付属資料編

付属資料１　PCG を取り巻く状況

1. PCG の略歴

1901/10/23

商務省の元に沿岸警備・運輸局（The Bureau of Coast Guard and Transportation）が設立

1967/10/10

国防省の下にフィリピンコーストガード（PCG）が設立

1998/3/30

大統領府へ移管

1998/4/15

運輸通信省（DOTC）へ移管

2. PCG の任務

1. 海上捜索救助業務
（Maritime Search and Rescue：MARSAR）

2. 海上安全管理業務
（Maritime Safety Administration：MARAD）

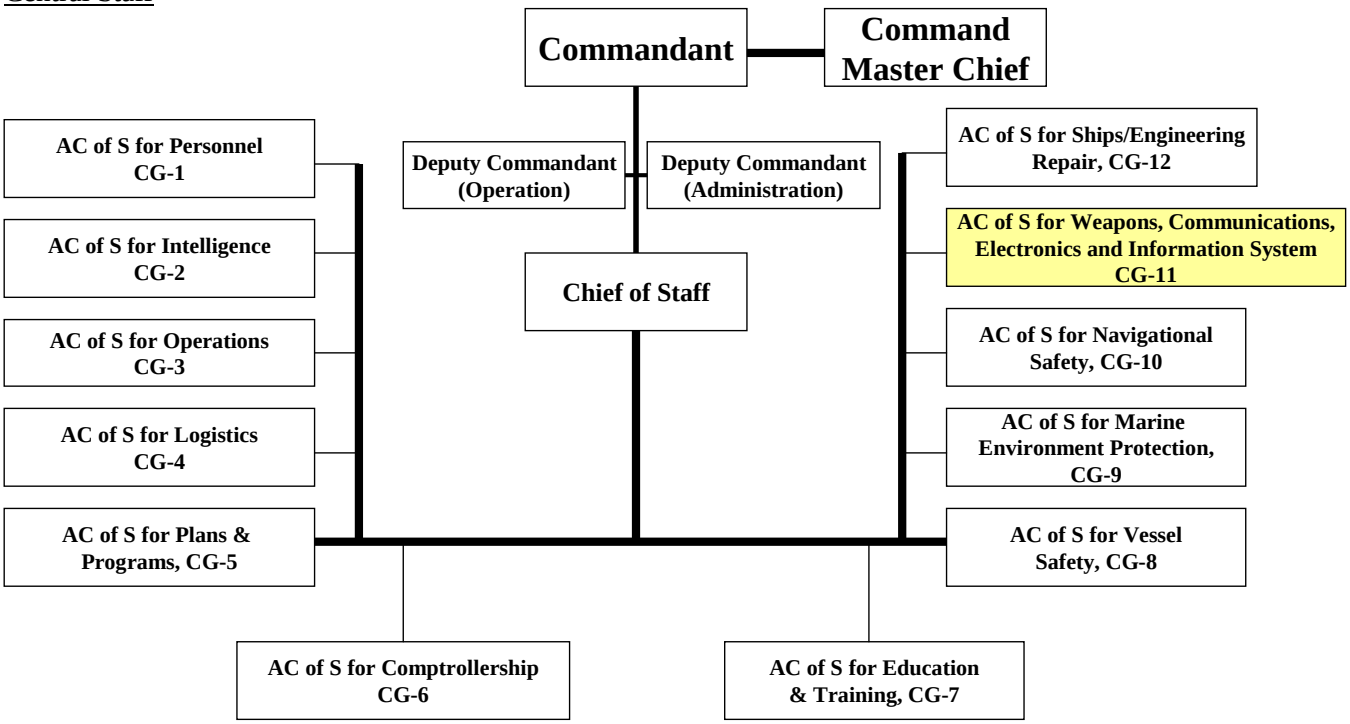
3. 海洋環境保全業務
（Marine Environmental Protection：MAREP)

4. 海上法令執行業務
（Maritime Law Enforcement：MARLEN)

5. 海上運用業務
（Maritime Operations：MAROPS)

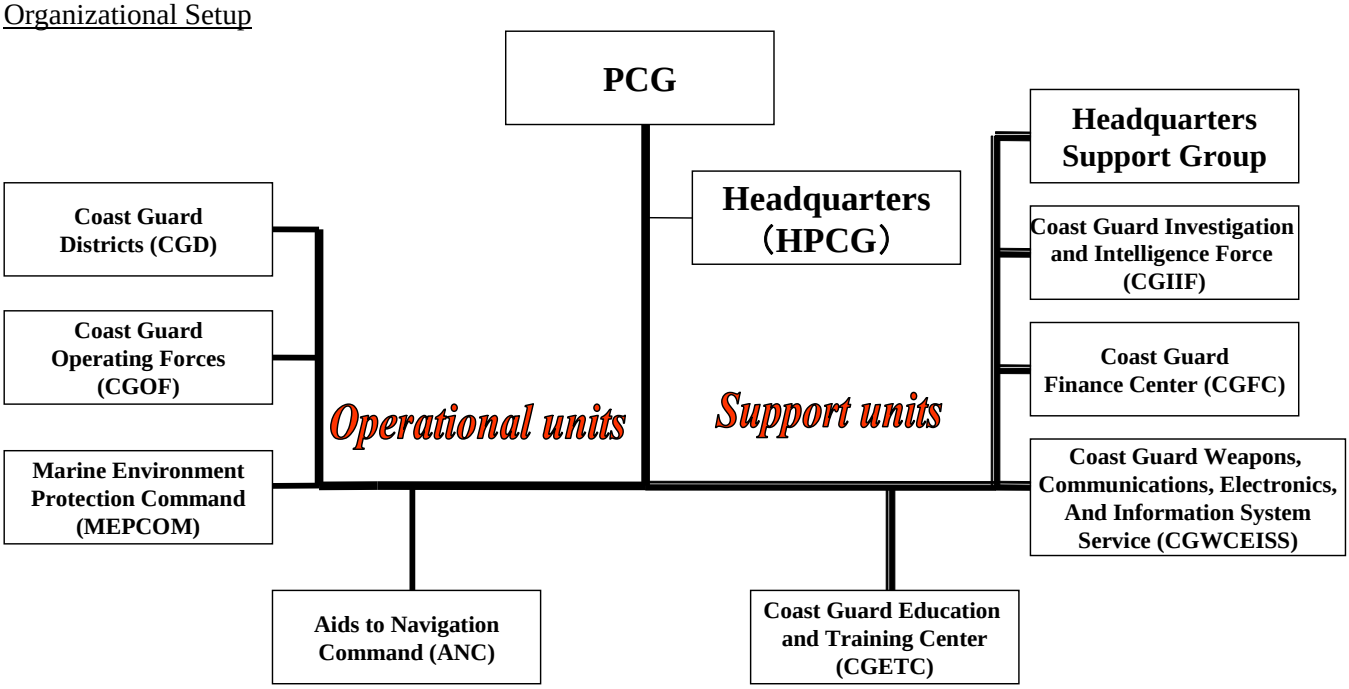
3. PCG の本庁組織

Central Staff

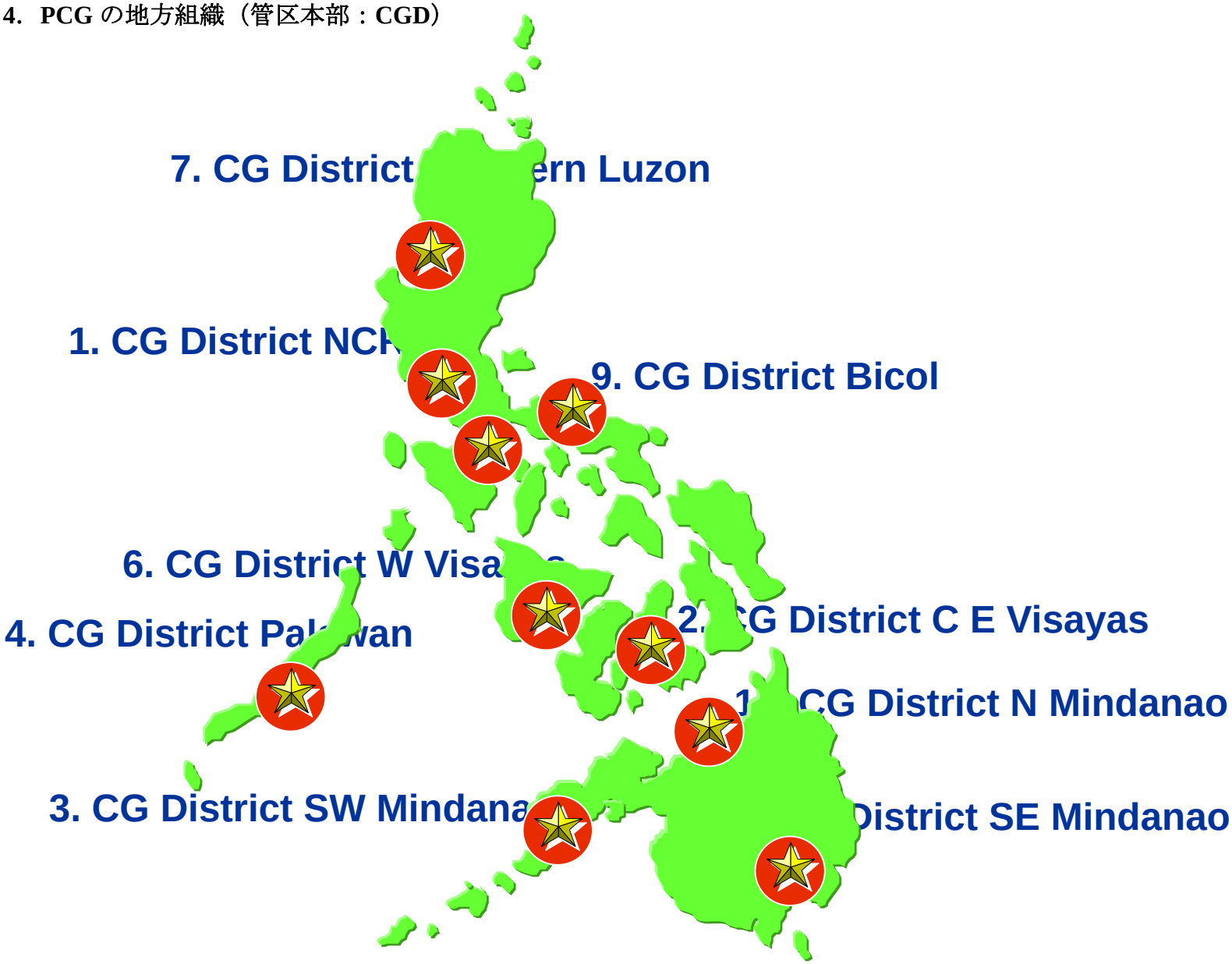


*AC of S: Assistant Chief of Staff

Organizational Setup



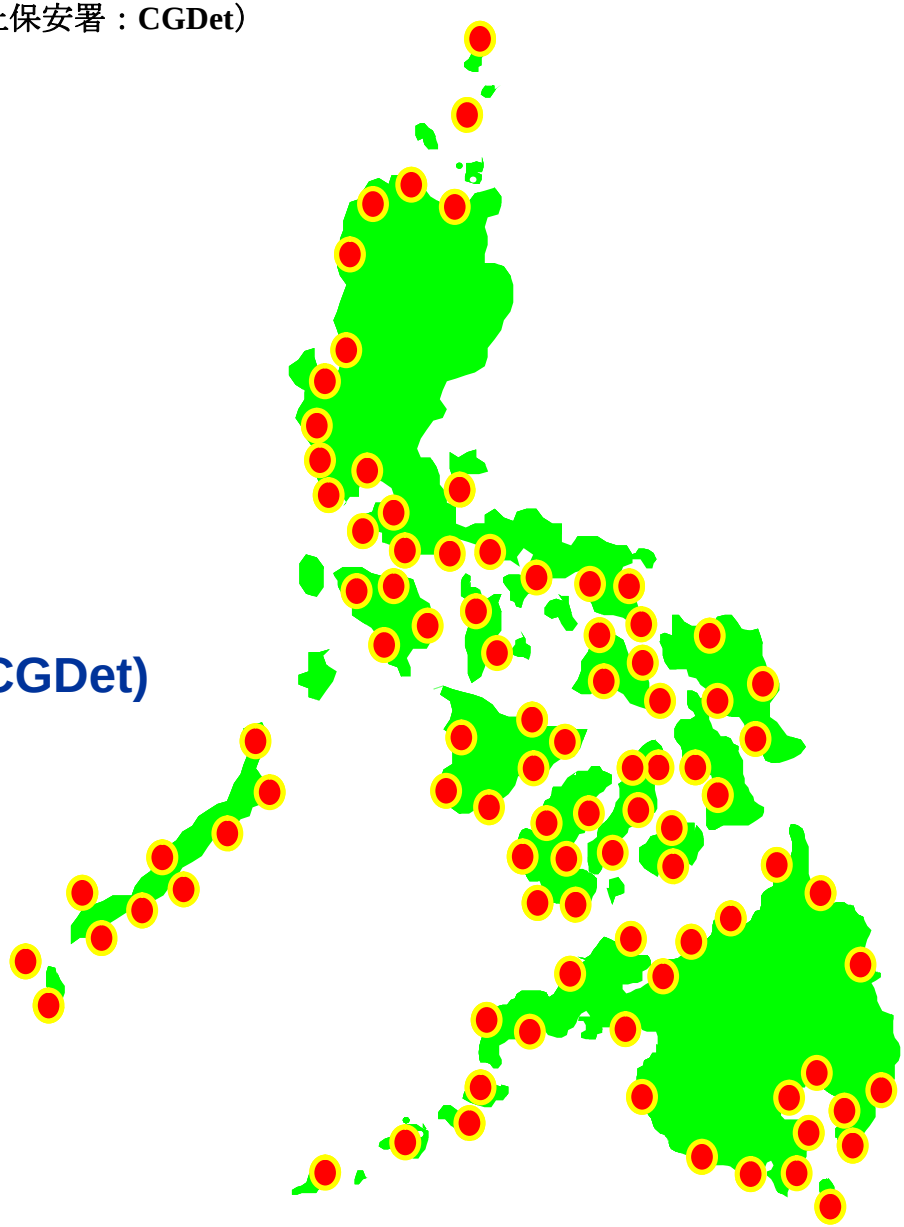
4. PCG の地方組織（管区本部：CGD）



5. PCG の地方組織（海上保安部：CGS、海上保安署：CGDet）

海上保安部 :54
(Coast Guard Station :CGS)

海上保安署 :182
(Coast Guard Detachment :CGDet)



6. PCG の要員及び予算

PCG の要員

年	士官	兵員	小計	技術員等	合計
2001	303	3,121	3,424	データなし	
2002	317	3,111	3,428	434	3,862
2003	359	3,065	3,424	438	3,862
2004	353	3,019	3,372	データなし	
2005	360	3,003	3,363	442	3,805

出典：PCG

PCG の予算

年	予算額（Peso)	前年比(%)
2000	1,010,093,000	
2001	1,117,276,000	110.6
2002	1,177,218,000	105.4
2003	1,184,572,000	100.6
2004	1,222,504,000	103.2
2005	1,354,450,000	110.8

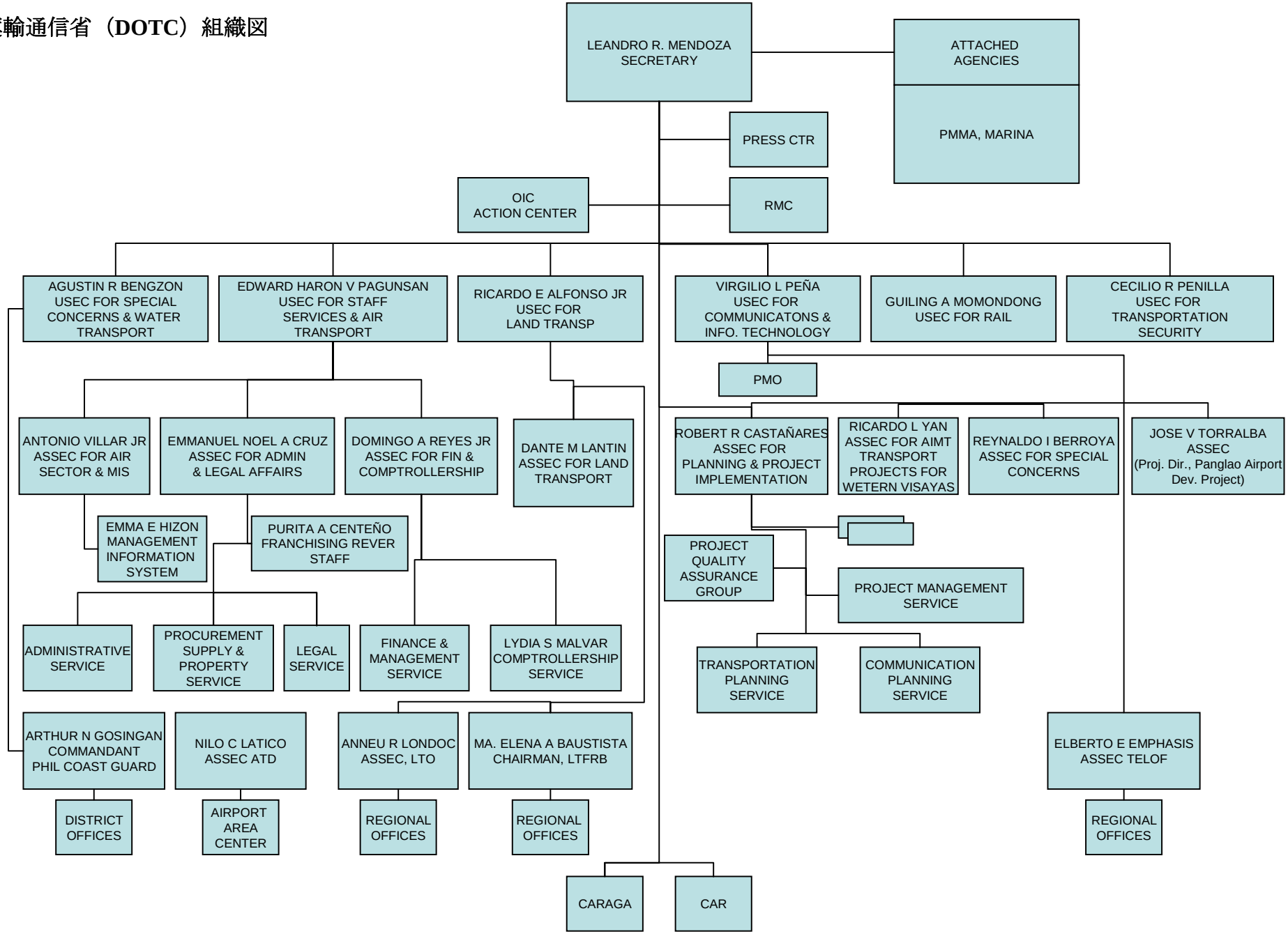
出典：PCG

7．PCG が所有する船艇及び航空機（2005 年 3 月現在）

	Inventory	Operational	Non-Operational	
Vessels				
Buoy / LH Tender	4	3	1	for Dry-docking
Patrol	1	1	－	
Search and Rescue	8	8	－	
Tugboat	1	1	－	
Barges	9	9	－	
Small Craft	31	20	11	
Aircraft				
Fixed-Wing	3	2	1	for Rehabilitation
Rotary-Wing	2	2	－	

