CASCADE News 6

November 2008

Alex **Wandels**
Programme Manager CASCADE

EUROCONTROL

The coming six months will be crucial for the future of ADS-B in Europe. As the summer of 2009 approaches, all major players should know exactly what they need to do to contribute to its implementation. There will be no place to hide! The draft Single European Sky Implementing Rule mandating the carriage of ADS-B from 2015 onwards was released for consultation last month. In parallel, the EUROCAE/RTCA standard for ADS-B in a radar environment is being finalised and should be published in April 2009.

The Surveillance Performance and Interoperability Implementing Rule (SPI IR) covers the three surveillance techniques expected to be used over the coming decades: Mode S, multi-lateration and ADS-B. Its purpose is to make aircraft "future proof" from a surveillance perspective, i.e. all aircraft equipped in accordance with this rule will be provided with an optimal, cost-effective, surveillance-based air traffic service wherever they operate in Europe. The aim is to have it adopted by the end of 2009.

The Requirements Focus Group is finalising the standard for ADS-B in a radar environment. This standard will determine all essential safety, performance and interoperability requirements for avionics and ground systems, as well as the compulsory criteria for airworthiness and operational approvals for ADS-B.

The first aircraft have obtained their airworthiness approval for ADS-B in a non-radar environment from EASA. Most of the 400 pioneer aircraft will follow in the coming months.

In the meantime, our pre-operational trials are paving the way for implementation. ADS-B in non-radar environments will be the first application to become operational in Trabzon, on the Black Sea coast of Turkey. The ground station, tracker and display system installations, business case, controller training, safety case and operational approval have been planned and executed with great enthusiasm.

Other sites around Europe will follow Trabzon's example. This first wave of implementations will instil the confidence required to use ADS-B in more dense traffic environments.

Amongst the airborne surveillance applications, In Trail Procedure is likely to be the first implemented. Simulations and trials have been completed and the plan to start using the applications pre-operationally with revenue flights is taking shape.

Australia, Canada and the United States are driving implementation forward with the same vigour. You can read what they have achieved so far and what their next targets are on pages 9, 10, and 11. Happy reading!

CASCADE Programme **Events:**

OFG/18 - 27-28 January 2009 - EUROCONTROL, Brussels

WG51/SC186 Joint 1090 Transponder MOPS meeting
17-19 February 2009 - EUROCONTROL, Brussels

RFG/19 - week of 23 February 2009 - EUROCONTROL, Brussels

EUROCAE WG51-SG4 Meeting #16
25-27 February 2009 - EUROCONTROL Experimental Centre, Bretigny

VFG/14 - 3 March 2009 - EUROCONTROL, Brussels

ITF/2 - 19 March 2009 - EUROCONTROL, Brussels

OFG/19 - 28-29 April 2009 - EUROCONTROL, Brussels

RFG/20 - week of 11 May 2009 - USA

OFG/20 - 13-14 October 2009 - EUROCONTROL, Brussels

CRISTAL MED Update

The CRISTAL MED project incorporates the local ADS-B validation activities of the Air Navigation Service Providers (ANSPs) of Portugal, France, Italy, Malta, Greece, Cyprus and Turkey. The sites were chosen with an implementation objective in mind, thus validation addresses real opportunities to improve surveillance.

The CRISTAL MED framework offers the advantage of harmonised validation plans and harmonised infrastructures, as well as a platform for information exchange between the project partners.

At the start of phase 2 (end 2006), the original objectives for all sites were as follows:

- **Ultimate objective:** to reach an implementation decision, possibly supported by a cost/benefit analysis and an initial safety assessment.
- **Medium-term objective:** to validate the target ADS-B application in an operational environment with the participation of air traffic controllers.
- **Short-term objective:** To install the validation infrastructure and perform a technical validation.

In the course of the project, four of the participating ANSPs (Portugal, Italy, Greece and Turkey) have subscribed to the European Convergence & Implementation Plan (ECIP) Objective SUR-05. This ECIP Objective states the commitment to improve ground-based surveillance using ADS-B-NRA (ADS-B in non-radar airspace) before 2012. One of the factors contributing to the decisions to commit to this objective was the positive experience with the CRISTAL MED validation infrastructure. These four ANSPs are currently working on implementation plans and the CRISTAL MED activity has become an integral part of this wider activity.

Portugal is in the contract phase for implementation of an ADS-B/WAM (Wide Area Multilateration) system in the Azores, expected to be operational by 2009/10 (see CASCADE News 5). In the context of CRISTAL MED work, Portugal is in the process of resolving some installation problems related to the remote location. Once this has been completed, the technical validation will start.

ADS-B recording at Rhodes plotted on Google Earth display

Greece (Rhodes) and Italy (Caraffa and Alghero) are performing technical validation and are now on track towards completing operational validation by the end of 2008.

