FCC RULES AND POSSIBLE LAN OPERATING FREQUENCIES

GENERAL

The source reference for FCC Rules is described, and then attention is called to some portions of the Rules which might have relevance to 802.4L.

REFERENCE

The FCC Rules are available from any Government Printing Office Bookstore, and consists of five volumes as follows:

CODE OF FEDERAL REGULATIONS (CFR)
TITLE 47 --- TELECOMMUNICATION --- October 1, 1986
Parts 0 to 19--Subchapter A GENERAL
Parts 20 to 39--Subchapter B COMMON CARRIER SERVICES
Parts 40 to 69--Subchapter B (Continued)
Parts 70 to 79--Subchapter C BROADCAST RADIO SERVICES
Parts 80 to END--Subchapter D SAFETY AND SPECIAL RADIO SERVICES

Three of these volumes are potentially relevant or important to a packet radio service: 0-19, 20-39 and 80 to END.

A large number of private and personal services are defined in the last volume. Low power communication is in Part 15 of the 1st volume.

CHANGES SINCE OCTOBER, 1986

These volumes are republished annually. The printed Rules may lag a year behind the actual situation. After the FCC makes a decision, it is a couple of months before there is a printed Report and Order. It is not incorporated until the next anniversary. The physical availability of the volumes will lag the closing date by months.

When action is contemplated, it is very important to involve Attorneys or other professionals who regularly track these matters. It is very risky to assume that there has been no material change in any particular section since the closing data for printing.

GENERAL INFORMATION

In Part 2.106, there is a general overall table of Frequency Allocations where pages 294-305 cover 821-4500 MHz. CAUTION: The Footnotes are part of this table, and sections cannot be understood without reading cited Footnotes. The right hand half is the detailed application to the USA within the International Allocations on the left hand half of the page.

Also, there is a great deal of detail and multiple use which is not shown at all--for example, spread spectrum at 2400-2500 MHz.

POSSIBLE SECTIONS FOR LICENSING OR CERTIFICATION

There is no existing section of the rules which covers wireless LAN as it is now conceived though there are a few places that are close enough to have potential for extension.

The normal decision tree for licensed transmitters would start with a choice between Common Carrier and Private System and then to a section or sections in Subpart D. An alternative for very low power short range systems is unlicensed but certified equipment under Part 15 (Radio Frequency Devices), but there is a possibility of extending some other part where there is a match in eligibility of the using entities. For example, many of the potential users of wireless LAN are also eligible as licensees in either Business or Special Industrial Radio Services.

A technical assumption is required on power and overall system bandwidth to evaluate any proposed alternative, or even to find a possibility.

Possible assumptions for spectrum allocation are 10, 40, 80 and 160 MHz. The system may be conceived as one radiating fixed site with greater range or many short-range sites with a "cellular" frequency reuse plan. The greater bandwidth requirements go with the many site frequency reuse plan.

CHANDOS A. RYPINSKI – 130 STEWART DRIVE – TIBURON, CA 94920 – TEL: 415 435 0642

15.122 Periodic Operation Above 70 MHz

This section relates to certified but unlicensed low power communication. The field strength limit of 5000 uv/meter at 3 meters is usable above 470 MHz. Measured for the average over a 0.1 second interval is a bit of latitude. The duty cycle limit of 30/1 or less frequent than every 10 seconds is a difficulty even for one transmitter with a circulating token. The bandwidth limit of 0.5% or 5 MHz per GHz center frequency is usable.

The formula[1] for converting field strength, E, to transmitter power, P, from an antenna with gain, G, relative to isotropic (spherically non-directive) at a distance, D, from the center of radiation, is:

$$P \text{ (watts)} = \frac{(E \text{ (volts/meter)} \times D \text{ (meters)})^2}{29.98 \times G \text{ (factor)}}$$

Using this formula, **5000 uV/m at 3 meters is 4.6 microwatts** into a half-wave dipole with gain factor 1.6; and the result is independent of frequency.

This limit may correspond to a reading on a measuring instrument with a bandwidth of 12 to 100 kHz. 100 microwatts is a usable transmitter at 100-200 feet with 1 Mbs bandwidth.

This is a very important section, because if acceptance and workability could be achieved, large blocks of spectrum and many transmitters could be used.

15.126 Spread Spectrum Systems

In three frequency bands, 902-928, 2400-2483.5 and 5725-5850 MHz, a power or 1 watt peak is authorized, which is great; however these are highly allocated frequencies. These bands have been made available for every imaginable service where a guarantee of interference free operation is not needed.

A minimum of 75 hopping frequencies occupied less than 0.4 seconds each is very limiting. This implies that the bandwidth of the hopped channel is less than 1/75th of the available band or 1 to 1.5 MHz. The requirement of only one use in a 30 second period is fitted to the hopping. The continuous capacity of the whole band for one station is 1 to 1.5 MHz, and still only a small number of transmitters could operate simultaneously.

The value of this section is that equipment built to these requirement can be Certified now.

21.901 Multi-point Distribution Services

This band is now used to distribute movies of doubtful social value to hotel and motel service subscribers, and for point-to-point video links used by schools (notably the Catholic Church in San Francisco area)

If a useful industrial service could be developed, which requires only 10 MHz and which did not affect existing users, the chances of securing a secondary use of this band are excellent. The authorization could come through a petition for rule change, developmental authorization or certification.

This is an example of the flexibility in meaning that may be obtained from "common carrier." If a communications carrier wanted to use this band without displacing the existing users, it could be relatively easy, legally.

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1. IEEE Standards Report No. 291, May 1969, "Measuring Field Strength in Radio Wave Propagation," Para 2.5.5. Standard Field Formulas

CHANDOS A. RYPINSKI - 130 STEWART DRIVE - TIBURON, CA 94920 - TEL: 415 435 0642

80.376 Marine Radio Determination Frequencies

Marine bands for radar are at 2900-3100 and 5460-5650 MHz. This is a possibility for co-use not often considered.

87.501 Aviation Radio-Navigation Land Stations

Ground based radars (long distance) are allocated 1300-1350 MHz. There could be some slight possibility of using this band.

A complex of aviation aids use 1535-1660 MHz. It would seem to complex to attempt co-use of this band.

Non-government land-based radars are allocated 2700-2900 MHz. The interference experienced is a good measure of the possibility of creating interference since these are fixed radars. The possibilities for co-use of this band might be good--technically.

90.75 Land Mobile Business Radio Service Frequency Table

There is not anything here. The 1427-1435 is the aviation flight test telemetry band, and it is highly restricted from any other use.

90.103 Land Transportation Radiolocation Service

It is interesting to note that 2900 to 3700 MHz could be used on a non-interfering basis for what is believed to be a necessary public service. The Frequency Table in this section is a good list of all existing radar bands and the noted existing users. This is precedent for co-use in a service for a particular class of mobile users.

94.61 Private Operational Fixed Service Technical Standards

These are the point-to-point microwave frequencies for private system use. As shown in the notes, almost all of these frequencies are shared with other services. There is much more detail shown on the use of these frequencies in 94.65.

The most interesting bands on this Table are 1850-1990 MHz, where older, low bandwidth efficiency equipment is often found, 2500-2690 MHz shared with a satellite service.

Opinion: 1850-1990 MHz is a good prospect for wideband, low-power co-use; and it is a very good band, technically and for lower cost equipment.

CHANDOS A. RYPINSKI - 130 STEWART DRIVE - TIBURON, CA 94920 - TEL: 415 435 0642

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Telecommunication

47

PART 80 TO END

Revised as of October 1, 1986

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47

PARTS 0 TO 19

Revised as of October 1, 1986

International table			United States table		FCC use designators	
Region 1—allocation MHz	Region 2—allocation MHz	Region 3—allocation MHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation MHz	Allocation MHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
862–890 FIXED. MOBILE except aeronautical mobile. BROADCASTING 703.	FIXED. MOBILE. BROADCASTING.			LAND MOBILE. NG30 NG43 NG63	PRIVATE LAND MOBILE (90).	
699 704	700	677 688 689 690 691 693 701	US116 US268 G2	821–825 LAND MOBILE. NG30 NG43 NG63	Reserve.	
				825–845 LAND MOBILE. NG30 NG43 NG63	DOMESTIC PUBLIC LAND MOBILE (22).	
				845–851 LAND MOBILE. NG30 NG63	Reserve.	
				851–866 LAND MOBILE. NG30 NG63	PRIVATE LAND MOBILE (90).	
				866–870 LAND MOBILE. NG30 NG63	Reserve.	
				870–890 LAND MOBILE. NG30 NG63	DOMESTIC PUBLIC LAND MOBILE (22).	
890–942	890–902	890–942		890–902		

FIXED. MOBILE except aeronautical mobile. BROADCASTING 703. Radiolocation. 704	FIXED. MOBILE except aeronautical mobile. Radiolocation. 705	FIXED. MOBILE. BROADCASTING. Radiolocation. 706		LAND MOBILE. US116 US268	Reserve.	
	902–928 FIXED. Amateur. Mobile except aeronautical mobile. Radiolocation. 705 707		902–928 RADIOLOCATION. 707 US215 US218 US267 US275 G11 G59	902–928 707 US215 US218 US267 US275	Amateur (97).	915 ± 13 MHz: Industrial, scientific and medical frequency.
	928–942 FIXED. MOBILE except aeronautical mobile. Radiolocation. 705		928–932 US116 US215 US268 G2	928–929 FIXED. US116 US215 US268	DOMESTIC PUBLIC LAND MOBILE (22). PRIVATE LAND MOBILE (90). PRIVATE OPERATIONAL FIXED MICROWAVE (94).	
				929–932 LAND MOBILE US116 US215 US268	DOMESTIC PUBLIC LAND MOBILE (22). PRIVATE LAND MOBILE (90).	
			932–935 FIXED US215 US268 G2	932–935 FIXED US215 US268		
942–960 FIXED. MOBILE except aeronautical mobile. BROADCASTING 703	942–960 FIXED. MOBILE.	942–960 FIXED. MOBILE. BROADCASTING.	935–941 US116 US215 US268 G2	935–941 LAND MOBILE US116 US215 US268	Reserve	
			941–944 FIXED	941–944 FIXED		

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			Allocation MHz	Allocation MHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			US268 US301 US302	US268 US301 US302		
699 704	708	701	944–960	944–960 FIXED NG120	AUXILIARY BROADCASTING (74). DOMESTIC PUBLIC FIXED (22). INTERNATIONAL FIXED PUBLIC (23). PRIVATE OPERATIONAL FIXED MICROWAVE (94).	
960–1215	AERONAUTICAL RADIONAVIGATION. 709		960–1215 AERONAUTICAL RADIONAVIGATION. 709 US224	960–1215 AERONAUTICAL RADIONAVIGATION. 709 US224	AVIATION (87).	
1215–1240	RADIOLOCATION. RADIONAVIGATION-SATELLITE (space-to-Earth) 710. 711 712 713		1215–1240 RADIOLOCATION. RADIONAVIGATION-SATELLITE (space-to-Earth). 713 G56	1215–1240 713		
1240–1260	RADIOLOCATION. RADIONAVIGATION-SATELLITE (space-to-Earth) 710. Amateur. 711 712 713 714		1240–1300 RADIOLOCATION.	1240–1300 Amateur.	Amateur (97).	
1260–1300	RADIOLOCATION. Amateur.					

	664 711 712 713 714		664 713 714 G56	664 713 714		
1300–1350	AERONAUTICAL RADIONAVIGATION 717 Radiolocation 715 716 718		1300–1350 AERONAUTICAL RADIONAVIGATION 717 Radiolocation 718 G2	1300–1350 AERONAUTICAL RADIONAVIGATION 717 718	AVIATION (87).	
1350–1400 FIXED. MOBILE. RADIOLOCATION. 718 719 720	1350–1400 RADIOLOCATION. 714 718 720		1350–1400 RADIOLOCATION. Fixed. Mobile. 714 718 720 G2 G27 G114	1350–1400 714 718 720		
1400–1427	EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). 721 722		1400–1427 EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). 722 US74 US246	1400–1427 EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). 722 US74 US246		
1427–1429	SPACE OPERATION (Earth-to-space). FIXED. MOBILE except aeronautical mobile. 722		1427–1429 SPACE OPERATION (Earth-to-space). FIXED. MOBILE except aeronautical mobile. 722 G30	1427–1429 SPACE OPERATION (Earth-to-space). Fixed (telemetering). Land Mobile (telemetering and telecommand). 722	Private Land Mobile (90). Satellite Communications (25).	
1429–1525 FIXED. MOBILE except aeronautical mobile. 722	1429–1525 FIXED. MOBILE 723 722		1429–1435 FIXED. MOBILE. 722 G30	1429–1435 Land Mobile (telemetering and telecommand). Fixed (telemetering) 722	Private Land Mobile (90).	
1525–1530	1525–1530	1525–1530	1435–1530	1435–1530		

International table			United States table		FCC use designators	
Region 1—allocation MHz	Region 2—allocation MHz	Region 3—allocation MHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation MHz	Allocation MHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
SPACE OPERATION (space-to-Earth). FIXED. Earth Exploration-Satellite. Mobile except aeronautical mobile 724 722 725	SPACE OPERATION (space-to-Earth). Earth Exploration-Satellite. Fixed. Mobile 723 722	SPACE OPERATION (space-to-Earth). FIXED. Earth Exploration-Satellite. Mobile 723 724 722	MOBILE (aeronautical telemetering). 722 US78	MOBILE (aeronautical telemetering). 722 US78	AVIATION (87).	
1530–1535 SPACE OPERATION (space-to-Earth). MARITIME MOBILE-SATELLITE (space-to-Earth). Earth Exploration-Satellite. Fixed. Mobile except aeronautical mobile. 722 726	1530–1535 SPACE OPERATION (space-to-Earth). MARITIME MOBILE-SATELLITE (space-to-Earth). Earth Exploration-Satellite. Fixed. Mobile 723 722 726		1530–1535 MARITIME MOBILE-SATELLITE (space-to-Earth). Mobile (aeronatuical telemetering). 722 US78 US272	1530–1535 MARITIME MOBILE-SATELLITE (space-to-Earth). Mobile (aeronautical telemetering). 722 US78 US272	AVIATION (87). SATELLITE COMMUNICATION (25).	
1535–1544	MARITIME MOBILE-SATELLITE (space-to-Earth). 722 727		1535–1544 MARITIME MOBILE-SATELLITE (space-to-Earth). 722	1535–1544 MARITIME MOBILE-SATELLITE (space-to-Earth). 722	MARITIME (80). SATELLITE COMMUNICATIONS (25).	
1544–1545	MOBILE-SATELLITE (space-to-Earth). 722 727 728		1544–1545 MOBILE-SATELLITE (space-to-Earth). 722 728	1544–1545 MOBILE-SATELLITE (space-to-Earth). 722 728	MARITIME (80). SATELLITE COMMUNICATION (25).	
1545–1559			1545–1559	1545–1559		

	AERONAUTICAL MOBILE-SATELLITE (R) (space-to-Earth). 722 727 729 730		AERONAUTICAL MOBILE-SATELLITE (R) (space-to-Earth). 722 729	AERONAUTICAL MOBILE-SATELLITE (R) (space-to-Earth). 722 729	AVIATION (87).	
1559–1610	AERONAUTICAL RADIONAVIGATION. RADIONAVIGATION-SATELLITE (space-to-Earth). 722 727 730 731		1559–1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) 722, US39 US208, US260	1559–1610 AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) 722, US39 US208, US260	AVIATION (87).	
1610–1626.5	AERONAUTICAL RADIONAVIGATION. 722 727 730 732 733 734		1610–1626.5 AERONAUTICAL RADIONAVIGATION 722, 732, 733, 734, US39, US208, US260, US306	1610–1626.5 AERONAUTICAL RADIONAVIGATION 722, 732, 733, 734, US39, US208, US260, US306	AVIATION (87).	
1626.5–1645.5	MARITIME MOBILE-SATELLITE (Earth-to-space). 722 727 730		1626.5–1645.5 MARITIME MOBILE-SATELLITE (Earth-to-space). 722 US39	1626.5–1645.5 MARITIME MOBILE-SATELLITE (Earth-to-space). 722 US39	MARITIME (80). SATELLITE COMMUNICATION (25).	
1645.5–1646.5	MOBILE-SATELLITE (Earth-to-space). 722 728		1645.5–1646.5 MOBILE-SATELLITE (Earth-to-space). 722 728 US39	1645.5–1646.5 MOBILE-SATELLITE (Earth-to-space). 722 728 US39	MARITIME (80). SATELLITE COMMUNICATION (25).	
1646.5–1660	AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). 722 727 730 735		1646.5–1660 AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). 722 735 US39	1646.5–1660 AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). 722 735 US39	AVIATION (87).	

