



International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
**First Meeting of the Communications, Navigation and Surveillance/Air Traffic
Management Subgroup (CNS/ATM/SG/1)**
(Lima, Peru, 8 to 12 February 2010)

Agenda Item 4: Review of pending matters of the ATM/CNS/SG, ATM and CNS Committees, and the respective Task Forces, for their consideration in the work programme of the CNS/ATM Subgroup

REPORT OF THE FOURTH MEETING OF THE GNSS TASK FORCE

(Presented by the Rapporteur)

SUMMARY	
This working paper presents the results of the fourth meeting of the GNSS Task Force (GNSS/TF/04), describing the status of implementation of its activities and pending and new activities for their consideration in the new CNS/ATM Subgroup.	
Reference:	
• Report of the GNSS/TF/4 meeting	
ICAO Strategic Objectives:	A – Safety D - Efficiency

1. **Introduction**

1.1 The fourth meeting of the GNSS/TF was held on 8-9 September 2009, at the ICAO Regional Office for North America, Central America and the Caribbean, in Mexico City. Five States (Brazil, Colombia, Cuba, Spain and United States) and two international organisations (COCESNA and IATA) attended the meeting, making up a total of 11 participants, including the ICAO officers.

1.2 The meeting reviewed the following agenda items:

- a) Develop draft regional guidelines for the evolution of air navigation systems in support of PBN implementation;
- b) Propose technical training programmes on GNSS systems for CAR/SAM States;
- c) Provide CAR/SAM States with guidance on the practical methodology for the implementation of GBAS systems;
- d) GNSS work programme for the new CNS/ATM Subgroup; and
- e) Other matters.

1.3 Regarding the aforementioned agenda items, the meeting reviewed five working papers and two information papers, and formulated two draft conclusions for consideration by the new CNS/ATM Subgroup. The report of the fourth meeting of the Task Force is contained in the **Appendix** to this working paper.

2. Discussion

Develop draft regional guidelines for the evolution of air navigation systems in support of PBN implementation

2.1 While discussing the development of regional guidelines for the evolution of air navigation systems in support of PBN implementation, the meeting took note of:

- a) the most recent work of the ICAO Air Navigation Panel with respect to GNSS;
- b) a form prepared by IATA for collecting information on avionics currently installed and to be installed in commercial aircraft, in order to establish a global database on this topic;
- c) the table listing navaids in CAR/SAM States, as an input for the drafting of a regional roadmap for the evolution of navigation systems; and
- d) a draft air navigation system evolution strategy for the CAR/SAM Regions, in support of the implementation of performance-based navigation (PBN).

2.2 The meeting analysed the importance of collecting data on radio aids and avionics, not only for navigation-related work, but also for other tasks of the Subgroup. It felt that the table on radio aids that had been prepared, as well as the avionics survey model proposed by IATA, should be analysed by the Subgroup for their adoption as draft information and source of information, respectively, in support of decision-making and the drafting of regional guidelines. Appendices A and B to the report on agenda item 1 of the GNSS/TF/4 meeting contain, respectively, the CAR/SAM radio aid table and the IATA current and future avionics survey form.

2.3 The meeting considered that the IATA form on existing avionics was adequate, and that States should request similar information from their general aviation users and non-IATA domestic fleets to supplement user data. This supplementary information should be part of the database that IATA was organising, so as to have a single source of information on this matter. In this sense, the meeting formulated the following draft conclusion:

DRAFT CONCLUSION GNSS/TF/4-1

COLLECTION OF INFORMATION ON EXISTING AND FUTURE AVIONICS IN THE CAR/SAM REGIONS

Taking into account the importance of having information on avionics already installed and to be installed on user aircraft, for purposes of planning and cost/benefit analyses:

- a) States/Territories and International Organisations are urged to collect information on avionics already installed and to be installed in non-IATA domestic fleets and other general aviation users, suggesting the adoption of a format similar to that of the IATA survey form (GNSS/TF/4 IP/4), the results to be sent to the respective ICAO Regional Office by **December 2010**; and
- b) IATA is urged to include the aforementioned information in the IATA database, informing the ICAO CAR/SAM Regional Offices about the response to this request.

2.4 The GNSS/TF/4 meeting examined and updated the draft CAR/SAM strategy for the evolution of air navigation systems in support of PBN implementation, as shown in Appendix C to the report on agenda item 1. It should be noted that the draft CAR/SAM strategy for the evolution of air navigation systems has been formulated on the basis of the CAR/SAM PBN roadmap.

Propose technical training programmes on GNSS systems for CAR/SAM States

2.5 Upon discussing the development of GNSS technical training programmes for CAR/SAM States, the GNSS/TF/4 Meeting agreed that, given the technical nature of its members, such development would be limited to the definition of knowledge and professional experience requirements to help CAR and SAM States develop their personnel training and hiring requirements.

2.6 The meeting prepared a draft Guide for the Development of a GNSS Training Programme, which appears in Appendix A to the report on agenda item 2.

2.7 In this regard, the Task Force formulated the following draft conclusion:

**DRAFT CONCLUSION
GNSS/TF/4-2**

GNSS TRAINING

Taking into account that training of a larger number of experts is essential for the future implementation of GNSS systems in the CAR/SAM Regions, as well as the various ICAO recommendations for the provision of GNSS technical training, and the ICAO initiative on the next generation of aviation professionals:

- a) States/Territories and International Organisations are urged to foster the training of national instructors, based, *inter alia*, on courses promoted by ICAO, as a way of supporting the internal dissemination of acquired knowledge;
- b) The States/Territories and International Organisations that have not yet included GNSS in their training programmes, include this type of training in their plans as of 2010; and
- c) ICAO is urged to include the necessary considerations on the technical training of professionals, *e.g. training on GNSS systems*, in the initiative on next generation aviation professionals and its corresponding instances.

Provide guidance to CAR/SAM States on the practical methodology for the implementation of GBAS systems.

2.8 In this regard, the meeting felt that, given the very recent completion of GBAS certification work by the FAA, the drafting of a guidance document on a practical methodology for the implementation of GBAS systems would be postponed until December 2010.

GNSS work programme for the new CNS/ATM Subgroup

2.9 The Group updated the status of implementation of the navigation activities contained in the work programme of the CNS Committee and the GNSS Task Force. The update and proposal of activities for the CNS/ATM Subgroup appear in the appendix to the report on agenda item 4.

3. Suggested Action

3.1 The Meeting is invited to:

- a) take note of the information contained in this working paper;
- b) analyse and consider the form proposed by IATA and described in paragraphs 2.2 and 2.3, and approve Draft Conclusion *GNSS/TF/4-01 - Collection of information on existing and future avionics in the CAR/SAM Regions*;
- c) analyse the table listing radio aids in existence in CAR/SAM States, as described in paragraph 2.2, to support the development of the regional roadmap for the evolution of navigation systems;
- d) taking into account the correlation with performance objectives, such as PBN, analyse and adopt the draft CAR/SAM strategy for the evolution of air navigation systems, described in paragraph 2.4;
- e) based on paragraphs 2.5 to 2.8, review the draft Guide for the Development of a GNSS Training Programme, and approve Draft Conclusion *GNSS/TF/4-02 - GNSS Training*;
- f) review and adopt the proposed pending and new activities related to navigation systems, as shown in paragraph 2.9, for their consideration in the work programme of the CNS/ATM Subgroup; and
- g) take any other action it may deem necessary.



GNSS/TF/4

INTERNATIONAL CIVIL AVIATION ORGANIZATION

**CAR/SAM REGIONAL PLANNING AND
IMPLEMENTATION GROUP (GREPECAS)**

CNS COMMITTEE

**FOURTH MEETING OF THE GNSS TASK
FORCE**

(GNSS/TF/4)

FINAL REPORT

(Mexico City, Mexico, 8-9 September 2009)

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

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HISTORY OF THE MEETING

1. PLACE AND DURATION

The Fourth Meeting of the GREPECAS GNSS Task Force (GNSS/TF/4) was held at the ICAO North American, Central American, and Caribbean Regional Office, in Mexico City, Mexico, on 8-9 September 2009.

2. OPENING

Mr. Michiel Vreedenburg, Deputy Director of the ICAO North American, Central American, and Caribbean (NACC) Office, welcomed the participants, highlighting the importance of the items to be addressed, and wishing them success in their discussions.

3. WORKING LANGUAGES

The working language of the Meeting was Spanish. The documentation was prepared in Spanish and English, indistinctly.

4. PARTICIPANTS AND ORGANISATION

Five States (Brazil, Colombia, Cuba, Spain and United States) and two international organisations (COCESNA and IATA) attended the Meeting, making a total of 11 participants, including ICAO officials. The list of participants appears on pages iii-1 to iii-2.

Mr. Gustavo Adolfo Camargo de Oliveira, rapporteur of the GREPECAS GNSS Task Force, acted as rapporteur of the Meeting, assisted by Mr. Julio Siu and Mr. Masoud Paydar from ICAO.

5. LIST OF CONCLUSIONS

No.	Title	Page
GNSS/TF/04/01	COLLECTION OF INFORMATION ON EXISTING AND FUTURE AVIONICS IN THE CAR/SAM REGIONS	1-1
GNSS/TF/04/02	GNSS TRAINING	2-2

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Agenda Item 1: Develop draft regional guidelines for the evolution of air navigation systems in support of PBN implementation

1.1 Under this agenda item, the following papers were presented and discussed: IP/02, IP/04 and WP/02. IP/02 - *ICAO Navigation Systems Panel (NSP) developments*, was presented by the Secretariat, providing the Group with the latest information on the work carried out by the NSP, with emphasis on GNSS matters:

- a) The meeting took note that Amendment 84 to Annex 10, Volume I had been approved and would be effective as of 19 November 2009. This amendment updated and reorganised the contents of Annex 10, Volume I, and introduced updates, such as those applicable to DME precision standards.
- b) IP/02 also informed that the Air Navigation Commission (ANC) had submitted Amendment 85 to Annex 10, Volume I to the States and International Organisations for consultation, with a deadline of 28 September 2009 for comments, and effective on 18 November 2010. This amendment contains three main elements, including modifications to standards relating to ILS coverage in difficult locations, modifications providing for the use of SBAS for CAT I under certain conditions, and updates reflecting the evolution of the GLONASS system. This paper also informed the meeting about the work being done by the NSP, such as the development of SARPs for GBAS CAT II and III, provisions for the introduction of Galileo, and the evolution of the GPS and GLONASS systems.

1.2 IP/04 - *IATA equipment survey*, was presented by IATA to inform the meeting about the survey on existing and future avionics on commercial aircraft, with a view to establishing a global database on this matter. During the presentation, the meeting had a chance to see the data collection form sent to IATA member airlines, and the meeting asked IATA to expand the information requested under the "LATAM" (for Latin America) nomenclature with information on the CAR and SAM Regions, so as to include region-specific data on flows and aircraft types.

1.3 The meeting considered that the information requested in the IATA form was adequate, and identified the need for States to require similar information from their general aviation users and domestic non-IATA fleets in order to complete user information. This supplementary information should be part of the database that is being organised by IATA so as to have a single source of information in this regard. In this sense, the meeting formulated the following draft conclusion:

DRAFT CONCLUSION

GNSS/TF/4-1

COLLECTION OF DATA ON EXISTING AND FUTURE AVIONICS IN THE CAR/SAM REGIONS

Taking into account the need to have information about avionics already installed and to be installed on the aircraft of the users for purposes of planning and cost-benefit analysis:

- a) States/Territories and international organisations are urged to collect information about avionics already installed and to be installed on non-IATA domestic aircraft fleets and other general aviation users, suggesting the adoption of a contents similar to that in the IATA form (GNSS/TF/04-IP/4), and to submit these results to the respective ICAO Regional Office by **December 2010**; and

- b) IATA is urged to add the aforementioned information in the IATA database, advising the ICAO CAR/SAM Regional Office about the response to this request.

1.4 As part of the activities approved by the third meeting of the GNSS/TF, Spain presented the table listing navigation aids in existence in CAR/SAM States, based on information collected by the SACCSA project. This table is intended to support the development of the regional roadmap for the evolution of navigation systems.

1.5 During the discussion, emphasis was placed on the importance of this radio aid information, particularly the date of installation and geographical coordinates of existing equipment, in order to assess existing navigation infrastructure, analyse coverage, and support future cost-benefit analyses and the analyses for the establishment of backup infrastructure.

1.6 Since this type of information is important for other tasks of the CNS/ATM Subgroup, the Task Force agreed to submit the table to the Subgroup for its consideration in other tasks and, if necessary, for completing it. The meeting reviewed the table, trying to avoid duplication of information already contained in other sources, such as the FASID and the AIP, and identified the data to be completed by the States. The table will be updated based on the comments received, and Spain will present the final version by 15 October 2009. In view of the above, the meeting deemed it advisable to recommend that this information and the action suggested for completing this table be channelled through the Subgroup.

1.7 WP/2 -- *CAR/SAM strategy for the evolution of air navigation systems*, presented by Brazil, introduced the draft CAR/SAM strategy for the evolution of air navigation systems, which had already been reviewed by the Group in June 2009, reflecting the comments and criticism received from various members of the Task Force and ICAO experts.

1.8 The meeting reflected the comments made by Colombia, Spain and ICAO in the document. Brazil would update the document by 15 October 2009, for presentation to the CNS/ATM Subgroup as a draft. This document shall be updated if major changes are made to its reference documents, such as the CAR/SAM PBN roadmap. The meeting also took note of IP/5, presented by IATA, containing its report on ATS user requirements, to be taken into account when updating the strategy.

