UNION PACIFIC RAILROAD COMPANY

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November 20, 1995

William Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

RE: Replacement set of comments for P.R. Docket No. 92-235,

Dear Sir,

Enclosed are an original and nine copies of Comments submitted on behalf of Union Pacific Railroad Company and Missouri Pacific Railroad Company in response to the Commission's Report and Order and Further Notice of Proposed Rule Making released on June 23, 1995 in the above docket. Do to difficulties beyond my control, several of the pages contained in the documents which were filed on November 20, 1995 were faxed to representatives of the Association of American Railroads for hand delivery to the Commission in order to meet the filing date.

I am concerned with the content and quality of the pages which were faxed and request that the documents be discarded and the enclosed set accepted as the official filing. If the request to substitute this set of documents is not allowable, please retain the first set as the official filling for Union Pacific Railroad Company and Missouri Pacific Railroad Company. If you have any questions, please contact me at (402) 271-4883. Thank you for your efforts in this matter.

Sincerely,

Edwin F. Kemp
General Director, Telecom Engineering
Union Pacific Railroad Company
Missouri Pacific Railroad Company

Enclosures

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List ABCDE

BEFORE THE

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

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NOV 21 1995
FCC MAIL ROOM

IN THE MATTER OF:	)	
	)	
Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Polices Governing Them	)	
	)	**P.R. Docket No. 92-235**
and	)	
	)	
Examination of Exclusivity and Frequency Assignment Policies of the Private Land Mobile radio Services	)	

DOCKET FILE COPY ORIGINAL

COMMENTS OF UNION PACIFIC RAILROAD COMPANY
AND
MISSOURI PACIFIC RAILROAD COMPANY

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COMMENTS OF UNION PACIFIC RAILROAD COMPANY
AND
MISSOURI PACIFIC RAILROAD COMPANY

Union Pacific Railroad Company and Missouri Pacific Railroad Company, pursuant to Section 1.415 of the Rules of the Federal Communications Commission (the "Commission"), file these Comments in response to the Commission's Report and Order and Further Notice of Proposed Rulemaking released June 23, 1995, in the matter of replacement of Part 90 with Part 88.

I. INTRODUCTION

Union Pacific Railroad Company ("UPRR") and Missouri Pacific Railroad Company ("MPRR") (UPRR and MPRR are referred to hereinafter collectively as "Union Pacific") are Class I common carrier railroads[1] subject to the regulatory jurisdiction of the Interstate

[1] Class I railroads are those with annual gross revenues in excess of $253.7 million.

Commerce Commission and the Federal Railroad Administration of the Department of Transportation. Union Pacific operates approximately 22,800 miles of mainline and branch track in 23 Western, Midwestern, and Southwestern states. In order to conduct safe and efficient railroad operations over such an extensive system, adequate and reliable mobile radio communications is essential.

Union Pacific has a very significant investment in radio equipment. Union Pacific's radio system consists of approximately 3,700 base stations, 7,300 mobile radios, 4,300 locomotive radios, 17,500 portable radios, and approximately 4,900 radios dedicated to defect notification and "end of train" telemetry operations. The current value of the equipment comprising Union Pacific's radio system, including supporting spares and repair parts, is estimated to be more than $71 million.

Considering the magnitude of Union Pacific's radio network, the Commission's proposal to modify the channels below 512 MHz and, ultimately, all existing radio equipment, is of great concern to Union Pacific. Although Union Pacific agrees with the intent of the Commission's proposal to reduce congestion in the PLMR service as well as to provide rulemaking which will promote the development and implementation of new technologies for radio application, it urges the Commission to consider the following comments concerning those issues raised in the Report and Order and Further Notice of Proposed Rule Making, P.R. Docket 92-235.

II. COMMENTS PERTAINING TO THE REPORT AND ORDER

This section contains Union Pacific Railroad's comments in response to the Commission's request for user input on service pool consolidation[2].

