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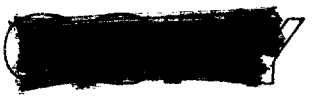

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

RECEIVED
JUN 18 1997
Federal Communications Commission
Office of Secretary

In the Matter of	)	
	)	
Amendment of Part 90 of the Commission's Rules To Provide for the Use of the 220 MHz-222 MHz Band by the Private Land Mobile Radio Service	)	PR Docket No. 89-552
	)	
Implementation of Sections 3 (n) and 332 of the Communications Act	)	GN Docket No. 93-252
	)	
Regulatory Treatment of Mobile Services	)	
	)	
Implementation of Section 309 (j) of the Communications Act-- Competitive Bidding	)	PP Docket No. 93-253

To: The Commission

REPLY

INTEK Diversified Corp. ("INTEK") by its counsel, pursuant to Section 1.429 of the Commission's Rules (47 C. F. R. § 1.429), hereby submits this Reply to the Oppositions and Comments on the Petitions for Reconsideration of the Commission's *Third Report and Order* ("*Order*") in the above-captioned proceeding.[1]

[1] 62 Federal Register 15978 (April 3, 1997).

I. THE FCC SHOULD PLACE ALL REQUESTS FOR WAIVER OF THE SPECTRUM EFFICIENCY STANDARD ON PUBLIC NOTICE AND PUBLISH ALL ITS DECISIONS ON WAIVER REQUESTS

In its Petition For Reconsideration (at 9), INTEK requested, among other things, that the FCC place all requests for waiver of the spectrum efficiency standard established for the 220 MHz band on public notice and provide an opportunity for interested parties to comment on the requests. INTEK noted that public notice of the waiver requests would ensure that the FCC had a complete record regarding important technical and policy issues that would impact an entire industry and not just the party requesting a Rule waiver. SEA, Inc. ("SEA")[2] supports INTEK's request, noting that public notice and comment will serve a valuable function in ensuring a full technical review of the waiver filing.

Metricom, Inc. ("Metricom"), however, opposes INTEK's request, arguing that "[t]here are no policy considerations involved with [the spectrum efficiency] waivers as those issues have already been decided by the Commission."[3] Although the FCC has decided in its *Third Report and Order* as a general policy matter that establishment of the spectrum efficiency standard for the 220 MHz band will serve the public interest, it is clear from the record in this proceeding itself that individual waiver requests of the spectrum efficiency standard will require consideration of both policy and technical issues. Commenters in this proceeding, for example, have debated the relative levels of spectrum efficiency of paging and dispatch systems. SEA Comments at 11. INTEK continues to believe that decisions on waiver of the efficiency standard

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[2]Comments of SEA, Inc. on Petitions For Reconsideration, PR Docket 89-552 (June 4, 1997) at 12.

[3]Comments of Metricom, Inc. In Response To Petitions For Reconsideration, PR Docket 89-552 (June 4, 1997) at 9.

that will impact the entire industry should be made only after affording all interested parties a fair opportunity for comment. Indeed, by ruling on the waiver requests in an open and public process, the FCC will ensure that all affected parties are fully informed of relevant decisions. Finally, contrary to Metricom's views, INTEK believes that the public notice process will facilitate an expedited waiver process by ensuring that the FCC's decisions are made on the basis of a complete record and will thus minimize any requirements for reconsideration or review of the waiver decision.

II. THE FCC SHOULD AMEND ITS INTERFERENCE STANDARDS TO ASSURE ADEQUATE PROTECTION TO PHASE I AND PHASE II LICENSEES

In its Petition, INTEK requested that the FCC reconsider the co-channel interference protection provided between Phase I and Phase II stations. In particular, INTEK urged that the FCC adopt the Phase I licensee's 28 dbu service contour (F(50,50)) as the protected service area. This request, which was consistent with the requests and comments of other parties including AMTA, SEA, the SMR Advisory Group, US Mobilcomm and Police Emergency Radio Services, was based upon the operating experience of INTEK's subsidiary, Roamer One, in managing 220 MHz stations in markets across the nation. To INTEK's knowledge, no party has opposed INTEK's, or other industry participants', requests in this regard.

