EVAIR Bulletin No 21

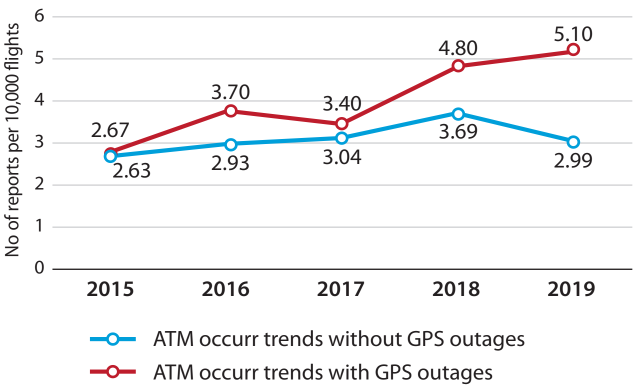
2015 - 2019 Summer periods

SUPPORTING EUROPEAN AVIATION

CONTENTS

EVAIR Bulletin No 21 comes to our readers during a period in which aviation is affected more than other industries by the COVID-19 pandemic. However, we continue to work and maintain the system in order to be fully prepared for the air traffic when it returns. The EVAIR Bulletin covers the 2015-2019 summer periods (1st April – 30 Sep). In this as in previous bulletins, we provide IATA statistics and an overview of a selected number of ATM problems. In this Bulletin, IATA's Global Aviation Data Management (GADM) department has for the first time conducted a summer analysis using the datasets of IATA's GADM Incident Data Exchange (IDX) and Flight Data Exchange (FDX) programmes. Unlike STEADES, IATA's new GADM database provides not only global trends but also trends across the operators from the eight IATA regions (NAM – North America, LATAM-CAR – Latin America and the Caribbean, EUR – Europe, ASPAC – Asia Pacific, NASIA – North Asia, CIS – the Commonwealth of Independent States, the former Soviet Union, MENA – the Middle East).

***Figure 1:** Incident data collection for the summer period 2015-2019*



Data collection

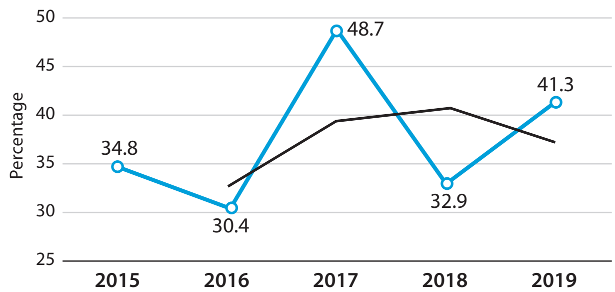
Between 2015 and 2019, aircraft operators and ANSPs provided EVAIR with more than 13,000 ATM occurrence reports. All European ANSPs, plus ANSPs from neighbouring regions and more than 340 aircraft operators, sent in their occurrence reports and/or feedback to EVAIR. Aircraft operators which participated in the overall process performed 4.9 million flights during summer 2019, and within the five-year period they performed 20.4 million flights.

For the purposes of monitoring the efficiency of the Call Sign Similarity De-confliction Tool, 21 ANSPs provided call sign similarity/confusion reports on a daily or monthly basis. For the 2015-2019 summer periods, EVAIR received about 6,000 reports from ANSPs' SMSs.

Feedback – Reporting motivator and support for quick fixes

EVAIR, since its very beginning, has facilitated the feedback process that allows ANSPs and AOs to close the loop of the open incident. EVAIR facilitates the process through the connections with AO and ANSP safety managers, and the exchange of their ATM occurrence information and results of SMS investigation. The feedback process is the driving force of EUROCONTROL voluntary ATM reporting.

***Figure 2:** Percentage feedback or the 2015-2019 summer periods*



The feedback process is most efficient if the initial report is sent to EVAIR as soon as possible after the incident occurred or at least within 30 days of the date of the occurrence. The reason for this requirement is that ANSPs keep records of all traffic for 30 days and within that period they can collect necessary data to do SMS investigations.

One of the indicators for the efficiency of the feedback process, but also for SMS investigations, is the timeframe needed to carry out investigations and prepare feedback on the occurrence reports submitted. Bearing in mind the importance of the feedback process, EVAIR regularly gives the percentage of the EVAIR database covered by feedback provided either by ANSPs or by AOs. In summer 2019, the percentage was 41.3% (Figure 2). It is important to point out that for a certain number of reports, AOs or ANSPs do not ask for feedback because the incident had a very low risk and in the majority of cases already clarified between pilot and controller on the operating frequency.

Another measurement of feedback performance is the period needed to close the loop of the open incident report. On average for the whole period covered by EVAIR (2007-2020), it takes 37.5 days for the provision of feedback. In 2019, however, it took 15.7 days for the provision of feedback, which is a great improvement.

Main events

In this summary, we discuss the trends in the various events, which we regularly monitor in our Bulletin.

RPAS/drones – small drones

In summer 2019, EVAIR recorded a drop in the number of RPAS/drone reports compared with summer 2018, when EVAIR recorded the highest level since 2013, the year when EVAIR started recording RPAS/drone incidents. The data show that in summer 2019, the most affected phase of the flight was the approach phase in line with the period previously monitored.

GPS outages

2018-2019 summer trends show a very large increase in GPS outages. For the period monitored, EVAIR identified 43 FIRs affected. As for the previous period, the detailed analysis confirmed that the majority of GPS events occurred near areas of political tension, which suggests that the potential causes of such outages could have been intentional interference (the eastern Mediterranean, the Europe/Middle East axis and the Black Sea/Caspian Sea axis). Unfortunately, only a few States affected by GPS outages have so far issued NOTAMs by way of information for and to raise awareness of pilots, although this should have been done by all affected States.

ACAS RA data collection

A look at ten years' summer periods shows that ACAS RAs fell from 1.2 per 10,000 flights in summer 2010 to 0.5 per 10,000 flights in summer 2019. During that period, a number of initiatives were taken at European level to mitigate problems related to ACAS RAs.

Laser interference

The trend in 'laser threats' in the EVAIR data base continues to decline. As an illustration, in the five 2015-2019 summer periods, laser interference accounted for 7.7% of the total data provided by AOs and ANSPs to EVAIR, but in summer 2019, laser threats accounted for only 1.9%.

For the most important stakeholders, primarily the police, AOs and ATC, the task is to work together in order to cope with problems in the most efficient way.

Call sign confusion

For summer 2019, call sign confusion reports provided by airline Safety Management Systems (SMSs) accounted for 9% of reports in the EVAIR database. 'Hear back' as part of the controller work and 'traffic and airspace problems' as part of the wider ATM area made up almost 50% of all CSC contributors.

Contributors to incidents

Four out of the seven regularly monitored contributors to ATM events throughout summer 2019 recorded an increase: air-ground communication, traffic information, ATC clearance instructions, and traffic and airspace problems. As usual air-ground communication, covering operational and spoken communication, and mistakes featured in the largest number of reports. A definition of each of the contributory areas is provided on the page 56 of this bulletin.

Stakeholder Corner

IATA

As part of the ATM safety cooperation between EUROCONTROL and the International Air Transport Association (IATA), IATA's Global Aviation Data Management department conducted a summer analysis using the datasets of IATA's GADM Incident Data Exchange (IDX) and Flight Data Exchange (FDX) programmes, which collect and collate multiple forms of aviation safety, operational and flight data. These databases comprise de-identified safety incident reports (ASRs) from over 200 and flight data from over 70 participating airlines throughout the world. Moreover, the data is quality-checked to ensure the reliability of the analysis results.

The scope of this analysis included research into ASRs and flight data for the summer periods (1 April to 30 September inclusive) for the years 2018 and 2019. During these summer periods, a total of 120,069 reports were submitted and collated in the GADM Incident Database. The airlines participating and submitting data to the GADM Incident Database represented a total of 5,953,067 flights during the summer periods from 2018 to 2019. This is equivalent to an average of 13% of the world's flights during these summer periods. For the same period, a total of 1,632,053 flights were collected in the Flight Data Exchange (FDX) programme.

Security and confidentiality – When collecting and processing data, EVAIR follows strict security and confidentiality arrangements. The safety data provided are properly safeguarded and de-identified, and the information is used only for the promotion and enhancement of aviation safety.

EVAIR suggestions/improvements – EVAIR is constantly looking for ways to improve its services and products. Suggestions and proposals are more than welcome. Please forward any thoughts, ideas or comments to Ms Dragica Stankovic, EVAIR Function Manager, at dragica.stankovic@eurocontrol.int, or to the EVAIR general address: evair@eurocontrol.int.

SUPPORT TO THE MONITORING OF THE EUROPEAN SAFETY ACTION PLANS

EUROCONTROL and IATA regularly provide European and global ATM statistics for a selected number of areas of safety concerns. EVAIR provides European while IATA provides global trends. In this EVAIR Bulletin, IATA has provided for 2018 and 2019, in addition to global trends, trends for the operators across the eight IATA regions: Europe (EUR), North America (NAM), Latin America and the Caribbean (LATAM-CAR), Asia Pacific (ASPAC), North Asia (NASIA), the Commonwealth of Independent States, the former Soviet Union (CIS), Africa (AFI) and the Middle East (MENA). The reason for providing only two years of trends and not as usual five years is that as from 2018, IATA replaced STEADES (the Safety Trend Evaluation and Data Exchange System) with GADM (Global Aviation Data Management) and started using new software and a new taxonomy, which is very much in line with ICAO's ADREP 2000 taxonomy.

Figure 3: *European ATM events in the 2015-2019 summer periods*

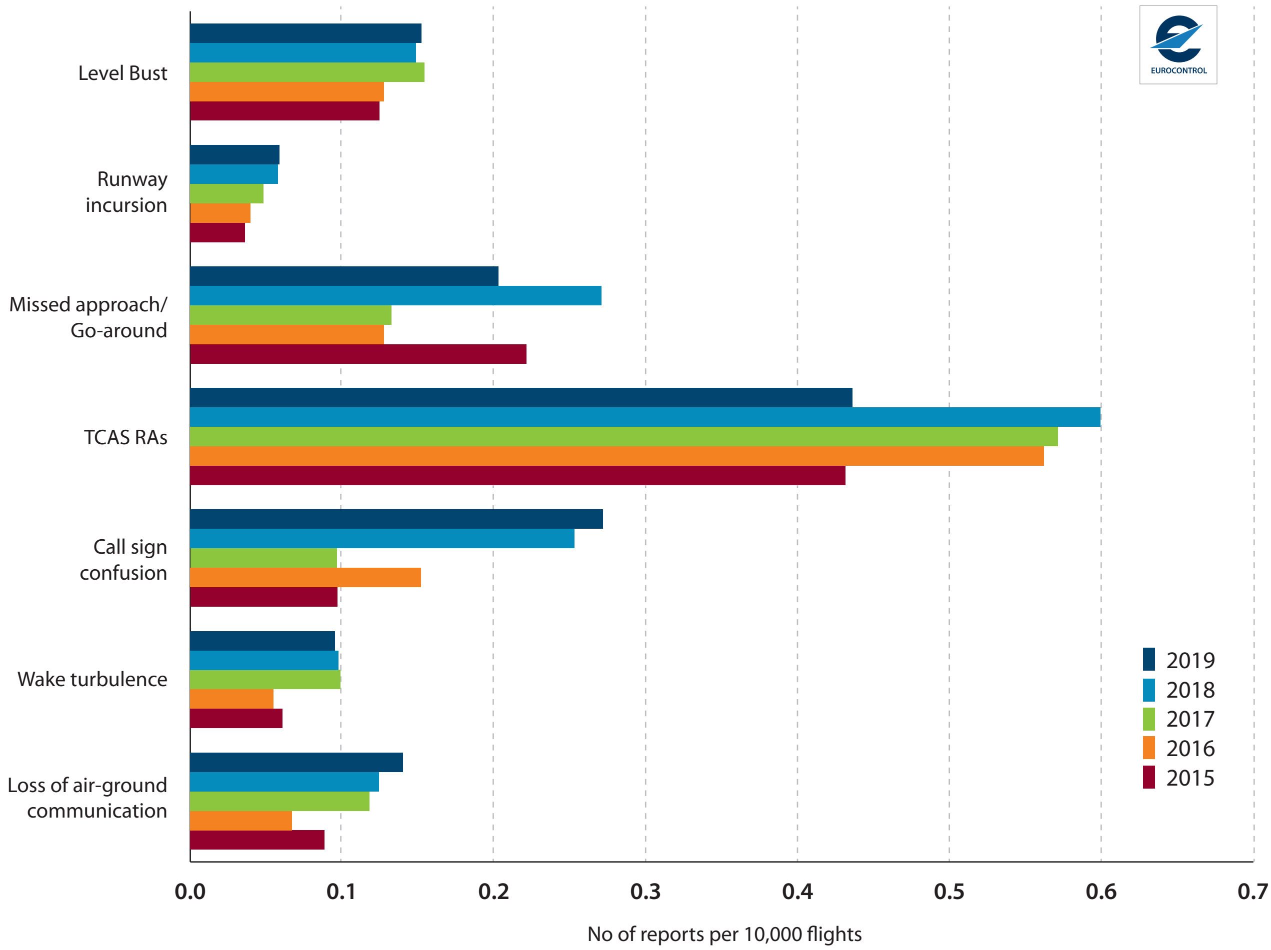
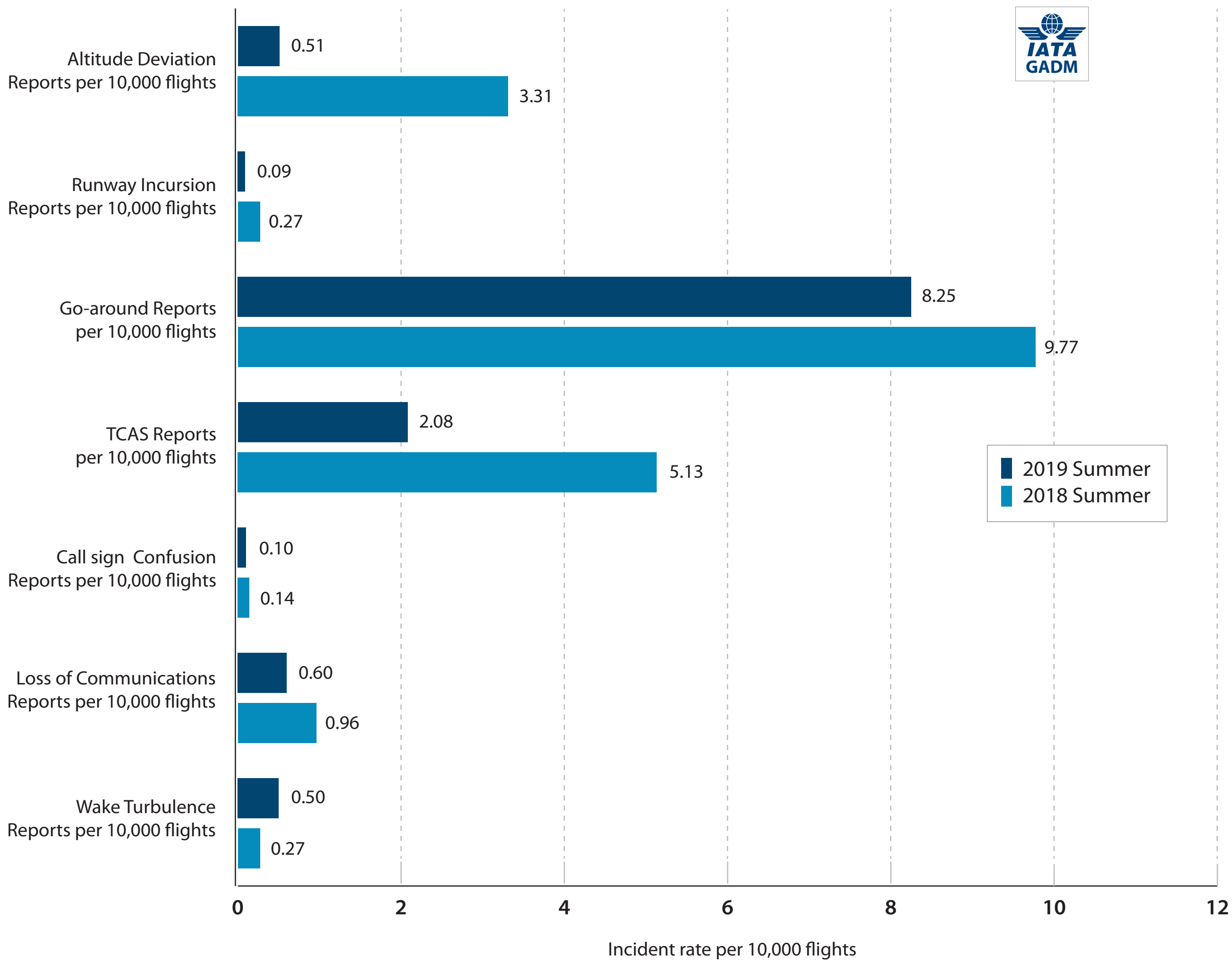


Figure 4: *IATA ATM events in the 2018-2019 summer periods*



For the 2015-2019 summer period, EVAIR collected and analysed 13,598 reports from 348 commercial, business and State aircraft operators (AOs) and practically all European ANSPs. The AOs who provided EVAIR with their ATM occurrence reports executed almost 20.4 million flights for the 2015-2019 summer periods whilst IATA's GADM collected Air Safety Reports (ASRs) from over 200 AOs and flight data from over 70 participating airlines throughout the world for the 2018-2019 summer periods. The airlines participating and submitting data to IATA's GADM represented almost six million flights during 2018-2019 summer periods.

The seven selected ATM areas monitored by EVAIR and IATA's GADM show slightly different trends in the two databases. For summer 2019, EVAIR recorded an increasing trend in four areas, whilst IATA's GADM recorded such a trend in one area. In four monitored areas, both databases had the same trends (TCAS RAs, wake turbulence, ACAS/TCAS and loss of communication).

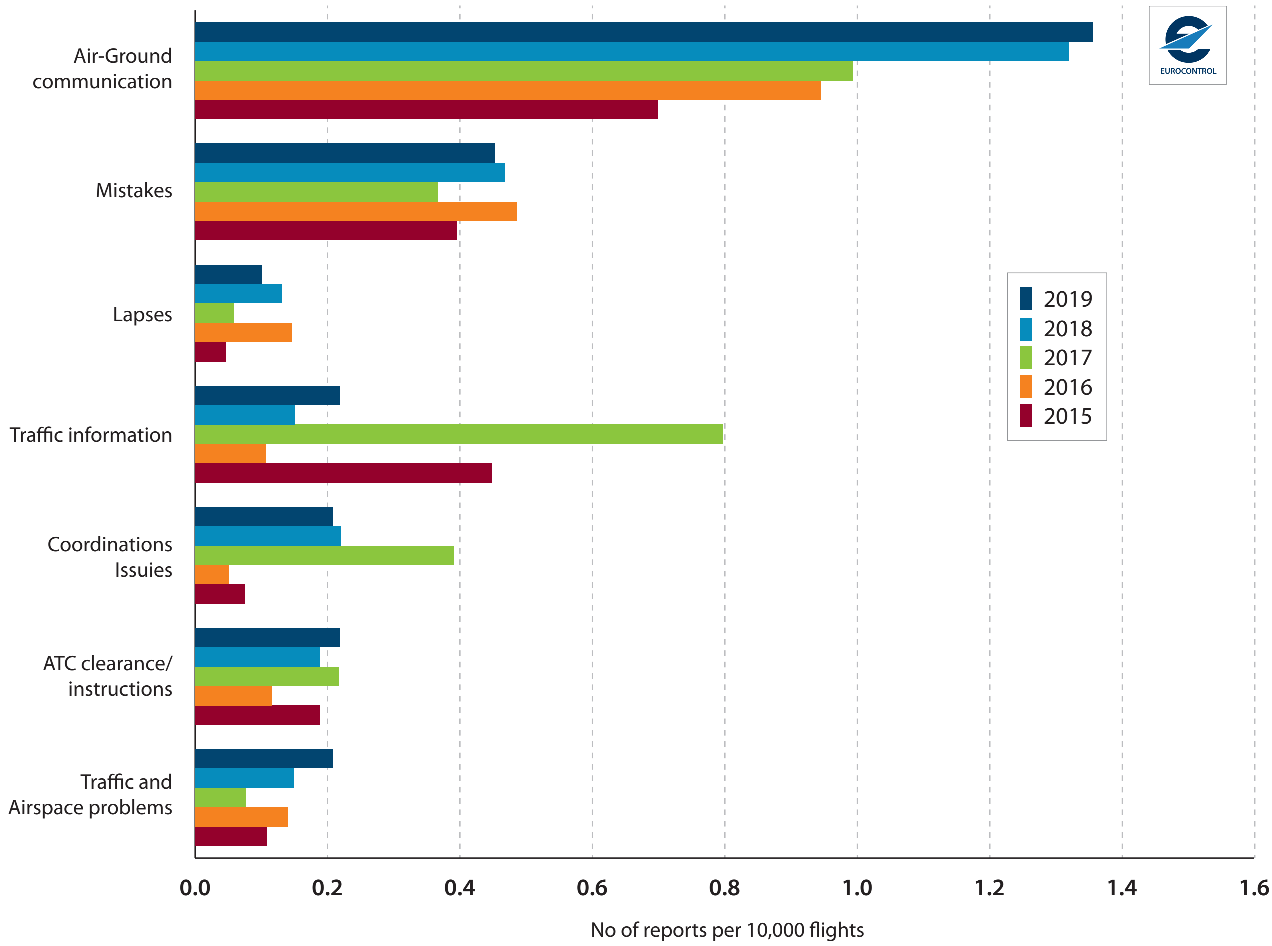
To find out more about each of the monitored event types, go to SKYbrary: www.skybrary.aero.

To learn more about IATA's GADM, go to www.iata.org/en/services/statistics/gadm/.

CONTRIBUTORS TO ATM OCCURRENCES IN THE 2015-2019 SUMMER PERIODS

EVAIR is a unique database, which, thanks to the taxonomy used, provides very high-granularity data. Data are fully analysed by licensed air traffic controllers and/or pilots, depending on the types of report. In its work, EVAIR uses the ADREP 2000 and HEIDI taxonomy, which, after analysis and data upload, gives high data granularity and the opportunity to drill down through the data and identify the root causes of different types of ATM event.

Figure 5: *Contributors to ATM incidents in the 2015-2019 summer periods*



Four out of seven regularly monitored contributors to ATM events, throughout summer 2019-recorded increase: Air-Ground communication, Traffic Information, ATC Clearance instructions and Traffic and Airspace Problems.

As usual, areas with the largest number of reports belong to Air-Ground communication, which consist of Operational and Spoken communication and mistakes. Below are the definitions of each of the contributory areas.

'Air ground communication" covers Spoken and Operational communication. Spoken communication covers call sign confusion, high R/T workload, language/accent, misunderstanding/misinterpretation, noise interference, pilot breach of R/T, poor/no coordination, and situation not conveyed by pilots.; **Operational communication** covers handling or radio communication/failure or unusual situations, hear-back omitted, phraseology, R/T monitoring sector, and transfer of communication.

"Mistakes" cover areas such as judgment, planning, decision-making, knowledge, experience, and failure to monitor, misreads or insufficiently learned information, etc. Of these, "planning" and "judgment" traditionally show the highest trends.

"Traffic information" covers three areas related to air traffic controller performance: incorrect information, late information and no information provided.

"ATC clearance/instructions" cover the following areas: wrong runway, runway excursion, closed runway, occupied runway, turn direction, rate of climb/descent, assigned or specific speed, assigned or specific track/heading, climb/descent conditional clearance, approach clearance, etc.

"Lapses" cover detection, destruction, forgetting, identification of information, loss of awareness, monitoring, perception of information, receipt of information, timing, etc.

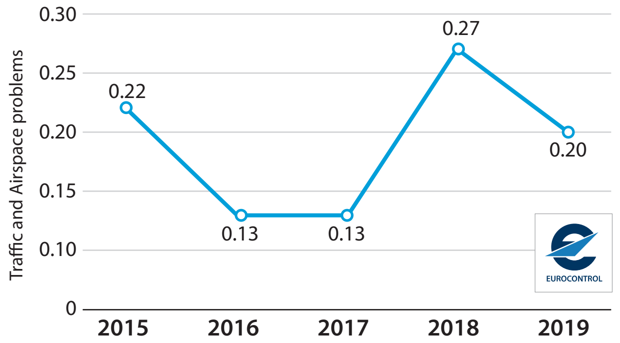
"Coordination problems" cover external coordination, internal coordination, and special coordination procedures with positions within the ATC suite and with sectors in the same unit.

