(4) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6112.5	6362.5
6117.5	6367.5
6122.5	6372.5
6127.5	6377.5
6132.5	6382.5
6137.5	6387.5
6142.5	6392.5
6147.5	6397.5
6152.5	6402.5
6157.5	6407.5
6162.5	6412.5
6167.5	6417.5

(5) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
5935	6185
5945	6195
5955	6205
5965	6215
5975	6225
5985	6235
5995	6245
6005	6255
6015	6265
6025	6275
6035	6285
6045	6295
6055	6305
6065	6315
6075	6325
6085	6335
6095	6345
6105	6355
6115 1	6365 1
6125 1	6375 1
6135 1	6385 1
6145 1	6395 1

6155 1.....6405 1
6165 1.....6415 1

1 Alternate channels

(6) 30 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
5945	6195
5975	6225
6005	6255
6035	6285
6065	6315
6095	6345
6125 1	6375 1
6155 1	6405 1

1 Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

(i) 6,525 to 6,875 MHz. 10 MHz maximum authorized bandwidth, 160 to 345 MHz separation:

(1) 400 kHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6525.2175	6870.2175
6525.6325	6870.6325
6526.0475	6871.0475
6526.4625	6871.4625
6526.8775	6871.8775
6527.2925	6872.2925
6527.7075	6872.7075
6528.1225	6873.1225
6528.5375	6873.5375
6528.9525	6873.9525
6529.3675	6874.3675
6529.7825	6874.7825

(2) 800 kHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6525.425	6870.425
6526.255	6871.255
6527.085	6872.085
6527.915	6872.915
6528.745	6873.745
6529.575	6874.575

(3) 1.6 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6548.34	6728.34
6550.00	6730.00
6551.66	6731.66
6558.34	6738.34
6560.00	6740.00
6561.66	6741.66
6588.34	6748.34
6590.00	6750.00
6591.66	6751.66
6598.34	6758.34
6600.00	6760.00
6601.66	6761.66
6608.34	6768.34
6610.00	6770.00
6611.66	6771.66
6618.34	6778.34
6620.00	6780.00
6621.66	6781.66
6628.34	6788.34
6630.00	6790.00
6631.66	6791.66
6638.34	6798.34
6640.00	6800.00
6641.66	6801.66
6648.34	6808.34
6650.00	6810.00
6651.66	6811.66
6658.34	6818.34
6660.00	6820.00
6661.66	6821.66
6668.34	6828.34
6670.00	6830.00

6671.66	6831.66
6678.34	6838.34
6680.00	6840.00
6681.66	6841.66
6688.34	6848.34
6690.00	6850.00
6691.66	6851.66
6698.34	6858.34
6700.00	6860.00
6701.66	6861.66
6708.34	6868.34
6710.00	6870.00
6711.66	6871.66

(4) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6550	6730
6560	6740
6590	6750
6600	6760
6610	6770
6620	6780
6630	6790
6640	6800
6650	6810
6660	6820
6670	6830
6680	6840
6690	6850
6700	6860
6710	6870 1

1 Use of this frequency is authorized on a non-interference basis to broadcast operations in the band 6875-7125 MHz.

(5) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
6545 1	6715 1
6555 1	6725 1
6565	6735
6585	6745

6605.....6765
6615.....6775
6625.....6785
6635.....6795
6645.....6805
6655.....6815
6665.....6825
6675.....6835
6685.....6845
6695.....6855
6705.....6865
6535 2.....6575 2

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1 These frequencies may be assigned for unpaired use.
2 Available only for emergency restoration, maintenance bypass, or other temporary-fixed purposes. Such uses are authorized on a non- interference basis to other frequencies in this band. Interference analysis required by Section 94.63(a) does not apply to this frequency pair.

(j) 10,550 to 10,680 MHz. 5 MHz maximum authorized bandwidth, 65 MHz separation:

(1) 400 kHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10605.2175	10670.2175
10605.6325	10670.6325
10606.0475	10671.0475
10606.4625	10671.4625
10606.8775	10671.8775
10607.2925	10672.2925
10607.7075	10672.7075
10608.1225	10673.1225
10608.5375	10673.5375
10608.9525	10673.9525
10609.3675	10674.3675
10609.7825	10674.7825
10610.2175	10675.2175
10610.6325	10675.6325
10611.0475	10676.0475
10611.4625	10676.4625
10611.8775	10676.8775
10612.2925	10677.2925
10612.7075	10677.7075
10613.1225	10678.1225
10613.5375	10678.5375
10613.9525	10678.9525

