



Agenda Item 4: Assessment of operational requirements to determine the implementation of improvements in communications, navigation and surveillance (CNS) capabilities for operations in route and terminal area

Follow-up to the Implementation of the RAIM Availability Prediction Service

(Presented by the Secretariat)

SUMMARY	
This working paper presents information regarding the activities carried out to follow-up the operations of RAIM availability prediction service via WEB (SATDIS).	
REFERENCES:	
<ul style="list-style-type: none"> • Final Report of the Eight Coordination Committee Meeting of Project RLA/06/901 (RCC/8) Lima, Peru, from 25 to 27 February 2015. • Reports of the teleconferences via WEB conducted on 30 January and 12 March 2015. • Final Report of the Fourteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/14) Lima, Peru, 10 to 14 November 2014. 	
<i>ICAO strategic objectives:</i>	<i>A – Safety</i> <i>B – Air navigation capacity and efficiency</i>

1 Background

1.1 As a follow-up to the operations of RAIM availability prediction service via WEB (SATDIS) which came into operation in mid-September 2014, the SAM/IG/14 Meeting considered that the operation be conducted in two stages: the first of free dissemination from 15 December 2014 to 15 October 2015 and the second phase which will be analyzed in the SAM/IG/16 to define if the prediction service will continue or not with free access, being formulated the Conclusion SAM IG/14-15 *Use of the RAIM Availability Prediction Service*.

1.2 Furthermore, the Eighth Meeting of Coordination of project RLA/06/901 when analyzed the compliance with the programme of activities approved by the Coordination Committee for the year 2014 with respect to the implementation and operation of the RAIM availability prediction service via WEB, considered that the ICAO South American Regional Office should consult the RAIM service provider the feasibility to generate different access categories to the SATDIS, such as temporary allocations and free access, and once the reply is received it be reported to the SATDIS Member States; and if any expenditure results from the required modification; the cost be subject to States approval either through a notification or via teleconference, being formulated in this regard Conclusion RCC/8-01 *Expansion of users for the SATDIS*.

2 Analysis

2.1 As a follow-up to the implementation of the actions indicated in the Conclusion SAM/IG/14-15, **Appendix A** of this working paper presents a summary of tasks carried out by some Member States of the project RLA/06/901 (Argentina, Brazil, Chile and Panama) reported in a teleconference on 30 January 2015. In the summary it can be noticed that these States have started a training process to disseminate the service among their users as well as the personnel of the air navigation service providers in charge of the reception and approval of flight plans.

2.2 The focal point of Brazil presented during the teleconference, a model of AIC developed to inform the users of the RAIM availability prediction service. A copy of the AIC is presented as **Appendix B** to this working paper.

2.3 In order to assist the States in the process of dissemination of the RAIM availability prediction service in massive way, a procedure was developed to create a user account and password for each State member of the SATDIS. The procedure is presented as **Appendix C** to this working paper. The procedure was presented and analyzed in the teleconference of 30 January 30 2015.

2.4 The assignment of an account with a user name and password for massive use, presents the disadvantage that a user could change the password affecting all users, but this can be avoided informing everyone not to change the assigned password.

2.5 Even when the SATDIS was initially oriented to users, it is important to remind States that they have published in their AIP PBN procedures that in case of not having availability of RAIM, the State service provider must publish a NOTAM in this regard. The SATDIS provides information of RAIM availability at aerodromes with a validation for 72 hours and it can be used for the elaboration of the NOTAM.

2.6 On 12 March 2015, another teleconference was held with the SATDIS member States and the company that provides the service (DWI), in order to require DWI a solution to access the SATDIS freely. It is important to remember that when preparing the technical specifications for the implementation of the RAIM availability prediction service, its Member States opted for non-free access.

2.7 In reply to the requirement of free access to the SATDIS, DWI offered a proposal presented as **Appendix D** to this working paper and which was circulated among all the focal points of the SATDIS so they discuss the proposal with their authorities. In this regard only Brazil reported that it did not support the proposal of DWI and that they would continue operating with the performance of the current SATDIS.

2.8 In this regard the Secretariat also believes that DWI proposal is not feasible, suggesting to Member States for their free access, the procedure described in Appendix C or other that the State can adopt.

3 Suggested action

The Meeting is invited to:

- a) Take note of the information provided herein;

- b) Inform on SATDIS operation and actions carried out to spread the service among the users and air navigation service providers; and
- c) analyze the actions proposed in section 2 and corresponding Appendixes regarding SATDIS operation.

