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July 30, 1993

VIA HAND DELIVERY

Mr. William F. Caton
Acting Secretary
Federal Communications
Commission
1919 M Street, N.W.
Washington, D.C.

Re: Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, PR Docket No. 93-61, RM-8013

Dear Mr. Caton:

Please accept for filing an original and five copies of the Reply Comments of North American Teletrac and Location Technologies, Inc., which were filed on July 29, 1993. The comments filed today are exactly the same as those filed yesterday with the exception of a revised cover page. I very much appreciate your cooperation in this matter and apologize for an incovenience that may have been caused.

Sincerely,

Caren M. Swan

Caren M. Swan
Paralegal

DOCKET FILE COPY ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Part 90	)	
of the Commission's Rules	)	**PR DOCKET NO. 93-61**
to Adopt Regulations	)	**RM-8013**
for Automatic Vehicle	)	
Monitoring Systems	)	
	)	

REPLY COMMENTS OF NORTH AMERICAN TELETRAC AND LOCATION TECHNOLOGIES, INC.

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Dated: July 29, 1993

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SUMMARY

Teletrac has submitted independent studies in this proceeding addressing the key issue of whether it is feasible for wideband pulse ranging systems to share spectrum with other LMS

Southwestern Bell advocates limiting LMS systems to 4 MHz. However, as demonstrated in our Opening Comments, that proposal, which is not backed by any specific support, would make no technical or economic sense and would be spectrally inefficient. Indeed, Southwestern Bell's arguments are internally inconsistent.

The comments have provided no reason to reject the Commission's proposal to leave existing forward links where they are currently located; nor do they offer any justification for introducing a new and confusing distinction between "wide area" and "local area" LMS systems. The Commission's proposals on these points are workable and well supported and should be adopted.

Finally, a number of Part 15 and amateur radio users fear that this proceeding will affect their status in the band, but the Commission has already confirmed that it will not. Such users have, as many have commented, coexisted well with Teletrac's system. No credible evidence has been presented to suggest that this situation will change with the adoption of permanent LMS rules.

-- No tags will be affected by the NPRM's migration proposal.

-- Only a small number, at most, of Amtech's 1300 "frequency agile" tag readers will have to be retuned.

-- Teletrac has proposed to grandfather readers in place as of May 26, 1992, the date of the Teletrac Petition.

-- Other readers can remain in the wideband pulse-ranging segment on a secondary basis as proposed by Mark IV.

Moreover, a new independent technical analysis prepared for Teletrac for this reply shows that, if there is no migration, Amtech can expect to suffer debilitating interference from none other than the only wideband advocate of sharing -- Pinpoint.

Among wideband pulse-ranging operators, Southwestern Bell and MobileVision support co-channel separation, leaving only Pinpoint as a sharing advocate. Even Pinpoint proposes only a one day "window" for new entrants and fails to offer any demonstration that a sharing proposal would work. Its own solution to the problem is simply to increase the power of its base stations from 484 watts ERP to 5000 watts ERP, thus threatening the very "power war" that would lead to a "Tragedy of the Commons" and degrade all LMS service. Pinpoint's proposal is not credible.

RECEIVED

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TO: The Commission

REPLY COMMENTS OF NORTH AMERICAN TELETRAC AND LOCATION TECHNOLOGIES, INC.

In opening comments only North American Teletrac and Location Technologies, Inc., doing business through their joint venture Pactel Teletrac ("Teletrac"), presented independent factual information concerning the crucial issue presented by the Commission's Notice of Proposed Rulemaking (the "NPRM") -- whether it is feasible for LMS systems to share the 902-928 MHz band. That information included

-- a report on the technical feasibility of sharing between wideband pulse-ranging systems prepared by Dr. Raymond Pickholtz, Professor of Engineering at George Washington University, a leading authority on spread spectrum technologies (Appendix 1 to the Comments). Professor Pickholtz concluded sharing was not technically feasible;

-- a field test and study of interference between wideband systems, conducted by Teletrac and reviewed by Professor Pickholtz (Appendix 2 to the

Comments). That field test and simulation

significantly reinforce Professor Pickholtz's

Comments of Hughes Aircraft Co., Mark IV IVHS, Southwestern Bell, MobileVision, Florida Department of Transportation, SAAB-Scania and Texas Instruments/MFS Network Technologies, Inc.). Nonetheless, other commenters continue to advance illogical and often contradictory arguments, again without any independent technical support. For example, although Pinpoint and Amtech[1] continue to maintain that sharing will work, they now concede there will be "black out areas" and that detailed technical rules will be needed. (Pinpoint Comments at 27; Amtech Comments at 20).

