read as follows:

* * * * *

Subpart D -- Unlicensed Personal Communications Services Devices

* * * * *

15.321 Specific requirements for asynchronous devices operating in the 1910-1920 MHz sub-band.

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

* * * * *

3. Section 15.301 is revised to read as follows:

§ 15.301 Scope.

This subpart sets out the regulations for unlicensed personal communications services (PCS) devices operating in the 1910-1930 MHz frequency band.

4. Sections 15.303(g) and (j) are revised to read as follows:

§ 15.303 Definitions.

* * * * *

(g) *Personal Communications Services (PCS) Devices [Unlicensed].* Intentional radiators operating in the frequency band 1910-1930 MHz that provide a wide array of mobile and ancillary fixed communication services to individuals and businesses.

* * * * *

(j) *Thermal noise power.* The noise power in watts defined by the formula $N=kTB$ where N is the noise power in watts, k is Boltzmann's constant, T is the absolute temperature in degrees Kelvin (e.g., 295° K) and B is the emission bandwidth of the device in hertz.

* * * * *

5. Sections 15.307(a),(d), and (e) are revised and new subparagraphs (a)(1) and (2) are added as follows:

§ 15.307 Coordination with fixed microwave service.

(a) UTAM, Inc., is designated to coordinate and manage the transition of the 1910-1930 MHz band from Private Operational-Fixed Microwave Service (OFS) operating under Part 94 of this Chapter to unlicensed PCS operations, conditioned upon submittal to and acceptance by the Commission of:

(1) A funding plan that is equitable to all prospective manufacturers of unlicensed PCS devices; and

(2) A plan for "band clearing" that will permit the implementation of noncoordinatable (nomadic) devices and, in particular, noncoordinatable data PCS devices, as promptly as possible. The responsibilities of UTAM, Inc. include, but are not limited to, relocation of existing OFS microwave stations pursuant to requirements established in ET Docket No. 92-9, negotiating costs of relocation, ensuring that comparable facilities are provided, and resolving any disputes of interference to OFS microwave operations from unlicensed PCS operations. These responsibilities shall terminate upon a determination by the Commission that interference to OFS microwave operations from unlicensed PCS operations is no longer a concern.

* * * * *

(d) A coordinatable PCS device is required to incorporate means that ensure that it cannot be activated until its location has been coordinated by UTAM, Inc. The application for certification shall contain an explanation of all measures taken to prevent unauthorized operation. This explanation shall include all procedural safeguards, such as the mandatory use of licensed technicians to install the equipment, and a complete description of all technical features controlling activation of the device.

(e) A coordinatable PCS device shall incorporate an automatic mechanism for disabling operation in the event it is moved outside the geographic area where its operation has been coordinated by UTAM, Inc. The application for certification shall contain a full description of the safeguards against unauthorized relocation and must satisfy the Commission that the safeguards cannot be easily defeated.

* * * * *

6. Section 15.311 is revised to read as follows:

§ 15.311 Labelling requirements.

In addition to the labelling requirements of Section 15.19(a)(3), all devices authorized under this subpart must bear a prominently located label with the following statement:

Installation of this equipment is subject to notification and coordination with UTAM, Inc. Any relocation of this equipment must be coordinated through, and approved by UTAM. UTAM may be contacted at [insert UTAM's toll-free number].

7. Paragraphs (a) and (i) of Section 15.319 are revised to read as follows:

§ 15.319 General technical requirements.

(a) The 1910-1920 MHz sub-band is limited to use by asynchronous devices under the requirements of Section 15.323. The 1920-1930 MHz sub-band is limited to use by isochronous devices under the requirements of Section 15.321.

* * * * *

(i) The device must comply with IEEE C95.1-1991 (ANSI/IEEE C95.1-1992), "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." Measurement methods are specified in IEEE C95.3-1991, "Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave." Copies of these standards are available from the IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, telephone 1-800-678-4333. All equipment shall be considered to operate in an "uncontrolled" environment. The application for certification must contain a statement confirming compliance with IEEE C95.1-1991. Technical information showing the basis for this statement must be submitted to the Commission upon request. PCS hand-held devices whose radiated power is 100 milliwatts or less are excluded from SAR testing requirements as long as a 2.5 cm separation is maintained between the radiating structure and the body of the user. The ANSI/IEEE standard uses the term "radiated power" as meaning the input power to the antenna.

