

Seamless air-to-ground connectivity is going to revolutionise the passenger's internet experience over mainland US.

Honeywell appointed reseller for SmartSky ATG system

Honeywell has been appointed a value-added reseller for the SmartSky air-to-ground connectivity services. The SmartSky system, expected to be launched later this year, will provide the mainland United States (US) with an air-to-ground communication capability for defence, business aviation and air transport.

Depending on the business model, it is estimated that the connectivity solution will generate an average revenue-gaining yield of \$100,000-200,000 dollars per aircraft per year for an airline.

According to John Peterson, Honeywell Aerospace, vice president and general manager, Software and Services, Honeywell Connected Enterprise, Honeywell Aerospace: "If you think about the WiFi experience you have in your home or office, airline passengers will be able to get that same experience with SmartSky."

Early ground-based connectivity solutions suffered because the network quickly became saturated. This created a poor passenger experience, "SmartSky will have 20-30 times the amount of spectrum compared to previous systems," says Peterson.

Internet latency is the time taken for data to travel between its source and destination. SmartSky chief commercial officer, Nancy Walker, says: "The SmartSky service has much lower latency, and so faster data transmission speeds than satellite connectivity."

One of the reasons that SmartSky can attain such low latency is because the transmitted distance between the aircraft and the ground is far shorter than it is between an aircraft and space.

Measured in milliseconds (ms), a lower latency translates to a 'snappier' user experience. "The internet has communications going both ways, so high latency means that pages will load slowly onto your internet browser," says Walker. "We make every effort to keep latency below 100ms. This is very low

compared to satellite systems, which can have average latency of about 800ms."

High latency affects the synchronisation between personal electronic device (PED) features like video-chat services and cloud-based gaming.

From June 2018 to March 2019, 125 million new players registered with the online video game Fortnite. Players say that latency longer than 120ms typically lowers gaming response time, creating an uneven playing experience. It is estimated that lowering latency by 500ms will improve player response time by a full second.

Compared to connecting to a traditional satellite system, SmartSky will have enough low latency capability to introduce competitive cloud-based gaming to the cabin over mainland US.

"In addition to gaming, one of the demos we perform on the aircraft is to have a passenger sitting in a front seat FaceTime a passenger sitting at the back," says Walker. "Then we ask them to turn their phones to face each other, while streaming to show the other person how fast the connection is."

As the communications path is relatively short compared to travelling up to a satellite, the system is less affected by the weather. "Anything that transmits through a non-vacuum space is affected by its environment. The relatively short travelling distance and low frequency means that the system is not greatly affected by rain-fade," says Walker.

To create a secure network, SmartSky has architected a system that allows one aircraft to use one beam at any given time. So, for a widebody, the maximum number of users accessing the SmartSky beam will never be more than the seating capacity of the aircraft.

SmartSky shoots the beam six degrees across the horizon, creating a stacked, 'ice cream cone' layer of coverage across the US.

Previous technology meant it was not possible to shoot the beam horizontally,

because the spectrum could interfere with other network users. These systems relied on a vertically shot beam, so passengers did not receive a good service on an aircraft that was not flying at the optimal altitude to receive the signal.

Each ground station will transmit multiple beams. "The system is constantly searching for the strongest beam and the best performance" says Walker. "We are launching upwards of 25,000 beams to cover the US, which will make the handover between beams seamless."

It is predicted the SmartSky system will be the standalone connectivity solution for regional jets operating over the US. With a maximum of 7,000 aircraft flying over the US at any given time, SmartSky will be able to ensure 100% capacity to each aircraft.

For widebody aircraft that travel in intercontinental services to and from the US, SmartSky is looking to offer the service as part of a hybrid system.

SATCOM from Honeywell is capital-efficient, so if the current network reaches its limit in a certain area, it will be easy to add additional capacity. "If we have customers with airline hubs in New York or Chicago or Atlanta, we can architect into the network greater capacity near those airports," says Walker.

As the service is bi-directional, it is possible to offload as much data from the aircraft as it is possible to upload. Typical traditional satellite-connected aircraft use about 10% of the bandwidth to transfer data off the aircraft. The SmartSky system dedicates about 50% of its bandwidth to offloading data from the aircraft.

"We believe this will redefine how airlines are using connectivity. Previously, systems have not been designed to offload in-flight data from the aircraft," says Walker. "Everything has been designed around passenger connectivity."

Airlines are increasingly looking at their aircraft as a node on the internet. This means they are developing more and more use cases for pulling data off the aircraft in real time. SmartSky has the unique ability to be able to do this.

"We are the network provider to the airlines, we handle all the offloaded data, the termination of the data and all the conditioning of the data and policies. That is, anything that is associated with being a network service provider," says Peterson. "The Honeywell SmartSky solution is unique because it services more than just the cabin network. Complimentary to connectivity, the solution opens up gateways that can capture and aggregate data." **AC**

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