Appendix A to the Report on Agenda Item 1
 Apéndice A al Informe sobre la Cuestión 1 del Orden del Día

GNS5/TF/4

STATE/FACILITY	RUNWAY TYPE	FUNCTION	ILS	LOC	Last Date Installation	Change Schedule	Frc Mhz	Lat	Long	Altitude	DME	VOR	Last Date Installation	Change Schedule	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation	Change Schedule	ID	Frc KHz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage	GBAS	SBAS	REMARKS				
ESTADO / INSTALACION	PISTA / TIPO	FUNCION			Fecha última Instalación	Previsión de cambio				Altitud			Fecha última Instalación	Previsión de cambio	ID				Altitud		Fecha última Instalación	Previsión de cambio	ID				Altitud	Cobertura FL	Cobertura horizontal			OBSERVACIONES				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33				
		Route/ Ruta																		In service/ En servicio			REA	370	110043 S	0680607 W		100				Required/ Requerido				
Robore		Route/ Ruta																		In service/ En servicio			OBO	325	181942 S	0594553 W		100				Required/ Requerido				
Rumenabaque		Route/ Ruta																		In service/ En servicio			RBO	330	143003 S	0672729 W						Required/ Requerido				
San Borja		Route/ Ruta													BOR	117.7	145055 S	0664415 W																		
		Route/ Ruta																		In service/ En servicio			SRJ	270	145115 S	0664403 W										
San Ignacio de Velasco		Route/ Ruta																		In service/ En servicio			SNG	270	162246 S	0605747 W										
San Javier		Route/ Ruta																		In service/ En servicio			SJV	640	161938 S	0623615 W										
San Joaquín		Route/ Ruta																		In service/ En servicio			JOA	217	130400 S	0644900 W										
San Matías		Route/ Ruta																		In service/ En servicio			SMT	330	162004 S	0682308 W										
Santa Ana		Route/ Ruta																		In service/ En servicio			ANA	345	134534 S	0652550 W		100					Required/ Requerido			
Santa Cruz de la Sierra	15 / NPA	Aprox / Ate	I												VIR	113.8	173729 S	0630854 W														Required/ Requerido				
	33 / PA 1	Aprox / Ate	I																	In service/ En servicio			VRO	280	173201 S	0631158 W							Required/ Requerido			
		Terminal																		In service/ En servicio																
		Route/ Ruta																		In service/ En servicio								200/45					Required/ Requerido			
		Route/ Ruta																		In service/ En servicio			TCZ	265	174801 S	0631020 W		200						Required/ Requerido		
Sucre		Route/ Ruta																		In service/ En servicio			SUR	116.5	190026 S	0651710 W		125/45						Required/ Requerido		
		Route/ Ruta																		In service/ En servicio			SER	230	190029 S	0651718 W		125						Required/ Requerido		
Tarija	13 / NPA	Aprox / Ate																		In service/ En servicio			TAR	117	213232 S	0644240 W								Required/ Requerido		
		Route/ Ruta																		In service/ En servicio			TAR	117	213232 S	0644240 W								Required/ Requerido		
		Route/ Ruta																		In service/ En servicio														Required/ Requerido		
Trinidad	14 / PA 1	Aprox / Ate	II																	In service/ En servicio			TJA	250	213308 S	0644225 W		80						Required/ Requerido		
	32 / NPA	Aprox / Ate																		In service/ En servicio														Required/ Requerido		
		Route/ Ruta																		In service/ En servicio			TRI	115.9	144744 S	0645612 W									Required/ Requerido	
		Route/ Ruta																		In service/ En servicio								180 / 45						Required/ Requerido		
Villa Montes		Route/ Ruta																		In service/ En servicio			TDD	210	144915 S	0645519 W		80							Required/ Requerido	
		Route/ Ruta																		In service/ En servicio			VTS	219	211504 S	0632418 W										
Yacuba		Route/ Ruta																		In service/ En servicio			YAC	385	215748 S	0633915 W		100							Required/ Requerido	
Brasil																																				
Abrópolis		Route/ Ruta																		In service/ En servicio			AV	290	15751.997 S	03841137.927 W		90								
Aloncos		Route/ Ruta																		In service/ En servicio			AFS	270	226201.22345 S	0432169.8622 W										
Alagonhas		Route/ Ruta																		In service/ En servicio			AGN	310	120916.00 S	0382337.00 W										
Alcantara		Route/ Ruta																		In service/ En servicio			ALC	230	022253.252 S	0442357.305 W										
Aldéia		Terminal																		In service/ En servicio			ADA	112.1	224846.121 S	0420543.557 W										
		Terminal																		In service/ En servicio			ADA	345	224922.725 S	0420547.927 W		30								
Alta floresta		Route/ Ruta																		In service/ En servicio			ATF	113.4	065206.1107 S	0560617.7444 W		200/45								
		Route/ Ruta																		In service/ En servicio			ATF	245	065214.0345 S	0680005.2732 W		200								
Altamira		Route/ Ruta																		In service/ En servicio			ATM	113.2	031457.6940 S	0521451.738 W										
		Route/ Ruta																		In service/ En servicio			ATM	295	031523.1400 S	0521503.161 W										
Amapa		Route/ Ruta																		In service/ En servicio			AMP	275	020407.948 S	0505138.054 W		180								
Andólois		Route/ Ruta																		In service/ En servicio			ANP	115.4	161538.706 S	0485931.397 W										
		Route/ Ruta																		In service/ En servicio			ANP	415	161902.728 S	0490224.963 W										
Araçáçu		Route/ Ruta																		In service/ En servicio																
		Route/ Ruta																		In service/ En servicio			112	AVJ	109583.702 S	0370417.074 W										
		Route/ Ruta																		In service/ En servicio																
Araçatuba		Route/ Ruta																		In service/ En servicio			ARA	265	210821.354 S	0502536.131 W										
Araçuaia		Route/ Ruta																		In service/ En servicio			ARG	230	082112.985 S	0491757.205 W										
Araguaína		Route/ Ruta																		In service/ En servicio			AGI	205	071401.339 S	0481434.105 W										
		Route/ Ruta																		In service/ En servicio			AAQ	205	214846.764 S	0480822.331 W										
Araguaçá		Route/ Ruta																		In service/ En servicio																
Araçá		Route/ Ruta																		In service/ En servicio			ARX	117	194120.571 S	0470338.077 W										
		Route/ Ruta																		In service/ En servicio																
Assis		Route/ Ruta																		In service/ En servicio			ARX	210	193339.713 S	0465752.781 W										

Appendix A to the Report on Agenda Item 1
 Apéndice A al Informe sobre la Cuestión 1 del Orden del Día

GNSS/TF/4

STATE/ FACILITY	RUNWAY/ TYPE	FUNCTION	ILS	LOC	Last Date Installation	Change Schedule	Frc Mhz	Lat	Long	Altitude	DME	VOR	Last Date Installation	Change Schedule	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation	Change Schedule	ID	Frec KHz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage	GBAS	SBAS	REMARKS						
ESTADO / INSTALACION	PISTA / TIPO	FUNCION			Fecha última Instalación	Previsión de cambio				Altitud			Fecha última Instalación	Previsión de cambio	ID				Altitud		Fecha última Instalación	Previsión de cambio	ID				Altitud	Cobertura FL	Cobertura horizontal			OBSERVACIONES						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33						
		Terminal																		In service/ En servicio																		
		Route/ Ruta													MAN	115.2	030213.166 S	0600729.604 W															20045					
Manicoré		Route/ Ruta																		In service/ En servicio			MCR	310	054825.797 S	0611655.086 W												
Marabá		Route/ Ruta													MRB	113.7	052205.34 S	0490807.042 W																				
		Route/ Ruta																		In service/ En servicio			MRB	370	052216.946 S	0490804.099 W												
Maricá		Terminal																		In service/ En servicio													23045					
		Route/ Ruta																		In service/ En servicio																		
Marília		Route/ Ruta																		In service/ En servicio			MRA	415	22141.666 S	049545.452 W												
Maritím		Route/ Ruta																		In service/ En servicio			MAR	375	222126 S	0400626 W												
Maripóá		Route/ Ruta																		In service/ En servicio			MRN	320	230833.0107 S	0520021.8792 W												
Marití		Route/ Ruta																		In service/ En servicio			MAE	260	233049.362 S	0463750.452 W												
Maxaranguape		Route/ Ruta																		In service/ En servicio			MXN	205	052310.314 S	0363151.546 W												
Merluza		Route/ Ruta																		In service/ En servicio			MLZ	1645	251600.727 S	0451509.807 W												
Moita		Route/ Ruta																		In service/ En servicio			NR	305	240301.699 S	0461550.817 W												
Montes Claros		Route/ Ruta																		In service/ En servicio			MCL	3310	164212.355 S	0434909.17 W								100				
Mossoro		Route/ Ruta													MSS	112.4	051149.8780 S	0372152.321 W																20045				
		Route/ Ruta																		In service/ En servicio			MSS	275	051136.53 S	0372152.338 W								90				
Moz		Route/ Ruta																		In service/ En servicio			MOZ	285	014501.290 S	0521401.797 W								90				
		Route/ Ruta																		In service/ En servicio			NAM	390	222610.672 S	0402525.707 W												
Namorado		Route/ Ruta																		In service/ En servicio														20045				
Namugue		Route/ Ruta													NUJ	122.2	175308.012 S	0402138.34 W																	20045			
Natal	16 L / PA 1	Aprox / Ate	I																	In service/ En servicio																		
	32 R / NPA	Aprox / Ate																		In service/ En servicio																		
		Terminal																		In service/ En servicio																		
		Route/ Ruta																		In service/ En servicio																20045		
		Route/ Ruta													NTL	114.3	055429.968 S	0351455.331 W																				
		Route/ Ruta																		In service/ En servicio			NTL	400	055359.7280 S	0351447.071 W												
Navegantes		Route/ Ruta																		In service/ En servicio			NVG	235	265232.372 S	0483909.992 W												
		Route/ Ruta																		In service/ En servicio			NOA	215	224306.813 S	0432850.124 W												
Nica		Route/ Ruta																		In service/ En servicio																		
Noronha		Route/ Ruta													NOR	133.5 ?	035154.6031 S	0322653.895 W																				
		Route/ Ruta																		In service/ En servicio			NOR	300	035130.1942 S	0322541.688 W												
Olinda		Route/ Ruta																		In service/ En servicio			OIA	340	035135.225 S	0514752.444 W												
Opaíba		Route/ Ruta																		In service/ En servicio			OLD	380	080218.797 S	0345707.242 W												
		Route/ Ruta																		In service/ En servicio			ORH	315	225824.422 S	0454444.343 W												
Ourinhos		Route/ Ruta																		In service/ En servicio																20045		
Palmas		Route/ Ruta													PMS	112.2	101716.837 S	0482130.714 W																		150		
		Route/ Ruta																		In service/ En servicio			PMS	255	101726.36 S	0482156.835 W												
Pampo		Route/ Ruta																		In service/ En servicio			PPM	285	224740.444 S	0404546.889 W												
Paracatu		Route/ Ruta																		In service/ En servicio			PKT	300	171301.595 S	0465601.754 W												
Paranaíba		Route/ Ruta																		In service/ En servicio			PNG	340	253204.719 S	0483151.028 W									70			
Pari-cachoeira		Route/ Ruta																		In service/ En servicio			PCR	325	001542.6 N	0694718.6 W												
Parintins		Route/ Ruta													PRI	114.1	024002.2118 S	0564823.199 W																				
Parnaíba		Route/ Ruta																		In service/ En servicio																		
Passo Fundo		Route/ Ruta													PFD	112.7	281441.726 S	0522001.3735 W																				
		Route/ Ruta																		In service/ En servicio			PFD	370	281426.896 S	0521947.188 W												
Patos de minas		Route/ Ruta																		In service/ En servicio			PAT	385	180407 S	0462936 W												
Paulo Afonso		Route/ Ruta													PAF	113.3	092409.894 S	0381519.679 W																		20045		
		Route/ Ruta																		In service/ En servicio			PAF	325	092359.348 S	0381453.547 W										120		
Pelada		Route/ Ruta																		In service/ En servicio			PEL	410	030834.074 S	0596937.6 W												
Pelotas		Route/ Ruta													PTS	113.3	314307.675 S	0521940.597 W																				

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ESTADO / INSTALACION	PISTA / TIPO	FUNCION								Altitud									Altitud								Altitud	Cobertura FL	Cobertura horizontal			OBSERVACIONES			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
		Route/ Ruta																		In service/ En servicio													Required/ Requerido		
Gran Carman		Route/ Ruta													GCM	115.6	191721.82 N	812219.32 W																	
		Route/ Ruta																			In service/ En servicio		ZIY	191708.75 N	812309.87 W										
Chile																																			
Araucagasta	18 / NPA	Apron / Ate		In service/ En servicio											FAG	114.9	23 28 01 S	70 26 52 W																Required/ Requerido	
	36 / NPA	Apron / Ate		In service/ En servicio											FAG	114.9	23 28 01 S	70 26 52 W																	Required/ Requerido
		Terminal/Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
Arica	02 / NPA	Apron / Ate		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
	20 / NPA	Apron / Ate		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Terminal		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio											ARI	116.5	18 22 10 S	70 20 47 W																	Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
Balmaceda		Route/ Ruta		In service/ En servicio											BAL	115.5	45 54 47 S	71 42 45 W																	Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio		BAL	390	45 55 10 S	71 41 54 W									Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
		Route/ Ruta		In service/ En servicio																	In service/ En servicio													Required/ Requerido	
Concepción	02 / PA 1	Apron / Ate	I	In service/ En servicio			109.9	36 45 30 S	73 03 17 W						CAR	114.3	36 45 20 S	73 03 11 W																Required/ Requerido	
	20 / NPA	Terminal		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
Constitución		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
Copilapo	XX/PA 1	Apron/Ate	I	In service/ En servicio			110.1	27 16 29 S	70 46 41 W												In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														Required/ Requerido
		Route/ Ruta		In service/ En servicio																	In service/ En servicio														