A. Union Pacific appreciates the Commission's Refarming decisions to date.

Based on several issues in the Report and Order, it was evident that the Commission is attempting work with the PLMR users to insure that the decisions that are made concerning the Refarming Docket have the user's best interest in mind. Union Pacific is specifically appreciative of the channel plan and the migration time frame established by the Commission regarding the VHF band. We do, however, have some concerns with the intent of other sections in the Report and Order which will be discussed later in this document.

B. Union Pacific opposes consolidating the railroad radio service with other service pools.

The Commission acknowledges that many of the PLMR user groups are not in favor of pool consolidation[3]. Union Pacific is also vehemently opposed to consolidating the railroad service pool with any other non railroad user group. Detail of Union Pacific's position is further described in the text below.

C. Restatement of the Commission's desire to consolidate service pools.

As stated in the Report and Order, the Commission requested that the PLMR user groups cooperate with each other and develop new categories for service pools[4]. The intent of this action is to reduce the number of service pools from 20 to 2, 3, or 4 radio services.

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2 Report and Order, PR Docket 92-235 at paras. 50 - 52.
3 Report and Order, PR Docket 92-235 at paras. 48, 49.
4 Report and Order, PR Docket 92-235 at para. 50.

The Commission is seeking to achieve multiple goals such as; (i). ensure more efficient use of newly created channels which result from migration to narrowband technologies, (ii). permit licensees to utilize innovative and spectrally efficient technologies for radio equipment, and (iii). foster greater operational efficiency for users and promote more flexible use of the spectrum.[5]

The Commission recognizes that unique radio services should be taken into consideration in order to "...prevent overcrowding and to maintain the critical functions of the users..."[6] The Commission further recognizes that these unique services may not be properly served by having multiple coordinators as implied by the statement "[a]dditionally, we recommend that users consider whether a single coordinator or multiple coordinators should be used for public safety users."[7]

Union Pacific agrees with the Commission's concerns of identifying unique radio services, over crowding and multiple coordinators in that:

1. *The railroads are unique PLMR users because of their requirement to be interoperable, nationwide.*

   Railroad train crews must be able to communicate with any and all railroad dispatchers nationwide in order to operate safely. Interoperability mandates that a radio network must be capable of providing clear communications to every user, regardless of which railroad company owns the radio equipment. Without interoperability, train movement coordination between railroads would be nearly impossible resulting in loss of life, property, and harm to the environment from train derailments.

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5 Report and Order, PR Docket 92-235 at para. 50.
6 Report and Order, PR Docket 92-235 at para. 53.
7 Report and Order, PR Docket 92-235 at para. 53.

2. *Railroad radio networks are currently over crowded in major metropolitan areas.*

Railroad operation safety and efficiency is currently being compromised in these congested areas. The only relief is to utilize additional channels which will become available as a result of the Refarming Docket PR 92-235.

3. *Having multiple coordinators for the railroad band is not in the best interest of the public nor the railroad employees.*

Railroad radio channels are used for critical functions routinely on a nationwide basis. It is essential to maintain a single, common frequency coordinator who understands the intricacies of railroad radio communications. Improper assignment of channels could easily result in catastrophic events due to interference to, or misinterpretation of, radio conversations between crews and dispatchers. These events often result in loss of life and contamination of the environment and always result in significant loss of property.

D. Consolidation of the service pools is contrary to the goals of the Commission for the railroad industry.

The following topics illustrate why Union Pacific believes the Commission's intention to combine service pools is not aligned with the Commission's desired results.

1. *Newly created channels in the railroad band will be lost to other users in the major metropolitan areas, destroying the current contiguous block of spectrum.*

Union Pacific feels that the potential relief associated with the availability of additional channels will be prohibited if multiple coordinators have access to the channels in the major metropolitan areas. This is due to many of the other user groups have multiple coordinators within the same trade association who are

structured to process frequency requests at a higher rate then the AAR's frequency coordinator.

