



Investigations into Loss of Communications

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How are EUROCONTROL and its stakeholders investigating the Losses of pilot-controller voice communications? Which causes have been identified, and solved to date?

This brochure presents the issues, gives an overview of the progress achieved and identifies the next investigative steps.

«PLOC» and «COMLOSS» are nowadays used interchangeably to define air-ground communications incidents whose duration affects normal ATC processes.

Definition of communications loss

Two acronyms can be used in describing loss of communications. The military prefers “COMLOSS”, standing for “communications loss”, while the civil sector tends to prefer “PLOC”, standing for “prolonged loss of communications”.

Loss of communications between aircraft and ATC may occur for a variety of reasons, some technical, others resulting from human related aspects in pilots and controller work. Losses of communications can vary considerably in length; it is, however, those with an impact on day-to-day ATC functions which have drawn attention to the problems and led to studies for their resolution.

A brief history

One early communications-loss problem was known as the “sleeping receiver”. Radios used to fall silent and were reactivated only when the pilot pressed the “transmit” key. Initially, in 1998, these events were flagged, investigated and reported by an only small number of airlines, including British Airways (BA) and KLM. It is unclear whether this type of event started prior to or in parallel with the introduction of 8.33-kHz radios; some events had already been observed by that time, however, but had not attracted a great deal of attention. The number of reported events increased. In the UK, the majority of reported incidents occurred over the London Terminal Area, either in the stack or during the descent and approach phases. BA then started its own internal investigation into the subject, but could not identify any common explanation or isolate any specific technical failure.

In May 2002, BA, NATS and UK SRG (the UK Safety Regulatory Group) organised a forum in order to bring communications-loss events to the wider attention of various European aviation safety stakeholders, including EUROCONTROL. Since 11th September 2001, PLOC events had become much more sensitive and any aircraft silence lasting more than a few minutes had clearly become unacceptable, because every silent aircraft was perceived as a security risk. The UK SRG invited EUROCONTROL to support wider investigations and broaden them to European level through its SRU (Safety Regulatory Unit) and COM (Communications Domain). A complementary Safety Improvement Initiative was launched by the EUROCONTROL Safety Team, addressing safety issues such as call-sign confusion, blocked transmissions, radio interference, standard phraseology and PLOC from an operational perspective.



EUROCONTROL’s COM Domain took over the investigative task from UK SRG in 2002. Their database of incidents was transferred to EUROCONTROL and extended to enable the logging of any PLOC events reported by civil or military controllers and aircrews.

Recent EUROCONTROL contributions

Comloss Incidents Reporting System

Since 2005, in co-operation with Eurocontrol DCMAC colleagues and in the framework of a NATO-EUROCONTROL ATM Security Coordinating Group (NEASCOG), the COM Domain standardised and enhanced the Comloss reporting forms and process: the Comloss Incidents Reporting System (CIRS) was born. The purpose of CIRS, a secure web-based reporting tool, is to collect and share with all involved part the required fresh information about the incident, to quantify the phenomenon across Europe and scrutinise the reports in search of common elements; the intention is also to further identify progressively new recurrent COMLOSS incident profiles, increase awareness and define means for mitigation or resolutions.

The information in the database includes:

- flight details, e.g. airline, aircraft identification and route;
- aircraft details, e.g. type and registration number;
- incident details, e.g. time and date of incident, location, phase of flight, speed and altitude of aircraft when PLOC occurred;
- ATC information, e.g. frequency, ATC sector, whether air-to-air relay was attempted and whether it succeeded in re-establishing communications;
- information about the loss of communications, e.g. duration, incident explanation;
- details of the aircraft equipment in use during the PLOC, e.g. headset, VHF transceiver and audio management unit.

