

§ 73.625

to support broadcasting for which a subscription fee is not required). The fee required by this provision shall be imposed on any and all revenues from such services, other than revenues received from a third party in return for the transmission of commercial advertisements used to support broadcasting for which a subscription fee is not required.

(2) *Payment of fees.* (i) Each December 1, all commercial and noncommercial DTV licensees and permittees will electronically report whether they provided ancillary or supplementary services in the 12-month period ending on the preceding September 30. Licensees and permittees will further report, for the applicable period:

(A) A brief description of the services provided;

(B) Which services were feeable ancillary or supplementary services;

(C) Whether any ancillary or supplementary services provided were not subject to a fee;

(D) Gross revenues received from all feeable ancillary and supplementary services provided during the applicable period; and

(E) The amount of bitstream used to provide ancillary or supplementary services during the applicable period. Licensees and permittees will certify under penalty of perjury the accuracy of the information reported. Failure to file regardless of revenues from ancillary or supplementary services or provision of such services may result in appropriate sanctions.

(ii) If a commercial or noncommercial DTV licensee or permittee has provided feeable ancillary or supplementary services at any point during a 12-month period ending on September 30, the licensee or permittee must additionally file the FCC's standard remittance form (Form 159) on the subsequent December 1. Licensees and permittees will certify the amount of gross revenues received from feeable ancillary or supplementary services for the applicable 12-month period and will remit the payment of the required fee.

(iii) The Commission reserves the right to audit each licensee's or permittee's records which support the calculation of the amount specified on line 23A of Form 159. Each licensee or

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permittee, therefore, is required to retain such records for three years from the date of remittance of fees.

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§ 73.625 DTV coverage of principal community and antenna system.

(a) *Transmitter location.* (1) The DTV transmitter location shall be chosen so that, on the basis of the effective radiated power and antenna height above average terrain employed, the following minimum F(50,90) field strength in dB above one uV/m will be provided over the entire principal community to be served:

Channels 2–6	35 dBu
Channels 7–13	43 dBu
Channels 14–69	48 dBu

NOTE TO PARAGRAPH (a)(1): These requirements above do not become effective until December 31, 2004 for commercial television licensees and December 31, 2005 for non-commercial television licensees. Prior to those dates, the following minimum F(50,90) field strength in dB above one uV/m must be provided over the entire principal community to be served:

Channels 2–6	28 dBu
Channels 7–13	36 dBu
Channels 14–69	41 dBu

(2) The location of the antenna must be so chosen that there is not a major obstruction in the path over the principal community to be served.

(3) For the purposes of this section, coverage is to be determined in accordance with paragraph (b) of this section. Under actual conditions, the true coverage may vary from these estimates because the terrain over any specific path is expected to be different from the average terrain on which the field strength charts were based. Further, the actual extent of service will usually be less than indicated by these estimates due to interference from other stations. Because of these factors, the predicted field strength contours give no assurance of service to any specific percentage of receiver locations within the distances indicated.

(b) *Determining coverage.* (1) In predicting the distance to the field strength contours, the F (50,50) field strength charts (Figures 9, 10 and 10b of § 73.699 of this part) and the F (50,10) field strength charts (Figures 9a, 10a and 10c of § 73.699 of this part) shall be used. To use the charts to predict the distance to a given F (50,90) contour, the following procedure is used: Convert the effective radiated power in kilowatts for the appropriate azimuth into decibel value referenced to 1 kW (dBk). Subtract the power value in dBk from the contour value in dBu. Note that for power less than 1 kW, the difference value will be greater than the contour value because the power in dBk is negative. Locate the difference value obtained on the vertical scale at the left edge of the appropriate F (50,50) chart for the DTV station's channel. Follow the horizontal line for that value into the chart to the point of intersection with the vertical line above the height of the antenna above average terrain for the appropriate azimuth located on the scale at the bottom of the chart. If the point of intersection does not fall exactly on a distance curve, interpolate between the distance curves below and above the intersection point. The distance values for the curves are located along the right edge of the chart. Using the appropriate F (50,10) chart for the DTV station's channel, locate the point where the distance coincides with the vertical line above the height of the antenna above average terrain for the appropriate azimuth located on the scale at the bottom of the chart. Follow a horizontal line from that point to the left edge of the chart to determine the F (50,10) difference value. Add the power value in dBk to this difference value to determine the F (50,10) contour value in dBu. Subtract the F (50,50) contour value in dBu from this F (50,10) contour value in dBu. Subtract this difference from the F (50,50) contour value in dBu to determine the F (50,90) contour value in dBu at the pertinent distance along the pertinent radial.

