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February 4, 2003

FILED ELECTRONICALLY

Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W., Room TW-A325
Washington, D.C. 20554

Re: ***Ex Parte***
In the Matter of Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153, February 14, 2002

Dear Ms. Dortch:

It was reported in a previous *ex parte* that on January 31, 2003, Kalpak Gude and Harry Ng of PanAmSat Corporation ("PanAmSat"), Nancy Eskenazi (via telephone) of SES Americom, Inc., and the undersigned counsel, representing PanAmSat, met with Richard Engelman, John Martin and Robert Nelson of the International Bureau. Included with that report was a technical analysis prepared by the Satellite Industry Association ("SIA") addressing the potential for ultra-wideband ("UWB") devices to interfere with fixed satellite service transmissions using C-band frequencies.

At the request of the International Bureau staff, four additional documents, which are included with this letter and which bear upon how SIA derived its results, have been made available to the Bureau. The first two documents, which can be accessed via the internet (**http://homepage.mac.com/montesquieu/FileSharing2.html**), are files that are executable using standard MathCad software. One of the documents concerns SIA's results for non-dithered UWB devices, and the other concerns the results for dithered UWB devices.

The other two documents, which are attached to this letter, are non-executable Word files for the two programs.

Respectfully submitted,

/s/ Joseph A. Godles
Joseph A. Godles
Attorney for PanAmSat Corporation

Attachments
Cc: Richard Engelman
John Martin
Robert Nelson

This panel calculates the ultra-wide-band (UWB) signal level.....fcc-pk-dith.mcd
as the uwb device walks around the earth station (circumference-angle).....**The bandwidth for the noise floor has been changed to 50 MHz**
at a constant distance to the earth station. The uwb EIRP is based on the peak level as given in **Section D-3 of NTIA-01-43 (pg-D-2)**
In particular, this panel is for.....**peak EIRP in 50 MHz**
earth station bandwidths and antenna center-line height.....

$bwif := 50.0 \cdot 10^6$

.....IF bandwidth (Hz)

$dtr := \frac{\pi}{180}$

$rtd := \frac{180}{\pi}$

$bwref := 1.0 \cdot 10^6$

.....reference bandwidth (Hz)

$elevi := 5.0$

.....e/s elevation angle relative to the horizontal plane (deg)
earth station antenna system-tempcomputation, noise floor and interference level.....

$esh := 7.5$

.....the height of the earth station antenna center-line (m)

$operator := 4.0$

.....operatro to select the "tsky" either compute or "otherwise" value.....

$itn := -10.0$

.....acceptable interference level (I/N)

$$tsky := \begin{cases} 76.8 - 4.624 \cdot elevi + 0.125 \cdot elevi^2 - 0.001138 \cdot elevi^3 & \text{if } (3.6 < operator < 5) \\ 50.0 & \text{otherwise} \end{cases}$$

$tsky = 56.663$

UWB parameters and earth station antenna off-axis angle and path loss.....

$WG1loss := 0.2$

.....waveguide-1 loss (dB)

$eirp := 0.0 - 0.0$

.....the peak-EIRP of the UWB unit (dBm/50MHz).....

$LNAnf := 1.0$

.....LNA nosie figure (dB)

$prf := 0.10 \cdot 10^6$

.....the pulse repetition frequency (Hz)

$hd := 4400.0$

.....horizontal-distance between the e/s and the UWB unit (**m**)
reference to the output of the antenna.....
Tsys = tsky + To(WG1LR-1) + (Tlna/WG1GR)

$To := 290$

$uwbh := 1.5$

.....the uwb unit height (m)

f := 3950.(

.....operating frequency (MHz)

$$WG1LR := 10^{\left(\frac{WG1loss}{10}\right)}$$

WG1LR = 1.047

.....waveguide-1 loss ratio

.....the uwb device height is lower than the e/s antenna center-line...add the angles.....

