Agenda Item 5: Assessment of operational requirements in order to determine the implementation of communications, navigation, and surveillance (CNS) capabilities improvement for en-route and terminal area operations

FOLLOW UP TO THE IMPLEMENTATION OF THE NEW SOUTH AMERICAN DIGITAL NETWORK -- REDDIG II

(Presented by the Secretariat)

SUMMARY

This working paper presents information on the progress made in the implementation of the new South American Digital Network -- REDDIG II. In addition, it presents the activities conducted through REDDIG project, as well as interference problems presented in the current REDDIG.

REFERENCES

- Report of the tenth workshop/meeting of the SAM Implementation Group (SAM/IG/10) (Lima, Peru, 1-5 October 2012);
- Twelfth ICAO Air Navigation Conference (AN-Conf/12) (Montreal, Canada, 19-30 November2012); e
- Report of the sixteenth meeting of the REDDIG Coordination Committee (RCC/16) (Lima, Peru, 18-20 March2013).

ICAO strategic objectives:	*A – Safety; and* *C – Environmental protection and sustainable development of air transport*

1. Background

1.1 Updated information is presented as follow-up to REDDIG II implementation activities. The main activities conducted lately have been the finalization of the negotiation phase between the REDDIG II bid winner and ICAO, the current status of the contract between ICAO (on behalf of all its member States) and the winning company, the focal points nominated by States to monitor REDDIG II implementation activities and the updated action plan for REDDIG II installation.

1.2 The REDDIG II implementation process, with support of a technical cooperation project, was presented by Brazil, on behalf of all REDDIG member States, at the Twelfth ICAO Air Navigation Conference (AN-Conf/12).

1.3 A website has been designed with the aim that REDDIG member States can better follow-up on REDDIG activities.

1.4 Interference problems have presented themselves in REDDIG with the international mobile telecommunications (IMT) system; actions are required to avoid possible new interferences.

2. **Analysis**

REDDIG II IMPLEMENTATION

2.1 Hereunder are described the main activities leading towards REDDIG II implementation:

a) Negotiation process;
b) Current situation of the contract between ICAO and the bidding process winner;
c) Focal points and their activities; and
d) REDDIG II implementation action plan.

Negotiation process

2.2 The bidding process between ICAO and the REDDIG II bid winner started in August 2013 and finalized at the end of March 2013. As a result of the negotiation process, success was obtained in achieving that the bid winner company include in its offer the following aspects taken under consideration during the REDDIG II offer evaluation phase, and RCC/15 meeting:

a) Replacement of a satellite MODEM at the Manaos and Ezeiza nodes;
b) Transfer of Asuncion and Santiago nodes antennae (optional in REDDIG II contract);
c) Confirmation of technical aspects regarding amplifiers and the network management system;
d) Presentation of details regarding the training manual; and
e) Purchasing of IP telephones to support speech services requirements for the regional air traffic flow managemetn.

2.3 With regard to the antennae transfers at the Asuncion and Santiago nodes (optional activity in the REDDIG II implementation contract), Chile informed that by the end of the first semester of 2013, they have transferred the whole REDDIG node, from Cerro Colorado to the area were the Santiago control centre is located. In this manner, the antenna transfer indicated in the REDDIG II Project would no longer be necessary.

2.4 Paraguay indicated that they had analyzed the offer presented by the bid winner regarding the REDDIG node transfer from Silvio Pettirossi international Airport in Asuncion to the Asuncion control centre are, being in agreement with the amount presented by the bidding process winner.

2.5 In addition to the activities considered upon in Chile and Paraguay, Colombia informed the Meeting that they had started with civil works for the construction of the new control center and control tower in Bogota, and that by the end of July 2013 they would be starting with a bidding process for the purchasing of equipment for the new Bogota control centre and control tower. An estimate was given that the installation of this equipment might be completed by July 2014, requesting the possibility that the new REDDIG equipment be installed in the new facilities. In this respect, the Secretariat informed that by the indicated date and in accordance with REDDIG II implementation chronogramme, REDDIG II should already be installed; therefore, the Secretariat would request the winning company to present a quotation for the transfer of the REDDIG II equipment from the current location to the area where the new control centre will be located.

