Your response

Your response should include details of:

- a description of the relevant technology;
- a view of the potential impact of the technology on the sectors we regulate, preferably
- identifying the impact against the criteria listed in section 3.16 of the call for inputs;
- the current state of development of the technology, including any demonstrations of
- feasibility;
- any unresolved issues which need to be addressed for the technology to achieve full
- potential;
- references to key publications and the leading groups working on the technology; and
- whether you would be open to discussing the technology in more detail with Ofcom.

Your response

Confidential? – N

• a description of the technology which you believe we should be evaluating.

High-Altitude Platforms (HAPs) are aircraft positioned above 20km altitude, in the stratosphere, to create a telecom/remote sensing network for civilian and military applications. These aircraft may be airplanes, airships, or balloons, usually uncrewed. At the 20-25km average altitude, winds are relatively light, allowing the HAP to station keep over a single reference point on the ground, with minimal power consumption. At 20km altitude, HAPs are "above the weather" and above the jet stream.

• a view of the potential impact of the technology on the sectors we regulate, preferably identifying the impact against the criteria listed in section 3.16.

HAP advantages include larger coverage areas, compared to terrestrial relay towers, no interference caused by obstacles (buildings, ground elevation), and shorter time and much lower cost to deployment. Compared to satellites, HAPs have the advantage of far lower latency, the possibility of return to the ground for maintenance and upgrades, and, in the case of remote sensing, the ability to remain over a single area for a longer period of time, delivering much higher resolution imagery.

• the current state of development of the technology, including any demonstrations of feasibility.

Avealto is using the knowledge gained from practical testing and development from the Ascender series to build a Commercial Prototype HAP vehicle. This vehicle will be around 65 meters in length (~200 feet). The vehicle will have on board a Ku bank Telecom Payload. This vehicle will incorporate advanced plastic film materials for both the outer envelope

and the inner cells. The initial tests of this vehicle are planned for the Caribbean covering portions of the Island of Hispaniola and surrounding ocean.

This Commercial Prototype will use a very lightweight high tensile strength UHMWPE for the outer envelope. The inner cells will be made from a Dupont Tedlar plastic film which is coated on both sides with a very thin layer of aluminum to reduce the permeability of the material to the very small Helium molecules. The coating process is done in a vacuum chamber and only deposits a few layers of aluminum molecules to maintain the exceptionally low weight of the material.

The Commercial Prototype will have a carbon fiber "keel" like the one tested on the Ascender 28 vehicle.

The Commercial Prototype will have a telecom payload operating in the Ku band. The vehicle will support a telecom payload of around 50 kilograms (110 pounds). A payload of this size will allow the vehicle to profitably serve multiple markets segments from a single vehicle.

The Commercial Prototype will have a sophisticated avionics package for "over the horizon" operations. This package includes a redundant autopilot and a transponder system similar to the one found on commercial aircraft to identify the location of Commercial Prototype for air safety purposes.

This Commercial Prototype vehicle will be fully tested to fully verify the HAP design prior to construction of multiple vehicles for commercial operations.

The initial test of the Commercial Prototype is planned for the Caribbean region in conjunction with three future customer's organizations, which are partnering with Avealto for the test.

The Telecom Payload is being developed in the United Kingdom, through a combination of commercial partners.

The Telecom Payload is designed to operate on multiple frequency bands and be able to serve multiple market segments on a single HAP. The telecom payload for what we believe will be the first lighter than air stationary operations HAP vehicle has some unique characteristics. The basic radio systems for satellites are well known. The main challenge will be the antenna system since "satellite" communication is usually operated at a much higher altitude.

The total weight of the radio and antenna system is designed to be no more than 50 kilograms (110 pounds). The amount of transmission capacity on board each HAP vehicle will affect the revenue which that vehicle can produce. Weight is a critical factor, but there is also a limited amount of power available from the batteries and solar panels to operate the radio equipment.

Avealto already has developed a relatively simple Ku-band system which could be used on the initial test of the Commercial Prototype

• any unresolved issues which need to be addressed for the technology to achieve full potential.

The frequencies allocated by ITU for HAP operations make viable commercial HAP operation economically unfeasible. There are two primary reasons for this.

1. Frequency Allocation. Frequencies allocated in bands that will not allow a reasonable level of quality in routine conditions. Frequencies above 38 GHz will not realistically allow high quality transmission of broadband at distances of up to 80 miles with any type of environmental degradation such as rain, snow or even fog.

2. Amount of Bandwidth. In order for a HAP services to be economically viable, each HAP vehicle must be able to sell enough bandwidth to recover the cost of vehicle operation, vehicle development, ground operations, ground network costs, administrative and sales cost and other overhead. In the bands below 38 GHZ only a very small amount of bandwidth has been allocated for HAP operation (for example 300 MHz between 27.9 and 28.2 GHz). Even if this bandwidth is efficiently reused in a HAP coverage area the total amount of capacity to sell to user is limited. This would be the same are requiring a train to only allow 2 passengers per train car, or a bus company to only allow 4 passengers on a bus that could hold 4o passengers.

HAPS can reuse the existing satellite frequencies without interfering with the geosynchronous satellite operations. AVEALTO commissioned a study form Mark Posen and RPC Telecom. This study shows the way that HAPS could reuse the frequencies now allocated for satellite use without interference and reuse these frequencies many thousands of time for a more efficient use of limited bandwidth. This would allow AVEALTO to provide cost effective services to areas that need connectivity.

• whether you would be prepared to join a call with Ofcom's technology team to discuss the technology in more detail.

Yes. Avealto is prepared to collaborate with Ofcom´s technology team.