Before the

Federal Communications Commission

Washington, DC 20554

In the Matter of	)	
	)	
Improving Public Safety Communications in the 800 MHz Band	)	
	)	
	)	WT Docket No. 02-55
Consolidating the 900 MHz Industrial/Land Transportation and Business Pool Channels	)	
	)	

To: The Commission

COMMENTS OF
AMERICAN ELECTRIC POWER COMPANY, INC.

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Background

American Electric Power Company, Inc. ("AEP"), a utility holding company registered under the Public Utilities Holding Company Act ("PUHCA") of 1935, is one of the country's largest energy providers. With more than 38,000 Megawatts of generating capacity in the U.S., AEP serves more than 4.8 million domestic customers. To serve territory covering more than 197,000 square miles in parts of 11 states, AEP operates approximately 38,000 miles of transmission lines and more than 186,000 miles of distribution lines.

AEP has been engineering and operating private land mobile radio ("PLMR") systems for more than 50 years and has significant expertise in this area. Within the past 10 years, AEP has built an 800 MHz radio communications network throughout the AEP service territory. This sophisticated radio system comprises 270 trunked base stations and serves approximately 12,000 end user terminals and 130 dispatch consoles throughout our 11-state service territory. AEP continues to engineer improvements to the system and is planning to move or add at least 20 base station locations in the next two years. AEP's investment in this system exceeds $100 million. This radio system is not a simple patchwork of mobile, portable, and base station radios, rather it is a complex radio network that offers advanced wide-area voice and data communication services.

AEP has no option other than to operate its private wireless network in order to meet the safety and operational requirements of the electric utility business. Commercial wireless networks are not an option due to limitations related to coverage, availability, reliability, and wide area dispatching. AEP's PLMR system is used to dispatch personnel in the repair of facilities and restoration of electric service as well as to coordinate the day-to-day operation of electrical transmission and distribution systems. If these

activities are not properly coordinated or handled in a timely manner, the communities we serve could be negatively affected. Furthermore, AEP's PLMR system enhances the safety of utility personnel who are often called on to work in the harshest and most dangerous of working conditions.

For the above reasons, AEP is gravely concerned about the impact of any plan for the 800 MHz band that could impair the continued viability of AEP's 800 MHz system. As described more fully herein, any plan requiring AEP to shuffle channels within the 800 MHz band or move to another band poses severe operational issues, such as, how to maintain full operational capabilities during a transition period. Such a transition period would be extremely disruptive, costly, and would be compounded should a disaster (such as a hurricane or ice storm) strike within the AEP service territory while such activity was taking place.

AEP understands and supports the very special needs of the public safety community, but AEP does not believe that wholesale disruption of the 800 MHz band plan is the right answer to solve the interference problems. In fact, utilities like AEP effectively become partners with public safety agencies during emergencies. In many areas around the country, public safety agencies and utilities even share the same infrastructure. Forcing utilities to other bands or even changing the current band plan could have a very negative impact on these partnerships.

The business and industrial/land transportation ("B/ILT") users in the band are not the sources of the interference and need not be part of the solution. To the contrary, B/ILT users can be just as much victims of the interference caused by cellular-like commercial mobile radio systems ("CMRS") as the public safety community. AEP urges

the Commission to focus on the perpetrators of the interference to provide the solutions to the interference problem and not spread that responsibility to innocent parties.

The Commission, in fact, stated the best option for absolute elimination of the problem with minimal disruption to 800 MHz users at paragraph 27 of its NPRM in the following sentence:

> "… could a band above 1 GHz provide a home for relocated 800 MHz cellular architecture SMR systems?"

Such relocation would provide assurance of solving the problem; whereas, rebanding 800 MHz does not. Further, it places the burden of solving the problem on the parties responsible for causing the interference.

Comments on NPRM

The Commission raised a series of questions in the NPRM to which AEP declines to comment. For example, the Commission asked about the need to provide more spectrum to public safety and about public safety interoperability. AEP believes that such issues are tangential to the basic issue of solving the interference problem and should be of secondary consideration. Additionally, others in the public safety community are better suited to respond to such questions. AEP's comments focus primarily on the technical issues at hand and on transition issues. AEP's comments are presented in the approximate order presented in the NPRM.