* * * * *

8. Section 15.323 is redesignated as Section 15.321. In the new Section 15.321, paragraphs (a),(b),(c)(1)and(4),(d), and (e) are revised to read as follows and paragraph (g) is deleted:

§ 15.321 Specific requirements for asynchronous devices operating in the 1910-1920 MHz sub-band.

(a) Operation shall be contained within the 1910-1920 MHz sub-band. The emission bandwidth of any intentional radiator operating in this sub-band shall be no less than 500 kHz.

(b) All systems of less than 2.5 MHz emission bandwidth shall start searching for an available spectrum window within 3 MHz of the sub-band edge at either 1910 or 1920 MHz, while systems of more than 2.5 MHz emission bandwidth will first occupy the center half of the sub-band. Devices with an emission bandwidth of less than 1.0 MHz may not occupy the center half of the sub-band if other spectrum is available.

(c) * * *

(1) Immediately prior to initiating a transmission, devices must monitor the spectrum window they intend to use for at least 50 microseconds.

* * * * *

(4) After completion of a transmission, an individual device or cooperating group of devices must cease transmission and wait a deference time randomly chosen from a uniform random distribution ranging from 50 to 750 microseconds, after which time an attempt to access the band again may be initiated. For each occasion that an access attempt fails after the initial inter-burst interval, the range of the deference time chosen shall double until an upper limit of 12 milliseconds is reached. The deference time remains at the upper limit of 12 milliseconds until an access attempt is successful. The deference time is re-initialized after each successful access attempt.

* * * * *

(6) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

* * * * *

(d) Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the channel edges and 1.25 MHz above or below the channel; 50 dB between 1.25 and 2.5 MHz above or below the channel; and 60 dB at 2.5 MHz or greater above or below the channel. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

(e) The frequency stability of the carrier frequency of intentional radiators operating in this sub-band shall be ± 10 ppm over 10 milliseconds or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to $+50^{\circ}$ Celsius at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20 degrees Celsius. For equipment that is capable of operating only from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

9. Section 15.321 is redesignated as Section 15.323. In the new Section 15.323, paragraphs (a),(b),(c)(1),(4),(6),(8),(d) and (f) are revised and new subparagraphs (c)(10), (c)(11), and (c)(12) are added to read as follows:

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

(a) Operation shall be contained within one of eight 1.25 MHz channels starting with 1920-1921.25 MHz and ending with 1928.75-1930 MHz. Further sub-division of a 1.25 MHz channel is permitted with a reduced power level, as specified in Section 15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.

(b) Intentional radiators with an intended emission bandwidth less than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1920 MHz and search upward from that point. Devices with an intended emission bandwidth greater than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1930 MHz and search downward from that point.

(c) * * *

(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit to determine if the access criteria are met.

* * * * *

(4) Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signalling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.

* * * * *

(6) If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

* * * * *

(8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

* * * * *

(10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

(11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within the 1.25 MHz frequency channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

(12) The provisions of (c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

(d) Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the channel edges and 1.25 MHz above or below the channel; 50 dB between 1.25 and 2.5 MHz above or below the channel; and 60 dB at 2.5 MHz or greater above or below the channel. Systems that further sub-divide a 1.25 MHz channel into X sub-channels must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 40 dB below the transmit power permitted for that device; in the bands between B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the 1.25 MHz channel edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement

instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

* * * * *

(f) The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to $+50^{\circ}$ degrees C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20° C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

III. Part 24 of Chapter I of Title 47 of the code of Federal Regulations is amended as follows:

PART 24--PERSONAL COMMUNICATIONS SERVICES

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

AUTHORITY: Secs. 4, 301, 302, 303, and 332, 48 Stat. 1066, 1082, as amended; 47 U.S.C. Sections 154, 301, 302, 303, and 332, unless otherwise noted.

2. In Section 24.1, paragraph (b) is revised to read as follows:

§ 24.1 Basis and purpose.

* * * * *

(b) Purpose. This part states the conditions under which portions of the radio spectrum are made available and licensed for PCS.

* * * * *

3. Section 24.3 is revised to read as follows:

§ 24.3 Permissible communications.

PCS licensees may provide any mobile communications service on their assigned spectrum. Fixed services may be provided only if ancillary to mobile operations. Broadcasting as defined in the Communications Act is prohibited.

4. Section 24.10 is revised to read as follows:

§ 24.10 Scope.

