Agenda Item 6: Assessment of operational requirements to define communication, navigation, and surveillance (CNS) improvements for en-route and terminal area operations

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

(Presented by the Secretariat)

SUMMARY

This working paper presents updated information on the status of implementation of the web-based RAM availability prediction service

References

- Report on the RAIM availability prediction service design document
- Summary of the teleconferences conducted for the implementation of the RAIM availability prediction service

ICAO strategic objectives:	*A – Safety* *B – Air navigation capacity and efficiency*

1 Background

1.1 Regarding the implementation of the RAIM availability prediction service, the SAM/IG/13 meeting considered that initial coordination among the States of the Region, the Secretariat, and the servide provider would be required to define the website format, the mode of access through the allocation of a password, and verification of data authenticity.

1.2 The meeting also felt that, once the service was available and operational, States should use it, encouraging efficient use by all stakeholders, and the Secretariat should amend the advisory circulars on PBN procedures for the SAM Region, to make reference to the existence of the RAIM availability prediction service. Accordingly, it formulated Conclusion 13/7 – *Implementation of the RAIM availability prediction service in the SAM Region.*

2 Discussion

2.1 ICAO, on behalf of Project RLA/06/901 member States, signed Contract 22501411 for the provision of a web-based RAIM availability prediction service on 30 May 2014.

2.2 On 16 June 2014, DWI submitted the project document (SDD) containing information on the mode of operation of the RAIM availability prediction service and the system supporting its operation, as required in the corresponding technical specifications. **Appendix A** contains a copy of the SDD.

2.3 In this regard, the SDD was reviewed to ensure consistency with the technical specifications developed for the implementation of the web-based RAIM availability prediction service.

2.4 Project RLA/06/901 member States have designated the focal points responsible for the prediction service at national level, and for the allocation of codes to access the service website. **Appendix B** shows a list of focal points**.**

2.5 Likewise, the meeting designed the RAIM website, the logo identifying the service, and the name of the website. The activities carried out within the context of this process were reported to, and reviewed by project member States through the exchange of e-mails with focal points for follow-up purposes, and a web teleconference with the service provider DWI on 11 June 2011. The final version of the SDD appears in **Appendix C** to this working paper. Following an analysis of the SDD, the name chosen for the regional website of the RAIM availability prediction service was SATDIS and the name given to the website was www.satdis.aero.

2.6 As foreseen in the contract, provisional factory acceptance tests were performed on 13-15 August 2014, which led to its acceptance with comments (see **Appendix D** to this working paper). Tests were carried out in Windsor, England, with the participation of a representative of one member State of Project RLA/06/901 (Uruguay) and one representative of the ICAO South American Regional Office. A second representative of a Project RLA/06/901 member State was expected to participate in the test, but he could not obtain the visa in time to travel to England.

2.7 Two web-based distance courses were conducted on 15 and 16 September 2014, one in English and the other in Spanish. The course included an explanation of the tools contained in the SAM RAIM website (SATDIS), the procedure for assigning codes, the import and export of data, and the query and fault resolution procedure. The course in Spanish can be downloaded from https://www.cubbyusercontent.com/pl/SATDIS+Formaci%c3%b3n+(Espa%c3%b1ol)+2014-09-16.webm/_2cbe0bd9f04c43f783468fe5f2f4b15e. The course was attended by all the focal points nominated by the States, as well as by other participants designated by the States.

2.8 Following the course, all focal points received from the service provider the respective user name and password to access SATDIS as administrators. In this sense, all focal points acknowledged receipt of the information.

2.9 The SATDIS website in three languages (Spanish, Portuguese, and English) started operating on 17 September 2014. For the prediction of en-route operations, waypoint data still needs to be sent by the provider; in the meantime, waypoints can be manually introduced.

2.10 For service use monitoring and the provision of feedback, a web teleconference was held on 13 October 2014 with the focal points designated by the States. **Appendix E** contains a summary of the teleconference. The focal points of Argentina, Bolivia, Brazil, Chile, Panama, Paraguay, Peru, and Venezuela participated in the teleconference. Uruguay informed it could not participate and sent its comments by e-mail.

2.11. The SATDIS FSAT final acceptance test has not been conducted yet; it will be carried out once DWI completes the database with all en-route waypoints and delivers the operations manual in Spanish and Portuguese.

2.12 The delegates of Project RLA/06/901 member States are expected to provide information on the activities carried out to date and those foreseen for the provision of the prediction service to air navigation service providers, aeronautical authorities, airworthiness and operations inspectors of the web-based RAIM availablity prediction service.

3 Suggested action

The Meeting is invited to:

a) take note of the information provided herein;

b) analyse section 2 of the working paper and its appendices; and

c) discuss any other aspect it may deem necessary.

SRRPAS System Design Document

Version	**1.0**	**Status**	**Released**
Version Date	**June 2014**	**Class**	**Commercial in Confidence**
Reference	**DW/02/001/084/004/1.0**		

DOCUMENT APPROVAL

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

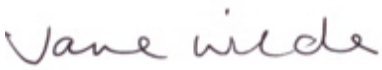
AUTHORITY	NAME AND SIGNATURE	DATE
Author	 Charles Thornberry	June 2014
Reviewer	 Jane Wilde	June 2014
Director	 John Wilde	June 2014

TABLE OF CONTENTS

1 INTRODUCTION

1.1 This document provides the system design information for the South America (SAM) Regional Receiver Autonomous Integrity Monitoring (RAIM) Prediction Availability Service (SRRPAS) as supplied by DW International (DWI) to the SAM Regional States.

1.2 This document provides information on the following topics:

- Technical descriptions of the SRRPAS and the host architecture hardware (Sections 2 and 3).
- SRRPAS branding options (Section 4).
- Training course outline (Section 5).
- Implementation schedule (Section 6).
- Hosting and operation support plan (Section 7).

1.3 The SRRPAS shall offer coverage to all 14 SAM member states though initially 11 states shall use the service:

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

2 SRRPAS DESCRIPTION

2.1 INTRODUCTION

2.1.1 This Section details the functionality of the SRRPAS. Screen shots from the NETRA RAIM Prediction Service are shown in the following sections to illustrate how RAIM predictions shall be presented. NETRA is based on the same core RAIM prediction solution upon which the SRRPAS shall be based. The presentation and "look and feel" will be updated to meet the ICAO branding guidelines.

2.1.2 The interface shall be provided in English, Spanish and Portuguese.

2.2 FUNCTIONALITY

2.2.1 Constellation Status Tool

2.2.1.1 The Constellation Status Tool shall present a view of the GPS satellite constellation based on the latest almanac and NANUs (Notice Advisory to Navigation Users) issued by the US Coast Guard (USCG). Information disseminated by the USCG can be found at the USCG NAVCEN web site.

2.2.1.2 The Constellation Status Tool shall present the number of operational satellites in the GPS Satellite constellation for a 72-hour period from the time of the request. The almanac used, and NANUs active at the request time, shall also be displayed.

2.2.1.3 A printer friendly version of this report shall be available to the User.

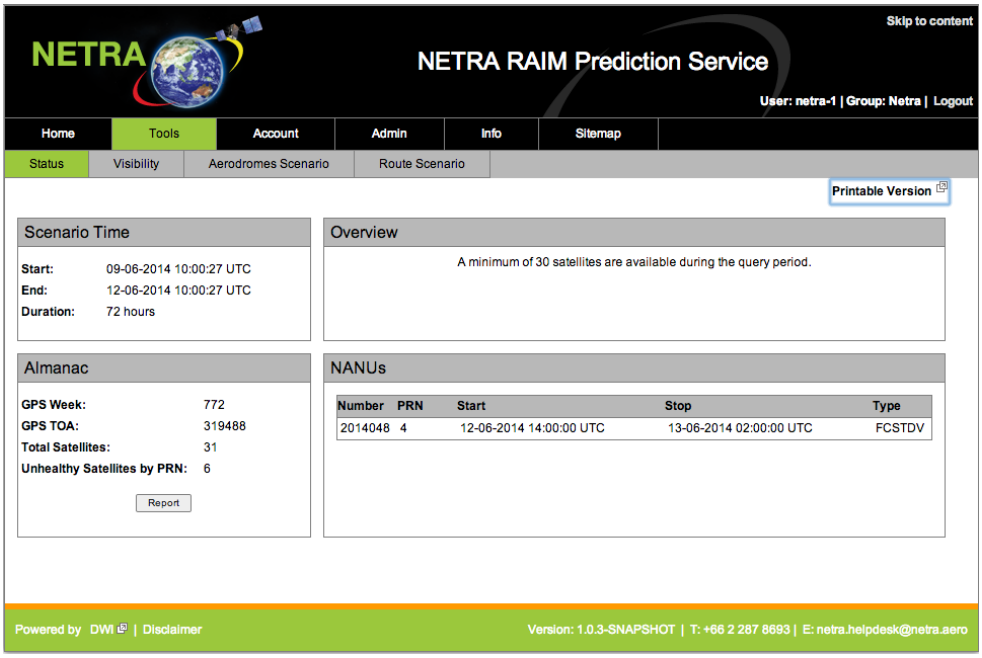


Figure 1 – Constellation Status Tool Screen Shot

2.2.2 Aerodrome Tool

2.2.2.1 The Aerodrome Tool shall calculate the predicted RAIM availability for a 24, 48 or 72 hour period (User selectable) for specific aerodromes. The tool shall support calculations for terminal navigation specifications for up to 20 aerodromes in a single scenario.

2.2.2.2 The Aerodrome Tool shall calculate the predicted RAIM availability at the Aerodrome Reference Point (ARP).

2.2.2.3 Calculations can be configured by the User, allowing selection of:

- GPS receiver type C-129 or C-145/6.
- Fault Detection (FD) or Fault Detection Exclusion (FDE).
- Baro-aiding on, off or both.
- Selective Availability (SA) on / off.
- Mask angle between -20 to +25 degrees.

2.2.2.4 The Aerodrome Tool shall provide a formatted report which displays the predicted RAIM outages over the scenario period for each of the selected aerodromes, in graphical and tabular formats.

2.2.2.5 A printer friendly version of this report shall be available to the User.

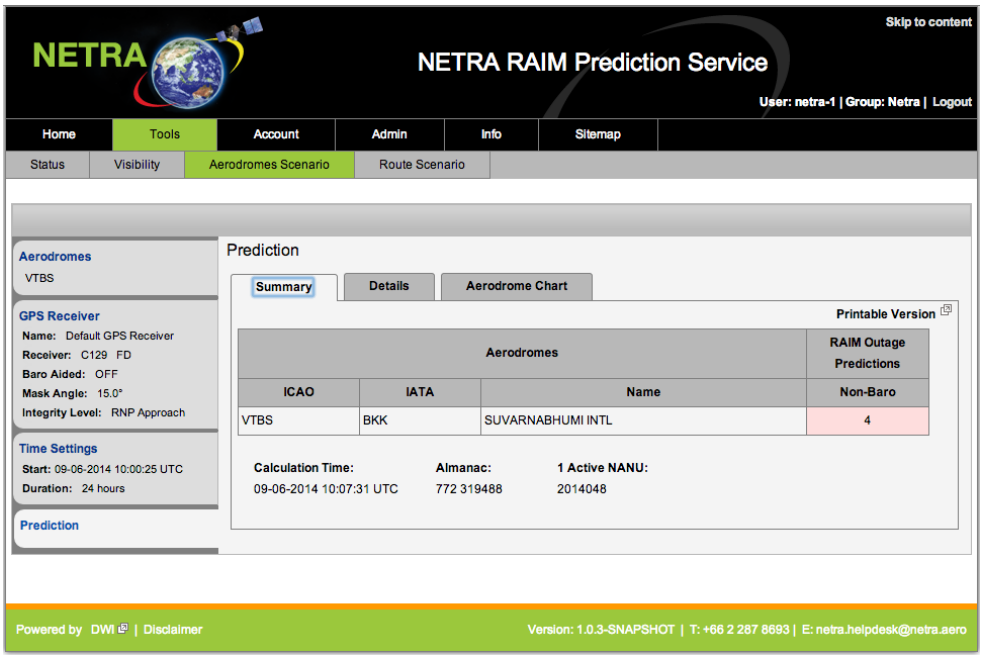


Figure 2 – Aerodrome Tool Summary Screen Shot

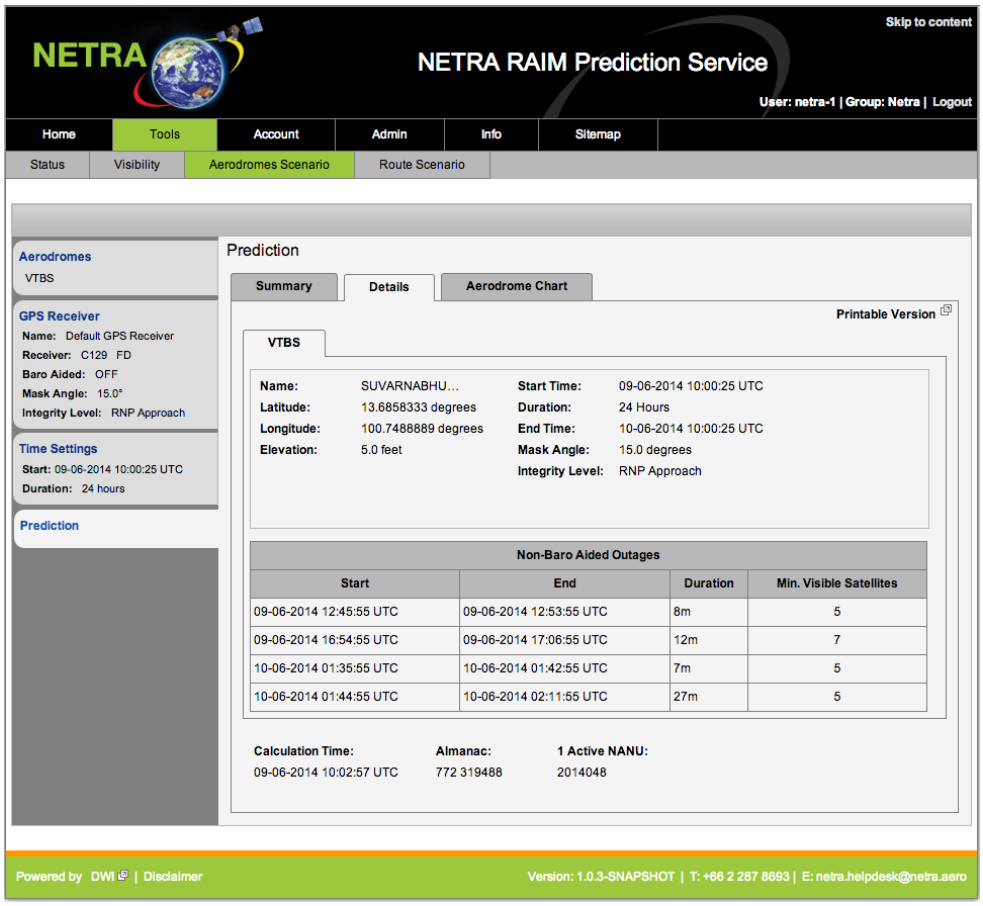


Figure 3 – Aerodrome Tool Details Screen Shot

2.2.3 Route Tool

2.2.3.1 The Route Tool shall calculate the predicted RAIM availability for points along a defined route using RAIM algorithms for all PBN Navigation Specifications.

