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COMMUNICATION FAILURE POLICY REVIEW

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SUMMARY

This working paper analyses current IFATCA policy regarding communication failure between aircraft and air traffic control units. It proposes new policy which takes into account currently available technology in order to provide additional flexibility to flight crew while retaining predictability for air traffic controllers.

1. INTRODUCTION

1.1. A loss of communication between an aircraft and air traffic control units is an infrequent event, yet when such an event does occur, it can pose a considerable challenge for both air traffic controllers (ATCOs) and flight crews. Communication failure can disrupt air traffic and adversely impact the safety, capacity, and efficiency of the air traffic services.

1.2. In some parts of the world, a civil aircraft suffering communication failure has resulted in States initiating a military interception (ICAO, 2021), causing additional disruption to the air traffic services and, in some cases, leading to questions of liability for funding the cost of the military response.

1.3. Communication failure has been a matter of interest for the International Federation of Air Line Pilots' Associations (IFALPA) and its members given the significance of the potential outcomes for flight crews.

2. DISCUSSION

2.1. Communication between flight crews and ATCOs is a vital component of the air traffic services. The requirement for aircraft to be properly equipped – and for flight crew to use – communication equipment is established in the various Annexes to the Convention on International Civil Aviation.

2.2. Annex 10 — *Aeronautical Telecommunications*, Volume II — *Communication Procedures including those with PANS status* defines air-ground communication as 'Two-way communication between aircraft and stations or locations on the surface of the earth' (ICAO, 2016a, p. 1-3), and sets out the format of air-ground messages as well as procedures for exchanging them

between air traffic services (ATS) units and flight crew. Annex 10 — *Aeronautical Telecommunications*, Volume III — *Communication Systems*, Part II — *Voice Communication Systems* establishes standards and recommended practices for radio communication equipment used by ATS units and flight crew for air-ground voice communication.

2.3. Parts I to IV of Annex 6 — *Operation of Aircraft* establish the requirement for aircraft operating international flights to be equipped with suitable and functioning radio communication equipment. For example, Annex 6, Part I establishes radio communication requirements for international commercial aircraft as follows:

> An aeroplane shall be provided with radio communication equipment capable of:
>
> a) conducting two-way communication for aerodrome control purposes;
>
> b) receiving meteorological information at any time during flight; and
>
> c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority (ICAO, 2022, p. 7-1).

2.4. Annex 2 — *Rules of the Air* defines the requirement for continuous voice communication between the flight crew and the ATCO for the purposes of flights within controlled airspace as follows:

> An aircraft operated as a controlled flight shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and establish two-way communication as necessary with, the appropriate air traffic control unit, except as may be prescribed by the appropriate ATS authority in respect of aircraft forming part of aerodrome traffic at a controlled aerodrome (ICAO, 2024, p. 3-12).

2.5. For many years air-ground communication was solely conducted via voice media such as high frequency (HF) and very high frequency (VHF) radio; today alternative methods available for communicating with ATC units include controller pilot data link communications (CPDLC) and satellite voice communications. Nonetheless, the availability of these non-voice communication methods does not nullify the Annex 2 standard. In other words, all controlled flights shall monitor voice communications from the ATS unit, even when alternative methods of communication are available. In practice, this means that an aircraft communicating with the ATS unit via CPDLC will also be monitoring HF of VHF voice channels. According to Annex 2 the only exception to this standard is when the appropriate ATS authority has made allowance for aircraft operating in the vicinity of an aerodrome to not communicate with the ATS unit.

2.6. When a radio communication failure precludes compliance with the Annex 2 standard described above, Annex 2 defines the necessary flight crew actions. These communication failure procedures are well-established, having been included in the first edition of Annex 2 published in 1948:

> If unable to maintain two-way radio communication … the pilot in command of an aircraft shall:
>
> a) conduct his flight so as to fly in VFR weather conditions; or
>
> b) land as soon as practicable; or
>
> c) proceed strictly according to the current flight plan, maintaining the minimum safe altitude or the last acknowledged assigned altitude, whichever is higher, to the aerodrome of intended landing, and:
>
> i) commence descent at expected approach time last received and acknowledged; or
>
> ii) if no expected approach time has been received and acknowledged, commence descent at the estimated time of arrival specified in the flight plan (ICAO, 1948, p. 15).

