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May 28, 1992

Office of the Secretary
ATT: Ms. Donna Searcy
Federal Communications Commission
1919 M Street, NW
RM. 222
Washington, DC 20554

Subject: Comments Regarding ET 92-9

Dear Ms. Searcy,

ROLM is pleased to present the enclosed comments (1 original, 9 copies) relating to the Notice of Proposed Rule Making, ET 92-9. We would like these comments to be considered during the Commission's deliberations on the rulings to be enacted which will impact these new wireless services.

Sincerely,
ROLM



Steven Sivitz
Program Manager - Wireless Systems

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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In the Matter of)
Redevelopment of Spectrum to) ET Docket No. 92-9
Encourage Innovation in the Use of)
New Telecommunications Technology)

ROLM Comments Relating to the Notice of Proposed Rule
Making:
Released February 7, 1992

Steven Sivitz
ROLM
4900 Old Ironsides Dr.
Santa Clara, CA 95052-8075
408-492-2585

Dated: May 28, 1992

ROLM Comments Relating to the Notice of Proposed Rule
Making:
ET Docket No. 92-9

Table of Contents

Summary	3
I. Introduction	5
II. Unlicensed Operation of Private Systems	8
III. 2 GHz Band for Personal Communications Services	10
IV. Frequency Allocations Should be Contiguous	13
V. The X + 2X + 4X Model	14
VI. Migration of Part 94 Licensees	15
A Phased Transition	17
Reimbursement of Transition Expenses	19
Use of Spectrum Between 1710 and 1850 MHz	20
VII. Conclusion	23
Attachment 1	26

Summary

As industry and government continue to work together to institute a new era of radio based communications, there are several unresolved issues slowing the availability of new services. The most pressing issues revolve around the frequency allocation. The Federal Communications Commission (FCC or Commission) is recommending that the emerging Personal Communications Services (PCS) be allocated frequencies in the 2 GHz band and the current licensees be transitioned to alternative frequencies or communication media. ROLM supports the direction and implementation process the FCC has indicated in this Notice of Proposed Rule Making for Emerging Technologies.

The following comments will focus on six topics that are important to ROLM. These are the

- (a) unlicensed operation for private systems;
- (b) suitability of 2 GHz for PCS;
- (c) transition of current 2 GHz licensees;
- (d) contiguous allocations for new services;
- (e) reimbursement of transition expenses and
- (f) alternative frequencies for transitioned services.

It is expected that other PCS participants will voice support for these recommendations. Our ultimate desire is for a fair and timely resolution to the regulatory debate,

so that all interested parties can focus on advancing the wireless opportunities.

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I. Introduction

ROLM herein submits its comments on the above captioned proceeding relating to spectrum allocations associated with emerging technologies and telecommunications services. As a major American manufacturer of business communications systems, ROLM enthusiastically endorses the Federal Communications Commission's efforts to allocate spectrum for personal communications services. ROLM is sensitive to the interwoven dilemmas the Commission is facing and hopes that they will resolve them in the near future. The Commission's tribulations are similar to those manufacturers and service providers continually face in weighing the priorities, effects and resources required to implement a new offering.

After reviewing over one hundred of the submissions relating to Gen. Docket 90-314¹, plus the spectrum usage study conducted by the FCC's Office of Engineering and Technology², ROLM applauds the Commission's intent and speed with which it has responded to the market demand for radio based personal communications. The national decisions are additionally compounded by international initiatives and progress focused on similar services. ROLM is in support of the general elements discussed in ET Docket 92-9³. More specifically, it is ROLM's belief that:

- (A) private systems should not be encumbered with licensing procedures;
- (B) the 2 GHz band is ideally suited for personal communications services (PCS);
- (C) there is no requirement for a mass migration of incumbent licensees out of the 2 GHz band;
- (D) frequency allocations for related services should be contiguous;
- (E) the migration expenses of incumbents should be reimbursed by the beneficiaries;
- (F) Federal Government resources should be allocated in conjunction with the PCS initiative.

1. Amendment of the Commission's Rules to Establish New Personal Communications Services Gen. Docket No. 90-314, RM-7140, RM-7175 and RM-7618.

2. Creating New Technology Bands for Emerging Telecommunications Technology; FCC/OET TS92-1; Jan. 1992.

3. Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, released Feb. 7, 1992.

