EIA 10E versus EIA 10F

The interference standard used in the analysis was the EIA 10E rather than the proposed EIA TSB-10F. TSB-10E does not take into account any extra link margin on short-range microwave systems. If a microwave radio link has a 50 dB fade margin, yet only requires a 35 dB fade margin to provide 99.999% availability, EIA 10E will permit only 1 dB of added interference into the microwave system rather than the 15 dB that would be consistent with maintaining the 99.999% availability. EIA is developing a new standard, 10F, which takes availability into account and better models real-world interference performance.

Elevation directional effects

The April 1993 Comsearch Study did not fully take into account the directional pattern of the microwave receive antenna. In particular, it ignored the attenuation of signals transmitted below the main beam and assumed that they would be received at the same level as if they were in the main beam. This assumption overstates the interference contribution of PCS transmitters located on the ground and near the receive antenna tower.

No consideration of interference mitigation

The Comsearch study did not address how a PCS operator could mitigate the harmful effects of PCS operations in the so-called "exclusion zones." Such mitigation techniques would appear to offer substantial potential. A few such techniques come immediately to mind. The PCS system operator could "engineer in" its base stations, providing more attenuation towards the microwave system than was assumed in the Comsearch study. The Comsearch study assumed that base stations transmitted using an omnidirectional pattern. But, of course, this is not necessary. Directional antennas are commonly used in cellular to restrict cell size, to focus coverage, and to control interference. They can be used in a similar fashion to fit base stations into the so-called "exclusion zone." Similarly, base stations could he engineered taking into account terrain and building blockage factors. Microcells or Remote Antenna Devices (RAD) could be used to fill gaps in coverage at extremely low power levels.

Since PCS systems will incorporate automatic power control, the PCS system operator could deploy only low-power cells in the "exclusion zone." Since this would require a higher cell density in the "exclusion zones" than in the rest of the PCS system, this mitigation technique trades off additional investment by the PCS system operator for reduced interference.

Interference mitigation techniques can also be applied at the microwave system. Additional investment in the microwave system can make it more resistant to interference. For example, replacing a standard microwave antenna with a high-performance antenna reduces interfering signals from behind the antenna by about 10 dB. Similarly, analog microwave systems might he upgraded to digital, giving the microwave system user the advantage of digital connectivity, while at the same time increasing the interference rejection capabilities of the microwave system by as much as 20 dB.

These considerations do not begin to address much more sophisticated techniques for interference mitigation such as smart antennas, wideband CDMA with notch filters, and multiple signal detection methods, all of which are likely to become available during PCS deployment.

Conclusion

Examination of the assumptions of the April 1993 Comsearch Study finds many areas where a more refined analysis would significantly reduce the size of the "exclusion zone" Comsearch calculated. The interference it predicts is many tens of dBs higher than would be expected from a carefully engineered PCS system. Most seriously, it used the term "exclusion zone" (a term that was also used by APC) to refer to areas where the PCS system operator would have to more carefully engineer the PCS system to control interference to the microwave system. These are not regions where PCS operations need be excluded.

V The August 1993 Comsearch Study

At the request of Bell Atlantic, Comsearch has prepared a second study of PCS/microwave sharing in Detroit. While Comsearch used the same analytic tools and interference criteria as it had in the April study, Comsearch modified a few key assumptions of the April study. In particular, Comsearch reduced the peak power of the PCS system to bring power levels closer to those expected of PCS technology. Additionally, Comsearch modified its interference calculations to reflect the interference performance of CDMA signals rather than of narrowband digital signals. Comsearch's August calculations did not take into account many of the factors we discussed above such as directionalization of PCS base stations, the 20 or 30 dB disparity between peak and average power, the possibility of interference mitigation at the microwave system, and several other elements. Nevertheless, Comsearch was able to conclude:

> The results of this conservative analysis indicate that the 20 MHz PCS allocation is indeed feasible for deploying a CDMA PCS system.[18]

and

> ... [T]he conservative assumptions used throughout the present analysis present a worse-case approach. Accordingly, the results should only improve as the models and data themselves improve. Results of this future work will be forthcoming.[19]

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[18] Comsearch, "Analysis of a 20 MHz PCS Spectrum Allocation for Detroit" (August 1993) ("August 1993 Comsearch Study"), at 9.

[19] *Id.* at 12.

The implications of more realistic assumptions are striking. Comsearch finds that PCS operation in 20 MHz bands is feasible. We concur with this conclusion and have attached the entire Comsearch study as Appendix A to this report. A comparison of the assumptions used in these studies is given in Table 1 below:

Key Assumptions of the APC and Comsearch Studies

System Attribute	APC	Comsearch (4/93)	Comsearch (8/93)
Peak Mobile Power	1 watt	1 watt	200 milliwatts
Average power effects considered	no	no	no
Propagation model	Hata	Hata, modified for over the horizon	Hata, modified for over the horizon
Microwave system loading	per 10E	per 10E	per 10E
Consideration of microwave system margin	no	no	no
Elevation discrimination in microwave antenna	no	no	no
PCS interference mitigation considered	no	no	no, but discussed
CDMA spreading considered	no	no	yes
Grid edge size	1.25 minutes (approximately 1.25 miles)	ten seconds (approximately one-sixth mile)	ten seconds (approximately one-sixth mile)
Microwave antenna directivity	azimuth only, "typical parameters	azimuth only, actual antenna parameters	azimuth only, actual antenna parameters
PCS cell size	0.25 to 0.5 miles	1.61 km	1.71 km
Microwave system configuration	hypothetical	actual (Detroit)	actual (Detroit)

VI Conclusions

The stakes in PCS are enormous. The FCC is in the process of designing a major new communications service which will affect our nation for decades to come. One contentious issue is the bandwidth required by individual PCS licenses. This report has shown that previous observations on this bandwidth issue were based on studies using tools and parameters

appropriate for other purposes, and that the use of the hyper-conservative parameters produces results biased towards a requirement for larger bandwidths for PCS systems.

Use of the term "exclusion zone," rather than a more informative term such as "careful engineering zone" also biases the discussion against understanding the potential for 20 MHz PCS licenses.

Finally, we offer the August 1993 Comsearch Study, which quantitatively shows the changes in results that flow from adopting some, but not all, of the improvements in analysis we suggest are required for full understanding. That study shows that PCS operations in 20 MHz are feasible.