In the major metropolitan areas, there will most certainly be a rush to obtain all available channels since it has been established that all user groups are congested in these areas. The AAR does not have the manpower in place to compete with trade associations who are structured for bulk license processing. As a result, the AAR will not be able to obtain the number of new channels as are needed by the railroads. In addition to the loss of potential channels, the contiguous block of spectrum associated with the railroad radio service will be destroyed in the major metropolitan areas.

2. Ability to utilize new technologies will be difficult, if not impossible, in the railroad band.

Once the availability of additional channels is compromised and contiguous spectrum is eliminated, the second goal of the Commission ceases to be feasible for the railroads. The Commission has stated:

> "[s]ome digital multiple access techniques, including time division multiple access (TDMA), require several adjacent channels to operate efficiently. Because specific channel allocations for each of the radio services are generally scattered within the PLMR bands, rather than in contiguous blocks, spectrum necessary to implement such techniques is difficult to amass."[8]

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[8] Report and Order, PR Docket 92-235 at para. 44.

Again, we agree with the Commission that it is essential to be able to combine channels in order to take advantage of new, innovative technologies. In fact, the railroad industry has made initial plans to utilize the railroad band to implement such technologies.

The railroads have discussed a "bandwidth on demand" technique for periodic high speed data communications in the VHF band. Refer to Figure 1 below for a diagram. In this technique, a base station trunking site controller would select a "target" channel, combine adjacent channels and then instruct the mobile requesting service to utilize the combined bandwidth for a single transaction. Once the data has been transferred, the trunking controller would release the channels back to independent communications paths. This technique would only encumber the amount of spectrum needed to meet the communications request at that time. The spectrum would then be reused for individual, voice and/or lower speed data communications.

Railroad Radio Service

Bandwidth on Demand
Channel Utilization

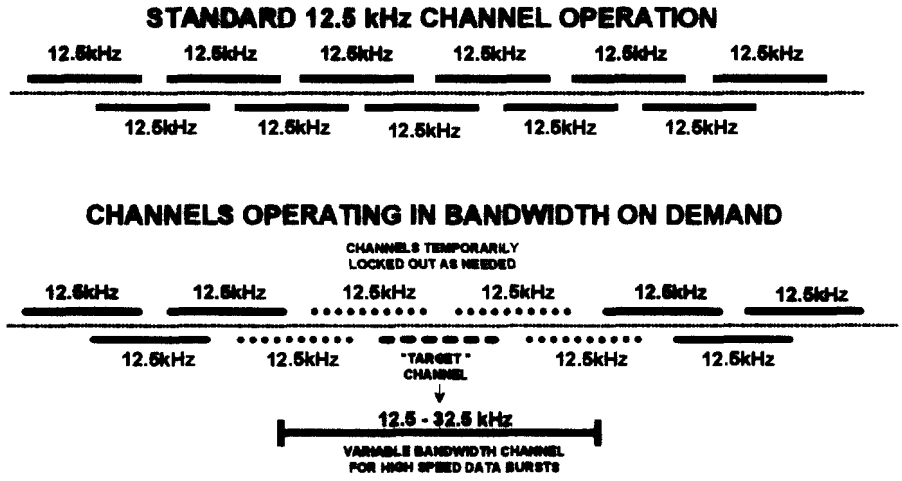

Figure 1

However, this technique is only feasible if the adjacent channels are under the control of one group of users who mutually agree to the operation and utilization of the channels which are affected. The railroads currently operate in the mode of sharing channels with each other and this technique is a natural progression into the future of communications for the railroad industry. This open sharing would not be possible with user groups who do not have the same motivation to communicate with each other as do the railroads.

A second technique which has been discussed by the railroads involves dedicating several contiguous channels in a portion of the railroad band to broad band data technologies. Refer to figure 2 below. As an example, modulation techniques such as 16 QAM (16 state, Quaduture Amplitude Modulation) could be used for short range, high speed data communications. Techniques such as this are necessary in order to facilitate the ever growing need for data communications in fixed areas.