2.2.3.2 A route shall be defined by a series of waypoints selected, or input, by the User. The Route Tool will maintain a list of current en-route waypoints and navaids which can be selected by ICAO or IATA identifier. The User shall also be able to define custom waypoints - if the User wants to enter routes in terminal airspace this option must be used. The anticipated time elapsed since the route start time shall be entered in the 'Time Offset' column for each waypoint. The RAIM algorithm, altitude and mask angle to be used shall also be selected for each waypoint - it shall be applied for the route segment following that waypoint.

2.2.3.3 The Route Tool shall calculate the predicted RAIM availability for points spaced along the route, based upon the Time Offset values entered, and shall display any predicted RAIM outages appropriate to the selected integrity level.

2.2.3.4 The Route Tool shall provide a formatted report, displaying the predicted RAIM outages over the scenario period. The report shall also show the predicted outages if the start time is delayed, or brought forward, by 5, 10 or 15 minutes.

2.2.3.5 A printer friendly version of this report shall be available to the User.

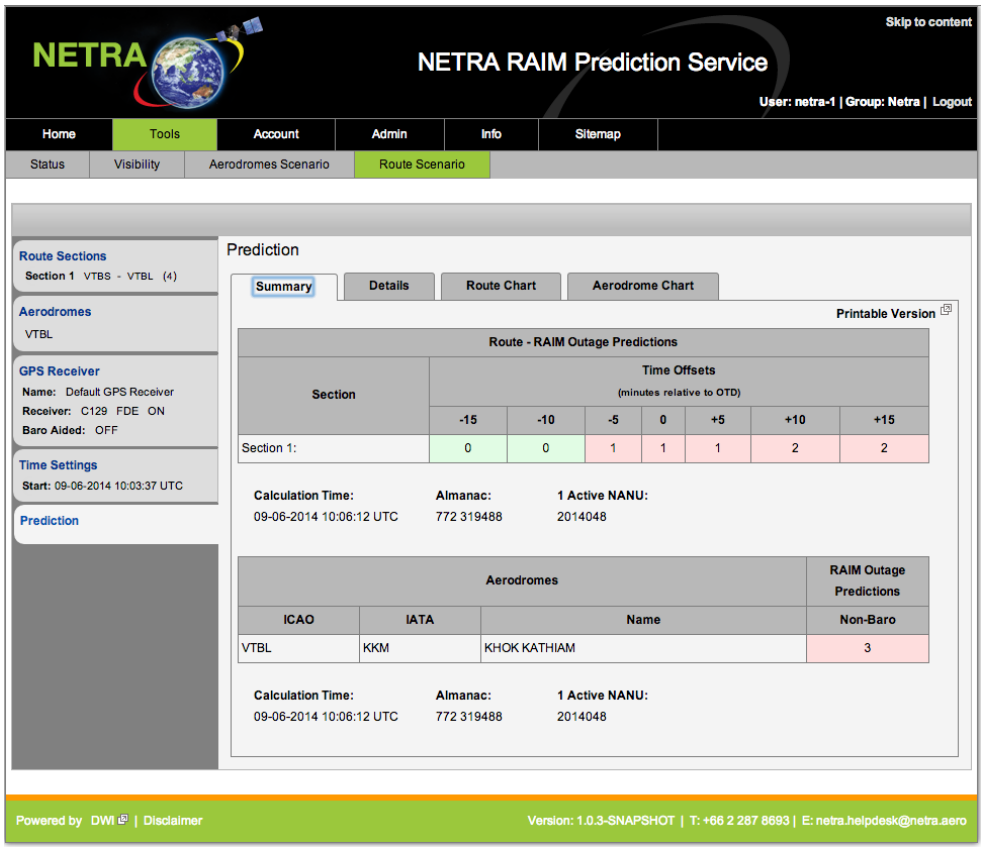


Figure 4 – Route Tool Summary Screen Shot

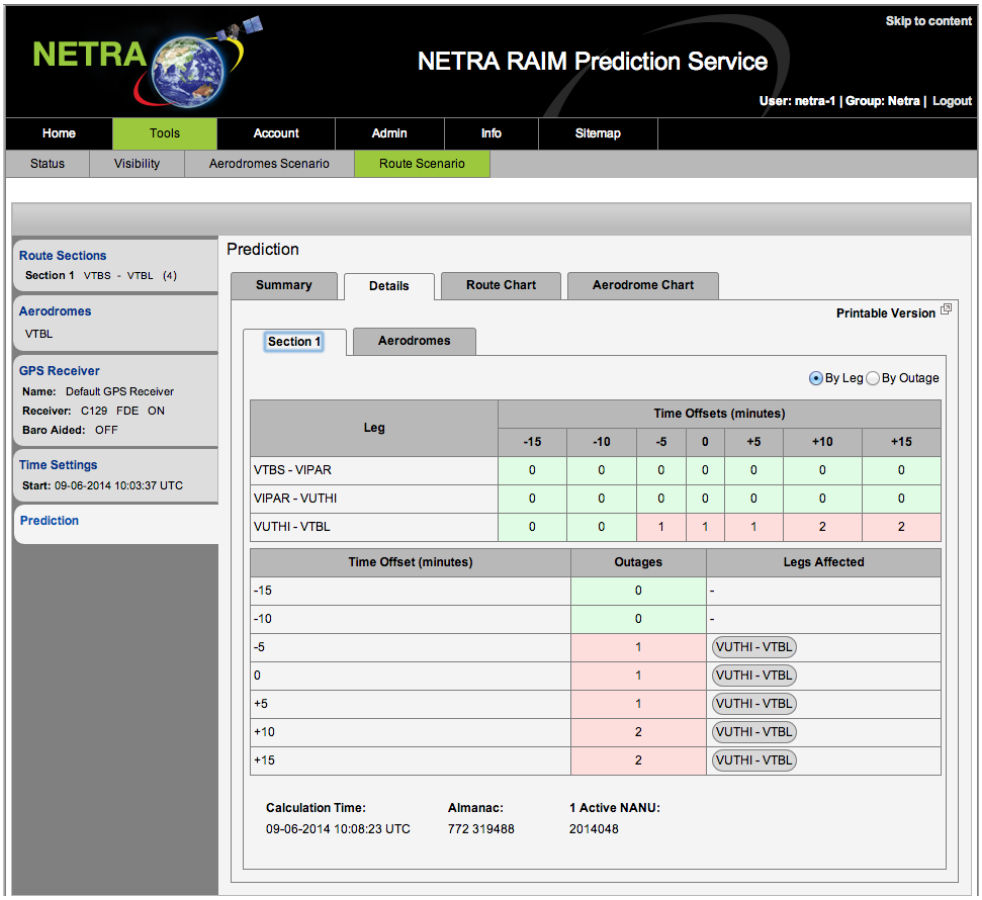


Figure 5 – Route Tool Details by Leg Screen Shot

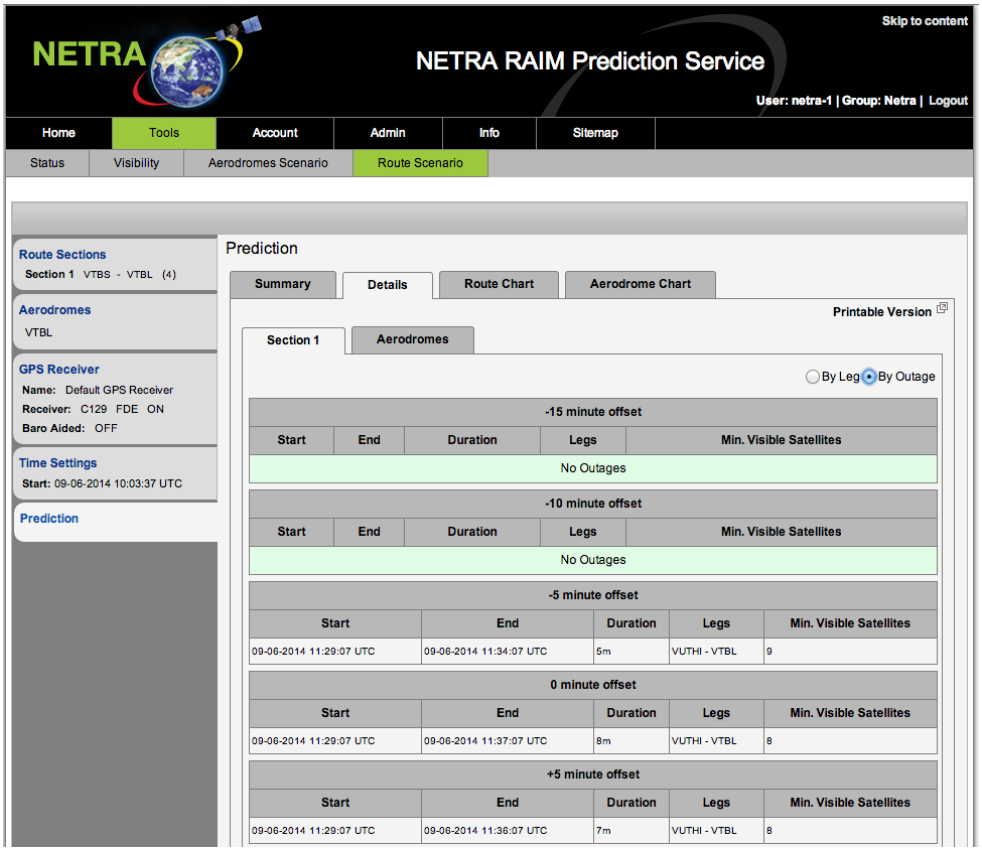


Figure 6 – Route Tool Details by Outage Screen Shot

2.2.4 Visibility Tool

2.2.4.1 The Visibility Tool is supplementary to the Constellation Status Tool. Whilst the Constellation Status Tool shall give the minimum number of operational satellites in the GPS Satellite constellation for up to a 72 hour period, the Visibility Tool shall calculate the location of the GPS satellites relative to a User-defined receiver position for a given time duration of up to 5 hours.

2.2.4.2 Receiver position, mask angle, scenario duration, number of samples and start time shall all be User configurable parameters.

2.2.4.3 The Visibility Tool shall provide the following outputs:

- A graphical sky plot representation of the visible satellites.
  - Only visible and healthy satellites displayed on the sky plot.
  - The area masked by the mask angle (between 0 and the mask angle value) shall be depicted as an opaque red area on the sky plot.
- A table of azimuth and elevation values and the visibility status for each satellite at each sample time in the scenario shall be displayed.
  - Azimuth and elevation shall be displayed in decimal degrees.
  - All satellites shall be included regardless of visibility and health.

2.2.4.4 A printer friendly version of this report shall be available to the User.

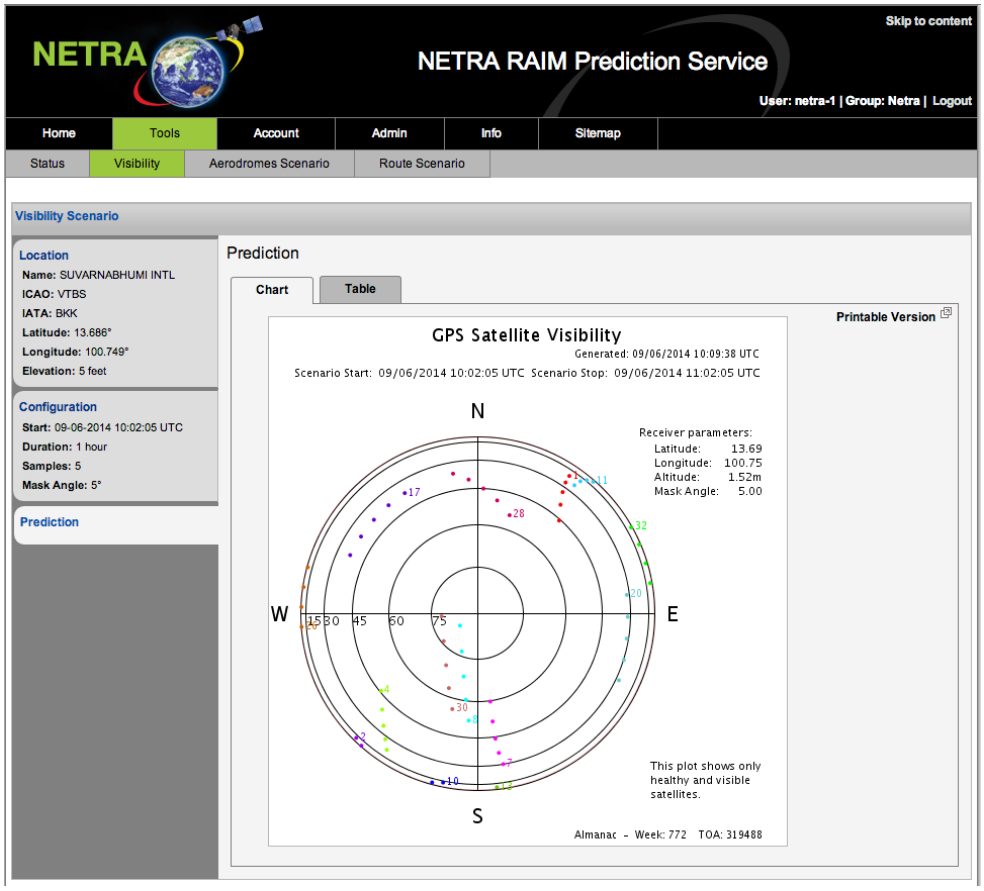


Figure 7 – Visibility Tool Screen Shot

3 SRRPAS HOSTING

3.1 HOSTING

3.1.1 The SRRPAS shall be operated by DWI and deployed across two geographically dispersed servers, at two different Data Centres, offering 24/7 service with a better than 99.5% availability. Figure 8 shows a high level depiction of the SRRPAS architecture.

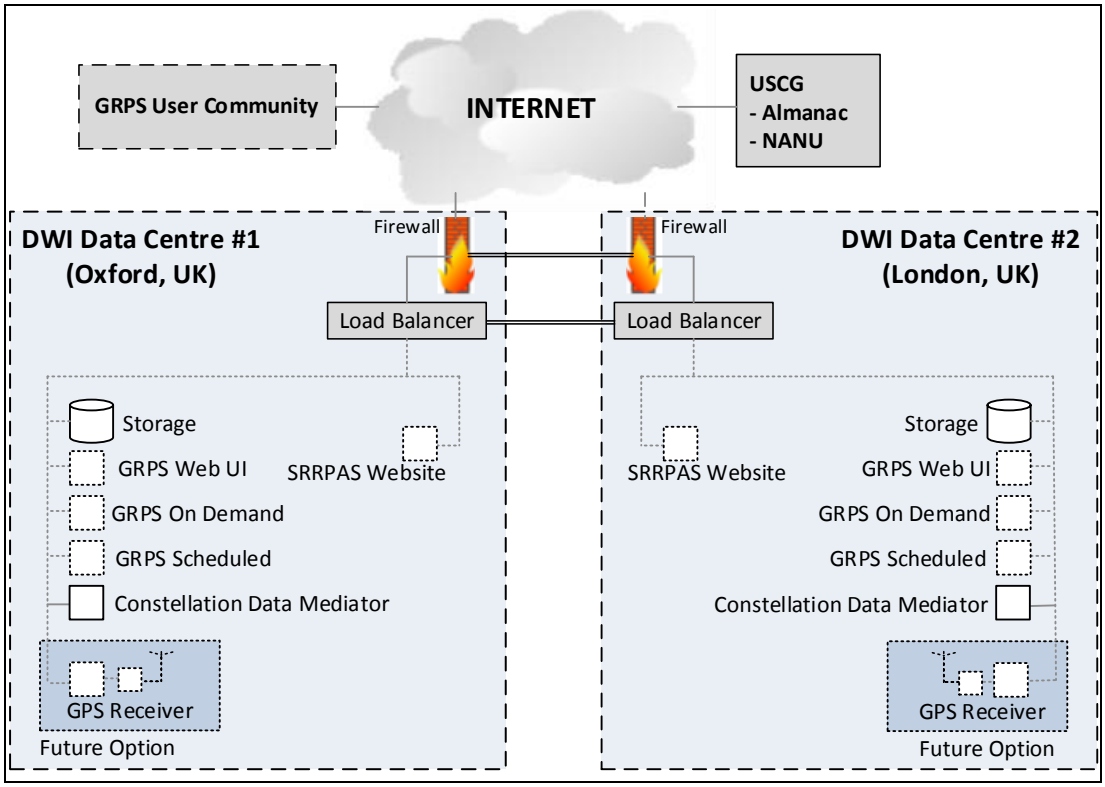


Figure 8 – SRRPAS Architecture

3.1.2 The SRRPAS application shall be hosted on an application server with a database back-end providing highly available data storage facilities.

