

RADIO ADMINISTRATION
FCC REGULATORY INFORMATION
ESTABLISHING A PUBLIC LAND MOBILE (PLM) RADIO STATION

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1. GENERAL

1.01 Purpose

This Practice provides guidelines for preparing FCC Form 401, which is the application for authority to construct or modify radio facilities in the Public Land Mobile (PLM) Service. It is a companion to System Practices 400-521-900 (Public Land Mobile Radio Station - General Considerations) and 400-521-902 (Notification of Status of Facilities - Preparation of FCC Form 489). For situations that are beyond the scope of these instructions or when assistance is required, contact the FCC Coordinator at General Headquarters.

1.02 Reissue

This Practice is reissued to change from AT&T to SWBT and to make corrections and updates in accordance with revised FCC application procedures and forms. Change arrows are omitted due to the magnitude of the changes.

1.03 Applicable FCC Rules

The PLM Service is governed specifically by Part 22, Subpart G, of the FCC Rules and Regulations. It is further governed by Subparts A, B, C, D, and E, of Part 22. In addition, it is regulated by general Parts 0, 1, 2, 17.

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1.04 Classes of Stations

The two classes of stations that are most commonly employed in PLM Service are included in this Practice. They are base and auxiliary test stations. Definitions of these classes of stations are given in Rule Section 22.2.

1.05 Arrangement of Text

Each part in this Practice provides guidelines for preparing a particular type of application required for the construction or modification of PLM stations. For applications requiring the use of an FCC form (termed "formal applications"), step-by-step instructions are given for responding to the numbered items on the form and for otherwise completing the application. Responses intended to be omitted must include the notation "not applicable" or "N/A." The notation "DNA" or "Does Not Apply" should not be used.

1.06 Illustrations

To assist in the preparation of the application, blank pages of Form 401 have been included as figures. Encircled numerical notations have been placed on the pages to indicate the paragraph(s) of this Practice that discusses the item so marked.

1.07 Reproduced Forms

Formal applications may be submitted on exact copies of the FCC form. Reproduced copies must be on 8 1/2 by 11 inch paper and made by a high-quality process, such as photo-offset. Copies may be preprinted with universally applicable information, such as the address of the applicant and corporate information. See System Practice 400-521-100 and local instructions for information about the number of copies required and to whom they should be sent.

1.08 It is advisable to check with your local FCC Engineer-In-Charge to assure that you are using the latest dated form available.

2. AUTHORIZATION FOR A NEW STATION

2.01 General Application Procedure

A formal application for a new Public Land Mobile radio station must be submitted on FCC Form 401 (Fig. 1). The completed application, with associated exhibits, should be accompanied by a letter of transmittal. This letter should:

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- o clearly state the purpose of the application
- o give the nature and location of the proposed facilities.

2.02 Preliminary Preparation of Form 401

Near the top center of each page enter NEW STATION and the proposed location. NEW STATION indicates that an FCC call sign has not yet been assigned. The proposed location must be the name of a nearby city, town, mountain, lake or other landmark shown on a standard U.S. Geological Survey map or aeronautical chart. The location indicated should be consistent with the proposed service area, i.e. Ft. Smith, Ar.

2.03 Exhibits

Near the top center of each attached exhibit, enter "Southwestern Bell Telephone Company", "Public Land Mobile Service New Station," and the proposed location and state. Near the right-hand top corner of each exhibit, place "FCC Form 401" and the exhibit number. Identification numbers for exhibits should be assigned in numerical order. If an exhibit requires more than one page, add information about the number of pages, such as "Page 1 of 2."

3. PREPARATION OF SCHEDULE A

- 3.01 Item 1: Since the application is for a new station, place an "X" in the "No" box.
- 3.02 Item 2: Enter an "X" in the appropriate box. If "Yes," give file number of pending application.
- 3.03 Item 3: Enter "Southwestern Bell Telephone Company" and the address (with zipcode) to which the FCC should mail the approved authorization.

NOTE: "Assumed Name Used For Doing Business (if any)" is not applicable. Therefore, enter "N/A" on this line.

Enter the telephone number of the person to whom questions regarding the application should be directed. This would be the person with FCC responsibilities at General Headquarters.

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- 3.04 Item 4: Enter "N/A".
- 3.05 Item 5: Respond as appropriate. A site is considered to be a fixed transmitting antenna location.
- 3.06 Item 6: Mark one box, A, B or C, as appropriate.
- 3.07 Item 7: Enter type of service by placing an "X" in either box "A", "D" or "E."
- 3.08 Item 8: Place an "X" in box "B." Wireline Common Carrier.
- 3.09 Item 9: Enter the control point street address, city or town and state in Column "A" and enter "I" in Column "B" of Table MOB-1A. Include all control points.
- 3.10 Item 10: Place an "X" in box "D" to indicate a Corporation as applicant.
- 3.11 Item 11: Enter "State of Missouri".
- 3.12 Item 12: Place an "X" in the "Yes" column.
- 3.13 Item 13: Place an "X" in the "Yes" column and reference FCC Form 430.
- 3.14 Item 14: Place an "X" in the "No" column.
- 3.15 Item 15: Place an "X" in the appropriate column and reference FCC Form 430.
- 3.16 Item 16: Place an "X" in the "No" column.
- 3.17 Item 17: Place an "X" in the appropriate column and reference FCC Form 430.

Since this application is for a new station, Table MOB-1B is not applicable; enter "N/A."

NOTE: For Items 13, 14, 15 and 17, it is also permissible to asterisk the item and add a footnote at the bottom of the page stating "Data on file - FCC Form 430 dated ____" (give date of latest filing).

- 3.18 Item 18: Place an "X" in the appropriate column. If "Yes," the exhibit should include the required information for all one-way and two-way base stations within a 40 mile radius, i.e. owned by Southwestern Bell Telephone Company, the corporation and affiliated companies (this includes cellular systems).

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- 3.19 Item 19: Enter an "X" in the "No" column.
- 3.20 Item 20: Since this is an application for a new station, place an "X" in the "No" column.
- 3.21 Item 21: Answer as appropriate. If "Yes," attach data required as an exhibit (Refer to Rule Section 22.16 and EA-70-5 "Radio Facilities-General Information" for detailed information).
- 3.22 Item 22: Enter exhibit and item numbers for Schedule A and all Schedule B's of Form 401.
- 3.23 Certification - Items 23, 24, 25, and 26: Respond as appropriate. The certification must be signed by an officer or by a duly authorized employee of the company. Refer to the Schedule of Authorization.

4. PREPARATION OF SCHEDULE B - ANTENNA LOCATIONS

4.01 General

One Schedule B should be completed for each antenna location. Indicate the number of Schedule B's in the space provided above Item 27.

- 4.02 Item 27: Respond as required for the antenna location.
- 4.03 Item 28: Indicate "A" or "B" since this is an application for a new station.
- 4.04 Item 29: Normally answered "No."
- 4.05 Item 30: Answer as appropriate. If "Yes," provide the information as requested.
- 4.06 Item 31: This application is for a new station, therefore enter "N/A."
- 4.07 Item 32: Answer as appropriate. If "Yes," attach exhibit giving the required information.

