SAM/IG/4
WP/20
05/10/09

International Civil Aviation Organization
South American Regional Office

FOURTH WORKSHOP/MEETING OF THE SAM IMPLEMENTATION GROUP (SAM/IG/4)
REGIONAL PROJECT RLA/06/901

Lima, Peru, 19 to 23 October 2009

Agenda Item 2: Optimisation of ATS Routes Structure

Preliminary Analysis of Air Traffic Data Compilation

(Presented by Brazil)

Summary

This working paper presents a preliminary analysis of air traffic data compilation that was performed from 1 to 31 July 2009.

References:

- SAM/IG/3 Report

1 Background

1.1 The SAM/IG/3 Meeting was of the opinion that statistical data is essential to form an airspace structure aimed to meet the principles and techniques of airspace planning. Traffic data should be collected regularly, to permit analysis of the evolution of air traffic demand in the Region in the upper airspace from FL245.

1.2 In this way, the SAM/IG/3 meeting adopted Conclusion SAM/IG/3-2 - Data Collection, requesting the collection of data on all flights that take place in the upper airspace (FL245 or above) of SAM Region, during the period from 01 to 31 July, 2009 and to send this information to the SAM Regional Office before 30 September 2009.

2 Preliminar Analysis of Air Traffic Data Compilation made by Brazilian Administration

2.1 Aircraft exploiter / Type of Aircraft

2.1.1 The preliminary analysis of available data from the FIR Brasilia, Curitiba and Recife, has indicated that, given the outstanding types of in 90% of the sample, 89% of flights could, in principle, be made by aircrafts and exploiters approved for RNAV-5.

As an example, the sample of type of aircraft of the Brasilia FIR, is shown in **Appendix A** to this Working Paper.

The definitive information can only be confirmed through the use of the Navigation Data Base, which is being composed by Project RLA/99/901, as well as DME coverage information, in order to identify in which airspaces, aircrafts that doesn't count with GNSS, could make use of DME/DME navigation.

2.2 City Pairs

2.2.1 Preliminary analysis of city pairs served in the Brazilian FIRs, identified that there is a significant number of city pairs involved in the provision of ATS. When considering 90% of the sample, it is possible to identify 157 city pairs in the Amazonica FIR, 257 in Brasilia FIR, 182 in FIR Curitiba FIR, and 149 in Recife FIR. Thus, it appears that perhaps the version 1 of the route network will have to use the concept of Trunk Routes, seeking to include several pairs of cities with one route, considering, moreover, the need to prioritize the highest volume of air traffic. As an example, the sample of city pairs of Brasilia FIR, is shown as **Appendix B** to this Working Paper..

2.3 Flight Level

2.3.1 In relation to flight levels, a high concentration in levels RVSM (between FL 290 and 410) of approximately 94% is observed, except in the FIR CW, where flights between Rio de Janeiro TMA and Sao Paulo were counted, which corresponds to 11.65% of the flights. Thus, in the FIR CW, the use of RVSM levels is of approximately 83%. As an example, the sample of flight levels of the Brasilia FIR, is presented as **Appendix C** to this Working Paper. That way you can verify that a possible exclusionary airspace, combined with the navigation capability of the fleet, could be used by a significant portion of users that fly in the upper airspace.

3. Suggested Action

3.1 The Meeting is invited to:

a) Take note of information provided in this Working Paper;

b) Discuss the parameters to be considered in the Programme for the Optimization of SAM Routes Network.

