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EUROCONTROL

NET*ALERT* Newsletter

Stay tuned

Ensuring the effectiveness of Safety Nets

WELCOME

Welcome to the summer edition of NET*ALERT*. The Safety Nets team continues to work directly with ANSPs to help them optimise their safety nets; we've now worked for eight in total. A common theme of this work has been optimising STCA to operate around airports that are outside of the major European TMAs. Our lead article shares some of the lessons we've learnt. On a similar theme, our regular update on SESAR safety nets projects reports on a standalone validation of an enhanced STCA for TMA operations.

In recent months we've been involved in a number of discussions about how safety nets should operate above and below the transition altitude, this is addressed in an article on page 6.

Should Downlink Aircraft Parameters have a role in enhancing safety nets? One DAP is already being used in this way at the MUAC – turn (or scroll) to the last page to find out more.

Finally, despite all of these developments, at the sharp end it's all about a controller's attention being drawn to a potential conflict at the working position. This is touched upon in our article on page 4.

Operating STCA at airports
outside of major TMAs

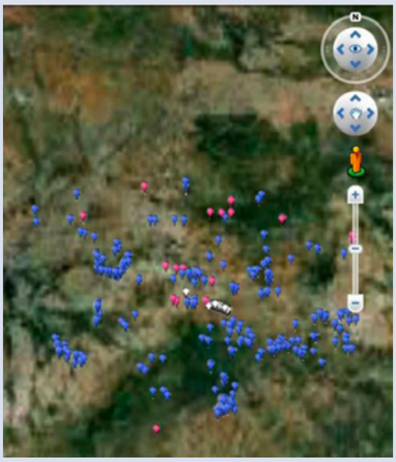
We often talk about STCA in the context of operating it from en-route centres or in major TMAs. However, STCA is also operated by many ATC units at airports outside of the major European TMAs. Although there may be fewer arriving and departing aircraft at these airports, there is no reason why the STCA itself should be any less sophisticated or why the challenge of correctly optimising it should be less complex. Using practical experiences from recent work with European ANSPs and SESAR, this article identifies some of these challenges and offers some possible solutions.

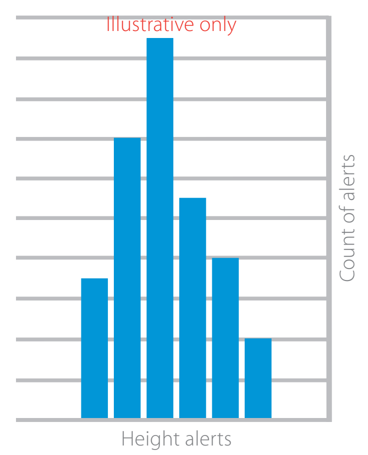
Operational challenges

In many respects, the objectives of optimising STCA for a smaller ATC unit, are the same as they are for a larger unit. The aim is to optimise parameters such as look-ahead times and alerting thresholds to keep the number of nuisance alerts to a minimum, and determine whether some regions of airspace or particular traffic types should be inhibited. It's in the specific challenges that the differences show up. For example major TMAs operate in controlled

Identifying hotspots

Using logs of STCA alerts, usually combined with surveillance data, it is possible to identify clusters of alerts or hotspots. Further analysis of these hotspots helps identify Mode A codes that should be excluded and airspace where specific STCA parameter settings or inhibition volumes should be applied. By using special conversion tools, these hotspots can be presented in Google Earth (see left – different coloured dots refer to alerts from different safety nets). The heights at which the alerts occur can also be analysed. (See graph below).





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Operating STCA at airports outside of major TMAs

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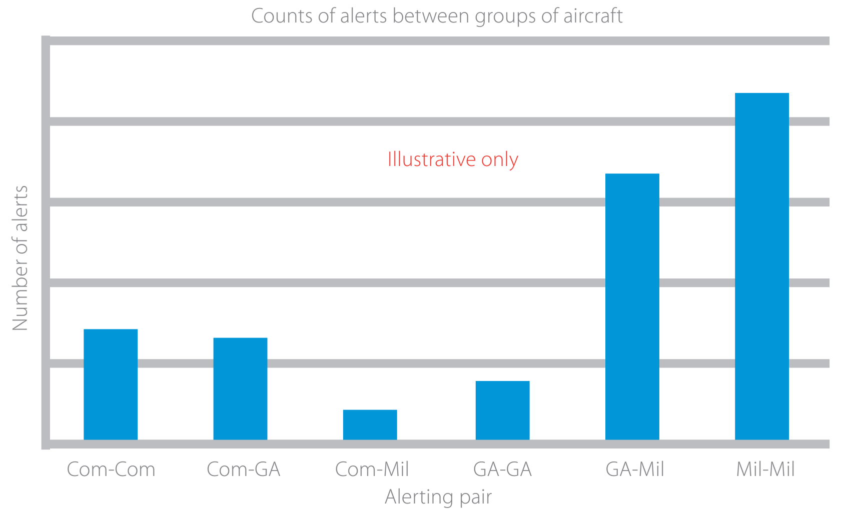
Identifying pairs of aircraft that frequently alert against one another using log files

STCA is often able to record a textual log of all alerts. The formats and information logged will vary between systems but typically the time of the alert as well as the callsign and/or Mode A code of the aircraft involved will be recorded. It may be necessary to reformat the log file so that it can be transferred to Excel. Then once in Excel, each callsign/Mode A code can be assigned to a type of flight (for example, commercial, GA, military, or helicopter). Counts of alerts can then be made to identify frequently alerting pairs of aircraft.

