34. PacTel Paging has met with representatives of NTIA and the Department of Navy, has outlined the proposed GAP service proposal, and has provided them with the engineering and technical data upon which PacTel bases its conclusion that the GAP service can co-exist with existing Government uses. As a result of these discussions, PacTel has been advised that neither NTIA nor the Department of Navy objects to the acceptance for filing of PacTel's rulemaking proposal, and the assignment of a rulemaking number to it, thereby initiating a normal public notice and comment cycle.

VI. PacTel's Commitment to GAP

35. PacTel, a financially secure and technically sophisticated company, has devoted -- and is committed to continuing to devote -- substantial resources to the development and implementation of the GAP service. Based upon the experimentation and development work that the company has done to date, PacTel has concluded that GAP is technically feasible. PacTel is willing and able to dedicate the further resources to GAP that are necessary to develop the service and to bring it to market.

36. PacTel already has conducted development work which provides valuable information concerning the feasibility of GAP. PacTel has tested the penetration and coverage area of 931 MHz paging transmissions. PacTel established a single

transmitter system in Texas and had operating personnel travel on aircraft on predesignated routes in Texas while monitoring test pages being sent out on the authorized system. Several important discoveries were made:

- At power levels presently used in terrestrial paging operations, pages can be received routinely in aircraft from transmission locations up to 250 miles away.
- Distant paging signals best enter the windows of the plane rather than the body of the aircraft. As a result, the paging transmitter must be oriented so as to permit the signal to approach the aircraft from the side, rather than from the front, the back or below.
- Angles of incidence to the aircraft as small as several degrees may be sufficient to permit reliable penetration of the windows of the aircraft.
- High gain antennas designed for terrestrial paging operations are ill-suited to provide GAP. For optimal result, uptilt configurations specifically oriented to send signals skyward are needed.

37. These preliminary findings confirm not only the feasibility of GAP service, but provide further evidence of the need for a special allocation. To engineer a reliable GAP system, transmitters are best located to the side of major commercial aircraft flight routes in areas between major commercial centers. This is significantly different from terrestrial paging operations that concentrate transmitters in

major metropolitan areas. Moreover, the configuration needed to direct the signal skyward is much different than that which is used to accomplish reliable terrestrial service. Special uptilt antennas will be necessary to maximize the signal in the appropriate directions. And, direct satellite control systems will have to be developed to permit widely spaced transmitters, some in remote areas, to be centrally operated and simulcast. These factors support PacTel's conclusion that channels should be devoted exclusively to this distinct service.

38. PacTel intends to continue its development program with respect to GAP. Further development is needed in the following important areas:

- Techniques for enhanced error correction and bit interleaving to overcome any potential interference.
- Techniques for successfully capturing pages from simulcast transmitters separated by hundreds of miles.
- Techniques for coordinating the satellite control of the nationwide network.
- Techniques for concentrating the radiated power skyward.
- Techniques for improving the ability to deliver adequate signals at the proper critical angles to penetrate aircraft.
- Techniques for numbering or retransmitting pages to minimize the lost pages on a per subscriber basis.

Additionally, if necessary, the effects of the Government off-shore operations on GAP reception will be further

quantified through cooperative tests conducted with the Department of the Navy. In sum, the Commission may proceed to issue a notice of proposed rulemaking with respect to GAP confident that the proponent has a sufficient level of commitment to the service to assure the development of an adequate record to support the allocations.[20/]

VII. The GAP Service Proposed Should Be Given Its Own Rulemaking Number

39. As the Commission is aware, a variety of proposals have been advanced regarding possible uses of spectrum in the 930-931 MHz band. See e.g., Echo Group L.P. Petition for Rulemaking, RM-7782 (to create a new Mobile Data Radio service); FAX-MAX Services Co. Petition for Rulemaking, RM-7760 (to create a public facsimile broadcast service); Telocator Petition for Rulemaking, RM-7617 (to create an Advanced Messaging Service). PacTel submits that its proposal to allocate spectrum to GAP is distinct from all previous proposals, and is deserving of public notice and comment in a separate proceeding.