Railroad Radio Service

Dedicated Block of Channels for Broadband Data Communications

STANDARD 12.5 kHz CHANNEL OPERATION

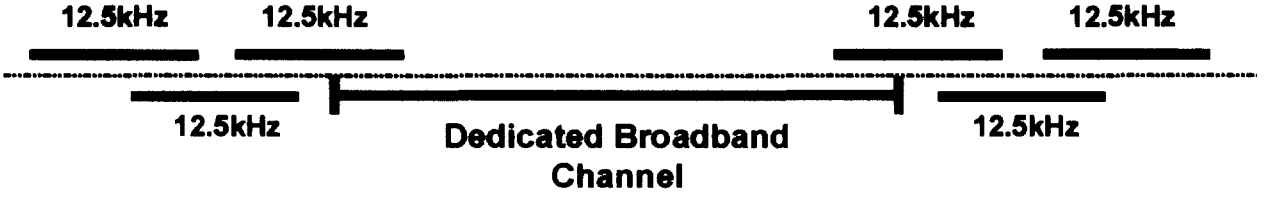

Figure 2

Union Pacific is currently aware of several broad bandwidth applications in the railroad industry. One of the applications is to provide a communications link between a computer onboard the locomotive and a data base source. This link will transfer critical terrain information to the locomotive for utilization by the Positive Train Control (PTC) system currently under development. The terrain information will provide the PTC computer with detail which will be used in location and braking algorithms for the purpose of stopping the train in an emergency.

A second broad bandwidth application would be the transfer of data from an event recorder located on the locomotive. The event recorder onboard a locomotive records all functions and actions of the engineer in addition to specific information associated with the locomotive . The event recorder is the equivalent of a flight recorder on an aircraft and is used to evaluate train handling as well as in investigations of derailments.

Attachment 1 to this document is a summary table of the known data systems associated within railroad operations. Many of the systems listed are essentially on hold, waiting for a cost effective communications network to be implemented. This network is only feasible if the railroad radio service is retained intact. Once an integrated voice and data network is in place, new data applications will be developed at an ever increasing rate.

In addition to the data applications listed, the railroads intend to implement trunking systems throughout the nation to achieve greater spectrum efficiency. To accomplish this, the railroads have discussed establishing trunking channels by pairing newly assigned frequencies into trunked channel groups. Since trunking is

relatively new to the VHF band, channel pairs are not established like those which have been allocated in the 800 MHz band for trunking. The only way to establish efficient channel pairs is to organize the channels with a constant separation between the base station's transmit and receive frequencies. If the railroads were to lose the newly assignable channels to non railroad members, the trunking channel plan will not be possible.

3. *Ability to foster greater operational efficiency and more flexible use of the spectrum will also be difficult to achieve.*

The railroads are very focused on operational efficiency. It is the only defense we have to remain competitive with other forms of transportation, especially in an era of "doing more with less." Technology is the primary tool used to achieve operational efficiency and wireless communications provides the majority of benefits for field operations.

As mentioned above, the railroads have had lengthy discussions on how to best organize the new channel plan, including the newly created channels. If the spectrum is not retained as one operational service pool, the railroads will lose the ability to take full advantage of the spectrum. All other potential non railroad users of the new channels will also not be able to achieve any communications techniques beyond what is commonly referred to as "simple talk paths."

Trunking technology is one major tool that the railroads see as a means to organize communications into working groups. Conversations will be confined to those who need to monitor the call. This will eliminate unwanted chatter resulting in safer and more efficient communication transactions.

It is true that opening up the railroad radio service pool will provide benefits to users who only need talk paths. In this sense, the use of the spectrum is more flexible. However, Union Pacific believes that the intention of the Commission is to provide optimum communications to all PLMR users, not just one group.

We believe that additional blocks of spectrum should be dedicated to simple talk paths as was established in the 221 to 222 MHz band. In other words, to maximize the spectrum utilization, large, complex, integrated systems should be separated from the simple voice communications systems which utilize only a few channels. If a non railroad user occupies a newly created channel, the railroads lose the potential for trunking channels, dynamically assigned data channels, and/or dedicated broad band channels.