2.7. The Annex 2 communication failure procedures have been expanded over the years, and the current version includes greater detail surrounding the required manoeuvres – both upon the initial recognition of the failure, and upon the aircraft reaching the vicinity of the landing aerodrome. Some of the important aspects of the current ICAO communication failure procedures are reproduced below:

> If in visual meteorological conditions, the aircraft shall:
>
> a) continue to fly in visual meteorological conditions; land at the nearest suitable aerodrome; and report its arrival by the most expeditious means to the appropriate air traffic services unit;
>
> b) if considered advisable, complete an IFR flight…
>
> If in instrument meteorological conditions or when the pilot of an IFR flight considers it inadvisable to complete the flight in (visual meteorological conditions), the aircraft shall:
>
> a) unless otherwise prescribed on the basis of regional air navigation agreement, in airspace where radar is not used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;
>
> …
>
> d) proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with e) below, hold over this aid or fix until commencement of descent;
>
> e) commence descent from the navigation aid or fix specified in d) at, or as close as possible to, the expected approach time last received and acknowledged …
>
> f) complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and

g) land, if possible, within 30 minutes after the estimated time of arrival specified in e) or the last acknowledged expected approach time, whichever is later (ICAO, 2024, p. 3-13).

2.8. The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) describe the necessary ATCO actions upon recognising the occurrence of a radio communication failure. The procedures include that 'separation shall be maintained between the aircraft having the communication failure and other aircraft, based on the assumption that the aircraft will comply (with the Annex 2 standards)' (ICAO, 2016b, p. 15-9).

2.9. The detail which has been added to the Annex 2 standards since its first iteration benefits ATCOs, because the more predictable the behaviour of the aircraft suffering radio communication failure, the easier it will be for the ATCO to effectively maintain separation from the communication failure aircraft and other aircraft in its vicinity. Figure 1 below depicts the most notable aspects of the existing communication failure procedures, which provide the ATCO with a known trajectory from which other aircraft may be separated.

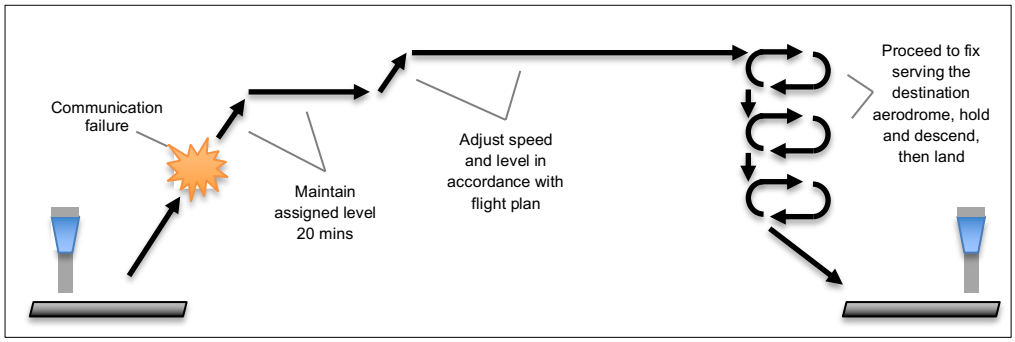

Figure 1: Current ICAO communication failure procedures

2.10. It should be noted that in practice it might not be possible for the ATCO to maintain separation as prescribed in the PANS-ATM where a communication failure flight adjusts its flight path to remain in visual meteorological conditions rather than continuing in accordance with the filed flight plan. If the flight crew is able to maintain their own separation from other aircraft, this may ameliorate the immediate safety concerns with this procedure; however, the disconnect between flight crew and the ATCO regarding the aircraft's manoeuvres may cause difficulties as the ATCO will continue to provide clearances and instructions to other aircraft intended to avoid the communication failure aircraft. Without a shard understanding of pilot intentions, these clearances and instructions may not be effective and may even reduce separation.

