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FACSIMILE COVER SHEET

To: Mr. William Jacobs
Company: EMS Technologies, Inc.
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From: Marni Shapiro
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Date: December 20, 1996
Pages including this cover page: 3
Client/Matter Number 1-10 - 5746/mxs

Comments:

TRANSMISSION REPORT

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No.	REMOTE STATION	START TIME	DURATION	#PAGES	MODE	RESULTS
1	7704474397	12-20-96 16:41	1'04"	3/ 3		COMPLETED 9600
		TOTAL	0:01'04"	3		

NOTE:
No. : OPERATION NUMBER 48 : 4800BPS SELECTED EC : ERROR CORRECT G2 : G2 COMMUNICATION
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Marni,

Here are the answers to Doug's questions. Please do not hesitate to call me if further clarification or addition is necessary. I will also be glad to talk with Doug if either he or you so desire.

I would like to get his response so we can be sure we are modifying the application properly.

Question 1.

Upon further review, it was determined that transmission at 1 watt should be sufficient. I have recalculated the link budgets and included them at the end of the fax. Hopefully, this eliminates the need to answer questions 2-7. I have included answers to the other questions in case it does not. If it does not, we will need some idea of what is an acceptable power level.

Question 2.

This question seems to be part of question 1. If it is not, I will need some clarification. I am not sure how beamwidth affects ERP in addition to or differently from the antenna gain.

Question 3.

The last sentence in exhibit 1 outlines our original procedure. Upon further review, we have determined that this procedure will only be useful for the Cell band (800-1000 MHz). We know the arithmetic for allocating the channels normally used in this band, so we can find frequencies where interference should not happen. The use of spread spectrum communications in the PCS band (1500-2000 MHz) places extreme limits on the effectiveness of this procedure in this band.

This procedure was intended for the 10 watt transmission power to ease concerns about interference. Other techniques we will employ to eliminate or reduce interference include limiting the dwell time at each frequency as discussed in exhibit 1 and reducing transmitting power to 1 watt.

If this question goes away in the change to 1watt, we would like to omit this. It might be a good idea to see how Doug feels about this omission for the 1 watt case.

Question 4.

This is the procedure in question 3. It is subject to the limits I discussed in question 3.

Question 5.

The diffraction fence reduces the transmitting antenna energy reflected from the parking lot. The diffraction fence is constructed from metal hardware cloth stretched over a metal frame. The hardware cloth is commonly available at hardware stores. It is 8.5 ft. high by 32 ft. wide.

Question 6.

I am not sure if he means the horizontal direction or horizontal polarization. The diffraction fence keeps energy (both horizontal and vertical polarizations) from radiating in the horizontal direction (i.e. across the ground in Exhibit 1, Fig. 1). It does not keep the horizontal polarization from radiating toward the antenna under test.

Question 7.

If this question does not go away with the 1 watt change, we will have to look in the FCC allocation table to determine this. From the information we already have, we do not think this will be a problem in the Cell and PCS bands.

Range Link Budget

The power received by a standard gain horn of specified gain being tested on our range (R=160) or at the boundary of EMS property (R=480).

R is the separation distance between the source and a recieve antenna

Power density = EIRP/(4*Pi*R**2)

0.8-1.0 GHz (Cell) Band

Gain of Standard Gain Horn (SGH) =			13.09	dBi for	0.8	GHz	
			14.366	dBi for	0.9	GHz	
			15.84	dBi for	1	GHz	
Power at amplifier=	1	W	=		30	dBm	
at 0.800 GHz	EIRP=	43.09	dBm	=	20.37042	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-40.1901	dB	15.98986	dBm		0.017449	mW/cm**2
160	-64.2725	dB	-8.09254	dBm		6.82E-05	mW/cm**2
480	-73.815	dB	-17.635	dBm		7.57E-06	mW/cm**2
at 0.900 GHz	EIRP=	44.366	dBm	=	27.32751	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-41.2132	dB	17.51881	dBm		0.023408	mW/cm**2
160	-65.2956	dB	-6.56359	dBm		9.14E-05	mW/cm**2
480	-74.838	dB	-16.106	dBm		1.02E-05	mW/cm**2
at 1.0 GHz	EIRP=	45.84	dBm	=	38.37072	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-42.1283	dB	19.55166	dBm		0.032867	mW/cm**2
160	-66.2107	dB	-4.53074	dBm		0.000128	mW/cm**2
480	-75.7532	dB	-14.0732	dBm		1.43E-05	mW/cm**2

