

(3) Continuous unmodulated emissions (NON), with a power at least 10 dB less than that authorized, to prevent false indication of channel occupation.

(c) Any station in the Cellular Radiotelephone Service may transmit emissions of the following types: 40K0F3E, 40K0F3D and 40K0F1D. See also §§ 22.901 and 22.917.

(d) Basic Exchange Telephone Radio Systems in the Rural Radiotelephone Service may transmit emissions of the following type: 20K0D7W.

(e) The frequency deviation must not exceed 12 kHz for frequency modulated emissions with a bandwidth of 40 kHz, and 5 kHz for frequency modulated emissions with a bandwidth of 16 kHz.

§ 22.359 Emission masks.

Unless otherwise indicated in the rules governing a specific radio service, all transmitters intended for use in the Public Mobile Services must be designed to comply with the emission masks outlined in this section. If an emission outside of the authorized bandwidth causes harmful interference, the FCC may, at its discretion, require greater attenuation than specified in this section.

(a) Analog modulation. For transmitters other than those employing digital modulation techniques, the mean or peak envelope power of adjacent channel emissions must be attenuated below the output mean or peak envelope power of the total emission (P, in Watts) in accordance with the following schedule:

(1) On any frequency removed from the center frequency of the assigned channel by more than 50 percent up to and including 100 percent of the authorized bandwidth:

at least 25 dB;

(2) On any frequency removed from the center frequency of the assigned channel by more than 100 percent up to and including 250 percent of the authorized bandwidth:

at least 35 dB;

(3) On any frequency removed from the center frequency of the assigned channel by more than 250 percent of the authorized bandwidth:

at least $43 + 10 \log P$ dB, or 80 dB, whichever is the lesser attenuation.

(b) Digital modulation. For transmitters not equipped with an audio low pass filter and for transmitters employing digital modulation techniques, the mean or peak envelope power of sideband emissions must be attenuated below the mean or peak envelope power of the total emission (P, in Watts) in accordance with the following schedule:

(1) For transmitters that operate in the frequency ranges 35 to 44 MHz, 72 to 73 MHz, 75.4 to 76.0 MHz and 152 to 159 MHz,

(i) On any frequency removed from the center frequency of the assigned channel by a displacement frequency f_d (in kHz) of more than 5 kHz but not more than 10 kHz:

at least $83 \log (f_d+5)$ dB;

(ii) On any frequency removed from the center frequency of the assigned channel by a displacement frequency f_d (in kHz) of more than 10 kHz but not more than 250 percent of the authorized bandwidth:

at least $29 \log (f_d^2+11)$ dB or 50 dB, whichever is the lesser attenuation;

(iii) On any frequency removed from the center frequency of the assigned channel by more than 250 percent of the authorized bandwidth:

at least $43 + 10 \log P$ dB, or 80 dB, whichever is the lesser attenuation.

(2) For transmitters that operate in the frequency ranges 450 to 512 MHz and 929 to 932 MHz,

(i) On any frequency removed from the center frequency of the assigned channel by a displacement frequency f_d (in kHz) of more than 5 kHz but not more than 10 kHz:

at least $83 \log (f_d+5)$ dB;

(ii) On any frequency removed from the center frequency of the assigned channel by a displacement frequency f_d (in kHz) of more than 10 kHz but not more than 250 percent of the authorized bandwidth:

at least $116 \log (f_d+6.1)$ dB, or $50 + 10 \log P$ dB, or 70 dB, whichever is the lesser attenuation;

(iii) On any frequency removed from the center frequency of the assigned channel by more than 250 percent of the authorized bandwidth:

at least $43 + 10 \log P$ dB, or 80 dB, whichever is the lesser attenuation.

(c) Measurement procedure. Either peak or average power may be used, provided that the same technique is used for both the adjacent channel or sideband emissions and the total emission. The resolution bandwidth of the measuring instrument must be set to 300 Hz for measurements on any frequency removed from the center frequency of the assigned channel by no more than 250 percent of the authorized bandwidth and 30 kHz for measurements on any frequency removed from the center frequency of the assigned channel by more than 250 percent of the authorized bandwidth.

§ 22.361 Standby facilities.

Licensees of stations in the Public Mobile Services may install standby transmitters for the purpose of continuing service in the event of failure or during required maintenance of regular transmitters without obtaining separate authorization, provided that operation of the standby transmitters would not increase the service areas or interference potential of the stations, and that such standby transmitters use the same antenna as the regular transmitters they temporarily replace.

§ 22.363 Directional antennas.

Fixed transmitters for point-to-point operation must use a directional transmitting antenna with the major lobe of radiation in the horizontal plane directed toward the receiving antenna or passive reflector of the station for which the transmissions are intended. Directional antennas used in the Public Mobile Services must meet the technical requirements given in Table C-2.

(a) Maximum beamwidth is for the major lobe at the half power points.

(b) Suppression is the minimum attenuation for any secondary lobe referenced to the main lobe.

(c) An omnidirectional antenna may be used for fixed transmitters where there are two or more receive locations at different azimuths.

§ 22.365 Antenna structures; air navigation safety.

Licensees must not allow antenna structures to become a hazard to air navigation.

(a) Marking and lighting. Antenna structures must be marked, lighted and maintained in accordance with Part 17 of this chapter and all applicable rules and requirements of the Federal Aviation Administration. Lighting and marking specifications are contained in FCC Form 715 and FCC Form 715a.

(b) Maintenance contracts. Licensees may enter into a contract with an entity to monitor and carry out necessary maintenance of antenna structures. Licensees that make such contractual arrangements, including situations in which a common antenna structure is used, continue to be responsible for the maintenance of antenna structures in regard to air navigation safety.

§ 22.367 Wave polarization.

Public mobile station antennas must be of the correct type and properly installed such that the electromagnetic emissions have the polarization required by this section.

(a) Vertical. Waves radiated by the following must be vertically polarized:

- (1) Base, mobile, dispatch, and auxiliary test transmitters in the Paging and Radiotelephone Service;
- (2) Transmitters in the Offshore Radiotelephone Service;
- (3) Transmitters on channels in the 72-76 MHz frequency range;

(4) Base, mobile and auxiliary test transmitters in the Cellular Radiotelephone Service;

(5) Control and repeater transmitters on channels in the 900-960 MHz frequency range;

(6) Rural subscriber stations communicating with base transmitters in the Paging and Radiotelephone Service pursuant to § 22.563.

(7) Ground and airborne mobile transmitters in the Air-ground Radiotelephone Service.

(b) Horizontal. Waves radiated by transmitters in the Public Mobile Services, other than transmitters required by paragraph (a) of this section to radiate a vertically polarized wave, must be horizontally polarized, except as otherwise provided in paragraphs (c) and (d).

(c) Circular. If communications efficiency would be improved and/or interference reduced, the FCC may authorize transmitters other than those listed in paragraphs (a)(1) through (a)(7) of this section to radiate a circularly polarized wave.

(d) Any polarization. Public Land Mobile stations transmitting on channels higher than 960 MHz are not limited as to wave polarization.

§ 22.369 Quiet zones.

Quiet zones are those areas where it is necessary to restrict radiation so as to minimize possible impact on the operations of radio astronomy or other facilities that are highly sensitive to interference. The areas involved and procedures required are as follows:

(a) NRAO, NRRO. The requirements of this paragraph are intended to minimize possible interference at the National Radio Astronomy Observatory site located at Green Bank, Pocahontas County, West Virginia, and at the Naval Radio Research Observatory site at Sugar Grove, Pendleton County, West Virginia.

(1) Carriers planning to construct and operate a new or modified Public Mobile Services station at a permanent fixed location within the area bounded by N.39°15' on the north, W.78°30' on the east, N.37°30' on the south, and W.80°30' on the west must notify the Director, National Radio Astronomy Observatory, Post Office Box No. 2, Green Bank, West Virginia 24944, in writing, of the technical details of the proposed operation. The notification must include the geographical coordinates of the antenna location, the antenna

Table C-2 - Technical Requirements for Directional Antennas

Frequency range	Maximum beamwidth	Suppression
35 to 512 MHz	80°	10 dB
512 to 1500 MHz	20°	13 dB
1500 to 2500 MHz	12°	13 dB

height, antenna directivity (if any), the channel, the emission type and power.

(2) When an application for authority to operate a station is filed with the FCC, the notification required in paragraph (a)(1) of this section should be sent at the same time. The application must state the date that notification in accordance with paragraph (a)(1) of this section was made. After receipt of such applications, the FCC will allow a period of 20 days for comments or objections in response to the notifications indicated.

(3) If an objection to the proposed operation is received during the 20-day period from the National Radio Astronomy Observatory for itself or on behalf of the Naval Radio Research Observatory, the FCC will, after consideration of the record, take whatever action is deemed appropriate.

(b) Table Mountain. The requirements of this paragraph are intended to minimize possible interference at the Table Mountain Radio Receiving Zone of the Research Laboratories of the Department of Commerce located in Boulder County, Colorado.

(1) Carriers planning to construct and operate a new or modified Public Mobile Services station at a permanent fixed location in the vicinity of Boulder County, Colorado are advised to give consideration, prior to filing applications, to the need to protect the Table Mountain Radio Receiving Zone from interference. To prevent degradation of the present ambient radio signal level at the site, the Department of Commerce seeks to ensure that the field strengths of any radiated signals (excluding reflected signals) received on this 1800 acre site (in the vicinity of coordinates 40°07'50" North Latitude, 105°14'40" West Longitude) resulting from new assignments (other than mobile stations) or from the modification or relocation of existing facilities do not exceed the values given in Table C-3.

(2) Advance consultation is recommended, particularly for applicants that have no reliable data to indicate whether the field strength or power flux density figures in the above table would be exceeded by their proposed radio facilities. In general, coordination is recommended for:

(i) Stations located within 2.4 kilometers (1.5 miles);

(ii) Stations located within 4.8 kilometers (3 miles) transmitting with 50 watts or more effective radiated power (ERP) in the primary plane of polarization in the azimuthal direction of the Table Mountain Radio Receiving Zone;

(iii) Stations located within 16 kilometers (10 miles) transmitting with 1 kW or more ERP in the primary plane of polarization in the azimuthal direction of Table Mountain Radio Receiving Zone;

(iv) Stations located within 80 kilometers (50 miles) transmitting with 25 kW or more ERP in the primary plane of polarization in the azimuthal direction of Table Mountain Receiving Zone.

(3) Applicants concerned are urged to communicate with the Radio Frequency Management Coordinator, Department of Commerce, Research Support Services NOAA/E5X2, Boulder Laboratories, Boulder, CO 80303; telephone (303) 497-6548, in advance of filing their applications with the FCC.

(4) The FCC will not screen applications to determine whether advance consultation has taken place. However, such consultation may avoid the filing of objections from the Department of Commerce or institution of proceedings to modify the authorizations of stations that radiate signals with a field strength or power flux density at the site in excess of those specified herein.

(c) Federal Communications Commission protected field offices. The requirements of this paragraph are intended to minimize possible interference to FCC monitoring activities.

(1) Carriers planning to construct and operate a new or modified Public Mobile Services station at a permanent fixed location in the vicinity of an FCC protected field office are advised to give consideration, prior to filing applications, to the need to avoid interfering with the monitoring activities of that office. FCC protected field offices are listed in § 0.121 of this chapter.

(2) Applications for stations (except mobile stations) that could produce on any channel a direct wave fundamental field strength of greater than 10 mV/m (-65.8 dBW/m² power flux density assuming a free space characteristic impedance of 120 π Ω) in the authorized bandwidth at the protected field office may be examined to determine the potential for interference with monitoring activities. After consideration of the effects of the predicted field strength of the proposed station, including the cumulative effects of the signal from the proposed station with other ambient radio field strength levels at the protected field office, the FCC may add a condition restricting radiation toward the protected field office to the station authorization.

(3) In the event that the calculated field strength exceeds 10 mV/m at the protected field office site, or if there is any question whether field strength levels might exceed that level, advance consultation with the FCC to discuss possible measures to avoid interference to monitoring activities should be considered.

Table C-3 - Field Strength Limits for Table Mountain

Frequency range	Field strength	Power flux density
1.6 to 470 MHz	10 mV/m	-65.8 dBW/m ²
470 to 890 MHz	30 mV/m	-56.2 dBW/m ²
890 to 3000 MHz	1 mV/m	-85.8 dBW/m ²

Note: Equivalent values of power flux density are calculated assuming free space characteristic impedance of 376.7 Ω (120 π Ω).

Prospective applicants may communicate with: Chief, Field Operations Bureau, Federal Communications Commission, Washington, DC 20554.