Based upon our criticisms of the earlier studies and the results of the August 1993 Comsearch Study, we suggest that it would be wrong for the Commission to rely on earlier studies as a basis for an informed conclusion on the proper bandwidth for PCS licenses.

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April 9, 1992

Mr. Albert Grimes
President
American Personal Communications
2212 Old Court Road
Baltimore, MD 21208-3432

Dear Mr. Grimes:

Baltimore Gas and Electric Company (BG&E) is a public utility engaged in providing electric and natural gas services in the Central Maryland area. As part of its mission to provide such services, BG&E operates its own microwave and fiber optic networks to support the voice and data requirements of the Company. BG&E is also authorized by the Maryland Public Service Commission as an Intrastate/Interexchange Carrier to provide various telecommunication services to non-residential customers.

In the context as both an incumbent 2 GHz fixed microwave licensee, as well as a telecommunication service user and provider, BG&E feels it can leverage its telecommunication assets by supporting the FCC's 2 GHz Radio Spectrum Allocation Proposal. Contrary to the opinion of many utilities, BG&E anticipates that PCS will provide the platform for significant utility business applications and supply benefits which will enhance rather than encumber utility operations.

Under the FCC proposal, BG&E believes its 2 GHz fixed radio frequencies represent a marketable commodity that it is willing to sell or share in some mutually financially beneficial arrangement with a PCS developer and to do so in a foreshortened time frame well ahead of the proposed 5-15 year period suggested by the FCC.

BG&E feels that American Personal Communications (APC) because of its local origins, its financial backing, and the reputation and experience of its corporate officers in the cellular telephone marketplace would be an ideal organization to develop and expand these PCS / Utility concepts.

If suitable compensation and technical details can be negotiated, we are willing to work with APC to demonstrate the viability of operating PCS in the 2 GHz spectrum on a co-sharing basis by offering our frequencies as a test platform. The results of such tests would provide an industry benchmark and the direction for further negotiation for license transfers or co-sharing.

As stated above, BG&E feels PCS may offer an attractive and low cost method of communicating with utility devices within the customers premises. We are anxious to explore a joint venture opportunity with APC and Motorola to research, develop, and market such devices to the utility industry. I am looking forward to meeting with you and your staff after the appropriate Non-Disclosure Agreements and Letters of Intent are signed to firm up our strategy.

G. A. Dieter, Supervisor
Planning & Development Unit
Telecommunications Department

GAD/slk

1 1ST STORY of Level 1 printed in FULL format.

Electrical World

February, 1994

SECTION: TELECOMMUNICATIONS; Vol. 208, No. 2; Pg. 5

LENGTH: 6208 words

HEADLINE: Information superhighways are under construction at many electric utilities

BYLINE: Herbert A. Cavanaugh, Executive Editor

BODY:

Electric utilities have the most critical private-industry need for "real-time" communications in the nation, placing great reliance on extensive internal communications systems to monitor, control, coordinate, and protect their operations. For this reason, advanced utility-owned and -maintained telecommun-ications systems rival, and in many cases exceed, the systems operated by commercial communications providers.

In fact, the sheer size, scope, and sophistication of utility telecommunications systems may have vaulted the industry into a major role in the development of the Clinton administration's national information infrastructure (NII) -- the so-called "information superhighway," a national broadband voice, video, and data communications network linking homes, schools, libraries, hospitals, research facilities, and businesses.

Superhighways. But according to statistics compiled by the Utility Telecommunications Council (UTC), Washington, DC, electric utilities already have information superhighways of their own, with over 43,000 private land-mobile transmitters, representing an investment of over $ 4.3-billion; approximately 7000 point-to-point microwave stations for an investment of over $ 1.3-billion, and more than 1700 point-to-multipoint microwave stations worth over $ 330-million. Further, it's anticipated that over the next five to 10 years, utilities will double or triple their internal radio spectrum requirements. Propelling this demand will be applications such as private, land-mobile radio, distribution automation, and data-communications requirements. In addition, utilities have installed over 8000 miles of fiberoptic cable, for an investment of over $ 300-million (Fig 1).

Quick decisions. There is one overriding design objective behind these capital expenditures on telecommunications equipment -- especially now when "competition" is the modus operandi, the customer is the driver, and business decisions must be instantaneous.

Observes George A. Dieter, supervisor, telecommunications planning and support services, Baltimore Gas & Electric Co (BG&E), "Very simply, the ultimate goal of any electric-utility telecommunications network should be to provide the most reliable service at the lowest possible cost." Distribution automation. Electric utilities recognized the importance of telecommunications early in their history, notes Dieter. "At BG&E, we have copper cables dating back to the 30s. These were used for our own telecommunications system to support our core business, because we recognized that we could provide better internal

communications services than could the local communications companies. For all these years, that is where our focus has been -- on the internal customer who is for the utility."

However, competition in the industry has intensified interest in telecommunications and will contribute to "a spurt of big investments in information products by electric utilities during the next several years," he says. "Most of these -- still in the internal area of the utility's operations -- will be in remote meter reading and distribution automation, which are on the verge of significant growth. People have been talking about these applications for years, but haven't done much about them because they have been too expensive. Now, as equipment costs come down, and priorities and operating conditions change, both will become cost-effective in certain areas of the business."

Lit fiber. BG&E also is interested in the external side of telecommunications. The utility has a 200-mi fiberoptic telecommunications superhighway -- a fiber ring -- that serves external business opportunities as well as its internal systems. "On the external side, we are leasing capacity -- lit fiber, rather than dark fiber," he says, observing that about half the highway is on the transmission system in optical ground wire, and the other half is divided up among distribution poles, and underbuilt on transmission lines. "We lease the fiber to companies that want to avoid access charges by the local telephone company for long-distance calls, and contract with large businesses to extend our fiber system onto their premises and connect them to their long-distance carrier, bypassing the local telephone company. They go from their premises, to BG&E, to Metropolitan Fiber Systems (MFS) -- with whom we have a partnership arrangement -- to the carrier. We do business with government systems, and credit-card companies, and are presently courting some banks. Further, we have a partnership with MFS and haul some of their voice and data traffic, too.