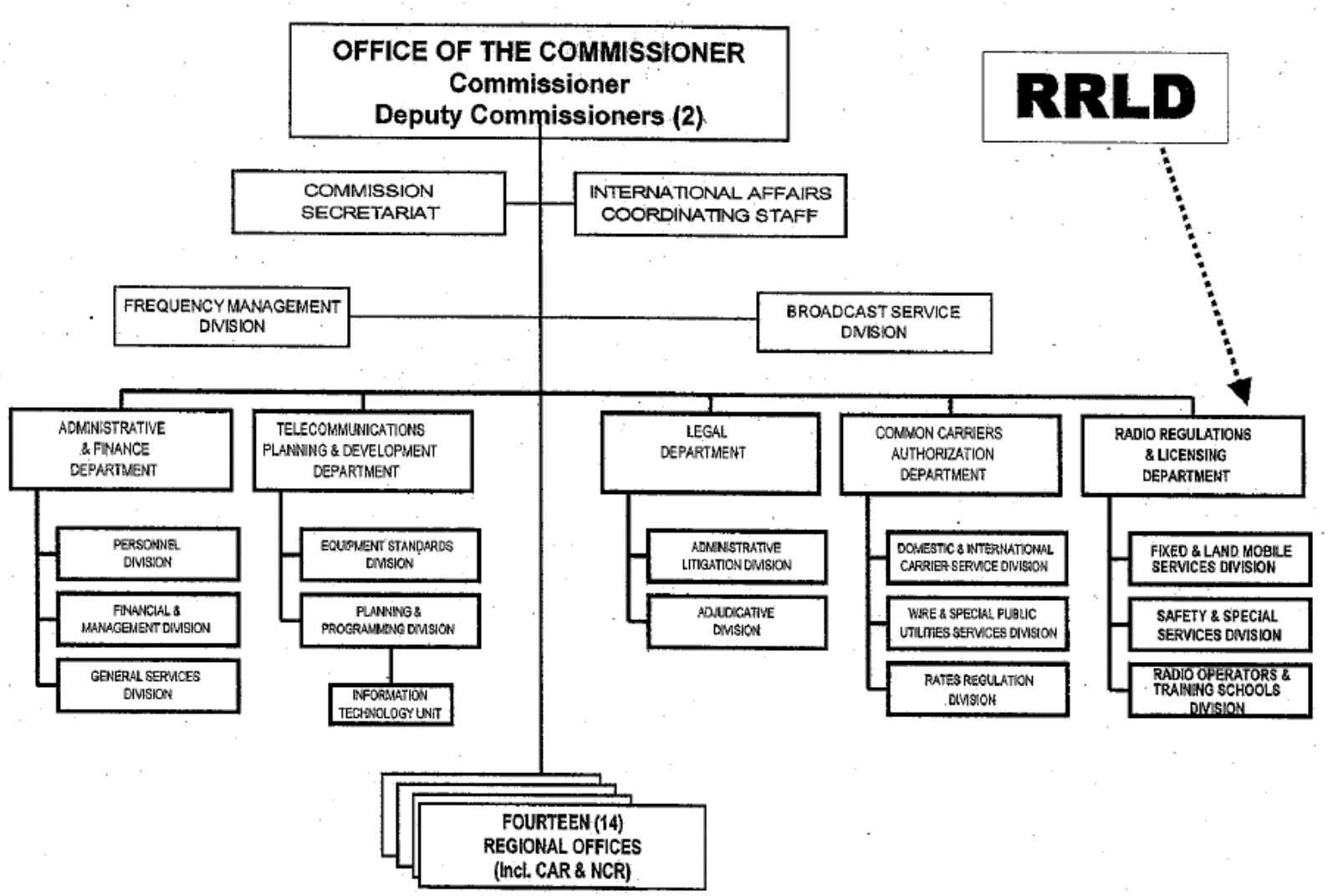
Source：PCG

8. 運輸通信省（DOTC）組織図



9. 周波数監理体制

フィリピン国の電波監理行政は、運輸通信省の外局の一つである国家電気通信委員会（National Telecommunications Commission：NTC）の Radio Regulatory and Licensing Department が担務しており、固定系及び移動系の周波数許認可と周波数監理業務を行っている。組織図は以下のとおり。



10. 海難発生状況

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
乗上げ	58	19	5	42	44	21	27	22	33	48
沈没	37	35	16	37	37	25	21	23	30	24
衝突	17	5	6	5	5	14	11	10	15	14
火災	23	6	8	9	11	7	10	15	16	7
転覆	33	32	11	88	109	47	49	44	63	64
行方不明	0	0	0	12	0	1	5	6	32	14
漂流/機関故障	13	9	9	8	0	14	17	20	41	39
浸水	0	3	0	0	0	2	1	1	1	4
接触	0	10	2	6	0	3	6	5	9	5
その他	0	0	1	1	57	17	21	6	5	13
海難発生件数	181	119	58	208	263	151	168	152	245	232
SAR活動件数	67	57	34	86	219	50	88	65	63	84
死亡者数	121	82	48	161	223	177	59	73	74	144
行方不明者数	97	38	20	174	127	102	74	146	232	116
救助者数	2,050	1,434	347	1,389	3,828	2,771	1,969	1,178	2,903	4,893

出典：PCG

11. 法令取締状況（2002 年）

	検挙件数	検挙人数	検挙隻数
密輸	63	7	29
密漁	77	303	104
不法入国	9	51	9
薬物違法所持	3	3	-
爆発物違法所持	7	-	-
銃器違法所持	11	3	-
違法伐採木材積み出し	39	-	7
海事法令違反	371	-	592
窃盗	3	2	-
海洋環境法令違反	8	-	8

出典：PCG

付属資料２　PCG が保有する通信機器

(1) 現地調査箇所の通信機器の現状

・Inventory List for Existing Facilities/Equipment for PCG Communication System

(2) PCG 保有の通信機器

・Radio Equipment for HPCG and PCG Major/Special Units

・Radio Equipment for CG Stations and CG Detachments

・Radio Equipment for Manila Coast Station

Inventory List for Existing Facilities/Equipment for PCG Communication Systems

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
I	**Manila Operation Center**									
1		VHF	NCU-300 TP Controller	NCA-738	6/1991	BP-93105	JRC / Japan	Operational	Run	
2		HF	TG/TP Console	NCA-737	6/1991	BP-93104	JRC / Japan	Operational	Run	
3		HF	TP Console	NCA-736	6/1991	BP-93098	JRC / Japan	Operational	Run	
4		HF	TG Console	NCA-735	6/1991	BP-93083	JRC / Japan	Operational	Run	
5		HF	TG Console	NCA-735	6/1991	BP-93084	JRC / Japan	Operational	Run	
6		HF	TG Console	NCA-735	6/1991	BP-93085	JRC / Japan	Operational	Run	
7		HF	TG Console	NCA-735	6/1991	BP-93086	JRC / Japan	Operational	Run	
8		HF	Connection Rack	GED-1138	6/1991	BP-93130	JRC / Japan	Operational	Run	
9		HF	Supervisory Rack	GED-1138	6/1991	BP-93120	JRC / Japan	Operational	Run	
10		HF	Supervisory Console	NCA-734	6/1991	BP-93073	JRC / Japan	Operational	Run	
11		Printer	Tele Printer	T1200SD	1992	BC/8048732	Siemens/Germany	Operational	Run	
12		Printer	Tele Printer	T1200SD	1992	BC/8048733	Siemens/Germany	Operational	Run	
12		Printer	Tele Printer	T1200SD	1992	BC/8048734	Siemens/Germany	Operational	Run	
14		Printer	Tele Printer	T1200SD	1992	BC/8048735	Siemens/Germany	Operational	Run	
15		Printer	Tele Printer	T1200SD	1992	BC/8048736	Siemens/Germany	Operational	Run	
16		Printer	Tele Printer	T1200SD	1992	BC/8048737	Siemens/Germany	Operational	Run	
17		Printer	Tele Printer	T1200SD	1992	BC/8048738	Siemens/Germany	Operational	Run	
18		Printer	Tele Printer	T1200SD	1992	BC/8048739	Siemens/Germany	Operational	Run	
19		Printer	Tele Printer	T1200SD	1992	BC/8048740	Siemens/Germany	Operational	Run	
20		Printer	Tele Printer	T1200SD	1992	BC/8048741	Siemens/Germany	Operational	Run	
21		Printer	Tele Printer	T1200SD	1992	BC/8048742	Siemens/Germany	Operational	Run	
22		Printer	Tele Printer	T1200SD	1992	BC/8048743	Siemens/Germany	Operational	Run	
23		Printer	Tele Printer	T1200SD	1992	BC/8048745	Siemens/Germany	Operational	Run	
24		Printer	Tele Printer	T1200SD	1992	BC/8048774	Siemens/Germany	Operational	Run	
25		MF	MF-TG Console	NCA-732	6/1991	BP-93099	JRC / Japan	Operational	Run	
26		MF	MF-TG/TP Console	NCA-733	6/1991	BP-93081	JRC / Japan	Operational	Run	

Note: Category → M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

Inventory List for Existing Facilities/Equipment for PCG Communication Systems

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
I	**Manila Operation Center** (continued)									
27		VHF	2GHz Band PCM-PSK Multiplex Radio Equipment	JUK-114	3/1993	JA10634	JRC / Japan	Stopped operation with interference problem		
28		VHF	Ditto	JUK-114	3/1993	JA11013	JRC / Japan	Non	Ditto	
29		VHF	Ditto	JUK-114	3/1993	JA10127	JRC / Japan	Non	Ditto	for Tx Stn.
30		VHF	VHF Marine Transmitter Receiver (CH-16)	GFD-260YM	6/1991	BH-11591	JRC / Japan	Operational	Run	
31		VHF	Ditto, but (CH-4)	GFD-260YM	6/1991	BH-11592	JRC / Japan	Operational	Run	
32		VHF	Ditto, but (CH-26)	GFD-260YM	6/1991	BH-11593	JRC / Japan	Operational	Run	
33		VHF	Ditto, but (CH-28)	GFD-260YM	6/1991	BH-11594	JRC / Japan	Operational	Run	
34		VHF	Ditto, but (Stand-by)	GFD-260YM	6/1991	BH-11595	JRC / Japan	Operational	Run	
35		PCM	Multiplex Terminal Equipment	JUJ-30A	9/1994	JB-10097	JRC / Japan	Operational	Run	
36			Telephone Repeater Equipment	JUR-30A	9/1994	JB-50291	JRC / Japan	Operational	Run	
37		Power	Power Distribution Board	NBJ-315C	6/1991	BP94279	JRC / Japan	Operational	Run	
II	**Coast Guard District, National Capital Region-Central Luzon**									
1		VHF	VHF Marine Band Transmitter Receiver (CH-16), 25 W	Toriton-II			Motorola, Malaysia	Operational	Run	
2		HF	Transmitter-Receiver	IC-M700		18449	ICOM / Japan	Non		
3		HF	Transmitter-Receiver	URC-187	1995	90892	Philippines	Non		
4		VHF	Transceiver (CH-82, CH-16)	IC-M120		08080		Operational	Run	
III	**Hospicio de San Jose (Detachment)**									
1		VHF	Marine Band Transmitter Receiver (CH-82, CH-16), 25 W	Toriton-II			Motorola, Malaysia	Operational	Run	
IV	**Buoy Tender Corregidor, AE-891**									
1		VHF	Radio Telephone Equipment (CH-16, CH-70)	FM-8500	12/1995		Furuno Electric Co. Ltd./Japan	Operational	Run	
2		MF/HF	DSC Terminal SSB Radio Telephone Equipment	DSC-6	3/1995		Furuno Electric Co. Ltd./Japan	Operational	Run	
3		MF/HF	DSC Watch Receiver	AA-50	8/1997			Operational	Run	
4		FM/AM	Transceiver	TD-L1620			TAIYO/Japan	Operational	Run	
5		HF	SSB Transceiver	FS-1502			Furuno Electric Co. Ltd./Japan	Operational	Run	

Note: Category → M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
IV	**Buoy Tender, AE-891**(continued)									
6			Direction Finder	TD-C318MKII	4/1995		TAIYO/Japan	Operational	Run	
7			Printer Unit	PP-510		0102919				
8			Digital Fax.	FAX-412			Furuno Electric Co. Ltd./Japan	Operational	Run	
9		MF	NAVTEX Receiver	NX-500			Furuno Electric Co. Ltd./Japan	Operational	Run	
10			Radio Telex (Narrow Band Direct Printing Telegraph Equipment, DP-5	SNS1FD-1	5/1990		Furuno Electric Co. Ltd./Japan	Operational	Run	
V	**SAR Vessel San Juan, SAR- 001**									
1		M/HF	DSC Receiver	AA-50	5/1999	2537-4438	Furuno Electric Co. Ltd./Japan	Operational	Run	
2		M/HF	DSC Terminal SSB Radio Telephone Equipment	DSC-6			Furuno Electric Co. Ltd./Japan	Operational	Run	
3		HF	SSB Transceiver	FS-8000		2522-0243	Furuno Electric Co. Ltd./Japan	Operational	Run	
4		VHF	Radio Telephone Equipment (CH-16, CH-70)	FM-8500			Furuno Electric Co. Ltd./Japan	Operational	Run	
5		Satellite	Inmarsat-C Mobile Earth Station	FELCOM 12	9/1999	3511-4078	Furuno Electric Co. Ltd./Japan	Operational	Run	
6		MF	NAVTEX Receiver	NX-500			Furuno Electric Co. Ltd./Japan	Operational	Run	
7		Satellite	Inmarsat-B High Speed Data Modem	FELCOM 81A		3504-0818	Furuno Electric Co. Ltd./Japan	Operational	Run	
8			Printer Unit	PP-510				Operational	Run	
9			Printer Unit	PP-510				Operational	Run	
VI	**PCG Head Quarter Radio Room**									
1		HF	Transceiver	TW7000			DATRON / USA	Operational	Run	
2			1 KW Amplifier Module	28-5B					No use	
3			Monitor Display					Operational	Run	
4			Personal Computer					Operational	Run	
5			Data Printer					Operational	Run	
6		HF	Transceiver, 125 W	RF2301		2094	Harris/USA		St-by	

Note: Category → M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
VI	**PCG Head Quarter Radio Room** (continued)									
7		VHF	Voice Transceiver	FM-2510			Furuno Electric Co. Ltd./Japan	Operational	Run	
VII	**PCG Head Quarter Action Center**									
1		HF	Transceiver	TW7000			USA	Operational	Run	
2		HF	Transceiver, 125 W	RF2301			Harris/USA			
3		HF	Transmitter-Receiver	IC-M700			ICOM / Japan	Operational	Run	
4		VHF	Marine Band Transmitter Receiver (CH-16), 25 W	Toriton-II			Motorola, Malaysia	Operational	Run	
VIII	**Coast Guard Aviation Group**									
1		VHF	Air Band Transceiver	IC-A110		1214	ICOM / Japan	Operational	Run	
2			Public Address System	KPA-80			Kolin Electronics			
IX	**Transmitting Station (Taguig)**									
1		MF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62303	JRC / Japan	Operational	Run	
2		MF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62304	JRC / Japan	Operational	Run	
3		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62292	JRC / Japan	Operational	Run	
4		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62293	JRC / Japan	Status information defective		
5		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62294	JRC / Japan	Operational	Run	
6		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62295	JRC / Japan	Operational	Run	
7		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62296	JRC / Japan	Operational	Run	
8		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62297	JRC / Japan	Operational	but Display trouble	
9		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62298	JRC / Japan	Matching unit defective		
10		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62299	JRC / Japan	Operational	Run	
11		HF	JRS-553 Transmitter, 5KW	JRS-553P	6/1991	BS62300	JRC / Japan	Operational	Run	
12		HF	JRS-753 Transmitter, 5KW	JRS-753AP	6/1991	BS62301	JRC / Japan	Used as spare parts		
13		HF	JRS-753 Transmitter, 5KW	JRS-753AP	6/1991	BS62302	JRC / Japan	Exciter defective		
14		HF	JRS-753 Transmitter, 5KW	JRS-753AP	6/1991	BS62300	JRC / Japan	Operational	Run	
15		HF	Matrix Control Rack	GED-1139	6/1991	BP93131	JRC / Japan	Operational	Run	
16			Supervisory Console	NCA-741	6/1991	BP93071	JRC / Japan	Operational	Run	
17			Remote Control Rack	GED-1136	6/1991	BP93128	JRC / Japan	Operational	Run	
			(JCC-300L Local Terminal Unit X 11)							
18			Supervisory Rack	GED-1139	6/1991	BP93116	JRC / Japan	Operational	Run	
			(NZY-55 Station Status Monitor X 1)							
			(JCC-300L Local Terminal Unit X 8)							

Note: ◄Category ► M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
IX	**Transmitting Station (Taguig)** (continued)									
			(NCE-3938T Tx Monitor X 2)							
19			Connection Rack	GED-1137	6/1991	BP93129	JRC / Japan	Operational	Run	
20			Telephone Repeater Equipment	JUR-30A	9/1994	JB50292	JRC / Japan	Operational	Run	
21			PCM MUX Terminal Equipment	JUJ-30A	9/1994	JB10098	JRC / Japan	Operational	Run	
22		U/VHF	2000MHz Band PCM-PSK MUX Radio Relay Equipment	JUK-114A	9/1994	No.1 JA 10120 No.2 JA 10130	JRC / Japan	Stopped operation with interference problem		
23			VDF (3 verticals)				England			
24			Engine Generator, 250 KVA							
X	**Receiving Station (Balagtas)**									
1		M/HF	Receiver Rack	GJD-179B	6/1991	BP32774	JRC / Japan	Operational	Run	
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NVA-81A Speaker)							
2		M/HF	Receiver Rack	GJD-179B	6/1991	BP32775	JRC / Japan	Operational	Run	
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NVA-81A Speaker)							
3		M/HF	Receiver Rack	GJD-179C	6/1991	BP32776	JRC / Japan	Operational	Run	
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NRD-95 Receiver)							
			(NVA-81A Speaker)							
			(JXA-8W 2181 kHz Auto Alarm)							
			(JXA-15W 500kHz Auto Alarm)							
			(NCZ-811 Control Terminal)							

Note: ◄Category ► M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
X	**Receiving Station (Balagtas)** (continued)									
4		M/HF	Antenna Multicoupler Rack	GJR-179	6/1991	BP32772	JRC / Japan	Operational	Run	
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
			(NFA-80FA Antenna Multicouper)							
5		M/HF	Antenna Changer Rack	GJD-179A	6/1991	BP32773	JRC / Japan	Operational	Run	
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
			(NQA-80BK Antenna Changer)							
6		M/HF	Supervisory Rack	GED-1134	6/1991	BP93126	JRC / Japan	Operational	Run	
			(NYZ-55 Station Status Monitor)							
			(JCC-300 Local Terminal Unit)							
			(NQC-712 Receiver Patch)							
7		M/HF	VDF (3 verticals)							
8		Power	Power Distribution Board							
9			Telephone Repeater Equipment	JUR-30A	9/1994	JB50293	JRC / Japan	Operational	Run	
10		V/UHF	2000MHz Band PCM-PSK MUX Radio Relay Equipment	JUK-114A	9/1994	No.1 JA 10133 No.2 JA 10134	JRC / Japan	Stopped operation with interference problem		

Note: ◀Category ▶ M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
X	**Receiving Station (Balagtas)** (continued)									
11			PCM Multiplex Terminal Equipment	JUJ-30A	9/1994	JB10099	JRC / Japan	Operational	Run	
12		Tester	Selective Level Meter	TD-2530			Ando Electric Co. Ltd./Japan	Operational	Run	
13		ANT sys.	Lighting Control Box (230V, 100W, X 2)		8/1991	3882	Nippon Koki Kogyo Co. Ltd.	Operational	Run	
XI	**CGD Cebu**									
1		VHF	Marine Band Transceiver, 25W		1997	34944	ICOM / Japan	Operational	Run	
2		HF	Transceiver	TW 7000	1997		DATRON / USA	Operational	Run	
3		HF	Transceiver	TW 7000	1997		DATRON / USA	Operational	St-by	
4			Tele-Printer	LX-300	1997		Epson/Japan	Operational		
XII	**CGS Cebu**									
1		VHF	Transceiver	FM-2570	1997		Furuno Electric Co. Ltd./Japan	Operational	Run	
XIII	**Detachment**									
1			Mobile Phone						Run	
XIV	**Detachment (Danao)**									
1		VHF	FM Transceiver, 5W (CH-16)	IC-O2AC	1990		ICOM / Japan	Operational	Run	
XV	**CG District Office**									
	(HQ Southwestern Mindanao)									
1		MF/HF	Transceiver (8,140 KHz)	IC-M710		5886	ICOM / Japan	Operational	Run	
2		VHF	Marine Band Transmitter Receiver	GM 300		159TYE A893	Motorola/Malaysia	Operational	Run	
XVI	**CGS Zamboanga**									
1		HF	Transceiver	TW 7000	1997	8693	DATRON / USA	Operational	Run	
2		VHF	Marine Band Transmitter Receiver	GM 300		78070	Motorola/Malaysia	Operational	Run	
XVII	**CGS Pagadian**									
1		MF/HF	Transceiver (8,140 KHz)	URC 187			Patrol Fone/	Operational	Run	
2		MF/HF	Transceiver (8,140 KHz)	URC 187			Patrol Fone/	Operational	St-by	
3		VHF	Marine Band Transmitter Receiver	H5057A			Motorola/Malaysia	Operational	Run	

Note: ◄Category ► M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

No.	Station Name	Category	Equipment/Facilities	Model	Mfg. Date	Serial No.	Manufacturer/Country of Origin	Operating Condition	Run/St-by	Remarks
XVIII	**SAR Vessel Davao Del Norte, AU-3504**									
1		VHF	Radio Telephone Equipment (CH-16, CH-70)	FM-8500			Furuno Electric Co. Ltd./Japan	Operational	Run	
2			Radio Telex (Narrow Band Direct Printing Telegraph Equipment, DP-5	NBDP 548 0991100			Furuno Electric Co. Ltd./Japan	Operational	Run	
3			Digital Fax.	FAX-208			Furuno Electric Co. Ltd./Japan	Operational	Run	
4		MF	NAVTEX Receiver	NX-500			Furuno Electric Co. Ltd./Japan	Operational	Run	
5			AD Converter	AD-100			Furuno Electric Co. Ltd./Japan	Operational	Run	
6			GPS Navigator	GP-3D			Furuno Electric Co. Ltd./Japan	Operational	Run	
7			Navigator Echo Sounder	PE-700			Furuno Electric Co. Ltd./Japan	Operational	Run	
8		VHF	Two-way Radio Telephone (Marine Band, Channel-16)	FM-8			Furuno Electric Co. Ltd./Japan	Operational	Run	
XIX	**Detachments (belonging to Zamboanga)**									
	Basilia		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Sangali		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Recado		No Existing Communication Equipment, but Text messaging through Mobile Phone and PLDT Landline.							
	Lamitan		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
XX	**Detachments (belonging to Pagadian)**									
	Margosatubig		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Malangas		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Naga		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Oltanga		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Talusan		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							
	Ipil		No Existing Communication Equipment, but Text messaging through Mobile Phone and Courrier.							

