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FEDERAL COMMUNICATIONS COMMISSION
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Building The Wireless Future™

CTIA

Cellular Telecommunications Industry Association
1250 Connecticut Avenue, N.W.
Suite 200
Washington, D.C. 20036
202-785-0081 Telephone
202-785-0721 Fax

January 24, 1996

Mr. William F. Caton, Secretary
Federal Communications Commission
1919 M Street, NW - Room 222
Washington, DC 20554

Ex Parte Contact: CC Docket No. ~~96-288~~ 96-228 (Amendment of the Commission's Rules to Establish Part 27; the Wireless Communications Service ("WCS"));

Dear Mr. Caton:

On Thursday, January 23, 1997, Mr. Randall S. Coleman, Vice President for Regulatory Policy and Law, CTIA, and Mr. David Jeppson, Lucent Technologies, spoke with Rudy Baca, Sr. Legal Advisor to Commissioner Quello, regarding the above-referenced docket concerning the Wireless Communications Service. The attached documents were distributed during the meeting. The views expressed in the communications are already reflected in CTIA's position as filed in the above-referenced proceedings.

Pursuant to Section 1.1206 of the Commission's Rules, an original and one copy of this letter are being filed with your office.

If there are any questions in this regard, please contact the undersigned.

Sincerely,

Katherine Harris

Katherine Harris

Attachments

No. of Copies rec'd 0+1
List ABCDE

GN Docket No. 96-228 - Proposed 2.3 GHz Allocation

I. No Compatible Equipment Exists for Mobile Applications

There is currently no mobile equipment for use in this band in the world. As a result, unless the services are defined prior to auction, potential bidders will face an unacceptable level of uncertainty both with respect to services and the availability of equipment.

II. Fixed Services May Be Feasible -- Mobile Services Infeasible

Manufacturers (Alcatel, DSC, Lucent, Motorola, Nortel) have suggested that fixed services (fixed wireless loops, or fixed data) may be feasible in the WCS spectrum, subject to coordination with DARS licensees.

But manufacturers (*e.g.*, Lucent Technologies) have also expressed concern that: "the WCS spectrum with SDARS in the middle of the band is unique to spectrum management and represents some extraordinary technical challenges. A reasonable solution to the threat of technical interference to SDARS in the middle band is to allow only fixed services in the WCS spectrum." January 13, 1997, Supplemental Technical Statement of Lucent Technologies, Inc.

Even MCI (which has disavowed any interest "as a potential bidder for spectrum licenses") has stated:

1. allocation of this spectrum for "fixed, temporary fixed, and/or low-tier mobility services [for data and voice] appears reasonable;" and
2. "would be conducive to manufacturing efficiencies needed to make these services affordable to the general public;" and
3. "would also mitigate technical concerns such as spectrum sharing, interference, etc. and also promote domestic-international interoperability."

III. Mobile Services a Potential Secondary Market

Mobile can be permitted on a secondary basis, to not preclude the future development of sharing technologies for fixed and mobile services.

Lucent Technologies
Bell Labs Innovations

David B. Jeppsen, Esq.
Federal Public Affairs
Director

Suite 700
900 19th Street, N.W.
Washington, DC 20006
Tel: 202-530-7050
Fax: 202-530-7007
djeppsen@lucent.com

January 8, 1997

By Hand

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20544

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JAN 8 '97
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Re. GN Dkt. 96-228/Wireless Communications Services

Dear Mr. Caton:

This is to notify the Commission of an *ex parte* presentation to the Office of Engineering and Technology in the above referenced proceeding. The substance of the presentation is reflected in the attached technical statement.

Please call me should there be any questions.

Very truly yours,

David B. Jeppsen

copy by hand:
Richard Smith
Bruce Franca
Michael Marcus
Tom Mooring

copy by facsimile:
Leslie Taylor

Lucent Technologies
Bell Labs Innovations

Technical Statement of Lucent Technologies Inc.

Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS") GN Docket No. 96-228

January 8, 1997

Lucent Technologies is a leading supplier of wireless equipment and technology, and therefore our interests are congruent with the stated objectives of the pending spectrum auction. However, Lucent Technologies is concerned about the stringent emissions requirements being proposed for equipment operating in the 2.3 GHz band. In particular, the limits being proposed for fixed applications are virtually unprecedented throughout the wireless industry. They will substantially increase the cost of fixed wireless systems, thereby deterring the deployment of these types of applications.