To confirm the operating experience of Roamer One, INTEK retained Trott Communications Group ("TCG"), an engineering consulting firm with many years of experience in the land mobile industry, to analyze the effects of both the FCC's existing co-channel protection rules and those proposed by INTEK and other parties. TCG's Report is appended to this Reply. As noted therein, among other things, TCG has concluded that "at a service boundary

of 40 dBu at 855 MHz, the same level of performance can be expected as at a service boundary of 28 dBu at 220 MHz." Thus, the FCC's objective of equating the protection provided 220 MHz co-channel stations with that provided 800 MHz co-channel stations simply cannot be accomplished by using as a measure the 38 dBu contour at 220 MHz. TCG concludes that use of the 38 dBu contour, rather than the 28 dBu contour, in effect, will reduce the coverage area that can be effectively served by the 220 MHz band because of harmful interference that will result between Phase I and Phase II stations. As a result, use of the 38 dBu service contour will result in the less effective use of the spectrum and will diminish the utilization of the 220 MHz band.

For these reasons, INTEK urges the FCC to adopt Rules on reconsideration in this proceeding consistent with the views expressed herein and in its Petition For Reconsideration.

Respectfully submitted,

INTEK DIVERSIFIED CORP.

By: _____
Robert B. Kelly

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Its Counsel

June 18, 1997

Certificate of Service

I, Katherine S. Poole, an attorney in the law firm of KELLY & POVICH, P.C., certify that on this 18th day of June, 1997, a true and complete copy of the foregoing Reply Comments of INTEK Diversified Corp. on Petitions for Reconsideration of the *Third Report & Order* was sent first class mail, postage prepaid, to:

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Katherine S. Poole

TROTT
COMMUNICATIONS GROUP

INTRODUCTION

Trott Communications Group, Inc. has been retained by INTEK Diversified Corp. to evaluate the effects of the existing FCC Rules and the proposed amendment of Part 90 concerning use of the 220MHz-222MHz band. This report addresses the following issues:

1. Comparison of establishing the service contour at 38dBu to other mobile services
2. Comparison of the 38dBu service contour to actual predicted service area
3. Comparison of the current 38dBu rule to the proposed 28dBu rule
4. Effect of current and proposed Rules upon Phase 1 and Phase 2 licensees

The following analysis uses the current requirements of Part 90 - Subpart T of the Rules, which states that a licensee's 38dBu[F(50,50)] field strength establishes its regulatory protected service area and that a proposed co-channel licensee's station must protect this contour from its 28dBu[F(50,10)] interference contour if the co-channel station is proposed at less than 120 km from an existing licensee. These field strength calculations are made using R6602 propagation curves. In the comparison to other services, Part 90 - Subpart S concerning 800MHz/900MHz SMR protected service area and co-channel interference requirements are used.

ANALYSIS

Field receiver performance is dependent upon the median RF signal voltage or power impressed upon its antenna terminals. Most modern receivers intended for mobile operations, regardless of frequency of operation, provide adequate performance with static receive voltages in the range of 0.25μV to 0.50μV, or expressed in decibel power form, -149dBw (-119dBm) to -143 dBw (-113dBm). If the service area boundary is expressed as a field strength in dBu (decibels referenced to 1μV/m), conversion formulas must be used in the assessment of performance. Since field strength is a function of both power and frequency, the conversion between field strength and receive signal level must include both factors. The following table depicts the relationship:

Field Strength	Frequency	Rx Sig Level	Rx Sig Level	Rx Sig Level
dBu	*MHZ*	*dBw*	*dBm*	*μV*
28	220	-123.91	-93.91	4.51
28	855	-135.70	-105.70	1.16
38	220	-113.91	-83.91	14.25
38	855	-125.70	-95.70	3.67
40	220	-111.91	-81.91	17.49
40	855	-123.70	-93.70	4.62

1425 Greenway Drive, Suite 350, Irving, Texas 75038, 972/580-1911, Fax: 972/580-0641, Email: trottgroup@aol.com

This table indicates that a field strength of 40dBu at 855MHz is equivalent to a receiver input power of -94dBm, while the same receiver input power at 220MHz is equivalent to a field strength of 28dBu. The two frequency bands (220MHz and 855MHz) have differing performance characteristics which offset, such as environmental losses, environmental noise, and signal level variabilities. The propagation model used to predict the service area boundary compensates for the frequency dependent path loss differential. Therefore, at a service area boundary of 40dBu at 855MHz, the same level of performance can be expected as at a service area boundary of 28dBu at 220MHz. Both systems must also include margins to compensate for their own modulation implementation and other equipment efficiencies; however, similar modulation implementations would require similar margins regardless of frequency band.

