## Comment Letter to the National Telecommunications and Information Administration

## Re: Proposed BEAD Alternative Broadband Technology Guidance

## From: Sceye Inc. 50 George Applebay Way Building 200, Moriarty, NM 87035

# 1. Company Overview and HAPS Overview

- **Sceye Overview**

Sceye Inc. is a pioneering aerospace company specializing in developing and deploying High Altitude Platform Station Systems (HAPS) for broadband connectivity. Founded in 2014 and headquartered in Moriarty, New Mexico, Sceye has rapidly established itself as a leader in alternative broadband technology solutions. The company's mission is centered on closing the digital divide by providing high-speed broadband access to unserved and hard-to-reach communities. Sceye's innovative approach combines cutting-edge material science with advanced telecommunications technology to create a technologically superior and economically viable solution for rural and remote areas. By using platforms at the edge of space, Sceye is capable of serving tens of thousands of users per platform at FCC-approved broadband speeds and connecting directly to handsets, making the service much cheaper with less expensive equipment.

- **HAPS Technology Overview**

According to the industry association HAPS Alliance, which Sceye is a member of, HAPS is an acronym for High-Altitude Platform System, which is a system that utilizes an unmanned vehicle, such as an aircraft, flying in the stratosphere as a communications base station. In doing so, the system is capable of providing communications services over an extensive area. The stratosphere is a layer of the atmosphere far above the clouds. Because of this, it is not affected by rain or snow, and air currents have little influence. These characteristics enable the flight of a stratospheric platform to be more stable as compared to flight in other layers of the atmosphere. HAPS can provide a wide array of services,, including connectivity, earth, atmosphere, and climate monitoring, disaster response, mapping and humanitarian missions, search and rescue, infrastructure inspection, and more. In the field of

telecommunications, HAPS is classified as a non-terrestrial network, equivalent to that of geostationary and low-earth-orbit satellites. This new network system is capable of covering a wider area more efficiently than traditional ground base stations. It is also unaffected by damage caused by disasters such as earthquakes and tsunamis.

To offer persistent and high-quality services, neither the lower atmosphere nor space suffices. Airplanes and drones offer proximity to the ground but offer little persistence and coverage. Satellites in Low Earth Orbit (LEO) offer global coverage but only seconds of persistence over any area and limited proximity. Geostationary satellites are persistent with regional coverage, but their extreme distance limits their usefulness. Sceye chose the stratosphere to be able to offer proximity, persistence and coverage in a single platform. This is crucial for communication where it allows us to offer broadband directly to the cellphone and for earth observation where precision makes data actionable.

Sceye's HAPS are designed to stay airborne in the stratosphere – between 60,000 ft and 65,000 ft – with powerful solar arrays, and best-in-class batteries, enabling our HAPS to stay over an area of operation and provide unparalleled telecommunications service and earth observation. Sceye has progressed where aerospace giants, tech giants and governments have failed by approaching engineering and business iteratively, letting increasingly capable HAPS fill the gaps. The company was founded in 2014 and started flying prototypes in 2016, with increasingly larger aircraft flying higher and higher, carrying more and more capacity. In 2021, Sceye flew the first platform in the stratosphere and in 2022, Sceye demonstrated wide-area, long-range telecom capabilities. In 2023, Sceye matured the system for launch, ascent and landing, which akin to a rocket are the hardest parts of the flight. In 2024, Sceye completed the most significant milestone, by being the first to fly past a full diurnal in the stratosphere, carrying advanced instruments for earth observation and communication.