Following the trend of written material towards real-time communication, going from three day postal delivery to nearly instantaneous availability via facsimile, wireless telephones will enhance productivity, responsiveness and competitiveness in the business environment. Being the nation's third largest provider of private business communications systems, necessitates that ROLM be responsive to our customers' demands for continually improving telecommunications. Therefore, ROLM is actively engaged in the development of wireless communication technology for business applications. We are involved in technical research and development, detailed market analysis and regulatory participation, in partnership with other companies, to insure the most effective solutions are delivered to our customers.

There is a general consensus within the industry, that the business environment will be the incubator for personal communications technology, services and pricing. ROLM was disappointed at the minimal visibility the wireless business system application received at the Commission's en banc hearings and within other industry forums. Many advances in telecommunications and computing were fostered because of the business environment. History has shown that technology advances made in this marketplace, facsimile and video recorders as examples, can quickly evolve into mass market products for the entire country's benefit.

ROLM agrees with the comments of Dale Stone from AT&T, Charles Jackson from NERA and others at the en banc hearing, strongly urging the Commission to separately evaluate the appropriate rulings for each of the proposed services. Some of the more complex issues, public switched network access, licensing and tariffs, have different levels of priority within each service. To attempt to make an all encompassing ruling will delay everyone's development efforts and lengthen the time-to-market continuum.

II. Unlicensed Operation of Private Systems

With the advent of additional radio-based personal communications, some of the new services, specifically wireless business exchanges, local area networks and peer-to-peer computing, intended for low power in-building applications, may be best served by the adoption of a new FCC ruling for unlicensed operation. Since these on-premise applications do not follow the conventional guidelines of mobile service, they should not be subjected to the same procedures and processes. Because these services can be made self-managing, the equipment should only be required to meet type certification which will validate performance compliance.

We understand there are different views on unlicensed systems from people who are not directly involved with on-premise user provided communications. In consideration of the effort necessary to develop the wireless office marketplace, ROLM is in agreement with the Part 16 concept postulated by Craig McCaw, Chairman of McCaw Cellular Communications, at the en banc hearings. The new ruling should provide for the unlicensed operation of private business systems for voice and data.⁴ This type of rule making should encompass the equipment certification criteria, co-primary frequency status and provide assurances against any new sources of interference within the office environment. By adopting a ruling, which provides for services that are self-regulating on a noninterfering basis, the Commission will provide comfort to the market and expedite this new offering.

Hopefully, the Commission will not adopt a licensing policy where a local or regional PCS licensee will provide, that is sell or tariff, air time to the various services being offered in the area. We know our customers, and believe all

⁴ It is not believed possible to accommodate a new generation of residential cordless phones within this ruling. Additional research needs to be done to determine if additional frequency at 46/49 MHz or elsewhere within the PCN allocation is more appropriate.

PBX users, would be very reluctant to pay for air time when using a system they own. By tariffing air time usage, wireless technology would be acceptable to those with only the most critical needs and would therefore, retard the growth and market size of wireless business systems. It is asked that the Commission very carefully consider the implications, most of which will have a negative impact, in licensing the user provided wireless service markets.

III. 2 GHz Band for Personal Communications Services

Over the course of the last year, ROLM has been conducting an extensive market survey of our installed base of customers. The essential question we were trying to answer was -- Is there a market for a wireless business exchange? Since millions of dollars will be required to develop, manufacture, market and support this type of a new product, we had to assure ourselves that wireless connectivity was important to our customers. Suffice it to say that every customer we have talked to has not only confirmed the concept of a wireless business exchange, but has identified specific applications, environments and users where the technology would prove beneficial, plus have characterized the overall value to their companies. Furthermore, it is felt that once installed, new applications and justifications will evolve. ROLM is convinced that personal

communications **IS NOT** technology in search of a market, but rather, the opposite.

Independent market research anticipates an explosive growth rate for wireless, approaching 70 million users or 60% of all households by the year 2000⁵. Nearly 30%, or 20 million users, will be in the business sector. To meet this demand industry models forecast a total PCS allocation requirement of 100 to 300 MHz⁶. This is a tremendous amount of spectrum from a finite resource. To further complicate the bandwidth search, the FCC will promote the goal of a seamless ubiquitous network by allocating contiguous spectrum for related services.

Currently, the most perplexing debate in the entire PCS concept revolves around the frequency allocation questions:

- At what band should these services operate?
- Does it need to be contiguous spectrum?
- How much spectrum will each require?

With these 3 issues in mind, one can quickly eliminate any U.S. allocation under 1 GHz, where there are only 3 one MHz allocations that are not licensed. Rearranging the licensees under 1 GHz, to accommodate PCS, would be a Herculean task.

⁵. The estimate for all wireless services -- cellular, paging, PCS, residential cordless phones, etc.

