GIGABIT WIRELESS, ON A PLANE?

Lufthansa Technik

When in-flight Wi-Fi first appeared more than a decade ago, it was all about Internet connectivity for airline passengers. In the years since, wireless networking has made huge strides but in-flight Wi-Fi has not, remaining relatively slow and expensive.

However, with the latest 802.11ac high-density Gigabit wireless technology from Aruba and aviation technology specialist Lufthansa Technik, and the realisation that there are a host of useful services that can run within the aircraft itself, that is about to change.

It means future airline passengers will be able to use Wi-Fi in a whole range of ways. Some of them will be applications that are already familiar from home but which have not previously been practical in the air, such as streaming video and audio, while others will be newer – for example being able to shop for Duty Free goods online and have them brought to our seat, or left for pick-up at our destination. It could even allow services to be individually tailored, perhaps with different levels of content and connectivity depending on your loyalty scheme status.

The key thing about all these services is that they will operate mainly or wholly within the aircraft, and will require little or no external connectivity. This is important because in-flight Internet bandwidth remains a challenge: air-to-ground communication is available, but only over land, and more specifically only over North America at present; elsewhere, the sole option is relatively expensive and limited satellite connectivity.

In the past, in-flight services have focused too much on connected applications such as email and the web, says Andrew Muirhead, Director of Lufthansa Technik's Business Unit Innovation. "We need to distinguish between in-flight Wi-Fi solutions without connectivity, and connectivity-based solutions," he explains. "Even with limited connectivity, or perhaps with no connectivity at all, there are lots of ways to provide services to the passengers."

A big opportunity here is to take offline content that is currently distributed either as printed literature or via screens built into the aircraft and put it online. As well as services such as on-board shopping, other examples include the moving map, news, movies, audio features, games, and information on destinations, the airline or on the in-flight meals.

Reducing the need for brochures and magazines not only saves printing and distribution costs, but more importantly for an airline it reduces the additional weight that the aircraft must carry, which saves fuel. Reducing the need for built-in screens also saves weight, but in addition it cuts the cost of buying and maintaining the in-cabin hardware.

Of course it will not be possible to completely eliminate the need for built-in screens, says Dr. Jan Remmer ter Haseborg, Product Engineer of Lufthansa Technik. For a start, not every passenger carries a connected mobile device, and of those that do, few will want to watch a two-hour movie on a smartphone – even if the movie studios can be persuaded to grant permission for wireless streaming of new movies. He therefore predicts that seat-back screens will still be needed on long-haul flights, with connected devices present as second screens and for greater interactivity.

The picture is quite different on short-haul flights. "The installation of Wi-Fi solutions is less complex and lighter than built-in screens, which reduces the investment for the airline and it might open possibilities for retail service on board," Muirhead says. "It means that on short-haul it will change from pure entertainment to added value services."

So what is the importance of 802.11ac in all this? A successor to the widely-deployed 802.11n standard –

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and backwardly compatible with 11n – it enables a single link to run at 500 Mbit/s or more, while multi-station throughput could exceed 1 Gbit/s. However, few 11ac-capable products are currently available.

Dr. ter Haseborg says that there are two key factors. The first is that product life cycles in the aviation market are much longer than in the consumer market, not least because of the lengthy regulatory test and qualification processes involved. This makes it difficult to bring new technology into the market on time. Starting with the very newest wireless technology, even if it is not yet widely used, should therefore give Lufthansa Technik's aviation-qualified wireless access point the longest possible service life.

The second is that inside of an airliner is not a friendly environment for Wi-Fi – it is basically a giant metal tube. Yet providing value-added services means providing sufficient bandwidth to a large number of clients with as few access points as possible, preferably no more than 5 access points in a single deck aircraft.

Double deck aircraft like the Airbus 380 and Boeing 747 should have proportionally more WAPs.

"We were looking for a stand-alone, which means controller-less, professional wireless solution which allows high performance for many users," says Dr. ter Haseborg. "Additionally we were looking for a module which could be easily integrated from a mechanical point of view. We also liked the integrated antennas, which allow us to build a new generation of wireless access points on board aircraft without additional cables and external antennas, which would increase the complexity of installation."

Although he and his colleagues had been testing equipment from the biggest companies in networking, when they saw first the Aruba AP-135 and then the 11ac-capable AP-225 they realised it was just what they needed.

This was thanks to the combination of 802.11ac performance with Aruba's advanced software which provides controller-less operation, plus other features such as simple set-up, adaptive radio management and corrective coverage. In tests it outperformed the competition even before it had been optimised for aircraft use.

It was also down to the AP-225's modular nature, which enables Lufthansa Technik to take the basic device, ruggedize it, add safety logic and an aircraft-type power supply, and seal the lot into an aviation-compliant airtight housing for stringent testing and qualification. The result: a whole new generation of Wi-Fi in the sky, based on Aruba technology.