"We originally built the backbone system as a large, private, internal network for our own use -- for protective relaying, and for our internal voice and data needs covering electric operations, billing, etc," he says. "We own 31 PBXs at 31 different sites that are linked together by fiber and microwave," Dieter adds.

Networking. BG&E has a "lot of rapidly expanding local-area and wide-area network connectivity," and growth in distributed computer architecture that need "seamless connectivity through our backbone network, to accommodate BG&E applications such as energy management and automated mapping and facilities management [AM/FM]. These are now done by leased telephone lines, but will be switched over to our internal system. We also carry part of our 800-MHz mobile radio traffic on it. All this will place a greater demand on our fiber system," he says.

2GHz upset. Besides the fiberoptic highway that it constructed in 1986, BG&E also has a point-to-point analog microwave system it is converting to digital -- with good reason. In 1989, Dieter says he recognized that with the advent of digital personal communications systems (PCS) to compete with analog cellular technology, BG&E would probably lose its reliable 2-GHz frequencies for point-to-point voice and data communications.Reason: The Federal Communications Commission (FCC) indicated that it wanted to put the new high-tech phones on the 2-GHz frequencies, raising the possibility that they would interfere with

utility telecommunications operations.

Digital loop. "Our analog system was 20 years old and running out of gas anyway," says Dieter. "It was pretty well loaded up. So, we had to look at the entire network architecture and figure out where we were going. We decided that what we really needed was a series of digital loops. We developed a scheme with a central loop completely of fiber, and hybrid northern and southern loops constructed of fiber and high-capacity, 135-megabit digital microwave. The three loops are now connected at two sites and form BG&E's backbone network that links its major properties. At the present time, our 800-MHz system is on the old analog point-to-point microwave, but as we convert to the digital system, we are moving [away from] it."

Intruders. According to Jeffrey L. Sheldon, general counsel for the Utilities Telecommunications Council (UTC), FCC granted PCS licenses on the 2-GHz frequency because it was eager to foster new technology. "However," says Sheldon, "FCC has indicated that under no circumstances can there be interference to an electric-utility microwave system. If there is, the PCS licensee would have to pay the utility to move to another frequency band or communications system. When the new licensees come into a utility area to build their systems," he continues, "they will have to do this without causing interference to the utility's microwave system. If they can't do that, then they will have to discuss with the utility how they can move it to a different microwave band, or install fiber optics for them, opening up a whole new realm of possibilities."

Since no PCS licenses are likely to be granted until next fall and FCC is ing together rules on auctioning off the frequencies, "nothing can happen at least a year," comments Dieter. He reveals that BG&E is now starting, as part of its load-management system, a one-year pilot comparing a two-way, automatic meter-reading radio system and a one-way, N-scan, meter-reading system. "We are also doing some distribution-automation feeder switching," he notes, adding that "If we do vacate the 2-GHz frequency, we'll go to 6 GHz, which isn't much of a problem here in Maryland. It could be in some other areas, though."

Tampa Electric Co's (TECO) Gregg Ehlers, vice president of information and technology engineering, says that his company has already made the switch from 2 to 6 GHz (Fig 2). "We haven't had that much of a problem with six. If there was going to be one, we would definitely experience it before most other utilities. [Tampa has been called the lightning capital of the US.] If we get much above 6 GHz, then we would start having problems."

Nightmare. He observes that "If PCS does show up across the US, it could be provided by as many as seven phone companies in a single city. What's the load on an electric utility's infrastructure if it has to supply pole attachments to seven new producers whose micro cells have to be interconnected? Will it be an opportunity, or a tremendous increase in operational costs, because of lag-time alone. To move a pole takes forever. Coordination will be a nightmare." TECO's proposed solution to this is building a common fiber ring in its service territory and leasing space on it to PCS "and anyone else who needs it for communications services."

Mobile radio. Many utilities, of course, operate their own private mobile communications systems, and, according to a new survey of 36 private and

public utilities, "How Utilities Use Radio," by Buford Goff & Associates Inc, ...mbia, SC:

-- Many utilities use more than one radio system, including mobile and portable units. While one system is used for general communications, others are dedicated to special functions -- such as load management, telemetering, alarms signaling, powerplant operations, and backbone or interconnections. The most important use of radio is for control of emergency operations.

-- Voice radio systems, which are used primarily for work assignments and maintenance orders, are very evenly distributed in the four radio-frequency bands allocated by the FCC: 23% of the 36 utilities in the study use VHF low band (30-75 MHz); 23% use VHF high band (130-175 MHz); 23% use UHF low band (410-470 MHz), and 23% use UHF high band (800 MHz-1 GHz.). Some 7% of the respondents use microwave (greater than 1 GHz.).

-- The number of mobile units used varies almost linearly with geographic area covered, up to 30,000 mi2. The average mobile density is one for 15 mi2 of coverage.

-- Only one-third of utilities currently carry data on their radio systems -- used mostly for load control.

-- Utility radio systems are highly reliable -- average system reliability is 97%.

-- Excluding customer relations, two-way radio is second only to the ...ephone as the primary method of utility communications -- 25% use radio as ...e primary method.

-- Within the next two years, six out of every seven utilities will modify their radio systems to improve communications, reduce costs, or provide better control of their operations. The increased use of mobile data will be the most significant change in the future of utility-based radio. An increase in the use of remote meter reading is also expected.

Buford Goff says it is presently under contract to Consumers Power Co to provide engineering services for the design and implementation of a new 800-MHz trunked radio network for the utility. This project covers the entire lower portion of the state of Michigan. It involves implementation of a mobile data conduit to allow high-speed data transmission to the mobile radio fleet while maintaining voice communications for dispatching. It involves 2500 mobile radios and is estimated to cost $ 22-million.

Another project involved the planning and implementation of a two-phase backbone microwave system for the Allegheny Power System, to carry voice, data, and radio control circuits within three electric operating companies' service areas. Phase I included installation of a microwave loop system consisting of 32 hops of 6-GHz and 2-GHz microwave equipment located throughout Pennsylvania, Maryland, Virginia, and West Virginia. Phase II of the project involved radial extensions off the backbone system encompassing 41 additional sites, which cover the remaining operating companies' service areas. Also included in Phase II are ...ee fiberoptic extensions of the microwave system into generating plants.