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Appendix A

ACFT Exploiter / Type of ACFT

BRASILIA FIR				
Exploiter of	Type of ACFT	Number of Flights	Percentage	Accumulated Percentage
TAM	A320	7789	24,61	24,61
GLO	B738	5237	16,55	41,16
GLO	B737	3364	10,63	51,79
TAM	A319	1544	4,88	56,67
WEB	B733	1315	4,16	60,83
GLO	B733	959	3,03	63,86
ONE	F100	793	2,51	66,36
AZU	E190	637	2,01	68,38
AZU	E195	534	1,69	70,06
TAM	A332	522	1,65	71,71
TAM	A321	380	1,20	72,92
PTB	E145	314	0,99	73,91
AAL	B772	286	0,90	74,81
IBE	A343	270	0,85	75,66
TAP	A332	256	0,81	76,47
TIB	E175	223	0,70	77,18
BET	DC87	218	0,69	77,87
CMP	B737	217	0,69	78,55
FAB	E145	188	0,59	79,15
AFR	B772	165	0,52	79,67
AAL	B763	159	0,50	80,17
DAL	B763	157	0,50	80,67
AZA	B772	152	0,48	81,15
TTL	B722	140	0,44	81,59
IBE	A346	131	0,41	82,00
FAB	LJ35	128	0,40	82,41
FAB	E135	122	0,39	82,79
TAM	B773	119	0,38	83,17
TSD	B722	116	0,37	83,54
DLH	B744	105	0,33	83,87
TUS	B763	101	0,32	84,19
VLO	B752	99	0,31	84,50
AFR	A332	95	0,30	84,80
TAM	B763	92	0,29	85,09
TAM	A330	90	0,28	85,38
AFR	B744	77	0,24	85,62
FAB	E120	76	0,24	85,86
BSL	B727	67	0,21	86,07
GUARA	E120	67	0,21	86,28

BRASILIA FIR				
Exploiter of	Type of ACFT	Number of Flights	Percentage	Accumulated Percentage
COA	B764	65	0,21	86,49
GEC	MD11	64	0,20	86,69
ACA	B763	62	0,20	86,89
ARG	B744	61	0,19	87,08
BAW	B744	61	0,19	87,27
UAL	B763	61	0,19	87,46
COA	B762	60	0,19	87,65
LAN	A343	60	0,19	87,84
UAL	B772	60	0,19	88,03
KLM	B772	59	0,19	88,22
TAM	A345	58	0,18	88,40
AMX	B772	56	0,18	88,58
SWR	A343	55	0,17	88,75
AEA	A332	51	0,16	88,91
DAL	B764	50	0,16	89,07
DLH	A343	48	0,15	89,22
MST	DC10	47	0,15	89,37
FAB	B732	45	0,14	89,51
MPD	A332	39	0,12	89,64
PTSPM	E145	39	0,12	89,76
TAP	A343	39	0,12	89,88
TPU	A319	36	0,11	90,00

Appendix B

Pair of Cities

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
SBSP	SBBR	775	2,45	2,45
SBBR	SBSP	754	2,38	4,83
SBSV	SBGR	643	2,03	6,86
SBGR	SBSV	636	2,01	8,87
SBCF	SBSP	564	1,78	10,66
SBSP	SBCF	550	1,74	12,39
SBRJ	SBBR	506	1,60	13,99
SBGR	SBBR	493	1,56	15,55
SBBR	SBRJ	480	1,52	17,07
SBBR	SBGR	471	1,49	18,56
SBGL	SBSV	439	1,39	19,94
SBRF	SBGR	435	1,37	21,32
SBGR	SBRF	429	1,36	22,67
SBBR	SBCF	427	1,35	24,02
SBCF	SBBR	416	1,31	25,34
SBSV	SBGL	385	1,22	26,55
SBBR	SBGL	329	1,04	27,59
SBBR	SBSV	320	1,01	28,60
SBCF	SBGR	311	0,98	29,59
SBGR	SBCF	310	0,98	30,57
SBGL	SBBR	290	0,92	31,48
SBFZ	SBGR	276	0,87	32,36
SBBR	SBEG	270	0,85	33,21
SBEG	SBBR	269	0,85	34,06
SBGL	SBRF	252	0,80	34,86
SBRF	SBGL	249	0,79	35,64
SBBR	SBFZ	247	0,78	36,42
SBGR	SBFZ	244	0,77	37,19
SBCY	SBBR	240	0,76	37,95
SBSP	SBGO	238	0,75	38,70
SBBR	SBCY	235	0,74	39,45
SBEG	SBGR	234	0,74	40,19
SBCF	SBSV	231	0,73	40,92
SBGO	SBSP	222	0,70	41,62
SBGR	SBEG	214	0,68	42,29
SBBR	SBRF	206	0,65	42,95
SBGR	SBNT	199	0,63	43,57
SBSV	SBKP	198	0,63	44,20
SBBR	SBBE	192	0,61	44,81
SBKP	SBSV	190	0,60	45,41
SBBR	SBPA	190	0,60	46,01