Indeed, the record in this proceeding suggests that high-speed data applications are the most plausible type of applications that will be offered in this band. However, these type of systems would be adversely affected by the specifications. Since the specifications are so stringent, they will disadvantage wideband solutions necessary for high-speed data, including Internet, applications.

There is a delicate balance between emissions requirements to prevent inter-system interference, and the effect those requirements have on the cost, size, and complexity of communications systems. The cost of subscriber units in commercial wireless systems is of particular concern, since this drives the overall cost of the service to customers, and determines the customer's ability to afford such services. We present the problem from the two perspectives as follows.

Equipment Complexity and Cost Perspective

The effect of emissions specifications has a marked effect on many aspects of communications systems. Those systems which are intended to be inexpensive, and available to the general public are most affected by stringent emissions requirements. Therefore, it is most important that sufficient, but not overly-conservative requirements are prescribed. The effect of various levels of requirements on base station filter size and cost are presented in Table 1. Comparing the first and second rows, it is evident that the difference between an emissions specification of 70+10log(P) and 43+10log(P) causes a significant difference in the size and cost of the filters. The third row shows what we believe to be achievable in the near future using advances in filter technology and improved power amplifiers. With specifications on the order of 70+10log(P), future gains will not be as dramatic, since different filter technology is necessary for the more stringent requirement.

Table 1. Effect of Emissions Specifications on Base Station Filter Cost

Emissions Specification (dBc/MHz)	Filter Q Required	Approximate Size	Price Range
70+10log(P)	10,000 - 20,000	12" x 12" x 2"	$250 - $500
43+10log(P)	3,000 - 4,000	2" x 4" x 1"	$100 - $200
43+10log(P)	1,000 - 2,000	1mm x 1mm x ½mm	$1 - $2

The impact due to the more stringent emissions specifications on subscriber units is even more significant. The 43+10log(P) specification can be met without special filtering, and therefore there is essentially no filter cost. This makes the production of relatively low cost, affordable subscriber terminals feasible. With higher out-of-band emission specifications, filtering would be required and thus raising the cost of the subscriber unit. However, in order to comply to the more stringent specification of 70+10log(P) without a sufficiently wide guard band, a very high Q filter with such a sharp roll-off becomes a tremendous design challenge. A technically feasible, though almost equally undesirable solution would be to improve the power amplifier performance. The 70+10log(P) out-of-band emissions requirement translates to a -40dBm requirement at the band edge and thus requiring the amplifier IP3 or 1 dB compression point be increased by as much as 10 dB. Thus a 10 to 20 watt power amplifier instead of a 2 watt amplifier required for such a low power subscriber terminal would be needed. This would drive the additional power requirement by 10 dB and increase the cost by 10 to 30 folds. For the more typical medium power applications, where power output on the order of 200mW is required, subscriber unit cost increase would be as significant as 100 folds.

Therefore, based on the perspective of equipment complexity and cost, the Commission should reduce the emissions specifications currently proposed for fixed applications to be consistent with the 43+10log(P) requirement proposed for mobile applications.. Without this reduction, equipment will simply be too costly to make the spectrum allocation valuable to the wireless industry, particularly for wireless data applications.

Interference Between Systems

In their technical comments, Primosphere Limited Partnership advocates making the emissions specifications even more stringent. Based on our analysis and experience, Lucent Technologies is of the opinion that their analysis addresses very worst case conditions, and that some of the assumptions are overly conservative. In addition, the SDARS receiver noise characteristics was not realistic in their analysis.

Primosphere Limited Partnership stated that the SDARS receiver Noise Temperature was 200.0 °K. This resulted in a system Noise Energy of -145.6 dBW/MHz. However, without an expensive sophisticated cooling mechanism, the Noise Temperature for any receiver RF front end must exceed the ambient Thermal Noise Temperature of 290 °K. Assuming the SDARS receiver has a reasonably good LNA and with the receiver RF front end Noise Figure accounted for, a more realistic assumption for the SDARS Noise Temperature is at least 2,000. °K, which yields a good 10 dB higher noise energy than that previously computed by Primosphere. In addition, Primosphere allotted 0.2 dB increase in Noise Energy which is almost un-measurable. We believe a more reasonable assumption should be 2 dB.