Note: ◄ Category ► M/HF, V/UHF, Microwave, ANT sys., Power supply, Tester (measuring equipment), Others

RADIO EQUIPMENT FOR HPCG AND PCG MAJOR/SPECIAL UNITS

UNIT	HF/DATACOM	HF/SSB			VHF/FM MAR BAND BASE RDO			VHF/FM & MAR BAND & UHF H-H RDO					AIRBAND
		HARRIS	ICOM M-700	URC-187	ICOM	STANDARD	MOTOROLA	ICOM	STANDARD	MOTOROLA	TRNK RDO	UHF GP-68	
HPCG - CGOC			1		1		1				2		1
HCPCU, CGCEC - RADIO ROOM	1	1		1			1				4	7	
HCGOF			1			1		2			2		
CGSOG											3		
CGTC											2		
CGSF								10			3		
HANC											1		
CGAG										1	1		1
HCGD NCR-CL	1		4		3	3 (Mega)	2 (Belcom)	12					
HCGD CEV	1		1				1						
HCGD SWM	1		1				1			1			
HCGD PAL	1			5		1	1	2	1	1			
HCGD STL	1						1	6					
HCGD WV	1	1			1	1	1	1		1			
HCGD NLZ	1			2	1			6		1			
HCGD SEM	1					1							
CGD BCL	1	1			1		1	3		1			
CGD NM	1	1											

RADIO EQUIPMENT FOR CG Stations & CG Detachments

		HF/SSB			VHF/FM MAR BAND BASE RDO			VHF/FM MAR BAND H-H RDO					
U N I T	HF/DATACOM	HARRIS	ICOM M-700	URC - 187	ICOM	STANDARD	MOTOROLA	ICOM	STANDARD	MOTOROLA	REMARKS	RF-2301	RF2304
CGD NCR-CL		2	1	2	2			4					
CGS MANILA					2			2					
CG Det Tangos					1			1					
CG Det Paranaque					1								
CG Det Naic					1								
CG Det Lamao					2								
CG Det Rosario					1								
CG Det CCP								1					
CGMT Pier 18													
CGSS Navotas					1			1					
CGS PASIG					1			2				1	
CG Det Delpan					1								
CG Det HDSJ					1			1					
CG Det Napindan													
Pureza Check Point					1								
Arroceros Check Pt					1								
CGS LAGUNA DE BAY					1			1					
CG Det Alabang													
CG Det Sta. Cruz													
CG Det Talim													
CG Det Palilia													
CG Det Cardona													
CGS CORREGIDOR			1		1			1					
CGS SUBIC			1		2								
CG Det Masinloc													
CG Det Iba													
CG Det Sta. Cruz													
CG Det Pundaquit													
PSC SBMA								1					
CG Det Camayan				1		1							
PSCC MANILA					1			1					
CGD CEV	2		1		1			3					
CGS CEBU					1			5*					

CG Det Mandaue													
CG Det Hagnaya													
CG Det Argao													
CG Det Tledo													
CG Det Camotes													
CG Det tuburan													
CG Det Pasil													
CG Det Danao													
CG Det Bantayan													
CG Det Tangil													
CG Det Bato													
CGS TAGBILARAN			1	1	1			3					
CG Det Jagana													
CG Det Ubay													
CG Det Talibon													
CG Det Tubigon													
CGCOP Catagbacan													
CGCOP Causeway													
CGS DUMAGUETE				1	2			4				1	
CG Det Tandayag													
CG Det Guihulngan													
CG Det Larena													
CG Det Bais													
CGCOP Solong-on													
CGCOP Lazi													
CGS TACLOBAN	1				2			1					
CG Det Guiuan													
CG Det Naval													
CGCOP Carigara													
CGCOP Sagkahan													
CGCOP Abuyog													
CGS ORMOC	1												
CG Det Baybay													
CG Det Palompon													
CG Det Isabel													
CGCOP San Isidro													
CGS MAASIN					1			2*				1	
CG Det Bato													
CG Det Hilongos													
CG Det Sogod													

CG Det Liloan													
CG Det San Juan													
CGCOP San Ricardo													
CGS CATBALOGAN			1		2			1					
CG Det Allen													
CG Det Calbayog													
CG Det Laoang													
CG Det Borongan													
CGD SWM			1		1			2					
CGS ZAMBOANGA					1			2					
CG Det Basilan													
CG Det Sanggali													
CG Det Recudo													
CG Det Lamitan													
CGS PAGADIAN				2	1/ 2*			2/ 1*					
CG Det Malangas													
CG Det Naga													
CG Det Margosatubig													
CGMT Ipil													
CG Det Ulotanga													
CGS COTABATO			1	1	1			1/2*					
CG Det Calamansig				1									
CG Det Polloc													
CGMT Lebac													
CGS JOLO				1	2*			2*					
CG Det Siasi													
CGS MAPUN													
CG Det Taganak													
CGS BONGAO			1	1	1			1					
CG Det Sitangkai				1									
CGMT Chinese pier													
CGD PALAWAN	1				1		1						
CGS PTO PRINCESA					1								
CG Det Narra													
CG Det Roxas													
CGMT Macarascas													

CGS BROOKES POINT			1		1			4					
CG Det Mangsee				1									
CG Det Balabac				1									
CG Det Rio Tuba				1									
CG det Rizal													
CG Det Quezon				1									
CGS CORON					1			2					
CG Det Talampulan													
CG Det Linapacan													
CG Det Culion													
CGS LIMINANGCONG				1									
CG Det El Nido				1									
CG Det Port of Liminangcong													
CGS CUYO					1								
CG Det Cagayancillo													
CG Det Araceli													
CGD STL	1		1		1								
CGS BATANGAS					4			1/1*					
CG Det Sta. Clara													
CG Det Bauan													
CG Det Lemery													
CG Det Nasugbu													
CG Det Anilao													
CG Det Calatagan													
CG Det Lian													
CG Det Balayan													
CG Det Lobo													
CGS LUCENA			1		1			1*					
CG Det Dalahican													
CG Det Mauban													
CG Det Atimonan													
CG Det Gasan													
CG Det Cotta													
CG Det Balanacan													
CG Det Sta. Cruz													
CG Det Guinayangan													
CG Det Gumaca													

CGS SAN JOSE				2	1			3					
CG Det Caminamit													
CG Det Sablayan													
CG Det Mamburao													
CG Det Abra de Ilog													
CG Det Tilik													
CGS CALAPAN			1		1			2					
CG Det San Antonio													
CG Det Pinamalayan													
CG Det Pto Galera													
MT Puerto Galera													
CG Det Roxas													
CGS ROMBLON					3								
CG Det Odiongan													
CG Det Looc													
CG Det Bagacay													
CG Det San Agustin													
CG Det Ambulong													
CG Det Cajidiocan													
CGS PUERTO REAL				1	1			2*					
CG Det Casiguran													
CG Det Burdeos													
CG Det Polilio													
CG Det Dinahican													
CG Det Baler													
CGMT Tignoan													
CGMT Patnanungan													
CGMT Poblacion 16													
CG Det Delasag													
CGD WV					2			6				1	
CGS ILO-ILO				1	1			1	1				
CG Det Estancia													
CG Det Ajuy													
CG Det Buenavista													
CGCOP Dumangas													
CGCOP Jordan													
CGCOP Iloilo Fishing Port													
CGS BACOLOD				2	7			1					
CG Det Cadiz													

CG Det Victorias													
CG Det San Carlos													
CG Det Escalante													
CG Det Pulupandan													
CG Det Hinigaran													
CGCOP Bredco													
CGCOP Tuburan													
CGS ROXAS				1	3			5				1	
CG Det Olutayan													
CGCOP Libas													
CGCOP Barra													
CG Det Banica													
CGCOP Pilar													
CGS DUMAGUIT				2	3								
CG Det Caticlan													
CG Det Boracay													
CGCOP Batan													
CGCOP New Washington													
CGCOP Buruanga													
				3									
CGS SAN JOSE DE BUENAVISTA					2			2					
CG Det Lipata													
CG Det Semirara													
CGCOP Libertad													
CGCOP Aniniy													
CGCOP Caluya													
CGD NLZ													
CGS SAN FERNANDO													
CG Det Bauang													
CG Det Darigayos													
CG Det Damortis													
CGS APARRI													
CG Det Claveria													
Cg Det Camiguin													
CG Det San Vicente													
CGS CURIMAO													
CG Det Salomogue													
CG Det Davila													
CGMT San Esteban													

CGS SUAL													
CG Det Dagupan													
CG Det Lucap													
CG Det Bolinao													
CGS BASCO													
CG Det Sabtang													
CG Det Itbayat													
CGD SEM	2		1		1							1	
CGS DAVAO					1								
CG Det Sasa								1					
CG Det Ilang								1					
CG Det Panabo								1					
CG Det Daliao													
CG Det Malalag													
CGS GENERA SANTOS				1	1			1				1	
CG Det Glan													
CG Det Fish Port													
CG Det Kiamba													
CGS BISLIG			1	1	1			1				1	
CG Det Tandag													
CGCOP Bislig													
CGCOP Cantillan													
CGS MATI			1	1	1			2					
CG Det Tibanban													
CG Det Baganga			1										
CG Det Lupon					1								
CGS SARANGANI				2	1								
CG Det Tagen													
CG Det Mavias													
CG Det Lipol													
CGD BICOL													
CGS LEGASPI													
CG Det Tabaco													
CG Det Virac													
CGCOP San Andres													

CG Det Naduran													
CG Det Camaligan													
CG Det Mercedes													
CGCOP Mercedes													
CG Det Pasacao													
CGCOP San PascuaL													
CG Det Sabang													
CG Det Victory													
CGS SORSOGON													
CG Det Matnog													
CG Det Bulan													
CG Det Pilar													
CG Det San Jacinto													
CG Det Talisay													
CGCOP Magallanes													
CGS MASBATE													
CG Det Aroroy													
CG Det Mandaon													
CG Det Cataingan													
CG Det Milagros													
CG Det Calumpang													
CG Det Placer													
CG Det Bapor													
CGD NM	1							3					
CGS CAGAYAN DE ORO			3					2					
CG Det Camiguin													
CG Det Baligoan													
CG Det Tagoloan													
CGS OZAMIS				1						2			1
CG Det Oroquita													
CG Det Tabigue													
CGS SURIGAO				1				4/1*					1
CG Det Dapa													
CG Det San Jose													
CG Det San Roque													
CG Det Lipata													
CG Det Roxas													
CGS ILIGAN			1	1				2					

CG Det Tubod													
CG Det Lugait													
CG Det Mukas													
CGS BUTUAN			1	2									
CG Det Nasipit													
CG Det Lumbocan													
CGS DAPITAN				1				3*					1
CG Det Sindangan													
CG Det Liloy													

RADIO EQUIPMENT FOR MANILA COAST STATION

MANDALUYONG OPERATION CENTER (MOC)

A

No.	Particulars	On Hand	Operational	Non-operational	Variance/Remarks
1	MF - TG 1				
	Associated Equipments				
	1.1 NCH-300P Telecontroller TX-1	1	/		
	1.2 NCG-95 Telecontroller RX-1	1	/		
	1.3 NGK-2 Morse Telecontroller	1	/		
	1.4 NQP-22 Signal Controller	1	/		
2	MF - TG 2				
	Associated Equipments				
	2.1 NCH-300P Telecontroller TX-2	1	/		
	2.2 NCG-95 Telecontroller RX-2	1	/		
	2.3 NCH-270 500 KHz A/A Controller	1	/		
	2.4 NCL-800T ARQ Modem	1	/		
	2.5 NQE-556A Telex Operational Unit	1	/		
	2.6 T1200 Teleprinter	1	/		
	2.7 NQP-22 Signal Controller	1	/		
3	MF - TP 1				
	Associated Equipments				
	3.1 NCH- 300P Telecontroller TX-1	1	/		
	3.2 NCG-95 Telecontroller RX-3	1	/		Received signal from BRS indicate trouble
	3.3 NCH-271 2182 KHz A/A Controller	1	/		
	3.5 NQQ-31B Telephone Repeater	1	/		
	3.6 NCL-800T ARQ Modem	1	/		
	3.7 NQE-556A Telex Operational Unit	1	/		
	3.8 T1200 Teleprinter	1	/		
	3.9 NQP-21 Signal Unit	1	/		
4	MF - TP 2				
	Associated Equipments				
	4.1 NCH-300 Telecontroler TX-2	1	/		
	4.2 NCG-95 Telecontroller RX-4	1	/		
	4.3 NQQ-31B Telephone Repeater	1	/		
	4.5 NQP- 21 Signal Unit	1	/		
5	HF - TG 1				
	Associated Equipments				

	5.1 NCH-300 P Telecontroller TX 3	1	/		
	5.2 NCG-95 Telecontroller RX 5	1	/		
	5.3 NCL-800T ARQ Modem	1	/		
	5.4 NQE-55LA Telex Unit	1	/		
	5.5 T1200 Teleprinter	1	/		
	5.6 NQP-22 Signal Unit	1	/		
6	HF - TG 2				
	Associated Equipments				
	6.1 NCH-300P Telecontroller TX-4	1	/		
	6.2 NCG-95 Telecontroller RX-6	1	/		
	6.3 NCL-800T ARQ Modem	1	/		
	6.4 NQE-556A Telex Unit	1	/		
	6.5 T1200 Teleprinter	1	/		
	6.6 NQP- 22 Signal Unit	1	/		
7	HF - TG 3				
	Associated Equipments				
	7.1 NCH-300P Telecontroller TX-5	1	/		
	7.2 NCG-95 Telecontroller RX-7	1	/		
	7.3 NCL-800T ARQ Modem	1	/		
	7.4 NQE-556A Telex Unit	1	/		
	7.5 T1200 Teleprinter	1	/		
	7.6 NQP-22 Signal Unit	1	/		
8	HF - TG 4				
	Associated Equipments				
	8.1 NCH-300P Telecontroller TX-6	1	/		
	8.2 NCG-95 Telecontroller RX-8	1	/		
	8.3 NCL-800T ARQ Modem	1	/		
	8.4 NQE-556A Telex Unit	1	/		
	8.5 T1200 Teleprinter	1	/		
	8.6 NQP-22 Signal Unit	1	/		
9	HF - TP 1				
	Associated Equipments				
	9.1 NCH-300P Telecontroller TX-7	1	/		
	9.2 NCG-95 Telecontroller RX-9	1	/		
	9.3 NQQ-31B Telephone Repeater	1	/		
	9.4 NQP-21 Signal Unit	1	/		
10	HF - TP 2				
	Associated Equipments				

	10.1 NCH-300P Telecontroller TX-8	1	/		
	10.2 NCG-95 Telecontroller RX-10	1	/		
	10.3 NQQ-31B Telephone Repeater	1	/		
	10.4 NQP-21 Signal Unit	1	/		
11	HF - TP 3				
	Associated Equipments				
	11.1 NCH-300P Telecontroller TX-9	1	/		
	11.2 NCG-95 Telecontroller RX-11	1	/		
	11.3 NQQ-31B Telephone Repeater	1	/		Original PS for repair
	11.4 NQP-21 Signal Unit	1	/		
12	HF - TP 4				
	Associated Equipments				
	12.1 NCH-300P Telecontroller TX-10	1	/		
	12.2 NCG-95 Telecontroller RX-12	1	/		
	12.3 NQQ-31B Telephone Repeater	1	/		Original PS for repair
	12.4 NQP-21 Signal Unit	1	/		
13	HF - TG 5				
	Associated Equipments				
	13.1 NCH-300P Telecontroller TX-11	1	/		
	13.2 NCG-95 Telecontroller RX-13	1	/		
	13.3 NGK-2 Morse Transmitter	1	/		
	13.4 NCL- 800T ARQ Modem	1	/		
	13.5 NQE -556A Telex Unit	1	/		
	13.6 T1200 Teleprinter	1	/		

B

1	VHF Radio				
	Associated Equipments				
	1.1 VHF Telecontroller NCE-4378	1	/		Original PS for repair
	1.2 VHF Controller NCU-300-1	1	/		Original PS for repair
	1.3 Jack Panel NQC-709	1	/		Wiring/Mechanical OK
2	Supervisory Console				
	Associated Equipments				
	2.1 Antenna Matrix Contoller NCH-376	1	/		Function TTS dependent
	2.2 RLP Antenna Remote Controller NCM-455	1	/		Function TTS dependent
	2.3 Master Clock NKH-100	1	/		
3	Supervisory Rack				

	Associated Equipments				
	3.1 Station Status Monitor NYZ-55	1	/		Original PS for repair
	3.2 TX Monitor NCE-3938 T-A	1	/		Original PS for repair
	3.3 Common Repeater NQQ-186	1	/		
4	Connection Rack	1			
5	2 GHz Band PCM-PSK MUX Radio JUK-114A	3	/		E1-DSL land driver substitute
6	PCM Multiplex Terminal JUJ-30A	1	/		
7	Telephone Repeater JUR-30A	1	/		
8	VHF Marine Radio GFD-260YM	5	/		
9	Automatic Branch Exchange NCF-924A	1	/		
10	Key Service Unit NA-ET-16DE	1	/		
11	Obstruction Light System	1	/		Manual operated/control card defective
12	Power Supply System				
	12.1 60 KVA AVR	1	/		
	12.2 7.5 KVA UPS	1	/		
	12.3 60 KVA Diesel Engine Generator Set	1	/		
13	UHF Radio Antenna System (JUK-114A)				
	13.1 Antenna System	3	/		Wiring/Mechanical OK
	13.2 Feeder Cable	3	/		Wiring/Mechanical OK
14	VHF Antenna System (GFD-260YM)				
	14.1 Antenna	5	/		
	14.2 Cabling System	5	/		Wiring/Mechanical OK
	14.3 Duplexer	5	/		
	14.4 Band Pass Filter	5	/		
	14.5 Coaxial Arrester	5	/		For maintenance check-up
15	MDF, Cable Trench and Cable Rack				Wiring/Mechanical OK
16	Land Driver Modem				
	16.1 HDSL Modem Crocus Telindus	1	/		Intersite link facing TTS (SMART)
	16.2 HDSL Modem Watson SZ 796	1	/		Intersite link facing BRS (GLOBE)

