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NEWSKY: New aeronautical communication network presented for the first time

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NEWSKY: a new communication network for aviation

At ATC Global 2009 (an international Air Traffic Control Exhibition and Conference), to be held in Amsterdam from 17–19 March 2009, the NEWSKY consortium will give a live demonstration of how aircraft, satellites and ground stations communicate with each other through an innovative data network using Internet technologies. On Earth, this has already become standard practice and the NEWSKY research project, led by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), aims to introduce it in the air as well.

In time, passengers will no longer be requested to "Please turn off any electronic equipment" before takeoff. The NEWSKY communication network allows pilots to communicate with the control tower over VoIP (**V**oice **o**ver **I**nternet **P**rotocol) and to download up-to-date weather and traffic data to the cockpit, while at the same time allowing the passengers in the cabin of the aircraft to surf the web and answer their e-mails. The connection is established and data is transmitted through processes that run completely in the background. Regardless of whether a direct connection to a ground station is established or whether it is relayed via a satellite, the network independently selects the best data connection for any given situation. "This means that the pilot does not need to think about which data channel to use, just as a mobile phone user does not need to think about which network is being used", explains Frank Schreckenbach, NEWSKY project manager at DLR, when asked about the advantages of the system.

Networking the sky

The NEWSKY project aims to create a communication network that meets the challenges of future air traffic. This, first and foremost, involves a reliable data exchange between the aircraft and the ground, both in remote areas over oceans and polar regions and in overloaded large metropolitan areas. By making extra information available, NEWSKY is expected to lead to a long-term improvement in air traffic safety standards, as well as a reduction in environmental pressure thanks to the optimisation of flight paths.

This project to 'network the sky' is being carried out by an international project team led by DLR and bringing together engineers from Thales Alenia Space, QinetiQ, Frequentis, Triagnosys, Deutsche Flugsicherung (the company in charge of air traffic control for Germany) and the University of Salzburg. The NEWSKY project is funded by the European Commission.

Safety-related data versus passenger e-mails

An important consideration in the development of the network was guaranteeing that safety-related data, for instance a distress call issued by the pilot, is always given priority over other data streams, such as passenger e-mail traffic. By incorporating unambiguous prioritisation by the system and the pilot, the engineers have ensured that safety-related data is always transmitted with the highest priority.

Another challenge, and one which makes this project fundamentally different from a ground-based communication network, is the fact that aircraft are highly mobile. The engineers solved this problem by including a number of ground-based computers in the communication channel linking the aircraft and the ground. These four or five servers are aware of the aircraft's exact position at any given time, which enables them to relay the data streams accordingly. If there were a direct communication link with the aircraft, the network would need to be continuously reconfigured because of the constantly changing position of the aircraft, leading to a substantial increase in data flow.

On stand H129 at ATC Global, the researchers will give a realistic demonstration of NEWSKY communications from the perspective of a pilot in the cockpit. The computer in the exhibition centre will be integrated into a terrestrial and a satellite-based network and behave as if it were on board an aircraft flying across the Atlantic Ocean. An additional display will show the data streams between the aircraft and the ground stations. In addition to this, the researchers will use a simulation environment to demonstrate how such a communication network will function when a large number of aircraft are involved.

Extensive certification required

The research team expects that their innovative network design can be realised in about ten years. "This is a global system, and extensive certification will be needed to meet the strict requirements of the aeronautics sector, leading to high investment outlays", says Frank Schreckenbach. Once the system is actually introduced, however, it will be many times cheaper to purchase and operate than current systems, and it will enable far more efficient data communication than now.

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