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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of	)	
	)	
Reallocation of the 216-220 MHz,	)	ET Docket No. 00-221
1390-1395 MHz, 1427-1429 MHz,	)	RM-9267
1429-1432 MHz, 1432-1435 MHz,	)	RM-9692
1670-1675 MHz, and 2385-2390 MHz	)	RM-9797
Government Transfer Bands	)	RM-9854

To: The Commission

REPLY COMMENTS OF FAIRFIELD INDUSTRIES, INC.

Fairfield Industries, Inc. ("Fairfield"), by its counsel, hereby submits these reply comments concerning the Commission's Notice of Proposed Rule Making in the above-captioned proceeding (the "*NPRM*"), FCC 00-395, released November 20, 2000.[1] Fairfield's reply specifically addresses the comments of Mobex Communications, Inc. ("Mobex"),[2] Securicor Wireless Holdings, Inc. ("Securicor"), and others who suggest that the Commission allocate portions of the 216-220 MHz band for high power uses and relocate incumbent, low power users of the band to other unidentified frequencies.

In its initial Comments Fairfield detailed how it uses the 216-220 MHz band for geophysical radio telemetry in oil and natural gas exploration and its opposition to any effort to authorize new, high-power services in the band. Fairfield explained that it initially used the 72-

[1] By *Order Granting Extension of Time*, DA 01-451, released February 16, 2001, the Chief, Office of Engineering and Technology, extended the time for filing reply comments in this proceeding until April 9, 2001.

[2] Mobex is the parent company of Regionet Wireless License, LLC, which previously submitted a petition for rule making proposing that the Commission allocate portions of the 216-220 MHz band for high-power paging services.

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76 MHz band until interference from other services forced it to relocate to the 216-220 MHz band. Fairfield explained that limiting additional allocations in the 216-220 MHz band to the Fixed Service would not avoid interference but merely substitute high-powered uses at fixed locations for lower power mobile locations. Fairfield also noted that secondary services operating on 216-220 MHz have harmoniously co-existed with primary services for years, and that upgrading telemetry and LPRS users to primary status could give them a measure of protection against subsequent users without jeopardizing existing primary services.

In their comments, Mobex and Securicor advocate reallocating portions of the 216-220 MHz band for high-powered Automated Maritime Telecommunications Service ("AMTS") or other uses. Mobex, acknowledging that marketplace developments have overtaken Regionet's proposal to use the band for paging services, suggests that the Commission reallocate the 218-219 MHz band for additional AMTS use licensed on a geographic area basis. Mobex states that the additional AMTS allocation "should not thereby disadvantage existing LPRS users."[3] Mobex suggests that the Commission should require persons obtaining a co-primary AMTS license in the reallocated band to accept responsibility for remedying actual interference to LPRS users or relocating them to different, unidentified frequencies. Id. It also suggests that the Commission prohibit new LPRS use of the spectrum allocated to AMTS. Mobex is silent as to incumbent telemetry users, although Fairfield assumes it would relocate them as well.

Securicor also advocates the geographic licensing of the 216-220 MHz band. However, its proposal would have the Commission adopt a new licensing scheme for the whole band (excluding current primary AMTS users). Securicor assumes that mobile operations would

[3] Mobex Comments at 7.

ultimately become the principal use.[4] Securicor further states its general belief that incumbent 216-220 MHz users "can be adequately protected, or where possible, relocated to different frequencies." Id. at 6. However, Securicur specifically refers to existing AMTS users only. It says nothing about the thousands of incumbent secondary users operating in the band. Like Mobex, Securicur provides no details of how it would provide interference protection (other than using narrowband operations), nor the "different frequencies" that are available for relocation.

Neither Mobex nor Securicur actually focus on the use of the transferred Government frequencies. Rather, they mostly propose reallocating current non-Government uses of the 216-220 MHz band. Despite the Commission's specific request for comments "on the best way to continue the viability of incumbent, non-Government services in the band, if we were to license new primary services" (*NPRM* at 8), neither Mobex nor Securicor provide such information. Instead, they offer general assertions that new primary licensees would have the responsibility to remedy interference or relocate incumbent users to unidentified "different frequencies." These vague suggestions ignore the operating and practical realities of incumbent services in the 216-220 MHz band, particularly secondary services such as telemetry and LPRS.

Fairfield previously described how its telemetry equipment is highly sensitive to other uses of the spectrum, and that under current conditions typically 40 to 80 channels are unavailable for use in a given exploration area. *See* Fairfield Comments at 3, 7-8. Since secondary uses like telemetry operate subject to interference from primary services, neither Mobex nor Securicor explain how the responsibility of new, "primary" licensees to remedy or avoid interference would actually protect incumbent secondary users like Fairfield. Thus, the

[4] Securicor Comments at 5.

only form of protection that Mobex and Securicor would apparently provide to secondary users is relocation to unidentified frequencies.