(2) The effective radiated power to be used is that radiated at the vertical angle corresponding to the depression angle between the transmitting an-

tenna center of radiation and the radio horizon as determined individually for each azimuthal direction concerned. In cases where the relative field strength at this depression angle is 90% or more of the maximum field strength developed in the vertical plane containing the pertaining radial, the maximum radiation shall be used. The depression angle is based on the difference in elevation of the antenna center of radiation above the average terrain and the radio horizon, assuming a smooth spherical earth with a radius of 8,495.5 kilometers (5,280 miles) and shall be determined by the following equation:

$$A = 0.0277 \text{ square root of } H$$

Where:

A is the depression angle in degrees.

H is the height in meters of the transmitting antenna radiation center above average terrain of the 3.2-16.1 kilometers (2-10 miles) sector of the pertinent radial.

This formula is empirically derived for the limited purpose specified here. Its use for any other purpose may be inappropriate.

(3) Applicants for new DTV stations or changes in the facilities of existing DTV stations must submit to the FCC a showing as to the location of their stations' or proposed stations' contour. This showing is to include a map showing this contour, except where applicants have previously submitted material to the FCC containing such information and it is found upon careful examination that the contour locations indicated therein would not change, on any radial, when the locations are determined under this section. In the latter cases, a statement by a qualified engineer to this effect will satisfy this requirement and no contour maps need be submitted.

(4) The antenna height to be used with these charts is the height of the radiation center of the antenna above the average terrain along the radial in question. In determining the average elevation of the terrain, the elevations between 3.2-16.1 kilometers (2-10 miles) from the antenna site are employed. Profile graphs shall be drawn for 8 radials beginning at the antenna site and extending 16.1 kilometers (10 miles) therefrom. The radials should be drawn for each 45 degrees of azimuth starting

with True North. At least one radial must include the principal community to be served even though such community may be more than 16.1 kilometers (10 miles) from the antenna site. However, in the event none of the evenly spaced radials include the principal community to be served and one or more such radials are drawn in addition to the 8 evenly spaced radials, such additional radials shall not be employed in computing the antenna height above average terrain. Where the 3.2–16.1 kilometers (2–10 mile) portion of a radial extends in whole or in part over large bodies of water (such as ocean areas, gulfs, sounds, bays, large lakes, etc., but not rivers) or extends over foreign territory but the contour encompasses land area within the United States beyond the 16.1 kilometers (10 mile) portion of the radial, the entire 3.2–16.1 kilometers (2–10 mile) portion of the radial shall be included in the computation of antenna height above average terrain. However, where the contour does not so encompass United States land area and (1) the entire 3.2–16.1 kilometers (2–10 mile) portion of the radial extends over large bodies of water or foreign territory, such radial shall be completely omitted from the computation of antenna height above average terrain, and (2) where a part of the 3.2–16.1 kilometers (2–10 mile) portion of a radial extends over large bodies of water or over foreign territory, only that part of the radial extending from the 3.2 kilometer (2 mile) sector to the outermost portion of land area within the United States covered by the radial shall be employed in the computation of antenna height above average terrain. The profile graph for each radial should be plotted by contour intervals of from 12.2–30.5 meters (40–100 feet) and, where the data permits, at least 50 points of elevation (generally uniformly spaced) should be used for each radial. In instances of very rugged terrain where the use of contour intervals of 30.5 meters (100 feet) would result in several points in a short distance, 61.0–122.0 meter (200–400 foot) contour intervals may be used for such distances. On the other hand, where the terrain is uniform or gently sloping the smallest contour interval indicated on the topo-