Southwestern Bell proposes a channel plan of 4 MHz, although it claims to have a system that will work on 2 MHz. (Southwestern Bell Comments at 9-10). Pinpoint and MobileVision, on the other hand, claim 8 MHz is the "minimum acceptable bandwidth for IVHS applications." (Pinpoint Comments at 33; MobileVision Comments at 36-40). In contrast to Pinpoint and Amtech, Southwestern Bell advocates co-channel separation. (Southwestern Bell Comments at 12-14 and n.25).

MobileVision,[2] among others, wants the forward link moved to a different frequency, even though one year ago MobileVision

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[1] As the Commission will recall, Pinpoint Communications, Inc. ("Pinpoint"), the only purported wideband pulse-ranging commenter advocating the sharing of the band, is represented by

supported Teletrac's proposal, under which the forward links would stay where they are.[3]

It is fair to say that the comments filed are a hodge-podge of rhetoric with no independent support for the proposals set forth. Indeed, the only common denominator seems to be that Teletrac has a technology that works, and has commercially operating systems providing service to customers. Even Pinpoint acknowledges in the press that Teletrac "offers the best quality and technology currently in the market."[4] Therefore, Teletrac must be stopped. For example,

-- Amtech proposes arbitrarily that, "Mobiles should transmit no more than 10 milliseconds in any 100 millisecond time period." (Amtech Comments at 33). Since Teletrac transmissions are approximately 20 milliseconds, that rule would effectively terminate Teletrac service.

-- Pinpoint, joined now by MobileVision, proposes forward links that are somewhere

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[3] Comments of MobileVision LP in Support of Teletrac Petition for Rulemaking, July 23, 1992 at 14 (the "proposed rules provide for a standardized forward link in each band. The Commission should adopt Teletrac's proposal.")

other than the existing forward links. (Pinpoint Comments at 21-22; MobileVision Comments at 43-44). Since neither company is presently in commercial operation, and since only Teletrac has a large installed base, again, the principal objective seems to be to cause Teletrac to lose that installed base.

-- Southwestern Bell proposes a channel plan that would obsolete existing investment and, of course, dislocate customers, all of whom happen to be Teletrac's customers. (Southwestern Bell Comments at 10).

As we discuss in detail below, practical rules envision co-channel separation for wideband pulse-ranging systems and migration of identification systems. The other necessary rules fall into place once that realistic regulatory architecture has been implemented.

DISCUSSION

I. CO-CHANNEL SEPARATION IS REQUIRED TO ASSURE THE VIABILITY OF WIDEBAND PULSE-RANGING SYSTEMS

A. The Teletrac System Is Currently Providing Valuable Service To Public And Private Consumers

Teletrac's wideband pulse-ranging system is presently providing valuable services to a variety of private and public entities. Many letters supporting Teletrac's services were attached to Teletrac's Petition for Rulemaking (See Petition, Appendices A to J). Commenters continue to make the point that

the Teletrac technology is in use, is real, and is delivering public benefits right now.

For example, the Federal Bureau of Investigation has stated to the Commission:

> Without making public the specific ways in which the FBI is utilizing these services, our surveillance capabilities have been significantly enhanced by the use of these commercial services. Very positive results are being obtained daily in on-going FBI investigations. The use of these services by our field offices in the metropolitan areas where the service is available is rapidly increasing.
>
> The FBI supports in principal those requests found in the referenced rulemaking petition. This includes the co-channel separation requested for AVM Systems. The FBI hopes that the Commission weighs all issues carefully to prevent any degradation in the quality of radio location services currently being provided.[5]

The Drug Enforcement Administration ("DEA") also receives ongoing real world operations support from Teletrac. For example, DEA's South Florida High Intensity Drug Trafficking Area Task Force comments:

> The Task Force has specifically targeted transportation modes as a vulnerability of drug trafficking organizations. Automated vehicle location is a weapon in that effort.
>
> Pactel Teletrac and their 900 MHz vehicle location technology has helped us in this effort. Their very reliable system has significantly enhanced our ability to observe suspects from a distance, often miles away. This ability has greatly increased Agent

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[5] Letter from William Bayse, Assistant Director, FBI Technical Services Division, dated May 14, 1993 (emphasis supplied), filed in PR Docket No. 93-61.