Nextel Proposal - General Comments

Clearly this proposal causes a severe impact on the B/ILT community - the very licensees who are not a part of the problem or the recipients of any benefit. Relocation to other bands for B/ILT licensees means complete replacement of existing equipment. For

reasons expanded later, AEP does not believe that rebanding of 800 MHz will solve the interference problem. Moving the B/ILT users to other bands leaves Nextel's cellular architecture within the pass bands of existing public safety receivers. As long as the receivers continue to "hear" the low-site signals within their pass bands, intermodulation will continue to occur. Moving Nextel to another band, on the other hand, assures elimination of the interference by moving the cellular-like structure out of the pass bands of public safety receivers.

Nextel also proposes that B/ILT users could remain in the 800 MHz band on a secondary basis.[1] This is a carrot without substance. For critical infrastructure providers, such a reclassification would be equal to immediately forcing their systems to another band. As the Commission points out, these providers cannot base their operations on a communications system that could be forced to precipitously discontinue service.[2] Utilities such as AEP need to be able to build and operate support systems in a manner that guarantees long term availability, as they are held publicly accountable for maintaining the highest standard of reliability. Furthermore, the secondary status is particularly impractical for large providers such as AEP because the nature of large integrated wireless systems makes it difficult to relocate operations on a piecemeal basis.

Nothing contained in the Nextel proposal assures that the interference problem will be eliminated. To the contrary, the plan calls for disruption of nearly all public safety and B/ILT licensees, while Nextel gains the contiguous spectrum it has desired for years and gains the opportunity to deploy yet more cellular-like architecture. Additionally, the $500 million that Nextel proposes to provide for the transition must be

[1] NPRM WT 02-81, Paragraphs 35, and 62
[2] NPRM WT 02-81, Paragraph 34

looked at very suspiciously. As a stand-alone amount of money, $500 million may look large. But, when one begins to spread it among all of the Public Safety systems that would have to be reconfigured, AEP believes that it will hardly begin the process. The plan should be discounted immediately with no further consideration by the Commission.

NAM Proposal - General Comments

Although the NAM proposal is more friendly to B/ILT licensees, it too suffers from the uncertainty of whether or not it will eliminate the interference. It also causes massive turmoil during a transition period for all licensees in the band. It appears, that it would require a huge amount of frequency coordination activity as entities changed channels. No channel-by-channel translation table has been provided. In fact, such a table does not even seem possible as the relative amount of spectrum allocated to each type of service changes in the plan. At the end of the day, the interference problem might or might not be any better. On the positive side, this plan would allow continued use of most of the existing infrastructure. So, if the plan fails, costs will be limited to coordination and retuning expenses.

AEP also has concerns about how reshuffling of the 800 MHz band would affect the Canadian and Mexican border regions. AEP has considerable operations within both regions. Thus we are concerned that any plan to reshuffle the 800 MHz spectrum include considerations to maintain equivalent allocations and afford protection from cellularized systems to public safety, IL/T and Business users in the Canadian and Mexican Border Regions.

Relocation of B/ILT Stations

With the issue of imposing secondary status on 800 MHz B/ILT incumbents in mind, AEP also sees the wholesale rebanding of these incumbents to 700 MHz or 900 MHz as impractical. While such a move would have a significant financial impact to AEP, the operational impacts are even more troublesome. The only practical way to ensure continuous communications in a migration scenario would be to build a new system to operate concurrently with the existing 800 MHz system. Even if AEP were to perform such a migration on a regional basis, running two concurrent systems is not feasible for a number of reasons.

Two concurrent systems would require double the number of facilities required to maintain AEP's current radio communications capacity, *i.e.* a new 700 or 900 MHz system built beside the existing 800 MHz system. Such a migration, on the infrastructure side, would affect tower loading, equipment building space, backhaul transport, and networking equipment. In many cases, existing facilities may not be capable of supporting such increases. This would be true in instances with towers that are currently fully loaded or with equipment shelters that are filled to capacity. It would be necessary to replace these facilities (which are adequate with the current communications system) to support the migration. Under this scenario, end users of the system would be provided with a single end terminal (portable or mobile radio) and be assured of communications during the entire transition. Such replacement would represent an undue burden on the utility ratepayer and shareholder.

