

5G NETWORKS IN AIRCRAFT MAINTENANCE

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Lufthansa Technik is one of the first companies in Germany to use its own private wireless networks based on the latest standard 5G. In February, the first 5G private wireless networks have been put into operation for two innovation projects in the field of VIP completion and engine overhaul at Lufthansa Technik's Hamburg base. For testing the technology, Lufthansa Technik has set up two separate private 5G networks at its Hamburg base, with different technology and network providers (Vodafone and Nokia). Instead of extending publicly available mobile networks to the Lufthansa base, a completely

independent infrastructure has been installed, with its own antennas and servers that can only be accessed by Lufthansa Technik. Therefore, "LH-Technik" appears as the network operator in the display of the mobile devices used.

The company is thus the first outside Asia to operate a fully-fledged standalone 5G network based on the new standard (3GPP Release 16) in an industrial environment. This enables higher security and a completely free configuration, which allows the company's own 5G networks to be adapted exactly to the requirements of the respective evaluation projects, for example in the ratio of upload and download bandwidth.

The new 5G network technology will benefit two innovation projects, with which the company is testing new technologies in the areas of engine overhaul and VIP completion. One project uses augmented reality to virtually visualize the 3D design data of the planned cabin interior in empty aircraft fuselages. By means of live data transmission, the technicians on site always have the opportunity to check the current position of all planned components and, additionally, to coordinate any necessary changes with the developers through collaborative video functions.

In the second project, the "**Virtual Table Inspection**", customers can remotely attend the inspection of engine parts and no longer have to travel to Hamburg for it. For this purpose, they are guided directly through the engine shop by means of a mobile device. Via a video stream they can communicate in real time with the engine mechanics performing the work, inspect the dismantled parts in high-resolution on the screen and make the appropriate order decisions.

Both projects have a very high demand for bandwidth for wireless data transmission, which could not be covered adequately by the previous 4G and Wi-Fi technologies. The public 4G upload rate was often no longer sufficient for high-resolution video streams, and the Wi-Fi standard, as an alternative, is not designed for a change of location between individual cells, which previously often led to connection terminations.

5G technology solves both problems at once, as it not only enables a significantly higher data transmission rate (in the final expansion stage up to 10 Gbit/s compared to a maximum of 1Gbit/s for 4G/LTE), but also allows mobile devices to switch smoothly between individual radio cells. One such network will cover one of the two engine shops in Hamburg, another a complete aircraft hangar with a surface area of about 8,500 square meters. In the latter case, it is particularly important that sufficient signal strength is always available inside the parked aircraft to ensure a secure connection. In order to ensure this at all times, 5G technology allows so-called beamforming, in which the antenna focuses its transmission field, which is otherwise spread across the entire hangar, on one or more mobile devices located in the hangar.

With frequencies that are close to those of conventional Wi-Fi (3.7 – 3.8 GHz), the radiation level remains within the non-critical range at all times, even in the focused use of 5G technology, so that any risk to employees in the relevant areas is ruled out. The German Federal Network Agency has approved Lufthansa Technik's use of the company's own frequencies accordingly. If 5G proves successful with the users in the two innovation projects, the technology will be rolled out to other Lufthansa Technik divisions in the near future so that its advantages can also be used in daily aircraft maintenance operations.

"Continuous innovation is part of our corporate DNA, and this is what drives us to constantly try out new approaches," explained Soeren Stark, Member of Lufthansa Technik's Executive Board, responsible for Technical Operations, Logistics and IT. "The first two application cases already impressively demonstrate the valuable contribution 5G technology can make to the aviation industry. It will also pave the way for numerous new innovations at Lufthansa Technik that will benefit our company, our employees and also our customers".

"The German economy needs 5G. We have 5G. As a partner in all things 5G, we want to help our industry to maintain its leading position into the future. Those who build on new technology today will be one step ahead tomorrow," said Hannes Ametsreiter, Chief Executive Officer of Vodafone Deutschland. "We support our partners in bringing 5G to their daily business as soon as possible. To the factories. To the business parks. And now even to aircraft hangars. With individual campus networks perfectly tailored to the needs of our partners."

Kathrin Buvac, President of Nokia Enterprise, said: "This application captures the essential value of fast, secure 5G private wireless networking to help improve operational efficiency, productivity and service. It highlights the potential for new ways of working that benefit not only our customers, but also the markets they serve."

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