The CIRS also allows retrieving data according to specific criteria:

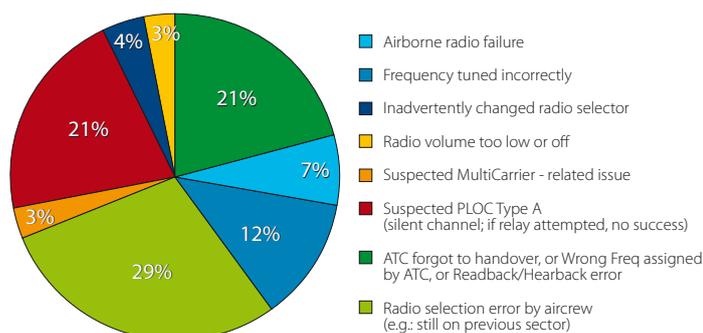
- The list of incidents based on filters (date, ATC unit, Operator, incident type)
- The number of recorded incidents per year
- The distribution of incidents by PLOC reason.

The CIRS database contains over 2168 events recorded since 1999 (most of them are concentrated in the last few years, owing to the initial lack of awareness and reporting). There were 500 events in 2005, 369 in 2006, 363 in 2007, and 246 in 2008 (status on 12th Nov.2008).

The population of CIRS users is increasing too (about 70 persons). People authorized to register to CIRS are mainly belonging to military reporting centres, airlines and airspace users, and ANSP.

Identification of recurrent incident profiles

On the basis of the observed symptoms, approximately 20% of PLOCs reported between 2004 and 2008 could be allocated to one of the identified PLOC profiles:



The importance of each profile in this database is of course influenced by the profiles of a few major contributors. As COMLOSS awareness and reporting expand, and as some resolutions are made, the relative importance of each PLOC profile is also evolving.

Unfortunately, the remaining 80% of reports on events still do not contain enough information to be explained and categorised; this also justified the development and ongoing deployment of CIRS across more COMLOSS stakeholders.

Among the recurrent profiles emerging from the report database are the following:

- Airborne radio failure (with identified repair action required).
- Human-factors-related profiles, e.g. human error involving the pilot's tuning to an incorrect frequency, inadvertently changing radio selector, or setting the radio volume too low. On the ATC side, there are incorrect frequencies assigned by ATC, errors in voice readback and hearback, ATC forgetting to call and hand-over aircraft, etc.

Call-sign confusion and pilot or controller overload are of course other possible operational factors contributing to the human errors described here.

- Technical communications causes, e.g. PLOC Type A (the sleeping receiver) and multi-carrier/squelch-related issues.

More technical or operational profiles should be identified in future through the benefits of CIRS deployment and improved reporting and analysis making use of it.

Communication loss affects all aviation segments.

The phenomenon is not restricted to a few airlines or radio types. In the thousand reported events which have disrupted ATC since 1999, more than 300 airlines, 12 radio types, 180 sectors and 190 channel frequencies are represented.

A typical example of PLOC Type A

A pilot reported the following:

«During our usual arrival preparation, we realised that our VHF1 radio, which was assigned to the Paris control frequency, was silent for several minutes. When we managed, by means of a brief radio check, to establish contact with London FIR, we were told that **several calls had been left unanswered; air-air relay attempted by ATC had not worked either.** We were then transferred to the appropriate sector frequency and the flight continued normally.

During that period, the flight was on its assigned route and level. We then received a call from a French Mirage fighter closing our left wing on 121.5 MHz. We explained to him that we were back in contact with London and that everything was OK with our radio, and then continued our flight and approach in the usual manner.»

In accordance with current procedures, military units are alerted when a communications loss continues for a certain duration. Every time fighters are scrambled, other air traffic is affected and has to be moved aside; the cost of each fighter launch is about 6000€.

Remedies found for two technical PLOC profiles

PLOC Type A

Thanks to BA's sustained efforts over the years in keeping its aircrews aware and accurately reporting events, a Service Bulletin for retrofitting its VHF receivers has finally been delivered to it by the involved radio manufacturer.

Since January 2005, BA has observed a clear decrease in the number of PLOC Type A occurrences, as the Service Bulletin has been deployed throughout the fleet.

It is now anticipated that PLOC Type A will be progressively eliminated from the whole BA fleet and the fleets of the few other affected airlines; it is now just a question of time.