3.1.3 The server shall be fault-tolerant and shall include support for hot-swapping of essential hardware such as disks and power supplies.

3.1.4 The hardware shall consist of two servers and other components, one for the redundant primary and mirror (2 in total) with the following minimum specification:

- Servers provided shall be HP Proliant DL360 G5 – E5335 Processor (Quad 2.0Ghz) – 4Gb Ram – 2x 72Gb SAS 10k Disks in Raid 1.
- Redundant Pair of Hardware Load Balancers balancing traffic at layer 4 100Mbit access switch ports with 1Gbps trunks between distribution, aggregation and core switching layers.
- Multiple upstream Internet providers shall be provided.

3.1.5 State of the art fire suppression facilities and fully backed up power supplies shall ensure the highest possible levels of availability for hosted systems. The SRRPAS shall be supported by a 24/7 monitoring and support presence on site in the data centre. Spare hardware shall be kept on site to enable fast recovery from failure.

3.1.6 The SRRPAS shall be subjected to a rigorous backup regime with daily system backups and off-site media storage.

3.2 IP SECURITY

3.2.1 The SRRPAS server infrastructure shall be protected by a dual Cisco PIX auto-failover firewall system.

3.2.2 The internal network clusters shall be hosted on a private network segment with a private address range – not directly accessible from outside the firewall. Only web traffic, email traffic and management traffic shall be permitted through the firewall.

3.2.3 The SRRPAS shall be patched with software security updates (OS, Database, etc) as they become available.

3.2.4 Local physical security measures shall be implemented.

3.3 CONSTELLATION DATA MEDIATOR

3.3.1 It is imperative that the SRRPAS maintains an up to date record of the GPS satellite constellation as well as scheduled changes to the constellation in order to ensure that the system calculations are based on the best available data.

3.3.2 The SRRPAS shall obtain constellation data and constellation updates from USCG of sources, as follows:

- Almanac.
- Forecast and unscheduled outages/changes (NANU).

3.3.3 The Constellation Data Mediator subsystem shall mediate the constellation information to provide the system with the best available picture of the constellation for the calculation time periods available via the SRRPAS website.

3.3.4 The Constellation Data Mediator subsystem shall be written to be resilient to errors in the data feeds from the external data sources. The SRRPAS shall not update reference constellation data until it is verified as good with respect to format validity and data value range checking.

3.3.5 By using multiple data sources, the SRRPAS shall be able to use the best data available if one or more of the data sources is not functioning correctly. The SRRPAS shall allow customisation of audit logging and notifications to system administrators based on errors detected in the source data (availability or content) to allow timely manual override of default behaviour and investigation of the issue if necessary.

3.3.6 All geographical data in the SRRPAS shall be sourced from commercially available data providers such as Jeppesen Inc.

4 THE SRRPAS BRANDING OPTIONS

4.1 SERVICE NAME

4.1.1 The service name is yet to be determined. Current options include:

- SRRPAS: The South American Regional RAIM Availability Service.
- RISAT: RAIM ICAO SAM Tool.
- SAMRAIM: South America Region RAIM Tool.

4.2 URL

4.2.1 A single URL shall be used for the service, based on the service name. The following URLs are proposed for the SRRPAS website:

- http://www.srrpas.com/
- http://www.srrpas.aero/
- http://www.risat.com/
- http://www.risat.aero/
- http://www.samraim.com/
- http://www.samraim.aero/
- http://www.samprediraim.com/
- http://www.samprediraim.aero/

4.3 LOOK & FEEL

4.3.1 The RAIM Project Group (RPG) shall provide DWI with the approved graphics to brand the SRRPAS website as required. At a minimum, a graphics file of the logo in .jpg or .png format shall for a 98 pixel by 98 pixel image to appear at the top left hand side of the page banner. The same graphics file shall be used for the basis to create the favicon which will appear on internet browser tabs.

4.3.2 The RPG may select up to 6 colours (by html colour code) for elements highlighted in Figure 9.

4.4 HOME PAGE TEXT CONTENT

4.4.1 DWI and the RPG shall agree the wording for the home page of the website. It is recommended that the text is approximately 200 words.

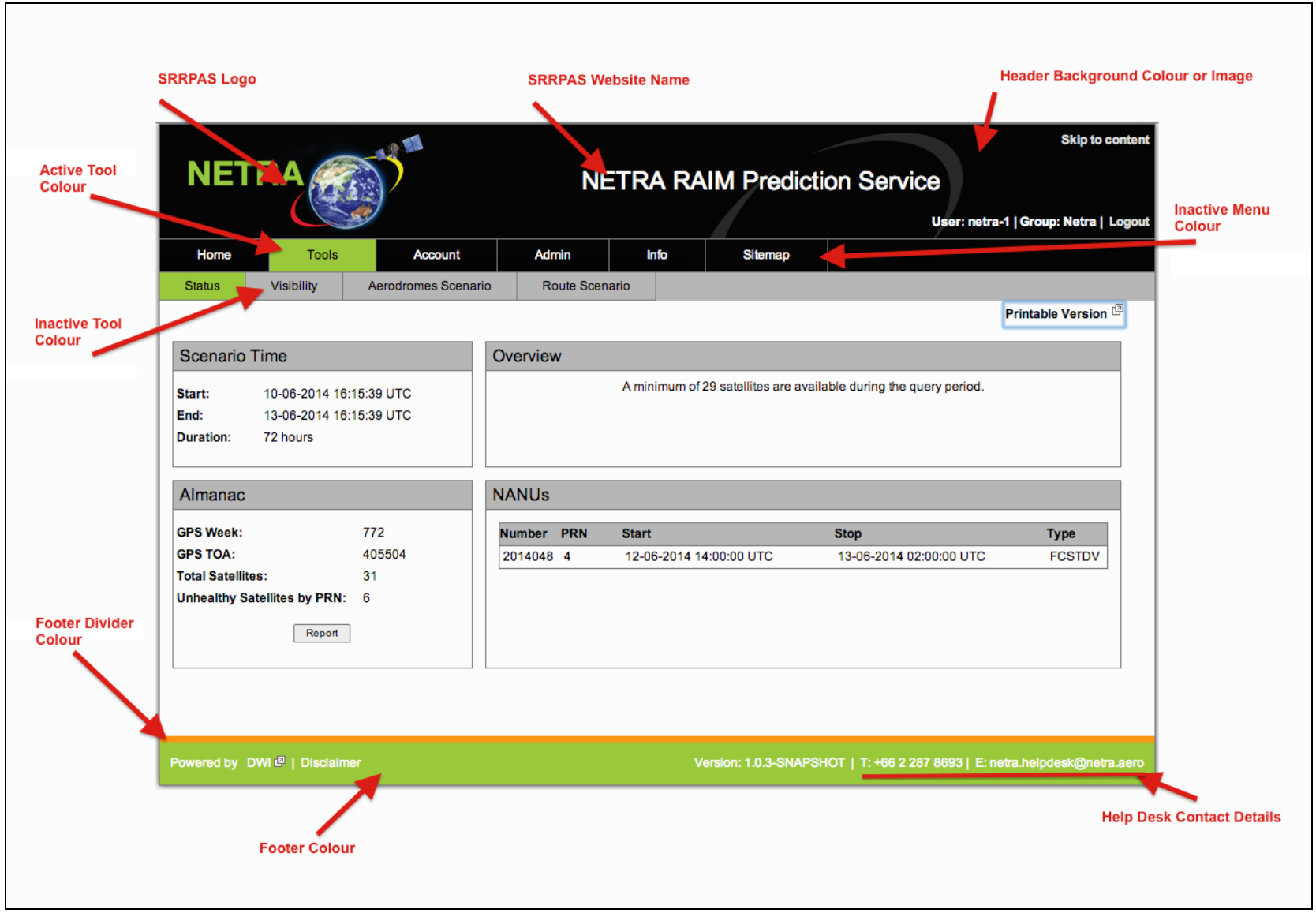


Figure 9 – SRRPAS Configurable Items

5 TRAINING COURSE OUTLINE

5.1 INTRODUCTION

5.1.1 The training course shall take place over 2 consecutive days and shall be conducted in English (Day 1) and Spanish (Day 2) via web conference.

5.1.2 It is intended that the Focal Point (FP) for each state shall participate in the training so that they in turn shall be able to train Users from their state. Training materials will be made available to the FPs.

5.2 COURSE OUTLINE

5.2.1 The course content shall contain the following topics:

- Course Aims & Objectives.
- Navigation & Access.
- Login.
- Site Structure.
- Tools:
  - Constellation Status Tool.
  - Aerodrome Tool.
  - Route Tool.
  - Visibility Tool.
- User Roles & Management.
- Helpdesk and Support.

5.3 COURSE CONTENT

5.3.1 The course content shall be made available to the RPG in soft copy in both English and Spanish.

5.4 JOINING INSTRUCTIONS

5.4.1 DWI uses the join.me application for web conferencing. Course attendees may participate in the conference by downloading the join.me application to their local computer and using a unique Meeting Code.

5.4.2 The download and Meeting Code are made available with the training invitation email.

5.5 TRAINING ATTENDEES

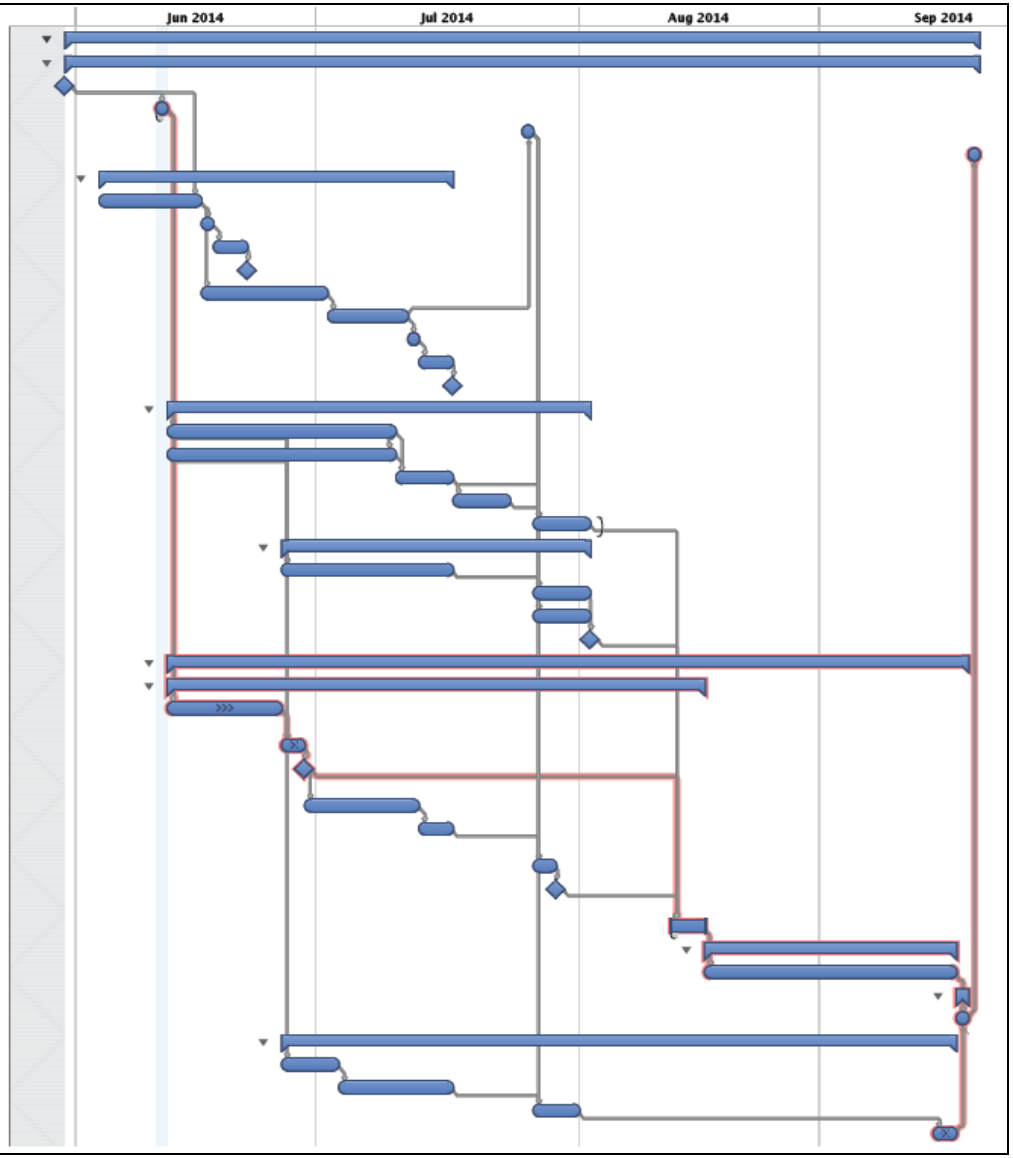
5.5.1 DWI will require a complete list of attendees from the RPG at least 10 workings days prior to the first training session.

5.5.2 The following information for each attendee will be required:

- Full name.
- Organisation.
- Role.
- Email address.
- Phone number.
- Course preference – English / Spanish.