Turkey (Trabzon) has installed the validation infrastructure, and is performing operational validation with high participation of operational staff. In parallel, Turkey is working on the Local Safety Case and on the preparation of a real-time simulation addressing the handling of equipped and non-equipped aircraft.

Example of daily operational log sheet used in Trabzon Tower

For the other ANSPs, the CRISTAL MED Phase 2 activities will be finalised, with mainly technical validation results:

- France (Ajaccio) has performed a thorough technical validation activity and is working on the completion of an initial operational validation.
- Cyprus (Larnaca/Pafos) and Malta (Dingli) are working on the completion of the technical validation.

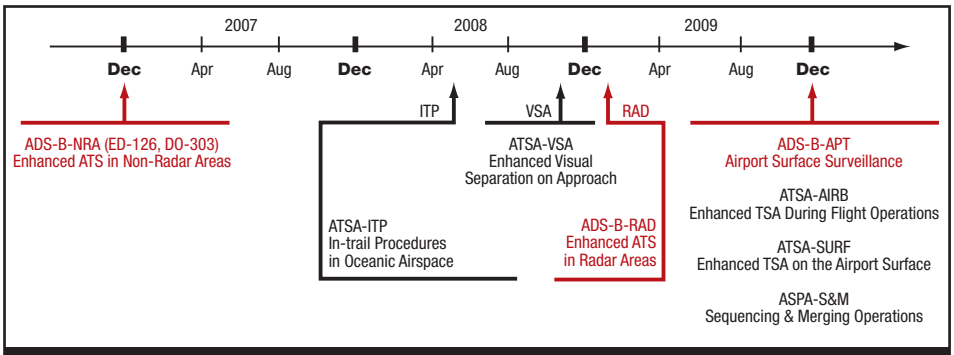
With the end of CRISTAL MED Phase 2 in sight, we foresee as follow-up activities:

- ADS-B-NRA implementation support to Portugal, Italy, Greece and Turkey;
- continued ADS-B validation support to other ANSPs if requested;
- determination of validation sites and partners for advanced ADS-B-RAD (air traffic services in radar areas using ADS-B) validation;
- determination of validation sites and partners for initial ADS-B-APT (airport surface surveillance) validation.
  An interim CRISTAL MED project report consolidating the technical validation results and available operational validation results will be delivered by the end of 2008.

Standardisation

With the development of operationally driven safety, performance and interoperability (SPR/INTEROP), standard material for each of the applications addressed within the CASCADE Programme, the Requirements Focus Group (RFG) is at the top of the "food chain" of ADS-B standardisation and other implementation-related activities with regard to operations.

A very good demonstration of this is the ADS-B-NRA SPR/INTEROP document (ED126/DO303).



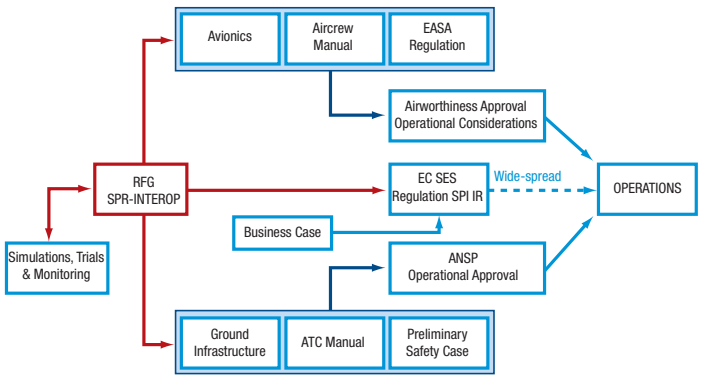
High-level RFG planning

This application standard forms the basis of:

- avionics certification and related operational considerations (EASA AMC 20-24);
- the development of the EUROCAE 1090 ES Ground Station technical standard;
- the development of Generic and local safety cases.

In addition, the work of the CASCADE Operational Focus Group feeds the development of both controller and flight crew guidance material.

The SPR/INTEROP material of the other RFG applications will adopt the same role. Most notably, the ADS-B-RAD application on the use of ADS-B surveillance data in high-density airspace (in conjunction with radar surveillance) will establish the most stringent requirements on ADS-B Out. ADS-B-RAD will also set the baseline for European ADS-B rulemaking through the SPI IR process.



On the path towards operations

Given its importance for European and American ADS-B rulemaking, the RFG ADS-B-RAD performance and safety assessment is conducted with a high degree of rigour.

The SPR/INTEROP document integration is now in its final stages and the joint EUROCAE/RTCA standard (ED161) should be adopted in February 2009.

However, 2008 was the year of the RFG Airborne Surveillance Applications. ATSA-ITP is the first ADS-B In application for which an SPR/INTEROP standard has been published (ED159/DO312). ATSA-ITP is a prime example of a focused and efficient development of application standard material. It was developed in close co-ordination with validation (CRISTAL ITP) and ICAO.