The attached Figure 1 depicts the 28dBu service area contour of Roamer One's St. Louis, MO site calculated per R6602[F(50,50)] using actual parameters. This contour is overlaid on a propagation plot using the same parameters and the Okumura/Hata Extended propagation model as implemented by EDX, Inc. The 28dBu service contour closely approximates the actual coverage area expected from this site at these operational parameters.

In order to evaluate and compare the differences between the current Rules and those proposed, two co-channel stations, both operating at 500 watts ERP and 500 ft (152 meters) HAAT on perfectly flat terrain, have been assumed. The table below indicates the distance to the service contour [F(50,50)] and the interference contour [F(50,10)] for those two stations using R6602.

Field Strength vs Contour Distance 500 ft. HAAT & 500 Watts ERP		
Contour	Field Strength	Contour Dist
Service F(50,50)	38dBu	44.6 km
Interference F(50,10)	28dBu	74.2 km
	Minimum Separation	118.8 km
Service F(50,50)	28dBu	64.5 km
Interference F(50,10)	18dBu	104.3 km
	Minimum Separation	168.8 km

This table indicates that using 28dBu rather than 38dBu to define the service contour extends the protected service area from 44.6 km to 64.5 km for either site. Likewise, using 18dBu rather than 28dBu to define the interference contour extends the distance from 74.2 km to 104.3 km for either site. Per the existing rules (38dBu service contour and 28dBu interference contour), the co-channel station's interference contour (28dBu) will not overlap the incumbent's service contour (38dBu) if the station separation is at least 118.8 km (44.6km + 74.2km). Using the proposed service and interference boundary field strength definition, a minimum separation of

168.8 km (64.5km + 104.3km) is required in order for the co-channel station's interference contour (18dBu) not to overlap the incumbent's service contour (28dBu). See Figure 3 depicting the contours at 170 km separation per proposed Rules. This increase in required separation is due to the proposed change in the definition of the service area contour while retaining the existing 10dB co-channel protection ratio.

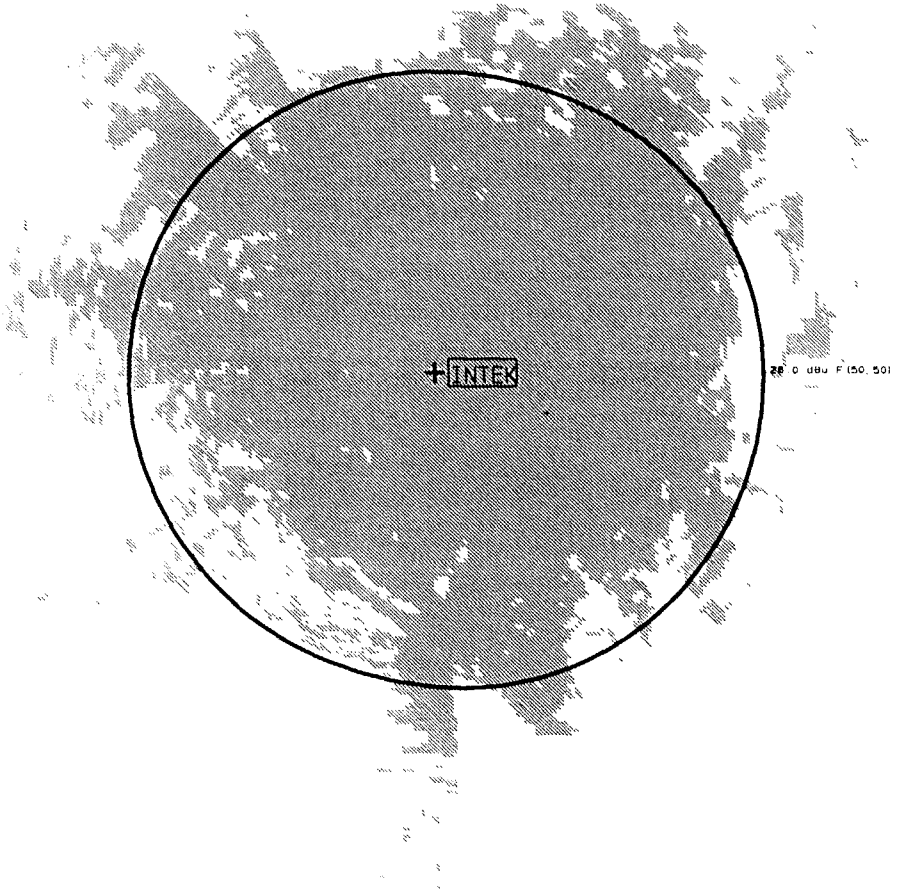
Based upon the proposed realistic service contour definition (28dBu), Figure 4 depicts the protected service area (38dBu) and interference contour (28dBu) of co-channel stations separated by 120 km per the existing Rules. In addition, the proposed 28dBu service contour is imposed on that figure. It is clear that area between the 38dBu and 28dBu service contours that falls within the 28dBu interference contour of the co-channel station cannot in any event be reliably served by Phase 2 stations due to co-channel interference from the Phase 1 station. Additionally, the area in question is well outside of both the 38dBu and 28dBu service contour of any potential Phase 2 station. The area within the 28dBu contour is 13,070 km^2 and the area within the 38dBu contour is 6,249 km^2.