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4.08 Table MOB-2

Item 33: Table MOB-2 is required for each antenna system at each site. Indicate the number of MOB-2's for each Schedule B in the space provided above (a).

- 4.09 Item 33(a): Since this is a new station place an "X" in the "Proposed" box.
- 4.10 Item 33(b): Enter full name of antenna manufacturer.
- 4.11 Item 33(c): Enter manufacturer's antenna type number.
- 4.12 Item 33(d): Enter directions of maximum gain. See supplementary explanation 3(d) at top of Table MOB-2.
- 4.13 Item 33(e): Enter maximum antenna gain in decibels. See supplementary explanation 3(e) at top of Table MOB-2.
- 4.14 Item 33(f): Enter maximum effective radiated power (ERP) rounded to the nearest whole watt.
- 4.15 Item 33(g): Enter height of antenna tip above ground level (AGL) in feet.
- 4.16 Item 33(h): Enter beam width of major lobe of antenna pattern in degrees. See supplementary explanation 3(h) at top of Table MOB-2.
- 4.17 Item 33(i): Normally an "X" is placed in the vertical box.
- 4.18 Item 33(j)(1): Enter the proposed frequency in Mhz.
- 4.19 Item 33(j)(2): Enter class of station code. See supplementary explanation 3(j)(2) at top of page.
- 4.20 Item 33(j)(3): Enter the appropriate emission designator(s) opposite each of the associated transmitting frequencies. Generally this would be: 15K0F2D, 16K0F3E, 16K0F3C, 16K0F1D and 16K0F1E.
- 4.21 Item 33(j)(4): Enter in watts the output power at which the transmitter will be operated. This output power must not exceed the type accepted power output.

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- 4.22 Item 33(j)(5): Enter the points of communication:
- a. For a two-way station, enter "Mobile and rural subscriber stations authorized for this service."
 - b. For a one-way station, enter "Receivers associated with this system."
 - c. For an auxiliary test station, enter "Base receivers associated with this system."
- 4.23 Item 33(j)(6): Normally not applicable. Enter "N/A."
- 4.24 Item 33(j)(7): Normally not applicable. Enter "N/A."
- 4.25 Enter "Southwestern Bell Telephone Company" in the space provided above item 34.
- 4.26 Item 34: Normally answered "Yes."
- 4.27 Item 35(a): Enter as appropriate.
- 4.28 Item 35(b): Enter overall heights of antenna structure as shown on latest FAA notification. If no FAA notification is required, enter the heights of the antenna structure, rounded to the next highest foot.
- 4.29 Item 35(c): Enter as appropriate. If "Yes," give Call Sign(s) of other radio station(s).
- 4.30 Item 35(d): Provide the information requested rounded to nearest tenth of a mile.
- 4.31 Item 35(e): Answer as appropriate. If yes, give FAA study number, if known.
- 4.32 Item 35(f): Answer as appropriate. If "Yes," respond "See attached exhibit No ___" and attach as an exhibit a copy of the approved FAA form. If the approved FAA Form is not available or if the FAA was notified by another company, enter the information as required.

NOTE: It is recommended that the FAA be notified for a new structure or increase in height of an existing structure.

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- 4.33 Item 35(g): If no shielding objects exist, enter "None," otherwise enter the information requested.
- 4.34 Item 36: Draw a vertical profile sketch in the space provided if (1) the antenna is new; (2) the antenna is to be mounted on a new structure or building; or (3) the antenna will increase the overall height of an existing structure or building.

The sketch shall include the overall structure height including appurtenances, height of the tip of the proposed antenna, ground elevation, and the height of any supporting building. All heights shown shall be AGL (above ground level) and AMSL (above mean sea level) and rounded to the next highest foot. It is recommended that the height of the antenna radiation center also be shown.

Do not attach a separate exhibit. The sketch must be drawn in the space provided and does not have to be drawn to scale.

4.35 Table MOB-3

Item 37: Complete one Table MOB-3 for each antenna. Indicate the number of Table MOB-3s in the space provided. Schedule B - Supplement pages may be reproduced as needed.

4.36 Supplementary Engineering Information

The transmitting antenna transmission line and associated line equipment information should be placed on a separate exhibit as indicated. (Separate exhibits are required for each Table MOB-3.)

For comparatively simple arrangements using no line equipment, list each type of line employed showing the full name of the manufacturer, the manufacturer's type number, the length in feet, and the loss in dB. (Fig. 2). Losses should be computed to the nearest 0.1 dB using the latest loss figures obtainable from the manufacturer.

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When diplexers or complicated line arrangements are involved, enter an exhibit number and provide a block diagram of the transmission line makeup on an exhibit similar to Fig. 3. List each item of transmission line equipment showing the name of the manufacturer, the manufacturer's type number, and the attenuation of the transmitted signal in dB. The loss must agree with the latest information published by the manufacturer. Also show output power at the transmitter and the antenna. However, if a diplexer is included in the manufacturer's type acceptance number for the proposed transmitter, the loss of this diplexer shall not be itemized. Somewhere on the exhibit, include the total transmission line loss.

- 4.37 Item 37 (Col. b): Determine the average elevation in Column b using the topographic map(s) marked with the required radials. Use a 7.5 minute quadrangle map for this purpose, if available. The coordinates must be accurate to 1 second of longitude and latitude and should agree with those shown in Item 27 of Schedule B. The location of the transmitting antenna is considered to be the station location. Only the 2 to 10 mile portion of the 10 mile profile is used to determine average elevation. See Rule Section 22.115 for additional information.

Topographic maps and profile graphs are not to be filed with the application, but instead, shall be retained as part of the records and be made available to the Commission's staff upon request.

The average terrain elevation may be computer-generated using elevations from a 30 second point, or better, topographic data file. If this method is used, the data file must be identified and the maps and profiles need not be prepared.

- 4.38 Item 37 (Col. c): Subtract the values in Column b from the height of the antenna radiation center expressed in feet above mean sea level and insert the difference in Column c.
- 4.39 Item 37 (Col. f): Determine the collective average terrain elevation of all eight radials. Do not include co-channel information.
- 4.40 Item 37 (Col. g): Subtract the value in Column f from the height of the antenna radiation center expressed in feet above mean sea level and insert the difference in Column g.

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4.41 Item 37 (Col. d): Enter the calculated effective radiated power for each radial. This value should be determined from the following data:

- a. Transmitter output power
(Associated Table MOB-2, Item 33(j) (4))
- b. Antenna gain
(Associated Table MOB-2, Item 33(e) for omni-directional antennas or Associated Table MOB-3, Item 37(a) for directional antennas)
- c. Total transmission line loss
(Associated Table MOB-3 #3 Supp. engr. information exhibit)

An example of one method of calculating effective radiated power (ERP) is as follows:

Transmitter Output power	60.0 Watts
Total transmission line loss	6.85 dB
Antenna gain	6.0 dB
Net loss:	$6.85 - 6.0 = 0.85 \text{ dB}$

Using conversion tables (Fig. 4), a loss of 0.85 dB gives a factor of 0.8225. Using the ERP formula, 60 watts times 0.8225 equals 49.35 watts. Rounded to the next highest whole number the ERP would be 50 watts.