This subpart contains some of the procedures and requirements for filing applications for licenses in the personal communications services. One also should consult Subparts F and G of this part. Other Commission rule parts of importance that may be referred to with respect to licensing and operation of radio services governed under this part include 47 C.F.R. Parts 0, 1, 2, 5, 15, 17 and 20.

5. Section 24.11 is revised to read as follows:

§ 24.11 Initial authorization.

(a) An applicant must file an application for an initial authorization in each market and frequency block desired.

(b) Blanket licenses are granted for each market and frequency block. Applications for individual sites are not required and will not be accepted.

6. Section 24.52 is revised to read as follows:

§ 24.52 RF hazards.

(a) Licensees and manufacturers are required to ensure that their facilities and equipment comply with IEEE C95.1-1991 (ANSI/IEEE C95.1-1992), "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." Measurement methods are specified in IEEE C95.3-1991, "Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave." Copies of these standards are available from IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. Telephone: 1-800-678-4333. The limits for both "controlled" and "uncontrolled" environments, as defined by IEEE C95.1-1991, will apply to all PCS base and mobile stations, as appropriate. The application for equipment authorization must contain a statement confirming compliance with IEEE C95.1-1991. Technical information showing the basis for this statement must be submitted to the Commission upon request.

(b) PCS hand-held devices whose maximum radiated power is 100 milliwatts or less are not required to be evaluated for compliance with ANSI/IEEE SAR (specific absorption rate) requirements, as long as a 2.5 cm separation distance is maintained between the radiating structure and the body of the user. (The ANSI/IEEE standard uses the term "radiated power," meaning input power to the antenna.)

(c) For further information on the Commission's environmental rules see Section 1.1301 et seq.

7. Subpart E is revised to read as follows:

Subpart E--Broadband PCS

§ 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 below. 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 as the Office of Engineering and Technology's Technical Information Center, Room 7317, 2025 M Street, N.W., Washington, D.C.

(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; Mayaguez/Aguadilla-Ponce, Puerto Rico; San Juan, Puerto Rico; and the United States Virgin Islands. The Mayaguez/Aguadilla-Ponce BTA consists of the following municipalities: Adjuntas, Aguada, Aguadilla, Anasco, Arroyo, Cabo Rojo, Coamo, Guanica, Guayama, Guayanilla, Hormigueros, Isabela, Jayuya, Juana Diaz, Lajas, Las Marias, Mayaguez, Maricao, Maunabo, Moca, Patillas, Penuelas, Ponce, Quebradillas, Rincon, Sabana Grande, Salinas, San Germain, Santa Isabel, Villalba, and Yauco. The San Juan BTA consists of all other municipalities in Puerto Rico.

§ 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 10 years of being licensed. 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 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.

§ 24.204 Cellular eligibility.

(a) 10 MHz Limitation. Until January 1, 2000, no license(s) for broadband PCS in excess of 10 MHz shall be granted to any party (including all parties under common control) if the grant of such license(s) will result in significant overlap of the PCS licensed service area(s) (MTAs or BTAs) and the cellular geographic service area(s) (CGSA) of licensee(s) in the Domestic Public Cellular Radio Telecommunications Service directly or indirectly owned, operated, or controlled by the same party.

(b) **15 MHz Limitation.** After January 1, 2000, no license(s) for broadband PCS in excess of 15 MHz shall be granted to any party (including all parties under common control) if the grant of such license(s) will result in significant overlap of the PCS licensed service area(s) (MTAs or BTAs) and the cellular geographic service area(s) (CGSA) of licensee(s) in the Domestic Public Cellular Radio Telecommunications Service directly or indirectly owned, operated, or controlled by the same party.

(c) **Significant Overlap.** For purposes of Subsections (a) and (b) of this section, significant overlap of a PCS licensed service area and CGSA(s) occurs when ten or more percent of the population of the PCS service area, as determined by the 1990 census figures for the counties contained therein, is within the CGSA(s).

(d) **Ownership Attribution.**

(1) For purposes of Subsections (a) and (b) of this section, "control" means majority voting equity ownership, any general partnership interest, or any means of actual working control (including negative control) over the operation of the licensee, in whatever manner exercised.

(2) For purposes of applying Subsections (a) and (b) of this section, and for purposes of Subsection (c) of Section 24.229 (40 MHz limit in same geographic area), ownership and other interests in broadband PCS licensees or applicants and cellular licensees will be attributed to their holders pursuant to the following criteria:

(i) Partnership and other ownership interests and any stock interest amounting to 5 percent or more of the equity, or outstanding stock, or outstanding voting stock of a broadband PCS licensee or applicant will be attributable.