⁶. Derived from spectrum studies by Motorola, A.D. Little Co., Northern Telecom, and others.

Looking elsewhere, it has been recommended by American chip manufacturers that the PCS allocation not be made above 2.3 GHz, because "use of any channels higher than 2.3 GHz would require the use of more costly gallium arsenide (GaAs) technology⁷". Additionally, staying below 2.3 GHz will assist in the commonality between European and American chip sets. So, the boundaries for the allocation have been set -- above 1 GHz and below 2.3 GHz.

ROLM is in full agreement with the FCC's indication that the most suitable place for the allocation falls between 1850 and 2200 MHz. Our position was reached after a thorough analysis of:

- propagation characteristics and engineering
- impact on incumbent licensees
- available bandwidth to support contiguous services
- availability and cost of radio technology
- FCC/OET frequency usage study ⁸
- time-to-market

Using these as the primary considerations, it is proposed that the 1850-1990 MHz band be adopted for three complimentary services:

7. Comments of National Semiconductor Corp., Before the FCC Gen. Docket No. 90-314, March 15, 1991.

8. See note 2.

- A. Wireless Telecommunications Office Systems (WTOS)⁹ for digital wireless connectivity to business telephone systems, providing communications within a building or campus;
- B. Personal Communications Networks (PCN) for providing wireless public access to the switched network;
- C. Data-PCS for high speed wireless data communications between personal computers and computer systems.

IV. Frequency Allocations Should be Contiguous

The FCC would promote the goal of a seamless ubiquitous network by allocating contiguous spectrum for WTOS, PCN and Data-PCS. The markets will develop sooner and grow faster if individuals can use the same handset (or terminal) on public and private networks. Contiguous spectrum will help to minimize the radio complexity required to scan for the correct frequency for a particular service.

Multifunctional equipment and services that span the markets can be more cost effectively developed than individual market-specific products. Contiguous spectrum would allow all manufacturers to take advantage of the economies of

⁹. WTOS is a telecommunications system that includes a switch, radio exchange (integrated or standalone), RF base stations and associated wireless handsets whose primary use is for voice and low speed data communications on private networks.

scale in providing low cost products to the market. Furthermore, contiguous spectrum facilitates the dynamic sharing of frequencies, when demand for one service exceeds that of another -- a higher concentration of private business traffic than public access traffic -- or when services need to overlap -- peer to peer computing at a conference. With proper frequency sharing guidelines and contiguous allocations, it may be possible to reduce the total cumulative discrete allocations for PCN, WTOS and Data-PCS.

V. The X + 2X + 4X Model

Now that the location of the allocation has been determined, the next 2 items are easier to answer. As previously noted, contiguous PCS allocations are desirable for several reasons. The economies of scale in the manufacturing process as well as the ultimate goal of a universal handset, which could be used in the home, office and public venues, require that spectrum planning locate the individual services in allocations that are not widely separated. Contiguous spectrum would be the ideal ruling.

The final issue is how much spectrum is needed for each of the services? Studies by several PCS experimental licensees, market forecasters and industry associations have shown that

there is approximately twice the spectrum requirement for PCN versus WTOS and WTOS versus Data-PCS. ROLM's analysis of WTOS dictates that 40 MHz be authorized to support the grade of service, density, coverage area and voice quality required in a business environment (See Attachment 1). With WTOS needing a 40 MHz allocation ("2X"), Data-PCS would require 20 MHz ("X") and PCN 80 MHz ("4X"). Therefore the model:

$$X+2X+4X = 140 \text{ MHz} = 1990-1850^{10}.$$

VI. Migration of Part 94 Licensees

Unfortunately for PCS the 2 GHz band is occupied by point-to-point microwave users (Part 94) who strongly oppose any sharing of this band with PCS. First and foremost, it is ROLM's belief that only a limited number of the microwave links will be impacted by new services operating in this band. This belief is based upon several points. First, several documented studies show that except for a very small number of metropolitan areas, there is an abundance of unlicensed spectrum at 1850 MHz¹¹. Second, some of the services, such as WTOS and Data-PCS (or wireless LANs), will

¹⁰. This model is intended as a reasonable estimate. Modifications may be necessary with market maturity, by application or per location.

