

Avealto Ltd. – High Altitude Wireless Infrastructure Platform (WIP)

Peter Lobner, 27 October 2023

1. Introduction



Avealto Ltd. is a privately-owned firm co-founded by CEO Walt Anderson and CTO David Chambers in London, UK in April 2013. The name Avealto translates to "High Bird" in Spanish. The firm is developing lighter-than-air

(LTA), solar-powered, uncrewed, high-altitude platforms (HAPs) that they refer to as Wireless Infrastructure Platforms (WIPs). The Avealto website is here: <https://avealto.com/>

Avealto's business plan is to build WIP vehicles in the UK, deploy and operate hundreds of WIPs worldwide, and sell mobile telephony, broadband communications and other wireless services to mobile operators, not to end users. The mobile operator will deliver these services to their own subscribers in areas of the world that currently don't have adequate access to telecom and data networks, including underserved communities, very-small-aperture terminal (VSAT, direct-to-home or office) networks, and marine operators. Avealto estimates that there are more than three billion people worldwide who don't have adequate access to telecom and data networks.

Avealto notes that the much shorter signal transmission path of HAPs compared to satellites offers significant technical advantages, notably lower signal latency, better Forward Error Correction (FEC) and lower power transmitter requirements.

Avealto is designing their WIP Telcom Payload to integrate into existing terrestrial and satellite communications infrastructures to provide connectivity throughout the world at a lower price than available satellite communications alternatives. In addition, the WIP

vehicles are expected to be able to carry secondary payloads for other value-added hosted services, such as earth observation, air quality monitoring, internet of things (IoT) connectivity, wildfire monitoring, and support for disaster response / emergency management.

Avealto reports that it “is in the final stage of development to create its first generation of commercially viable HAP vehicles.” In September 2015, Avealto expected to begin commercial services in 2017. That target was not realized. In March 2023 a service entry date of early 2025 was announced for their first planned commercial WIP deployment, which would be for an Indonesian client.

2. Design criteria for the Avealto WIP vehicle

Avealto plans to develop its fleet of high altitude WIP vehicles to meet the following general design criteria:

- Vehicle must be designed to be recovered and reused. They must be able to withstand multiple launches and landings.
- Vehicle must be able to maintain a relatively geo-stationary position at altitudes between 60,000 and 72,000 feet (18 to 22 km).
- Vehicle must be able to operate for 3 to 6 months on station.
- Vehicle must be able to carry a Telecom Payload of at least 55 kg (121 lb).
- The vehicle must be all-electric.
 - The WIP vehicle has a peak power demand of 60 kilowatts.
 - Solar panels must be able to produce adequate DC power during daylight hours to support airship systems (electric motors and avionics), the telecom payload, and also charge the batteries for overnight operations.
 - Batteries must have adequate capacity to power the vehicle and the communications payload during hours of darkness.
- Vehicle must have secure remote monitoring and autonomous control capabilities.

3. Early WIP design based on the JP Aerospace Ascender (2015 to 2018)

Avealto's early HAP vehicle technology development work began in collaboration with the U.S. firm JP Aerospace, which was well-known for its work on a family of V-shaped, semi-rigid airships, known as "Ascender," designed for operating in the stratosphere. JP Aerospace completed a High Altitude Platform feasibility study for Avealto in mid-2015. JP Aerospace test vehicles were flown multiple times as part of this study.

On 30 September 2015 Avealto announced a development partnership with JP Aerospace to design and build a HAP vehicle prototype to provide telecommunication services. At that time, Avealto announced, "When the initial design is finalized, volume production and deployment of the High Altitude Platforms will proceed. Avealto plans to build the operational High Altitude Platforms and associated Telecom Payloads in the United Kingdom..... Avealto plans to have commercial High Altitude Platform vehicles ready for deployment in 2017."

Four months later, Walter Anderson announced on 4 February 2016 that JP Aerospace had flown its Ascender 36 for the first time and noted that this was a prototype for a telecommunications platform the company was developing for Avealto. The Ascender 36 was a semi-rigid airship with carbon fiber keels inside the envelope forming the legs of the Vee, and joined by two transverse carbon fiber trusses, one at the nose and the other amidships to carry the electric motor-



driven propellers, battery, flight control system and payload.