On the other hand, a migration could be initiated by providing users with two sets of end terminals as base station sites were individually converted. In this case, operational or safety concerns arise if a user attempts to operate the wrong radio and

cannot communicate over the infrastructure that is operating in the area in which he is located. Additionally, keeping users trained and competent in operating two completely different sophisticated radio terminals is difficult at best and user confusion could lead to serious lapses in communication that endanger utility personnel and/or the general public.

Furthermore, concurrent operation of two radio systems would involve integration problems that, while solvable, do not have clear solutions today. For instance, while compatible 900 MHz equipment that could be connected to AEP's existing network is available today, the existing AEP network is not expandable to the level of capacity necessary to support a complete second set of radio infrastructure. This means that any migration strategy that involves infrastructure operating in two bands will require AEP to build two networks. The operation of two separate networks inevitably leads to the problem of how to interconnect them in an integrated manner to ensure that the communications between any two parties over a large geographic area is not disrupted. Since AEP performs dispatching operations on a wide area basis in a greatly consolidated manner, maintaining this wide area communications capability is essential.[3]

If a migration is to take place using two separate networks, AEP must ensure that its dispatchers can communicate with all of their field personnel in an integrated, expeditious manner. While these integration issues in theory may be solvable, AEP could not even begin to support any sort of migration away from its current radio system until clear solutions exist for these problems. AEP anticipates that a migration would take several years to plan and implement; a process that will not fit within the constraints

[3] AEP operates dispatch centers that are responsible for regions that may be spread across parts of several states, *e.g.* dispatchers in Fort Wayne, IN are responsible for communicating with field personnel in a region that stretches from Benton Harbor, MI to Canton, OH. AEP dispatches its entire 11 state service area from 5 distribution dispatch centers.

that would be imposed by the reallocation timeframe suggested by paragraph 65 of the NPRM. AEP additionally wishes to point out that relocation will necessarily be a very long process for an additional reason. Whether rebanding to 700 or 900 MHz, there is no off-the-shelf supply of available equipment. Manufacturers will need time to produce sufficient equipment to allow all 800 MHz B/ILT to reband, even if only to 900 MHz. It has taken years to produce and install all of the current 800 MHz equipment. In AEP's view, neither the manufacturing capacity to produce the equipment nor a sufficient supply of technical talent to install the equipment exists to effect a quick and smooth transition.

The NPRM also asks at paragraph 36 whether current equipment could be modified to operate at 900 MHz, given the narrower bandwidth channels. It is important to note that 800 MHz equipment is not designed to operate outside of that band. AEP believes very strongly that while an amateur radio operator might effect such changes on a case-by-case basis, it would be extremely bad public policy to allow or encourage such modifications in the PLMR bands. One of the purposes of the equipment approval program is to assure that equipment will be manufactured in a way that minimizes the potential for spurious interference. Allowing thousands of technicians around the country to modify basic frequency-determining circuitry, modulation levels, and filtering circuits could result in a great deal of "dirty" equipment. Few shops have the necessary sophisticated equipment necessary to make proper measurements on equipment. Rather than solving interference problems, such a plan could significantly increase interference.

Relocation Costs

As noted above, the radio equipment compatible with AEP's 800 MHz trunked radio network cannot be "retuned" to operate in the 700 MHz or 900 MHz bands; any move out of 800 MHz would require the wholesale replacement of all of AEP's radio equipment. We believe that this is the case with most, if not all, 800 MHz land mobile radio licensees today.[4] The replacement equipment would include all mobile and portable radio units as well as base station components such as repeaters, combiners, antennas, and tower-top amplifiers.

If the relocation to 700 MHz were considered, AEP's cost to relocate would be in excess of the $60 million[5]. (This figure assumes the cost of 700 MHz will be roughly equivalent to that of current 800 MHz equipment.) However, in addition to the raw hardware replacement costs, other issues connected to 700 MHz cause AEP concern. Television stations will continue to encumber the 700 MHz band in parts of AEP service for territory for many years to come. Furthermore, even if a 700/800 MHz swap were to take place in areas where Nextel currently holds 700 MHz licenses, additional provisions will need to be made to address parts of AEP service territory that are held by other 700 MHz Economic Area licensees.