"Traffic and airspace" cover airspace problems, pilot problems, traffic load/complexity and weather problems.

GO-AROUNDS IN THE 2015-2019 SUMMER PERIODS

A "go-around" is a normal phase of flight, one of the last safety barriers. EVAIR and IATA's GADM monitor these areas in order to identify ATM safety problems associated with "go-arounds". In the EVAIR database in the 2015-2019 summer periods, go-arounds accounted for 6.3% – and in summer 2019 alone – 6.8% of all ATM reports provided.

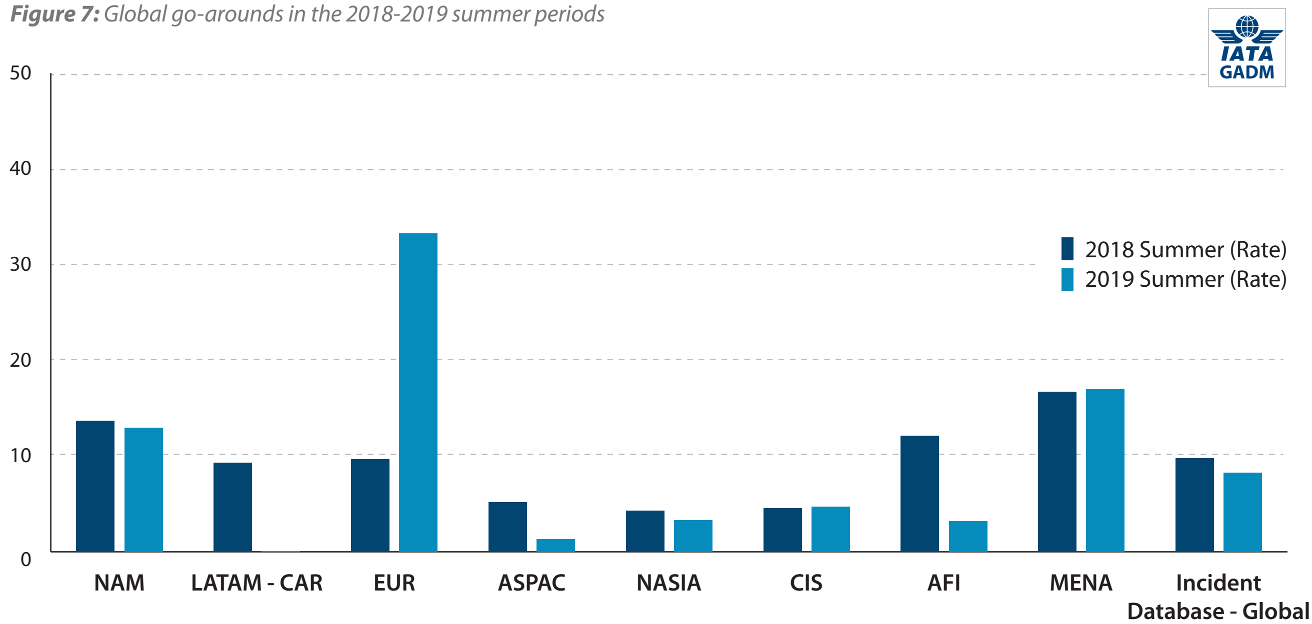
Figure 6: *Missed approach go-arounds in the 2015-2019 summer periods*



The EVAIR database identified go-around events with associated ATM safety problems in 38 different States and about 120 locations across Europe. Figures confirm that the problem is pan-European. Some States and some locations have higher figures than the average. Identification of States and locations with higher trends is an indicator for these States, their ANSPs and AOs as to where they need to focus their ATM safety actions. For confidentiality reasons, EVAIR cannot disclose the names of States and locations, but it can always share this information directly with the States and ANSPs concerned.

Best practices, recommendations and lessons learned relating to go-arounds can be found in SKYbrary: http://www.skybrary.aero/index.php/Portal:Go-Around_Safety_Forum_Presentations

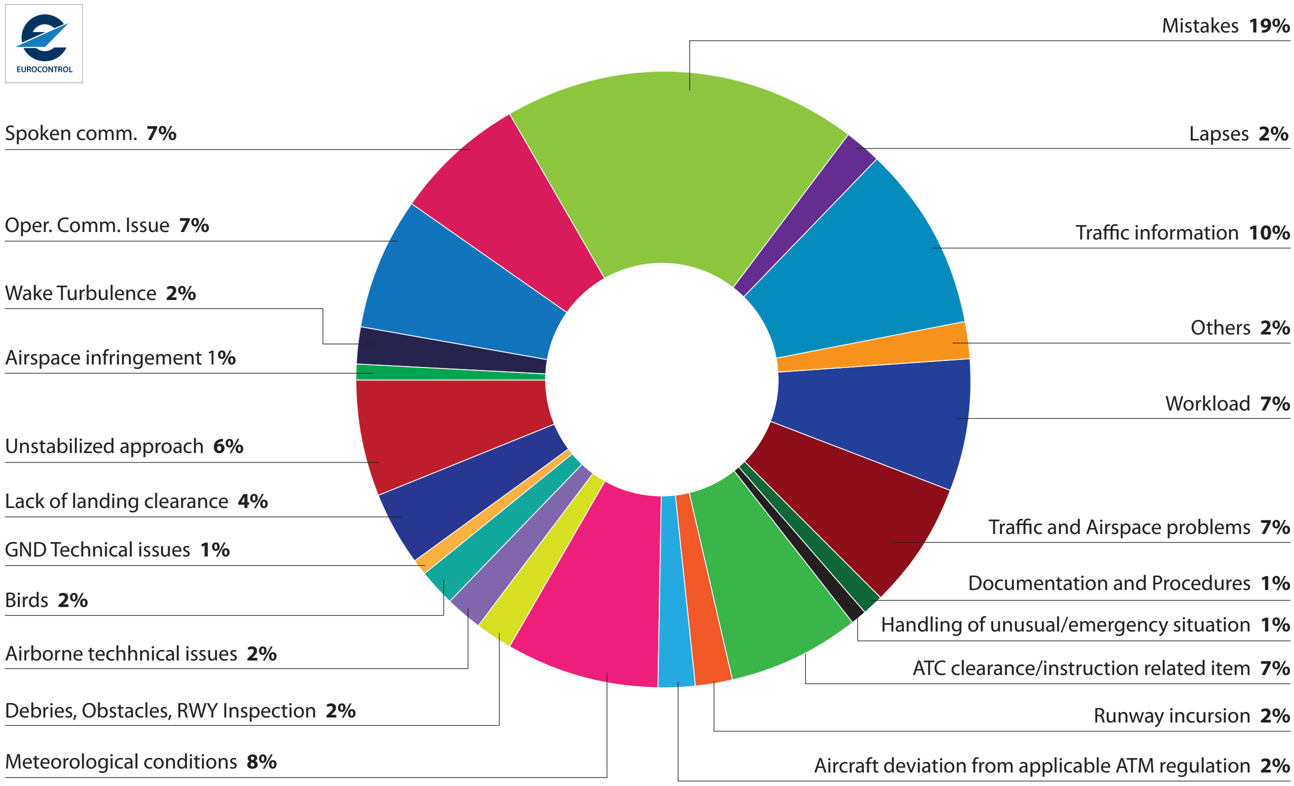
Figure 7: *Global go-arounds in the 2018-2019 summer periods*



Unlike STEADES, IATA's new GADM database provides not only global Go-around trends but also trends across the operators from the eight IATA regions. For this EVAIR bulletin, IATA provided only two years overview because they started with the new GADM software and taxonomy in 2019.

Since IATA data covers only a two-year period, it is premature to compare in great detail to the EVAIR and IATA trends. We are working closely with IATA to check data from various perspectives and to understand them much better.

__Figure 8:__ Go-around contributors in the 2015-2019 summer periods



In its in-depth analysis of go-arounds, the EVAIR team always makes a number of different searches in order to identify as many go-around contributors as possible. Each of the contributors shown in Figure 8 could be further broken down. We have kept the analysis at the level of a little over 20 contributors in order to make the graph readable. In total, we identified 39 different causes in the 2015-2019 summer periods.

In the 2015-2019 summer periods, three go-around contributory areas, namely air-ground communication, covering operational and spoken communication, mistakes and traffic information, accounted for 43% of the overall contributory percentage. All three are related to controller and pilot performance.

Meteorological conditions related to go-arounds identified in pilot reports were wind with wind gusts, wind shear, tailwind, headwind, low visibility, heavy rain and snow. "Traffic and airspace problems" incorporate airspace design and procedures, pilot problems, traffic load and complexity.

The category 'other' includes areas with a few reports, namely coordination problems, transfer of traffic, procedure design, GND-GND communication, RWY configuration, balloons, RPAS and loss of communication.

De-identified occurrence reports

Airline report dated 12 May 2019

A standard missed approach had been flown using the ATC-assigned altitude of 4,000 feet. Our aircraft was cleared for the ILS RWY 25 procedural approach. On the outbound leg, proximate traffic was seen heading directly towards our aircraft showing -200 feet. ATC advised of potential conflict. With the lack of radar, we do not think that the ATC unit was aware of this aircraft and we believe that the pilots of the aircraft had followed an alternative route to that instructed by ATC. A traffic warning received, followed by a TCAS RA descent instruction, which was immediately actioned. As the descent was initiated, TCAS reversed the instruction to a TCAS climb. Our aircraft climbed to approximately 4,400 feet before becoming clear of traffic and descending back to the assigned level. A small aircraft was seen passing below the captain's window on a reciprocal course. Separation was gauged at a minimum of 200 feet vertically and approximately 1-2 miles laterally. Several passengers commented on the aircraft to the cabin crew. ATC advised and they have confirmed they will be submitting a report in respect of the incident. We were surprised that the aircraft provided a descent instruction when the conflicting traffic was 200 feet below, as the initial manoeuvre potentially positioned us closer to the conflicting traffic. The climb instruction was more suitable and provided a rapid resolution of the event.

ANSP feedback facilitated by EVAIR

We hereby wish to inform you of the measures which the Operational Safety Department have taken since your flight had to execute a TCAS RA during a second approach after a failed first approach. Our Department immediately initiated an internal investigation based on the study of both voice communications and radar images, and also supplemented by personal interviews with the controllers on duty at the time of the incident. In less than a month, a Final Internal Investigation Report was drawn up and from its conclusions, a series of recommendations and specific corrective measures to be applied were issued. All these corrective measures, without exception, were carried out during the following four months. Due to the severity of the incident, the internal reports and corrective measures referred to above have been sent to the State Commissions in charge of investigating air safety incidents. The Operational Safety Department has made a major effort to ensure that cases such as the one which occurred will not occur again, following the lessons learned.

Airline report dated 3 July 2019

While on ILS approach to RWY 03L following preceding traffic, we executed a missed approach procedure owing to loss of separation with the preceding aircraft.

ANSP Feedback facilitated by EVAIR

Analysis-conclusions

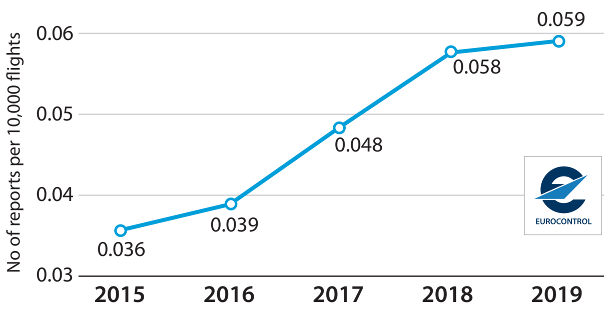
1) The first traffic was established on the ILS for RWY 03L at 20 NM with a ground speed of 244 kts. The second flight was following 4 NM behind with a ground speed 234 kts. Approaching short final the separation between the two aircraft was reduced to 2 NM. As a result, when the second flight was 2.5 NM from touchdown on RWY 03L at 1,200 ft, it was instructed by the controller to execute a missed approach procedure.
2) The controller, on first contact with the second flight, instructed the captain to reduce speed to the minimum approach speed and gave him traffic information concerning the preceding traffic. Later on, the controller instructed the captain of the second flight to be prepared for a possible go-around, which actually happened 30 seconds later, since the separation between the two aircraft was reduced to 2 NM.
3) From examination of radar data, it has been noted that the vectoring performed by the APP unit between the two aircraft involved in the incident was incorrect and it caused the consequent loss of separation between them on the short final.
4) The incident is, according to RAT, category C1.
5) The workload of the controller was medium.
6) The incident will be analysed in the next refresher course of the controllers.

RUNWAY INCURSIONS IN THE 2015-2019 SUMMER PERIODS

Summer 2019 recorded a very slight increase in Runway Incursions (RI) compared with 2018. This followed four years of increases in RI events.

EVAIR figures show that in the 2015-2019 summer periods, RIs accounted for 1.5% of the overall 2015-2019 summer data, which is 0.2% less than in the summer period 2014-2018. In summer 2019, RIs accounted for 1.8%, which is 0.3% more than in the previous summer period.

Figure 9: *Runway incursions in the 2015-2019 summer period*



This Bulletin gives us unique opportunity to compare EVAIR RIs with the global trend and trends within different region of operators monitored by IATA's GADM. In particular, this is the first time that IATA, thanks to the replacement of its Safety Trend Evaluation and Data Exchange System (STEADES) with the new Incident Data Exchange (IDX) Program is in the position to provide world operators' regional situation as well as global trend.

In IATA's database, only three regions recorded RI events in summer 2019 (EUR, ASPAC, and NASIA). At the global level, North America, Latin America, CIS, the Middle East and Africa operators did not record RI events, consequently leading to a big drop in IATA's RI figures.

Looking at the European operators, both EVAIR and IATA recorded a slight increase in RIs in summer 2019.

Figure 10: *Global runway incursions in the 2018-2019 summer periods*

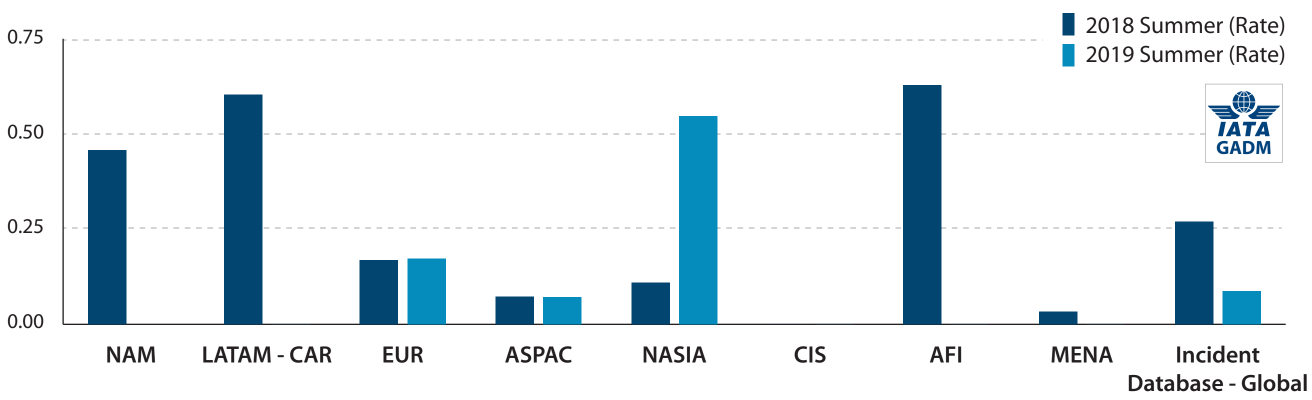
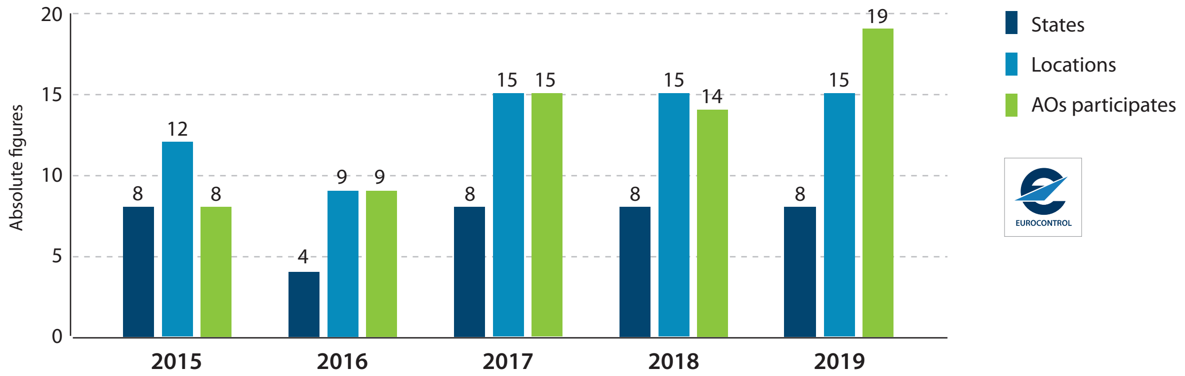


Figure 11: *Runway incursions by State, location and AO involved in the 2015-2019 summer periods*

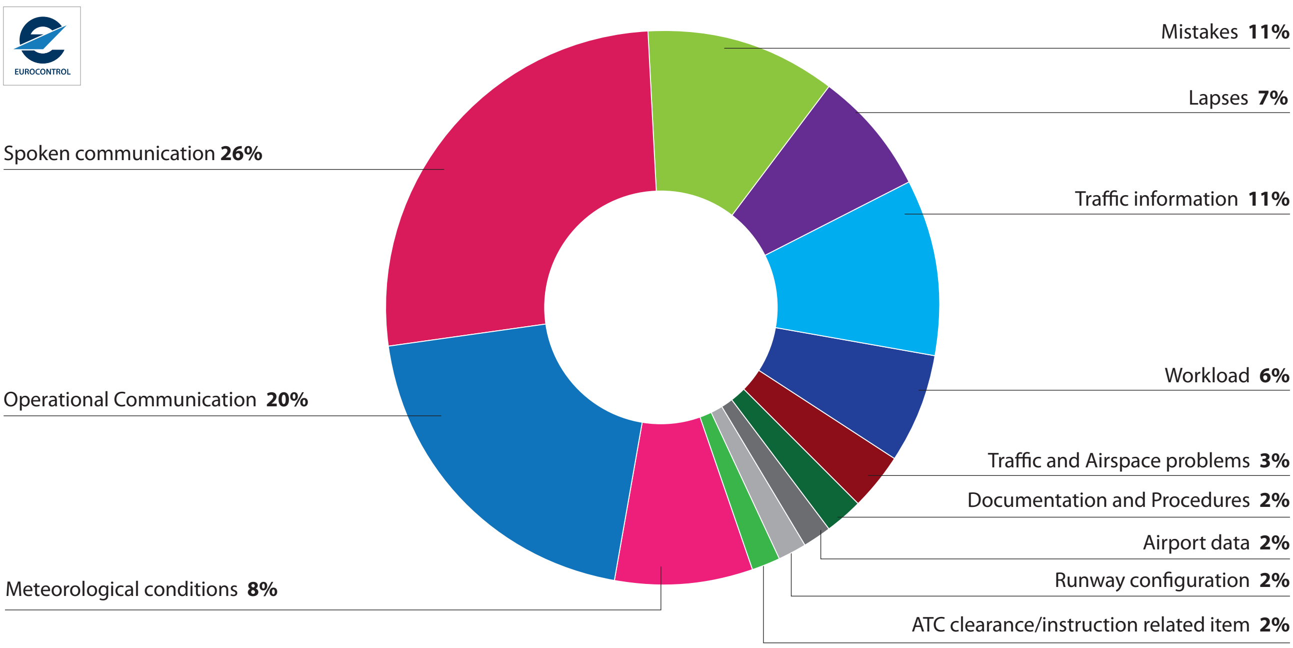


For the period under study, upon viewing the number of States/location at which runway incursions occurred and the AOs involved, EVAIR concluded that the only increase was in the number of AOs involved during summer 2019.

The number of States and locations indicates that the problem is Europe-wide, although some areas are more affected than others are. Searches in the database showed that, for all 2015-2019 summer periods, two States accounted for 56% of runway incursion events, and four States for 73%. When we applied the same approach to locations, it showed that five of the forty-one locations accounted for 35% of the runway incursion events.

As regards ATM involvement, data show that in the 2015-2019 summer periods, there was direct ATM involvement in 14% and indirect involvement in 30% of the RI events.

Figure 12: *Runway incursion basic contributory factors in the 2015-2019 summer periods*



In the 2015-2019 summer periods, 8.5% of RIs were followed by go-arounds. This is an improvement, because it is 6% less than for the previous five years. All go-arounds in the measured period were executed due to the presence of aircraft on the runway. Four out of twelve areas identified as the most frequent ATM RI causes account for 64% of RIs, which indicates where we need to look in order to mitigate the problem.

For more details about contributory factors, mitigating measures and recommendations in the European Action Plans for the prevention of Runway Incursions (and Excursions) go to https://www.skybrary.aero/bookshelf/books/4093.pdf

De-identified occurrence reports

Airline report dated 21 June 2019

The A/C lined up behind departing traffic. Another B737 holding at A12 for 17R was instructed to line up behind us. We were holding at GA10. The instruction to line up behind us was given twice, but not correctly read back. As the departing A/C started to roll, we started to manoeuvre forward to line up, and at the same time a B737 passed the A12 holding point and encroached on the RWY. I called twice over the R/T for the B737 to stop but the pilot did not acknowledge and continued to line up on 17R. As it became obvious that B737 was not going to stop, I stopped at A10, remaining clear of the RWY and applied the parking brake. The tower controller then informed pilot of the B737 that they had breached their clearance. After an exchange between the tower controller and the pilot of the B737, ATC cleared the B 737 to take off. We were then cleared to line up and departed after tit. IMMEDIATE ACTION TAKEN AND/OR SUGGESTIONS FOR RESOLUTION: We stopped and remained clear of the runway to avoid a potential ground collision.

Feedback from ANSP facilitated by EVAIR

In managing the departure traffic sequence from the holding point of the B737 for 17R, the ATC used well-structured conditional clearances.

At a given moment, the situation at the holding point was as follows:

- The departing traffic, an A320, was lined up on RWY 17R at A11, waiting to be cleared for take-off.
- The second A320 was holding short of the runway at A10, with conditional clearance to enter the runway behind the aligned A320.
- The B737 was holding short of the runway at A12.

At that point, ATC clearly transmitted to the B737 a well-structured conditional clearance using the standard wording: "B737, behind the A320, line up and wait runway 17 right, behind."

The pilot of the B737 read back this clearance incorrectly: "Line up and wait, behind, 17 right." ATC noticed and corrected the incomplete read back: "Behind the A320". For a second time, the B737 pilot read back incorrectly: "Behind the Airbus". This second incorrect read back was not noticed by ATC. Consequently, as the first A320 was starting is take-off run, the B737 went beyond the brown bar at A12, causing a runway incursion, as it was not its turn to enter.

The second A320 pilot acted quickly, informing the controller of the B737 error and reporting that in order to avoid a conflict, he was maintaining his its position at A10 short of the runway. Thanks to the performance of the second A320, two aircraft did not simultaneously enter the runway. ATC simply changed the planned departure sequence and cleared the B737 (which apologised) for take-off.

Airline report dated 15 June 2019

During taxi-out, on reaching holding point RWY07 on TWY B, we noticed four people walking behind the fence by threshold 07 towards the runway centreline. As the fence is very close to the TO position, we advised the TWR of their presence and the danger which could result in applying take-off power towards them. After line-up, we had to vacate the RWY via H and then wait again on TWY B, and another aircraft had to perform a go-around. Flyco and military vehicles were sent to the place to make them leave. The total taxi time was approximately 25 minutes.

Feedback from ANSP facilitated by EVAIR

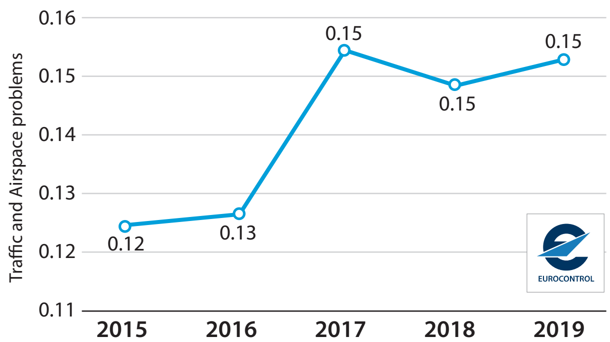
This incident was reported in detail in the tower log. According to the log entry, the four people (children) mentioned were moving at a safe distance (approximately 200 m from the threshold according to the inspection) outside the airport fence. The time needed for the on-site inspection by the police and the airport authorities resulted in one go-around and some delays. There was no safety impact and the incident was not investigated any further. Please thank your crew for their vigilance and safe attitude. In case of doubt, it is always best to report.