Supplementary radials shall be drawn and profiles prepared in the direction of co-channel stations within 75 miles. Indicate the radial bearing and provide the information for all columns. Do not include this data in the calculations of average terrain elevation (Col. f). If there are no co-channel stations within 75 miles, include an entry to that effect.

- 4.42 Item 37 (Col. e): Enter the maximum distance in miles from the base station to the reliable service contour. The reliable service contour can be determined from the parameter set forth in Rule Section 22.504.
- 4.43 Frequencies: List in the column provided the frequencies from Item 33(j) (1) that have identical values in Columns c and d.

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- 4.44 Item 37 (Col. h): If radials given in Column b were computer generated, identify file (data base) used. If not, enter "N/A".
- 4.45 Item 37(i): Answer as appropriate. If "No," attach as an exhibit a directional antenna pattern. The radiation pattern should be prepared on letter-size polar coordinate paper and should show:
- o The antenna power gain distribution in the horizontal plane expressed in decibels
 - o True North
 - o Reference half-wave dipole

For directional antennas, chart the radiation pattern showing the antenna gain in dB on bearings of 0, 45, 90, 135, 180, 225, 270 and 315 degrees and on the bearing to each co-channel station within 75 miles. (Fig. 5)

NOTE: If an antenna that is normally nondirectional is so placed that it no longer radiates an equal amount of power in all directions (side mounted on a metal tower), it must be shown as directional in the application and all information normally required for a directional antenna provided.

- 4.46 Item 37(j): Answer as appropriate. If "yes," attach interference studies.

NOTE: Rule Sections 22.502 and 22.503 established minimum mileage separation standards for co-channel interference studies.

- 4.47 Table MOB-4

Item 38: This item does not apply to mobile radio. Enter N/A.

- 4.48 Verify that all exhibits supporting each Schedule B have been enumerated in Schedule A, Item 22.

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5. EXCEPTIONS FOR 900 MHz PAGING STATIONS

5.01 Preparation of an application for a 900 MHz one-way paging station is similar to the preparation of an application described in Parts 3 and 4 of this Practice. However, the responses to Items 33(j)(1) and Item 37, Table MOB-3 of Schedule B Form 401 should be prepared in the following manner.

5.02 Item 33(j)(1), Frequency: Enter "900 MHz frequency to be assigned by FCC."

NOTE: A non-network frequency preference may be specified, but the Commission is not bound by such request.

5.03 Item 37, Supplementary Engineering Information - Include as exhibits the following:

- a. The transmitting antenna transmission line and associated line equipment information.
- b. The exact station location plotted on a map with a scale of 1:250,000 and the protected service area depicted by a 20 mile radius.

6. MODIFICATIONS TO EXISTING STATIONS

6.01 General Information

Except for minor modifications described in Rule Section 22.9(d), all changes are considered major and require the completion of a Form 401 with appropriate responses made to all items and associated exhibits included.

6.02 Change of Previous Information

Much of the information required in an application for modifications or additions to an existing station will have been previously filed with the FCC. Items such as station location, geographical coordinates, etc., are shown on the station's current authorization. All information now being supplied **must** agree with the previously filed information and the current authorization, or it must be corrected in the new application. When such changes are made, an explanation should be given.

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6.03 Previous Exhibits

Only exhibits previously filed with the Commission that are more than one 8 1/2 by 11 inch page in length and that will not be affected by the proposed changes, may be properly referenced to a previously filed application. (Rule Section 22.13(d).)

6.04 Preparation of Form 401

At the top center of each page enter the station's call sign and location, including the state in which the station is located. The location should agree with that shown on the current authorization.

6.05 New Exhibits

Near the top center of each attached exhibit, enter Southwestern Bell Telephone Company "Public Land Mobile Service," the station's call sign and the location and state. Near the top right-hand corner of each exhibit, place "FCC FORM 401" and exhibit number. The numbers used to identify exhibits should be assigned in numerical order. If more than a one page exhibit is needed, add the number of pages such as "Page 1 of 2."

6.06 Specific Application Procedures

Preparation of an application to modify a station authorization is similar to that for a new station described in Parts 2, 3 and 4 of this practice. However, the items listed below should be prepared as follows:

- 6.07 Item 1: Since the application is for an existing station, place an "X" in the "Yes" box and give the Call Sign.
- 6.08 Item 9: If a control point is being added or deleted, respond as appropriate. If no change, enter "N/A." If a control point is being relocated, complete Table MOB-1B as required.
- 6.09 Item 20: If the application is for one or more additional channels, place an "x" in the "Yes" column and provide the loading study exhibit.
- 6.10 Item 21: Since this is a modification to an existing station, place an "X" in the "No" column.

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- 6.11 Item 28: Mark an "X" in as many boxes as applicable.
- 6.12 Item 31: Place an "X" in as many boxes as applicable. Attach an exhibit giving details of changes if box "j" is checked.
- 6.13 Item 33(a): Respond as appropriate.

7. AMENDMENTS

7.01 General

In some situations it may become necessary to amend an application that has been filed with the FCC and is still pending. An amendment is a type of informal application that can be submitted in letter form. Individual pages of the Form 401 should be used. Provide a brief description of the purpose of the amendment and the reason it is required. Indicate if, in your opinion, the amendment is major or minor.

7.02 Amending Form 401

An amendment must contain the following:

- o A completed Form 401 Schedule A, page 1. Answer Item 2 "Yes" and provide the file number assigned to the original application. An application cannot be amended until it has appeared on Public Notice as accepted for filing.
- o All other pages on which items are being amended, including appropriate exhibits. Near the right hand corner of each amended page place "Amended (date)."