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ESTADO / INSTALACION	PISTA / TIPO	FUNCION			Fecha última Instalación	Previsión de cambio				Altitud			Fecha última Instalación	Previsión de cambio	ID				Altitud		Fecha última Instalación	Previsión de cambio	ID				Altitud	Cobertura FL	Cobertura horizontal	GBAS	SBAS	OBSERVACIONES										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33										
Santiago Ap Arturo Merino	17 / PA 3	Aprox / Ate	III	In service/ En servicio			110.3	33 24 41 S	70 47 05 W		In service/ En servicio	In service/ En servicio			AMB	116.1	33 25 11 S	70 47 04 W													Required/ Requerido											
	35 / NPA	Aprox / Ate	I	In service/ En servicio			111.1	33 24 29 S	70 48 06 W		In service/ En servicio	In service/ En servicio			PDH	117.2	33 24 53 S	70 48 05 W													Required/ Requerido											
		Route/ Ruta																		In service/ En servicio												Required/ Requerido										
Santiago AD El Bosque											In service/ En servicio	In service/ En servicio			BQE	117.5	33 30 00 S	70 42 00 W														Required/ Requerido										
Santiago AD Los Cerrillos											In service/ En servicio	In service/ En servicio			STI	112.3	33 30 08 S	70 42 11 W															Required/ Requerido									
Santo Domingo		Route/ Ruta									Required/ Requerido	In service/ En servicio			SON	113.7	33 39 57 S	71 37 10 W									20045						Required/ Requerido									
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio			SON	355	33 39 04 S	71 36 46 W						Required/ Requerido										
Tabon		Route/ Ruta									In service/ En servicio	In service/ En servicio			TBN	113.9	32 55 06 S	70 50 14 W									90						Required/ Requerido									
Talagante		Route/ Ruta									Required/ Requerido	In service/ En servicio								In service/ En servicio			TAL	240	33 40 59 S	70 55 58 W							Required/ Requerido									
Temuco	06 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio			TCO	114.1	38 45 59 S	72 37 51 W																Required/ Requerido								
	24 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio			TCO	114.1	38 45 59 S	72 37 51 W																Required/ Requerido								
		Route/ Ruta									In service/ En servicio	In service/ En servicio			TCO	114.1	38 45 59 S	72 37 51 W			In service/ En servicio			TCO	360	38 46 00 S	72 36 53 W		90/45					Required/ Requerido								
Tongoy		Route/ Ruta									In service/ En servicio	In service/ En servicio			TOY	115.1	30 16 35 S	71 28 25 W									20045								Required/ Requerido							
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio															Required/ Requerido							
Valdivia		Route/ Ruta									In service/ En servicio	In service/ En servicio			VLD	114.5	39 40 16 S	73 05 08 W																		Required/ Requerido						
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																Required/ Requerido						
Ventanas		Route/ Ruta									In service/ En servicio	In service/ En servicio			VTN	113.3	32 44 19 S	71 29 46 W																			Required/ Requerido					
Quintero		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																Required/ Requerido						
Villa del Mar Colombia		Aprox/Ate	I	In service/ En servicio			110.7	32 56 39 S	71 28 13 W																																	
Arauca		Route/ Ruta									In service/ En servicio	In service/ En servicio			AUC	114	07 04 02 N	070 43 52 W										20045								Required/ Requerido						
Abcoanal		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																Required/ Requerido						
Ambalema		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
Araucacura		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
Armenia		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
Bahia Solano		Route/ Ruta									In service/ En servicio	In service/ En servicio			EJA	115.9	07 01 43 N	073 48 20 W																			Required/ Requerido					
Barranca Bermeja		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
Barranca de Upiá		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
Barranquilla	04 / PA 1	Aprox / Ate	I	In service/ En servicio							In service/ En servicio	In service/ En servicio								In service/ En servicio																	Required/ Requerido					
	22 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio								In service/ En servicio																		Required/ Requerido				
		Terminal/Route/ Ruta									In service/ En servicio	In service/ En servicio			BAG	113.7	10 47 48 N	074 51 37 W																					Required/ Requerido			
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																		Required/ Requerido				
Santa Fe de Bogotá	13 R / PA 2	Aprox / Ate	II	In service/ En servicio							In service/ En servicio	In service/ En servicio								In service/ En servicio																		Required/ Requerido				
	31 L / Visual										In service/ En servicio	In service/ En servicio								In service/ En servicio																		Required/ Requerido				
	13 L / PA 2	Aprox / Ate	II	In service/ En servicio							In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
	31 R / Visual										In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
		Terminal									In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
		Route/ Ruta									In service/ En servicio	In service/ En servicio			BOG	113.9	04 50 48 N	074 19 24 W			In service/ En servicio																		Required/ Requerido			
Bucaramanga		Route/ Ruta									In service/ En servicio	In service/ En servicio			BGA	113.5	07 07 54 N	073 11 04 W																					Required/ Requerido			
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
Buenaventura		Route/ Ruta									In service/ En servicio	In service/ En servicio			BUN	112.9	03 49 32 N	076 59 45 W																					Required/ Requerido			
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
Buvis		Route/ Ruta									In service/ En servicio	In service/ En servicio			BUV	116.2	05 31 56 N	073 51 31 W																						Required/ Requerido		
Calí	01 / PA 1	Aprox / Ate	I	In service/ En servicio							In service/ En servicio	In service/ En servicio								In service/ En servicio																		Required/ Requerido				
	19 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
		Terminal/Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio																			Required/ Requerido			
Carepa		Route/ Ruta									In service/ En servicio	In service/ En servicio			LCE	112.6	07 49 05 N	076 43 19 W																								

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																																OBSERVACIONES		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		
Santiago de Cuba	09 / NPA	Aprox / Ate			In service/ En servicio						In service/ En servicio	In service/ En servicio																				Required/ Requerido		
	27 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio			UCU	113.3	195840.08 N	0754921.56 W										17045				Required/ Requerido		
Vardier		Terminal																														Required/ Requerido		
		Route/ Ruta													UVA	114.8	230128.87 N	0812712.93 W					UCU	339	196822.36 N	0754915.3 W		70				Required/ Requerido		
Varadero	06 / PA 1	Aprox / Ate		I	Required/ Requerido																											Required/ Requerido		
	24 / NPA																															Required/ Requerido		
		Terminal																															Required/ Requerido	
Tunas		Route/ Ruta																															Required/ Requerido	
		Route/ Ruta																															Required/ Requerido	
Zanago		Route/ Ruta																															Required/ Requerido	
Dominica																																	Required/ Requerido	
Menville Hall	Visual																																Required/ Requerido	
Rosseau	Visual																																Required/ Requerido	
Republica Dominicana																																	Required/ Requerido	
Barahona	12 / NPA	Aprox / Ate																															Required/ Requerido	
Cabo Rojo		Route/ Ruta																															Required/ Requerido	
		Route/ Ruta																																Required/ Requerido
Hemera	01 / NPA	Aprox / Ate																															Required/ Requerido	
	19 / NPA	Aprox / Ate																															Required/ Requerido	
La Romana	Visual																																Required/ Requerido	
Puerto Plata	08 / NPA	Aprox / Ate																															Required/ Requerido	
	26 / NPA	Aprox / Ate																															Required/ Requerido	
		Terminal																															Required/ Requerido	
Punta Cana	09 / NPA	Aprox / Ate																															Required/ Requerido	
Punta Caucedo		Terminal																															Required/ Requerido	
		Route/ Ruta																															Required/ Requerido	
		Route/ Ruta																																Required/ Requerido
Santiago	Visual																																Required/ Requerido	
Santo Domingo	17 / PA 1	Aprox / Ate		II D																													Required/ Requerido	
Ecuador	35 / NPA																																Required/ Requerido	
Ambato		Route/ Ruta													AMV	112.7	011709 S	0793247 W																Required/ Requerido
Araucabi		Terminal																															Required/ Requerido	
		Route/ Ruta																																Required/ Requerido
Bahia		Route/ Ruta																																Required/ Requerido
Chongon		Terminal																															Required/ Requerido	
COCCA		Route/ Ruta																															Required/ Requerido	
Condorcocha		Terminal																															Required/ Requerido	
		Route/ Ruta													QIT	115.3	000219 S	0783041 W															Required/ Requerido	
Cuenca		Route/ Ruta													CUV	114.5	025006 S	0785501 W															Required/ Requerido	
		Route/ Ruta																															Required/ Requerido	
Esmeraldas		Route/ Ruta													ESV	115.7	005921 N	0793736 W																Required/ Requerido
		Route/ Ruta																																Required/ Requerido
Galapagos		Route/ Ruta													GLV	112.3	002740 S	0901531 W																Required/ Requerido
		Route/ Ruta																																Required/ Requerido
Guayaquil	03 / NPA	Aprox / Ate																															Required/ Requerido	
	21 / PA 1	Aprox / Ate		II	In service/ En servicio																												Required/ Requerido	
		Terminal																															Required/ Requerido	
		Route/ Ruta																																Required/ Requerido
Guataquiza		Route/ Ruta																																Required/ Requerido
Isabela		Route/ Ruta																																Required/ Requerido
Lago agrio		Route/ Ruta													LAV	112.3	000608 N	0765123 W																Required/ Requerido
		Route/ Ruta																																Required/ Requerido
Latacunga	18 / PA 1	Aprox / Ate		I																													Required/ Requerido	
		Route/ Ruta													LTV	117.1	005627 S	0783703 W																Required/ Requerido
Lota		Route/ Ruta																															Required/ Requerido	
Macara		Route/ Ruta																															Required/ Requerido	
Macas		Route/ Ruta													MSV	112.5	021627 S	0780636 W																Required/ Requerido
		Route/ Ruta																																Required/ Requerido

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STATE/ FACILITY	RUNWAY/ TYPE	FUNCTION	ILS	LOC	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	Frc Mhz	Lat	Long	Altitude	OME	VOR	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frec Khz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage/ Cobertura horizontal	GBAS	SBAS	REMARKS			
ESTADO / INSTALACION	PISTA / TIPO	FUNCION								Altitud									Altitud								Cobertura FL					OBSERVACIONES			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
Machala		Route/ Ruta									In service/ En servicio	In service/ En servicio			MHV	112.1	031742 S	0795639 W		In service/ En servicio							140/25					Required/ Requerido			
Manta	23 / PA 1	Aprox / Ate Terminal	I D								In service/ En servicio	In service/ En servicio			MNV	113.9	005605 S	0803943 W		In service/ En servicio							60/25					Required/ Requerido			
Monjas Sur		Route/ Ruta									In service/ En servicio	In service/ En servicio			OMS	114.8	001408 S	0782840 W		In service/ En servicio															
Montalvo		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		MTL	331	020412 S	0765808 W									
Olmado		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		OLM	400	000948 N	0780338 W									
Palma		Terminal									In service/ En servicio	In service/ En servicio			PAV	113.1	013050 S	0780241 W		In service/ En servicio			Pal	365	020130 S	0794832 W	40					Required/ Requerido			
Pastaza		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		PTZ	340	013058 S	0780236 W									
Portoviejo		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		PTN	390	010246 S	0802806 W									
Quito	17 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio											Required/ Requerido			
	35 / PA 1	Aprox / Ate	II	In service/ En servicio							In service/ En servicio	In service/ En servicio									In service/ En servicio											Required/ Requerido			
Riobamba		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														
Salinas		Route/ Ruta									In service/ En servicio	In service/ En servicio			SAV	114.1	021311 S	0805824 W		In service/ En servicio							100/250								
San Cristobal		Route/ Ruta									In service/ En servicio	In service/ En servicio			SCV	113.1	005422 S	0893709 W		In service/ En servicio															
Tarapoa		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		SCR	300	005434 S	0893658 W									
Tena		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		TRP	328	000753 S	0761929 W									
Tulcan		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		TNA	465	005903 S	0774942 W									
Tulcan		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio		TLC	418	004926 N	0774114 W									
EI Salvador																																			
San Salvador/EI Salvador	07 / PA 1	Aprox / Ate	II	Required/ Requerido							In service/ En servicio	In service/ En servicio									In service/ En servicio												Required/ Requerido		
	25 / NPA										In service/ En servicio	In service/ En servicio									In service/ En servicio												Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio						200/45						Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio						235						Required/ Requerido		
San Salvador/Lopango	15 / NPA	Aprox / Ate		In service/ En servicio							In service/ En servicio	In service/ En servicio									In service/ En servicio												Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio							200/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
French Antilles (F)																																			
Frot de Franco	09 / PA 1	Aprox / Ate	II D								In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
	27 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio							200/45						Required/ Requerido	
Pointe-a-Pitre	11 / PA 1	Aprox / Ate	II D								In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
	29 / NPA										In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio							200/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio							250						Required/ Requerido	
Saint Barthelemy	Visual										In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
Saint Martin	Visual										In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
French Guiana																																			
Cayenne	08 / PA 1	Aprox / Ate	II D								In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido	
	26 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								200/45						Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								300					Required/ Requerido	
Granada																																			
Carriacou	Visual										In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
Saint Georges	10 / PA 1	Aprox / Ate	II								In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
	28 / NPA										In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								200/45						Required/ Requerido
Guatemala																																			
Chinufu		Terminal									Required/ Requerido	Required/ Requerido									Required/ Requerido														Required/ Requerido
		Route/ Ruta									Required/ Requerido	Required/ Requerido									Required/ Requerido														Required/ Requerido
Plores	10 / PA 1	Aprox / Ate	I D								In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
Guatemala	01 / NPA	Aprox / Ate	II D	Required/ Requerido							In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido
	19 / PA 1	Aprox / Ate	II D	Required/ Requerido																															

