



Investigation into Loss
of Communications

LOSS
Communications

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Investigations into Loss of Communications



What causes of loss of pilot-controller communications have been identified to date? How are EUROCONTROL and its stakeholders investigating the resolution of such losses? 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 communication 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 and others resulting from the man-machine interface. 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 a 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 contributions

Common PLOC database and reporting

In 2002, EUROCONTROL's COM Domain took over the investigative task from UK SRG. 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. The reporting forms were standardised and enhanced, taking the stakeholders' suggestions into consideration. The purpose of the database is to quantify PLOC phenomena across Europe and scrutinise the reports in search of common elements in order to progressively identify new COMLOSS incident profiles.

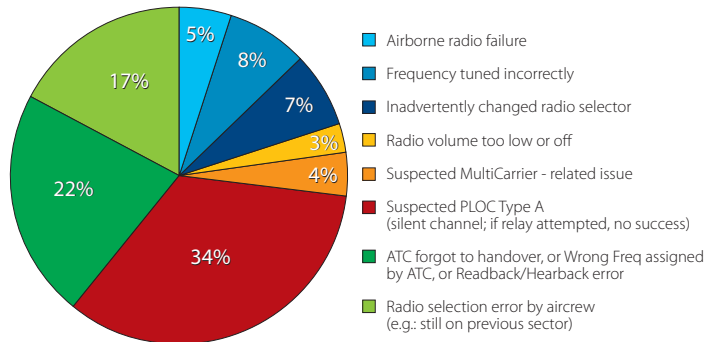
The information in the database includes:

- flight details, e.g. airline, call sign, flight number 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, possible observed silence on the channel, remedial actions;
- details of the aircraft equipment in use during the PLOC, e.g. headset, VHF transceiver and audio management unit.

The database contains over 1050 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 191 events in 2002, 121 in 2003, 307 in 2004, and 355 already in 2005 (this figure was correct on 1st September 2005).

Identification of recurrent incident profiles

On the basis of the symptoms reported and with the support of IATA for the interrogation of airlines shortly after each PLOC, approximately 32% of PLOCs reported in 2004 and 2005 can 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, the relative importance of each PLOC profile is expected to change.

Unfortunately, approximately 68% of reports on events still do not contain enough information to be explained and categorised.

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/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 could be identified in future through improved reporting and refined analysis.

Communication loss is affecting all aviation segments.

The phenomenon is not restricted to a few airlines or radio types. In the thousand reported events that disturbed 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 radio manufacturer involved.

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

Recent laboratory and flight trials 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 equisignal areas (same signal strength originating from different offset ground transmitters). Work is currently in progress 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 installed. Awareness of this issue among avionics manufacturers is now considered essential. Recently, multi-carrier operation in 8.33-kHz channel spacing was proven to be feasible and standardisation activities were initiated.

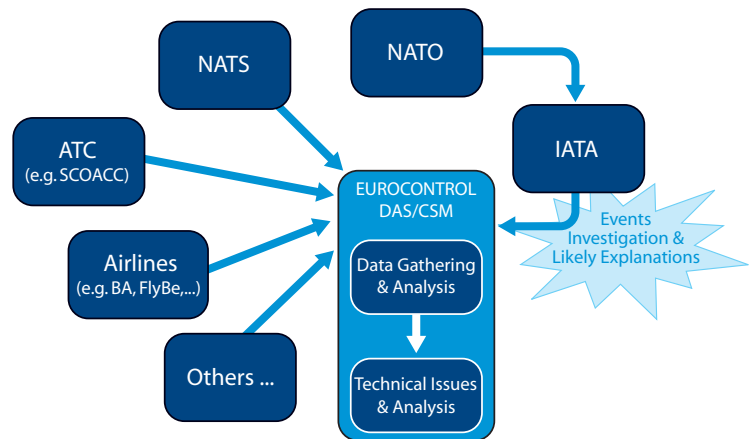
Further extending COMLOSS awareness and cooperation with a view to its reduction

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).

The diagram depicts the current flow of PLOC incident reports involving EUROCONTROL:

Current Flow of PLOC Reports



To ensure that PLOC resolution is made more efficient, all involved stakeholders need to share commonly updated information and share their actions. In this perspective, the NEASCOG group is currently working to establish a definition of loss-of-communications common to both civil and military control centres, based on the operational aspects.

Furthermore, EUROCONTROL has suggested that it share its reporting forms and procedures also with IATA and NATO. In addition it will share the existing PLOC database, and especially the work at identifying causes and developing more remedies for all PLOC profiles, whether the causes are technical, operational, or both combined.

Once that has been established, the COM Domain in Eurocontrol would exploit its expertise focusing more on technical profiles of PLOC and their resolution across Europe; on its side, DAP/SAF will continue managing the Air-Ground Communication Safety Initiative, aiming at delivering an industrial Action Plan in 2006 with the partners IFATCA, IFALPA, ERA and Flight Safety Foundation.



Contacts for information and PLOC reporting



P. Delhaise

Current Systems manager in the COM Domain, DAS/CSM, Eurocontrol Brussels, e-mail: patrick.delhaise@eurocontrol.int



M. Esposito

Telecoms Engineer, COM Domain, DAS/CSM, Eurocontrol Brussels, e-mail: massimiliano.esposito@eurocontrol.int