ATSA-VSA is the second ADS-B In application for which SPR/INTEROP material (ED160) should be published in December 2008. The ATSA-VSA performance and safety assessment work broke some new ground regarding the conduct of these assessments for situational awareness applications by including flight crew human factor aspects. This adds further refinement to an advanced and internationally agreed approach to ADS-B performance and safety assessments - a significant "by-product" of the RFG work.

In the meantime, the work on ATSA-SURF and ASPA-S&M is progressing. Their application definitions (OSEDs) are maturing and operational hazard assessments are being conducted. In addition, ATSA-AIRB will be swiftly progressed using the outcome of the ATSA-VSA (and also ATSA-ITP) work as a blueprint. Last but not least, ADS-B-APT will be addressed as soon as the ADS-B-RAD work has been finalised.

In parallel, in 2009, another important standard will need to be developed: the joint EUROCAE/RTCA 1090 ES transponder MOPS. Based on the outcome of the RFG work, this document will form the detailed interoperability standard for the 1090 MHz Extended Squitter data link. This will establish the avionics baseline for ADS-B rulemaking in Europe and the USA (and for other regions across the world).

ADS-B Pioneer Airline Project and Airborne Monitoring

Air France, Air One and Volkswagen are the first pioneer airlines to obtain airworthiness approval for 1090 MHz extended squitter based on AMC 20-24. AMC 20-24 is the EASA Acceptable Means of Compliance for ADS-B surveillance in non-radar areas using 1090 MHz extended squitter. The airworthiness approval is given by EASA and FAA and covers Airbus, Boeing and Dassault airframes. The majority of the pioneer airlines are expected to follow and become certified shortly.

Airworthiness approval is the final milestone in the ADS-B pioneer airline project. In conjunction with the appropriate flight crew training, it allows aircraft to receive ADS-B based separation service in areas not covered by radar.

In European airspace the pioneer airlines are expected to be able to make use of their approval in Portugal, the Netherlands, Greece, Italy, and Turkey, which are all committed to implementing ADS-B based surveillance in parts of their airspace not covered by radar. The EASA approval will also be valid in the Hudson Bay area of Canada, where the ADS-B operational service commenced in November 2008.

Airworthiness approval for use of ADS-B in European airspace is a major step towards ADS-B operations, which will create opportunities for capacity increase, as well as fuel and emissions savings, whilst enhancing safety levels.

The ADS-B pioneer project currently includes 18 aircraft operators, now that KLM has joined. SATA is another airline that in all likelihood will soon join the project. An overview of the current certification status is shown in Table 1. The first column indicates the organisations applying for airworthiness via the Type Certificate (TC) and those applying for airworthiness via a Supplemental Type Certificate (STC). It also lists the organisations applying for airworthiness approval. The second column shows the aircraft type for which the application is intended and the last two columns show the status as regards availability.

The ADS-B pioneer airlines

In parallel, the CASCADE ADS-B airborne monitoring project is continuing to monitor and evaluate the performance of all the pioneer aircraft, as well as other aircraft that operators request to be monitored. The monitor data is collected from six sites across Europe and the evaluations currently cover 886 aircraft and 18 500 hours of ADS-B and radar data recordings.

Aircraft performance is communicated to the operators using a performance report. The airlines can receive a performance report of their monitored aircraft, if requested. Airborne monitoring performance reports have been used to support the certification dossier by most of the organisations applying for TC or STC approvals.

The ADS-B Airborne Monitoring project also supports the CRISTAL GA (General Aviation) and CRISTAL Med partners. The CRISTAL Med partners are supported to identify opportunity aircraft that are feasible for ADS-B ground validation. The Airborne Monitoring project can on request from the CRISTAL Med partner evaluate the performance of specific aircraft that are normally operating in the area.

	"Applicant"	Ac type	New aircraft	Retrofit
TC	Airbus	A380 A330/A340 A320 family	Optional Optional Optional	- SB available on request SB available on request
TC	Boeing	B737 - 600/700/800/900 B757, B767 B747-400 B777	Free of charge for CASCADE Pioneer Airlines Otherwise optional/SB on request	
TC	ATR	ATR72	Certification ongoing	
TC	Dassault	Falcon 2000	Optional	SB available on request
STC	Aeroconseil	A321	N/A	STC approval ongoing
STC	ATI	A3ST	N/A	STC approval ongoing
STC	Air France	B777, B747	N/A	STC approval !!
STC	British Airways	A320 family, B777, B747	N/A	STC approval ongoing

Table 1: ADS-B certification status

ADS-B at TRABZON, Turkey
Real Time Simulation to Prepare for Implementation

The city of Trabzon is located on the shore of the Black Sea. It has a small but expanding airport without surveillance, which means that flights arrive and depart under a procedural service. Because position reports from pilots are not as accurate as surveillance, the separation standards and traffic information parameters are much larger. Mountainous terrain to the south of the Trabzon airspace, very close to the airport, poses an additional hazard to safety.