RADIO EQUIPMENT FOR MANILA COAST STATION

TAGUIG TRANSMITTING STATION (TTS)

No.	Particulars	On Hand	Operational	Non-operational	Remarks
1	2 GHz Band PCM-PSK Mux Radio SUK-114 A	1	/		
2	PCM Mux Terminal Eqpt. JUJ-30A	1	/		
3	Telephone Repeater Eqpt JUR-30A	1	/		
4	Obstruction Tower Light System	1	/		Requested bulb needed
5	Power Supply System				
	5.1 Electrical Panels & PDB	1	/		
	5.2 250 kVA IVR	1	/		
	5.3 3 kVA UPS	1		/	Defective MOSFET Transistor
	5.4 250 kVA Diesel Engine Generator Set	1	/		
6	Antenna System/ Ant. Field System				
	6.1 UHF Radio Antenna System	1	/		Standby E1/DSL substituted
	6.2 Ant 1 T Type Antenna CT046	1		/	Underground coaxial cable portion missing
	6.3 Ant 2 T Type Antenna CT046	1		/	Underground coaxial cable portion missing/leak
	6.4 Ant 3 Omnidirectional CM230	1	/		Radial grounding cable portion missing
	6.5 Ant 4 Omnidirectional CM230	1	/		
	6.6 Ant 5 Broadband HW 330	1	/		
	6.7 Ant 6 Broadband HW330	1	/		
	6.8 Ant 7 Broadband HW330	1	/		VSWR affected when flooded
	6.9 Ant 8 Broadband HW330	1	/		
	6.10 Ant 9 Broadband HW330	1	/		
	6.11 Ant 10 Broadband HW330	1	/		
	6.12 Ant 11 Broadband HW330	1	/		
	6.13 Ant 12 Broadband HW330	1	/		
	6.14 Ant 13 Log Periodic CLP6030	1		/	Signal control cable for rotator portion missing/motor
					rotator system for repair
	6.15 Ant 14 Log Periodic CLP6030	1		/	Signal control cable for rotator portion missing/motor
					rotator system for repair
7	Supervisory Console				
	7.1 AF/Key NJU-33	1	/		
	7.2 RLP Ant Local Controller NCR-454	1	/		
	7.3 Monitor Releiver NRD-525	1	/		

	7.4 Clock 6HCED00062	1	/		
	7.5 Tx Patch NQC 711	1	/		
8	Supervisory Rack				
	8.1 Station Status Monitor NYZ-55	1	/		LCD display malfunction
	8.2 Tx Monitor NCE-3938T-A	1	/		
	8.3 Local Terminal Unit JCC-300LR8	8	/		
9	Remote Control Rack				
	9.1 Local Terminal Unit JCC-300 LR8	1	/		
10	Radio Transmitter				
	10.1 TX-1 TG-1 MF-1 JRS-553	1		/	Defective Exciter
	10.2 TX-2 TG-2 MF2 JRS-553	1		/	Defective Exciter
	10.3 TX-1 TP1 HF1 JRS-753	1		/	Defective Exciter
	10.4 TX-2 TP2 HF2 JRS-753	1	/		
	10.5 TX-3 TG-1 HF3 JRS-753	1	/		
	10.6 TX-4 TG-2 HF4 JRS-753	1	/		
	10.7 TX-5 TG-3 HF5 JRS-753	1	/		
	10.8 TX-6 TG-4 HF6 JRS-753	1		/	Abnormal signal level
	10.9 TX-7 TP-1 HF7 JRS-753	1		/	Abnormal signal level
	10.10 TX-8 TP-2 HF8 JRS-753	1	/		
	10.11 TX-9 TP-3 HF JRS-753	1	/		
	10.12 TX-10 TP-4 HF JRS-753	1		/	PS/PA Module tramsferred to other TXR
	10.13 TX-11 TG-5 HF JRS-753	1	/		

RADIO EQUIPMENT FOR MANILA COAST STATION

BALAGTAS RECEIVING STATION (BRS)

No.	Particulars	On Hand	Operational	Non-operational	Remarks
1	2 GHz Band PCM-PSK Mux Radio JUK-114 A	1	/		E1/DSL land driver substituted
2	PCM Mux Terminal Eqpt. JUJ-30A	1	/		
3	Telephone Repeater Eqpt JUR-30A	1	/		
4	Obstruction Tower Light System	1	/		Manual Operated
5	Power Supply Sytem				
	5.1 60 kVA AVR	1	/		
	5.2 7.5 kVA UPS	1	/		16 pcs. 12 volts battery needed
	5.3 60 kVA Diesel Engine Generator Set	1	/		
6	UHF Radio Antenna System				
	6.1 Antenna System	1	/		
	6.2 Feeder Cable System	1	/		
7	MDF, Cable Trench & Cable Rack	1	/		Wiring/Mechanical OK
8	Conection Rack	X			
9	Receiver Rack GJD 179B SN 32774	1	/		
	9.1 500 kHz Rx1 NRD-95	1	/		
	9.2 500 kHz Rx2 NRD-95	1	/		
	9.3 2182 kHz Rx3 NRD-95	1	/		Received signal from BRS indicate trouble
	9.4 2182 kHz Rx4 NRD-95	1	/		
	9.5 Rx5 NRD-95	1	/		
10	Receiver Rack GJD 179B SN 32775				
	10.1 Rx6 NRD-95	1	/		
	10.2 Rx7 NRD-95	1	/		
	10.3 Rx8 NRD-95	1	/		
	10.4 Rx9 NRD-95	1	/		
	10.5 Rx10 NRD-95	1	/		
11	Receiver Rack GJD 179C SN 32776				
	11.1 Rx11 NRD-95	1	/		
	11.2 Rx12 NRD-95	1	/		

	11.3 Rx13 NRD-95	1	/		
	11.4 500 kHz A/A JXA-15W	1	/		
	11.5 2182 kHz A/A JXA-8W	1	/		
	11.6 Remote Control Terminal NCZ-811	1	/		
12	Supervisory Rack GED-1134 SN BP-93126				
	12.1 RX Patch NQC-712	1	/		Wiring/mechanical OK
	12.2 Station Status Monitor NYZ-55	1	/		
	12.3 Local Terminal Unit JCC-300LR8	1	/		
13	Antenna Changer Rack				
	13.1 Antenna Changer NQA-80 BK	1	/		
	13.2 Antenna Multicoupler NAF-80FA	1	/		
14	Antenna System				
	14.1 Broadband Dipole Ant.	1	/		
	14.2 T-Type Ant.	1	/		
	14.3 Fixed log-periodic Ant	4	/		
	14.4 Omnidirectional Ant	1	/		
15	Flexi-Hopper Nokia CE	1	/		Intersite link facing MOC (GLOBE)

SUBMITTED BY:

MR. WILLIAM L. PERLAS
Asst. OIC, MCO Mandaluyong

付属資料３　フィリピンの通信衛星

[運用会社]

MABYHAY Philippine Satellite Corporation（MPSC）

- 親会社：Philippine Long Distance Telephone Company（PLDT）

[衛星名]

AGILA Ⅱ

- Agila は、タガログ語で“ワシ”を意味し、フィリピンの国鳥となっている。

[トランスポンダとサービスエリア]

C バンド　：30　　アジア、ハワイ

Ku バンド　：24　　フィリピン、中国、香港、台湾

[連絡先等]

会社所在地：2F PLDT Tower 1, 6799 Ayala Avenue, 1200 Makati City, Philippines

電話：+63-2-887-5788

FAX：+63-2-887-5789

ホームページ：www.mabuhaysat.com

連絡先：Redie A. Ona 氏（E-mail : eona@mabuhaysat.com）

[MABUHAY 社からの入手資料]

- Ku-Band Performance Parameters
- C-Band Performance Parameters
- Automatic Level Control (ALC) Mode Description
- Earth Station Specifications and Operating Requirement for Systems Accessing MPSC Satellite
- 回線設計例　・Manila　～　Cebu (Ku/C)
  ・Manila　～　Zamboanga (Ku/C)
  ・Manila　～　Palawan (Ku)

MAKATI OFFICE
20/F PLDT Tower II, 6799 Ayala Avenue
Makati City, 1226 Philippines
Tel. (63-2) 887-5788; Fax (63-2) 887-5789

MABUHAY CONTROL CENTER
Group 5, Naval Magazine
Subic Bay Freeport Zone, 2222, Philippines
Tel (63-47)252-9004; Fax (63-47)252-9002

MABUHAY
Philippines Satellite Corporation

AGILA II
Ku - BAND PERFORMANCE PARAMETERS

1. Introduction

This document provides the key performance parameters of the Ku-Band transponders of Mabuhay Philippines Satellite Corporation (MPSC) Agila II satellite to assist customers in the design of their earth stations.

Note that since the orbital positions are allocated by international agreement, it may be necessary, because of future reallocation, for MPSC to interchange or relocate the satellite. Also, due to potential RF channel or satellite failures, customers may be required on short notice to change RF channels, frequencies within a channel and/or satellites. Customers should therefore ensure that their transmitters and receivers have the necessary frequency agility.

2. Satellite Orbital Location and Stationkeeping Accuracy

TABLE 1

Orbital Location	146° E Longitude
North – South Station Keeping	± 0.05°
East – West Station Keeping	± 0.05°
Attitude	± 0.15°

3. Effective Isotropic Radiated Power (EIRP)

Figure 1 provides the EIRP contour of the Agila II typical Ku-Band channel.

4. G/T Ratio

Figure 2 provides the G/T contour of the Agila II typical Ku – Band channel.

5. Saturated Flux Density (SFD)

The Agila II Ku-band channels can be operated either in Fixed Gain Mode (FGM) or Automatic Level Control Mode (ALC).

In FGM, attenuators that are ground commandable in 1 dB steps is available to set the input power necessary to saturate at each transponder. The SFD shall be adjustable between –77 dBW/m^2 to –95 dBW/m^2. The nominal SFD setting for FGM is –88 dBW/m^2 at 7dB/K. G/T.

For ALC mode description, refer to Attachment 1.

6. Transponder Frequency Plan

The satellite has frequency and polarization plans as described in Figure 3.

7. RF Bandwidth

Usable Transponder Bandwidth : 36 MHz
Transponder 3dB Bandwidth : 33 MHz

8. Maximum Symbol Rate

The Agila II satellite transponder has a 3 dB bandwidth of 33 MHz, therefore, the maximum symbol rate of a carrier shall be 25.78 Msymbols.

9. Beacon Technical Data

Beacon frequencies are transmitted from Subic Facility and Zamboanga back-up facility for geographic redundancy.

Primary (Subic) : 12255.775 MHz Vertical and Horizontal Polarization
Secondary (Zamboanga): 12249.150 MHz Vertical and Horizontal Polarization
EIRP minimum : 17 dBW

10. Cross-polarization Isolation

The spacecraft transmit antenna has cross polarization of more than 30 dB.

11. TWTA Amplitude Transfer Characteristic

A typical TWTA amplitude transfer characteristic is shown in the curve of Figure 4.

12. Frequency Response Of Transponder Channel

The frequency response meets the requirements shown in Table 2 at any frequency between the offsets shown.

TABLE 2. Frequency Response (dB)

Frequency Offset From Center (MHz)	0	± 6	± 8	± 10	± 12	± 13.5	± 18
Input (dB)	-0.28	-0.28	-0.32	-0.37	-0.63	-1.03	-3.02
Total (dB)	-0.37	-0.37	-0.45	-0.57	-0.92	-1.84	-6.75

13. Group Delay Response of Channel

Group delay limits are shown in Table 3.

TABLE 3. Group Delay Response (ns)

Frequency Offset From Channel Center (MHz)	0	± 6	± 8	± 10	± 12	± 13.5	± 18
Input	3.21	3.21	3.36	4.42	5.95	10.54	58.39
Overall	5.97	5.97	7.80	10.98	16.18	35.86	143.81

14. Gain Slope

The gain slope falls within the masks defined by Table 4.

TABLE 4. Gain Slope Variations (dB/MHz)

Frequency Offset From Center (MHz)	0	± 6	± 8	± 10	± 12	± 13.5	± 18
Input	0.044	0.044	0.065	0.105	0.135	0.262	2.156
Total	0.067	0.067	0.093	0.134	0.180	0.534	5.368

15. Total Phase Shift

The total phase shift does not exceed the values given in Table 5. Total phase shift is defined as the maximum shift of carrier phase when a single unmodulated carrier is varied from saturation and below.

TABLE 5. Total Phase Shift

Input Level (dB Below Saturation)	Maximum Relative Phase Shift (°)
0	49
-3	41.5
-6	29.5
-9	20.5
-12	12
-14	7
-20	0

16. System Redundancy

The Agila II satellite has the following redundancy scheme:

Receiver Redundancy	4 for 2; tolerates two failures without loss of receive capability
Channel Amplifier/TWTA redundancy	Two rings: one 15 for 12 and the other 16 for 12

MAKATI OFFICE
20/F PLDT Tower-2, Ayala Avenue,
Makati City, 1226 Philippines
Tel. (63-2) 887-5788; Fax (63-2) 887-5789

MABUHAY SPACE CENTER
Group 5, Naval Magazine
Subic Bay Freeport Zone, 2222, Philippines
Tel (63-47)252-9004; Fax (63-47)252-9002

MABUHAY
Philippines Satellite Corporation

ATTACHMENT B

AGILA II
C-BAND PERFORMANCE PARAMETERS

1. Introduction

This document provides the key performance parameters of the C-band transponders of Mabuhay Philippines Satellite Corporation (MPSC) Agila - II satellite to assist customers in the design of their earth stations.

Note that since the orbital positions are allocated by international agreement, it may be necessary, because of future reallocation, for MPSC to interchange or relocate the satellite. Also, due to potential RF channel or satellite failures, customers may be required on short notice to change RF channels, frequencies within a channel and/or satellites. Customers should therefore ensure that their transmitters and receivers have the necessary frequency agility.

2. Satellite Orbital Location and Stationkeeping Accuracy

TABLE 1

Orbital Location	146° E Longitude
North - South Station Keeping	± 0.05°
East - West Station Keeping	± 0.05°
Attitude	± 0.15°

3. Effective Isotropic Radiated Power (EIRP)

Figure 1 provides the EIRP contour of the Agila - II typical C-band channel.

4. G/T Ratio

Figure 2 provides the G/T contour of the Agila - II typical C-band channel.

5. Saturated Flux Density (SFD)

The Agila - II C-band channels contains commandable attenuators that control channel gain and hence, saturation flux density. The attenuator can be set from –80 to –97 dBW/m^2 in 0.5 dB steps. The nominal SFD setting is –88 dBW/m^2 at G/T of 0.5 dB/K.

6. Transponder Frequency Plan

The satellite has frequency and polarization plans as described in Figure 3.

7. Cross-polarization Isolation

The spacecraft transmit antenna has cross polarization of more than 27 dB over 100% of the coverage area.

8. TWTA Amplitude Transfer Characteristic

A typical TWTA amplitude transfer characteristic is shown in the curve of Figure 4.

9. Frequency Response Of Transponder Channel

The frequency response meets the requirements shown in Table 2 at any frequency between the offsets shown.

TABLE 2. Frequency Response (dB)

Frequency Offset From Center (MHz)	± 12	± 18
Input (dB)	-0.7	-1.0
Total (dB)	-1.1	-2.0

10. Group Delay Response of Channel

Group delay limits are shown in Table 3.

TABLE 3. Group Delay Response (ns)

Frequency Offset From Channel Center (MHz)	0	± 8	± 12	± 16	± 18
Input	0	3.74	6	12.35	26.41
Overall	0	10.95	21.64	49.93	109.5

11. Gain Slope

The gain slope falls within the masks defined by Table 4.

TABLE 4. Gain Slope Variations (dB/MHz)

Frequency Offset From Center (MHz)	± 12	± 14	± 16	± 18
Input	0.06	0.07	0.20	0.70
Total	0.13	0.20	0.50	1.60

12. Total Phase Shift

The total phase shift does not exceed the values given in Table 5. Total phase shift is defined as the maximum shift of carrier phase when a single unmodulated carrier is varied from saturation and below.

TABLE 5. Total Phase Shift

Input Level (dB Below Saturation)	Maximum Relative Phase Shift (°)
0	49
-3	38
-6	27
-9	16
-12	10
-14	7
-20	0

13. System Redundancy

The Agila - II satellite has the following redundancy scheme:

Receiver Redundancy	4-for-2; tolerates two failures without loss of receive capability
Channel Amplifier/TWTA redundancy	Two rings with 19-for-15 redundancy

14. Beacon Technical Data

Beacon frequencies are:

Horizontal Polarization : 4196.000 MHz
Vertical Polarization : 4198.000 MHz

AUTOMATIC LEVEL CONTROL (ALC) MODE DESCRIPTION

The ALC mode provides automatic on – board compensation for uplink rain fade. The ALC circuit maintains the TWTA drive power level at a constant level over the dynamic range available in the event of an uplink signal fade. A commandable TWTA drive adjust attenuation following the ALC circuit is provided to adjust the TWTA drive downward from the level of saturation or above saturation to correct for long-term drifts in order to meet stability requirements.

The channel amplifier output level may be adjusted by ground command in 0.5 dB steps over a range of 15.5 dB.

In this operating mode, the maximum variation from the peak TWTA power level is 1.4 dB.

This feature is available for Agila 2 Ku- band only.

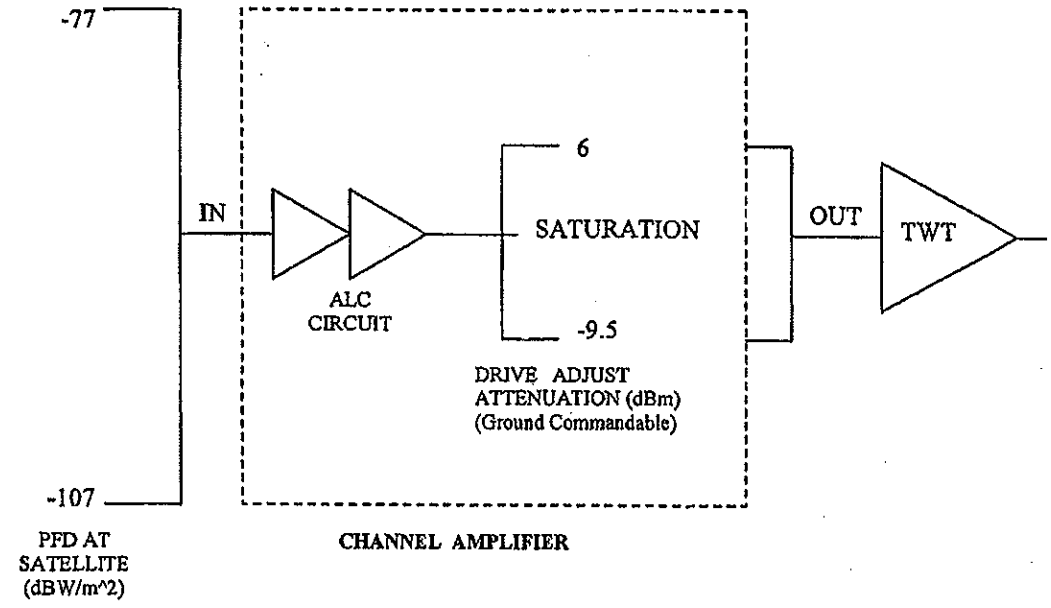


Figure 1. Block Diagram

The following table shows the available ALC range that the ALC circuit can compensate with respect to the Power Flux Density (PFD) at the satellite from the transmitting earth station.