6 IMPLEMENTATION SCHEDULE

Title	Duration	Start	End
1) Contract Admin	80d	30/05/2014	18/09/2014
1.1) Formal Meetings	80d	30/05/2014	18/09/2014
1.1.1) Contract Award		30/05/2014	30/05/2014
1.1.2) KO Meeting	1d	11/06/2014	11/06/2014
1.1.3) Design Review Meeting	1d	25/07/2014	25/07/2014
1.1.4) Completion & Sign-Off	1d	18/09/2014	18/09/2014
2) SDD	31d	04/06/2014	16/07/2014
2.1) Write Draft SDD	9d	04/06/2014	16/06/2014
2.2) Print SDD	1d	17/06/2014	17/06/2014
2.3) International Courier	3d	18/06/2014	20/06/2014
2.4) Draft SDD Delivery		20/06/2014	20/06/2014
2.5) SDD Review by RPG	11d	17/06/2014	01/07/2014
2.6) Write Final SDD	7d	02/07/2014	10/07/2014
2.7) Print SDD	1d	11/07/2014	11/07/2014
2.8) International Courier	3d	14/07/2014	16/07/2014
2.9) Final SDD Delivery		16/07/2014	16/07/2014
3) Software & Website Development	37d	12/06/2014	01/08/2014
3.1) Language & Localisation	20d	12/06/2014	09/07/2014
3.2) Branding	20d	12/06/2014	09/07/2014
3.3) Hosting Architecture	5d	10/07/2014	16/07/2014
3.4) In-House Testing	5d	17/07/2014	23/07/2014
3.5) Deployment	5d	28/07/2014	01/08/2014
4) Operation Manual	27d	26/06/2014	01/08/2014
4.1) Write Operator Manual	15d	26/06/2014	16/07/2014
4.2) Translate to ES	5d	28/07/2014	01/08/2014
4.3) Translate to PT	5d	28/07/2014	01/08/2014
4.4) Operator Manual Delivery		01/08/2014	01/08/2014
5) Site Acceptance Tests	70d	12/06/2014	17/09/2014
5.1) PSAT & DCI	47d	12/06/2014	15/08/2014
5.1.1) Write Draft PSAT/DCI Inspection Procedures	10d	12/06/2014	25/06/2014
5.1.2) Translate to ES	2d	26/06/2014	27/06/2014
5.1.3) Draft PSAT/DCI Inspection Procedures Delivery		30/06/2014	30/06/2014
5.1.4) Review by RPG	10d	30/06/2014	11/07/2014
5.1.5) Write Final PSAT/DCI Inspection Procedures	3d	14/07/2014	16/07/2014
5.1.6) Translate to ES	2d	28/07/2014	29/07/2014
5.1.7) Final PSAT/DCI Inspection Procedures Delivery		29/07/2014	29/07/2014
5.1.8) PSAT & DCI	3d	13/08/2014	15/08/2014
5.2) ORD	22d	18/08/2014	16/09/2014
5.2.1) ORD	22d	18/08/2014	16/09/2014
5.3) FSAT	1d	17/09/2014	17/09/2014
5.3.1) FSAT	1d	17/09/2014	17/09/2014
6) Training	59d	26/06/2014	16/09/2014
6.1) Write Course Outline	5d	26/06/2014	02/07/2014
6.2) Collate Training Slides & Screen Shots	10d	03/07/2014	16/07/2014
6.3) Translate to ES	4d	28/07/2014	31/07/2014
6.4) Deliver Training	2d	15/09/2014	16/09/2014



7 HOSTING AND OPERATION SUPPORT PLAN

7.1 AVAILABILITY

7.1.1 Availability means that the system is functioning at any given time.

7.1.2 Conversely, “down-time” is the cumulative time that the system has not been working within acceptable parameters.

7.1.3 The availability of the SRRPAS shall be at least 99.5% each calendar month.

7.2 RESPONSE TIME

7.2.1 For SRRPAS a response time of 2 seconds is offered, based on reasonable volumes and outside Internet response times and delays caused by non DWI systems.

7.3 HELP DESK

7.3.1 Help Desk Support

7.3.1.1 Help desk support shall be offered to Users for the SRRPAS. The language used by the DWI help desk team is English. If any translation is required in the replies to the user, the DWI team may request assistance from the state FP.

7.3.1.2 It is intended that DWI provide support to the FPs. FPs shall provide frontline support to their User base. If additional technical support is required then DWI shall assist via the help desk.

7.3.2 Help Desk Working Hours and Response Times for Non-Emergency Enquiries

7.3.2.1 DWI will provide a help desk that will be available to answer help desk enquiries during normal working hours in the UK.

7.3.2.2 The normal working hours for DWI staff are Monday to Friday, 09:00 to 17:00 GMT (or BST depending on daylight savings).

7.3.2.3 DWI staff will not normally be expected to provide help desk cover for non-emergency enquiries during national holiday days in the UK. These days are as identified by UK government and DWI’s working time and holiday policy (available upon request).

7.3.3 Help Desk Working Hours and Response Times for Emergency Enquiries

7.3.3.1 The DWI help desk will be available to answer emergency enquires 24 hours a day, 7 days a week.

7.3.3.2 Issues that causes an emergency enquiry shall be defined as:

- The SRRPAS is not available.
- At least one tool or function is out of service.

7.3.4 Error Correction Schedule

7.3.4.1 DWI shall respond to error reports according to the following schedule:

Response Times for Error Classification			
	Level 1	**Level 2**	**Level 3**
Severity 1	4 Hours.	2 Working Days.	Next maintenance release.
Severity 2	1 Working Day.	5 Working Days.	Next maintenance release.
Severity 3	3 Working Days.	15 Working Days.	As appropriate.

7.3.4.2 Level of Response indicates the nature of the response to be expected as the error is resolved.

Level Identification	Description
Level 1	Acknowledgement of receipt of error report.
Level 2	Provide one or more of the following as appropriate: - Patch. - Workaround. - Temporary fix. - Details of the problem resolution plan and timetable for fix. Explanatory notes for the patch, workaround or temporary fix.
Level 3	Official compiled/object/binary code fix or software update; and updated user manuals, if appropriate.

7.3.4.3 Error Classification indicates the severity of impact of the error and the typical resource that will be used to resolve the issue.

Error Classification	Description	Impact
Severity 1	Criteria: a) The software is unavailable.* b) There are no existing workarounds to restore product functionality. DWI shall place top priority on the technical issue; necessary technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours and over-time hours.	High Business Impact.
Severity 2	Criteria: a) Significant functionality* is not working according to the software specification. b) Through the use of the software, significant business objectives cannot be met. DWI shall place high priority on the technical issue; necessary technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours.	Medium Business Impact.
Severity 3	Criteria: a) Minor functionality* is not working according to the software specification. b) Through the use of the software, minor business objectives cannot be met. DWI shall place a lower priority on the technical issue; appropriate technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours.	Low Business Impact.

7.3.4.4 If it becomes necessary to escalate an issue, Users can request to have a named point of contact within the DWI's technical team. This team member will become the primary point of contact until the issue is resolved.

7.3.4.5 * Unavailable, significant and minor functionality in the SRRPAS are specified as follows:

Unavailable Functionality:

- The software does not generate RAIM prediction results or the website does not present the RAIM prediction results.
- Any tool fails to load, display or generate results and no workaround is available.

Significant Functionality:

- The SRRPAS is using the incorrect GPS Almanac and/or NANUs.
- Requests to increase the total number of users for the SRRPAS website.

Minor Functionality:

- Requests for clarification / explanation of RAIM prediction results.
- Group / user account management.
- User permissions change requests.
- Requests to assist with creation or changes to scenario information and / or saved GPS Rx configurations.
- Website response times are slower than normal / expected but is otherwise functioning correctly.
- Cosmetic and / or layout problems with the website.
- Other similar.

7.3.4.6 DWI's Working Hours

Working and Non-Working Hours	Description	Days	Hours
Working Hours	Working hours are the routine hours worked by DWI's staff.	Monday to Friday.	09:00 - 17:00 GMT or BST depending on UK daylight savings.
Overtime Hours	Overtime hours are the hours that DWI's staff would be asked to work to implement a patch, fix or workaround while based at their normal place of work.	Monday to Friday.	07:00 - 09:00 and 17:00-20:00 GMT or BST depending on UK daylight savings.
Exceptional Hours	Exceptional hours are the hours that DWI staff would be expected to work while working to resolve a pre-agreed escalated support request	Monday to Sunday.	00:00 - 24:00 By prior arrangement.
National Holidays	National Holidays as identified by UK government and DWI's working time and holiday policy.	Available upon request.	

7.3.5 Help Desk Contact Details

7.3.5.1 The help desk e-mail address will be determined during the development phase of the project but shall take the form helpdesk@srrpas.com once the URL has been agreed.

7.4 ACCESS REQUESTS

7.4.1 Each state shall be given access for the FP and 10 additional accounts. These accounts shall be distributed and managed by the state FPs.

7.4.2 The SRRPAS shall include a page displaying the contact details for each state FP for incoming requests for access from state users.

7.5 QUARTERLY SUMMARIES OF SUPPORT ISSUES

7.5.1 DWI shall send the RPG a detailed summary report including information on all tickets including:

- Open tickets which have yet to be resolved at the time of reporting.
- Tickets which have been closed since the last quarterly report.

7.5.2 The report shall contain at least the following information:

- Ticket status – Open / Closed.
- Priority.
- Age.
- Date created.
- Ticket number – unique identifying number.

APPENDIX B

NATIONAL FOCAL POINTS
REGIONAL RECEIVER AUTONOMOUS INTEGRITY MONITORING RAIM

STATE	ADMINISTRATION	NAME	TITLE	TELEPHONE	E-MAIL ADDRESS
ARGENTINA	Dirección Nacional de Inspección de Navegación Aérea - ANAC	Rafael Alberto Molina	Director de Relaciones Regionales	(54 11) 594-13000 Ext. 69126	rmolina@anac.gov.ar
BOLIVIA	DGAC	Jaime Alvarez	Inspector CNS	(591 2) 244-4450 (2651)	jalvarez@dgac.gob.bo
BRAZIL	Departamento de Control del Espacio Aéreo DECEA	Julio César Pereira Rosa		(55 21) 2101-6398	cezar@cgna.gov.br
COLOMBIA	Unidad Administrativa Especial de Aeronáutica Civil - UAEAC	John Jairo Mesa Alcaraz	Técnico Aeronáutico, Grupo AIS-COM-MET	(57 1) 296 2389	john.mesa@aerocivil.gov.co
CHILE	Dirección General de Aeronáutica Civil - DGAC	Alfonso de la Vega Sepúlveda	Encargado de la Sección Navegación Aérea del Dpto. de Planificación	(56 2) 439 2952	adelavega@dgac.gob.cl
ECUADOR	Dirección General de Aviación Civil - DGAC	Darwin Francisco Suárez León	Especialista de la Dirección de Navegación Aérea	(593 2) 294 7400 Ext. 4117 - 4084	darwin.suarez@aviacioncivil.gob.ec darwin-suarez@hotmail.com
GUYANA					
FRENCH GUIANA					
PANAMA	Autoridad Aeronáutica Civil de Panamá - AAC	Ana Montenegro	Jefa de la Unidad de Planificación del Espacio Aéreo	(507) 315-9834	anadeleon@aeronautica.gob.pa
PARAGUAY	Dirección Nacional de Aeronáutica Civil - DINAC	Alexis Morán Maldonado	Jefe Depto. de Comunicaciones Gerencia de Telecomunicaciones y Electrónica-GTE	(595 21) 758 5208	moranchu@gmail.com
PERU	Dirección General de Aeronáutica Civil – DGAC	Sady Beaumont Jorge Taramona	Inspector de Naveg. Aérea	(511) 615-7881 (511) 615-7881	orlandobe@gmail.com jtaramona@gmail.com
SURINAME					
URUGUAY	DINACIA	José Carbone Martín Ruíz	Téc. en Información Aeronáutica Inspector de CNS División Navegación Aérea	(5982) 2604-0067 2601-1265 (5982) 2604-0408 Int.4045	aispub@dinacia.gub.uy aruiz@dinacia.gub.uy navegacionaerea@dinacia.gub.uy

STATE	ADMINISTRATION	NAME	TITLE	TELEPHONE	E-MAIL ADDRESS
VENEZUELA	Omar Linares			(58 212) 303 4514	o.linares@inac.gob.ve

Actualización: 05 de noviembre de 2014

APPENDIX C

SRRPAS System Design Document Version	**1.3**	**Status**	**Draft**
Version Date	**August 2014**	**Class**	**Commercial in Confidence**
Reference	**DW/02/001/084/004/1.3**		

DOCUMENT APPROVAL

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

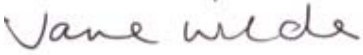
AUTHORITY	NAME AND SIGNATURE	DATE
Author	 Charles Thornberry	August 2014
Reviewer	 Jane Wilde	August 2014
Director	 John Wilde	August 2014

TABLE OF CONTENTS

1 INTRODUCTION

1.1 This document provides the system design information for the South America (SAM) Regional Receiver Autonomous Integrity Monitoring (RAIM) Prediction Availability Service (SRRPAS) as supplied by DW International (DWI) to the SAM Regional States.

1.2 This document provides information on the following topics:

- Technical descriptions of the SRRPAS and the host architecture hardware (Sections 2 and 3).
- SRRPAS branding options (Section 4).
- Training course outline (Section 5).
- Implementation schedule (Section 6).
- Hosting and operation support plan (Section 7).

1.3 The SRRPAS shall offer coverage to all 14 SAM member states though initially 11 states shall use the service:

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

2 SRRPAS DESCRIPTION

2.1 INTRODUCTION

2.1.1 This Section details the functionality of the SRRPAS. Screen shots from the NETRA RAIM Prediction Service are shown in the following sections to illustrate how RAIM predictions shall be presented. NETRA is based on the same core RAIM prediction solution upon which the SRRPAS shall be based. The presentation and "look and feel" will be updated to meet the ICAO branding guidelines.

2.1.2 The interface shall be provided in English, Spanish and Portuguese.

2.2 FUNCTIONALITY

2.2.1 Constellation Status Tool

2.2.1.1 The Constellation Status Tool shall present a view of the GPS satellite constellation based on the latest almanac and NANUs (Notice Advisory to Navigation Users) issued by the US Coast Guard (USCG). Information disseminated by the USCG can be found at the USCG NAVCEN web site.

2.2.1.2 The Constellation Status Tool shall present the number of operational satellites in the GPS Satellite constellation for a 72-hour period from the time of the request. The almanac used, and NANUs active at the request time, shall also be displayed.

2.2.1.3 A printer friendly version of this report shall be available to the User.

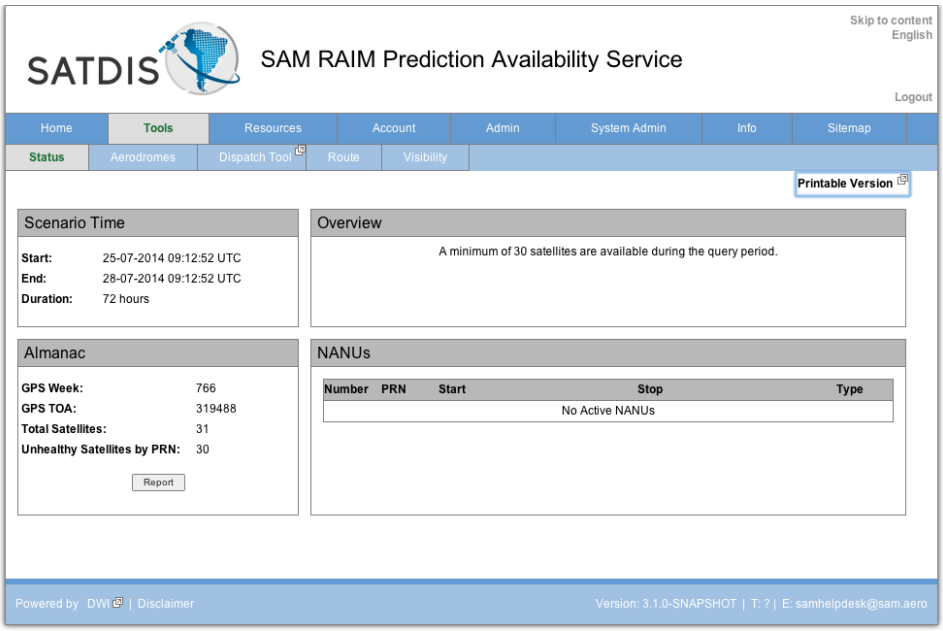


Figure 1 – Constellation Status Tool Screen Shot

2.2.2 Aerodrome Tool

2.2.2.1 The Aerodrome Tool shall calculate the predicted RAIM availability for a 24, 48 or 72 hour period (User selectable) for specific aerodromes. The tool shall support calculations for terminal navigation specifications for up to 20 aerodromes in a single scenario.

