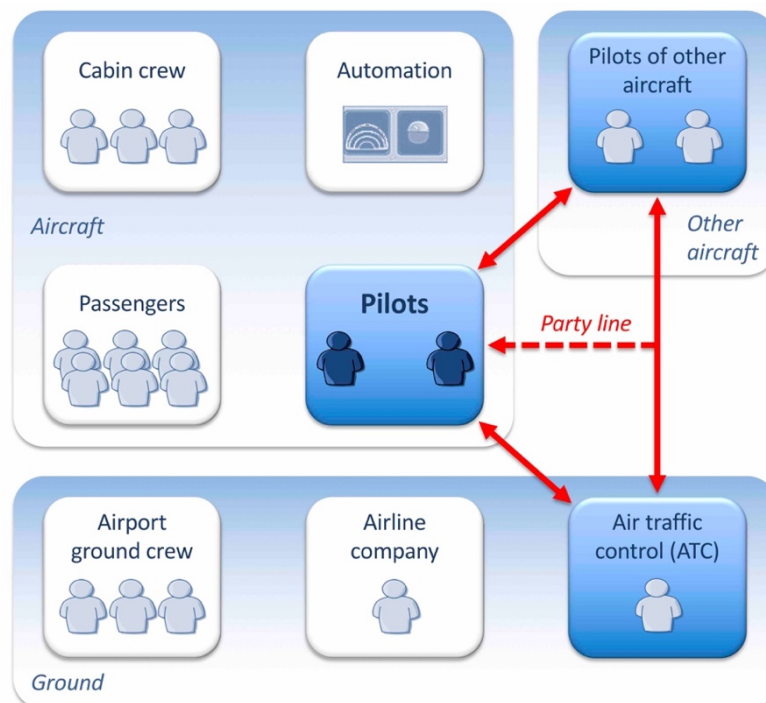




## Pilot-ATC Communication

Pilots and air traffic controllers communicate orally using a radio system known as radiotelephony (RT). This allows the transmission of signals in both directions but not simultaneously. Pilot-ATC communication has been described as “a specialized subcategory of aviation language corresponding to a limited portion of the language uses of only two aviation professions – controllers and flight crews” (ICAO, 2010, p. 3-2). In addition to radio links, pilots and controllers have in recent decades made increasingly use of **data link** technology to transmit text messages.

**Figure 1: Pilot interactions with ATC.**



As Shawcross (2009) observed, pilot-ATC radio communication takes place under challenging conditions. It is conducted largely without visual contact in environments that are often time-pressured and stressful. The medium of communication is a VHF radio link that can be noisy and is subject to problems such as microphone clipping and interference. Clipping occurs when an operator either starts speaking before activating the microphone or deactivates it before finishing speaking. Interference happens when simultaneous radio transmissions are made on the same frequency, with the result that transmissions are degraded or blocked.<sup>1</sup>

<sup>1</sup> This was one of the causal factors in the 1977 Tenerife runway collision. There was interference between transmissions from the tower and Pan Am Flight 1736). Either message could have alerted the other aircraft (KLM Flight 4805) before the collision. However, neither message could be heard clearly because of the near-simultaneous transmission (CIAIAC, 1978; Roitsch et al., 1978).



Given these constraints, one might expect miscommunications to occur more frequently than they actually do. Mell (1993) cited several important characteristics of radiotelephony to explain why problems are in fact quite rare. Firstly, the communications have a “predictable and repetitive nature”. Secondly, they make use of “an internationally recognised phraseology”. Thirdly, there are “a restricted number of topics... associated with a restricted terminology”.

As indicated in Figure 1, one controller is responsible for multiple aircraft within a particular sector. As planes progress through the airspace, the controller contacts one pilot at a time. All aircraft in a sector can hear the controller speak to other planes on a common radio frequency. When aircraft leave the sector, they are assigned a new radio frequency and handed over to the next controller. Drawing on the work of the sociologist Erving Goffman (1981), Sullivan and Girginer (2002) characterized this as “successive one-to-one interaction with multiple ratified participants, both addressed and unaddressed”.

Howard (2008, p. 372) highlighted four socio-environmental features of pilot-ATC discourse: “It is completely mediated, it is highly regulated, it is an intense environment, and the primary actors (flight crews and ATCs) emerge from different organizational structures and cultures.” Discussing the latter point, Garzone et al. (2010) noted that pilots and controllers must work as a team to coordinate their actions, especially during takeoff and landing, despite having different backgrounds and possibly different nationalities. Furthermore, there are significant cognitive differences between the two groups:

The ATCs are resident in the sites where operations take place and know the local environment very well. This profound knowledge has its linguistic counterpart in their familiarity with local contextual elements, for which there are often shared denominations and conventional Community-of-Practice (cf. Wenger 1999) forms - often shorthands - used to refer to them. On the other hand, pilots have to operate in settings of which in many cases they have never had any first-hand experience. So, they use direct visual input (whenever possible), also counting on a degree of standardization in airport design, and - above all - they rely on maps and on the recognition of landmarks (natural or artificial, e.g. signs on the ground). (Garzone et al., 2010, pp. 224-225)

Pilot-ATC communication consists of two varieties of language: **standard phraseology** and **plain language** (ICAO, 2007, 2010). Standard phraseology is designed for routine flight operations and plain English is meant to be used for non-routine situations, but in practice there is often intermixing of the two varieties. The use of standard phraseology and plain language within pilot-ATC communication may be considered an example of diglossia, when two languages or language varieties are used under different conditions within a single linguistic community (Maher, 2017).

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