Three scenarios based on forecast traffic for 2011 are foreseen for the RTS:

- no ADS-B (baseline);
- 50% equipage;
- 100% equipage.

Trabzon airport

Airspace controlled by Trabzon Air Traffic Control

DHMI, the Turkish Air Traffic Services Provider, identified Trabzon as a suitable site for implementation of an ADS-B based surveillance system. The provision of such surveillance services will significantly increase the controllers' situational awareness of air traffic and enable them to handle aircraft in a more efficient way than with today's procedures. Indeed, a Cost Benefit Analysis (CBA), conducted by the CASCADE Programme, concluded that implementation of ADS-B at Trabzon would bring both quantitative and qualitative benefits, and would be a key investment.

To prepare the implementation of ADS-B at Trabzon, a Real Time Simulation (RTS) based on Trabzon Airspace and traffic will be conducted at the EUROCONTROL Experimental Centre in early 2009. The objective of this RTS is "to assess the operational impact of handling both ADS-B equipped and non-equipped traffic in the Trabzon Non Radar Area (NRA)".

To allow all Trabzon controllers to participate in the RTS, the simulation will be run over two periods of two weeks each. This will give all 12 controllers an opportunity to experience the benefits of surveillance over a procedural service and to contribute to the result of the simulation. Both the approach and tower positions will be simulated. They are side by side in Trabzon tower, and this configuration will remain when the ADS-B display is installed. Since Trabzon is participating in the CRISTAL MED trials, an ADS-B monitor has already been installed in the tower (see CRISTAL Med article on p.2).

Since the baseline is procedural control, the simulation platform will have to be configured to allow procedural control. This will provide interesting challenges to both the designers and pseudo pilots.

The implementation of ADS-B in Trabzon will significantly increase the controllers' situational awareness of traffic in and around the Trabzon TMA. It will also enable the traffic to be handled most efficiently to the benefit of both airspace users and the service provider.

Benefits of the In Trail Procedure in North Atlantic airspace

The In Trail Procedure (ITP) has the potential to lower fuel costs by up to 108 million euros per year across the transatlantic fleet. The expected savings are based on a simulation carried out by CRISTAL ITP, indicating that ITP could provide a total reduction of 150,000 tons of fuel and 344,000 tons of CO2 emissions per year.

Further to previous CASCADE News articles on the CRISTAL ITP project and the ITP procedure, here we will have a closer look at the benefits of the ITP procedure.

To quantify the benefits, CRISTAL ITP simulated the impact of introducing the ITP procedure in North Atlantic airspace. The simulation used a tool developed by NATS, called NATSIM, capable of simulating changes to North Atlantic air traffic.

The ITP benefit analysis modelled four potential future scenarios in the years 2010, 2015, and 2020. For each scenario, real traffic data samples from 2007 were taken and grown statistically in line with NATS estimates of North Atlantic traffic growth. Each scenario made assumptions on the percentage of ADS-B Out equipped aircraft as well as the percentage of aircraft able to carry out ITP procedures. The scenarios were based on the assumptions shown in the input data columns in Table 1.

The results in Table 1 show a clear increase in the number of step climbs carried out as a result of the introduction of ITP. The increase in number of step climbs indicate that the aircraft can better follow their optimal profile. The natural consequence of this is reduced fuel burn, which is also observed in the results.

The results in Table 1 are presented for two cases: the “basic” and the “behaviour” cases. The simulations are based on real traffic samples reflecting today’s aircraft behaviour. In today’s operations the probability of receiving a flight level change (climb), during the North Atlantic crossing, is relatively low – about 12% of aircraft request a climb; around half of them will actually receive one. As a reaction to this, airline operators typically request a flight level based on the assumption that the aircraft will not be able to climb during the crossing. The requested flight level will therefore be a compromise flight level, giving the best fuel economy when no flight level change can be made during the flight. When flying at a compromise flight level, the aircraft starts its crossing at an altitude higher than its optimal cruise altitude and exits the North Atlantic at an altitude lower than its optimal cruise altitude.

Step Climb Increase is the proportion by which the number of total step climbs received by all aircraft has increased, note that this includes additional climbs at standard separation. Total Fuel Burn Reduction is the reduction in the total fuel burnt by all aircraft crossing the North Atlantic Airspace, during the entire flight.