Range Link Budget

The power received by a standard gain horn of specified gain being tested on our range (R=160) or at the boundary of EMS property (R=480).

R is the separation distance between the source and a recieve antenna

Power density = EIRP/(4*PI*R**2)

1.4-1.7 GHz Band

Gain of Standard Gain Horn (SGH) =			15.94	dBi for	1.4	GHz	
			16.58	dBi for	1.55	GHz	
			17.05	dBi for	1.7	GHz	
Power at amplifier=	1	W	=	30	dBm		
at 1.4 GHz	EIRP=	45.94	dBm	=	39.26449	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-45.0509	dB	16.8291	dBm		0.033633	mW/cm**2
160	-69.1333	dB	-7.2533	dBm		0.000131	mW/cm**2
480	-78.6757	dB	-16.7957	dBm		1.46E-05	mW/cm**2
at 1.55 GHz	EIRP=	46.58	dBm	=	45.49881	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-45.935	dB	17.22502	dBm		0.038973	mW/cm**2
160	-70.0174	dB	-6.85738	dBm		0.000152	mW/cm**2
480	-79.5598	dB	-16.3998	dBm		1.69E-05	mW/cm**2
at 1.7 GHz	EIRP=	47.05	dBm	=	50.69907	W	
R	Space Loss		Power Recv by SGH			Power Density	
10	-46.7373	dB	17.36268	dBm		0.043427	mW/cm**2
160	-70.8197	dB	-6.71972	dBm		0.00017	mW/cm**2
480	-80.3621	dB	-16.2621	dBm		1.88E-05	mW/cm**2

Attachment 5

Range Link Budget

The power received by a standard gain horn of specified gain being tested on our range (R=160) or at the boundary of EMS property (R=480).

R is the separation distance between the source and a recieve antenna

Power density = EIRP/(4*Pi*R**2)

1.7-2.0 GHz Band

Gain of Standard Gain Horn (SGH) =	14.48	dBi for	1.7	GHz	
	15.11	dBi for	1.85	GHz	
	15.62	dBi for	2	GHz	
Power at amplifier=	1	W	=	30	dBm
at 1.7 GHz	EIRP=	44.48	dBm	=	28.05434 W

R	Space Loss		Power Recv by SGH		Power Density	
10	-46.7373	dB	12.22268	dBm	0.02403	mW/cm**2
160	-70.8197	dB	-11.8597	dBm	9.39E-05	mW/cm**2
480	-80.3621	dB	-21.4021	dBm	1.04E-05	mW/cm**2

at 1.85 GHz	EIRP=	45.11	dBm	=	32.43396	W

R	Space Loss		Power Recv by SGH		Power Density	
10	-47.4718	dB	12.74822	dBm	0.027782	mW/cm**2
160	-71.5542	dB	-11.3342	dBm	0.000109	mW/cm**2
480	-81.0966	dB	-20.8766	dBm	1.21E-05	mW/cm**2

at 2.0 GHz	EIRP=	45.62	dBm	=	36.47539	W

R	Space Loss		Power Recv by SGH		Power Density	
10	-48.1489	dB	13.09106	dBm	0.031244	mW/cm**2
160	-72.2313	dB	-10.9913	dBm	0.000122	mW/cm**2
480	-81.7738	dB	-20.5338	dBm	1.36E-05	mW/cm**2