PFD (dBW/m^2)	AVAILABLE ALC RANGE (dB)
-77	30
-80	27
-83	24
-89	18
-95	12
-100	7
-105	2
-107	0

NOTE:

1. ALC attenuation setting has no bearing with available ALC range.
2. For single carrier operation, normal setting is:

Attenuation state	: 22
Gain Setting	: 9
Corresponding TWT Operating Point For This Setting (IBO, OBO)	: 4.5, 1.0

Figure 2 is the typical gain transfer curve showing the EIRP output relative to the PFD at the satellite. Within the PFD range of –77 to –107 dBW/m^2, the maximum EIRP output variation from the peak value is 1.4 dB (worst case).

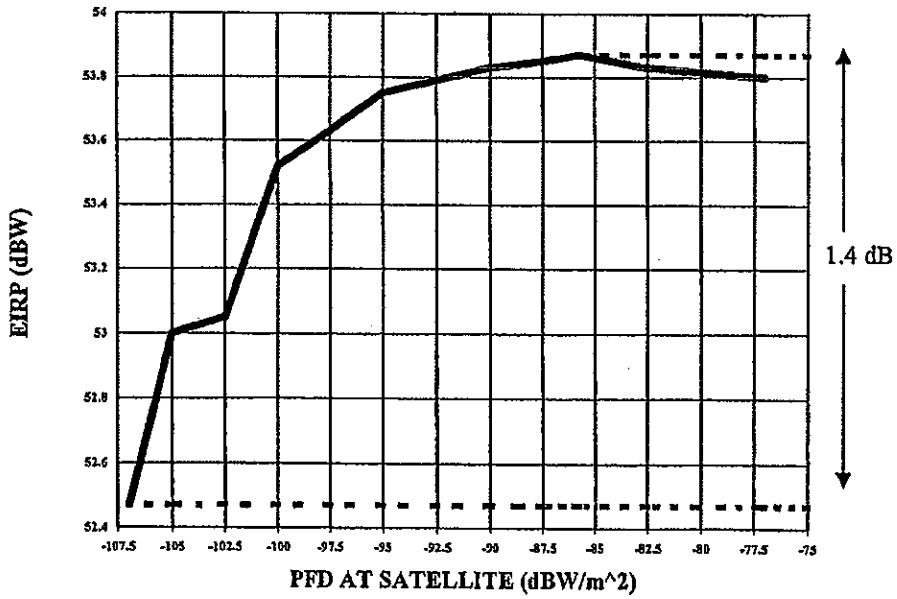


Figure 2. Agila 2 Typical Gain Transfer Curve for ALC Mode

EARTH STATION SPECIFICATIONS AND OPERATING REQUIREMENTS FOR SYSTEMS ACCESSING MPSC SATELLITES

INTRODUCTION

The purpose of this document is to describe the technical and operational requirements to be adhered to by Customers leasing space segment from MPSC. It contains specifications to be met by the Customer' s earth stations and the system operational requirements to be adhered to in order to obtain MPSC approval for access by the earth stations to the MPSC space segment

1.0 OPERATING REQUIREMENTS FOR CUSTOMER EARTH STATIONS

MPSC' s approval is required for all earth stations accessing the MPSC space segment. This section lists the specifications to be met by earth stations, prior to being granted access to the satellite to ensure that interference will not occur to other MPSC customers or other satellite systems.

Compliance with the requirements shall be demonstrated through the provision of manufacturer' s test data, user system design information and measured results. In addition, the user may be required to complete a set of Qualification Tests on the earth stations to demonstrate compliance with these specifications.

MPSC, as the satellite operator, must abide by international rules on coordination of adjacent satellite systems. As such, information on the user' s system is essential to enable MPSC to protect the system as much as possible.

To reduce the impact of cross-polar, adjacent channel, and adjacent satellite interference, the specific assignment of traffic on the Agila satellite shall be made by MPSC. Channel assignments are subject to change in order to provide effective resource management and to protect the health of the satellite. The RF equipment in the earth station should be capable of easily changing to any RF Channel in the **5.925 to 6.725 GHz** transmit band and **3.56 to 4.2 GHz** receive band.

1.1 PARTICULARS OF APPLICANT

The following information should be provided:

1) Name of company or given name
2) Mailing address

1.2 PARTICULARS OF PROPOSED EARTH STATION

In order to provide a contact point for all matters relating to the use and performance of the satellite space segment, the user shall designate an Operation Center to coordinate interfacing with MPSC' s Network Operation Center (NOC). The user shall provide names, telephone numbers, hours of

operation, etc. for their Operation Center. A contact point is required on a 24-hours/day basis. Both MPSC and user shall promptly inform each other of any changes in the Operation Center working arrangements.

The following earth station information must be provided:

1) Earth station location
2) Earth station coordinates (Latitude, Longitude)
3) Earth station antenna size and HPA rating
4) Name/designation of earth station operator as a 24 hours/day contact point
5) Telephone number of operator and operation center as a 24 hours/day contact

1.3 TRANSMISSION CHRACTERISTICS

1.3.1 GENERAL

For the designated transmitting earth station, the number of carriers accessing the satellite and their types shall be provided. Some common terminologies used to identify and/or classify different types of carriers are described below:

- TDMA - Time Division Multiple _ Access carrier
- DAMA - Demand Assigned Multiple-Access carrier
- PAMA - Pre-Assigned Multiple-Access carrier
- SCPC - Single Channel (voice/data) Per Carrier
- PSK - Phase Shift Keyed Carrier
- FDM-FM - Frequency Division Multiplexed-Frequency Modulated Carrier
- FM - Frequency Modulated Carrier
- CW - Continuous Wave Carrier

1.3.2 CARRIER PARAMETERS

Provide the following information regarding each type of carrier

- Uplink EIRP: The earth station transmit uplink EIRP per carrier in dBW;
- Transmission Bandwidth per carrier in KHz;
- Center frequency of each carrier in GHz.

Reassignment of carriers to another RF channel, or another satellite may require changes in the nominal EIRPs from the user' s earth stations.

1.3.3 USE OF UPLINK POWER CONTROL

The use of any type of uplink power control (UPC) unit in any transmit location will be subject to MPSC' s approval. A detailed functional description and operational specification of the UPC must, therefore, be provided. The functional description must as a minimum include the following information:

- How the uplink fade is detected by the UPC;
- How the uplink carrier level is controlled by the UPC;
- The compensation level intended for this installation;
- The maximum compensation level of the UPC shall be **9 dB** with a **250 msec** time constant.

1.3.4 TRANSMITTER INHIBIT REQUIREMENTS

Monitor and transmit inhibit functions, triggered by events such as a loss of lock on the phase locked oscillators, or excessive transmit power, must be included in the earth station design to ensure station shutdown. This will ensure that other customers on the satellite will not be adversely affected by these failures.

Users shall be required to turn down a station upon notification by MPSC of interference to other satellite services.

MPSC reserves the right to require the user to make available to MPSC a transmitter inhibit with remote control capability to protect other customers of the system from uncontrolled interference. Some means must be available to prevent accidental service initiation by remote stations on other than the correct satellite and RF channel, and to ensure that the transmissions will cease if the station' s antenna becomes severely misaligned. It is therefore necessary, unless otherwise agreed to by MPSC, that the remote terminals include a transmitter inhibit feature which requires the system to receive a known signal (pilot, etc) before the transmitter can be activated.

1.4 MODULATION CHARACTERISTICS

The modulation type and the characteristics of the carriers transmitted to an RF Channel are subject to approval by MPSC. In some cases it may be necessary to conduct pre-operational characterization tests to determine the effects of the proposed system on the overall performance of the other customers using the satellite.

1.4.1 DIGITAL MODULATION DETAILS

Complete Table 2 of the Customer Application Form for each digital carrier. Supply the following information:

- Type of Modulation – BPSK, QPSK, MSK, OKQPSK, etc.
- Information Bit Rate – Bit rate before encoding
- FEC Rate – If coding is used, provide the coding rate
- Transmission Bit Rate – Provide the actual transmitted bit rate over the satellite
- Threshold Eb/No – For satisfactory operation of the service a minimum or threshold Eb/No is necessary. Provide this number in dB for your system.
- Threshold BER – The bit error rate obtained when the system is operating at the threshold Eb/No is the Threshold BER. Supply this value for your system.
- Transmission BW – Each carrier will require certain BW to transmit the digital information. Specify the actual occupied bandwidth.
- IF Frequency Range – A band of frequencies in which the modulator output frequency can be assigned.
- IF Frequency Step Size – A minimum amount which the modulator output frequency can be incremented within its IF Frequency Range.
- Carrier Spacing – If more than one carrier is required to support the service, the spacing from each other will include the actual transmission bandwidth and the guard band required to minimize the adjacent carrier interference. The modem IF frequency step size must also be considered as any frequency band between the carriers that cannot be used due to hardware limitations will have to be included. Supply the carrier spacing required in your network.

1.4.1.1 SCRAMBLING

Digital carriers, shall, if necessary, use some form of continuous scrambling prior to modulation to ensure that the power spectral density at the antenna input of the designated transmit earth station meets the specifications given in Section 1.7.6 (Transmit Power Spectral Density).

1.4.2 FM MODULATION DETAILS

For each type of FM carrier (i.e. FDM-FM, FM-SCPC, etc.), provide the following information:

- Baseband Frequency Range (kHz)
- Peak-to-Peak Frequency Deviation (kHz)
- Transmission Bandwidth (kHz)

- S/N required
- Pre-detection bandwidth
- Sweep frequency of the energy dispersal waveform
- Shape of the energy dispersal waveform

1.4.2.1 ENERGY DISPERSAL

For analog carriers, sufficient energy dispersal shall be applied to meet the specifications given in Section 1.7.6. For FDM-FM carriers, additionally, to prevent excessive interference densities into other RF channels of the same or other satellites, the energy dispersal system shall automatically be adjusted with variations in the baseband signal so that the transmitted Power Density per 4 kHz for any baseband loading shall not exceed by more than 2 dB the power density per 4 kHz with full baseband loading.

1.4.3 POWER SPECTRAL DENSITY PLOTS

The power spectral density plots of the modulated carriers can be obtained from the spectrum analyzer. All settings of the spectrum analyzer should be noted and supplied to MPSC with the spectral density plots. The total carrier power reference must be shown in the plots.

1.5 UPCONVERTER CHARACTERISITCS

The following information as a minimum shall be supplied:

1.5.1 MANUFACTURER AND MODEL

Manufacturer of the upconverter and the model number shall be given to identify the equipment.

1.5.2 OUTPUT FREQUENCY RANGE

A band of RF frequencies in which the upconverter output frequencies can be assigned.

1.5.3 FREQUENCY AGILITY

Carrier frequency assignments are subject to change in order to avoid interference, to provide effective resource management and to protect the health of the satellite. The upconverter should, therefore, be frequency agile and capable of easily changing to any other RF channel.

Provide the information regarding the agility of the upconverter such as frequency step size. In the case of a crystal controlled upconverter, provide the RF center frequency of the upconverter.

1.5.4 FREQUENCY STABILITY

The frequency stability of the upconverter in the short term (ppm/day) and also in the long term (ppm/month) should be specified. Manufacturer' s data may be provided.

1.5.5 INHIBIT REQUIREMENTS

In the event of loss of lock on the phase locked oscillators, transmit-inhibit functions must be activated to ensure station shutdown to protect other customers. With the return of Prime Power after a long outage, the transmission of carriers must also be inhibited until the RF frequency sources used in the system are stabilized.

1.5.6 OUT-OF-BAND SPURIOUS RESPONSE

Anywhere outside of the user' s RF channel bandwidth, the signal power radiated from the antenna as a result of spurious tones, noise, or harmonics shall have an EIRP of at least 50 dB less than the carrier EIRP. This limit does not apply to uplink multicarrier intermodulation noise; for those specifications see Section 1.6.2.

1.6 HIGH POWER AMPLIFIER CHARACTERISTICS

1.6.1 HPA Details

Specify the following details of the HPA:

- Manufacturer and model number
- Type of HPA (e.g. TWT, Klystron, SSPA)
- RF bandwidth
- Maximum output power
- RF output power at 1.0 dB compression point for SSPA
- Short-term and long-term gain stability
- Third-order intercept point
- Provide as an attachment transfer characteristics of the HPA

1.6.2 UPLINK ENERGY SPREADING NOISE OR MULTICARRIER INTERMODULATION NOISE

Outside the user assigned RF channel bandwidth, the noise power density due to intermodulation products from multiple carriers in the user-owned earth station HPAs, or due to energy spreading from large digital carriers, shall not exceed the value set

out below considering the aggregate effect of all transmitting earth stations transmitting in the RF Channel.

The intermodulation noise or energy spreading power density level at the satellite input shall not exceed **–101 dB-Hz** relative to single carrier saturating input power, outside the user' s assigned RF channel.

Users shall demonstrate that the earth station HPA shall have sufficient output back-off to ensure that the requirement is met under fully loaded conditions, and that appropriate uplink filtering is provided where necessary.

1.7 PARTICULARS OF THE ANTENNA SYSTEM

1.7.1 ANTENNA DETAILS

The following information for the antenna subsystem must be provided:

- Manufacturer and model number
- Size (diameter in m)
- Operating frequency bands (GHz)
- Type of feed (Focal feed, Horn feed, gregorian, etc.)
- Number of ports (Tx, Rx)
- Transmit Gain (dBi)
- Transmit 3 dB beamwidth (deg.)
- Receive gain (dBi)
- Receive 3 dB beamwidth (deg.)

1.7.2 ANTENNA POINTING CAPABILITY

Provide the range of the orbital arc in degrees, over which the antenna may be pointed. Since the orbital positions are allocated by international agreement, it may be necessary, because of future reallocation, for MPSC to interchange or relocate the satellites.

1.7.3 ANTENNA POLARIZATION

The Agila 2 satellite uses linear polarization as shown in the Frequency plan. Earth stations accessing the satellites shall use the appropriate polarization. The antenna should be capable of operating with either polarization to permit the service to be assigned to any of the transponders.

Users shall follow an approved procedure in consultation with MPSC in setting the polarization angle of any antenna transmitting to the Agila 2 satellite.

For small earth stations such as VSAT terminals operating in an interactive burst mode, where the RF signal in most cases is not easily accessible from the terminal, alignment of polarization angle through nullification of cross-pol signal may become impractical. For such cases, users' antenna must be equipped with other means such as a calibrated polarization angle scale with a minimum of 1 degree resolution. This would allow to set the polarization angle to a pre-determined value. The polarization angle at each location can be calculated using the coordinates of the station and that of the satellite. The accuracy of this method depends on the accuracy of the earth station coordinates, the algorithm used to calculate the polarization angle, and the resolution of the polarization angle scale of the antenna. Users shall demonstrate by analysis and providing manufacturer' s data, that the transmit polarization angle of their VSAT can be set and maintained within 1.5 degrees of the nominal satellite polarization angle.

1.7.4 ANTENNA CROSS-POLARIZATION ISOLATION

The cross-polarized signal power component transmitted by the users' earth stations shall be a minimum of **30 dB** below the co-polarized component within the 1 dB points of the main beam of the transmitting antenna on any assigned channel.

1.7.5 ANTENNA SIDELOBES

Users should obtain antennas having the best sidelobe performance available, and ensure that their system design can accommodate 2 degrees satellite spacing between satellites.

1.7.5.1 TRANSMIT EARTH STATION ANTENNA SIDELOBE PATTERN

Unless otherwise agreed to by MPSC, the transmit earth station antenna sidelobe gain shall meet the 29-25 log θ pattern as specified in Table 1-1, where θ is the angle in degrees from the axis of the main lobe.

1.7.5.2 RECEIVE EARTH STATION ANTENNA SIDELOBE PATTERN

It is also recommended that the receive earth station antenna sidelobe pattern meet the specifications in Table 1-1. It shall be assumed for coordination purposes that the receive antenna gain pattern meets these specifications.

Table 1 – 1

TRANSMIT SIDELOBE PATTERN OF AN EARTH STATION ANTENNA

The transmit sidelobe gain of any antenna to be employed in transmission from an earth station in the fixed satellite service shall lie below the envelope defined below.

In the plane of the geostationary satellite orbit as it appears at the particular earth station location:

Sidelobe Gain Envelope (dBi)	Angle from the boresight (degrees)
29-25log10(θ)	1.0° ≤ θ ≤ 7.0°
+8	7.0° < θ ≤ 9.2°
32-25log10(θ)	9.2° < θ ≤ 48.0°
-10	48.0° < θ ≤ 180.0°

Where θ is the angle in degrees from the axis of the main lobe, and dBi refers to dB relative to an isotropic radiator. For the purposes of this section, the peak gain of an individual sidelobe may not exceed the envelope defined above for θ between 1° and 7°. For θ greater than 7°, the envelope may be exceeded by 10% of the sidelobes, but not individual sidelobe may exceed the envelope by more than 3 dB.

Antenna manufacturer' s test data and system design calculations shall be submitted to MPSC to demonstrate compliance with these requirements.

1.7.6 TRANSMIT POWER SPECTRAL DENSITY

The power spectral density at the antenna input of the designated transmit earth station shall not exceed **–50 dBW/Hz** (with an antenna having a transmit gain pattern conforming to the 29-25logθ sidelobe envelope).

1.7.7 TRACKING REQUIREMENTS

Stations should be designed with a tracking capability consistent with the overall objectives of the user' s network, bearing in mind the station-keeping tolerances MPSC intends to employ.

Under normal conditions, MPSC intends to maintain the orbital movements of its satellite to ± 0.05° both for North – South and East – West station keeping.

1.7.8 SATELLITE BEACON CHARACTERISTICS

Beacon frequencies for the Agila 2 are **4196 MHz**, Horizontal polarization and **4198 MHz,** Vertical polarization.

1.8 OPERATING REQUIREMENTS

In addition to meeting the earth station technical specifications, it is necessary for the user-owned earth stations to be operated in a manner which ensures that interference to other systems and services does not occur. This will require general operating procedures to be established between the customer' s operations center and MPSC NOC related to service initiation, performance monitoring, and trouble reporting.

1.8.1 NETWORK OPERATION CENTER (NOC)

NOC is the overall control point for the space segment services and, as such, has authority regarding all operational matters pertaining to the security and health of the satellite, as well as the protection of other customer services. In this role, NOC can and will, as required, demand that a user' s uplink equipment be turned down when such equipment is interfering, or is reasonably suspected of creating interference, with the satellite or other customer services.

1.8.2 ACCESS TO THE SATELLITE

All access to the satellite shall be established in accordance with the operating procedures specified in Attachment D. **Any changes in antenna position, or frequency assignment after initial earth station commissioning shall be reported to NOC before implementation.** These changes shall be carried out as per the procedures in Attachment D.

1.8.3 MONITORING AND CONTROL

Customers shall provide means to permit MPSC to verify carrier levels. If necessary, this shall include a method by which carriers may be switched ON and OFF, either remotely or by a site visit by the user.

Should it be determined by MPSC that one or more of the user' s carriers are causing a problem to another service, NOC will contact the User control office and request immediate corrective action on the user' s part.

1.8.4 EARTH STATION OPERATION AND CONTROL

In order to ensure that the earth stations will not interfere with users of other RF channels, certain monitor and control functions are required as detailed in Sec. 1.3.4. Some method must be available to inhibit transmission from the earth station in the event

a failure causes operation at an incorrect frequency or excessive power level.

1.9 FREQUENCY ASSIGNMENTS

Prior to accessing the satellite, the customer is required to submit a list containing the frequencies of all the assigned carriers in the designated RF channel to MPSC. All the subsequent changes in the frequency plan and carrier frequencies must be reported to MPSC immediately.

2.0 QUALIFICATION TESTING

Prior to granting approval for access to MPSC' s RF Channels, a series of qualification tests and measurements may be required on some or all of the earth stations to demonstrate compliance with the specifications set out in this document. Tests, when required, may be performed at a manufacturer' s premises or in the field. Arrangements for the provision of required test equipment shall be the responsibility of the earth station owner and operator.

For some measurements, such as antenna gain patterns, Manufacturer' s data may be used to show compliance with the specifications. All test data should be retained as a benchmark for maintenance and fault sectionalization.

The earth station performance must be maintained after initial approval. MPSC reserves the right to require retesting following evidence of interference from an earth station. Changes in equipment that could result in changes in these performance specifications may require tests to be repeated.

The tests listed in the following sections are required to ensure that mutual interference is controlled.

Note that the acceptance of the results by MPSC does not constitute an endorsement of the overall performance of the earth station design.