**In summary, HAPS technology and the serving of users from the stratosphere offers a novel, economical and efficient way to provide broadband to households which would otherwise not be connected. The technology is new and growing rapidly, and it is crucial that it is seriously being considered, in order to provide the American people with the connectivity that is so important to their daily lives.**

## 2. Addressing Alternative Technologies Beyond LEO Satellites

High Altitude Platform Stations (HAPS) offer a cost-effective and reliable alternative to Low Earth Orbit (LEO) satellites, which are often burdened by high operational costs and performance inconsistencies. Sceye's HAPS technology delivers broadband speeds above 100/20 Mbps, outperforming LEO satellites in terms of both speed stability and cost-efficiency. More broadly, Non-Terrestrial Networks (NTNs) represent an emerging field in telecommunications, extending beyond traditional satellite networks to include aerial platforms like HAPS and unmanned aerial vehicles (UAVs). While UAVs face limitations in energy consumption and flight duration, and LEO satellites struggle with significant path loss and long communication delays, HAPS systems excel due to their larger platform size, lower path loss, extended mission duration, and superior communication range.

Integrating NTNs with existing terrestrial infrastructure can enhance wireless coverage, offering a scalable and economically viable solution for comprehensive network connectivity. NTNs function as access nodes that improve the performance of terrestrial networks by increasing capacity, coverage, and reducing delays. They can address gaps left by terrestrial networks, particularly in sparsely populated or challenging environments where infrastructure investment is economically unfeasible. This is especially pertinent in rural areas where geographic obstacles and low population densities create "white spots" with poor coverage, necessitating costly new terrestrial site deployments.

By positioning HAPS in the stratosphere, these platforms benefit from optimal radio propagation conditions, enabling high-quality line-of-sight communication even through terrain obstacles. Sceye's HAPS have proven this capability with a world record-setting connection from a stratospheric platform to ground-based smartphones over 140 km away. With their advanced lifting, powering, and station-keeping abilities, HAPS can support significant telecom payloads and serve as "Towers in the Sky," facilitating the delivery of widespread broadband coverage. These aerial platforms extend the range and coverage of terrestrial networks or provide connectivity to unserved areas where ground-based infrastructure is impractical. Utilizing technologies like OpenRAN and MIMO antenna arrays, HAPS offer high-capacity NTN solutions with minimal interference and lower latency compared to satellite links, making them a cost-effective option for bridging the digital divide and supporting next-generation networks.

In contrast, LEO satellites, despite their broader coverage potential, encounter significant challenges that dampen their effectiveness for consistent high-speed connectivity. This disparity in performance reliability starkly highlights the potential advantage of HAPS technology. HAPS systems, like those developed by Sceye, are uniquely positioned to deliver not just improved reliability but also superior speed and cost-effectiveness. By operating in the stratosphere, HAPS platforms avoid many of the operational challenges faced by LEO satellites, such as atmospheric drag and orbital decay, which can complicate maintenance and longevity. Furthermore, HAPS systems can provide more stable and direct communication links, which reduce latency significantly compared to the often circuitous and delay-prone paths associated with satellite signals. This makes HAPS an ideal solution for achieving the high-speed, high-reliability broadband access that is crucial for bridging the digital divide, particularly in rural and remote regions where traditional infrastructure is not viable.

Furthermore, the largest aggregator of internet speed tests, called Ookla, has provided evidence that SpaceX has never been close to serving a majority of their customers with FCC-mandated speeds, as can be seen in their study from November 2022-November 2023 (64.54/9.72 Mbps median download/upload). Their 25th quartile speeds are significantly worse at 35/7.5 Mbps (download/upload). As such, it is not probable that the LEO constellation can guarantee FCC-mandated broadband speeds. Below is a state-by-state breakout of median speeds for the last year based on the 180,187 speed tests Sceye has bought from Etrality GmbH from the start of the US public launch in Sep 2021 to Apr 2024. Finally, Starlink never participated in the Affordable Connectivity Program (ACP) and currently charges $120 per month for service while guaranteeing 30/8 Mbps (download/upload) according to their FCC customer label. This does not include the $499 cost of the terminal. This compares to an ACP-aligned price of $19.50 per month for Sceye broadband, which guarantees 100/20 Mbps (download/upload).