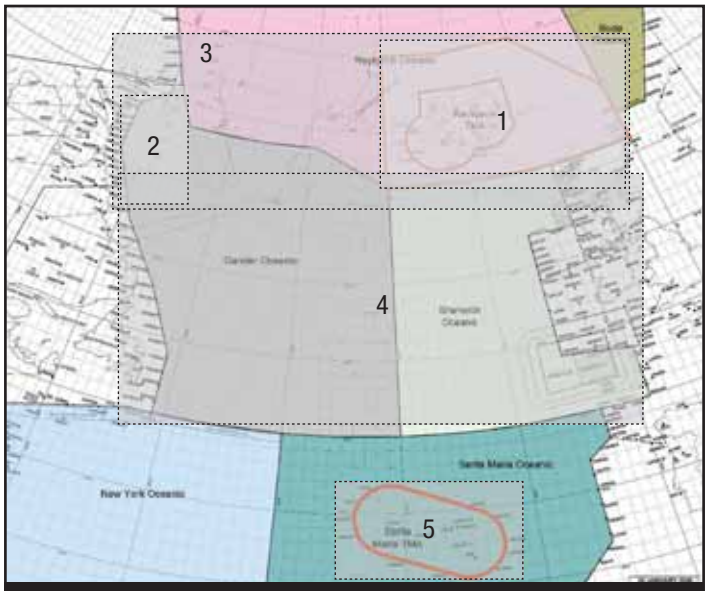
Input data				“BASIC” (Low) Results		“BEHAVIOUR” (High) Results	
Scenario	Traffic growth (%)	ITP Enabled (%)	ADS-B Out Equipped (%)	Total Fuel Burn Reduction (%)	Step Climb Increase (%)	Total Fuel Burn Reduction (%)	Step Climb Increase (%)
2010	114	5	45	0.03	17	0.09	132
2015	134	20	80	0.08	56	0.20	211
2020	156	70	95	0.24	273	0.62	607
2020 all ITP	156	100	100	0.38	556	0.99	1.107

Table 1: ITP benefit simulation input data and results

Traditionally, the majority of aircraft crossing the North Atlantic remain at a single flight level for their entire crossing, with only about 6% of aircraft requesting and receiving a climb. As an aircraft burns fuel, its optimal flight level increases; this means that for most aircraft, the optimal flight profile across the North Atlantic involves 2 – 3 flight level changes (or “step climbs”). ITP-enabled aircraft can perform climbs through an occupied flight level at separations far below today’s standard for the North Atlantic. They are also able to identify climb opportunities under both ITP and conventional separation through the use of the Cockpit Display of Traffic Information (CDTI).

The introduction of ITP provides increased confidence that the aircraft will be able to climb and follow its optimal vertical profile during the crossing. The results presented as “behaviour” refer to the change in behaviour of airline operators, who under this scenario request an optimal initial altitude and rely on ITP to allow the aircraft to identify climb opportunities and perform the necessary manoeuvres to follow the optimal flight level for the entire crossing.

The efficiency increase made possible by ITP, leading to financial and environmental savings, shows a clear benefit of ITP, for both aircraft operators and the environment (Table 2).



Identified potential sites for ATSA-ITP revenue aircraft trials: 1. Reykjavik (Radar coverage), 2. Gander (Radar coverage), 3. Reykjavik and Gander (ADS-B coverage), 4. Shanwick and Gander (RLongSM), 5. Santa Maria

The term ‘Annual Fleet’ refers to all aircraft crossing North Atlantic airspace. The “Annual Fuel Burn Saving per ITP Aircraft” figure assumes an aircraft making two NAT crossings per day. Fuel cost is assumed at €0.71734 per kg.

	“BASIC” (Low) Results			“BEHAVIOUR” (High) Results		
Scenario	Annual Fleet Fuel Burn Savings (tonnes / Euros)	Annual Fleet CO2 Reduction (tonnes)	Annual Fuel Burn Saving per ITP Aircraft	Annual Fleet Fuel Burn Savings (tonnes / Euros)	Annual Fleet CO2 Reduction (tonnes)	Annual Fuel Burn Saving per ITP Aircraft
2010	4,105 / €2,944,989/	9.3k	€89k	13,446 / €9,645,188	31k	€294k
2015	11,600 / €8,321,220	26k	€54k	31,125 / €22,327,040	71k	€145k
2020	36,810 / €26,405,079	84k	€43k	94,543 / €67,819,365	215k	€111k
2020 all ITP	57,797 / €41,460,451	131k	€47k	151,329 / €108,554,552	344k	€124k

Table 2: Financial and environmental savings generated by ITP

The full benefit analysis can be downloaded from the CASCADE website at www.eurocontrol.int/cascade/ (click on ‘Documents’ and look for CRISTAL ITP).