APPENDIX A**Follow-Up to activities carried out by the Sates for the operation of RAIM Availability Prediction Service via WEB (www.sadis.aereo)**

(Teleconference VIA GO TO MEETING on 30 January 2015)

Argentina

1. It was reported that they continue in the phase of training of staff who works in the Office ARO/AIS (DGSTA service provider) at national level and there are plans to place a link to the SATDIS portal on the ANAC website, being the matter handled by ITC staff at this moment.
2. They also reported that the operation of the availability of RAIM prediction for PBN operations in route was verified, confirming that the waypoints had already joined the SATDIS, thus facilitating the checking for this flight phase, taking into account that initially the service did not include the waypoints that had to be manually entered.
3. Finally it was informed that still had failed to the operation to allow free access to the SATDIS, providing to all users a common user name and password.

Brazil

1. Brazil informed that the option of providing a unique user name and password to the users represents a problem since a user could change the password and this would prevent access to the remaining users, becoming necessary to generate another common password, with the same risk in case the password is changed again.
2. In this sense, Brazil suggested that the best option to have the prediction service available to all users would be to have access to SATDIS free of password for year 2015 and that the ICAO South American Regional Office proposes this option to DWI (service provider) at no cost for the SATDIS members (Project RLA/06/901).
3. Also reported that a model of AIC has been developed in Brazil, but it has not been published yet due to the lack of an acceptable procedure of free access to the SATDIS.
4. Additionally it was reported that the implementation phase of the RAIM availability prediction for a PBN operation in route, the action to complete the parameters as the level of integrity (type of RNAV or RNP), the angle of masking, waypoint coordinates (if necessary to insert it in view that this data is already present) was not very friendly; also if one of the fields is not completed, an alarm is displayed, but this is not in the right place.

Chile

1. The focal point of Chile informed that Chile would not place SATDIS open to all users and would keep access via user name and password. Also informed that their priority by the moment is to spread the SATDIS service and continue with preparation course for operators of the ARO/AIS offices.

Panama

2. The focal point reported that he had assigned some user names and password but still had failed to inform all the interested users a common user name and password.

APPENDIX B

MODEL OF AIC

RAIM AVAILABILITY PREDICTION SERVICE

PREPARED BY BRAZIL

BRASIL

DEPARTAMENTO DO CONTROLE DO ESPAÇO AÉREO
SUBDEPARTAMENTO DE OPERAÇÕES
AV. GENERAL JUSTO, 160 – 2º Andar
20021-130 – RIO DE JANEIRO – RJ

AIC

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O texto exibido é muito l

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PREVISÃO DE DISPONIBILIDADE RAIM

1 DISPOSIÇÕES PRELIMINARES

1.1 FINALIDADE

Esta Circular de Informação Aeronáutica (AIC) tem por finalidade divulgar o SATDIS SAM, ferramenta para acesso ao serviço de previsão da disponibilidade RAIM (*Receiver Autonomous Integrity Monitoring*) na Região SAM, informação indispensável aos usuários ou operadores de aeronaves que intencionam realizar operação em rota ou aproximação baseadas em performance – PBN.

1.2 ÂMBITO

Esta AIC (Circular de Informação Aeronáutica) se aplica a todos os usuários do SISCEAB (Sistema de Controle do Espaço Aéreo Brasileiro) que intencionem realizar operações PBN no espaço aéreo brasileiro.

2 DISPOSIÇÕES GERAIS

Ao estabelecer o conceito navegação por performance, a ICAO especificou requisitos que devem ser cumpridos para realizar uma operação PBN em termos de integridade, disponibilidade, precisão, continuidade, disponibilidade e funcionalidades necessárias para a operação proposta por um conceito de espaço aéreo.

Com os avanços tecnológicos e possibilidades dos novos sistemas de bordo, um novo conceito de navegação, além daquele baseado em sensor específico para determinado auxílio, surgiu e vem sendo amplamente empregado em rota, nas aproximações e saídas dos aeroportos, os procedimentos de navegação por performance, operação PBN. Para o emprego dos mesmos, estabeleceu-se não apenas os requisitos técnicos para os auxílios existentes na época eram suficientes, mas outros que devem ser preenchidos e são inerentes a aeronave, piloto e procedimentos para realizar a operação segura dentro de cada performance.