Through reviews with controllers, further analysis and surveillance data replays, it is possible to determine if certain types of flights should be inhibited from alerting against one another, and the Mode A codes used by these flights can be noted.



airspace, mainly cater for commercial traffic and are primarily configured around one or more major airports. By contrast, within the area of responsibility of ATC units at smaller airports (typically around 50NM from the airport) there may be both controlled and uncontrolled airspace, several different types of traffic (e.g. commercial, General Aviation (GA), military and helicopters), a high proportion of aircraft flying using visual flight rules (VFR) and possibly other airfields with a variety of purposes (e.g. other commercial airports, GA airfields, heliports, or military airfields). This range of aircraft types undertaking different activities (which may include frequent climbing, descending and turning), and some of which may not be under the control of the ATC unit in question, can provide a complex environment in which to operate STCA.

One decision is what types of aircraft should be alerting against one another. For example, should military aircraft be alerting if they are frequently flying in formation and are not under the control of ATC? It is normal practice to prevent STCA from producing alerts between these aircraft. Different STCAs have different ways of doing this. For example, some, particularly those used in larger ACCs or TMAs tend to base track eligibility on one of the aircraft in a pair having a correlated flight plan. Some further require that the correlated flight plan is in an 'assumed' state (i.e. under the control of the ATC unit). Other STCA systems determine track eligibility on the basis of Mode A (SSR) code alone. For these systems it is absolutely essential that the Mode A code list is complete and up to date. Note that for this method to work, the system must allow the user to define a sufficient number of 'excluded' Mode A codes or code blocks.

Inhibiting alerts for specific types of aircraft may not always be the only solution or the most practical choice. For example, for some controllers having some alerts that can be quickly evaluated and dismissed as 'not operationally relevant' is often preferable to the risk of missing a genuine alert. Furthermore, for STCA systems that use Mode A code lists to determine track eligibility, a common practice is to inhibit alerts between aircraft flying VFR by excluding the blocks of Mode A codes they use. However this may not always be an option as an aircraft may fly VFR for one portion of its flight and IFR for the other using the same Mode A code. Additionally, there may not be sufficient Mode A codes available to distinguish between IFR only, VFR only and mixed IFR/VFR flights.

Another decision is whether to inhibit alerts in specific volumes of airspace. Inhibition volumes are often implemented because no amount of tuning can reduce the nuisance alert rate to an acceptable level. For example, at a heliport or an airport with lots of helicopter traffic flying VFR, the proximity between helicopters, or between helicopters and other aircraft, is likely to be such that many STCA alerts are generated. However, the generally lower speeds of helicopters means that in practice a serious conflict is unlikely. In this case an inhibition zone may be the most practical solution. Another common example is the use of inhibition zones to suppress STCA alerts between non-controlled aircraft flying outside of controlled airspace.

The major drawback of inhibition volumes is that they might suppress desirable STCA alerts, so care must be taken in their design. An alternative solution is to investigate the effectiveness of implementing a volume of airspace with smaller alerting thresholds to minimise the number of nuisance alerts but at the same time alert the controller if aircraft are genuinely predicted to come too close to one another. One example where this may be applicable is close to the departure end of a runway if nuisance alerts are regularly produced between departing aircraft types of different performance (e.g. between commercial aircraft, GA aircraft and helicopters). However, caution does need to be taken in developing such volumes, as any solution which reduces the number of nuisance alerts through lower parameters

Operating STCA at airports outside of major TMAs

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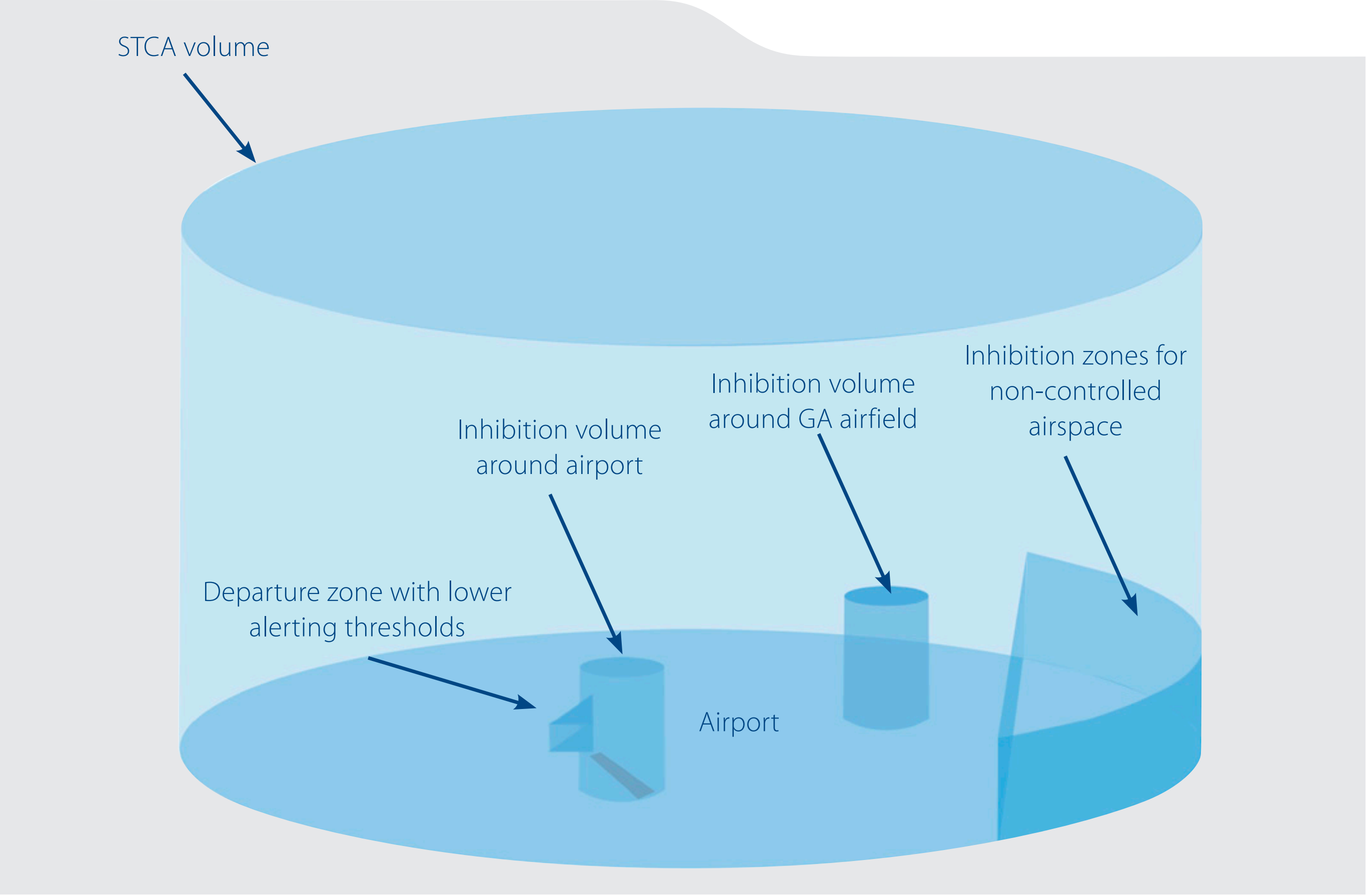