Vanilla music. Catastrophic events from ice storms to earthquakes have long demonstrated the need for utilities to own and operate their own internal communications systems and utilities, such as Detroit Edison Co (DE), Columbus Southern Power Co (CSP), and Northeast Utilities (NU), have recently installed cutting-edge communications technologies to automatically give quick fixes on outage locations when customers call in to report them -- and to enhance their customer-service images. "There's nothing that will tarnish the image of a utility faster than a 20-min busy signal followed by two hours of vanilla music when a customer is trying to report a nighttime power outage in frigid weather," comments one industry observer.

Outage analysis. At DE, company officials built a "best-in-class" telecommunications facility to reduce the "busy" signals that commonly greet the thousands of customers trying to report power outages. The utility spent $ 11-million on centralizing telephone operations and purchasing state-of-the-art equipment that could drastically increase the volume of customer calls during regular business hours and in emergency situations. All telephone operations are now centralized in a single suburban location, where a voice-response unit (VRU) operates 24 hours a day and processes trouble calls directly into the utility's computerized outage-analysis system, and then to dispatchers. The system also updates customers on when restoration is expected. Further, the number of telephone trunk lines was increased from 212 to more than 1300 and the number of incoming phone lines from 288 to 1536.

Footprint. CSP also has a new telephone answering system that solves the problem of "peak loads on the telephone lines." CSP spokesmen say it virtually eliminates busy signals and provides fast answers for customers. Developed with Ninety First Century Communications Inc, Columbus, Ohio, the system provides the capability to handle overflow calls during widespread outages, and quickly records and tracks phone calls to give utility dispatchers a "footprint" of the problem areas.

Computer dialers. At NU, dramatic advances have been made in its customer-communications system. According to Tod O. Dixon, NU's vice president for information resources, computer dialers were installed to cut downtime on credit and collections, and 800 numbers are used for all calls not directed to specific company individuals. Further, the customer-service number will soon be tied into Southern New England Telephone Co's introduction of statewide automatic number identification (ISDN). With this new technology, a customer account appears on the customer-service representative's information screen as soon as the rep picks up the phone. Customers do not have to begin the conversation by stating their names and addresses, since the computer has already identified them by their phone number.

NU also is automating outage reports with VRUs that use ISDN to pinpoint the location of customers when they phone the utility from their homes during power outages. This allows customers to report outages without speaking to customer-service representatives. The system also communicates restoration information to customers, along with an estimate of how long power will be out. When fully implemented, the system will allow NU to answer up to 672 calls simultaneously.

With the multiplicity of new applications, however, can arise an unforeseen demand for bandwidth. "NU's demand for bandwidth is growing several times faster than we anticipated," he says. "In fact," he continues, "the bandwidth that

ur people are looking for this year is three times greater than we previously
planned for. The big reason for this is our image applications, especially
ne customer-service area. We do multiplexing to the point where we have put
ideo (five video-conferencing sites), data, and voice on all the same digital
circuits and use frame-relay communications protocol equipment at 10 of our
sites to deliver the bits/sec.

"During the next three months, we are going to build a very high-speed
asynchronous transfer mode (ATM) network and piggyback everything together on
it. ATM runs only on digital circuits, which are virtually error free, so there
is very little error correction. This permits us to get a great deal more data
through and meet our bandwidth demands. The ATM 'pipe' is a very big and wide
communications path, and when it reaches the end unit, it fans out to serve all
the end users." Incidentally, he says, "all our sites are linked by fiber,
digital microwave, and leased T1 communications lines to ensure more than 100%
redundancy in our communications system."

NU is in the process of re-engineering, and telecommunications plays a
critical role in it, implies Dixon. "The ability to communicate is inherent in
almost every company redesign we think about, and the availability of data as we
move more and more into a competitive environment is going to be vital to our
survival."

Added value. "A utility's communications system needs to be evaluated on the totality of the services it can provide, and particularly on its ability to enable it to get closer to its customers," comments Paul Spaduzzi, an Atlanta (Ga.)-based utility marketing consultant working in interactive communications. "Interactive communications systems allow the utility to provide new services to its customers, and to segment its market."

Adds Dieter: "It is only in the past several years that utilities have recognized that they have a lot of expertise in telecommunications that could be wed to the good relationships they have with their customers. We realized that there is more we could do for and with our customers if we could communicate with them -- not by just sending a bill every month, but by actual two-way communications involving such value-added services as real-time pricing, or appliance diagnoses and controls."

Customer choice. One example of an advanced utility telecommunications project that demonstrates the value of adding interactive information-carrying capability to utility lines, is an Entergy Corp pilot project going on now at 80 residences in Chenal Valley, Ark. Called "Customer Choice 2000" and jointly developed by Entergy Enterprises Inc and First Pacific Networks (FPN), Sunnyvale, Calif, Powerview is a high-speed, real-time, intelligent electronic demand-side management (DSM) system, using standard communications protocols, giving customers greater control over electricity use, and providing a constant, interactive communications link between the utility and its customers. Sponsored by Entergy Enterprises -- the unregulated Entergy subsidiary that owns 9.95% of FPN -- and joined by Sprint Corp, and Honeywell Inc, Minneapolis, Minn, the homes on the Powerview system are linked to the utility through its 700-mi-long fiberoptic installation and its coaxial cable networks, enabling customers to automatically shift electricity consumption away from peak-demand periods. Entergy also uses its "fiber backbone" internally for billing and other communications purposes.

Three networks. The system is made up of three major networks: the home network, the distribution network, and the utility host network (Fig 1). The home network has three primary components: the intelligent utility unit (IUU), an electric meter, and an in-home user interface. The IUU is a communications switch powered by a microprocessor that provides the key communications interface between the home and the utility. The home network also has a user interface and controllers for appliances so customers can preprogram them to respond to utility price signals.

Although Entergy has only 81 homes in its present pilot project, "we have asked regulators for permission to install 35,000 of the units this year and next," says Jack L. King, president and chief operating officer of Entergy Enterprises Inc. "Eventual installation will come to 800,000 in our service territory," he adds.

Hard DSM. Describing the system's genesis, King says that "a few years ago, we were looking for the best verifiable, 'hardened' DSM program we could find, because we had real concerns about some of the DSM activities that were going on around the country. They were what we call 'soft,' because their effectiveness could not be quantified satisfactorily. FPN, we eventually discovered, had telecommunications technologies that showed real promise. We entered into negotiations with them, and jointly modified their technology to accomplish what we wanted to do."