Additionally, if the relocation is to 900 MHz, AEP anticipates the need for additional tower sites. This is due to a variety of factors that decrease base station coverage, including the higher propagation losses and reduced effective radiated power

[4] Motorola has released a new dual-band (700/800 MHz) portable into the market, but the vast majority of existing installations do not include this recent product development. This radio has not been on the market long enough to achieve any meaningful market share; consequently, all current 800 MHz licensees who are forced to move from the band would replace virtually all of their radio equipment in service today.

[5] See Appendix A for a rough detail of this amount.

("ERP") due to the channel allocation scheme used at 900 MHz. [6] AEP's cursory analysis indicates that about fifty additional sites may be required. AEP's site construction cost is typically in the range of $300,000 on average. Thus, the move to 900 MHz could cost AEP an additional $15 million on top of the $60 million detailed above. The total cost to AEP to relocate to 900 MHz could be in the range of $75 million.

Cost Reimbursement Options

At paragraph 43, the Commission asks the question about who should pay the, "… cost of relocating public safety systems - and Business, SMR and Industrial/Land Transportation systems as well ..." As restated in paragraph 44, Nextel asserts that, "there will be a benefit to 800 MHz SMR, Business and Industrial/Land Transportation licensees if they relocate in the 700 MHz and 900 MHz bands." There is simply no basis for such an assertion. AEP's 800 MHz system works well and no benefit will be derived by a move to 700 MHz or 900 MHz.

Proposals in the Nextel white paper are nothing more than a thinly-veiled attempt by Nextel to sidestep its responsibility to resolve interference caused by its operations. Regulations (such as 47 CFR 90.173(b)) and precedent dictate that Nextel fix the interference problem even if they are operating completely within the channels authorized by their licenses. Nextel should be held solely accountable for the interference they cause to Public Safety radio systems rather than allowing them to divert the responsibility by forcing the B/ILT community to move to 700 or 900 MHz and even assist in the relocation costs for public safety. Nextel even attempts to drag A and B band

[6] 900 MHz channels are typically allocated in continuous blocks that require transmitter-combining equipment that operates at a higher loss than that used at 800 MHz. The increase loss due to the combiner results in a reduction in ERP and receive sensitivity.

cellular operators into the mix for relocation costs. Nextel is the primary cause of the interference and should be the primary source of the solution. If rebanding or reshuffling of the 800 MHz spectrum is ultimately required, associated costs should be solely the responsibility of the party most responsible for the problem, Nextel, even if operating fully within the technical parameters of the rules. Public safety and B/ILT users affected should be entitled to reimbursement for all equipment, engineering, licensing, and installation costs associated with required changes.

Neither the Commission nor the B/ILT licensees have a responsibility to make Nextel whole. Nextel first came to the Commission with a proposal for an improved dispatch system under its "Fleet Call" proposal. Since then, it has kept pushing for more and more, including clearing of the upper 200 SMR and status as a full CMRS (wireless telephone) carrier. It has taken spectrum intended for one type of service and turned it into something quite different by building thousands of cell sites to support public switched telephone traffic, not dispatch service as it originally requested. Nextel cannot now be heard to ask for yet more contiguous spectrum and to ask others to pay for its mistakes. The Nextel plan seems to be an attempt to gain more contiguous spectrum under the guise of solving a public safety interference problem.

If some type of rebanding or reshuffling plan is adopted, AEP supports a reimbursement plan that fully compensates Public Safety, B/ILT, and SMR incumbents that are forced to relocate. As the Commission considers any reimbursement program, AEP urges the Commission to stay focused on the cause of the interference problem and place the cost of remediation on those causing the interference. Innocent parties should not be required to pay for changes to their own equipment or to participate in a compensation program for public safety brought about by the actions of another party.

While, Nextel uses the spectrum to make money, Public Safety and B/ILT users are specifically prohibited by the rules from making any profit on their spectrum.[7] They use their spectrum for protection of life and property or to make their operations more efficient.

Alternative Technical Options

AEP is skeptical that a complete reallocation of the 800 MHz band will completely solve the public safety interference problem. Even rebanding of B/ILT stations offers little certainly to reduce occurrences of the problem, given that the cellular-like stations remain within the pass band of public safety receivers. Other technical approaches to solve the problem could be more effective without the disruption to all incumbents of the 800 MHz band. There are several reasons AEP believes this.

