EUROPEAN AVIATION NETWORK

European Aviation Network: Q&A

- **What is the European Aviation Network?**
  The European Aviation Network (EAN) is the world's first integrated S-band satellite and complementary LTE-based terrestrial network across Europe that will bring unprecedented passenger connectivity to the aviation industry. It will allow for high-speed internet access on European flights: Passengers can use their personal devices for internet browsing, video streaming, gaming and other online services, with unmatched high capacity, low-latency performance. The EAN consists of two main components, the S-band satellite from Inmarsat, which covers Europe and the surrounding oceanic regions, and the complementary ground component of Deutsche Telekom, which provides the required capacity in areas with extensive air traffic.

- **What is the latest status of the European Aviation Network (EAN)?**
  Inmarsat's S-band satellite is ready for commercial service to support inflight internet services when EAN goes 'live' later this year. All in-orbit tests were successfully completed after the satellite was launched onboard an Arianespace rocket from French Guiana in June 2017. Inmarsat's partner, Deutsche Telekom, has now completed construction of the complementary ground network, which will be fully integrated with the S-band satellite to deliver a truly seamless service. The ground network consists of around 300 sites across Europe, with the antennas installed on existing masts wherever possible. EAN's LTE sites will have a typical range of 80-100km (up to 150km max), can transmit data to the operating altitude of passenger planes, and are flexible enough to deal with aircraft speeds.

- **Which airlines are already signed up to use EAN?**
  International Airlines Group (IAG), which includes world-renowned airlines British Airways, Iberia, Aer Lingus and Vueling, is our launch customer. Installation has already begun with plans to equip over 300 aircraft with EAN and aims to have 90% of its short haul fleet complete by early 2019.

- **What are the advantages of integrating a satellite and an LTE-based ground network?**
  EAN benefits from the mass coverage of a satellite and the performance, low latency and flexibility of a ground-based system. It is an innovative means to efficiently reuse the spectrum. In addition, its robust, cost effective and ultra-compact technology makes EAN uniquely qualified for European airspace, where aircraft size, flight density and frequent aircraft manoeuvring are challenging to broadband satellite-only systems.

- **Is EAN also more cost effective for airlines than satellite-only alternatives?**
  Yes, operation and maintenance costs are lower and ground stations can easily be added to the network in order to respond to customer needs and increase capacity.

- **Who handles the end customer relationship: Inmarsat, DT or the airline?**
  Responsibility for the end-customer relationship will depend on individual airline agreements. It may rest with the airline, Inmarsat or DT (acting as internet service provider on behalf of Inmarsat or the airline).

- **How will airlines benefit from the European Aviation Network?**
  Airlines can offer reliable, high-speed and future-proof inflight broadband access across Europe's high-traffic flight paths. A recent study quantifying the commercial opportunities of inflight connectivity by the London School of Economics and Political Science (LSE) forecasted that European airlines which successfully deliver new broadband enabled ancillary services to passengers will benefit from an extra $8.2 billion in revenue by 2035. EAN goes a long way to helping airlines capitalise on this opportunity.

- **How will passengers benefit from the European Aviation Network?**
  EAN will transform the inflight experience for European passengers. Passengers can use their personal devices for internet browsing, video streaming, gaming and other online services, with unmatched high capacity, low-latency performance.

- **How does Europe benefit from having something like EAN in operation?**
  EAN will leapfrog the capabilities of any existing inflight connectivity offer, placing Europe at the forefront of aviation connectivity innovation. It is a solution for Europe developed by leading European companies, including Inmarsat, Deutsche Telekom, Thales, Nokia and Cobham. EAN will not only benefit the European airline industry by providing their customers with best-in-class connectivity in the skies; it will also transform passenger experience and bring major economic benefits to the continent through the millions of additional working hours that connectivity can provide.

- **Does the EAN system hand-over from ground to satellite coverage at a certain altitude?**
  No. Both, the satellite and ground network are always on and the hand-over is seamless and not dependent on the altitude of the aircraft. Airlines may switch on the service at a certain point after take-off, however, not right at the start.

- **Which technical challenges did you have to overcome to make the ground network a reality?**
  One of the main technical challenge was to overcome the Doppler effect. The Doppler effect is the change in frequency when the signal receiver – i.e. the airplane – is moving away at high speed from the signal source – i.e. the LTE base station on the ground. For a flying plane, we had to compensate this shift in frequencies. Otherwise no stable signal could be received. The second main challenge was to design an antenna that evenly covers the sky so that each aircraft anywhere in the network receives a good signal. The third big topic was to extend the cell range beyond standard LTE limits with a cell range of up to 150 km.

- **Can passengers make direct phone or data calls from their devices to the ground?**
  No. The ground network is a special LTE network, adapted to the frequency of Inmarsat´s satellite and using different technical parameters (speed, altitude, cell length). EAN LTE is not the same LTE used on the ground. Flight passengers will connect with their devices to a WiFi network on board of the plane. Wi-Fi traffic is then either routed through the S-band satellite or the LTE ground network.