SkyFive contribution to the Discussion Document on Re-planning options for frequency bands within 1710-2300 MHz

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About SkyFive

Airline passengers want to stay connected but suffer from poor performance of today's inflight Wi-Fi services. Engines that generate Terabytes of data on every flight. Taxi drones that will require reliable connectivity for safely navigating dense urban airspaces. Connecting the skies generates huge benefits for an ecosystem much larger than aviation.

SkyFive is world's first provider of broadband connectivity services in the skies based on standard 4G and 5G technologies, which we leverage to boost performance, cut latency, and drive down cost per bit. We partner with Operators to use existing cell towers on the ground, and extend communication services into the aircraft cabin, allowing passengers to seamlessly connect like on the ground.

After years of research and development in Bell Labs, SkyFive was spun off from Nokia 2019 to fully focus on A2G. Our company is home to aviation and telecommunications specialists with over 250 years of cumulative experience, including the key inventors of the technology, the creators of the commercial solution, and the builders of the European Aviation Network.

SkyFive is headquartered on the Ludwig Bölkow Aerospace and Security Campus in Munich, Germany.

For more information, please visit www.skyfive.world

Introduction

- In March 2020, in a response to the discussion paper on planning for the 2GHz spectrum band, Nokia outlined in its submission the benefits of using the band for Air-to-Ground communications (A2G) both overseas and in New Zealand. This document is to supplement the Nokia submission.
- SkyFive would now like to further discuss the A2G, in parallel to similar discussions in neighbouring Indonesia and Australia, and in the context of operational benefits for airlines and augmentation of the GRN for coping with natural disasters.
- Note: Nokia has set up SkyFive as a dedicated company to drive the global proliferation of A2G: SkyFive consists of the former Nokia A2G team and was joined by key people from the aviation industry, who collectively built the European Aviation Network

About A2G technology

- A2G is a technology for providing true broadband connectivity to aircraft of any kind and any size, based on a cellular network with skywards-pointing antennas. A2G connects from 10 km below rather than from 36.000 km above and delivers high throughput and low latency at a fraction of cost per bit compared with SATCOM systems.
- For the ground network, A2G leverages standard 4G/5G mobile network technology on a dedicated frequency band: Band 65A, from 1980-1995 MHz and 2170-2185 MHz respectively. This band is used across all of Europe, will be used in the Middle East, and is planned to be used by early adopters in the Asia-Pacific region, except for China.
- The first large-scale deployment – the European Aviation Network – has gone live in 2019. To date, close to 300 A320/321 aircraft have been retrofitted with A2G aircraft terminals. The network delivers up to 100 Mbps per aircraft and, given the many city pairs in Europe, covers the airspace over the entire continent, not just particular air routes.
- To airlines, the TCO of an A2G system is significantly lower of a SATCOM system: the system is less complex and hence cheaper, does not induce additional drag hence does not increase fuel consumption (and associated CO2 emissions), can be mounted overnight hence does not lead to loss of revenue while the aircraft is grounded, and provides data in Mbps rather than Mb hence incentivizes consumption rather than penalizing it.
- To lower flying aircraft, helicopters and drones (below 5000 feet) A2G is a reliable and low-cost solution to provide large bandwidth compared to expensive satellite and more interference prone terrestrial 4G systems.

Use cases and benefits for New Zealand

- The A2G aircraft terminal is very small compared to SATCOM systems (the outside antenna is the size of a coffee cup), and could therefore also be mounted on small aircraft types, such as, regional jets, helicopters and turboprops, allowing to provide coverage also for flights to and from rural and remote areas.
- Airlines could transmit operational data, especially aircraft system status, to destination airports well ahead of landing. This allows optimizing ground handling, with regards to gate availability, refueling, and maintenance, and therewith minimizes the aircraft turnaround time and leads to more on-time departures. Operational efficiency can be improved through various use cases.
- Airline passengers could enjoy a more seamless end-to-end journey, by starting to arrange ground transportation (e.g. book a taxi or check in with car rental) still inflight. In case of disruptions with connecting flights, airlines could reach out in real time and start suggesting alternatives, rather than forcing their passengers to queue up at transfer desks.
- When transporting patients to hospitals on air, the medical personnel could transmit critical biometric data of the patient already inflight, allowing the hospital to take all preparatory action. In addition, medical experts based anywhere on the ground could start with the diagnosis and consult the flight crew to perform immediate medical actions.
- An A2G network could extend the GRN into the sky, allowing to transmit relevant mission data between ground forces and air support. Crews of water bombers could receive the accurate positions of firefighters on the ground and align where to engage. In the other direction, aerial video could be transmitted to ground forces to improve their situational awareness.
- To A2G system is ideal also for medium-altitude Unmanned Aerial Vehicles (UAV) to connect to A2G network, which allows to reduce the UAV payload and increase the safety of such devices.
- A2G system can complement 4G based public safety networks and provide the same capabilities to officers on air for helicopters as well (NGCC).
- Unlike satellite-based systems the implementation requires mostly resources from New Zealand to design, build and operate the ground network that will contribute to the local economy.

Next steps

- Nokia, SkyFive, and its potential partners in New Zealand propose to RSM to align the A2G spectrum allocation in the 2GHz band with Europe, the Middle East, and its neighbors, and make the following country-wide allocations: 1980 MHz – 1995 MHz and 2170 MHz – 2185 MHz, thus 2x15 MHz, which appears modest when compared to 250-550 MHz mobile broadband allocations to major carriers.
- Aligning with the international standards ensures the maximum choice in A2G product and service supply for the New Zealand aviation industry, thereby delivering a very cost-effective solution for local airline operators. Aircraft fly and are traded across national borders frequently, therefore airlines are looking for a uniform solution.
- The alternative use of Band 65 (of which still the upper half, i.e. another 2x15 MHz, would not be used by A2G) by IoT services based on Mobile Satellite Services with a Complementary Ground Component does not appear to be realistic, as this would require a significant device ecosystem (today there is none) for reaching a viable cost point for IoT devices.
- We are working with local partners to demonstrate the capabilities of he A2G system potentially being the 1st demo system implemented outside of Europe.

Closing remarks

SkyFive appreciates the opportunity to provide input to Radio Spectrum Management's Discussion document on 'Re-planning options for frequency bands within 1710-2300 MHz'.

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