2.1 CARRIER SPECTRAL CHARACTERISTICS

The power spectral of the modulated carriers shall be measured in order to confirm the following requirements:

- Transmit Carrier Spectral Density Distribution
- Occupied bandwidth
- Energy dispersal and Scrambling

2.2 RF TRANSMITTER CHARACTERISITCS

Tests shall be performed on the RF transmitter (modulator, upconverter and HPA) to demonstrate the following requirements:

- Out – of – band Spurious Signals
- Transmitter Frequency Stability

- Transmitter EIRP stability
- Uplink Intermodulation and Energy Spreading Noise

2.3 ANTENNA CHARACTERISTICS

- Antenna sidelobes
- Cross-polarization Isolation
  The field adjustment is critical for good cross-polarization performance and data shall be taken during the line-up procedure to be provided by MPSC.

2.4 TRANSMITTER INHIBITS

A transmitter inhibit function shall be demonstrated to operate in the event of any of the following conditions:

- Excess transmit power
- Out of lock conditions on transmitter phase locked oscillators
- Activation of remote control over the earth station

3.0 RF CHANNEL DESIGN PARAMETERS

3.1 USABLE RF CHANNEL BANDWIDTH

Each satellite transponder channel has a well-defined frequency response characteristic. The usable channel bandwidth is about **36 MHz**. For some services, however, the effects of channel-edge multi-path, gain slope and group delay, adjacent channel interference, etc., may restrict the usable bandwidth to a smaller proportion of the transponder channel bandwidth. This is specially true for frequency division multiple access channel services.

3.2 TOTAL USABLE RF CHANNEL POWER

For the case of single carrier in an RF transponder channel, the total usable power can be the maximum output capability of the transponder TWT power amplifier. When a number of carriers share the TWT power amplifier, the usable power will depend on constraining intermodulation products (both in-band and those falling in adjacent channels), cross-talk between carriers, and the effects of carrier suppression. The total usable power, therefore, becomes dependent on the types of services which share the power.

The Agila 2 TWTA transfer characteristics are such that when the channel is used to carry FDMA services, a **8 dB** total input power back-off from saturation, corresponding to a **4 dB** total output power back-off from saturation, provides an approximately "optimum" operating point for a typical multicarrier service.

For single carrier applications, **4.5 dB** input power back-off from saturation, corresponding to a **1 dB** output power back-off from saturation shall be adopted.

The operating values can be used for design purposes to assess the percentage utilization of individual FDMA carriers operating in an RF channel.

The above operating point is an initial selection by MPSC that appears to be optimum. This value could be modified by mutual agreement when the majority of the traffic in the transponder are defined and if a new value were found to be more favorable to the users of the RF channel.

3.3 MULTICARRIER INTERMODULATION NOISE

Based on a homogeneous RF Transponder Channel carrying FDMA traffic and operating at **4 dB** output back-off from the single carrier saturated output power, the design value for the intermodulation noise power density shall be **–94.5 dB-Hz** relative to the single carrier saturated output power of the RF Transponder Channel.

If other multicarrier operating point of the Transponder RF channel is found mutually favorable to the users, MPSC will through simulation and using the RF Transponder channel transfer characteristics determine the corresponding multicarrier intermodulation noise power density.

3.4 CARRIER POWER ALLOCATION

Users shall be responsible for defining their required carrier EIRP levels based on a link analysis. This analysis shall make use of the appropriate satellite characteristics and shall use the full load design value for satellite multicarrier intermodulation noise. It should include margins for satellite degradations, various sources of interference, and propagation effects. The carrier EIRP level from satellite will be used to ensure the users' total power utilization will not exceed beyond an RF channel as described in Section 3.6.

Users should design their system noting the satellite parameters described in the "Agila 2 C-Band Performance Parameters".

3.5 INTERFERENCE CHARACTERISTICS FOR LINK DESIGNS

The following sections provide current best estimates of the level of interference that may occur from a variety of sources, both within and

external to the satellite. The values are based on current channel allocation plans and are subject to revision if channel or satellite assignment changes are required.

Interference from adjacent satellite systems is, in most cases, beyond the control of MPSC and depends on a variety of factors, including the traffic assigned to the specific RF Channels. Assignments on the RF channels adjacent to and cross-polarized to channels designated for FDMA services will be made, to the extent possible, so that mutual interference is minimized. However, traffic reassignments may be made at future dates, due to satellite channel degradations or for other reasons.

Consequently, the interference levels are meant as a guide and are **not guaranteed.**

3.5.1 ADJACENT SATELLITE INTERFERENCE

This factor depends on the types of traffic that may be carried on adjacent satellites. The orbital positions may be adjusted from time to time through international agreement. Since the characteristics of adjacent satellites and their traffic may change in the future, it is difficult to accurately predict adjacent satellite interference levels.

a.) UPLINK: the uplink interference power density at the satellite input due to adjacent satellite systems is approximately **–103 dB-Hz** relative to the single carrier saturating input power.

b.) DOWNLINK: The combined effect of the interference from adjacent satellites can be expressed as downlink EIRP interference power density at the satellite output which depends on the receiving earth station antenna size and sidelobe gain pattern. Assuming the antenna sidelobe gain, as a function of off-axis angle, θ, is given by 29-25 log (θ), the equivalent EIRP power density allocation is approximately **–87 dB-Hz ???**

3.5.2 CROSS-POLARIZATION INTERFERENCE

This could arise due to either FDMA traffic or TV carriers in the cross-polarized RF channels. In the case of TV interference, several MHz of bandwidth may have to be avoided. The recommended allocation for the cross-polarized interference noise are as follows:

a.) UPLINK: The uplink cross-polarized interference power density at the satellite input is approximately **–110 dB-Hz** relative to the single carrier saturating input power.

b.) DOWNLINK: The recommended allocation for the downlink cross-polarized interference noise power density at the satellite output is approximately **-110 dB-Hz** relative to the single carrier saturating output power.

3.6 CALCULATION OF PERCENTAGE UTILIZATION

The power utilization is computed by taking the sum of the carrier powers (total required output back-off) as a percentage of the RF Channel total usable carrier power.

The bandwidth utilization is computed by taking the sum of the carrier allocated bandwidth as a percentage of the usable bandwidth of the RF channel.

Agila Ⅱ衛星の回線設計例

番号	Uplink	Downlink	衛星	周波数帯	ページ数
①	Manila	Cebu	Agila 2	Ku	3
②	Cebu	Manila	Agila 2	Ku	4
③	Manila	Zamboanga	Agila 2	Ku	3
④	Zamboanga	Manila	Agila 2	Ku	4
⑤	Manila	Palawan	Agila 2	Ku	3
⑥	Palawan	Manila	Agila 2	Ku	4
⑦	Manila	Cebu	Agila 2	C	3
⑧	Cebu	Manila	Agila 2	C	4
⑨	Manila	Zamboanga	Agila 2	C	3
⑩	Zamboanga	Manila	Agila 2	C	4

資料提供　:MABUHAY Philippine Satellite Corporation (MPSC)
担当者　:Redie A. Ona氏
計算日　:2005年3月8日(火)

Digital Link Budget
Produced using Satmaster Pro
Tuesday, March 08, 2005

Service Name	LB038 - Sample link 1		
Coverage	Philippines		
Uplink earth station	Manila		
Downlink earth station	Cebu		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	14.60N	10.40N	degrees
Site longitude	121E	123.80E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Horizontal	Vertical	-
Rain model	ITU (110.6)	ITU (106.1)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	2.4	1.8	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	4	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W

Satellite Input Parameters	**Value**	**Units**
Satellite longitude	146.00E	degrees
Transponder type	TWTA	-
Receive G/T	7	dB/K
Saturation flux density	-92	dBW/m2
Satellite attenuator pad	0	dB
Satellite ALC	0	dB
EIRP (saturation)	55	dBW
Transponder bandwidth	36	MHz
Input back off total	8	dB
Output back off total	4	dB
Intermodulation interference	21	dB
Number of transponder carriers	AUTO	-

Carrier/Link Input Parameters	**Value**	**Units**
Modulation	4-PSK	-
Required bit error rate performance	10^-5	-
Required Eb/No without FEC coding	9.59	dB
Required Eb/No with FEC coding	5.9	dB
Information rate	0.07	Mbps
Overhead	0	%
FEC code rate	0.875	-
Spreading gain	0	dB
Reed Solomon code	1	-
(1 + Roll off factor)	1.2	-
Carrier spacing factor	1.4	-
Bandwidth allocation step size	0.001	MHz

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System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	44.6			dB/m2
Uplink C/No	99			dB.Hz
Downlink C/No	102.37			dB.Hz
Total C/No	97.36			dB.Hz
Uplink EIRP for saturation	71.11			dBW
General Calculations	Up	Down		Units
Elevation	56.5	61.46		degrees
True azimuth	118.39	113.86		degrees
Compass bearing	119.63	114.3		degrees
Path distance to satellite	36696.4	36449.21		km
Propagation time delay	0.122406	0.121581		seconds
Antenna efficiency	65	65		%
Antenna gain	49.28	45.61		dBi
Availability (average year)	99.9	99.9		%
Link downtime (average year)	8.766	8.766		hours
Availability (worst month)	99.615	99.615		%
Link downtime (worst month)	2.809	2.809		hours
Spectral power density	-60.28	-23.1		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	35.02	35.02	35.02	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	40.62	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.88	206.88	206.88	dB
Atmospheric absorption	0.15	0.15	0.15	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.52	0.52	0.52	dB
Total path loss (excluding rain)	207.4	207.4	207.4	dB
Rain attenuation	0	8.54	0	dB
Uplink power control	0	4	0	dB
Uncompensated rain fade	0	4.54	0	dB
C/No (thermal)	62.92	58.38	62.92	dB.Hz
C/N (thermal)	16.11	11.57	16.11	dB
C/ACI	25	20.46	25	dB
C/ASI	25	20.46	25	dB
C/XPI	30	25.46	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	8.79	13.33	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	55	55	55	dBW
Transponder output back-off (total)	4	4	4	dB
Output back-off per carrier	32.08	36.62	32.08	dB
Satellite EIRP per carrier	22.92	18.38	22.92	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.65	205.65	205.65	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.34	0.34	0.34	dB
Atmospheric losses total	0.45	0.45	0.45	dB
Total path loss (excluding rain)	206.1	206.1	206.1	dB
Rain attenuation	0	0	6.55	dB
Noise increase due to precipitation	0	0	4.77	dB
Downlink degradation (DND)	0	0	11.32	dB
Total system noise	98.72	98.72	295.81	K
Figure of merit (G/T)	24.86	24.86	20.1	dB/K
C/No (thermal)	70.29	65.75	58.97	dB.Hz
C/N (thermal)	23.47	18.93	12.15	dB
C/ACI	25	20.46	25	dB

C/ASI	25	20.46	25	dB
C/XPI	30	25.46	30	dB
C/IM	21	16.46	21	dB
Eb/(No+Io)	15.4	10.86	9.54	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.19	57.65	57.5	dB.Hz
C/N (thermal)	15.38	10.84	10.69	dB
C/ACI	21.99	17.45	21.99	dB
C/ASI	21.99	17.45	21.99	dB
C/XPI	26.99	22.45	26.99	dB
C/IM	20.99	16.46	20.99	dB
C/(No+Io)	59.69	55.15	56.48	dB.Hz
C/(N+I)	12.87	8.33	9.67	dB
Eb/(No+Io)	11.23	6.7	8.03	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.23	6.7	8.03	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.33	0.8	2.13	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	35.02	dBW
Antenna gain	49.28	dBi
Antenna feed flange power per carrier	-14.26	dBW
Uplink power control	4	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-5.2578	dBW
Required HPA power capability	0.298	W
Spectral power density	-60.28	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz
Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	22.92	dBW
Percentage transponder power used	0.16	%

Max transponder carriers limited by:-	Bandwidth	[642.86]

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Digital Link Budget
Produced using Satmaster Pro
Tuesday, March 08, 2005

Service Name	LB038 - Sample link 1		
Coverage	Philippines		
Uplink earth station	Cebu		
Downlink earth station	Manila		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	10.40N	14.60N	degrees
Site longitude	123.80E	121E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Vertical	Horizontal	-
Rain model	ITU (106.1)	ITU (110.6)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	1.8	2.4	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	4	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	**Value**		**Units**
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	6.5		dB/K
Saturation flux density	-91.5		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	56.5		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	**Value**		**Units**
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB

Information rate	0.07			Mbps
Overhead	0			%
FEC code rate	0.875			-
Spreading gain	0			dB
Reed Solomon code	1			-
(1 + Roll off factor)	1.2			-
Carrier spacing factor	1.4			-
Bandwidth allocation step size	0.001			MHz
System margin	0.001			dB

Calculations at Saturation	Value	Units
Gain 1m^2	44.6	dB/m2
Uplink C/No	99	dB.Hz
Downlink C/No	106.29	dB.Hz
Total C/No	98.26	dB.Hz
Uplink EIRP for saturation	71.53	dBW

General Calculations	Up	Down	Units
Elevation	61.46	56.5	degrees
True azimuth	113.86	118.39	degrees
Compass bearing	114.3	119.63	degrees
Path distance to satellite	36449.21	36696.4	km
Propagation time delay	0.121581	0.122406	seconds
Antenna efficiency	65	65	%
Antenna gain	46.78	48.11	dBi
Availability (average year)	99.9	99.9	%
Link downtime (average year)	8.766	8.766	hours
Availability (worst month)	99.615	99.615	%
Link downtime (worst month)	2.809	2.809	hours
Spectral power density	-57.35	-21.6	dBW/Hz

Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	35.45	35.45	35.45	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	41.11	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.82	206.82	206.82	dB
Atmospheric absorption	0.14	0.14	0.14	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.51	0.51	0.51	dB
Total path loss (excluding rain)	207.33	207.33	207.33	dB
Rain attenuation	0	9.03	0	dB
Uplink power control	0	4	0	dB
Uncompensated rain fade	0	5.03	0	dB
C/No (thermal)	62.92	57.89	62.92	dB.Hz
C/N (thermal)	16.11	11.08	16.11	dB
C/ACI	25	19.97	25	dB
C/ASI	25	19.97	25	dB
C/XPI	30	24.97	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	8.31	13.33	dB

Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	56.5	56.5	56.5	dBW
Transponder output back-off (total)	4	4	4	dB

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Output back-off per carrier	32.08	37.11	32.08	dB
Satellite EIRP per carrier	24.42	19.39	24.42	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.71	205.71	205.71	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.35	0.35	0.35	dB
Atmospheric losses total	0.46	0.46	0.46	dB
Total path loss (excluding rain)	206.17	206.17	206.17	dB
Rain attenuation	0	0	6.23	dB
Noise increase due to precipitation	0	0	4.7	dB
Downlink degradation (DND)	0	0	10.93	dB
Total system noise	98.72	98.72	291.45	K
Figure of merit (G/T)	27.36	27.36	22.66	dB/K
C/No (thermal)	74.21	69.19	63.28	dB.Hz
C/N (thermal)	27.4	22.37	16.47	dB
C/ACI	25	19.97	25	dB
C/ASI	25	19.97	25	dB
C/XPI	30	24.97	30	dB
C/IM	21	15.97	21	dB
Eb/(No+Io)	16.03	11.01	12.59	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.61	57.58	60.09	dB.Hz
C/N (thermal)	15.8	10.77	13.28	dB
C/ACI	21.99	16.96	21.99	dB
C/ASI	21.99	16.96	21.99	dB
C/XPI	26.99	21.96	26.99	dB
C/IM	20.99	15.97	20.99	dB
C/(No+Io)	59.92	54.89	58.38	dB.Hz
C/(N+I)	13.1	8.08	11.57	dB
Eb/(No+Io)	11.47	6.44	9.93	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.47	6.44	9.93	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.57	0.54	4.03	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	35.45	dBW
Antenna gain	46.78	dBi
Antenna feed flange power per carrier	-11.33	dBW
Uplink power control	4	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-2.3314	dBW
Required HPA power capability	0.5846	W
Spectral power density	-57.35	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz

Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	24.42	dBW
Percentage transponder power used	0.16	%
Max transponder carriers limited by:-	Bandwidth	[642.86]

③ -1

Digital Link Budget
Produced using Satmaster Pro
Tuesday, March 08, 2005

Service Name	LB039 - Sample link 2		
Coverage	Philippines		
Uplink earth station	Manila		
Downlink earth station	Zamboanga		
Satellite name	Agila 2		
Link Input Parameters	Up	Down	Units
Site latitude	14.60N	7N	degrees
Site longitude	121E	122E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Horizontal	Vertical	-
Rain model	ITU (110.6)	ITU (122.7)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	2.4	1.8	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	6	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	Value		Units
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	7		dB/K
Saturation flux density	-92		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	54.5		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	Value		Units
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB
Information rate	0.07		Mbps
Overhead	0		%
FEC code rate	0.875		-
Spreading gain	0		dB
Reed Solomon code	1		-
(1 + Roll off factor)	1.2		-
Carrier spacing factor	1.4		-
Bandwidth allocation step size	0.001		MHz

③-2

System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	44.6			dB/m2
Uplink C/No	99			dB.Hz
Downlink C/No	101.86			dB.Hz
Total C/No	97.19			dB.Hz
Uplink EIRP for saturation	71.11			dBW
General Calculations	Up	Down		Units
Elevation	56.5	60.84		degrees
True azimuth	118.39	105.31		degrees
Compass bearing	119.63	105.16		degrees
Path distance to satellite	36696.4	36478.15		km
Propagation time delay	0.122406	0.121678		seconds
Antenna efficiency	65	65		%
Antenna gain	49.28	45.61		dBi
Availability (average year)	99.9	99.9		%
Link downtime (average year)	8.766	8.766		hours
Availability (worst month)	99.615	99.615		%
Link downtime (worst month)	2.809	2.809		hours
Spectral power density	-60.28	-23.6		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	35.02	35.02	35.02	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	38.62	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.88	206.88	206.88	dB
Atmospheric absorption	0.15	0.15	0.15	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.52	0.52	0.52	dB
Total path loss (excluding rain)	207.4	207.4	207.4	dB
Rain attenuation	0	8.54	0	dB
Uplink power control	0	6	0	dB
Uncompensated rain fade	0	2.54	0	dB
C/No (thermal)	62.92	60.38	62.92	dB.Hz
C/N (thermal)	16.11	13.57	16.11	dB
C/ACI	25	22.46	25	dB
C/ASI	25	22.46	25	dB
C/XPI	30	27.46	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	10.79	13.33	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	54.5	54.5	54.5	dBW
Transponder output back-off (total)	4	4	4	dB
Output back-off per carrier	32.08	34.62	32.08	dB
Satellite EIRP per carrier	22.42	19.88	22.42	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.66	205.66	205.66	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.34	0.34	0.34	dB
Atmospheric losses total	0.45	0.45	0.45	dB
Total path loss (excluding rain)	206.11	206.11	206.11	dB
Rain attenuation	0	0	7.64	dB
Noise increase due to precipitation	0	0	4.94	dB
Downlink degradation (DND)	0	0	12.59	dB
Total system noise	98.72	98.72	308.22	K
Figure of merit (G/T)	24.86	24.86	19.92	dB/K
C/No (thermal)	69.78	67.24	57.19	dB.Hz
C/N (thermal)	22.96	20.42	10.38	dB
C/ACI	25	22.46	25	dB

C/ASI	25	22.46	25	dB
C/XPI	30	27.46	30	dB
C/IM	21	18.46	21	dB
Eb/(No+Io)	15.28	12.74	8.07	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.11	59.57	56.16	dB.Hz
C/N (thermal)	15.29	12.75	9.35	dB
C/ACI	21.99	19.45	21.99	dB
C/ASI	21.99	19.45	21.99	dB
C/XPI	26.99	24.45	26.99	dB
C/IM	20.99	18.46	20.99	dB
C/(No+Io)	59.64	57.1	55.39	dB.Hz
C/(N+I)	12.83	10.29	8.58	dB
Eb/(No+Io)	11.19	8.65	6.94	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.19	8.65	6.94	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.29	2.75	1.04	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	35.02	dBW
Antenna gain	49.28	dBi
Antenna feed flange power per carrier	-14.26	dBW
Uplink power control	6	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-3.2578	dBW
Required HPA power capability	0.4723	W
Spectral power density	-60.28	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz
Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	22.42	dBW
Percentage transponder power used	0.16	%