2.6 During the negotiation period, the bid winner's Service Level Agreement (SLA) document on ground communications services was also examined. In this regard, it was considered that the SLA's validity period would cover the first six months of provision of the services taken under consideration in the REDDIG II technical specifications. In the event that the REDDIG member States decide to extend the ground service provision contract, they will make a new revision to the SLA.

Current situation of the contract between ICAO and the bidding process winner

2.7 The contract between ICAO and the bid winner has been completed and examined by both parties, including in same considerations resulting from the bidding process. For the signature of the contract, ICAO (TCB) requires that all REDDIG member States submit RLA/03/901 project Document Substantive Revision Q, which includes the purchasing of REDDIG II and its management until 2018, duly signed.

2.8 With this, it is expected that ICAO will sign the contract by the May 2013. The contract will be carried out in two phases: In Phase 1, to be implemented during the second quarter of 2013, the bid winner will present the REDDIG II design documents, the installation procedures, the training manuals, the factory acceptance documents, the on-site documents, the network documents, etc., which would be examined by the REDDIG member States. Phase 2 includes REDDIG II installation and will start once all REDDIG member States have cancelled their corresponding REDDIG II quotas, scheduled for no later than 31 March 2013. Practically all REDDIG member States have deposited their quotas corresponding to REDDIG II, pending only three States.

Focal points and their activities

2.9 RCC/16 meeting examined and updated the list of focal points nominated by REDDDIG member States, whose main functions will be to participate in the installation of the corresponding REDDIG II node, the node provisional and final acceptance, obtain the frequencies license, and free the equipment from customs. The revised list of focal points is shown as **Appendix A.**

REDDIG II implementation action plan

2.10 The tentative chronogramme of activities for REDDIG II implementation is presented in **Appendixe B**.

PRESENTATION OF REDDIG PROJECT AT AN-CONF/12

2.11 The working paper presented at AN-Conf/12 on the experience gained in the implementation process of a mixed(satellite/ground) IP digital network, obtained with the support of an ICAO technical cooperation Project, had great acceptance at the Conference, with the formulation of Recommendation 1/6 – *Data communications issues*, shown in **Appendix C** to this working paper.

NEW REDDIG WEBSITE

2.12 A new website has been designed in order that REDDIG member States can find in one single page all information pertaining to Project RLA/03/901 - *REDDIG Management and Satellite Segment Administration System*. The site's url is: http://www1.lima.icao.int/reddig/.

2.13 The page contains information on REDDIG Administration, CNS/ATM applications and information on REDDIG II. In addition, it includes information on meetings, seminars and courses related with the objectives of the Project.

2.14 The administrative information pertaining to the Project, the REDDIG II bidding process and other information that the REDDIG Administration is not open to all public, and is accessed through a password. The person desiring a password, should request it from the REDDIG Administration for their approval.

INTERFERENCE OF THE INTERNATIONAL MOBILE TELECOMMUNICATIONS (IMT) SYSTEM IN THE FIXED SATELLITE SERVICE (FSS) BAND

2.15 The REDDIG node in Lima, Peru, had been interfered with in September 2012 by an IMT system, the WIMAX (broadband internet wireless transmission service transmitting in the 2.3 to 3.5 Ghz band). The interfering signal operated at the 3.521 GHz frequency and belongs to the mobile telephone company NEXTEL.

2.16 The interference kept the Lima node out of service for five days, the services during that period were offered through the ISDN backup ground network. The interference was solved with the installation of a filter in the REDDIG node.