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STATE/ FACILITY	RUNWAY/ TYPE	FUNCTION	ILS	LOC	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	Frc Mhz	Lat	Long	Altitude	DME	VOR	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frec Khz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage/ Cobertura horizontal	GBAS	SBAS	REMARKS								
ESTADO / INSTALACION	PISTA / TIPO	FUNCION																														OBSERVACIONES								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33								
		Terminal																		In service/ En servicio												Required/ Requerido								
		Route/ Ruta													AUR	114.5	143527.84 N	903134.5 W															Required/ Requerido							
		Route/ Ruta																		In service/ En servicio		GUA	375	145518.93 N	902840.67 W								Required/ Requerido							
		Route/ Ruta																		In service/ En servicio													Required/ Requerido							
Itapa		Route/ Ruta																		In service/ En servicio													Required/ Requerido							
		Route/ Ruta													TIK	113.3	165505.95 N	895233.38 W																Required/ Requerido						
		Route/ Ruta																		In service/ En servicio																				
Popun		Route/ Ruta																		In service/ En servicio		TKL	385	165456.26 N	895248.48 W															
Puerto Barrios	Visual	Route/ Ruta																		In service/ En servicio		POP	363	1619.5 N	8925.3 W									Required/ Requerido						
		Route/ Ruta													RAB	116.1	150033.29 N	902812.03 W																Required/ Requerido						
Rabinal		Route/ Ruta																		In service/ En servicio																				
		Route/ Ruta																		In service/ En servicio		RBN	313	150041.09 N	902809.31 W										Required/ Requerido					
Retalhuleu		Route/ Ruta																		In service/ En servicio		REU	340	1431.3 N	9141.8 W															
San José	15 / NPA	Aprox / Ate																		In service/ En servicio														Required/ Requerido						
		Terminal																		In service/ En servicio															Required/ Requerido					
		Route/ Ruta													SJD	114.1	13563.5 N	905106.06 W																		Required/ Requerido				
Guyana																				In service/ En servicio																				
Timehri	06 / PA 1	Aprox / Ate		II																In service/ En servicio															Required/ Requerido					
		Terminal																		In service/ En servicio																Required/ Requerido				
		Route/ Ruta																		In service/ En servicio																Required/ Requerido				
		Route/ Ruta																		In service/ En servicio		TIM	113.5	06291 N	0581528 W											20045			Required/ Requerido	
		Route/ Ruta																		In service/ En servicio																Required/ Requerido				
Kamarango		Route/ Ruta																		In service/ En servicio		TIM	356	06300 N	0581400 W											300			Required/ Requerido	
Kaleteur		Route/ Ruta																		In service/ En servicio		KAM	406	055300 N	0604800 W													Required/ Requerido		
Kata		Terminal																		In service/ En servicio		KAI	342	051300 N	0581600 W													Required/ Requerido		
		Route/ Ruta																		In service/ En servicio																Required/ Requerido				
Haiti																				In service/ En servicio																				
Cap Haitien	Visual	Route/ Ruta													HCN	113.9	19 43 42 N	072 11 37 W																		Required/ Requerido				
		Route/ Ruta																		In service/ En servicio		HTN	288	19 43 54 N	072 11 37 W													Required/ Requerido		
Puerto Principe	09 / PA 1	Aprox / Ate		II D																In service/ En servicio																Required/ Requerido				
	27 / NPA	Aprox / Ate																		In service/ En servicio																	Required/ Requerido			
		Terminal													PAP	115.3	18 34 36 N	072 18 18 W																		Required/ Requerido				
		Route/ Ruta													CBN	113.2	18 26 18 N	072 16 30 W																			Required/ Requerido			
Honduras																				In service/ En servicio																				
Oboleon		Route/ Ruta																		In service/ En servicio																	Required/ Requerido			
Copan Ruinas		Route/ Ruta																		In service/ En servicio																	Required/ Requerido			
La Ceiba	06 / NPA	Aprox / Ate													LCE	111.7	15 44 14 N	086 53 26 W																			Required/ Requerido			
		Route/ Ruta													BTO	113.5	15 44 06 N	086 51 48 W																			Required/ Requerido			
		Route/ Ruta																		In service/ En servicio																				
La mesa		Route/ Ruta													LMS	113.1	15 28 11.38 N	087 54 30.67 W																						
		Route/ Ruta																		In service/ En servicio																				
		Route/ Ruta																		In service/ En servicio		LMS	370	15 26 55.89 N	087 55 56.64 W															
Picacho		Route/ Ruta																		In service/ En servicio		PIC	334	14 08 57 N	087 12 21 W															
Puerto Lempira		Route/ Ruta																		In service/ En servicio		PLP	320	15 15 34 N	083 46 43 W															
Punta Castilla		Route/ Ruta																		In service/ En servicio		CTL	289	16 00 26 N	085 58 26 W															
Roatan		Terminal																		In service/ En servicio																	Required/ Requerido			
		Route/ Ruta													ROA	113.8	16 18 54 N	086 31 54 W																			Required/ Requerido			
San Pedro Sula	03 / NPA	Aprox / Ate																		In service/ En servicio																	Required/ Requerido			
	21 / PA 1	Aprox / Ate		I D	RVM		110.7	15 26 29.98 N	087 55 59.28 W											In service/ En servicio																	Required/ Requerido			
		Terminal																		In service/ En servicio																	Required/ Requerido			
		Route/ Ruta																		In service/ En servicio																	Required/ Requerido			
		Route/ Ruta																		In service/ En servicio		SAP	360	15 31 12.01 N	087 51 51.61															

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ESTADO / INSTALACION	PISTA / TIPO	FUNCION								Altitud									Altitud														OBSERVACIONES			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33				
		Route/ Ruta																		In service/ En servicio																
Willemstad/Curacao	11 / PA 1	Aprox / Ate	II D	In service/ En servicio			111.9	12 11 18 N	68 56 26 W		In service/ En servicio	In service/ En servicio								In service/ En servicio			PJM	308	18 02 33 N	63 07 03 W		255				Required/ Requerido				
	29 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			PJG	116.7	12 12 01 N	69 00 36 W			In service/ En servicio								200/45					Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio							225					Required/ Requerido			
Nicaragua																																				
Managua	09 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
	27 / NPA	Aprox / Ate	II								In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								200/45					Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								280					Required/ Requerido		
Puerto Cabezas	09 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio													Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio								180/45					Required/ Requerido		
Panamá																																				
Alonso Valderrama		Route/ Ruta																			In service/ En servicio			CHE	440	075856.39 N	0802436.45 W									Required/ Requerido
Panama	Visual																																		Required/ Requerido	
Bocas del Toro	09 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
	26 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio			BDT	114.9	092019.86 N	0821506.34 W			In service/ En servicio									90/45					Required/ Requerido	
Chanquinola	Visual																																		Required/ Requerido	
David	04 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio									In service/ En servicio			DAV	350	082323.39 N	0822541.16 W								Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
France		Route/ Ruta									In service/ En servicio	In service/ En servicio			FNC	109	092177.72 N	0795156.31 W			In service/ En servicio															Required/ Requerido
La Palma		Route/ Ruta									In service/ En servicio	In service/ En servicio			PML	113.1	082422.39 N	0780818.88 W			In service/ En servicio									180/45					Required/ Requerido	
Panama Int/Tucumen	03 R / PA 1	Aprox / Ate	II	INAT			110.7	090423.33 N	0782241.14 W		In service/ En servicio	In service/ En servicio									In service/ En servicio			AT	326	090224.94 N	0792348.5 W							Required/ Requerido		
	21 L / NPA	Aprox / Ate																																	Required/ Requerido	
	03 L / NPA	Aprox / Ate																																	Required/ Requerido	
		Terminal									In service/ En servicio	In service/ En servicio			TUM	117.1	090305.62 N	0792400.21 W																		Required/ Requerido
Santiago		Route/ Ruta									In service/ En servicio	In service/ En servicio			STG	114.5	080520.48 N	0805623 W																		Required/ Requerido
Taboga		Route/ Ruta									In service/ En servicio	In service/ En servicio			TBG	110	084715.26 N	0793343.28 W			In service/ En servicio									200/45					Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
Tupiza		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio															Required/ Requerido
Tupiza		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio															Required/ Requerido
Paraguay																																				
Asunción	02 / NPA	Aprox / Ate																																		Required/ Requerido
	20 / PA 1	Aprox / Ate	II D								In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Terminal									In service/ En servicio	In service/ En servicio									In service/ En servicio															Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio			VAS	115.9	25 14 39 S	057 31 19 W			In service/ En servicio									200/45						Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio															Required/ Requerido
Ciudad del Este	23 / PA 1	Aprox / Ate	II								In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
	05 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio			YES	116.3	25 27 36 S	054 51 00 W			In service/ En servicio															Required/ Requerido
Concepción		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio			CON	405	23 26 18 S	067 25 48 W		65					Required/ Requerido		
Estigarribia		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
Filadelfia		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio														Required/ Requerido	
Itaipava		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio			ITU	225	25 24 31 S	054 37 18 W							Required/ Requerido		
MCAL Estigarribia		Route/ Ruta									In service/ En servicio	In service/ En servicio									In service/ En servicio			M												

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STATE/ FACILITY	RUNWAY/ TYPE	FUNCTION	ILS	LOC	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	Frc Mhz	Lat	Long	Altitude	DME	VOR	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frec Khz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage/ Cobertura horizontal	GBAS	SBAS	REMARKS		
ESTADO / INSTALACION	PISTA / TIPO	FUNCION																														OBSERVACIONES		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		
La Fria		Route/ Ruta									In service/ En servicio	In service/ En servicio			LFA	113	081441 N	0721605.3 W		In service/ En servicio			PLJ	310	063407 N	0664810.2 W								
Los Piqueros		Route/ Ruta									In service/ En servicio	In service/ En servicio			MIQ	114.8	103644.1 N	0665917.3 W		In service/ En servicio			MIQ	292	103639.1 N	0665903.3 W								
Maracaibo	02 L / PA 1	Aprox / Ate	II								In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido										Required/ Requerido			
	20 R / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido										Required/ Requerido			
		Terminal									In service/ En servicio	In service/ En servicio			MAR	115.7	103503.1 N	0714246.3 W		In service/ En servicio							200/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido					280						Required/ Requerido		
Maracay		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Margarita	09 / PA 1	Aprox / Ate	II								In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio			MTA	114.1	105524.1 N	0635741.2 W		In service/ En servicio	Required/ Requerido						200/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido					300						Required/ Requerido		
Maun		Terminal									In service/ En servicio	In service/ En servicio			MUN	115.3	094449.1 N	0630908.2 W		In service/ En servicio	Required/ Requerido						190/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido					190						Required/ Requerido		
Mene Maucra		Route/ Ruta									In service/ En servicio	In service/ En servicio			MAU	117.9	104127.1 N	0710224.3 W		In service/ En servicio	Required/ Requerido						190/45						Required/ Requerido	
Monchal		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
No León		Route/ Ruta									In service/ En servicio	In service/ En servicio			NOL	116.1	102623.1 N	0670932.3 W		In service/ En servicio	Required/ Requerido												Required/ Requerido	
Ocamo		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Paraguana	09 / NPA	Aprox / Ate									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Visual									In service/ En servicio	In service/ En servicio			PRG	113.6	114700.1 N	0700800.3 W		In service/ En servicio	Required/ Requerido						200/45						Required/ Requerido	
Paramillo		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Puerto Ayacucho		Route/ Ruta									In service/ En servicio	In service/ En servicio			PAY	112.8	053708 N	0673632.3 W		In service/ En servicio	Required/ Requerido													Required/ Requerido
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Puerto Cabello		Terminal									In service/ En servicio	In service/ En servicio			PBL	117.7	102913.3 N	0680435.3 W		In service/ En servicio	Required/ Requerido						200/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Punta San Juan		Terminal									In service/ En servicio	In service/ En servicio			PNA	112.9	111014.1 N	0682458.3 W		In service/ En servicio	Required/ Requerido						70/45						Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
San Antonio del Tachira	16 / NPA										In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Visual									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
San Carlos de rio Negro		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
San Felipe		Route/ Ruta									In service/ En servicio	In service/ En servicio			SFD	112.1	075308 N	0672614.3 W		In service/ En servicio	Required/ Requerido													Required/ Requerido
San Fernando de Apure		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
San Juan de Manapiare		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
San Sebastián		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Santa Barbara de Bannas		Route/ Ruta									In service/ En servicio	In service/ En servicio			STB	114.9	085901 N	0715618.3 W		In service/ En servicio	Required/ Requerido						100/45						Required/ Requerido	
Santa Barbara del Zulia		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			SOM	116.5	085638.1 N	0640923.2 W		In service/ En servicio	Required/ Requerido						80/45						Required/ Requerido	
San Tome		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Tucupita		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Tuy		Route/ Ruta									In service/ En servicio	In service/ En servicio			TUY	115.2	101742.1 N	0664750.3 W		In service/ En servicio	Required/ Requerido													Required/ Requerido
		Terminal									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Tocoma		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Tucupita		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Tumeremo		Route/ Ruta									In service/ En servicio	In service/ En servicio			TMO	114.4	071503 N	0613101.2 W		In service/ En servicio	Required/ Requerido												Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Ujoquen		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Ulman		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Valencia	28 / NPA	Aprox / Ate									Required/ Requerido	Required/ Requerido								In service/ En servicio	Required/ Requerido											Required/ Requerido		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			VAL	117.4	100857.2 N	0675522.5 W		In service/ En servicio	Required/ Requerido												Required/ Requerido	
		Route/ Ruta									In service/ En servicio	In service/ En servicio								In service/ En servicio	Required/ Requerido											Required/ Requerido		
Valera		Route/ Ruta									In service/ En servicio	In service/ En servicio			VRA	114.4	092539.1 N	0703325.3 W		In service/ En servicio	Required/ Requerido													

Appendix A to the Report on Agenda Item 1
 Apéndice A al Informe sobre la Cuestión 1 del Orden del Día