2.11. While more specific procedures for aircraft behaviour makes the job of ATCOs easier, the increased specificity of the communication failure procedures reduces the options available for flight crew. This is particularly true for flight crew on modern high-performance aircraft, for whom the option to maintain flight in visual meteorological conditions (VMC) is not always practical. When combined with the dangers to civil flights arising from geopolitical conflicts, flight

crew suffering communication failure may be faced with a difficult choice between continuing their flight into undesirable airspace without communication, attempting to remain in VMC and landing at an unfamiliar aerodrome, or deviating from the ICAO communication failure procedures. Figure 2 below illustrates these decisions facing the flight crew during a communication failure.

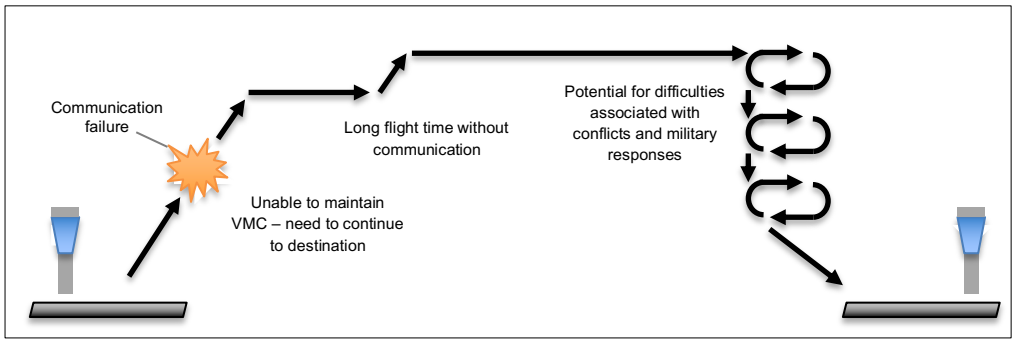

Figure 2: Flight crew decisions during communication failure

2.12. As discussed above, the availability of alternative communications systems like CPDLC does not abrogate the need for flight crews to comply with the Annex 2 standard to maintain radio communication, and therefore for flight crews to follow the radio communication failure procedures when suffering radio communication failure, even when primarily communicating via CPDLC. Nonetheless, the alternative communications can provide a means of the flight crew and ATC unit confirming a shared understanding of the flight crew's intentions, allowing the ATCO to accurately plan separation from other aircraft.

2.13. The existing IFATCA policy regarding radio communication failure contained in the IFATCA Technical and Professional Manual and is of a high level and simple nature:

There shall be one unified global set of procedures for communication failure (IFATCA, 2024, p. 127).

2.14. This policy was adopted in 2013 following a comprehensive study of radio communication failure by the TOC. The 2013 study identified limitations which existed at the time, and which continue to exist to this day, including:

a) the necessity to continue to destination for long range flights in instrument meteorological conditions (IMC), given the ever-increasing range of commercial aircraft;
b) the necessity to cross sovereign borders while not in normal communication if following the IMC procedures;
c) the reliance on remaining in VMC given the deficiencies of see-and-avoid, particularly in high performance commercial aircraft;
d) no clear procedures regarding alternative communication methods;

e) different procedures for surveillance and non-surveillance airspace, and the unlikelihood that flight crews are readily aware whether their flight is receiving an ATS surveillance service; and
f) a lack of awareness of the details of documentation creating local exceptions (IFATCA TOC, 2013).

2.15. The 2013 TOC working paper also includes a description of the activities of an ICAO Communication Failure Coordinating Group to review provisions for radio communication failure (p. 5), which unfortunately did not result in any significant adjustments to the global procedure.

2.16. Current IFATCA policy has been achieved in some ways, as there is indeed only one procedure defined within ICAO provisions; however, the nature of the procedures has led some ATS authorities to publish local variations to the Annex 2 procedures in State aeronautical information publications (AIP). These local variations are intended to account for local peculiarities in airspace and aerodromes which make them not well-suited to the global communication failure procedures. Examples of local variations include Hong Kong, which includes additional procedures for selecting and flying standard arrivals routes if arriving at Hong Kong (HK CAD 2025), and the United Kingdom, which publishes an expectation that IFR flights flying via an ATS route will comply with the IMC procedure even in VMC (UK CAA 2025).