Intermodulation

First of all, if intermodulation interference is the primary mode of interference, rebanding 800 MHz as Nextel proposed will not move public safety away from all possible interfering intermodulation products. This is especially true in cases where "Upper 200 SMR" transmitters are co-located with cellular transmitters. With the power levels normally involved with CRMS installations, combining these two types of transmitters at one tower location could result in intermodulation products in the proposed public safety bands at levels that would interfere with normal operations.

Some proponents of rebanding contend that by isolating the various services from one another, radio manufacturers could build radios with tighter front ends that reduce the influence of out of band signals. As a practical matter though, the radio manufacturers

[7] 47 C.F.R. § 90.179(f)

appear to be heading in the other direction and leaning towards building dual-band 700/800 MHz radios to provide users with one radio model that covers Public Safety allocations in both bands. Such a radio would need to utilize a wider front end or one that is "steerable[8]," thus missing the opportunity to build a radio with "tighter" performance specifications. However, even if radio manufacturers decide to build a radio customized to the proposed Public Safety band located in 800 MHz, the band plans used within Canadian and Mexican border regions may dictate that the front ends of Public Safety radios still cover relatively large portion of the 800 MHz band, thus reducing the effectiveness of such a solution. It is AEP's contention that Nextel and perhaps the Cellular carriers will need to carefully coordinate inter- and intra-system channel assignments at transmitter locations in order to significantly reduce the threat of intermodulation interference to public safety, even if rebanding occurs. If such is the case, AEP questions whether rebanding of 800 MHz is justified.

Receiver Overload

In addition to the intermodulation interference, receiver overload has been cited as a common interference mode in regards to public safety interference. It is commonly agreed that the public safety problem is fundamentally caused by the difference in the relatively low received signal strength of the public safety signals compared to the relatively high received signal strength of the low site CMRS signals. On-street signal measurements made by AEP and others indicate that a nearby CMRS signals can be in excess of 70 dB higher than that of the distant "high site" radio system. Nextel contends

[8] "Steerable" front ends can be coarsely tuned to a particular portion of the band, but since they are usually based on varactor diode technology, these front ends are less effective filters because they capacitor-based and have a less "steep" pass band compared to a traditional inductor-based front end. This in turn allows more of the out-of-band signal into the radio and raises the potential for intermodulation interference.

that this relative difference in signal level can be reduced by requiring public safety licensees to maintain a minimum signal level in areas that may experience overload.[9] This could be accomplished by increasing the number of public safety base stations, either by simulcasting the same channels at multiple transmitter locations or moving to a cellularized architecture where public safety receivers roam from one set of channels to another, much like CMRS receivers. Neither are very attractive options because of the increased costs involved with such solutions. More importantly though, both solutions are problematic because of real-world operational concerns. There is a practical limit to how close simulcast transmitters can be placed to one another and it may not be possible to achieve the minimum power level specified by Nextel, even with a simulcast transmitter configuration. Also, moving to a cellular architecture to increase received signal levels without fully loading those channels is spectrally inefficient and a given public safety agency may not have access to the number of channels required to build out a cellular architecture. Hence, the minimum received signal levels that Nextel recommends may be difficult or impossible to achieve in many situations.

AEP additionally questions whether on-street CMRS signal levels of –30 dBm are really necessary or merely the byproduct of poor RF engineering practice. (*e.g.* running hundreds of watts of ERP on low height sites with steeply downtilted antennas.) It is AEP's contention that extremely high receive signal strength levels from CMRS transmitters will continue to cause receiver overload near CMRS tower locations, even if a new band plan is adopted for 800 MHz. AEP believes that overload interference will need to be addressed on the CMRS side of the equation by limiting the on street signal levels of CMRS providers when an interference problem has been identified.

[9] NPRM 02-81, Paragraph 76

Transmitter Sideband Noise

Off-channel emissions from transmitters can cause significant interference to neighboring licensees[10]. Through the use of high quality factor ("high Q") filters, attenuation of sideband and other spurious products can be reduced much more than 80 dB. Tightening the emission mask for EA-licensees (and non-EA licensees using cellular-like technology) could have a profoundly positive effect on eliminating extraneous emission interference.