*Ascender 36 launching.
Source: JP Aerospace via Avealto*



Ascender 36 in flight. Source: JP Aerospace

In November 2017, JP Aerospace conducted an indoor float test of their Ascender 28, which was a 28 meter (92 foot) long, V-shaped HAP prototype built for Avealto. Like the Ascender 36, the Ascender 28 was a semi-rigid airship, but with its carbon fiber keels outside the gas envelope.



Ascender 28 float test. Note the visible carbon fiber keels outside the V-shaped gas envelope. Source: JP Aerospace

After the float test, John Powell, JP Aerospace Chief Designer reported, “The Float Test was a huge success. As of today, we officially have an airship. The Ascender 28 will now be disassembled and moved to our flight line in Nevada, where we will make between 5-7 test flights over the coming months, testing all systems for function and increased flight duration. Later missions will also test the Avealto Telecom Payload.” Flight tests were conducted in the Black Rock Desert in September 2018.

The planned 60-meter (197-foot) production HAP vehicle JP Aerospace was developing for Avealto was to be a V-shaped, solar-powered airship that could remain on station in the stratosphere for up to six months at a time. Once on station, the HAP would have a telcom footprint measuring approximately 240 to 480 km (149 to 298 miles) in diameter on the ground, depending on topography.

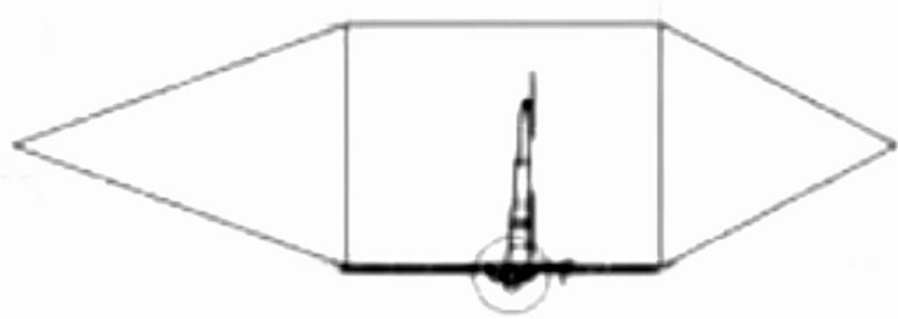
With no fanfare, development of the production HAP was terminated and Avealto’s development partnership with JP Aerospace was concluded in 2018.

Avealto retained the Ascender 28 vehicle and conducted additional float tests in May 2019 to test new helium release valves and altitude control systems,

In a 2020 PBEC video (@ 6:40 min into the video), Avealto co-founder and CTO, David Chambers, reported that Avealto had contracted with an American supplier (JP Aerospace) to build and fly a “...pre-pre production vehicle, that is, just a proof-of-concept, which would demonstrate features of the autopilot system and buoyancy control system.” Chambers referred to these as “Phase 1” tests.

4. Current WIP design (2019 to present)

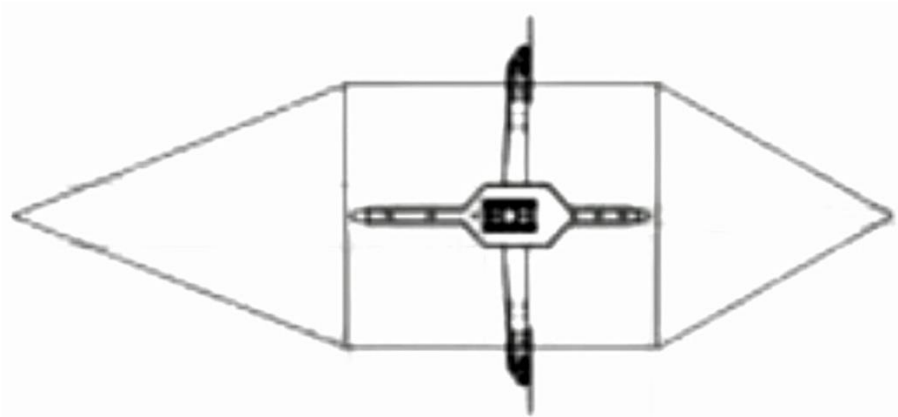
Avealto’s development work continued in the UK on a new design for the WIP vehicle. In late 2020, a design had been developed for a “minimum product” WIP, which was a semi-rigid airship with a cylindrical mid-section and conical ends, as depicted in the following diagrams.