Dark fiber. King says the saving to Entergy from the resulting DSM activities will more than offset the total cost of installing the Powerview telecommunications infrastructure. "It was cheaper to build our communications infrastructure, which is primarily fiber optics, than it was to build new powerplants to satisfy demand. But the real kicker is that you only need about 5% of the system's capability to do all the DSM and other electric-utility operations. So, 95% of our telecommunications infrastructure will be dark fiber -- unused. This means Entergy will be marketing that other 95% to try to optimize the use of the system. We will sell that space to whomever needs communications, ranging from home security and home shopping to telephone service and entertainment."

Footprint. Meanwhile, the 5% Entergy does use will be doing a lot for the utility side of the business, he says. "For example, it makes automated meter reading very easy. It allows itemized billing in which we can identify the footprint [electrical use pattern] of 37 different appliances. It gives us remote on and off capabilities, provides power on and off indicators that let us know -- at the same time as the customer -- when there's an outage, and through data-processing equipment feeding back to us, locates the device that's causing the problem.

"But all of these are side benefits. The real economic drivers are the DSM activities, such as real-time pricing, appliance disconnects, and other optimal smart-home energy controls using power-line carrier, ATM interface devices, and special-purpose 386-processor computers. With this telecommunications system," King continues, "we can communicate with every customer on the system within 10 seconds. In other words, the amount of electrical load that is running out on our system and that powerplant dispatchers have control over will be monitored and updated every 10 seconds."

Video programming. "Our ultimate telecommunications goal is giving our tomers the very best real-time demand-side and operational improvements that can come up with," he says -- "creating customer communications and services that no one else can match, thus greatly enhancing our competitive position. For example, we have the capability of doing video programming to communicate with specific customer segments, and we can do real-time pricing on each individual residential customer -- eventually doing the same with our commercial and industrial customers."

Field of dreams. "When we complete this system," he declares, "it will be an information superhighway for which Entergy has a real need and for which there is already a market. It's not that way with the telephone and cable companies, however. They may be talking about building information superhighways, but they are basing their discussions on a field of dreams -- markets that have not yet developed. What they are saying among themselves is: 'If we build it, they will come.' Entergy can build its superhighway for existing markets and it won't require government subsidies, accelerated depreciation on existing telephone equipment, or rate increases. In fact, it will lower electric rates."

Deep pockets. One utility observer, who says his fiberoptic system is equal in cost to "a third of a 'good-size' fossil-fired powerplant," cautions that "just stringing the fiber costs about $ 30,000 a mile, not counting the electronic end devices -- which would double the cost. The moral is that if you are going to spend millions to install a fiber system that is practically limitless when it comes to carrying information, be sure that there are going to be enough applications to run on that fiber to make your investment worth it, ' that someone else with even deeper pockets than you doesn't parallel your .e and compete against you."

Second entry. Entergy is not the only utility that will be using FPN's Powerview product. The Southern Company says it is buying 3500 units of FPN's Powerview product with an option to purchase 5000 more, for testing in the utility's service territory. The utility also says it will purchase a technology license from FPN, paying an initial license fee installment of $ 5-million, and will assist in further development of the product. The utility, which also has advanced DSM and automatic meter-reading projects going on at Gulf Power Co and Georgia Power Co, respectively, intends to match Entergy's stake in FPN by acquiring a 9.95% interest in the firm.

The Southern Company has also formed a non-regulated wireless company that is putting in an 800-MHz trunked mobile radio system throughout its service area, where it will use a combination of microwave and fiber for the utility's operating companies and, with Securities & Exchange Commission approval, to businesses in such areas as the public-safety sector.

Joint ventures. "The main thing we are trying to do internally as far as the wide-area part of our backbone network is concerned," says M. Euel Wade, senior vice president of Southern Company Services and chief information officer of the the Southern Company, "is get a fiber infrastructure built that will give us a two-way feed to all of our major powerplants, division offices, and corporate headquarters. We are also doing the same thing with our local-area networks, putting a telecommunications system in place to implement our client-server .hitecture. One major application -- human resources -- is up and running on .e client-server network now. The next application will probably be customer service. We have about 600 miles of fiber left to install to do all this."

High capacity. Wade indicates that the company has already installed about
miles of high-capacity fiber for its internal uses, "at virtually no cost
the company." He explains that "we formed joint ventures with other carriers
they provide the dollars, we provide the rights-of-way, and we share the
fibers." About 95% of it is installed on the transmission ground wire, "and
there is plenty of extra capacity we can leverage," he says.

"What we are trying to do here is establish an environment where we can pass data, voice, and video seamlessly, not only throughout our enterprise but also throughout our customers' and our clients' [enterprises]," he explains. "The one thing we have decided is that the control of information about our product to our customers is a strategic imperative. Meanwhile, he says, "The Southern Company intends to play a role in the Clinton Administration's information superhighway. Certainly," he continues, "with the fiber backbone that we have installed right now, we ought to be involved at least on a regional basis. These are exciting times."

Massive. Wade is part of a group of electric-utility executives who met with Clinton Administration officials recently to discuss the importance of their playing a major role in the development of the nation's information infrastructure. The group explains that since electric utilities are already using one of the most massive and sophisticated telecommunications systems in the world to monitor and control energy demand in the US, and since utilities have extensive experience in deploying fiber and operating advanced mobile radio systems, they would be invaluable in constructing the NII. Adds Edison Electric Institute's Walker F. Nolan, "electric utilities already run a separate wire to
tually every home in America. Many have already made substantial investments
fiber optics [with] significant capacity that could be used for different purposes."

No common carriers. The visit appears to have had an effect. In a December 1993 trial-balloon speech at the National Press Club in Washington, DC, Vice President Gore referred to "utilities" as players in the NII. In Gore's speech on January 11 at the University of California, he specifically mentioned electric utilities as players. "It took a while time to get that word 'electric' in there," Entergy's King advises.

"We certainly want to play a role in the NII," Wade informs, "but we are not sure right now what that role is. What we are sure of, however, is that we don't want to be labeled as common carriers and be burdened with their restrictions."