> safety and reduced our manpower requirements on a per case basis. This extremely innovative technology will allow the Task Force the luxury of conducting an entire surveillance, over any amount of time, without having to be close to the target involved.
>
> We would support any effort by the Commission to protect the Pactel Teletrac frequency allocation. They are presently singly responsible for the vehicle location technology we now enjoy in the South Florida area. This company has a real commitment to law enforcement and provides a valuable service we strongly support.[6]

The ongoing law enforcement applications provided by Teletrac are not restricted to the Federal level. Teletrac is increasing public safety at the local level as well. The City of Coral Gables, Florida, for example, comments

> The Coral Gables Police Department has used the Pactel Teletrac system in our City to dramatically enhance our surveillance capabilities and allow us an increased measure of officer safety.
>
> We understand the Commission is considering proposals that could make the Teletrac system lose some significant capabilities. We feel any decision that would diminish PacTel Teletrac's ability to provide accurate vehicle location service would hamper our law enforcement efforts.
>
> We have found PacTel Teletrac, and the radio location system they provide, to be extremely reliable and most helpful with our ever increasing responsibilities here in our local area of concern. Anything the Commission can do to assist PacTel in their frequency

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[6] Letter from Thomas J. Tiderington, Group Supervisor, Southeast Florida Regional Task Force, DEA, filed in PR Docket No. 93-61 on June 25, 1993 (emphasis supplied).

allocation would be appreciated by our Agency.[7]

Increased law enforcement effectiveness is only one important service Teletrac now offers. Teletrac's fleet management services, augmented by status messaging, is enhancing efficiency, reducing costs and increasing consumer satisfaction. These enhancements are being used by an ever increasing number of companies. Letters filed with Teletrac's Petition (Exhibits A to J) demonstrated such presently available benefits from Teletrac's system.[8] For example, the United States Postal Service has reported to the Commission:

[redacted]

> expand our use of the Teletrac system, further decreasing our costs.[9]

Intelligent Vehicle Highway Systems ("IVHS") hold much promise for the future. Teletrac is a way to that future. For example,

-- Teletrac is a participant in Project Direct. That project, taking place in Detroit, involves equipping 30 vehicles with radio location units to monitor how drivers respond to traffic information.

-- In Los Angeles, under the auspices of the Los Angeles County Transportation Commission, 150 tow trucks have been equipped with Teletrac units to streamline assistance to disabled vehicles.

-- In conjunction with Houston Mass Transit, Teletrac has agreed to provide 120 Teletrac equipped vehicles for handicapped commuter service.[10]

The Comments of IVHS America confirm that Teletrac is the only wideband pulse-ranging system currently offering IVHS services (IVHS America Comments at 8) and that such systems are necessary to the national deployment of IVHS services. (Id. at 10). IVHS America supports protecting Teletrac "to the

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[9] Letter of J. Cherr, U.S. Postal Service, Processing and Distribution Center, dated April 30, 1993, filed in PR Docket No. 93-61 on June 29, 1993 (emphasis supplied).

[10] Teletrac's services are also of use to the hearing and speech impaired, especially in emergency situations.

maximum extent possible from interfering uses." (Id. at 18, emphasis supplied).

Thus the commercially operating Teletrac system is essential to the provision of a variety of services and users. The system's real world versatility and reliability suggest that, if allowed to flourish under a realistic set of permanent rules, Teletrac-like systems will spur innovation in a number of areas.

B. Narrowband Systems Must Be Migrated

1. Most Identification System Vendors Support Migration

In its Petition and Opening Comments, Teletrac conclusively demonstrated, with independent technical support, that narrowband systems create substantial interference for wideband pulse-ranging systems. Accordingly, the Commission's proposal to migrate narrowband systems makes eminent technical, economic and common sense and should be adopted.

Comments from manufacturers of automatic vehicle identification equipment -- other than Amtech -- support the migration proposal. For example, Hughes Aircraft Co. ("Hughes")

Technologies, Inc. similarly recognizes the need to separate wideband and narrowband systems. (TI/MFS Comments at 11).

AT/Comm, Inc, another identification system manufacturer that provides toll tag services on the Illinois Tollway and at other locations, also supports migration and co-channel separation between wideband pulse-ranging and narrowband systems. (Comments of AT/Comm).