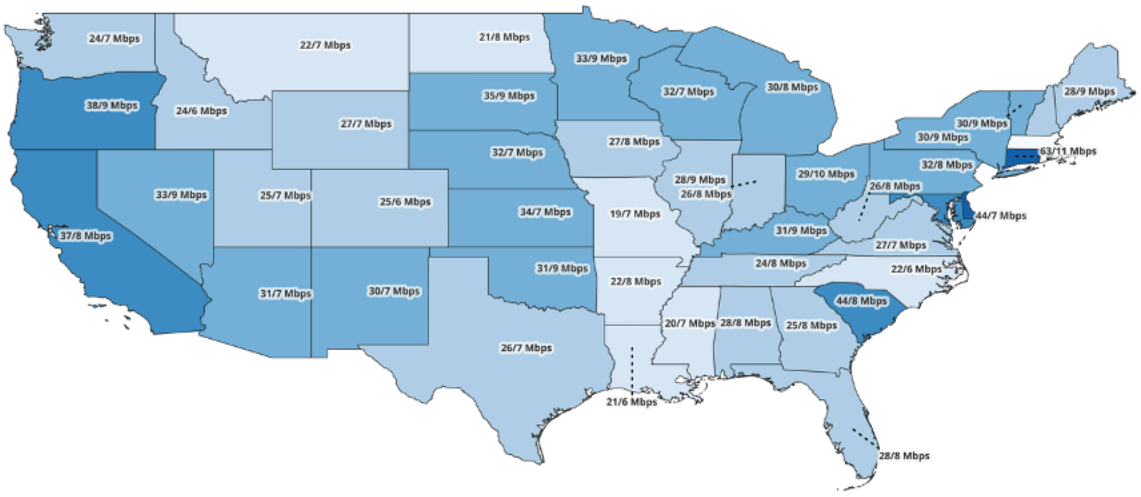


**Figure 1: State-wise Breakdown of Starlink Speeds in 2024**

**In summary, we strongly recommend that the agency explicitly recognize HAPS as an example of a viable and promising alternative technology within its guidance, alongside LEO satellites and unlicensed fixed wireless. The unique capabilities, cost advantages, and demonstrated performance of HAPS make them a valuable tool for expanding broadband access, especially in unserved and underserved areas, and should be considered alongside other solutions in achieving universal connectivity goals.**

## 3. Deployment in Hard-to-Reach Areas

Sceye's intended future proposal for BEAD funds focuses on deploying High Altitude Platform Systems (HAPS) technology to address the critical broadband needs in northern New Mexico. One intended project targets unserved and underserved areas across ten counties in New Mexico: Rio Arriba, Sandoval, Los Alamos, Santa Fe, San Miguel, Torrance, Bernalillo, Valencia, Cibola, and Socorro. This ambitious initiative aims to provide reliable broadband access to 19,525 unserved and underserved households in regions where traditional infrastructure deployment has proven challenging due to geographical constraints and prohibitive costs. This also with explicitly address an areas where no subgrantee has proposed to deploy Reliable Broadband Service in the RDOF program or where proposals are expected to exceed the Eligible Entity’s High-Cost Per Location Threshold (EHCPLT). In this instance, Sceye’s use of HAPS technology offers a strategic solution to bridge the connectivity gap. By deploying broadband via high-altitude platforms, Sceye can bypass the logistical and financial barriers that often hinder traditional broadband expansion in

rugged or remote locations. This approach aligns perfectly with the BEAD Program's goal of achieving universal broadband access, providing a feasible alternative where traditional deployment methods are not just impractical but economically unsustainable.

**In summary, there is currently no technology which can easily connect EHCPLT in rural areas. HAPS offers to do that in areas like mountainous New Mexico in a faster, cheaper and more efficient way than current alternatives.**

## 4. Compliance with Technical Capacity Requirements

HAPS are well-positioned to meet the technical capacity requirements for the BEAD program due to a number of factors:

- The stratosphere and the altitude of 60,000-65,000 feet provides an excellent vantage point for serving tens of thousands of users at once, which is also convenient for load balancing among different user groups like businesses, schools, and households.
- Power usage increases in a cubic relationship (the third power), making it much more efficient to serve users from the stratosphere relative to space, at 300-22,000 miles distance.
- Terrestrial disturbances, including natural disasters, power outages and localized issues do not affect HAPS, providing important redundancy in situations where all terrestrial infrastructure can have a single point of failure.
- The geometry is favorable relative to terrestrial infrastructure, where tower heights of just a few hundred feet create very steep angles which create interference and limit efficiencies, whereas HAPS serve a much wider field of view allowing the platforms to use many more antennas at once.