(4) Advance consultation is recommended for applicants that have no reliable data to indicate whether the field strength or power flux density figure indicated would be exceeded by their proposed radio facilities. In general, coordination is recommended for:

(i) Stations located within 2.4 kilometers (1.5 miles);

(ii) Stations located within 4.8 kilometers (3 miles) with 50 watts or more average effective radiated power (ERP) in the primary plane of polarization in the azimuthal direction of the protected field offices.

(iii) Stations located within 16 kilometers (10 miles) with 1 kW or more average ERP in the primary plane of polarization in the azimuthal direction of the protected field office;

(iv) Stations located within 80 kilometers (50 miles) with 25 kW or more average ERP in the primary plane of polarization in the azimuthal direction of the protected field office;

(5) Advance coordination for stations transmitting on channels above 1000 MHz is recommended only if the proposed station is in the vicinity of a protected field office designated as a satellite monitoring facility in § 0.121 of this chapter.

(6) The FCC will not screen applications to determine whether advance consultation has taken place. However, such consultation may serve to avoid the need for later modification of the authorizations of stations that interfere with monitoring activities at protected field offices.

§ 22.371 Disturbance of AM broadcast station antenna patterns.

Public Mobile Service licensees that construct or modify towers in the immediate vicinity of AM broadcast stations are responsible for measures necessary to correct disturbance of the AM station antenna pattern which causes operation outside of the radiation parameters specified by the FCC for the AM station, if the disturbance occurred as a result of such construction or modification.

(a) Non-directional AM stations. If tower construction or modification is planned within 1 kilometer (0.6 mile) of a non-directional AM broadcast station tower, the Public Mobile Service licensee must notify the licensee of the AM broadcast station in advance of the planned construction or modification. Measurements must be made to determine whether the construction or modification affected the AM station antenna pattern. The Public Mobile Service licensee is responsible for the installation and continued maintenance of any detuning apparatus necessary to restore proper non-directional performance of the AM station tower.

(b) Directional AM stations. If tower construction or modification is planned within 3 kilometers (1.9 miles) of a directional AM broadcast station array, the Public Mobile Service licensee must notify the licensee of the AM broadcast station in advance of the planned construction or modification. Measurements must be made to determine whether the construction or modification affected the AM station antenna pattern. The Public Mobile Service licensee is responsible for the installation and continued maintenance of any detuning apparatus necessary to restore proper performance of the AM station array.

§ 22.373 Access to transmitters.

Unless otherwise provided in this part, the design and installation of transmitters in the Public Mobile Services must meet the requirements of this section.

(a) Transmitters and control points, other than those used with in-building radiation systems, must be installed such that they are readily accessible only to persons authorized by the licensee to operate or service them.

(b) Transmitters must be designed and installed such that any adjustments or controls that could cause the transmitter to deviate from its authorized operating parameters are readily accessible only to persons authorized by the licensee to make such adjustments.

(c) Transmitters (other than hand-carried or pack-carried mobile transmitters) and control points must be equipped with a means of indicating when the control circuitry has been put in a condition that should cause the transmitter to radiate.

(d) Transmitters must be designed such that they can be turned off independently of any remote control circuits.

(e) Transmitters used with in-building radiation systems must be installed such that, to the extent possible, they are readily accessible only to persons authorized by the licensee to access them.

(f) Transmitters used with in-building radiation systems must be designed such that, in the event an unauthorized person does gain access, that person can not cause the transmitter to deviate from its authorized operating parameters in such a way as to cause interference to other stations.

§ 22.377 Type-acceptance of transmitters.

Except as provided in paragraph (b) of this section, transmitters used in the Public Mobile services must be type-accepted for use in the services regulated under this part. Transmitters must be type-accepted when the station is ready for service, not necessarily at the time of filing an application.

(a) The FCC may list as type-accepted only transmitters that are capable of meeting all technical requirements of the rules governing the service in which they will operate. The procedure for obtaining type-acceptance is set forth in Part 2 of this chapter.

(b) Transmitters operating under a developmental authorization (see Subpart D) do not have to be type-accepted.

(c) Type-accepted transmitters are listed in the FCC's "Radio Equipment List," which is available for public inspection at the FCC in Washington, DC, and its field offices.

(d) In addition to the technical standards contained in this part, transmitters intended for operation in the Cellular Radiotelephone Service must be designed to comply with the technical requirements contained in the cellular system compatibility specification (see § 22.933) and the electronic serial number rule (see § 22.919).

§ 22.379 Replacement of equipment.

Licensees may replace any equipment in Public Mobile Service stations without applying for authorization or notifying the FCC, provided that:

(a) If a transmitter is replaced, the replacement transmitter must be type-accepted for use in the Public Mobile Services;

(b) The antenna structure must not become a hazard to air navigation and its height must not be increased;

(c) The interference potential of the station must not be increased;

(d) The effective radiated power, emission type, antenna radiation pattern and center of radiation height above average terrain are not changed.

§ 22.381 Auxiliary test transmitters.

Auxiliary test transmitters may be used only for testing the performance of fixed receiving equipment located remotely from the control point. Auxiliary test transmitters may transmit only on channels designated for mobile transmitters.

§ 22.383 In-building radiation systems.

Licensees may install and operate in-building radiation systems without applying for authorization or notifying the FCC, provided that the locations of the in-building radiation systems are within the protected service area of the licensee's authorized transmitter(s) on the same channel or channel block.

Subpart D - Developmental Authorizations

§ 22.401 Description and purposes of developmental authorizations.

Communications common carriers may apply for, and the FCC may grant, authority to construct and operate one or more transmitters subject to the rules in this subpart and other limitations, waivers and/or conditions that may be prescribed. Authorizations granted on this basis are developmental authorizations. In general, the FCC grants developmental authorizations in situations and circumstances where it cannot reasonably be determined in advance whether a particular transmitter can be operated or a particular service can be provided without causing interference to the service of existing stations. For example, the FCC may grant developmental authorizations for:

(a) Field strength surveys to evaluate the technical suitability of antenna locations for stations in the Public Mobile Services;

(b) Experimentation leading to the potential development of a new Public Mobile Service or technology; or,

(c) Stations transmitting on channels in certain frequency ranges, to provide a trial period during which it can be individually determined whether such stations can operate without causing excessive interference to existing services.

§ 22.403 General limitations.

The provisions and requirements of this section are applicable to all developmental authorizations.

(a) Developmental authorizations are granted subject to the condition that they may be cancelled by the FCC at any time, upon notice to the licensee, and without the opportunity for a hearing.

(b) Except as otherwise indicated in this subpart, developmental authorizations normally terminate one year from the date of grant. The FCC may, however, specify a different term.

(c) Stations operating under developmental authorizations must not interfere with the services of regularly authorized stations.

(d) A grant of a developmental authorization does not provide any assurance that the FCC will grant an application for regular authorization to operate the same transmitter(s), even if operation during the developmental period has not caused interference and/or the developmental program is successful.

§ 22.409 Developmental authorization for a new Public Mobile Service or technology.

The FCC may grant applications for developmental authority to construct and operate transmitters for the purpose of developing a new Public Mobile Service or a new technology not regularly authorized under this part, subject to the requirements of this section. Such applications may request the use of any portion of the spectrum allocated for Public Mobile Services in the Table of Frequency Allocations contained in Part 2 of this chapter, regardless of whether that spectrum is regularly available under this part. Requests to use any portion of the spectrum for a service or purpose other than that indicated in the Table of Frequency Allocations in Part 2 of this chapter may be made only in accordance with the provisions of Part 5 of this chapter.

(a) Preliminary determination. The FCC will make a preliminary determination with respect to the factors set forth in paragraphs (a)(1) through (a)(3) of this section before acting on an application for developmental authority pursuant to this section. These factors are:

(1) That the public interest, convenience or necessity warrants consideration of the establishment of the proposed service or technology;

(2) That the proposal appears to have potential value to the public that could warrant the establishment of the new service or technology;

(3) That some operational data should be developed for consideration in any rule making proceeding which may be initiated to establish such service or technology.

(b) Petition required. Applications for developmental authorizations pursuant to this section must be accompanied by a petition for rule making requesting the FCC to amend its rules as may be necessary to provide for the establishment of the proposed service or technology.

(c) Application requirements. Authorizations for developmental authority pursuant to this section will be issued only upon a showing that the applicant has a definite program of research and development which has reasonable promise of substantial contribution to the services authorized by this part. The application must contain an exhibit demonstrating the applicant's technical qualifications to conduct the research and development program, including a description of the nature and extent of engineering facilities that the applicant has available for such purpose. Additionally, the FCC may, in its discretion, require a showing of financial qualification.

(d) Communication service for hire prohibited. Stations authorized under developmental authorizations granted pursuant to this section must not be used to provide communication service for hire, unless otherwise specifically authorized by the FCC.

(e) Adherence to program. Carriers granted developmental authorization pursuant to this section must substantially adhere to the program of research and development described in their application for developmental authorization, unless the FCC directs otherwise.

(f) Report requirements. Upon completion of the program of research and development, or upon the expiration of the developmental authorization under which such program was permitted, or at such times during the term of the station authorization as the FCC may deem necessary to evaluate the progress of the developmental program, the licensee shall submit a comprehensive report, containing:

(1) A description of the progress of the program and a detailed analysis of any result obtained;

(2) Copies of any publications produced by the program;

(3) A listing of any patents applied for, including copies of any patents issued;

(4) Copies of any marketing surveys or other measures of potential public demand for the new service;

(5) A description of the carrier's experiences with operational aspects of the program including -

(i) The duration of transmissions on each channel or frequency range and the technical parameters of such transmissions; and,

(ii) Any interference complaints received as a result of operation and how these complaints were investigated and resolved.

(g) Confidentiality. Normally, applications and developmental reports are a part of the FCC's public records. However, an applicant or licensee may request that the FCC withhold from public records specific exhibits, reports and other material associated with a developmental authorization.

(h) Renewal. Expiring developmental authorizations issued pursuant to this section may be renewed if the carrier -

(1) Shows that further progress in the program of research and development requires additional time to operate under developmental authorization;

(2) Complied with the reporting requirements of paragraph (e) of this section; and,

(3) Immediately resolved to the FCC's satisfaction all complaints of interference caused by the station operating under developmental authority.

§ 22.411 Developmental authorization of 43 MHz paging transmitters.

Because of the potential for interference to the intermediate frequency stages of receivers in broadcast television sets and video recorders, 43 MHz paging channels are assigned only under

developmental authorizations subject to the requirements of this section, except as provided in paragraph (d) of this section.

(a) Carrier responsibility. Carriers so authorized shall operate the 43 MHz paging service under developmental authority for a period of two years. During the two year developmental period, carriers must resolve any broadcast television receiver intermediate frequency interference problems that may occur as a result of operation of the 43 MHz paging transmitter(s). Carriers shall inform subscribers receiving service on the channels assigned under developmental authority during the developmental period that this service could be terminated by the FCC on short notice if such action were to become necessary to eliminate interference. Carriers shall notify the appropriate FCC Field Office, in advance, of the date on which service to subscribers is to begin.

(b) Periodic surveys. To determine the extent of any interference to broadcast television receivers resulting from operation of 43 MHz paging stations authorized pursuant to this section, carriers shall conduct semi-annual surveys during the first two years of operation. The first such survey is to begin on the date when service to subscribers commences. For each survey, the carrier shall contact at least 25 television viewers to determine whether they have experienced interference.

(1) The carrier shall contact viewers located throughout the geographic area encompassed by a 3 kilometer (2 mile) radius of the 43 MHz paging transmitter antenna site. The carrier must not attempt to obtain a misleading survey by contacting only viewers less likely to be experiencing interference. For example, the carrier must not contact only the viewers located most distant from the paging transmitter antenna site. Instead, the carrier shall contact viewers located near the paging transmitter antenna site.

(2) The carrier shall not, in subsequent surveys, contact viewers who were contacted in a previous survey; provided that, in the event that all of the viewers within 3 kilometers (2 miles) have been contacted, viewers located near the paging transmitter antenna site shall be contacted again.

(c) Periodic reports. Following each survey, the carrier shall submit to the FCC a written report disclosing and evaluating the extent of any interference. These reports must include:

(1) The number of the report (1 to 4);

(2) The station call sign;

(3) The file number of the application that resulted in the developmental authorization;

(4) An exact description of the transmitter location(s);

(5) The date(s) and time of day when the survey was conducted;

(6) The survey method used (e.g. telephone, on-site, etc.);

(7) The names, addresses and telephone numbers of the viewers contacted;

(8) If interference resulted from operation of the 43 MHz paging station, a summary of how the interference problem was resolved;

(9) The names and telephone numbers of any technical personnel consulted and/or employed to resolve interference problems.