Once again, a simple talk path can be created and inserted in any band of the PLMR spectrum. Loss of opportunity becomes a real factor when complex, nationwide, interoperable systems are consolidated with smaller, independent systems.

III. COMMENTS PERTAINING TO THE FNPRM IN PR DOCKET 92-235

As an "incentive" to move to narrowband technology, the Commission has proposed to allow licensees who convert to narrowband to prevent licensing of new co-channel licensees. The Commission also proposed to allow exclusive licensees to resell excess capacity. While the Commission's specific recommendations concerning exclusivity would have limited applicability in the context of a separate railroad service, Union Pacific is concerned that the Commission's proposals for exclusivity and the right of resale bridge the distinction between

private and commercial services. The Commission should preserve the right of frequency coordinators to facilitate effective spectrum management and conversion to narrowband technology by limiting access to specific frequencies once certain technical requirements have been fulfilled. However, any attempt to implement exclusivity and resale would not only be unnecessary but would not accommodate the wide variation of systems in the railroad radio band.

A. Exclusivity is not necessary because of the existence of sufficient incentives to implement narrowband technologies.

As mentioned previously most PLMR users, including the railroads, suffer from extreme congestion especially in the major metropolitan areas. Because of the congestion, most users will convert to narrowband on their own in order to obtain additional channels. A study of the current state of use of the PLMR bands concluded that, "[t]he amount of spectrum allocated for [private wireless use] has not kept pace with the need, and existing [private wireless] spectrum is so highly congested as to be unusable for some communications purposes."[9]

Aside from the Commission's definition of exclusivity, the railroads have been engaged in a system of "shared exclusivity" since the creation of the railroad radio service. The railroad industry has exclusive use of the railroad radio service spectrum on a shared basis between all railroads. This method of sharing has proven to be very effective in terms of efficient spectrum usage. However, this method is only successful because of the railroad industry's requirement for interoperability which fosters cooperation between individual railroad companies.

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[9] Methods for Assigning Spectrum Licenses to Private Wireless Communications Users, by Nathan Associates, Inc., (June, 1995)

B. Resale of excess capacity is not desirable in the PLMR bands.

On the surface, resale of excess capacity is attractive. However, resale of spectrum will impose a undue burden on railroad operations. Private users are not in the business of generating revenue directly from their use of spectrum as does the commercial users. The railroads are in the business of moving freight and passengers, not selling spectrum. Management of selling spectrum would require the dilution of business resources and will divert attention away from running the railroad. Resale of spectrum would also expose the railroads to additional liability as providers of spectrum. More importantly, the railroads will most likely not have significant excess capacity because of congestion and pent-up demand by voice and data applications.

C. Auctioning of spectrum is not a feasible vehicle for channel allocation for the railroads.

Market-based allocation devices, such as auctions, are not appropriate for the railroads because of their public safety functions and unique operational needs. Because of the safety-related nature of the railroad communications networks, the railroads should be treated as "public safety" entities if auctions are implemented in the PLMR bands and should be exempted on the same basis as other public safety entities.

Some of the safety-related uses of radio by the railroads are mandated by statute and regulation from the Federal Railroad Administration. In an auction, the railroads could never be certain that they will have access to essential radio frequencies. This is completely unacceptable. The railroads cannot risk the inability to comply with statutory and regulatory safety requirements based on the ability of the railroads to outbid other contenders for the same spectrum.

D. User fees are not necessary as an incentive to become more spectrally efficient and can also result in financially penalizing those who do convert to narrowband.

As previously mentioned, incentives already exist for the railroads to move to more spectrally efficient technologies. This movement will be made at great expense to the railroads and with the addition of user fees, the resulting costs may be prohibitive.

Union Pacific also feels that the PLMR users are being singled out in terms of being subject to user fees. Other users of spectrum should be reviewed by the Commission as well. If user fees are not imposed universally as well as equitably, the railroads should be exempt because of their public safety functions.