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
SBGL	SBFZ	187	0,59	46,60
SBFZ	SBGL	185	0,58	47,18
SBBR	SBCT	183	0,58	47,76
SBCT	SBBR	182	0,58	48,34
SBVT	SBCF	178	0,56	48,90
SBPA	SBBR	177	0,56	49,46
SBCF	SBVT	176	0,56	50,01
SBNT	SBGR	175	0,55	50,57
SBBE	SBBR	172	0,54	51,11
SBSV	SBSP	171	0,54	51,65
SBSP	SBSV	161	0,51	52,16
SBSP	SBUL	158	0,50	52,66
SBSV	SBBR	157	0,50	53,16
SBCY	SBCG	153	0,48	53,64
SBUL	SBSP	150	0,47	54,11
SBGR	SBMO	142	0,45	54,56
SBGR	KMIA	138	0,44	55,00
SBCF	SBKP	138	0,44	55,43
SBBR	SBKP	138	0,44	55,87
LEMD	SAEZ	138	0,44	56,31
SAEZ	LEMD	132	0,42	56,72
KMIA	SBGR	132	0,42	57,14
KJFK	SBGR	132	0,42	57,56
SBGR	KJFK	125	0,40	57,95
SBGR	SBPS	123	0,39	58,34
SBGR	SBGO	123	0,39	58,73
SBCG	SBGR	123	0,39	59,12
SBBR	SBTE	122	0,39	59,50
SBGO	SBGR	121	0,38	59,89
SBPS	SBGR	119	0,38	60,26
SBMO	SBGR	119	0,38	60,64
LFPG	SBGR	119	0,38	61,01
SBKP	SBBR	117	0,37	61,38
SBPJ	SBBR	113	0,36	61,74
SBGR	LFPG	110	0,35	62,09
SBBR	SBPJ	108	0,34	62,43
SPIM	SBGR	104	0,33	62,76
SBCY	SBGO	102	0,32	63,08
SBBR	SBSL	101	0,32	63,40
SBGO	SBCY	99	0,31	63,71
SBVT	SBBR	98	0,31	64,02
SBPV	SBBR	94	0,30	64,32
SBGL	SBBE	94	0,30	64,62

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
SBRF	SBKP	93	0,29	64,91
SBBR	SBPV	93	0,29	65,20
SBKP	SBRF	92	0,29	65,50
SBKP	SBCF	92	0,29	65,79
SBCF	SBPS	92	0,29	66,08
SBBR	SBIZ	92	0,29	66,37
SBBR	SBVT	91	0,29	66,66
SBBE	SBGL	91	0,29	66,94
SBGR	LEMD	90	0,28	67,23
SBPS	SBCF	88	0,28	67,51
SBCF	SBCT	88	0,28	67,78
LEMD	SBGR	88	0,28	68,06
KMIA	SBGL	84	0,27	68,33
SBRP	SBGR	83	0,26	68,59
SBGL	LFPG	80	0,25	68,84
SBIZ	SBBR	79	0,25	69,09
SBGL	KMIA	79	0,25	69,34
SBCY	SBPV	79	0,25	69,59
LFPG	SBGL	79	0,25	69,84
SBSR	SBSP	78	0,25	70,09
SBCT	SBCF	77	0,24	70,33
SBKP	SBFZ	75	0,24	70,57
SBFZ	SBKP	73	0,23	70,80
SBKP	SBEG	69	0,22	71,02
SBVT	SBKP	68	0,21	71,23
SBCY	SWJI	68	0,21	71,45
SBEG	SBKP	67	0,21	71,66
SBSV	SBRJ	66	0,21	71,87
SBSL	SBBR	66	0,21	72,07
SBAR	SBGR	66	0,21	72,28
SBRJ	SBSV	65	0,21	72,49
SBCY	SBGR	65	0,21	72,69
SBBH	SBSP	65	0,21	72,90
LIRF	SAEZ	65	0,21	73,10
KMIA	SBKP	65	0,21	73,31
SBSP	SBBH	64	0,20	73,51
SBBR	SBNT	64	0,20	73,71
SBRB	SBBR	62	0,20	73,91
SBKP	SBMO	62	0,20	74,11
SBGR	MPTO	62	0,20	74,30
SBGL	SBEG	62	0,20	74,50
SBCY	SBSP	62	0,20	74,69