Mark IV IVHS Division ("Mark IV") also finds no fault with the Commission's proposal. Like Hughes, Mark IV is operating, having been installed at more than 31 locations in nine states (Mark IV Comments at 4). Mark IV has applied for several other locations. (Id.). Yet, Mark IV recommends

> Licensing of short-range systems should be based upon exclusive-use channelization with co-channel separation requirements in the 902-904 MHz, 912-918 MHz and 926-928 MHz bands to facilitate rapid and effective licensing and deployment of the IVHS systems which we expect will be needed to meet the public demand for IVHS capabilities in coming years.
>
> -- Id. at 7

Indeed, Mark IV is so certain of the ease of meeting the Commission's requirements that it suggests that the migration to the new band should occur within six months after the Commission adopts final rules. In its Petition and opening comments, Teletrac proposed to grandfather all narrowband licenses granted before May 26, 1992. (Teletrac Comments at 22-23). We continue to adhere to that position. As to any license granted after that date, Teletrac supports the Mark IV proposal that migration should occur within six months.

Mark IV also proposes that tag reader systems be given secondary status in the wideband pulse-ranging allocation. (Mark IV Comments at 10-11). Teletrac supports that proposal as well. Teletrac has never objected to others operating in the band under technically correct criteria, as long as those secondary tag readers are operational in a manner that does not cause interference to wideband pulse-ranging systems.

Other commenters also support migration. For example, the Florida Department of Transportation makes clear that the potential for interference is real. (Florida Comments at 1-2). Florida recommends that a new band be allocated for toll collection and IVHS needs. (Id. at 2).[11] SAAB-Scania, another tag reader manufacturer, supports a proposal to migrate tag readers to 2450 - 2483.5 MHz. (SAAB-Scania Comments at 11). In Europe, Amtech is already operating at 2.4 GHz.[12] Indeed, SAAB-Scania recognizes that, absent separation, there is a likelihood interference will debilitate its systems.

> Since the power levels at which the associated vehicle tags operate are necessarily low, the introduction into the radio environment of multiple 300 watt, co-channel transmitters installed along the highways (as is contemplated within the NPRM)

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[11] IVHS America has formed a group to find additional spectrum for IVHS services. This group was formed after the California Transportation Department expressed an interest in finding alternative spectrum for its tag reader system.

[12] Amtech has also received FCC authority to operate at 2.4 GHz in this country. See FCC Equipment Authorization, FCC ID No. FIHXI1400-AI1400. See also Krauss Affidavit at ¶ 8 filed as Exhibit A to Teletrac's Reply Comments in Support of its Petition.

> will create a substantial threat to the reliable operation of these systems. It is well within the boundaries of reason to predict that following the installation of a proposed LMS system within a market, ETTM systems will quickly degrade due to co-channel interference and a substantial increase in the noise floor.
>
> -- SAAB-Scania Comments at 4

(See also AT/Comm Comments). Thus, the overwhelming weight of the comments from identification system manufacturers is that the Commission's proposal for separation of wideband pulse-ranging systems from other LMS systems is sound, low cost and pro-competitive.

2. The Opposition of Pinpoint and Amtech to Migration is Contrary to Sound Analysis

Pinpoint acknowledges that narrowband tag reader systems will cause "black out areas" to wideband pulse-ranging systems (Pinpoint Comments at 27), but, apparently to mollify Amtech, claims the problem is not that serious. (Id). Even Amtech finally has been forced to admit the existence of blackout areas. (Amtech Comments at 20).

Interestingly, Pinpoint and Amtech disagree on one key issue -- the susceptibility of Amtech tags to interference from Pinpoint's proposed system. Pinpoint claims that the received signal from an Amtech tag is at the -10 to -20 dBm level (Pinpoint Comments at 29), while Amtech indicates power levels 40

dB lower.[13] Pinpoint proposes to deal with interference into its

system from Amteche-like systems by locating the Pinpoint forward

Amtech and its supporters take positions inconsistent with the technical facts and ignore those facts when they cannot respond. Amtech argues that it must have freedom to place its tag readers throughout 902-928 MHz to meet the needs of emerging uses.[15] That is simply not correct.

It is absolutely clear that the Amtech system is spectrally inefficient. Jeffrey Krauss, a leading spectrum policy expert, prepared an affidavit analyzing the various technical infirmities in Amtech's technology, filed as Exhibit A to Teletrac's Reply Comments in Support of its Petition for Rulemaking. Amtech has assiduously avoided responding to the Krauss Affidavit at any point in this proceeding. Amtech admits it would be unable to reuse a frequency between a toll plaza and a satellite plaza

