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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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In the Matter of	)	
	)	
Amendment of Subpart T of	)	
Part 90 of the	)	
Commission's Rules to	)	FCC File No.
Revise the Allocation of	)	
Channels in the Band	)	
220-222 MHz	)	

PETITION FOR RULE MAKING

Fred Daniel d/b/a Orion Telecom (Orion) respectfully requests that the Commission amend Subpart T of Part 90 of its Rules to revise the allocation of channels in the 220-222 MHz band. In support of its position, Orion shows the following.

The Commission's allocation of channels in the 220-222 MHz band should be revised to provide a greater potential for more efficient use of the spectrum by trunked system operators. Although well intentioned in light of the information available to it at the time, the Commission's allocation of channels to frequency blocks at intervals of 150 kHz will not make optimum use of rapidly developing radio communications technology. Adjustment of the table at Rule Section 90.721 to allocate channels for each Trunked Channel Group which are adjacent to one another, rather than isolated from one another.

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List A B C D E

Section 332 of the Communications Act of 1934, as amended, provides, in relevant part that

> in taking actions to manage the spectrum to be made available for use by the private land mobile services, the Commission shall consider whether such actions will improve the efficiency of spectrum use and reduce the regulatory burden upon spectrum users, based upon sound engineering principles, user operational requirements, and marketplace demands.

The Commission is presented with few opportunities which will simultaneously improve the efficiency of spectrum use and reduce the burden upon spectrum users. The rule amendment which Orion suggests should do both, at no additional administrative cost to the Commission.

When the Commission initially allocated the channels nearly two years ago, it was clearly contemplating the use of Amplitude Compandered Single sideBand (ACSB) technology. Orion's suggestion is not intended to criticize ACSB technology or to obstruct its use in any way. However, since the time that the Commission initially considered how to allocate the band, new digital technology has been developed and is ready to be placed in service which promises that an even higher degree of spectrum efficiency can be had.

Most Private Land Mobile Radio Services licenses authorize the use of a bandwidth of 20 kHz, and most primary use channels are allocated at intervals of 25 kHz. Materials filed with the

Commission by Fleet Call, Inc. indicate that Motorola, Inc. has developed digital voice equipment which can provide six times as many voice channels in the same bandwidth as a single frequency modulation (FM) voice channel. Through its subsidiary, SMART SMR, Inc., Fleet Call has indicated that it intends to use such highly efficient equipment for its Enhanced Specialized Mobile Radio Systems. Other manufacturers have indicated that they are developing competing digital voice equipment with at least as great an enhancement of spectrum efficiency.

The Commission's current allocation of channels which are 5 kHz wide, and which are spaced at intervals of 150 kHz, would seem to provide five times the spectrum efficiency of one 25 kHz wide channel. However, were the Commission to restructure the 220-222 MHz band channels so that each five channel Trunked Channel Group consists of a continuous band of spectrum, the Commission would facilitate the development of technology which would increase spectrum efficiency by approximately 20 percent, compared to the current Trunked Channel Group plan.[1]

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[1] Using the same type of equipment as to be used by the SMART SMR, Inc. ESMR system, six digitized voice channels could be fitted within the same bandwidth as five ACSB voice channels. If equipment is employed which is capable of providing a system of dynamic time slot assignment among users, it may be possible to transmit even more information than six voice channels in the same bandwidth required for five ACSB channels.

In the preceeding paragraph, Orion said that the current plan "would seem to provide five times the spectrum efficiency" of a 25 kHz wide FM channel. Revising the Trunked Channel Group plan as suggested by Orion could provide even greater spectrum efficiency. Revising the plan would allow two or more trunked system licensees to combine their assigned groups of channels to obtain a band 50, 75, 100, or more kiloHertz wide. Such a wideband system could accommodate a single data stream at a bit rate disproportionately higher than could be fitted within a smaller authorized bandwidth. A single data stream transmitted in a wider channel can be disproportionately more efficient because transmission capacity is not lost in preserving multiple guardbands. A single data stream at a bit rate that would fully occupy, for example, a band 50 kHz wide would not waste the guardbands which ACSB modulation or conventional "narrow band" FM transmission require.[2] To provide licensees the opportunity to utilize the most efficient modulation schemes available, both now and in the future, the Commission should assign channels to each licensee which are mutually adjacent to one another.

In the bands 896-901 and 935-940 MHz, the Commission used the channel blocking method suggested by Orion. There is no

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[2] See Rule Section 90.209(l) for the emission mask which is applicable to channels in the 220-222 MHz band, and Rule Section 90.209(f) for the emission mask which is applicable to wider-band VHF channels on which FM data emission is authorized. These emission masks impose guardbands between adjacent channels within which no information can be transmitted.

indication, whatsoever, that the adjacent channel blocking method used in the 900 MHz band has had any deleterious effect on the filing of applications, construction, or actual operation of trunked systems in the 900 MHz band. Based on its favorable experience with the concept in the 900 MHz band, the Commission should consider applying the adjacent channel concept to the 220-222 MHz band.