graphic map (see paragraph (b)(5) of this section) should be used, although only relatively few points may be available. The profile graphs should indicate the topography accurately for each radial, and the graphs should be plotted with the distance in kilometers as the abscissa and the elevation in meters above mean sea level as the ordinate. The profile graphs should indicate the source of the topographical data employed. The graph should also show the elevation of the center of the radiating system. The graph may be plotted either on rectangular coordinate paper or on special paper which shows the curvature of the earth. It is not necessary to take the curvature of the earth into consideration in this procedure, as this factor is taken care of in the charts showing signal strengths. The average elevation of the 12.9 kilometer (8 miles) distance between 3.2–16.1 kilometers (2–10 miles) from the antenna site should then be determined from the profile graph for each radial. This may be obtained by averaging a large number of equally spaced points, by using a planimeter, or by obtaining the median elevation (that exceeded for 50% of the distance) in sectors and averaging those values. In directions where the terrain is such that negative antenna heights or heights below 30.5 meters (100 feet) for the 3.2 to 16.1 kilometers (2 to 10 mile) sector are obtained, an assumed height of 30.5 meters (100 feet) shall be used for the prediction of coverage. However, where the actual contour distances are critical factors, a supplemental showing of expected coverage must be included together with a description of the method employed in predicting such coverage. In special cases, the Commission may require additional information as to terrain and coverage.

(5) In the preparation of the profile graph previously described, and in determining the location and height above sea level of the antenna site, the elevation or contour intervals shall be taken from the United States Geological Survey Topographic Quadrangle Maps, United States Army Corps of Engineers' maps or Tennessee Valley Authority maps, whichever is the latest, for all areas for which such maps are

available. If such maps are not published for the area in question, the next best topographic information should be used. Topographic data may sometimes be obtained from State and Municipal agencies. Data from Sectional Aeronautical Charts (including bench marks) or railroad depot elevations and highway elevations from road maps may be used where no better information is available. In cases where limited topographic data is available, use may be made of an altimeter in a car driven along roads extending generally radially from the transmitter site. United States Geological Survey Topographic Quadrangle Maps may be obtained from the United States Geological Survey, Department of the Interior, Washington, D.C. 20240. Sectional Aeronautical Charts are available from the United States Coast and Geodetic Survey, Department of Commerce, Washington, D.C. 20235. In lieu of maps, the average terrain elevation may be computer generated, except in the cases of dispute, using elevations from a 30 second point or better topographic data file. The file must be identified and the data processed for intermediate points along each radial using linear interpolation techniques. The height above mean sea level of the antenna site must be obtained manually using appropriate topographic maps.

(c) *Antenna system.* (1) The antenna system shall be designed so that the effective radiated power at any angle above the horizontal shall be as low as the state of the art permits, and in the same vertical plane may not exceed the effective radiated power in either the horizontal direction or below the horizontal, whichever is greater.

(2) An antenna designed or altered to produce a noncircular radiation pattern in the horizontal plane is considered to be a directional antenna. Antennas purposely installed in such a manner as to result in the mechanical beam tilting of the major vertical radiation lobe are included in this category.

(3) Applications proposing the use of directional antenna systems must be accompanied by the following:

(i) Complete description of the proposed antenna system, including the

manufacturer and model number of the proposed directional antenna.

(ii) Relative field horizontal plane pattern (horizontal polarization only) of the proposed directional antenna. A value of 1.0 should be used for the maximum radiation. The plot of the pattern should be oriented so that 0 degrees corresponds to true North. Where mechanical beam tilt is intended, the amount of tilt in degrees of the antenna vertical axis and the orientation of the downward tilt with respect to true North must be specified, and the horizontal plane pattern must reflect the use of mechanical beam tilt.

(iii) A tabulation of the relative field pattern required in paragraph (c)(3)(ii) of this section. The tabulation should use the same zero degree reference as the plotted pattern, and be tabulated at least every 10 degrees. In addition, tabulated values of all maxima and minima, with their corresponding azimuths, should be submitted.