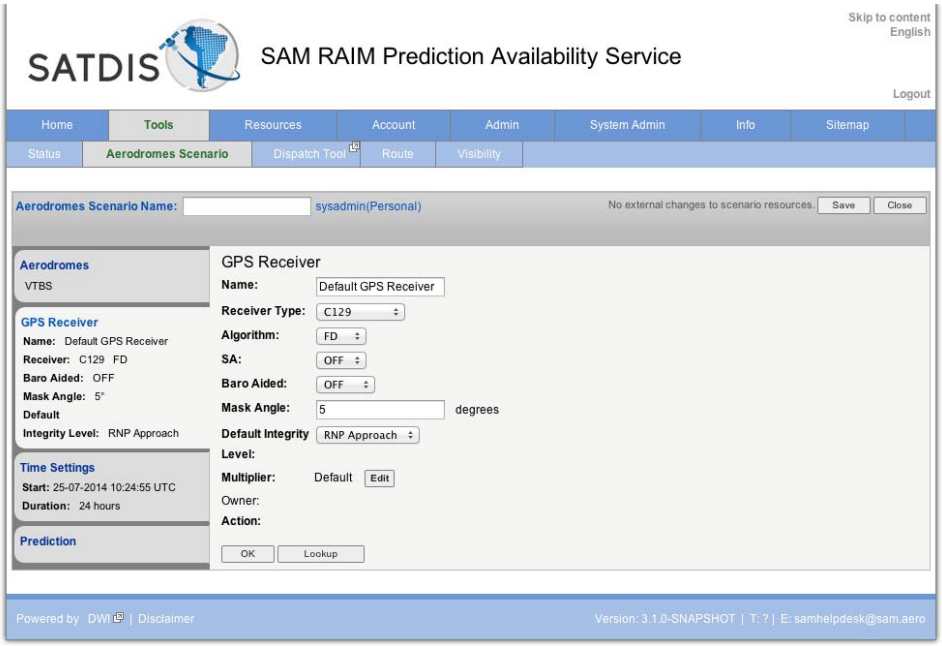
2.2.2.2 The Aerodrome Tool shall calculate the predicted RAIM availability at the Aerodrome Reference Point (ARP).

2.2.2.3 Calculations can be configured by the User, allowing selection of:

- GPS receiver type C-129 or C-145/6.
- Fault Detection (FD) or Fault Detection Exclusion (FDE).
- Baro-aiding on, off or both.
- Selective Availability (SA) on / off.
- Mask angle between -20 to +25 degrees.
- RAIM integrity levels:
  - RNAV 5.
  - RNAV 2.
  - RNAV 1.
  - RNP 1.
  - RNP 0.3.
  - RNP Approach.
  - Advanced RNP[1].

[1] *The planned deployment of SATDIS shall meet the requirements of Advanced RNP but shall exclude Advanced RNP as a Navigation Specification as this shall only require that the User further select a Navigation Specification that already exists.*

2.2.2.4 The selection of these options for the RAIM calculation are made in the “GPS Receiver” tab and are used to calculate RAIM for all aerodromes added to the scenario.



2.2.2.5 The Aerodrome Tool shall provide a formatted report which displays the predicted RAIM outages over the scenario period for each of the selected aerodromes, in graphical and tabular formats.

2.2.2.6 A printer friendly version of this report shall be available to the User.

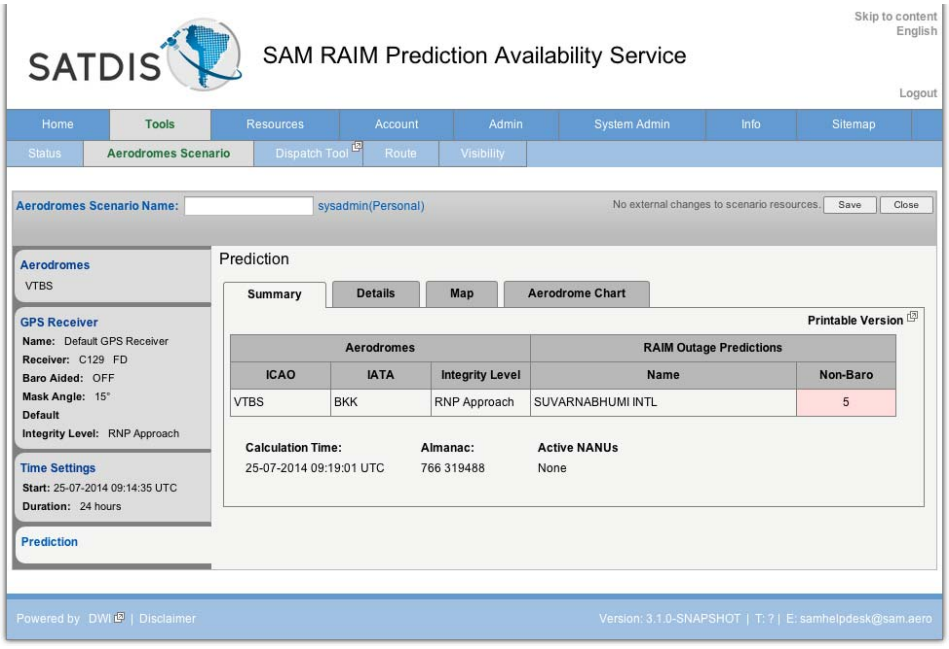


Figure 2 – Aerodrome Tool Summary Screen Shot

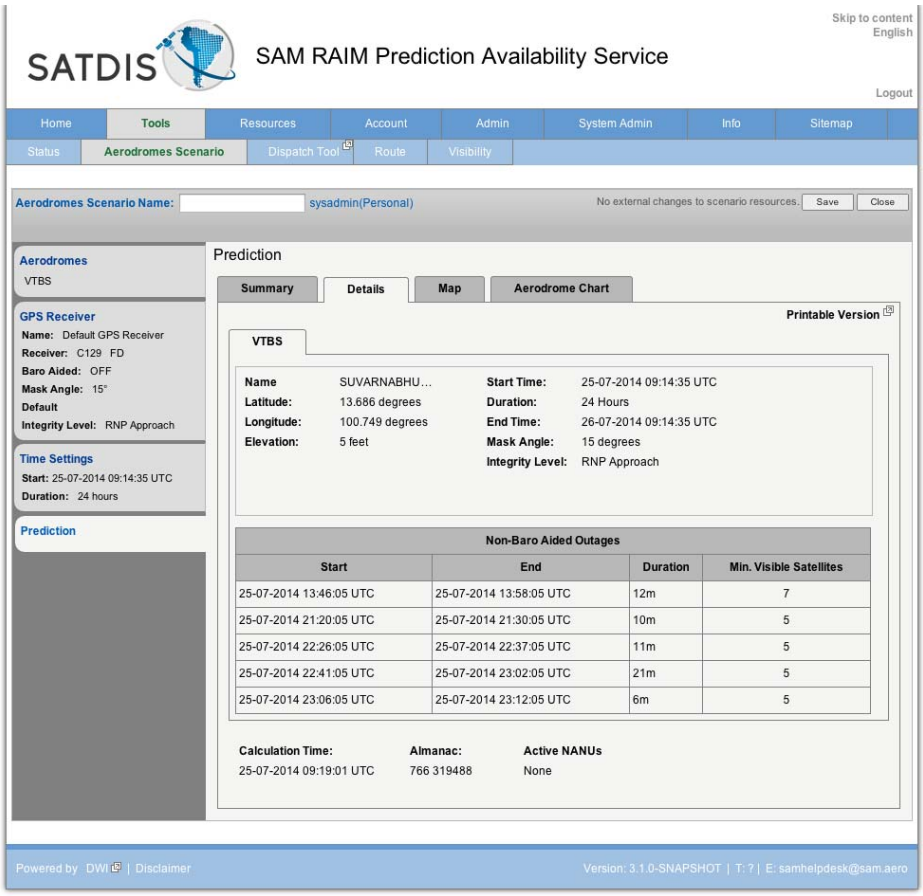


Figure 3 – Aerodrome Tool Details Screen Shot

2.2.3 Route Tool

2.2.3.1 The Route Tool shall calculate the predicted RAIM availability for points along a defined route using RAIM algorithms for all PBN Navigation Specifications.

2.2.3.2 A route shall be defined by a series of waypoints selected, or input, by the User. The Route Tool will maintain a list of current en-route waypoints and navaids which can be selected by ICAO or IATA identifier. The User shall also be able to define custom waypoints - if the User wants to enter routes in terminal airspace this option must be used.

2.2.3.3 For each waypoint on the route the user shall be able to select:

- Anticipated time elapsed since the route start.
- Altitude.
- Mask angle.
- Integrity levels:
  - RNP 10.
  - RNP 4.
  - RNP 2.

- RNAV 5.
- RNAV 2.
- RNAV 1.
- RNP 0.3.
- Advanced RNP[2].

2.2.3.4 For the entire route the user shall be able to select GPS receiver parameters:

- GPS receiver type C-129 or C-145/6.
- Fault Detection (FD) or Fault Detection Exclusion (FDE).
- Baro-aiding on, off or both.
- Selective Availability (SA) on / off.

2.2.3.5 The anticipated time elapsed since the route start time shall be entered in the 'Time Offset' column for each waypoint. The RAIM algorithm, altitude and mask angle to be used shall also be selected for each waypoint - it shall be applied for the route segment following that waypoint.

2.2.3.6 The Route Tool shall calculate the predicted RAIM availability for points spaced along the route, based upon the Time Offset values entered, and shall display any predicted RAIM outages appropriate to the selected integrity level.

2.2.3.7 The Route Tool shall provide a formatted report, displaying the predicted RAIM outages over the scenario period. The report shall also show the predicted outages if the start time is delayed, or brought forward, by 5, 10 or 15 minutes.

2.2.3.8 A printer friendly version of this report shall be available to the User.

[2] *The planned deployment of SATDIS shall meet the requirements of Advanced RNP but shall exclude Advanced RNP as a Navigation Specification as this shall only require that the User further select a Navigation Specification that already exists.*

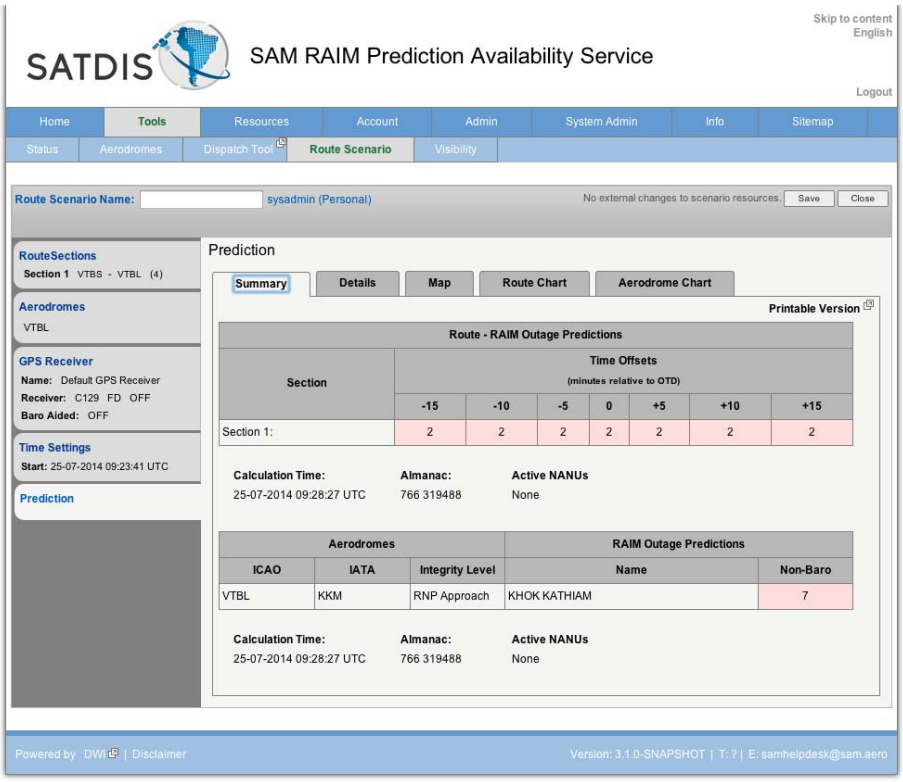


Figure 4 – Route Tool Summary Screen Shot

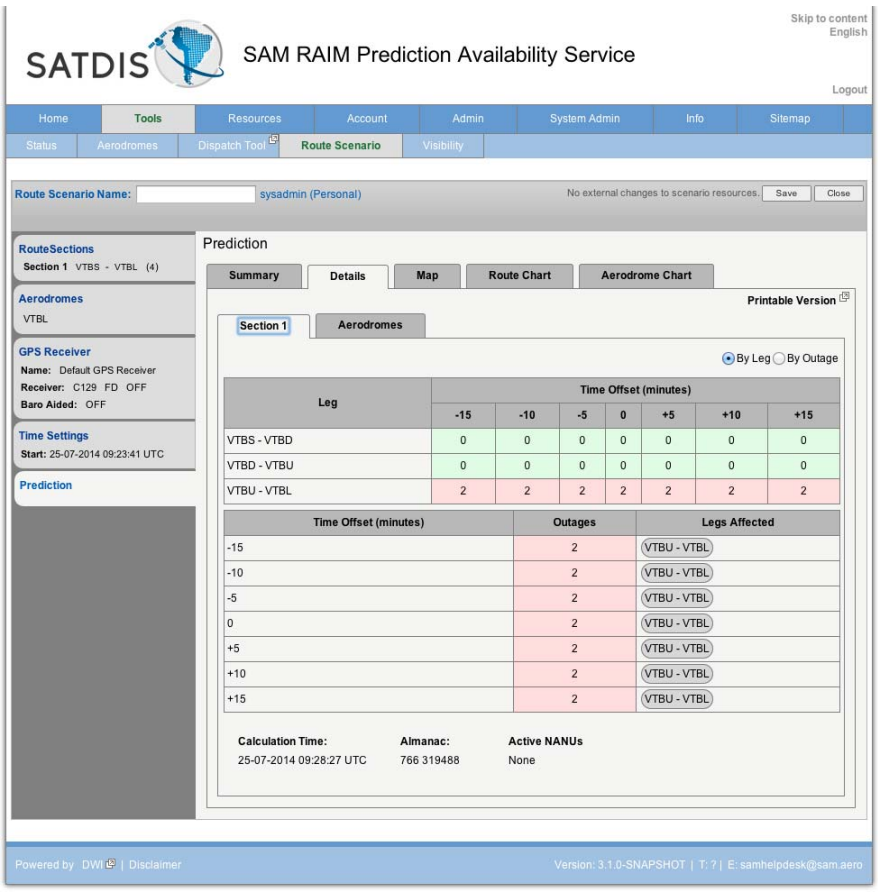


Figure 5 – Route Tool Details by Leg Screen Shot

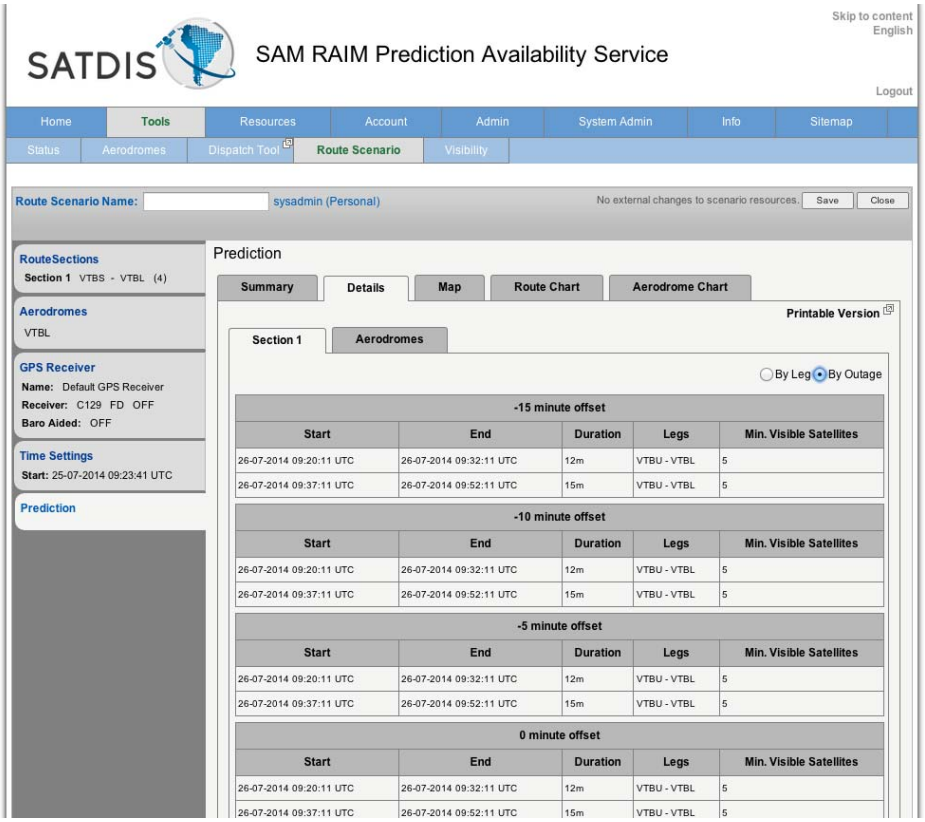


Figure 6 – Route Tool Details by Outage Screen Shot

2.2.4 Visibility Tool

2.2.4.1 The Visibility Tool is supplementary to the Constellation Status Tool. Whilst the Constellation Status Tool shall give the minimum number of operational satellites in the GPS Satellite constellation for up to a 72 hour period, the Visibility Tool shall calculate the location of the GPS satellites relative to a User-defined receiver position for a given time duration of up to 5 hours.