International table			United States table		FCC use designators	
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			Allocation MHz	Allocation MHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1660–1660.5	AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). RADIO ASTRONOMY. 722 735 736		1660–1660.5 AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). RADIO ASTRONOMY. 722 735 736	1660–1660.5 AERONAUTICAL MOBILE-SATELLITE (R) (Earth-to-space). RADIO ASTRONOMY. 722 735 736	AVIATION (87).	
1660.5–1668.4	RADIO ASTRONOMY. SPACE RESEARCH (passive). Fixed. Mobile except aeronautical mobile. 722 736 737 738 739		1660.5–1668.4 RADIO ASTRONOMY. SPACE RESEARCH (passive). 722 US74 US246	1660.5–1668.4 RADIO ASTRONOMY. SPACE RESEARCH (passive). 722 US74 US246		
1668.4–1670.0	METEOROLOGICAL AIDS. FIXED. MOBILE except aeronautical mobile. RADIO ASTRONOMY 722 736	—	1668.4–1670.0 METEOROLOGICAL AIDS (radiosonde). RADIO ASTRONOMY. 722 736 US74 US99	1668.4–1670.0 METEOROLOGICAL AIDS (radiosonde). RADIO ASTRONOMY. 722 736 US74 US99		
1670–1690	METEOROLOGICAL AIDS. FIXED. METEOROLOGICAL-SATELLITE (space-to-Earth). MOBILE except aeronautical mobile. 722		1670–1690 METEOROLOGICAL AIDS (radiosonde). METEOROLOGICAL-SATELLITE (space-to-Earth). 722 US211	1670–1690 METEOROLOGICAL AIDS (radiosonde). METEOROLOGICAL-SATELLITE (space-to-Earth). 722 US211		
1690–1700	1690–1700		1690–1700	1690–1700		

METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth). Mobile except aeronautical mobile. 671 722 741	METEOROLOGICAL AIDS. METEOROLOGICAL-SATELLITE (space-to-Earth). 671 722 740 742		METEOROLOGICAL-AIDS (Radiosonde). METEOROLOGICAL-SATELLITE (space-to-Earth). 671 722	METEOROLOGICAL-AIDS (Radiosonde). METEOROLOGICAL-SATELLITE (space-to-Earth). 671 722		
1700–1710 FIXED. METEOROLOGICAL-SATELLITE (space-to-Earth). Mobile except aeronautical mobile. 671 722	1700–1710 FIXED METEOROLOGICAL SATELLITE (space-to-Earth). MOBILE except aeronautical mobile. 671 722 743		1700–1710 FIXED METEOROLOGICAL-SATELLITE (space-to-Earth). 671 722 G118	1700–1710 METEOROLOGICAL-SATELLITE (space-to-Earth). Fixed. 671 722		
1710–2290 FIXED. Mobile.	1710–2290 FIXED. MOBILE.		1710–1850 FIXED. MOBILE. 722 US256 G42	1710–1850 722 US256		
722 744 746 747 748 750	722 744 745 746 747 748 749 750		1850–1990	1850–1990 FIXED.	1850–1990 PRIVATE OPERATIONAL-FIXED MICROWAVE (94).	
			1990–2110 US90 US111 US219 US222	1990–2110 FIXED. MOBILE. US90 US111 US219 US222 NG23 NG118	AUXILIARY BROADCASTING (74).	
			2110–2200 US111 US252	2110–2200 FIXED. US111 US252 NG23	DOMESTIC PUBLIC FIXED (21). PRIVATE OPERATIONAL-FIXED MICROWAVE (94).	
			2200–2290	2200–2290		

International table			United States table		FCC use designators	
Region 1—allocation MHz	Region 2—allocation MHz	Region 3—allocation MHz	Government	Non-Government	Rule part(s)	Special-use frequencies
(1)	(2)	(3)	Allocation MHz (4)	Allocation MHz (5)	(6)	(7)
			FIXED. MOBILE. SPACE RESEARCH (space-to-Earth) (space-to-space) US303 G101	US303		
2290–2300 FIXED. SPACE RESEARCH (space-to-Earth) (deep space). MOBILE except aeronautical mobile.	2290–2300 FIXED. MOBILE except aeronautical mobile. SPACE RESEARCH (space-to-Earth) (deep space).		2290–2300 FIXED. MOBILE except aeronautical mobile. SPACE RESEARCH (space-to-Earth) (deep space only).	2290–2300 SPACE RESEARCH (space-to-Earth) (deep space only).		
2300–2450 FIXED. Amateur. Mobile. Radiolocation.	2300–2450 FIXED. MOBILE. RADIOLOCATION. Amateur.		2300–2310 RADIOLOCATION Fixed. Mobile. US253 G2	2300–2310 Amateur. US253	Amateur (97).	
			2310–2390 MOBILE. RADIOLOCATION. Fixed. US276 G2	2310–2390 MOBILE US276		
664 752	664 751 752		2390–2450 RADIOLOCATION. 664 752 G2	2390–2450 Amateur. 664 752	Amateur (97).	
2450–2500 FIXED. MOBILE. Radiolocation. 752 753	2450–2500 FIXED. MOBILE. RADIOLOCATION. 752		2450–2483.5 752 US41	2450–2483.5 FIXED. MOBILE. Radiolocation. 752 US41		2450 ± 50 MHz: Industrial, scientific and medical frequency.

			2483.5–2500 752 US41	2483.5–2500 RADIODETERMINATION SATELLITE (space-to-Earth) 752 US41 NG147		
2500–2655 FIXED 762 763 764 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760	2500–2655 FIXED 762 764 FIXED-SATELLITE (space-to-Earth) 761 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760	2500–2535 FIXED 762 764 FIXED SATELLITE (space-to-Earth) 761 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760 754	2500–2655	2500–2655 FIXED. BROADCASTING-SATELLITE.	AUXILLIARY BROADCASTING (74).	
		2535–2655 FIXED 762 764 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760				
720 753 756 758 759	720 755	720	720 US205 US269	720 US205 US269 NG47 NG101 NG102		
2655–2690 FIXED 762 763 764 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760 Earth Exploration-Satellite (passive). Radio Astronomy. Space Research (passive).	2655–2690 FIXED 762 764 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 761 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760 Earth Exploration-Satellite (passive). Radio Astronomy. Space Research (passive).	2655–2690 FIXED 762 764 FIXED-SATELLITE (Earth-to-space) 761 MOBILE except aeronautical mobile. BROADCASTING-SATELLITE 757 760 Earth Exploration-Satellite (passive). Radio Astronomy. Space Research (passive).	2655–2690 Earth Exploration-Satellite (passive). Radio Astronomy. Space Research (passive).	2655–2690 FIXED. BROADCASTING-SATELLITE. Earth Exploration-Satellite (passive). Radio Astronomy. Space Research (passive).	AUXILIARY BROADCASTING (74). PRIVATE OPERATIONAL-FIXED MICROWAVE (94).	
758 759 765	765	765 766	US205 US269	US205 US269 NG47 NG101 NG102		

International table			United States table		FCC use designators	
Region 1—allocation MHz	Region 2—allocation MHz	Region 3—allocation MHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation MHz	Allocation MHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2690–2700	EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). 767 768 769		2690–2700 EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). US74 US246	2690–2700 EARTH EXPLORATION-SATELLITE (passive). RADIO ASTRONOMY. SPACE RESEARCH (passive). US74 US246		
2700–2900	AERONAUTICAL RADIONAVIGATION 717. Radiolocation. 770 771		2700–2900 AERONAUTICAL RADIONAVIGATION 717. METEOROLOGICAL AIDS. Radiolocation. 770 US18 G2 G15	2700–2900 717 770 US18		
2900–3100	RADIONAVIGATION 773 774 775 Radiolocation. 772		2900–3100 MARITIME RADIONAVIGATION 774 775 Radiolocation. US44 US286 G56	2900–3100 MARITIME RADIONAVIGATION 774 775 Radiolocation. US44 US286	MARITIME (80).	
3100–3300	RADIOLOCATION. 713 776 777 778		3100–3300 RADIOLOCATION. 713 776 778 US110 G59	3100–3300 Radiolocation. 713 776 778 US110		
3300–3400 RADIOLOCATION 778 779 780	3300–3400 RADIOLOCATION. Amateur. Fixed. Mobile. 778 780	3300–3400 RADIOLOCATION. Amateur. 778 779	3300–3500 RADIOLOCATION. 664 778 US108 G31	3300–3500 Amateur. Radiolocation. 664 778 US108	Amateur (97).	

3400–3600 FIXED. FIXED-SATELLITE (space-to-Earth). Mobile. Radiolocation.	3400–3500 FIXED. FIXED-SATELLITE (space-to-Earth). Amateur. Mobile. Radiolocation 784 664 783					
781 782 785	3500–3700 FIXED. FIXED-SATELLITE (space-to-Earth). MOBILE except aeronautical mobile Radiolocation 784		3500–3600 AERONAUTICAL RADIONAVIGATION (ground-based). RADIOLOCATION US110 G59 G110	3500–3600 Radiolocation. US110		
3600–4200 FIXED. FIXED-SATELLITE (space-to-Earth). Mobile.	786		3600–3700 AERONAUTICAL RADIONAVIGATION (ground-based). RADIOLOCATION US110 US245 G59 G110	3600–3700 FIXED-SATELLITE (space-to-Earth). Radiolocation. US110 US245		
	3700–4200 FIXED. FIXED-SATELLITE (space-to-Earth). MOBILE except aeronautical mobile. 787		3700–4200	3700–4200 FIXED. FIXED-SATELLITE (space-to-Earth). NG41	DOMESTIC PUBLIC FIXED (21). SATELLITE COMMUNICATIONS (25).	
4200–4400	AERONAUTICAL RADIONAVIGATION 789 788 790 791		4200–4400 AERONAUTICAL RADIONAVIGATION. 791 US261	4200–4400 AERONAUTICAL RADIONAVIGATION. 791 US261	AVIATION (87).	
4400–4500	FIXED. MOBILE.		4400–4500 FIXED. MOBILE.	4400–4500		
4500–4800			4500–4800	4500–4800		

[41 FR 7398, Feb. 18, 1976; 41 FR 9346, Mar. 4, 1976, as amended at 49 FR 48700, Dec. 14, 1984]

§ 15.117 Operation between 49.82–49.90 MHz.

(a) A low power communication device may be operated on one or more of the permitted frequencies listed in this section without any restriction on the type of modulation provided it complies with all the technical specifications of § 15.118 or § 15.119.

Permitted frequencies of operation:

49.830 MHz	49.875 MHz
49.845 MHz	49.890 MHz
49.860 MHz	

(b) The manufacture of a cordless telephone using the frequencies in paragraph (a) of this section under the provisions of § 15.118 shall cease October 1, 1984. All cordless telephones manufactured after October 1, 1984 shall conform to the requirements in §§ 15.231–15.237, inclusive.

(Secs. 4(l), 302 and 303(r), Communications Act of 1934)

[41 FR 7398, Feb. 18, 1976, as amended at 49 FR 1518, Jan. 12, 1984]

§ 15.118 Technical specification for the band 49.82–49.90 MHz.

A low power communication device that is marketed or that is home built in a quantity greater than 5 and is not marketed, must meet all the technical specifications in this section.

(a) Frequency tolerance of carrier: ±0.01%. This tolerance shall be maintained for a temperature variation of −20° to +50° C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20° C.

(b) Emission shall be confined within a 20 kHz band centered on the carrier frequency. Devices that provide for an external input signal shall be checked for compliance with this requirement when modulated by the intended type of input signal.

(c) The emission of RF energy on the carrier frequency shall not exceed 10,000 μV/m measured at 3 meters.

(d) The out-of-band emissions, including harmonics, on any frequency more than 10 kHz removed from the carrier shall not exceed 500 μV/m measured at 3 meters. The spectrum shall be scanned from 25 to 1000 MHz and all signals exceeding 50 μV/mat 3 meters shall be reported.

(e) The antenna shall be permanently attached to the enclosure containing the device. If the device provides for connection of external accessories, including external electrical input signals, the device must be tested with accessories attached. The emissions tests shall be performed with the device and accessories configured in a manner which tends to produce maximized emissions within the range of variations that can be expected under normal operating conditions.

(f) If the device is designed to operate from public utility lines, the RF energy fed back into the power lines shall not exceed 100 microvolts on any frequency below 25 MHz.

[41 FR 7398, Feb. 18, 1976; 41 FR 9346, Mar. 4, 1976, as amended at 50 FR 4666, Feb. 1, 1985]

§ 15.119 Alternative technical specifications for the band 49.82–49.90 MHz.

A low power communication device which is home built in a quantity of 5 or less and which is not marketed may be operated in the band 49.82–49.90 MHz provided it meets all the following technical specifications.

(a) The RF carrier and modulation products shall be maintained within the band 49.82–49.90.

(b) The power input to the device measured at the battery or the power line terminals shall not exceed 100 milliwatts under my condition of modulation.

(c) The antenna shall be a single element 1 meter or less in length permanently mounted on the enclosure containing the device.

(d) The device shall, with the exception of the microphone, be completely self-contained with the antenna permanently attached to the enclosure containing the device. The microphone may be external to the device, provided it is permanently attached to the enclosure with a cable not longer than 1.5 meters.

(e) Harmonic emissions shall be suppressed at least 20 dB below the level of the unmodulated carrier.

[41 FR 7398, Feb. 18, 1976, as amended at 42 FR 4464, Jan. 25, 1977]

§ 15.120 Interim requirements for operation above 70 MHz.

Manufacture and importation of a low power communications device complying with all the provisions of paragraphs (a) through (c) of this section shall cease September 1, 1983. Applications for certification of such a device will not be accepted by the Commission after June 15, 1983.

(a) The emission of RF energy on the fundamental frequency or any harmonic or other spurious frequency shall not exceed the field strength in the following table:

Frequency (MHz)	*Field strength (μV/m at 30 m)*
70 to 130	50.
130 to 174	50 to 150 (linear interpolation).
174 to 260	150.
260 to 470	150 to 500 (linear interpolation).
470 and above	500.

(b) The device is provided with means for automatically limiting operation so that the duration of each transmission shall not be greater than 1 second and the silent period between transmissions shall not be less than 30 seconds.

(c) The device shall be so constructed that there are no external or readily accessible controls which may be adjusted to permit operation in a manner inconsistent with the provisions of this section.