2.17. Such variations, while intended to improve the response to communication failure, are not always well-known by flight crews and might be overlooked in a high workload cockpit environment. This may lead to a mismatch between how the ATCO is expecting the flight to manoeuvre and what the flight does. Increased flexibility in the global procedures should negate the need for such local variations, which should in turn improve predictability for both flight crew and ATCOs.

2.18. IFALPA (2021) has developed a comprehensive position paper regarding radio communication failure, which identifies the negative impacts of radio communication failure on aircraft operations and the potential negative outcomes for flight crew. Most significantly, the position paper discusses the activation of military jets to respond to a civil aircraft suffering from radio communication failure when those civil aircraft cross State borders. According to IFALPA, operators and even pilots have been pursued to pay fines or contribute towards the cost of military activation associated with radio communication failure. Such action violates just culture principles, which have been effective in contributing towards the safety performance of the industry, and instead the threat of monetary fines may lead to undesirable flight crew and operator behaviour such as not identifying and actively responding to radio communication failure and/or not complying with the applicable ICAO procedures.

2.19. Because of the non-continuous nature of communications between flight crew and ATCOs, it is unlikely that either party will recognise a communication failure

immediately upon it occurring. In some instances, flight crew may receive an indication from their equipment that a failure has occurred, while in other instances ATCOs may not become aware of the failure until they attempt to contact the flight crew – in large area control sectors, the failure may not be recognised for many minutes. Due to this potential mismatch between flight crew and ATS unit recognition of communication failure, it is vital that a flight suffering communication failure does not immediately deviate from its ATC clearance upon recognition of the condition. Communication failure procedures should include a minimum time during which the flight continues in accordance with its clearance and the ATCO establishes separation with other aircraft (including larger buffers where appropriate).

2.20. IFALPA has been advocating for many years to increase the flexibility available to flight crew in the case of radio communication failure (cf. IFATCA 2013, pp. 5-6), including the option to return to the departure aerodrome or divert to an alternate aerodrome. The possibility of broadcasting intentions through the use of alternative squawk codes has been considered, with 7601, 7602, 7603 and 7604 potentially indicating pre-defined manoeuvres. Difficulties associated with the use of such codes include that they are regularly assigned to regular flights (posing surveillance coupling/decoupling issues) and that they are not considered emergency codes by on-board and ground equipment (posing human recognition issues). Due to these difficulties, there is currently no global agreement to implement the use of these additional codes; however, 7601 has been implemented in Europe as a means of indicating that an IFR flight will remain in VMC and land at the nearest suitable aerodrome (EASA, 2024, p. 17).

2.21. The ICAO Air Navigation Commission is currently considering alternative radio communication failure procedures and is looking to introduce the requested flexibility for flight crew by including the option to return to the departure aerodrome if the failure occurs soon after departure, and the option to divert to an en route alternate aerodrome specified in the filed flight plan. Figure 3 below illustrates these proposed alternative options for flight crew experiencing a communication failure.

2.22. The availability of alternative pilot action is expected to lead to improved outcomes for flight crew and operators, but it may also reduce predictability for ATCOs and therefore make it difficult for ATCOs to maintain separation between the aircraft suffering radio communication failure and other aircraft in its vicinity as prescribed by the PANS-ATM.