GNSS/TF/4

STATE/ FACILITY	RUNWAY/ TYPE	FUNCTION	ILS	LOC	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	Frc Mhz	Lat	Long	Altitude	DME	VOR	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frc Mhz	Lat	Long	Altitude	NDB	Last Date Installation/ Fecha última Instalación	Change Schedule/ Previsión de cambio	ID	Frec Khz	Lat	Long	Altitude	FL Coverage	Horizontal Coverage/ Cobertura horizontal	GBAS	SBAS	REMARKS				
ESTADO / INSTALACION	PISTA / TIPO	FUNCION								Altitud									Altitud								Altitud	Cobertura FL	Cobertura horizontal			OBSERVACIONES				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33				
Valle de Pasqua		Route/ Ruta									In service/ En servicio	In service/ En servicio			VPA	117.8	091344.1 N	0655902.2 W		In service/ En servicio			YAR	260	100259.1 N	0890442.3 W										
Yanigua		Route/ Ruta									In service/ En servicio	In service/ En servicio			BAL	113.9	101110.1 N	0673249.3 W																		
B.A. El Libertador		Route/ Ruta									In service/ En servicio	In service/ En servicio			CH 100X	073411 N	0720107.3 W																			
B.A. Mayor Buenaventura		Route/ Ruta									In service/ En servicio	In service/ En servicio																								
Virgin Islands (UK)																																				
Roadtown	07 / NPA	Apron / Ate																															Required/ Requerido			
Virgin Gorda		Visual																															Required/ Requerido			
Virgin Islands (USA)																																				
Christians	09 / PA 1	Apron / Ate		II							In service/ En servicio	In service/ En servicio																					Required/ Requerido			
	27 / NPA	Apron / Ate									In service/ En servicio	In service/ En servicio																					Required/ Requerido			
		Route/ Ruta									In service/ En servicio	In service/ En servicio																						Required/ Requerido		
Saint Thomas	10 / PA 1	Apron / Ate		I							In service/ En servicio	In service/ En servicio																					Required/ Requerido			
	28 / NPA	Apron / Ate									In service/ En servicio	In service/ En servicio																						Required/ Requerido		
		Terminal									In service/ En servicio	In service/ En servicio																						Required/ Requerido		
EASTERN CARIBBEAN (Trinidad y Tobago AIP)																																				
Terrance B. Lettsome		Route/ Ruta																																		
Bradshaw		Route/ Ruta									In service/ En servicio				SKB	CH 57 X	17 18 23 N	062 43 40 W		In service/ En servicio			BFI	360	18 26 45 N	064 32 09 W										
		Route/ Ruta																																		
Canefield		Route/ Ruta																																		
Canouan		Route/ Ruta																																		
Crown Point		Route/ Ruta																																		
E.T. Joshua		Route/ Ruta																																		
		Route/ Ruta									In service/ En servicio				SV	CH 12 X	13 08 26 N	061 13 34 W					SV	403	13 08 26 N	061 13 34 W										
Fort de France-Le Lamentin		Route/ Ruta									In service/ En servicio	In service/ En servicio			FOF	113.3	14 35 27 N	061 01 22 W																		
		Route/ Ruta																																		
Gaboto		Route/ Ruta																																		
George F. Charles		Route/ Ruta																																		
Gerald's		Route/ Ruta																																		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			BGI	112.7	13 04 30 N	059 29 02 W																		
Gransley Adams		Route/ Ruta																																		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			BNE	112.4	13 44 00 N	060 58 37 W																		
Hexanorra		Route/ Ruta																																		
		Route/ Ruta									In service/ En servicio	In service/ En servicio																								
Marie Galante		Route/ Ruta																																		
		Route/ Ruta																																		
Menville Hall		Route/ Ruta																																		
		Route/ Ruta									In service/ En servicio	In service/ En servicio			POS	116.9	10 27 58 N	061 23 31 W																		
Piarco		Route/ Ruta																																		
		Route/ Ruta																																		
Pointe-A-Pitre Le Raizet		Route/ Ruta									In service/ En servicio	In service/ En servicio			PPR	112.9	16 15 55 N	061 32 25 W																		
Point Salines		Route/ Ruta									In service/ En servicio	In service/ En servicio			GND	117.1	12 00 06 N	061 47 07 W																		
		Route/ Ruta																																		
ST Maarten		Route/ Ruta									In service/ En servicio	In service/ En servicio			PJM	133	18 02 17 N	063 07 06 W																		
		Route/ Ruta																																		
UC Bird		Route/ Ruta									In service/ En servicio	In service/ En servicio			ANU	114.5	17 07 33 N	061 48 01 W																		
		Route/ Ruta																																		
		Route/ Ruta																																		
Wallblake		Route/ Ruta																																		
Bermuda																																				
Bermuda		Route/ Ruta									In service/ En servicio	In service/ En servicio			BDA	113.9	32 21 51.767 N	064 41 22.454 W																		

APPENDIX B / APENDICE B

IATA SURVEY FORM ON CURRENT AND FUTURE AVIONICS / FORMULARIO DE ENCUESTA IATA SOBRE AVIONICA EXISTENTE Y FUTURA



Airspace Planning - Equipment Survey Version 5

NOTES:

- (1) Data provided will be de-identified before publication unless specific permission is obtained from the airline(s) concerned to identify the source.
- (2) In the pull down menus, BF = BEFORE, BF2010 means before the year 2010.
- (3) Please use your flight plan aircraft type designator for each type.

Airline two letter IATA code: >>>>>> If your airline is not an IATA member, please enter your airline name: >>>>>>

Aircraft types you CURRENTLY operate <small>See note (3)</small>	Number of aircraft	Expected Retire Date	Regions where you operate or propose to operate these aircraft (Please select all that apply and estimate the number of flights or projected flights per week)																			
			AFI Flights	ARABIAN SEA Flights	ASIA Flights	EUR Flights	INDIAN OCEAN Flights	LATAM Flights	MID Flights	NAM Flights	Atlantic - NAT Flights	Atlantic - SAT Flights	Pacific - NOPAC/CENPAC Flights	Pacific - SOPAC Flights	POLAR Flights							
Aircraft type 1	>>>>>>	>>>>>>																				
Aircraft type 2	>>>>>>	>>>>>>																				
Aircraft type 3	>>>>>>	>>>>>>																				
Aircraft type 4	>>>>>>	>>>>>>																				
Aircraft type 5	>>>>>>	>>>>>>																				
Aircraft type 6	>>>>>>	>>>>>>																				
FUTURE FLEET 1	Service Entry Date	>>>>>>																				
FUTURE FLEET 2	Service Entry Date	>>>>>>																				

Aircraft Equipment and Capabilities <small>Check items which are filled from your aircraft type entries</small>	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Future Fleet 1	Future Fleet 2
FANS 1/A								
FMS RTA								
ADS-C								
ADS-B OUT (Mode S ES) DO-260 transponder								
ADS-B OUT (Mode S ES) DO-260A transponder								
ADS-B OUT (Mode S ES) DO-260B transponder								
<i>If fitted with ADS-B, Transponder Power Output</i>								
ADS-B IN (Mode S ES) with EFB display								
ADS-B IN (Mode S ES) with other MFD								
CPDLC via ACARS-CPDLC FANS 1/A VDL Mode A								
CPDLC via FANS 1/A VDL Mode 2								
CPDLC via ATN VDL Mode 2								
CPDLC FANS 1/A SATCOM (INMARSAT / MTSAT)								
CPDLC FANS 1/A SATCOM (IRIDIUM)								
CPDLC via FANS 1/A HDL								
Digital Data Link (ARINC 623)								
GPS								
GPS TSO status								
GLS (GBAS)								
RNP 10 (RNAV 10)								
RNAV 5								
RNP 4								
PRNAV								
RNAV 2/1								
Basic RNP 1								
RNP APCH								
RNP AR APCH								
APV BARO VNAV (LNAV / VNAV)								
RNP-Tx (select from pull down menu)								
DME								
FMC WPR ACARS								
RF / FRT Turn Capability								
HF RTT								
Inertial Navigation								
ILS								
ATC RTF SATCOM (INMARSAT / MTSAT)								
ATC RTF SATCOM (IRIDIUM)								
VHF RTF (813/33)								

Additional Information You Wish To Provide

Thank you for your assistance with the survey. Please send the completed spreadsheet to infrastructure@iata.org. [Click >>> infrastructure@iata.org](mailto:infrastructure@iata.org)

Version 5 built 29 August 2009

APPENDIX C

CAR/SAM STRATEGY FOR THE EVOLUTION OF AIR NAVIGATION SYSTEMS

DRAFT

First Edition

Rev 2.0

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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1. INTRODUCTION

1.1 Acronyms

ABAS	Aircraft Based Augmentation System
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
ANSP	Air Navigation System Provider
APV	Approach with Vertical Guidance
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
BARO-VNAV	Barometric Vertical Navigation
CAR/SAM	Caribbean and South American Regions
CAT-I	Category I Precision Approach
CAT-II	Category II Precision Approach
CAT-III	Category III precision Approach
CFIT	Controlled Flight Into Terrain
CNS/ATM	Communications, Navigation and Surveillance/Air Traffic Management
DME	Distance-Measuring Equipment
EGNOS	European Geostationary Navigation Overlay Service
FAA	Federal Aviation Administration - USA
GAGAN	GPS and Geostationary Earth Orbit Augmented Navigation - India
GALILEO	Europe's own global navigation satellite system
GBAS	Ground Based Augmentation System
GLONASS	Global Navigation Satellite System – Russia
GLS	GBAS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GREPECAS	Caribbean and South American (CAR/SAM) Regional Planning and Implementation Group
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IRS	Inertial Reference System
LAAS	Local Area Augmentation System (USA)
MSAS	Multi-functional Satellite Augmentation System - Japan
NAVAID	Navigation Aid
NSP	Navigation Systems Panel
NDB	Non-Directional Radio Beacon
PBN	Performance-Based Navigation
RAIM	Receiver Autonomous Integrity Monitoring
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP APCH	Approach RNP
RNP AR	Approach RNP, with Authorization Required
SBAS	Satellite-Based Augmentation System
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
TMA	Terminal Control Area
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio Range
WAAS	Wide Area Augmentation System
WGS-84	World Geodetic System -1984

1.2 Objective and general considerations

Pursuant to its terms of reference and work programme, as revised and approved by the CNS/COMM/6 meeting, the GNSS Task Force (GNSS/TF) of the CNS Committee of the GREPECAS ATM/CNS Subgroup was assigned, *inter alia*, the task of developing a draft document describing the evolution of the air navigation infrastructure required to support CAR/SAM PBN requirements.

This proposal has its origin in the initiatives of the “Global Air Navigation Plan” (Doc. 9750) and the “CAR/SAM Regional Air Navigation Plan” (Doc. 8733), based on the fact that technology is not a goal in itself, and that it must be based on operational requirements in order to attain the global ATM operational concept.

Accordingly, this proposal has been developed taking into account the following guidance and reference documents:

- a) Annex 10, Volume I;
- b) Strategies for the introduction and use of non-visual radio aids for approach, landing, and departure procedures in the CAR/SAM Regions (Appendix I to the CAR/SAM Air Navigation Plan, Doc 8733);
- c) Guidance for the transition to satellite-based navigation systems in the CAR/SAM Regions (Appendix H to the CAR/SAM Air Navigation Plan, Doc 8733);
- d) CAR/SAM PBN Roadmap, version 1.4 / July 2009;
- e) GNSS Manual, Doc 9849 AN/457; and
- f) Analysis of the navigation infrastructure in support of PBN.

The main objective of this strategy is to define a gradual implementation of the navigation infrastructure that will help to promote the safety, inter-functionality, and cost-effectiveness of the infrastructure needed to meet future ATM requirements, propose the activities and actions required so that the air navigation infrastructure will support the short- and medium-term PBN requirements established in the CAR/SAM PBN roadmap, and develop a long-term projection of activities and actions for air navigation infrastructure.

The CAR/SAM Strategy for the Evolution of Air Navigation Systems, hereinafter called “the Strategy”, shall be considered a guiding document for all parties involved. This document does not contain regulatory or mandatory requirements. Air navigation authorities shall publish the corresponding regulations for the introduction and use of PBN.

This strategy is a living document that shall be reviewed and updated every two years or when major modifications to the base document are being considered.

1.3 Scope of the strategy

According to this proposal, the implementation of air navigation systems responds to a harmonised CAR/SAM strategy that takes into account operational requirements and the relevant cost-benefit analyses, based on which CAR/SAM States, Territories and International Organisations may draft their action plan for the implementation of the required navigation systems, in keeping with CAR/SAM implementation dates.

To better understand this air navigation strategy, the operational requirements, the required navigation infrastructure, the regional studies and trials proposed in this document are presented in chronological order. The timetable for this proposal is the same as that of the CAR/SAM PBN roadmap for the short (2006-2010), medium (2011-2015) and long term (2016+).

The dates indicated herein are tentative dates in which air navigation systems will be operational at regional level. However, some of the air navigation systems described in this strategy will be used for resolving local problems prior to the dates established in this document, so there will be a migration from these pioneering areas to broader regional areas.

The policy for the implementation of the new air navigation technologies in the CAR/SAM Regions should be based first on voluntary implementation in specific areas, using the existing certified equipment, followed by implementation in more extensive areas, supported by the respective regulations and updated equipment.

1.4 **Structure of the document**

This document is structured as follows:

- Section 1 (this section) lists the acronyms used, the purpose of the document, explains its scope and structure, and describes the target audience.
- Section 2 describes the evolution of the Air Navigation Operational Scenario, that is, the short- (2009-2010), medium- (2011-2015) and long-term (2016-2025) operational requirements for en route and terminal airspace, aerodrome operations, and on-board systems.
- Section 3 describes the evolution of the air navigation infrastructure required to support the envisaged operational scenario.
- Section 4 specifies a tentative action plan, whose timely implementation will promote the operational use of the new GNSS technologies.

1.5 **Target audience**

This strategy has been developed to assist States/Territories/International Organisations, as well as aviation community stakeholders, in the implementation of PBN, of the plan for the future transition, and of the corresponding investment strategies.