may affect other situations where an STCA alert would be desirable. Therefore, such volumes should be as small as possible.

Analysing surveillance data and/or log files can help in designing new STCA volumes. Such analysis can determine the appropriate dimensions of STCA volumes and the appropriate STCA alerting thresholds, and even whether an inhibition volume would be more suitable than simply lowering the STCA parameters.

Technical challenges

In some instances the momentary loss of Mode A (SSR code) or Mode C (barometric altitude) has been found to result in unexpected nuisance STCA alerts of short duration (typically one or two track update cycles). These kinds of short duration nuisance alerts have been observed when the Mode A code for a track on an STCA exclude list has been temporarily lost (i.e. the loss of the Mode A code has momentarily made the track eligible to alert against other Mode A codes on the STCA exclude list). Similarly some STCAs are configured to assume that a track without Mode C could be anywhere vertically from the ground upwards. Here, the loss of Mode C information (or even just non-validated Mode C) for just a single radar cycle has been observed to produce nuisance alerts.

The solutions are twofold. Firstly, STCA should not itself be vulnerable to missing data, such as Mode A or Mode C. Secondly system tracks supplied to STCA have to be sufficiently stable; in particular the temporary loss of radar/surveillance data should not lead to an immediate loss of data in the system track supplied to STCA.

Practical challenges

ATC units operating STCA at smaller airports are often faced with a number of practical issues. Sometimes, for perfectly valid reasons, investment in the ATM system may not be as substantial as at ACCs or major TMAs, which may mean that the STCA does not have all the functionality that exists in those operated by larger units. And of course, safety nets are generally procured as part of a new ATM system for the airport, and can therefore simply be one part of the overall package (see NET*ALERT* Issue 12). Additionally, larger units may have one or two staff spending a sizeable proportion of their time dedicated to refining and monitoring safety nets. With a lower staff count this is very unlikely to be practicable at smaller units.

What are the lessons?

The lesson here is that tuning at smaller airports is no less demanding than it is at larger airports. Indeed, given the potential for mixed traffic and a complex ATC environment– the challenges can often be the same, if not greater. So don't compromise when setting out your system requirements; try to understand what you are going to get (for example, request an explanation of system algorithms); be prepared to set aside time for system testing and to tune what you have available; and seek out any wider expertise within your ANSP and broader community.

HMI:
a vital factor in STCA effectiveness

The final report into a serious incident between two commercial aircraft over Swedish airspace on 2nd July 2010 underlines the importance of HMI factors in the effectiveness of controller situational awareness and the safety nets and tools at their disposal.

As in most incidents and accidents, a combination of factors were found to have contributed to the incident which led to TCAS alerting on both the aircraft involved. This article focuses on the lessons learnt for ground-based safety nets.

The importance of HMI

In this incident a single controller was manning two sectors using a deep rectangular screen. He had recently taken over the position.

Traffic was decreasing, and most of the workload was in the top half of the screen, where traffic included co-ordinations, VFR flights, transfers to the tower, calls and so on.

The incident occurred in the bottom half of the screen. Although STCA, and an information function called Conflict Alert And Risk Display (CARD) alerted – these alerts were not noticed by the controller.

The STCA alert between the two aircraft appeared as a red frame around the radar labels on the affected aircraft as well as a red background behind call signs in all lists where the flights were represented. No additional audible alert was possible with this particular system and the STCA alert was also not noticed by the controller.

CARD is an information function on the radar screen that shows MTCD conflicts and risks, depending on what is selected, and (unlike STCA) is based on flight plan data rather than radar data. The CARD indicater was placed in the bottom right of the screen. Interviews with other controllers found that CARD was not considered very helpful as it warned too often without any conflicts arising. Many chose to position it in the lower part of the screen – its position at the time of this incident.

Summary of the incident

Scandinavian (SAS) 4083 was en route from Evenes to Oslo, both in Norway. The aircraft had a heading of 200 degrees at flight level 360. Finnair (FIN) 2014 was en route to Helsinki, Finland, at the same altitude with a heading of 100 degrees. During the incident both aircraft were in contact with the air traffic controller.