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[15] Teletrac's opening comments discussed in some detail a number of recent proceedings in which the Commission has recognized the need for co-channel separation to assure that high quality service can be provided free of disabling interference. (Teletrac Comments at 41-45). Amtech's pleading provides selected quotations designed to leave the impression that spectrum sharing is the key goal of the Commission's spectrum regulation. (Amtech Comments at 28 n.56). However, the Commission has confirmed, even in many of the same proceedings selectively quoted by Amtech, the importance of maintaining a high quality of service. See, e.g., Frequency Coordination in Private Land Mobile Radio, 4 F.C.C. Rcd 6325 (frequency selection important to "ensuring a satisfactory grade of communications service to all users"); Allocation of the 849-851/894-896 MHz Bands, 5 F.C.C. Rcd 3861, 3873 (noting the need to assure operation "on a noninterference basis with adjacent services," and establishing technical standards including frequency

separated by a few hundred feet (Amtech Comments at 11-12), thereby implicitly conceding its design is poor. Amtech's spectral inefficiency is also demonstrated in its receiver description. (Id. at 8 n. 16). Amtech's wide bandwidth in the receiver is a result of, among other things, a primitive modulation technique. This receiver design is a significant contribution to Amtech's spectral inefficiency. Accordingly, Amtech's demands to obtain continued use of the entire band -- a demand its commercially operating competitors do not join in -- is really nothing more than a refusal to deal with its own inefficiency.

In addition, Amtech represents to this Commission that moving its operation to different frequencies would be very costly. (Id. at 36-37 and n.69). But while Amtech makes loose statements to this Commission, it says quite a different thing in documents that must comply with the federal securities laws. Amtech's 1992 10-K disclosure form notes the pendency of this rulemaking and plainly states:

> The Company's products are "frequency agile" in the sense they can operate anywhere within the 902-928 MHz band.
>
> -- Amtech 1992 Form 10-K at 12 (Attached hereto as Exhibit 3) (emphasis supplied).

Amtech says nothing to the Securities and Exchange Commission or its shareholders about any exceptional costs of

moving frequencies.[16] Indeed, given Mark IV's willingness to migrate quickly, the Amtech cries of cost and burden would appear to lack credibility. There are other sound reasons to conclude that adoption of a migration plan would cause little cost to Amtech. Amtech, in its Comments, agrees with the Teletrac proposal that narrowband licenses in the wideband allocation as of May 26, 1992 would not have to be migrated. (Amtech Comments at 36-37). That includes the majority of installed Amtech tag readers. Further, Amtech admits in its Comments that it has only deployed approximately 1300 tag readers. (Id.). Thus, the potential relocation costs for this small number of frequency agile readers must, in all common sense, be minimal. In any event, if the Commission adopts Mark IV's proposal, which Teletrac supports, to allow identification systems to have secondary status in the wideband pulse-ranging allocation, Amtech need not migrate those tag readers which do not cause interference.

Amtech also claims that it needs additional spectrum for high volume locations like the Oakland Bay Bridge in California (Amtech Comments at 12), which is currently not an Amtech location. Amtech has not demonstrated that the Commission's allocation of 10 MHz of spectrum for identification systems, most

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[16] The federal securities laws require disclosure of material facts.

of which claim to use narrowband technology, is inadequate.[17] Amtech requires 800 kbits/sec to support 20 lanes of traffic, with each lane passing 10 vehicles per second. The 10 vehicle per second rate would be highly unlikely given the average size of passenger cars and the current maximum legal speed limit of 55 mph. It is more likely that less than two cars per second would pass.[18] This would imply a data rate requirement of less than 160 kbits/sec, or one-fifth of what Amtech claims to require. Even if 800 kbits/sec is required, a single 6 MHz channel should be able to support several such systems, given that other services have developed data rates up to 25 times more efficient.[19] Once again, Amtech appears to have little regard for frequency management. The data capacity needed to satisfy the requirements of high capacity locations like the Oakland Bay

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[17] According to a recent news report, the Texas Turnpike Authority has stopped negotiating with Amtech to install a new toll system on the Dallas North Tollway. "Turnpike ends talks with Amtech Group," Dallas Morning News, July 16, 1993 at 1D. (Exhibit 4). The article notes claims by Amtech competitors that inefficiencies in the Amtech system have cost the authority millions in toll revenues, while the Authority states it broke off negotiations because no agreement could be reached on price.

[18] At 55 mph, a car travels only about 8 feet in a tenth of a second. Assuming a reasonable separation of three or four car lengths, we conclude that a single lane would process less than 2 cars per second at a speed of 55 mph.

[19] Digital HDTV systems have been developed that stuff more than 20 mbit/sec into a 6 MHz channel.