10614.3675	10679.3675
10614.7825	10679.7825

(2) 800 kHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10605.425	10670.425
10606.255	10671.255
10607.085	10672.085
10607.915	10672.915
10608.745	10673.745
10609.575	10674.575
10610.425	10675.425
10611.255	10676.255
10612.085	10677.085
10612.915	10677.915
10613.745	10678.745
10614.575	10679.575

(3) 1.25 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10560.625	10625.625
10561.875	10626.875
10563.125	10628.125
10564.375	10629.375

(4) 1.6 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10565.84	10630.84
10567.50	10632.50
10569.16	10634.16
10570.84	10635.84
10572.50	10637.50
10574.16	10639.16
10575.84	10640.84
10577.50	10642.50
10579.16	10644.16
10580.84	10645.84

10582.50	10647.50
10584.16	10649.16
10585.84	10650.84
10587.50	10652.50
10589.16	10654.16
10590.84	10655.84
10592.50	10657.50
10594.16	10659.16
10595.84	10660.84
10597.50	10662.50
10599.16	10664.16
10600.84	10665.84
10602.50	10667.50
10604.16	10669.16
10605.84	10670.84
10607.50	10672.50
10609.16	10674.16
10610.84	10675.84
10612.50	10677.50
10614.16	10679.16

(5) 2.5 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10551.25	10616.25
10553.75	10618.75
10556.25	10621.25
10558.75	10623.75
10561.25	10626.25
10563.75	10628.75
10566.25	10631.25
10568.75	10633.75
10571.25	10636.25
10573.75	10638.75
10576.25	10641.25
10578.75	10643.75
10581.25	10646.25
10583.75	10648.75
10586.25	10651.25
10588.75	10653.75
10591.25	10656.25
10593.75	10658.75
10596.25	10661.25
10598.75	10663.75
10601.25	10666.25
10603.75	10668.75
10606.25	10671.25
10608.75	10673.75

10611.25	10676.25
10613.75	10678.75

(6) 3.75 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10551.875	10616.875
10555.625	10620.625
10559.375	10624.375
10563.125	10628.125

(7) 5 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10567.5	10632.5
10572.5	10637.5
10577.5	10642.5
10582.5	10647.5
10587.5	10652.5
10592.5	10657.5
10597.5	10662.5
10602.5	10667.5

(k) 10,700 to 11,700 MHz. 30 MHz maximum authorized bandwidth, 500 MHz separation:

(1) 10 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10705	11205
10715	11215
10725	11225
10735	11235
10745	11245
10755	11255
10765	11265
10775	11275
10785	11285
10795	11295
10805	11305
10815	11315

10825	11325
10835	11335
10845	11345
10855	11355
10865	11365
10875	11375
10885	11385
10895	11395
10905	11405
10915	11415
10925	11425
10935	11435
10945	11445
10955	11455
10965	11465
10975	11475
10985	11485
10995	11495
11005	11505
11015	11515
11025	11525
11035	11535
11045	11545
11055	11555
11065	11565
11075	11575
11085	11585
11095	11595
11105	11605
11115	11615
11125	11625
11135	11635
11145	11645
11155	11655
11165	11665
11175	11675
11185	11685
11195	11695

(2) 30 MHz bandwidth channels:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10725	11225
10755	11255
10785	11285
10815	11315
10845	11345
10875	11375

10905	11405
10935	11435
10965	11465
10995	11495
11025	11525
11055	11555
11085	11585
11115	11615
11145	11645
11175	11675

(l) * * * (formerly (h))

(m) * * * (formerly (j))

(n) * * * (formerly (k))

(o) * * * (formerly (l))

(p) * * * (formerly (m))

(q) Frequency diversity transmission will not be authorized in this service in the absence of a factual showing that the required communications cannot practically be achieved by other means. Where frequency diversity is deemed to be justified on a protection channel basis, it shall be limited to one protection channel for the bands 3,700-4,200 MHz, 5,925-6,425 MHz, and 6,525-6,875 MHz, and a ratio of one protection channel for three working channels for the bands 10,550-10,630 MHz and 10,700-11,700 MHz. In the bands 3,700-4,200 MHz, 5,925-6,425 MHz, and 6,525-6,875 MHz, no frequency diversity protection channel will be authorized unless there is a minimum of three working channels, except that where a substantial showing is made that a total of three working channels will be required within three years, a protection channel may be authorized simultaneously with the first working channel. A protection channel authorized under such exception will be subject to termination if applications for the third working channel are not filed within three years of the grant date of the applications for the first working channel. Where equipment employing digital modulation techniques with cross-polarized operation on the same frequency is used, the protection channel authorized under the above conditions may be considered to consist of both polarizations of the protection frequency where such is shown to be necessary.

Section 94.71 Emission and bandwidth limitations.

