Sat/Xpndr	Beam Connectivity	Carrier	Data Rate (kbps)	Modulation	Coding	BW (kHz)	PEB (kHz)	Uplink EIRP (dBW)	Avail (%)	Margin (dB)
LANT/X06A	C7-C7	Remote to Hub	4096	QPSK	2D16 438B 2/3	4230	4050	40.6	99.96	3.0
LANT/X06A	C7-C7	Hub to Remote	2048	QPSK	DVB-S2 1/2	3340	3300	40.8	99.93	3.1
						7600	**7400**			

CARRIER / MODEM INFORMATION & LINK PERFORMANCE REQUIREMENTS

Ckt Ref #:	4272		Modem Make:	iDirect				
			Model:	Evolution				
Network:			Step Size:	2.5	kHz			
			Min. Allocated BW:	10	kHz			
Information Rate:	4096	kbps						
Modulation Type:	QPSK		Symbol Rate:	3131.5	ksps			
Code Rate:	4009/6130	2D16 438B 2/3	Noise BW:	3131.5	kHz	=	1.00	x SBW
			Absolute Min. Alloc. BW:	4227.5	kHz	=	1.35	x SBW
Link Availability:	99.96	%	Actual Min. Alloc. BW:	4230.0	kHz	=	1.35	x SBW

RFT INFORMATION

	Uplink	Downlink	
Site Code:	GD20-20	Hamilton	
Country:	USA	Canada	
Latitude:	38.3	43.3	N
Longitude:	77.47	79.88	W
ITU Rain Zone:	K	K	
Rain Rate:	50.1	39.4	mm/hr
Satellite G/T & Saturated EIRP:	7.3	52.1	dB/K & dBW
Geographic Advantage:	-0.2	-0.7	dB
Azimuth:	119.6	120.0	degrees
Elevation:	24.1	19.8	degrees
Slant Range:	39158	39576	km
A(0.01%):	4.6	3.9	dB
Antenna Diameter:	0.508	9	m
HPA & LNA:		51	W & K
Waveguide Loss:	1	0.8	dB
Antenna Gain:	30.7	55.0	dBi
Antenna Efficiency:	0.60	0.60	
Antenna Noise Temp. @ 20° elev. angle:		40	dB & K

SATELLITE INFORMATION

Satellite:	XTAR-LANT			Uplink	Downlink			
Xpdr Number:	6A		Beam Coverage:	C7	C7			
Longitude:	30	W	Beam Type:		Spot			
Actual BW:	72	MHz	Center Frequency:	8.35	7.7	GHz		
			Polarity:	RHCP	LHCP			
			Total Operating Point:	5.0	3.0	dB		
D/L EIRP Density			G/T & EIRP Reference Contours:	7.5	52.8	dB/K & dBW		
-27.7 dBW/Hz			Xpdr Constant at Gain Setting of 0 dB:	-106.5		dBW/m2K		
			Gain (Pad) Setting:	-9.0		dB		
			Effective Xpdr Constant:	-97.5		dBW/m2K		

SPACE SEGMENT REQUIREMENTS

BW must be purchased in multiples of: 10 kHz from 72 MHz of useable xpdr BW

Power:	5.6234%	which is	4050.0	kHz referenced to	72.0	MHz useable BW	
Limited by BW:	5.8750%	which is	4230.0	kHz referenced to	72.0	MHz useable BW	
Equivalent:	5.8750%	which is	15.3	dB COPBO ref. to	3.0	dB TOPBO	
Power & BW:			4230.0	kHz referenced to	72.0	MHz useable BW	

UPLINK RFT REQUIREMENTS

Power at HPA Flange:	10.9	dBW	12.24	W
Insertion Loss:	1.0	dB		
Power at Antenna Flange:	9.9	dBW	9.72	W
Power Density at Antenna Flange:	-55.1	dBW/Hz		
EIRP Density:	-24.4	dBW/Hz		
EIRP per Carrier:	40.6	dBW		