(d) Exceptions. The FCC may grant a regular authorization in the Paging and Radiotelephone Service for a 43 MHz paging station in the following circumstances:

(1) After the two-year developmental period, provided that broadcast TV interference complaints have been resolved by the carrier in a satisfactory manner. Licensees that hold a developmental authorization for a 43 MHz paging station and wish to request a regular authorization must file an application (FCC Form 401) prior to the expiration of the developmental period.

(2) In the case of the assignment of or a transfer of control of a regular authorization of a 43 MHz paging station in the Paging and Radiotelephone Service, provided that the station has been in continuous operation providing service with no substantial interruptions.

§ 22.413 Developmental authorization of 72-76 MHz fixed transmitters.

Because of the potential for interference with the reception by broadcast television sets and video recorders of full service TV stations transmitting on TV Channels 4 and 5, 72-76 MHz channels are assigned for use within 16 kilometers (10 miles) of the antenna of any full service TV station transmitting on TV Channel 4 or 5 only under developmental authorizations subject to the requirements of this section, except as provided in paragraph (b) of this section.

(a) Carrier responsibility. Carriers so authorized shall operate the 72-76 MHz fixed station under developmental authority for a period of at least six months. During the developmental period, carriers must resolve any broadcast television receiver interference problems that may occur as a result of operation of the 72-76 MHz transmitter(s).

(b) Exceptions. The FCC may grant a regular authorization in the Paging and Radiotelephone Service for a 72-76 MHz fixed station under the following circumstances:

(1) After six months of operation under developmental authorization, and provided that broadcast TV interference complaints have been resolved by the carrier in a satisfactory manner, the FCC may grant a regular authorization. Licensees that hold a developmental authorization for a 72-76 MHz fixed station and wish to request a regular authorization must file an application (FCC Form 401) prior to the expiration of the developmental authorization.

(2) In the case of the assignment of or a transfer of control of a regular authorization of a 72-76 MHz fixed station in the Paging and Radiotelephone Service, the FCC may grant such assignment or consent to such transfer of control provided that the station has been in continuous operation providing service with no substantial interruptions.

(3) If a proposed 72-76 MHz fixed transmitter antenna is to be located within 50 meters (164 feet) of the antenna of the full service TV station transmitting on TV Channel 4 or 5, the FCC may grant a regular authorization instead of a developmental authorization.

§ 22.415 Developmental authorization of 928-960 MHz fixed transmitters.

Channels in the 928-929 MHz and 952-960 MHz ranges may be assigned under developmental authorizations to fixed transmitters in point-to-multipoint systems at locations that are short-spaced (i.e. do

not meet the 113 kilometer (70 mile) separation requirement of § 22.625), subject to the requirements of this section.

(a) Carrier responsibility. Applications for developmental authorizations pursuant to this section must contain an engineering analysis that shows that no interference will be caused or received. Carriers so authorized shall operate the short-spaced transmitter for a period of one year.

(b) Exceptions. The FCC may grant a regular authorization in the Paging and Radiotelephone Service for a short-spaced fixed station under the following circumstances:

(1) After one year of operation under developmental authorization, and provided that no interference has been caused, the FCC may grant a regular authorization. Licensees that hold a developmental authorization and wish to request a regular authorization must file an application (FCC Form 401) prior to the expiration of the developmental authorization.

(2) In the case of the assignment of or a transfer of control of a regular authorization of a short-spaced fixed station in the Paging and Radiotelephone Service, the FCC may grant such assignment or consent to such transfer of control provided that the station has been in continuous operation providing service and no interference has been caused.

§ 22.417 Developmental authorization of meteor burst systems.

Because of the potential for interference to other 42-46 MHz operations, central office and rural subscriber stations in Alaska are authorized to use meteor burst propagation modes to provide rural radiotelephone service only under developmental authorizations subject to the requirements of this section, except as provided in paragraph (b) of this section. See also §§ 22.725(c) and 22.729.

(a) Carrier responsibility. Carriers and subscribers so authorized shall operate the station under developmental authority for a period of at least one year.

(b) Exceptions. The FCC may grant a regular authorization in the Rural Radiotelephone Service for a central office or rural subscriber to use meteor burst propagation modes to provide rural radiotelephone service under the following circumstances:

(1) After one year of operation under developmental authorization, and provided that no interference has been caused to other operations, the FCC may grant a regular authorization. Licensees that hold a developmental authorization to use meteor burst propagation modes to provide rural radiotelephone service and wish to request a regular authorization must file an application (FCC Form 401) prior to the expiration of the developmental authorization.

(2) In the case of the assignment of or a transfer of control of a regular authorization of a central office or rural subscriber station authorizing the use of meteor burst propagation modes in the Rural Radiotelephone Service, the FCC may grant such assignment or consent to such transfer of control provided that the station has been in operation providing service with no substantial interruptions.

Subpart E - Paging and Radiotelephone Service

§ 22.501 Scope.

The rules in this subpart govern the licensing and operation of public mobile paging and radiotelephone stations. The licensing and operation of these stations are also subject to rules elsewhere in this part that apply generally to the Public Mobile Services. However, in case of conflict, the rules in this subpart govern.

§ 22.507 Number of transmitters per station.

This section concerns the number of transmitters licensed under each station authorization in the Paging and Radiotelephone Service. Each station must have at least one transmitter. There is no limit to the number of transmitters that a station may comprise. However, transmitters within a station should be operationally related and/or should serve the same general geographical area. Operationally related transmitters are those that operate together as a system (e.g. trunked systems, simulcast systems), rather than independently. Furthermore, the FCC may split wide-area systems into two or more stations for administrative convenience. Except for nationwide paging and other operationally related transmitters, transmitters that are widely separated geographically are not licensed under a single authorization. The FCC may consolidate separately authorized stations upon request (FCC Form 401) of the licensee, if appropriate under this section.

NOTE: Notwithstanding the provisions of § 22.507, until further notice there can be no more than 99 transmitters per station.

§ 22.511 Construction period for the Paging and Radiotelephone Service.

The construction period for stations in the Paging and Radiotelephone Service is one year.

§ 22.515 Permissible communications paths.

Mobile stations may communicate only with and through base stations. Base stations may communicate only with mobile stations and receivers on land or surface vessels.

§ 22.529 Application requirements for the Paging and Radiotelephone Service.

In addition to information required by Subparts B and D of this part, applications for authorization to operate a transmitter in the Paging and Radiotelephone Service must contain the applicable supplementary information described in this section.

(a) **Administrative information.** The following information is required by FCC Form 401, Schedule B.

(1) The number of transmitter sites for which authorization is requested.

(2) The call sign(s) of other facilities in the same area that are ultimately controlled by the real party in interest to the application.

(b) **Technical information.** The following information is required by FCC Form 401, Schedule B.

(1) Location description; city; county; state; geographical coordinates correct to ±1 second, the datum used (NAD 27 or NAD 83), site elevation above mean sea level, proximity to adjacent market boundaries and international borders;

(2) Antenna manufacturer, model number and type, antenna height to tip above ground level, the height of the center of radiation of the antenna above the average terrain, the height of the antenna center of radiation above the average elevation of the terrain along each of the 8 cardinal radials, antenna gain in the maximum lobe, the beamwidth of the maximum lobe of the antenna, a polar plot of the horizontal gain pattern of the antenna, the electric field polarization of the wave emitted by the antenna when installed as proposed;

(3) The center frequency of each channel requested, the maximum effective radiated power, the effective radiated power in each of the cardinal radial directions, any non-standard emission types to be used, including bandwidth and modulation type, the transmitter classification (e.g. base, fixed, mobile), and the locations, if any, of any points of communication.

ONE-WAY PAGING OPERATION

§ 22.531 Channels for one-way paging operation.

The following channels are allocated for assignment to base transmitters that provide one-way public paging service. Unless otherwise indicated, all channels have a bandwidth of 20 kHz and are designated by their center frequencies in MegaHertz.

Low VHF channels

35.20	35.46	43.20	43.46
35.22	35.50	43.22	43.50
35.24	35.54	43.24	43.54
35.26	35.56	43.26	43.56
35.30	35.58	43.30	43.58
35.34	35.60	43.34	43.60
35.38	35.62	43.38	43.62
35.42	35.66	43.42	43.66

High VHF channels

152.24	152.84	158.10	158.70
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UHF channels

931.0125	931.2625	931.5125	931.7625
931.0375	931.2875	931.5375	931.7875
931.0625	931.3125	931.5625	931.8125
931.0875	931.3375	931.5875	931.8375
931.1125	931.3625	931.6125	931.8625
931.1375	931.3875	931.6375	931.8875
931.1625	931.4125	931.6625	931.9125
931.1875	931.4375	931.6875	931.9375
931.2125	931.4625	931.7125	931.9625
931.2375	931.4875	931.7375	931.9875

(a) The 43 MHz channels may be assigned under developmental authorizations, pursuant to the requirements of § 22.411.

(b) Channels 931.8875, 931.9125, and 931.9375 MHz may be assigned only to transmitters providing nationwide network paging service.

(c) Upon application (FCC Form 401), common carriers may be authorized to provide one-way paging service using the leased subcarrier facilities of broadcast stations licensed under Part 73 of this chapter.

(d) Occasionally in case law and other formal and informal documents, the low VHF channels have been referred to as "lowband" channels, and the high VHF channels have been referred to as "guardband" channels.

(e) Pursuant to the U.S.-Canada Interim Coordination Considerations for 929-932 MHz, as amended, only the following UHF channels may be assigned in the continental United States North of Line A or in the State of Alaska East of Line C, within the indicated longitudes:

(1) From longitude W.73° to longitude W.75° and from longitude W.78° to longitude W.81°:

931.0125	931.1125	931.1875	931.2625
931.0375	931.1375	931.2125	931.8625
931.0625	931.1625	931.2375	

(2) From longitude W.81° to longitude W.85°:

931.0125	931.2125	931.3875	931.5875
931.0375	931.2375	931.4125	931.6125
931.0625	931.2625	931.4625	931.6375
931.1125	931.2875	931.4875	931.8625
931.1375	931.3125	931.5125	
931.1625	931.3375	931.5375	
931.1875	931.3625	931.5625	

(3) Longitudes other than specified in paragraphs (e)(1) and (e)(2) of this section:

931.0125	931.1625	931.2875	931.4125
931.0375	931.1875	931.3125	931.4625
931.0625	931.2125	931.3375	931.8625
931.1125	931.2375	931.3625	
931.1375	931.2625	931.3875	

(4) At any longitude, with authorization condition requiring coordinated, shared use and equal access by licensees in both countries:

931.4375	931.8875	931.9125	931.9375
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§ 22.535 Effective radiated power limits.

The effective radiated power (ERP) of base transmitters operating on the channels listed in § 22.531 must not exceed the limits in this section.

(a) Maximum ERP. The ERP must not exceed the applicable limits in this paragraph under any circumstances.

Frequency Range (MHz)	Maximum ERP (Watts)
35-36	600
43-44	500
152-159	1400
931-932	3500

(b) Basic power limit. Except as provided in paragraph (d) of this section, the ERP of transmitters on the VHF channels must not exceed 500 Watts.

(c) Height-power limit. Except as provided in paragraph (d) of

this section, the ERP of transmitters on the VHF channels must not exceed the amount that would result in an average distance to the service contour of 32.2 kilometers (20 miles). The average distance to the service contour is calculated by taking the arithmetic mean of the distances determined using the procedures specified in § 22.537 for the eight cardinal radial directions, excluding cardinal radial directions for which 90% or more of the distance so calculated is over water.

(d) Encompassed interfering contour areas. Transmitters are exempt from the basic power and height-power limits of this section if the area within their interfering contours is totally encompassed by the interfering contours of operating co-channel base transmitters controlled by the same licensee. For the purpose of this paragraph, operating transmitters are authorized transmitters that are providing service to subscribers.

(e) Adjacent channel protection. The ERP of transmitters must not exceed 500 Watts if they:

(1) Transmit on a channel in the 152-159 MHz frequency range and are located less than 5 kilometers (3.1 miles) from any station licensed in the Private Radio Services that receives on an adjacent channel; or,

(2) Transmit on channel 158.10 or 158.70 MHz and are located less than 5 kilometers (3.1 miles) from any station licensed in the Public Mobile Services that receives on either of the following adjacent channels: 158.07 MHz or 158.67 MHz.

§ 22.537 Technical channel assignment criteria.

The rules in this section establish technical assignment criteria for the channels listed in § 22.531. These criteria permit channel assignments to be made in a manner such that reception by public paging receivers of signals from base transmitters, within the service area of such base transmitters, is protected from interference caused by the operation of independent co-channel base transmitters.