2.2.4.2 Receiver position, mask angle, scenario duration, number of samples and start time shall all be User configurable parameters.

2.2.4.3 The Visibility Tool shall provide the following outputs:

- A graphical sky plot representation of the visible satellites.
  - Only visible and healthy satellites displayed on the sky plot.
  - The area masked by the mask angle (between 0 and the mask angle value) shall be depicted as an opaque red area on the sky plot.
- A table of azimuth and elevation values and the visibility status for each satellite at each sample time in the scenario shall be displayed.
  - Azimuth and elevation shall be displayed in decimal degrees.
  - All satellites shall be included regardless of visibility and health.

2.2.4.4 A printer friendly version of this report shall be available to the User.

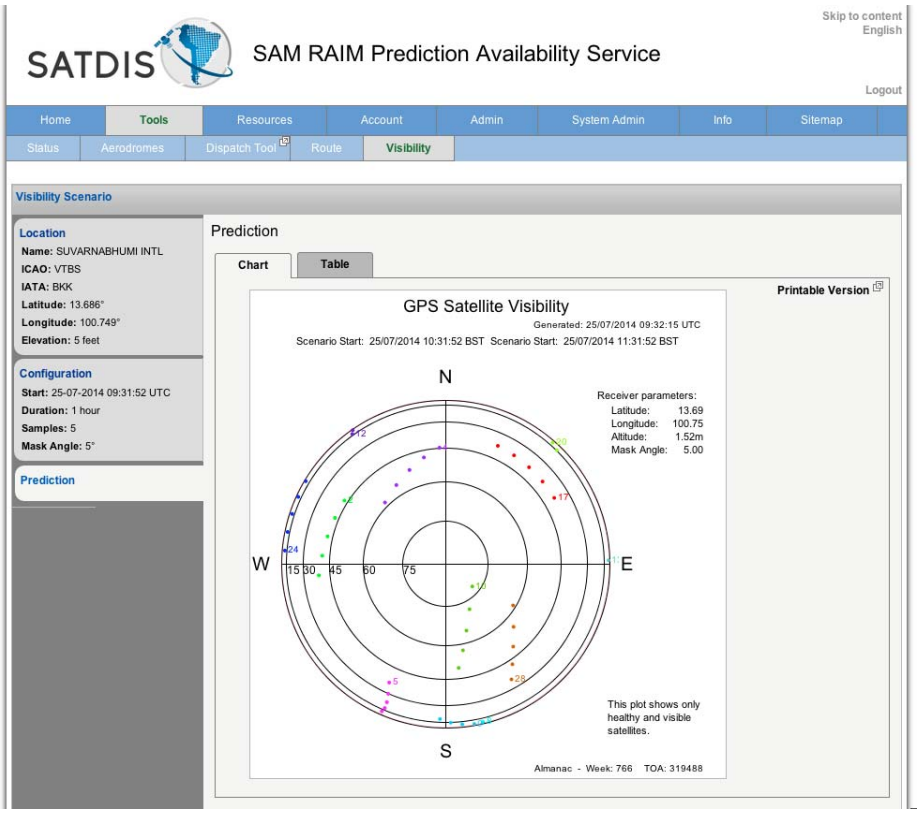


Figure 7 – Visibility Tool Screen Shot

3 SRRPAS HOSTING

3.1 HOSTING

3.1.1 The SRRPAS shall be operated by DWI and deployed across two geographically dispersed servers, at two different Data Centres, offering 24/7 service with a better than 99.5% availability. Figure 8 shows a high level depiction of the SRRPAS architecture.

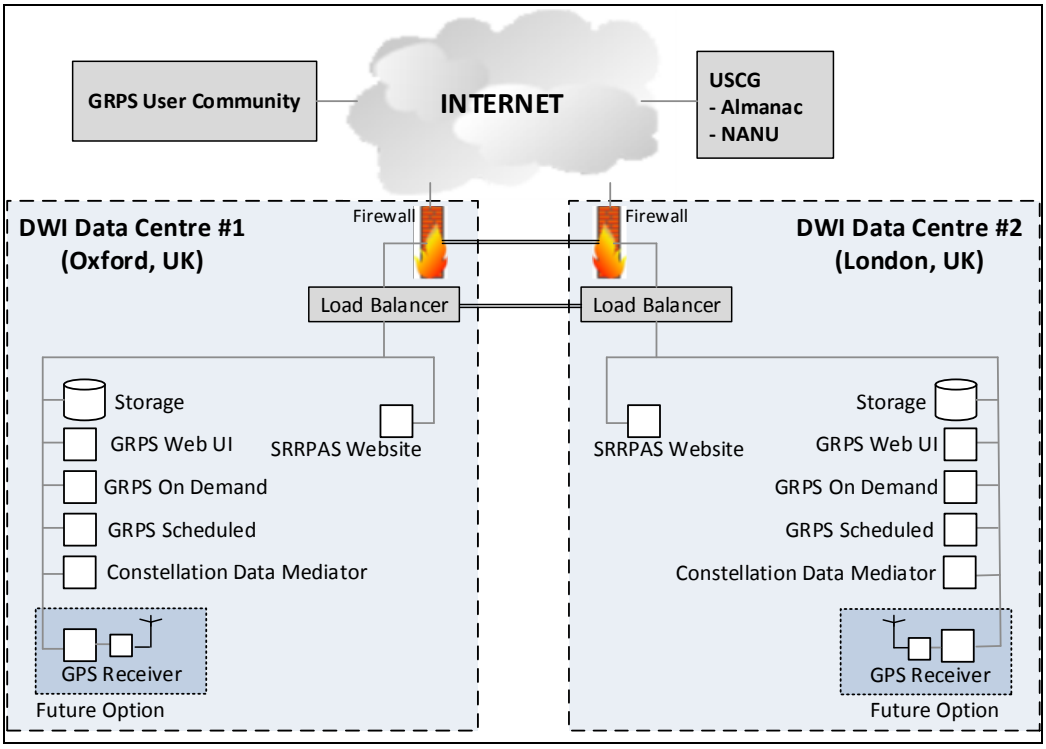


Figure 8 – SRRPAS Architecture

3.1.2 The SRRPAS application shall be hosted on an application server with a database back-end providing highly available data storage facilities.

3.1.3 The server shall be fault-tolerant and shall include support for hot-swapping of essential hardware such as disks and power supplies.

3.1.4 The hardware shall consist of two servers and other components, one for the redundant primary and mirror (2 in total) with the following minimum specification:

- Servers provided shall be HP Proliant DL360 G5 – E5335 Processor (Quad 2.0Ghz) – 4Gb Ram – 2x 72Gb SAS 10k Disks in Raid 1.
- Redundant Pair of Hardware Load Balancers balancing traffic at layer 4 100Mbit access switch ports with 1Gbps trunks between distribution, aggregation and core switching layers.
- Multiple upstream Internet providers shall be provided.

3.1.5 State of the art fire suppression facilities and fully backed up power supplies shall ensure the highest possible levels of availability for hosted systems. The SRRPAS shall be supported by a 24/7 monitoring and support presence on site in the data centre. Spare hardware shall be kept on site to enable fast recovery from failure.

3.1.6 The SRRPAS shall be subjected to a rigorous backup regime with daily system backups and off-site media storage.

3.2 IP SECURITY

3.2.1 The SRRPAS server infrastructure shall be protected by a dual Cisco PIX auto-failover firewall system.

3.2.2 The internal network clusters shall be hosted on a private network segment with a private address range – not directly accessible from outside the firewall. Only web traffic, email traffic and management traffic shall be permitted through the firewall.

3.2.3 The SRRPAS shall be patched with software security updates (OS, Database, etc) as they become available.

3.2.4 Local physical security measures shall be implemented.

3.3 CONSTELLATION DATA MEDIATOR

3.3.1 It is imperative that the SRRPAS maintains an up to date record of the GPS satellite constellation as well as scheduled changes to the constellation in order to ensure that the system calculations are based on the best available data.

3.3.2 The SRRPAS shall obtain constellation data and constellation updates from USCG of sources, as follows:

- Almanac.
- Forecast and unscheduled outages/changes (NANU).

3.3.3 The Constellation Data Mediator subsystem shall mediate the constellation information to provide the system with the best available picture of the constellation for the calculation time periods available via the SRRPAS website.

3.3.4 The Constellation Data Mediator subsystem shall be written to be resilient to errors in the data feeds from the external data sources. The SRRPAS shall not update reference constellation data until it is verified as good with respect to format validity and data value range checking.

3.3.5 By using multiple data sources, the SRRPAS shall be able to use the best data available if one or more of the data sources is not functioning correctly. The SRRPAS shall allow customisation of audit logging and notifications to system administrators based on errors detected in the source data (availability or content) to allow timely manual override of default behaviour and investigation of the issue if necessary.

3.3.6 All geographical data in the SRRPAS shall be sourced from commercially available data providers such as Jeppesen Inc.

4 THE SRRPAS BRANDING OPTIONS

4.1 SERVICE NAME

4.1.1 The service name shall be: SATDIS: Satélites Disponsibles

4.2 URL

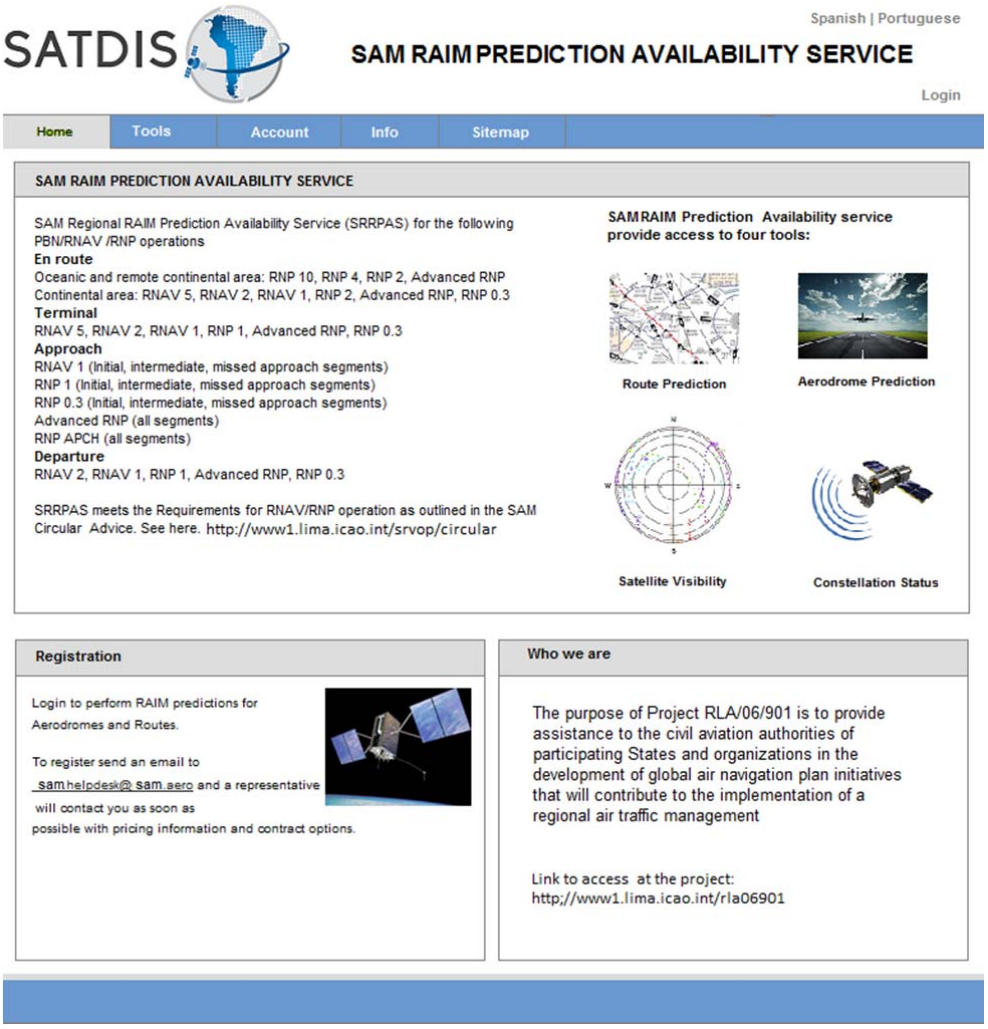
4.2.1 A single URL shall be used for the service, based on the service name. The following URL is proposed for the SRRPAS website:

- http://www.satdis.aero/

4.3 LOOK & FEEL

4.3.1 The RAIM Project Group (RPG) shall provide DWI with the approved graphics to brand the SRRPAS website as required. At a minimum, a graphics file of the logo in .jpg or .png format shall for a 98 pixel by 98 pixel image to appear at the top left hand side of the page banner. The same graphics file shall be used for the basis to create the favicon which will appear on internet browser tabs.

4.3.2 A mock-up of the website homepage, to show indicative colours is shown below.



4.3.3 The RPG may select up to 6 colours (by html colour code).

4.4 HOME PAGE TEXT CONTENT

4.4.1 DWI and the RPG shall agree the wording for the home page of the website. It is recommended that the text is approximately 200 words.

5 TRAINING COURSE OUTLINE

5.1 INTRODUCTION

5.1.1 The training course shall take place over 2 consecutive days and shall be conducted in English (Day 1) and Spanish (Day 2) via web conference.

5.1.2 It is intended that the Focal Point (FP) for each state shall participate in the training so that they in turn shall be able to train Users from their state. Training materials will be made available to the FPs.