IV. SUMMARY and CONCLUSION

The Railroad Radio service ultimately represents a model for the goals set forth by the Commission in that:

1. The band is efficiently and effectively shared by many companies who function as one company in terms of radio communications.
2. The band is a contiguous block of spectrum which fosters the deployment of spectrally efficient technologies.
3. The band is coordinated by one organization which results in the most safe and efficient means to dynamically assign and reassign channels to meet the ever changing needs of the railroad users.

The reason for the current success of the railroad radio band is that all users having a common interest and similar communication needs have been grouped together. We believe that the Commission should follow through with their request for consensus plans from user groups. The submitted consensus plans should identify those users who feel that consolidation with each another is mutually beneficial. The final quantity of service pools should be based on the number of PLMR users having similar communications needs who can be logically grouped together into communications pools. The number of service pools should not be arbitrarily established without regard to the operational needs of PLMR users.

Union Pacific Railroad urges the Commission preserve the railroad radio service and not destroy the only band created by the Communications Act of 1934 which appears to meet the needs and desires of all PLMR users. The Commission should strive to preserve the attributes of the railroad radio band and continue to promote them in additional user bands.

Union Pacific does not feel that time and energy should be expended forcing users who do not wish to be grouped together into the same wireless communications environment.

As previously discussed, Union Pacific is not in favor of implementing exclusivity, reselling excess capacity, competing for spectrum through auctions, nor paying excessive or unreasonable user fees. The Commission has established a substantial amount of change through the Refarming proceedings. Union Pacific believes that the current changes should be allowed to "take root" in the PLMR bands to see if the remaining issues will be resolved without further regulation.

Respectfully Submitted,

Edwin F. Kemp
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Wireless Systems Engineering
Union Pacific Railroad Company
Missouri Pacific Railroad Company
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Omaha, Nebraska 68179-0230
Voice #: (402) 271-4883
Fax #: (402) 233-3001

ATTACHMENT 1

Data System	Function
EOT/HOT, (2 WAY)	Telemetry link to the end of the train for monitoring functions such as brake line pressure and motion detection.
Distributed Power	Wireless remote control of helper locomotives from the lead locomotive in a train.
Health Monitoring	Locomotive health information system for remote evaluation of locomotive operational efficiency and malfunction analysis.
Fuel Management	Fuel usage and availability on the locomotive as well as fuel efficiency evaluation.
WOR	Work Order Reporting utilized by the conductor to enhance customer service.
PTS/PTC	Positive Train Separation/Control to prevent collisions between trains.
AEI	Automatic Equipment Identification for containers and box cars.
Event Recorder	Wireless download of event recorder.
Crossing Safety	Wireless warning to vehicles such as school buses and emergency vehicles of trains approaching a crossing.
Cab Signals	Notification of signals along the tracks.
Train Line	Locomotive intercommunications for the purposes of braking and control functions associated with train handling.
Consist Telemetry	Distributed monitoring of consist.
Defect Detector Comm. Link	Communications with wayside defect detectors to enhance the notification of a defect to the train crew.
Belt Pack	Remote control of locomotive with a hand held device used in confined areas such as yards and maintenance areas.
Ticket Sales/ Manifest	Passenger service functions.
Credit Card Authorization	Passenger service functions.
Track Warrants p/o PTS	Movement authority sent to crew members for train operations.
Commissary Reports	Passenger service functions.
Security System Monitoring	Security systems for passenger service as well as freight consists.
Location Systems i.e. DGPS	Location systems for all types of trains and train services.

VERIFICATION

STATE OF NEBRASKA)
) ss:
COUNTY OF DOUGLAS)

I, Edwin F. Kemp, General Director, Telecommunications Wireless Systems Engineering of Union Pacific Railroad Company and Missouri Pacific Railroad Company, being duly sworn, state that I have read the foregoing Comments, that I know their contents and that those contents are true as stated.

Edwin F. Kemp

Subscribed and sworn to before me this 14th day of November, 1995.

Notary Public

GENERAL NOTARY-State of Nebraska
DORIS J. VAN BIBBER
My Comm. Exp. Nov. 30, 1996

My Commission expires:

Nov. 30, 1996