(ii) Partnership and other ownership interests and any stock interest amounting to 20 percent or more of the equity, or outstanding stock, or outstanding voting stock of a cellular licensee will be attributable, except that ownership will not be attributed unless the partnership and other ownership interests and any stock interest amount to 40 percent or more of the equity, or outstanding stock, or outstanding voting stock of a cellular licensee if the ownership interest is held by a small business, a rural telephone company, or a business owned by minorities and/or women, as these terms are defined in Section 1.2110 of the Commission's Rules, or if the ownership interest is held by an entity with a non-controlling equity interest in a broadband PCS licensee or applicant that is a business owned by minorities and/or women.

(iii) Stock interests held in trust shall be attributed to any person who holds or shares the power to vote such stock, to any person who has the sole power to sell such stock, and, in the case of stock held in trust, to any person who has the right to revoke the trust at will or to replace the trustee at will. If the trustee has a familial, personal or extra-trust business relationship to the grantor or the beneficiary, the grantor or beneficiary, as appropriate, will be attributed with the stock interests held in trust.

(iv) Non-voting stock shall be attributed as an interest in the issuing entity if in excess of the amounts set forth above.

(v) Debt and instruments such as warrants, convertible debentures, options or other interests (except non-voting stock) with rights of conversion to voting interests shall not be attributed unless and until conversion is effected, except that this provision does not apply in determining whether an entity is a small business, a rural telephone company, or a business owned by minorities and/or women, as these terms are defined in Section 1.2110 or other provisions of the Commission's Rules.

(vi) Limited partnership interests shall be attributed to limited partners and shall be calculated according to both the percentage of equity paid in and the percentage of distribution of profits and losses.

(vii) Officers and directors of a broadband PCS licensee or applicant or a cellular licensee shall be considered to have an attributable interest in the entity with which they are so associated. The officers and directors of an entity that controls a PCS licensee or applicant or a cellular licensee shall be considered to have an attributable interest in the broadband PCS licensee or applicant or a cellular licensee.

(e) [Reserved]

(f) Cellular Divestiture. Parties holding controlling or attributable ownership interests in cellular licensees may be a party to a broadband PCS application (i.e., have a controlling or attributable interest in a broadband PCS applicant), and such PCS applicant will be eligible for more than one 10 MHz broadband PCS license and/or 30 MHz broadband PCS license(s) pursuant to the divestiture procedures set forth in paragraphs (1) through (3) of this subsection; Provided, however, that these divestiture procedures shall be available only for parties with controlling or attributable ownership interests in cellular licensees where the CGSA(s) covers 20 percent or less of the PCS service area population.

(1) The broadband PCS applicant shall certify on its short-form auction application, filed in accordance with Section 24.305, that it and all parties to the application will come into compliance with the limitations on common ownership of cellular and broadband PCS interests set forth in this section.

(2) If such an applicant is a successful bidder, it must submit with its long-form application (see Section 24.307) a signed statement describing its efforts to date and future plans to come into compliance with the limitations on common ownership of cellular and broadband PCS interests set forth in this section.

(3) If such an applicant is otherwise qualified, its application will be granted subject to a condition that the licensee shall come into compliance with the limitations on common ownership of cellular and broadband PCS interests set forth in this section within ninety (90) days of final grant.

(i) Parties holding controlling interests in cellular licensees that conflict with the attribution threshold or service overlap limitations set forth above will be considered to have come into compliance if they have submitted to the Commission an application for assignment of license or transfer of control of the cellular licensee (see Section 22.39) by which, if granted, such parties no longer would have an attributable interest in the cellular license. If no such assignment or transfer application is tendered to the Commission within ninety (90) days of final grant, the Commission may consider the short-form certification and the long-form divestiture statement to be material, bad faith misrepresentations and will invoke the condition on the PCS license, cancelling it automatically, retain all monies paid to the Commission, and, based on the facts presented, take any other action it may deem appropriate. Divestiture may be to an interim trustee if a buyer has not been secured in the required time frame, as long as the applicant has no interest in or control of the trustee, and the trustee may dispose of the license as it sees fit.

(ii) Where parties to broadband PCS applications hold less-than-controlling (but still attributable) interests in cellular licensee(s), they shall submit, within ninety days of final

grant, a certification that the applicant and all parties to the application have come into compliance with the limitations on common ownership of cellular and broadband PCS interests set forth in this section.