¹¹. American Personal Communications Frequency Agile Sharing Technology (FAST) Report on Spectrum Sharing, July 1991. Also, Reply Comments of Digital Spread Spectrum Technologies, Gen. Docket No. 90-314, January, 1991.

be operating within buildings, where it is generally accepted that 10 dB of attenuation will be realized due to the walls, ceilings and superstructure. Third, since these new services will be operating at very low transmission power levels¹², coupled with free space attenuation, they will inflict negligible energy into neighboring microwave links. Finally, there are several current studies¹³ which show the feasibility of dynamic channel allocation which can be employed to avoid any contentious frequency situations. As a proof of this concept, ROLM has concluded a successful evaluation of off-the-shelf technology which incorporates dynamic channel allocation as one of its frequency sharing attributes.

In those situations where technology or frequency sharing guidelines cannot be implemented to avoid interfering with Part 94 users, it is felt that a transition plan, to alternative communications media or other microwave frequencies, can be developed which is nondetrimental to the current licensees' communication requirements. The concept ROLM envisions has three components:

- (a) a phased transition;
- (b) reimbursement of transition expenses;

12. Present estimates are between 10 and 50 mW peak power.

13. See American Personal Communications Frequency Agile Sharing Technology (FAST) Report on Spectrum Sharing, July 1991. Southwestern Bell Intelligent Multiple Access Spectrum Sharing (IMASS); Supplemental Comments, Gen. Docket # 90-314, January 9, 1992.

- (c) use of spectrum at 4, 6, 10 GHz and between 1710 and 1850 MHz.

A Phased Transition

There are very few, if any, PCS observers who do not agree that these services will first be introduced in high density metropolitan areas. This is a solid assumption because services will be offered where the people are. Again referring to the various 2 GHz usage studies, metropolitan areas have a relatively small penetration of microwave links. ROLM proposes that a transition program be constructed such that those microwave paths of shorter lengths have a shorter transition period than those paths with longer lengths. During the transition, fixed services licensees should be allowed to continue operations on a co-primary basis with the new services. After the stipulated transition time frame, fixed services and PCS would have co-primary status.

The migration of fixed services to alternative media should be orchestrated where those paths under 10 miles have a 5 year transition time frame, paths of 10-20 miles have a 10 year transition time frame and those of 20+ miles have a 15 year time frame. At anytime during the transition period the PCS provider may present the microwave user with a Notification of a Request to Relocate (NRR). The NRR would

be the mechanism by which the PCS provider initiated the actual migration of the microwave licensee to an alternative frequency or communication media.

This is an equitable proposal for several reasons. Availability of alternatives for short, highly reliable communication links are readily available. It is recognized that the FCC will need to amend the rules for Parts 21 and 94 to accommodate the 2 GHz incumbents in other bands. Representatives from the common carriers, private microwave operators, radio manufacturers and the National Spectrum Managers Association should propose changes for compatible inclusion of the 2 GHz users. With these recommendations the FCC must move expeditiously to incorporate them into a new licensing proceeding.

This gradual transition proposal takes into consideration the technical life cycle of the equipment and it provides for a reasonable amortization period for newly installed equipment. It would not be surprising if the vast majority of the longer links (20+ miles) are never transitioned due to the combination of interference avoidance technology and the lack of profitable PCS opportunities in those areas conducive to long microwave paths.

Reimbursement of Transition Expenses

When it is necessary to migrate fixed services, because of interference or constraints on PCS capacity, due to lack of clear bandwidth for these new services, then the PCS beneficiaries should be responsible for reimbursing the incumbents for their incurred costs. Within thirty (30) days of the NRR, the microwave user may request a transition and reimbursement plan or advise the requester that he/she will prepare his/her own plan. The financial settlements should be limited to direct expenses, such as frequency dependent equipment, site engineering and application fees or the cost of interface equipment to alternative media such as cable (fiber optic).

If the parties cannot reach agreement on the transition plan and associated costs, it is reasonable to assume that a contentious situation exists. In order to prevent a new service from being held hostage to exorbitant transition settlements, or the incumbent being forced to accept an inadequate alternative, the two parties should have the plan evaluated by an independent expert. Both parties need to agree that the expert's recommendation is binding.

Leaving the determination of who is a mutually acceptable expert up to the individual participants could contribute to a continuing delay. Therefore, it is suggested that the FCC

convene a conference of the appropriate service associations, trade associations and standards bodies who will be tasked with compiling a list of experts to be used when transition negotiations reach an impasse. This list should be reviewed on a bi-annual basis.

There are additional benefits to this reimbursed transition. Those fixed services that upgrade will likely do so to leading edge technology and will have most of the costs associated with the new systems offset by PCS reimbursements. Furthermore, the transitions will be a catalyst for growth in the microwave equipment market.