No que tange performance de integridade, estabeleceu-se que as aeronaves, para realizar operações mais precisas como a RNP, deveriam dispor a bordo de equipamento que indicasse a integridade dos sinais utilizados na operação e que estes estivessem dentro de padrões pré-estabelecidos. Com surgimento de meios, que permitem uma previsão do cenário da arquitetura dos satélites GPS com antecipação, impeliu a ICAO, a partir de 2013, a proporcionar orientações, através do DOC 9613 Manual PBN, recomendando a que todos os usuários ou operadores que desejem realizar operações de

voo RNP devam assegurar-se da previsão de integridade dos sinais utilizados na navegação antes mesmo de iniciar o seu vôo.

Em vista disto, recomenda-se ao operador ou usuário de aeronave, antes de realizar esse tipo de operação, que realize um serviço de pré-voo com o intuito de assegurar-se da disponibilidade dos sinais dos satélites GPS para a operação pretendida estará OK e a integridade não irá se reduzir a ponto de comprometer a operação PBN prevista.

O serviço de predição de RAIM se diferencia do sistema monitoramento de integridade de bordo da aeronave, pois este é inerente à aviônica da aeronave e se trata de integridade em tempo real no momento que a aeronave executa a operação, enquanto, a predição de RAIM provida pelo SATDIS refere a um prognóstico da arquitetura dos satélites com 48 horas de antecipação. Permitindo que usuário planeje seus voos e dependendo do “status” degradado dos sinais poderá, inclusive, realizar uma mudança ou atraso de rota ou cancelamento da operação em determinada localidade.

De acordo com o DOC 9613, caso se constate através de predição, uma contínua perda de detecção dos satélites por mais de cinco (05) minutos a operação para RNP 1, RNP 2, RNP 5 deveria ser revisada (atrasada a decolagem ou planejado outro tipo de procedimento).

A ferramenta não é garantia de que haverá um cenário da operação desejada tal qual previsto na fase de pré-voo. É uma ferramenta para avaliar a expectativa para encontrar condições para operar RNP, por isso o usuário deverá estar ciente que o RAIM ou disponibilidade do GPS poderá ser perdida em voo e deverá prever procedimentos alternativos, caso isso ocorra.

Com o intuito de incentivar os usuários a utilizarem serviço de predição RAIM, o DECEA, em associação com o escritório da ICAO em Lima, disponibilizará, até 15 de dezembro de 2015, o serviço de predição do SATDIS SAM, que poderá ser utilizado para todas rotas e aeródromos do espaço aéreo brasileiro bem como toda a região SAM.

Após este período, será estudada pelo DECEA a forma de divulgar tais informações de forma reduzida, provavelmente se restringirá apenas as fases de aproximação e será através de NOTAM. De todas as maneiras, recomenda-se a que todos os usuários façam suas ações no sentido de adquirir tais informações com um provedor deste serviço como a DWI.

2.1 USO DO SERVIÇO DE PREDIÇÃO RAIM PARA OPERAÇÃO RNAV

Embora as aeronaves operando RNAV não tenham a mesma performance em termos requisitos de RAIM a bordo para alertar quando a aeronave não se encontra dentro dos limites de segurança, o serviço de predição deve ser incentivado o seu uso pelo operador ou usuário, pois possibilitará ter uma visão do cenário em que irá executar sua operação no futuro.

2.2 ACESSO AO SISTEMA

Até 15 de dezembro de 2015, o serviço de predição de RAIM, SATDIS SAM estará disponível aos usuários em tempo integral, no *site* www.aisweb.aer.mil.br, no link SATDIS.

No site estará disponível um manual com instruções necessárias para o usuário consultar a disponibilidade dos satélites para suportar a sua operação na fase de rota ou na fase de aproximação PBN.

2.3 FERRAMENTAS

As principais informações que poderão ser extraídas do SATDIS para suportar uma operação aérea são Estado da Constelação, Rota e aeródromos.

a) Estado da Constelação

A ferramenta Estado da Constelação apresenta uma visão da constelação de satélites GPS com base no último almanaque e no NANUs (Aviso Consultivo para os usuários da navegação), emitidos pela Guarda Costeira dos EUA. É apresentado o número de satélites operacionais da constelação GPS com informações atualizadas referentes ao momento da visualização. O almanaque usado e os NANUs existentes que afetam a disponibilidade de satélites durante o período de tempo solicitado também são exibidos. Esta ferramenta fornece o estado da constelação GPS para as próximas de 72 horas (as horas são em UTC).

b) Rota e aeródromo

O usuário poderá utilizar realizar consulta de predição de rota (ferramentas > rota) ou de aproximação (ferramentas > aeródromos) para isso deverá previamente inserir os requisitos de performance como tipo de operação (RNP1, RNP APCH), ângulo de mascaramento, recomenda-se utilizar um valor acima de cinco graus, pois valores inferiores pode resultar em um cenário que comprometerá a operação planejada.