(Secs. 4, 303, 307, 48 Stat., as amended, 1066, 1082, 1083; 47 U.S.C. 154, 303, 307)

[40 FR 10677, Mar. 7, 1975. Redesignated at 41 FR 7398, Feb. 18, 1976, and amended at 46 FR 55527, Nov. 10, 1981]

§ 15.122 Periodic operation in the bands 40.66–40.70 MHz and above 70 MHz.

A low power communication device may be operated in the band 40.66–40.70 MHz or at any frequency above 70 MHz subject to the following conditions:

(a) The emission of RF energy on the fundamental frequency as well as spurious and harmonic emissions shall not exceed the field strength in the following table:

Fundamental frequency (MHz)	Field strength of fundamental (μV/m at 3m)	Field strength harmonics and spurious (μV/m at 3m)
40.66 to 40.70	1000	100
70 to 130	500	50
130 to 174	[1] 500–1500	[1] 50–150
174 to 260	1500	150
260 to 470	[1] 1500–5000	[1] 150–500
470 and above	5000	500

[1] Linear interpolation.

NOTE: For pulsed operation, measured field strength shall be determined from the averaged absolute voltage during a 0.1 second interval when field strength is at its maximum value.

(b) The device is provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the transmission duration but in no case less than 10 seconds.

(c) For operation in the band 40.66 to 40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be ±0.01%. This tolerance shall be maintained for a temperature variation of −20° to +50°C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C.

(d) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than .5% of the center frequency.

NOTE: Bandwidth is determined at the points 20dB down from the modulated carrier.

(e) If the device is to be operated from public utility lines, the RF energy fed back into the power lines shall not exceed 250 microvolts at any frequency between 450 kHz and 30 MHz.

(Secs. 4, 303, 307, 48 Stat., as amended, 1066, 1082, 1083; 47 U.S.C. 154, 303, 307)

[46 FR 55527, Nov. 10, 1981, as amended at 47 FR 51760, Nov. 17, 1982]

§ 15.126 Operation of spread spectrum systems.

Spread spectrum systems may be operated in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz frequency bands subject to the following conditions:

(a) They may transmit within these bands with a maximum peak output power of 1 watt.

(b) RF output power outside these bands over any 100 kHz bandwidth must be 20 dB below that in any 100 kHz bandwidth within the band which contains the highest level of the desired power. The range of frequency measurements shall extend from the lowest frequency generated in the device (or 100 MHz whichever is lower) up to a frequency which is 5 times the center frequency of the band in which the device is operating.

(c) They will be operated on a noninterference basis to any other operations which are authorized the use of these bands under other Parts of the Rules. They must not cause harmful interference to these operations and must accept any interference which these systems may cause to their own operations.

NOTE: Spread spectrum systems using the 902-928 MHz, 2400-2500 MHz and 5725-5850 MHz bands should be cautioned that they are sharing these bands on a noninterference basis with systems supporting critical government requirements that have been allocated the usage of these bands on a primary basis. Many of these systems are airborne radiolocation systems that emit a high EIRP which can cause harmful interference to other users. For further information about these systems, write to: Director, Office of Plans and Policy, U.S. Department of Commerce, National Telecommunications and Information Administration, Room 4096, Washington, D.C. 20230.

Also, future investigations of the effect of spread spectrum interference to Government operations in the 902-928 MHz band may require a future decrease in the power limits.

(d) For frequency hopping systems, at least 75 hopping frequencies, separated by at least 25 kHz, shall be used, and the average time of occupancy on any frequency shall not be greater than four-tenths of one second within a 30-second period. The maximum bandwidth of the hopping channel is 25 kHz. For direct sequence systems, the 6 dB bandwidth must be at least 500 kHz.

(e) If the device is to be operated from public utility lines, the potential of the RF signal fed back into the power lines shall not exceed 250 microvolts at any frequency between 450 kHz and 30 MHz.

[50 FR 25239, June 18, 1985]

§ 15.131 Certification required for devices that are marketed or built in a quantity greater than 5 and not marketed.

A low power communication device manufactured after October 1, 1975 which is marketed or built in a quantity greater than 5 and not marketed shall be certificated pursuant to Subpart B of this part.

[41 FR 7398, Feb. 18, 1976, as amended at 50 FR 5755, Feb. 12, 1985]

§ 15.132 Labelling and identification requirements.

(a) A device subject to certification by the Commission for which an application is received on and after May 1, 1981, shall be identified pursuant to §§ 2.925 and 2.1045. In addition, the nameplate or label shall contain the following statement:

This device complies with Part 15 of FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference that may cause undesired operation.

(b) A device subject to certification by the Commission for which an application is filed between April 1, 1976 and May 1, 1981, shall have permanently and visibly affixed an identification label containing information shown on the sample below.

FCC IDENTIFICATION DATA

Name _____

Model No.

Unique identifier _____

"This device complies with FCC Rules Part 15 as of date of manufacture."

Date of manufacture _____

(1) *Name.* This shall include the trade name, if any, and the name and address of the manufacturer or of the vendor provided the name of the latter was included in the application for certification.

(2) *Identifier.* This is the model number assigned to the device by the manufacturer or applicant for certification and must be identical to that shown on the application for certification. This identifier must be preceded by the words "MODEL NO."

(3) *Date.* This is the month and year when the device was manufactured. If desired, this may be coded, provided the code therefor is filed with the application for certification.

(c) A device subject to certification by the Commission for which an application was filed before April 1, 1976 may be identified in any manner: *Provided,* The name, number and date required by paragraph (b) of this section are clearly identifiable and distinct from any other number or designator on the device.

(d) When it is not practicable to affix the label required under this section due to the size, use of the device, or other factors, the wording specified under paragraph (a) or (b) above and the FCC identifier (when applicable) shall, as an alternative, be placed on the first page of the instruction manual or a pamphlet given to the user.

(Secs. 4, 303, 307, 48 Stat., as amended, 1066, 1082, 1083; 47 U.S.C. 154, 303, 307)

[44 FR 17180, Mar. 21, 1979, as amended at 45 FR 71356, Oct. 28, 1980; 51 FR 4366, Feb. 4, 1986]

§ 15.133 Certification and identification required for home built device.

A person who constructs not more than five low power communication devices for his own use, and not for sale, need not meet the requirements of § 15.131 and § 15.132. In lieu thereof, he shall attach to each such device a signed and dated label that reads as follows:

I have constructed this device for my own use. I have tested it and certify that it complies with the applicable regulations of FCC Rules Part 15. A copy of my measurements is in my possession and is available for inspection.

_____

(Signature)

_____

(Date)

§ 15.141 Measurement procedure.

(a) Any procedure acceptable to the Commission may be used to measure the RF energy emitted or conducted by a low power communication device. For swept frequency equipment, measurements shall be made with the frequency sweep stopped. Field strength measurements shall be made, to the extent possible, on an open field site.

(b) The procedure used at the FCC Laboratory for type approval testing of a wireless microphone operating in the band 88-108 MHz is given in FCC Bulletin OCE 19 available from the Commission.

(c) The measurement techniques set out in FCC Measurement Procedure MP 1 "FCC Methods of Measurements for Determining Compliance of Radio Control and Security Alarm Devices and Associated Receivers" is used by the FCC to determine compliance of devices operating under § 15.122 with the technical specifications.

(d) For devices operating between 1.705 and 10 MHz, the following shall be observed:

(1) The minimum bandwidth of the measuring instrumentation shall be:

—200 Hz for measurements below 150 kHz
—9 kHz for measurements from 150 kHz to 30 MHz
—100 kHz for measurements from 30 to 300 MHz

(2) The antenna to be used for field strength measurements shall be:

—below 18 MHz, a shielded balance loop
—from 18 to 30 MHz, a shielded balanced loop or calibrated tuned half-wave dipole
—from 30 to 300 MHz, a calibrated tuned half-wave dipole.

(Secs. 4, 303, 307, 48 Stat., as amended, 1066, 1082, 1083; 47 U.S.C. 154, 303, 307)

[28 FR 12521, Nov. 22, 1963, as amended at 46 FR 55527, Nov. 10, 1981; 51 FR 4366, Feb. 4, 1986]

SUBCHAPTER B—COMMON CARRIER SERVICES

PART 20—[RESERVED]

PART 21—DOMESTIC PUBLIC FIXED RADIO SERVICES

Subpart A—General

Subpart B—Applications and Licenses

GENERAL FILING REQUIREMENTS

PROCESSING OF APPLICATIONS

Subpart C—Technical Standards

Subpart D—Technical Operation

Subpart E—Miscellaneous

Subpart F—Developmental Authorizations

Subpart G—Digital Electronic Message Service

Subpart H—[Reserved]

Subpart I—Point-to-Point Microwave Radio Service

Subpart J—Local Television Transmission Service

Subpart K—Multipoint Distribution Service

AUTHORITY: Secs. 4, 303, 48 Stat. 1066, as amended, 1082, as amended; 47 U.S.C. 154, 303.

SOURCE: 44 FR 60534, Oct. 19, 1979, unless otherwise noted.

Subpart A—General

§ 21.0 Scope and authority.

(a) The purpose of the rules and regulations in this part is to prescribe the manner in which portions of the radio

) Applications for authorizations perate stations at temporary loca- s under the provisions of this sec- shall be made upon FCC Form and may be accompanied by com- ed FCC Form 403 for simultaneous sideration provided the equipment be used is of "packaged" design. nket applications may be submit- for the required number of trans- ters.

.808 Notification of station operations at temporary locations.

.) The licensee of stations which authorized pursuant to the provi- s of § 21.807 shall notify the Com- sion, and its Engineer in Charge of dio district wherein operation is e conducted, of each period of op- tion at least 5 days prior to installa- of the facilities. This notification ll include:

) The call sign, manufacturer's e, type or model number, output er and specific location of the smitter(s).

2) The maintenance location for the smitter.

) The location of the transmitting ceiving station with which it will mmunicate and the identity of the respondent operating such facili- s.

4) The exact frequency or frequen- s to be used.

5) The public interest, convenience l necessity to be served by oper- on of the proposed installation.

6) The commencement and antici- ed termination dates of operation m each location. In the event the l termination date differs from previous notification, written ice thereof promptly shall be given the Commission and its Engineer in arge.

7) Where the notification contem- tes initially a service which is to be dered for a period longer than 90 s. the notification shall contain a wing as to why application should be made for regular authorization.

8) A copy of the foregoing notifica- shall be posted with the station li- se (see § 21.214).

§ 21.809 Stations affected by coordination contour procedures.

In frequency bands shared with the communication-satellite service, applicants shall also comply with the requirements of § 21.706 (c) and (d).

Subpart K—Multipoint Distribution Service

§ 21.900 Eligibility.

Authorizations for stations in this service will be granted to existing and proposed communications common carriers. Applications will be granted only in cases where it can be shown that: (a) The applicant is legally, financially, technically, and otherwise qualified to render the proposed service; (b) there are frequencies available to enable the applicant to render a satisfactory service; and (c) the public interest, convenience and necessity would be served by a grant thereof. In addition, the applicant shall submit a statement indicating whether there is any affiliation or relationship to any intended or likely subscriber or program originator. An applicant will not be eligible for authorization in this service unless it can be shown with reasonable certainty that at least fifty percent of the service rendered will be to subscribers who are not affiliated or related to the applicant. Any applicant for multichannel multipoint distribution service desiring a preference in the random selection process, in accordance with the procedures set out in § 1.1824, shall so indicate as part of its application.

[44 FR 60534, Oct. 19, 1979, as amended at 50 FR 5994, Feb. 13, 1985]

§ 21.901 Frequencies.

(a) Frequencies in the bands 2150-2162 MHz and 2596-2644 MHz are available for assignment to fixed stations in this service. Frequencies in the band 2150-2160 MHz are shared with non-broadcast omnidirectional radio systems licensed under other parts of the Commission's Rules, and frequencies in the band 2160-2162 MHz are shared with directional radio systems authorized in other common carrier services. Frequencies in the 2596-2644 MHz band are shared with Instructional Television Fixed Service Stations licensed under Part 74 of the Commission's Rules. The response channels E_1, E_2, E_3, E_4, F_1, F_2, F_3, and F_4 listed in § 74.939(d) are also available for assignment to fixed stations in this band and are shared with Instructional Television Fixed Service Stations licensed under Part 74 of the Commission's Rules.

(b) Applicants may be assigned a channel(s) according to one of the following frequency plans:

(1) At 2150-2156 MHz (designated as channel 1),

(2) At 2156-2162 MHz (designated as channel 2), or

(3) At 2156-2160 MHz (designated as channel 2A), or

(4) At 2596-2602 MHz, 2608-2614 MHz, 2620-2626 MHz and 2632-2638 MHz (designated as channels E_1, E_2, E_3 and E_4 respectively with the four channels to be designated the E-group channels) and the associated response channels E_1, E_2, E_3 and E_4 listed in § 74.939(d), or

(5) At 2602-2608 MHz, 2614-2620 MHz, 2626-2632 MHz, and 2638-2644 MHz (designated as channel F_1, F_2, F_3 and F_4 respectively with the four channels to be designated the F-group channels and the response channels F_1, F_2, F_3 and F_4 listed in § 74.939(d).

(c) Channel 2 will be assigned only where there is evidence that no harmful interference will occur to any authorized point-to-point facility in the 2160-2162 MHz band. Channel 2 may be assigned only if the transmitting antenna of the station is to be located within ten (10) miles of the coordinates of the following metropolitan areas:

Principal City	Coordinates
Akron, Ohio	Lat. 41°05'06" N., long. 81°31'06" W.
Albany-Schenectady-Troy, N.Y.	Lat. 42°39'00" N., long. 73°45'24" W.
Anaheim-Santa Ana-Garden Grove, Calif.	Lat. 33°46'30" N., long. 117°54'48" W.
Atlanta, Ga	Lat. 33°45'00" N., long. 84°23'12" W.
Baltimore, Md	Lat. 39°17'18" N., long. 76°37'00" W.
Birmingham, Ala	Lat. 33°30'42" N., long. 86°48'24" W.
Boston, Mass	Lat. 42°21'42" N., long. 71°03'30" W.