Primosphere assumed a 10dBW/MHz of EIRP for the Fixed Wireless system (FWS). This value is relatively low compared to a realistic FWS Base Station, and yet much too high for a subscriber's terminal. Further, in their analysis, no cable loss, antenna polarization loss, nor any antenna pattern roll-off due to the use of highly directive antenna typically used for the FWS were accounted for.

Lucent Technologies also performed an in-depth interference analysis using an approach similar to that performed by the Primosphere. This analysis shows that the proposed FCC limits are more than adequate, and indeed are more stringent than what is needed for fixed applications. Based on our analysis, the FWS subscribers terminal having sufficiently low EIRP and the antenna being highly directive, thus the 43+10log(P) out-of-band emissions specifications would be adequate to prevent excessive interference into the SDARS receiver. As far as the FWS base station interference into the SDARS receiver, our results concluded that, other than a few extraneously worst cases, the interference energy is sufficiently low that the 43+10log(P) out-of-band emissions specifications should suffice. In those few cases where interference may occur, the Commission can alleviate any harmful effects of possible interference by requiring WCS/FWS and SDARS licensees to mutually cooperate with each other and to, where appropriate and reasonable, implement interference avoidance techniques, such as antenna position, antenna directionality, or extra filtering. The Commission has resolved competing

uses of spectrum through a similar approach in other areas, see, e.g.Local Multipoint Distribution Service and Fixed Satellite Services, Report and Order and Fourth Notice of Proposed Rulemaking, FCC 96-311 (rel. July 22, 1996), and there is no reason why the same principle cannot be followed here. In short, there is no basis for imposing the unrealistic emission requirements proposed by Primosphere, and the 43+10log(P) requirement should be adequate for both fixed and mobile WCS systems..

As an alternative, the Commission can consider differentiating between the forward and reverse link of WCS systems. Our analysis concluded that interference will become a problem on the forward link, before it becomes a problem on the reverse link. Since the reverse link emissions requirement affects system cost most significantly, the Commission could set more lenient specifications on the reverse link and impose a slightly more restrictive requirement for the forward link.

Specifically, the Commission could impose an emissions specification on the order of 60+10log(P) on the forward link (this is in line with Cellular in-band standards), and 43+10log(P) on the reverse link. Such specifications would greatly reduce the cost of wireless systems for this band, but would continue to ensure the manageability of inter-system interference. By taking such steps, the Commission would in turn increase the appeal and value of the 2.3GHz spectrum.

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Lucent Technologies

David B. Jeppsen, Esq.
Federal Public Affairs
Director

Suite 700
900 19th Street, N.W.
Washington, DC 20006
Tel: 202-530-7050
Fax: 202-530-7007
djeppsen@lucent.com

January 13, 1997

By Hand

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JAN 13 1997

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20544

Re: GN Dkt. 96-228/Wireless Communications Services

Dear Mr. Caton:

On January 9, 1997, a conference call was held between several members of the Office of Engineering and Technology and several RF engineers at Lucent Technologies. The subject matter of the conference call was Lucent Technologies' January 8 Technical Statement.

Since that time, we have had discussions with the technical consultants for Primosphere Limited Partnership. Based on those discussions, Lucent Technologies has supplemented its January 8 Technical Statement as enclosed.

Please call me should there be any questions.

Very truly yours,

David B. Jeppsen

Enclosure

copy by hand:

Richard Smith, OET
Bruce Franca, OET
Michael Marcus, OET
Tom Mooring, OET
Jonathan Cohen, WTB
Tom Stanley, WTB*
Rudy Baca, Office of Commissioner Quello*
Jane Mago, Office of Commissioner Chong*
David Sidall, Office of Commissioner Ness*
Julius Genachowski, Office of Chairman Hundt*
Jackie Chorney, Office of Chairman Hundt*

copy by facsimile:
Leslie Taylor, Counsel to Primosphere
Robert Ungar, Counsel to Primosphere

* January 8, 1997 Technical Statement of Lucent Technologies is also enclosed

Lucent Technologies
Bell Labs Innovations

Supplemental Technical Statement of Lucent Technologies Inc.

Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS") GN Docket No. 96-228

January 13 1997

The following is a supplement to the January 8, 1997 Technical Statement of Lucent Technologies Inc.

Band Plan/Pairing

After technical discussions with Primosphere Limited Partnership, we agree that the WCS spectrum with SDARs in the middle of the band is unique to spectrum management and represents some extraordinary technical challenges. A reasonable solution to the threat of harmful interference to SDARs in the middle band is to allow only fixed services in the WCS spectrum.

Lucent recommends that the WCS spectrum be divided into six (6) 5 MHz bands, A,B,C,D,E,F as shown below:

2.3 GHz Band Plan

A	B	C	2320-2345	D	E	F
2305-2310	2310-2315	2315-2320	SDARs	2345-2350	2350-2355	2355-2360
Fixed Wireless Loop Paired w/ E	Fixed/Data Paired w/ F	Fixed Voice/Data unpaired		Fixed Voice/Data unpaired	Fixed/Data Paired w/ A	Fixed Wireless Loop Paired w/ B

As Lucent has stated in its comments filed in this proceeding, it is important that the Commission allocate the band to a specific set of services in order to give the industry the certainty it needs to move the auction forward. Thus, Lucent recommends that the band be allocated for the services indicated above.

By limiting the blocks to fixed services only, the Commission can help alleviate the threat of harmful interference to SDARs in the middle band. The Commission should clarify, that to the extent possible, operators in the bands should work with SDARs operators, either directly or through industry associations, to coordinate implementation and resolve disputes about any interference into the SDARs spectrum.

Emission Limits

Lucent's January 8 Technical Statement explains that the 70 + 10 log (P) emission limit being proposed for fixed systems is overly restrictive and that the 43 + 10 log (P) emission limit for fixed systems should be adequate. To the extent that there is harmful interference from fixed WCS systems to adjacent SDARS systems, the licensees should be required to implement, where appropriate, certain interference mitigating techniques. As an alternative, Lucent suggested that the Commission could impose a slightly more restrictive limit (60 + 10 log (P)) on the forward link of fixed systems.

Subsequently, Lucent and Primosphere Engineers have discussed their differences. Based on additional information provided by Primosphere, Lucent has modified a couple of assumptions. The resulting analysis indicates that for fixed applications, the 70 + 10 log (P) requirement is sufficient for forward link operation. On the reverse link, the commission could reduce the specification by at least 10 dB.

In order to ensure adequate protection on the forward link, the commission could require that the WCS services operating in the C and D blocks utilize opposite circular polarization for their transmissions on the forward link. This approach has been suggested by Primosphere. However, we do not believe this to be necessary for the reverse links.

Finally, Lucent has seen the filing of Primosphere proposing that Section 27.54 of the rules be ammended to impose a 100W EIRP limit to fixed stations. Lucent Technologies does not believe that this limit is required, given the emissions limits already being proposed by the Commission.

The results of Lucent's interference analysis with SDARs systems are attached as Table 1.

Table 1

INTRODUCTION

The following is an interference analysis of a potential fixed wireless application at 2305-2320 MHz and 2345-2360 MHz into the Satellite Digital Audio Radio System.

APPROACH

The interference analysis is based on an approach similar to that used by Primosphere Limited Partnership. However, we feel that some of the assumptions made by Primosphere are overly conservative, and therefore have proposed different assumptions based on our experience.

The SDARS receiver system noise energy is first computed based on a reasonably good receiver design. Allowing for 1 -2 dB of noise fluctuation, an allowable interference noise energy is established. Based on the EIRP of a typical Fixed Wireless System (FWS), the path loss stemming from the distance between the SDARS antenna and the FWS antenna, and the FWS antenna pattern gain roll-off, the link budget is computed. Thus the isolation required is determined and compared to the FCC proposed isolation requirement.

INTERFERENCE ANALYSIS

Primosphere indicates that the SDARS system receive Noise Energy is on the order of 200-300°K. We believe this to be difficult to achieve for typical subscriber units, when antenna noise temperature is included. However, we use a number of 250°K for a worst-case analysis. This translates to 24dBK.

Thus, the SDARS system Noise Energy = -228.6 dBW/K+dBHz +24 dBK
or -144.6 dBW/MHz.
or 3.467 E-15 W/MHz.