40. To the best of PacTel's knowledge, no other party has mentioned ground-to-air paging as a service within the

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20/ The innovative nature of the proposed service and the technological innovations that PacTel is devoted to developing to provide the new service have caused PacTel to request a Pioneer's Preference in a separate filing.

scope of an ongoing rulemaking request.[21/] And, no other petitioner for rulemaking has proposed the specific change to the Table of Frequency Allocations which PacTel is advocating. Moreover, as is set forth in detail in this petition, GAP raises a series of technical, operational and design criteria issues that are deserving of industry attention and that could not reasonably have been deemed within the scope of any on-going proceeding.

41. For the foregoing reasons, PacTel respectfully requests that its GAP proposal be given a separate RM file number which will initiate a normal comment cycle designed to develop a meaningful record upon which the Commission can act.

VIII. Licensing Standards

42. In making an allocation of spectrum from the reserve band, the applicable licensing standards are important. PacTel has given this matter considerable thought, and proposes the following:

21/ Of all the pending requests by other parties respecting 930-931 MHz, the Telocator Advanced Messaging Service request, RM 7617, is the broadest based. Yet, while Telocator mentions a variety of new and advanced technology messaging options (electronic mail, imaging, terrestrial consumer uses), no mention is made of ground-to-air paging. Moreover, PacTel and the Commission have been advised by Telocator that it did not intend for its 930-931 MHz proposal to cut-off from separate notice and comment creative messaging proposals which, unlike Telocator, propose specific services.

A. Regulatory Status

43. In National Association of Regulatory Utilities Commissioners v. FCC, 525 F. 2d 630, 641 (D.C. Cir. 1976), the court stated, inter alia, that "to be a common carrier one must hold oneself out indiscriminately to the clientele one is suited to serve". The court also has stated that a "second prerequisite to common carrier status...is the requirement...that the system be such that customers transmit intelligence of their own design and choosing". 533 F.2d 601, 609 (D.C. Cir. 1976). In view of these directives, GAP would appropriately be regulated as a common carrier service. The fundamental purpose of the allocation would be to create a nationwide system available to all prospective users on a non-discriminatory basis to meet their communications needs. For the same reasons that the Commission recently determined to regulate the expanded air-ground radio telephone service allocation as a common carrier service, GAP should be accorded common carrier status.

44. The Commission should, however, forbear from applying the full panopoly of common carrier regulations to GAP. As earlier noted, more than one provider of GAP should be authorized, thereby rendering GAP providers non-dominant. Applying the reasoning in the Commission's Competitive Carrier Rulemaking, 85 FCC 2d 1, 10 (1980), GAP should be subject to reduced and/or streamlined regulation. If GAP providers are

deemed required to file rates with the Commission for interstate services, such filings should be subject to a presumption of lawfulness, expedited review procedures, and should not require cost justification material. See, e.g., Fifth Report and Order, 98 FCC 2d 1191, 1192 (1984).

45. Additionally, because GAP will largely be an interstate communications service which could be jeopardized if it was subject to a patchwork of state regulations, the Commission should assert exclusive jurisdiction with respect to the interstate communications offered on GAP channels. Consequently, the Commission should preempt not only technical and operational standards, but also state or local rate and entry/exit regulations with respect to the nationwide aspects of this service. This would not preclude state regulation of any incidental terrestrial-based services that might be offered.