NOTE 1: For purposes of the cellular ownership attribution limit, all ownership interests in cellular operations that serve 10 or more percent of the population of the PCS service area should be included in determining the extent of a PCS applicant's cellular ownership.

NOTE 2: When a party owns an attributable interest in more than one cellular system that overlaps a PCS service area, the total population in the overlap area will apply on a cumulative basis.

EXAMPLE 1: Company A holds a 15 percent non-controlling ownership interest in Cellular Licensee X and a 15 percent non-controlling ownership interest in Cellular Licensee Y. Cellular Licensee X covers 30 percent of the population of the PCS service area and Cellular Licensee Y covers 10 percent of the population of the PCS service area. A broadband PCS applicant in which Company A holds an attributable ownership interest will be eligible for a broadband PCS license or licenses for more than 10 MHz because Company A does not hold attributable ownership interests in cellular operations which together include ten or more percent of the population of the PCS service area.

EXAMPLE 2: Cellular Company A owns a 45 percent non-controlling interest in cellular license 1, and a 22 percent non-controlling interest in both cellular licenses 2 and 3. Cellular license 1 includes 15 percent of the pops in BTA 1. Cellular license 2 covers 7 percent of the pops in BTA 2 and 5 percent of the pops in BTA 3. Cellular license 3 covers 7 percent of the pops in BTA 3. Together Cellular licenses 1, 2 and 3 cover 9 percent of the pops in MTA 1.

If Cellular Company A is not a designated entity, it can purchase 40 MHz of spectrum in BTA 2 or in MTA 1. It can acquire only 10 MHz in BTA 1 or BTA 3 because it is considered to have ownership interests in 15 percent of the pops in BTA 1 and 12 percent of the pops in BTA 3.

If Cellular Company A wants to acquire 40 MHz of spectrum in BTA 3 it can either agree to divest either cellular license 2 or 3, or it can invest as a non-controlling investor in a PCS license that is held and controlled by a business owned by minorities and/or women.

If Cellular Company A wants to acquire 40 MHz of spectrum in BTA 1 it can agree to divest its interests in cellular license 1. It cannot invest as a non-controlling investor in a business owned by minorities and/or women because its 45 percent ownership of license 1 will be attributed, since it is greater than the 40 percent threshold.

If Cellular Company A is a designated entity, it can acquire 40 MHz of PCS spectrum in every area except BTA 1, where it is considered to have an ownership interest in 25 MHz of spectrum already because it is over the 40 percent threshold.

EXAMPLE 3: Cellular Company A owns a 45 percent non-controlling interest in cellular license 1 that covers 5 percent of the pops in BTA 1. Cellular Company A also owns a 21 percent non-controlling interest in cellular license 2 that covers 9 percent of the pops in BTA 1. If Cellular Company A is not a designated entity, then it can buy only 10 MHz of spectrum, because it is considered to have an ownership interest of 14 percent of the pops in BTA 1. If it wants to buy 30 MHz it would have to certify before the auction that it will divest either cellular license 1 or 2.

If Cellular Company A is a designated entity, then it would be considered to have an ownership interest in only 5 percent of the pops in BTA 1 and would thus be eligible to buy up to 40 MHz in BTA 1.

EXAMPLE 4: Company A holds a 10 percent interest in Cellular Licensee 1. Company B holds a 10 percent interest in Cellular Licensee 1. Cellular Licensee 1 covers more than 10 percent of the population of the PCS service area. Neither Company A nor Company B is a designated entity. A PCS entity with interests held by Company A and Company B is ineligible for a 30 MHz PCS license because the attributable ownership in cellular license 1 is 20 percent.

EXAMPLE 5: Same as Example 4 except that Company A and Company B are designated entities. The PCS entity is eligible for a 30 MHz PCS license because the attributable cellular ownership is less than 40 percent.

§ 24.229 Frequencies.

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

(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;

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

Block E: 1885-1890 MHz paired with 1965-1970 MHz; and

Block F: 1890-1895 MHz paired with 1970-1975 MHz.

(c) PCS licensees shall not have an ownership interest in frequency blocks that total more than 40 MHz and serve the same geographic area. For the purpose of this section, PCS licensees are entities having an ownership interest of 5 or more percent or other attributable ownership interest, as defined in Section 24.204(d), in a PCS license.