(a) Contour overlap. The FCC may grant an application requesting assignment of a channel to a proposed base transmitter only if:

(1) The interfering contour of the proposed transmitter does not overlap the service contour of any protected co-channel transmitter controlled by a carrier other than the applicant, unless that carrier has agreed in writing to accept any interference that may result from operation of the proposed transmitter; and,

(2) The service contour of the proposed transmitter does not overlap the interfering contour of any protected co-channel transmitter controlled by a carrier other than the applicant, unless the applicant agrees to accept any interference that may result from operation of the protected co-channel transmitter; and,

(3) The area and/or population to which service would be provided by the proposed transmitter is substantial, and service gained would exceed that lost as a result of agreements to accept interference.

(b) Protected transmitter. For the purposes of this section, protected transmitters are authorized transmitters for which there is a current FCC public record and transmitters proposed in prior-filed pending applications.

(c) VHF service contour. For paging stations transmitting on the VHF channels, the distance from the transmitting antenna to the service contour along each cardinal radial is calculated as follows:

$$d = 1.243 \times h^{0.40} \times p^{0.20}$$

where d is the radial distance in kilometers
 h is the radial antenna HAAT in meters
 p is the radial ERP in Watts

(1) Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) The value used for p in the above formula must not be less than 27 dB less than the maximum ERP in any direction or 0.1 Watt, whichever is more.

(3) The distance from the transmitting antenna to the service contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. However, in resolving petitions to deny, the FCC may calculate the distance to the service contour using the formula in paragraph (c) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(d) VHF interfering contour. For paging stations transmitting on the VHF channels, the distance from the transmitting antenna to the interfering contour along each cardinal radial is calculated as follows:

$$d = 6.509 \times h^{0.28} \times p^{0.17}$$

where d is the radial distance in kilometers
 h is the radial antenna HAAT in meters
 p is the radial ERP in Watts

(1) Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) The value used for p in the above formula must not be less than 27 dB less than the maximum ERP in any direction or 0.1 Watt, whichever is more.

(3) The distance from the transmitting antenna to the interfering contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. In resolving petitions to deny, however, the FCC may calculate the distance to the interfering contour using the formula in paragraph (d) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(e) 931 MHz service contour. For paging stations transmitting on the 931 MHz channels, the service contour is a circle, centered on the transmitting antenna, with a radius determined from Table E-1.

(f) 931 MHz interfering contour. For paging stations transmitting

Table E-1 - 931 MHz Paging Service Radii

Service Radius km (miles)	Effective Radiated Power (Watts)					
	0-125	126-250	251-500	501-1000	1001-1860	1861-3500
Antenna HAAT meters (feet)						
0-177 (0-581)	32.2 (20)	32.2 (20)	32.2 (20)	32.2 (20)	32.2 (20)	32.2 (20)
178-305 (582-1001)	32.2 (20)	32.2 (20)	32.2 (20)	32.2 (20)	37.0 (23)	41.8 (26)
306-427 (1002-1401)	32.2 (20)	32.2 (20)	37.0 (23)	41.8 (26)	56.3 (35)	56.3 (35)
428-610 (1402-2001)	32.2 (20)	37.0 (23)	41.8 (26)	56.3 (35)	56.3 (35)	56.3 (35)
611-861 (2002-2825)	37.0 (23)	41.8 (26)	41.8 (26)	56.3 (35)	83.7 (52)	83.7 (52)
862-1219 (2826-3999)	41.8 (26)	56.3 (35)	56.3 (35)	83.7 (52)	83.7 (52)	83.7 (52)
1220+ (4000+)	56.3 (35)	56.3 (35)	83.7 (52)	83.7 (52)	83.7 (52)	83.7 (52)

on the 931 MHz channels, the interfering contour is a circle, centered on the transmitting antenna, with a radius determined from Table E-2.

(g) In-building radiation systems. The locations of in-building radiation systems must be within the service contour(s) of the licensee's authorized transmitter(s) on the same channel. In-building radiation systems are not protected facilities, and therefore do not have service or interfering contours.

§ 22.539 Additional channel policies.

The rules in this section govern the processing of applications for a paging channel when the applicant has applied for or been granted an authorization for other paging channels in the same geographic area. This section applies to applications proposing to use the channels listed in § 22.531, excluding the nationwide network paging channels and broadcast station subcarriers, or the channels listed in § 22.561, where the application proposes to use those channels to provide paging service only. The general policy of the FCC is to assign one paging channel in an area to a carrier per application cycle. That is, a carrier must apply for one paging channel, receive the authorization, construct the station, provide service to subscribers, and notify the FCC of commencement of service to subscribers (FCC Form 489) before applying for an additional paging channel in that area.

(a) VHF transmitters in same area. Any transmitter on any VHF channel listed in § 22.531 is considered to be in the same geographic area as another transmitter on any other VHF channel listed in § 22.531 if:

(1) One transmitter location is within the service area of the other transmitter; or,

(2) The area within the overlap of the service contours of the two transmitters constitutes 50 percent or more of the service area of either of the transmitters.

(b) 931 MHz transmitters in same area. Any transmitter on any 931 MHz channel is considered to be in the same geographic area as another transmitter on any channel listed in § 22.531 if it is located less than 64.4 kilometers (40 miles) from that transmitter. Likewise, any transmitter on any channel listed in § 22.531 is considered to be in the same geographic area as another transmitter on any 931 MHz channel if it is located less than 64.4 kilometers (40 miles) from that transmitter.

(c) Initial channel. The FCC will not assign more than one channel for new paging stations. Paging stations are considered to be new if there are no authorized transmitters on any channel listed in § 22.531 controlled by the applicant in the same geographic area.

(d) Additional channel. Applications for transmitters to be located in the same geographic area as an authorized station controlled by the applicant, but to operate on a different channel, are considered as requesting an additional channel for the authorized station, unless paragraph (e) of this section applies.

(e) Additional transmitters on same channel. Notwithstanding other provisions of this section, applications for transmitters to be located in the same geographic area as an authorized station controlled by the applicant, and to operate on the same paging

Table E-2 - 931 MHz Paging Interfering Radii

Interfering Radius km (miles)	Effective Radiated Power (Watts)						
	Antenna HAAT meters (feet)	0-125	126-250	251-500	501-1000	1001-1860	1861-3500
0-177 (0-581)		80.5 (50)	80.5 (50)	80.5 (50)	80.5 (50)	80.5 (50)	80.5 (50)
178-305 (582-1001)		80.5 (50)	80.5 (50)	80.5 (50)	80.5 (50)	88.5 (55)	96.6 (60)
306-427 (1002-1401)		80.5 (50)	80.5 (50)	88.5 (55)	96.6 (60)	130.4 (81)	130.4 (81)
428-610 (1402-2001)		80.5 (50)	88.5 (55)	96.6 (60)	130.4 (81)	130.4 (81)	130.4 (81)
611-861 (2002-2825)		88.5 (55)	96.6 (60)	96.6 (60)	130.4 (81)	191.5 (119)	191.5 (119)
862-1219 (2826-3999)		96.6 (60)	130.4 (81)	130.4 (81)	191.5 (119)	191.5 (119)	191.5 (119)
1220+ (4000+)		130.4 (81)	130.4 (81)	191.5 (119)	191.5 (119)	191.5 (119)	191.5 (119)

channel, are not considered to be requests for an additional paging channel.

(f) Amendment of pending application. If the FCC receives and accepts for filing an application for a transmitter to be located in the same geographic area as a transmitter proposed in a pending application previously filed by the applicant, but on a different channel, the subsequent application is considered as a major amendment to change the technical proposal of the prior application, unless paragraph (e) applies. The filing date of any application so amended is the date the FCC received the subsequent application.

(g) Dismissal of premature applications for additional channel. If the FCC receives an application requesting an additional channel for an authorized station prior to receiving notification that the station is providing service to subscribers on the authorized channel(s), the FCC may dismiss that application without prejudice in accordance with § 22.128.

§ 22.541 Procedures for mutually exclusive 931 MHz paging applications.

Mutually exclusive 931 MHz applications are processed in accordance with the rules in this section.

(a) Filing groups. Pending mutually exclusive applications are processed in filing groups. Mutually exclusive applications in a filing group are given concurrent consideration. The FCC may dismiss as defective (pursuant to § 22.128 of this part) any mutually exclusive application(s) whose filing date is outside of the date range for inclusion in the filing group. The types of filing groups used in day-to-day application processing are specified in paragraph (b)(3) of this section. A filing group is one of the following types:

(1) Renewal filing group. A renewal filing group comprises a timely-filed application for renewal of an authorization and all timely-filed mutually exclusive competing applications.

(2) Same-day filing group. A same-day filing group comprises all mutually exclusive applications whose filing date is the same day, which is normally the filing date of the first-filed application(s).

(3) Thirty-day notice and cut-off filing group. A thirty-day notice and cut-off filing group comprises mutually exclusive applications whose filing date is no later than 30 days after the date of the Public Notice listing the first-filed application(s) (according to the filing dates) as acceptable for filing.

(4) Window filing group. A window filing group comprises mutually exclusive applications whose filing date is within an announced filing window. An announced filing window is a period of time between and including two specific dates, which are the first and last dates on which applications (or amendments) for a particular purpose may be accepted for filing. In the case of a one-day filing window, the two dates are the same. The dates are made known to the public in advance.

(b) Procedures. Generally, the FCC may grant one application in a filing group of mutually exclusive applications and dismiss other application(s) in the filing group that are excluded by that grant, pursuant to § 22.128 of this part.

(1) Selection methods. In selecting the application to grant, the FCC may use competitive bidding or comparative hearings, depending on the type of applications involved.

(2) Dismissal of applications. The FCC may dismiss any application in a filing group that is defective or otherwise subject to dismissal under § 22.128 of this part, either before or after employing selection procedures.

(3) Type of filing group used. Except as otherwise provided in this part, the type of filing group used in processing of two or more mutually exclusive applications depends on the purpose(s) of the applications.

(i) If one of the mutually exclusive applications is a timely-filed application for renewal of an authorization, a renewal filing group is used.

(ii) If any mutually exclusive application filed on the earliest filing date is an application for modification and none of the mutually exclusive applications is a timely-filed application for renewal, a same-day filing group is used.

(iii) If all of the mutually exclusive applications filed on the earliest filing date are applications for initial authorization, a thirty-day notice and cut-off filing group is used.

(4) Disposition. If there is only one application in any type of filing group, the FCC may grant that application and dismiss without prejudice any applications excluded by that grant (i.e. not in the filing group). If there is more than one mutually exclusive application in a filing group, the FCC disposes of these applications as follows:

(i) Applications in a renewal filing group. All mutually exclusive applications in a renewal filing group are designated for comparative consideration in a hearing.

(ii) Applications in a thirty-day notice and cut-off filing group.

(A) If all of the mutually exclusive applications in a thirty-day notice and cut-off filing group are applications for initial authorization, the FCC administers competitive bidding procedures in accordance with Subpart Q of Part 1 of this chapter. After such procedures, the application of the successful bidder may be granted and the other applications may be dismissed without prejudice.

(B) If any of the mutually exclusive applications in a thirty-day notice and cut-off filing group is an application for modification, the FCC may attempt to resolve the mutual exclusivity by facilitating a settlement between the applicants. If a settlement is not reached within a reasonable time, the FCC may designate all applications in the filing group for comparative consideration in a hearing. In this event, the result of the hearing disposes all of the applications in the filing group.

(iii) Applications in a same-day filing group. If there are two or more mutually exclusive applications in a same-day filing group, the FCC may attempt to resolve the mutual exclusivity by facilitating a settlement between the applicants. If a settlement is not reached within a reasonable time, the FCC may designate all applications in the filing group for comparative consideration in a hearing. In this event, the result of the hearing disposes all of the applications in the filing group.

(iv) Applications in a window filing group. Applications in a window filing group are processed in accordance with the procedures for a thirty-day notice and cut-off filing group in paragraph (b)(4)(ii) of this section.

(c) Terminology. For the purposes of this section, terms have the following meanings:

(1) The "filing date" of an application is the date on which that application was received in a condition acceptable for filing or the date on which the most recently filed major amendment to that application was received, whichever is later, excluding major amendments in the following circumstances:

(i) the major amendment reflects only a change in ownership or control found by the FCC to be in the public interest; or,

(ii) the major amendment as received is defective or otherwise found unacceptable for filing.

(2) An "application for initial authorization" is:

(i) any application requesting an authorization for a new station;

(ii) any application requesting authorization for an existing station to operate on an additional channel.

(iii) any application requesting authorization for a new transmitter at a location more than 2 kilometers (1.2 miles) from any existing transmitters of the applicant licensee on the requested channel.

(3) An "application for modification" is any application other than an application for initial authorization or renewal.

§ 22.551 Nationwide network paging service.

The rules in this section govern the application for and provision of nationwide network paging service on the channels reserved specifically for such service in § 22.531(b).

(a) Nationwide network organizers. If and when a nationwide network paging channel becomes available for assignment, the FCC will issue a Public Notice inviting applications from carriers seeking to organize a nationwide network paging service. The Public Notice will provide complete details regarding application requirements and procedures.