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Figure 1

FCC 401 - Schedule A - Page 1

FCC Use Only Call Sign		File No.	
FCC 401 FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554		Approved by OMB 3060-0046 Expires 11/30/89	
APPLICATION FOR NEW OR MODIFIED COMMON CARRIER RADIO STATION AUTHORIZATION UNDER PART 22 Schedule A - (Complete One Schedule A Per Application)			
1. Does this application refer to an existing station? (3.01) <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," give Call Sign: (6.07)		2. Is this an amendment to a pending application? (3.02) <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," give File No.:	
3. Name of Applicant. Indicate the name, mailing address and telephone number of the applicant. (For Subsidiary Communications Authorizations, see Instruction No. 5(C).) (3.03) Legal Name of Applicant (If person, list last name first) _____ Assumed Name Used for Doing Business (if any) _____ Mailing Street Address or P.O. Box, City, State and ZIP Code _____ Area Code - Telephone No. _____			
4. Contact Representative. Indicate the name, mailing address, and telephone number of person to contact, if other than applicant. Name (Last name first) (3.04) _____ Firm or Company Name _____ Mailing Street Address or P.O. Box, City, State and ZIP Code _____ Area Code - Telephone No. _____			
5. Indicate the number of separate sites requested in this application. <input type="text"/> (3.05)			
6. Type of Service (Mark "X" One) A. <input type="checkbox"/> One-Way (Except Subsidiary Communications Authorization) B. <input type="checkbox"/> Two-Way (3.06) C. <input type="checkbox"/> Both One-Way and Two-Way D. <input type="checkbox"/> One-Way (Subsidiary Communications Authorization) Will Broadcast facilities be leased? <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," submit as Exhibit _____, the name and address of the proposed lessee.		7. Nature of Service (Mark "X" One) A. <input type="checkbox"/> Public Land Mobile Service (Other than Air-Ground Radiotelephone Service) B. <input type="checkbox"/> Domestic Public Cellular Radio Telecommunications Service Attach as Exhibit _____ a showing of financial qualifications as required by Section 22.917 of FCC Rules and Regulations C. <input type="checkbox"/> Offshore Radio Service (3.07) D. <input type="checkbox"/> Rural Radio Service E. <input type="checkbox"/> Air-Ground Radiotelephone Service F. <input type="checkbox"/> Developmental Attach as Exhibit _____ a narrative statement in support of the request. (See Subpart F, Part 22 of FCC Rules and Regulations.)	
8. Carrier Type (3.08) A. <input type="checkbox"/> Radio Common Carrier B. <input type="checkbox"/> Wireline Common Carrier			
9. Control Points - Table MOB-1A: to be completed for control points which are initial, additional or deleted. In Column (B) use the following symbols to specify status: I=Initial; A=Additional; D=Deleted. (3.09) (8.08)			
(A) Location (Street Address, City or Town and State)		(B) I, A or D	FCC Use Only Control Point No.
1. _____			
2. _____			
3. _____			
Table MOB-1B: to be completed for control points which are to be relocated. Give the present location first, followed by the proposed location.			
Location (Street Address, City or Town and State)			FCC Use Only Location No.
1. Present Location: _____			
Proposed Location: _____			
2. Present Location: _____			
Proposed Location: _____			
(All previous editions of FCC 401 are obsolete.) FCC 401 - Schedule A - Page 1 August 1987			

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Figure 1

FCC 401 - Schedule A - Page 2

10. Applicant is: (Mark "X" One) (3.10) A. <input type="checkbox"/> Individual B. <input type="checkbox"/> Partnership C. <input type="checkbox"/> Unincorporated Association D. <input type="checkbox"/> Corporation		11. If applicant is a corporation (including joint stock companies) identify the state or country laws under which it is organized. (3.11)	
Place an "X" in the appropriate column.			
		YES	NO
12. Does the applicant certify that it complies with Section 310(b) of the Communications Act of 1934, as amended, and Section 22.4 of the Commission's Rules regarding alien ownership and control? If "NO," attach as Exhibit _____ a statement describing applicant's ownership or control by aliens. (3.12)			
13. Is applicant directly or indirectly controlled by any other corporation? If "YES," give names and addresses of all such controlling corporations, including organization having ultimate control, in Exhibit _____. (3.13)			
14. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission? If "YES," attach as Exhibit _____ a showing giving call sign of license or permit revoked and relate circumstances. (3.14)			
15. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement, or any other means or unfair methods of competition? If "YES," attach as Exhibit _____ a statement relating the facts. (3.15)			
16. Has the applicant, or any party to this application, or any person directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If "YES," attach as Exhibit _____ a statement relating the facts. (3.16)			
17. Is applicant, or any person directly or indirectly controlling the applicant, presently a party in any pending matter referred to in Items 15 and 16? If "YES," show in Exhibit _____ a statement relating the facts. (3.17)			
18. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement, or any other means or unfair methods of competition? If "YES," show, for each, call sign (if known), file no. (if pending), service, base station location (city and state), frequency and name of licensee in Exhibit _____. (3.18)			
19. Has applicant been denied state certification for the facilities proposed in this application? If "YES," attach as Exhibit _____ a statement describing the state authority's action and any pending appeals, or whether the state appeal process has been exhausted and attach copies of any relevant decisions. (3.19)			
20. Is this an application for one or more additional channels for which a loading study is required per Sections 22.16 and 22.516 of FCC Rules? If "YES," include required loading study as Exhibit _____. In the same Exhibit, show data on held orders or from a valid statistical survey or any other materials which demonstrate that the public interest would be served by grant of this application. (3.20) (6.09)			
21. Is this application for more than one channel on a new system? If "YES," show, in Exhibit _____, data on held orders or from a valid statistical survey or any other materials which demonstrate that the public interest would be served by grant of this application. (3.21) (6.10)			
22. List below the Exhibits that are attached to this application. (3.22) (4.48)			
Exhibit Number	Sec. and/or Item No. of Rule or Form	Exhibit Number	Sec. and/or Item No. of Rule or Form
CERTIFICATION			
The APPLICANT waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. All statements made in the attached exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that the statements made in this application are true, complete and correct to the best of his (her) knowledge and belief, and are made in good faith. (3.23)			
WILLFUL FALSE STATEMENTS MADE ON THIS APPLICATION ARE PUNISHABLE BY FINE AND IMPRISONMENT (U.S. Code, Title 18, Section 1001) AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. Code, Title 47, Section 312(a)(1))		23. Date	24. Typed Name of Person Signing
		25. Signature	26. Title (Position Held by Person Signing Application)

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Figure 1

FCC 401 - Schedule B - Page 1

<p>FCC 401</p>	<p>Approved by OMB 3060-0046 Expires 11/30/89</p>																		
<p>Schedule B (Complete One Schedule B Per Antenna Location)</p>																			
<p>There are _____ Schedule B's with this application. This is Schedule B number _____ (4.01)</p>																			
<p>27. Antenna Location Record. (For Temporary Fixed Stations, see Instruction 5(B).) (4.02)</p>																			
<p>a. Street Address, City, County and State (If in area not designated by street, give distance and direction from, and name of, nearest town)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>b. North Latitude (Deg-Min-Sec)</p> </td> <td style="width: 50%; vertical-align: top;"> <p>FCC Use Only Location No.</p> </td> </tr> <tr> <td style="width: 50%; vertical-align: top;"> <p>c. West Longitude (Deg-Min-Sec)</p> </td> <td style="width: 50%;"></td> </tr> </table>	<p>b. North Latitude (Deg-Min-Sec)</p>	<p>FCC Use Only Location No.</p>	<p>c. West Longitude (Deg-Min-Sec)</p>															
<p>b. North Latitude (Deg-Min-Sec)</p>	<p>FCC Use Only Location No.</p>																		
<p>c. West Longitude (Deg-Min-Sec)</p>																			
<p>28. Application Type. (Mark "X" as many as applicable.) (4.03) (6.11)</p> <p>A. <input type="checkbox"/> Radio Station Authorization</p> <p>B. <input type="checkbox"/> Amendment of Pending Application (As indicated in Item 2 on Schedule A).</p> <p>C. <input type="checkbox"/> Fill in</p> <p>D. <input type="checkbox"/> Modification of Authorization</p> <p>E. <input type="checkbox"/> Partial Assignment (A separate FCC 401 is to be filed by assignee and assignor) (Mark "X" One) File No. _____ <input type="checkbox"/> Assignee <input type="checkbox"/> Assignor</p> <p>F. <input type="checkbox"/> Subsidiary Communications Authorization</p>																			
<p>29. Does the applicant request waiver of any requirements of FCC Rules? (4.04) <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," attach Exhibit _____ specifying Rule(s) for which waiver is requested and demonstrating good cause for each waiver. (See Instruction No. 9).</p>																			
<p>30. Are there any other pending applications known to the applicant with which this application is believed to be mutually exclusive? (4.05) <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," provide the following:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">a. File Number</th> <th style="width: 33%;">b. Call Sign</th> <th style="width: 33%;">c. Frequency (MHz)</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>		a. File Number	b. Call Sign	c. Frequency (MHz)															
a. File Number	b. Call Sign	c. Frequency (MHz)																	
<p>31. Nature of Request. (Mark "X" as many as applicable.) (4.06) (6.12)</p> <p>A. <input type="checkbox"/> Change Frequency D. <input type="checkbox"/> Increase Power G. <input type="checkbox"/> Change Control Point Location</p> <p>B. <input type="checkbox"/> Add Frequency E. <input type="checkbox"/> Increase Antenna Height H. <input type="checkbox"/> Additional Antenna Location</p> <p>C. <input type="checkbox"/> Delete Frequency F. <input type="checkbox"/> Change Antenna/Transmitter Location I. <input type="checkbox"/> Change Antenna System</p> <p>J. <input type="checkbox"/> Other (specify): _____</p> <p>Attach as Exhibit _____ a showing of specific details of changes.</p>																			
<p>32. Would grant of this application have a significant environmental effect per Rule Section 1.1307? (4.07) <input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," attach Exhibit _____ as the required environmental assessments per Rule Sections 1.1308 and 1.1311.</p>																			