CASCADE Business case

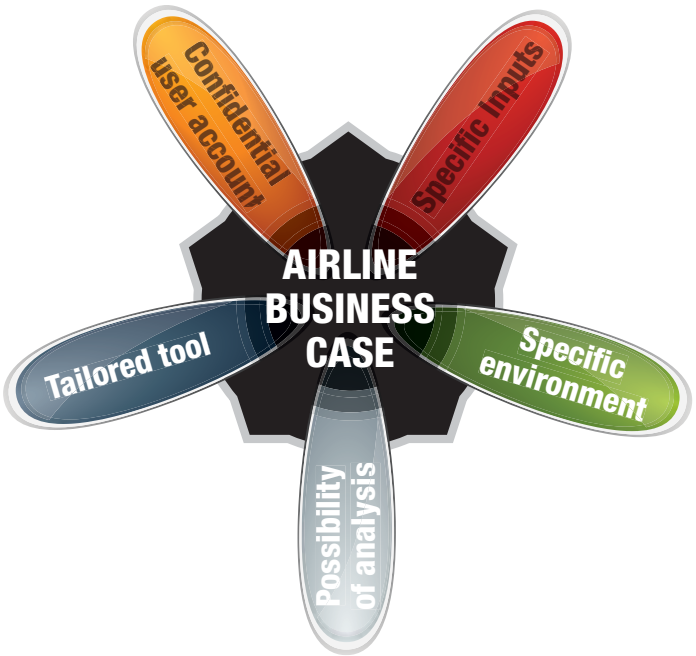
CASCADE Pioneer Airline Business Case Project

After two years of ADS-B Business Case work for Air Navigation Service Providers, a strong consensus has emerged on the benefits of ADS-B (www.eurocontrol.int/cascade, 'Documents' section). The time has now come to focus on airlines.

What does a CASCADE Business Case Bring to Airlines?

It will bring a tailored ADS-B Business Case for airlines through a web-based application using EMOSIA (European Model for Strategic ATM Investment Analysis), developed by EUROCONTOL. This Business Case will include:

- a confidential user account to evaluate ADS-B benefit scenarios;
- the possibility of dealing with uncertainty impacting costs and benefits;
- the possibility of assessing the best time to equip the fleet.

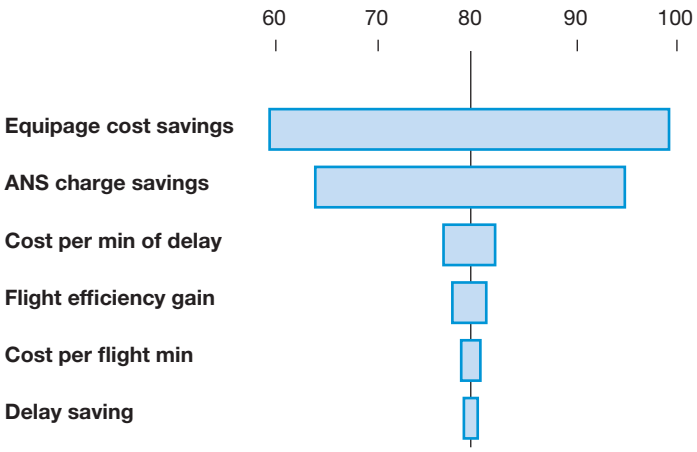


The costs include timely ADS-B Out fleet equipage. The benefits comprise those generated by ground implementation for the airline's operations. The business case will calculate net ADS-B benefits such as shorter vectored approaches and less time loss associated with holding, delays and diversions.

What is the Added Value for Airlines?

The added value for an airline is to make the impact of ADS-B related decisions more transparent. Among various factors influencing decisions on strategic investments, it is important to understand uncertainties and their significance. CASCADE will help airlines to do so with graphic value maps revealing the key operational and commercial factors.

In the diagram, the top two values represent more than 90% of the uncertainty of the output whilst the five remaining make up only 10%. EMOSIA focuses on what really matters by identifying the variables most critical to the success of the project.



In November, the CASCADE Business Case team launched their first business case process for Air Europa in Mallorca. Other candidates will follow in the forthcoming months.

EMOSIA will help airlines get the best return on investment.

Interested in the CASCADE Business Case?

We invite you to contact us to arrange a one-day meeting at the location of your choice. For more detailed arrangements, please contact Bernard Lacroix at bernard.lacroix@eurocontrol.int.

United States on Track for National Deployment

Ground station site in Boca Raton, Florida

Only one year after awarding the national contract to ITT Corp., the FAA in August met its aggressive deadline for meeting Initial Operating Capability of ADS-B In.

Key sites in South Florida are up-linking traffic, weather, and flight information to equipped aircraft flying in the service area. The FAA Surveillance and Broadcast Services (SBS) office, and safety oversight organisations within the FAA are analysing data and are on track for an In-Service Decision (ISD) in November, which will clear the way for continued installations. Deployment will start along the East Coast, West Coast, Alaska, and portions of the Mid West, with 310 ground stations operational by 2010. By 2013, 794 ground stations will complete the national deployment with ADS-B coverage in all places where there is radar coverage today.

This August also saw an important milestone toward finalising the FAA's proposed rule requiring ADS-B Out by 2020 to operate in Class A, B, C and other designated airspace. The ADS-B Aviation Rulemaking Committee (ARC) released its recommendations for public comments. Since the ARC represents every facet of the aviation community, its recommendations tell the FAA how to more closely align the final rule with stakeholders' interests.