LINK CALCULATION

		Clear Sky	Rain on U/L	Rain on D/L	
Probability of Rain Loss:			0.03	0.00	%
Uplink:					
Earth Station EIRP:	A	40.6			dBW
Atmospheric Loss:	C		3.0		dB
Power Flux Density:	D=A-B-C	-122.3	-125.2		dBW/m2
Saturation Flux Density:	E	-104.8			dBW/m2
Carrier Input Backoff:	F=E-D	17.5	20.5		dB
Area of Isotropic Antenna:	G	-39.9			dBm2
Satellite G/T:	H	7.3			dB/K
Boltzmann's Constant:	I	-228.6			
C/No:	J=F+G+H-I	73.8	70.8		dBHz
Noise Bandwidth:	K	65.0			dBHz
C/N:	L=J-K	8.8	5.8		dB
Cross-Pol C/I:	M	30.1	27.1		dB
Adjacent Satellite C/I:	N	30.1	27.1		dB
Total C/I:	O	27.1	24.1		dB
Total C/(N+I):	P	8.7	5.8		dB
Downlink:					
Saturated EIRP:	Q	52.1			dBW
Carrier Output Backoff:	R	15.5	18.5		dB
Carrier EIRP:	S=Q-R	36.6	33.6		dBW
Path Spreading Loss:	T	162.9			dBm2
Atmospheric Loss:	U			8.4	dB
Pointing Error Loss:	V	0.5			dB
Power Flux Density:	W=S-T-U-V	-126.8	-129.8	-135.3	dBW/m2
Area of Isotropic Antenna:	X	-39.2			dBm2
Earth Station G/T:	Y	33.0		28.9	dB/K
Boltzmann's Constant:	I	-228.6			
C/No:	Z=W+X+Y-I	95.5	92.6	83.1	dBHz
Noise Bandwidth:	K	65.0			dBHz
C/N:	A'=Z-K	30.6	27.6	18.1	dB
Xpdr IM C/I:	B'	16.7	13.7		dB
Cross-Pol C/I:	C'	30.1	27.1		dB
Adjacent Satellite C/I:	D'	29.6	26.6		dB
TotalC/I:	E'	16.3	13.3		dB
Total C/(N+I):	F'	16.2	13.2	14.1	dB
Total Link:					
C/N:	I'	8.8	5.8	8.3	dB
C/I:	J'	16.0	13.0		dB
C/(N+I):	K'	8.0	5.0	7.6	dB
Noise Bandwidth:	K	65.0			dBHz
C/(No+Io):	L'	73.0	70.0	72.6	dBHz
Information Rate:	M'	66.1			dBHz
Ebi/(No+Io):	N'=L'-M'	6.8	3.9	6.5	dB
Link Margin:	O'	3.0	0.1	2.7	dB
Implementation Margin:	P'	0.0			dB
Target Ebi/No:	Q'=N'-O'-P'	3.8			dB

CARRIER / MODEM INFORMATION & LINK PERFORMANCE REQUIREMENTS

Ckt Ref #:	4273		Modem Make:	iDirect				
			Model:	Evolution				
Network:			Step Size:	2.5	kHz			
			Min. Allocated BW:	10	kHz			
Information Rate:	2048	kbps						
Modulation Type:	QPSK		Symbol Rate:	2473.4	ksps			
Code Rate:	207/500	DVB-S2 1/2	Noise BW:	2473.4	kHz	=	1.00	x SBW
			Absolute Min. Alloc. BW:	3339.1	kHz	=	1.35	x SBW
Link Availability:	99.93	%	Actual Min. Alloc. BW:	3340.0	kHz	=	1.35	x SBW

RFT INFORMATION

	Uplink	Downlink	
Site Code:	Hamilton	GD20-20	
City:	Hamilton, Ontario	Fredericksburg, VA	
Country:	Canada	USA	
Latitude:	43.3	38.3	N
Longitude:	79.88	77.47	W
ITU Rain Zone:	K	K	
Rain Rate:	39.4	50.1	mm/hr
Satellite G/T & Saturated EIRP:	6.3	52.7	dB/K & dBW
Geographic Advantage:	-1.2	-0.1	dB
Azimuth:	120.0	119.6	degrees
Elevation:	19.8	24.1	degrees
Slant Range:	39576	39158	km
A(0.01%):	4.9	3.7	dB
Antenna Diameter:	9	0.508	m
HPA & LNA:		50.7	W & K
Waveguide Loss:	2	0.5	dB
Antenna Gain:	55.7	29.9	dBi
Antenna Efficiency:	0.60	0.59	
Antenna Noise Temp. @ 20° elev. angle:		63	dB & K