CONCLUSION

Based upon the above analysis, it is clear that the Rules should define the protected service area for 220MHz-222MHz stations at 28dBu. This is consistent with that used in other similar services providing like service and consistent with the expected actual service area. Retaining the 38dBu protected service area will decrease the actual area that otherwise would be served without co-channel stations. This decrease will be due to co-channel interference and will affect both the Phase 1 and Phase 2 licensees since similar conditions will exist for both stations.

This issue mandates serious consideration since it is not just an incumbent issue, but can have serious impact upon the operational service area of future licensees, since their normal service area will also be reduced by co-channel interference from incumbent Phase 1 licensees or other Phase 2 applicants.

George W. Weimer, P.E.
Trott Communications Group, Inc.
Vice President of Engineering



MSITE (tm): INTEK.MAP

Propagation model: Hata-extended/E-P diff
Time: 50.00% Loc: 50.00% Margin: .0 dB
Climate: Continental Temperate
Gndcvr: None
Atm. factor: None
K Factor: 1.333
RX Antenna: Omni
Height: 5.0 feet AGL Gain: .0 dBd

Received power (at remote)

> -94.0 dBmW
< -94.0 dBmW

Minimum threshold level: -103.0 dBmW

Site	Ant Elv AMSL (feet)	FRPd (dBW)	Ant. Type /Orient.	Coordinates
INTEK *	949.0	16.68	OM-V	N 38 39 2.00
grp: 1	220.0000 MHz			W 90 20 8.00