The main aviation community stakeholders in the CAR/SAM Regions that will benefit from this strategy are:

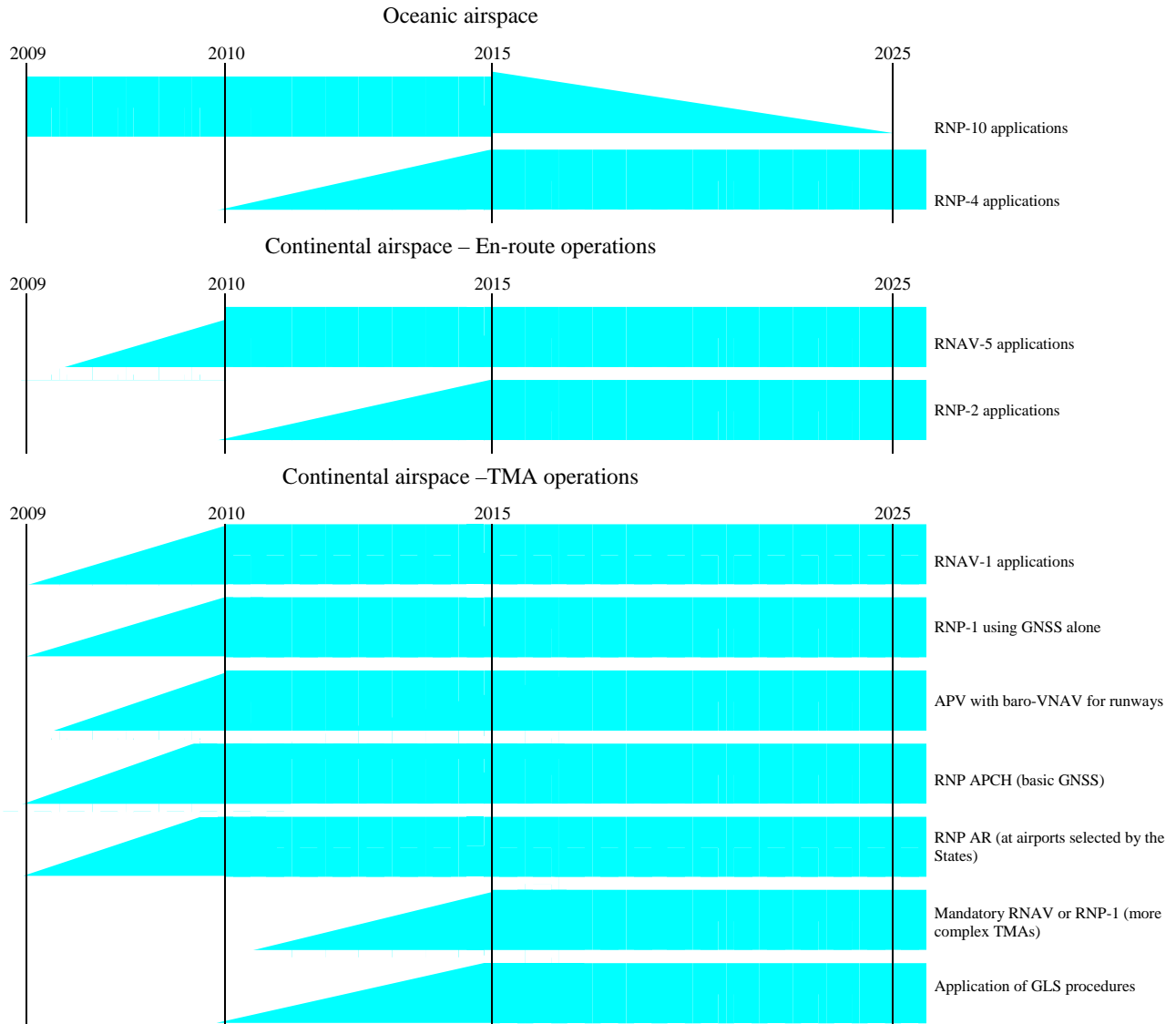
- Regulatory agencies, the national regulatory authorities of CAR/SAM States/Territories/International Organisations responsible for the verification of air navigation systems;
- Air navigation service providers (ANSPs). Civil and military air navigation service providers of CAR/SAM States/Territories/International Organisations responsible for the acquisition/design, acceptance, and maintenance of air navigation systems;
- Airport operators responsible for the acquisition/design, acceptance, and maintenance of navigation systems at the airports;
- Airspace users, who are the end users of air navigation systems; and
- International organisations.

2. **EVOLUTION OF THE OPERATIONAL SCENARIO, ACCORDING TO THE CAR/SAM PBN ROADMAP**
- 2.1 **Oceanic airspace – En-route operations**
- a) Taking into account low air traffic density in oceanic airspaces, no significant short-term changes are expected in the existing airspace structure that would require changes in the applicable RNAV specifications. In airspaces where RNP-10 is applied (EUR/SAM corridor, Lima-Santiago de Chile and South Atlantic Random Route System), no changes are expected in the short term.
 - b) In oceanic airspace, it is expected that RNP 4 will be applied in the medium term, using ADS/CPDLC, to enable 30 NM lateral and longitudinal separations. This application will depend on the evolution of the aircraft fleet flying in the airspace.
- 2.2 **Continental airspace – En-route operations**
- a) In the short term, RNAV-5 is envisaged in selected airspaces where operational benefits can be derived and where the available CNS infrastructure will support it.
 - b) In the medium term, RNP-2 is expected in selected high-density continental airspaces, using GNSS only, taking into account that the ground infrastructure will not support RNAV applications. The establishment of a backup system for GNSS will be required, as well as the development of contingency procedures in case of GNSS failure. The use of RNP-2 will facilitate the application of PBN in airspaces that lack surveillance. With the use of GNSS alone, it will be necessary to obtain more information from the GNSS signal through the use of GPS monitoring systems.
- 2.3 **Continental airspace – Terminal control area (TMA)**
- a) In the short term, the implementation of RNAV-1 is expected in TMAs selected by the States, under radar coverage, and with the appropriate ground navigation infrastructure that allows for DME/DME and DME/DME/INS operations. During this phase, both equipped and non-equipped aircraft will be allowed to operate, and RNAV-1 operations shall begin once the appropriate percentage of approved air operations has been achieved.
 - b) In non-radar environments and/or where there is no appropriate ground navigation infrastructure, the implementation of RNP-1 in the short term is expected in TMAs selected by the States, using GNSS alone, provided there is an appropriate percentage of approved air operations. Both approved and non-approved aircraft will also be allowed to operate in these TMAs.
 - c) PBN approach procedures shall be implemented in the short term as approach procedures with vertical guidance (APV) using baro-VNAV for runways, be it as primary approach or as backup for all final approaches to the runway, based on RNP APCH or RNP AR APCH navigation specifications.
 - d) Use of RNP APCH (basic GNSS) approach procedures is expected in the short term in most international airports selected by the State, maintaining conventional approach procedures for conventional non-equipped aircraft.
 - e) Use of RNP AR approach procedures is expected in the short term at airports

selected by the State, where operational benefits to be obtained are evident, based on the existence of significant obstacles.

- f) In the medium term, it is expected that RNAV or RNP 1 applications will be extended to TMAs selected by the States, depending on ground infrastructure and aircraft navigation capabilities. At more complex TMAs, the use of RNAV or RNP 1 (exclusionary airspace) equipment will be mandatory. At less complex TMAs, both equipped and non-equipped aircraft will be allowed to operate.
- g) In the medium term, it is expected that RNP APCH and RNP AR procedures will be extended to selected airports. Initial implementation of GLS procedures is also envisaged, thus ensuring a smooth TMA-to-approach transition, basically using GNSS for the two phases.

2.4 Timetable for operational requirements



3. **EVOLUTION OF AIR NAVIGATION INFRASTRUCTURE**

3.1 **Short term (up to 2010)**

- a) Initial deactivation of NDBs.
- b) Definition of the GNSS backup infrastructure.
- c) Changes to DME infrastructure to meet ICAO RNAV (DME/DME) requirements at selected TMAs.
- d) Initial implementation of ABAS for en-route, TMA, and NPA operations.

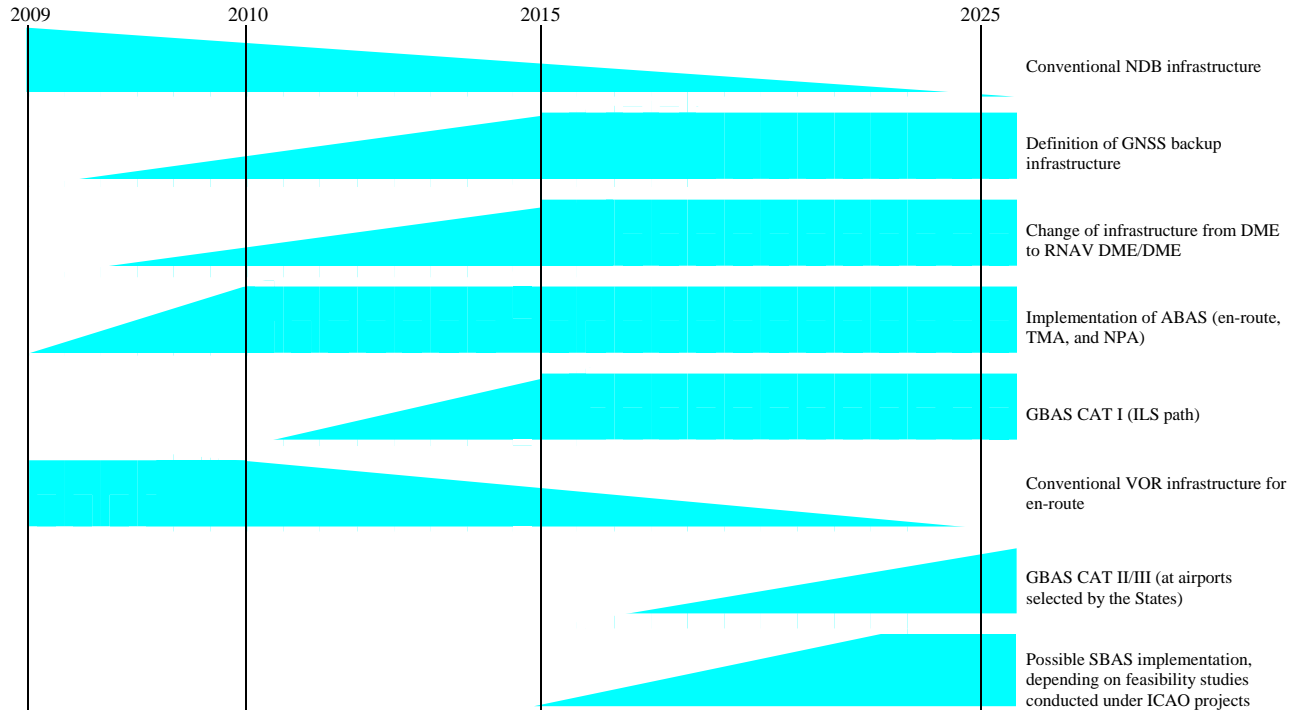
3.2 **Medium term (2011-2015)**

- a) The implementation of GBAS CAT I stations at airports with sufficient operational demand will improve en-route and TMA operations (SIDs and STARs) on paths similar to those of the ILS.
- b) At some airports, ILS systems will be maintained as GNSS/GBAS backup.
- c) Initial deactivation of VOR for en-route operations.

3.3 **Long term (2016-2025)**

- a) Continue deactivating conventional aids, maintaining the backup structure, if necessary.
- b) Implementation of GBAS Cat II/III at selected airports.
- c) Implementation of GBAS CAT I approach at other CAR/SAM airports with sufficient operational demand.
- d) Possible implementation of SBAS, depending on feasibility studies already carried out and underway under ICAO projects, taking into account current mono-frequency systems and the evolution of ionosphere algorithms, as well as the future availability of a multi-frequency, multi-constellation satellite structure.

3.4 Timetable for air navigation infrastructure



4. **TENTATIVE ACTION PLAN**

4.1 **Short term (up to 2010)**

- a) The implementation of an automatic tool for the development of procedures should be established in order to meet the new demand for procedures such as RNAV and RNP.
- b) Analysis of DME/DME coverage and DME implementation to support operations, and introduction of improvements.

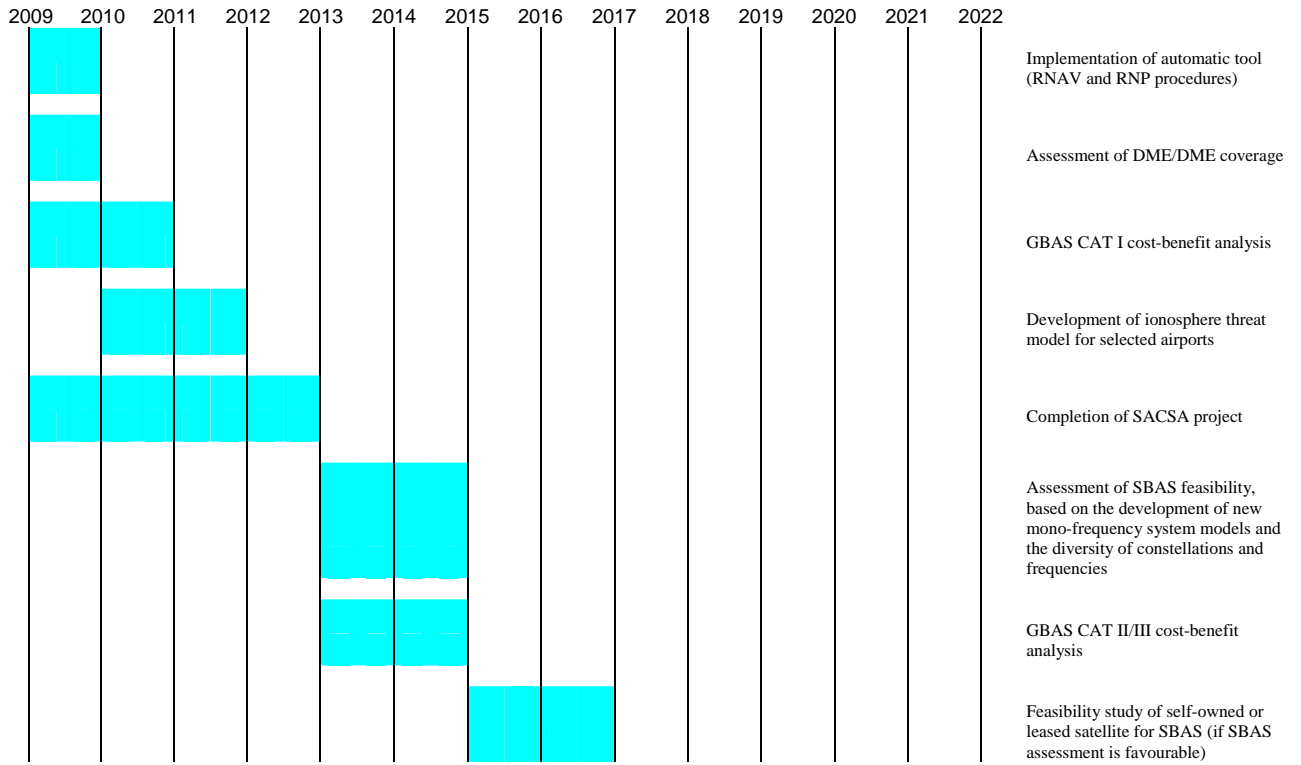
4.2 **Medium term (2011-2015)**

- a) In order to determine which airports are suitable for the installation of GBAS CAT I stations, each State must make a cost-benefit analysis based on its own operational demand.
- b) For each eligible airport, a GBAS ionosphere threat model will be required for certification and commissioning purposes.
- c) Complete and conclude the SACCSA project to see the possibility of implementing an SBAS system in the CAR/SAM Regions.
- d) Assess the technical, operational, and financial feasibility of SBAS systems, based on the development of new mono-frequency system models, the future implementation of GPS operations, and the commissioning of the GALILEO constellation.