Lucent also believes that a 1-2 dB allowable noise rise is reasonable for the SDARS noise floor from a WCS interferer. For a 1.5 dB noise rise, the allowable interferer level would be -148.4 dBW/MHz.

FWS Forward Link

Consider the Forward Link of a typical Fixed Wireless System. The EIRP from the Base Station (BS) is typically 16 dBW/MHz. Based on the directional antenna pattern look angles and distances, 3 cases are examined here.

Case 1, Assume that the SDARS antenna is approximately 100 ft from the base of the BS antenna tower where the BS antenna is mounted 100 ft above ground. The distance D_s used for path loss calculation is

D_s = 141.4 ft, assuming SDARS antenna is on the ground.

Assuming free space, the path loss, $L_s = 10 \log (4 \pi D_s / \lambda)^2$,

where λ = 0.4203 ft, the wavelength at 2340 MHz,

L_s = -72.5 dB.

Even if the BS antenna is tilted down as much as 5 degrees towards the ground and, at such a close distance, the SDARS antenna is at a directional angle outside of the first sidelobe region. Based on the BS antenna pattern, the gain at such look angle is more than 20 dB below that of the main beam peak. The Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-72.5 dB
Minimum BS antenna pattern roll-off		-20.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-73.5 dBW/MHz
Interference Noise Energy Allowed		-148.4 dBW/MHz-148.4
Required Out-of-band Isolation		-74.9 dB

Thus, this rather conservative approach falls in the ballpark of the -70dB Out-of-band Emission proposed by FCC. In addition, we do not include such effects as possible cable loss and antenna polarization loss etc.

Case 2, let's double the distance between the SDARS antenna and the base of the BS antenna tower. D_s = 223.6 ft, and thus L_s = -76.5 dB. The directional angle is such that the SDARS appears outside of the BS antenna main lobe region where the energy received will be at least 18 dB below that from the BS antenna main beam peak. The gain reduction could be even greater at the region between the main lobe and the first sidelobe. Similarly, the Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-76.5 dB
Minimum BS antenna pattern roll-off		-18.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-75.5 dBW/MHz
Interference Noise Energy Allowed		-148.4 dBW/MHz
Required Out-of-band Isolation		-72.9 dB

Again, this number is comparable to the 70 dB isolation proposed by FCC, and still assumes there are not additional mitigating effects such as cable loss and antenna polarization loss etc.

Case 3. Assume that the BS antenna is not down tilted. In order for the SDARS antenna to be seen at the FWS BS antenna near main beam region, the distance would be at least 1370 ft. That is when the SDARS antenna is in the direction with pattern roll-off of 2dB below BS antenna main beam peak. Thus, D_s = 1373ft, and thus L_s = -92.3 dB. Again, the Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-92.3 dB
BS antenna pattern roll-off		-2.0 dB
BS antenna pattern roll-off		-2.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-73.5 dBW/MHz
Interference Noise Energy Allowed		-148.4 dBW/MHz
Required Out-of-band Isolation		-74.9 dB

Again, the result is comparable to the -70 dB isolation proposed by FCC.

FWS Reverse Link

Let's now consider the Reverse Link of a typical Fixed Wireless System. The EIRP from the Subscriber Station (SS) is nominally 4 dBW/MHz. Due to the highly directive nature of the SS antenna, the back lobe is well below 25 dB with respect to the main beam peak. Assuming the SDARS antenna is about 100 ft from the SS antenna, the path loss is computed to be -69.5 dB. The Fixed Wireless system interference to SDARS is determined as follows:

SS EIRP		4 dBW/MHz
Path loss		-69.5 dB
Pattern roll-off		-25.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-87.5dBW/MHz
Interference Noise Energy Allowed		-148.4 dBW/MHz
Required Out-of-band Isolation		-60.9 dB

Comparing this number to the 70 dB isolation proposed by FCC, this meets the proposed FCC specification with almost 10 dB to spare without even accounting for other additional losses. Thus, the commission could relax the reverse link specification without affecting SDARS operation.

The results of Lucent's interference analysis with SDARs systems are attached as Table 1.

Table 1

INTRODUCTION

The following is an interference analysis of a potential fixed wireless application at 2305-2320 MHz and 2345-2360 MHz into the Satellite Digital Audio Radio System.