$$WG1GR := 10^{\left(\frac{-WG1loss}{10}\right)}$$

WG1GR = 0.955

.....waveguide-1 gain ratio = 1/WG1LR

$$alpha := atan\left(\frac{esh - uwbh}{hd}\right)$$

alphad := alpha·rtd

alphad = 0.078

.....uwb unit ele-angle

$$TLNA := \left(10^{\left(\frac{LNAnf}{10}\right)} - 1.0\right)\cdot To$$

TLNA = 75.088

.....LNA temperture

$$dist := \frac{hd}{\cos(alpha)}$$

dist = $4.4 \cdot 10^{3}$

.....distance between e/s and UWB (m)

ele := elevi + alphad

eler := ele·dtr

ele = 5.078

.....the effective ele-angle

$$tsys := tsky + To\cdot(WG1LR - 1) + \frac{TLNA}{WG1GR}$$

tsys = 148.957

t := 0, 1.. 90

.....the circumpherence angle (deg)

tt := 0, 5.. 90

noise := −228.6 + 10·log(bwif·tsys) + 30

noise = −99.88

.....e/s noise floor (dBm)

d(t) := acos(cos(eler)·cos(t·dtr))

dd(t) := d(t)·rtd

.....the off-axis angle (radians)

int := itn + noise

int = −109.88

.....interference level (dBm)

$$g32(t) := \begin{cases} 32 - 25\cdot\log(dd(t)) & \text{if } dd(t) \geq 48 \\ -10 & \text{otherwise} \end{cases}$$

.....actual ant-gain towards the UWB

<<<.....free-space path loss (dB)

$$lpfs := 20\cdot\log\left(f\cdot\frac{dist}{1000}\right) + 32.45$$

$$lpfs = 117.251$$

$$lp := \begin{cases} 20\cdot\log\left(f\cdot\frac{dist}{1000}\right) + 32.45 & \text{if } dist < 1800 \\ 20\log(f) + 38.5\log\left(\frac{dist}{1000}\right) + 32.45 - 5 & \text{otherwise} \end{cases}$$

<<<.....after Fresnel-zone path

$$lpfz := 20\log(f) + 38.5\log\left(\frac{dist}{1000}\right) + 32.45 - 5$$

$$lpfz = 124.155$$

$$lp = 124.155$$

BWCF for <u>peak-power in 50MHz to average power in 1MHz</u> (NTIA pg-D-2).....

$$prf2 := 2.0\cdot prf$$

$$bwcfp := \begin{cases} 10 + 10\cdot\log\left(\frac{bwif}{bwref}\right) & \text{if } bwif < prf2 \\ 10\cdot\log\left(\frac{bwif\cdot bwif}{0.2\cdot bwref\cdot prf}\right) & \text{if } bwif \geq prf2 \end{cases}$$

$$bwcfp = 50.969$$

bandwidth correction factor BWCF) for <u>Average EIRPnon-dithered</u> signal (3.5.1.1/pg 3-5)

$$bwcfa := 10\cdot\log\left(\frac{bwif}{bwref}\right)$$

$$bwcfa = 16.99$$

.....the effective average-EIRP/MHz is >>>>>>

$$EIRPeff := eirp - bwcfp$$

$$EIRPeff = -50.969$$

<<<<<and the permited level is -41.25

$$delEIRPeff := EIRPeff - (-41.25)$$

$$delEIRPeff = -9.719$$

<<<<<excess dB above the average-EIRP.....

.....In order to keep both <u>peak and the average power densities</u> to .....within the allowable limit (p=0 dBm/50MHz & a=-41.25 dBm/MHz),

.....it is necessary to adjust the peak input power level to ensure that .....the resultant average-power level is within the limit of -41.3 dBm/MHz

