HAPSMobile and Loon First in the World to Deliver LTE Connectivity from a Fixed-Wing Autonomous Aircraft in the Stratosphere

Jointly developed communications payload enables video call during Sunglider's stratospheric test flight

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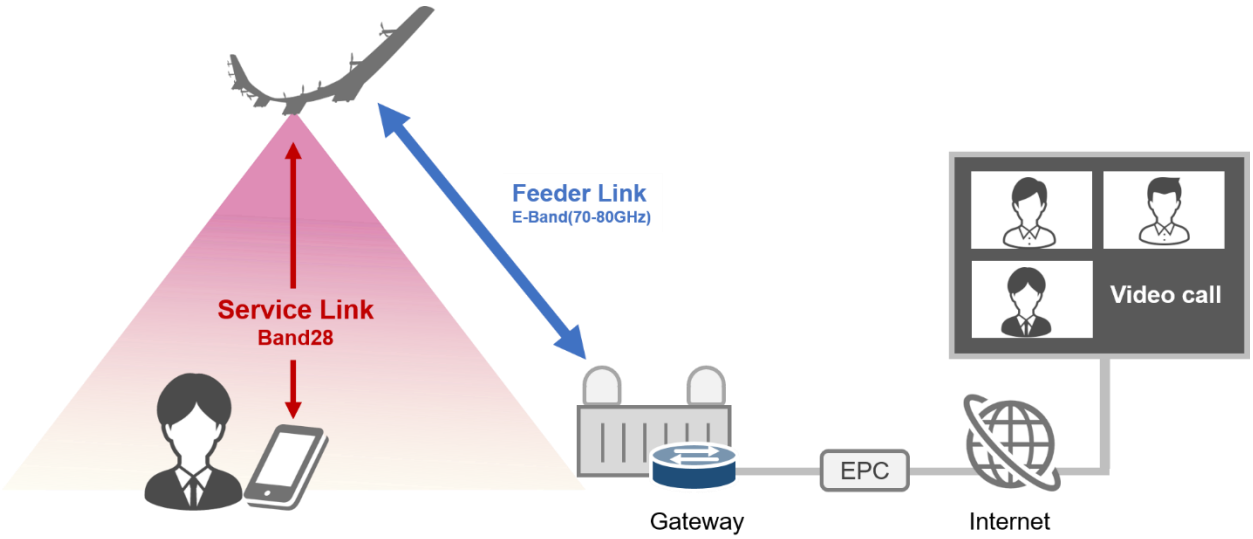
HAPSMobile Inc.
Loon LLC

TOKYO / MOUNTAIN VIEW - SoftBank Corp.'s HAPSMobile Inc. ("HAPSMobile") and Alphabet's Loon LLC ("Loon") today announced they successfully tested their jointly developed communications payload in the stratosphere on HAPSMobile's "Sunglider," a solar-powered unmanned aircraft system (UAS). Taking place during Sunglider's first stratospheric test flight at Spaceport America (SpA) in New Mexico on September 21 MT, the test marked the world's first successful delivery of LTE connectivity from a fixed-wing High Altitude Platform Station (HAPS) autonomous aircraft in the stratosphere.

The stratosphere-ready payload used in the test flight was a first-of-its-kind for a fixed-wing, autonomous aircraft-based HAPS to deliver LTE connectivity. Using MIMO technology, the payload enabled LTE connectivity to be delivered continuously for approximately 15 hours during Sunglider's test flight. The payload performed as planned in the demanding conditions of the stratosphere, where wind speeds reached greater than 58 knots (approximately 30 meters per second) and temperatures were as low as -73 degrees Celsius.

During the test, the communications payload enabled a video call between Loon members and AeroVironment, Inc. ("AeroVironment") team members with smartphones at SpA and HAPSMobile team members in Tokyo. The test system was composed of a service link from Sunglider using the 700MHz spectrum band (LTE Band28) and a feeder link between the aircraft and a ground gateway using millimeter wave spectrum*. Since the radio waves transmitted and received by Sunglider operate on the same frequencies as existing smartphones and devices, Loon and AeroVironment members in SpA were able to use regular smartphones to participate in the video call. During the test flight, smooth operations and connection speeds enabled high-definition, low-latency video calls.