It should also be noted that the telecom industry is investing billions of dollars into HAPS platforms, including leading global players like Softbank, Deutsche Telecom, Facebook, and Google. This is a testament to the significant technological potential of HAPS, which offer a novel way of scaling infrastructure in areas where time, cost or geography makes further deployments impossible.

Sceye also has a strong individual track record in showcasing technical feasibility. Already in 2022, Sceye flew a massive Multiple Input Multiple Output (MIMO) antenna array in the stratosphere, with download speeds of 166 Mbps and 41 Mbps downlink at 20 MHz bandwidth. Sceye is now developing a novel wide-coverage antenna capable of servicing hundreds of thousands of people with full mobile connectivity directly to cell phones or tens of thousands of fixed broadband devices with FCC-defined speeds. This solution will be deployed in 2026 with contracts already in place for deployment in large numbers in Latin America and strategic investments from telecommunications companies in other parts of the world.

**In summary, HAPS are already proven as a viable way to service FCC-defined broadband speeds to users, and the unique characteristics of HAPS provide redundancy and reliability in ways that terrestrial infrastructure does not. This**

**once again underlines the value of explicitly mentioning high-altitude platforms as a specific technology, along with unlicensed fixed wireless.**

## 5. Compliance with Financial, Managerial, Technical, and Operational Capacity

Sceye has demonstrated substantial financial and managerial capacity through its significant investments and operational track record in New Mexico. Since establishing operations in the state in 2017, the company has invested over $200 million in developing its facilities and technologies. This includes expanding operations from its initial R&D and hangar facilities at the Roswell International Airport to a second facility at the Moriarty Airport in 2019.This financial commitment underscores Sceye's long-term dedication to developing and deploying HAPS technology in United States.

Sceye has consistently demonstrated its technical and operational capabilities through a series of successful HAPS deployments and tests. Already in 2022, Sceye successfully demonstrated testing of 4G extended range services from a commercial-scale HAPS. Throughout 2023, Sceye conducted four successful commercial-scale HAPS flights, achieving key objectives such as reliable launch and ascent, automation of pressure control, demonstration of altitude control, and pitch stability with payloads. In 2024, Sceye achieved the most critical milestone of flying past a full diurnal in the stratosphere while staying over an area of operation, something which the US government and NASA has spent $12 billion trying to do. These accomplishments showcase Sceye's ability to operationalize its HAPS technology effectively. They are also a testament to Sceye’s strong team, which is composed of both industry veterans and subject-matter experts from fields like America’s Cup and Formula 1, where materials and performance are pushed to the utmost limits.

Sceye’s founder, Mikkel Vestergaard Frandsen is an entrepreneur and philanthropist. Widely recognized as one of the first humanitarian entrepreneurs, Mikkel has started and grown multiple material science companies whose mission is to benefit humanity. He is the founder and CEO of the aerospace company Sceye, as well as the founder and owner of public health companies LifeStraw and Vestergaard. Mikkel has been recognized for his global leadership in public health innovation and sustainable business by the New York Times, The Economist, TIME magazine, and the World Economic Forum among others. Stephanie Luongo Stephanie leads the overall planning and execution of mission and experimental flight test operations for SCEYE’s stratospheric platforms. She has extensive work experience in the aerospace industry, holding various roles in mission operations, engineering, and teaching. Stephanie currently serves as the Chief of Mission Operations at Sceye since May 2021. Prior to

