

## **Atmospheric-Space Network Offering Global Broadband Communications Services**

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### **ABSTRACT**

Stratospheric networks will emerge as a competitive modality for providing broadband services. Each network requires only one airborne hub per city in a simple “star” network configuration versus a mesh network of many satellite nodes with each either having multiple inter-satellite links or a data trunkline to a ground station. Consequently, a stratospheric network will be much simpler to deploy, maintain, and upgrade than a satellite network. Spectrum opportunities can be pursued on a regional basis instead of negotiated on a global scale. The airborne hub can be routinely serviced for optimal performance. Highly-competitive terrestrial broadband wireless technologies can be adapted, rather than developing space-rated technologies optimized for a unique satellite bus. The stratospheric network can be a fast evolving solution to be deployed one market at a time to ease the financing commitment and to reduce the market risk of growing a global wireless communications business.

Angel Technologies Corporation and its development partners {Deskin Research Group ([www.deskin.com](http://www.deskin.com)), Raytheon Systems Company ([www.raytheon.com](http://www.raytheon.com)), and Wyman Gordon Corporation ([www.wyman-gordon.com](http://www.wyman-gordon.com))} are pioneering broadband wireless millimeter wavelength services from piloted High Altitude Long Operation (HALO) aircraft. Scaled Composites ([www.scaled.com](http://www.scaled.com)) in Mojave, California, a subsidiary of Wyman Gordon, is flight testing the HALO/Proteus “proof of concept” airplane of full scale, and its sister company, Scaled Technology Works ([ww.scaled-works.com](http://ww.scaled-works.com)) in Montrose, Colorado will Type Certify the airplane through the FAA and will be the series producer of the airplane. Angel and Raytheon have demonstrated a symmetric wideband link from a rooftop, tracking antenna to a general aviation airplane in flight, through which T1 access, ISDN access, web browsing, high-resolution videoconferencing, large file transfers, and Ethernet LAN bridging were delivered. The HALO/Proteus airplane will be the central node of a broadband communications network with a star topology. The packet-switched network as envisioned will offer bit rates to each of thousands of end user in the multi-megabit per second range. A variety of spectrum bands licensed for commercial wireless services could provide the needed MMW-carrier bandwidth. The signal footprint of the network, the “Cone of Commerce,” will cover a typical large city and its surrounding communities. HALO aircraft will fly above commercial airline traffic. A fleet of aircraft will be operated in shifts to achieve around-the-clock service.

The HALO Network can uniquely match its communications density to the demographics of end users within a metropolitan area, and have round trip delays allowing real-time, interactive, content-rich (multimedia) communications. Both of these important “network parameters” are well suited to providing services to multiple thousands of end users in major cities. With the added benefits of ubiquitous access and small low-cost user terminals, stratospheric networks will become important to expanding commerce and to promoting economic growth. A combined atmospheric-space network can offer global wireless broadband connections between end users worldwide, from those in remote areas to the many thousands of end users living within and near major cities. The benefits of such a combination will be summarized and design considerations will be highlighted in this talk.

**Keywords:** HALO Aircraft, HALO Network, Cone of Commerce, broadband wireless services, metropolitan area network, switched broadband, megabit data services, packet switching, wireless multimedia, satellite concentrator.