EXAMPLE 1: Company A, which is a rural telephone company with no cellular interests, buys a 7 percent stake in a 30 MHz BTA that constitutes 8 percent of the population in MTA 1, which encompasses BTA 1. It is then offered an opportunity to buy 8 percent of the equity in a 30 MHz license in MTA 1. It cannot accept this offer because it would be over the 5 percent threshold on two overlapping PCS licenses. Its status as a rural telephone company has no impact on the 5 percent threshold for PCS licensees.

EXAMPLE 2: Company A has two investors, Company B and Company C. Company B owns 15 percent of Company A. Company C, a rural telephone company, owns 25 percent of Company A. Company B and Company C do not have any interests in each other.

Company B has 100 percent ownership of cellular license 1 that covers 20 percent of the pops in BTA 1 and 6 percent of the pops in MTA 1. Company C owns 25 percent of cellular license 2 that covers 20 percent of the pops in BTA 2 and 6 percent of the pops in MTA 1. Company A has no separate cellular interests. MTA 1 encompasses both BTA 1 and BTA 2.

Company A cannot purchase 30 MHz of spectrum in BTA 1. Such a purchase would put Company B over the aggregation limit of 40 MHz in BTA 1 because it would have over 5 percent ownership of the PCS license in addition to its cellular license.

Company A can, however, purchase 30 MHz in BTA 2 or MTA 1 because Company C is a rural telephone company, and thus Company C's interest in cellular license 2 falls below the 40 percent threshold and is not counted against the spectrum cap. If Company C were not a rural telephone company, then Company A could not acquire 30 MHz in BTA 2 or MTA 1 because its partners in those licenses would be over the spectrum cap.

Company B can also buy 30 MHz in BTA 2 or MTA 1 as long as Company A does not also buy 30 MHz in BTA 2 or MTA 1 because Company B and Company C have no joint ownership.

Company C can also buy 30 MHz in BTA 1 or 2 or MTA 1 as long as Company A does not also buy in the region where Company C buys. If Company A were to buy a 30 MHz MTA 1 license, then Company B and C would be prohibited from acquiring either of the BTAs because they would be over the 5 percent threshold for PCS spectrum in the same region.

(d) After January 1, 2000, licensees that have met the 5-year construction requirement may assign portions of licensed PCS spectrum. In no case may an assignee aggregate more than 40 MHz of PCS/cellular spectrum.

§ 24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) power with an antenna height up to 300 meters HAAT. See Section 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power; see Table 1 of this section. In no case may the peak output power of a base station transmitter exceed 100 watts. The service area boundary limit and microwave protection criteria specified in Section 24.236 and Section 24.237 apply.

Table 1. Reduced Power for Base Station Antenna Heights Over 300 Meters

HAAT in meters	Maximum e.i.r.p. (watts)
≤ 300	1,640
≤ 500	1,070
≤ 1,000	490
≤ 1,500	270
≤ 2,000	160

(b) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

(c) 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.

§ 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 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 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 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 Section 21.100(d) 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 2 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 2: Coordination Distances In Kilometers

e.i.r.p. (W)	PCS Base Station Antenna HAAT in Meters												
	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	
500	328	331	335	343	352	359	365	370	375	391	421		
1000	354	357	361	369	378	385	391	397	402	418			
1200	361	364	368	376	385	392	398	404	409				
1640	372	375	379	388	397	404	410	416	421				

NOTE: If actual value does not match table values, round to the closest higher value on this table. See Section 24.53 for HAAT calculation method.

(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 systems, 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 the 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 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.

§ 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 plus $10 \log_{10} (P)$ decibels or 80 decibels, whichever is the lesser attenuation.

NOTE: 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.