FCC 401 - Schedule B - Page 1
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Figure 1

FCC 401 - Schedule B - Page 2

FCC Use Only Antenna No.					
33. Table MOB-2 ANTENNAS, RADIATION AND POINTS OF COMMUNICATION.					
1. One Table MOB-2 is to be completed for each new or modified antenna system at each site, including the addition or modification of transmitters which will change power output from a transmitter, or effective radiated power or emissions.					
2. Attach separate Table MOB-2 if authorization of more than one antenna system is requested.					
3. Supplementary Explanations of Certain Items:					
d - Directions of Maximum Gain. The maximum number of directions to be shown is 4. Specify bearings of directions of maximum gain, in degrees from true north. If omnidirectional, specify "Omni."					
e - Maximum Antenna Gain. Maximum power gain over reference half-wave dipole, in decibels.					
h - Beam Width of Major Lobe of Antenna Pattern. Defined as the arc, in degrees, including only points on the polar diagram which are within 3 decibels (half power points) of the point of maximum gain. For omnidirectional antennas, the beam width is defined as 360 degrees.					
j(2) - Class of Station. Use the following codes:					
BS - Base Station TS - Test SB - Subscriber Station CT - Control Station DI - Dispatch RX - Relay Station RP - Repeater SI - Signaling IO - Inter-Office ST - Standby CO - Central Office					
There are 4.06 Table MOB-2's with this Schedule B. This is Table MOB-2 number _____ of Schedule B number _____.					
a. Antenna Status 4.09 6.13 1. <input type="checkbox"/> Existing 2. <input type="checkbox"/> Proposed	b. Make of Antenna 4.10	c. Type No. of Antenna 4.11			
d. Directions of Maximum Gain 4.12	e. Maximum Antenna Gain 4.13 Decibels	f. Maximum Effective Radiated Power 4.14 Watts			
g. Height of Antenna Tip Above Ground Level 4.15 Feet	h. Beam Width of Major Lobe of Antenna Pattern 4.16 Degrees				
i. Polarization (Mark "X" One) 4.17 1. <input type="checkbox"/> Vertical 2. <input type="checkbox"/> Horizontal 3. <input type="checkbox"/> Circular 4. <input type="checkbox"/> Elliptical					
j. Transmitters (Same line numbers apply to same transmitters)					
FCC Use Only Transmitter No.	Line No.	(1) Frequency (MHz)	(2) Class of Station (Enter Code)	(3) Emission Designators	(4) Transmitter Output Power (Watts)
	1				
	2	4.18	4.19	4.20	4.21
	3				
	4	5.02			
	5				
	6				
	7				
	8				
Transmitters, continued					
Line No.	(5) Points of Communication			(6) Azimuth of Radio Path (Degrees From True North)	(7) Length of Radio Path (Miles)
1					
2					
3	4.22			4.23	4.24
4					
5					
6					
7					
8					

FCC 401 - Schedule B - Page 2
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Figure 1

FCC 401 - Schedule B - Page 3

Applicant's Name (4.25)		FCC Use Only: File No.	
34. Has the applicant obtained reasonable assurance that it can use the proposed site? <input type="checkbox"/> Yes <input type="checkbox"/> No (4.26)			
35. Antenna Structure Statement (4.27)		(b) Overall Heights of Antenna Structure (Feet) <i>(Heights should include obstruction light, if required, and any other surmounting appurtenance.)</i>	
(a) Status of Structure <i>(Mark "X" One)</i>		Above Ground Level Site Elevation (4.28) Above Mean Sea Level	
1. <input type="checkbox"/> New Structure 2. <input type="checkbox"/> Existing Structure, Height Not Increased		_____ + _____ = _____	
3. <input type="checkbox"/> Existing Structure, Height Increased			
(c) Will proposed transmitting antenna be supported by the antenna structure of any other radio station? (4.29)		(d) Distance from transmitting antenna structure to nearest runway of nearest aircraft landing area (Miles): (4.30)	
<input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," give Call Sign: _____		_____	
(e) Is the antenna mounted on an existing structure or building which currently bears lighting and markings prescribed by FCC Rules Part 17? (4.31)			
<input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," give FCC Antenna Tower No. or FAA Aeronautical Study No. if known: _____			
(f) Has FAA been notified? (4.32)		1. Date Filed <i>(Month-Day-Year)</i>	
<input type="checkbox"/> Yes <input type="checkbox"/> No If "YES," answer items (f)1-3.		2. Name Under Which Filed	
		3. Regional Office Where Filed <i>(City, State)</i>	
(g) Aeronautical Hazards. List any natural formation or existing man-made structure (hills, trees, water tanks, tower, etc.) that applicant believes would tend to shield the antenna structure from aircraft and thereby minimize the aeronautical hazard of the antenna structure. (4.33)			

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Figure 1

FCC 401 - Schedule B - Page 4

36. Vertical Profile Sketch of Antenna Structure. In the space below draw a vertical profile sketch.
DO NOT attach a separate Exhibit. Use only the space provided below.