While it could not reach consensus on every issue, the ARC endorsed the compliance date of 2020 and requirement for ADS-B Out. It encouraged the FAA to look at ways to encourage early equipage, such as using pre-existing equipment for early benefits, and asked the Agency to look at requiring ADS-B In and deciding by 2012 on whether a rule is needed. The ARC also raised concerns about how ADS-B transmissions would affect the 1090MHz frequency. While 1090MHz is a concern for the FAA, the SBS office is leading a spectrum review and will deliver a report in January detailing mitigations.

Finally, the FAA is on target for commissioning ADS-B for air traffic control surveillance by 2010. Four key sites are being prepared that will give the Agency the data it needs for a thorough test of the United States' national airspace system. This includes all air traffic control platforms, radar and non-radar airspace, high radio-frequency congestion, and vastly different environments, from mountains to oceans. The four sites are located in Juneau, Alaska; Houston, Texas; Louisville, Kentucky; and Philadelphia, Pennsylvania. Each site must be approved for ADS-B separation services and controller training and procedures must be in place before the complete system can be commissioned.

This is an aggressive schedule for a complex U.S. system, but the FAA is meeting deadlines to have a final rule effective by early 2010, all key site ADS-B services commissioned by late 2010, and nationwide coverage by 2013.

Weather data being uplinked to the cockpit in southern Florida

Obtaining Approval for ADS-B Service in Hudson Bay Airspace

NAV CANADA has developed its Air Traffic Management (ATM) implementation for ADS-B Out services through close consultation with its customers. Based on estimates for percentage of ADS-B equipped aircraft, this ATM plan aims to respond to the needs of those customers who had invested in the appropriate avionics, while still accommodating the others who were working towards qualifying.

The next step was to identify the requirements to be eligible to receive ADS-B based separation services in Canadian non-radar airspace.

Transport Canada, the Canadian civil aviation authority (CAA), has recently approved the application of an ADS-B Out five nautical miles separation standard in non-radar airspace in the vicinity of Hudson Bay. This approval is based on their assessment of a comprehensive safety case developed by NAV CANADA. To be eligible for ADS-B service, operators must have approval from Transport Canada. Once they get this approval, they must advise NAV CANADA in order to have their aircraft entered into an eligibility table.

Certification, Qualification, and Eligibility What do They All Mean?

In the Canadian context, the accountability for managing the initial and ongoing process for ADS-B eligibility is shared between Transport Canada and NAV CANADA. However, rolled up in this eligibility process, certification and qualification are the exclusive responsibility of the CAA. In accordance with the approved safety case, eligibility for ADS-B separation service is based on satisfying two conditions:

- The aircraft meets a minimum performance specification to transmit ADS B messages for the purpose of applying the separation standard;
- The flight crew is qualified in the operation of the equipment and the operational practices of the ADS-B airspace.

Certification

The Certification process clearly identifies the means and methods by which an aeronautical product will be shown to comply with the applicable airworthiness requirements, which are typically identified in a compliance record document. For the Canadian application of ADS-B, this is satisfied if the Aircraft Flight Manual (AFM) or AFM Supplement contains a statement indicating compliance with the EASA AMC 20-24 for ADS-B, or Transport Canada Advisory Circular (AC) No. 700 009 Issue 1.

Qualification

The qualification standards set proficiency objectives and define the requirements of mastery for the duty position, apply a performance statement, conditions, and standards to a task or sub-task and are linked to an evaluation strategy. This is satisfied if flight crews know, understand and apply the contents of NAV CANADA's ADS-B Hudson Bay Implementation information pamphlet. The pamphlet is available at http://www.navcanada.ca/ (click on 'Services', then 'ANS Programs', and finally 'ADS-B').

Eligibility

To provide separation based on ADS-B, NAV CANADA must satisfy the specific risk mitigation actions identified as part of our Safety Management System (SMS) process. Operators must advise NAV CANADA that they have received official notice from Transport Canada that they meet the requirements for Operations. This confirms that the two eligibility conditions for certification and qualification have been met in accordance with the approved safety case. Once NAV CANADA acknowledges receipt of this information, operators may include "RMK/ADSB" in their ICAO flight plan and expect to be provided ADS-B separation services

Hudson Bay New Start Date- 15 January 2009

After discussion with IATA and based on recent status reports from many customers, NAV CANADA has decided to postpone operational implementation of ADS-B in Hudson Bay airspace to 15 January 2009. The main reason is that few aircraft received approval for ADS-B operations on the originally planned date of 20 November 2008.

NAV CANADA encourages you to contact them for any advice or assistance that may be available towards accelerating your aircraft approvals. Questions may be directed to NAV CANADA Customer Service at 1-800-876-4693-4 or service@navcanada.ca.

NAV CANADA ADS-B site in Hudson Bay

Update on ADS-B in Australia

Australia's Upper Airspace Program : the Half Way Mark

The Australian Upper Airspace Program (UAP) has reached the half way mark with the recent introduction of three more ADS-B ground stations in Western Australia, bringing the total number of operational sites to 14.