Use of Spectrum Between 1710 and 1850 MHz

One of the transition options is to provide a "new home" for the microwave users at 1710 to 1850 MHz. Since this is a nonshared¹⁴ Government band, an accommodation will have to be made with the National Telecommunications and Information Administration. It is recommended that the 1710 band be held in reserve for those microwave paths which cannot be reliably migrated to 4, 6 or 10 GHz, due to their long lengths.

ROLM has several reasons for feeling that this is not an unreasonable request. Considering the positive impact PCS

¹⁴. Nonshared between Government and commercial users.

will have on the U.S. economy and technology base, the Federal Government has an obligation to actively assist in the introduction of emerging technologies. The industry is not asking for financial support, which is often provided by foreign governments to their industries, but rather a modest request to make available a portion of a national resource which is capable of accommodating these nationwide services. There is established precedence for successful spectrum sharing between the Federal Government and industry¹⁵.

A recent study of the 1710 band, by NTIA¹⁶, identified roughly 7800 facilities in the Government Master File and noted that 87% of the assignments are for fixed line-of-sight, point-to-point systems with the Dept. of Agriculture being the largest user of these frequencies. Compared with the 29,000 microwave facilities identified by the Utilities Telecommunications Council¹⁷ in an equal amount of spectrum at 1850 MHz, the Government band is lightly populated. From the report it is apparent that the applications for these frequencies are typically in remote or lightly populated regions of the country. Recognizing that there are portions of this government band being used for critical needs, these should be set apart from the shared use being proposed. With

15. Fixed service at 932-935 MHz paired with 941-944 MHz is one example of Government and commercial sharing.

16. Cerezo, E.A.; *Federal Spectrum Usage of the 1710-1850 and 2200-2290 MHz Bands* (NTIA TR 92-285), March, 1992, pg. 4-3.

17. Comments of the Utilities Telecommunications Council, Gen. Docket 90-314, January 9, 1992.

this approach, it would lead one to believe that Part 94 links in urban or suburban areas could be efficiently accommodated in this band without jeopardizing current or future government communications.

Government sharing of the 1710-1850 band should be taken into consideration relative to the pending Congressional legislation¹⁸ aimed at reallocating 200 MHz of government spectrum to the FCC. Crediting the near term spectrum made available to Part 94 transitioners will help alleviate the pressure being exerted under the Dingell/Markey/Inouye bill for the Government to specify spectrum options and availability.

Another incentive for relocating in the 1710 band is the cost saving benefit for retrofitting the installed base of microwave links. It would not be unreasonable to think that some of the radios could simply be retuned depending upon the proximity of the old frequencies to the new ones. Path engineering, repeater locations and antennas could all stay the same. From the Government's perspective they have already stated that, "With few exceptions, [their equipment] is commercial equipment purchased off-the-shelf which can be crystal tuned to any frequency across the 1700 to 2400 MHz

¹⁸. Emerging Telecommunications Technology Act, 1989, H.R. # 2965 (531). a.k.a Dingell/Markey/Inouye Bill.

band"¹⁹. This is a logical accommodation for both entities with no unforeseen disruption to Government communications.

VII. Conclusion

The American worker is looking for improvements in the business telephone exchange to make him/her more productive and responsive. In the business environment, there are daily requirements for real-time voice communications. These span industries and organizations, from the warehouse shipping supervisor needing to expedite an order, to the maintenance engineer needing the manufacturer's assistance while repairing a flow control valve. The best way to meet the demand for real-time communications is with the introduction of wireless technology.

Telecommunications is one of the last bastions of U.S. worldwide leadership. Maintaining this role needs to be a national priority. The most significant issue delaying technical advances in the wireless industry is the lack of allocations for emerging technologies. This NPRM is an essential step forward.

¹⁹. See note 12; Federal Spectrum Usage of the 1710-1850.

The private and common carrier fixed services operating in the 2 GHz band provide valuable communications. They support essential goods and services throughout the United States. ROLM does not mean to minimize the concerns or issues fixed service licensees face by the introduction of personal communications. To the contrary, ROLM seeks an equitable solution to the dilemma of how to provide many of these same users with the next generation business communication products, while asking them to make adjustments in their established communication programs.

By proposing a gradual shift, on an as needed basis, from one communications method to another, for which they are fairly compensated, ROLM feels that both the old and the new can be accommodated. The Commission has not been capricious in its plans to locate the emerging technologies and services in the 2 GHz band. They have not resorted to "band clearing" methods of frequency allocation similar to those instituted by foreign governments for their personal communications programs. The FCC has evaluated alternative frequencies for both fixed services and PCS from an available technology perspective, cost justification, impact on the public, ease of implementation and many other viewpoints.