Technical Options

With the above factors in mind, AEP believes the public safety interference problem needs to be addressed on a short term basis with technical solutions (most likely on a case-by-case basis) with an evolution to separating cellular-like architecture systems from traditional Land Mobile Radio systems operating in the 800 MHz band as a long term means to minimize the possibility of the reoccurrence of interference. If a new 800 MHz band plan is the route adopted by the Commission, AEP would prefer to see a plan that allows 800 MHz licensees to move to new allocations within the 800 MHz band only to address specific cases of interference. Such moves would be instituted only when various technical solutions fail to address the interference. These technical solutions could include requiring CMRS carriers to coordinate channel allocations to minimize intermodulation at collocation sites, limiting on-street received signal strengths to reasonable levels, requiring antennas of a minimum height above ground, and limiting out-of-channel emissions by the use of devices such as auto-tuning (cavity based)

[10] See the APCO Project 39 Best Practices Guide, *Avoiding Interference Between Public Safety Wireless Communications Systems and Commercial Wireless Communication Systems Operating at 800 MHz*, December, 2001, p. 9

transmitter combining systems. Current Commission regulations concerning interference in the 800 MHz band are too general in their nature and need to be modified to specifically address intermodulation, receiver overload, and out of channel emissions.

The use of technical remedies to address interference to Public Safety 800 MHz systems is consistent with the technical analysis presented in Nextel's original Fleet Call Waiver Request. This analysis states:

> "As demonstrated above, ESMR service can be implemented without interference to existing SMR stations (or other 851-869 MHz stations). Furthermore, very conservative assumptions were used in the analysis above providing an extra interference buffer to existing stations and proposed ESMR stations. It is therefore believed that any actual interference experienced in the six congested markets from ESMR service will be limited to isolated cases. Because of the flexibility of the ESMR service, such isolated cases of interference can be resolved by utilizing a number of different techniques at the ESMR base station including changing frequencies, reducing power or height, re-orienting or changing directional antennas, or employing electrical or mechanical beam tilt."[11]

If the foresaid analysis was appropriate grounds for granting one of the many waivers that allowed Nextel to build a cellularized CMRS system directly adjacent to and interleaved with Public Safety, B/ILT and traditional SMRs, Nextel should be held accountable to adhere to these remedies. Public Safety and B/ILT licensees should not be disrupted because Nextel no longer finds a technical approach to the problem convenient or financially attractive.

[11] Fleet Call, Inc Waiver Request at paragraph 37, p. A-13, April 5, 1990. Filed in Fleet Call, Inc., 6 FCC RCD 1533(1991) – Page from original document reproduced in Appendix B

Frequency Coordination

Any plan that does not provide a channel-by-channel translation table will lead to serious frequency coordination issues. Plans that do not keep the same amount of spectrum for each type of licensee will, by definition, lead to the need for coordination activities. The costs and delays associated with frequency coordination would add to the transition problems. Today, without this extra workload, some coordinators are taking four months or more to coordinate an application. One can only assume that the situation would become much more intolerable with the added workload of re-coordinating nearly all 800 MHz licensees. There is no reason to believe that a "super coordinator" would do any better job that the current coordinators.

Conclusion

AEP has identified significant issues to any plan that involves reshuffling of the 800 MHz band or that requires B/ILT licensees to relocate to 700 MHz or 900 MHz. Innocent parties would be inconvenienced and would incur excessive cost. In addition, B/ILT licensees would suffer severe operational difficulties that could endanger the safety of workers and equipment. AEP believes that any long-term band plan that leaves the CMRS type systems directly adjacent to Public Safety would present a risk to all. At the conclusion of the turmoil of a massive relocation, the interference problem would remain unsolved in many cases.

AEP urges the Commission, as an immediate response to the Public Safety interference, to require the CMRS parties that are causing the interference to remedy the issues using technical solutions. The technical solutions would include coordinating channel allocations at collocation sites to reduce intermodulation products, limiting on-

street receive signal strength, and limiting out of channel emissions. If the interference could not be resolved by technical means then the interfering site should be removed from service immediately.

AEP further submits that a long-term and definitive solution to the Public Safety interference issue would be to provide separation between CMRS cellular type systems and all other traditional 800 MHz users.