Max transponder carriers limited by:-	Bandwidth	[642.86]

④-1

Digital Link Budget
Produced using Satmaster Pro
Tuesday, March 08, 2005

Service Name	LB039 - Sample link 2		
Coverage	Philippines		
Uplink earth station	Zamboanga		
Downlink earth station	Manila		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	7N	14.60N	degrees
Site longitude	122E	121E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Vertical	Horizontal	-
Rain model	ITU (122.7)	ITU (110.6)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	1.8	2.4	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	6	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W

Satellite Input Parameters	**Value**	**Units**
Satellite longitude	146.00E	degrees
Transponder type	TWTA	-
Receive G/T	4.5	dB/K
Saturation flux density	-89.5	dBW/m2
Satellite attenuator pad	0	dB
Satellite ALC	0	dB
EIRP (saturation)	56.5	dBW
Transponder bandwidth	36	MHz
Input back off total	8	dB
Output back off total	4	dB
Intermodulation interference	21	dB
Number of transponder carriers	AUTO	-

Carrier/Link Input Parameters	**Value**	**Units**
Modulation	4-PSK	-
Required bit error rate performance	10^-5	-
Required Eb/No without FEC coding	9.59	dB
Required Eb/No with FEC coding	5.9	dB

Information rate	0.07			Mbps
Overhead	0			%
FEC code rate	0.875			-
Spreading gain	0			dB
Reed Solomon code	1			-
(1 + Roll off factor)	1.2			-
Carrier spacing factor	1.4			-
Bandwidth allocation step size	0.001			MHz
System margin	0.001			dB

Calculations at Saturation	Value	Units
Gain 1m^2	44.6	dB/m2
Uplink C/No	99	dB.Hz
Downlink C/No	106.29	dB.Hz
Total C/No	98.26	dB.Hz
Uplink EIRP for saturation	73.54	dBW

General Calculations	Up	Down	Units
Elevation	60.84	56.5	degrees
True azimuth	105.31	118.39	degrees
Compass bearing	105.16	119.63	degrees
Path distance to satellite	36478.15	36696.4	km
Propagation time delay	0.121678	0.122406	seconds
Antenna efficiency	65	65	%
Antenna gain	46.78	48.11	dBi
Availability (average year)	99.9	99.9	%
Link downtime (average year)	8.766	8.766	hours
Availability (worst month)	99.615	99.615	%
Link downtime (worst month)	2.809	2.809	hours
Spectral power density	-55.34	-21.6	dBW/Hz

Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	37.46	37.46	37.46	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	40.58	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.83	206.83	206.83	dB
Atmospheric absorption	0.14	0.14	0.14	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.51	0.51	0.51	dB
Total path loss (excluding rain)	207.34	207.34	207.34	dB
Rain attenuation	0	10.49	0	dB
Uplink power control	0	6	0	dB
Uncompensated rain fade	0	4.49	0	dB
C/No (thermal)	62.92	58.43	62.92	dB.Hz
C/N (thermal)	16.11	11.61	16.11	dB
C/ACI	25	20.51	25	dB
C/ASI	25	20.51	25	dB
C/XPI	30	25.51	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	8.84	13.33	dB

Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	56.5	56.5	56.5	dBW
Transponder output back-off (total)	4	4	4	dB

Output back-off per carrier	32.08	36.58	32.08	dB
Satellite EIRP per carrier	24.42	19.92	24.42	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.71	205.71	205.71	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.35	0.35	0.35	dB
Atmospheric losses total	0.46	0.46	0.46	dB
Total path loss (excluding rain)	206.17	206.17	206.17	dB
Rain attenuation	0	0	6.23	dB
Noise increase due to precipitation	0	0	4.7	dB
Downlink degradation (DND)	0	0	10.93	dB
Total system noise	98.72	98.72	291.45	K
Figure of merit (G/T)	27.36	27.36	22.66	dB/K
C/No (thermal)	74.21	69.72	63.28	dB.Hz
C/N (thermal)	27.4	22.91	16.47	dB
C/ACI	25	20.51	25	dB
C/ASI	25	20.51	25	dB
C/XPI	30	25.51	30	dB
C/IM	21	16.51	21	dB
Eb/(No+Io)	16.03	11.54	12.59	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.61	58.11	60.09	dB.Hz
C/N (thermal)	15.8	11.3	13.28	dB
C/ACI	21.99	17.5	21.99	dB
C/ASI	21.99	17.5	21.99	dB
C/XPI	26.99	22.5	26.99	dB
C/IM	20.99	16.5	20.99	dB
C/(No+Io)	59.92	55.42	58.38	dB.Hz
C/(N+I)	13.1	8.61	11.57	dB
Eb/(No+Io)	11.47	6.97	9.93	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.47	6.97	9.93	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.57	1.07	4.03	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	37.46	dBW
Antenna gain	46.78	dBI
Antenna feed flange power per carrier	-9.32	dBW
Uplink power control	6	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	1.6791	dBW
Required HPA power capability	1.472	W
Spectral power density	-55.34	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz

Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	24.42	dBW
Percentage transponder power used	0.16	%
Max transponder carriers limited by:-	Bandwidth	[642.86]

⑤-1

Digital Link Budget
Produced using Satmaster Pro
Tuesday, March 08, 2005

Service Name	LB042 - Sample link 5		
Coverage	Philippines		
Uplink earth station	Manila		
Downlink earth station	Palawan		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	14.60N	9.80N	degrees
Site longitude	121E	118.70E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Horizontal	Vertical	-
Rain model	ITU (110.6)	ITU (109.5)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	2.4	1.8	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	6	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	**Value**		**Units**
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	7		dB/K
Saturation flux density	-92		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	56		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	**Value**		**Units**
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB
Information rate	0.07		Mbps
Overhead	0		%
FEC code rate	0.875		-
Spreading gain	0		dB
Reed Solomon code	1		-
(1 + Roll off factor)	1.2		-
Carrier spacing factor	1.4		-
Bandwidth allocation step size	0.001		MHz

System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	44.6			dB/m2
Uplink C/No	99			dB.Hz
Downlink C/No	103.28			dB.Hz
Total C/No	97.62			dB.Hz
Uplink EIRP for saturation	71.11			dBW
General Calculations	Up	Down		Units
Elevation	56.5	56.31		degrees
True azimuth	118.39	108.25		degrees
Compass bearing	119.63	108.56		degrees
Path distance to satellite	36696.4	36706.59		km
Propagation time delay	0.122406	0.12244		seconds
Antenna efficiency	65	65		%
Antenna gain	49.28	45.61		dBi
Availability (average year)	99.9	99.9		%
Link downtime (average year)	8.766	8.766		hours
Availability (worst month)	99.615	99.615		%
Link downtime (worst month)	2.809	2.809		hours
Spectral power density	-60.28	-22.1		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	35.02	35.02	35.02	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	38.62	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.88	206.88	206.88	dB
Atmospheric absorption	0.15	0.15	0.15	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.52	0.52	0.52	dB
Total path loss (excluding rain)	207.4	207.4	207.4	dB
Rain attenuation	0	8.54	0	dB
Uplink power control	0	6	0	dB
Uncompensated rain fade	0	2.54	0	dB
C/No (thermal)	62.92	60.38	62.92	dB.Hz
C/N (thermal)	16.11	13.57	16.11	dB
C/ACI	25	22.46	25	dB
C/ASI	25	22.46	25	dB
C/XPI	30	27.46	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	10.79	13.33	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	56	56	56	dBW
Transponder output back-off (total)	4	4	4	dB
Output back-off per carrier	32.08	34.62	32.08	dB
Satellite EIRP per carrier	23.92	21.38	23.92	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.71	205.71	205.71	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.37	0.37	0.37	dB
Atmospheric losses total	0.48	0.48	0.48	dB
Total path loss (excluding rain)	206.19	206.19	206.19	dB
Rain attenuation	0	0	6.84	dB
Noise increase due to precipitation	0	0	4.82	dB
Downlink degradation (DND)	0	0	11.65	dB
Total system noise	98.72	98.72	299.34	K
Figure of merit (G/T)	24.86	24.86	20.05	dB/K
C/No (thermal)	71.19	68.66	59.54	dB.Hz
C/N (thermal)	24.38	21.84	12.73	dB
C/ACI	25	22.46	25	dB

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C/ASI	25	22.46	25	dB
C/XPI	30	27.46	30	dB
C/IM	21	18.46	21	dB
Eb/(No+Io)	15.59	13.05	10	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.32	59.78	57.9	dB.Hz
C/N (thermal)	15.51	12.97	11.09	dB
C/ACI	21.99	19.45	21.99	dB
C/ASI	21.99	19.45	21.99	dB
C/XPI	26.99	24.45	26.99	dB
C/IM	20.99	18.46	20.99	dB
C/(No+Io)	59.76	57.22	56.79	dB.Hz
C/(N+I)	12.95	10.41	9.98	dB
Eb/(No+Io)	11.31	8.77	8.34	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.31	8.77	8.34	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.41	2.87	2.44	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	35.02	dBW
Antenna gain	49.28	dBi
Antenna feed flange power per carrier	-14.26	dBW
Uplink power control	6	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-3.2578	dBW
Required HPA power capability	0.4723	W
Spectral power density	-60.28	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz
Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	23.92	dBW
Percentage transponder power used	0.16	%

Max transponder carriers limited by:-	Bandwidth	[642.86]

Digital Link Budget
Produced using Satmaster Pro
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Service Name	LB042 - Sample link 5		
Coverage	Philippines		
Uplink earth station	Palawan		
Downlink earth station	Manila		
Satellite name	Agila 2		
Link Input Parameters	Up	Down	Units
Site latitude	9.80N	14.60N	degrees
Site longitude	118.70E	121E	degrees
Site altitude	0.5	0.5	km
Frequency	14.359	12.541	GHz
Polarization	Vertical	Horizontal	-
Rain model	ITU (109.5)	ITU (110.6)	(mm/h or zone)
Availability (average year)	99.9	99.9	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	1.8	2.4	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	6	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	Value		Units
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	8.5		dB/K
Saturation flux density	-93.5		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	56.5		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	Value		Units
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB

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Information rate	0.07			Mbps
Overhead	0			%
FEC code rate	0.875			-
Spreading gain	0			dB
Reed Solomon code	1			-
(1 + Roll off factor)	1.2			-
Carrier spacing factor	1.4			-
Bandwidth allocation step size	0.001			MHz
System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	44.6			dB/m2
Uplink C/No	99			dB.Hz
Downlink C/No	106.29			dB.Hz
Total C/No	98.26			dB.Hz
Uplink EIRP for saturation	89.63			dBW
General Calculations	Up	Down		Units
Elevation	56.31	56.5		degrees
True azimuth	108.25	118.39		degrees
Compass bearing	108.56	119.63		degrees
Path distance to satellite	36706.59	36696.4		km
Propagation time delay	0.12244	0.122406		seconds
Antenna efficiency	65	65		%
Antenna gain	46.78	48.11		dBi
Availability (average year)	99.9	99.9		%
Link downtime (average year)	8.766	8.766		hours
Availability (worst month)	99.615	99.615		%
Link downtime (worst month)	2.809	2.809		hours
Spectral power density	-59.26	-21.6		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	33.55	33.55	33.55	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	39.46	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	206.89	206.89	206.89	dB
Atmospheric absorption	0.15	0.15	0.15	dB
Tropospheric scintillation fading	0.39	0.39	0.39	dB
Atmospheric losses total	0.54	0.54	0.54	dB
Total path loss (excluding rain)	207.43	207.43	207.43	dB
Rain attenuation	0	9.37	0	dB
Uplink power control	0	6	0	dB
Uncompensated rain fade	0	3.37	0	dB
C/No (thermal)	62.92	59.55	62.92	dB.Hz
C/N (thermal)	16.11	12.73	16.11	dB
C/ACI	25	21.63	25	dB
C/ASI	25	21.63	25	dB
C/XPI	30	26.63	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	13.33	9.96	13.33	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	56.5	56.5	56.5	dBW
Transponder output back-off (total)	4	4	4	dB

Output back-off per carrier	32.08	35.46	32.08	dB
Satellite EIRP per carrier	24.42	21.04	24.42	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	205.71	205.71	205.71	dB
Atmospheric absorption	0.11	0.11	0.11	dB
Tropospheric scintillation fading	0.35	0.35	0.35	dB
Atmospheric losses total	0.46	0.46	0.46	dB
Total path loss (excluding rain)	206.17	206.17	206.17	dB
Rain attenuation	0	0	6.23	dB
Noise increase due to precipitation	0	0	4.7	dB
Downlink degradation (DND)	0	0	10.93	dB
Total system noise	98.72	98.72	291.45	K
Figure of merit (G/T)	27.36	27.36	22.66	dB/K
C/No (thermal)	74.21	70.84	63.28	dB.Hz
C/N (thermal)	27.4	24.03	16.47	dB
C/ACI	25	21.63	25	dB
C/ASI	25	21.63	25	dB
C/XPI	30	26.63	30	dB
C/IM	21	17.63	21	dB
Eb/(No+Io)	16.03	12.66	12.59	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	62.61	59.23	60.09	dB.Hz
C/N (thermal)	15.8	12.42	13.28	dB
C/ACI	21.99	18.62	21.99	dB
C/ASI	21.99	18.62	21.99	dB
C/XPI	26.99	23.62	26.99	dB
C/IM	20.99	17.62	20.99	dB
C/(No+Io)	59.92	56.54	58.38	dB.Hz
C/(N+I)	13.1	9.73	11.57	dB
Eb/(No+Io)	11.47	8.09	9.93	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	11.47	8.09	9.93	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5.57	2.19	4.03	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	33.55	dBW
Antenna gain	46.78	dBi
Antenna feed flange power per carrier	-13.24	dBW
Uplink power control	6	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-2.2363	dBW
Required HPA power capability	0.5975	W
Spectral power density	-59.26	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.8	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz

Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	24.42	dBW
Percentage transponder power used	0.16	%
Max transponder carriers limited by:-	Bandwidth	[642.86]

Digital Link Budget
Produced using Satmaster Pro
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Service Name	LB041 - Sample link 4		
Coverage	Philippines		
Uplink earth station	Manila		
Downlink earth station	Cebu		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	14.60N	10.4N	degrees
Site longitude	121E	123.80E	degrees
Site altitude	0.5	0.5	km
Frequency	6.125	3.9	GHz
Polarization	Horizontal	Vertical	-
Rain model	ITU (110.6)	ITU (106.1)	(mm/h or zone)
Availability (average year)	99.98	99.98	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	3.7	2.4	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	0	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	**Value**		**Units**
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	0.54		dB/K
Saturation flux density	-88.54		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	40.14		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	**Value**		**Units**
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB
Information rate	0.07		Mbps
Overhead	0		%
FEC code rate	0.875		-
Spreading gain	0		dB
Reed Solomon code	1		-
(1 + Roll off factor)	1.2		-
Carrier spacing factor	1.4		-
Bandwidth allocation step size	0.001		MHz

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System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	37.2			dB/m2
Uplink C/No	103.4			dB.Hz
Downlink C/No	90.17			dB.Hz
Total C/No	89.97			dB.Hz
Uplink EIRP for saturation	74.4			dBW
General Calculations	Up	Down		Units
Elevation	56.5	61.46		degrees
True azimuth	118.39	113.86		degrees
Compass bearing	119.63	114.3		degrees
Path distance to satellite	36696.4	36449.21		km
Propagation time delay	0.122406	0.121581		seconds
Antenna efficiency	65	65		%
Antenna gain	45.64	37.96		dBi
Availability (average year)	99.98	99.98		%
Link downtime (average year)	1.753	1.753		hours
Availability (worst month)	99.905	99.905		%
Link downtime (worst month)	0.693	0.693		hours
Spectral power density	-53.35	-37.96		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	38.32	38.32	38.32	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	37.53	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	199.48	199.48	199.48	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.3	0.3	0.3	dB
Atmospheric losses total	0.35	0.35	0.35	dB
Total path loss (excluding rain)	199.84	199.84	199.84	dB
Rain attenuation	0	1.44	0	dB
Uplink power control	0	0	0	dB
Uncompensated rain fade	0	1.44	0	dB
C/No (thermal)	67.32	65.88	67.32	dB.Hz
C/N (thermal)	20.51	19.06	20.51	dB
C/ACI	25	23.56	25	dB
C/ASI	25	23.56	25	dB
C/XPI	30	28.56	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	16.26	14.81	16.26	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	40.14	40.14	40.14	dBW
Transponder output back-off (total)	4	4	4	dB
Output back-off per carrier	32.08	33.53	32.08	dB
Satellite EIRP per carrier	8.06	6.61	8.06	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	195.5	195.5	195.5	dB
Atmospheric absorption	0.04	0.04	0.04	dB
Tropospheric scintillation fading	0.24	0.24	0.24	dB
Atmospheric losses total	0.28	0.28	0.28	dB
Total path loss (excluding rain)	195.78	195.78	195.78	dB
Rain attenuation	0	0	0.2	dB
Noise increase due to precipitation	0	0	0.48	dB
Downlink degradation (DND)	0	0	0.68	dB
Total system noise	98.72	98.72	110.23	K
Figure of merit (G/T)	17.22	17.22	16.74	dB/K
C/No (thermal)	58.09	56.65	57.41	dB.Hz
C/N (thermal)	11.28	9.84	10.6	dB
C/ACI	25	23.56	25	dB

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C/ASI	25	23.56	25	dB
C/XPI	30	28.56	30	dB
C/IM	21	19.56	21	dB
Eb/(No+Io)	8.83	7.39	8.26	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	57.6	56.16	56.99	dB.Hz
C/N (thermal)	10.79	9.35	10.18	dB
C/ACI	21.99	20.55	21.99	dB
C/ASI	21.99	20.55	21.99	dB
C/XPI	26.99	25.55	26.99	dB
C/IM	20.99	19.55	20.99	dB
C/(No+Io)	56.56	55.12	56.07	dB.Hz
C/(N+I)	9.75	8.3	9.26	dB
Eb/(No+Io)	8.11	6.67	7.62	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	8.11	6.66	7.62	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	2.21	0.76	1.72	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	38.32	dBW
Antenna gain	45.64	dBi
Antenna feed flange power per carrier	-7.33	dBW
Uplink power control	0	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-2.3253	dBW
Required HPA power capability	0.5854	W
Spectral power density	-53.35	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.96	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz
Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	8.06	dBW
Percentage transponder power used	0.16	%
Max transponder carriers limited by:-	Bandwidth	[642.86]

Digital Link Budget
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Service Name	LB041 - Sample link 4		
Coverage	Philippines		
Uplink earth station	Cebu		
Downlink earth station	Manila		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	10.4N	14.60N	degrees
Site longitude	123.80E	121E	degrees
Site altitude	0.5	0.5	km
Frequency	6.125	3.9	GHz
Polarization	Vertical	Horizontal	-
Rain model	ITU (106.1)	ITU (110.6)	(mm/h or zone)
Availability (average year)	99.98	99.98	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	2.4	3.7	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	0	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W
Satellite Input Parameters	**Value**		**Units**
Satellite longitude	146.00E		degrees
Transponder type	TWTA		-
Receive G/T	0.94		dB/K
Saturation flux density	-88.94		dBW/m2
Satellite attenuator pad	0		dB
Satellite ALC	0		dB
EIRP (saturation)	41.31		dBW
Transponder bandwidth	36		MHz
Input back off total	8		dB
Output back off total	4		dB
Intermodulation interference	21		dB
Number of transponder carriers	AUTO		-
Carrier/Link Input Parameters	**Value**		**Units**
Modulation	4-PSK		-
Required bit error rate performance	10^-5		-
Required Eb/No without FEC coding	9.59		dB
Required Eb/No with FEC coding	5.9		dB

Information rate	0.07			Mbps
Overhead	0			%
FEC code rate	0.875			-
Spreading gain	0			dB
Reed Solomon code	1			-
(1 + Roll off factor)	1.2			-
Carrier spacing factor	1.4			-
Bandwidth allocation step size	0.001			MHz
System margin	0.001			dB