*The service link used a 5MHz band of the 700MHz spectrum band for this test. In addition to an outdoor environment, the video call test was successful indoors.



Vint Cerf, recognized as one of the “Fathers of the Internet” and VP and Chief Internet Evangelist, Google, LLC, and Jun Murai—known as the “Father of the Internet in Japan” and Professor at Keio University’s Faculty of Environment and Information Studies, and HAPSMobile External Director—also joined the video call and discussed HAPS’ significance for the future of the Internet.

Footage of the test flight can be seen here.

Images of the video call

During the test flight, HAPSMobile also conducted basic measurements of stratosphere-to-ground radio wave propagation data that will be used toward future contributions to the ITU Radiocommunication Sector (ITU-R) with a view to international standardization. With the valuable data and learnings that the teams collected during this test, HM and Loon will be collectively working with ITU, 3GPP, regulators and telcos to further the already in progress work on HAPS. The test also provided insight into how HAPS could be used in disasters and alongside other lifesaving technologies.

Junichi Miyakawa, Representative Director & CTO of SoftBank Corp., and also President & CEO of HAPSMobile, said, “I am thrilled that our wireless communications equipment jointly

developed with Loon exceeded our expectations in severe high-altitude conditions. Through this test we've obtained vital data that will accelerate the development of commercial services and improve the coverage and quality of our HAPS connectivity. We look forward to further developing the payload with Loon so we can revolutionize mobile connectivity and bridge the world's digital divide."

Loon's CEO Alastair Westgarth said, "This successful test represents yet another step to develop a new layer of connectivity based in the stratosphere. It is also an important step in our ongoing strategic partnership with HAPSMobile. By developing technologies to harness the opportunity of the stratosphere, we are making progress toward our shared goal of connecting unconnected and under-connected populations around the world."

Vint Cerf, VP and Chief Internet Evangelist, Google, said, "I had the privilege of participating in a milestone demonstration on September 21. A HAPSMobile solar-powered Sunglider aircraft flew to over 62,000 feet carrying a Loon LTE base station. That floating, stratospheric base station connected a mobile phone to the Internet where a four-way, high resolution video conference ensued. Participants in the video call were in New Mexico, Tokyo, Mountain View, California and Washington, DC. This technology holds great promise for the future of connectivity, especially as part of efforts to expand internet access to places that don't yet have it."

Jun Murai, Faculty of Environment and Information Studies Professor at Keio University, and also HAPSMobile External Director, said, "Using the stratosphere for the mobile Internet is going to be the next most innovative challenge, and it will add to the existing and achieved innovations of the Internet. It was my honor to participate in this historic trial of Internet-based video conferencing among multiple points using HAPSMobile's Sunglider, which was actually flying in the stratosphere. The result was a perfect success, making very strong impressions on everybody with high-resolution, smooth video and practically no latency, which made for exciting and natural conversations. HAPS technology is greatly needed by all of us for natural disaster recovery and Internet inclusion, which are key missions of the Internet today. The Internet is for everyone, everything and everywhere. Now we step forward to achieve this dream."

About Loon
Loon's mission is to connect people everywhere by inventing and integrating audacious technologies. By leveraging these advanced technologies, Loon is making it possible to expand internet access to the billions who currently lack it. Loon works with a range of partners to expand and supplement existing networks and enable new solutions that will meet the connectivity needs of the future. To date, Loon's stratospheric balloons have travelled more than 40 million kilometers around the world and connected hundreds of thousands of people.

About HAPSMobile
HAPSMobile Inc., a subsidiary of SoftBank Corp. and minority-owned by AeroVironment Inc. (NASDAQ: AVAV), plans and operates a High Altitude Platform Station (HAPS) business with the aim of bridging the world's digital divide. HAPSMobile is primarily engaged in network equipment research and development for the HAPS business, construction of core networks, new business planning and activities for spectrum usage. AeroVironment, Inc. is HAPSMobile's

minority owner and aircraft development partner for its solar-powered unmanned aircraft “Sunglider” designed for stratospheric telecommunications platform systems that flies approximately 20kms above ground in the stratosphere. HAPSMobile has a strategic relationship with Loon, a subsidiary of Alphabet, the parent company of Google. For more information, please visit https://www.hapsmobile.com.