5.2 COURSE OUTLINE

5.2.1 The course content shall contain the following topics:

	Duration	Topics Covered
Introduction	0h 15m	Introduction About DWI Course Aims & Objectives
Principles of RAIM	0h 30m	GNSS Principles
Introduction to SatDis	0h 25m	SatDis Building Blocks Accessing the SatDis Website SatDis Website Structure
Short Break	0h 10m	
SatDis in Detail – Part #1	1h 0m	GPS Constellation Status Tool GPS Satellite Visibility Tool Airport Approach/Departure RAIM Check
Break	0h 30m	
SatDis in Detail – Part #2	1h 0m	Route RAIM Check User Roles and Permissions
Short Break	0h 10m	
Help Desk & Support	0h 30m	Tier 1 Support - In-Country “Focal Point” Tier 2 & 3 Support - DWI Help Desk
Open Session / Q&A	0h 20m	Recap of any topic as requested by attendees Questions & Answers
Wrap-Up & Close	0h 10m	Course Hand-Outs Help Desk Contact Details
Course Duration	5h 0m	

5.3 COURSE CONTENT

5.3.1 The course content shall be made available to the RPG in soft copy in both English and Spanish.

5.4 JOINING INSTRUCTIONS

5.4.1 DWI uses the join.me application for web conferencing. Course attendees may participate in the conference by downloading the join.me application to their local computer and using a unique Meeting Code.

5.4.2 The download and Meeting Code are made available with the training invitation email.

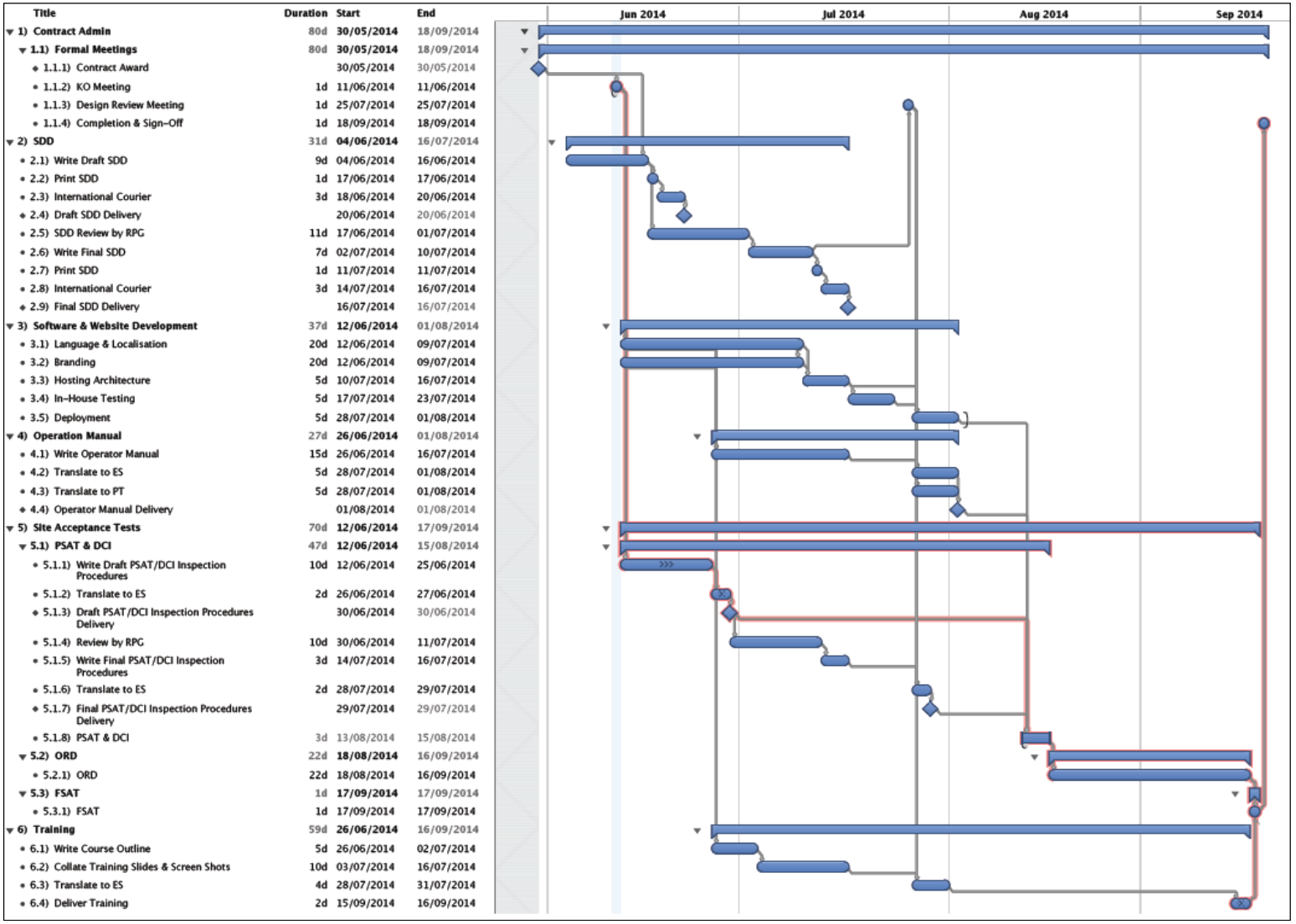
5.5 TRAINING ATTENDEES

5.5.1 DWI will require a complete list of attendees from the RPG at least 10 workings days prior to the first training session.

5.5.2 The following information for each attendee will be required:

- Full name.
- Organisation.
- Role.
- Email address.
- Phone number.
- Course preference – English / Spanish.

6 IMPLEMENTATION SCHEDULE- BASELINE



Title	Duration	Start	End
1) Contract Admin	80d	30/05/2014	18/09/2014
1.1) Formal Meetings	80d	30/05/2014	18/09/2014
1.1.1) Contract Award		30/05/2014	30/05/2014
1.1.2) KO Meeting	1d	11/06/2014	11/06/2014
1.1.3) Design Review Meeting	1d	25/07/2014	25/07/2014
1.1.4) Completion & Sign-Off	1d	18/09/2014	18/09/2014
2) SDD	31d	04/06/2014	16/07/2014
2.1) Write Draft SDD	9d	04/06/2014	16/06/2014
2.2) Print SDD	1d	17/06/2014	17/06/2014
2.3) International Courier	3d	18/06/2014	20/06/2014
2.4) Draft SDD Delivery		20/06/2014	20/06/2014
2.5) SDD Review by RPG	11d	17/06/2014	01/07/2014
2.6) Write Final SDD	7d	02/07/2014	10/07/2014
2.7) Print SDD	1d	11/07/2014	11/07/2014
2.8) International Courier	3d	14/07/2014	16/07/2014
2.9) Final SDD Delivery		16/07/2014	16/07/2014
3) Software & Website Development	37d	12/06/2014	01/08/2014
3.1) Language & Localisation	20d	12/06/2014	09/07/2014
3.2) Branding	20d	12/06/2014	09/07/2014
3.3) Hosting Architecture	5d	10/07/2014	16/07/2014
3.4) In-House Testing	5d	17/07/2014	23/07/2014
3.5) Deployment	5d	28/07/2014	01/08/2014
4) Operation Manual	27d	26/06/2014	01/08/2014
4.1) Write Operator Manual	15d	26/06/2014	16/07/2014
4.2) Translate to ES	5d	28/07/2014	01/08/2014
4.3) Translate to PT	5d	28/07/2014	01/08/2014
4.4) Operator Manual Delivery		01/08/2014	01/08/2014
5) Site Acceptance Tests	70d	12/06/2014	17/09/2014
5.1) PSAT & DCI	47d	12/06/2014	15/08/2014
5.1.1) Write Draft PSAT/DCI Inspection Procedures	10d	12/06/2014	25/06/2014
5.1.2) Translate to ES	2d	26/06/2014	27/06/2014
5.1.3) Draft PSAT/DCI Inspection Procedures Delivery		30/06/2014	30/06/2014
5.1.4) Review by RPG	10d	30/06/2014	11/07/2014
5.1.5) Write Final PSAT/DCI Inspection Procedures	3d	14/07/2014	16/07/2014
5.1.6) Translate to ES	2d	28/07/2014	29/07/2014
5.1.7) Final PSAT/DCI Inspection Procedures Delivery		29/07/2014	29/07/2014
5.1.8) PSAT & DCI	3d	13/08/2014	15/08/2014
5.2) ORD	22d	18/08/2014	16/09/2014
5.2.1) ORD	22d	18/08/2014	16/09/2014
5.3) FSAT	1d	17/09/2014	17/09/2014
5.3.1) FSAT	1d	17/09/2014	17/09/2014
6) Training	59d	26/06/2014	16/09/2014
6.1) Write Course Outline	5d	26/06/2014	02/07/2014
6.2) Collate Training Slides & Screen Shots	10d	03/07/2014	16/07/2014
6.3) Translate to ES	4d	28/07/2014	31/07/2014
6.4) Deliver Training	2d	15/09/2014	16/09/2014

7 HOSTING AND OPERATION SUPPORT PLAN

7.1 AVAILABILITY

7.1.1 Availability means that the system is functioning at any given time.

7.1.2 Conversely, “down-time” is the cumulative time that the system has not been working within acceptable parameters.

7.1.3 The availability of the SRRPAS shall be at least 99.5% each calendar month.

7.2 RESPONSE TIME

7.2.1 For SRRPAS a response time of 2 seconds is offered, based on reasonable volumes and outside Internet response times and delays caused by non DWI systems.

7.3 HELP DESK

7.3.1 Help Desk Support

7.3.1.1 Help desk support shall be offered to Users for the SRRPAS.

7.3.1.2 In the first instance FPs shall provide frontline support to their User base. It is intended that DWI provide support to the FPs. If additional technical support is required then DWI shall assist via the help desk.

7.3.1.3 The language used by the DWI help desk team is English. If any translation is required in the replies to the user, the DWI team may request assistance from the state FP.

7.3.1.4 Queries to the helpdesk email shall generate an automated response including a unique ticket number (for example: Ticket#2014071810000123) to enable tracking of a query.

7.3.1.5 If the query relates to access or account management, DWI shall contact the relevant FP (for example a request for access coming from a Brazilian operator shall be referred to the Brazilin FP). FPs shall then address the issue. Such assistance may include:

a) Allowing access to new Users.

b) Resetting the password of existing Users.

c) Removing Users.

7.3.1.6 See Section 7.4 for more information.

7.3.1.7 FPs shall provide initial support to the Users. Where the FP requires technical assistance, DWI shall provide this by email to the end-user. Technical assistance may relate to:

a) The quality of the GPS RAIM predictions,

b) Monitoring and validation of the US Notice Advisory to NAVSTAR Users (NANU) Service and GPS NOTAMs.

c) Interface or operational assistance.

7.3.1.8 See Section 7.3.4 for response times.

7.3.1.9 Queries for access to the SRRPAS originating from outside of the South American Region shall be shall be declined.

7.3.2 Help Desk Working Hours and Response Times for Non-Emergency Enquiries

7.3.2.1 DWI will provide a help desk that will be available to answer help desk enquiries during normal working hours in the UK.

7.3.2.2 The normal working hours for DWI staff are Monday to Friday, 09:00 to 17:00 GMT (or BST depending on daylight savings).

7.3.2.3 DWI staff will not normally be expected to provide help desk cover for non-emergency enquiries during national holiday days in the UK. These days are as identified by UK government and DWI's working time and holiday policy (available upon request).

7.3.3 Help Desk Working Hours and Response Times for Emergency Enquiries

7.3.3.1 The DWI help desk will be available to answer emergency enquires 24 hours a day, 7 days a week.

7.3.3.2 Issues that causes an emergency enquiry shall be defined as:

- The SRRPAS is not available.
- At least one tool or function is out of service.

7.3.4 Error Correction Schedule

7.3.4.1 DWI shall respond to error reports according to the following schedule:

Response Times for Error Classification			
	Level 1	**Level 2**	**Level 3**
Severity 1	4 Hours.	2 Working Days.	Next maintenance release.
Severity 2	1 Working Day.	5 Working Days.	Next maintenance release.
Severity 3	3 Working Days.	15 Working Days.	As appropriate.

7.3.4.2 Level of Response indicates the nature of the response to be expected as the error is resolved.

Level Identification	**Description**
Level 1	Acknowledgement of receipt of error report.
Level 2	Provide one or more of the following as appropriate: - Patch. - Workaround. - Temporary fix. - Details of the problem resolution plan and timetable for fix. Explanatory notes for the patch, workaround or temporary fix.
Level 3	Official compiled/object/binary code fix or software update; and updated user manuals, if appropriate.

7.3.4.3 Error Classification indicates the severity of impact of the error and the typical resource that will be used to resolve the issue.

Error Classification	Description	Impact
Severity 1	Criteria: a) The software is unavailable.* b) There are no existing workarounds to restore product functionality. DWI shall place top priority on the technical issue; necessary technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours and over-time hours.	High Business Impact.
Severity 2	Criteria: a) Significant functionality* is not working according to the software specification. b) Through the use of the software, significant business objectives cannot be met. DWI shall place high priority on the technical issue; necessary technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours.	Medium Business Impact.
Severity 3	Criteria: a) Minor functionality* is not working according to the software specification. b) Through the use of the software, minor business objectives cannot be met. DWI shall place a lower priority on the technical issue; appropriate technical resources shall be assigned to resolving the issue or implementing a workaround. Work shall be carried out during normal working hours.	Low Business Impact.

7.3.4.4 If it becomes necessary to escalate an issue, Users can request to have a named point of contact within the DWI's technical team. This team member will become the primary point of contact until the issue is resolved.

7.3.4.5 * Unavailable, significant and minor functionality in the SRRPAS are specified as follows:

Unavailable Functionality:

- The software does not generate RAIM prediction results or the website does not present the RAIM prediction results.
- Any tool fails to load, display or generate results and no workaround is available.

Significant Functionality:

- The SRRPAS is using the incorrect GPS Almanac and/or NANUs.
- Requests to increase the total number of users for the SRRPAS website.

Minor Functionality:

- Requests for clarification / explanation of RAIM prediction results.
- Group / user account management.
- User permissions change requests.
- Requests to assist with creation or changes to scenario information and / or saved GPS Rx configurations.
- Website response times are slower than normal / expected but is otherwise functioning correctly.
- Cosmetic and / or layout problems with the website.
- Other similar.

7.3.4.6 DWI's Working Hours

Working and Non-Working Hours	Description	Days	Hours
Working Hours	Working hours are the routine hours worked by DWI's staff.	Monday to Friday.	09:00 - 17:00 GMT or BST depending on UK daylight savings.
Overtime Hours	Overtime hours are the hours that DWI's staff would be asked to work to implement a patch, fix or workaround while based at their normal place of work.	Monday to Friday.	07:00 - 09:00 and 17:00-20:00 GMT or BST depending on UK daylight savings.
Exceptional Hours	Exceptional hours are the hours that DWI staff would be expected to work while working to resolve a pre-agreed escalated support request	Monday to Sunday.	00:00 - 24:00 By prior arrangement.
National Holidays	National Holidays as identified by UK government and DWI's working time and holiday policy.	Available upon request.	

7.3.5 Help Desk Contact Details

7.3.5.1 The help desk e-mail address will be determined during the development phase of the project but shall take the form helpdesk@srrpas.com once the URL has been agreed.

7.4 ACCESS REQUESTS

7.4.1 Each state shall be given access for the FP and 10 additional accounts. These accounts shall be distributed and managed by the state FPs.

7.4.2 The SRRPAS shall include a page displaying the contact details for each state FP for incoming requests for access from state users.

7.4.3 Access is provided by username/password credentials. FPs provide access by using the SRRPAS to generate an automated email to the intended new User. This email includes temporary access credentials. The new User must use these credentials to access their account and change the password within 24 hours of receipt of the email. If the User fails to do so the FP can generate a new email with new temporary access credentials.