The screenshot displays the SATDIS web application interface. At the top, there is a logo for SATDIS and a navigation menu with options: Início, Ferramentas (highlighted), Recursos, Conta, Admin, Informações, and Mapa da página. Below the menu, there is a sub-menu with options: Estado (highlighted), Aeródromos, Rota, and Visibilidade. The main content area is titled "Previsão de Disponibilidade de Serviço SAM RAIM" and includes a "Versão para impressão" button. The interface is divided into several sections:

- Hora do cenário:**
 - Início: 23-11-2014 19:06:14 UTC
 - Fim: 26-11-2014 19:06:14 UTC
 - Duração: 72 horas
- Visão Geral:**
 - Um mínimo de 30 satélites estão disponíveis durante o período de consulta.
- Almanac:**
 - Semana GPS: 796
 - GPS TOA: 233472
 - Total de satélites: 31
 - Satélites insalubres por PRN: 3
 - Relatório button
- NANUs:**

Número	PRN	Início	Parar	Tipo
Sem NANUs ativos				

3 DISPOSIÇÕES FINAIS

3.1 A aprovação desta AIC foi publicada no Boletim Interno do DECEA N^o XX, de "dd mmm yyyy" .

3.2 Esta AIC cancela a AIC NXX / YY, de "dd mmm yyyy".

AMOSTRA

ANEXO XX

"Clique e digite"

AMOSTRA

APPENDIX C

SUGGESTED PROCEDURE TO GENERATE A SINGLE ACCOUNT BY STATE FOR MASSIVE ACCESS

Each focal point of the SATDIS that has the SATDIS Administrator role should generate a user name to be applied at national level. The name of this user name could be the full or abbreviated country name; for example, the focal point of Argentina could generate a user name called ARGENTINA or ARGT.

To create this user name, the focal point as administrator, should follow the procedure described in the operating manual, section 10.2.2 *creating new users*. The steps would be as follows:

- 1 Select Administration**
- 2 Select User**
- 3 Select Add**
- 4 Select “Add” and fill de application “**user data**”. Since these data correspond to the same focal point, put a different name and surname from yours, as your name is of the administrator. You could fill fictitious name and surname. For example for Argentina could place:

Name: Administration
Surname: ANAC
E-mail: Fill a different e-mail from that registered as administrator; if necessary generate a new e-mail address or use any you can access.
User name: Fill as user name, the name of the country or an abbreviation; for example for Argentina, it can be fill Argentina or an abbreviation ARGENT to easy remember.
- 5 In **Funtions** box, select **user** and press the arrow to move the Word “*user*” to the next box.
- 6 In “**Tools and Permission**” box select at least **User Data Permission and User Tool Permission**. Use arrows to move to the next box.
- 7 Press “Save”.
- 8 A password will be send to the selected e-mail address. Once the password is received, it must be changed quickly. It can be used RAIM in capital letters as password (suggestion only).**
- 9 In this manner the user name and password will have been generated to be used for free access by users.

Argentina would have then:

User name: **Argentina**

Password: **RAIM**

The other focal points of States might have for example:

Bolivia

User name: **Bolivia**

Password: **RAIM**

Brazil

User name: **Brazil**

Password: **RAIM**

And so on.

APPENDIX D

Proposal for SATDIS Expansion



Proposal for SATDIS Expansion

Version	1.0	Status	Released
Version Date	March 2015	Class	Commercial in Confidence
Reference	DW/01/003/266/001/1.0		

DOCUMENT APPROVAL

The following table identifies all management authorities who have successively approved the present issue of this document.


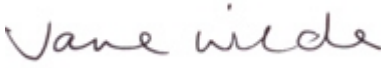

AUTHORITY	NAME AND SIGNATURE	DATE
Author	 Charles Thornberry	March 2015
Reviewer	 Jane Wilde	March 2015
Director	 John Wilde	March 2015

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1 INTRODUCTION

DW International Limited (DWI) is pleased to present this proposal for the expansion of access to the SAM RAIM Prediction Availability Service (SATDIS) ICAO SAM.