(c) Affiliated local carriers. Parties seeking to become affiliated local carriers in a nationwide network paging service must have specific completed contracts with the network organizer with which they are proposing to affiliate. Applications may contain a letter, in lieu of the contracts, indicating that the applicant has a completed contract with the organizer.

(d) Liability for technical operation. Nationwide network organizers and affiliated local carriers are jointly and severally liable for the technical operation of the local network stations.

§ 22.559 One-way paging application requirements.

In addition to information required by Subparts B and D and § 22.529 of this part, applications for authorization to operate a paging transmitter on the channels listed in § 22.531 must contain the applicable supplementary information described in this section.

(a) Interference exhibit. Except as provided in paragraph (b) of this section, an exhibit demonstrating compliance with § 22.537 with regard to protected transmitters is required for applications to operate a transmitter on the VHF channels. This exhibit must:

(1) Identify each protected transmitter located within 109 kilometers (68 miles) of the proposed transmitter in directions in which the distance to the interfering contour is 76.5 kilometers (47.5 miles) or less, and within 178 kilometers (111 miles) of the proposed transmitter in directions in which the distance to the interfering contour exceeds 76.5 kilometers (47.5 miles).

(2) For each protected transmitter identified, show the results of distance calculations indicating that there would be no overlap of service and interfering contours, or alternatively, indicate that the licensee of or applicant for the protected transmitter and/or the applicant, as required, have agreed in writing to accept any interference resulting from operation of the proposed transmitter.

(b) Encirclement exhibit. An exhibit showing that the area within the interfering contour of the proposed transmitter would be totally encompassed by interfering contours of operating co-channel base transmitters controlled by the applicant is required for applications to operate a transmitter with ERP exceeding the basic power and height-power limits of § 22.535. For VHF transmitters, this encirclement exhibit may substitute for the interference exhibit required in paragraph (a) of this section.

ONE-WAY OR TWO-WAY MOBILE OPERATION

§ 22.561 Channels for one-way or two-way mobile operation.

The following channels are allocated for paired assignment to transmitters that provide (or support other transmitters that provide) one-way or two-way public land mobile service. These channels may be assigned for use by mobile or base transmitters as indicated, and to fixed transmitters (including control, repeater or other fixed transmitters). The mobile channels may also be assigned for use by base or fixed transmitters under certain circumstances (see § 22.567(h)). Unless otherwise indicated, all channels have a bandwidth of 20 kHz and are designated by their center frequencies in MegaHertz.

VHF channels

base	mobile	base	mobile
152.03	158.49	152.57	157.83
152.06	158.52	152.60	157.86
152.09	158.55	152.63	157.89
152.12	158.58	152.66	157.92
152.15	158.61	152.69	157.95
152.18	158.64	152.72	157.98
152.21	158.67	152.75	158.01
152.51	157.77	152.78	158.04
152.54	157.80	152.81	158.07

UHF channels

base	mobile	base	mobile
454.025	459.025	454.350	459.350
454.050	459.050	454.375	459.375
454.075	459.075	454.400	459.400
454.100	459.100	454.425	459.425
454.125	459.125	454.450	459.450
454.150	459.150	454.475	459.475
454.175	459.175	454.500	459.500
454.200	459.200	454.525	459.525
454.225	459.225	454.550	459.550

454.250	459.250	454.575	459.575
454.275	459.275	454.600	459.600
454.300	459.300	454.625	459.625
454.325	459.325	454.650	459.650

§ 22.563 Provision of rural radiotelephone service upon request.

Channels in the frequency ranges 152.03-152.81, 157.77-158.67, 454.025-454.650 and 459.025-459.650 MHz, inclusive, are also allocated for assignment in the Rural Radiotelephone Service. Stations in the Paging and Radiotelephone Service that provide two-way public mobile service on these channels must also provide rural radiotelephone service upon request from a subscriber.

§ 22.565 Transmitting power limits.

The transmitting power of base, mobile and fixed transmitters operating on the channels listed in § 22.561 must not exceed the limits in this section.

(a) **Maximum ERP.** The effective radiated power (ERP) of base and fixed transmitters must not exceed the applicable limits in this paragraph under any circumstances.

Frequency Range (MHz)	Maximum ERP (Watts)
152-153	1400
157-159	150
454-455	3500
459-460	150

(b) **Basic power limit.** Except as provided in paragraph (d) of this section, the ERP of base transmitters must not exceed 500 Watts.

(c) **Height-power limits.** Except as provided in paragraph (d) of this section, the ERP of base transmitters must not exceed the amount that would result in an average distance to the service contour of 41.6 kilometers (26 miles) for VHF channels or 30.7 kilometers (19 miles) for UHF channels. The average distance to the service contour is calculated by taking the arithmetic mean of the distances determined using the procedures specified in § 22.567 for the eight cardinal radial directions, excluding cardinal radial directions for which 90% or more of the distance so calculated is over water.

(d) **Encompassed interfering contour areas.** Base transmitters are exempt from the basic power and height-power limits of this section if the area within their interfering contours is totally encompassed by the interfering contours of operating co-channel base transmitters controlled by the same licensee. For the purpose of this paragraph, operating transmitters are authorized transmitters that are providing service to subscribers.

(e) **Adjacent channel protection.** The ERP of base and fixed transmitters must not exceed 500 Watts if they transmit on channel 454.025 MHz and are located less than 7 kilometers (4.3 miles) from any Private Radio Services station receiving on adjacent channel 454.0000 MHz.

(f) **Mobile transmitters.** The transmitter output power of mobile transmitters must not exceed 60 watts.

(g) **Other transmitters.** The ERP of dispatch and auxiliary test transmitters must not exceed 100 watts.

§ 22.567 Technical channel assignment criteria.

The rules in this section establish technical assignment criteria for the channels listed in § 22.561. The criteria in paragraphs (a) through (f) of this section permit channel assignments to be made in a manner such that reception by public mobile receivers of signals from base transmitters, within the service area of such base transmitters, is protected from interference caused by the operation of independent co-channel base and fixed transmitters in the Paging and Radiotelephone Service and central office stations, including Basic Exchange Telephone Radio Systems (BETRS), in the Rural Radiotelephone Service. Additional criteria in paragraph (g) of this section permit channel assignments to be made in a manner such that BETRS communications are protected from interference caused by the operation of independent co-channel base and fixed transmitters in the Paging and Radiotelephone Service and other central office stations in the Rural Radiotelephone Service. Separate criteria in paragraph (h) apply only to assignment of the channels designated in § 22.561 as mobile channels to base and fixed transmitters, and permit these channel assignments to be made in a manner such that reception by public base and fixed receivers of signals from associated mobile and fixed transmitters is protected from interference caused by the operation of independent co-channel base and fixed transmitters.

(a) **Contour overlap.** The FCC may grant an application requesting assignment of a channel to a proposed base, fixed or central office station transmitter only if:

(1) The interfering contour of the proposed transmitter does not overlap the service contour of any protected co-channel transmitter controlled by a carrier other than the applicant, unless that carrier has agreed in writing to accept any interference that may result from operation of the proposed transmitter; and,

(2) The service contour of the proposed transmitter does not overlap the interfering contour of any protected co-channel transmitter controlled by a carrier other than the applicant, unless the application contains a statement that the applicant agrees to accept any interference that may result from operation of the protected co-channel transmitter; and,

(3) The area and/or population to which service would be provided by the proposed transmitter is substantial, and service gained would exceed that lost as a result of agreements to accept interference.

(b) **Protected transmitter.** For the purposes of this section, protected transmitters are authorized transmitters for which there is a current FCC public record and transmitters proposed in prior-filed pending applications, in the Paging and Radiotelephone Service and the Rural Radiotelephone Service.

(c) VHF service contour. For base stations transmitting on the VHF channels, the radial distance from the transmitting antenna to the service contour along each cardinal radial is calculated as follows:

$$d = 1.609 \times h^{0.40} \times p^{0.20}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

(1) Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) The value used for p in the above formula must not be less than 27 dB less than the maximum ERP in any direction, or 0.1 Watt, whichever is more.

(3) The distance from the transmitting antenna to the service contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. However, in resolving petitions to deny, the FCC may calculate the distance to the service contour using the formula in paragraph (c) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(d) VHF interfering contour. For base and fixed stations transmitting on the VHF channels, the radial distance from the transmitting antenna to the interfering contour along each cardinal radial is calculated as follows:

(1) If the radial antenna HAAT is less than 150 meters:

$$d = 8.577 \times h^{0.24} \times p^{0.19}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) If the radial antenna HAAT is 150 meters or more:

$$d = 12.306 \times h^{0.23} \times p^{0.14}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

(3) The value used for p in the above formulas must not be less than 27 dB less than the maximum ERP in any direction, or 0.1 Watt, whichever is more.

(4) The distance from the transmitting antenna to the interfering contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. However, in resolving petitions to deny, the FCC may calculate the distance to the interfering contour using the appropriate formula in paragraph (d) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(e) UHF service contour. For base stations transmitting on the

UHF channels, the radial distance from the transmitting antenna to the service contour along each cardinal radial is calculated as follows:

$$d = 1.726 \times h^{0.35} \times p^{0.18}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

(1) Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) The value used for p in the above formula must not be less than 27 dB less than the maximum ERP in any direction, or 0.1 Watt, whichever is more.

(3) The distance from the transmitting antenna to the service contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. However, in resolving petitions to deny, the FCC may calculate the distance to the service contour using the formula in paragraph (e) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(f) UHF interfering contour. For base and fixed stations transmitting on the UHF channels, the radial distance from the transmitting antenna to the interfering contour along each cardinal radial is calculated as follows:

(1) If the radial antenna HAAT is less than 150 meters:

$$d = 9.471 \times h^{0.23} \times p^{0.15}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula.

(2) If the radial antenna HAAT is 150 meters or more:

$$d = 6.336 \times h^{0.31} \times p^{0.15}$$

where d is the radial distance in kilometers
h is the radial antenna HAAT in meters
p is the radial ERP in Watts

(3) The value used for p in the above formulas must not be less than 27 dB less than the maximum ERP in any direction, or 0.1 Watt, whichever is more.

(4) The distance from the transmitting antenna to the interfering contour along any radial other than the eight cardinal radials is routinely calculated by linear interpolation of distance as a function of angle. However, in resolving petitions to deny, the FCC may calculate the distance to the interfering contour using the appropriate formula in paragraph (f) of this section with actual HAAT and ERP data for the inter-station radial and additional radials above and below the inter-station radial at 2.5° intervals.

(g) Protection for BETRS. In applying the provisions of paragraph (a) of this section, if either or both of the transmitters

involved is a BETRS central office station, the following contour substitutions must be used:

(1) The service contour of the BETRS central office station(s) is a circle, centered on the central office station antenna, with a radius of 40 kilometers (25 miles).

(2) The interfering contour of any station of any type, when determining whether it would overlap the service contour of a BETRS central office station, is calculated as follows:

$$d = 36.364 \times h^{0.2} \times p^{0.1}$$

where d is the radial distance in kilometers
 h is the radial antenna HAAT in meters
 p is the radial ERP in Watts

Whenever the actual HAAT is less than 30 meters (98 feet), 30 must be used as the value for h in the above formula. The value used for p in the above formula must not be less than 27 dB less than the maximum ERP in any direction, or 0.1 Watt, whichever is more.

(h) Assignment of mobile channels to base or fixed transmitters. Mobile channels may be assigned to base or fixed transmitters if the following criteria are met:

(1) The paired base channel, as designated in § 22.561, is assigned to base transmitters in the same geographical area operated by the same licensee.

(2) The authorization is granted subject to the condition that no interference be caused to fixed receivers in use on or prior to the date of the grant.

§ 22.569 Additional channel policies.

The rules in this section govern the processing of applications for a mobile channel when the applicant has applied or been granted an authorization for other mobile channels in the same geographic area. This section applies to applications proposing to use the channels listed in § 22.561, except applications that propose to use these channels to provide paging service only, which are subject to § 22.539 of this part, instead of this section. The general policy of the FCC is to assign no more than two channels in an area to a carrier per application cycle. That is, a carrier must apply for no more than two channels, receive the authorization, construct the station, provide service to subscribers, and notify the FCC of commencement of service to subscribers (FCC Form 489) before applying for additional mobile channels in that area.

(a) Transmitters in same area. Any transmitter on any channel listed in § 22.561 is considered to be in the same geographic area as another transmitter on any other channel listed in § 22.561 if:

(1) One transmitter location is within the service area of the other transmitter; or,

(2) The area within the overlap of the service contours of the two transmitters constitutes 50 percent or more of the service area of either of the transmitters.