This simply is not a viable solution for Fairfield's geophysical telemetry operations. The unique requirements of those operations favor using frequencies below 300 MHz. *See e.g.*, Fairfield Comments at 3. These include the use of small, lightweight portable transmitters that can operate over distances of up to several miles to transmit telemetry data from remote sensors to a central receiver. In the attached Declaration of Fairfield's Vice President and Director of Research and Development, Clifford H. Ray explains the signal propagation characteristics and interference considerations which favor Fairfield's operations in the lower frequencies.

As the frequency increases the distance is reduced over which a signal remains usable at a given power level. Higher frequencies also are less able to penetrate foliage. Both are major concerns for telemetry research which occurs on land, in shallow water (depths up to about 150 feet), and in transition zones such as marshes and swamps. The transmitters and battery packs are small and lightweight to allow exploration crews to carry and deploy several units at one time. The lower operating frequencies provide sufficient signal propagation at the required low power levels to cover the several miles over which telemetry measurements are typically made. The lower frequencies also sufficiently penetrate foliage. *See* Declaration at 1-2.

The options normally available to offset propagation deficiencies at higher frequencies are not practical in the case of Fairfield's operations. One option is to use higher powered transmitters. However, this could require significantly larger and heavier batteries which would reduce the portability of the equipment. Higher power operation also would consume battery supply considerably faster, shortening the useful life of each transmitter before a recharge or battery replacement is required. While battery technology has generally improved in recent

years, Fairfield cannot determine at this time whether such improvements would allow the development of a battery that is sufficiently portable and that has sufficient operating power and duration at an economic cost to support higher frequency field operations. Much would depend on the specific frequencies which nobody has identified.

A second option is to increase antenna gain. However, this also increases the directionality of the antenna requiring more precise orientation of the transmitting unit towards the central receive position. This is not practical or even possible in many exploration settings. For example, water-based research requires the transmitter to float on the water's surface. The constant movement of a floating transmitter would make it virtually impossible to keep a directionalized antenna oriented towards the receiver.

In addition to the interference and signal propagation problems noted in Mr. Ray's Declaration, the forced relocation of telemetry equipment to higher operating frequencies presents a number of other problems. It would require Fairfield to redesign all of its telemetry equipment. The transmitters now used are not retunable over a broad range. Rather, they are specifically designed to operate in the 214-234 MHz band. It would cost Fairfield millions of dollars to design, develope and prototype new telemetry equipment that would operate at higher frequencies. It also would cost several additional millions of dollars to deploy such new equipment in the field. These costs are just to Fairfield alone.

Considering the significant cost increases to redesign and deploy new telemetry equipment and batteries that could operate at some unknown higher frequency, there is a strong possibility that Fairfield could not afford to undertake such changes. Geophysical telemetry equipment is one of only many costs associated with seismic research for oil and natural gas. There is a price point at which the use of the telemetry equipment is not economical. For

example, geophysical research in transition areas (marshes and swamps) was historically limited due to the high cost to acquire data. This situation has somewhat changed with the latest developments in telemetry technology[5] and the increasing demand for oil and natural gas, allowing increased exploration in higher cost transition areas. However, if the cost to acquire data significantly increases for the reasons discussed above or other unforeseen consequences, those added costs may again make such research prohibitively expensive.[6]

Mobex and Securicor have not adequately addressed the Commission's concerns, or those of commenters such as Fairfield, with respect to the continued viability of incumbent users of the 216-220 MHz band. Mobex's and Securicor's proposals also fail to take into account the thousands of secondary Low Power Radio Service users that provide valuable services in addition to telemetry.

These reply comments necessarily address the general issues raised in Mobex's and Securicor's proposals. Because neither proposal suggests a possible alternate frequency band to relocate incumbent 216-220 MHz users, it is impossible to provide a more detailed or specific analysis. For example, in the absence of proposed alternate frequencies Fairfield cannot determine the operating requirements that might apply to its telemetry equipment, or the impact that other users of that spectrum would have.

Before the Commission could even consider amending its rules to provide for the type of relocation that Mobex and Securicor suggest, the Administrative Procedure Act requires that Fairfield (and other parties) have reasonable notice of the relocation proposal and a meaningful opportunity to comment. 5 U.S.C. Section 553. That has not occurred in this proceeding. The

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[5] *See* Fairfield Comments at 3-4.

[6] Neither Mobex nor Securicor suggest that the cost of relocating incumbent 216-220 MHz users would include increased operating costs.

Commission did not propose to relocate incumbent 216-220 MHz users, but rather stated that it sought to avoid any detrimental impact to them. *NPRM* at 8. Mobex's and Securicor's proposals are too vague to provide any opportunity for meaningful comment. Under these circumstances, the Commission is precluded from taking action that would require the relocation of Fairfield's telemetry operations without further proceedings.

Respectfully submitted,

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April 9, 2001

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DECLARATION OF CLIFFORD RAY

I, Clifford H. Ray, hereby declare as follows:

1. I am Executive Vice President and Director of Research and Development for Fairfield Industries, Inc. ("Fairfield"). My education has been in engineering with a B.S., M.Eng., & PhD. in Electrical Engineering at Texas A&M University. I have had more than 20 years experience in managing the development of geophysical data acquisition equipment.