2.17 Even though the interfering signal had been separated more than 200 Mhz from REDDIG (3789496, 3791248, 3792562 Hz), the closeness to the WIMAX station (200 metres from the REDDIG node) caused the interference. This interference could have been avoided if the procedures for installations at zones adjacent to airports had been followed, and if there had been coordination among the spectrum administrator, the mobile telecommunications company and the aeronautical service provider.

2.18 In this respect, REDDIG RCC/16 meeting deemed it convenient that REDDIG member States take note of this interference case and that they inform their local radio frequency spectrum administration of this, to avoid possible interferences at other REDDIG nodes.

2.19 RCC/16 meeting also considered important that the staff in charge of REDDIG nodes maintenance be alert to any interference to the REDDIG node, and that they immediately inform the case to the REDDIG Administrator and the national radio frequency spectrum administrator.

2.20 The mobile telecommunications companies are requiring greater band width to support their increasing services requirements, and that these requirements could augment their use in the band assigned as primary character to the FSS. Therefore, the aeronautical administrations should coordinate with the spectrum administration entities on the importance of protecting the FSS band, particularly the satellite communications networks used to support aeronautical services, and thus avoid possible interferences.

3. **Action suggested**

3.1 The Meeting is invited to:

a) Take note of the information provided; and
b) Analyze the REDDIG II implementation activities described in Section 2 of this working paper.

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APPENDIX A / APENDICE A

REDDIG II FOCAL POINTS / PUNTOS FOCALES REDDIG II

STATE / ESTADO	Name / Nombre	Cargo	E-Mail / Correo-e	Telephone / Teléfono	Address / Dirección
ARG	Moira Lidia Callegare, ANAC	Jefe Departamento Proyectos – DNSA	mcallegare@anac.gov.ar	(5411) 594-13097	Edificio ANAC Central Paseo Colón 1452, Ciudad Autónoma de Buenos Aires, CP 1063
	Sergio Alberto Vallone, ANAC	Inspector de Navegación Aérea, Depto. Regional Noroeste de Inspecciones de la Dirección Nacional de Inspecciones de Navegación Aérea	svallone@anac.gov.ar	(54351) 475-6414	Dirección Regional Noroeste Camino Pajas Blancas Km. 8.5, CP 5000, Córdoba Capital
	Obdulio Gouarnalusse, DGCTA - FFAA	Jefe Departamento de Proyectos	ogouarna@faa.mil.ar; ogouarnalusse@gmail.com	(5411) 4480-2362; (5411) 5166-2362	Av. Comodoro Pedro Zanni 250, Edif. Cóndor, Sector Amarillo, Of. 472, 1104 Buenos Aires
	Cristian Javier Vittor, DGCTA - FFAA	Asesor de la Dirección C.N.S.	jvittor@anac.gov.ar; javiervittor@gmail.com	(5411) 4480-2362; (5411) 5166-2362; (5411) 44802350	Av. Comodoro Pedro Zanni 250, Edif. Cóndor, Sector Amarillo, Of. 472, 1104 Buenos Aires
BRA	Athayde Licério Frauche, DECEA	Oficial CNS Coordinador REDDIG	dcte4@decea.gov.br, frauche@hotmail.com	(5521) 2101-6584; (5521) 2101-6219	Av. General Justo 160, Rio de Janeiro, Brasil
BOL	Hernando Lara, AASANA	Jefe Unidad Nacional CNS AASANA	nanos_24@hotmail.com	(5912) 212-7959	Aeropuerto Internacional El Alto, Bloque Técnico AASANA
	Remigio Blanco, AASANA	Responsable de Telecomunicaciones AASANA	rblanco@aasana.bo	(5912) 237-0340	Aeropuerto Internacional El Alto, Bloque Técnico AASANA
CHI	Christian Vergara Leyton, DGAC	Supervisor de Mantenimiento Técnico Centro de Control de Santiago	cvergara@dgac.cl	(562) 836-4005; (562) 836-4011; (562) 644-8345	Avenida San Pablo 8411, Comuna de Pudahuel, Santiago, Chile
	Pedro Pastrián Céspedes, DGAC	Supervisor de Mantenimiento Técnico Centro de Control de Santiago	ppastrian@dgac.cl	(562) 836-4005; (562) 836-4011; (562) 644-8345	Avenida San Pablo 8411, Comuna de Pudahuel, Santiago, Chile