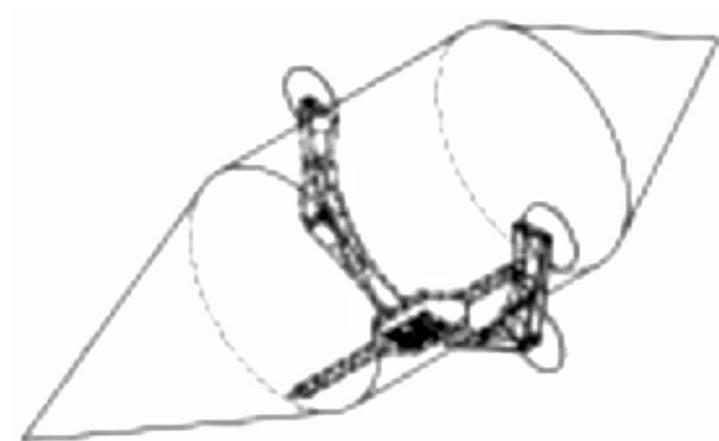
Side view, showing the general shape of the non-rigid gas envelope & a rigid propulsion pylon



Front view, showing cantilevered transverse propulsion pylons supported from the rigid keel and fitting closely around the gas envelope



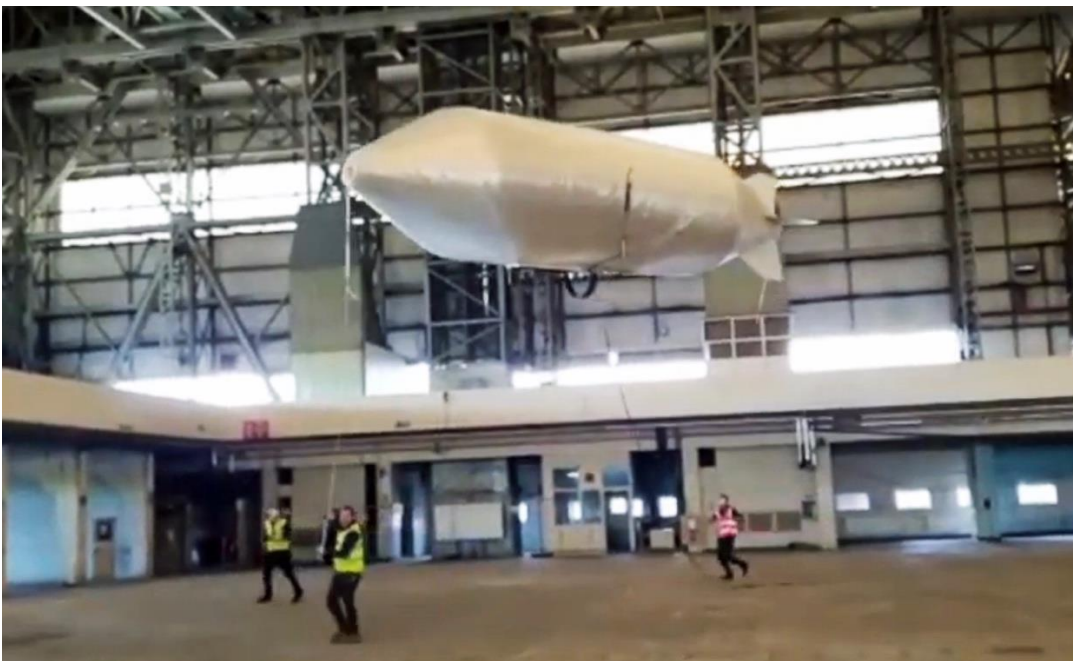
Bottom view, showing longitudinal rigid keel & cantilevered transverse propulsion pylons



Isometric view, showing longitudinal rigid keel & cantilevered transverse propulsion pylons

*General arrangement of an Avealto “minimum product” WIP, circa 2020.
Source: Adapted from screenshots from Avealto video for PBEC (20 December 2020)*

Avealto began flight testing a 16-meter (52.5-ft) subscale vehicle in late 2020 in the Brabazon hangar in Bristol, UK. On 28 June 2021 testing began under the supervision of the UK Civil Aviation Authority (CAA), with the goal of obtaining UK Flight Approval. At the time, the company reported that it expected to begin commercial services by the end of the 1st quarter of 2023. Multiple test vehicles flew prior to completing initial R&D.