LEVEL BUSTS IN THE 2015-2019 SUMMER PERIODS

Level busts in the summer periods for the five summers accounted for about 4.5% of all EVAIR reports. In summer 2019, level busts accounted for 4.8% of the EVAIR data, which is a little higher than the five-year summer period as a whole. In the EVAIR database, in 12.7% of 2015-2019 summer-period level bust events, ACAS RAs were a last barrier preventing more serious incidents and the erosion of separation minima. This is almost 2% more than the figure for the previous five years.

For the period 2018-2019, IATA recorded in general higher trends for level busts within operators from North America (NAM), the Commonwealth of Independent States (CIS), the former Soviet Union and the Middle East (MENA). However, all of them recorded decrease of level bust events in 2019. The only operators which in summer 2019 recorded a slight increase in level busts were European.

Figure 13: *Level busts in the 2015-2019 summer periods*



As for previous chapters, IATA provided Level bust statistics with regional and global trends. IATA data gives an overview of the events reported by the operators within the eight IATA regions.

Figure 14: *IATA level busts/altitude deviations in the 2018-2019 summer periods*

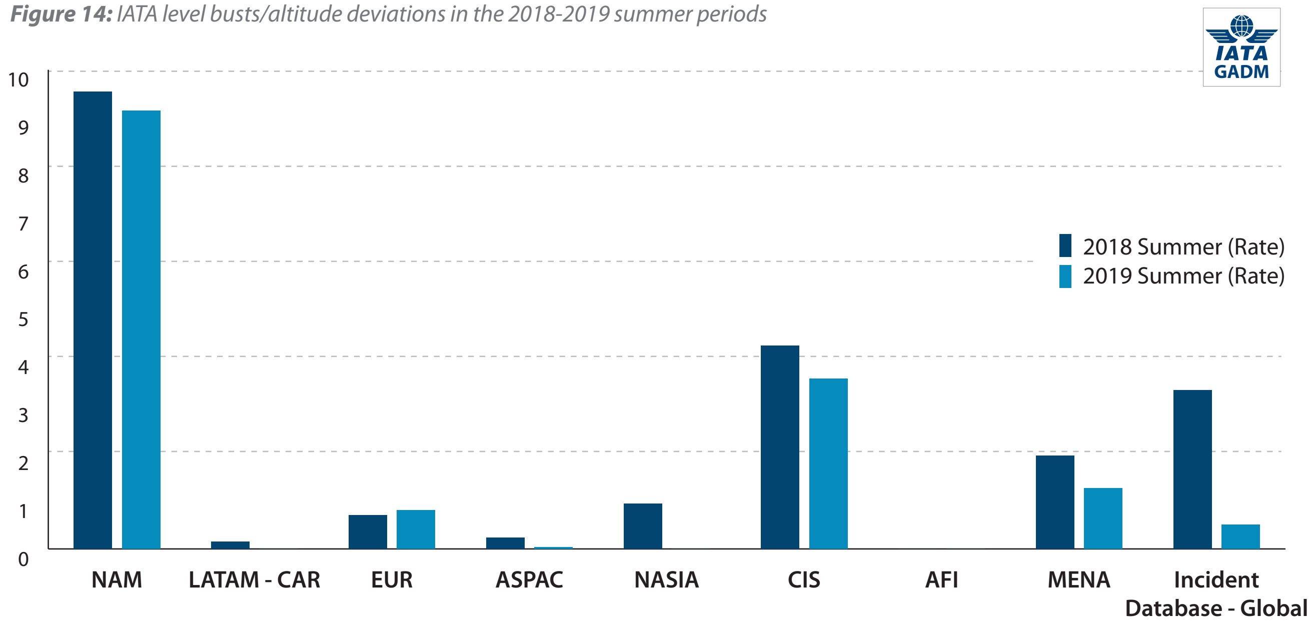
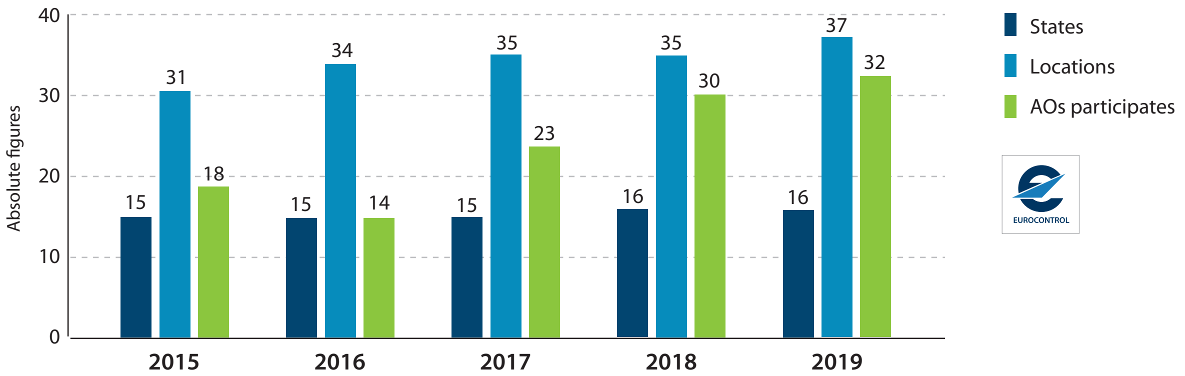


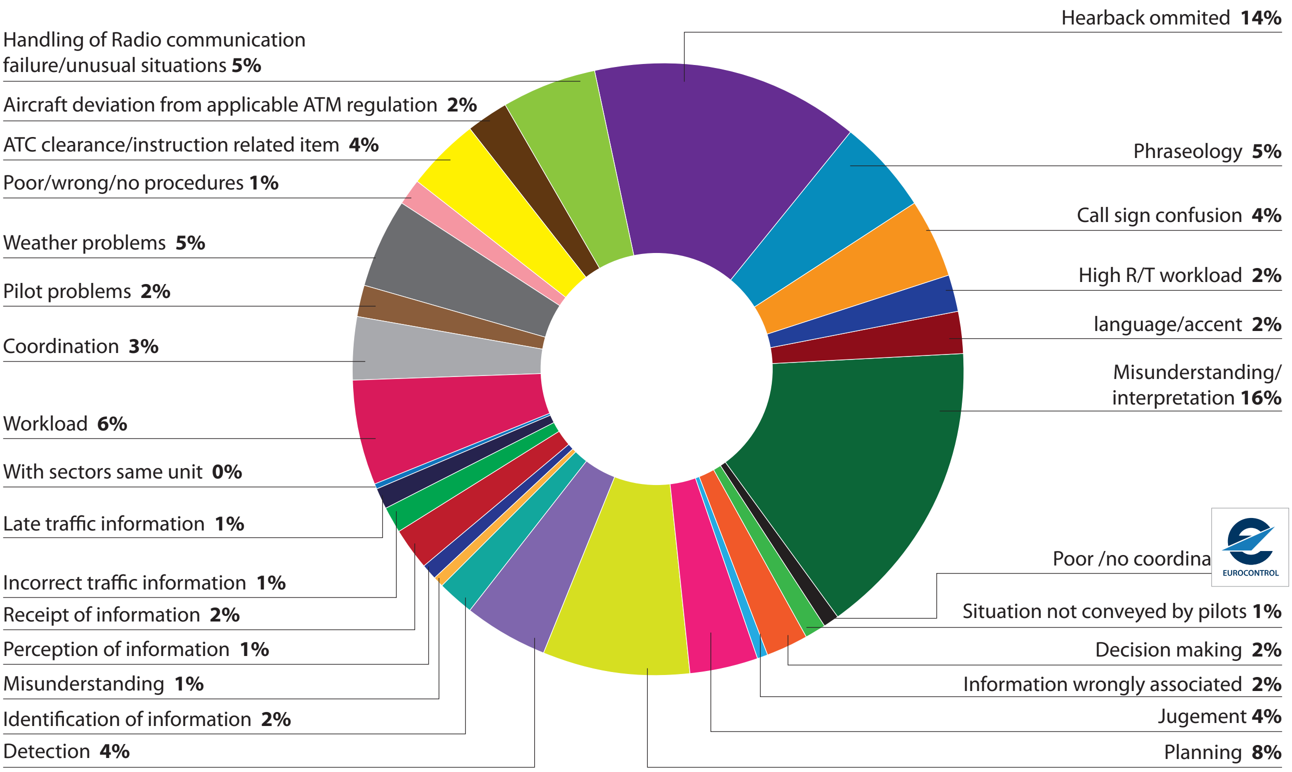
Figure 15: Level busts by State, location and AO involved in the 2015-2019 summer periods



For the 2015-2019 summer periods, EVAIR recorded a total of 31 States, 85 different locations and 43 AOs involved in level busts. Some of the States, Locations and AOs appear within all monitored period. In 2019, for three monitored areas, EVAIR recorded an increase only in AOs involved in level bust occurrences.

Of thirty level bust contributors, air ground communication, which encompasses hear back omitted, misunderstanding/misinterpretation, phraseology, call sign confusion, language/accent, and poor/no coordination, is the main contributor, with more than 50%.

Figure 16: Level bust contributors in the 2015-2019 summer periods



De-identified occurrence reports

Airline report dated 19 May 2019

This was a training flight with three crew on the flight deck. The TEM brief included the fact that the TMA was very busy. The sterile cockpit rule was therefore adopted from FL200 and below. The A/C was handed over to the next radar control. It became very apparent that this frequency was extremely busy. We were at 6000 ft and flying at 220 knots on a southerly heading when instructed by ATC to descend to 3000 ft to be level for 9 miles before BWY. The PM read back the clearance. PF selected 3000 on the FCU and began the descent. At approximately 1818UTC descending through 5200 ft we received a traffic alert. The PF responded in accordance with the drill. ATC then called "return to 6000, do not understand why you descended". The PF selected 6000 on the FCU and open climb. We were monitoring the conflicting traffic. We then received a TCAS RA at 4700 ft instructing us to climb. The PF actioned the RA but forgot to call "Flt Dirs off, give me the bird". The conflict was soon resolved. ATC was notified of the RA and the aircraft returned to FL60. The ATC frequency was saturated. ATC responded by telling us 'Not sure what happened there but we will pull the tapes". The flight then continued normally and a safe landing was conducted, with no further incident. We noted that our call sign was being clipped and that there was at least another two aircraft with similar phonetic call signs.

ANSP feedback facilitated by EVAIR

Initial details show that A/C No 1 downwind for RWY14 responded to a descent instruction to altitude 3000 feet intended for other traffic, but the controller did not challenge the garbled response. The descent of A/C No 1 placed the aircraft in conflict with the departing A/C climbing to 5000 feet. Vertical resolution instructions were issued, but the pilots reported receiving TCAS resolution advisories.

Airline report dated 19 June 2019

While in the cruise phase our flight received the instruction to climb to FL380, which was not standard because there was traffic leaving 370. After a few minutes at FL380 the controller told us that we did not have the clearance to climb to FL380 but to maintain that level because of traffic. The flight crew was sure of the change of level requested by control but apologised and continued normal operations.

ANSP feedback facilitated by EVAIR

The flight was 40 NM south-east of TANLA at FL370. The flight was converging with other traffic also at FL370. The controller asked the captain if he could climb to FL380 (non-standard) for a while, to ensure separation. The captain reported, "affirm able" and the controller reported "copied and I'll call you back". After a while, the controller observed the flight climbing to FL380 and reported to the captain that he had not been cleared to climb. The captain reported that he understood that he had been cleared to climb to FL380 and apologised.

Analysis - Conclusions

1) The tracks of two conflicting flights were converging at an angle of 33 degrees.
2) The controller had noticed the converging aircraft in time.
3) According to the voice recorder, the question of the controller to the captain was clear and the captain sounded as if he understood that the controller would call him again for a level change.
4) At 14.11.41, according to radar data, the flight started climb to FL380.
5) At 14.12.58, the controller noticed the climb and informed the captain.
6) At 14.22.31, the flight crossed the converging traffic with a vertical separation of 1,000 ft and a lateral separation of 6.2 NM.
7) The flight in question had never been cleared to climb to FL380. The phraseology of the controller was correct.
8) The climb did not create any problems with any other traffic.

The workload of the controller was heavy. According to RAT, the incident was category A.

Recommendation

- The airline should be informed of the conclusions of the investigation.
- Crews should always confirm the instructions of the controller.
- The incident will be analysed with ACC controllers.

EVAIR SUPPORT TO THE EUROCONTROL CALL SIGN SIMILARITY (CSS) PROJECT

EVAIR regularly monitors the effectiveness of the EUROCONTROL Call Sign Similarity De-confliction Tool (CSST) and the associated CSS Service Level 1 (i.e. single aircraft operator de-confliction). The main objective of the monitoring is to record and, to a certain degree, analyse the call sign similarity and confusion (CSS/C) reports received from ANSPs and aircraft operators. There is a particular emphasis on data involving CSST user airlines, although the reports received of CSS/C events involving aircraft from non-CSST user airlines are also useful, as they help provide a performance comparison between the two sets of operators. More importantly, however, the information is also used to facilitate ad hoc mid-season changes to conflicting call signs, thus providing an ongoing safety benefit. Moreover, this activity does not concern only similarities within the schedules of individual airlines, it also works across airlines (irrespective of their CSST user status) and so provides a multi-AO dimension to the proceedings. EVAIR monitoring results are also used, inter alia, for CSST safety assessment and as a decision-making element to potentially proceed with Service Level 2.

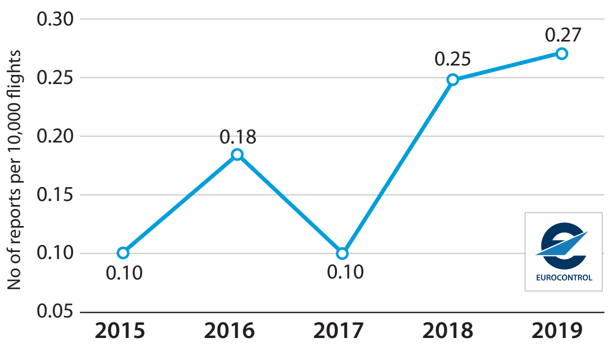
CALL SIGN SIMILARITIES AND CONFUSIONS IN THE 2015-2019 SUMMER PERIODS

To monitor 'call sign similarities' and 'confusions', EVAIR uses two data sources, one from the airlines and the other from the ANSPs. The reports from the airlines relate mainly to confusions, while those from the ANSPs concern similarities and confusions.

In summer 2019, call sign confusion reports provided by airline Safety Management Systems accounted for 9% of reports in the EVAIR database, which is much higher than for the all 2015-2019 summer periods, in which they accounted for 6.1%.

PILOT REPORTS – CALL SIGN CONFUSION IN THE 2015-2019 SUMMER PERIODS

Figure 17: *Call Sign confusion in the 2015-2019 summer periods*



The EVAIR database recorded a continued increase in the CSC reports in summer 2019 compared with previous summers.

At cumulated global level, IATA's GADM recorded a drop in the CSC trend compared with summer 2018 (figure 18). However, out of the eight monitored regions, the only region that recorded the increase in summer 2019, was the European region.

Figure 18: *Global call sign confusion in the 2015-2019 summer periods*

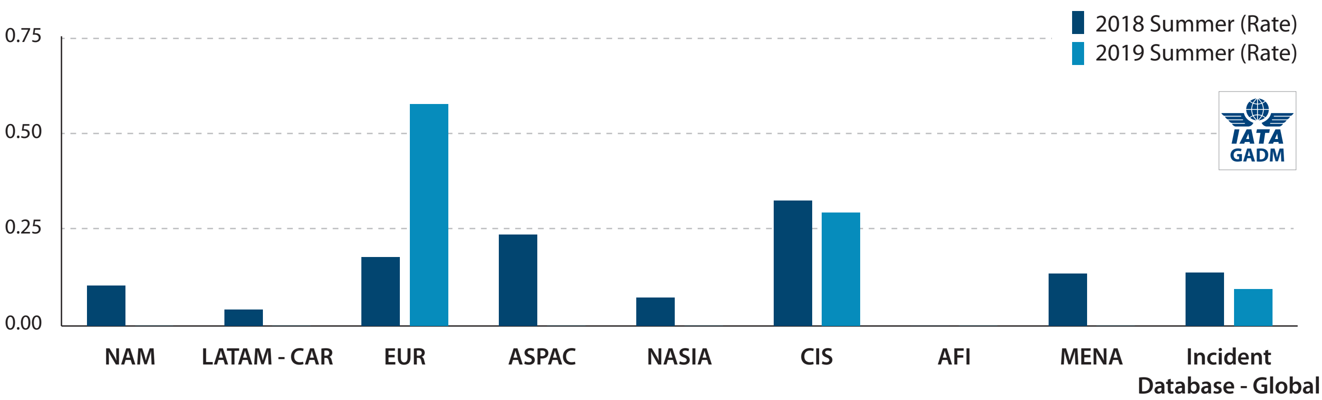
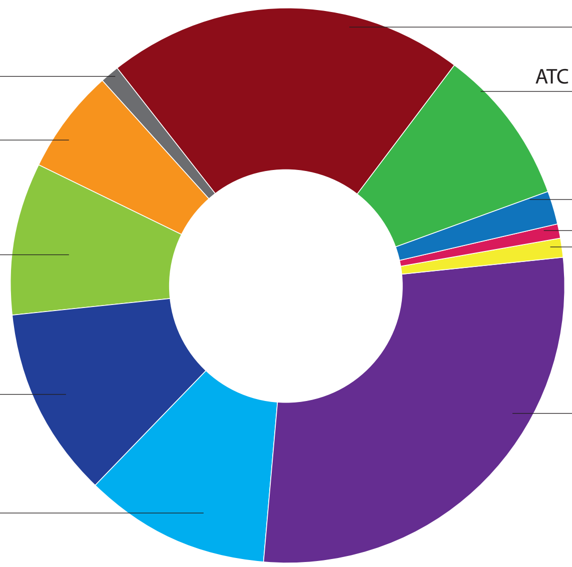


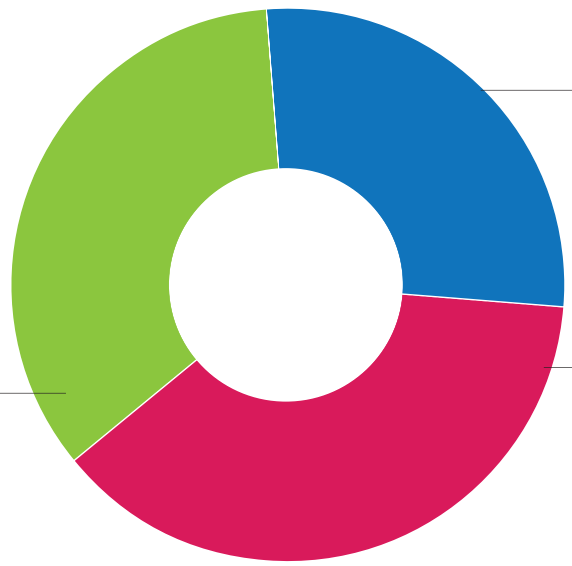
Figure 19: Call sign ATM contributors in the 2015-2019 summer periods



'Hear back' as part of controller work and 'traffic and airspace problems' as part of the wider ATM area accounted for almost 50% of the overall CSC contributors recorded by EVAIR.

Within the data set related to CSC (6.1% of the overall data for the 2015-2019 summer periods), ATM directly contributed to 28% of call sign confusions across Europe.

Figure 20: CSC ATM system contribution in the 2015-2019 summer periods



AIR NAVIGATION SERVICE PROVIDER CALL SIGN SIMILARITY AND CONFUSION DATA FOR THE 2015-2019 SUMMER PERIODS

For the 2015-2019 summer periods, EVAIR received about 6,000 call sign similarity/confusion reports. In comparison with the previous period (2014-2018), the number of ANSPs sending their CSS/C reports increased from 18 to 22.

We would like to take this opportunity to restate that EUROCONTROL's call sign similarity/confusion reporting and data collection mechanism makes it possible to take ad-hoc measures to resolve similarities. ANSPs wishing to benefit from the support of the EUROCONTROL Call Sign Management Cell Services provide the CSS/C reports on a daily basis, whereas those who do not need such assistance provide their data on a monthly basis. The EUROCONTROL Call Sign Management Cell Services help to resolve problems more quickly, at least in cases in which AOs are willing to change their call signs on an ad-hoc basis, before the end of the season.

***Figure 21:** Number of AOs with CSS/C as identified by ANSPs in the 2015-2019 summer periods*

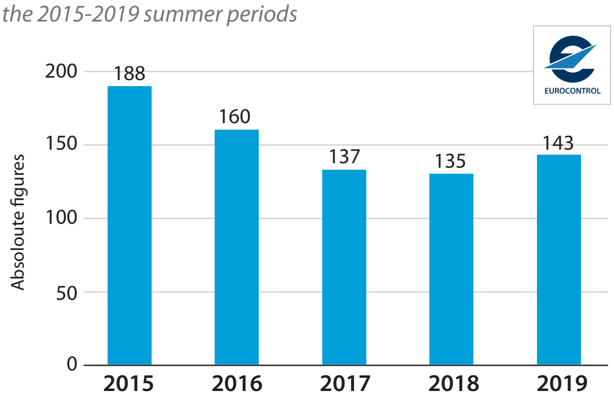


Figure 21 shows the number of AOs that had a problem with call sign similarities and confusions. After three years of decreasing numbers of AOs with problems of call sign similarities and confusions in the summer, EVAIR recorded an increase in the number in 2019. This increase could be a signal to check which airlines had the problem with call sign similarities and confusions and whether their call signs complied with the alphanumeric construction and if they use the Call Sign Similarity De-confliction Tool.

Additional measures could perhaps be taken via the various airline associations, including the largest, IATA, in order to continue promoting call similarity/confusion de-confliction activities, and the use of the Call Sign Similarity De-confliction Tool. In summer 2019, European carriers were practically the only ones using this tool; there were 43 of them. CSST users were among the top 20 AOs for NM traffic in 2019, accounting for 49% of all NM movements. This effectively meant that over 5 million flights went through some sort of similarity detection check using the CSST. Whilst the majority are European carriers, it is important to point out that among the non-European airlines, there is particular interest from the Middle East in participating in the CSS/C activities.

Call sign similarity statistics show that the problem still lies mainly with the individual aircraft operator (AOs), regardless of the use of the Call Sign Similarity De-confliction Tool (Figure 22). There was a big difference between tool users and non-users before summer 2017, with non-users having more problems. Since summer 2017, however, the difference has been very small, and in 2018 there were more similarities between tool users than between non-users. This is a signal to check what is going on and which airline tool users have had problems with call sign similarities.

Explanation of the abbreviations in Figures 22 and 23

CSS NN-Call Sign Similarity between airlines not using the tool;
CSS UU – Call Sign Similarity between airlines using the tool;
CSS UN – Call Sign Similarity between users and non-users.