What Gore said in his address on January 11 was: "The pressure of competition will . . . drive continuing advancements in technology, quality, and cost. . . . To take one example of what competition means, cable companies, long-distance companies, and electric utilities must be free to offer two-way communications and local telephone. To accomplish this goal, our legislative package will establish a federal standard that permits entry to the local telephone markets."

In the game. Dieter says, "We certainly would like to play a part in the NII if it's voluntary, sensible, and profitable. Such a highway may be a good
lternative revenue source for BG&E -- a way of interacting with our customers,
i a way of improving our own internal service. Utilities can play an important
e providing a large part the backbone, but the industry has to get together and make sure that Congress does not keep it out of the game. It's a great

opportunity, but the window won't be open for long.'

Proposed legislation. There is plenty of proposed legislation holding the windows open for now. In the last session of Congress, then Sen Al Gore and Sen Conrad Burns (R-Mont) cosponsored the Infrastructure Modernization Bill, S 1200, aimed at implementing a broadband communications network with an emphasis on fiber optics. As Vice President, Gore is heading up an inter-governmental agency task force that is focusing on the development of the NII. Currently there is a bill in the Senate, titled the Telecommunications Infrastructure Act (S 1086), and there are two pending House bills: The National Communications Competition and Information Infrastructure Act of 1993 (HR 3636), and the Antitrust Reform Act of 1993 (HR 3626), all three of which are aimed at creating an advanced information infrastructure.

GRAPHIC: Photograph: 1. Linemen install fiberoptic cable at Pacific Gas & Electric Co (photo above) and Boston Edison Co (right). Companies like PG&E and Boston Edison are deploying fiber optics more and more as part of their "backbone" communications system along transmission paths and between substations. US utilities have already installed over 8000 miles of fiberoptic cable, for an investment of over $ 800-million ; Photograph: Wade: Getting on the superhighway ; Photograph: 4. Parallel highways -- one for autos, the other for information -- span Fox River in Green Bay, Wis, far below Wisconsin Public Service Corp lineman Walter Hoeft, who balances on chicken ladder atop 300-ft transmission tower, readying helical-wrap machine for installation of high-capacity, 100-mi, fiberoptic, voice, and data telecommunications link ;

ustration: Diagram: 2. "Our vision for the future for our telecommunications tem is 'easy access to shared data,' says Gregg Ehlers, vice president of information and technology engineering at Tampa Electric Co. He adds that "we're working on getting rid of a lot of the vertical communications systems that were built at TECO, and producing an enterprise-wide information network (above). We've moved to a fully digital telecommunications network -- a primary, 28-count, linked and cross-linked fiber backbone of 150 miles. It's all loop technology and without cost to TECO because of unique partnering opportunities we had with local bypass companies. They bought the fiber; we installed it, maintain it, and lease it back to them so they can use it for their point-to-point communications services in Tampa" ; Photograph: 3. The saving from its new DSM system more than offsets the cost of building Entergy's fiber-coax infrastructure, says Jack L. King (left), president of Entergy Enterprises. "The real kicker is that we only need about 5% of the infrastructure's capacity for DSM and other operations. Entergy may be marketing the other 95% to services ranging from home shopping to entertainment"

LANGUAGE: ENGLISH

LOAD-DATE-MDC: February 24, 1994

January 25, 1994

C T I A Cellular Telecommunications Industry Association
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Building The Wireless Future

Thomas E. Wheeler
President/CEO

Chairman Reed Hundt
Federal Communications Commission
1919 M Street, N.W. Room 814
Washington, D.C. 20554

Re: Ex Parte
Docket No. 93-252 (Regulatory Parity)

Dear Mr. Chairman:

The attached White Paper, *What Is A Commercial Mobile Service Provider?*, addresses the question of what constitutes a commercial mobile service, and how such services should be classified and treated under the provisions of the Omnibus Budget Reconciliation Act of 1993.

Congress has made clear its intention that services which look alike to customers should be treated in a like manner. Thus, commercial mobile services include both mobile services that are "provided for a profit and make[] interconnected service available" *and* their functional equivalents are substitutes for one another and should be classified as commercial mobile services and regulated in a like manner.

The White Paper reasons that the appropriate tests to determine functional equivalence are product substitutability and customer perception.

The paper concludes that by relying on a broad construction of the definition and by treating both these services and their functional equivalents as "Commercial Mobile Services," *and by applying regulatory forbearance to such services*, the Commission will limit regulatory gamesmanship and properly focus licensees' energies on competing on the merits in the marketplace.

By so doing, the Commission will provide new opportunities and incentives for such providers to offer innovative and efficient services, and foster a competitive wireless marketplace.

Very Truly Yours,

Thomas E. Wheeler

Attachments

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Building The
Wireless Future

PCS WHITE PAPER No. 2
Second Series

What Is A Commercial Mobile Service Provider?

January 25, 1994

What Is A Commercial Mobile Service Provider?

The Omnibus Budget Reconciliation Act of 1993 created a new classification system for mobile service, defining two broad general categories: Commercial Mobile Service, and Private Mobile Service.

A new section of the Communications Act defines Commercial Mobile Service as *"any mobile service (as defined in section 3(n)) that is provided for profit and makes interconnected service available (A) to the public or (B) to such classes of eligible users as to be effectively available to a substantial portion of the public, as specified by regulation by the Commission."*[1]

The Communications Act was also amended to provide the following definition of "mobile service":

> 'Mobile service' means a radio communication service carried on between mobile stations or receivers and land stations, and by mobile stations communicating among themselves, and includes (1) both one-way and two-way radio communications services, (2) a mobile service which provides a regularly interacting group of base, mobile, portable, and associated control and relay stations (whether licensed on an individual, cooperative, or multiple basis) for private one-way or two-way land mobile communications by eligible users over designated areas of operation, and (3) any service for which a license is required in a personal communications service established pursuant to the proceeding entitled 'Amendment to the Commission's Rules to Establish New Personal Communications Services' (GEN Docket No. 90-314; ET Docket No. 92-100), or any successor proceeding.[2]

What really constitutes a commercial mobile service? It is undeniable that all current common carrier mobile services, such as cellular and common carrier paging services are CMS. But Congress also made it clear that its intent is to ensure that services which look alike to customers will be treated in a like manner. Thus, Congress directed that all functionally-equivalent services would also be treated as CMS. For example, as was clearly stated during mark-up, CMS is "broadly defined to include PCS, and enhanced special mobile radio services (ESMRs), and cellular-like services."[3]

In keeping with this Congressional mandate, CMS should not be construed as a narrow, fixed set of services, such as "cellular-like." Such a narrow construction would both invite regulatory gamesmanship in order to obtain artificial marketplace advantages and risk rapid obsolescence as new mobile services and technologies develop.