(b) 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: List of Parties

I. Petitioners

1. Advanced Cordless Technologies (ACT)
2. Alcatel Network System, Inc. (Alcatel)
3. Alliance of Rural Area Telephone and Cellular Service Providers (Alliance)
4. American Personal Communications (APC)
5. American Petroleum Institute (API)
6. American Telephone and Telegraph (AT&T)
7. Ameritech
8. AMSC Subsidiary Corporation (AMSC)
9. Anchorage Telephone Utility
10. Apple Computer, Inc. Emergency Petition of September 13, 1993
11. Apple Petition for Reconsideration and Clarification of December 22, 1993
12. Association of Public-Safety Communications Officials (APCO)
13. Bell Atlantic Personal Communications, Inc. (Bell Atlantic)
14. BellSouth Corporation
15. Blooston, Mordorfsky, Jackson & Dickens (Blooston)
16. Chickasaw Telephone Co., Cincinnati Bell Telephone Co., Illinois Consolidated Telephone Co., Milling Telephone Co., and Roseville Telephone Co. (CCIMR)
17. Columbia Cellular Corp. (Columbia)
18. Comcast Corp.
19. COMSAT Corp. (Comsat)
20. Concord Telephone Co. (Concord)
21. Cellular Telecommunications Industry Association (CTIA)
22. Duncan, Weinberg, Miller & Pembroke, P. C. (DWMP)
23. Ericsson Corporation
24. Florida Cellular RSA Limited Partnership (Florida Cellular)
25. General Communications, Inc. (GCI)
26. GTE Service Corporation (GTE)
27. Iowa Network Services, Inc. (INS)
28. Killen & Associates, Inc.
29. LACE, Inc. (Lace)
30. McCaw Cellular Communications, Inc. (McCaw)
31. MCI Telecommunications Corp. (MCI)
32. Mebtel, Inc.
33. Metricom, Inc.
34. Motorola Inc.
35. Murray, George E. (Murray)
36. National Communications System, Manager of the (NCS)
37. National Telephone Cooperative Association (NTCA)
38. Nextel Communications, Incorporated (Nextel; formerly Fleet Call)
39. Northern Telecom Inc.
40. NYNEX Corporation

41. **Organization for the Protection and Advancement of Small Telephone Companies (OPASTCO)**
42. **Pacific Bell and Nevada Bell (PacBell)**
43. **Pacific Telecom Cellular, Inc. (Pacific Telecom)**
44. **PacTel Corp.**
45. **PCS Action, Incorporated**
46. **Pegasus Communications, Inc. (Pegasus)**
47. **Personal Network Services Corp. (PNSC)**
48. **PMN, Incorporated**
49. **Point Communications Company (Point)**
50. **Radiofone, Incorporated**
51. **Rockwell International, Inc. (Rockwell)**
52. **Rural Cellular Association (RCA)**
53. **Southwestern Bell Corporation**
54. **SpectraLink Corporation**
55. **Sprint Corporation**
56. **State of Texas - Office of the Attorney General Petition**
57. **Telecommunications Industry Association - Fixed Point-to-Point Communication Section of the Network Equipment Division (TIA-NED)**
58. **Telecommunications Industry Association - Mobile and Personal Communications Division (TIA-Mobile)**
59. **Telephone and Data Systems, Inc. (TDS)**
60. **Personal Communications Industry Association (PCIA; formerly Telocator)**
61. **Time Warner Telecommunications (Time Warner)**
62. **TRW, Incorporated**
63. **U.S. Intelco Networks, Inc. (Intelco)**
64. **US West, Incorporated**
65. **Unlicensed PCS Ad Hoc Committee for 2 GHz Microwave Transition and Management (UTAM)**
66. **Utilities Telecommunications Council (UTC)**
67. **Wireless Information Networks Forum (WINForum)**

II. Opposing and Commenting Parties

1. **Advanced MobileComm Technologies, Inc. and Digital Spread Spectrum Technologies, Inc. (AMT/DSST)**
2. **Alcatel**
3. **APC**
4. **API**
5. **Apple**
6. **Association of American Railroads (AAR)**
7. **Association of Independent Designated Entities (AIDE)**
8. **APCO**

9. Bell Atlantic
10. Cablevision Systems Corporation (Cablevision)
11. Cellular Information Systems, Incorporated (CIS)
12. Cellular Telecommunications Industry Association (CTIA)
13. Citizens Utilities Company (CUC)
14. Ericsson
15. TIA-Fixed
16. General Communication, Incorporated (GCI)
17. GTE
18. Hill & Welch
19. Interdigital Communications Corporation (Interdigital)
20. KSI, Incorporated
21. Massachusetts Emergency Telecommunications Board (Mass-Emergency)
22. McCaw
23. MCI
24. Motorola
25. Murray
26. National Emergency Number Association (NENA)
27. Nextel
28. Northern Telecom
29. NYNEX
30. Omnipoint Corporation, Incorporated (Omnipoint)
31. PacBell
32. PCS Action
33. PMN
34. Qualcomm Incorporated
35. Rand McNally & Company (Rand McNally)
36. ROLM Company (Rolm)
37. SpectraLink
38. Sprint
39. TDS
40. PCIA
41. United States Telephone Association (USTA)
42. UTAM
43. UTC
44. WINForum