STATE / ESTADO	Name / Nombre	Cargo	E-Mail / Correo-e	Telephone / Teléfono	Address / Dirección
COL	Henry Mendoza Sandoval, UAEAC	Director de Telecomunicaciones y Ayuda a la Navegación Aérea	henry.mendoza@aerocivil.gov.co	(571) 296-2224; (57) 317-5170996	Aeropuerto Internacional El Dorado, Av. El Dorado N° 112-09 Edif. C.N.A. (Centro Nacional de Aeronavegación)
	Gabriel Enrique Guzmán Pachon	Jefe del Grukpo de Sistemas de Comunicaciones	gabriel.guzman@aerocivil.gov.co	(571) 296-2940; (57) 317-656 7202	Aeropuerto Internacional El Dorado, Av. El Dorado N° 112-09 Edif. C.N.A. (Centro Nacional de Aeronavegación)
ECU	Rául Avellán Oña, DGAC	Dirección de Nodo Aeropuerto "José Joaquín de Olmedo"	ravellan1@yahoo.com raul.avellan@dgac.gob.ec	(593-4) 269-2829	Av. De las Américas, Edif. Servicio para la Navegación Aérea, Guayaquil
FRA	Michel Metzelard, SNA-AG/Centre de Contrôle de Cayenne Félix Eboué	Chef de maintenance	michel.metzelard@aviation-civile.gouv.fr	(594) 594-359317 (Tech room); (594) 594-359321 (Antenna station)	Aviation Civile, Aeroport de Cayenne Félix Eboué, 97351 Matoury, Guyane Francaise
GUY	Mortimer Salisbury, Guyana Civil Aviation Authority	Supervisor - AN & T	mbsalisbury2000@yahoo.com	(592) 261-2569	Control Tower complex, Cheddi Jagan International Airport, Timehri, East Bank Demerara, Guyana
	Sewchan Hemchan, Guyana Civil Aviation Authority	Electrical Engineer	sewchan_hemchan@yahoo.com	(592) 261-2569	Control Tower complex, Cheddi Jagan International Airport, Timehri, East Bank Demerara, Guyana
PAR	Ramón Salinas Ruiz, DINAC	Gerente de Telecomunicaciones y Electrónica	salinas_184@hotmail.com; salinas_184@gmail.com	(595) 21 758 5208	Centro de Control Unificado, Gral. Artigas y Fernando de Mompox, Mariano Roque Alonso, Paraguay
	Aldo Pereira Alcaraz, DINAC	Jefe Sección Radiocomunicaciones	aldopereira26@gmail.com	(595-21) 645-708; (595-21) 645598	Centro de Control Unificado, Gral. Artigas y Fernando de Mompox, Mariano Roque Alonso, Paraguay
PER	Luis Silva Gárate, CORPAC	Jefe del Equipo encargado de la Operac. y Mantto. del Nodo REDDIG-Lima	lsilva@corpac.gob.pe	(511) 515-3015; (511) 414-1250	Aeropuerto Internacional Jorge Chávez, Callao, Perú