After more detailed analysis, data showed that the main reason for this large increase was the fact that one airlines changed its R/T call sign in November 2017 but kept the old three-letter designator. Air traffic controllers across Europe, however, kept calling this airline using the old R/T call sign because the three-letter designator had very strong association with the old R/T call sign. This situation created a great deal of confusion and resulted in the jump in the statistics in summer 2018. EUROCONTROL and the national CAA together with the airline in question monitored the situation and informed ICAO, with a request to check the procedure for changing R/T call signs and the link with the three-letter designator. In accordance with the ICAO procedure, a change of R/T call sign has to be followed by

Figure 22: Call Sign Similarity De-confliction Tool users and non-users in the 2015-2019 summer periods

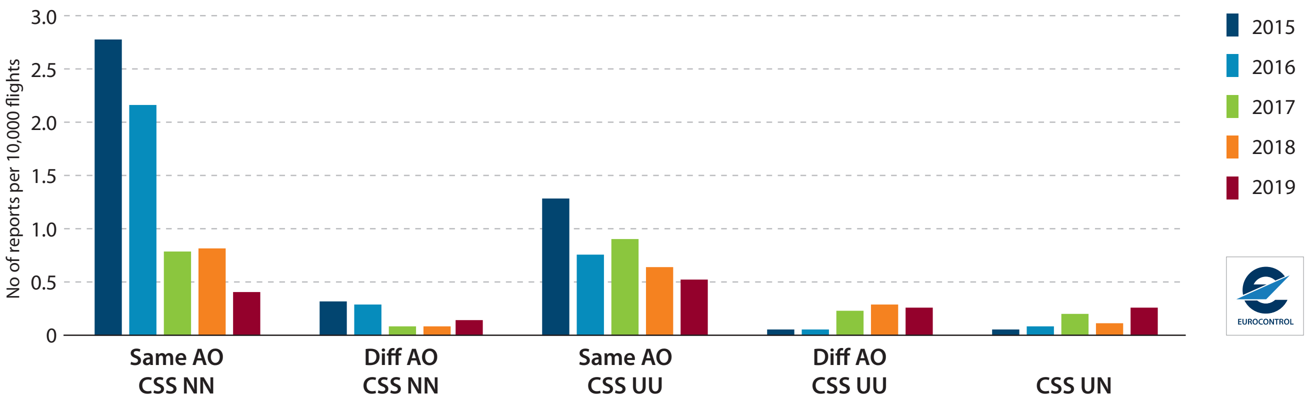
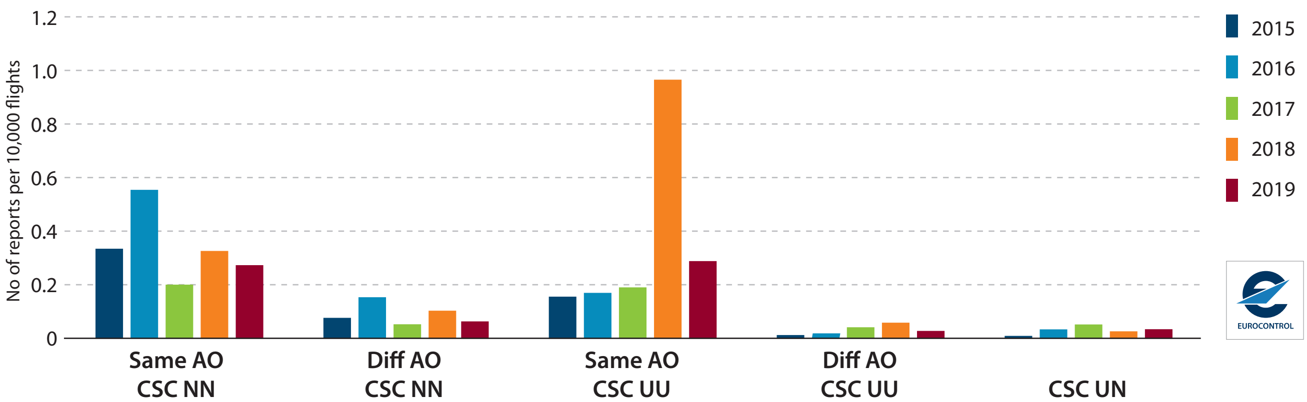


Figure 23: Call Sign Confusion De-confliction Tool users and non-users in the 2015-2019 summer periods



a change of three-letter designator, which was not the case in this situation. In June 2018, EUROCONTROL organised a meeting with the airline in question, which, after complying with the ICAO procedure and following awareness-raising activities, changed its R/T call sign to something close to the three-letter designator. Continued monitoring showed a drop in call sign confusions related to that airline. It is important to emphasise that the upward trend in summer 2018 was not linked to the logic or efficiency of the Call Sign Similarity De-Confliction Tool. In summer 2019, we noticed that two airlines tool users accounted for 43% of all instances of confusion among Call Sign Similarity De-Confliction Tool users. We believe that additional work with these two airlines would help to reduce the number of CSCs among tool users, as was the case after EUROCONTROL organised the meeting in 2018 referred to above.

CSST access and additional tokens

It has been very pleasing to note that new AOs continue to join the CSST family. A prerequisite for using the CSST is to have an NM token. It is also important to be aware that the service can be added to the existing token or an additional token can be purchased for only €200. This is a small price to pay compared with the time saved by using the CSST. Once added, CSST access will be guaranteed for the remaining life of the token. The hope is that the fee will not discourage AOs from signing up to use the Tool, as it represents good value for money.

To make things run more smoothly, AOs need to clearly identify the request for access to the CSST. To that end, AOs that apply for a new token or ask to extend an existing one must ensure that the CSST is included in the Purpose of Request box. To extend an existing token, it is also necessary to insert the user ID (CCID).

The application form can be found at http://www.eurocontrol.int/network-operations/access-service-request-form.

Call Sign Management Cell (CSMC) support

The CSMC (nm.csmc@eurocontrol.int) is also on hand and can provide limited help to AOs in navigating the application process. The CSMC prepares the CSST for the forthcoming season and is available to discuss AO training requirements. Subject to CSMC staff availability, CSST familiarisation sessions may be provided in Brussels, or if so requested, they can be provided on the AO's premises. Both may be subject to UPP arrangements.

CSST operations update

No recent major updates have been made to the **CSST, although small changes to some default settings have been made available with NM software release 24.0 for June 2020. These were requested by CSST users to allow ease of use and to reflect changes in the way AOs manage schedules.**

Learn more about call sign similarity

Please contact the Call Sign Management Cell (CSMC) at nm.csmc@eurocontrol.int.
You can find more information on the Call Sign Similarity Project at http://www.eurocontrol.int/services/call-sign-similarity-css-service.

De-identified occurrence report

Airline report dated 17 September 2019

Around 40 NM east of LST and 10 minutes from the border with the neighbouring FIR, we were cruising at FL360 from the south to the north from SOK. Everything was normal. At about 07:00 UTC, ATC instructed an A321, TTT52DT, to descend from FL360 to FL350. They were crossing our route from east to west (right to left) at the same level. The crew of TTT52DT for some reason thought that they were already at FL350 and ignored the instructions from ATC, which repeated to them several times to descend because of traffic but they kept ignoring and refusing to follow the instructions. We did not know that the traffic concerned was us, but I could see on TCAS traffic at the same level "No factor" approaching us at that moment. At around 07:03UTC, after several ignored instructions from ATC to TTT52DT, ATC instructed us to climb immediately to FL370. Just a second later the TCAS showed a TCAS TRAFFIC ADVISORY, traffic approaching from the right showing 00 (SAME LEVEL). The CAPT (PF) climbed to FL370 on autopilot, as we did not receive a TCAS RA during the event. I looked through the window and saw the traffic very close, approaching us, and probably they were finally descending. I think that at about 3 NM, they were just about 50-100 ft LOWER THAN US. When the traffic passed exactly beneath us, the TCAS on the ND showed -200ft descending. We had a vertical separation of about 200 ft when we crossed each other. Later on, TTT52DT reported on the frequency a TCAS RA, and they were then descending to FL350. ATC explained the cause of the TCAS RA as the aircraft having ignored ATC instructions for some reason, and for several times. During the event, we only got a TCAS TA, climbed momentarily to FL370 (non-standard level), then descended back to FL360 after receiving ATC instructions. The flight continued normally.

ANSP feedback facilitated by EVAIR

1) The tracks of the two flights were crossing and they were converging at an angle of 65 degrees.
2) At 06.59.37, according to the radar data and the voice recorder, the controller instructed TTT52DT to descend to FL350.
3) The controller called TTT52DT and pronounced the call sign of the flight incorrectly. He omitted the letter T.
4) The call of the controller was answered by TTT5JD and he failed to notice it.
5) At 07.00.40, the captain of TTT5JD reported maintaining FL350.
6) At 07.01.03, the controller instructed RRR2014 to climb to FL370. At that time, the distance between the two flights was 7.9 NM. The captain of RRR2014 reported traffic in sight.
7) At 07.01.43, TTT52DT executed a TCAS/RA and started to descend.
8) At 07.02.13, the two flights crossed with a vertical separation of 1500 ft. After the crossing of the two flights, the captain of RRR2014 reported a TCAS/TA.

Conclusions

1) The controller noticed the conflict between TTT52DT and RRR2014 immediately and his decision to instruct TTT52DT to descend to FL350 (non-standard) was correct.
2) The controller failed to notice that the read-back of his instructions was coming from TTT5JD. As a result, the controller focused his attention to TTT52DT without noticing that TTT5JD was descending to FL350.
3) The controller's decision to instruct RRR2014 to climb to FL370 was correct. Had it been 30 seconds earlier the TCAS/RA would have been avoided.
4) The workload of the controller was very heavy and the traffic was of high complexity.
5) The descent of TTT5JD did not affect any other traffic in the vicinity.

Airline report dated 10 Aug 2019

While holding at holding point BB, awaiting line-up clearance a Boeing B737 moved towards holding point AA, which is next to BB. An Embraer was taking off from runway 15, and ATC called us to line up behind (at least that was what we both heard). We read back the clearance "EEE78G line up runway 15". Our read-back was not challenged, neither by ATC nor by the other aircraft. So in accordance with procedure, we checked that the runway and approach were clear and we commenced our line-up. When we were already on the centre line, ATC called the B737, whose flight number was 87G (which was similar to ours), to ask whether he was lining up. The crew of the B737 answered that it was EEE78G which was lined up. We asked if they wanted us to vacate the runway because of the confusion. ATC asked us to maintain position, and within a minute we were cleared for take-off. We are certain that the controller had called us to line up and he never challenged our read-back before we lined up. However, since the flight numbers were very similar (78G and 87G), it seems that there was a call sign confusion between us, the controller and the other aircraft.

ANSP feedback facilitated by EVAIR

Timeline

09:44 EEE78G requests taxi.

09:55 GND instructs EEE78G to taxi to PP RWY15.

09:51 GND transfers EEE78G to the TWR controller reminding it to "…continue taxi holding point one five passing November stand by Tower eighteen seven".

09:54 NNN87G requests taxi to RWY15 and GND ATC instructs accordingly.

10:04 TWR controller clears NNN87G to line up and wait, but it has not yet been transferred on his frequency from the GND controller.
EEE78G crew, believing that this last clearance is directed at them, reads back "good morning EEE78G line up and wait one five".

10:05 GND ATC transfers NNN87G to TWR ATC. TWR controller clears NNN87G to line up and wait RWY15.
NNN87G replies, "I think EEE78G is lining up now".
EEE78G confirms that it is lining up.
TWR ATC instructs EEE78G to hold position.

10:07 TWR controller clears EEE78G for take-off RWY15.
EE78G requests to say again the call sign.

10:08 TWR ATC confirms the call sign and the take-off clearance.

10:10 TWR clears NNN87G to line up and wait RWY15.

Conclusions

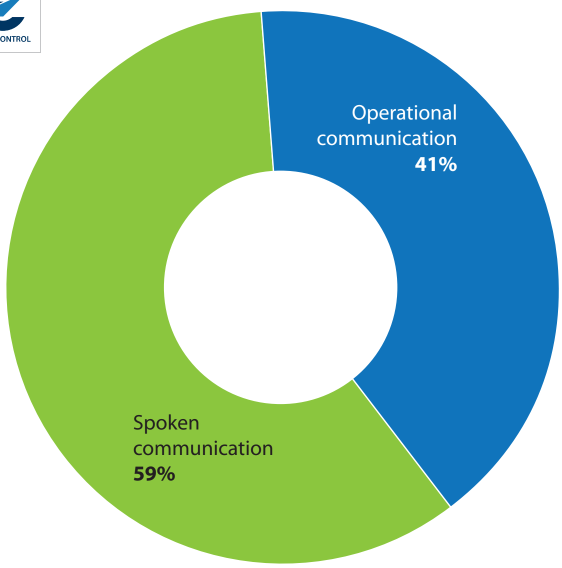
The cause of the event was call sign confusion between NNN87G and EEE78G. It would be useful to change those call signs in order to prevent similar occurrences in the future.

AIR-GROUND COMMUNICATION IN THE 2015-2019 SUMMER PERIODS

In 2019, air-ground communication, covering spoken and operational communication, accounted for almost 45.4% of ATM occurrences reported by AOs and ANSPs. This was 10% higher than for the previous year.

Spoken and operational communication are part of and defined in the EUROCONTROL HEIDI taxonomy (see definitions on page 40).

Figure 24: Relation between spoken and operational communication in the 2015-2019 summer periods

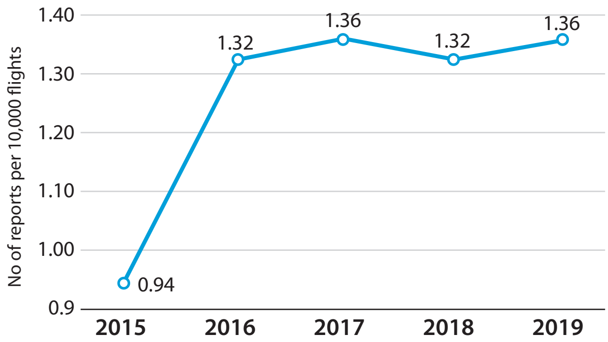


Spoken communication is traditionally a much larger contributor than operational communication and this is confirmed by five years of cumulated summer season figures. The graph (Figure 24) shows the total number of reports received in connection with spoken and operational communications in the 2015-2019 summer periods. The main areas of spoken communication problems are call sign confusion, high R/T workload, language/accent, misunderstanding/interpretation, etc. The main areas of operational communication problems are hear back omitted, phraseology and R/T monitoring sector.

An in-depth comparison of spoken and operational communication between 2019 and 2018 showed that of all EVAIR data provided by AOs and ANSPs, spoken communication in 2019 accounted for 27.8% of reports compared with 18.6% in 2018. Operational communication almost was at the same level, 17% in both years.

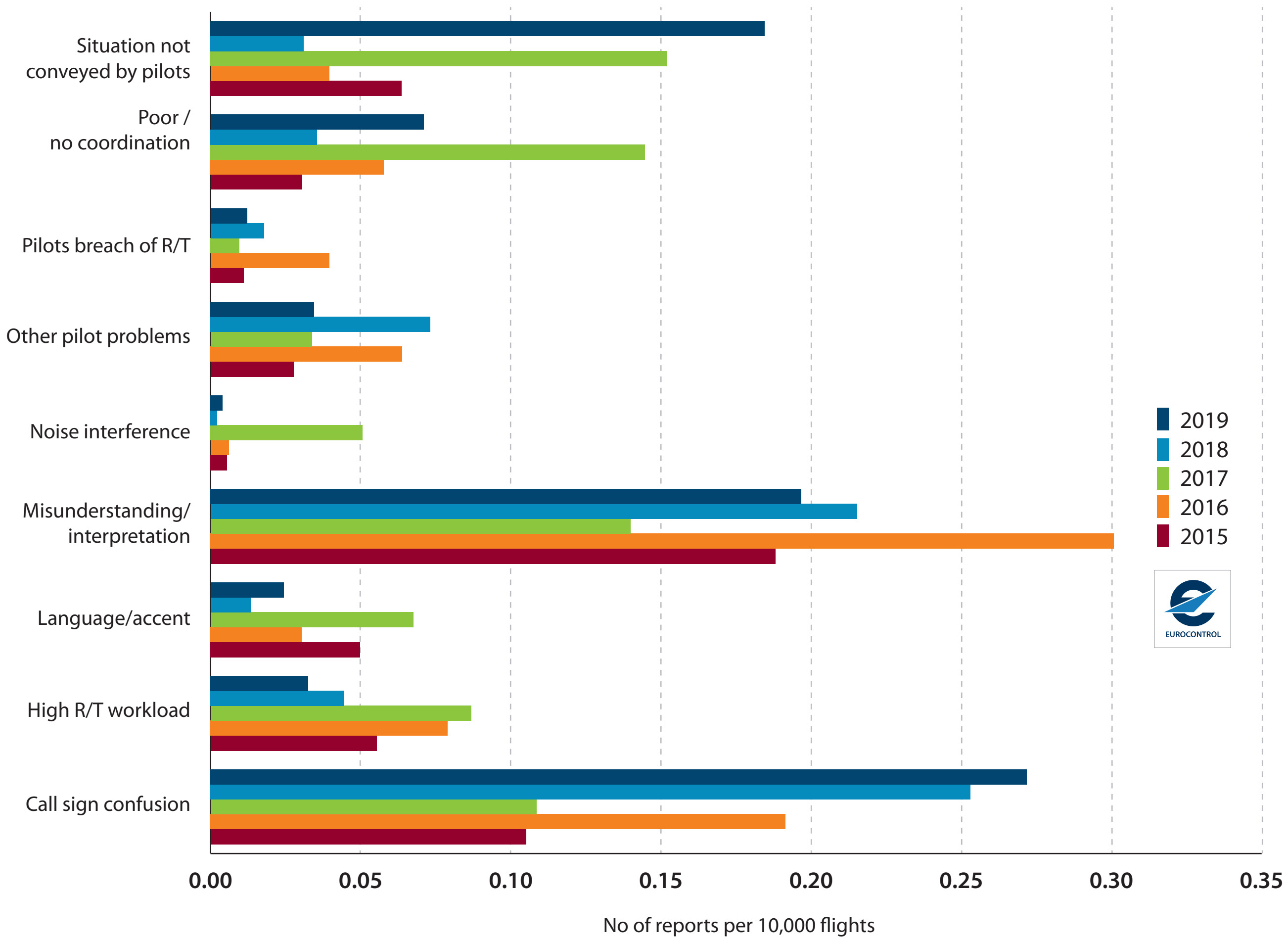
Air-ground communication continues to be one of the most frequent contributors to runway and taxiway incursions, level busts, call sign confusion, ACAS RAs and go-arounds.

Figure 25: Air-ground communication in the 2015-2019 summer periods



The general trend for air-ground communication from 2016 to 2019 in terms of the number of occurrences per 10,000 flights was quite stable, at between 1.32 and 1.36 occurrences per 10,000 operations.

__Figure 26:__ Spoken communication in the 2015-2019 summer periods

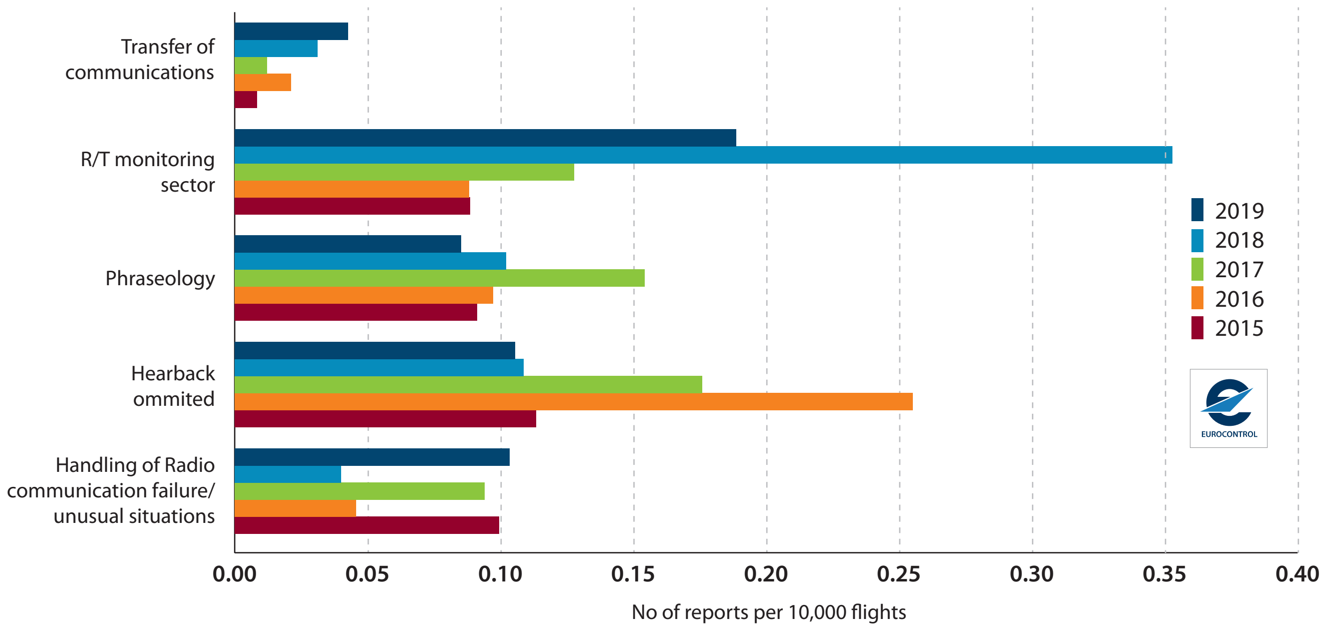


Air-ground communication is the occurrence causal area with the highest trends. Thus EVAIR probes deeper within spoken and operational communication.

Regardless of the season, spoken communication with misunderstanding/interpretation and call sign confusion are the areas with the highest grouping of reports.

Summer 2019 recorded an increase compared with summer 2018 in four out of nine monitored areas, situation not conveyed by pilots, poor/no coordination, call sign confusion and language/accent.

Figure 27: *Operational communication in the 2015-2019 summer seasons*



Out of five monitored areas in operational communication, only two recorded an increase in 2019 compared with 2018, transfer of communication and handling of radio communication failure/unusual situation. The areas hear back omitted, phraseology and R/T monitoring sectors, although traditionally having a higher number of reports, recorded a decrease in summer 2019 compared with summer 2018.

De-identified occurrence reports

Airline reports dated 14 April 2019

Airline No 1

During final approach, tower was unresponsive on the tower frequency. The crew attempted to make contact on secondary frequencies and guard with no response. At the approach minima, the crew performed a missed approach since they had no landing clearance. The following traffic also executed a missed approach. Contact was re-established with the approach controller, who advised that they were also unable to contact the tower by any means. The crew monitored the tower on COMM2. The crew accepted vectors for a second approach and advised the time remaining before diversion. Once the aircraft was on the vectors to the ILS, the tower controller made contact on the primary tower frequency and cleared both aircraft to land. The subsequent landing was uneventful. The radio quality was noted as strength 3, clarity 3.

Airline No 2

Two A/C were on approach, landing just after 0300 local time. They were handed over to the tower controller around 8 miles from touchdown. The crew heard the A/C ahead repeatedly asking tower for clearance with no response. We tried but had the same problem. The FO called approach and asked if they had contact, but approach could not reach the tower either. The FO tried 121.5, and the tower and ground frequencies with no response. The flight in front ended up going around in the absence of contact. We waited until the last minute, just in case there was a response but we received none and so performed a go-around at roughly 400 ft. A standard missed approach was executed. We spoke to approach again, who then vectored us south while they continued trying to contact the tower controller. Eventually, the tower responded to our calls. No apology or were reason given for not answering before. We suspect that the tower controller was sleeping. The second approach went without incident. We reported to the tower after landing that their radio strength/quality was 2/5 – poor. They did not really seem to be interested. Nothing further to report.

ANSP feedback facilitated by EVAIR

Two aircraft were involved. Following completion of the investigation, we fully agree with the description of the event provided by the A/C which was No 1 for the approach, since it is entirely accurate.

The tower for its part reported a temporary problem with a bad cable connection to the VCS (voice communication system) monitor, which meant that it was impossible to get through by ANY means (neither on the main frequency nor via internal lines).

Nevertheless, the controller had several other means of communication available as valid alternatives. They are all listed in the Operational Manual. In addition, our technicians had no record of this incident. We cannot therefore conclude that this was a technical incident.

On the other hand, safety was not compromised at all. As the pilots said, GOING AROUND is a manoeuvre which crew must perform when, at the approach minima, a landing clearance has not been issued by the tower.

We have finally concluded that this incident was severity E and thus had NO EFFECT ON SAFETY. However, since continuous improvement is a main goal, we have recommended that the air traffic controller involved, who has been identified as a DIRECT CONTRIBUTOR to the event, review this investigation in order to learn better practices in relation to communication contingencies and thus to prevent any recurrence of this kind of situation.