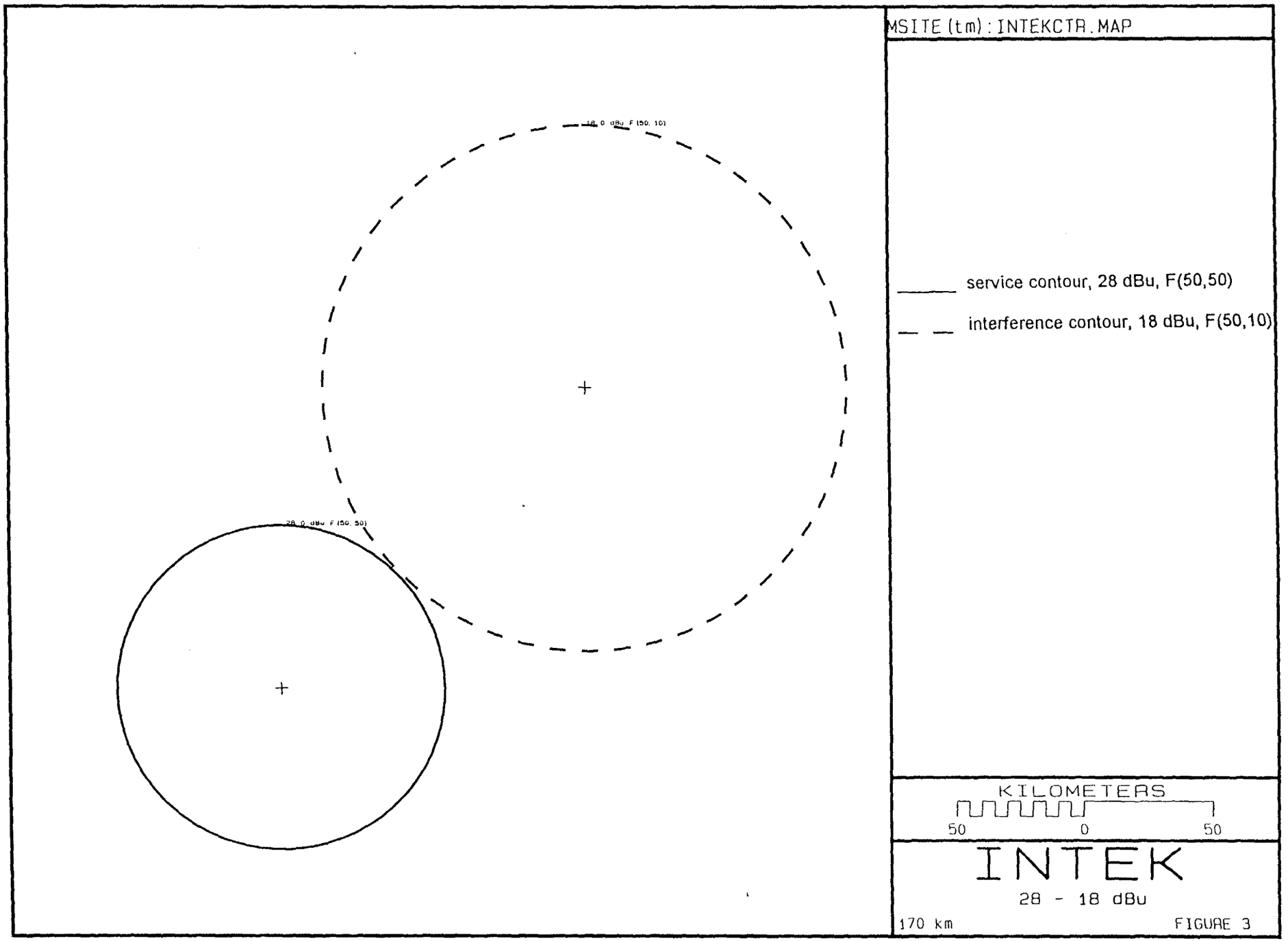
MILES

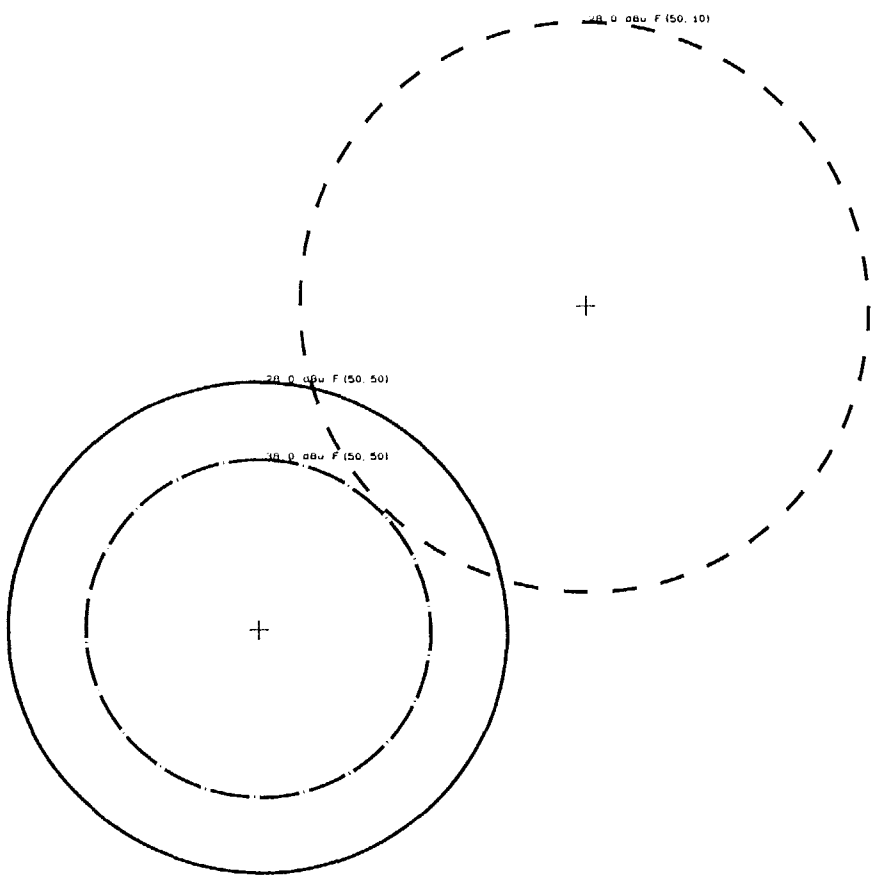
10 0 10 20 30

INTEK

ST LOUIS

COVERAGE FIGURE 1


MSITE (tm) : INTEKCTR.MAP
18.0 dBu F(50, 10)
28.0 dBu F(50, 50)
service contour, 28 dBu, F(50,50)
interference contour, 18 dBu, F(50,10)
KILOMETERS
50
0
50
INTEK
28 - 18 dBu
170 km
FIGURE 3



MSITE (tm) : INTEKCTR.MAP

— . — service contour, 38 dBu, F(50,50)

_____ service contour, 28 dBu, F(50,50)

— — interference contour, 28 dBu, F(50,10)

KILOMETERS

50 0 50

INTEK

LOST SERVICE AREA

120 km

FIGURE 4

TROTT
COMMUNICATIONS GROUP

DECLARATION

I, George W. Weimer, P.E., declare under penalty of perjury that:

I am Vice President of Engineering for Trott Communications Group ("TCG"), Inc. an independent engineering company founded in 1978 and located in Irving, Texas. I am a registered professional engineer in the State of Texas (Reg No. 51628E).

Much of my work over the past 25 years has been in RF system design, interference and radio propagation analyses. In conjunction with the above work, I have conducted many analyses as they pertain to co-channel , time delay and delay spread interference.

TCG has been retained by INTEK Diversified Corp. to evaluate the effects of the existing FCC rules concerning the co-channel station separation between the Phase I and Phase 2 licensees. I have prepared the attached report.

The above statements are true to the best of my knowledge and belief.

George W. Weimer, P.E.
June 17, 1997

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GEORGE W. WEIMER, P.E.
VICE PRESIDENT OF ENGINEERING

George Weimer has more than 30 years experience in Land Mobile and Microwave Communications. His duties as Vice President of Engineering with Trott include:

- ✧ Analyzing functional and operational requirements and designing radio communication systems and upgrades for various clients.
- ✧ Helping clients prepare requirements documentation, manage configurations, and procure computer automation including CAD, records management and MDT systems.