Principal City	Coordinates
Buffalo, N.Y	Lat. 42°53'12" N., long. 78°52'30" W.
Chicago, Ill	Lat. 41°53'00" N., long. 87°37'30" W.
Cincinnati, Ohio	Lat. 39°06'00" N., long. 84°30'48" W.
Cleveland, Ohio	Lat. 41°29'48" N., long. 81°42'00" W.
Columbus, Ohio	Lat. 39°57'42" N., long. 83°00'06" W.
Dallas, Tex	Lat. 32°46'36" N., long. 96°48'42" W.
Dayton, Ohio	Lat. 39°45'24" N., long. 84°11'42" W.
Denver, Colo	Lat. 39°44'24" N., long. 104°59'18" W.
Detroit, Mich	Lat. 42°20'00" N., long. 83°03'00" W.
Fort Worth, Tex	Lat. 32°45'00" N., long. 97°17'42" W.
Gary, Ind	Lat. 41°36'00" N., long. 87°20'00" W.
Hartford, Conn	Lat. 41°46'00" N., long. 72°40'30" W.
Houston, Tex	Lat. 29°45'48" N., long. 95°21'42" W.
Indianapolis, Ind	Lat. 39°46'12" N., long. 86°09'18" W.
Kansas City, Mo	Lat. 39°06'00" N., long. 94°34'42" W.
Los Angeles-Long Beach, Calif.	Lat. 34°03'18" N., long. 118°15'00" W.
Louisville, Ky	Lat. 38°14'48" N., long. 85°45'42" W.
Memphis, Tenn	Lat. 35°07'30" N., long. 90°03'24" W.
Miami, Fla	Lat. 25°46'30" N., long. 80°11'24" W.
Milwaukee, Wis	Lat. 43°02'18" N., long. 87°54'48" W.
Minneapolis-St. Paul, Minn.	Lat. 44°59'00" N., long. 93°15'48" W.
New Orleans, La	Lat. 29°57'48" N., long. 90°03'48" W.
New York City, N.Y.-Newark-Jersey City-Paterson, N.J.	Lat. 40°42'30" N., long. 74°00'00" W.
Norfolk, Va	Lat. 36°50'42" N., long. 76°17'12" W.
Oklahoma City, Okla	Lat. 35°29'30" N., long. 97°30'12" W.
Philadelphia, Pa	Lat. 39°57'00" N., long. 75°09'48" W.
Phoenix, Ariz	Lat. 33°27'18" N., long. 112°04'24" W.
Pittsburgh, Pa	Lat. 40°26'12" N., long. 80°00'30" W.
Portland, Oreg	Lat. 45°32'06" N., long. 122°37'12" W.
Providence, R.I	Lat. 41°49'00" N., long. 71°24'24" W.
Rochester, N.Y	Lat. 43°09'30" N., long. 77°36'30" W.
Sacramento, Calif	Lat. 38°35'06" N., long. 121°29'24" W.
San Antonio, Tex	Lat. 29°25'24" N., long. 98°29'43" W.
San Bernardino-Riverside, Calif.	Lat. 34°06'30" N., long. 117°18'36" W.
San Diego, Calif	Lat. 32°42'48" N., long. 117°09'12" W.
San Francisco-Oakland, Calif.	Lat. 37°46'30" N., long. 122°25'00" W.
San Jose-Palo Alto-Sunnyvale, Calif.	Lat. 37°22'36" N., long. 122°02'00" W.
Seattle-Everett, Wash	Lat. 47°35'48" N., long. 122°19'48" W.
St. Louis, Mo	Lat. 38°37'00" N., long. 90°11'36" W.
Syracuse, N.Y	Lat. 43°03'06" N., long. 76°09'00" W.
Tampa-St. Petersburg, Fla.	Lat. 27°57'06" N., long. 82°27'00" W.
Toledo, Ohio	Lat. 41°38'48" N., long. 83°32'30" W.
Washington, D.C	Lat. 38°53'30" N., long. 77°02'00" W.

(d) Frequencies in the band 2596–2644 MHz and associated response channels will be assigned only in accordance with the following conditions:

(1) Prior to commencing construction of any facilities to use frequencies in this band permittees must submit to the Commission a written statement from all cochannel and adjacent channel Instructional Television Fixed Service Licensees, Permittees or Applicants with transmitters located within 50 miles of the permittee's transmitters that operation of the permittee's transmitter will not cause harmful interference to Instructional Television Fixed Service Operation or that the Instructional Television Fixed Service Licensee, Permittee, or Applicant will accept whatever interference occurs. If the permittee is unable to obtain such a statement from the ITFS Licensee, Permittee, or Applicant it may submit a Petition for Declaratory Ruling pursuant to § 1.2 of this chapter on the issue of whether harmful interference will occur. The Petition must be simultaneously served on the affected ITFS entity. In such cases, the Commission will determine if harmful interference will occur using accepted engineering standards. The MDS permittee must also detail what efforts it made to obtain the desired statement from the ITFS operator.

(2) The E-group channels will be assigned to a single applicant in each area and the F-group channel will be assigned to a different applicant in that area. In such areas, each applicant may submit only a single application for either the E-group channels or the F-group channels but not both.

The partners, owners, trustees, beneficiaries, officers, directors or stockholders holding more than one percent of an entity's stock, or any other person or entity holding a similar cognizable interest in the applicant for, or licensee of, one group of channels in any area, shall not have a cognizable interest in the applicant for, or licensee of, either the same group, or the other group of channels in the same area.

(3) All applicants for frequencies in this band must specify the channels being applied for; however, the Commission may on its own initiative assign different channels in the band if it is determined that such action would serve the public interest.

(4) Notwithstanding the provisions of § 21.31 of this part, applications for frequencies in this band will be accepted only on the date(s) specified by the Commission.

(5) Notwithstanding the provisions of § 21.31(a) all applications that propose to locate transmission facilities within or within 15 miles of the border of a Standard Metropolitan Statistical Area (SMSA) will be considered together. In the case of a Standard Consolidated Statistical Area (SCSA) all applications that propose to locate facilities within or within 15 miles of the boundary of any SMSA contained in the SCSA will be considered together. In those cases in which an applicant proposes to locate its transmission facilities so that it will be located in, or within 15 miles of, more than one SMSA, the applicant must specify which SMSA it intends to be its primary service area. Each application will be entitled to comparative consideration or to be included in a lottery in only one such service area.

(6) Licensees or permittees of the frequencies in this band may petition the Commission to authorize exchange of assigned channels to allow adjacent channel operation. For example, one licensee may be assigned channels E_1, F_1, E_2 and F_2 and the other licensee could be assigned channels E_3, F_3, E_4 and F_4. Such a petition will be granted if the petitioners show that the exchange will result in better service to the public.

(7) All applications for frequencies in this band must contain a showing of how interference with the operation of adjacent channels will be avoided and what steps the applicant has taken to comply with § 21.902(a) of this part.

(e) Frequencies in the band segments 18,580–18,820 MHz and 18,920–19,160 MHz are available for assignment to fixed stations in this service for a point-to-point return links from a subscriber's location. Assignments in the 18 GHz band for these return links will be made in accordance with the provisions of Subpart I of Part 21.

[44 FR 60534, Oct. 19, 1979, as amended at 48 FR 33900, July 26, 1983; 49 FR 25479, June 21, 1984; 49 FR 37777, Sept. 26, 1984]

§ 21.902 Frequency interference.

(a) All applicants, permittees, and licensees shall make exceptional efforts to avoid harmful interference to other users and to avoid blocking potential adjacent channel use in the same city and cochannel use in nearby cities. In areas where major cities are in close proximity, careful consideration should be given to minimum power requirements and to the location, height, and radiation pattern of the transmitting antenna. Licensees, permittees and applicants are expected to cooperate fully in attempting to resolve problems of potential interference before bringing the matter to the attention of the Commission.

(b) As a condition for use of frequencies in this service, each carrier is required to:

(1) Not enter into any lease or contract or otherwise take any action that would unreasonably prohibit location of another station's transmitting antenna at any given site.

(2) Cooperate fully and in good faith to resolve interference and transmission security problems.

(3) Engineer the system to provide at least 45 dB of cochannel interference protection within the protected service areas of all other authorized or previously proposed stations that transmit, or may transmit, signals for standard television reception.

(4) Engineer the station for adjacent channel operation and, if transmissions are to be provided for standard television reception, insure that, whenever possible, the ratio of the signal

transmitted to the signal of any authorized, or previously proposed, adjacent channel station is less than 0 dB when measured at the output of a standard antenna located anywhere within the protected service area of the adjacent channel station and oriented to receive the maximum possible adjacent channel signal.

(c) The following interference studies, as appropriate, shall be included with each application:

(1) An analysis of the potential for harmful co-channel interference with any authorized or previously proposed station(s), if: (i) The proposed transmitting antenna has an unobstructed electrical path to any part of the protected service area of any other station(s) that utilize(s), or would utilize, the same frequency; or (ii) if the proposed transmitter is within 50 miles of the coordinates of any such station; or (iii) if the great circle path between the proposed transmitter and the protected service area of any such station is 150 miles or less and 90 percent or more of the path is over water or within 10 miles of the coast or shoreline of the Atlantic Ocean, the Pacific Ocean, the Gulf of Mexico, any of the Great Lakes, or any bay associated with any of the above. (See §§ 21.701(a), 21.901(a) and 74.902 of this chapter);

(2) An analysis of the potential for harmful interference with any authorized or previously proposed station(s), if the proposed transmitting antenna has an unobstructed electrical path to any part of the protected service area of any other station(s) that utilizes, or would utilize, an adjacent channel frequency (see §§ 21.701(a), 21.901(a) and 74.902 of this chapter);

(3) In the case of a proposal to operate a non-colocated station within the protected service area of an authorized, or previously proposed, adjacent channel station, an analysis that identifies the areas within the protected service areas of both the authorized or previously proposed adjacent channel station and the proposed station that cannot be protected as specified in § 21.902(b)(4) and an explanation of why the proposed station cannot be colocated with the existing or previously proposed station.

(4) In the case of a proposal for use of channel 2, an analysis of the potential for harmful interference with any authorized point-to-point station located within fifty (50) miles which utilizes the 2160—2162 MHz band; and

(5) An analysis concerning possible adverse impact upon Mexican and Canadian communications if the station's transmitting antenna is to be located within 35 miles of the border.

(d) Subject to the limitations contained in (e) of this section each MDS licensee shall be protected from harmful electrical interference as determined by the theoretical calculations within an area described as follows:

(1) For a station using a transmitting antenna with an omnidirectional horizonal plane radiation pattern the boundary of the protected service area will be 15 miles from the transmitter site.

(2) For a station using a transmitting antenna with a non-omnidirectional horizonal plane radiation pattern the boundary of the protected service area will be the locus of all points located at distances from the transmitter as determined by the following equation;

$$D_b = \frac{D_{bmax}}{\text{antilog}\left(\frac{G_{bmax}-G}{20}\right)}$$

in which the parameters are defined as follows:

D_b = the distance from the transmitter site to the boundary in direction of interest;

G = the transmitter antenna gain in the direction of interest;

G_{max} = the maximum antenna gain

D_{bmax} = the distance to boundary, in the direction of maximum gain that will make the total area of the protected service area equal to or less than 710 square miles; all distances are in miles, the gains are in dB relative to an isotropic antenna, and the antilog is taken to the base 10;

(3) Except that when the electrical horizon determined using the transmitting antenna height, a 30 foot receiving antenna height, and assuming 4/3 earth radius propagation conditions, is closer to the transmitter than boundary described in paragraph (d) (1) or (2) of this section, the electrical horizon shall be the boundary of the protected service area.

(e) No MDS licensee will be protected from harmful interference caused by:

(1) Any station with an earlier filing date.

(2) Any station that was authorized before July 1984.

(3) Any multichannel MDS station whose application was pending on September 9, 1983.

(f) In addressing potential harmful interference in this service the following definitions shall be used:

(1) Co-channel interference is defined as the ratio of the desired signal to the undesired signal present in the desired channel, at the output of a reference receiving antenna oriented to receive the maximum desired signal. Harmful interference will be considered present when a free space calculation determines that this ratio is less than 45 dB.

(2) Adjacent interference is defined as the ratio of the desired signal to undesired signal present in an adjacent channel, at the output of a reference receiving antenna oriented to receive the maximum desired signal level. Harmful interference will be considered present when a free space calculation determines that this ratio is less than 0 dB except that in cases between MDS stations and Instructional Television Fixed Service stations constructed before May 26, 1983 the ratio shall be less than 10 dB.

(3) For purposes of this section all interference calculations involving receive antenna performance shall use the reference antenna characteristics shown in figure 1.

Carrier frequency
410 kHz
500 kHz
2182 kHz
8364 kHz
121.500 kHz
243.000 kHz

(1) Except in distress the assigned frequency for direction finding is 410 kHz;

(2) Ship stations may use 500 kHz for direction finding exclusively in Regions 1 and 3 outside areas of heavy radio traffic. Use must not interfere with distress urgency and safety signals or calls and replies.

(b) *Radiodetermination frequencies for cable-repair ships.* Except in Region 1 the channels in the 285-325 kHz band are assignable to ship stations for cable-repair radiodetermination operations. In Region 1 the channels available for assignment for such operations are limited to the 285-315 kHz band. The conditions of use of these channels are set forth in Subpart X of this part. Channel usage must comply with the following requirements:

(1) They are not permitted within the territorial waters of a foreign country;

(2) Their output power must not exceed 15 watts; and

(3) They must not cause interference to any maritime station in the radionavigation service.

(c) *Radionavigation frequencies.* The frequency bands assignable to ship and shore stations, including ship and shore radar stations, for radionavigation purposes are:

Ship transmit	Shore transmit
2900-3100 MHz	2900-3100 MHz
5460-5650 MHz	
9300-9500 MHz	9300-9500 MHz
14.0-14.05 GHz	

(d) *Radiolocation frequencies.* (1) The frequency bands assignable to ship and shore radiolocation stations are:

Ship and shore stations (MHz)
2450-2500
2900-3100
5460-5650
9300-9500

(2) The 2450-2500 MHz band may be used for radiolocation purposes on the conditions that harmful interference must not be caused to the fixed and mobile services and that no protection shall be given from interference caused by emissions from industrial, scientific, or medical equipment; and

(3) Use must not cause harmful interference to the radionavigation service and to the Government radiolocation service.

Ship Earth Stations

§ 80.377 Frequencies for ship earth stations.

The frequency band 1626.5-1645.5 MHz is assignable for communication, radiodetermination and telecommand messages, and developmental operations that are associated with the position, orientation and operational functions of maritime satellite equipment. The frequency band 1645.5-1646.5 MHz is reserved for use in the Future Global Maritime Distress and Safety System (FGMDSS).

Aircraft Stations

§ 80.379 Maritime frequencies assignable to aircraft stations.

This section describes the maritime frequencies assignable to aircraft stations for simplex operations:

(a) Available frequencies:

Carrier frequency	Conditions of use
2738 kHz	(1)
2830 kHz	(1)
3023 kHz	(2)
4125 kHz	(3)
5680 kHz	(2)
121.500 MHz	(4)
123.100 MHz	(4)
156.300 MHz	(5)
156.375 MHz	(5)
156.400 MHz	(5)
156.425 MHz	(5)
156.450 MHz	(5)
156.625 MHz	(5)
156.800 MHz	(5)
156.900 MHz	(5
157.100 MHz	(6
157.425 MHz	(5)(7

(b) The conditions of use c
rier frequencies in paragra
this section, are:

(1) For permissible geogra
of operation see § 80.373(
other limitations see § 80.373

(2) Aircraft and ship sta
use 3023.0 kHz and 5680.0
search and rescue scene-of-
ordination including comm
between these stations and
ing land stations. Stations u
frequencies must use J3E em

(3) Assignable for distress
communications between ai
maritime mobile stations;

(4) Assignable for search
between ships and aircraft
using these frequencies mus
emission;

(5) These frequencies ma
by aircraft stations when:

(i) The altitude of aircra
does not exceed 1,000 feet,
reconnaissance aircraft pa
in icebreaking operations w
titude of 1,500 feet is allowe

(ii) The mean power of a
tions must not exceed five w

(iii) Communications are
operations in which the
mobile stations are primari
and where direct communi
tween the aircraft and t
coast station is required;

(iv) Stations may use 15
for safety purposes only;

(v) Stations may use 15
for distress, safety and c
and

(vi) Use of 156.375 MHz b
not permitted in the New C
area specified in §80.383.

(6) The use of 157.100 MH
to communications with
the Department of Interi
Mead, Nevada; and

(7) Commercial fishing
associated aircraft may
MHz while engaged in
fishing activities except
miles of the United Sta
border and Puget Soun

(Secs. 4(i), and 303(r), Communications Act of 1934, as amended, 47 U.S.C. 154(i) and 303(r), and § 0.231(d) of the Commission's rules)

[28 FR 14096, Dec. 21, 1963, as amended at 30 FR 2801 Mar. 4, 1965; 40 FR 8951, Mar. 4, 1975; 40 FR 20924, May 13, 1975; 47 FR 51879, Nov. 10, 1982; 49 FR 35092, Sept. 6, 1984]

§ 87.467 Cooperative use of operational stations.