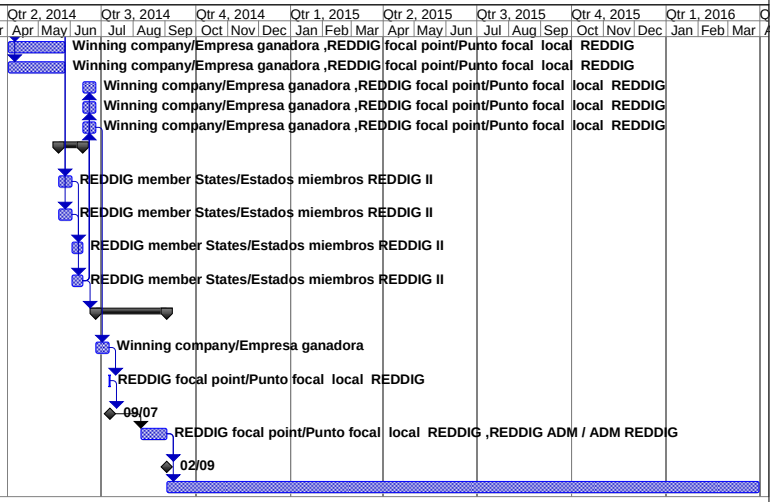
STATE / ESTADO	Name / Nombre	Cargo	E-Mail / Correo-e	Telephone / Teléfono	Address / Dirección
SUR	Rabindre Maharban, Ministry of Transport, Communication and Tourism, Civil Aviation Department	Chief CNS Technical Division	cad.navcom@tct.gov.sr; rabindre2000@yahoo.com	(597) 325-123; (597) 325-172; (597) 497-143	J. A. Pengel International Airport, Zanderij, district Para, Zorg en Hoop Airport, Paramaribo
	Renaldo Lansdorf, Ministry of Transport, Communication and Tourism, Civil Aviation Department	Senior Aeronautical Telecommunication Technician	r.lansdorf@yahoo.com	(597) 325-123; (597) 325-172	J. A. Pengel International Airport, Zanderij, district Para, Zorg en Hoop Airport, Paramaribo
TRI	Rohan Garib, Civil Aviation Authority	Executive Manager Air Navigation Services	rgarib@caa.gov.tt	(1-868) 669-4806 (1-868) 669-4706,	Trinidad and Tobago Civil Aviation Authority Complex, Caroni North Bank Road, Piarco
	Veronica Ramdath, Civil Aviation Authority	Manager Telecommunications and Electronics	vramdath@caa.gov.tt; vramdath@gmail.com		
URU	Marcos Vignolo, DINACIA	Director de Electrónica	mvignolo@dinacia.gub.uy	(5982) 6010932, Ext. 4520	Aeropuerto Internacional de Carrasco Av. Wilson Ferreira Aldunate 253 Paso Carrasco, Canelones
	Miguel Vera, DINACIA	Técnico de la División Comunicaciones	miguelvera@adinet.com.uy	(5982) 6010932, Ext. 4520	Aeropuerto Internacional de Carrasco Av. Wilson Ferreira Aldunate 253 Paso Carrasco, Canelones
VEN	Vicente FioreFedullo, INAC	Jefe Región Maiquetía-Venezuela	v.fiore@inac.gob.ve	(58212) 355-2143; (58212) 355-1412	Edificio ATC, 2do piso, Depto. De Comunica., Maiquetía, Edo. Vargas, Venezuela
	Luis Escobar, INAC	Coordinador de los Sistemas de Comunicaciones CNS Región Maiquetía	l.escobar@inac.gob.ve	(58212) 355-2143; (58212) 355-1412	Edificio ATC, 2do piso, Depto. De Comunica., Maiquetía, Edo. Vargas, Venezuela