7.4.4 Each state shall be allowed to create up to 10 accounts. The FP shall have the ability to add, remove and manage these accounts. The FPs shall be given detailed instruction on the management and administration of access during the training, see Section 5 for more information. In addition, FPs can use the same helpdesk system (see Section 7.3) to assist them with any issues they may encounter relating to administration. The training materials will be made available to the FPs for reference.

7.4.5 Contact email addresses for each FP shall be listed on the website.

7.5 QUARTERLY SUMMARIES OF SUPPORT ISSUES

7.5.1 DWI shall send the RPG a detailed summary report including information on all tickets including:

- Open tickets which have yet to be resolved at the time of reporting.
- Tickets which have been closed since the last quarterly report.

7.5.2 The report shall contain at least the following information:

- Ticket status – Open / Closed.
- Priority.
- Age.
- Date created.
- Ticket number – unique identifying number.

  Visitor statistics and page views derived from logs for system access and tool user activity.

7.5.3 Post processing of files for reporting/troubleshooting will be as and when required. There is no proposed self-service user interface to the logged data. All logging will be to file in DWI defined format - files will be kept by DWI for minimum of 6 months.

7.5.4 SRRPAS User statistics reporting log detail for audit purposes:

- System access – logs for user login/logout events to SRRPAS .
- Tool activity logs - Calculation actions identifying each user, group and action; for the following specific tools (All configurable on|off):
  - Status - no input data, log almanac reference and nanu references only.
  - Aerodrome - log calculation summary data, raw calculation input and output.
  - Route - log calculation summary data, raw calculation input and output

- Visibility - log input data and constellation data (almanac reference and nanu references), sufficient to reproduce the output if required.
- The period for historical logged data is configurable and will be set at 6 months.

PROVISIONAL SITE ACCEPTANCE TEST CERTIFICATE

Reference: International Civil Aviation Organization (ICAO)
Contract: 22501411
SAM Regional Receiver Autonomous Integrity Monitoring (RAIM) Prediction Availability Service, and associated equipment
RLA/06/901 – SAM Regional States

We hereby acknowledge that the RAIM Prediction Availability Service and associated equipment, as well as the Data Centre facilities, *have been verified in accordance with the mutually agreed upon test procedures and are compliant with the provisions of ICAO Contract No 22501411.*

On behalf of DW International Limited

JOHN WILDE

Authorized Representative (BLOCK LETTERS)

Signature and Date

On behalf of the SAM Regional States

Onofrio Smarrelli

Authorized Representative (BLOCK LETTERS)

Signature and Date

Note: Any comments, deficiencies or observations discovered during the PSAT shall be indicated.

Pages detailing the above shall be attached to this certificate.

COMMENTARIES AND ACCTIONS AS A RESULT OF THE PSAT FOR THE SAM RAIM PREDICTION AVAILABILITY SERVICE VIA WEB

(Windsor Office 13 to 15 August 2014)

1| The web site used to access the SAM Regional RAIM Prediction Availability Service (SRRPAS) was https://test.dwinst.com/satdis/home.html and not www.satdis.aero . The www.satdis.aero will be in operation the 22 August 2014.

2 In the home WEB page of SRRPAS the following correction , changes and input have to be made:

2,1 Change the word PGN for PBN

2.2 Introduction of the direct access tools as images as specified in the SDD document (figure in paragraph 4.3.2)

2.3 For the registration part the email address samhelpdesk@sam.aero has to be replaced by a direct access through INFO and after that CONTACT . Once in contact a list of 12 email address will be dispayed. The list of email addresses correspond to the focal points selected by the 11 States that are participating at the SRRPAS services and the email of the SRRPAS project manager from the ICAO SAM Region for the States of SAM Region that are not member of SRRPAS.

2.4 At the bottom of the WEB page for the helpdesk access a direct link acces has to be made

3 For the disclaimer content that will be acceded from the bottom of the SRRPAS web page change the name of ICAO with the SRRPAS states members.

4 The Spanish and Portuguese web page contents are not completed the same are in progress and will be completed the 22 August 2014.

5 The PSAT document in the section related to Main Menu bar navigation is missing the test related to Resources.

6 For route section no waypoint data contains the SRRPAS , in order to obtain the RAIM prediction availability service for a specific national or regional route the way point data has to be introduced manually. On this respect the SRRPAS States will supplied their route national waypoint data in a specified format that DWI will informed the 19TH August 2014 .Once DWI received the waypoint data the same will be introduced in the SRRPAS.

7 Printable PDF report has to be fixed the same do not reflect the same information in the monitor,

8 The data stored for audit process is in progress and is expected to be completed Friday 22 August. The data remain stored for a period of 6 months.

APPENDIX E

SUMMARY OF THE TELECONFERENCE FOR FOLLOW-UP OF SATDIS OPERATION

(13 October 2015, from 8:30 to 10:00 am (Lima local time)

1 Introduction

1.1 In order to monitor the operation and use of the web-based RAIM availability prediction service in the SAM Region (www.satdis.aero), a teleconference was held on 13 October 2014 from 8:30 am to 10:00am (Lima local time).

1.2 The teleconference was attended by the following national focal points (focal point representatives) in charge of national coordination of the web-based RAIM availability prediction service:

Argentina:	Luis Alarcón	lalarcon@anac.gov.ar
Bolivia	Jaime Álvarez	jalvarez@dgac.gob.bo
Brazil	Julio Cezar Pereira Rosa	cezar@cgna.gov.br
Chile	Alfonso De La Vega	adelavega@dgac.gob.cl
Panama	Ana De León Toro	anadeleon@aeronautica.gob.pa M
Paraguay	Victor Moran	moranchu@gmail.com
	Diego Aldana	
Peru	Sady Beaumont	orlandobe@gmail.com
Venezuela	Omar Linares	o.linares@inac.gob.ve

1.3 Uruguay did not participate in the teleconference but sent its comments by e-mail. The focal point of Venezuela only participated at the beginning of the teleconference.

1.4 The agenda adopted for the teleconference was as follows:

Comments on the use of SATDIS

1.4.1 Regarding this matter, each State, through its focal points, is expected to make comments on the use of SATDIS and the operations manual. Based on these comments, actions will be designed and submitted to the provider, as long as they fall within the specifications contained in the contract between ICAO and DWI (technical specifications).

Operational use of SATDIS at national level

1.4.2 In this regard, the States will provide information on how they foresee the operational use of SATDIS.

Other matters

1.4.3 In this regard, the participants of the teleconferences will be able to suggest items related to this matter as they deem appropriate.

2 Comments on the use of SATDIS

2.1 In this regard, most delegates noted that, when querying RAIM availability prediction for en-route operations, the database did not include all the waypoints of the route, but only those related to the VORs. It was noted that DWI was expanding the database to include all the waypoints for en-route operations. This is a pending task of DWI. If the database is not fed with all the information on waypoints, the final acceptance of the SATDIS service will not take place.

2.2 Likewise, some delegates informed that they continued to practice with the service and that they were disseminating information on SATDIS at national level, mainly amongst air navigation service providers.

2.3 All the focal points participating in the teleconference informed that they had received from DWI the user name and password to access SATDIS as Administrators. Their functions include the assignment of user names and passwords at national level. The delegate of Argentina stated that he was not sure whether his access was as Administrator and would check, and inform the ICAO SAM Office as soon as possible (no later than friday 17 October).

2.4 Regarding some comments made on the use of SATDIS, it was noted that the SATDIS Operations Manual would be consulted to see if it contained any guidance to solve the problem. In case the Operations Manual did not contain any guidance, the DWI helpdesk would be consulted in order to find a solution. Regarding the Operations Manual, DWI had not yet delivered the Spanish and Portuguese versions, which were supposed to be completed on 10 October 2014.

2.5 In this sense, the focal points were reminded that the operation of, and services provided by, SATDIS were based on the technical specifications developed and revised by Project RLA/06/901 member States, and on the revision of the SATDIS project document (SDD) submitted by DWI and also reviewed by all Project RLA/06/901 member States. In case a problem was identified in relation to a service not contemplated in the RAIM technical specifications or not included in the SDD, it would not be possible to request DWI to include it in SATDIS. They could be included in SATDIS but it would have an implementation cost.

2.6 A summary of the comments made by each focal point follows:

Argentina

2.6.1 The representative of Argentina noted that he had been practicing with SATDIS, and that it was very user-friendly. He also stated that they had started a SATDIS dissemination programme at national level for AIS personnel.

Bolivia

2.6.2 The delegate of Bolivia mentioned some difficulties in the use of the tool for en-route operations. In this sense, he was requested to send a brief description of such difficulties to the SAM Office as soon as possible, no later than 17 October 2014. One of them had to do with the possibility of enlarging the icon that enabled changes to some parameters to complete the predition for en-route operations. Regarding another problem, it was suggested that the SATDIS operations manual be consulted to see if it provided any clarification to solve the problem; if not, DWI would be informed accordingly. Regarding the icon, DWI would be informed of the possibility of making it more intelligible.

2.6.3 Likewise, the delegate of Bolivia informed that they were in the process of informing the service provider (AASANA) about the SATDIS service.

Brazil

2.6.4 Brazil noted some initial difficulties, which were consulted with DWI and resolved. One of these difficulties concerned the fact that, when closing the SATDIS website, the login remained open, thus SATDIS stayed open to the whole world. To avoid this, DWI explained that, after using SATDIS, users had to logout.

2.6.5 Some issues were clarified, such as the format of the coordinates used by SATDIS and the insertion of new data on aerodrome operations or waypoints in the SATDIS database. It was explained that SATDIS used decimal degrees for latitude and longitude, and that the SATDIS operations manual contained information on how to import data into the SATDIS database.

2.6.6 Brazil also commented on the possibility for the SATDIS home page to explain the operation of SATDIS and to have a glossary of terms. In this regard, it was noted that the SATDIS home page had a limited number of characters and thus could not be expanded. A request will be submitted to DWI to be able to access the operations manual through SATDIS and for the operations manual to include a glossary of terms.

Chile

2.6.7 The delegate of Chile noted that he had sent his comments on SATDIS to the SAM Regional Office on 25 September 2014, a copy of which is contained in **Appendix A** to this summary. Many of the comments concerned the format of the coordinates and the display of GPS paths on Google Earth, which, since they are not contemplated in the technical specifications of the RAIM availability prediction service, the contractor is not obliged to include them.

2.6.8 These observations could be analysed for their inclusion in SATDIS at the forthcoming SAM/IG meeting (SAM/IG/14, Lima, Peru, 10-14 November 2014) and if the meeting deems it appropriate, DWI could be asked to submit the corresponding quote. It was also requested that a face-to-face course be conducted; this could also be analysed by the SAMIG/14 meeting.

2.6.9 Regarding the question about the meaning of numbers 0, 15, 30, 45, 60, 75, and 90 in the GPS visibility graph, it was noted that the numbers represented degrees, where 90 degrees represented the centre (zenith) and 0 degrees represented the surface level.

Panama

2.6.10 The delegate of Panama noted that, initially, he had had problems with the password and that DWI had sent him a new password. In this regard, it was noted that, once the password was received, it had to be used as soon as possible (within 24 hours); otherwise, it would be lost and a new password had to be requested. He also stated that he continued to practice with SATDIS and to disseminate information on SATDIS to the rest of the personnel of the air navigation service provider (AIS offices).

Paraguay

2.6.11- The delegate of Paraguay informed that, when using the application to determine RAIM prediction availability en route, the waypoints of the route were not shown. As stated in paragraph 2.1 of this summary, this is an activity still pending completion by the contractor (DWI).

Peru

2.6.11 The focal point of Peru informed that he had initially coordinated with the service provider (CORPAC) for the dissemination of information on the service and the way in which it would be made available to users.

Uruguay

2.6.12 The delegate of Uruguay could not participate in the teleconference, but sent by e-mail comments on the use of SATDIS. In this sense, he explained that only VORs had been loaded into the application, that the en-route tool did not permit to save pre-defined routes, and that the application crashes quite often. Tests had been conducted with different Internet connections and browsers, but the application failed with all of them.

2.6.13 Regarding the first comment, paragraph 2.1 provides the answer; as to the second comment, the operations manual describes how to import data, and regarding the third comment, it is important to inform the DWI help desk accordingly. On this matter, which was reported by only one State, it would be very much appreciated if the remaining focal points informed me as soon as possible, before **17 October 2014,** if their application also showed this failure.

3 Operational use of SATDIS

3.1 In this regard, most focal points reported that, for the time being, they were providing information about the service to air navigation service providers involved, that is, AIS offices.

3.2 Brazil reported that it was planning to announce on the website of CGNA (Air Navigation Management Centre of DECEA) that the RAIM availability prediction service was available for airport and en route operations, following consultations with SATDIS.

3.3 Other States have not decided yet how they would proceed with the operational use of the service.

3.4 Focal points were apprised of the need for the personnel of the aeronautical authority of SATDIS member States responsible for approving the operations of aircraft operators concerning the use of GNSS-based (RNAV and RNP) navigation procedures to make sure that the operator takes into account the use of the RAIM availability prediction service as indicated in the advisory circulars published in the SAM Region for the approval of aircraft and operators (see http://www1.lima.icao.int/srvsop/circular).

3.5 In this regard, it was noted that the operational use of SATDIS was the responsibility of the States and that the States would present more information on the operational use of the service at the SAMIG/14 for its analysis and recommendations.

4 Other matters

4.1 In this regard, there were no comments; it was only noted that there might be another teleconference to report on the progress made by the contractor, DWI, on the implementation of pending SATDIS issues.

Appendix

ANALYSIS AND ASSESSMENT OF SATDIS – RAIM WD Int.

1.- LAT / LONG coordinates are expressed in degrees and decimals. For a long time now, WGS-84 has been used as a reference, and it is expressed in degrees, minutes, and seconds.

It is not clear how a new aerodrome and its geographic coordinates should be inserted "manually."

2.- The "prediction" globe is difficult to interpret. It would be better to see the "track" or the AP/AD through a Google Earth link, showing the track in colours to denote RAIM "predictions."

3.- In Prediction, it would be much better to print the Globe (N-S-E-W) rather than tables. However, it would be equally difficult to "imagine" the satellites on sight. Furthermore, it is not clear: a) what are the rings, b) what does the 15-30-45 scale means, etc.

4.- The SW does not allow printing of the page "as it is", but rather transfers you to another page containing a list that might not be needed.

5.- Tools – Visibility shows LAT /LONG in degrees and decimals.

7.- Tools – Scenarios for 10 selected ADs

a) The list of ADs cannot be printed.

b) AD Prediction, full details cannot be printed.

c) Graphs and Summary, are NOT printed.

d) AD Graphs, Interruption should be done by the hour (1) and not by 4-hour blocks.

8.- Satellite prediction between WPs. Satellite availability prediction must be directly related to the distance between WPs, in NM, and aircraft speed. Thus, for an aircraft type, whether a Cessna 172 or a B747, prediction would be totally different because of flight time between WPs.

9.- In SW, when clicking on the "Printable Version", the reader is taken to another page. Everything that the reader wants to print should be "printable".

10.- The route graph is not explained in "Prediction – Route scenario."

11.- In Prediction, Aerodrome Graph:

a) Hourly intervals should be restricted to intervals of 30 minutes and/or hours. As stated before, this would allow the reader to visualise more "precisely" the ***satellite outage time block.***

Suggestion/Recommendation

This is an SW that, because of its characteristics, is NOT totally friendly. It is "expressed" in "Tables" that are not easy to interpret. Consequently, a high level of knowledge of the use and

interpretation of this tool is required. Support by Google Earth will be highly convenient in order to see the “Prediction” in colours.

If the budgets allow, it is suggested that a workshop with the manufacturer be conducted in Lima for those who will have the task of providing training in the States.