Airline report dated 8 April 2019

During the cruise phase and while we were nearing the top of the descent, ATC instructed our flight to descend. Three pilots were in the cockpit as the captain was being line-checked by a line training captain on the jump seat. We all heard a clearance to FL270. This was read back by the FO and the captain selected FL270 on the FCU. A descent mode was then engaged. As we were passing FL340, the controller instructed us to stop the descent at FL330 and stated that he had given us descent clearance to FL370. The FO advised him that we had understood FL270 and had read that back. He responded that it was not a problem at all but that we should maintain FL330. He sounded quite relaxed about the event and it did not seem to be very significant to him. We levelled at FL 330 and the rest of the flight went without incident. The flight crew discussed the event after arriving. Although all three crew members had heard the same clearance, we could not be sure whether the initial clearance given was to FL370 or FL270. When the clearance was given, we were nearing the top of the descent and had not yet moved on to headsets. We were listening to ATC through the aircraft's speakers and the audio clarity is not so good as headsets. The controller's English accent was not considered by us to be a factor. At the suggestion of the line training captain who was also in the cockpit, we all agreed that after this event we would put on our headsets well before the descent. This event may be filed incorrectly, as although it resulted in a level bust, it was fundamentally due to a radio communication error.

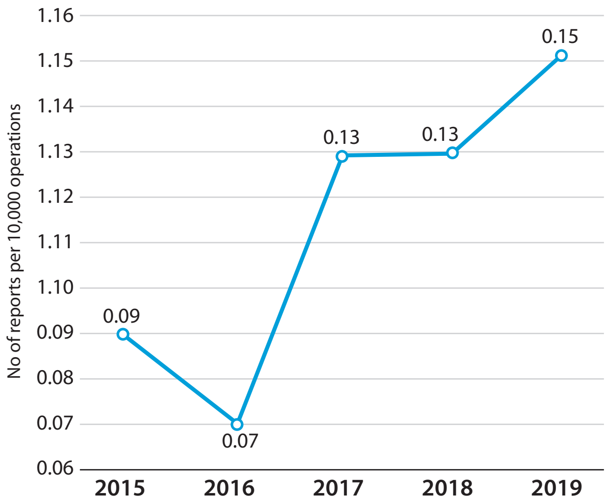
ANSP feedback facilitated by EVAIR

With reference to the event at hand, we have listened to the recordings and confirm that the controller cleared the flight to descend to FL370 and also the read-back seems to be FL370, but it is not as readable as the controller's instruction. This does not exclude the possibility that, owing to some frequency disturbance, the crew may have understood FL270. The discrepancy between the assigned level and the level selected by the pilot triggered an alert on the radar label, and for this reason the controller intervened to stop the flight at FL330. The event did not generate a safety occurrence.

LOSS OF COMMUNICATION IN THE 2015-2019 SUMMER PERIODS

Both, EVAIR at European level, and IATA's GADM IDX at global level, perform analyses in support of EUROCONTROL's project on the loss of communication and its monitoring.

Figure 28: *Loss of communication in the 2015-2019 summer periods*



For the 2015-2019 summer periods, EVAIR collected around 250 reports, which is more than for the previous five-year period (2014-2018). In summer 2019, EVAIR recorded a slight increase compared with summer 2018. In the same period, IATA GADM recorded a significant increasing trend on the global level and within the European operators.

Figure 29: *Global loss of communication in the 2015-2019 summer periods*

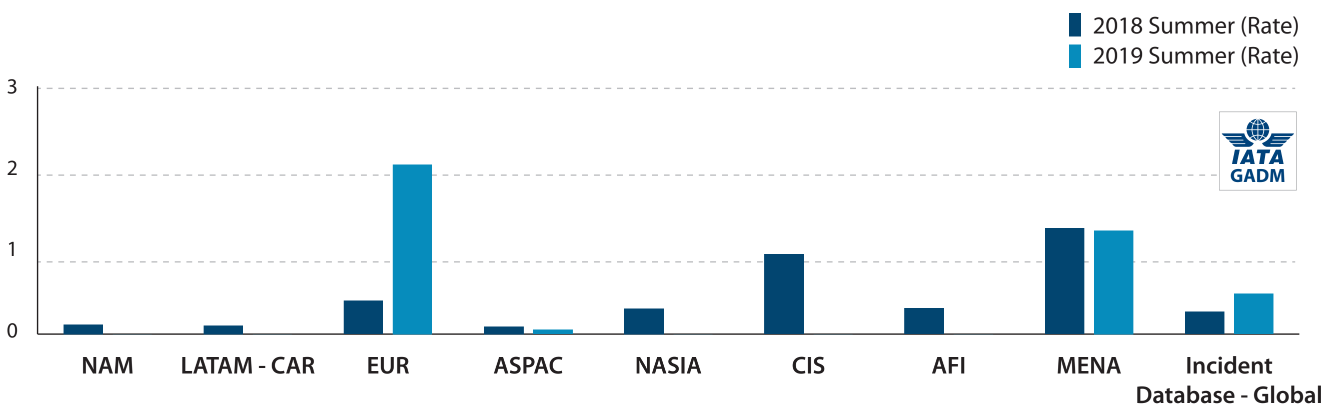
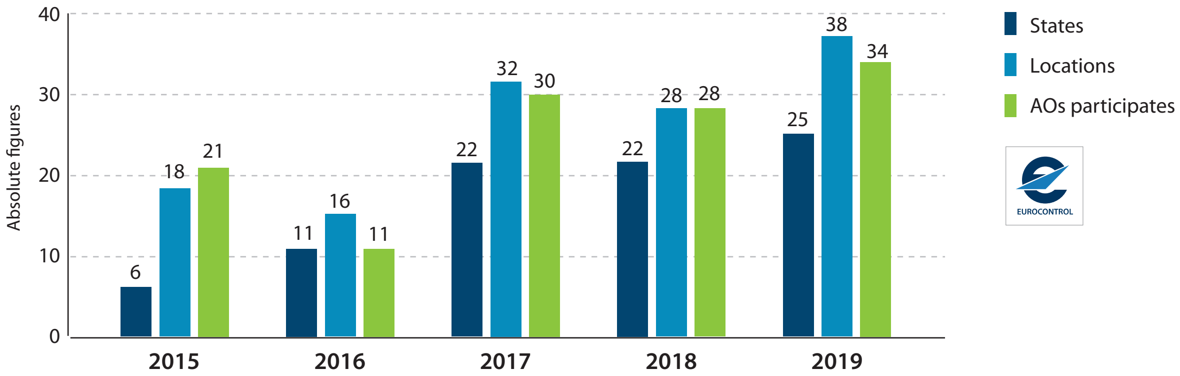
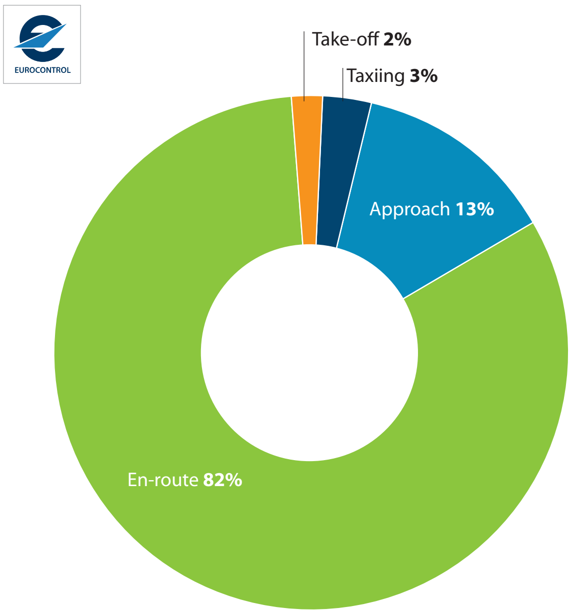


Figure 30: Loss of communication by State and Locations Full years and 2015-2019 summer periods



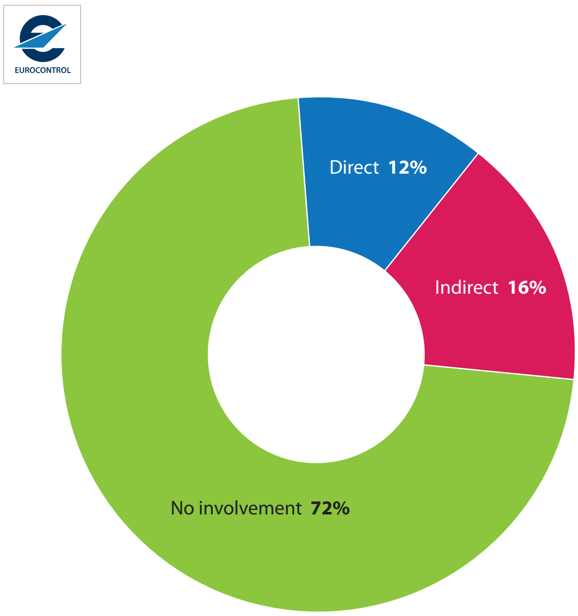
With regard to loss of communication trends by State, location and AO affected, EVAIR recorded an increase in summer 2019 compared with summer 2018 for all the three elements. During this period, EVAIR recorded 50% of all loss of communication events in three States. At the same time, the five worst affected locations accounted for 30% of the all loss of communication events. For the five-year period 2015-2019, five AOs accounted for almost 37% of all loss of communication events.

Figure 31: *Loss of communication phases of flight in the 2015-2019 summer periods*



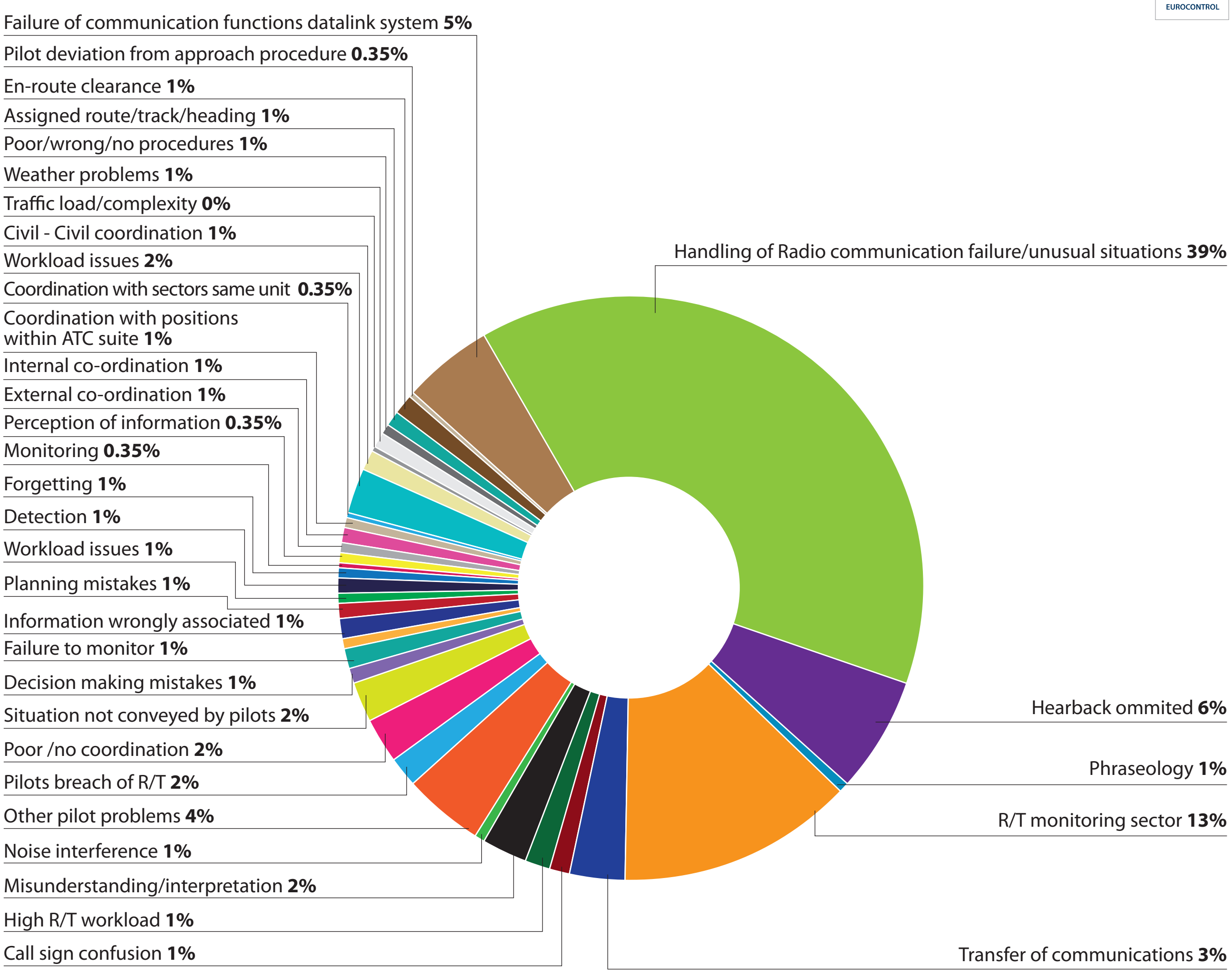
Most loss of communication incidents in the 2015-2019 summer periods (82%) occurred in the en-route phase. The most frequent causes of loss of communication in the en-route phase were hear back omitted, R/T monitoring sector and handling of radio communication.

Figure 32: *Loss of communication – ATM system contribution in the 2015-2019 summer periods*



ATM did not contribute to the majority of events, which means that the problems were in the airborne part of the ATM system, either problems with pilots or cockpit technical problems.

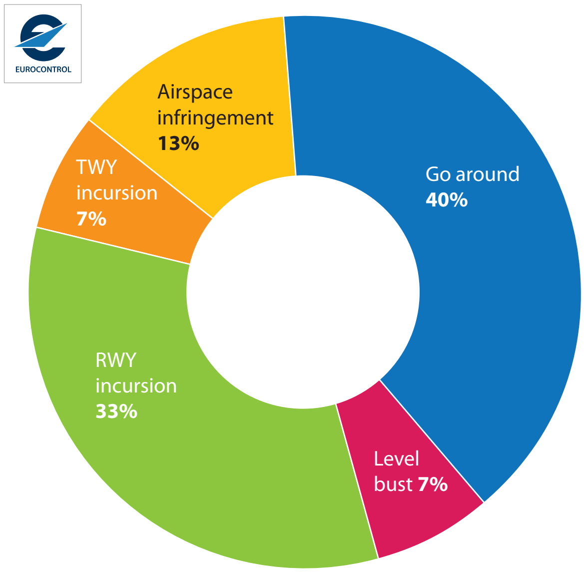
Figure 33: *Loss of communication contributors in the 2015-2019 summer periods*



As for the previous seasons, the main contributor to loss of communication was handling of radio communication failure/ unusual situations, which accounted for 39% of cases, which was less than in the previous five-year period. Handling of radio communication failure/unusual situations encompasses wrong frequency selection, forgetting to change the frequency, lack of ATC instruction to change the frequency, etc. Figure 33 gives a useful insight into the areas which might be addressed in order to mitigate the problem.

Although the majority of loss of communication events occur in en-route phase, loss of communication events occurring at low altitude are more risky, and are associated with other types of events and might also be their cause. In the EVAIR data base for the 2015-2019 summer periods, we have determined that loss of communication was associated with four areas, go-arounds, RWY incursions, TWY incursions and airspace infringements. Within these four areas, go-arounds is top with 43%, followed by RWY incursions with 36% (figure 34).

Figure 34: Events associated event with loss of communication in the 2015-2019 summer periods



De-identified occurrence reports

Airline report dated 1 April 2020

Five minutes after overflying DAM, the crew received a company message (ACARS) that the flight had lost radio contact and fighter planes were about to leave to intercept it. At that time, the crew was still listening to the ATC from SMA sector, and it seemed to the crew that they had never been transferred to the MTLU sector (the crew even talked about it, saying it should happen soon). The crew could hear radio exchanges loud and clear on the previous frequency. Unfortunately, 121.5 was not listened to. Contact was established with the next sector just after receiving the ACARS message from our operations (at 06:42 at the latest).

ANSP feedback facilitated by EVAIR

The crew made its last communication in SSEV airspace, on the frequency of the SMA sector, which was integrated with the SSEV sector. Some minutes later, when the SSEV and SMA sectors separated, the aircraft was in SSEV sector airspace but on the SMA sector frequency, so when ATC in the SSEV sector tried to transfer the flight to the MTLU sector, the crew did not respond. Later on, ATC in the MTLU sector tried unsuccessfully to contact the crew on its frequency. In the following minutes, the SSEV, MTLU and MDGU sectors tried to contact the flight on the emergency frequency, but no response was received from the aircraft. Finally, the crew made contact on the emergency frequency and on the MTLU sector frequency when the a/c was crossing through the MDGU sector. During the loss of communication with the flight, there were no conflicts with other traffic. The severity assigned to the incident was C – significant incident.

Airline report dated 1 May 2020

While in the cruise phase, we noticed that we had not been called by ATC for a while. We tried to contact ATC on the active frequency but got no answer so we tried to call on 121.500 and ATC gave us a new control frequency. Control told us after 10 minutes that the national air force would be intercepting us. Two military a/c reached us after 10 minutes. We tried to call them on 121.500 with no success and the ATC told us that they were not in contact with them. They stayed beside us from 19:05 UTC until 19:12 UTC and then left. We received no more instruction from ATC. We are not sure what happened with the radio (if the ATC forgot us or if we did not hear them). We were on 121.500 but with low volume owing to disturbing noises during the beginning of the cruise so we did not hear the calls.

ANSP feedback facilitated by EVAIR

On the basis of your Air Safety Report received on 13 June 2019 relating to the loss of communication occurrence dated 1 May 2019, we have made a short analysis.

The flight entered FERKO FIR at 18:14 at FL360. Since it did not make contact, the ACC controller called the neighbouring ACC1, informed them that the flight had not made contact and asked them to try to re-establish contact with it. However, the neighbouring ACC was also no longer in contact with the flight. The controller repeatedly tried to establish contact on both regular and emergency frequencies, but unsuccessfully. The company aircraft also tried to establish contact. Neighbouring ACC2 was informed of the situation. At 18:39, the company flight established contact on the emergency frequency and relayed the message to contact ACC2. At that time, the flight was approaching NOXBA. At 18:41, ACC2 confirmed establishment of contact with the crew. We have no further information on procedures taking place within ACC2.

Airline report dated 25 July 2020

During the cruise phase, a national military F18 intercepted the civilian flight. The military aircraft approached from the rear left, and positioned itself to the left and slightly forward at the same level. On seeing the fighter, the crew made contact on 121.5, and got the radar frequency from the military pilot. On reading back the frequency, the military aircraft asked the crew to continue with ATC, and broke away low turning right. The crew asked the controller why the flight had been intercepted, as the crew believed they were in contact with proper ATC. The controller said that the crew had not answered his calls. The rest of the flight continued without incident.

ANSP feedback facilitated by EVAIR

The flight established radio contact with the MWS ATC and was instructed to proceed direct to VICER point. Abeam GOV MWS, ATC instructed the crew to contact NW5 but no reply was received. Sectors SW5 and NW5 tried several times to establish radio contact, even on the emergency frequency, but without success. Neighbouring ACC2 was informed of the problem. The occurrence has been classified as a PLOC.

Here are the findings of ACC2:

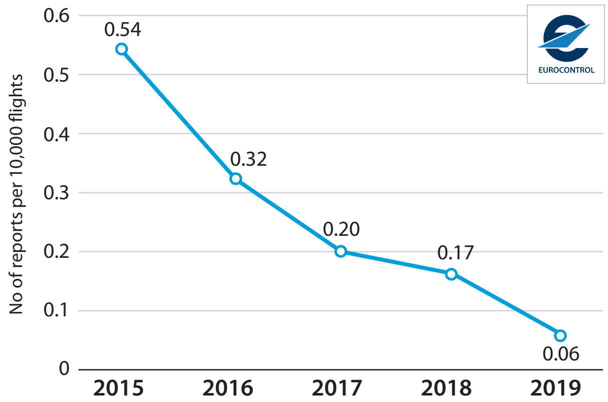
- 12:00:05 The ACC1 controller called the ACC2 controller to inform him that the flight was no longer answering.
- 12:00:18 The ACC2 controller tried to reach the flight on the operational frequency and also on 121.5 MHz.
- 12:04:05 The national military called the ACC2 controller to inform him that they had two jets in flight and that they would do a short close-up to relay the 121.5 MHz message. The ACC2 controller acknowledged and said that he was going to try via ACARS.
- 12:08:49 We can hear the crew trying to reach us on 121.5 MHz but the crew cannot hear us.
- 12:10:26 The controller requested the crew to contact ACC2 radar. This time the crew heard us and acknowledged.
- 12:10:43 The crew established contact.

SPECIFIC EVENTS

LASER THREATS ACROSS EUROPE IN THE 2015-2019 SUMMER PERIODS

The decreasing trend in laser threats continued in summer 2019. However, problems still exist and some States are still recording increases. For the most important stakeholders, above all police, AOs and ATC, the task is to work together in order to cope with the problems in the most efficient way.

Figure 35: *Laser interference in the 2015-2019 summer periods*



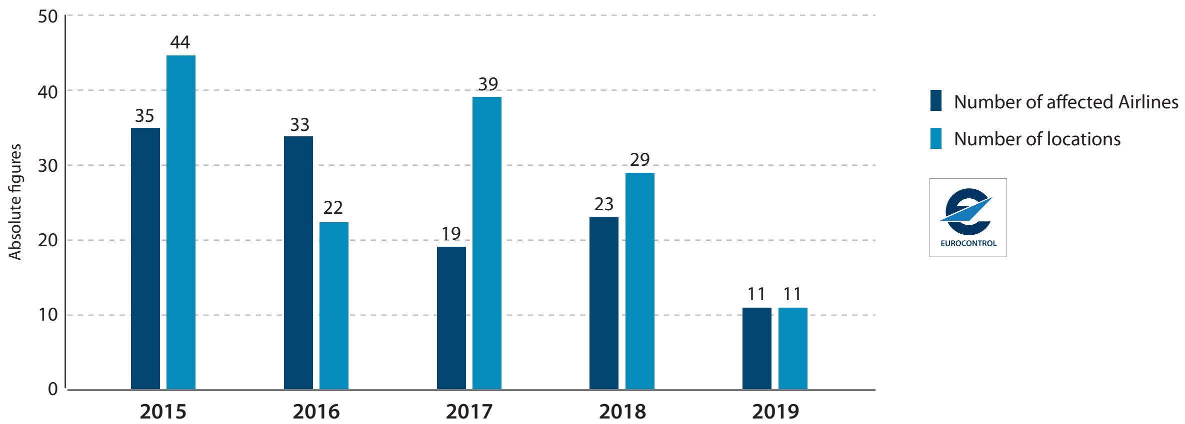
In 2015-2019 summer periods, laser interference reports represented for 7.7% of the data provided by AOs and ANSPs, but in summer 2019, such reports accounted for 1.9% only.

Normally, the final approach phase is the worst affected. It is worth pointing out that for the summer periods of the five years, EVAIR recorded 3% of the laser interference incidents between FL 200 and FL 390. According to pilots, these were green and blue lasers, apparently quite powerful since they reached aircraft at such high levels.

The duration of the laser incidents varied from a few seconds up to eight minutes, which leads us to the potential conclusion that the perpetrators may have used additional equipment, such as laser holders to target the aircraft. According to pilot reports, some of the laser interference was very powerful.

Annual trends in the number of reports by location and aircraft affected by laser interference show that in summer 2019 there was a significant decrease in the number of AOs affected and also in the number of locations (figure 36). This is in line

Figure 36: Laser interference by location and AO affected in the 2015-2019 summer periods



with the overall decreasing trend seen in Fig 35. From the reports received, we confirm that pilots followed very closely the recommended procedure, i.e. to report the interference to ATC, and ATC to forward the report to the police. In some instances, the police wait for the concerned aircraft to land in order to interview the pilots.

Reports can be sent to Dragica.stankovic@eurocontrol.int and/or evair@eurocontrol.int.
More information about lasers is available on SKYbrary (www.skybrary.aero).

De-identified occurrence reports

Airline report dated 14 July 2017

The laser attack lasted approximately 7 to 8 minutes. The captain noticed a blue laser being pointed at the aircraft while the aircraft was climbing through 14,000 ft. The location was a small village to the left side of the aircraft. The attack continued as the aircraft passed abeam and was definitely deliberate. ATC was advised.