(a) Licensees and persons eligible to become licensees of operational fixed stations under this subpart may make cooperative use of such licensed facilities under the conditions and subject to the limitations specified in this section.

(b) Such licensed facilities may be cooperatively used and shared only by: (1) Persons licensed or eligible to be licensed for an operational station in the Aviation Radio Services; or by (2) government entities, units or subunits, right-of-way companies, or enterprises whose rates and services are regulated by a governmental authority or body, regardless of whether such entities, units, subunits, companies, or enterprises are licensed or eligible to be licensed within the Aviation Radio Services.

(c) The cooperative use of licensed facilities is authorized only on frequencies for which all participants would be separately eligible for assignment.

(d) Licensed facilities may be cooperatively used under this section only (1) without charge to any of the participants in its use, or (2) on a nonprofit, cost sharing basis pursuant to a written contract between the parties involved which provides that the licensee shall have control of the licensed facilities and that contributions to capital and operating expenses are accepted only on a cost sharing nonprofit basis, prorated equitably, among all participants using the facilities, or (3) on a reciprocal basis (e.g., use of one licensee's facilities in exchange for the use of another licensee's facilities) without charge for either capital or operating expense, pursuant to a written contract between the licensees involved.

(e) Each licensee sharing its facilities under this section shall maintain records showing the cost of the facilities and their operation and use, the charges made to and payments made by each of those using the facilities or contributing to their capital cost or operating expense, and the information specified below, and such records shall be available for inspection by the commission.

(f)-(i) [Reserved]

(j) The licensee shall inform the Commission whenever the cooperative use of any of his facilities in accordance with this section is permanently discontinued.

(Secs. 4(i), and 303(r), Communications Act of 1934, as amended, 47 U.S.C. 154(i) and 303(r), and § 0.231(d) of the Commission's rules)

[31 FR 9803, July 20, 1966, as amended at 33 FR 10345, July 19, 1968; 36 FR 16913, Aug. 26, 1971; 47 FR 54450, Dec. 3, 1982; 49 FR 35095, Sept. 6, 1984]

Subpart N—Radionavigation Land Stations

§ 87.501 Frequencies available.

In applying for a radionavigation land station authorization, the applicant need not specify the proposed operating frequencies inasmuch as the assigned frequencies are determined by the Commission after coordination with other agencies of the government. In order to facilitate coordination of frequencies, the appropriate Regional Office of the Federal Aviation Administration must be notified prior to submission to the Commission of an application for a new radio-navigation land station or an application for modification of an existing radionavigation land station to change frequency, power, location or emission. Each such application, when submitted to the Commission, shall be accompanied by a statement showing the name of the FAA Regional Office notified and the date of such notification.

(a) Localizer stations with simultaneous radiotelephone channels and their associated glide path stations.

The frequencies:

Localizer MHz	Glide Path MHz
108.1	334.7
108.15	334.55
108.3	334.1
108.35	333.95
108.5	329.9
108.55	329.75
108.7	330.5
108.75	330.35
108.9	329.3
108.95	329.15
109.1	331.4
109.15	331.25
109.3	332.0
109.35	331.85
109.5	332.6
109.55	332.45
109.7	333.2
109.75	333.05
109.9	333.8
109.95	333.65
110.1	334.4
110.15	334.25
110.3	335.0
110.35	334.85
110.5	329.6
110.55	329.45
110.7	330.2
110.75	330.05
110.9	330.8
110.95	330.65
111.1	331.7
111.15	331.55
111.3	332.3
111.35	332.15
111.5	332.9
111.55	332.75
111.7	333.5
111.75	333.35
111.9	331.1
111.95	330.95

(b) Glide path stations: The band 328.6 to 335.4 MHz paired with localizers as shown in paragraph (a) of this section.

(c) Aeronautical marker beacon station: 75 MHz.

(d) Omnidirectional radio range (VOR) stations: 112.05 through 117.95 MHz and the following frequencies in the 108–112 MHz band.

MHz: 108.20, 108.25, 108.40, 108.45, 108.60, 108.65, 108.80, 108.85, 109.00, 109.05, 109.20, 109.25, 109.40, 109.45, 109.60, 109.65, 109.80, 109.85, 110.00, 110.05, 110.20, 110.25, 110.40, 110.45, 110.60, 110.65, 110.80, 110.85, 111.00, 111.05, 111.20, 111.25, 111.40, 111.45, 111.60, 111.65, 111.80, 111.85, 112.00, 112.05.

(e) 90–110 kHz.

(f) Radiobeacon stations: 190–285 kHz; 325–435 kHz; and 510–525 kHz.

(g) [Reserved]

(h)(1) The band 960–1215 MHz is available for the use of ground based facilities and directly associated airborne electronic aids to air navigation.[1] When distance measuring equipment (DME) is intended to operate in association with a single VHF navigation facility in the 108–117.975 MHz frequency band, the DME operating channel shall be paired with the VHF channel as shown in the following table.

DME CHANNELING AND PAIRING

[In megahertz]

VHF channel	Airborne interrogating frequency	Ground reply frequency
108.00	1 041	978
108.05	1 041	1 104
108.10	1 042	979
108.15	1 042	1 105
108.20	1 043	980
108.25	1 043	1 106
108.30	1 044	981
108.35	1 044	1 107
108.40	1 045	982
108.45	1 045	1 108
108.50	1 046	983
108.55	1 046	1 109
108.60	1 047	984
108.65	1 047	1 110
108.70	1 048	985
108.75	1 048	1 111
108.80	1 049	986
108.85	1 049	1 112
108.90	1 050	987
108.95	1 050	1 113
109.00	1 051	988
109.05	1 051	1 114
109.10	1 052	989
109.15	1 052	1 115
109.20	1 053	990
109.25	1 053	1 116
109.30	1 054	991
109.35	1 054	1 117
109.40	1 055	992
109.45	1 055	1 118
109.50	1 056	993
109.55	1 056	1 119
109.60	1 057	994
109.65	1 057	1 120
109.70	1 058	995
109.75	1 058	1 121
109.80	1 059	996
109.85	1 059	1 122
109.90	1 060	997
109.95	1 060	1 123
110.00	1 061	998
110.05	1 061	1 124
110.10	1 062	999
110.15	1 062	1 125
110.20	1 063	1 000

[1] U.S. government stations have been authorized to use this band to establish systems using spread spectrum techniques on condition that harmful interference is not caused to the aeronautical radionavigation service. Refer to Rule § 87.506 for information regarding reporting such interference.

DME CHANNELING AND PAIRING—Continued

[In megahertz]

VHF channel	Airborne interrogating frequency	Ground reply frequency
110.25	1 063	1 126
110.30	1 064	1 001
110.35	1 064	1 127
110.40	1 065	1 002
110.45	1 065	1 128
110.50	1 066	1 003
110.55	1 066	1 129
110.60	1 067	1 004
110.65	1 067	1 130
110.70	1 068	1 005
110.75	1 068	1 131
110.80	1 069	1 006
110.85	1 069	1 132
110.90	1 070	1 007
110.95	1 070	1 133
111.00	1 071	1 008
111.05	1 071	1 134
111.10	1 072	1 009
111.15	1 072	1 135
111.20	1 073	1 010
111.25	1 073	1 136
111.30	1 074	1 011
111.35	1 074	1 137
111.40	1 075	1 012
111.45	1 075	1 138
111.50	1 076	1 013
111.55	1 076	1 139
111.60	1 077	1 014
111.65	1 077	1 140
111.70	1 078	1 015
111.75	1 078	1 141
111.80	1 079	1 016
111.85	1 079	1 142
111.90	1 080	1 017
111.95	1 080	1 143
112.00	1 081	1 018
112.05	1 081	1 144
112.10	1 082	1 019
112.15	1 082	1 145
112.20	1 083	1 020
112.25	1 083	1 146
112.30	1 094	1 157
112.35	1 094	1 031
112.40	1 095	1 158
112.45	1 095	1 032
112.50	1 096	1 159
112.55	1 096	1 033
112.60	1 097	1 160
112.65	1 097	1 034
112.70	1 098	1 161
112.75	1 098	1 035
112.80	1 099	1 162
112.85	1 099	1 036
112.90	1 100	1 163
112.95	1 100	1 037
113.00	1 101	1 164
113.05	1 101	1 038
113.10	1 102	1 165
113.15	1 102	1 039
113.20	1 103	1 166
113.25	1 103	1 040
113.30	1 104	1 167
113.35	1 104	1 041
113.40	1 105	1 168
113.45	1 105	1 042
113.50	1 106	1 169
113.55	1 106	1 043

DME CHANNELING AND PAIRING—Continued

[In megahertz]

VHF channel	Airborne interrogating frequency	Ground reply frequency
113.60	1 107	1 170
113.65	1 107	1 044
113.70	1 108	1 171
113.75	1 108	1 045
113.80	1 109	1 172
113.85	1 109	1 046
113.90	1 110	1 173
113.95	1 110	1 047
114.00	1 111	1 174
114.05	1 111	1 048
114.10	1 112	1 175
114.15	1 112	1 049
114.20	1 113	1 176
114.25	1 113	1 050
114.30	1 114	1 177
114.35	1 114	1 051
114.40	1 115	1 178
114.45	1 115	1 052
114.50	1 116	1 179
114.55	1 116	1 053
114.60	1 117	1 180
114.65	1 117	1 054
114.70	1 118	1 181
114.75	1 118	1 055
114.80	1 119	1 182
114.85	1 119	1 056
114.90	1 120	1 183
114.95	1 120	1 057
115.00	1 121	1 184
115.05	1 121	1 058
115.10	1 122	1 185
115.15	1 122	1 059
115.20	1 123	1 186
115.25	1 123	1 060
115.30	1 124	1 187
115.35	1 124	1 061
115.40	1 125	1 188
115.45	1 125	1 062
115.50	1 126	1 189
115.55	1 126	1 063
115.60	1 127	1 190
115.65	1 127	1 064
115.70	1 128	1 191
115.75	1 128	1 065
115.80	1 129	1 192
115.85	1 129	1 066
115.90	1 130	1 193
115.95	1 130	1 067
116.00	1 131	1 194
116.05	1 131	1 068
116.10	1 132	1 195
116.15	1 132	1 069
116.20	1 133	1 196
116.25	1 133	1 070
116.30	1 134	1 197
116.35	1 134	1 071
116.40	1 135	1 198
116.45	1 135	1 072
116.50	1 136	1 199
116.55	1 136	1 073
116.60	1 137	1 200
116.65	1 137	1 074
116.70	1 138	1 201
116.75	1 138	1 075
116.80	1 138	1 202
116.85	1 139	1 076
116.90	1 140	1 203

DME CHANNELING AND PAIRING—Continued

[In megahertz]

VHF channel	Airborne interrogating frequency	Ground reply frequency
116.95	1 140	1 077
117.00	1 141	1 204
117.05	1 141	1 078
117.10	1 142	1 205
117.15	1 142	1 079
117.20	1 143	1 206
117.25	1 143	1 080
117.30	1 144	1 207
117.35	1 144	1 081
117.40	1 145	1 208
117.45	1 145	1 082
117.50	1 146	1 209
117.55	1 146	1 083
117.60	1 147	1 210
117.65	1 147	1 084
117.70	1 148	1 211
117.75	1 148	1 085
117.80	1 149	1 212
117.85	1 149	1 086
117.90	1 150	1 213
117.95	1 150	1 087

(2) *1300-1350 MHz:* The band 1300-1350 MHz is available to the aeronautical radionavigation service for ground-based radars.

(3) *1535-1660 MHz:* The use of this band shall be limited to the following functions:

1535-1557.5 MHz[1]—Transmissions from satellite-borne stations to stations in the aeronautical mobile (R) and maritime mobile services for communication and/or radiodetermination purposes, except that the band segment 1537.5-1557.5 MHz is available for maritime use only on a secondary basis and the band segment 1535-1537.5 MHz is available for aeronautical mobile (R) use only on a secondary basis. Transmissions from terrestrial aeronautical stations directly to aircraft stations in the aeronautical mobile (R) service are also permitted when such aeronautical stations are utilized to augment and/or interface with the satellite-to-aircraft links.

1557.5-1567.5 MHz[1]—Reception of glide path stations.

1567.5-1592.5 MHz—Airborne electronic aids to air navigation and any directly associated ground-based facilities.

[1]Frequencies so designated are available on a developmental basis only, pending further rule making and/or the results of the ITU Space WARC, 1971.

1592.5-1622.5 MHz[1, 2]—Aircraft collision avoidance systems.

1622.5-1637.5 MHz[2]—Airborne electronic aids to air navigation and any directly associated ground-based facilities.

1637.5-1660 MHz[1]—Transmissions from stations in the aeronautical mobile (R) and maritime mobile services to satellite-borne stations for communication and/or radiodetermination purposes, except that the band segment 1637.5-1657.5 MHz is available for maritime use only on a secondary basis and the band segment 1657.5-1660 MHz is available for aeronautical mobile (R) use only on a secondary basis. Transmissions from aircraft stations in the aeronautical (R) service directly to terrestrial aeronautical stations are also permitted when such aeronautical stations are utilized to augment and/or interface with the aircraft-to-satellite links.

(4) *2700-2900 MHz:* Non-Government land-based radars in the aeronautical radionavigation service may be authorized in the band 2700-2900 MHz, subject to the conclusion of appropriate arrangements between the Commission and the Government agencies concerned, and upon special showing of the need for the service which the Government is not yet prepared to render.

(5) *5000-5250 MHz:*[3] The band 5000-5250 MHz is for the use of ground-based facilities which are directly associated with airborne electronic aids to air navigation.

(6) *9000-9200 MHz:* The band 9000-9200 MHz is available to the aeronautical radionavigation service for ground-based radars. Operation in this band may be subject to receiving some degree of interference from stations operating in the radiolocation service.

(7) *14,000-14,400 MHz:* The band 14,000-14,400 MHz is available for use

[2]Radio altimeters are permitted to use the band 1600-1660 kHz only until such time as international standardization of other aeronautical radionavigation systems or devices requires the discontinuance of radio altimeters in this band. No new authorizations or applications for type acceptance of altimeters will be accepted.

[3]The band 5.0-5.25 GHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band.

should be given authority to serve a particular area; or where it appears that an applicant, either directly or indirectly, seeks to use more than 25 kHz of the available spectrum space in this band, the applications may be designated for hearing.

(8) Frequencies in this band may only be assigned to radiolocation stations which are also assigned frequencies in the 1605-1800 kHz band, provided the use of frequencies in this band is necessary for the proper functioning of the particular radiolocation system. Operations in this band are on a secondary basis to stations operating in accordance with the Commission's table of frequency allocations contained in § 2.106 of this chapter.

(9) This band is allocated to the radiolocation service on a secondary basis to other fixed or mobile services and most accept any harmful interference that may be experienced from such services or from the industrial, scientific, and medical (ISM) equipment. Operating in accordance with Part 18 of this chapter. In the 2483.5-2500 MHz band, no applications for new or modification to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, or on a subsequent date following as a result of submitting an application for license on or before July 25, 1985, are grandfathered and their operation is co-primary with the Radiodetermination Satellite Service.

(10) Speed measuring devices will not be authorized in this band.

(11) This frequency band is shared with and is on a secondary basis to the Maritime Radionavigation Stations (Part 80) and to the Government Radiolocation Service.

(12) This frequency band is shared with and is on a secondary basis to the Government Radiolocation Service.