*WIP subscale prototype indoor test in the Brabazon hangar, Bristol, UK.
Source, both photos: Screenshots from Avealto video for PBEC*



WIP subscale prototype indoor flight test. Source, both photos: Avealto



WIP subscale prototype indoor flight test. Source: Avealto via Digital Journal

5. Power via El-Sky Whisper Beam

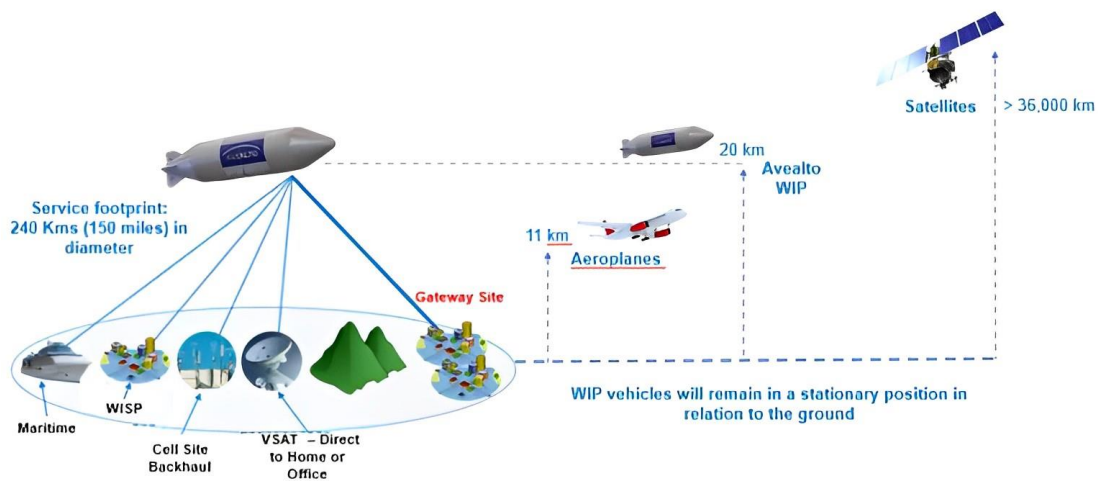


As a supplement or alternative to on-board batteries, Avealto announced in May 2022 that it had teamed with the U.S. firm Electric Sky, Inc. (El-Sky, <http://www.el-sky.com>), to adapt their ground-based “Whisper Beam” technology to deliver power to an airborne WIP. El-Sky's Whisper Beam system would use a ground-based array to transmit a microwave beam up to a WIP vehicle at an altitude between 60,000 and 72,000 feet (18 to 22 km), where an on-board antenna array would receive and convert the microwave energy into electricity.

The first demonstration of microwave power transmission from a ground station to an airborne airship was conducted under the ETHER program at the CRL Kansai Advanced Research Center in Kobe, Japan, in October 1995. In this demonstration, a small blimp known as HALROP successfully flew at low altitude and converted beamed microwave energy to electric power for airship systems and propulsion. AVEALTO's WIP will apply the same technology over a much longer range and at higher power levels.

6. Concept of Operation

Each WIP vehicle will be placed at a geo-stationary position at 60,000 to 72,000 feet (18 to 22 km) above a service area measuring about 240 km (150 miles) in diameter. Within each service area, a gateway site will link users to existing terrestrial and satellite telecom infrastructures. The intended user community includes: wireless internet service providers (WISP), backhaul services for remote area mobile phone operators, very-small-aperture terminal (VSAT) direct-to-home or office broadband internet networks and Ku-band services for marine operators.