B. Qualifying Criteria To Be A GAP Licensee

46. In order to deter speculation, applicants seeking licenses as GAP service providers should be required to meet strict qualifying criteria, including: (1) financial qualifications, (2) technical qualifications, and (3) service commitments. Regarding financial qualifications, applicants should be required to demonstrate that they have the financial resources needed to construct and operate a nationwide air-ground system. Unlike traditional paging services which

can be implemented on a local basis with a relatively small capital investment, the provision of nationwide air-ground service will require a substantial commitment of capital. Also, because the number of licenses to be issued will be limited, the Commission and the public can ill-afford to have this precious spectrum assigned to entities that are not financially secure. PacTel recommends that applicants be required to provide full particulars regarding the costs of construction and operation of the proposed facilities, together with other initial expenses. Drawing upon experience in the cellular arena, firm financial commitments should be required in order to assure that applicants have the seriousness of purpose and intent to provide the proposed services. See, e.g., FCC Rules, Section 22.917.

47. As for technical qualifications, applicants should be required to provide a complete technical description of their proposed systems, along with a detailed description of their qualifications to provide the proposed services.

48. As to service availability, the Commission should adopt minimum service requirements. PacTel Paging proposes that GAP licensees be required to construct a minimum of 25 terrestrial base stations within the first 18 months of the issuance of the authorization. These ground stations should not be concentrated in any single geographic area or region, but rather should be disbursed generally throughout the United States. Thus, for purposes of meeting the minimum construction

requirement, licensees should not be able to count any transmitter that is located within a certain number of miles (perhaps 250 or 300) of another terrestrial base station of the system. A standard of this nature will obligate licensees to adopt a nationwide focus as they proceed with the construction of their systems.

C. Selection Method

49. Exclusive radio common carrier paging licenses generally are assigned by lottery. GAP would appear to be an appropriate service for the use of random selection techniques, since the number of interested providers of service will, no doubt, exceed the number of available channels. The Commission must, however, adopt rules and procedures that will reduce speculation for these licenses. Specifically, PacTel Paging recommends that:

(a) Threshhold criteria regarding financial qualifications, technical qualifications and minimum service proposal requirements must be strictly enforced;

(b) Applicants should be restricted from filing or participating in more than one application for a nationwide GAP license; and

(c) Restrictions on the alienation of a GAP authorization prior to the initiation of nationwide service must be adopted and strictly enforced. A three year holding period should be instituted.

D. Additional Provisions

50. Except as otherwise provided above, this new paging service should be subject to the provisions in Part 22 of general applicability to radio common carrier services, and to the rules governing one-way services to the extent applicable to nationwide systems.

IX. Conclusion

51. The foregoing premises having been duly considered, PacTel respectfully petitions the Commission to initiate a rulemaking proceeding to allocate spectrum and adopt rules for ground-to-air paging as set forth herein. The preferred spectrum is in the 930-931 MHz reserve band, but if the Commission determines for any reason that this is not available for this allocation, PacTel requests that other suitable spectrum be allocated to this necessary and innovative GAP service. By separate filing, PacTel is requesting a Pioneer's Preference with respect to this new service proposal.

Respectfully submitted,

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TECHNICAL REPORT ON NAVY RADAR INTERFERENCE WITH AIRBORNE PAGERS

This report was prepared by Dr. Charles L. Jackson and Dr. Jeffrey Krauss at the request of PacTel Paging. This report analyzes interference from the Navy AN/SPS-49 radar system ("Navy radar") to airborne pagers used to provide Ground-Air Paging ("GAP") in the 930-931 MHz band.

Executive Summary

When operating co-channel, the radar system in question will illuminate "nearby" aircraft for approximately 1 percent of the time. Consequently, to a first approximation, about 1 percent of pages to passengers in the illuminated aircraft will be lost. More careful calculations indicate that, using current paging technology, about 1.3 percent of pages will be lost. We judge that this level of lost pages will not be a significant increase over the fraction of pages lost today. More advanced paging system designs, employing bit-interleaving and stronger error correcting codes will be less susceptible to such interference. Additionally, system operators have several options to reduce the effects of such interference today. Given the low absolute level of interference and the availability of several mitigating techniques, we judge that interference from the Navy radars would not be economically significant even if all aircraft were continuously illuminated by such radars. In fact, such illumination will occur for only a small fraction of flights.