APPROACH

The interference analysis is based on an approach similar to that used by Primosphere Limited Partnership. However, we feel that several of the assumptions made by Primosphere are overly conservative, and therefore have proposed different assumption based on our experience.

The SDARS receiver system noise energy is first computed based on a reasonably good receiver design. Allowing for a couple of dB of fluctuation, an allowable interference noise energy is established. Further, based on the EIRP of a typical Fixed Wireless System (FWS), the path loss stemmed from the distance between the SDARS antenna and the FWS antenna, and the FWS antenna pattern gain roll-off, the link budget is computed. Thus the isolation required is determined and compared to the FCC proposed isolation requirement.

INTERFERENCE ANALYSIS

Without an expensive sophisticated cooling mechanism, the Noise Temperature for any receiver RF front end must exceed the ambient Thermal Noise Temperature of 290 °K. Assuming the SDARS receiver has a reasonably good LNA and with the Receiver RF front end Noise Figure accounted for, it is rather realistic to assume a 2,000. °K of SDARS Noise Temperature, which translates to 33 dBK.

Thus, the SDARS system Noise Energy = -228.6 dBW/K-Hz +33 dBK
or -135.6 dBW/MHz.
or -2.754 E-14 W/MHz.

In order to allow for a 2 dB increase on the Interference Noise Energy budget for an average SDARS receiving system, -133.6 dBW/MHz (or 4.365 E-14 W/MHz) is allowed. This results in a delta of 1.611E-14 W/MHz or -137.9 dBW/MHz Allowed Interference Noise Energy.

FWS Forward Link

Consider the Forward Link of a typical Fixed Wireless System. The EIRP from the Base Station (BS) is typically 16 dBW/MHz. Based on the directional antenna pattern look angles and distances, 3 cases are examined here.

Case 1, Assume that the SDARS antenna is approximately 100 ft from the base of the BS antenna tower where the BS antenna is mounted 100 ft above ground. The distance D_s used for path loss calculation is

D_s = 141.4 ft, assuming SDARS antenna is on the ground.

Assuming free space, the path loss, $L_s = 10 \log (4 \pi D_s / \lambda)^2$,

where λ = 0.4203 ft, the wavelength at 2340 MHz,

L_s = -72.5 dB.

Even if the BS antenna is tilted down as much as 5 degrees towards the ground and, at such a close distance, the SDARS antenna is at a directional angle outside of the first sidelobe region. Based on the BS antenna pattern, the gain at such look angle is more than 20 dB below that of the main beam peak. The Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-72.5 dB
Minimum BS antenna pattern roll-off		-20.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-73.5 dBW/MHz
Interference Noise Energy Allowed		-137.9 dBW/MHz
Required Out-of-band Isolation		-63.4 dB

Comparing this number to the -70 dB Out-of-band Emission proposed by FCC, this worst-case analysis meets the proposed FCC specification with at least 6.6 dB to spare. This is a rather conservative number considering there are other additional losses such as cable loss and antenna polarization loss etc. which would amount to additional 4 dB of additional margin and thus relax the out-of band emission requirement to 60+10log(p).

Case 2, let's double the distance between the SDARS antenna and the base of the BS antenna tower. D_s = 223.6 ft, and thus L_s = -76.5 dB. The directional angle is such that the SDARS appears outside of the BS antenna main lobe region where the energy received will be at least 18 dB below that from the BS antenna main beam peak. The gain reduction could be even greater at the region between the main lobe and the first sidelobe. Similarly, the Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-76.5 dB
Minimum BS antenna pattern roll-off		-18.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-75.5 dBW/MHz
Interference Noise Energy Allowed		-137.9 dBW/MHz
Required Out-of-band Isolation		-62.4 dB

Comparing this number to the 70 dB isolation proposed by FCC, this worst-case analysis meets the proposed FCC specification with more than 7.6 dB to spare. Similarly, by adding the possible cable loss and antenna polarization loss etc., additional 4 dB of margin is realized and thus the out-of band emission requirement of 60+10log(p) is more than adequate here.