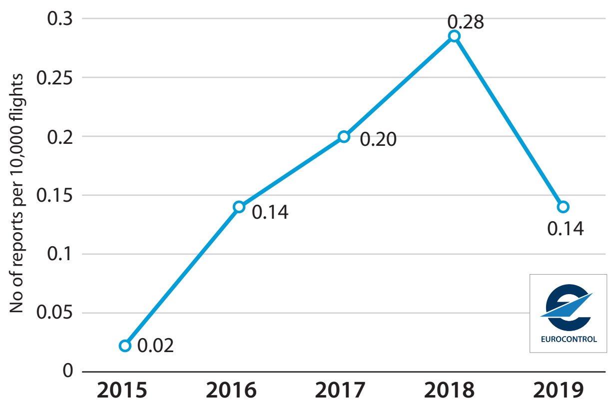
Airline report dated 5 August 2017

In the cruise phase at FL360 on UL608 tracking NW, the FO stated we were being tracked by a green laser. We were tracked for several minutes, and advised ATC of this. Having been laser-attacked several times in recent years, I was surprised that we were able to be reached at our cruising level.

RPAS – REMOTELY PILOTED AIRCRAFT SYSTEMS/DRONES IN THE 2015-2019 SUMMER PERIODS

EVAIR drone statistics are based on ATM incident data provided by commercial airspace users and European ANSPs, including a few ANSPs from neighbouring regions. The clear majority of reports come from aircraft operators.

Figure 37: *RPAS trends in the 2015-2019 summer periods*



In summer 2019, for the first time since EVAIR started monitoring RPAS/drones in European airspace, we recorded a reduction in the number of reports (figure 37). However, after having meetings with airline associations and their members, the impression is that there were many more encounters but that reports were not submitted to EVAIR. We would like to take this opportunity to invite ANSPs and AOs to report to us all their RPAS/drones encounters. Increased reporting enables us to make a better analysis, and equally important to support other projects dealing with RPAS/drone problems. Without a good set of data, this analysis and support will not be possible.

RPAS/drones by State and location

Until summer 2018, EVAIR had recorded a continuous increase in the number of States and locations affected by uncoordinated RPAS/drone activities. On the other hand in summer 2019 we recorded a drop in each of the areas monitored in line with the overall drop in the number of RPAS/drone occurrences collected.

It is important to emphasise that for the five summer periods, the majority (87%) of events were recorded in just three States out of the twenty-two that submitted reports. It is also important to point out that the number of reports and therefore the percentage are very closely linked to the main airport hubs, where our best reporters, mostly AOs, operate.

Figure 38: *Drone spread by State, Location and AO affected in the 2015-2019 summer periods*

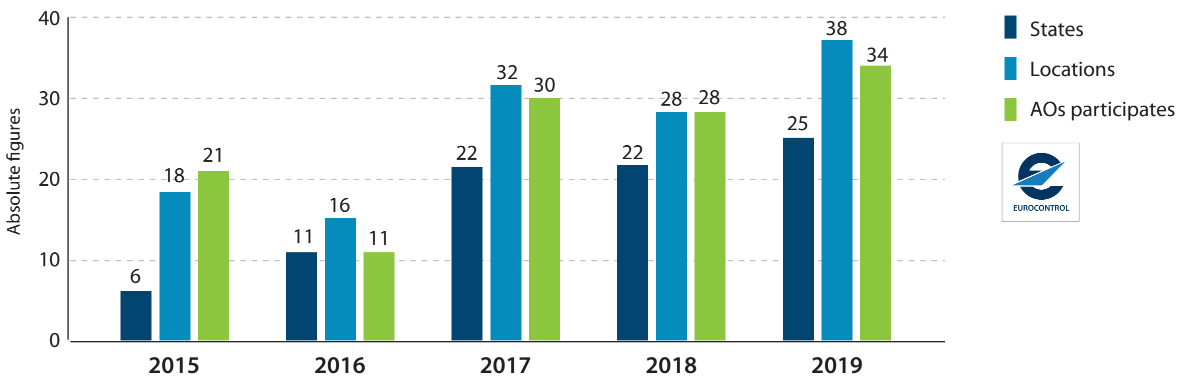
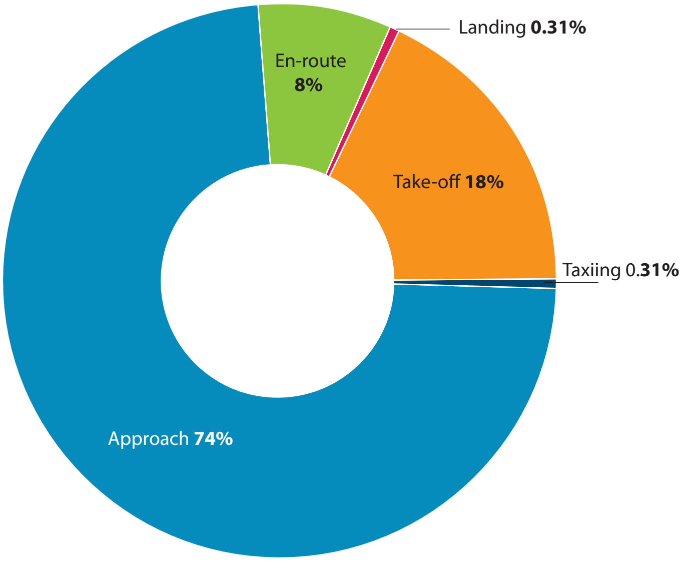
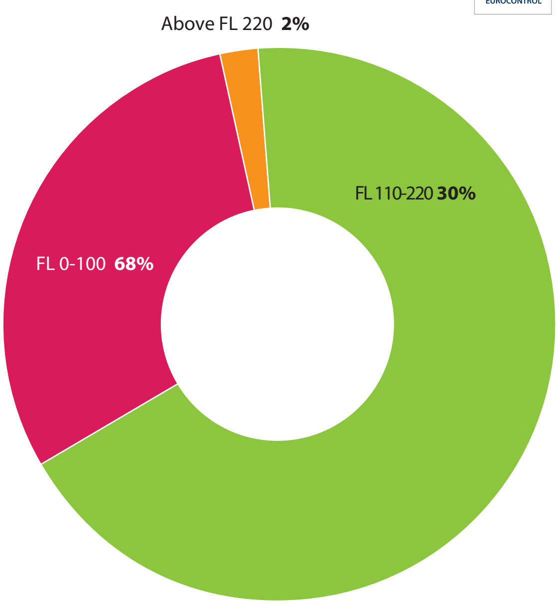


Figure 39: RPAS phases of flight in the 2015-2019 summer periods



The data show that the absolute majority of drone incidents occurred in the approach phase, either during arrival or departure. In many cases, encounters were so close that pilots were able to describe the shapes, sizes and colours of the drones.

Figure 40: RPAS distributions across FLs in the 2015-2019 summer periods



In the 2015-2019 summer periods, most of the reports concerning RPAS/drones (68%) were recorded at the low levels from 0 to FL100. EVAIR recorded very few at high FLs. The highest incident recorded in this five-year period happened at FL 310.

EUROCONTROL is cooperating with all European aviation stakeholders in activities aimed at safely integrating RPAS. You can read more about EUROCONTROL involvement in the RPAS field here at www.eurocontrol.int/unmanned-aircraft-systems and www.eurocontrol.int/tool/uas-no-fly-areas-directory-information-resources.

The following links contain further information on RPAS/drones, published by various international organisations:

ICAO:
http://cfapp.icao.int/tools/ikit/rpasikit/story.html
https://www.icao.int/safety/UA/UASToolkit/Pages/default.aspx

EC 'The future of flying":
www.ec.europa.eu/transport/modes/air/news/2015-03-06-drones_en.htm

EASA:
https://www.easa.europa.eu/system/files/dfu/204696_EASA_concept_drone_brochure_web.pdf
https://www.easa.europa.eu/newsroom-and-events/news/partners-step-efforts-address-integration-drones-european-airspace

Joint Authorities for Rulemaking on Unmanned Systems:
http://jarus-rpas.org/

De-identified occurrence reports

Airline report dated 12 April 2019

Cleared to FL120 on the present heading, passing FL98 FO saw an object above and in front of the aircraft. The object, which appeared to be a large black quadcopter, passed over and slightly to the right of the aircraft. The FO estimated 50-100 ft vertical and 10-20 ft lateral separation between the flight deck and the drone. Speed: circa 250 kts. Drone sighting reported to ATC.

Airline report dated 10 April 2019

Drone observed on final approach. Drone observed by captain on extended runway centre line. Aircraft at 800 ft, approx. 2 miles from threshold, drone seen directly ahead, 100-200 ft below and stationary. ATIS stated drone activity reported. Drone assessed as not an immediate threat and approach continued to landing. Sighting reported to tower. Police met aircraft on arrival.

Airline report dated 31 May 2019

Drone near-collision. At 4.8d 1,700 ft, I saw a drone at the same altitude, stationary in position. No colour or make possible but estimate less than 100 m in proximity. Slowed aircraft, reported to tower ATC.

Airline report dated 19 June 2019

During approach at 3,400 feet on the G/S, we both saw a moving object flying towards us, slightly to the right of the LOC. Initially we thought it was a bird, but then we realised it was a drone. It flew very close to the FO's window, and we initially thought that it had gone into the right engine. Luckily, we missed it. The tower was informed immediately, and they informed the police. It was quite a big drone, and if it had struck the engine, it would have led to an engine explosion.

Airline report dated 22 August 2019

In the south-east Mediterranean, we were cleared to climb to FL 220 by ATC. TCAS indicated that we had traffic coming towards us level at FL 230. We were a little perplexed, as the traffic hardly appeared to be moving at all. It was very well lit with NAV lights and strobes. On further questioning, ATC stated that they believed it was a neighbouring State's military drone and they were not controlling it. Its altitude was unverified, as it was obviously not in contact with Nicosia. The drone appeared to be orbiting at a very slow speed. Its altitude was consistent with our TCAS. We passed beneath it and to the right, having reduced our rate of climb significantly. From what we could see (it was night-time), it was a large military drone. At no stage was there a risk of an AIRPROX. Although there was no safety event as such, I am submitting this as a heads-up for any one operating in the region, as this type of occurrence appears to be increasing. Air forces intercept this type of military drone. It appears that military drones are being operated as if they are in uncontrolled Class G airspace. The reality is that the airspace is Class C and they are being operated without permission and within another country's sovereign airspace. This practice is inherently unsafe and just adds another level of risk to various nations' airspace political fudge.

GPS OUTAGES IN THE 2015-2019 SUMMER PERIODS

GPS analysis and statistics provide a general overview for the 2015-2019 summer periods within ECAC and the neighbouring airspace. The first GPS outages reported in 2013 attracted attention as a new type of event in the EVAIR database. Interested stakeholders, AOs, ANSPs, including IATA, and EASA were duly informed. Since then, EVAIR has been regularly informing our main stakeholders about GPS outage trends and associated problems.

Within the EVAIR mechanism, there is a special track for the collection of GPS outage reports. For the 2015-2019 summer periods, when comparing GPS outage reports with the rest of the ATM reports the GPS outage reports accounted for 24% of all data. This is much higher than in the previous five-year period (2014-2018) (when such reports were not systematically collected).

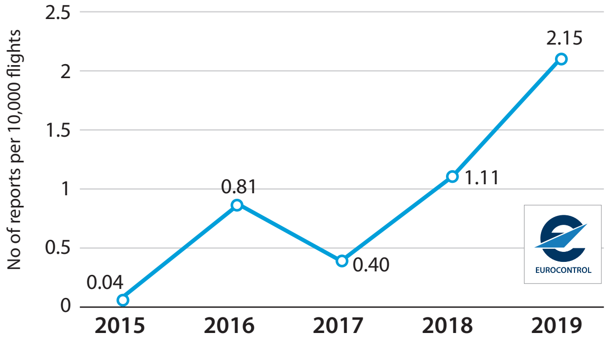
We wish to emphasise that following repeated requests to AOs to provide GPS outage reports, the number of GPS outage reports increased. Apparently, AOs now pay more attention to GPS outages and report to EVAIR more regularly, even without additional reminder messages.

GPS outage reports collected by EVAIR, as well as information obtained from various meetings attended by aircraft operators and ANSPs, have confirmed that the problem not only exists but that it is also increasing. While it cannot be quantified how much of the increase is due to improved reporting, the significance and annual variation in the increase suggests that GPS outages are indeed becoming a clearly present operational problem.

As in the past, GPS problems are reported more within PBN airspace and at airports where SID/STAR procedures are based on satellite navigation. Data collected so far and discussions with experts from different aviation areas (safety, navigation, surveillance, and communication) have led to the conclusion that satellite navigation remains most vulnerable to radio frequency interference (RFI), because other possible causes (satellite constellation problems, receiver problems, and significant solar activity) have remained rare during this reporting period. In this regard, aircraft operators continue to caution ANSPs against excessive plans to decommission ground navigation aids and to maintain GNSS-independent surveillance capabilities.

EUROCONTROL experts are trying to identify safety problems related to GPS outages and are raising awareness about the problem, working closely with experts from IATA, EASA, ICAO and other organisations involved in the implementation of satellite navigation technology.

Figure 41: *GPS outages for the 2015-2019 summer periods*



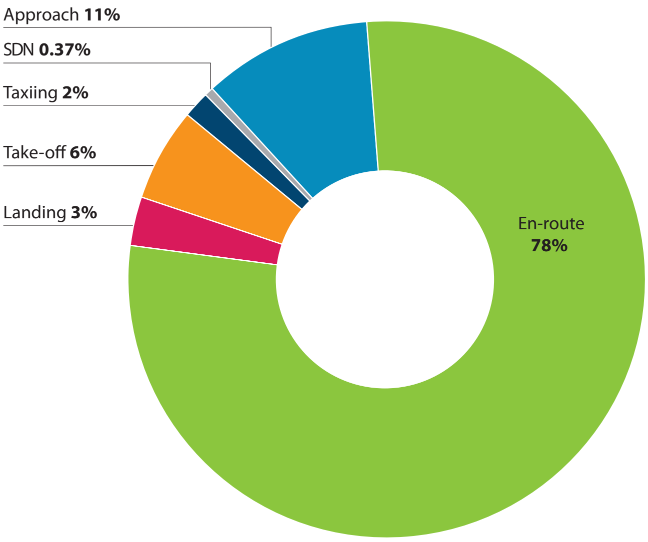
The 2018-2019 summer trends show a very high increase, nearly doubling the rate of occurrence. For the period monitored, EVAIR identified 43 FIRs affected by GPS outages. From a geographical point of view, the worst affected regions remained the same, namely the eastern Mediterranean, the Europe/Middle East axis and the Black Sea/Caspian Sea axis.

As for the previous period, detailed analysis confirmed that the majority of GPS events occurred near areas of political tension, which suggests that the potential causes of such outages could have been intentional interference. The presence of RFI affecting aircraft at significant distances and altitudes from conflict zones have been confirmed by a number of independent in-flight measurements.

Regardless of geographical region, personal privacy device (PPD) jammers were identified as a potential cause of GPS outages. For the 2015-2019 summer periods, there were no PPD jamming cases in the EVAIR database. However, there is one known case where aircraft departures were delayed because the aircrew were unable to initialise GNSS receivers during pre-departure checks and establish satellite navigation. Further effects on airport operations due to PPD or other illegal jammers cannot be excluded, but can be difficult to identify.

A multidisciplinary team within EUROCONTROL, supported by external experts and organisations, continues its work on an operational impact assessment of GPS outages. In this connection, the data provided are of the utmost importance and we would take this opportunity to invite airlines to continue reporting to EVAIR not only other ATM occurrences but also GPS outages.

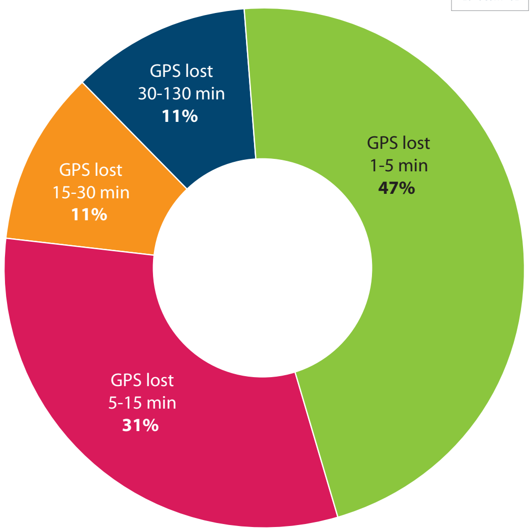
Figure 42: *GPS outages by phase of flight in the 2015-2019 summer periods*



In general, the percentage of GPS outages by phase of flight is similar to that in the previous period. As usual, the most affected phase was en route. The approach phase came in second place with 11% where the approaches affected are those following SID/STAR procedures based on satellite navigation. The worst affected airports are in the south Mediterranean and the Middle East.

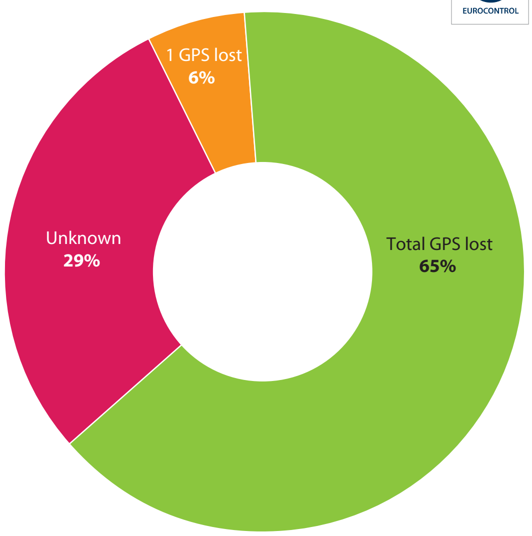
The duration of the lost GPS signal indicates the size of the affected region. Since the majority of the affected traffic is en-route, where the average aircraft speed is 8 NM/min and more, then it is not too difficult to calculate the size of the area or airway longitude where there was no GPS navigation (figure 43). The worst cases are those where GPS was lost for between 30 minutes and more than 2 hours, which was 11% of the GPS cases in the EVAIR database. Translated into nautical miles, this means that the distance flown without GPS was between 240 NM and 1,400 NM, an extremely long

Figure 43: *Duration of GPS outages in the 2015-2019 summer periods*



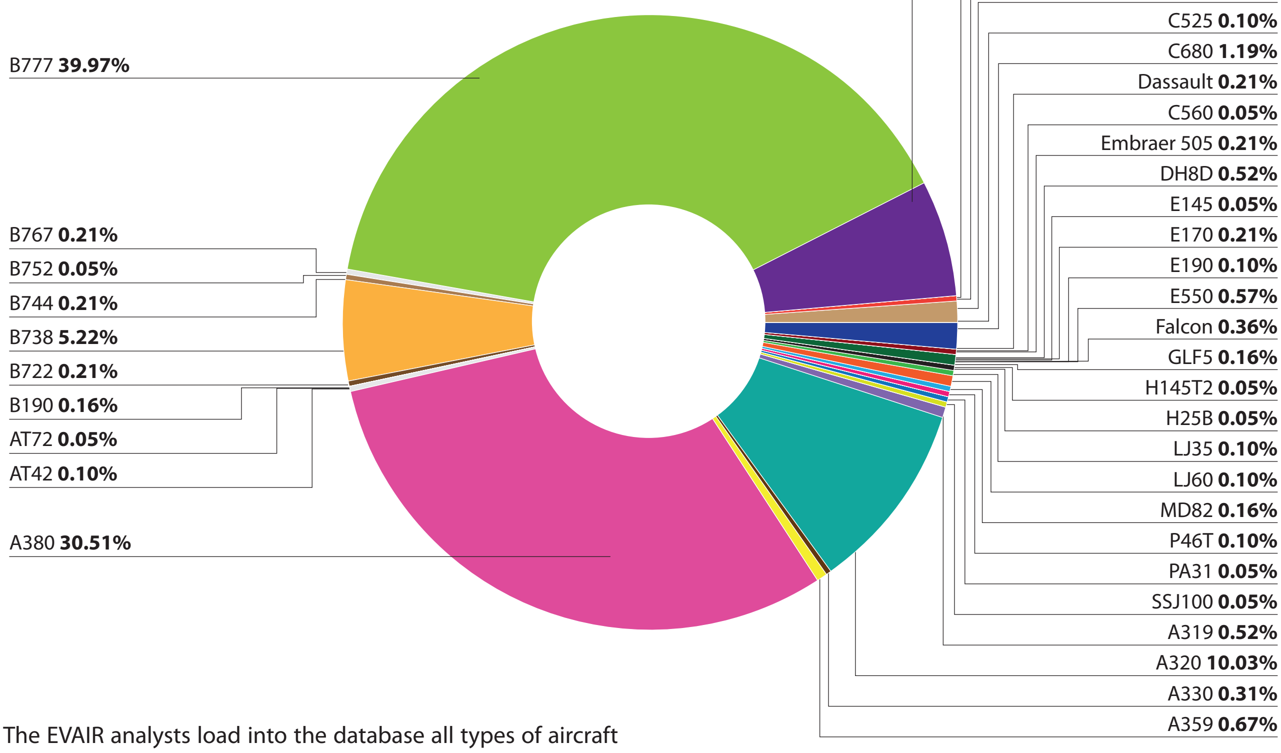
route and covering an extensive area. It should not, however, be concluded that RFI was present over such a large distance because some GPS receivers fail to return to normal operation after clearing the RFI zone. Several such receiver problems have been reported and are being resolved by manufacturers. Most often, the GPS signal was lost for between 1 and 5 minutes, which represented 47% of the GPS data for the 2015-2019 summer periods.

Figure 44: *GPS loss in the 2015-2019 summer periods*



The majority of commercial airlines, which are the main EVAIR reporters, have two GPSs on board. The reports sent to EVAIR typically contain information about loss of function of either or both receivers, i.e. partial or total GPS loss. A number of GPS reports omit the information about the number of GPS receivers affected and are presented as 'Unknown' in the figure above. In the 2015-2019 summer periods, 65% of the reports containing information about GPS loss reported total loss.

Figure 45: *Type of aircraft affected by GPS failure in the 2015-2019 summer periods*



The EVAIR analysts load into the database all types of aircraft reported, including different versions of the same type, e.g. B777, B772, B773, B778, and B77L. For better presentation on the graph, we present them as the basic type, B777. The same applies to different versions of different Airbus types. If we were to include in the statistics all versions of the same type of Boeing or Airbus, we would have more than 100 different types, which would be impossible to represent. However, if needed for in-depth analysis, we are prepared to provide more detailed information for stakeholders on request.

The worst affected aircraft types are those, which fly most frequently through the areas affected by GPS outages. As for the previous period, the most affected were B777s and A380s. However it should not be concluded from this that GPS receivers installed in such aircraft are of lesser quality.

In this Bulletin, we reiterate that, in accordance with the ICAO GNSS Manual (Doc 9849), ANSPs which identify or receive reports of GNSS problems must issue an appropriate NOTAM if the outages are of a frequent nature. So far, however, few States have issued NOTAMs, even though the areas in question are very wide and many States have been affected. The issuing of NOTAMs is crucial if aircraft operators are to be properly prepared to use alternate navigation when flying through the regions affected. The OPADD (include reference) include a format for such NOTAMS. Furthermore, if the probable cause of the GPS outage is RFI, the ANSP should inform the corresponding radio regulatory authority, provide all available relevant details, and request an investigation.

Note: The official ICAO term for satellite navigation is GNSS, Global Navigation Satellite System. This includes GPS, GLONASS, and corresponding augmentation systems. However, for reporting purposes, pilots generally simply refer to GPS.

De-identified occurrence reports

Airline report dated 1 April

Right after take-off, the crew experienced a common well-known GPS outage, with the associated CAS messages. GPS2 remained active until 0611 UTC when the crew experienced a complete GPS failure. The crew asked for radar vectors for the rest of the departure. Just after complete GPS failure, the crew experienced a lightning strike with a possible loss of all communication This did not happen, but it could have made the GPS outage a much higher safety risk.

Airline report dated 8 April 2019

Failure of both GPSs leading to "unable RNP NAV and Terr Pos EICAS cautions". When transiting between the Middle East and Europe at FL400, the crew experienced failure of both GPS on the aircraft. This led to "NAV unable RNP and EICAS cautions followed by Terr Pos". Both ECL checklists were actioned. DME updating was selected and navigation performance was restored. Both GPSs returned to normal operation after approximately 25 minutes.

Airline report dated 6 April 2019

After take-off in the Middle-East, we experienced a double GPS failure. The failure occurred at around 2015 UTC and lasted until approximately 2045 UTC. The checklist was gone through, a navigation check was performed with the closest VOR, and ATC were informed. ANP increased to 3.0 and we had the message UNABLE REQ NAV PERFORMANCE. Radar vectors were requested from ATC. After 30 minutes, our GPS became operational again. The transponder FAIL light was lit during this event but ATC observed no problems and we could also see other traffic on TCAS.