Description of Navy Radar

The Navy radar system is a long-range two-dimensional air surveillance radar manufactured by Raytheon.[1] The Navy radar emits 300 kilowatts of output power from a klystron power source. The radar antenna has a 28 dBi gain, with a 3.3 degree horizontal beamwidth and a 9 degree vertical beamwidth. The Navy radar scans 360 degrees horizontally at a scan rate of 6 RPM or 12 RPM. The scan rate is selected by the radar operator. The radar also can scan vertically. In normal fleet operations, the Navy radar scans through both the horizontal and vertical planes. The Navy radar can also lock onto aircraft, but this is not normal operation.

The Navy radar is capable of operating on 849-942 MHz.[2] The Navy radar operates on a 2 MHz channel plan. Any channel, or group of channels, may be locked out manually by the operator. When used in fleet operations, several ships in a task force may use this radar, using every other channel. The occupied bandwidth of the emitted signal is 1 MHz at -3dB.

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[1] The technical description of the Navy Radar is based on a meeting held October 1, 1991, organized by NTIA. At that meeting, Navy representatives provided the information disclosed herein on an unclassified basis.

[2] Operation of the Navy Radar below 902 MHz is limited to more than 200 miles offshore to protect land mobile stations from interference. The Navy does not protect land mobile above 928 MHz.

The signal consists of a 2 microsecond pulse followed by a linear frequency sweep across 1 MHz in 125 microseconds. The pulse pair is repeated 285 times per second.

The Navy radar is used on approximately 200 to 300 Navy ships located offshore and in Navy shipyards. Some of the locations where Navy radar systems are commonly used include Southern California, Hawaii, Norfolk, and Puerto Rico.

Interference to Existing Paging Systems

Today, terrestrial paging systems located in coastal areas (such as Southern California and San Francisco) theoretically may receive interference from the Navy radar.[3] We understand that, in fact, land mobile stations operating in Los Angeles have experienced such interference. The Navy has indicated that they do not restrict Navy radar above 902 MHz, so it is possible that Navy radar does today interfere with terrestrial paging systems. In our discussions with the Navy representatives, they did not mention any complaints that Navy radars were interfering with terrestrial paging systems. We suspect that the Navy radar does interfere with terrestrial paging operations, but that interference, as shown below, is so minute that it results in a negligible number of lost pages to subscribers. Other causes, such as a lack of building penetration, can be expected to result in higher losses of pages than this interference source.

Paging System Coverage

Under standard paging engineering standards, the coverage area of a paging system is defined by its Carey contours. The Carey contours predict that there will be an acceptable probability of reception within a given area 90 percent of the time to 90 percent of the locations within the area. Current paging systems operate with probabilistic coverage and the operation of the industry and its customers accommodate lost pages and "dead" areas.

Theoretical Analysis of Interference Without Mitigating Factors

In order to analyze the potential for interference to a GAP system in 930-931 MHz band, we have made the following assumptions:

- The airborne pager will receive harmful interference if it is illuminated by the radar signal;

[3] Many of the coastal cities, such as San Diego, are built next to or around the areas the Navy stations ships. If a Navy ship in San Diego used its radar system in its normal mode, it would illuminate substantial areas served by pagers on both sides of the Bay.

- The Navy radar antenna has a 6 RPM horizontal sweep with no vertical nodding;[4] and

- The Navy radar antenna has a 3.6 degree horizontal beamwidth.[5]

Based on these assumptions, the average time probability of illumination of an airborne receiver is 3.6/360 = 1 percent. Thus, out of every 10-second period, the aircraft will be illuminated 0.01 x 10 seconds = 1/10th of a second = 100 milliseconds.[6]