Calculations at Saturation	Value	Units
Gain 1m^2	37.2	dB/m2
Uplink C/No	103.4	dB.Hz
Downlink C/No	95.04	dB.Hz
Total C/No	94.45	dB.Hz
Uplink EIRP for saturation	73.94	dBW

General Calculations	Up	Down	Units
Elevation	61.46	56.5	degrees
True azimuth	113.86	118.39	degrees
Compass bearing	114.3	119.63	degrees
Path distance to satellite	36449.21	36696.4	km
Propagation time delay	0.121581	0.122406	seconds
Antenna efficiency	65	65	%
Antenna gain	41.88	41.72	dBi
Availability (average year)	99.98	99.98	%
Link downtime (average year)	1.753	1.753	hours
Availability (worst month)	99.905	99.905	%
Link downtime (worst month)	0.693	0.693	hours
Spectral power density	-50.05	-36.79	dBW/Hz

Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	37.86	37.86	37.86	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	37.55	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	199.42	199.42	199.42	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.3	0.3	0.3	dB
Atmospheric losses total	0.35	0.35	0.35	dB
Total path loss (excluding rain)	199.78	199.78	199.78	dB
Rain attenuation	0	1.47	0	dB
Uplink power control	0	0	0	dB
Uncompensated rain fade	0	1.47	0	dB
C/No (thermal)	67.32	65.85	67.32	dB.Hz
C/N (thermal)	20.51	19.04	20.51	dB
C/ACI	25	23.53	25	dB
C/ASI	25	23.53	25	dB
C/XPI	30	28.53	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	16.26	14.79	16.26	dB

Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	41.31	41.31	41.31	dBW
Transponder output back-off (total)	4	4	4	dB

Output back-off per carrier	32.08	33.55	32.08	dB
Satellite EIRP per carrier	9.23	7.76	9.23	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	195.56	195.56	195.56	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.24	0.24	0.24	dB
Atmospheric losses total	0.29	0.29	0.29	dB
Total path loss (excluding rain)	195.85	195.85	195.85	dB
Rain attenuation	0	0	0.2	dB
Noise increase due to precipitation	0	0	0.48	dB
Downlink degradation (DND)	0	0	0.68	dB
Total system noise	98.72	98.72	110.28	K
Figure of merit (G/T)	20.98	20.98	20.5	dB/K
C/No (thermal)	62.96	61.49	62.27	dB.Hz
C/N (thermal)	16.15	14.68	15.46	dB
C/ACI	25	23.53	25	dB
C/ASI	25	23.53	25	dB
C/XPI	30	28.53	30	dB
C/IM	21	19.53	21	dB
Eb/(No+Io)	12.39	10.92	11.96	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	61.6	60.14	61.09	dB.Hz
C/N (thermal)	14.79	13.33	14.28	dB
C/ACI	21.99	20.52	21.99	dB
C/ASI	21.99	20.52	21.99	dB
C/XPI	26.99	25.52	26.99	dB
C/IM	20.99	19.53	20.99	dB
C/(No+Io)	59.35	57.88	59.04	dB.Hz
C/(N+I)	12.53	11.07	12.22	dB
Eb/(No+Io)	10.9	9.43	10.59	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	10.9	9.43	10.58	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5	3.53	4.68	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	37.86	dBW
Antenna gain	41.88	dBi
Antenna feed flange power per carrier	-4.03	dBW
Uplink power control	0	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	0.974	dBW
Required HPA power capability	1.2514	W
Spectral power density	-50.05	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.96	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz

Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	9.23	dBW
Percentage transponder power used	0.16	%
Max transponder carriers limited by:-	Bandwidth	[642.86]

Digital Link Budget
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Service Name	LB040 - Sample link 3		
Coverage	Philippines		
Uplink earth station	Manila		
Downlink earth station	Zamboanga		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	14.60N	7N	degrees
Site longitude	121E	122E	degrees
Site altitude	0.5	0.5	km
Frequency	6.125	3.9	GHz
Polarization	Horizontal	Vertical	-
Rain model	ITU (110.6)	ITU (122.7)	(mm/h or zone)
Availability (average year)	99.98	99.98	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	3.7	2.4	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	0	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W

Satellite Input Parameters	**Value**	**Units**
Satellite longitude	146.00E	degrees
Transponder type	TWTA	-
Receive G/T	0.54	dB/K
Saturation flux density	-88.54	dBW/m2
Satellite attenuator pad	0	dB
Satellite ALC	0	dB
EIRP (saturation)	39.6	dBW
Transponder bandwidth	36	MHz
Input back off total	8	dB
Output back off total	4	dB
Intermodulation interference	21	dB
Number of transponder carriers	AUTO	-

Carrier/Link Input Parameters	**Value**	**Units**
Modulation	4-PSK	-
Required bit error rate performance	10^-5	-
Required Eb/No without FEC coding	9.59	dB
Required Eb/No with FEC coding	5.9	dB
Information rate	0.07	Mbps
Overhead	0	%
FEC code rate	0.875	-
Spreading gain	0	dB
Reed Solomon code	1	-
(1 + Roll off factor)	1.2	-
Carrier spacing factor	1.4	-
Bandwidth allocation step size	0.001	MHz

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System margin	0.001			dB
Calculations at Saturation	Value			Units
Gain 1m^2	37.2			dB/m2
Uplink C/No	103.4			dB.Hz
Downlink C/No	89.63			dB.Hz
Total C/No	89.45			dB.Hz
Uplink EIRP for saturation	74.4			dBW
General Calculations	Up	Down		Units
Elevation	56.5	60.84		degrees
True azimuth	118.39	105.31		degrees
Compass bearing	119.63	105.16		degrees
Path distance to satellite	36696.4	36478.15		km
Propagation time delay	0.122406	0.121678		seconds
Antenna efficiency	65	65		%
Antenna gain	45.64	37.96		dBi
Availability (average year)	99.98	99.98		%
Link downtime (average year)	1.753	1.753		hours
Availability (worst month)	99.905	99.905		%
Link downtime (worst month)	0.693	0.693		hours
Spectral power density	-53.35	-38.5		dBW/Hz
Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	38.32	38.32	38.32	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	37.53	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	199.48	199.48	199.48	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.3	0.3	0.3	dB
Atmospheric losses total	0.35	0.35	0.35	dB
Total path loss (excluding rain)	199.84	199.84	199.84	dB
Rain attenuation	0	1.44	0	dB
Uplink power control	0	0	0	dB
Uncompensated rain fade	0	1.44	0	dB
C/No (thermal)	67.32	65.88	67.32	dB.Hz
C/N (thermal)	20.51	19.06	20.51	dB
C/ACI	25	23.56	25	dB
C/ASI	25	23.56	25	dB
C/XPI	30	28.56	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	16.26	14.81	16.26	dB
Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	39.6	39.6	39.6	dBW
Transponder output back-off (total)	4	4	4	dB
Output back-off per carrier	32.08	33.53	32.08	dB
Satellite EIRP per carrier	7.52	6.07	7.52	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	195.51	195.51	195.51	dB
Atmospheric absorption	0.04	0.04	0.04	dB
Tropospheric scintillation fading	0.24	0.24	0.24	dB
Atmospheric losses total	0.28	0.28	0.28	dB
Total path loss (excluding rain)	195.79	195.79	195.79	dB
Rain attenuation	0	0	0.24	dB
Noise increase due to precipitation	0	0	0.55	dB
Downlink degradation (DND)	0	0	0.79	dB
Total system noise	98.72	98.72	112.11	K
Figure of merit (G/T)	17.22	17.22	16.66	dB/K
C/No (thermal)	57.54	56.1	56.76	dB.Hz
C/N (thermal)	10.73	9.29	9.94	dB
C/ACI	25	23.56	25	dB

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C/ASI	25	23.56	25	dB
C/XPI	30	28.56	30	dB
C/IM	21	19.56	21	dB
Eb/(No+Io)	8.37	6.93	7.7	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	57.11	55.67	56.39	dB.Hz
C/N (thermal)	10.3	8.85	9.58	dB
C/ACI	21.99	20.55	21.99	dB
C/ASI	21.99	20.55	21.99	dB
C/XPI	26.99	25.55	26.99	dB
C/IM	20.99	19.55	20.99	dB
C/(No+Io)	56.17	54.72	55.58	dB.Hz
C/(N+I)	9.36	7.91	8.77	dB
Eb/(No+Io)	7.72	6.27	7.13	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	7.72	6.27	7.13	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	1.82	0.37	1.23	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	38.32	dBW
Antenna gain	45.64	dBi
Antenna feed flange power per carrier	-7.33	dBW
Uplink power control	0	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	-2.3253	dBW
Required HPA power capability	0.5854	W
Spectral power density	-53.35	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.96	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz
Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	7.52	dBW
Percentage transponder power used	0.16	%

Max transponder carriers limited by:-	Bandwidth	[642.86]

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Service Name	LB040 - Sample link 3		
Coverage	Philippines		
Uplink earth station	Zamboanga		
Downlink earth station	Manila		
Satellite name	Agila 2		
Link Input Parameters	**Up**	**Down**	**Units**
Site latitude	7N	14.60N	degrees
Site longitude	122E	121E	degrees
Site altitude	0.5	0.5	km
Frequency	6.125	3.9	GHz
Polarization	Vertical	Horizontal	-
Rain model	ITU (122.7)	ITU (110.6)	(mm/h or zone)
Availability (average year)	99.98	99.98	%
Water vapour density	20	20	gm/m3
Surface temperature	25	25	°C
Antenna aperture	2.4	3.7	metres
Antenna efficiency / gain	65	65	% (+ prefix dBi)
Coupling loss	0.5	0.5	dB
Antenna tracking / mispoint error	0.3	0.3	dB
LNB noise figure / temp	-	35	dB (+ prefix K)
Antenna noise	-	36.11	K
Adjacent carrier interference	25	25	dB
Adjacent satellite interference	25	25	dB
Cross polarization interference	30	30	dB
Uplink station HPA output back-off	4.5	-	dB
Number of carriers / HPA	1	-	-
HPA C/IM (up)	50	-	dB
Uplink power control	0	-	dB
Uplink filter truncation loss	0	-	dB
Required HPA power capability	MIN	-	W

Satellite Input Parameters	**Value**	**Units**
Satellite longitude	146.00E	degrees
Transponder type	TWTA	-
Receive G/T	1.3	dB/K
Saturation flux density	-89.3	dBW/m2
Satellite attenuator pad	0	dB
Satellite ALC	0	dB
EIRP (saturation)	41.31	dBW
Transponder bandwidth	36	MHz
Input back off total	8	dB
Output back off total	4	dB
Intermodulation interference	21	dB
Number of transponder carriers	AUTO	-

Carrier/Link Input Parameters	**Value**	**Units**
Modulation	4-PSK	-
Required bit error rate performance	10^-5	-
Required Eb/No without FEC coding	9.59	dB
Required Eb/No with FEC coding	5.9	dB

Information rate	0.07			Mbps
Overhead	0			%
FEC code rate	0.875			-
Spreading gain	0			dB
Reed Solomon code	1			-
(1 + Roll off factor)	1.2			-
Carrier spacing factor	1.4			-
Bandwidth allocation step size	0.001			MHz
System margin	0.001			dB

Calculations at Saturation	Value	Units
Gain 1m^2	37.2	dB/m2
Uplink C/No	103.4	dB.Hz
Downlink C/No	95.04	dB.Hz
Total C/No	94.45	dB.Hz
Uplink EIRP for saturation	73.59	dBW

General Calculations	Up	Down	Units
Elevation	60.84	56.5	degrees
True azimuth	105.31	118.39	degrees
Compass bearing	105.16	119.63	degrees
Path distance to satellite	36478.15	36696.4	km
Propagation time delay	0.121678	0.122406	seconds
Antenna efficiency	65	65	%
Antenna gain	41.88	41.72	dBI
Availability (average year)	99.98	99.98	%
Link downtime (average year)	1.753	1.753	hours
Availability (worst month)	99.905	99.905	%
Link downtime (worst month)	0.693	0.693	hours
Spectral power density	-50.4	-36.79	dBW/Hz

Uplink Calculation	Clear	Rain Up	Rain Dn	Units
Uplink transmit EIRP	37.51	37.51	37.51	dBW
Transponder input back-off (total)	8	8	8	dB
Input back-off per carrier	36.08	37.77	36.08	dB
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	199.43	199.43	199.43	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.3	0.3	0.3	dB
Atmospheric losses total	0.35	0.35	0.35	dB
Total path loss (excluding rain)	199.78	199.78	199.78	dB
Rain attenuation	0	1.69	0	dB
Uplink power control	0	0	0	dB
Uncompensated rain fade	0	1.69	0	dB
C/No (thermal)	67.32	65.63	67.32	dB.Hz
C/N (thermal)	20.51	18.82	20.51	dB
C/ACI	25	23.31	25	dB
C/ASI	25	23.31	25	dB
C/XPI	30	28.31	30	dB
C/IM	50	50	50	dB
Eb/(No+Io)	16.26	14.57	16.26	dB

Downlink Calculation	Clear	Rain Up	Rain Dn	Units
Satellite EIRP total	41.31	41.31	41.31	dBW
Transponder output back-off (total)	4	4	4	dB

Output back-off per carrier	32.08	33.77	32.08	dB
Satellite EIRP per carrier	9.23	7.54	9.23	dBW
Mispoint loss	0.3	0.3	0.3	dB
Free space loss	195.56	195.56	195.56	dB
Atmospheric absorption	0.05	0.05	0.05	dB
Tropospheric scintillation fading	0.24	0.24	0.24	dB
Atmospheric losses total	0.29	0.29	0.29	dB
Total path loss (excluding rain)	195.85	195.85	195.85	dB
Rain attenuation	0	0	0.2	dB
Noise increase due to precipitation	0	0	0.48	dB
Downlink degradation (DND)	0	0	0.68	dB
Total system noise	98.72	98.72	110.28	K
Figure of merit (G/T)	20.98	20.98	20.5	dB/K
C/No (thermal)	62.96	61.27	62.27	dB.Hz
C/N (thermal)	16.15	14.46	15.46	dB
C/ACI	25	23.31	25	dB
C/ASI	25	23.31	25	dB
C/XPI	30	28.31	30	dB
C/IM	21	19.31	21	dB
Eb/(No+Io)	12.39	10.7	11.96	dB

Totals per Carrier (End-to-End)	Clear	Rain Up	Rain Dn	Units
C/No (thermal)	61.6	59.91	61.09	dB.Hz
C/N (thermal)	14.79	13.1	14.28	dB
C/ACI	21.99	20.3	21.99	dB
C/ASI	21.99	20.3	21.99	dB
C/XPI	26.99	25.3	26.99	dB
C/IM	20.99	19.31	20.99	dB
C/(No+Io)	59.35	57.66	59.04	dB.Hz
C/(N+I)	12.53	10.84	12.22	dB
Eb/(No+Io)	10.9	9.21	10.59	dB
System margin	0	0	0	dB
Net Eb/(No+Io)	10.9	9.21	10.58	dB
Required Eb/(No+Io)	5.9	5.9	5.9	dB
Excess margin	5	3.31	4.68	dB

Earth Station Power Requirements	Value	Units
EIRP per carrier	37.51	dBW
Antenna gain	41.88	dBi
Antenna feed flange power per carrier	-4.38	dBW
Uplink power control	0	dB
HPA output back off	4.5	dB
Waveguide loss	0.5	dB
Filter truncation loss	0	dB
Number of HPA carriers	1	-
Total HPA power required	0.6235	dBW
Required HPA power capability	1.1544	W
Spectral power density	-50.4	dBW/Hz

Space Segment Utilization	Value	Units
Overall link availability	99.96	%
Information rate (inc overhead)	0.07	Mbps
Transmit rate	0.08	Mbps
Symbol rate	0.04	Mbaud
Occupied bandwidth	0.048	MHz
Noise bandwidth	46.81	dB.Hz

Minimum allocated bandwidth required	0.056	MHz
Allocated transponder bandwidth	0.056	MHz
Percentage transponder bandwidth used	0.16	%
Used transponder power	9.23	dBW
Percentage transponder power used	0.16	%
Max carriers by transponder bandwidth	642.86	-
Max carriers by transponder power	1875.44	-
Max transponder carriers limited by:-	Bandwidth	[642.86]

付属資料４　**PCG** に対する各国の援助

[開発調査]

海上交通管理計画	1992 年 JICA	（別紙①）

[海上無線]

沿岸無線整備事業	1989 年 OECF	（別紙②）
GMDSS 整備	1998 年 仏国	（本編第 2 章 2.6 参照）

[捜索救助]

海難救助・海上汚染防止システム増強事業	2002 年 JBIC	（別紙③）
救助船　・2002 年－4 隻	オーストラリア	
・2003 年－4 隻		

[航路標識]

海上安全整備事業（Ⅰ）	1991 年 OECF	（別紙④）
灯台等整備事業	1993 年 英国	
灯台新設、気象観測・通信設備整備		
海上安全整備事業（Ⅱ）	1995 年 OECF	（別紙④）
海上安全整備事業（Ⅲ）	1999 年 JBIC	（別紙④）
灯台改良改修事業	2001 年 スペイン	
灯台改良改修/老朽更新		

[技術協力]

海上保安人材育成プログラム	2002 年 JICA	（別紙⑤）

付属資料４ 別紙：我が国による援助の概要

① JICA 開発調査「海上交通管理計画調査」

[実施年]

1992 年

[実施機関]

海事産業庁（Maritime Industry Authority）

[目的・事業内容]

・安全面を中心にした海上交通管理に関する基本計画の策定

・優先プロジェクトに対するプレ・フィジビリティ調査

[優先プロジェクト]

・船員教育

・船舶検査

・航路標識

・捜索救助

・海上通信

・安全運航管理

② OECF ローン「沿岸無線整備事業」

[実施機関]

運輸通信省（Department of Transportation and Communication：DOTC）

[借款契約]

1989 年 5 月

[完工]

1996 年 3 月

[承諾額/実行額]

26 億円/19 億円

[目的・事業]

沿岸無線局等を設置することにより、効率的かつ信頼性の高い海上無線通信サービスを提供し、海上における人命・財産の安全性を高める。

・マニラ中央海岸局(送信所、受信所、オペレーションセンター)、マニラ港湾局の建設

・以下に係る無線通信設備の調達、据付等

- マニラ中央海岸局
- マニラ港湾局
- 電気通信学園における訓練用機器
- オペレーションセンターから気象庁、港湾庁への UHF リンク
- 運用・維持に関する訓練
- コンサルティング・サービス

③　JBIC ローン「海難援助・海上汚染防止システム増強事業」

[実施機関]

運輸通信省

[借款契約]

2002 年 3 月

[承諾金額]

93 億円

[目的・事業内容]

海難援助と海上汚染防止事故への対応能力向上

防災船（多目的対応船） 7 隻の調達

機能　　：消火、送水、油濁回収

長さ　　：37 メートル

速力　　：30 ノット

総トン数　：190 トン

④　海上安全整備事業（Ⅰ）（Ⅱ）（Ⅲ）

[目的・事業内容]

・マニラーセブ間の航行援助施設（灯台/ライトビーコン）の修復

・設標船の調達

・ブイベースの建設

・運用・維持のためのトレーニング

[整備事業(Ⅰ)]

・OECF ローン

・実施機関　：海事産業庁

・借款契約　：1991 年 7 月

・貸付契約額：35 億円

[整備事業(II)]

・OECF ローン

・実施機関　：運輸通信省

・借款契約　：1995 年 8 月

・貸付契約額：55 億円

[整備事業(III)]

・JBIC ローン

・実施機関　：運輸通信省

・借款契約　：1999 年 12 月

・貸付契約額：47 億円

⑤　JICA 技術協力「海上保安人材育成プロジェクト」

[実施機関]

フィリピンコーストガード（PCG）

[実施期間]

2002 年 7 月～2007 年 6 月

[日本側投入計画]

長期専門家　　：5 人　　・チーフアドバイザー/教育訓練
・海洋環境保全/油防除
・海難救助/航行安全
・法令励行
・業務調整

短期専門家　　：年間 4～5 名

機材供与

研修員受入れ　：年 3～4 人

投入額　　：6 億円


jICA
ジャイカ