SATELLITE INFORMATION

				Uplink	Downlink	
Satellite:	XTAR-LANT					
Xpdr Number:	6A		Beam Coverage:	C7	C7	
Longitude:	30	W	Beam Type:		Spot	
Actual BW:	72	MHz	Center Frequency:	8.35	7.7	GHz
			Polarity:	RHCP	LHCP	
			Total Operating Point:	5.0	3.0	dB
D/L EIRP Density			G/T & EIRP Reference Contours:	7.5	52.8	dB/K & dBW
-27.5 dBW/Hz			Xpdr Constant at Gain Setting of 0 dB:	-106.5		dBW/m2K
			Gain (Pad) Setting:	-9.0		dB
			Effective Xpdr Constant:	-97.5		dBW/m2K

SPACE SEGMENT REQUIREMENTS

BW must be purchased in multiples of:			10	kHz from	72	MHz of useable xpdr BW	
Power:	4.5709%	which is	3300.0	kHz referenced to	72.0	MHz useable BW	
Limited by BW:	4.6389%	which is	3340.0	kHz referenced to	72.0	MHz useable BW	
Equivalent:	4.6389%	which is	16.3	dB COPBO ref. to	3.0	dB TOPBO	
Power & BW:			3340.0	kHz referenced to	72.0	MHz useable BW	

UPLINK RFT REQUIREMENTS

Power at HPA Flange:	-12.9	dBW	0.05	W	
Insertion Loss:	2.0	dB			
Power at Antenna Flange:	-14.9	dBW	0.03	W	
Power Density at Antenna Flange:	-78.9	dBW/Hz			
EIRP Density:	-23.2	dBW/Hz			
EIRP per Carrier:	40.8	dBW			

LINK CALCULATION

			Clear Sky	Rain on U/L	Rain on D/L	
Probability of Rain Loss:				0.03	0.04	%
Uplink:						
Earth Station EIRP:	A		40.8			dBW
Path Spreading Loss:	B		162.9			dBm2
Atmospheric Loss:	C			3.0		dB
Power Flux Density:	D=A-B-C		-122.2	-125.1		dBW/m2
Saturation Flux Density:	E		-103.8			dBW/m2
Carrier Input Backoff:	F=E-D		18.4	21.4		dB
Area of Isotropic Antenna:	G		-39.9			dBm2
Satellite G/T:	H		6.3			dB/K
Boltzmann's Constant:	I		-228.6			
C/No:	J=F+G+H-I		72.9	69.9		dBHz
Noise Bandwidth:	K		63.9			dBHz
C/N:	L=J-K		8.9	5.9		dB
Cross-Pol C/I:	M		30.2	27.3		dB
Adjacent Satellite C/I:	N		30.2	27.3		dB
Total C/I:	O		27.2	24.3		dB
Total C/(N+I):	P		8.9	5.9		dB
Downlink:						
Saturated EIRP:	Q		52.7			dBW
Carrier Output Backoff:	R		16.4	19.4		dB
Carrier EIRP:	S=Q-R		36.3	33.3		dBW
Path Spreading Loss:	T		162.8			dBm2
Atmospheric Loss:	U				2.2	dB
Pointing Error Loss:	V		0.5			dB
Power Flux Density:	W=S-T-U-V		-127.0	-130.0	-129.3	dBW/m2
Area of Isotropic Antenna:	X		-39.2			dBm2
Earth Station G/T:	Y		8.0		5.8	dB/K
Boltzmann's Constant:	I		-228.6			
C/No:	Z=W+X+Y-I		70.4	67.4	65.9	dBHz
Noise Bandwidth:	K		63.9			dBHz
C/N:	A'=Z-K		6.5	3.5	2.0	dB
Xpdr IM C/I:	B'		16.8	13.9		dB
Cross-Pol C/I:	C'		30.2	27.3		dB
Adjacent Satellite C/I:	D'		19.7	16.8		dB
TotalC/I:	E'		14.9	11.9		dB
Total C/(N+I):	F'		5.9	2.9	1.8	dB
Total Link:						
C/N:	I'		4.5	1.5	1.2	dB
C/I:	J'		14.7	11.7		dB
C/(N+I):	K'		4.1	1.1	1.0	dB
Noise Bandwidth:	K		63.9			dBHz
C/(No+Io):	L'		68.0	65.1	64.9	dBHz
Information Rate:	M'		63.1			dBHz
Ebi/(No+Io):	N'=L'-M'		4.9	1.9	1.8	dB
Link Margin:	O'		3.1	0.1	0.0	dB
Implementation Margin:	P'		0.0			dB
Target Ebi/No:	Q'=N'-O'-P'		1.8			dB