(iv) Horizontal and vertical plane radiation patterns showing the effective radiated power, in dBk, for each direction. Sufficient vertical plane patterns must be included to indicate clearly the radiation characteristics of the antenna above and below the horizontal plane. In cases where the angles at which the maximum vertical radiation varies with azimuth, a separate vertical radiation pattern must be provided for each pertinent radial direction.

(v) All horizontal plane patterns must be plotted to the largest scale possible on unglazed letter-size polar coordinate paper (main engraving approximately 18 cm×25 cm (7 inches×10 inches)) using only scale divisions and subdivisions of 1, 2, 2.5, or 5 times 10^{nth}. All vertical plane patterns must be plotted on unglazed letter-size rectangular coordinate paper. Values of field strength on any pattern less than 10 percent of the maximum field strength plotted on that pattern must be shown on an enlarged scale.

(vi) The horizontal and vertical plane patterns that are required are the patterns for the complete directional antenna system. In the case of a composite antenna composed of two or more individual antennas, this means

that the patterns for the composite antenna, not the patterns for each of the individual antennas, must be submitted.

(4) Where simultaneous use of antennas or antenna structures is proposed, the following provisions shall apply:

(i) In cases where it is proposed to use a tower of an AM broadcast station as a supporting structure for a DTV broadcast antenna, an appropriate application for changes in the radiating system of the AM broadcast station must be filed by the licensee thereof. A formal application (FCC Form 301, or FCC Form 340 for a noncommercial educational station) will be required if the proposal involves substantial change in the physical height or radiation characteristics of the AM broadcast antennas; otherwise an informal application will be acceptable. (In case of doubt, an informal application (letter) together with complete engineering data should be submitted.) An application may be required for other classes of stations when the tower is to be used in connection with a DTV station.

(ii) When the proposed DTV antenna is to be mounted on a tower in the vicinity of an AM station directional antenna system and it appears that the operation of the directional antenna system may be affected, an engineering study must be filed with the DTV application concerning the effect of the DTV antenna on the AM directional radiation pattern. Field measurements of the AM stations may be required prior to and following construction of the DTV station antenna, and readjustments made as necessary.

(5) Applications proposing the use of electrical beam tilt pursuant to section 73.622(f)(4) must be accompanied by the following:

(i) Complete description of the proposed antenna system, including the manufacturer and model number. Vertical plane radiation patterns conforming with paragraphs (c)(3)(iv), (c)(3)(v) and (c)(3)(vi) of this section.

(ii) For at least 36 evenly spaced radials, including 0 degrees cor-

responding to true North, a determination of the depression angle between the transmitting antenna center of radiation and the radio horizon using the formula in paragraph (b)(2) of this section.

(iii) For each such radial direction, the ERP at the depression angle, taking into account the effect of the electrical beam tilt, mechanical beam tilt, if used, and directional antenna pattern if a directional antenna is specified.

(iv) The maximum ERP toward the radio horizon determined by this process must be clearly indicated. In addition, a tabulation of the relative fields representing the effective radiation pattern toward the radio horizon in the 36 radial directions must be submitted. A value of 1.0 should be used for the maximum radiation.

[62 FR 26990, May 16, 1997, as amended at 63 FR 13562, Mar. 20, 1998; 66 FR 9985, Feb. 13, 2001; 66 FR 65135, Dec. 18, 2001]

§ 73.626 DTV distributed transmission systems.

(a) A DTV station may be authorized to operate multiple synchronized transmitters on its assigned channel to provide service consistent with the requirements of this section. Such operation is called a distributed transmission system (DTS). Except as expressly provided in this section, DTV stations operating a DTS facility must comply with all rules applicable to DTV single-transmitter stations.

(b) For purposes of compliance with this section, a station's "authorized service area" is defined as the area within its predicted noise-limited service contour determined using the facilities authorized for the station in a license or construction permit for non-DTS, single-transmitter-location operation.

(c) *Table of Distances.* The following Table of Distances describes (by channel and zone) a station's maximum service area that can be obtained in applying for a DTS authorization.

Channel	Zone	F(50,90) field strength (dBu)	Distance from reference point
2–6	1	28	108 km. (67 mi.)