

32nd IAA SYMPOSIUM ON SPACE AND SOCIETY (E5)
Is Space R&D Truly Fostering A Better World For Our Future? (2)

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BRIDGING THE DIGITAL DIVIDE: AN ANALYTICAL APPROACH TO HOW PROLIFERATED
LOW-EARTH ORBIT (PLEO) CONSTELLATIONS WILL BRING MILLIONS OF HUMANS INTO
THE INFORMATION AGE

Abstract

In 2020, more than 1,000 spacecraft were launched into space worldwide; more than double any previous year in the space age. This rapid increase has been driven by the introduction of proliferated low-Earth orbit (pLEO) mega-constellations. These large networks of satellites have one main commercial goal, to provide low-latency, high bandwidth internet access anywhere on Earth. With approximately 41% of the human population being without access to the internet, the digital divide is as wide as ever. Worldwide, 3.14 billion people don't have access to the wide array of technical, educational and social resources that many assume are commonplace. Following the successful 2020 launch campaign of both OneWeb's and SpaceX's mega-constellations, this paper takes an analytical approach to discern just how many people worldwide these networks could connect when fully operational. Additionally, for areas where known, the effects on current internet service provider (ISP) coverages are assessed. The populations affected are categorized by adoption percentage, whether or not the constellation has optical inter-satellite links (OISL's), whether they face bureaucratic or political hurdles to connect and if this new connection improves upon their current internet availability. The proposed architectures of each different mega-constellation are then compared to analyze which areas are benefited the most by each offering. This research culminates in a global heatmap of how much pLEO internet will benefit each region worldwide based on these parameters. Given how wide the digital divide can be, this research is vital to illuminate just how beneficial these future pLEO constellations will be to humanity, agnostic of what nation we hail from.