The radar emits pulse, not continuous radiation; thus, during only a small portion of the time the radar antenna is pointed at the aircraft will the Navy radar be interfering with the airborne pager reception. As stated before, the radar signal consists of a 2 microsecond pulse followed by a linear sweep across 1 MHz in 125 microseconds. There are 40 25 kHz channels in 1 MHz. The sweeping pulse occupies the 25 kHz paging channel for a period of 125 microseconds/40 = 3.1 microseconds. Consequently, the Navy radar emits power on the paging channel during 2 + 3.1 microseconds = 5.1 microseconds of each pulse pair. A pulse pair is repeated 285 time/sec; thus, the Navy radar emits power on the paging channel 285 x 5.1 microseconds/sec = 1.45 milliseconds/sec = 0.15 percent of the time. Now, if we ignore the frequency sweep and make the very conservative assumption that the pulse is always emitting power on the paging channel, then the radar emits power (2 + 125 microseconds) x 285/second = 36 milliseconds/second = 3.6 percent of the time.

The pager transmission rate is assumed to be 1200 baud (2 level FSK).[7] One symbol, therefore, takes 0.83 milliseconds. If we assume that the Navy radar is on continuously, not pulsed, then one illumination interferes with the pager reception for 0.1 second x 1200 bits/second = 120 bits. If we assume that the interference caused lost messages to an airborne receiver only while the Navy radar was illuminating the aircraft, then the probability of a lost bit is 120 bits every 10 seconds; 120 bits/12000 bits = 1 percent. To a first approximation, we can take this as the probability of lost paging messages (i.e., we assume that all transmitted bits carry paging messages and that paging messages are short).

Next let us assume that the pager transmissions use a 1200 baud POCSAG protocol for pages.[8] The POCSAG protocol consists of a 576 bit preamble followed by variable number of 544 bit "batches"; each 544 bit "batch" contains synchronization data plus user data. Pagers need not receive the preamble to achieve synchronization. Each batch contains 17 blocks of

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[4] The results would be similar if 12 RPM were chosen. If vertical nodding is taken into account, the time of illumination would decrease.

[5] The specification given by the Navy was 3.3 degrees. We have used 3.6 degrees in order to make the calculation easier to follow.

[6] Of course, if vertical nodding is taken into account the time of illumination would be less.

[7] A faster baud rate does not affect this conclusion since it increases both total bits in 10 seconds and interfered-with bits in 0.1 seconds in the same proportion.

[8] 1200 baud POCSAG systems are used by paging companies today and represent reasonable practice. They are based upon a standard developed from the mid-1970s to the 1980s and do not represent "state-of-the-art" technology for avoiding interference and fading.

32 bits each, and the first block of each batch is the synchronization codeword. If the pager receives interference during the synchronization codeword, it normally retains synchronization from the previous synchronization codeword. It loses synchronization only if it misses two synchronization codewords in a row. Synchronization codewords are separated by 544 bits (453 milliseconds). The radar interference occurs once every 10 seconds for a period of 100 milliseconds. Hence, no more than one synchronization codeword can be interfered with on a single sweep of the radar.

Taking into account the actual message structure of 1200 baud POCSAG, we calculate that the probability of losing a tone-only page due to such harmful interference from the Navy radar is 1.3 percent. The probability of entirely missing a numeric page is also 1.3 percent. Additionally, the probability of the pager correctly receiving a paging address but then having the numeric portion of a 10-digit numeric page be lost due to harmful interference from the radar is 0.5 percent.

If a customer receives a numeric page where interference corrupts the message part, the pager will still respond but will indicate that the numeric field has been received partially or completely in error. In such a case, the subscriber still receives much of the economic benefits of paging. Paging services now offer page storage services that allow a customer to retrieve such garbled pages. (More commonly, of course, these services are used to retrieve pages missed for other causes such as pager turned off, subscriber out of service area, etc.)

Factors Mitigating the Theoretical Analysis

This result is worst-case. It considers a paging receiver illuminated by a co-channel radar. But, most of the country, even most of the costal areas, will not be in range of these radars most of the time. If the radars are in operation, they may well be operating on the other channels, such as channels in the 902-928 MHz part of the band, that will not affect 930 MHz and 940 MHz paging. The radar antennas may be set to operate in an up-and-down nodding motion, which would lower the time of illumination. The aircraft orientation is important, since the radio signal appears to enter through the aircraft windows. Thus, if the aircraft is heading directly toward or away from the radar source, relatively little energy can enter the airplane.