The working position had been handed over about ten minutes before the incident. The previous air traffic controller had been informed that Finnair had been cleared at flight level 360, which is an irregular cruising altitude for the magnetic track in question. The air traffic controller who took over responsibility for the sector was informed verbally about the traffic situation by the colleague he was replacing, and the overall assessment was that the aircraft would not come into conflict with each other. When the handover was completed the radar label for FIN 2014 was correlated with its radar symbol. There was no marking or note made that the aircraft was on the wrong semicircular level.

At 12:11:43 the air traffic controller confirmed radar contact with FIN and confirmed its radar label by performing an 'assume'. One of the air traffic control tools used to view a flight's future flight path, CARD, showed a red mark for the anticipated conflict.

At 12:14:50 STCA alerted the conflict. Approximately 30 seconds later the air traffic controller called FIN with instructions to immediately descend to a lower flight level, which was not answered.

At 12:15:30 SAS was called with the instruction to climb to flight level 370, which was answered immediately.

At 12:15:56 TCAS activated in both aircraft. The crews followed the instructions, SAS continued the initiated climb and FIN descended.

The least separation between the two aircraft was 4.9NM and 500 feet, 4NM and 900 feet and 3.1NM and 1,000 feet.

HMI: a vital factor in STCA effectiveness

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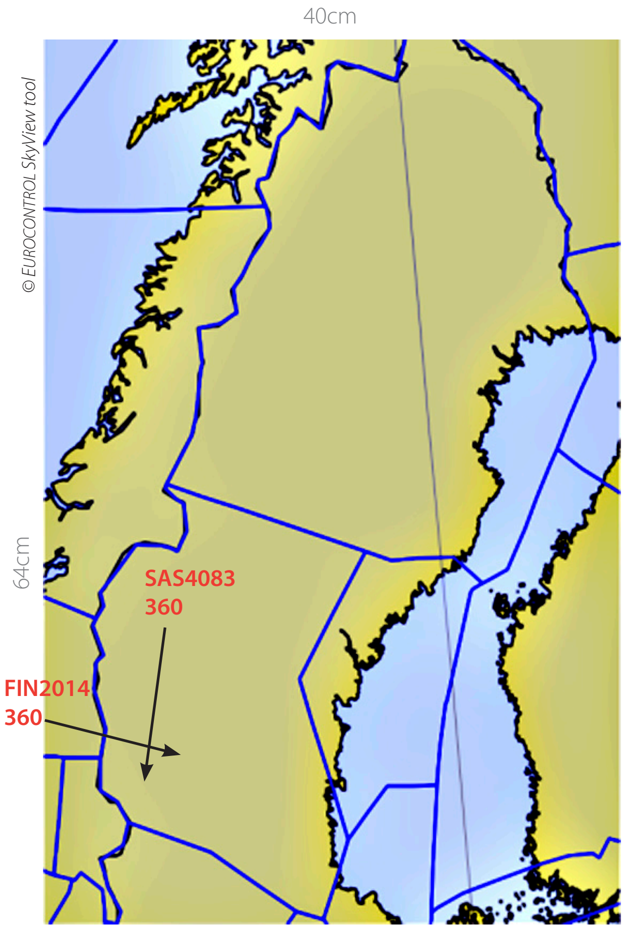


(approximate geometry)

Representation of controller screen and dimensions

During a routine scanning of the radar screen the air traffic controller eventually noticed that the two aircraft were at the same flight level. He had no recollection of an STCA warning. He then took steps to separate the aircraft – but too late to prevent TCAS alerts activating in both aircraft.

Changes to STCA in Sweden

The STCA in use at the time of the incident used static colours and was unable to complement the visual warning with a sound signal.

A new air traffic control system, is planned for deployment in early 2012. The new system includes completely new software and hardware and the presentation of STCA has been changed. As well as a red frame around the radar labels, the following have been added:

- radar position symbol (RPS) in red,
- vector line for one minute in red,
- the line between the RPS and the label will be red,
- historical plots are in red,
- STCA warning window in red in the flight traffic lists, and
- a sound warning.

Comments EUROCONTROL safety nets expert Stanislaw Drozdowski: *"In this case, it was fortunate that the controller's instructions were compatible with the TCAS RAs. If, by chance, they had been contradictory, the outcomes may have been different. This incident underlines the need to address HMI at the controller working position not just for one alert, but also for possible combinations of alerts, known as 'multiple' alerts."*

The full report by SHK, the Swedish Accident Investigation Board, can be downloaded at www.havkom.se.

About Multiple Alerts

Multiple alerts are correctly generated and operationally relevant, but activate simultaneously with other alerts. They can be safety net/safety net alerts, or safety net/controller tool alerts, such as the STCA/CARD-MTCD alerts described in this incident.

Multiple alerts have two distinct effects: they increase cognitive workload and they can cause or exacerbate the phenomenon of Inattentional Blindness. Although ATCOs are used to managing simultaneous tasks, multiple alerts may obviously cause excessive workload or difficulties coping with conflicting objectives. The ATCO will need to assess both alerts and judge whether the alerts relate to the same or to different situations, and then prioritise which alert to deal with first.

Inattentional Blindness is where a subject is unable to see things that are nonetheless fully within their field of vision. It might occur when the attention of the controller is engaged in solving a particular situation - triggered for example by one alert - while another unexpected situation suddenly occurs.

In 2009 SPIN produced a paper proposing mitigations to multiple alerts in relation to safety nets. Before the alert is generated they suggested applying filter logic or prioritisation logic to the system. A similar prioritisation logic is used by some STCAs to distinguish those alerts generated by a predicted separation infringement from those alerts indicating an ongoing separation infringement.

Once the alerts have been generated there are four possible strategies to adopt: first, the ATCO can subjectively assess the situation; secondly, we can define a procedure to guide the controller in assigning a priority to one or the other alert. Thirdly, we can apply HMI design solutions incorporating some prioritisation logic: implement an acknowledgment mechanism that serves to momentarily or permanently de-activate an alert which is considered less urgent than another active alert; or finally, implement a specific HMI feature that shows controllers which alerts have a higher priority. Some STCAs, for example, distinguish between a more severe alert displayed in red and a less severe alert displayed in a different colour.