The structure of this document is as follows:

- Section 2: Company Profile.
- Section 3: SATDIS Expansion.
- Section 4: Pricing.

This proposal shall remain valid until 30th April 2015.

2 DWI COMPANY PROFILE

DWI was established in August 2005 and has developed an international reputation for providing independent, high quality consultancy in the fields of Quality Assurance, Air Navigation Applications, Instrument Procedure Design, Aircraft Certification, Data Integrity, Operational Approval and the development of Operational Concepts.

The Company also provides high quality software services, including the specification, development and hosting of bespoke software applications and products supplied to a growing number of high-profile international client companies.

The Company is proud to list among its clients organisations such as: [AeroLogic](#); [AEROTHAI](#); [Air Canada](#); [Air Europa](#); [Air France](#); [Air Macau](#); [Air Mauritius](#); [Air New Zealand](#); [Air Niugini](#); [Air Support](#); [American Airlines](#); [ANA](#); [ARINC](#); [Asiana Airlines](#); [Avitech](#); [BaseOps](#); [Delta Air Lines](#); [Cathay Pacific](#); [Civil Aviation Authority, Mongolia](#); [Civil Aviation Authority of Singapore](#); [Emirates](#); [EUROCONTROL](#); [flydubai](#); [General Authority of Civil Aviation, Saudi Arabia](#); [Global Supply Systems](#); [Honeywell](#); [Hong Kong Civil Aviation Department](#); [Hunnu Air](#); [ICAO South American Regional Office](#); [Isavia](#); [Japan Airlines](#); [Jeju Air](#); [Jeppesen](#); [Jet Airways](#); [Jetstar Japan](#); [KLM](#); [Lufthansa Cargo](#); [Martinair](#); [MIAT Mongolian Airlines](#); [Ministry of Land, Transport & Maritime Affairs, Korea](#); [NATS](#); [Navtech](#); [Novair](#); [NTT Data](#); [Oman Air](#); [Rockwell Collins](#); [Royal Jordanian](#); [S7 Airlines](#); [Sabre Airline Solutions](#); [SilkAir](#); [SITA](#); [Skyplan](#); [Smart4Aviation](#); [STARS](#); [Swiss International Air Lines](#); [United Airlines](#); [Universal Weather & Aviation Inc](#); [UPS](#); [Vanilla Air](#); [Virgin Atlantic](#); and [Virgin Australia](#).

In specific reference to this proposal, DWI is responsible for the hosting and support of the AUGUR GPS RAIM prediction system for EUROCONTROL, the NETRA RAIM Prediction Service for AEROTHAI and SATDIS for the South America Region. DWI also supplies an integrated version of the GRPS direct to flight planning companies such as Air Support, ARINC Direct, Honeywell, Jeppesen, Navtech, Rockwell Collins, Sabre Airline Solutions, SITA, Skyplan, Smart4Aviation and Universal Weather & Aviation Inc. In addition, DWI partnered with Jeppesen to supply RNP AR predictions to South West Airlines down to 0.1NM, with the service going live in Q1 2011.

Independent specialists are sub-contracted, as necessary, to provide additional expertise for specific tasks.

DWI is an ISO 9001:2008 certified company.

More information about DWI can be found at www.dwnt.com.

3 SATDIS EXPANSION

3.1 SATDIS

DWI designed and developed SATDIS for ICAO SAM for use by South American states. SATDIS went live in Q4 2014 and can be found here: <https://www.satdis.aero/>. The SATDIS offers the capability to calculate RAIM predictions for GNSS-based operations using the following tools:

- Constellation Status Tool.
- Aerodrome Tool.
- Route Tool.
- Visibility Tool.

Table 1 shows which SAM member states are covered and which are currently participating.

State	Coverage	Participation
Argentina	✓	✓
Bolivia	✓	✓
Brazil	✓	✓
Chile	✓	✓
Colombia	✓	✓
Ecuador	✓	✓
French Guiana	✓	X
Guyana	✓	X
Paraguay	✓	✓
Peru	✓	✓
Panama	✓	✓
Suriname	✓	X
Uruguay	✓	✓
Venezuela	✓	✓

Table 1 – SATDIS State Users

Figure 1 shows the SATDIS homepage.