(13) Operations in this band are limited to survey operations using transmitters with a peak power not to exceed 5 watts into the antenna.

(14) This frequency band is shared with and is on a secondary basis to the Aeronautical Radionavigation Service (Part 87) and to the Government Radiolocation Service.

(15) The non-Government Radiolocation Service in this band is secondary to the Maritime Radionavigation Stations (Part 80), the Aeronautical Radionavigation Service (Part 87) and the Government Radiolocation Service.

(16) This frequency band is shared with and is on a secondary basis to the Maritime Radionavigation Stations (Part 80) and the Government Meteorological Aids Service.

(17) Operation in this frequency band is on a secondary basis to airborne Doppler radars at 8800 MHz.

(18) Radiolocation installations will be coordinated with the Government Meteorological Aids Service, and insofar as practicable, will be adjusted to meet the needs of that service.

(19) Operations in this band are on a secondary basis to the Amateur Radio Service (Part 97). Pulsed emissions are prohibited.

(20) This band is restricted to radiolocation systems using type N0N emission with a power not to exceed 40 watts into the antenna.

(21) Non-Government radiolocation stations in the band are secondary to the Government Radiolocation Service, the Amateur Radio Service and the Amateur-Satellite Service. Pulse-ranging radiolocation stations in this band may be authorized along the shorelines of Alaska and the contiguous 48 states. Radiolocation stations using spread spectrum techniques may be authorized in the band 420-435 MHz for operation within the contiguous 48 states and Alaska. Also, stations using spread spectrum techniques shall be limited to a maximum output power of 50 watts, shall be subject to the applicable technical standards in § 90.209 until such time as more definitive standards are adopted by the Commission and shall identify in accordance with § 90.425(c)(3). Authorizations will be granted on a case-by-case basis; however, operations proposed to be located within the zones set forth in § 90.177(c) should not expect to be accommodated.

(22) For frequencies 2455, 10,525, and 24,125 MHz unmodulated continuous wave (AO) emission only shall be employed and a frequency stability of at least .2 percent shall be maintained.

Such stations shall be exempt from the requirements of §§ 90.403(c) and (f) and 90.429.

(23) Devices designed to operate as field disturbance sensors on frequencies between 2450 and 2500 MHz with a field strength equal to or less than 50,000 microvolts per meter at 30 meters, on a fundamental frequency, will not be licensed or type accepted for use under this part. Such equipment must comply with the requirements for field disturbance sensors as set forth in Subpart F of Part 15 of this chapter.

(24) Devices designed to operate as field disturbance sensors on frequencies between 10,500 and 10,550 MHz and between 24,050 and 24,250 MHz, with field strength equal to or less than 250,000 microvolts per meter at 30 meters, on the fundamental frequency, will not be licensed or type accepted for use under this part. Such equipment must comply with the requirements for field disturbance sensors as set forth in Subpart F of Part 15 of this chapter.

(25) Station assignments on frequencies in this band will be made subject to the conditions that the maximum output power shall not exceed 375 watts and the maximum authorized bandwidth shall not exceed 1.0 kHz.

(26) Each frequency assignment in this band is on an exclusive basis within the primary service area to which assigned. The primary service area is the area where the signal intensities are adequate for radiolocation purposes from all stations in the radiolocation system of which the station in question is a part; that is, the primary service area of the station coincides with the primary service area of the system. The normal minimum geographical separation between stations of different licensees shall be at lease 1200 mi. (1931 km.) when the stations are operated on the same frequency or on different frequencies separated by less than 1.0 kHz. Where geographical separation of less than 1200 mi. (1931 km.) is requested under these circumstances, it must be shown that the desired separation will result in a protection ratio of at least 20 decibels throughout the primary service area of other stations.

(27) Notwithstanding the bandwidth limitations otherwise set forth in this section of the rules, wideband systems desiring to operate in this band may use such bandwidth as is necessary for proper operation of the system provided that the field strength does not exceed 120 microvolts per meter per square root Hertz (120 uv/m/Hz½) at 1 mile. Such wideband operations shall be authorized on a secondary basis to stations operating within otherwise applicable technical standards. Applications for wideband systems in this band will be accepted beginning December 15, 1985.

(28) Since the 1605-1705 kHz band has been reallocated for AM broadcasting, no new assignments in the 1605-1705 kHz portion of this band shall be made after September 30, 1985.

(29) Beginning July 1, 1987, licensees of existing systems authorized frequencies in the 1605-1705 kHz portion of this band may request modification of their authorizations to change frequencies to the 1900-2000 kHz band.

(30) Until July 1, 1988, this band will be available only for licensees of existing systems operating in the 1605-1705 kHz portion of the 1605-1715 kHz band requesting modification of their authorizations to change frequencies to this band and for licensees of wideband systems. On July 1, 1988, requests for new station authorizations in this band will be accepted and, if necessary, will be subject to the random selection procedures outlined in § 1.972 of the Commission's Rules.

(d) *Additional frequencies for automatic vehicle monitoring (AVM) systems.* The frequency bands 903-904 MHz, 904-912 MHz, 918-926 MHz, and 926-927 MHz may be assigned for AVM operations in accordance with § 90.239 except that for corporations rendering service to others under paragraph (a)(2) of this section, such operations are limited to the 904-912 MHz and 918-926 MHz bands.

(e) *Other additional frequencies available.* Radiolocation stations in this service may be authorized, on request, to use frequencies allocated exclusively to Federal Government stations, in those instances where the Commission finds, after consultation

§ 90.257(a)(1). These frequencies are shared with other services and are available only in accordance with the provisions of § 90.257.

(17) Frequencies in this band will be assigned for low power wireless microphones in accordance with the provisions of § 90.265.

(18) Rules concerning the use of this band for narrowband operations are set forth in § 90.271.

(e) *Limitation on number of frequencies assignable.* Normally only one frequency, or pair of frequencies in the paired frequency mode of operation, will be assigned for mobile service operations by a single applicant in a given area. The assignment of an additional frequency or pair of frequencies will be made only upon a satisfactory showing of need, except that: (See also § 90.253.)

(1) The frequencies 27.235, 27.245, 27.255, 27.265, and 27.275 MHz are available in accordance with § 90.255.

(2) Frequencies in the 25-50 MHz, 150-170 MHz, and 450-512 MHz bands, and the frequency bands 903-904 MHz, 904-912 MHz 918-926 MHz, and 926-027 MHz may be assigned for the operation of Automatic Vehicle Monitoring (AVM) systems in accordance with § 90.239, notwithstanding this limitation.

(3) The frequency band 33.00-33.01 MHz may be used for developmental operation subject to the provisions of Subpart Q. Any type of emission other than pulsed emission may be used if the bandwidth occupied by the emission is contained within the assigned frequency band.

(Secs. 4(i) and 303(r), Communications Act of 1934, as amended, §§ 0.131 and 0.331 of the Commission's Rules and 5 U.S.C. 553 (b)(3)(B) and (d)(3); 47 U.S.C. 154(i) and 303)

[43 FR 54791, Nov. 22, 1978, as amended at 47 FR 39513, Sept. 8, 1982; 47 FR 41044, Sept. 16, 1982; 47 FR 50701, Nov. 9, 1982; 49 FR 20505, May 15, 1984; 49 FR 36377, Sept. 17, 1984; 50 FR 13605, Apr. 5, 1985; 50 FR 39110, Sept. 27, 1985; 50 FR 39680, Sept. 30, 1985; 50 FR 40976, Oct. 8, 1985]

Subpart F—Radiolocation Service

§ 90.101 Scope.

The Radiolocation Service accommodates the use of radio methods for determination of direction, distance, speed, or position for purposes other than navigation. Rules as to eligibility for licensing, permissible communications, frequency available, and any special requirements are set forth in the following section, except that the operation of Automatic Vehicle Monitoring (AVM) systems is governed by interim provisions set forth in § 90.239.

§ 90.103 Radiolocation Service.

(a) *Eligibility.* The following persons are eligible for authorizations in the Radiolocation Service to operate stations to determine distance, direction, speed, or position by means of radiolocation devices, for purposes other than navigation:

(1) Any person engaged in a commercial, industrial, scientific, educational, or local government activity

(2) A corporation or association that will furnish radiolocation service to other persons.

(3) A corporation that will furnish a nonprofit radio communication service to its parent corporation, to another subsidiary of the same parent, or to its own subsidiary where the party to be served is regularly engaged in any of the eligibility activities set forth in this paragraph.

(b) *Frequencies available.* The following table indicates frequencies available for assignment to stations in the Radiolocation Service, together with the class of station(s) to which they are normally assigned, and the specific assignment limitations, which are explained in paragraph (c) of this section:

Radiolocation Service Frequency Table

Frequency or band	Class of station(s)	Limitation
Kilohertz:		
70 to 90	Radiolocation land or mobile.	1
90 to 110	Radiolocation land	2
110 to 130	Radiolocation land or mobile.	1
1605 to 1715	do	4, 5, 6, 28, and 29.

Radiolocation Service Frequency Table— Continued

Frequency or band	Class of station(s)	Limitation
1715 to 1750	do	5, 6
1750 to 1800	do	5, 6, 7
1900 to 1950	do	6, 25, 26, 27, and 30.
1950 to 2000	do	6, 25, 27, and 30.
3230 to 3400	do	6, 8
Megahertz:		
420 to 450	do	21
2450 to 2500	do	9, 22, 23
2900 to 3100	do	10, 11
3100 to 3300	do	12
3300 to 3500	do	12, 13
3500 to 3700	do	12
5250 to 5350	do	12
5350 to 5460	do	10, 14
5460 to 5470	do	10, 15
5470 to 5600	do	10, 11
5600 to 5650	do	10, 16
8500 to 9000	do	12, 17
9000 to 9200	do	10, 14
9200 to 9300	do	12
9300 to 9500	do	10, 15, 18
9500 to 10,000	do	12
10,000 to 10,500	do	12, 13, 19
10,500 to 10,550	do	20, 22, 24
13,400 to 14,000	do	12
15,700 to 17,700	do	12
24,050 to 24,250	do	12, 22, 24
33,400 to 36,000	do	12

(c) Explanation of assignment limitations appearing in the frequency table of paragraph (b) of this section:

(1) This frequency band is shared with and stations operating in this frequency band in this service are on a secondary basis to stations licensed in the International Fixed Service and the Maritime Mobile Service.

(2) This frequency band is shared with and stations operating in this frequency band in this service are on a secondary basis to the LORAN Navigation System; all operations are limited to radiolocation lands stations in accordance with footnote US104, § 2.106 of this chapter.

(3) [Reserved]

(4) Non-Government radiolocation service in this band is on a secondary basis to stations in the Aeronautical Radionavigation Service operating on 1638 or 1798 kHz.

(5) Station assignments on frequencies in this band will be made subject to the conditions that the maximum output power shall not exceed 375 watts and the maximum authorized bandwidth shall not exceed 2 kHz.

(6) Because of the operation of stations having priority on the same or adjacent frequencies in this or in other countries, frequency assignments in this band may either be unavailable of may be subject to certain technical of operational limitations. Therefore, applications for frequency assignments in this band shall include information concerning the transmitter output power; the type and directional characteristics of the antenna and the minimum hours of operation (GMT).

(7) This band is shared with the Disaster Communications Service (Part 99) and operations are on a secondary basis to that service between local sunset and local sunrise, or at any time during an actual or imminent disaster. Local sunrise and sunset times shall be derived from the 1946 American Nautical Almanac. Each frequency assignment in this band is on an exclusive basis within the daytime primary service area to which assigned. The daytime primary service area is the area where the signal intensities are adequate for radiolocation purposes during the hours from sunrise to sunset from all stations in the radiolocation system of which the station in question is a part; that is, the primary service area of the station coincides with the primary service area of the system. The normal minimum geographical separation between stations of different licensees shall be at least 580 km. (360 mi.) when the stations are operated on the same frequency or on different frequencies separated by less than 3 kHz. Where geographical separation of less than 580 km. (360 mi.) is desired under these circumstances it must be shown that the desired separation will result in protection ratio of at least 20 decibels throughout the daytime primary service area of other stations. Applications in this band are placed on public notice in accordance with § 1.962 of this chapter. Where the number of applicants requesting authority to serve an area exceeds the number of frequencies available for assignment; or where it appears that fewer applicants or licensees than the number before it

Business Radio Service Frequency Table— Continued

Frequency or band	Class of station(s)	Limitations
469.800	do	1, 2, 26
469.825	do	1, 2, 26
469.850	do	1, 2, 26
469.875	do	1, 2, 26
469.900	do	1, 2, 26
469.925	do	1, 2, 26
469.950	do	1, 2, 26
469.975	do	1, 2, 26
470 to 512	Base or mobile	32
806 to 821	Mobile	33
851 to 866	Base or mobile	33
928 and above	Operational-fixed	34
929 to 930	Base only	42
1427 to 1435	Operational-fixed, base or mobile.	21
2450 to 2500	Base or mobile	24
10,550 to 10,680*	do	

* The frequencies in the band 10.55–10.68 GHz are available for Digital Termination Systems and for associated intermodal links in the Point-to-Point Microwave Radio Service. No new licenses will be issued under this subpart but current licenses will be renewed.

(c) Explanation of assignment limitations appearing in the frequency table of paragraph (b) of this section:

(1) Operation on this frequency is limited to a maximum output power of 110 watts.

(2) This frequency will be assigned only for operation in a permanent area, normally within 120 km (75 mi.) of a specified reference point.

(3) This frequency will be assigned only to stations used in itinerant operations, except within 35 miles (56 km.) of Detroit, Mich., where it may be assigned for either itinerant or permanent area operations (i.e., general use).

(4) Operation on this frequency is limited to a maximum output power of 2 watts; and each station authorized will be classified and licensed as a mobile station. Any units of such a station, however, may provide the operational functions of a base or fixed station on a secondary basis to mobile service operations, *Provided,* That the separation between the control point and the center of the radiating portion of the antenna of any units so used does not exceed 8 m (25 ft.).

(5) This frequency is also available in the Special Emergency Radio Service for low power paging use on a coequal basis.

(6) Operation on this frequency is limited to a maximum output power of 1 watt and each station authorized will be classified and licensed as a mobile station. Any units of such a station, however, may provide the operational functions of a base of fixed station on a secondary basis to mobile service operations, *Provided,* That the separation between the control point and the center of the radiating portion of the antenna of any units so used does not exceed 8 m (25 ft.).

(7) The frequencies available in the band 72–76 MHz are listed in § 90.257(a)(1). These frequencies are shared with other services and are available only in accordance with the provisions of § 90.257.

(8) Use of this frequency in this service in limited to stations located in Puerto Rico and the Virgin Islands.

(9) This frequency is shared with Taxicab Radio Service and is available for assignment in the Business Radio Service only to stations which are used exclusively in areas outside of Standard Metropolitan Statistical Areas of 50,000 or more population (1950 Census). Operations on this frequency are on a secondary basis to operations in the Taxicab Radio Service.

(10) This frequency is assigned only for one-way paging communications to mobile receivers. Only A1D, A2D, A3E, F1D, F2D, F3E, or G3E emissions may be authorized.

(11) This frequency is also available for base or mobile stations in the Special Industrial and Forest Products Radio Services on a secondary basis to paging operations in the Business Radio Service.

(12) This frequency will not be assigned to stations for use at temporary locations.

(13) This frequency may be used for mobile operation for radio remote control and telemetering functions. A1D, A2D, F1D, or F2D emission may be authorized and mobile stations used to control remote objects or devices may be operated on the continuous carrier transmit mode.