* * * * *

(b) The maximum bandwidth that will be authorized per frequency is set out in the table that follows. Regardless of the maximum

authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency Band (MHz)	Maximum authorized bandwidth
928-929	12.5, 25 kHz 1 7
932-932.5, 941-941.5	12.5 kHz 1
932.5-935, 941.5-944	12.5, 25, 50, 100, 200 kHz 1
952-960	12.5, 25, 50, 100, 200 kHz 1 6
1850-1990	5 or 10 MHz 1
2130-2150	800 or 1600 kHz 1
2150-2160	10 MHz
2180-2200	800 or 1600 kHz 1
2450-2483.5	625 kHz 2
2483.5-2500	800 kHz
2650-2680	6 MHz 3
2686.9375-2688.9375	125 kHz 3
3700-4200	20 MHz
5925-6425	30 MHz
6425-6525	25 MHz
6525-6875	10 MHz
10,550-10,680	5 MHz
10,700-11,700	30 MHz
12,200-12,700	10 or 20 MHz 1
13,200-13,250	25 MHz
17,700-18,140	80 MHz
18,140-18,142	2 MHz
18,142-18,580	6 MHz
18,580-18,820	20 MHz
18,820-18,920	10 MHz
18,920-19,160	20 MHz
19,160-19,260	10 MHz
19,260-19,700	80 MHz
21,200-23,600	up to 100 MHz 5
31,000-31,300	25 or 50 MHz
38,600-40,000	up to 50 MHz
Bands above 40,000 4	

* * * * *

Section 94.73 Power limitations.

(a) On any authorized frequency, the average power delivered to an antenna in this service shall be the minimum amount of power necessary to carry out the communications desired. Application of this principle shall include, but not be limited to, requiring a licensee who replaces one or more of his antennas with larger antennas to reduce his antenna input power by an amount appropriate to

compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below. Further, the output power of a transmitter on any authorized frequency in this service shall not exceed the following:

Frequency Band (MHz)	Maximum allowable transmitter power		Maximum allowable EIRP 2	
	Fixed(W)	Mobile(W)	Fixed(dBW)	Mobile(dBW)
928 to 929	5.0		+17	
932 to 932.5			+17	
932.5 to 935	20.0		+40	
941 to 941.5			+30	
941.5 to 944	20.0		+40	
952 to 960	20.0		+40	
1850 to 1990	20.0		+45	
2130 to 2150	20.0		+45	
2150 to 2160	20.0		+45	
2180 to 2200	20.0		+45	
2450 to 2500	20.0		+45	
2500 to 2686	10.0		+45	
2686 to 2690	0.25		+45	
3700 to 4200	20.0		+50	
5925 to 6425	20.0		+50	
6425 to 6525		20.0		+35
6525 to 6875	20.0		+50	
10,550 to 10,680 9	10.0		+50	
10,700 to 11,700	10.0		+50	
12,200 to 12,700	10.0		+50	
12,700 to 13,250	10.0		+50	
17,700 to 18,600	10.0		+55	
18,600 to 18,800	10.0		+35	
18,800 to 19,700	10.0		+55	
21,200 to 23,600	10.0		+40	
31,000 to 31,300	0.05	0.05		
38,600 to 40,000	10.0		+40	

* * * * *

Section 94.75 Antenna Limitations.

* * * * *

(b) Directional antennas shall meet the performance standards (for parallel polarization) indicated in the following table:

Antenna Standards

Frequency (MHz)	Category	Maximum beam-width to 3 dB points (included angle in degrees)	Minimum antenna gain (dBi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
932.5 to 935	A	14.0	n/a		6	11	14	17	20	24
941.5 to 944	B	20.0	n/a			6	10	13	15	20
952 to 960	A	14.0	n/a		6	11	14	17	20	24
	B	20.0	n/a			6	10	13	15	20
1,850 to 2,690	A	5.0	n/a	12	18	22	25	29	33	39
	B	8.0	n/a	5	18	20	20	25	28	36
3,700 to 4,200	A	n/a	36	23	29	33	36	42	55	55
	B	n/a	36	20	24	28	32	32	32	32
5,925 to 6,875	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
10,550 to 10,680	A	3.4	34	20	24	28	32	35	55	55
	B	3.4	34	20	24	28	32	35	35	39
10,700 to 11,700	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
11,700 to 13,250	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 19,700	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
21,200 to 23,600	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
27,500 to 29,500	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
31,000 to 31,300	n/a	4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a
38,600 to 40,000	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36

* * * * *

Section 94.77 Interference to geostationary-satellites.