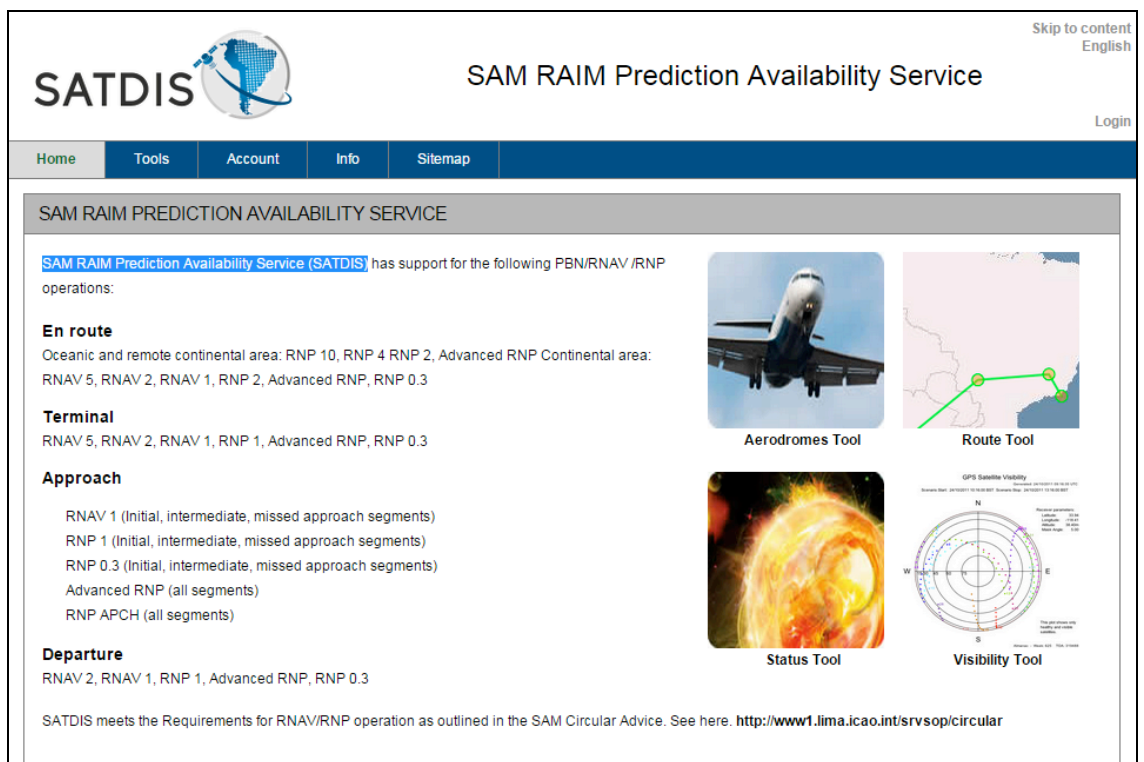


Figure 1 – SATDIS Homepage

3.2 ACCESS EXPANSION

SATDIS currently allows the following password-protected access for each state: The state Focal Point (FP) and 10 additional accounts. These accounts are be distributed and managed by the state FPs.

ICAO SAM wishes to expand access via either of the following two options:

- a) An increase to the number of accounts available to each state, distributable in batches of 10.
- b) The creation of a single account with a fixed username/password that cannot be changed, for general distribution. This option effectively makes SATDIS “open-access” with no restrictions on the number of Users accessing SATDIS.

Option (a) can be managed easily on a case-by-case basis with each state requesting and being granted additional accounts directly with DWI, with ICAO SAM coordinating.

Option (b) requires additional infrastructure and server capability to ensure that SATDIS performance levels are maintained, as the potential usage will be unpredictable with no known User-base.

4 PRICING

Table 2 shows the price of expanding access to SATDIS.

Description	Cost (USD)	Notes
Option (a) Additional 10 User accounts per ICAO SAM member state. ¹	5,910	Annual Charge.
Option (b) Unlimited Account for general distribution. ¹ Includes maintenance.	71,440	Annual Charge.
Travel & subsistence, if required, for commissioning or training.	At cost.	Flights premium economy. Economy car rental. Holiday Inn or equivalent hotel costs. Travel time for DWI staff at ½ day increments. Invoiced monthly as incurred.

Table 2 – Deployment and RAIM Pricing

Notes:

1 – A reasonable usage limit will be applied which will be regularly reported to the Customer and reviewed annually between the Customer and DWI. The results of this review will be used to set the reasonable usage limit for the following year.

Bespoke configuration, should any be required for ICAO SAM, shall be chargeable at standard rates (Management/Design: USD1,100.00 per day; Software Engineer: USD950.00 per day).