The analysis did not take into account interference from the radar antenna sidelobes or backlobe, because no antenna patterns were provided. However, rough estimates suggest that this will not be a problem for paging transmissions.[9]

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[9]: A rough analysis of the interference from backlobes follows:

- Assume radar output power = 350 kilowatts, pager base station output power = 350 watts
- D(desired)/U(undesired) = -30 dB
- Assume radar power is spread across 2 MHz, pager is spread across 25 kHz, 2000/25 = 80 = 19 dB
- Net D/U = -30 dB + 19 dB = -11 dB
- Assume radar antenna backlobe gain = -10 dB, pager transmitter antenna gain = +10 dB
- Net D/U = -11 + 10 dB -(-10 dB) = +9 dB for pager/receiver at equal distance from both transmitters and 0 dB gain antenna on pager.

Conclusion: pager transmissions have a 9 dB advantage over radar backlobe emissions at equal distances.

Additionally, as discussed below, more robust protocols and other design options can be used to reduce the likelihood of interference.

Finally, we would note that the ground-to-air propagation path is predominantly line-of-sight and may prove to be superior to the typical terrestrial paging propagation path particularly with regard to Rayleigh fading. If so, then the interference effects from the Navy radars may be regarded as substitutes for the path impairments affecting terrestrial paging receivers.

Design Flexibility

The paging system operator has the opportunity to employ specific design elements to minimize the already low impact of radar interference. The firm can site paging transmitters to counteract radar emissions from shipyards and channels, and to overcome interference around airports and along popular air travel routes. It can use directional base station antennas for the same purpose. Also, the system operator could send duplicate pages to those subscribers who frequently travel in illuminated aircraft to further minimize interference potential.

Interference results in lost pages, and with normal paging service the subscriber is unaware when pages are lost. However, with serial numbering of pages, a subscriber who receives page #53 and page #55 would be able to call and ask that page #54 be sent again. A service that stores each page and allows subscribers to call in and retrieve missed pages would be a powerful adjunct to the serial numbering of pages. This message storage service, without serial numbering, is offered today by PacTel Paging under the name PageSaver.

Finally, interleaving and a more robust paging protocols such as Ermes and AAP could be used. Specific error protection schemes could be developed to counteract periodic interference. The next generation of pagers will make it feasible to employ different transmission protocols in software or firmware for different paging markets, while still gaining the benefits of common hardware implementation.

Conclusion

Navy radar AN/SPS-49 will illuminate commercial aircraft and will thereby create interference resulting in lost pages. However, taking into account the short but periodic nature of the illumination and the availability of system design approaches capable of combatting this interference, the interference should be economically insignificant.

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October 15, 1991

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October 15, 1991

SUMMARY OF QUALIFICATIONS

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Received an A.B. degree from Harvard College in Applied Mathematics and the degrees of M.S., E.E. and Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology. At MIT, he specialized in operations research, computer science and communications. While a graduate student at MIT, he held the faculty rank of Instructor, taught graduate operations research courses and was co-developer of an undergraduate course in telecommunications.

Prior to joining NERA, Dr. Jackson was a co-founder of the telecommunications consulting firm of Shooshan & Jackson Inc. In earlier employment, Dr. Jackson was staff engineer for the Communications Subcommittee of the U.S. House of Representatives and was on the staff of the Federal Communications Commission. He has also worked as a digital designer and computer programmer.

Dr. Jackson has served as an expert witness in litigation on computer services and software and has testified before several state utility commissions.

He has authored or co-authored numerous studies on public policy issues in telecommunications and has testified before Congress on issues of technology and telecommunications policy. Over the last several years, he has also directed or participated in projects in acquisition analysis, market planning and product pricing. He has written for both professional journals and the popular press with articles appearing in publications ranging from *The IEEE Transactions on Computers* to *Scientific American* to *The St. Petersburg Times*. He holds a U.S. patent on an alarm signaling system.