Case 3, Assume that the BS antenna is not down tilted. In order for the SDARS antenna to be seen at the FWS BS antenna near main beam region, the distance would be at least 1370 ft. That is when the SDARS antenna is in the direction with pattern roll-off of 2dB below BS antenna main beam peak. Thus, D_s = 1373ft, and thus L_s = -92.3 dB. Again, the Fixed Wireless system interference to SDARS is determined as follows:

BS EIRP		16 dBW/MHz
Minimum path loss		-92.3 dB
BS antenna pattern roll-off		-2.0 dB
BS antenna pattern roll-off		-2.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-73.5 dBW/MHz
Interference Noise Energy Allowed		-137.9 dBW/MHz
Required Out-of-band Isolation		-64.4 dB

Comparing this number to the -70 dB isolation proposed by FCC, there is a 5.6 dB of margin in case. However, with additional cable loss and antenna polarization loss accounted for, the isolation required is well within the 60dB region. Again, one should be convinced that 60+10log(p) is sufficient.

FWS Reverse Link

Let's now consider the Reverse Link of a typical Fixed Wireless System. The EIRP from the Subscriber Station (SS) is nominally 8dBW/2.5MHz, or 4 dBW/MHz. Due to the highly directive nature of the SS antenna, the back lobe is well below 25 dB with respect to the main beam peak. Assuming the SDARS antenna is about 100 ft from the SS antenna, the path loss is computed to be -59.5 dB. The Fixed Wireless system interference to SDARS is determined as follows:

SS EIRP		4 dBW/MHz
Path loss		-69.5 dB
Pattern roll-off		-25.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-87.5dBW/MHz
Interference Noise Energy Allowed		-137.9 dBW/MHz
Required Out-of-band Isolation		-50.4 dB

Comparing this number to the 70 dB isolation proposed by FCC, this meets the proposed FCC specification with almost 20 dB to spare without even accounting for other additional losses. Similar to the above analysis for the forward link, by adding the possible cable loss and antenna polarization loss etc., additional 4 dB of margin is realized and thus the out-of band emission requirement of 50+10log(p) is more than adequate here.

Comparison to Primosphere Interference Analysis

According to the response letter from Primosphere to FCC, the SDARS receiver Noise Temperature was assumed to be 200.0 °K. This resulted in a system Noise Energy of -145.6 dBW/MHz, which yielded a good 10 dB more conservative number than that of a practical receiving system.

The allowable 0.2 dB increase in Noise Energy is almost un-measurable because an average spectrum analyzer has resolution of 0.1dB. We believe a more reasonable assumption would be 2 dB, and have used that in the above computation.

Primosphere assumed a 10 dBW/MHz of FWS EIRP, without accounting for any pattern roll-off due to a high directivity antenna typically used for the Fixed Wireless systems and/or other mis-match VSWR gain drop or antenna polarization gain drop. The link budget is summarized below:

FWS EIRP		10 dBW/MHz
Path loss at 100ft		-69.2 dB
BS antenna pattern roll-off		0.0 dB
SDARS antenna gain	+	3.0 dB
Interfering energy from FWS at SDARS receiver		-56.2 dBW/MHz
Interference Noise Energy Allowed		-158.6 dBW/MHz
Required Out-of-band Isolation		-102.4 dB

Comparing this number to the 70 dB isolation proposed by FCC, Primosphere suggested that an additional isolation of 32.4 dB should be required. Based on their assumptions, a -89.4dB (or approximately -90 dB) Out-of-band emission is proposed by Primosphere. Lucent Technologies believes this is too conservative as expressed above.

MCI Communications
Corporation

1801 Pennsylvania Avenue, NW
Washington, DC 20006

December 19, 1996

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

Re: GN Docket No. 96-228 (Wireless Communications Service)
Notification of Ex Parte Presentation

Dear Mr. Caton:

Pursuant to Section 1.1206(a)(2) of the Commission's rules, notification is hereby submitted that the undersigned, together with Rajiv Shah and Robert Powers of MCI, met with members of the Commission's staff (Walter Strack, Mika Savir, Josh Roland and Matthew Moses of the Wireless Telecommunications Bureau, Jonathan Cohen of the Mass Media Bureau, and Tom Mooring of the Office of Engineering and Technology).