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
MPTO	SBGR	62	0,20	74,89
SCEL	LEMD	61	0,19	75,08
SBEG	SBGL	61	0,19	75,28
EGLL	SBGR	61	0,19	75,47
SBGR	EGLL	60	0,19	75,66
SBCF	SBRF	60	0,19	75,85
SBBR	SBRB	60	0,19	76,04
EDDF	SBGR	60	0,19	76,23
SBGR	EDDF	59	0,19	76,41
SBGP	SBGP	59	0,19	76,60
SBGL	SBGO	59	0,19	76,79
SBFL	SBBR	59	0,19	76,97
SBGO	SBGL	58	0,18	77,16
SBBR	SBMA	58	0,18	77,34
LEMD	SCEL	58	0,18	77,52
SBMA	SBBR	57	0,18	77,70
SBBR	SBFL	57	0,18	77,88
SBKP	SBPA	55	0,17	78,06
SBGR	SBBE	55	0,17	78,23
SBMO	SBKP	54	0,17	78,40
SBBE	SBGR	53	0,17	78,57
LPPT	SBGL	53	0,17	78,74
SBGO	SBCF	52	0,16	78,90
SBTE	SBBR	51	0,16	79,06
SBCF	SBGO	51	0,16	79,22
MMMX	SBGR	51	0,16	79,38
SBGR	MMMX	50	0,16	79,54
SBGL	LPPT	48	0,15	79,69
LPPT	SBGR	47	0,15	79,84
SBKP	SBNF	46	0,15	79,99
SBKP	SBCT	45	0,14	80,13
SBGO	SBRP	44	0,14	80,27
SBGR	LPPT	43	0,14	80,40
SBGR	LIMC	43	0,14	80,54
SAEZ	LIRF	43	0,14	80,68
LIMC	SBGR	43	0,14	80,81
KDFW	SBGR	43	0,14	80,95
SBGR	KDFW	42	0,13	81,08
SBBR	SBMO	42	0,13	81,21
SBKP	SKBO	40	0,13	81,34
SBGR	SBCN	39	0,12	81,46
SAEZ	LFPG	38	0,12	81,58

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
SBIL	SBSP	37	0,12	81,70
SBCG	SBBR	36	0,11	81,81
SBCF	SBNT	36	0,11	81,93
SBBR	SBCG	36	0,11	82,04
SBRJ	SBRF	35	0,11	82,15
SBRF	SBRJ	35	0,11	82,26
SBCF	SBIL	35	0,11	82,37
SBSP	SBIL	34	0,11	82,48
SBGR	SBAR	34	0,11	82,59
SBGO	SBCG	34	0,11	82,70
SBCN	SBGR	34	0,11	82,80
SBBR	SBKG	34	0,11	82,91
SBSV	SBCT	33	0,10	83,01
SBJP	SBGR	33	0,10	83,12
SBGR	SBJP	33	0,10	83,22
SBBR	SBBH	33	0,10	83,33
SBBH	SBBR	33	0,10	83,43
SBVT	SBSV	32	0,10	83,53
SBSP	SBRP	32	0,10	83,63
SBSL	SBGR	32	0,10	83,74
SBNT	SBGL	32	0,10	83,84
SBGR	CYYZ	32	0,10	83,94
SBGL	SBNT	32	0,10	84,04
KIAH	SBGR	32	0,10	84,14
KATL	SBGR	32	0,10	84,24
SBRJ	SBAR	31	0,10	84,34
SBMO	SBGL	31	0,10	84,44
SBGR	SBRP	31	0,10	84,53
SBGR	KIAH	31	0,10	84,63
SBGR	EHAM	31	0,10	84,73
SBGL	SBJP	31	0,10	84,83
SBGL	MPTO	31	0,10	84,93
SBGL	KATL	31	0,10	85,02
SBCT	SBSV	31	0,10	85,12
SBBR	SAEZ	31	0,10	85,22
KORD	SBGR	31	0,10	85,32
KIAD	SBGR	31	0,10	85,42
KATL	SBGL	31	0,10	85,51
CYYZ	SBGR	31	0,10	85,61
SLVR	SBGR	30	0,09	85,71
SKBO	SBGR	30	0,09	85,80
SBGR	SKBO	30	0,09	85,90