APPENDIX B / APENDICE B
TENTATIVE TIME SCHEDULE-PHASES / PROGRAMA TENTATIVO- FASES

ID	Nom de la tâche	Duration	Start	Finish
1	**Tentative REDDIG II implementation work programme / Programa tentativo de trabajo implantacion REDDIG II**	**386 days**	**Fri 17/05/13**	**Tue 02/09/14**
2	**Phase 1 - Project / Fase 1 - Proyecto**	**170 days**	**Fri 17/05/13**	**Wed 11/12/13**
3	**Documentation drafting and approval process / Proceso de elaboración y aprobación documentación**	**170 days**	**Fri 17/05/13**	**Wed 11/12/13**
4	REDDIG II preliminary design installation / Preparación diseño preliminar instalación REDDIG II (SDD)	45 days	Fri 17/05/13	Thu 11/07/13
5	Preparation of installation and training procedures documentation and NMS documentaion preparation / Preparacion documentos de procedimiento de instalacion y capacitacion y ptrparacion documentacion del sistema NMS	15 days	Thu 11/07/13	Tue 30/07/13
6	FAT protocol preparation / Preparacion protocolo FAT	10 days	Tue 30/07/13	Mon 12/08/13
7	SAT protocol preparation / Preparacion protocolo SAT	10 days	Mon 12/08/13	Fri 23/08/13
8	Documentation submittance (SDD, FAT/SAT protocol, on-site installation procedure, training manuals) to ICAO / Envio documentación (SDD, protocolo FAT/SAT, procedimiento instalacion sitio, manuales de capacitación) a OACI	0 days	Fri 23/08/13	Fri 23/08/13
9	Documentation review / Revision de la documentacion	40 days	Fri 23/08/13	Fri 11/10/13
10	Technical-operational meeting / Reunión tecnico-operacional	5 days	Fri 11/10/13	Thu 17/10/13
11	Final design/Diseño finalizado	15 days	Thu 17/10/13	Tue 05/11/13
12	Documentation reviewed and approved / Documentos revisados y aprobados	0 days	Tue 05/11/13	Tue 05/11/13
13	Schedule DRM /Cronograma DRM	30 days	Tue 05/11/13	Wed 11/12/13
14	**Phase 2 - REDDIG II implementation / Fase 2 - Implantación de la REDDIG II**	**246 days**	**Tue 05/11/13**	**Tue 02/09/14**
15	**Purchasing and integration of VSAT equipment / Adquisición e itnegración equipos VSAT**	**35 days**	**Wed 11/12/13**	**Thu 23/01/14**
16	Purchasing of equipment and remittance to company HQ for integration / Adquisición de equipos y envío a la sede de la empresa ganadora para su integración	7 wks	Wed 11/12/13	Thu 23/01/14
17	**Preparation of ground backbone network / Preparación red medular terrestre**	**30 days**	**Tue 05/11/13**	**Wed 11/12/13**
18	Hiring of service for all nodes / Contratación de servicio para todos los nodos	1 wk	Tue 05/11/13	Mon 11/11/13
19	Equipment purchasing / Adquisión equipos	6 wks	Tue 05/11/13	Wed 11/12/13
20	**Integration at factory, training and FAT / Integracion en fábrica, entrenamiento y FAT**	**45 days**	**Thu 23/01/14**	**Wed 19/03/14**
21	Equipment assembling at factory / Ensamblar equipos en fábrica	6 wks	Thu 23/01/14	Fri 28/02/14
22	Network configuration and pre-test / Configuracion y pre-test de la red	8 wks	Thu 23/01/14	Thu 13/03/14
23	Documentation submittance for on-factory-training / Envío documentación para entrenamiento en fábrica	0 wks	Thu 23/01/14	Thu 23/01/14
24	On-factory-training / Entrenamiento en fábrica	3 wks	Thu 23/01/14	Tue 11/02/14
25	FAT	5 days	Thu 13/03/14	Wed 19/03/14
26	FAT signature / Firma FAT	0 days	Wed 19/03/14	Wed 19/03/14
27	**Remittance of equipment to sites (customs clearance 1 month approx) / Envío de los equipos a los sitios (liberación equipos aduana 1 mes tiempo estimado)**	**80 days**	**Wed 19/03/14**	**Wed 25/06/14**
28	Preparation of equipment remittance / Preparación para envio de equipos	2 wks	Wed 19/03/14	Tue 01/04/14
29	Ezeiza	8 wks	Tue 01/04/14	Tue 20/05/14
30	La Paz	10 wks	Tue 01/04/14	Mon 02/06/14
31	Rio de Janeiro	8 wks	Tue 01/04/14	Tue 20/05/14
32	Santiago	10 wks	Tue 01/04/14	Mon 02/06/14
33	Bogota	9 wks	Tue 01/04/14	Mon 26/05/14
34	Guayaquil	9 wks	Tue 01/04/14	Mon 26/05/14
35	Georgetown	8 wks	Tue 01/04/14	Tue 20/05/14
36	Cayenne	9 wks	Tue 01/04/14	Mon 26/05/14
37	Asuncion	10 wks	Tue 01/04/14	Mon 02/06/14
38	Lima	10 wks	Tue 01/04/14	Mon 02/06/14
39	Paramaribo	10 wks	Tue 01/04/14	Mon 02/06/14
40	Piarco	8 wks	Tue 01/04/14	Tue 20/05/14