ACAS REPORTING IN THE 2015-2019 SUMMER PERIODS

In accordance with earlier agreements and requests from our stakeholders, EVAIR tries to identify and monitor operational, procedural and technical problems related to ACAS. The activity forms part of the obligation taken over following the successful implementation of the mandatory carriage of ACAS II. The aim of the monitoring remains unchanged – to support the continued safe and effective operation of ACAS by identifying and measuring trends and problems associated with resolution advisories (RAs).

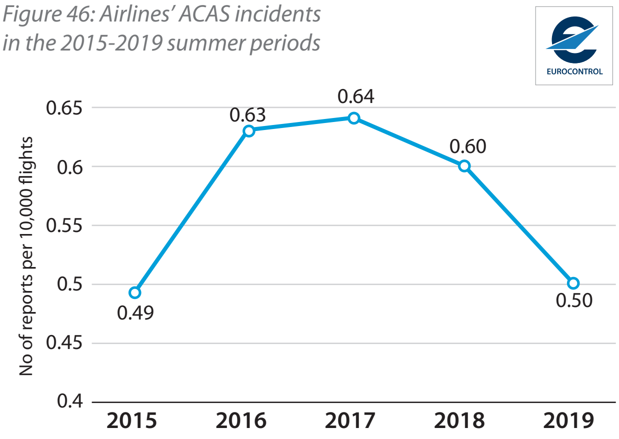
ACAS is the generic term for airborne collision avoidance systems, of which TCAS II is the only system implemented to date. The purpose of ACAS is to improve air safety by acting as a 'last-resort' method of preventing mid-air collisions or near-collisions between aircraft. Although ACAS II implementation was completed in 2005, ACAS monitoring continues in order to improve safety by identifying technical, procedural and operational deficiencies. TCAS II version 7.1 was made mandatory within European Union airspace on all civil aircraft over 5,700 kg MTOW or 19 passenger seats as from December 2015, and since then EVAIR has been focusing its monitoring on the performance of the new version of TCAS.

ACAS RA statistics are the product of the data provided by safety managers at airlines and air navigation service providers (ANSP).

We wish to point out that some ACAS/TCAS reports which were not followed by feedback from ANSPs rely on pilot and air traffic controller perceptions and memories of the events rather than measured or calculated values. A significant number of ACAS RA reports are supported by ANSP feedback based on operational investigations, including radar and voice records.

AIRLINE ACAS REPORTING IN THE 2015-2019 SUMMER PERIODS

Figure 46: Airlines' ACAS incidents in the 2015-2019 summer periods

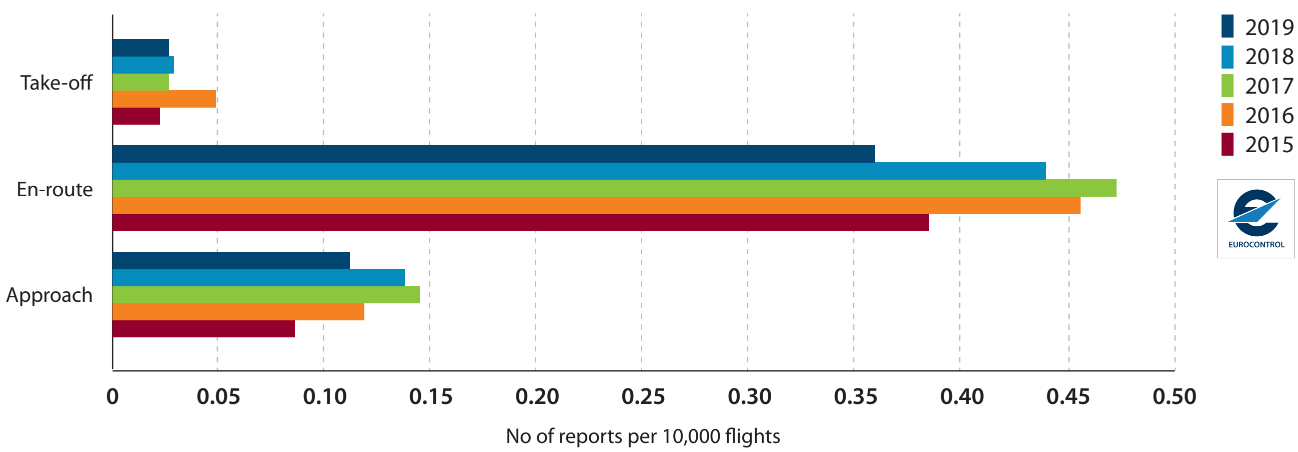


ACAS RAs accounted for 18.5% of ATM incident reports provided mainly by AOs for the 2015-2019 summer seasons, whilst in summer 2019, ACAS RAs accounted for 16.6% of the total. Summer trends (the number of reports per 10,000 flights) show a slight decrease after three years of more or less same levels of ACAS RAs. If we look at the ten-year period, what we see is that the number of ACAS RAs fell from 1.2 in summer 2010 to 0.5 ACAS RAs per 10,000 flights in summer 2019.

The absolute figures for ACAS RAs by aircraft operator/AO, State and location show that in summer 2019, EVAIR recorded a reduction for States and locations and a small increase in the number of AOs. In the 2015-2019 summer periods, six States out of 56 in which EVAIR recorded ACAS RAs, accounted for 80% of the ACAS RA events. The six states in which EVAIR recorded the majority of ACAS RA are at the same time areas with the highest traffic volumes (figure 48).

Following summer 2018, when nuisance and useful RAs remained at the same level for the first time since EVAIR started monitoring them, EVAIR recorded a much higher level of useful RAs in summer 2019, which confirms the trust pilots have in the technology (figure 49).

Figure 47: *Airline ACAS RAs by phase of flight in the 2015-2019 summer periods*



Throughout the entire monitored period, which in EVAIR started in 2006, the en-route phase at pan-European level records more reports than other flight phases. In summer 2019, all phases of flights recorded a reduction in the number of ACAS RAs.

Figure 48: Airline ACAS RA occurrences by State, location and carrier in the 2015-2019 summer periods

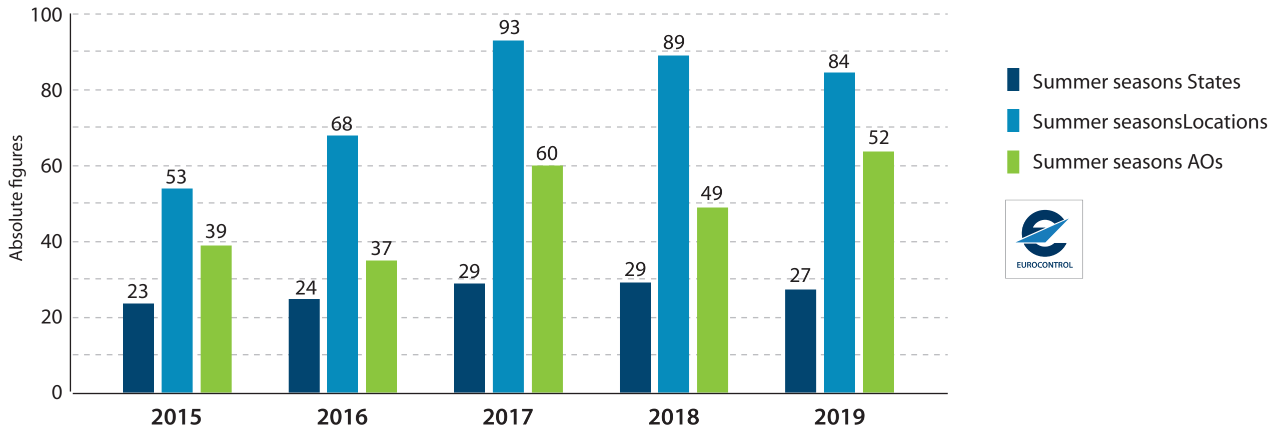
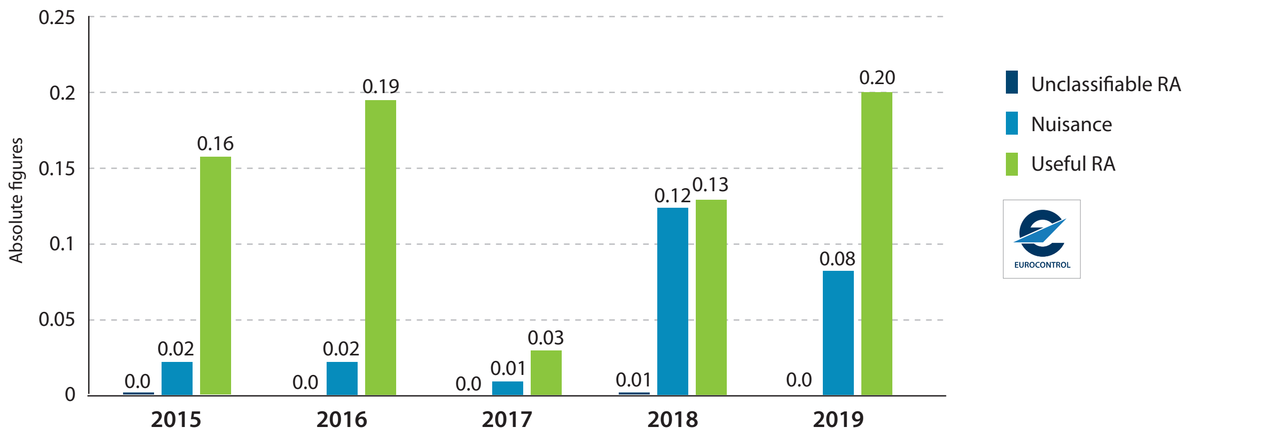


Figure 49: ACAS RA classification in the 2015-2019 summer periods

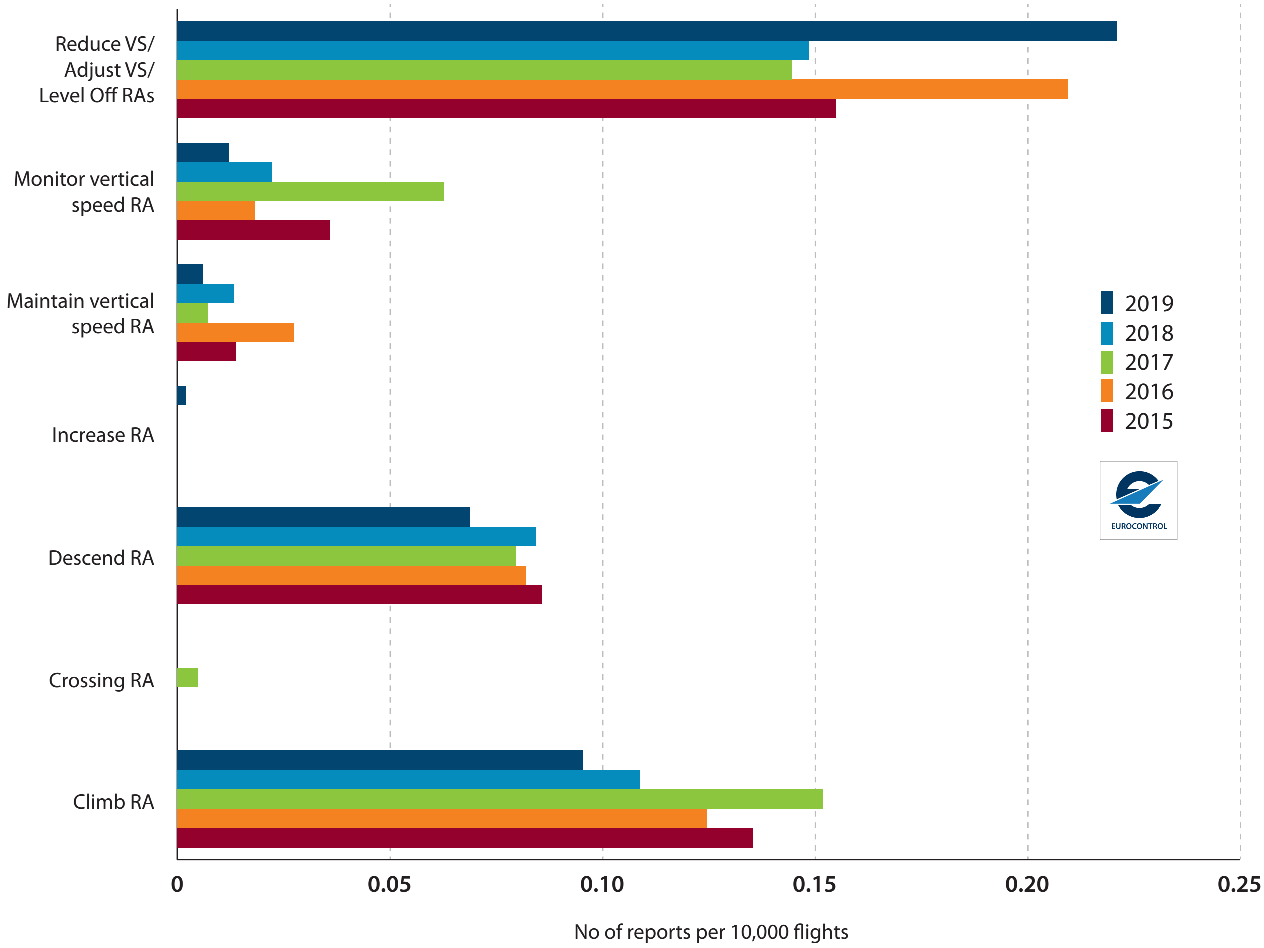


ICAO ADREP definitions of types of RA are shown below.

- **Useful RA** – The ACAS II system generated an advisory in accordance with its technical specifications in a situation where there was, or might have been, a risk of collision between aircraft.
- **Unnecessary (Nuisance) RA** – The ACAS II system generated an advisory in accordance with its technical specifications in a situation where there was not, and could not have been, a risk of collision between aircraft.
- **Unclassifiable RA** – The ACAS II system generated an advisory that cannot be classified because of insufficient data.

ACAS RA INSTRUCTIONS IN THE 2015-2019 SUMMER PERIODS

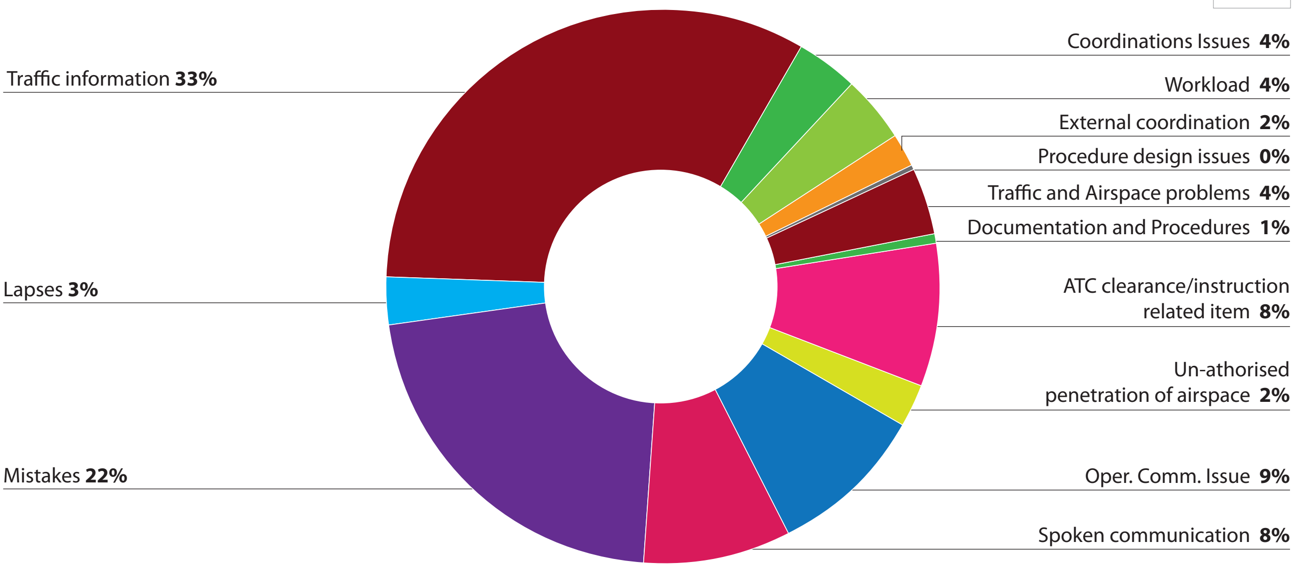
Figure 50: *ACAS RA instructions in the 2015-2019 summer periods*



In summer 2019, the only area of ACAS RA instructions, which recorded an increase, was level-off RAs. After two years of decreases, level off RAs reached the level of summer 2016, which was one of the highest for this type of ACAS RA. A drill down through the level off RA reports showed that a high vertical rate was the cause of 50% of them.

ACAS RA CONTRIBUTORS IN THE 2015-2019 SUMMER PERIODS

Figure 51: *ACAS RA contributors in the 2015-2019 summer periods*



In the 2015-2019 summer periods, 4 out of 13 of the most frequent ATM operational ACAS RA contributors accounted for 80% or reports. Among these four areas, traffic information was the highest percentage (33%). We are of the opinion that identification of the most frequent contributors is a good indicator of the direction in which to orient efforts to improve the current situation.

Figure 52

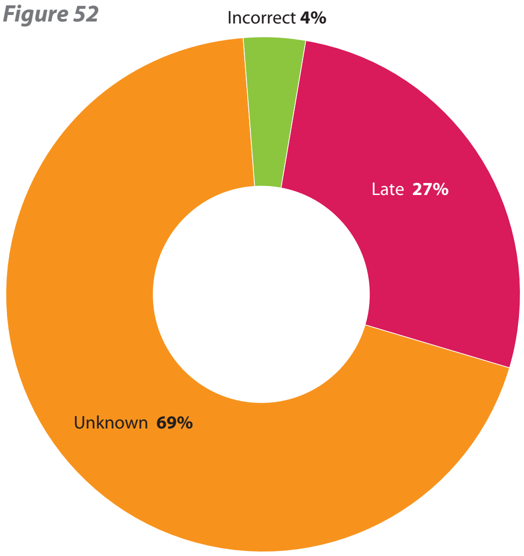
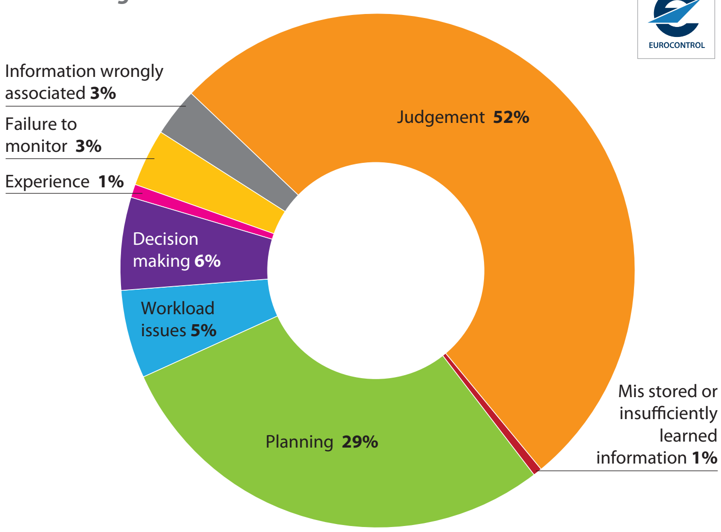


Figure 53



In the 2015-2019 summer periods, in reports in which it was possible to identify problems related to traffic information the main contributor was late provision of traffic information (27%), the item which relates directly to controller work.

In the category mistakes, judgment and planning are the most frequent problems. They account for more than 80%. These are contributors directly related to controller work and are very often linked to a need for additional training.

AO report dated 27 May 2019

On 27.5.19, the flight descended following STAR. It was cleared to descend to 7,000 ft. The flight was at about 9,000 when the radar controller instructed us to turn right to heading 150° and to continue descend to 7,000 ft. Ten minutes before that, the crew heard ATC advising that there was uncontrolled traffic in the approach. ATC gave several radar vectors to avoid that traffic. As soon as the flight reached 8,000 ft, traffic appeared on TCAS 4 miles ahead without an altimeter indication. The crew looked visually for the traffic. Finally, the traffic was in sight by both pilots. The traffic was turning to the right when TCAS triggered an advisory. The crew took control. The autopilot was disconnected to turn to the left because the traffic was very close to the flight position.

The crew immediately transmitted to ATC about the TA and the traffic in sight at their altitude, its position and opposite direction. The crew reported to ATC about their left turn to separate as much as possible because they realised that there was no altitude indication on the TCAS. The other traffic did not communicate anything to ATC. It was suspected that TCAS was not working properly to give us a TA-RA. Two seconds later, the crew turned to the left, and ATC instructed them to go direct to KEBOT. There was no other communication or explanation by ATC regarding this incident.

ANSP Feedback facilitated by EVAIR

VFR traffic with transponder A7000 was engaged in firefighting efforts. The aircraft coming from the south-east was flying at altitudes between 5,400 and 4,600 ft. It was not known whether this VFR traffic was on the frequency of any ATC. The commercial aircraft was descending to 7,000 ft on heading 150º and was in contact with ATC. The other flight on the ATC frequency had carried out flight tests on the DVOR/DME, and was descending to 9,000 ft. It came directly to NDB EG and was on the frequency of the same ATC. The firefighting VFR traffic penetrated at least two ATC sectors' class A airspace (reserved for IFR flights), without making radio contact and thus without having obtained authorisation to fly in that airspace. The VFR aircraft flew above the maximum altitude for VFR flights. At the time when the commercial flight was descending through 8,900 ft, at 1.7 NM and on a heading convergent with the firefighting VFR traffic, the latter turned off mode C for almost 4 minutes, contrary to what was published in the national AIP for TMA VFR procedures. The procedure states that if an aircraft is equipped with Mode C, it is mandatory to respond in mode A/C. At the moment when ATC was informed of the existence of the VFR traffic at 4,000 ft, the commercial flight reported a TCAS RA.

Although the description of commercial flight was OK as was the report from the aircraft making the calibration at 9,000 ft, there was some confusion about the TCAS RA towing to the absence of altitude information for the firefighting aircraft.

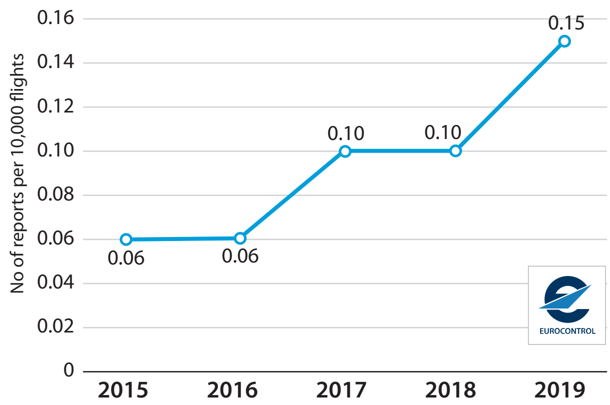
In the previous traffic situation, ATC had to stop the descent at 6,500 ft of the other aircraft descending to 5,000 ft and going to KEBOT, precisely because of the presence of the firefighting aircraft, which at that time was flying between 5,400 ft and 5,000 ft and proceeding on a convergent heading. As mentioned above, the firefighting VFR aircraft stopped displaying altitude information for 4 minutes. At the previous instant, its altitude had been 4,900 ft and at the subsequent instant 5,100 ft, hence it is quite probable that the vertical separation from the commercial flight aircraft was between 3,800 and 3,600 ft at the moment of crossing. Finally, a few minutes after the conflict, the firefighting aircraft contacted ATC and was instructed to carry out its firefighting work at altitudes between 4,000 and 4,500 ft so as not to interfere with approach traffic. The controllers stated in their reports that they were not aware of any fire or aerial extinguishing operations.

WAKE TURBULENCE IN THE 2015-2019 SUMMER PERIODS

EUROCONTROL has been involved for years in many different wake turbulence (WT) activities as a leader or supporting other organisations. In general terms, the main aim of all these activities is identification of the problem and its mitigation.

Since it has been established, EVAIR has been collecting, inter alia, data related to wake turbulence and has been supporting wake turbulence activities internally and externally.

Figure 54: *Wake turbulence in the 2015-2019 summer periods*



The 2015-2019 summer season trends in the EVAIR database show an increase of WT incidents. The highest jump was in summer 2019. In the five summer periods, WT incidents in EVAIR database accounted for 3.1% of the reports provided by AOs and supported by ANSP feedbacks. Thanks to the large increase in WT reports in summer 2019, the percentage of WT reports in the summer 2019 data increased to 4.8%.