(4.34)

FCC 401 - Schedule B - Page 4
August 1987

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Figure 1

FCC 401 - Schedule B - Page 5

37. Table MOB-3 HEIGHT AND POWER ENGINEERING DATA

1. One Table MOB-3 must be completed for each antenna. DO NOT SUBSTITUTE A SEPARATE EXHIBIT FOR THIS TABLE.

2. All distances specified in feet in this Table are to be rounded to the nearest whole number.

3. Supplementary engineering information may be included in an Exhibit _____ (4.36) (5.03)

Table MOB-3
 There are _____ Table MOB-3's with this Schedule B. This is Table MOB-3 number _____ of Schedule B number _____ (4.35)

List here the frequencies which have identical Column (c) and Column (d) values.	(a)	(b)	(c)	(d)	(e)
	Radial Bearing (Degrees From True North)	Average Elevation Along Radial (2-10 mi.) Above Mean Sea Level (Feet)	Height of Antenna Radiation Center Above Average Elevation of Radial (2-10 mi.) (Feet)	Effective Radiated Power in Radial Direction (Watts)	Distance to Reliable Service Area Contour (Miles)
1.	0°				
2.	45°				
3.	90°	(4.37)	(4.38)	(4.41)	(4.42)
4.	135°				
5.	180°				
6.	225°				
7.	270°				
8.	315°				
	*				
	*				
	*				
	(f) Average Terrain Elevation (Feet) (4.39)	(g) Antenna Radiation Center Height Above Average Terrain (Feet) (4.40)			

*Show radials and associated data in direction of each co-channel station as prescribed by Rule Section 22.115(a). If more space is needed for additional radials, attach as Exhibit _____ (4.41)

(h) If the values in Table MOB-3, column (b) above have been computer generated, identify the file (data base) used to obtain the values: _____ (4.44)

(i) Is antenna omnidirectional and mounted at the top of the antenna structure? Yes No
 If "NO," attach as Exhibit _____ a directional antenna pattern (polar diagram) showing power distribution (expressed in decibels of power gain over a reference half-wave dipole antenna) of signal radiated in the horizontal plane, as well as any engineering drawings required by Section 22.15(j)(4) of FCC Rules and Regulations. (4.45)

(j) Are there any co-channel facilities within the mileage standards specified in Section 22.15(b)(1) of FCC Rules and Regulations? Yes No
 If "YES," attach as Exhibit _____ interference studies required by Rule Section 22.15(b)(2). (4.48)

38. Table MOB-4 LOCATIONS OF FIXED ANTENNAS REGULARLY RECEIVING SIGNALS OF THE STATION
 (All frequencies associated with each fixed antenna are to be grouped together. List each location once.) (4.47)

(a) Location (City or Town, County and State)	(b) Latitude (Deg.-Min.-Sec)	(c) Longitude (Deg.-Min.-Sec)	(d) Call Sign	(e) Frequency (MHz)

FCC 401 - Schedule B - Page 5
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Figure 1

FCC 401 - Schedule B - Supplement

SCHEDULE B - SUPPLEMENT (4.35)					
TABLE MOB-3 HEIGHT AND POWER ENGINEERING DATA					
(Reproduce additional copies as needed)					
37. Table MOB-3 HEIGHT AND POWER ENGINEERING DATA					
1. One Table MOB-3 must be completed for each antenna. DO NOT SUBSTITUTE A SEPARATE EXHIBIT FOR THIS TABLE.					
2. All distances specified in feet in this Table are to be rounded to the nearest whole number.					
3. Supplementary engineering information may be included in an Exhibit _____.					
Table MOB-3					
There are _____ Table MOB-3's with this Schedule B. This is Table MOB-3 number _____ of Schedule B number _____.					
List here the frequencies which have identical Column (c) and Column (d) values.	(a)	(b)	(c)	(d)	(e)
	Radial Bearing (Degrees From True North)	Average Elevation Along Radial (2-10 mi.) Above Mean Sea Level (Feet)	Height of Antenna Radiation Center Above Average Elevation of Radial (2-10 mi.) (Feet)	Effective Radiated Power in Radial Direction (Watts)	Distance to Reliable Service Area Contour (Miles)
	1.	0°			
	2.	45°			
	3.	90°			
	4.	135°			
	5.	180°			
	6.	225°			
	7.	270°			
	8.	315°			
	*				
	*				
	*				
(f) Average Terrain Elevation (Feet)			(g) Antenna Radiation Center Height Above Average Terrain (Feet)		
*Show radials and associated data in direction of each co-channel station as prescribed by Rule Section 22.115(a). If more space is needed for additional radials, attach as Exhibit _____.					
(h) If the values in Table MOB-3, column (b) above have been computer generated, identify the file (data base) used to obtain the values:					
(i) Is antenna omnidirectional and mounted at the top of the antenna structure? <input type="checkbox"/> Yes <input type="checkbox"/> No					
If "NO," attach as Exhibit _____ a directional antenna pattern (polar diagram) showing power distribution (expressed in decibels of power gain over a reference half-wave dipole antenna) of signal radiated in the horizontal plane, as well as any engineering drawings required by Section 22.15(j)(4) of FCC Rules and Regulations.					
(j) Are there any co-channel facilities within the mileage standards specified in Section 22.15(b)(1) of FCC Rules and Regulations? <input type="checkbox"/> Yes <input type="checkbox"/> No					
If "YES," attach as Exhibit _____ interference studies required by Rule Section 22.15(b)(2).					

FCC 401 - Schedule B - Supplement
August 1987

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Figure 2

Transmission Line - Simple Arrangement

FCC FORM 401
EXHIBIT NO. 4

SOUTHWESTERN BELL TELEPHONE COMPANY
PUBLIC LAND MOBILE RADIO SERVICE
STATION KBM534, MANHATTAN, KANSAS

Supplementary Answer to Item 37:

Antenna Transmission Line Arrangement

<u>Make</u>	<u>Type No.</u>	<u>Length(Feet)</u>	<u>Total Loss(dB)</u>
Motorola Duplexer	C-19		0.8
Andrews	LDF5-50A	350	1.5
Miscellaneous Loss			0.6
		Total	2.9