(b) Initial channel. The FCC will not assign more than two channels for new stations. Stations are considered to be new if there are no authorized transmitters on any channel listed in

§ 22.561 controlled by the applicant in the same geographic area.

(c) Additional channel. Applications for transmitters to be located in the same geographic area as an authorized station controlled by the applicant, but to operate on a different channel, are considered as requests for an additional channel for the authorized station, unless paragraph (d) of this section applies.

(d) Additional transmitters on same channel. Notwithstanding other provisions of this section, applications for transmitters to be located in the same geographic area as an authorized station controlled by the applicant, and to operate on the same channel, are not considered as requests for an additional channel.

(f) Dismissal of application constituting cumulative request for more than two channels. If the FCC receives an application for a transmitter to be located in the same geographic area as a transmitter proposed in a pending application previously filed by the applicant, but on different channels such that, considered together, the applications would constitute a request for more than two channels, the FCC may dismiss the subsequent application without prejudice.

(g) Dismissal of premature applications for additional channel. If the FCC receives an application requesting two additional channels (or one additional channel) for an authorized station prior to receiving notification that the station is providing service to subscribers on all (or all except one) of the authorized channels, the FCC may dismiss that application without prejudice.

§ 22.571 Responsibility for mobile stations.

Mobile stations that are subscribers in good standing to a two-way service in the Paging and Radiotelephone Service, when receiving service from that station, are considered to be operating under the authorization of that station. Licensees are responsible for exercising effective operational control over mobile stations receiving service through their stations. Mobile stations that are subscribers in good standing to a two-way service in the Paging and Radiotelephone Service, while receiving service from a different station, are considered to be operating under the authorization of such different station. The licensee of such different station is responsible, during such temporary period, for exercising effective operational control over such mobile stations as if they were subscribers to it.

§ 22.573 Use of base transmitters as repeaters.

As an additional function, base transmitters may be used as repeaters. Licensees must be able to turn the base transmitter on or off from the control point regardless of whether a subscriber-operated transmitter is transmitting.

§ 22.575 Use of mobile channel for remote control of station functions.

Carriers may remotely control station functions (e.g. shut down or reactivate base transmitters, turn aviation obstruction warning lights on or off, etc.) using a control transmitter operating on a mobile channel, subject to the conditions in this section and in § 22.567(h) of this part.

(a) The control transmitter must be capable of overriding transmissions from subscriber-operated transmitters if necessary. Subscriber-operated transmitters must not be capable of being used

to deliberately or accidentally prevent the licensee from controlling the station.

(b) The licensee must implement measures designed to prevent station functions from being controlled by persons not authorized by the licensee to control the station.

(c) The control transmitter location must be within the composite service contour of the licensee's authorized station on the paired base channel.

§ 22.577 Grandfathered dispatch service.

No new dispatch transmitters or dispatch points are authorized. Carriers that were authorized to provide dispatch service prior to January 1, 1982, and have provided such service continuously since that date may continue to provide such service.

(a) Installation. A grandfathered station licensee may install a dispatch transmitter for one or more subscribers without applying for specific authorization, provided that the following conditions are met.

(1) The dispatch transmitter must use the mobile channel that is paired with the channel used by the grandfathered base station.

(2) The dispatch transmitter antenna must not exceed the criteria in § 17.7 of this chapter that determine whether the FAA must be notified of the proposed construction.

(3) The output power of the dispatch transmitter must not exceed 10 Watts.

(4) The dispatch transmitter must be incapable of overriding the functioning of any control transmitter that may be using the same

channel.

(5) The dispatch transmitter must be under the continuous supervision of the licensee.

(b) Notification. Licensees must notify the FCC by letter whenever a dispatch transmitter is installed pursuant to paragraph (a) of this section. The notification must include the name and address of the subscriber(s) for which the dispatch transmitter was installed, the location of the dispatch transmitter, the height of antenna structure above ground and above mean sea level, the channel(s) used, and the call sign and location of the grandfathered base station.

(c) Termination without hearing. Operation of a dispatch transmitter pursuant to paragraphs (a) and (b) of this section may be terminated by the FCC without a hearing upon notice to the licensee.

(d) Dispatch transmitters requiring authorization. A dispatch transmitter that does not meet the requirements of paragraph (a) of this section may be installed only upon grant of an application for authorization therefor.

(e) Permissible communications. A dispatch transmitter operated by a subscriber may communicate only with mobile transmitters operated by that subscriber through the associated base transmitter.

§ 22.579 Operation of mobile transmitters across U.S.-Canada border.

Mobile stations licensed by Canada may receive two-way service while in the United States from stations licensed under this part, after authorization has been granted by the FCC. Mobile stations

Table E-3 - Maximum ERP (Watts) for Control Transmitters (HAAT 152 meters or less)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)									
	15 (50)	30 (100)	46 (150)	61 (200)	76 (250)	91 (300)	107 (350)	122 (400)	137 (450)	152 (500)
209 (130)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
201 (125)	1000	1000	1000	1000	1000	1000	1000	850	750	725
193 (120)	1000	1000	1000	1000	900	750	675	600	550	500
185 (115)	1000	1000	800	725	600	525	475	425	375	350
177 (110)	850	700	600	500	425	375	325	300	275	225
169 (105)	600	475	400	325	275	250	225	200	175	150
161 (100)	400	325	275	225	175	150	140	125	110	100
153 (95)	275	225	175	125	110	95	80	70	60	50
145 (90)	175	125	100	75	50					

See § 22.627(b)(1)(ii). This table is for antenna heights of 152 meters (500 feet) or less above average terrain. For antenna heights between those in the table, use the next higher antenna height. For distances between those in the table, use the next lower distance.

that normally operate under the authority of base stations licensed under this part may receive two-way service while in Canada from stations licensed under this part or by Canada, upon authorization by Canada.

§ 22.589 One-way or two-way application requirements.

In addition to information required by Subparts B and D and § 22.529 of this part, applications for authorization to operate a transmitter on the channels listed in § 22.561 must contain the applicable supplementary information described in this section.

(a) Interference exhibit. Except as provided in paragraph (b) of this section, an exhibit demonstrating compliance with § 22.567 with regard to protected transmitters is required. This exhibit must:

(1) For UHF channels, identify each protected transmitter located within 108 kilometers (67 miles) of the proposed transmitter in directions in which the distance to the interfering contour is 76.4 kilometers (47.5 miles) or less, and within 178 kilometers (111 miles) of the proposed transmitter in directions in which the distance to the interfering contour exceeds 76.4 kilometers (47.5 miles); and identify each protected Basic Exchange Telephone Radio System central office transmitter in the Rural Radiotelephone Service within 231 kilometers (144 miles),

(2) For VHF channels, identify each protected transmitter located within 135 kilometers (84 miles) of the proposed transmitter in directions in which the distance to the interfering contour is 93.3 kilometers (58 miles) or less, and within 178 kilometers (111 miles) of the proposed transmitter in directions in which the distance to the interfering contour exceeds 93.3 kilometers (58 miles).

(3) For each protected transmitter identified, show the results of distance calculations indicating that there would be no overlap of service and interfering contours, or alternatively, indicate that the licensee of or applicant for the protected transmitter and/or the applicant, as required, have agreed in writing to accept any interference resulting from operation of the proposed transmitter.

(b) Encompassment exhibit. An exhibit showing that the area within the interfering contour of the proposed transmitter would be

totally encompassed by interfering contours of operating co-channel base transmitters controlled by the applicant is required for applications to operate a transmitter with ERP exceeding the basic power and height-power limits of § 22.565. This encompassment exhibit may substitute for the interference exhibit required in paragraph (a) of this section.

POINT-TO-POINT OPERATION

§ 22.591 Channels for point-to-point operation.

The following channels are allocated for assignment to fixed transmitters that support other transmitters that provide public mobile service. Unless otherwise indicated, all channels have a bandwidth of 20 kHz and are designated by their center frequencies in MegaHertz.

VHF channels			
72.02	72.36	72.80	75.66
72.04	72.38	72.82	75.68
72.06	72.40	72.84	75.70
72.08	72.42	72.86	75.72
72.10	72.46	72.88	75.74
72.12	72.50	72.90	75.76
72.14	72.54	72.92	75.78
72.16	72.58	72.94	75.80
72.18	72.62	72.96	75.82
72.20	72.64	72.98	75.84
72.22	72.66	75.42	75.86
72.24	72.68	75.46	75.88
72.26	72.70	75.50	75.90
72.28	72.72	75.54	75.92
72.30	72.74	75.58	75.94
72.32	72.76	75.62	75.96
72.34	72.78	75.64	75.98

UHF channels - State of Hawaii

488.250491.250	489.750492.750
488.750491.750	490.250493.250
489.250492.250	490.750493.750

Table E-4 - Maximum ERP (Watts) for Control Transmitters (HAAT more than 152 meters)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)					
	152 (500)	305 (1000)	457 (1500)	610 (2000)	762 (2500)	914 (3000)
209 (130)	1000	447	219	117	71	46
193 (120)	500	209	95	50	30	19
177 (110)	225	91	35	19	11	8
161 (100)	100	30	10	5	3	2
153 (95)	50	13	5	3	2	1

See § 22.627(b)(1)(ii). This table is for antenna heights of more than 152 meters (500 feet) above average terrain. For intermediate values of height and/or distance, use linear interpolation to obtain the maximum permitted ERP.

Microwave channels
(bandwidth individually assigned)

2110.1	2160.1
2110.2	2160.2
2110.3	2160.3
⋮	⋮
2129.9	2179.9

(a) The 72-76 MHz channels may be assigned under developmental authority pursuant to the requirements of § 22.413. The 72-76 MHz channels may also be used in point-to-multipoint configurations. The 72-76 MHz channels are also allocated for assignment in the Private Radio Services (see Part 90 of this chapter).

(b) Channels in the frequency ranges 2110-2130 and 2160-2180 MHz are also allocated for assignment in the broadband Personal Communications Service (see Part 24 of this chapter), the Multipoint Distribution Service and the Point-to-Point Microwave Radio Service (see Part 21 of this chapter). Assignment of channels in these ranges is subject to the transition rules in § 22.602 of this part.

(c) Channels in the frequency ranges 488.250-490.750 and 491.250-493.750 MHz may be assigned only to inter-island fixed stations located in the State of Hawaii.

The effective radiated power of fixed stations operating on the channels listed in § 22.591 must not exceed 150 Watts. The equivalent isotropic radiated power of fixed stations operating in the frequency ranges 2110-2130 and 2160-2180 MHz must not exceed the limits set forth in Part 21 of this chapter for stations operating in these frequency ranges.

§ 22.599 Assignment of 72-76 MHz channels.

Because of the potential for interference to the reception of TV Channels 4 and 5 by broadcast television sets and video recorders, assignments of the 72-76 MHz channels are subject to the following conditions:

(a) Assignments of 72-76 MHz channels for use within 129 kilometers (80 miles) of a full service TV station transmitting on TV Channel 4 or 5 are subject to the condition that the licensee must eliminate any interference caused to television reception on TV Channels 4 and 5. If the FCC notifies the licensee of an interference problem and the licensee does not resolve the problem within 90 days of such notification, operation of the interfering 72-76 MHz fixed station must be immediately discontinued.

(b) 72-76 MHz channels may be assigned for use within 16 kilometers (10 miles) of a full service TV station transmitting on TV Channel 4 or 5 under a developmental authorization, pursuant to § 22.413. However, for use within 50 meters (164 feet) of a TV station transmitting on TV Channel 4 or 5, 72-76 MHz channels may be assigned under a regular authorization, rather than a developmental authorization.

§ 22.593 Effective radiated power limits.

Table E-5 - Maximum ERP (Watts) for Control Transmitters (HAAT 152 meters or less)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)									
	15 (50)	30 (100)	46 (150)	61 (200)	76 (250)	91 (300)	107 (350)	122 (400)	137 (450)	152 (500)
261 (162)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
257 (160)	1000	1000	1000	1000	1000	1000	1000	1000	1000	800
249 (155)	1000	1000	1000	1000	1000	875	775	700	625	575
241 (150)	1000	1000	950	775	725	625	550	500	450	400
233 (145)	850	750	650	575	500	440	400	350	320	300
225 (140)	600	575	465	400	350	300	275	250	230	225
217 (135)	450	400	335	300	255	240	200	185	165	150
209 (130)	350	300	245	200	185	160	145	125	120	100
201 (125)	225	200	170	150	125	110	100	90	80	75
193 (120)	175	150	125	105	90	80	70	60	55	50

See § 22.627(b)(1)(iii). This table applies for antenna heights of 152 meters (500 feet) or less above average terrain. For antenna heights between those in the table, use the next higher antenna height. For distances between those in the table, use the next lower distance.

§ 22.601 Assignment of microwave channels.