4.3 **Long term (2016-2025)**

- a) In order to determine which airports are suitable for the installation of GBAS CAT II/III stations, each State must conduct a cost-benefit analysis, based on its own operational demand.
- b) SBAS operations with a self-owned or leased GEO satellite, which could enable SBAS operations independently from WAAS and/or EGNOS.

4.4 **Action Plan timetable**



Agenda Item 2: Propose technical training programmes on GNSS for CAR/SAM States

2.1 Under this agenda item, working papers WP/3 and WP/4 were presented and discussed.

2.2 The meeting took note that the objective of this task was to respond to the concerns of some experts regarding training of personnel on GNSS management and maintenance. Since the GNSS Task Force was composed of technical experts, the intention was to simply establish knowledge and professional experience requirements to help CAR/SAM States develop training requirements.

2.3 WP/3 - *Analysis of GNSS/SBAS training requirements and levels*, presented by Spain, was based on studies conducted by SACCSA, which developed a training model for professionals responsible for the operation of SBAS systems. The document defines training requirements for SBAS maintenance, supervisory, and engineering personnel. The proposed programme defines personnel requirements arising from the implementation of an SBAS system in the CAR/SAM Regions; the initial qualifications and training level required from human resources with respect to each element of the SBAS system; and the training process required, based on regional training levels and the identified training requirements.

2.4 WP/4 - *Analysis of GNSS/GBAS training requirements and levels*, presented by Brazil, was based on the experience obtained since 2003 from the operation and maintenance of the GBAS prototype station installed in cooperation with the FAA at the Rio de Janeiro International Airport – SBGL, and contained a plan proposal based on the work model presented by Spain in WP/3.

2.5 The two working papers were discussed together and the meeting considered that, in order to properly understand their purpose, it would be necessary to change the title to “Guide for the Development of a GNSS Training Programme” and consolidate the two papers for presentation to the CNS/ATM Subgroup. This document would be prepared by Brazil by 15 October 2009. During the discussion, the meeting noted that CAR/SAM States could derive more benefits from GNSS training provided by ICAO, and that more attention should be given to subsequent internal dissemination of this knowledge within each State/Organisation in order to have more experts in each State.

2.6 The meeting took note of the ICAO initiative concerning the symposium on Next Generation Aviation Professionals to be held in Montreal on 1-4 March 2010, and of its preparatory meeting to be held in October 2009. In this regard, the meeting deemed it necessary for the initiative to include aspects related to the training of aviation professionals, such as training on GNSS systems.

2.7 In view of the above, the meeting agreed on the following draft conclusion:

DRAFT CONCLUSION
GNSS/TF/4-2**GNSS TRAINING**

Taking into account that training of a larger number of experts is fundamental for the future implementation of GNSS systems in the CAR/SAM Regions, as well as the various ICAO recommendations in the sense of providing GNSS technical training, and the ICAO initiative on next generation aviation professionals:

- a) States/Territories and International Organisations are urged to encourage the training of national instructors, based, *inter alia*, on ICAO-sponsored courses, in support of the internal dissemination of the knowledge obtained;

- b) States/Territories and International Organisations that have not included GNSS training in their training plans are urged to do so starting in 2010; and
- c) ICAO is urged to include the necessary provisions on technical training of professionals--such as GNSS training--in the initiative concerning next generation aviation professionals and its corresponding instances.

APPENDIX

GUIDELINES FOR THE PREPARATION OF A GNSS TRAINING PROGRAMME

1. INTRODUCTION

1.1 The purpose of this document is to establish a training guide on the management and operation of GNSS systems in general, and on SBAS/GBAS in particular. The work and conclusions of the SACCSA Phase II and the experience of the early implementation of the GBAS prototype stations in the Regions were drawn upon in preparing this document. Accordingly, the following items have been established:

- To identify human resource requirements resulting from the implementation of GNSS systems in the CAR/SAM Regions.
- To determine the initial personnel qualification and training level needed in each of the elements in the SBAS/GBAS system.
- To establish a training programme, taking into account the existing training capacity in the region and the training requirements identified.

1.2 This document covers all of the objectives proposed, defining the training requirements for maintenance, supervision, and engineering personnel working in the GNSS system.

1.3 The training design process will consist of four basic phases:

Phase 1: Formulation of the mission and objective of GNSS systems.

Phase 2: Description of functions, which consists of:

- a) Identification of key tasks and activities of the system personnel.
- b) Grouping of tasks and activities in each function, thus establishing the positions required for the fulfilment of these tasks and activities.
- c) Grouping of positions in units and, grouping of units in bigger clusters, i.e. defining the functional structure of the system.

Phase 3: Baseline analysis, or, in other words, training levels to be initially held by technical personnel of the future GNSS augmentation service provider.

Phase 4: Lastly, design of the training activity, based on the functional structure of the SBAS/GBAS system, particularly focusing on:

- a) Tasks to be performed by the individual responsible for a specific position and degree of specialisation required,
- b) Skills and knowledge required to perform the aforementioned tasks,
- c) etc.

1.4 This document proposes a training plan to train the technical personnel on the optimum operation of the systems and tools that make up SBAS/GBAS systems in order to optimise their operation.

2. DISCUSSION

2.1 DESCRIPTION OF PROCESSES (FUNCTIONS)

2.1.1 GNSS (SBAS/GBAS) systems consist of the following segments:

- **Space Segment:** consists of the global coverage L-band navigation payload of GEO satellites (for SBAS), and will consist of the satellite constellation, providing distance data to aircraft receivers and the GBAS ground station.
- **Ground Segment:** which will control the SBAS and GBAS mission and will provide GPS satellite augmentation information.
- **User Segment:** which will consist of “SBAS standard” receivers or GBAS monitors to be used to verify signal-in-space services.
- **Support Segment:** which will consist of the platforms for the Validation and Qualification of system services.

2.1.2 Training requirements for the operation of the different system elements are mainly focused on the ground and support segments.

2.1.3 Ground Segment: is made up of the following elements:

- Reference Stations.
- Process and Control Centres, which contain:
 - A central processing unit.
 - A central control unit.
- Satellite Access Stations (SBAS).
- Ground Communications Network.

2.1.4 Support Segment: is made up of the following subsystems:

- User-level service analysis subsystem.
- Service analysis subsystem.
- End-to-end and service volume simulation subsystem.
- Filing and data access subsystem.

2.1.5 Each of these elements will require technical and maintenance personnel duly trained to perform a series of activities.

2.2 IDENTIFYING TASKS AND ACTIVITIES OF GROUND SEGMENT PERSONNEL

2.2.1 Among other activities this personnel may be called upon to perform are the following:

- Operation of equipment and systems of ground segment stations.
- Maintenance of ground segment equipment.
- Operation of communications between system stations / units.

2.2.2 In addition to these activities, coordination, planning, and management tasks will need to be performed, and this will require a specific position of responsibility.

2.3 IDENTIFYING TASKS AND ACTIVITIES OF SUPPORT SEGMENT PERSONNEL

2.3.1 In this case, the following tasks and activities could be considered:

- Training, operational validation, and certification, as necessary, on specific user and system applications.
- Development, maintenance and/or implementation of simulation tools.
- Tasks related to system data filing and analysis.
- Support to the operation and maintenance functions of the ground segment, and, above all, to system engineering and development functions.
- Tasks related to the interoperability between system elements.

2.4 MISSION OF WORK POSITIONS

2.4.1 Once the context of the activities involved in GNSS augmentation systems has been established, it will be advisable to determine the structure of the work positions to ensure an optimum performance of the corresponding tasks.

2.4.2 Next, and in very broad terms, is a description of the mission of each work position.

2.4.2.1 System Manager

The System Manager will be ultimately responsible for everything done by system personnel. His/her mission is to direct, coordinate, supervise, and establish performance guidelines for the efficient completion of system activities, in accordance with the development plans and the policies established by the service provider.

2.4.2.2 Ground Segment Manager

He/she is responsible for the operation of the GNSS system and his/her mission is to plan, control, and standardise CPCS, SAS, and ERS operation.

He/she may have personnel to assist in his/her tasks, thus creating “ground segment technical divisions”.

2.4.2.3 Local System Manager

The mission of the Local System Manager is to direct, coordinate, supervise, and establish performance guidelines for the activities of the local system under his/her responsibility, in accordance with the development plans and policies established by the GNSS augmentation service provider. He/she is ultimately responsible for achieving the objectives at the local level, as well as for implementing procedures and other directives issued by the different central units (support segment, quality and safety; and ground segment).

- **Maintenance personnel** → His/her mission is to perform maintenance on the systems installed. This maintenance will be level 0 (equipment reboot, power supply, acclimatisation and level 1 (replacing boards or components identified as defective). Since there is more than one local manager, they will be responsible for the corresponding maintenance area. An assessment will be made of the need to create a maintenance area for the support segment, or perhaps one of the areas located in one of the CPCS can support the support segment engineering area in performing maintenance tasks (based on future decisions as to the physical location of process and control centres).
- **Supervision personnel** → The system control and monitoring (the main functions of the UCC) teams will operate the system on 24H shifts.
- **Engineering personnel** → The mission of the engineering personnel will be, on one hand, the general coordination of maintenance (perform level 2 maintenance of ERS, and support level 0 and 1 maintenance) and operations; and, on the other hand, support the local unit (CPCS n manager).

2.4.2.4 **Support Segment Manager**

His/her mission is to plan, coordinate, and manage the operation of the support segment elements in accordance with the commitments undertaken.

- **Data analysis personnel** → The mission of analysts is to operate all the tools (simulators and other analytical tools) built in the different support segment subsystems (see item 3, Description of Processes (functions) and conduct a first analysis of results and conclusions.
- **Engineering personnel** → The mission of engineering personnel will be to create study scenarios, analyse results obtained, propose modifications and arrive at conclusions related to the areas of action of the support segment. They could also participate in the maintenance of the equipment of the support segment subsystems, since the equipment consist of HW and SW. This area is also responsible for the detailed analysis of the results obtained by the analysis area and generating the action derived from it.

2.4.2.5 **Safety and Quality System Manager**

He/she will be responsible for developing/implementing the Quality and Safety System, in accordance with quality/safety certifications required of the GNSS augmentation service provider, and for coordinating and being accountable for seeing through the objectives established in the quality and safety policies of the service provider.

2.5 **WORK POSITION PROFILES**

2.5.1 Once the functional structure has been defined, and the mission of the person responsible or the personnel in each of the proposed areas is known, it is possible to understand the scope of action of each of the aforementioned work positions and, therefore, to determine the minimum and/or desirable requirements in terms of training, knowledge, and experience for each of the work positions, as reflected in the following tables:

		GES ¹	ING ²	OPS ³
	TOPICS	NR ⁴	NR	NR
Specific Training				
Legend: 0: No specific training required 1: Basic level required 2: Advanced level required 3: Expert level required	Air Nav. & ATC	2	2	1
	Propagation of electromagnetic waves	1	2	0
	Electrical facilities	1	2	2
	Radar and aids	1	1	0
	Satellite navigation	2	2	1
	Augmentation programmes	2	2	1
	Quality systems	2	0	0
	Safety management systems	2	0	0
	Auditing	2	0	0
	GNSS	0	2	0
	Prevention of labour risks	0	0	1
	Environment	0	0	0
	ATC systems and operations	0	1	2
Prior Technical Experience				
Legend: 0: No specific experience required 1: 1-3 years 2: 3-5 years 3: More than 5 years	In the GNSS field	1	2	1
	In Air. Nav. or ATC	2	0	0
	Level of knowledge of augmentation programmes *	1	0	0
	Quality systems	1	0	0
	Safety systems (implementation and management)	1	1	0
	Experience in performing audits *	1	0	0
	Control and monitoring of operations in the satellite control centres	0	2	0
	Control and monitoring of operations in network infrastructure	0	2	0
	Control and monitoring of operations in fixed and mobile communications	0	2	0
	Control and monitoring of operations in other fields	0	1	0
	Maintenance (preventive and corrective) in the aeronautical field	0	1	2
	Operation of critical systems	0	1	2
	Use of identification, analysis, and retrieval equipment	0	2	2
	Definition/design of technical procedures	0	2	0
	Definition and drafting of technical manuals	0	2	0
Data processing, analyses, drawing of conclusions and def. of work plans	0	2	0	

¹ GES: Management personnel

² ING: Engineering personnel

³ OPS: Operations/ maintenance personnel

⁴ NR: Minimum recommended level

* Apply the legend on the degree of knowledge (From 0:None to 3:Expert)

	Tasks related to the operation and supervision of aeronautical systems and equipment	0	0	2
Prior managerial experience				
Legend: 0: No specific experience required 1: 1-3 years 2: 3-5 years 3: More than 5 years	Equipment management	3	1	0
	Budget management	3	0	0
	Infrastructure management	3	0	0
	Negotiation	3	1	0
	Planning	3	1	0
	National and international coordination	2	1	0
	Technical project management	2	0	0
	Process reengineering	1	0	0
Office software				
Legend: 1: User 2: Advanced	MS Word	1	1	1
	MS Excel	2	1	1
	MS Access	1	1	1
	MS Power Point	1	1	1
	MS Project	2	1	1
	Internet and e-mail	2	1	1
	Database managers	1	2	1
Languages				
Legend: ICAO Level: 2, 3, 4 ó 5	Level of English (ICAO)	4	3	2