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[1] 47 U.S.C. Section 332(d)(1) (1993).

[2] 47 U.S.C. Section 153(n) (1993).

[3] Rep. Edward J. Markey, Statement at the Mark-up of Budget Reconciliation, Subtitle C Licensing Improvement Act of 1993, H.R. 2264 (May 11, 1993).

By relying on a broad construction of CMS (which already includes, under PCS, "a broad family of services") and by treating both these services *and their functional equivalents* as CMS, the Commission will limit regulatory gamesmanship and properly focus licensees' energies on competing in the marketplace on the merits.

What Are The Tests For Commercial Mobile Service Classification?

There are three tests for determining what is a Commercial Mobile Service (CMS).

These tests include:

- that service is provided for a profit.
- that it makes available interconnected service, i.e., services interconnected with the public switched telephone network.
- that it is available to the public, or a "substantial portion" of the public.

These tests are specified by the Omnibus Budget Reconciliation Act, and are generally consistent with traditional tests of common carriage as incorporated in the Communications Act.

What do these tests really mean?

"For Profit" Service. The "for profit" test distinguishes purely internal and integrated non-commercial services from for-profit equivalents of CMS. Defining the test broadly to include services which may have components (such as interconnection) which are resold at cost will avoid any incentive to develop artificial distinctions in order to create and exploit regulation-based advantages in the marketplace.

"Interconnected" Service. Interconnected service should be defined as a "service that allows a subscriber to send or receive messages over the public switched network." Attempts to impose fine distinctions predicated on such criteria as "real-time" access or customer control are fraught with the risk of encouraging companies to create artificial and unnecessary features in order to exploit differential regulatory treatment. The straight-forward definition will allow technology, not regulation, to determine the most efficient serving arrangements and network configurations.

Moreover, such artificial distinctions rest on a fragile assumption that, for example, a store-and-forward capability somehow transforms a commercial or "public" communications service from common to non-common carriage. Under such a construct, would telegraphy have been classified as a common or private carrier service? What of a publicly-offered electronic mail or other record service, would it be private or common carriage?

Similarly, efforts to establish quantified thresholds for interconnection as a basis for classification risk imposing unnecessary costs and reporting requirements on all providers -- commercial and private -- for minimal customer benefit. Assigning different regulatory status on the basis of differing types of interconnection also ignores both technological developments and invites regulatory gamesmanship, risking distortion of the marketplace and of the technical configuration of telecommunications networks. A far better, and simpler, solution is to classify all interconnected services as CMS, and subject them to regulatory forbearance, eliminating the incentive for gamesmanship and technological inefficiency.

"The Public" or "Classes of Eligible Users." The Conference Report makes it clear that CMS includes services available to "broad or narrow classes of users so as to be effectively available to a substantial portion of the public."[4] This is consistent with the courts' reading of the common law test regarding carriers, which relied upon a "holding out" of service to the public -- and not the size of the potential user population -- as the test for classification.[5]

System capacity, service area size, and location are *not* appropriate tests for CMS classification. While they may serve as technical or geographic limitations on the potential user population -- the same tests would not be regarded as proper for the classification of other telecommunications services or providers. For example, that an SMR provider may serve 12,000 users does not render it any more "private" a service than would a rural or cooperative telephone company's 10,000 wireline users render it a private or non-common service provider.

Any SMR services which satisfy the tests for CMS classification *or* which are the functional equivalents of CMS should be classified as CMS. SMR services which do not provide interconnection, which are not provided to the public, and which are properly not the functional equivalent of CMS should be the only SMR services classified as private mobile services.

What Obligations Fall On Commercial Mobile Service Providers?

The Act has been amended to indicate that CMS providers, to the extent they are engaged as CMS providers, are to be treated as common carriers under the Act.[6] Thus, they are obligated to furnish service upon reasonable request, charge just and reasonable rates, and practice no unjust and unreasonable discrimination. But, as is indicated below, this results in no new burdens being imposed on how such providers conduct their business. For example, the House Report clearly states that the Commission may find that "commercial mobile services need not be tariffed at all."[7]

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[4]H.R. Conf. Rep. No. 103-213, 103rd Cong., 1st Sess. 496 (1993) (emphasis supplied).

[5]*See Nat. Ass'n of Regulatory Utility Com'rs v. F.C.C.*, 525 F.2d 630, 641-42 (D.C.Cir.), *cert. denied*, 425 U.S. 992 (1976), and cases cited therein for the principle that common carriers need not serve the whole public, and that their services may be so specialized as to be of possible use to only a fraction of the total population.

[6]47 U.S.C. Section 332(c)(1) (1993).

[7]H.R. Rep. No. 103-111, 103rd Cong., 1st Sess. 260 (1993).

Classifying Small Companies as CMS Providers is Not a Problem

In spite of scattered suggestions that classifying small companies (such as dispatch companies) as CMS providers will result in difficulties for them, even the smallest company should *not* be disadvantaged by such classification.

There is No Regulatory Disadvantage to CMS Classification. Classifying small companies as CMS providers should not be a problem *if* CMS providers are subjected to permissive detariffing ("forbearance") -- as the Omnibus Budget Reconciliation Act clearly permits. As amended, the Act provides that *the Commission may subject CMS providers to forbearance by determining that enforcement of regulatory provisions are not necessary in order to (1) "ensure that the charges, practices, classifications, or regulations for or in connection with that service are just and reasonable and are not unjustly or unreasonably discriminatory;" (2) protect consumers; and (3) that such a finding is consistent with the public interest.*[8] The only provisions which may not be forborne are those obligating common carriers to furnish service upon reasonable request, providing for just and reasonable rates, prohibiting unjust and unreasonable discrimination, and authorizing parties to seek redress by application to the Commission.[9]

If forbearance is applied, companies which are classified as CMS providers will suffer no new regulatory burdens or obligations, and will not have to change their contracts with their customers, nor the way they do business. The rationale used to justify forbearance of non-dominant carriers in the Competitive Carrier proceeding will support a finding that CMS providers need not have to file tariffs, nor will they be required to file section 214 applications in order to initiate or terminate service, in order to serve the public interest. Sufficient evidence exists of competition in the mobile services marketplace to support such a finding.