III. Replying Parties

1. Alcatel
2. Alliance
3. APC
4. API
5. AT&T
6. American Wireless Communication Corporation (AWCC)
7. Ameritech
8. AMSC
9. Apple
10. AIDE
11. Association of Maximum Service Television, Incorporated (AMSTV)
12. Association of Public-Safety Communications Officials-International, Incorporated (APCO)
13. Bell Atlantic
14. CTIA
15. Comcast
16. Comsat
17. Encompass
18. Ericsson
19. Federal Communications Bar Association (FCBA)
20. GCI
21. GTE
22. Hill & Welch
23. Industrial Telecommunications Association, Inc. (ITA)
24. Loral Qualcomm Satellite Services, Incorporated (LQSS)
25. McCaw
26. MCI
27. Metricom
28. Motorola
29. National Emergency Number Association (NENA)
30. National Rural Telecom Association (NRTA)
31. NCS
31. Nextel
33. Northern Telecom
34. NYNEX
35. PacBell
36. Pacific Telecom
37. PCS Action
38. PMN
39. Radiofone
40. Rand McNally
41. Rolm

42. RCA
43. Southwestern Bell
44. Sprint
45. PCIA
46. TIA-Fixed
47. Time Warner
48. Texas Advisory Commission on State Emergency Communications (Texas Emergency)
49. TRW
50. UTAM
51. UTC
52. Intelco
53. US West
54. WINForum

IV. Opposing and Commenting Parties on Apple Emergency Petition

1. Alcatel
2. APC
3. API
4. Apple
5. AT&T
6. Business Software Alliance (BSA)
7. Compaq Computer Corporation (Compaq)
8. Comsearch
9. Cox Enterprises, Inc. (Cox)
10. Hewlett-Packard Company (HP)
11. MCI
12. Metricom
13. Microsoft Corporation
14. Northern Telecom
15. Spectralink
16. UTAM
17. UTC

V. Replying Parties on Apple Emergency Petition

1. Alcatel
2. Apple
3. AT&T
4. BSA
5. Ericsson
6. HP

7. Motorola
8. Northern Telecom
9. PacBell
10. Rolm
11. UTAM

Appendix C: Final Regulatory Flexibility Analysis

Pursuant to 5 U.S.C. Section 603, an initial Regulatory Flexibility Analysis was incorporated in the Notice of Proposed Rule Making and Tentative Decision in combined ET Docket No. 92-100 and GEN Docket No. 90-314. Written comments on the proposals in the Notice of Proposed Rule Making, including the Regulatory Flexibility Analysis, were requested. A Final Regulatory Flexibility Analysis was incorporated in the Second Report and Order in GEN Docket No. 90-314.

A. Need for and Objective of Rules: Our objective is to provide spectrum allocations, licensing and authorization rules, and technical standards for broadband PCS at 2 GHz. Authorizing this new service will make available a broad range of new services and technologies to both business users and consumers. The revised PCS rules will provide licensees and developers of unlicensed equipment the flexibility to introduce a wide variety of new and innovative telecommunications services and equipment.

B. Issues Raised by the Public in Response to the Initial and Final Analyses: A number of parties supported regulations that would facilitate participation in PCS by small businesses. Specifically, these parties argue that small frequency blocks, small service areas, and special consideration for small businesses in the licensing of PCS would facilitate small businesses participation in providing PCS services. The FCC empaneled a Small Business Advisory Committee (SBAC) that also assessed the policy implications of this proceeding for small businesses and filed a report with the Commission on September 15, 1993. The SBAC concluded that small frequency blocks with multiple licensees in each service area and a frequency block designated for qualified small, female, and minority businesses would assist entrepreneurial entry in PCS. The SBAC also suggested that the Commission consider other mechanisms to foster entry opportunities and capital formation for such groups. These issues and associated filings have been considered and addressed in the Second Report and Order and this Memorandum Opinion and Order, except issues related to licensee selection procedures. Licensing issues are the subject of a separate proceeding (PP Docket No. 93-253) that will establish rules to implement competitive bidding in broadband PCS. A Report and Order in that proceeding will be issued in the near future.

C. Any Significant Alternative Minimizing Impact on Small Entities and Consistent with Stated Objectives: We have reduced burdens wherever possible. The regulatory burdens we have retained are necessary to ensure that the public receives the benefits of broadband PCS in a prompt and efficient manner. We will continue to examine alternatives in the future with the objectives of eliminating unnecessary regulations and minimizing any significant impact on small entities.