Based on AO narratives and severity categorisation, EVAIR identified that 17% of the WT reports in the 2015-2019 summer periods, were categorised as moderate to severe turbulence, and 3.2% of the WT reports ended with an impact on passengers or cabin attendants (shock, light injury, fainting passengers, etc.).

EVAIR data indicate that the heavy aircraft category was the generator of WT in 58% of WT reports. In these situations, the aircraft encountering WT was a medium category. In 20% of WT reports, a medium category aircraft was the generator of WT for another medium category aircraft.

The seriousness of the WT is also expressed in AO reports in terms of the aircraft banking after encountering the WT. Such events represented 38% of the WT reports with the ranging from 5 to 40 degrees in the 2015-2019 summer periods. Owing to serious turbulence, the autopilot was disconnected in 27 % of the WT reports.

Like the EVAIR database, in the IATA GADM, the European operators recorded a significant increase in summer 2019, while on the overall global level WT showed a decrease in the same period (figure 55). The CIS region also recorded a WT increase in summer 2019, while the rest either had a decrease or recorded no WT cases.

Figure 55: *IATA wake turbulence global and regional trends in the 2018-2019 summer periods*

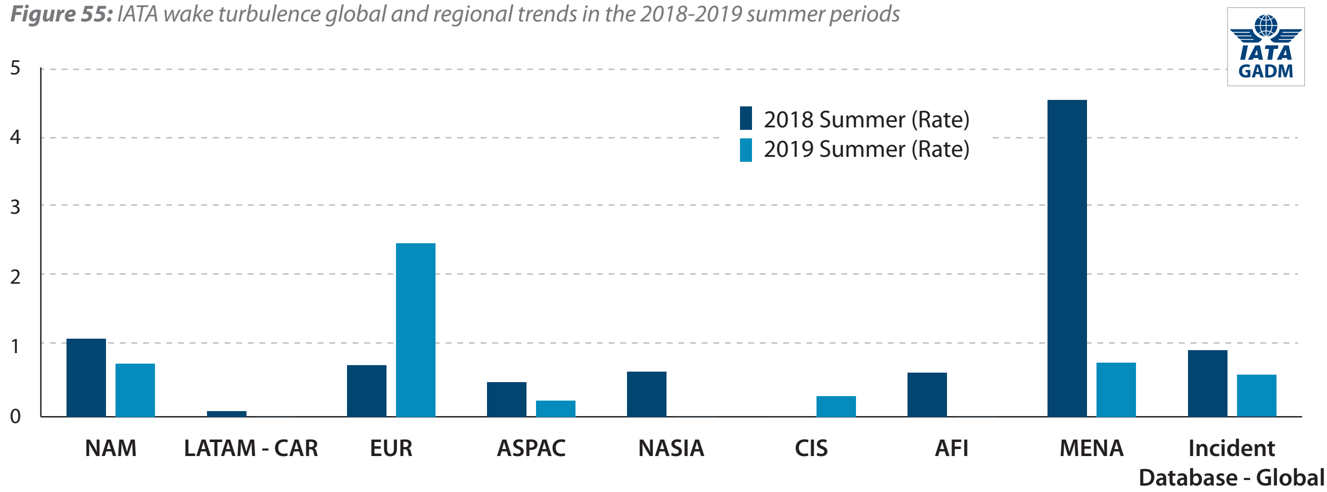
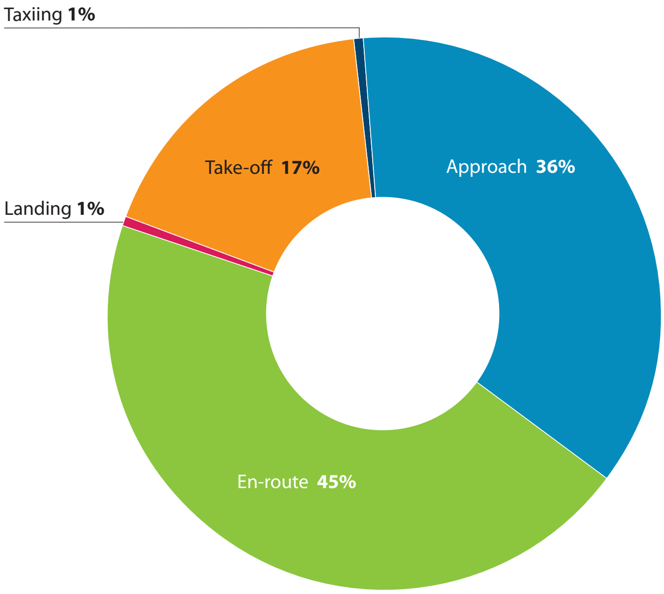
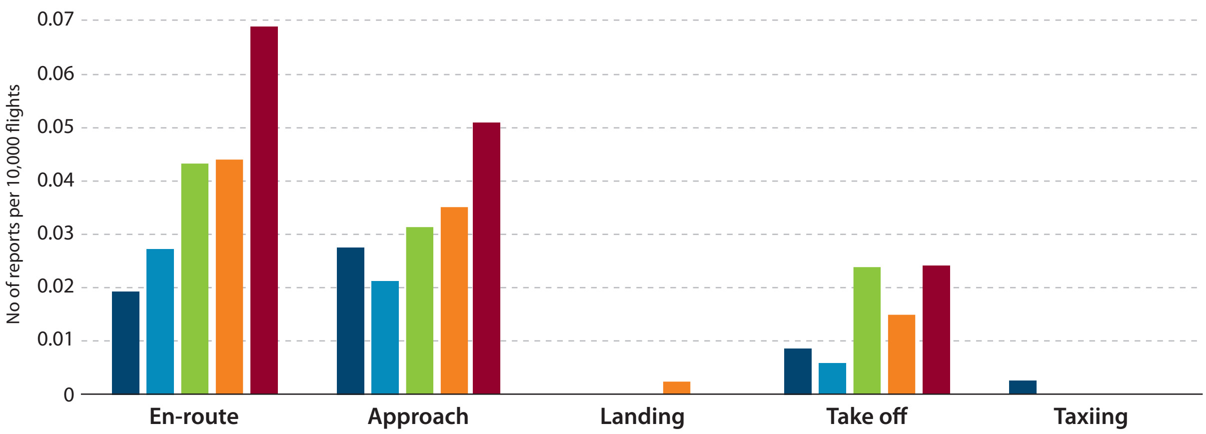


Figure 56: *EVAIR WT phases of flight in the 2015-2019 summer periods*



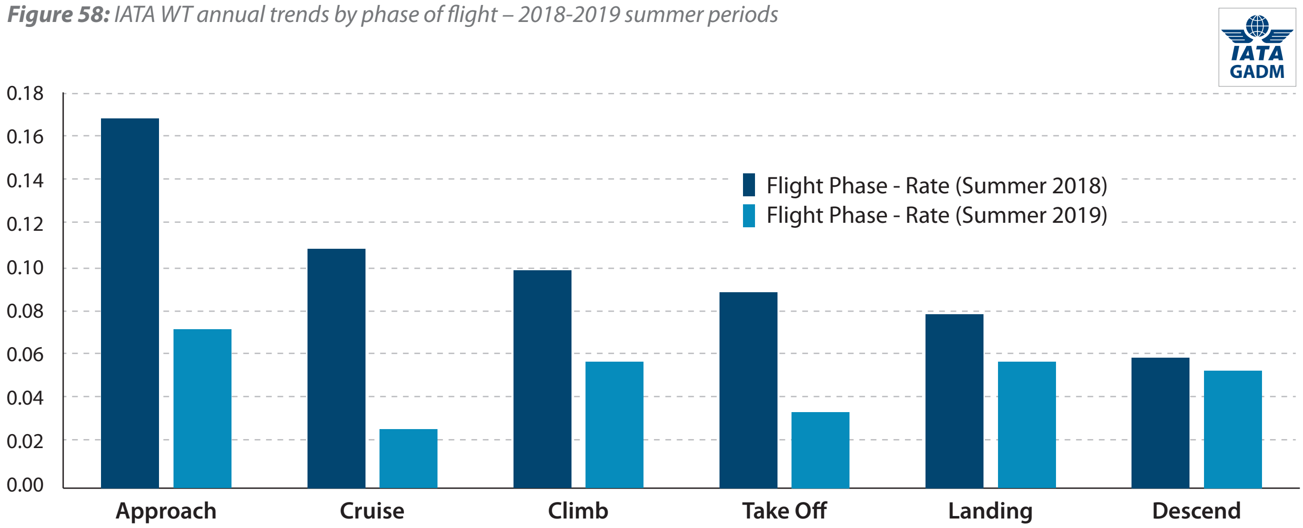
The EVAIR cumulative data show that in the 2015-2019 summer seasons, the approach and en-route/cruising phases of flight were the worst affected by WT.

Figure 57: *EVAIR WT annual trend by phase of flight – 2015-2019 summer periods*



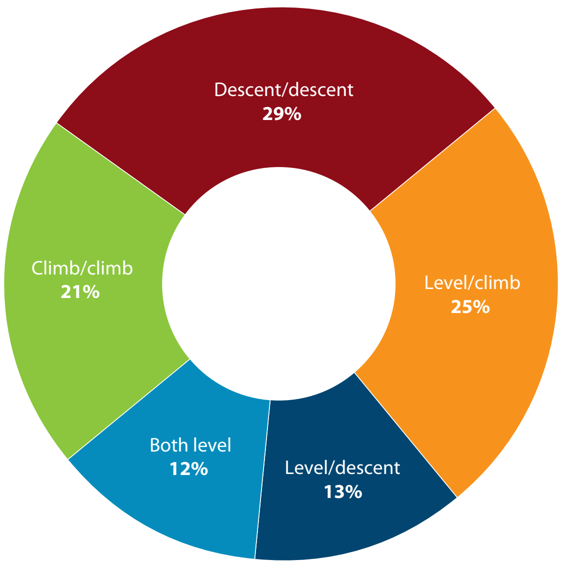
The summer trends for the five years (Figure 57) show that across the whole period, WT in the en-route and approach phases always had a higher number of reports.

Figure 58: *IATA WT annual trends by phase of flight – 2018-2019 summer periods*



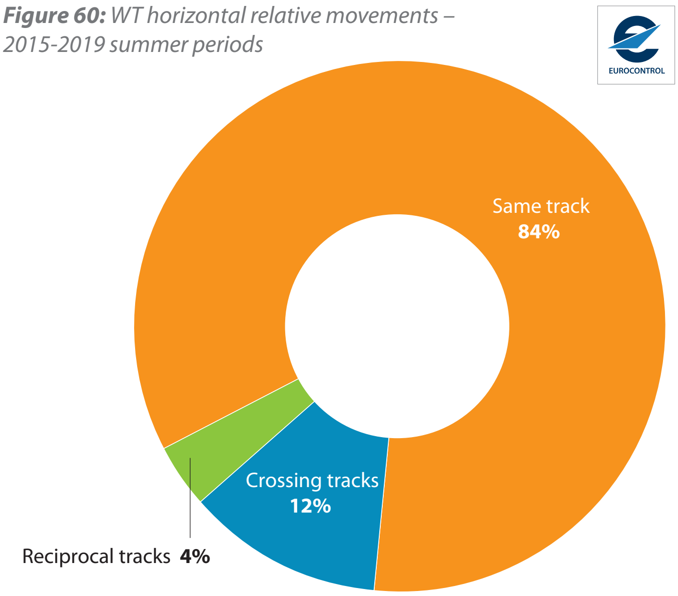
In IATA's GADM database, 57% of WT reports contain information about the phase of flight in which the wake turbulence event occurred. The data show that the highest number of occurrences was in the approach phase, at 26%, followed by the climb and cruise phases, at 18% and 17% respectively.

Figure 59: *WT vertical profiles – 2015-2019 summer periods*



A deeper search through the EVAIR WT data shows the vertical and horizontal profiles of the traffic at the moment of WT (Figures 59 and 60). In the vertical profiles, the descent/descent position of both aircraft was the most frequent (29%).

Figure 60: *WT horizontal relative movements – 2015-2019 summer periods*



Horizontal relative movements from the EVAIR WT database show that in the absolute majority of WT situations, both aircraft had the same track (84%). In 64% of these situations, aircraft in the heavy category were the generators, and in 23%, the generators were aircraft in the medium category. For the rest, there was no information in the database.

ANNEX 1 – EUROPEAN ACTION PLANS

EUROPEAN ACTION PLAN FOR AIR-GROUND COMMUNICATION SAFETY

The Air-Ground Communication (AGC) Safety Improvement Initiative was launched by the EUROCONTROL Safety Team in 2004, and addresses communication problems identified in the Runway Incursion and Level Bust Safety Improvement Initiatives as well as other problems of concern, such as call sign confusion, undetected simultaneous transmissions, radio interference, use of standard phraseology, and prolonged loss of communication. Communication between air traffic controllers and pilots remains a vital part of air traffic control operations, and communication problems can result in hazardous situations. A first step towards reducing the incidence of communication problems is to understand why and how they happen. The Action Plan is available on the ALLCLEAR Communication Toolkit http://skybrary.aero/index.php/Solutions:ALLCLEAR.

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF LEVEL BUST

Reducing level busts is one of EUROCONTROL's highest priorities. EUROCONTROL began raising awareness of the level bust problem in 2001, organised a series of workshops, and established a Level Bust Task Force to define recommendations and to formulate an action plan to reduce level busts.

The Level Bust Action Plan is the outcome of work carried out by EUROCONTROL's cross-industry Level Bust Task Force, which was set up in 2003. The Task Force reviewed the evidence available, identified the principal causal factors, and listened to the air navigation service providers and aircraft operators with experience in reducing level busts.

The Action Plan contains recommendations for air traffic management, air traffic controllers, and aircraft operators. It is designed to reduce the frequency of level busts and reduce the risks associated with level busts. Implementation of the Action Plan will be monitored by the Task Force Monitoring Group reporting to the EUROCONTROL Safety Improvement Sub-Group (SISG).
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Level_Bust

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF RUNWAY INCURSIONS (EAPPRI)

Findings from the incident and accident reports have been used to determine the new recommendations contained in the updated European Action Plan for the Prevention of Runway Incursions.

The increasing availability of runway incursion incident reports is a positive indication of the commitment of organisations and operational staff to preventing runway incursions and runway accidents by learning from past accidents and incidents and sharing this information across Europe.

The new recommendations contained in Action Plan V3.0 are the result of the combined and sustained efforts of organisations representing all areas of aerodrome operations. The organisations which have contributed to this Action Plan are totally committed to enhancing the safety of runway operations by advocating the implementation of the recommendations which it contains. These organisations include, but are not limited to, aerodrome operators, air navigation service providers, aircraft operators, and regulators.
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Incursions_(EAPPRI)

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF RUNWAY EXCURSIONS (EAPRE)

The European Action Plan for the Prevention of Runway Excursions (EAPPRE), Edition 1.0, published in January 2013, provides recommendations and guidelines for ANSPs, aerodrome operators, Local Runway Safety Teams, aircraft operators and manufacturers, AIS providers, regulators and EASA.
https://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Excursions_(EAPPRE)

CALL SIGN SIMILARITY (CSS)

The European Action Plan for Air Ground Communication Safety (conceived inter alia by EUROCONTROL, aircraft operators (AOs) and the Flight Safety Foundation) has identified call sign similarity (CSS) as a significant contributor to air-ground communication problems. Analysis of ATC-reported events shows that 4% involve incidents where CSS is involved.

Research and CBA studies show that the most cost-efficient way of providing a long-lasting, Europe-wide solution is to create a central management service to de-conflict ATC call signs. This strategy provides economies of scale and rapid payback on investment (three years). More importantly, it is calculated that it will eliminate over 80% of CSS incidents and thus improve safety.
http://www.eurocontrol.int/services/call-sign-similarity-css-service

ANNEX 2 – DEFINITIONS

The following definitions are extracted from the HEIDI and/or HERA taxonomies.

HEIDI (Harmonisation of European Incident Definitions Initiative for ATM) is intended to finalise a harmonised set of definitions (taxonomy) for ATM-related occurrences.

HERA (Human Error in European Air Traffic Management) is a detailed methodology for analysing human errors in ATM, including all types of error and their causal, contributory and compounding factors.

More information can be found at:

HEIDI: http://www.eurocontrol.int/articles/esarr-2-reporting-and-assessment-safety-occurrences-atm

HERA: http://www.eurocontrol.int/services/human-error-atm-hera

DEFINITIONS

ATC clearance/instruction (HEIDI): In relation to incorrect aircraft action. Authorisation for an aircraft to proceed under conditions specified by an air traffic control unit and deviations from the clearance which cause runway incursions, taxiway incursions, apron incursions, level busts, unauthorised penetration of airspace, etc.

Coordination (HEIDI): Internal coordination encompassing coordination with sectors within the same unit, and sectors within the ATC suite; external coordination, civil/civil and civil/military; and special coordination, covering expedited clearance, prior permission required, revision and other special coordination.

Contributory factors (HEIDI): Part of the chain of events or combination of events which has played a role in the occurrence (either by facilitating its emergence or by aggravating the consequences thereof) but for which it cannot be determined whether its non-existence would have changed the course of events.

Decision-making (HERA): Covers absence of or incorrect or late decisions.

Failure to Monitor (HERA): Failure to monitor people, information or automation

Judgment (HERA): Mainly associated with separation

Lapses (HEIDI): Psychological problems, encompassing receipt of information, identification of information, perception of information, detection, misunderstanding, monitoring, timing, distraction, forgetting and loss of awareness

Level bust (HEIDI): Any unauthorised vertical deviation of more than 300 feet from an ATC flight clearance (departing from a previously maintained FL, overshooting, undershooting, levelling-off at a level other than the cleared level)

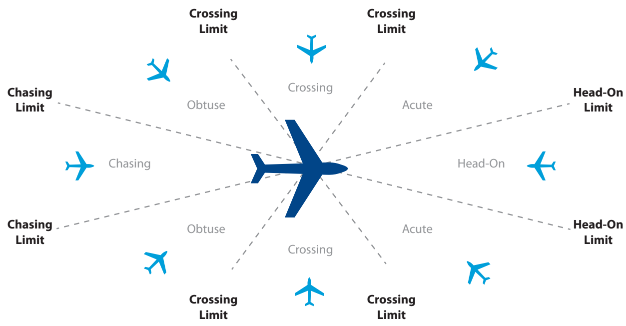
Mental/emotional/personality problems (HERA): These include the following items:

- Mental capacity: loss of picture or safety awareness
- Confidence in self, in others, in information, in equipment, in automation
- Complacency
- Motivation/morale
- Attitudes towards others
- Personality traits: aggressiveness, assertiveness, lack of confidence, risk taking
- Emotional status: stress, post-incident stress
- Misstored or insufficiently learned information
- Planning: insufficient, incorrect or failed
- Recall of information: failed, inaccurate, rare information, past information
- Violations: routine, exceptional

Mistakes (HEIDI): Psychological problems, encompassing information wrongly associated, workload problems, information not detected, failure to monitor, recall of information, misunderstanding or insufficiently learned information, judgment, planning, decision-making, assumptions and mindset

Operational communication (HEIDI): Air-ground, ground-ground and use of equipment for verification testing. Air-ground communication encompasses hear-back omitted, pilot read back, standard phraseology, message construction, R/T monitoring including sector frequency monitoring and emergency frequency monitoring, handling of radio communication failure and unlawful radio communication transmission. Ground-ground communication refers to standard phraseology, speech techniques, message construction, standard use of equipment, radio frequency, telephones, intercoms, etc.

RA geometry between two aircraft (ASMT)



Runway incursion (ICAO): Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft

Spoken communication (HEIDI): Human/human communication, encompassing air-ground and ground-ground communication but also call sign confusion, noise interference and other spoken information provided in plain language. Air-ground communication refers to language/accent, situation not conveyed by pilots, pilot breach of radiotelephony (R/T), workload, misunderstanding/misinterpretation, and other pilot problems. Ground-ground communication refers to misunderstanding/misinterpretation, poor/no coordination.

Taxiway incursion (HEIDI): Any unauthorised presence on a taxiway of an aircraft, vehicle, person or object, which creates a collision hazard or results in a potential loss of separation

Traffic and airspace problems (HEIDI): There are four sets of causal factors under this heading:

- Traffic load and complexity, encompassing excessive and fluctuating load, unexpected traffic demand, complex mix of traffic, unusual situations (emergency, high-risk, other), abnormal time pressure, under load and call sign confusion
- Airspace problems, encompassing flights in uncontrolled and controlled airspace, airspace design characteristics (complexity, changes, other) and temporary sector activities (military, parachuting, volcanic activity, training)

- Weather problems such as poor or unpredictable weather (snow, slush, ice, fog, low cloud, thunderstorm, wind shear)
- Pilot problems concerning language, culture and experience aspects

Traffic Information (HEIDI): Essential and local traffic information provided by an air traffic controller to the pilot. Essential information is related to the provision of traffic information containing:

a) direction of flight of aircraft concerned;
b) type and wake turbulence category (if relevant) of aircraft concerned;
c) cruising level of aircraft concerned; and
d) estimated time over the reporting point nearest to where the level will be crossed; or
e) relative bearing of the aircraft concerned in terms of the 12-hour clock as well as distance from the conflicting traffic; or
f) actual or estimated position of the aircraft concerned.

Local traffic in this context consists of any aircraft, vehicle or personnel on or near the runway to be used, or traffic in the take-off and climb-out area or the final approach area, which may constitute a collision hazard to the other aircraft and about which the information has to be provided.

Workload problems (HERA): These concern both minimal and excessive workload.

ANNEX 3 - ACRONYMS

A/C	Aircraft
ACAS	Airborne Collision Avoidance System
ACARS	Aircraft Communications, Addressing and Reporting System
ACC	Air Control Centre
ADREP	Accident Data Reporting
AFI	Africa
AGC	Air-Ground Communication
AIP	Aeronautical Information Publication
ANP	Actual Navigation Performance
ANSP	Air Navigation Services Provider
AO	Aircraft Operator
ASMT	ATM Safety Monitoring Tool
ASPAC	Asia-Pacific
ASR	Air Safety Report
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
AUA	ATC Unit Airspace
CAS	Channel Associated Signalling
CIS	Commonwealth of Independent States (States of former USSR)
CPDLC	Controller-Pilot Data Link Communications
CSMC	Call Sign Management Cell
CSC	Call Sign Confusion
CSS	Call Sign Similarity
CSST	Call Sign Similarity Tool
CSS UG	Call Sign Similarity User Group
DME	Distance Measurement Equipment
DVOR	Doppler VOR
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
ECL	En-route Check List
EICAS	Engine Indication and Crew Alert System
EVAIR	EUROCONTROL Voluntary ATM Incident Reporting
FDX	IATA Flight Data Exchange
FCU	Flight Control Unit
FIR	Flight Information Service
FSF	Flight Safety Foundation
GADM	IATA's Global Aviation Data Management
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
G/S	Glideslope
EAPRE	European Action Plan for Prevention of Runway Excursions
EAPRI	European Action Plan for Prevention of Runway Incursions
ERAA	European Regional Airlines Association
FL	Flight Level
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
ILS	Instrument Landing System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IDX	IATA Incident Data Exchange
LATAM-CAR	Latin America and the Caribbean
LB	Level Bust
LOC	Loss of Communication
NASIA	North Asia
MENA	Middle East
MTOW	Maximum Take-off Weight
NAV	Navigation
NDB	Non-Directional Beacon
NM	Network Manager
NOP	Network Operations Portal
NOTAM	Notice to Airman
OPADD	Operating Procedure for AIS Dynamic Data
PBN	Performance Based Navigation
PF	Pilot Flying
PLOC	Prolonged Loss of Communication
PM	Pilot Monitoring
PPD	Persona Privacy Devise
RA	Resolution Advisory
RFI	Radio-Frequency Interference
RNP	Required Navigation Performance
RPAS	Remotely Piloted Aircraft Systems
RWY	Runway
SID/STAR	Standard Instrument Departure/Standard Arrival
STEADES	Safety Trend Evaluation and Data Exchange System
TCAS	Traffic Collision Avoidance System
TA	Traffic Advisory
THR	Threshold
TEM	Threat and Error Management
TMA	Terminal Control Area
TO	Take off
TWY	Taxiway
UTC	United Coordinated Time
VCS	Voice Communication System
VOR	Very High Frequency Omnidirectional Radio Range

SUPPORTING EUROPEAN AVIATION