These limitations are necessary to minimize the probability of harmful interference to reception in the bands 2655-2690 MHz, 5925-6875 MHz, and 12.7-12.75 GHz on board geostationary-space stations in the fixed-satellite service (Part 25). Stations authorized in the band 2655-2690 MHz prior to July 1, 1976 that exceed the power levels in paragraphs (a) and (b) of this section are permitted to operate indefinitely, provided that the operation of such stations does not result in harmful interference to reception in this band on board geostationary space stations.

(a) 2655 to 2690 MHz and 5925 to 6875 MHz. * * *

* * * * *

Section 94.79 Minimum path lengths for fixed links.

(a) The distance between end points of a fixed link must equal or exceed the value set forth in the table below or the EIRP must be reduced in accordance with the equation set forth below.

Frequency Band (MHz)	Minimum path length (km)
Below 1,850	n/a
1,850 to 7,125	17
10,550 to 13,250	5
Above 17,700	n/a

(b) For paths shorter than those specified in the Table, the EIRP shall not exceed the value derived from the following equation.

EIRP = 30 - 20 log[A/B], dBW

Where:

EIRP = Equivalent isotropic radiated power in dBW.
A = Minimum path length from the Table for the frequency band in kilometers.
B= The actual path length in kilometers.

NOTE: Automatic transmit power control may be used to meet this requirement pursuant to Section 94.45.

(c) Upon an appropriate technical showing, applicants and licensees unable to meet the minimum path length requirement may be granted an exception to these requirements.

NOTE. Links authorized prior to April 1, 1987 need not comply with this requirement.

Section 94.94 Microwave digital modulation.

Microwave transmitters employing digital modulation techniques in the bands 10,550-10,680 and 17,700-19,700 MHz shall transmit at bit rate, in bits per second (bps), equal to or greater than the authorized bandwidth in Hertz (e.g., to be acceptable, equipment transmitting at a 20 Mbps rate must not require an authorized bandwidth greater than 20 MHz). In the 17,700-19,700 MHz band, this bps/Hz standard is independent of the antenna (polarization) used, frequency reuse, or how the system is configured. For the 3,700-4,200 MHz, 5,925-6,425 MHz, 6,525-6,875, 10,550-10,630 MHz, and 10,700-11,700 MHz point-to-point microwave bands, standards of Section 21.122 shall be met.

NOTE: Systems authorized in the 17,700-19,700 MHz band prior to December 1, 1988 may install equipment with no minimum bit rate.

Appendix B -- Commenting Parties

UTC Petition (RM-7981) -- Comments

Alcatel Network Systems, Inc.
American Personal Communications
American Petroleum Institute
American Telephone and Telegraph, Inc.
Association of American Railroads and Large Public Power Council
Cellular Telecommunications Industry Association
Centel Corporation
Communications Satellite Corporation
GTE Service Corporation
Harris Corporation - Farinon Division
McCaw Cellular Communications, Inc.
Motorola Inc.
National Association of Broadcasters, Radio-Television News Directors Association, The Cable-Satellite Public Affairs Network, The Association for Maximum Service Television, Inc. and Turner Broadcasting System, Inc.
National Spectrum Managers Association
Ocom Corporation
Public Safety Microwave Committee
SCS Mobilecom, Inc.
Southwestern Bell Corporation
Telocator
Time Warner Telecommunications, Inc.
Utilities Telecommunications Council

UTC Petition -- Reply Comments

Alcatel Network Systems, Inc.
Centerior Energy Corporation
PacifiCorp
Spatial Communications, Inc.
Utilities Telecommunications Council

Alcatel Petition (RM-8004) -- Comments
American Personal Communications
American Petroleum Institute
Association of American Railroads
Centel Corporation
Communications Transmission, Inc.
Comsearch
GE American Communications, Inc.
GTE Service Corporation
Harris Corporation - Farinon Division
Home Box Office
Hughes Communications Galaxy
Large Public Power Council
MCI Telecommunications Corporation
Microwave Radio Corporation
National Association of Broadcasters, Radio-Television News Directors Association, The Cable-Satellite Public Affairs Network, The Association for Maximum Service Television, Inc. and Turner Broadcasting System, Inc.
National Spectrum Managers Association
Pacific Telesis Group
Spatial Communications, Inc.
Telecommunications Industry Association Fixed Point to Point Communications Section
Utilities Telecommunications Council

Alcatel Petition -- Reply Comments
Alcatel Network Systems, Inc.
Bonneville International Corporation
Capital Cities/ABC Inc.
CBS Inc.
Digital Microwave Corporation
GTE Service Corporation
Harris Corporation - Farinon Division
Home Box Office
Hughes Communications Galaxy
IDB Communications Group, Inc.
National Public Radio, Inc.
Pan American Satellite
United Video, Inc.