Concept of operation. Source: Avealto

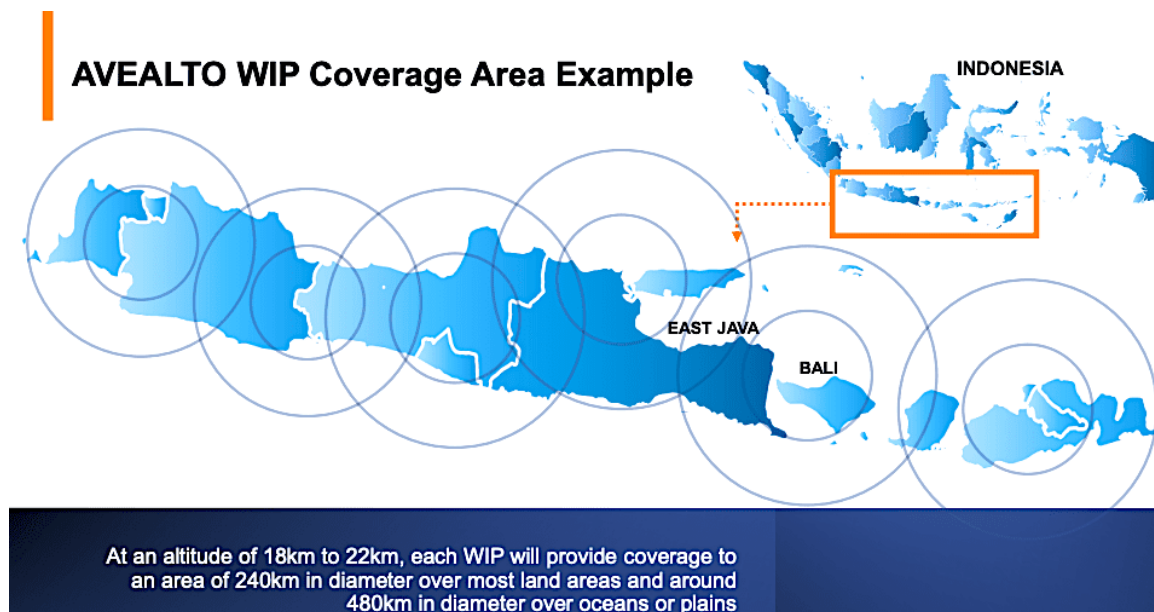


Rendering of an Avealto WIP vehicle at operating altitude . Source: Avealto

The WIP vehicle is designed to be recovered on the ground at the end of each deployment cycle. At that time the vehicle and telcom payload can be refurbished and readied for a subsequent flight, relocated to a different site or replaced by a new vehicle and/or payload package.

7. Initial deployment plans

In March 2023, Avealto announced that it had selected Indonesia as its first market to provide services with its WIP vehicles. Indonesia has more than 6,000 inhabited islands, and has the 4th largest population in world. Avealto stated that initial commercial service operations are planned for early 2025. The following map shows the telcom service area that Avealto expects to cover in Indonesia with six WIP vehicles.



Partial Indonesia service coverage map with six Avealto Wireless Infrastructure Platform (WIPs). Source: Avealto

8. Funding

In October 2022 Avealto reported it had launched a US\$20 million Series A round to fund initial production of the WIP vehicles. Avealto announced via EINPressWire:

“ROUND A funding opportunity for \$20 million, to be used to set up factory operations and begin production of Wireless Infrastructure Platform (“WIP”) vehicles after successfully completed its R&D with 4 patents. The company has identified a large existing market in which it can provide services at a lower cost and higher quality than existing providers.”

Avealto subsequently confirmed that the Series A funding goal had increased to US\$35 million.

9. Manufacturing facilities

In October 2022, Avealto reported that they were seeking a manufacturing facility in the UK that was large enough for final assembly and inflation testing of full-size WIP vehicles, which are expected to have a length of about 100 meters (328 ft). As of October 2023, selection of a manufacturing site has not been announced.

10. Patents

The company filed four UK patents in June 2022 related to their WIP communications platform, novel antenna design and vehicle control systems. As of October 2023, the patents were pending and have not yet been published.