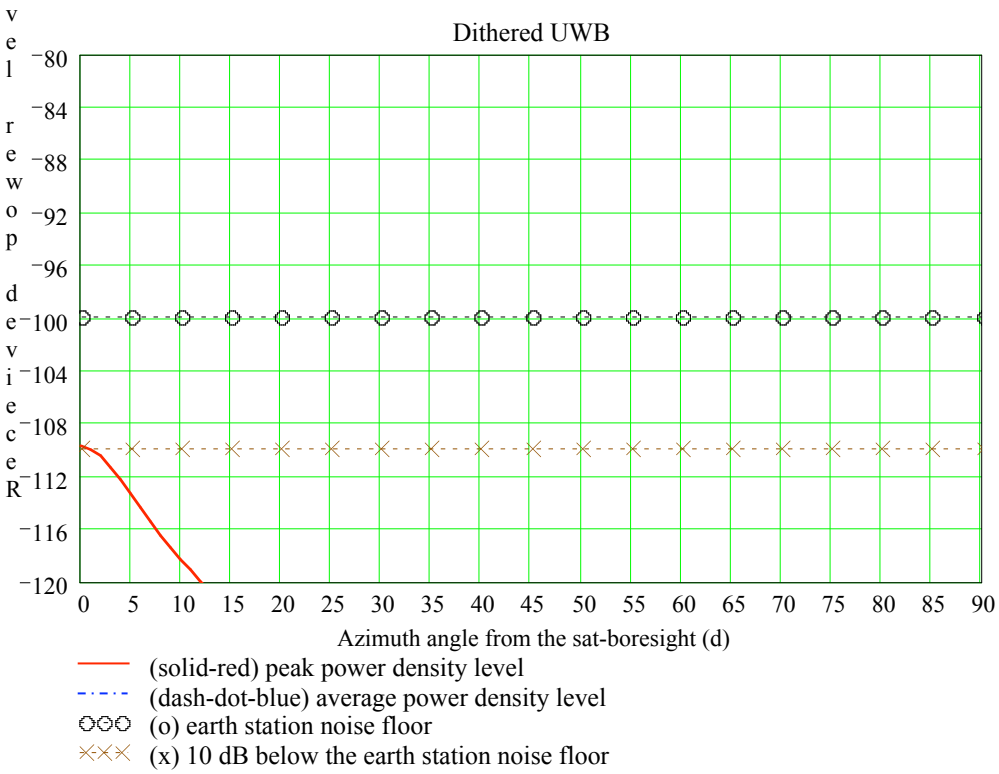
rev-level as the uwb unit walks around the earth station

$$pav(t) := (eirp - bwcfp) + bwcfa - lp + g32(t)$$

.....received average-power

.....received peak-power....

$$ppk(t) := eirp - lp + g32(t)$$



ppk(0) = −109.797

pav(0) = −143.777

.....

To fit three figures in a single page, the height of the figure must be limited to 2.8cm hight and the legend is limited to three curves

.....

noise = −99.88

int = −109.88

This panel calculates the ultra-wide-band (UWB) signal level.....fcc-pk-nondither.mcd **********
as the uwb device walks around the earth station (circumference-angle).....angle-d-pfd.mcd..... **The bandwidth for the noise floor has been changed to 50 MHz**
at a constant distance to the earth station. The uwb EIRP is based on
i) the first step is to input the peak-power level into "eirp"
the average level but it is modified by the "bwcf" for average and peak.
ii) the second step is to check the average-level and to ensure
Ref: NTIA-01-43 Section 3: average-pg-3-5 & peak-pg3-6
that the level is within the allowable limit of -41.25 dBm/MHz
In particular, this panel is for.....**average & peak EIRP & dithered signal iii) if the average-level is exceeded -41.25, adjust the peak-level**
earth station bandwidths and antenna center-line height.....

$bwif := 50.0 \cdot 10^6$

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TLNA = 75.088

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$$tsys := tsky + To \cdot (WG1LR - 1) + \frac{TLNA}{WG1GR}$$

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$$g32(t) := \begin{cases} 32 - 25\cdot\log(dd(t)) & \text{if } dd(t) \geq 48 \\ -10 & \text{otherwise} \end{cases}$$

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$$lp := \begin{cases} 20\cdot\log\left(f\cdot\frac{dist}{1000}\right) + 32.45 & \text{if } dist < 1800 \\ 20\log(f) + 38.5\log\left(\frac{dist}{1000}\right) + 32.45 - 5 & \text{otherwise} \end{cases}$$

.....free-space path loss (dB)

peap power in a 50MHz to average power in 1MHz (NTIA Appendix-D pg.D-1).....