The purpose of the meeting was to present MCI's views on the issues raised in the Commission's Notice of Proposed Rulemaking in GN docket No. 96-228, and to outline MCI's proposal for a single 30 MHz nationwide license with flexibility of use, and flexibility to partition and disaggregate. Attached hereto is a copy of the presentation materials used by MCI in today's meeting.

The Commission staff asked how the proposal outlined in MCI's presentation could accommodate the needs of public safety. In response, we noted that some of the public safety entities had stated on the record that the 2.3 GHZ band was not particularly suited to their needs and that they would prefer a set aside in the vicinity of 800 MHz, where equipment is more readily available and full mobility networks can be constructed at a lower cost. Consistent with the framework envisioned by MCI, a nationwide licensee could provide an efficient infrastructure to serve many of the needs of public safety users. We recommended that the Commission simply adopt a requirement that the licensee serve the needs of public safety users, without mandating particular technology or capacity requirements; this need be no more detailed than, for example, Section 100.53 of the Commission's rules, which requires DBS licensees to serve Alaska and Hawaii where such service is technically feasible.

Sincerely,

Larry A. Blosser

Larry A. Blosser

cc (w/encl):

Walter Strack	Mika Savir
Josh Roland	Matthew Moses
Jonathan Cohen	Tom Mooring

MCI

Wireless Communications Service (WCS)
GN Docket No. 96-228

December 19, 1996

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Background / Summary

- MCI as proponent of nationwide PCS Licenses
- MCI's current wireless strategy (resale/interconnection)
- MCI's interest in the WCS rulemaking
- Opponents claim nationwide licensing just won't work
- Opportunity for the FCC to try nationwide licensing

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MCI was a proponent of nationwide licensing in the PCS rulemaking; subsequently, MCI adopted a resale/interconnection strategy for wireless services.

MCI's interest in this proceeding is not as a potential bidder for spectrum licenses, but as a prospective customer and "value added merchandiser" of wireless services and capacity the licensee(s) will provide.

Many of the commenters in this proceeding merely reiterate their opposition to nationwide licensing. For the most part, these commenters have failed to give adequate consideration to changes in both the wireless market and in the FCC's regulatory framework, which combine to make this an appropriate time to consider nationwide licensing.

- Nationwide licensing would be consistent with mandate to utilize various auction techniques.

- This auction presents an opportunity to make a significant step, without major risks, toward new spectrum management techniques.

- Nationwide licensing would be particularly well-suited to this band, for reasons explained below.

Principal Benefit of Nationwide Licensing

- Additional facilities-based competition
  - Wholesale or infrastructure level
  - Service providers and content providers
  - Categories are not mutually exclusive

Additional competition would be possible:

– at the "wholesale" or "infrastructure" level (currently served by the major CMRS carriers including AT&T Wireless, Primeco, Sprint PCS, and more specialized service providers ARDIS, RAM etc.)

– at the "service provider" level (currently served by CMRS carriers, agents, resellers, others)

Opportunities to participate in infrastructure buildout (as sublicensees, franchisees or partitioneers), and as service provider/content provider (reseller, agent, value-added merchandiser) are not mutually exclusive

• The 45 MHz broadband PCS spectrum cap should be retained; the introduction of additional facilities-based competition would serve the public interest

Specific recommendations for 2.3 GHz WCS auctions

- Nationwide license for 30 MHz of spectrum
  - Flexibility to manage deployment and interference
  - Significant economies of scale to the providers of infrastructure equipment
- Licensee may structure business relationships in any reasonable manner, subject to an obligation to make capacity reasonably available to other providers of "services" and "content"
  - Interconnection and access to the WCS "infrastructure" should be consistent with the current framework.

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- Nationwide license for 30 MHz of spectrum

- Afford the licensee flexibility in managing the spectrum geographically; this permits uniformity of base infrastructure across the country. It also helps minimize interference management problems and provides economies of scale to providers of infrastructure equipment.

- Afford the licensee flexibility to structure business relationships in any reasonable manner, provided that capacity (not just sublicenses of spectrum or geographic area), is reasonably available to other providers of services and content, allowing for service or content competition.

- Broadly speaking, the nationwide licensee would be responsible for providing an efficient infrastructure, while the licensee and others provide services and content, discussed in more detail below

- Interconnection and access to the WCS "infrastructure" should be consistent with the current regulatory framework.