11. For more information

- “Avealto Selects JP Aerospace to Create High Altitude Platform,” Avealto Ltd press release via PR.com, 30 September 2015: <https://www.pr.com/press-release/639055>
- “JP Aerospace Flies Prototype Airship For Launches, Comms,” Aviation Week & Space Technology, 26 September 2016: <https://aviationweek.com/defense-space/jp-aerospace-flies-prototype-airship-launches-comms>
- “Avealto Completes First Round Funding with a 3 Million US Dollars investment,” Avealto press release via ResponseSource, 21 November 2016: <https://pressreleases.responsesource.com/news/92049/avealto-completes-first-round-funding-with-a-million-us-dollars/>

- “High Altitude Platform Prototype Now Ready for Flight Tests,” Avealto Ltd press release via ResponseSource, 7 November 2017: <https://pressreleases.responsesource.com/news/94331/high-altitude-platform-prototype-now-ready-for-test-flights/>
- “AVEALTO’s High Altitude Platform: A Transformative Technology Whose Time Has Come,” Satellite Markets & Research, 2 September 2021: <https://www.satellitemarkets.com/avealto-high-altitude-platform-transformative-technology-whose-time-has-come>
- “Avealto Wireless Infrastructure Platform Design Gets Top Review in Independent Evaluation” Market Media, published online on Digital Journal, 8 February 2022: <https://www.digitaljournal.com/pr/avealto-wireless-infrastructure-platform-design-gets-top-review-in-independent-evaluation>
- “Avealto Successfully Completed Initial Wireless Infrastructure Platform R&D with 4 Patents,” NewsWires, 4 October 2022: https://www.einnews.com/pr_news/593968913/avealto-successfully-completed-initial-wireless-infrastructure-platform-r-d-with-4-patents
- “AVEALTO Opening \$20 Million Round A To Fund Initial Production of Wireless Infrastructure Platform Vehicles,” EINPressWire, 17 October 2022: <https://www.einpresswire.com/article/596215151/avealto-opening-20-million-round-a-to-fund-initial-production-of-wireless-infrastructure-platform-vehicles>
- “AVEALTO Wireless Infrastructure Platform to Operate in Indonesia,” Avealto press release, 13 March 2023: <https://avealto.com/wp-content/uploads/2023/03/20230313-PRESS-RELEASE.pdf>
- Alex Goldman, “GVF webinar: HAP builder Avealto claims non-interference with satellites,” Connectivity Business News, 28 April 2022: <https://connectivitybusiness.com/news/strategy-markets/gvf-webinar-hap-builder-avealto-claims-non-interference-with-satellites/>
- “Whisper Beam Wireless To Power Avealto High-Altitude Airships,” Avealto press release via Digital Journal, 9 May 2023: <https://www.digitaljournal.com/pr/news/marketers->

[media/whisper-beam-wireless-to-power-avealto-high-altitude-airships](https://www.satellitetoday.com/business/2023/02/13/avealto-launches-trademark-dispute-against-airbus-haps-venture/)

- Rachel Jewett, “Avealto Launches Trademark Dispute Against Airbus HAPS Venture,” Via Satellite, 13 February 2023: <https://www.satellitetoday.com/business/2023/02/13/avealto-launches-trademark-dispute-against-airbus-haps-venture/>
- “HAPS Alliance Member Spotlight with AVEALTO on Closing the Digital Divide,” HAPS Alliance: <https://hapsalliance.org/blog/haps-alliance-member-spotlight-with-avealto-on-closing-the-digital-divide/>

Videos

- “Avealto Video for PBEC (Pacific Basin Economic Council) - United by a Passion for Communications & Space,” (11:36 min), posted by Michael Walsh, 20 December 2020: <https://www.youtube.com/watch?v=jR9lcJbOJZs&t=309s>
- “Walt Anderson, NOAH 2021,” (7:06 min), posted by We Don’t Have Time, 6 December 2021: <https://www.youtube.com/watch?v=lyzUZTeuACI>

Patents Pending (not yet published)

- GB202209473D0, “A communications system and a vehicle for the same,” Filed 28 June 2022, Published 10 August 2022, Pending: [https://patents.google.com/patent/GB202209473D0/en?q=\(Avealto+Ltd\)&oq=Avealto+Ltd](https://patents.google.com/patent/GB202209473D0/en?q=(Avealto+Ltd)&oq=Avealto+Ltd)
- GB202209475D0, “A lighter than air vehicle and a communication system comprising the same,” Filed 28 June 2022, Published 10 August 2022, Pending: [https://patents.google.com/patent/GB202209475D0/en?q=\(Avealto+Ltd\)&oq=Avealto+Ltd](https://patents.google.com/patent/GB202209475D0/en?q=(Avealto+Ltd)&oq=Avealto+Ltd)
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