Assignment of the microwave channels listed in § 22.591 is subject to the transition rules in § 22.602 of this part. No new systems will be authorized under this part.

(a) **Coordination required.** Before filing applications for authority to modify existing stations on these channels or major amendments to such applications, carriers must coordinate the planned channel usage, using the procedure outlined in § 22.150, with affected parties in this radio service and the Point-to-point Microwave Service and the Multipoint Distribution Service. Affected parties are licensees and other applicants with previously filed pending applications whose stations could affect or be affected by the proposed modification of the existing station in terms of interference.

(b) **System parameters.** In designing a system modification, the applicant must select sites, equipment and channels that will avoid harmful interference to other users. All parties must cooperate fully and make reasonable efforts to resolve technical problems and conflicts that may inhibit the most effective and efficient use of the radio spectrum; however, a party receiving notification is not obligated to suggest changes or re-design a proposal in cases involving conflicts. The applicant must identify in the application all parties with which the technical proposal was coordinated. In the event that technical problems are not resolved or if an affected party does not respond to coordination efforts within 30 days after notification, an explanation must be contained in the application. Where technical conflicts are resolved by an agreement between the parties that requires special procedures to reduce the likelihood of harmful interference (such as the use of artificial site shielding), or would result in a reduction of quality or capacity of either system, the details thereof must be contained in the application.

(c) **Bandwidth.** Applicants must request the minimum emission bandwidth necessary. The FCC does not authorize bandwidths larger than 800 kHz under this part.

§ 22.602 Transition of the 2110-2130 and 2160-2180 MHz channels to emerging technologies.

The microwave channels listed in § 22.591 have been allocated for use by emerging technologies services (ETS). No new systems

will be authorized under this part. The rules in this section provide for a transition period during which existing Paging and Radiotelephone Service (PARS) licensees using these channels may relocate operations to other media or to other fixed channels, including those in other microwave bands. For PARS licensees relocating operations to other microwave bands, authorization must be obtained under Part 21 of this chapter.

(a) Licensees proposing to implement ETS may negotiate with PARS licensees authorized to use these channels, for the purpose of agreeing to terms under which the PARS licensees would (1) relocate their operations to other fixed microwave bands or other media, or alternatively, (2) accept a sharing arrangement with the ETS licensee that may result in an otherwise impermissible level of interference to the PARS operations.

(b) PARS operations on these channels will continue to be co-primary with other users of this spectrum until two years after the FCC commences acceptance of applications for ETS, and until one year after an ETS licensee initiates negotiations for relocation of the fixed microwave licensee's operations.

(c) After the periods specified in paragraph (b), existing PARS operations become secondary to ETS operations, provided that:

(1) The ETS applicant, provider, licensee or representative guarantees payment of all relocation costs, including all engineering, equipment, site and FCC fees, as well as any reasonable additional costs that the PARS licensee might incur as a result of relocation to another fixed band or migration to another medium;

(2) The ETS applicant, provider, licensee or representative completes all activities necessary for implementing the replacement facilities, including engineering and cost analysis of the relocation procedure and, if radio facilities are involved, identifying and obtaining, on the incumbents behalf, new channels and frequency coordination; and,

(3) The ETS applicant, provider, licensee or representative builds the replacement system and tests it for comparability with the existing 2 GHz system.

(d) The PARS licensee is not required to relocate until the

Table E-6 - Maximum ERP (Watts) for Control Transmitters (HAAT more than 152 meters)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)					
	152 (500)	305 (1000)	457 (1500)	610 (2000)	762 (2500)	914 (3000)
261 (162)	1000	501	282	170	110	71
241 (150)	400	209	110	60	36	23
225 (140)	225	102	50	28	16	10
209 (130)	100	48	21	11	7	5
193 (120)	50	19	9	5	3	2

See § 22.627(b)(1)(iii). This table is for antenna heights of more than 152 meters (500 feet) above average terrain. For intermediate values of height and/or distance, use linear interpolation to obtain the maximum permitted ERP.

alternative facilities are available to it for a reasonable time to make adjustments, determine comparability, and ensure a seamless handoff.

(e) If within one year after the relocation to new facilities, the PARS licensee demonstrates that the new facilities are not comparable to the former facilities, the ETS applicant, provider, licensee or representative must remedy the defects or pay to relocate the PARS licensee back to its former (or equivalent) 2 GHz channels.

§ 22.603 488-494 MHz fixed service in Hawaii.

Before filing applications for authorization of inter-island control and/or repeater stations, applicants must coordinate the planned channel usage with existing licensees and other applicants with previously filed applications, using the procedure outlined in § 22.150. Applicants and licensees shall cooperate fully and make reasonable efforts to resolve any channel usage conflicts. In situations where technical solutions to such conflicts cannot be devised, the FCC may select a channel or channels to assign or may designate the application(s) for hearing. To be acceptable for filing, applications and major technical amendments must contain a certification that coordination has been completed and an exhibit listing the name(s) of the licensees and applicants with which the planned channel usage has been coordinated.

POINT-TO-MULTIPOINT OPERATION

§ 22.621 Channels for point-to-multipoint operation.

The following channels are allocated for assignment to transmitters utilized within point-to-multipoint systems that support transmitters that provide public mobile service. Unless otherwise

indicated, all channels have a bandwidth of 20 kHz and are designated by their center frequencies in MegaHertz.

Public Mobile Pool

(25 kHz bandwidth)

928.8625959.8625 928.9375959.9375
 928.8875959.8875 928.9625959.9625
 928.9125959.9125 928.9875959.9875

(12.5 kHz bandwidth)

928.85625 ...959.85625 928.93125 ...959.93125
 928.86875 ...959.86875 928.94375 ...959.94375
 928.88125 ...959.88125 928.95625 ...959.95625
 928.89375 ...959.89375 928.96875 ...959.96875
 928.90625 ...959.90625 928.98125 ...959.98125
 928.91875 ...959.91875 928.99375 ...959.99375

Private Radio General Access Pool

(25 kHz bandwidth)

956.2625 956.3125 956.3625 956.4125
 956.2875 956.3375 956.3875 956.4375

928.0125952.0125 928.1875952.1875
 928.0375952.0375 928.2125952.2125
 928.0625952.0625 928.2375952.2375
 928.0875952.0875 928.2625952.2625
 928.1125952.1125 928.2875952.2875
 928.1375952.1375 928.3125952.3125

Table E-7 - Maximum ERP (Watts) for Control Transmitters

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)								
	30 (100)	46 (150)	61 (200)	76 (250)	91 (300)	107 (350)	122 (400)	137 (450)	152 (500)
108 (67)	1000	1000	1000	1000	1000	1000	1000	1000	1000
106 (66)	1000	1000	1000	1000	1000	1000	1000	1000	750
105 (65)	1000	1000	1000	1000	1000	1000	825	650	600
103 (64)	1000	1000	1000	1000	1000	775	625	500	400
101 (63)	1000	1000	1000	1000	440	400	350	320	300
100 (62)	1000	1000	1000	525	375	250	200	150	125
98 (61)	1000	700	450	250	200	125	100	75	50
97 (60)	1000	425	225	125	100	75	50		

See § 22.627(b)(2). This table applies to control transmitters in the Boston, Chicago, Cleveland, Detroit, Los Angeles, New York - Northeastern New Jersey, Philadelphia, Pittsburgh and Washington, DC urban areas. This table is for antenna heights of 152 meters (500 feet) or less above average terrain. For antenna heights between those in the table, use the next higher antenna height. For distances between those in the table, use the next lower distance.

928.1625952.1625 928.3375952.3375

Public, Private, Government Shared Pool

(12.5 kHz bandwidth)

(12.5 kHz bandwidth)

956.25625 956.30625 956.35625 956.40625
 956.26875 956.31875 956.36875 956.41875
 956.28125 956.33125 956.38125 956.43125
 956.29375 956.34375 956.39375 956.44375

932.00625 ...941.00625 932.25625 ...941.25625
 932.01875 ...941.01875 932.26875 ...941.26875
 932.03125 ...941.03125 932.28125 ...941.28125
 932.04375 ...941.04375 932.29375 ...941.29375
 932.05625 ...941.05625 932.30625 ...941.30625
 932.06875 ...941.06875 932.31875 ...941.31875
 932.08125 ...941.08125 932.33125 ...941.33125
 932.09375 ...941.09375 932.34375 ...941.34375
 932.10625 ...941.10625 932.35625 ...941.35625
 932.11875 ...941.11875 932.36875 ...941.36875
 932.13125 ...941.13125 932.38125 ...941.38125
 932.14375 ...941.14375 932.39375 ...941.39375
 932.15625 ...941.15625 932.40625 ...941.40625
 932.16875 ...941.16875 932.41875 ...941.41875
 932.18125 ...941.18125 932.43125 ...941.43125
 932.19375 ...941.19375 932.44375 ...941.44375
 932.20625 ...941.20625 932.45625 ...941.45625
 932.21875 ...941.21875 932.46875 ...941.46875
 932.23125 ...941.23125 932.48125 ...941.48125
 932.24375 ...941.24375 932.49375 ...941.49375

928.00625 ...952.00625 928.18125 ...952.18125
 928.01875 ...952.01875 928.19375 ...952.19375
 928.03125 ...952.03125 928.20625 ...952.20625
 928.04375 ...952.04375 928.21875 ...952.21875
 928.05625 ...952.05625 928.23125 ...952.23125
 928.06875 ...952.06875 928.24375 ...952.24375
 928.08125 ...952.08125 928.25625 ...952.25625
 928.09375 ...952.09375 928.26875 ...952.26875
 928.10625 ...952.10625 928.28125 ...952.28125
 928.11875 ...952.11875 928.29375 ...952.29375
 928.13125 ...952.13125 928.30625 ...952.30625
 928.14375 ...952.14375 928.31875 ...952.31875
 928.15625 ...952.15625 928.33125 ...952.33125
 928.16875 ...952.16875 928.34375 ...952.34375

Private Radio Power Pool

UHF Channels in Specified Urban Areas

(25 kHz bandwidth)

Boston

928.3625952.3625 928.6125952.6125
 928.3875952.3875 928.6375952.6375
 928.4125952.4125 928.6625952.6625
 928.4375952.4375 928.6875952.6875
 928.4625952.4625 928.7125952.7125
 928.4875952.4875 928.7375952.7375
 928.5125952.5125 928.7625952.7625
 928.5375952.5375 928.7875952.7875
 928.5625952.5625 928.8125952.8125
 928.5875952.5875 928.8375952.8375

470.0125 473.0125 482.0125 485.0125
 470.0375 473.0375 482.0375 485.0375
 470.0625 473.0625 482.0625 485.0625
 470.0875 473.0875 482.0875 485.0875
 470.1125 473.1125 482.1125 485.1125
 470.1375 473.1375 482.1375 485.1375
 470.1625 473.1625 482.1625 485.1625
 470.1875 473.1875 482.1875 485.1875
 470.2125 473.2125 482.2125 485.2125
 470.2375 473.2375 482.2375 485.2375
 470.2625 473.2625 482.2625 485.2625
 470.2875 473.2875 482.2875 485.2875

(12.5 kHz bandwidth)

Chicago, Cleveland

928.35625 ...952.35625 928.60625 ...952.60625
 928.36875 ...952.36875 928.61875 ...952.61875
 928.38125 ...952.38125 928.63125 ...952.63125
 928.39375 ...952.39375 928.64375 ...952.64375
 928.40625 ...952.40625 928.65625 ...952.65625
 928.41875 ...952.41875 928.66875 ...952.66875
 928.43125 ...952.43125 928.68125 ...952.68125
 928.44375 ...952.44375 928.69375 ...952.69375
 928.45625 ...952.45625 928.70625 ...952.70625
 928.46875 ...952.46875 928.71875 ...952.71875
 928.48125 ...952.48125 928.73125 ...952.73125
 928.49375 ...952.49375 928.74375 ...952.74375
 928.50625 ...952.50625 928.75625 ...952.75625
 928.51875 ...952.51875 928.76875 ...952.76875
 928.53125 ...952.53125 928.78125 ...952.78125
 928.54375 ...952.54375 928.79375 ...952.79375
 928.55625 ...952.55625 928.80625 ...952.80625
 928.56875 ...952.56875 928.81875 ...952.81875
 928.58125 ...952.58125 928.83125 ...952.83125
 928.59375 ...952.59375 928.84375 ...952.84375

470.0125 473.0125 476.0125 479.0125
 470.0375 473.0375 476.0375 479.0375
 470.0625 473.0625 476.0625 479.0625
 470.0875 473.0875 476.0875 479.0875
 470.1125 473.1125 476.1125 479.1125
 470.1375 473.1375 476.1375 479.1375
 470.1625 473.1625 476.1625 479.1625
 470.1875 473.1875 476.1875 479.1875
 470.2125 473.2125 476.2125 479.2125
 470.2375 473.2375 476.2375 479.2375
 470.2625 473.2625 476.2625 479.2625
 470.2875 473.2875 476.2875 479.2875