- ✧ Assisting government, utility and private agencies with strategic and tactical planning.
- ✧ Designing microwave, fiber optics and radio common carrier systems including trunking, paging, mobile telephone and cellular radiotelephone.
- ✧ Designing multi-user antenna systems to control interference, performing interference studies and solving existing interference problems.

Before joining Trott, Mr. Weimer was a program manager and a project engineer with E-Systems, Inc., Commercial Division, in Arlington, Texas. A mobile digital system for the City of Miami, Florida was a three-year project that involved design of an 800 MHz conventional radio system and MDT and CAD systems. Mr. Weimer was responsible for system design, both digital and RF, and implementation, including testing.

While with E-Systems, Mr. Weimer also designed the transmitter control system for the City of Los Angeles Police Department simulcast radio system and a digital signaling system for a mobile data system for Orange County, California.

Mr. Weimer also served as Communications Engineer for the State of Louisiana Department of Transportation. This assignment involved system planning and design, preparation of procurement specifications and implementation management.

While with the State of Louisiana, Mr. Weimer provided communications consultation to other state, local and federal government agencies for system design, evaluation, implementation and maintenance planning. He also served as Frequency Coordinator for the state's Highway Maintenance and Local Government Radio Services. He was a radio maintenance supervisor and microwave and a two-way radio technician for the Department of Highways. Here he gained in-depth experience in all phases of RF system maintenance, scheduling, and supervision.

Mr. Weimer is an APCO member, IEEE member and a Fellow of The Radio Club of America. He holds a Bachelor of Science degree in Electrical Engineering from Louisiana State University and is a Registered Professional Engineer in the State of Texas.