Likewise, as the Commission's *Regulatory Parity Notice* tentatively concludes, such provisions as Sections 219 (annual and other reports) and 220 (accounts, records and memoranda; depreciation charges) do not directly protect consumers from unjust rates or other similar harms, while imposing costs of compliance which are out of proportion with the protections afforded by them. Thus, SMRs may be classified as CMS providers and subjected to forbearance, releasing them from burdensome regulatory requirements.

There are Economic Benefits to CMS Classification. Not only is there no disadvantage to small companies who are properly classified as CMS providers, there are important economic benefits. Classifying small companies as CMS providers will allow them to offer new services and features to their users, as new technologies are developed. For example, as CMS providers, traditional dispatch companies may be able to offer new digital applications in addition to their voice services. SMR spectrum could be used to provide a wireless data service just as FM radio

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[8] 47 U.S.C. Section 332(c)(1) (1993).

[9] The amendment to the Act provided that the Commission would not forbear from applying Sections 201, 202 and 208 of the Act to CMS providers. 47 U.S.C. Section 332(c)(1).

broadcasters are able to provide data services and cellular companies simultaneously can provide voice and data service via Cellular Digital Packet Data (CDPD).

Spectrum is too scarce a resource to allow artificial regulatory restraints to frustrate development and deployment of the most efficient -- and highest valued -- technologies and services. Classifying SMR providers as CMS providers will create opportunities for more investor interest and developmental efforts by equipment manufacturers, as well as incentives for service innovation. In fact, CMS classification will enable SMR providers to offer full interconnection and allow them to serve a broader public, which private classification by and large would foreclose.

Transition Period as a Safeguard. To the extent that providers of services which were formerly classified as private land mobile radio services are affected by the creation of CMS, the Act provides a one year period for the Commission to adopt modifications to its rules in order to effect the transition to the new treatment of such services. Thus, there is no need to fear that a sudden shock will disrupt the mobile services marketplace, even with respect to the small SMR service providers.

Private Mobile Services and Functional Equivalence

Private Mobile Services are and should be a much smaller body of services, clearly set apart from Commercial Mobile Services.

The Act itself defines Private Mobile Service as *"any mobile service (as defined in section 3(n)) that is not a commercial mobile service or the functional equivalent of a commercial mobile service, as specified by regulation by the Commission."*[10]

The legislative history of the Omnibus Budget Reconciliation Act makes it clear that Congress conceived of Private Mobile Services as a small subset of mobile services, intending to redress the growth of disparately-regulated but functionally-equivalent services after the establishment of private land mobile services as a classification in 1982.[11] Such largely unregulated services grew in capability and in availability to rival public, regulated services, with SMR alone serving over 1.5 million users. Congress therefore adopted regulatory parity to redress this situation, ensuring that "equivalent mobile services are regulated in the same manner."[12]

Examples of private mobile services would include such Part 90 services as the Petroleum Power Service and other, internally-oriented, non-commercial services which are not the functional equivalent of CMS.

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[10]47 U.S.C. Section 332(d)(3).

[11]Under the former Section 332, adopted by the Communications Amendments Act of 1982, P.L. No. 97-259, 96 Stat. 1087, 1096 (1982).

[12]House Report at 259.

Functional Equivalence. The Budget Act clearly directs that "functionally equivalent" services are to be treated in a like manner, *i.e.*, classified and treated as CMS. Services which meet the CMS definition are automatically to be so classified *as are services which are their functional equivalents even if not squarely within the CMS definition.* Thus, non-profit or non-interconnected services which are the functional equivalents of CMS services should be treated in a like fashion. Again, this will not result in the imposition of any new burden on such a service or its provider if CMS is subjected to forbearance.

The appropriate tests to determine functional equivalence are product substitutability and customer perception. This is consistent both with antitrust law and Commission precedent, both of which look to such indicia in order to determine the likeness of products or services.

Although the legislative history *permits* the Commission to make a determination of non-equivalency on the basis of an interconnected mobile service's failure to employ frequency or channel re-use to augment the number of channels available for its service, in conjunction with not making service available in a wide geographic area, this is not an appropriate finding.[13]

System capacity and service area size are not appropriate criteria for regulatory classification -- nor are they appropriate standards for a determination of "non-equivalency." Such criteria, in fact, invite inefficiency and balkanization of the telecommunications infrastructure by providing incentives for isolation and incompatibility, inasmuch as other service providers -- both wireline and wireless -- have knitted together separately-owned and operated exchanges and systems in multiple markets to make possible innovative and efficient nationwide service.

Self-Classification. Permitting licensees to select or self-classify themselves and their offerings as private mobile or CMS is appropriate with respect to services which are not clearly within the CMS definition and which are not the functional equivalent of CMS services, but any licensee that provides a CMS service must fully comply with the CMS rules.

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[13]Conference Report at 496.

Building The Wireless Future

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Michael F. Altschul
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February 8, 1994

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D.C. 20554

Re: *Ex Parte* Presentation
GEN Docket No. 90-314
Personal Communications Services

Dear Mr. Caton:

On Tuesday, February 8, 1994, Justin L. Jaschke, President of CenCall Communications Corporation, and Michael F. Altschul, Vice President and General Counsel of the Cellular Telecommunications Industry Association, met with Ms. Karen Brinkman, Legal Advisor to Chairman Reed E. Hundt, Mr. Rudolfo M. Baca, Legal Advisor to Commissioner James H. Quello, and Ms. Lisa Smith, Legal Advisor to Commissioner Andrew C. Barrett, to discuss the pending issues in the above-captioned proceeding. The attached presentation sets forth the substance of the views expressed in connection with this matter.

Pursuant to section 1.1206(a)(1) of the Commission's rules, an original and one copy of this filing are being filed with your office.

If there are any questions concerning this submission, please contact me at (202) 785-0081.

Sincerely,

Michael Altschul

cc: Karen Brinkman
Rudy Baca
Lisa Smith