For more information about this discussion paper contact the safety nets team at: safety-nets@eurocontrol.int

Safety nets

and the transition altitude

In the past few months the Safety Nets team here at EUROCONTROL has been involved in a number of discussions about how safety nets should operate above and below the transition altitude. Here we share some best practices and highlight that the way each safety net operates will depend upon the functionality of individual systems.

Transition altitude

ICAO PANS-OPS (Doc 8168) defines the transition altitude as the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Aircraft above the transition altitude fly on flight levels. To do this all aircraft flying above the transition altitude use a common pressure datum for vertical measurement – a common standard pressure setting of 1013.25 hectopascals (QNE). At lower altitudes it's important for pilots to know their vertical position with respect to the ground and other obstacles. Therefore, below the transition altitude aircraft altimeters use the regional or airfield pressure setting (QNH) which gives the true altitude of the aircraft above mean sea level.

Transition altitude

The transition altitude can vary from 3,000 feet to 18,000 feet. In the US and Canada, the transition altitude is fixed at 18,000 feet while in Europe and much of the rest of the world, the transition altitude varies. EASA is investigating a harmonised transition altitude for Europe.

STCA conflict detection above and below the transition altitude

For STCA to identify correctly a potential conflict between one aircraft flying above the transition altitude and one below, a common source of altitude needs to be used to avoid false or missed alerts (see diagrams overleaf). For conflict detection, STCA should use the barometric flight level derived from Mode C which is based upon the standard pressure setting. The barometric flight level is used for conflict computation in STCA regardless of where the aircraft are relative to the transition altitude. Incidentally, the same principle is used by TCAS.

The use of barometric flight level for conflict detection by both STCA and TCAS has the added advantage of mitigating against situations where an incorrect pressure setting has been input into the altimeter by the flight crew – often the cause of incidents.

Defining STCA regions with respect to the transition altitude

A further question is how the vertical boundaries which define the volumes of airspace in which STCA operates should be specified with respect to the transition altitude. STCA makes comparisons of an aircraft's vertical position against the vertical boundaries of various STCA regions to establish whether an aircraft is currently within a region or will be within it in the future. Here the desirable behaviour for STCA is the following:

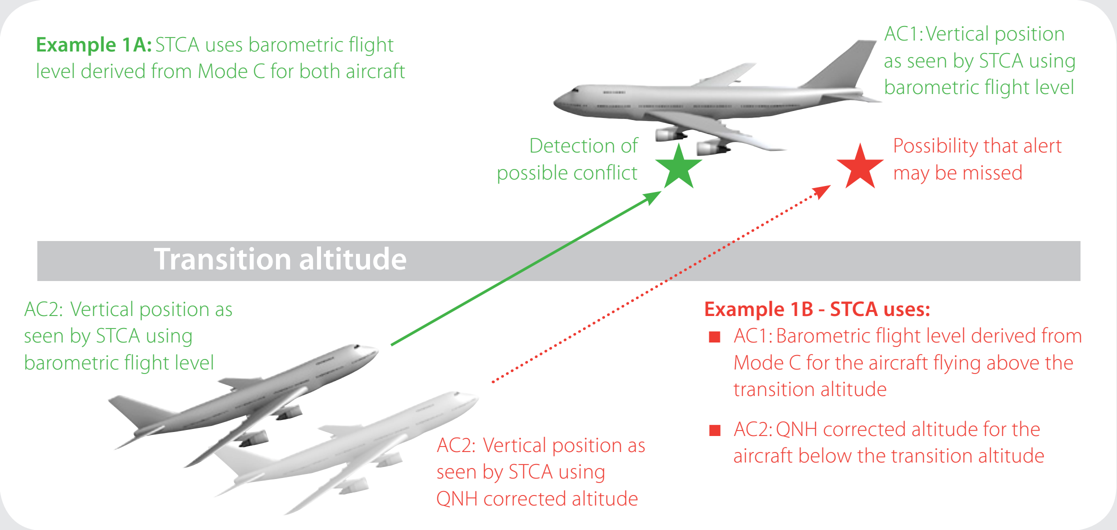
- Above the transition altitude vertical boundaries are defined in flight levels. Aircraft barometric flight levels are used

Safety nets and the transition altitude

continued

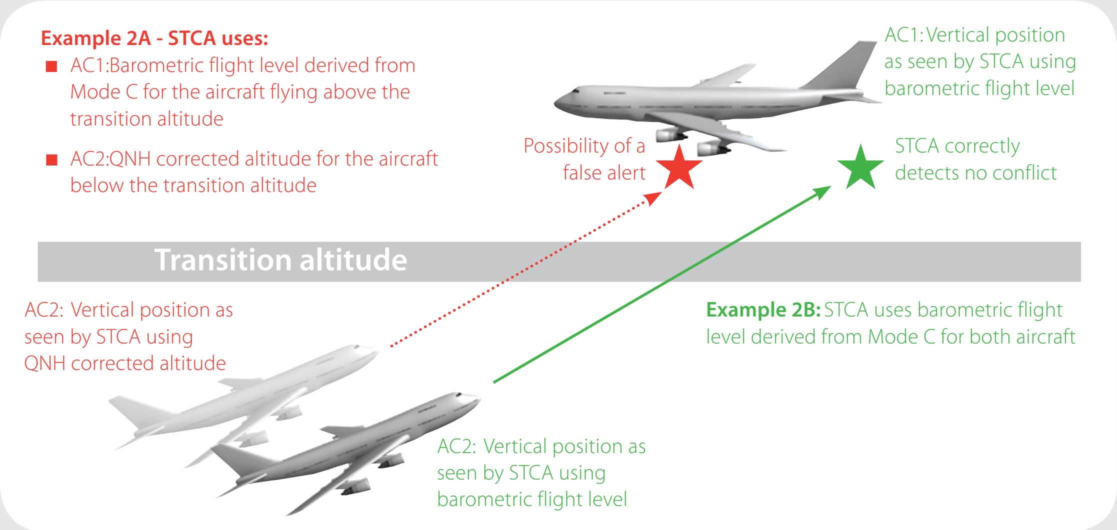
Example 1A & 1B

Effect of using different vertical position information to detect potential conflicts (low pressure day)