Multi-carrier-related PLOCs

Laboratory and flight trials conducted by Eurocontrol confirmed that some receivers' squelch operation may be disturbed in multi-carrier environments. According to the current MOPS (Minimum Operational Performance Specification), receiver sensitivity in multi-carrier operation shall not be worse than -85 dBm.

One type of analogue radio retrofitted for 8.33-kHz operations was identified during these trials as failing to meet the MOPS requirement. A PLOC might be experienced by this type of radio when flying in multi-carrier equi-signal areas (same signal strength originating from different offset ground transmitters). Since September 2008, work is in progress in EUROCAE to include a test for multi-carrier operation sensitivity in the relevant airborne transceiver standards, in order to prevent aircraft radios with limited squelch performance from being deployed.

Awareness of this issue among avionics manufacturers is now considered essential.

Multi-carrier operation in 8.33-kHz channel spacing was proven to be feasible and standardization activities are almost completed, with the final step planned begin 2009 at EUROCAE. The squelch issue will thus be carefully considered together with possible conversion of multi-carrier sectors to 8.33 kHz.



While further deploying CIRS, progress will be made at extending COMLOSS awareness and cooperation with a view to its reduction

Since becoming involved, EUROCONTROL has steadily worked to raise PLOC awareness among airlines, avionics and aircraft industries, and civil and military ATC organisations.

Progress reports are presented in workshops and working groups such as EATM SISG (the Safety Improvement Sub-Group), CMIC (the Civil-Military Interface Standing Committee), and NEASCOG (the NATO/EUROCONTROL ATM Security Coordinating Group).

In order to ensure that PLOC resolution is made more efficient, all the stakeholders involved need to share commonly updated information and join their efforts. CIRS has been defined in that purpose and appears to be an appropriate tool, recognised to be fully in the scope of the Directive 2003/42 of 13 June 2003 on "Occurrence Reporting in Civil Aviation". The objective of this Directive is to contribute to the improvement of air safety by ensuring that relevant information on safety is reported, collected, stored, protected and disseminated. It solely aims to the prevention of accidents and not to attribute blame or liability.



| Incident ID | Date | Time | Location | Category | Status | Reported by |
|-------------|------------|-------|-----------|-----------------------|--------|-------------|
| 123456789 | 2008-10-15 | 14:30 | Brussels | Loss of communication | Open | John Doe |
| 987654321 | 2008-11-01 | 08:15 | Paris | Loss of communication | Open | Jane Smith |
| 567890123 | 2009-01-20 | 19:45 | London | Loss of communication | Open | Mike Brown |
| 234567890 | 2009-03-05 | 10:00 | Amsterdam | Loss of communication | Open | Sarah White |
| 890123456 | 2009-05-12 | 16:20 | Frankfurt | Loss of communication | Open | David Black |

The current population of CIRS users needs to be extended. Indeed, too many incidents are recorded solely by military users (NATO, CRC Glons or other reporting centers ...) or in less extend by a few pioneer airlines and ANSPs. With CIRS, the completeness of each COMLOSS incident description can easily be improved.

Once CIRS will be shared with most ANSPs and airspace users too, EUROCONTROL may continue its work consisting in identifying causes and developing more remedies for all PLOC profiles, whether the causes are technical, operational or both combined.

Contacts for information and PLOC reporting

A video "Investigation into Communication Loss" describes how Comloss occurrences are managed from end-to-end. Please visit www.eurocontrol.int/cirs to watch the video and ask for CIRS information.

Also you may contact :

P. Delhaise

Current Systems Manager in the COM Domain, EUROCONTROL, Brussels
e-mail: patrick.delhaise@eurocontrol.int

Frederic Villeronce

CIRS coordinator
email: frederic.villeronce@eurocontrol.int

EUROCONTROL priority at present is to progress deployment and usage of CIRS in ANSPs, Airspace Users offices and Military Reporting Centers, in order to gather from each involved part the necessary incident information for understanding and reducing a maximum of COMLOSS occurrences.