(14) This frequency may be used for mobile operation for remote control and telemetering functions. A1D, A2D, F1D, or F2D emission may be authorized. The use of the continuous carrier transmit mode for these purposes is permitted only for stations authorized

§ 90.259 Assignment and use of frequencies in the bands 216–220 MHz and 1427–1435 MHz.

Frequencies in the bands 216–220 MHz and 1427–1435 MHz may be assigned to applicants under this part provided the band is listed in the individual radio service under which they establish eligibility. Use of these bands is limited to telemetering purposes only and all operation is secondary to Federal Government operations. Base stations authorized in this band shall be used to perform telecommand functions with associated mobile telemetering stations. Base stations may also command actions by the vehicle itself, but will not be authorized solely to perform this function. Airborne use will not be authorized. Each application will be coordinated with the Federal Government by the Federal Communications Commission and is subject to such technical and operational limitations as may be imposed by the government. Each application should include precise information concerning emission characteristics, transmitter frequency deviation, output power, type and directional characteristics, if any, of the antenna, and the minimum necessary hours of operation.

§ 90.261 Assignment and use of frequencies in the band 450–470 MHz for fixed operations.

The following frequencies may be assigned for fixed operations, on a secondary basis to land mobile operations, to eligibles in the services indicated. All such use of these frequencies for fixed systems is limited to locations 85 or more miles (136.79 or more km.) from the center of any urbanized area of 600,000 or more population except that the distance may be 65 miles (104.6 km.), if the output power does not exceed 20 watts. All such fixed systems are limited to a maximum of two frequencies and must employ directional antennas with a front-to-back ratio of at least 15 dB, except that omnidirectional antennas having unity gain may be employed for stations communicating with a minimum of three receiving locations encompassed in a sector of at least 160° in azimuth. For two-frequency systems, the separation between transmit-receive frequencies is 5 MHz. Fixed stations located more than 136 km. (85 miles) from the center of urbanized areas of 600,000 or more population and operating on frequencies no longer available for that use may continue indefinitely until such time as modification involving addition of new facilities is proposed. Such use is, however, on a secondary basis to land mobile operations and harmful interference may not be caused to land mobile stations. The centers of urbanized areas are determined from the appendix, page 226, of the U.S. Commerce publication "Air Line Distance Between Cities in the United States." Urbanized areas of 600,000 or more population are defined in the U.S. Census of Population 1970, Vol. 1, table 20, pages 1-74.

(a) The following frequencies may be assigned to fixed stations in the Public Safety and Special Emergency Radio Services, on a secondary basis to land mobile operations in the Industrial (except Business) and Land Transportation Radio Services.

Frequencies MHz: 451.025, 451.050, 451.075, 451.100, 451.125, 451.150, 451.175, 451.200, 451.225, 451.250, 451.275, 451.300, 451.325, 451.350, 451.375, 451.400, 451.425, 451.450, 451.475, 451.500, 451.525, 451.550, 451.575, 451.600, 451.625, 451.650, 451.675, 451.700, 451.725, 451.750, 451.775, 451.825, 451.850, 451.875, 451.900, 451.925, 451.950, 451.975, 452.000, 452.025, 452.050, 452.075, 452.100, 452.125, 452.150, 452.175, 452.200, 452.225, 452.250, 452.275, 452.300, 452.325, 452.350, 452.375, 452.400, 452.425, 452.450, 452.475, 452.500, 452.625, 452.650, 452.675, 452.700, 452.725, 452.750, 452.775, 452.800, 452.825, 452.850, 452.875, 452.900, 452.975, 453.000, 456.025, 456.050, 456.075, 456.100, 456.125, 456.150, 456.175, 456.200, 456.225, 456.250, 456.275, 456.300, 456.325, 456.350, 456.375, 456.400, 456.425, 456.450, 456.475, 456.500, 456.525, 456.550, 456.575, 456.600, 456.625, 456.650, 456.675, 456.700, 456.725, 456.750, 456.775, 456.825, 456.850, 456.875, 456.900, 456.925, 456.950, 456.975, 457.000, 457.025, 457.050, 457.075, 457.100, 457.125, 457.150, 457.175, 457.200, 457.225, 457.250, 457.275, 457.300, 457.325, 457.350, 457.375, 457.400, 457.425, 457.450, 457.475, 457.500, 457.625, 457.650, 457.675, 457.700, 457.725, 457.750, 457.775, 457.800, 457.825, 457.850, 457.875, 457.900, 457.975, 458.000, 462.200, 462.225, 462.250, 462.275, 462.300, 462.325, 462.350, 462.375, 462.400, 462.425, 462.450, 462.475, 462.500, 462.525, 467.200, 467.225, 467.250, 467.275, 467.300, 467.325, 467.350,

467.375, 467.400, 467.425, 467.500, 467.525.

(b) The following be assigned to fixed s dustrial Radio Servic ness) on a secondar mobile operations Safety, Special Emer Transportation Radio

Frequencies MHz:
452.150, 452.200, 452.22
452.300, 452.325, 452.35
452.425, 452.450, 452.47
452.650, 452.675, 452.70
452.775, 452.800, 452.82
452.900, 457.050, 457.10
453.225, 453.250, 453.27
453.350, 453.375, 453.40
453.475, 453.500, 453.52
453.600, 453.625, 453.65
453.725, 453.750, 453.77
453.850, 453.875, 453.90
453.975, 457.050, 457.10
457.225, 457.250, 457.27
457.350, 457.375, 457.40
457.475, 457.500, 457.52
457.600, 457.625, 457.65
457.725, 457.750, 457.77
457.850, 457.875, 457.90
458.150, 458.200, 458.22
458.300, 458.325, 458.35
458.425, 458.450, 458.47
458.550, 458.575, 458.60
458.675, 458.700, 458.72
458.800, 458.825, 458.85
458.925, 458.950, 458.97
460.075, 460.100, 460.12
460.200, 460.225, 460.25
460.325, 460.350, 460.37
460.450, 460.475, 460.50
460.575, 460.600, 460.62
465.075, 465.100, 465.12
465.200, 465.225, 465.25
465.325, 465.350, 465.37
465.450, 465.475, 465.50
465.575, 465.600, 465.625.

(c) The following fr assigned to fixed stat Transportation Radi secondary basis to l ations in the Public S trial (except Business

451.025, 451.050, 451.0
451.150, 451.175, 451.20
451.275, 451.300, 451.32
451.400, 451.425, 451.45
451.525, 451.550, 451.57
451.650, 451.675, 451.70
451.775, 451.825, 451.85
451.925, 451.950, 451.97
452.075, 452.125, 452.17
453.050, 453.100, 453.15
453.250, 453.275, 453.30

ownership or control of the authorized radio facilities; or,

(2) The assignment or transfer is involuntary due to the licensee's bankruptcy or death.

[50 FR 13352, Apr. 4, 1985]

§ 94.49 Report of temporary location.

The Engineer in Charge of each radio district wherein temporary operation by an operational fixed station is authorized shall be notified of such inter-district operating authority only at such time as the initial or modified authorization for such operation is granted by the Commission. (See § 0.121 of this chapter for description of Radio District boundaries and for addresses of Engineers in Charge.)

§ 94.51 Time in which station must be in operation.

(a) The station authorized must be in operation within 12 months from the date of grant or the authorization cancels automatically and must be returned to the Commission. Requests for extension may be granted upon a showing of good cause, setting forth in detail the applicant's reasons for failure to have the facility operating in the prescribed 12-month period. Such requests must be submitted no later than 30 days prior to the end of the 12-month period to the Commission's offices in Gettysburg, Pennsylvania and shall be addressed to: Federal Communications Commission, Gettysburg, Pennsylvania 17325. Stations authorized under § 94.93 must be in operation within 36 months from the date of grant or the authorization cancels automatically and must be returned to the Commission.

(b) Pursuant to § 94.187, Extended network stations in Digital Termination Systems have 60 months from date of grant to complete construction; Limited network stations have 30 months from date of grant to complete construction. For these stations, construction must be completed and the stations be ready for operation in the specified number of months or the authorizations cancel automatically and must be returned to the Commission.

[51 FR 2704, Jan. 21, 1986; 51 FR 4596, Feb. 6, 1986]

§ 94.53 Discontinuance of station operation.

In case of permanent discontinuance of a station licensed under this part, the licensee shall forward the station license to the Federal Communications Commission, Gettysburg, Pennsylvania 17325, for cancellation. For purposes of this section, any station which has not operated for one year or more is considered to have been permanently discontinued.

[49 FR 36378, Sept. 17, 1984]

§ 94.57 Continued operation subsequent to modification.

Operation in accordance with the provisions of an authorization which has been modified may be continued until such modifications can be implemented, *provided* that the provisions of §§ 94.51 and 94.53 are met.

Subpart C—Technical Standards

§ 94.61 Applicability.

(a) The technical standards of this subpart shall govern the issuance of authorizations for new stations and changes in authorized stations as specified in § 94.45. Except as provided for in § 94.65, licensees of transmitting equipment (including antennas) authorized prior to July 1, 1976, including their successors or assigns in business, will be permitted to utilize such equipment, in accordance with the standards indicated in § 94.92, provided that the operation of this equipment does not cause interference in excess of the levels specified in § 94.63 to another operational-fixed station or, in the 12,200-12,700 MHz band, to a direct broadcast satellite system. In case of such interference, the licensee of the non-conforming equipment may be required to install equipment which fully conforms to the technical standards of this subpart.

(b) Frequencies in the following bands are available for assignment to stations in the Private Operational-Fixed Service:

Frequency Band (MHz)	
928-929	(19) and (20).
952 to 960	(1) and (20).
1850 to 1990	(2) and (15).
2130 to 2150	(2) and (21).
2150 to 2160	(3).
2180 to 2200	(2) and (21).
2450 to 2500	(4) and (21).
2500 to 2690	(5) and (22).
6525 to 6575	(15) (28)
6575 to 6625	(2) (15) (28)
6625 to 6875	(2) (8) (15) (28)
10,550 to 10,680	(24)
12,200 to 12,500	(2) (21) (25)
12,500 to 12,700	(2) (6) (21) (25)
12,700 to 13,200	(26)
13,200 to 13,250	(9) (14) (21)
17700 to 18580	(6) (8) (10) (21) (27).
18580 to 18820	(10) (17) (21).
18820 to 18920	(21) (24).
18920 to 19160	(10) (17) (21).
19160 to 19260	(21) (24).
19260 to 19700	(10) (21) (27).
21,200 to 22,000	(10), (11), (12), (13) and (23).
22,000 to 23,600	(10), (12), (13) and (23).
31,000 to 31,300	(23), (29).
38,600 to 40,000	(9), (18) and (23).
Bands above 40,000	(16) and (23).

[1] Frequencies in this band are shared with stations in the International Fixed (in Puerto Rico and the Virgin Islands) and International Control Services. (Part 23)

[2] Frequencies in this band are shared with stations in the International Control Service. (Part 23)

[3] Frequencies in this band are shared with stations in the Multipoint Distribution Service (Part 21). These frequencies may be used for the transmission of the licensee's products and information services, excluding video entertainment material, to the licensee's customers.

[4] Frequencies in this band are shared with mobile and radiolocation stations in other services, and must accept harmful interference that may be experienced from operations of industrial, scientific, or medical (ISM) equipment operating on 2450 MHz. In the 2483.5-2500 MHz band, no applications for new stations or modifications to existing stations to increase the number of transmitters will be accepted. Existing licensees as of July 25, 1985, or on a subsequent date following as a result of submitting an application for license on or before July 25, 1985, are grandfathered and their operation is co-primary with the radiodetermination Satellite Service. However, all grandfathered temporary fixed licensees are required to notify directly each Radiodetermination Satellite Service licensee concerning present and proposed locations of operation.

[5] Frequencies in this band are shared with earth stations in the Fixed Satellite Service (Part 25), space stations in the Broadcasting Satellite Service (Part 25), and with stations in the Instructional Television Fixed Service (ITFS) (Part 74). Stations licensed under Part 94 are restricted to the three group H channels, 2650-2656 MHz, 2662-2668 MHz and 2674-2680 MHz; and the three response frequencies, 2686.9375, 2687.9375, and 2688.9375 MHz.

[6] Frequencies in this band are shared with Earth (Earth-to-space) stations in the Fixed Satellite Service. (Part 25)

[7] [Reserved]

[8] Frequencies in this band are shared with space (space-to-Earth) stations in the Fixed Satellite Service. (Part 25)

[9] This band is shared with fixed and mobile station operations authorized under other services.

[10] Frequencies in this band are shared with fixed stations in the Domestic Public Radio Services. (Part 21)

[11] Frequencies in this band are shared with space (space-to-Earth) stations in the Earth Exploration Satellite Service. (Part 25)

[12] Authorizations are normally granted only to common carriers (Part 21) in the band segments 21.2-21.8 GHz and 22.4-23.00 GHz, and to operational-fixed users (Part 94) in the segments 21.8-22.4 GHz and 23.0-23.6 GHz. Cross-service assignments for these users may be made only upon a showing that no interference-free frequencies are available in the appropriate band segments. Frequencies in the 21.8-22.0 GHz and 23.0-23.2 GHz band segments may be authorized to operational fixed users under the provisions of § 94.91.

[13] This frequency band is shared with U.S. Government Stations.

[14] Frequencies in this band are shared with stations in the Television Auxiliary Broadcast Service (Part 74), the Local Television Transmission Service (Part 21) and the Point-to-Point Microwave Service (Part 21).

[15] This band is not available to: (i) Persons whose sole basis for eligibility in the Private Operational-Fixed Microwave Service is established under § 90.75(a)(1) relating to the Business Radio Service (Part 90), except when they are sharing a system authorized to an eligible entity, and (ii) persons seeking to establish systems solely to provide private carrier communications service to other entities eligible under Part 94. Persons and entities eligible for this band may use these frequencies for the point-to-point transmission of their products and information service, excluding video entertainment material, to their customers.

[16] Available on developmental basis only under Subpart E of this part.

[17] Frequencies in this band are shared with (1) DTS internodal links, Point-to-Point Microwave Service stations and point-to-point return radio links for MDS stations under Part 21 rules and (2) aural broadcasts STL and intercity relay stations under Part 74 rules.

[18] These frequencies are assigned for use within a rectangular service area to be described in the application by the maximum and minimum latitudes and longitudes. Such service area shall be as small as practicable consistent with the local service requirements of the user. The use of these frequencies is subject to the terms and conditions set forth in § 21.711. These frequencies shall be assigned only where it is shown that the applicant will have a reasonable projected requirement for a multiplicity of service points or transmission paths within the area.

[19] Frequencies in this band are paired with the band of 952-953 MHz and are limited for use by multiple address remote stations.

[20] The frequencies in this band which are allocated for Part 94 multiple address systems are available for point-to-multipoint transmission of the licensee's products and information services, excluding video entertainment material, to the licensee's customers. Other frequencies in this band are available for the point-to-point transmission of the licensee's products and information services, excluding video entertainment material, to the licensee's customers.

[21] This band is available for radio systems to be used for the point-to-point transmission of the licensee's products and information services, excluding video entertainment material, to the licensee's customers.

[22] This band is available for radio systems to be used for the point-to-multipoint transmission of the licensee's products and information services to the licensee's customers. However, this band may not be used for the distribution of video entertainment material prior to August 1, 1985.

[23] This band is available for radio systems to be used for the point-to-point transmission of the licensee's program material or services to the licensee's customers.

[24] Frequencies in this band are shared with the Common Carrier services for Digital Termination Systems. The channelization of this band is indicated in § 94.189.

[25] Frequencies in this band have been allocated to the Direct Broadcast Service and are authorized for Operational Fixed use only pursuant to § 94.93.