APPENDIX B / APENDICE B
TENTATIVE TIME SCHEDULE-PHASES / PROGRAMA TENTATIVO- FASES

ID	Nom de la tâche	Duration	Start	Finish
41	Montevideo	9 wks	Tue 01/04/14	Mon 26/05/14
42	Maiquetia	9 wks	Tue 01/04/14	Mon 26/05/14
43	Manaus	2 wks	Fri 13/06/14	Wed 25/06/14
44	Recife	2 wks	Fri 13/06/14	Wed 25/06/14
45	Curitiba	2 wks	Fri 13/06/14	Wed 25/06/14
46	**Theoretical-practical course in Rio de Janeiro / Curso teórico-práctico en Río de Janeiro**	**20 days**	**Tue 20/05/14**	**Fri 13/06/14**
47	Session 1 (10 Spanish-speaking) / Sesión 1 (10 personas en español)	2 wks	Tue 20/05/14	Mon 02/06/14
48	Session 2 (10 Spanish-speaking) / Sesión 2 (10 persons en español)	2 wks	Tue 20/05/14	Mon 02/06/14
49	Session 3 (10 Spanish-speaking) / Sesión 3 (10 personas en español)	2 wks	Mon 02/06/14	Fri 13/06/14
50	Session 4 (10 English-speaking) / Sesión 4 (10 personas en inglés)	2 wks	Mon 02/06/14	Fri 13/06/14
51	**On-site installation activities / Actividades de instalación en el sitio**	**56 days**	**Wed 25/06/14**	**Tue 02/09/14**
52	Simultaneous on-site installation / Instalación todos los sitios en forma simultánea	2 wks	Wed 25/06/14	Tue 08/07/14
53	PSAT / NSAT (provisional and network acceptance test) / (Prueba de aceptacion provisional y de red)	1 day	Tue 08/07/14	Wed 09/07/14
54	PSAT / NSAT Signature / Firma	0 days	Wed 09/07/14	Wed 09/07/14
55	FSAT (Final acceptance test) / (Prueba de aceptacion final)	4 wks	Fri 08/08/14	Tue 02/09/14
56	FSAT signature / Firma FSAT	0 days	Tue 02/09/14	Tue 02/09/14
57	Two (2) years' guarantee / Dos (2) años de garantía	94 wks	Tue 02/09/14	Thu 31/03/16



APPENDIX C

AN-CONF/12 RECOMMENDATION 1/6 – DATA COMMUNICATIONS ISSUES

That ICAO:

a) organize a multidisciplinary review of air traffic control communication requirements and issues; and

b) review the operation, management and modernization of a regional digital network technical cooperation project and other similar regional experiences with the aim that this efficient practice can be adapted for use in other ICAO regions;

That States:

c) explore multi-modal solutions when appropriate to overcome transition issues; and

d) anticipate and accelerate the migration of air traffic management communication systems towards more efficient technologies to timely service the aviation system block upgrade modules.

- END -