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
SBGR	SBSL	30	0,09	85,99
SBGR	KORD	30	0,09	86,09
SBGR	KMCO	30	0,09	86,18
SBGR	KIAD	30	0,09	86,28
SBGR	KEWR	30	0,09	86,37
SBGR	KATL	30	0,09	86,47
SBCY	SBSR	30	0,09	86,56
SBCG	SBSP	30	0,09	86,66
SBBR	SBJU	30	0,09	86,75
SBBR	SBAR	30	0,09	86,84
SBBR	LPPT	30	0,09	86,94
SBAR	SBGL	30	0,09	87,03
SAEZ	SBBR	30	0,09	87,13
MPTO	SBGL	30	0,09	87,22
LEMD	SBGL	30	0,09	87,32
KMCO	SBGR	30	0,09	87,41
KEWR	SBGR	30	0,09	87,51
SVMI	SBGR	29	0,09	87,60
SBKP	SBMG	29	0,09	87,69
SBJP	SBGL	29	0,09	87,78
SBGR	SVMI	29	0,09	87,87
SBGL	SBMO	29	0,09	87,97
SBGL	SBAR	29	0,09	88,06
SBGL	LEMD	29	0,09	88,15
SBAR	SBRJ	29	0,09	88,24
LFPG	SAEZ	29	0,09	88,33
GOOY	SBKP	29	0,09	88,42
LSZH	SBGR	28	0,09	88,51
EHAM	SBGR	28	0,09	88,60
SBSV	SBCF	27	0,09	88,69
SBSR	SBCG	27	0,09	88,77
SBLO	SBSP	27	0,09	88,86
SBCT	SBKP	27	0,09	88,94
SBSR	SBRJ	26	0,08	89,03
SBGR	LSZH	26	0,08	89,11
SBCY	SBLO	26	0,08	89,19
KLAX	SBGR	26	0,08	89,27
SBGR	LIRF	25	0,08	89,35
SBGR	KLAX	25	0,08	89,43
SBCY	SBDN	25	0,08	89,51
SBCF	SBUL	25	0,08	89,59
LIRF	SBGR	25	0,08	89,67

BRASILIA FIR				
Origin	Destiny	Number of Flights	Percentage	Accumulated Percentage
EDDM	SBGR	25	0,08	89,75
SBSR	SBCY	24	0,08	89,82
SBTE	SBCF	23	0,07	89,89
SBGR	EDDM	23	0,07	89,97
SBBR	SBJP	23	0,07	90,04

Appendix C

Flight Levels

BRASILIA FIR			
Flight Level	**Number of Flights**	**Percentage**	**Accumulated Percentage**
370	5627	17,78	17,78
360	4900	15,48	33,27
350	3820	12,07	45,34
380	3275	10,35	55,69
340	2531	8,00	63,68
390	2315	7,32	71,00
330	1745	5,51	76,51
400	1385	4,38	80,89
320	1210	3,82	84,71
310	1017	3,21	87,93
300	790	2,50	90,43
410	783	2,47	92,90
280	535	1,69	94,59
270	436	1,38	95,97
290	352	1,11	97,08
250	316	1,00	98,08
260	268	0,85	98,93
430	144	0,46	99,38
450	99	0,31	99,69