that, they worked as a Senior Launch Operations Engineer at BLUE ORIGIN from January 2020 to May 2021. Stephanie also served as the Director of Mission Operations/Chief Flight Test Engineer at World View from October 2017 to October 2019. As Payload Director, Arturo Fountain brings over 12 years of engineering experience to Sceye, with a strong background in wireless telecommunications and network design. As a Senior RAN Design Engineer at AT&T Mobility, Arturo has extensive experience in designing, integrating, and optimizing network elements, including wireless networks and propagation modeling. His expertise in spectrum planning, antenna configuration, and software development for network optimization aligns well with Sceye's HAPS technology. Arturo's skills in rapid deployment for special events and disaster recovery, as well as his experience with multiple vendor platforms, make him a valuable asset to Sceye's innovative team. His ability to manage end-to-end projects and develop custom solutions demonstrates the kind of problem-solving skills crucial for advancing Sceye's mission in stratospheric communications.

**In summary, the Sceye team has succeeded where the largest national aerospace companies, tech companies and NASA have failed, by creating a platform capable of persistent flight in the stratosphere. This showcases a high level of managerial, operational and operational capacity, while the company has shown excellent financial performance, by creating an operational platform at a fraction of the cost of existing programs.**

## 6. Applicability to BEAD Investment in Alternative Technologies

High Altitude Platform Stations (HAPS) present a transformative solution for extending broadband connectivity to the hardest-to-reach populations, aligning with the NTIA’s request for comments on innovative broadband technologies. HAPS technology offers a scalable and efficient means of delivering high-speed internet to underserved areas, addressing gaps left by traditional methods. By operating at high altitudes, HAPS can cover users at distances exceeding 62 miles, effectively reaching remote and sparsely populated regions where traditional infrastructure deployment is economically unfeasible.

One of the key advantages of HAPS technology is its ability to drive down the cost of providing connectivity, a critical consideration for government-funded broadband expansion efforts. Traditional deployment methods often involve high infrastructure costs and logistical challenges, especially in difficult terrains and low-density areas.

HAPS platforms, by contrast, offer a more cost-effective alternative, enabling broader coverage with lower operational and capital expenses. This cost-efficiency makes HAPS an attractive option for government initiatives aimed at closing the digital divide and ensuring universal broadband access.

The NTIA's emphasis on leveraging alternative technologies underscores the need for solutions that not only enhance connectivity but also reduce expenses associated with broadband deployment. HAPS technology addresses this need by providing a reliable and economical way to extend high-speed internet to underserved communities. By incorporating HAPS into government broadband strategies, it is possible to achieve comprehensive coverage while minimizing costs, ultimately driving forward the goal of equitable and widespread internet access.

**In summary, HAPS presents a complementary tool for federal officials to connect the all households, especially those in the hardest to reach areas, and at a price tag which makes it possible with existing funding.**

## 7. Compliance with Cost Coverage Requirements

Sceye, leveraging its High Altitude Platform Systems (HAPS) technology, can integrate the cost of all eligible initial non-recurring fees, such as installation or customer premises equipment, into its subgrant agreements. This strategy ensures that installation and equipment expenses do not hinder broadband adoption for Americans in BSLs, particularly in unserved and underserved communities which historically receive minimal attention from traditional providers. HAPS technology's ability to minimize infrastructure needs substantially reduces overall deployment costs, allowing for the potential of the industry to be a leader in providing affordable broadband access.

Sceye's innovative approach aligns with NTIA's goals to promote accessible broadband for all and is particularly effective in rural and remote areas. These areas, often overlooked even when significant incentives like the RDOF auction process are available, find a viable solution in HAPS. In particular, Sceye's unique position and maturity allows it to set a benchmark for affordable broadband plans, offering services at just $19.50, which meet FCC requirements and further promote digital inclusion through economically efficient means.

**In summary, Sceye is uniquely able to remain committed to the pricing set forth by the Affordable Care Program (ACP), without even relying on government support. This stands in stark contrast to LEO offerings requiring hundreds of dollars of upfront fees and monthly prices in the hundreds of dollars as well. LEO**

**satellites have proven themselves, in the sense that the price has not decreased and the performance still does not meet FCC-defined broadband speeds, while Sceye is able to meet the speed requirement at a fraction of the LEO price.**