.....after Fresnel-zone path loss (dB)

prf45 := 0.45·prf

bandwidth correction factor BWCF) for Average EIRPnon-dithered signal (3.5.1.1/pg 3-5)

$$bwcfp := \begin{cases} 0 & \text{if } (bwif \geq prf45) \wedge (bwref < prf) \\ 10\log\left(\frac{prf}{bwref}\right) & \text{if } (bwif \geq prf45) \wedge (bwref \geq prf) \\ 20\log\left(\frac{bwif}{prf45}\right) & \text{if } (prf45 < bwif) \wedge (bwref < prf) \\ 10\log\left(\frac{bwif\cdot bwif}{bwref\cdot 0.2\cdot prf}\right) & \text{if } (prf45 \geq bwif) \wedge (bwref \geq prf) \end{cases}$$

$$bwcfa := \begin{cases} 0 & \text{if } [(bwif \geq prf) \wedge (bwref < prf)] \\ 10\cdot\log\left(\frac{prf}{bwref}\right) & \text{if } [(bwif \geq prf) \wedge (bwref \geq prf)] \\ 10\cdot\log\left(\frac{bwif}{prf}\right) & \text{if } [(bwif > prf) \wedge (bwref < prf)] \\ 10\cdot\log\left(\frac{bwif}{bwref}\right) & \text{if } [(bwif > prf) \wedge (bwref \geq prf)] \end{cases}$$

lp = 124.155

bwcfp = 50.969

bwcfa = 16.99

averageEIRP := eirp − bwcfp

Interference level as the uwb unit walks around the earth station....no corretion for peak....

averageEIRP = −50.969

delAEIRP := averageEIRP − (−41.25)

pav(t) := (eirp − bwcfp) + bwcfa − lp + g32(t)

.....average EIRP

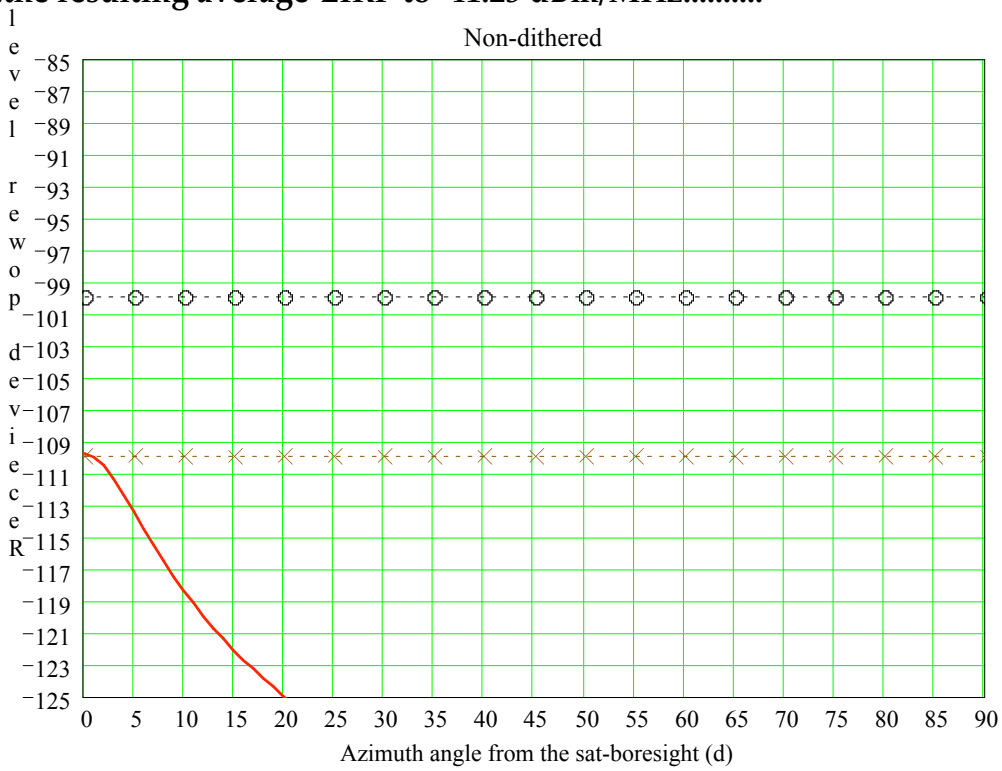
delAEIRP = −9.719

ppk(t) := eirp − lp + g32(t)

.....peak EIRP

it is necessary to keep both the peak and the average EIRP

.....to within the specified limt of (p=0 dBm/50MHz & -41.25 dBm/MHz).
.....if the average-EIRP level is exceeded (delAEIRP>0), it is
.....necessary to reduce the input peak-power level to make
.....the resulting average-EIRP to -41.25 dBm/MHz.....



pav(0) = □143.777

.....

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ppk(0) = □109.797
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