Example 2A & 2B

Effect of using different vertical position information to detect potential conflicts (high pressure day)



for comparison against flight level defined boundaries above the transition altitude.

- Below the transition altitude vertical boundaries are defined in altitude. Aircraft QNH corrected altitudes are used for comparison against altitude defined boundaries at or below the transition altitude.

The rationale for this is outlined in the diagrams above.

Other ground-based safety nets and the transition altitude

For the other ground based safety nets, APM, APW and MSAW, the same desired behaviour applies for setting surfaces and volumes as it does for STCA. For example, APW volumes operate both above and below the transition altitude. Therefore the desired behaviour for conflict detection is:

- For vertical boundaries defined in flight levels: Barometric flight level derived from Mode C is used for conflict detection.
- Vertical boundaries defined in feet: QNH is used in the conversion of the Mode C (barometric flight levels) reports into a true altitude.

For APW another question can sometimes arise of how best to define an APW volume when, the upper vertical limit is above the transition altitude but defined in feet. In this case, it is best to allow the ANSP to choose the units (flight levels, altitude or height) for the upper and lower boundaries or each APW volume. In practice, many APW systems force all vertical boundaries above the transition altitude to be defined in flight levels, and all vertical boundaries below the transition altitude to be defined as altitudes. Consequently, the rule for the application of QNH correction is then only related to the location of the aircraft relative to the transition altitude.

APM and MSAW operate closer to the ground, therefore it is desirable that potential penetrations of their surfaces are determined with reference to the true altitude of the aircraft. For these safety nets, it is standard

Safety nets and the transition altitude

continued

practice for QNH corrected altitude to be used for the conflict detection. Alternatively, to have the same effect, some systems use QNH to convert the vertical boundaries into flight levels and compare it to the barometric flight level of the aircraft.

As with STCA, using QNH corrected altitude for conflict detection (based upon the regional or airfield QNH) mitigates against incorrect altimeter settings.

Pressure settings and deviations for temperature

Some MSAW systems also use the local outside air temperature (OAT) to refine the calculation of the true altitude.

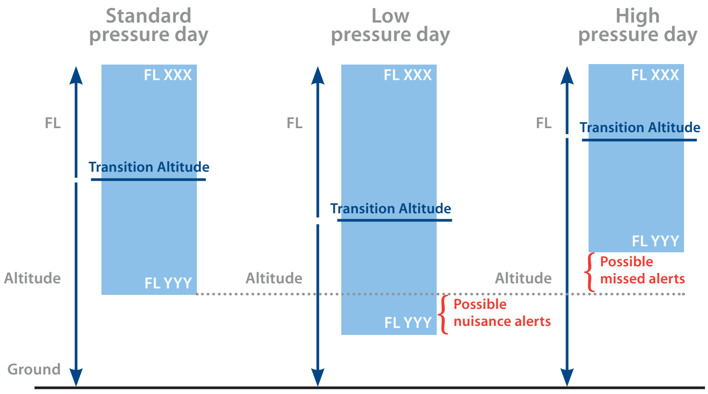
The ICAO standard atmosphere has a pressure of 1013.25 hPa and a mean temperature of 15°C at sea level. In simplistic terms, every 1°C deviation from this temperature will result in a deviation from the true altitude by approximately 0.4%. So, as it gets colder, the altitude the pilot sees on the altimeter is actually higher than the aircraft is flying. For example, if the air temperature at sea level were 5°C, an aircraft indicating an altitude of 1,000ft (after QNH correction), would in reality be at about 960 ft.

In practice, the correction to be applied for temperature only starts to be significant below 0°C, and becomes critical at several thousand feet and very cold temperatures. For example if the air temperature at sea level were -20°C, an aircraft indicating an altitude of 5,000ft (after QNH correction) would in reality be at about 4,290ft. The aircraft would in fact be 710ft lower than indicated.

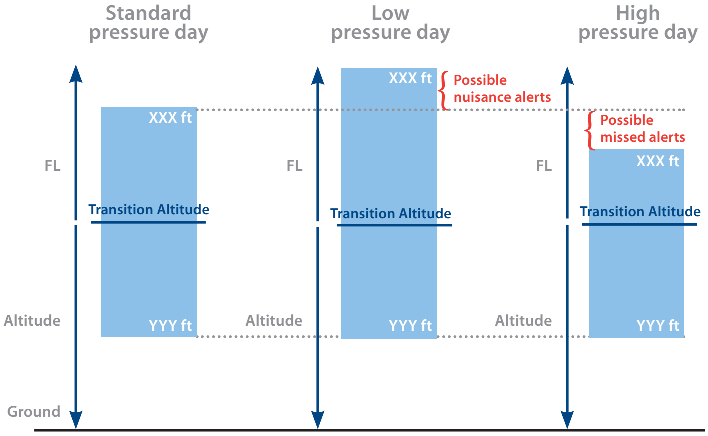
Reality

In reality, the way that particular safety net regions and surfaces are defined depends on the functionality and choices available in the system. While some systems have advanced functionalities that, for example, take account of true altitude if the aircraft is above the transition altitude, but about to descend through it, other systems are much more restrictive and limit the user to selecting either barometric pressure or true altitude as an input to each safety net.