In summary, AEP recognizes the seriousness of the effect that Nextel interference is having on Public Safety radio systems. AEP also realizes that the Public Safety interference issue must be addressed. However, AEP asserts that Nextel alone should be called upon to correct the interference, not the B/ILT 800 MHz community, the vast majority of whose members are not causing interference.

Respectfully Submitted,

David B. Trego,
Vice President, Telecommunications
American Electric Power Service Corporation

Appendix A – Relocation Cost Breakdown

The following is a rough breakdown of costs associated with moving the existing AEP 800 MHz Land Mobile Radio System to 700 MHz. It is not intended to present detailed costs, rather it is intended to the reasoning behind the relocation costs set forth in these NPRM comments.

Description	Quantity	Unit Cost	Total Cost
Mobiles and portables	10500	$2,500.00	$26,250,000.00
Site Repeaters	1000	$15,000.00	$15,000,000.00
Site RF equipment (Combiners, antennas, etc)	250	$10,000.00	$2,500,000.00
Network (Central Switch, etc.)	12	$1,000,000.00	$12,000,000.00
Consoles	130	$25,000.00	$3,250,000.00
Engineering labor (10 Engineers)	20000	$80.00 / hour	$1,600,000.00
Installation labor (10 Installation Techs)	20000	$65.00 / hour	$1,300,000.00
Tower services	250	$5,000.00 / tower	$1,250,000.00
Total			**$63,150,000.00**

Assumptions

1. The cost of 700 MHz equipment will be roughly equivalent to that of the 800 MHz AEP is using today.
2. Existing tower locations will be suitable for a 700 MHz radio system
3. Existing network and consoles will be incompatible with new 700 MHz equipment and will subsequently need to be replaced as well.

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and other ESMR) mobiles.

35. FCI has developed the concept of the Enhanced Geographic Area (EGA) to define the area in which ESMR service is to be provided and to buffer ESMR service from interference. FCI proposes to retain the cochannel mileage separations from its SMR facilities that will be replaced by ESMR base stations. This will provide the necessary flexibility in selecting ESMR base station locations and prevent "strike" applications from being filed to hinder ESMR service. Further, FCI seeks additional protections within the EGA. FCI requires a stable cochannel and adjacent channel environment within the EGA to prevent constant re-tuning of base station frequencies to protect and be protected from new and modified cochannel and adjacent channel stations. Therefore, FCI seeks to preclude new or modified non-ESMR cochannel or adjacent channel stations (except Public Safety stations) within the EGA. FCI further seeks authority to construct and modify ESMR base stations without prior Commission approval provided that the new or modified ESMR base stations do not require FAA approval or environmental processing under Section 1.1307.

36. Some stations in the 851-869 MHz band operate with "offset" frequencies, i.e. the channels are 12.5 kHz removed rather than the normal 25 kHz channel spacing. These stations do not fall into either the cochannel or adjacent channel interference analyses described above. For purposes of the capacity demonstrations described below, a 25 mile separation between ESMR stations and offset facilities has been assumed. Because of the relatively low height and power of the ESMR base stations, the greater potential for interference is to the ESMR service from the offset stations. The 25 mile separation utilized below is believed to be sufficient to allow interference-free ESMR and offset station operation. The effects of increasing or decreasing the 25 mile assumed offset separation, however, has little impact on the system capacities determined below. Furthermore, these offset stations only affect the system capacity determinations of the Los Angeles market.

37. As demonstrated above, ESMR service can be implemented without interference to existing SMR stations (or other 851-869 MHz stations). Furthermore, very conservative assumptions were used in the analysis above providing an extra interference buffer to existing stations and proposed ESMR stations. It is therefore believed that any actual interference experienced in the six congested markets from ESMR service will be limited to isolated cases. Because of the flexibility of the ESMR service, such isolated cases of interference can be resolved by utilizing a number of different techniques at the ESMR base station including changing frequencies, reducing power or height, re-orienting or changing directional antennas, or employing electrical or mechanical beam tilt.

VI. CAPACITY DETERMINATION

38. Based on the system design parameters discussed above, prototype system designs have been made for two proposed ESMR markets: Los Angeles and San Francisco. A database of Part 90 851-869 MHz facilities was