The new sites at Mt Newman, Meekatharra and Leonora are providing low-level coverage around mining hotspots as well as extending the benefits of high-level coverage to overflying traffic.

View from the tower of the ground station at Meekatharra in the outback of Western Australia.

The recently-commissioned Newman site overlaps with Perth radar to extend inland coverage out to more than 600 nautical miles from Perth. With the mining industry fuelling spectacular traffic growth throughout Western Australia, the new sites bring surveillance and enhanced safety to some of the most congested procedural airspace in the country.

The number of aircraft approved to receive ADS-B services continues to climb and has reached over 600 airframes, including the Singapore Airlines and Qantas flagship Airbus A380s. The UAP deployment will continue throughout 2009, during which time installation of ADS-B ground stations will also commence at existing en route radar sites.

Enhanced Availability for Approved Aircraft using 'SA aware' Avionics

Analysis of the performance of ADS-B transmissions from approved aircraft has revealed a significant increase in availability/ continuity for aircraft equipped with GPS Selective Availability (SA) aware avionics. Examination, by Airservices Australia, of a sample of more than 150 million ADS-B reports over a three-month period during 2007 revealed that 'SA aware' avionics had provided useable GPS positional data with adequate integrity availability of 99.997%, whereas 'SA on' avionics achieved only 99.85%. While further analysis is ongoing, the findings do appear to support the Australian regulation already in force that requires

ADS-B avionics to be driven from 'SA aware' GPS receivers from 2012. The availability of software upgrades to convert popular GPS multimode receivers from 'SA on' to 'SA aware' will help to extend these benefits to more aircraft.

ADS-B Coverage through Tasmania's Wide Area Multilateration System (TAS WAM)

The TAS WAM system comprises 14 receivers and will be used to deliver five nautical mile separation services in the period prior to equipage of aircraft operating in the Tasmania region with ADS-B avionics. The system will also provide a consolidated (Asterix Cat21) ADS-B feed to the en-route air traffic control centre in Melbourne for operational use in exactly the same way as the Upper Airspace Program. Initial testing is promising and it is expected that TAS WAM will become operational early in 2009.

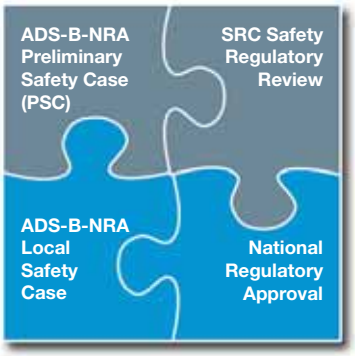
ADS-B transmission availability is shown as a percentage of total ADS-B reports. For aircraft included in the analysis the Navigation Uncertainty Category (NUC) was derived from the GPS horizontal protection limit.

Availability	NUC > 3	NUC > 4	NUC > 6
SA Aware	100.000%	99.997%	99.106%
SA On	99.973%	99.851%	48.063%

Availability results for September to November 2007

Other News

ADS-B-NRA Preliminary Safety Case Final Step: Review by the Safety Regulation Commission



The purpose of the Preliminary Safety Case (PSC) is to provide a solid basis for Local Safety Cases produced by ANSPs (see CASCADE News 4). The EUROCONTROL Safety Team has reviewed and endorsed the ADS-B-NRA PSC, now available on the CASCADE website. As the final review step, the Safety Regulation Commission (SRC) is performing the Safety Regulatory Review of the ADS-B-NRA PSC. The SRC undertakes EUROCONTROL's work in the field of ATM Safety Regulation across the whole ECAC area. It is composed of senior executives from organisations responsible for ATM Safety Regulation at national level. ADS-B-NRA PSC is expected to facilitate the safety work of service providers and regulators in charge of ADS-B-NRA implementation.

ATSAW on the Airport Surface

ATSAW SURF is an ADS-B application which will enable Airborne Traffic Situational Awareness on the airport surface. Its aim is to provide benefits in terms of safety, capacity and efficiency. CASCADE launched the CRISTAL SURF project in October 2008, with the objective of validating this important ADS-B application. CRISTAL SURF includes a flight trial at Toulouse airport to assess performance, a study of the safety benefits, as well as a real time simulation to address operational acceptability, capacity and efficiency benefits. The project is performed in partnership with AIRBUS, DSNA and Egis Avia.

CASCADE Integration Task Force (ITF) has Kicked off

CASCADE has established an "Implementers' Forum" to provide detailed solutions to technical and operational issues encountered during ADS-B implementation and integration. The first CASCADE Integration Task Force (ITF/1) meeting took place on 11 September 2008, attracting a large audience from airlines, the avionics Industry, ANSPs and regulators.

Whilst the ITF/1 focused on the avionics certification status in relation to AMC 20-24, the plan for ITF/2 (on 19 March 2009) is to invite NAV CANADA to give a first-hand feedback on their Hudson Bay implementation.

EUROCONTROL