Dr. Jackson is a member of the IEEE and Sigma Xi. From 1982 to 1988, he was an adjunct professor at Duke University.

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
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EMPLOYMENT

	NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC. (NERA)
1989-	Vice President. Telecommunications and public policy consulting services for a variety of clients in the telecommunications industry.
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1980-1988	Principal. Telecommunications and public policy consulting services for a variety of clients in the telecommunications industry.
	COMMUNICATIONS SUBCOMMITTEE, U.S. HOUSE OF REPRESENTATIVES--Washington, D.C.
1977-1980	Staff Engineer. Responsible for common carrier legislation and spectrum related issues.
	COMMON CARRIER BUREAU, FEDERAL COMMUNICATIONS COMMISSION--Washington, D.C.
1976-1977	Special Assistant to Chief. Responsible for technological issues and land mobile policy.
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1975-1976	Engineering Assistant to Commissioner Robinson.
	CNR, Inc.--Boston, Massachusetts
1973-1976	Consultant. Worked on implementation of digital communication systems over dispersive channels.
	MASSACHUSETTS INSTITUTE OF TECHNOLOGY--Cambridge, Massachusetts
1973-1976	Instructor.
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1971-1973	Research and Teaching Assistant.
	SIGNATRON--Lexington, Massachusetts
1968-1971	Research Engineer.

STANFORD RESEARCH INSTITUTE--Menlo Park, California
1966-1968 Programmer.

PROFESSIONAL ACTIVITIES

Member, Sigma XI, Institute of Electrical and Electronics Engineers (IEEE), IEEE Computer Society, IEEE Communications Society, IEEE Information Theory Group, American Association for the Advancement of Science, and International Telecommunications Society.

From 1987-88, served on Board of Directors of Telecommunications Policy and Research Conference. Chairman of Board 1988.

Chairman, WP1/IS of the FCC's Advisory Committee on Advanced Television.

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Capabilities and Experience

Dr. Krauss provides government relations and strategic planning services for telecommunications ventures. He advises clients on the impact of government regulations, spectrum management policies and legislation upon telecommunications networks and technology. Dr. Krauss also assists clients in achieving exceptions or changes to government spectrum management policies affecting their telecommunications needs. He offers expert witness testimony and assists clients in preparing testimony and in testifying before government bodies. Based on his knowledge of the telecommunications industry and emerging technologies, he provides competitive assessments and other "due diligence" analyses to businesses and investors.

He participates actively in policy and standards activities of trade associations such as the Electronic Industries Association, the American Electronics Association, and the National Cable Television Association, including the following committees:

EIA Point-to-Point Microwave Communications Section
EIA Satellite Communications Section
EIA Legislative Affairs Council
NCTA Engineering Committee
AEA Government Relations Committee
SBCA Technical Committee
FCC Advanced Television Advisory Committee
U.S. CCIR IWP 11/6 and JIWP 10-11-3

Dr. Krauss is an active participant in the FCC Advisory Committee process for choosing a standard for High Definition Television. He participates in the FCC's industry advisory group for the 1992 World Administrative Radio Conference, which will decide on radio spectrum allocations for personal wireless communications networks, digital satellite radio broadcasting services and mobile satellite services. He writes a monthly column for Communications Engineering and Design Magazine entitled "Capital Currents" which reviews FCC and Congressional activities that influence telecommunications technology.

FCC Participation

During the 1987-90 time period, Dr. Krauss prepared comments and studies that were filed in the following FCC dockets and investigations:

Docket No. 85-301, Cable TV Terminal Devices
Docket No. 86-336, Scrambling of Satellite TV Signals
Docket No. 86-495, Allocation of Spectrum for Basic Exchange Telecommunications Radio Service
Docket No. 86-496, Implementation of Reduced Orbital Spacing for Satellites