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Figure 3

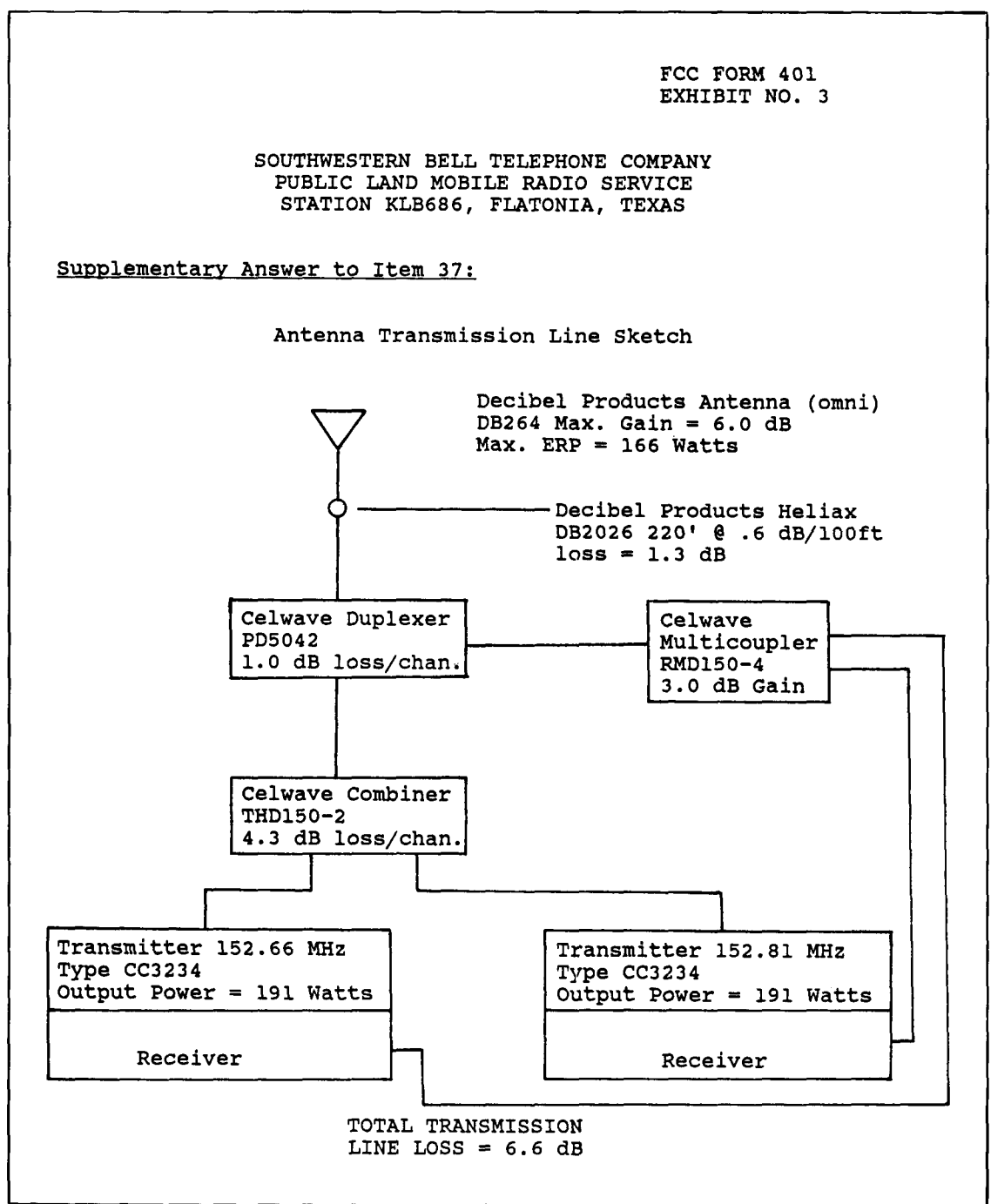
Transmission Line - Complex Arrangement

FCC FORM 401
EXHIBIT NO. 3

SOUTHWESTERN BELL TELEPHONE COMPANY
PUBLIC LAND MOBILE RADIO SERVICE
STATION KLB686, FLATONIA, TEXAS

Supplementary Answer to Item 37:

Antenna Transmission Line Sketch



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Figure 4

Conversion Tables (Sheet 1 of 2)

RELATION BETWEEN DB AND POWER RATIO - GAINS										
DB	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	1.00	1.02	1.05	1.07	1.10	1.12	1.15	1.17	1.20	1.23
1	1.26	1.29	1.32	1.35	1.38	1.41	1.45	1.48	1.51	1.55
2	1.58	1.62	1.66	1.70	1.74	1.78	1.82	1.86	1.91	1.95
3	2.00	2.04	2.09	2.14	2.19	2.24	2.29	2.34	2.40	2.45
4	2.51	2.57	2.63	2.69	2.75	2.82	2.88	2.95	3.02	3.09
5	3.16	3.24	3.31	3.39	3.47	3.55	3.63	3.72	3.80	3.89
6	3.98	4.07	4.17	4.27	4.37	4.47	4.57	4.68	4.79	4.90
7	5.01	5.13	5.25	5.37	5.50	5.62	5.75	5.89	6.03	6.17
8	6.31	6.46	6.61	6.76	6.92	7.08	7.24	7.41	7.59	7.76
9	7.94	8.13	8.32	8.51	8.71	8.91	9.12	9.33	9.55	9.77
10	10.0	10.2	10.5	10.7	11.0	11.2	11.5	11.7	12.0	12.3
11	12.6	12.9	13.2	13.5	13.8	14.1	14.5	14.8	15.1	15.5
12	15.8	16.2	16.6	17.0	17.4	17.8	18.2	18.6	19.1	19.5
13	20.0	20.4	20.9	21.4	21.9	22.4	22.9	23.4	24.0	24.5
14	25.1	25.7	26.3	26.9	27.5	28.2	28.8	29.5	30.2	30.9
15	31.6	32.4	33.1	33.9	34.7	35.5	36.3	37.2	38.0	38.9
16	39.8	40.7	41.7	42.7	43.7	44.7	45.7	46.8	47.9	49.0
17	50.1	51.3	52.5	53.7	55.0	56.2	57.5	58.9	60.3	61.7
18	63.1	64.6	66.1	67.6	69.2	70.8	72.4	74.1	75.9	77.6
19	79.4	81.3	83.2	85.1	87.1	89.1	91.2	93.3	95.5	97.7
20	100	102	105	107	110	112	115	117	120	123
21	126	129	132	135	138	141	145	148	151	155
22	158	162	166	170	174	178	182	186	191	195
23	200	204	209	214	219	224	229	234	240	245
24	251	257	263	269	275	282	288	295	302	309
25	316	324	331	339	347	355	363	372	380	389
26	398	407	417	427	437	447	457	468	479	490
27	501	513	525	537	550	562	575	589	603	617
28	631	646	661	676	692	708	724	741	759	776
29	794	813	832	851	871	891	912	933	955	977
30	1000	1020	1050	1070	1110	1120	1150	1170	1200	1230
31	1260	1290	1320	1350	1380	1410	1450	1480	1510	1550
32	1580	1620	1660	1700	1740	1780	1820	1860	1910	1950
33	2000	2040	2090	2140	2190	2240	2290	2340	2400	2450
34	2510	2570	2630	2690	2750	2820	2880	2950	3020	3090
35	3160	3240	3310	3390	3470	3550	3630	3720	3800	3890
36	3980	4070	4170	4270	4370	4470	4570	4680	4790	4900
37	5010	5130	5250	5370	5500	5620	5750	5890	6030	6170
38	6310	6460	6610	6760	6920	7080	7240	7410	7590	7760
39	7940	8130	8320	8510	8710	8910	9120	9330	9550	9770
40	10 000	DB = 10 Log ₁₀ Power Ratio								
50	100 000									
60	1 000 000									
70	10 000 000									
80	100 000 000									
90	1 000 000 000									
100	10 000 000 000									

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Figure 4

Conversion Tables (Sheet 2 of 2)