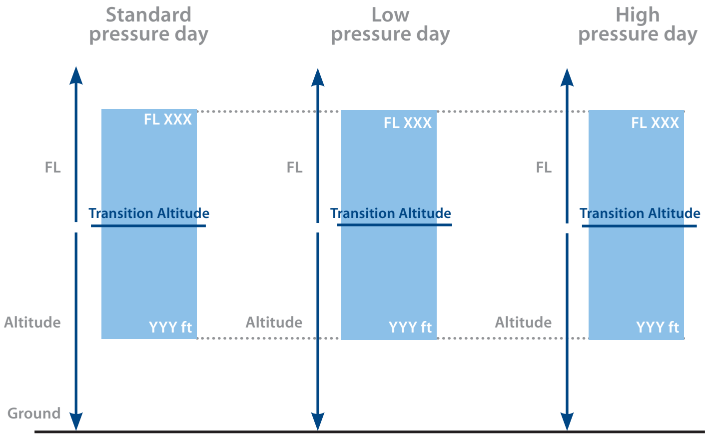
Example 1: Upper and lower boundaries of regions defined in flight levels (lower boundaries change with pressure)



Example 2: Upper and lower boundaries of regions defined in feet (upper boundaries change with pressure)



Example 3: Upper boundaries defined in flight levels and lower boundaries defined in feet (upper and lower do not alter as pressure changes)



SESAR update

Our regular review of SESAR safety nets related projects follows…

Evolution of Ground-Based Safety Nets (P 4.8.1)

The standalone validation of an STCA industrial prototype developed by Project 10.4.3, and the associated validation report have been delivered. The focus was to confirm the performance of multi-hypothesis algorithms. The validation satisfied minimum alerting performance requirements in a relatively complex medium sized TMA environment. These requirements were based upon the SPIN guidance material.

The performance of the industrial prototype was compared with that of a multi-hypothesis based STCA that has been operating for many years in the Lyon TMA. The comparison was performed using eleven days of recorded data selected from different times of the year to reflect seasonal variations in traffic levels. The prototype increased the proportion of undesirable alerts from 21% to 29% (i.e. safety levels were maintained, but with a potentially negative impact on human performance). These increases were mainly due to specific traffic situations involving IFR and VFR flights that have not yet been specified and addressed by the SESAR prototype (e.g. alerts based upon airspace class distinctions). Planned improvements to the prototype include reducing the undesirable alert rate between aircraft flying VFR in uncontrolled (Class G) airspace. Also in P 4.8.1, the safety and performance benefits, as well as associated costs, of enhanced ground-based safety nets using existing down-link aircraft parameters (DAPs) in TMA and en-route environments have been evaluated along with the preliminary operational requirements. The next step in this work area is to evaluate the safety assurance. This will then be consolidated into Safety and Performance Requirements (SPR) by end of 2012.

Partners: DSNA (leader), NATS, ENAV, SELEX, EUROCONTROL

Safety Nets Adaptation to New Modes of Operation (P 10.4.3)

This technical project has supported the validation of the enhanced STCA for TMA operations by Project 4.8.1. The scope of the validation was limited to a subset of functionalities developed in the prototype. New functionalities developed in the scope of SESAR were either out of the scope of this validation (e.g. traffic in parallel runways and cleared flight level input) or could not be tested due to lack of adequate situations in the data (e.g. traffic in stacks).

Nevertheless, taking into account these limitations and the increase in the proportion of undesirable alerts, the validation emphasised that the prototype, parameterised and tuned in a limited time frame of 3 weeks, achieved similar levels of performance to the state-of-the-art STCA.

Since that validation report (SESAR 10.04.03-D36), additional analysis has demonstrated improvements in the performance of the prototype, for example by implementing the correction of invalid/garbling mode A codes and area levels using QNH. Further improvements would be achieved by taking airspace classes into account. These last results provide confidence in the way that the SESAR prototype will improve STCA operations in the TMA.

On the basis of this validation, a first release of a refined technical specification of the adaptation of safety nets to new modes of operation, addressing airspace classes and correction of area levels using QNH, has been released and delivered to the SJU.

This technical project has also developed a performance evaluation method for safety nets. The first demonstration mock-up is now available for industry trials.

Partners: THALES (leader), DSNA, ENAV, EUROCONTROL, INDRA, SELEX

Evolution of Airborne Safety Nets (P 4.8.2)

Promising results have been produced in the work area identifying and evaluating possible modifications to ACAS in a future time and trajectory-based environment. They indicate that reduced TCAS thresholds could suppress one third of undesired/unnecessary TCAS RAs without any negative impact on true alerts. The results were presented to EUROCAE WG75 and were well received. The next goal is the development of MOPS (Minimum Operational Performance Standards) in co-operation with RTCA SC147.

A workshop has also taken place to identify safety hazards related to general aviation (GA) aircraft equipped with a system capable of passive coordination with current and future ACAS (such as the ACAS Xp system envisaged for GA in the United States). The formal output of the workshop will be a safety assessment report supporting possible safety and performance requirements.

Partners: DSNA (leader), AIRBUS, NATS, EUROCONTROL

TCAS Evolution (P9.47)

This technical project was kicked off in April 2012. The overall aim is to develop an industrial prototype to be validated by P 4.8.2. The first two tasks are a preliminary system impact assessment of the changes to TCAS proposed in 4.8.2, and developing performance objectives and functional requirements for the use of improved hybrid surveillance in Europe. In addition, this project will provide support to standardisation activities of EUROCAE and RTCA (WG75/SC147 and WG51/SC186).