Table A1: Requirements for candidates to work positions generated in SBAS/GBAS systems

Position	Candidate requirements	Level ⁵
SBAS/GBAS system manager	Degree in telecommunications or aerospace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Satellite navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	N
	▪ Radar and aids	D
	▪ GNSS	D
	▪ Augmentation programmes	D
	At least 3 years of managerial experience in similar units.	N
	Quality system management experience.	D
	Safety management experience.	N
	At least 3 years of experience in the GNSS field.	D
	Knowledge of office software, database managers, and planning tools.	N
High level of English, both spoken and written. ICAO (operational) level 4 required.	N	

⁵

D: Desirable

N: Required in order to perform the job with sufficient guarantee

Safety and quality system manager	Degree in airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ GNSS	D
	▪ Augmentation programmes	D
	Experience in quality system management	N
	Experience in safety management	N
	At least 3 years of experience in the GNSS field	D
Ground segment manager	Knowledge of Office software package	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	N
	▪ Radar and aids	N
	▪ GNSS	N
	▪ Augmentation programmes	N
	Experience in the operation of critical systems	N
Support segment manager	At least 3 years of experience in the GNSS field	D
	Knowledge of the Office package and database management tools	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ GNSS	N
	▪ Augmentation programmes	N
Local system manager	Experience in safety management	D
	At least 3 years of experience in the GNSS field	D
	Knowledge of Office software and database management tools.	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Satellite navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	N
	▪ Radar and aids	N
▪ GNSS	N	
▪ Augmentation programmes	N	
At least 3 years of managerial experience in units of similar size	N	
Experience in quality system management	D	

	Experience in safety management	D
	At least 3 years of experience in the GNSS field	D
	Knowledge of office software, database managers, and planning tools	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
Data analysis team	Intermediate degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	D
	▪ Significant knowledge of operational aid tools	N
	Security Management experience.	D
	At least 3 years of experience in the field of GNSS.	D
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Support segment engineering team	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Experience in safety management	D
	At least 3 years of experience in the GNSS field	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Maintenance team	Intermediate degree as maintenance technician, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Supervision team	Intermediate degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Knowledge of Office software, as well as database management tools	N
	Intermediate level of English, both spoken and written. ICAO level 2 required.	N
Ground segment engineering team	Degree in telecommunications or airspace engineering, or any other like degree, with specific training in:	N

	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Experience in safety management	D
	At least 3 years of experience in the GNSS field	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N

Table A2: Requirements for candidates to work positions generated by SBAS/GBAS systems

2.6 REQUIRED TRAINING CYCLE

2.6.1 The last phase of the process is the description of the training cycle, understood as a series of training activities to be carried out by individuals who, from the three groups analysed, would be the most appropriate candidates for the job positions previously described.

Training activity	Job Position ⁶									
	G1	G2	G3	G4	GL	I1	I2	O1	O2	O3
Course on satellite navigation and augmentation programmes	2	2	2	2	2	2	2	1	1	1
Course on the SBAS/GBAS system	2	2	2	2	2	2	2	1	1	1
Satellite communications	1	1	1	1	1	2	2	1	1	1
Operation and maintenance of SBAS/GBAS reference stations	0	0	0	0	0	2	2	2	2	2
Operation and maintenance of satellite access stations (SAS) (SBAS)	0	0	0	0	0	2	2	2	2	2
Operation and maintenance of SBAS/GBAS process and control centres	0	0	0	0	0	2	2	2	2	2
On-the-job safety and health	1	1	1	1	1	1	1	2	2	2
Competency-based management system	2	2	2	2	2	1	1	0	0	0
Course on measuring instruments	0	0	0	0	0	0	0	2	2	2
Course on quality systems	2	2	2	2	2	1	1	0	0	0
Course on safety management	2	2	2	2	2	1	1	0	0	0
2 Advanced Level	1	Basic Level		0	N/A					

Table A3: Training activities proposed for the different groups

⁶

G1	→	SBAS/GBAS System Manager
G2	→	Support Segment Manager
G3	→	Ground Segment Manager
G4	→	Quality and Safety System Manager
GL	→	Local Manager
I1	→	Support Segment Engineering Personnel
I2	→	Ground Segment Engineering Personnel
O1	→	Data Analysis Personnel
O2	→	Supervision Personnel
O3	→	Maintenance Personnel

2.6.2 The following possible modalities are proposed for these training activities:

- **On-line or CBT Courses:** These CBTs will be classified according to their duration:
- **In-person P Courses:** These classroom courses can be delivered either in the conventional form, with a teacher and the students in a classroom, or the teacher conducting the course for the students through satellite communication.

2.6.3 Taking into account these modalities, it is proposed that the aforementioned activities be carried out as described in the following tables.

2.6.4 The tables have been divided by training activity, defining the need to carry out the activity in one, two, or three courses (C1, C2 or C3), with different scopes. These courses can be taught on-line, in-person, or a combination of both.

2.6.5 Likewise, different levels of detail have been determined for each course: basic and advanced.

2.6.6 Furthermore, a recurrent element has been identified (at least once a year) to ensure an appropriate level of knowledge throughout the life of the SBAS/GBAS system.

Course on Satellite Navigation and Augmentation Programmes						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	CBT	CBT	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	CBT	CBT	CBT	CBT	NA	NA

Table B1: Course on Satellite Navigation and Augmentation Programmes

Course on the SBAS/GBAS System						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B2: Course on the SBAS/GBAS System

Satellite Communications						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B3: Satellite Communications

Operation and Maintenance of SBAS/GBAS Reference Stations						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	NA
In-person	NA	P	NA	P	NA	NA
Recurrent	NA	CBT	NA	CBT	NA	NA

Table B4: Operation and Maintenance of SBAS/GBAS Reference Stations

Operation and Maintenance of Satellite Access Stations (SAS)						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	NA
In-person	NA	P	NA	P	NA	NA
Recurrent	NA	CBT	NA	CBT	NA	NA

Table B5: Operation and Maintenance of Satellite Access Stations (SAS)

Operation and Maintenance of SBAS/GBAS Process and Control Centres						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	CBT
In-person	NA	P	NA	P	NA	P
Recurrent	NA	CBT	NA	CBT	NA	CBT

Table B6: Operation and Maintenance of SBAS/GBAS Process and Control Centres

On-the-job safety and health						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	NA	NA	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B7: On-the-job safety and health

Competency-based management system						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	NA	NA	NA	NA	NA	NA

Table B8: Competency-based management system

Course on measuring instruments						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	NA	P	NA	NA	NA	NA
Recurrent	NA	NA	NA	NA	NA	NA

Table B9: Course on Measuring Instruments

Course on quality systems						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	P	P	P	P	NA	NA

Table B10: Course on Quality Systems

Course on safety management						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	CBT	CBT	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	P	P	P	P	NA	NA

Table B11: Course on Safety Management

Agenda Item 3: Provide CAR/SAM States with guidance on the practical methodology for the implementation of GBAS systems

3.1 Under this agenda item, United States presented IP/3 - *FAA GBAS update*, which informed the group that the FAA continued researching and developing GBAS technology. In 2009, the FAA and HONEYWELL approved the design of the SLS-4000 system for CAT I operations. This certification will enable private entities to acquire and install these systems for use throughout US airspace. Research and development efforts continue for purposes of validating the requirements proposed in Annex 10 in support of CAT II and CAT III operations.

3.2 Regarding the development of a document with guidance on a practical methodology for the implementation of GBAS systems, and given the recent completion of GBAS certification work by the FAA, the meeting agreed to defer the date of delivery of this document until December 2010. The representative of United States offered to take on this task, and to prepare a first draft by June 2010.

Agenda Item 4: GNSS work programme for the new CNS/ATM Subgroup

4.1 Under this agenda item, WP/5 - *Review of GNSS activities listed in the CNS Committee work programme, and continuation of navigation activities by the new CNS/ATM Subgroup* was presented by the Secretariat.

4.2 The meeting was informed that GREPECAS/15 had approved the proposal of the new CNS/ATM Subgroup, whose terms of reference were based on performance objectives aligned with the ATM Operational Concept and the Global Air Navigation Plan. The tasks of the new Subgroup will be performed under the project development concept.

4.3 The Group was then presented with an analysis of the status of implementation of the navigation-related activities listed in the work plan of the CNS Committee, and a proposal for the implementation of pending and new navigation-related activities that could be included in the work plan of the new GREPECAS CNS/ATM Subgroup.

4.4 The Group updated the status of implementation of the navigation-related activities listed in the work programme of the CNS Committee and of the GNSS Task Force (WP/5, Appendices A and B). The update and proposal of activities for the CNS/ATM Subgroup are contained in **Appendix** to this part of the Report.

APPENDIX

ACTIVITIES RELATED TO NAVIGATION SYSTEMS PROPOSED FOR INCLUSION IN THE WORK PROGRAMME OF THE
NEW CNS/ATM SUBGROUP

PROJECT: PERFORMANCE-BASED NAVIGATION

Associated Strategic Objective / GPI	Activity #	Activity	Follow-up action	To be initiated by	Status	Deliverables	Deadline
1	2	3	4	5	6	7	8
D GPI 21	CNS/3-2.1	Analyse the results of SBAS augmentation trials conducted in the CAR/SAM Regions	Results of project RLA/03/902 Phase III. The results of projects RLA/00/009 and RLA/03/902 Phase II have been analysed.	CNS/ATM Subgroup	Valid	Analysis of the results of SBAS trials	Dec 2011
D GPI 21 GPI 5	CNS/3-2.2.1	Update guidelines and regional strategies for the installation and implementation of GNSS augmentation systems	It is estimated that updates will be made to GBAS (2010) and SBAS (2011), based on studies	CNS/ATM Subgroup	Valid	Proposal of updates to the regional strategy for the implementation of GNSS augmentation systems	Dec 2011

Associated Strategic Objective / GPI	Activity #	Activity	Follow-up action	To be initiated by	Status	Deliverables	Deadline
1	2	3	4	5	6	7	8
D GPI21	CNS/3.2.3.1	Considerations on the feasibility of regional application, technical aspects, operational benefits, associated costs, implementation, implications for airborne equipment and other relevant aspects.	<p>Analysis of the results of GBAS trials in the CAR/SAM Regions (March 2010) and initial cost-benefit analysis of GBAS 1 implementation (June 2010)</p> <p>Has not been started at regional level</p> <p>An initial analysis of SBAS has been conducted under project RLA/03/902 Phase II. However, a more in-depth cost-benefit analysis is foreseen in Phase III of Project RLA/03/902</p>	CNS/ATM Subgroup	Valid	<p>Cost-benefit analysis for the implementation of GBAS systems</p> <p>Cost-benefit analysis for the implementation of an SBAS system</p>	<p>Dec 2010</p> <p>Dec 2011</p>
D GPI21	CNS/3.2.3.2	Conduct studies on options for regional implementation of an SBAS/GBAS system, taking into account GNSS evolution	<p>Studies on GBAS implementation have been started in Brazil and Chile</p> <p>Initial studies for the implementation of an SBAS have been conducted under projects RLA/00/009 and RLA/03/902</p>	CNS/ATM Subgroup	Valid	<p>Study for the implementation of a GBAS system, with options and considerations for its implementation</p> <p>Studies for the implementation of an SBAS system in the CAR/SAM Regions</p>	<p>Dec 2010</p> <p>Dec 2011</p>

Associated Strategic Objective / GPI	Activity #	Activity	Follow-up action	To be initiated by	Status	Deliverables	Deadline
1	2	3	4	5	6	7	8
D GPI21	CNS/3-3.6	Develop proposals for regional guidelines for the evolution of air navigation systems	<p>IATA presented the GNSS/TF/04 with a proposal of database for the collection of information on existing and future avionics. This information has already been requested from IATA members, and results are expected for early 2010. Similarly, the GNSS/TF identified the need for this information to be completed by States, at the level of their national fleets and general aviation users.</p> <p>The GNSS/TF is proposing a table to collect information on existing radio aid systems and States are being asked to complete it</p>	CNS/ATM Subgroup	Valid	<p>List of avionics available on CAR/SAM aircraft, as well as a projection of future systems</p> <p>List of navigation aids existing in the CAR/SAM Regions, and dates of installation</p>	<p>Jun 2010</p> <p>Dec 2010</p>
D, GPI 21	CNS/3-3.8	Provide guidance to the States of the Region with respect to the practical methodology for the implementation of GBAS systems	<p>Underway</p> <p>Preliminary practical guidance document in preparation. The GNSS/TF/04 meeting agreed that, given the experience of the FAA in trials, certification and start-up of GBAS systems, the FAA would submit a practical guide for the implementation of a GBAS.</p>	CNS/ATM Subgroup	Valid	<p>Practical guide for the implementation of an SBAS system, taking into account GNSS evolution</p> <p>Practical guide for the implementation of GBAS systems in the CAR/SAM Regions</p>	<p>Dec 2011</p> <p>Dec 2010</p>

Associated Strategic Objective / GPI	Activity #	Activity	Follow-up action	To be initiated by	Status	Deliverables	Deadline
1	2	3	4	5	6	7	8
D GPI 21 GPI5	CNS/3-3.9	Analyse the ground navigation infrastructure supporting PBN implementation	New activity	CNS/ATM Subgroup	Valid	<p>VOR and DME radio aid coverage calculated, identifying areas in which the navigation infrastructure would not support RNAV-5 operations based on VOR/DME and DME/DME in the CAR/SAM Regions, taking into account the flight levels required in the various operations</p> <p>Analysis and identification CAR/SAM TMA sections where DME infrastructure would not support RNAV-2 and RNAV-1 operations, with or without the use of inertial systems.</p>	<p>Jun 2011</p> <p>Jun 2011</p>

Agenda Item 5: Other matters

5.1 The Meeting did not identify any other matter to deal with.