[26] Frequencies in this band are only available for applications filed pursuant to § 94.93.

[27] Frequencies in this band are shared with Broadcast Auxiliary, and Cable Television Relay services.

[28] This band is also available for applications filed pursuant to § 94.93.

[29] Frequencies in this band are co-equally shared with stations in the Domestic Public Fixed (Part 21), Auxiliary Broadcasting (Part 74), Cable Television Relay (Part 78) and General Mobile Radio (Part 95) Services.

(Secs. 4, 303, 48 Stat., as amended, 1066, 1082, 1083 (47 U.S.C. 154, 303, 307); secs. 4(i), 301 and 303(r), Federal Communications Act of 1934, as amended, 47 U.S.C. 4(i), 301 and 303(r))

equipment which fully conforms to the technical standards of this subpart. In such cases, if the engineering analysis performed in accordance with § 94.15(b) demonstrates that (1) the conforming station would receive interference from a non-conforming station in excess of the levels specified in this section and (2) the interference would be eliminated if the non-conforming equipment were replaced with equipment which complies with the standards of this subpart, the licensee (or prospective licensee) of the station which would receive interference shall provide written notice of the potential interference to both the non-conforming licensee and the Commission's office in Gettysburg, PA. The non-conforming licensee shall make all required equipment changes within 180 days from the date of official Commission notice informing the licensee that it must upgrade its equipment, unless an alternative solution has been agreed to by all parties involved in the interference situation. If a non-conforming licensee fails to make all required changes within the specified period of time, the Commission may require the licensee to suspend operation until the changes are completed.

(Secs. 4, 303, 48 Stat., as amended, 1066, 1082, 1083 (47 U.S.C. 154, 303, 307); secs. 4(i), 301 and 303(r), Federal Communications Act of 1934, as amended, 47 U.S.C. 4(i), 301 and 303(r))

[40 FR 20928, May 13, 1975, as amended at 43 FR 1625, Jan. 11, 1978; 45 FR 55733, Aug. 21, 1980; 46 FR 9954, Jan. 30, 1981; 48 FR 1501, Jan. 13, 1983; 49 FR 36378, Sept. 17, 1984; 49 FR 37780, Sept. 26, 1984; 50 FR 7344, Feb. 22, 1985; 51 FR 2704, Jan. 21, 1986; 51 FR 4596, Feb. 6, 1986]

§ 94.65 Frequencies.

Frequencies normally available for assignment in this service are set forth with applicable limitations in the following tables, except that licensees holding valid authorizations prior to August 1, 1975 which do not meet the provisions of this section may continue to be authorized indefinitely:

(a) 928-929 and 952-960 MHz.

(1) 25 kHz maximum bandwidth.[1] Persons licensed on these frequencies as of January 1, 1981, may continue to operate as licensed until January 1, 1991.

PAIRED FREQUENCIES (MHz)

Remote transmit	Master transmit
928.0125	[2] [6] 952.0125
928.0375	[2] [6] 952.0375
928.0625	[2] [6] 952.0625
928.0875	[2] [6] 952.0875
928.1125	[2] [6] 952.1125
928.1375	[2] [6] 952.1375
928.1625	[2] [6] 952.1625
928.1875	[2] [6] 952.1875
928.2125	[2] [6] 952.2125
928.2375	[2] [6] 952.2375
928.2625	[2] [6] 952.2625
928.2875	[2] [6] 952.2875
928.3125	[2] [6] 952.3125
928.3375	[2] [6] 952.3375
928.3625	[3] [6] 952.3625
928.3875	[3] [6] 952.3875
928.4125	[3] [6] 952.4125
928.4375	[3] [6] 952.4375
928.4625	[3] [6] 952.4625
928.4875	[3] [6] 952.4875
928.5125	[3] [6] 952.5125
928.5375	[3] [6] 952.5375
928.5625	[3] [6] 952.5625
928.5875	[3] [6] 952.5875
928.6125	[3] [6] 952.6125
928.6375	[3] [6] 952.6375
928.6625	[3] [6] 952.6625
928.6875	[3] [6] 952.6875
928.7125	[3] [6] 952.7125
928.7375	[3] [6] 952.7375
928.7625	[3] [6] 952.7625
928.7875	[3] [6] 952.7875
928.8125	[3] [6] 952.8125
928.8375	[3] [6] 952.8375

UNPAIRED FREQUENCIES (MHz)

[4] 928.8625	[2] [5] [6] 956.2625	[4] 959.8625
[4] 928.8875	[2] [5] [6] 956.2875	[4] 959.8875
[4] 928.9125	[2] [5] [6] 956.3125	[4] 959.9125
[4] 928.9375	[2] [5] [6] 956.3375	[4] 959.9375
[4] 928.9625	[2] [5] [6] 956.3625	[4] 959.9625
[4] 928.9875	[2] [5] [6] 956.3875	[4] 959.9875
	[2] [5] [6] 956.4125	
	[2] [5] [6] 956.4375	

[1] When required, upon justification, two adjacent channels may be assigned to provide a 50 kHz bandwidth. However, the system will still be required to use equipment which meets the ±.00015 percent tolerance requirement (see § 94.67(a)).

[2] Available to all persons eligible under Part 94 for use in multiple address radio systems. Available to the Power Radio Service only if the frequencies in footnote 3 are exhausted in a particular geographic area. Available for shared use by Part 22 Domestic Public Land Mobile Radio Service users after January 1, 1987, only if frequencies noted in footnote 4 are exhausted in a particular geographic area.

[3] Available only to persons eligible under § 90.63 for licensing in the Power Radio Service for use in multiple address electric, gas, water, or steam utility system operation.

[4] Available for Part 22 Domestic Public Land Mobile Radio Service users. Available for shared use by Part 94 users after January 1, 1987, only if the frequencies noted in footnote 2 are exhausted in a particular geographic area. These frequencies may be assigned for paired or unpaired multiple address system use in one-way or two-way systems. If paired, the lower frequency shall be for the remote unit use. Applications for these frequencies shall be subject to the conditions outlined in § 22.27 of this chapter.

[5] Available to all persons eligible under Part 94 for single frequency multiple address systems utilizing one-way or two-way fixed operations. Also available to all persons eligible under Part 94 for single frequency multiple address systems utilizing one-way or two-way mobile operations on a secondary basis.

[6] Available for radio systems to be used for the point-to-multipoint transmission of the licensee's products or services, excluding video entertainment material, to the licensee's customers.

(2) 50 kHz maximum bandwidth.

Paired Frequencies

Transmit (or receive)	Receive (or transmit)
956.65	953.05
956.75	953.15
956.85	953.25
956.95	953.35
957.05	953.45
957.25	953.65
957.35	953.75
957.45	953.85
957.65	954.05
957.75	954.15
957.85	954.25
958.05	954.45
958.15	954.55
958.25	954.65
958.45	954.85
958.55	954.95
958.65	955.05
958.85	955.25
958.95	955.35
959.05	955.45
959.25	955.65
959.35	955.75
959.45	955.85
959.55	955.95
959.65	956.05

(3) 100 kHz maximum bandwidth.

Paired Frequencies

Transmit (or receive)	Receive (or transmit)
956.6	953.0
956.7	953.1
956.8	953.2
956.9	953.3
957.0	953.4
957.1	953.5
957.2	953.6
957.3	953.7
957.4	953.8
957.5	953.9
957.6	954.0
957.7	954.1
957.8	954.2
957.9	954.3
958.0	954.4
958.1	954.5
958.2	954.6
958.3	954.7
958.4	954.8
958.5	954.9
958.6	955.0

Paired Frequencies—Continued

Transmit (or receive)	Receive (or transmit)
958.7	955.1
958.8	955.2
958.9	955.3
959.0	955.4
959.1	955.5
959.2	955.6
959.3	955.7
959.4	955.8
959.5	955.9
959.6	956.0
959.7	956.1

(4) 200 kHz maximum bandwidth.

Paired Frequencies

Transmit (or receive)	Receive (or transmit)
957.15	953.55
957.55	953.95
957.95	954.35
958.35	954.75
958.75	955.15
959.15	955.55

(b) *1850-1990 MHz.*

(1) 10 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (or receive)	Receive (or transmit)
1855	1935
1865	1945
1875	1955
1885	1965
1895	1975
1905	1985

UNPAIRED FREQUENCIES

[1] 1915
[1] 1925

[1] Available for systems employing one-way transmission.

(2) 5 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (or receive)	Receive (or transmit)
1860	1940
1870	1950
1880	1960
1890	1970

PAIRED FREQUENCIES—Continued

Transmit (or receive)	Receive (or transmit)
1900	1980

(c) *2130-2150 MHz; 2180-2200 MHz.* 800 kHz maximum bandwidth, unless noted.

PAIRED FREQUENCIES

2130-2150 MHz Transmit (or receive)	2180-2200 MHz Receive (or transmit)
2130.8	2180.8
2131.6	[1] 2181.6
2132.4	2182.4
2133.2	[1] 2183.2
2134.0	2184.0
2134.8	[1] 2184.8
2135.6	2185.6
2136.4	[1] 2186.4
2137.2	2187.2
2138.0	[1] 2188.0
2138.8	2188.8
2139.6	[1] 2189.6
2140.4	2190.4
2141.2	[1] 2191.2
2142.0	2192.0
2142.8	[1] 2192.8
2143.6	2193.6
2144.4	[1] 2194.4
2145.2	2195.2
2146.0	[1] 2196.0
2146.8	2196.8
2147.6	[1] 2197.6
2148.4	2198.4
2149.2	2199.2

[1] Consideration will be given on a case-by-case basis to assigning these frequency pairs to systems employing 1600 kHz bandwidth transmissions.

(d) *2150-2160 MHz:* Specific frequency of operation to be set forth in authorization. Omnidirectional transmission only may be authorized, subject to providing protection from harmful interference to previously authorized stations in this service and in other services sharing this band.

(e) *2450-2500* MHz: This band is shared with base, mobile, and radiolocation stations, and is subject to no protection from interference from Industrial, Scientific and Medical devices operating on 2450 MHz.

800 kHz maximum bandwidth, unless noted.

PAIRED FREQUENCIES

Transmit (or receive)	Receive (or transmit)
2451.9	2476.3
2452.7	2477.1
2453.5	2477.9
2454.3	2478.7
2455.1	[1] 2479.5
2455.9	2480.3
2456.7	2481.1
2457.5	2481.9
2458.3	2482.7
2459.1	2483.5
2459.9	2484.3
2460.7	2485.1
2461.5	2485.9
2462.3	2486.7
2463.1	[1] 2487.5
2463.9	2488.3
2464.7	2489.1
2465.5	2489.9
2466.3	2490.7
2467.1	2491.5
2467.9	2492.3
2468.7	2493.1
2469.5	2493.9
2470.3	2494.7
2471.1	[1] 2495.5
2471.9	2496.3
2472.7	2497.1
2473.5	2497.9
2474.3	2498.7
2475.1	2499.5

[1] Consideration will be given on a case-by-case basis to assigning these frequency pairs to systems employing wideband (8.0 MHz) transmissions.

(f) *2500-2690 MHz:* Operational-fixed stations may be authorized to operate in this band on the specific channels indicated below:

FREQUENCIES (MHz)

2650-2656 [1]
2662-2668 [1]
2674-2680 [1]
2686.9375 [1] [2]
2687.9375 [1] [2]
2688.9375 [1] [2]

Such assignments are subject to the condition that all stations licensed on these channels must comply with the technical standards set forth in § 94.65. Operational-fixed stations authorized in this band as of July 16, 1971, which do not comply with the above provisions may continue to operate on the frequencies assigned on a coequal basis with other stations operating in accordance with the Table of Frequency allocations. Requests for subsequent license renewals or modifications for such stations will be considered. However, expansion of systems comprised of such stations will not be permitted, except on frequencies allocated under this part.

[1] Pursuant to § 94.69, stations licensed on these channels may employ any type of emission consistent with efficient use of the spectrum and good engineering practice, except that Type B, damped-wave emission will not be authorized.

[2] Response frequencies: When authorized, they may be paired respectively with the Channels 2650-2656, 2662-2668, and 2674-2680 MHz.

(g) *6525-6875 MHz.*

(1) 10 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (or receive)	Receive (or transmit)
6545 [1]	[1] 6715
6555 [1]	[1] 6725
6565	6735
6585	6745
6595	6755
6605	6765
6615	6775
6625	6785
6635	6795
6645	6805
6655	6815
6665	6825
6675	6835
6685	6845
6695	6855
6705	6865
6535 [2]	[2] 6575

[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 § 94.63(a) does not apply to this frequency pair.

(2) 5 MHz maximum bandwidth.

PAIRED FREQUENCIES

Transmit (or receive)	Receive (or transmit)
6550.0	6730.0
6560.0	6740.0
6590.0	6750.0
6600.0	6760.0
6610.0	6770.0
6620.0	6780.0
6630.0	6790.0
6640.0	6800.0
6650.0	6810.0
6660.0	6820.0
6670.0	68.30
6680.0	6840.0
6690.0	6850.0
6700.0	6860.0
6710.0	[1] 6870.0

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

UNPAIRED FREQUENCIES

6720 [2]

[2] This frequency may be assigned for unpaired use.

(h) *12,200-12,700 MHz:* The Commission has allocated the 12.2-12.7 GHz band for use by the broadcasting-satellite service. Operational-fixed stations authorized after September 9, 1983 shall be licensed on a noninterference basis and shall be required to make any and all adjustments necessary to prevent interference to operating domestic broadcasting-satellite systems. (Section 94.93 contains special provisions for stations authorized in the band on or before September 9, 1983). Notwithstanding any other provisions, no operational-fixed stations shall be permitted to cause interference to broadcasting-satellite stations of other countries operating in accordance with the Region 2 plan for the broadcasting-satellite service established at the 1983 RARC.

(i) *10,550-10,680 MHz.* (1) 2.5 MHz maximum authorized bandwidth channels, 65 MHz separation:

Transmit (receive) (MHz)	Receive (transmit) (MHz)
10551.25	10616.25
10553.75	10618.75
10556.25	10621.25
10558.75	10623.75

(2) 1.25 MHz maximum authorized bandwidth channels, 65 MHz separation:

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

(j) *17700-19700 MHz.* (Note, however, that stations authorized as of September 9, 1983 to use frequencies in the band 17.7-19.7 GHz may, upon proper application, continue to be authorized for such operations.)

SYSTEM PLAN
WIRELESS LAN--BUS MODE, 1 MBS
SPREAD SPECTRUM, 2400-2483.5 MHZ, 1.6 MBS WITH BCH (31,21) FEC

OVERVIEW

This plan explores a possible integrated voice-data wireless LAN operating with spread spectrum modulation under FCC Rule 15.126 with a transmission capacity of 1.6 Mbs in the medium which, when allocated between data, forward error correcting coding and losses from propagation and processing time, yields a 1 Mbs channel. The system plan includes special measures for avoidance of excessive degradation from time dispersion and cochannel interference from frequency reuse.

The system concept is based on the use of low power transmitters, short distance propagation paths and multi-site "macro" diversity with fixed radio sites located on a continuous grid of square cells 140 meters/460 feet on a side. The indicated transmitter power requirement is 2 milliwatts with 24 dB margin.

The LAN protocols served are limited to Bus mode and then to a 1 Mbs transmission capacity with a Token Passing Protocol. There may be non-optimum possibility for using CSMA/CD.

Table of Contents Page

CHANDOS A. RYPINSKI - 130 STEWART DRIVE - TIBURON, CA 94920 - TEL: 415 435 0642