The allocation adjustment suggested by Orion should not impose any additional significant costs on manufacturers or users. Contemporaneous ACSB equipment must be designed with sufficient adjacent channel rejection to protect against other licensees' transmissions. Therefore, contemporaneous equipment should be perfectly compatible with an allocation system in which a trunked system is assigned mutually adjacent channels.[3]

There is one potential detriment in Orion's suggestion, but it would be imposed only on operators who chose not to make the most efficient possible use of their spectrum. Stated another

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[3] Orion's plan might actually facilitate a decrease in the cost of receivers. When adjacent channel transmitters are co-located, the ratio of desired to undesired signals remains constant throughout the mobile operating area. However when adjacent channels are assigned to trunked systems at different locations, receivers must be adequate to reject higher levels of undesired signals because mobile units will sometimes be operating much closer to the undesired transmitter than they are to the desired transmitter. Therefore, Orion's plan could allow manufacturers to design their equipment with looser receiver tolerances, resulting in lower costs and greater user choice among grades of equipment.

way, the plan suggested by Orion could impose additional costs only on persons who chose not to make the most efficient use of the radio spectrum. Under the current channel blocking plan, the channels of a trunked system can be routed into a single transmission line and a single antenna by using a device known as a cavity combiner. Under Orion's plan, it would be necessary for an operator desiring to use ACSB voice transmission or very narrowband FM transmission to employ a different arrangement of equipment.

Under Orion's plan, an ACSB or very narrowband FM operator would not be able to use a cavity combiner, but would either use a ferrite combiner or install one feedline and one antenna for each channel. A ferrite combiner is not significantly different in cost compared to a cavity combiner. However, the insertion loss of a ferrite combiner is higher than the loss imposed by a cavity combiner, so under Orion's plan, an operator choosing to combine all transmitters into a single antenna would need to use a higher power transmitter to overcome the ferrite combiner loss. As explained below, using separate feedlines and antennas may be more costly than using a combiner, but probably not substantially more costly.

At channel intervals of 150 kHz, the cost of a cavity combiner is high, compared to a combiner designed for channel intervals of one MHz. Because the physical size of cavity

combiner components is necessarily greater at 220 MHz than at 800 MHz, the cost of combining 220 MHz band channels would also be elevated because more materials would be required in the manufacture of the equipment. This means that a cavity combiner for 220 MHz is likely to be priced higher than similar equipment used by currently operating SMR-Trunked systems. Consequently, the cost differences at 220 MHz between cavity combining, ferrite combining, and use of separate antennas is of diminished significance, compared to operation at higher frequencies.

Under Orion's plan, an operator could avoid the need for either a combiner or multiple antenna systems by using a single transmitter which sent a single high speed data stream. Not only would making the most efficient use of the spectrum save the operator the cost of a multiple antenna system or of the cost of a combiner, it would also save the operator the cost of more than one transmitter.[4] Under Orion's plan, not only could the operator choose the most economical mode of transmission, but, in the public interest, the Commission could simultaneously reap the benefits of enhanced spectrum efficiency.

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[4] The single high speed digital transmitter would be higher than a single ACSB transmitter, but substantially lower than five ACSB transmitters. Orion estimates that a digital transmitter capable of sending a single Time Division Multiple Access data stream for land mobile applications which would fully utilize five adjacent channels in the 220-222 MHz band would cost approximately two-and-one half times as much as a single ACSB transmitter.

In sum, Orion suggests that the Commission revise its Trunked Channel Group table so that five mutually adjacent channels in the 220-222 MHz band would be assigned to each trunked system. This revision should allow the Commission to enhance the efficiency of spectrum utilization, while providing users the opportunity to reduce their costs, compared to the current channel allocation plan.

Conclusion

For all the foregoing reasons, Orion respectfully requests that the Commission commence a rule making proceeding to amend its rules as suggested at the attached Appendix A.

Respectfully submitted,
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Dated: February 9, 1993

APPENDIX A

Amend the table at Rule Section 90.721 to read, as follows:

TABLE - TRUNKED CHANNEL GROUPS

Group No.	Channel Nos.
1	1-2-3-4-5
6	6-7-8-9-10
11	11-12-13-14-15
16	16-17-18-19-20
31	31-32-33-34-35
36	36-37-38-39-40
41	41-42-43-44-45
46	46-47-48-49-50
61	61-62-63-64-65
66	66-67-68-69-70
71	71-72-73-74-75
76	76-77-78-79-80
91	91-92-93-94-95
96	96-97-98-99-100
101	101-102-103-104-105
106	106-107-108-109-110
121	121-122-123-124-125
126	126-127-128-129-130
131	131-132-133-134-135
136	136-137-138-139-140