2. Fairfield has submitted Comments to the Federal Communications Commission ("FCC") in ET Docket No. 00-221. In those Comments Fairfield described its use of the 216-220 MHz band for geophysical radio telemetry and discussed the FCC's proposals for the use of that band following transfer from Government to non-Government use. Fairfield opposes any additional high-power allocations in the 216-220 MHz band. This spectrum is already highly congested and adding any new high-power service in the band would cause destructive interference to Fairfield's geophysical telemetry operations which provide a critical tool in the exploration for new and expanded oil and natural gas reserves in remote areas.

3. This Declaration is provided in support of Reply Comments that Fairfield is submitting in response to the suggestions of some commenters that the FCC relocate low power users of the 216-220 MHz band like Fairfield to other, unidentified frequencies.

4. Fairfield's telemetry equipment, marketed under the trade name BOX - THE SEISMIC DATA NET® ("BOX"), uses land-based and water-based sensors (geophones and hydrophones, respectively) and transmitters using low-power AM radio signals to send data to a highly sensitive receiver. Typically, telemetry path distances may be several miles in length and can require up to a thousand separate transmitter/sensor units. Telemetry measurements are made in shallow water (up to about 150 foot depths), on land, and in transition areas or zones such as marshes and swamps. The transmitting/sensor apparatus and accompanying battery packs are small and light-weight to allow exploration crew members to carry several units at one time. This is usually done on foot, light weight land vehicles, marine vessels and air boats which may be used in marsh or swamp portions of a transition area. The small, light-weight batteries and transmitters dictate very low power outputs, making operation at frequencies below 300 MHz essential for their superior propagation characteristics.

5. When Fairfield originally introduced its geophysical telemetry equipment (under the TELESIS® brand name), it operated in the 72-76 MHz band. However, due to increasing noise and interference, particularly from high-power transmitters, the band was gradually rendered unusable for geophysical telemetry -- particularly since such operations require simultaneous use of many channels. Consequently, Fairfield redesigned its next generation equipment to operate in the 216-220 MHz band.[1] When this change was made this band had significantly less noise and interference compared to 72-76 MHz, although an average of 40 to

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[1] The equipment initially operated in the 216-220 MHz band. In 1997 this was expanded to include part of the 220-222 MHz band after the FCC granted Fairfield's Petition for Rulemaking to allow telemetry operations on these frequencies.

80 channels are now typically unavailable in a given exploration area due to noise and interference from other users of these frequencies. However, signals in the 216-220 MHz band experience more propagation loss than those in the 72-76 MHz band at the same power level and are not as effective in penetrating foliage. Thus, the 216-220 MHz band is a compromise: More channels are available but with less effective propagation.

6. These propagation differences between the 72-76 MHz and 216-220 MHz bands illustrate why geophysical telemetry operations are best conducted at frequencies below about 300 MHz.

7. One option to offset reduced propagation is increased transmitter power. However, this would require using significantly larger and heavier batteries, thereby reducing the portability of the equipment. Additionally, the higher power operation would consume battery supply at a considerably faster rate than the low power operations now in use. This would shorten the useful life of each sensor/transmitter before a recharge or battery replacement is needed.

8. Another option is to increase antenna gain. Antennas used in the 216-220 MHz band are generally omni-directional. However, as antenna gain and, hence, directionality, is increased, the antenna requires a more precise orientation of the transmitting unit to assure that it is directed towards the central receive position. In many exploration settings this is not practical, and is virtually impossible for water-based explorations due to the movement of the transmitters on the water's surface.

9. Even if these options could be used to compensate for propagation losses at frequencies above 216-220 MHz, some survey areas would still experience potential range limitations. For example, signal losses due to the higher frequencies' inability to penetrate foliage would remain a problem adversely affecting explorations on land and in transition areas (swamp and marsh). The reduced operating range would require smaller research areas compared to the current typical survey area. These difficulties would dramatically increase the cost and time to explore a given area.

10. Finally, none of the parties suggesting the possibility of relocating current users of the 216-220 MHz band has suggested any specific frequencies which are actually available and viable for use. Without knowing a specific frequency band, any discussion of the problems inherent in relocating the operating frequencies for geophysical telemetry is necessarily general. For example, it is impossible to know the operating power requirements without knowing the frequency range. Similarly, it is impossible to predict the impact that incumbent users of the same spectrum might have and whether they would preclude the use of such frequencies for telemetry just as high power uses rendered the 72-76 MHz band useless several years ago.

11. None of the commenting parties has made a sufficient case for relocating geophysical telemetry to another frequency band. They have neither demonstrated a compelling case for high power operation in the congested 216-220 MHz band -- which is the home for so many low power users like geophysical telemetry, law enforcement, and the hearing impaired --

nor have they demonstrated a practical alternative for the current users. Fairfield urges the FCC not to authorize any new high power services within the 216-220 MHz band and to allow the current users of the band to continue operating free from the potential of additional interference.

12. I hereby declare that the facts and matters set forth in this Declaration are true and correct to the best of my personal knowledge. Executed under penalty of perjury this 9th day of April, 2001.

Clifford H. Ray
Executive Vice President
Fairfield Industries, Inc.

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