Partners: Honeywell (leader), AIRBUS, DSNA, EUROCONTROL

Ground-Airborne Safety Net Compatibility (P 4.8.3)

DFS continues to analyse RA encounters collected from ACAS monitoring stations and Mode S radars to support analysis of the operational benefits of RA downlink. Work continues on both the Functional Hazard Assessment (FHA) evaluation of the options for presenting RAs to controllers, and a draft plan and mock-up to prepare for a preliminary validation of the RA downlink operational concept.

Partners: DSNA (leader), DFS, AENA, INDRA, AIRBUS, EUROCONTROL

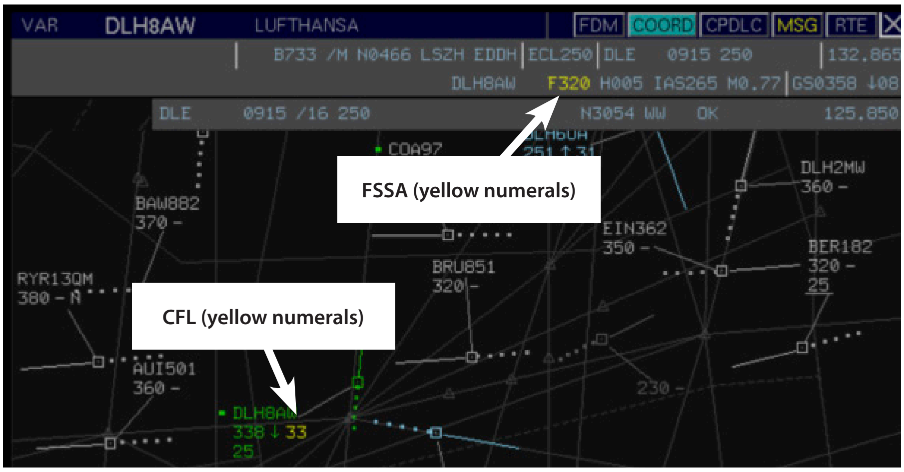
ACAS Monitoring (P 15.4.3)

Development of a prototype ACAS monitoring system continues. The system specification has been completed. Work is now underway on the development of the prototype in preparation for a test session during the summer.

Partners: THALES (leader), INDRA, EUROCONTROL, DFS

Use of Mode S parameters
at MUAC

Issue 10 of NETALERT discussed whether Downlink Aircraft Parameters (DAPs) might have a role in enhancing safety nets and how the Selected Flight Level (SFL) DAP could be used to prevent level busts. At the Maastricht Upper Area Control Centre (MUAC) the SFL DAP, or Final State Selected Altitude (FSSA) as it is referred to, is already being used to identify any discrepancies with the Cleared Flight Level (CFL) entered by the controller. Here we provide a brief overview of it.



When there is a discrepancy between the FSSA and CFL, the CFL in the track label automatically turns yellow. This will only occur after a short 'grace period', allowing the pilot to receive and execute the clearance. If the controller has the mouse on the situation display positioned over the flight in question, the FSSA can be read in the Flight Information Message (FIM), also displayed in yellow when not matching the CFL (without a 'grace period').

FSSA-CFL comparison

The FSSA entered into the Flight Management System by the pilot should reflect the ATC clearance given by the controller. MUAC's system provides controllers with a warning if FSSA does not match the CFL. The warning is only raised after a number of track updates, to allow the pilot to update the FMS with the vertical clearance, and for the radar to detect the change. This functionality strongly reduces the risk of loss of separation caused by misinterpretations, callsign confusion or misidentification. In fact, initial estimates made by MUAC indicate that approximately 18% of the separation infringements between 2004 and 2009 could have been prevented if the FSSA alert had been in place.

That said, the use of the FSSA DAP does not replace the requirement for the pilot to provide a voice readback after a controller has issued a vertical clearance.

The Probe

The FSSA DAP is now also used in the Probe, a contextual conflict detection mechanism. The Probe is an automatic 'what-if' tool used to identify possible conflicts at an intended CFL before it is input into the system by the controller.

Future enhancement of STCA

Additional use of the FSSA DAP to enhance the MUAC STCA is under development and planned for implementation in June 2012. The use of this DAP by STCA for conflict prediction is intended to both reduce nuisance alerts and at the same time flag valid STCA alerts earlier.

This article is based upon a document produced by MUAC (Operational use of Mode S at the Maastricht Upper Area Control Centre (MUAC)) that is available on the EUROCONTROL website (http://bit.ly/M47rwd). The document also contains a link to a film of the use of FSSA.

Snippets

The next SPIN meeting

The next meeting of the SPIN Sub-Group will be hosted by the Maastricht Upper Area Control Centre on the 19th and 20th September. The agenda will include RA Downlink. If you are not on the SPIN distribution but would like to attend, please contact the Safety Nets team (safety-nets@eurocontrol.int).

New ACAS Bulletin available... not so fast

In November 2008 ICAO published a recommendation to reduce the vertical rate to 1,500 ft/min in the in the last 1,000 feet before reaching the cleared level. The purpose of the recommendation was to avoid unnecessary Resolution Advisories (RAs) being generated due to high vertical rates. However, monitoring shows that there is no significant change to the frequency of such RAs. Therefore, the latest issue of ACAS Bulletin is dedicated to this subject.

Recent real-life events are used to demonstrate how high vertical rates caused RAs which could have been avoided, as well as an example in which a high vertical rate resulted in an RA to which the pilot reacted incorrectly, busting the cleared level by 1500 feet. ACAS Bulletin can be found at: www.eurocontrol.int/acas

Contact

Contact us by phone:
Ben Bakker (+32 2 729 3146),
Stan Drozdowski (+32 2 729 3760) or by
email: safety-nets@eurocontrol.int

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