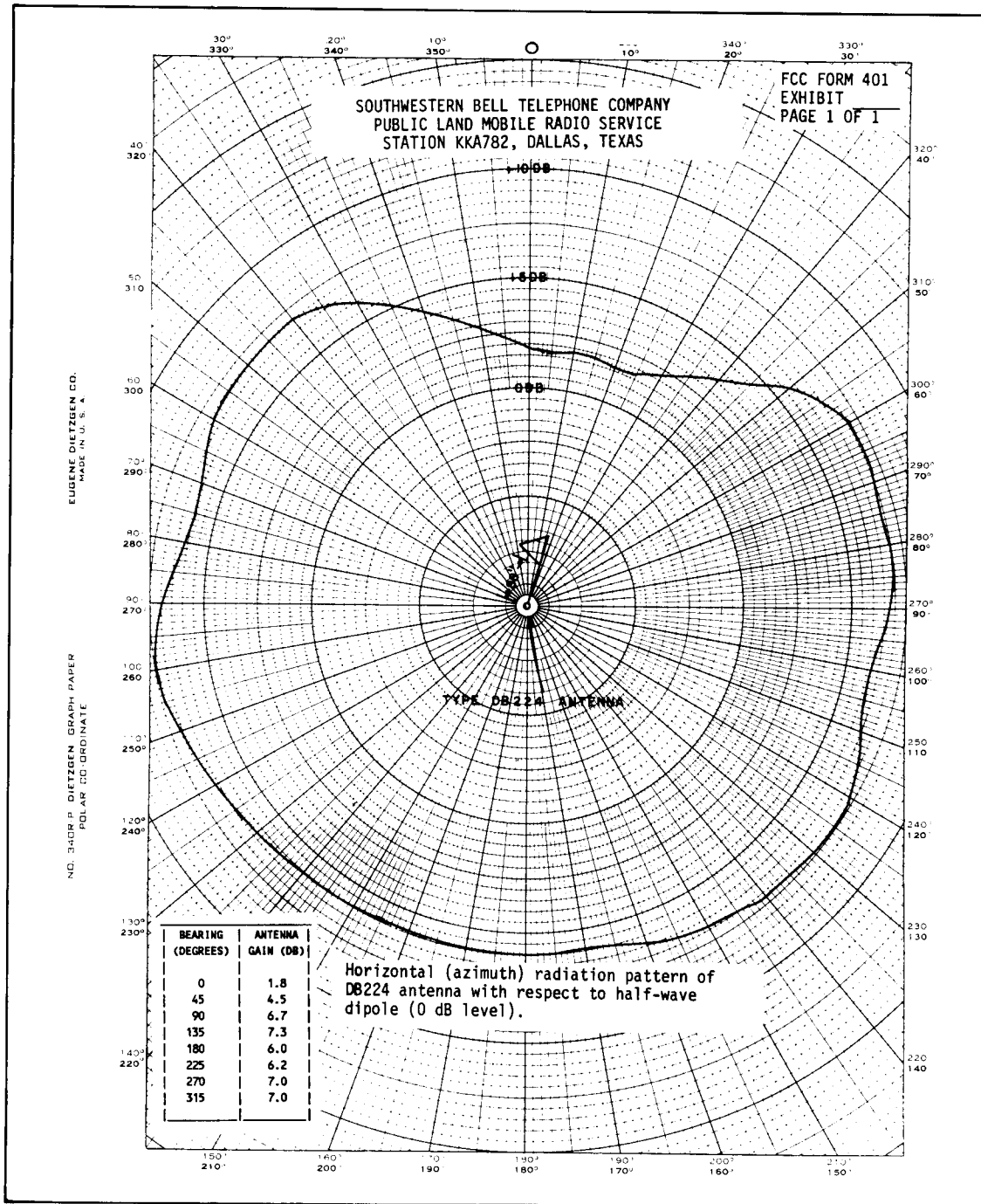
RELATION BETWEEN DB AND POWER RATIO - LOSSES										
DB	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	1.000	.977	.955	.933	.912	.891	.871	.851	.832	.813
1	.794	.776	.759	.741	.724	.708	.692	.676	.661	.646
2	.631	.617	.603	.589	.575	.562	.550	.537	.525	.513
3	.501	.490	.479	.468	.457	.447	.437	.427	.417	.407
4	.398	.389	.380	.372	.363	.355	.347	.339	.331	.324
5	.316	.309	.302	.295	.288	.282	.275	.269	.263	.257
6	.251	.245	.240	.234	.229	.224	.219	.214	.209	.204
7	.200	.195	.191	.186	.182	.178	.174	.170	.166	.162
8	.158	.155	.151	.148	.145	.141	.138	.135	.132	.129
9	.126	.123	.120	.117	.115	.112	.110	.107	.105	.102
10	.1000	.0977	.0955	.0933	.0912	.0891	.0871	.0851	.0832	.0813
11	.0794	.0776	.0759	.0741	.0724	.0708	.0692	.0676	.0661	.0646
12	.0631	.0617	.0603	.0589	.0575	.0562	.0550	.0537	.0525	.0513
13	.0501	.0490	.0479	.0468	.0457	.0447	.0437	.0427	.0417	.0407
14	.0398	.0389	.0380	.0372	.0363	.0355	.0347	.0339	.0331	.0324
15	.0316	.0309	.0302	.0295	.0288	.0282	.0275	.0269	.0263	.0257
16	.0251	.0245	.0240	.0234	.0229	.0224	.0219	.0214	.0209	.0204
17	.0200	.0195	.0191	.0186	.0182	.0178	.0174	.0170	.0166	.0162
18	.0158	.0155	.0151	.0148	.0145	.0141	.0138	.0135	.0132	.0129
19	.0126	.0123	.0120	.0117	.0115	.0112	.0110	.0107	.0105	.0102
20	.01000	.00977	.00955	.00933	.00912	.00891	.00871	.00851	.00832	.00813
21	.00794	.00776	.00759	.00741	.00724	.00708	.00692	.00676	.00661	.00646
22	.00631	.00617	.00603	.00589	.00575	.00562	.00550	.00537	.00525	.00513
23	.00501	.00490	.00479	.00468	.00457	.00447	.00437	.00427	.00417	.00407
24	.00398	.00389	.00380	.00372	.00363	.00355	.00347	.00339	.00331	.00324
25	.00316	.00309	.00302	.00295	.00288	.00282	.00275	.00269	.00263	.00257
26	.00251	.00245	.00240	.00234	.00229	.00224	.00219	.00214	.00209	.00204
27	.00200	.00195	.00191	.00186	.00182	.00178	.00174	.00170	.00166	.00162
28	.00158	.00155	.00151	.00148	.00145	.00141	.00138	.00135	.00132	.00129
29	.00126	.00123	.00120	.00117	.00115	.00112	.00110	.00107	.00105	.00102
30	.00100	.000977	.000955	.000933	.000912	.000891	.000871	.000851	.000832	.000813
31	.000794	.000776	.000759	.000741	.000724	.000708	.000692	.000676	.000661	.000646
32	.000631	.000617	.000603	.000589	.000575	.000562	.000550	.000537	.000525	.000513
33	.000501	.000490	.000479	.000468	.000457	.000447	.000437	.000427	.000417	.000407
34	.000398	.000389	.000380	.000372	.000363	.000355	.000347	.000339	.000331	.000324
35	.000316	.000309	.000302	.000295	.000288	.000282	.000275	.000269	.000263	.000257
36	.000251	.000245	.000240	.000234	.000229	.000224	.000219	.000214	.000209	.000204
37	.000200	.000195	.000191	.000186	.000182	.000178	.000174	.000170	.000166	.000162
38	.000158	.000155	.000151	.000148	.000145	.000141	.000138	.000135	.000132	.000129
39	.000126	.000123	.000120	.000117	.000115	.000112	.000110	.000107	.000105	.000102
40	.0001	$DB = 10 \log_{10} \frac{1}{\text{Ratio}}$								
50	.00001									
60	.000001									
70	.0000001									
80	.00000001									
90	.000000001									
100	.0000000001									

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Figure 5

Directional Antenna Pattern



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