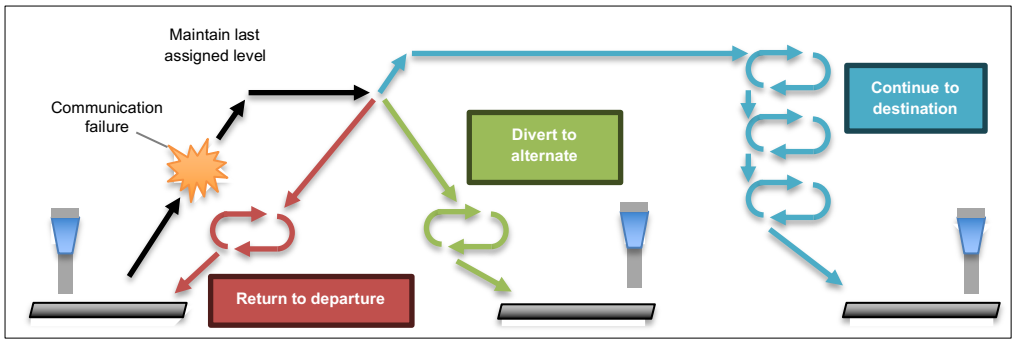

Figure 3: Proposed new communication failure procedures

2.23. The increasing prevalence of ATS surveillance systems should make the 7600 squawk (and its ADS-B equivalent) more visible to ATCOs, bringing the communication failure to the attention of the ATCO sooner. Earlier notification is expected to facilitate an effective ATCO response to the event; however, in the presence of uncertainty it is expected that the ATCO would rely upon establishing a large separation 'buffer zone' around the flight until its intentions became known. Thus, any increased flexibility for flight crew will be a trade-off, as other flights are impacted by being kept well clear of the communication failure aircraft. The increased difficulty which ATCOs face when procedures are less certain may be alleviated by the increasing availability of alternative means of communications between flight crews and ATCOs. The availability of CPDLC and satellite voice communications even when voice communication equipment has failed will provide a means of sharing flight crew intentions with the ATC unit.

2.24. Large operators have sophisticated operations control capabilities. There may be a greater role for aircraft operators to facilitate communications between flight crew and ATCOs where the flight crews cannot communicate with the ATC unit, but they can communicate with their operator. It is vital that communication details for ATC units are provided in the appropriate section of the AIP and in the ICAO Ops Control Directory to facilitate alternative communication. Non-aviation communication media may also provide a means of sharing information between flight crew and ATCOs – mobile telephones networks for low-level aircraft and inflight Wi-Fi for larger aircraft may be used to contact ATS units directly or share details with operations control facilities for forwarding to ATS units. Regardless of the medium, sharing information between the flight crew and the ATCO is vital to establishing a shared understanding of the flight's trajectory and assuring separation between the communication failure flight and other aircraft.

2.25. For remotely piloted aircraft systems (RPAS), communication failure procedures should be identical, except that the location of the remote pilot station on the ground and independent of the remotely piloted aircraft (RPA) is expected to provide additional opportunities for alternative communications to be established between the remote flight crew and the ATCO. Nonetheless, in accordance with the integration of RPAS into manned aviation, their behaviour should be consistent with manned aircraft when experiencing communications

failure. RPAS can also suffer a radio communication failure when there is a lost C2 Link, but in that case the remote pilot has also lost the ability to adjust the flight path of the RPA, so whether or not alternative communications can be established, the RPA must continue on its contingency flight path in accordance with the applicable lost C2 Link procedures.

3. CONCLUSION

3.1. Existing communication failure procedures were first published in 1948, and although they have been improved, the basic principles remain unchanged. Some organisations are advocating for increased flexibility in the global procedures to allow flights to return to the departure aerodrome, divert to an alternate aerodrome or continue to destination.

3.2. While giving flight crews more options during communication failure may improve operational outcomes, it also poses challenges for ATCOs as they must maintain separation between the communication failure aircraft and other aircraft in its vicinity.

3.3. Creating unified global procedures that include buffer times for ATCO recognition and use alternative communication methods to share information will provide a means of allowing increased flexibility while retaining predictability and ensuring safe outcomes for all flights.

4. DRAFT RECOMMENDATIONS

4.1. It is recommended that existing IFATCA policy:

There shall be one unified global set of procedures for communication failure.

is amended to read:

There shall be globally standardised procedures for communications failure which:

- **a) take into account the availability of ATS surveillance systems and alternative communication methods; and**
- **b) prescribe a minimum time during which the flight continues in accordance with the ATC clearance after the flight crew recognises the communication failure.**

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