New York - Northeastern New Jersey

470.0125 470.1625 476.0125 476.1625
 470.0375 470.1875 476.0375 476.1875
 470.0625 470.2125 476.0625 476.2125
 470.0875 470.2375 476.0875 476.2375
 470.1125 470.2625 476.1125 476.2625
 470.1375 470.2875 476.1375 476.2875

Dallas-Fort Worth				Los Angeles			
482.0125	482.1625	485.0125	485.1625	470.0125	473.0125	506.0625	509.0625
482.0375	482.1875	485.0375	485.1875	470.0375	473.0375	506.0875	509.0875
482.0625	482.2125	485.0625	485.2125	506.0125	509.0125	506.1125	509.1125
482.0875	482.2375	485.0875	485.2375	506.0375	509.0375		
482.1125	482.2625	485.1125	485.2625				
482.1375	482.2875	485.1375	485.2875				
Detroit				Miami			
476.0125	479.0125	482.0125	485.0125	470.0125	470.1625	473.0125	473.1625
476.0375	479.0375	482.0375	485.0375	470.0375	470.1875	473.0375	473.1875
476.0625	479.0625	482.0625	485.0625	470.0625	470.2125	473.0625	473.2125
476.0875	479.0875	482.0875	485.0875	470.0875	470.2375	473.0875	473.2375
476.1125	479.1125	482.1125	485.1125	470.1125	470.2625	473.1125	473.2625
476.1375	479.1375	482.1375	485.1375	470.1375	470.2875	473.1375	473.2875
476.1625	479.1625	482.1625	485.1625				
476.1875	479.1875	482.1875	485.1875				
476.2125	479.2125	482.2125	485.2125				
476.2375	479.2375	482.2375	485.2375				
476.2625	479.2625	482.2625	485.2625				
476.2875	479.2875	482.2875	485.2875				
Houston				Philadelphia			
488.1625	491.1625	488.2375	491.2375	500.0125	503.0125	506.0125	509.0125
488.1875	491.1875	488.2625	491.2625	500.0375	503.0375	506.0375	509.0375
488.2125	491.2125	488.2875	491.2875	500.0625	503.0625	506.0625	509.0625
				500.0875	503.0875	506.0875	509.0875
				500.1125	503.1125	506.1125	509.1125
				500.1375	503.1375	506.1375	509.1375
				500.1625	503.1625	506.1625	509.1625
				500.1875	503.1875	506.1875	509.1875
				500.2125	503.2125	506.2125	509.2125
				500.2375	503.2375	506.2375	509.2375
				500.2625	503.2625	506.2625	509.2625
				500.2875	503.2875	506.2875	509.2875

Table E-8 - Maximum ERP (Watts) for Base Transmitters (HAAT 152 meters or less)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)									
	15 (50)	30 (100)	46 (150)	61 (200)	76 (250)	91 (300)	107 (350)	122 (400)	137 (450)	152 (500)
209 (130)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
201 (125)	1000	1000	1000	1000	1000	1000	1000	850	750	725
193 (120)	1000	1000	1000	1000	900	750	675	600	550	500
185 (115)	1000	1000	800	725	600	525	475	425	375	350
177 (110)	850	700	600	500	425	375	325	300	275	225
169 (105)	600	475	400	325	275	250	225	200	175	150
161 (100)	400	325	275	225	175	150	140	125	110	100
153 (95)	275	225	175	125	110	95	80	70	60	50
145 (90)	175	125	100	75	50					

See § 22.659(b)(2). This table is for antenna heights of 152 meters (500 feet) or less above average terrain. For antenna heights between those in the table, use the next higher antenna height. For distances between those in the table, use the next lower distance.

Pittsburgh

470.0125	470.1625	473.0125	473.1625
470.0375	470.1875	473.0375	473.1875
470.0625	470.2125	473.0625	473.2125
470.0875	470.2375	473.0875	473.2375
470.1125	470.2625	473.1125	473.2625
470.1375	470.2875	473.1375	473.2875

San Francisco

482.0125	485.0125	488.0125	491.0125
482.0375	485.0375	488.0375	491.0375
482.0625	485.0625	488.0625	491.0625
482.0875	485.0875	488.0875	491.0875
482.1125	485.1125	488.1125	491.1125
482.1375	485.1375	488.1375	491.1375
482.1625	485.1625	488.1625	491.1625
482.1875	485.1875	488.1875	491.1875
482.2125	485.2125	488.2125	491.2125
482.2375	485.2375	488.2375	491.2375
482.2625	485.2625	488.2625	491.2625
482.2875	485.2875	488.2875	491.2875

Washington, DC

488.0125	491.0125	494.0125	497.0125
488.0375	491.0375	494.0375	497.0375
488.0625	491.0625	494.0625	497.0625
488.0875	491.0875	494.0875	497.0875
488.1125	491.1125	494.1125	497.1125
488.1375	491.1375	494.1375	497.1375
488.1625	491.1625	494.1625	497.1625
488.1875	491.1875	494.1875	497.1875
488.2125	491.2125	494.2125	497.2125
488.2375	491.2375	494.2375	497.2375
488.2625	491.2625	494.2625	497.2625
488.2875	491.2875	494.2875	497.2875

(a) Channels in the Private Radio General Access Pool and the Private Radio Power Pool may be assigned only if the applicant shows that none of the channels in the Public Mobile Pool are available for the proposed use.

(b) Channels in the Public, Private, Government Shared Pool are allocated for assignment in the Private Operational-Fixed Microwave Service (47 CFR Part 94) and to U.S. government fixed stations.

§ 22.623 System configuration.

This section requires a minimum configuration for point-to-multipoint systems using the channels listed in § 22.621.

(a) 928-960 MHz. These channels may be assigned, individually or paired, only to fixed transmitters in a system that controls at least four public mobile base transmitters that transmit on the same channel. If a 932-933 MHz channel and a 941-942 MHz channel are assigned as a pair, the 941-942 MHz channel must be assigned only to control transmitters; the 932-933 MHz channel may be assigned to control or fixed relay transmitters.

(b) 470-512 MHz. These channels may be assigned only individually (unpaired), to control transmitters that directly control at least four public mobile base transmitters that transmit on the same channel. Fixed relay transmitters are not authorized.

(c) Selection and assignment. The FCC selects and assigns a channel when granting applications for authorization to operate a new station to transmit in the 470-512, 932-933 and 941-942 MHz frequency ranges. Applicants having a preference may request the assignment of a specific channel or channel pair, but the FCC may in some cases be unable to satisfy such requests.

§ 22.625 Transmitter locations.

This section governs where point-to-multipoint transmitters on the channels listed in § 22.621 may be located.

(a) 928-960 MHz. In this frequency range, the required minimum distance separation between co-channel fixed transmitters is 113 kilometers (70 miles). However, this requirement may be waived if the applicant submits an engineering analysis that shows that no interference would be caused to either system. In such a case, a developmental authorization may be issued (see § 22.415). If no interference is experienced during the term of the developmental authorization, the licensee may apply for a regular authorization.

(b) 470-512 MHz. The purpose of the rule in paragraph (b)(1) of this section is to define the areas in which the 470-512 MHz channels are allocated for public mobile use. The purpose of the rules in paragraphs (b)(2) and (b)(3) of this section is to reduce the likelihood that interference to television reception from public mobile operations on these channels will occur.

(1) Control transmitter locations. Control transmitter locations must be within 80 kilometers (50 miles) of the designated locations in this paragraph.

Urban area	N. Latitude	W. Longitude
Boston, MA	42°21'24"	71°03'24"
Chicago, IL	41°52'28"	87°38'22"
Cleveland, OH	41°29'51"	81°41'50"
Dallas, TX	32°47'09"	96°47'37"
Detroit, MI	42°19'48"	83°02'57"
Houston, TX	29°45'26"	95°21'37"
Los Angeles, CA	34°03'15"	118°14'28"
Miami, FL	25°46'37"	80°11'32"
New York, NY	40°45'06"	73°59'39"
Philadelphia, PA	39°56'58"	75°09'21"
Pittsburgh, PA	40°26'19"	80°00'00"
San Francisco-Oakland, CA	37°46'39"	122°24'40"
Washington, DC	38°53'51"	77°00'33"

(2) Protection from intermodulation interference. Control transmitter locations must be at least 1.6 kilometers (1 mile) from the main transmitter locations of all TV stations transmitting on TV channels separated by 2, 3, 4, 5, 7, or 8 TV channels from the TV channel containing the frequencies on which the control station will transmit. This requirement is intended to reduce the likelihood of intermodulation interference.

(3) Co-channel protection from control transmitters with high antennas. This paragraph applies only to control transmitters that utilize an antenna height of more than 152 meters (500 feet) above average terrain. The distance between the location of such a control transmitter and the applicable protected TV station location specified in this paragraph must equal or exceed the sum of the distance from the control transmitter location to the radio horizon in the direction of the specified location and 89 kilometers (55 miles - representing the distance from the main transmitter location of the TV station to

its Grade B contour in the direction of the control transmitter). The protected TV station locations in this paragraph are the locations of record as of September 1974, and these do not change even though the TV stations may have been subsequently relocated.

(i) The protected TV station locations are as follows:

Control Transmitter Frequency Range	Protected TV Station Location
470-476 MHz	Washington, DC 38°57'17" 77°00'17"
476-482 MHz	Lancaster, PA 40°15'45" 76°27'49"

(ii) The distance to the radio horizon is calculated using the following formula:

$$d = \sqrt{17 \times h}$$

where d is the distance to the radio horizon in kilometers
h is the height of the antenna center of radiation above ground level in meters

§ 22.627 Effective radiated power limits.

The effective radiated power (ERP) of transmitters operating on the channels listed in § 22.621 must not exceed the limits in this section.

(a) **Maximum ERP.** The ERP must not exceed the applicable limits in this paragraph under any circumstances.

Frequency Range (MHz)	Maximum ERP (Watts)
470-512	1000
928-929	50
932-933	30
941-942	600
952-960	150

(b) **470-512 MHz limits.** The purpose of the rules in paragraphs (b)(1) through (b)(3) of this section is to reduce the likelihood that

interference to television reception from public mobile operations on these channels will occur. The protected TV station locations specified in this section are the locations of record as of September 1974, and these do not change even though the TV stations may have been subsequently relocated.

(1) **Co-channel protection.** The ERP of control transmitters must not exceed the limits in the tables in paragraphs (b)(1)(ii) and (b)(1)(iii) of this section. The limits depend upon the height above average terrain of the control transmitter antenna and the distance between the control transmitter and the nearest protected TV station location in paragraph (b)(1)(i) of this section.

(i) The protected TV station locations are as follows:

Control Transmitter Frequency Range	Protected TV Station Location
470-476 MHz	Jacksonville, IL 39°45'52" 90°30'29"
	Mt. Pleasant, MI 43°34'24" 84°46'21"
	Oxford, OH 39°30'26" 84°44'09"
	Washington, DC 38°57'17" 77°00'17"
476-482 MHz	Champaign, IL 40°04'11" 87°54'45"
	Madison, WI 43°03'01" 89°29'15"
	Parkersburg, WV 39°20'50" 81°33'56"
	Fort Wayne, IN 41°05'35" 85°10'42"
	Lancaster, PA 40°15'45" 76°27'49"
482-488 MHz	South Bend, IN 41°36'26" 86°12'48"
488-494 MHz	Philadelphia, PA 40°02'30" 75°14'24"
494-500 MHz	None
500-506 MHz	Johnstown, PA 40°19'47" 78°53'45"
506-512 MHz	Washington, DC 38°57'49" 77°06'18"
	Waterbury, CT 41°31'02" 73°01'00"

(ii) Table E-3 and E-4 apply to control transmitters in the New York - Northeastern New Jersey and Cleveland urban areas that transmit on channels in the 476-482 MHz range and to control

Table E-9 - Maximum ERP (Watts) for Base Transmitters (HAAT more than 152 meters)

Distance to Protected TV Station in kilometers (miles)	Antenna Height Above Average Terrain in meters (feet)					
	152 (500)	305 (1000)	457 (1500)	610 (2000)	762 (2500)	914 (3000)
209 (130)	1000	447	219	117	71	46
193 (120)	500	209	95	50	30	19
177 (110)	225	91	35	19	11	8
161 (100)	100	30	10	5	3	2
153 (95)	50	13	5	3	2	1

See § 22.659(b)(2). This table is for antenna heights of more than 152 meters (500 feet) above average terrain. For intermediate values of height and/or distance, use linear interpolation to obtain the maximum permitted ERP.