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SATELLITE CONSTELLATIONS - 2024 SURVEY, TRENDS AND ECONOMIC SUSTAINABILITY

**Abstract**

The author's previous satellite constellations survey from 2021 has garnered over 10000 views, thus an update is well-justified. NewSpace Index ([www.newspace.im](http://www.newspace.im)) has tracked commercial satellite constellations since 2016 and is the largest known public database. There were 372 entries by the end of 2023, 130 more since the last manuscript.

While most of the constellations have been slower than announced to scale-up, new ones keep emerging. Listed and new companies have continued launching their first or early demonstration missions and, in some cases, small batches of satellites. SpaceX and OneWeb have completed their first-generation constellations. However, OneWeb has yet to start consumer services. Many constellations have gone bankrupt or become dormant. The largest constellations continue to be SpaceX Starlink, OneWeb, Planet and Spire. For many constellations, it is unclear when the multitude of launches will start due to delays, a more challenging fundraising environment, and with new markets being slow to grow. Nevertheless, over 35 satellite constellations launched their first prototypes in 2023, an increase over the previous years.

The first part of the paper will present the updated industry survey of commercial satellite constellations thanks to contemporary data and by adding activity status to the figures to reveal new insights. Trends will also be covered, for which there is now more information, for example on applications, masses, orbits, funding, delays and manufacturers. Delays and launch cadences are an important input to satellite manufacturing and launch market forecasts. Fundraising trends are a similar case with many companies now requiring later stage funding.

The second half of the paper will examine constellations by applications, selected by their popularity. Trends will also be discussed for each application. Furthermore, the economic sustainability of many applications will be researched and presented when information is available, based on public company financials, fundraising amounts, and market studies. Starlink and UnseenLabs have been stated to have achieved break-even, but for most others the profitability is far.

Finally, the largest governmental constellations will be also listed, because they are being rapidly developed, and are also an important source of revenue for spacecraft manufacturers and launch vehicles.

Satellite constellations count for the majority of satellite launches; thus, the field is important for the whole NewSpace ecosystem. However, it is also concluded that most commercial constellations are not happening at their originally announced scales and timelines, because of the market and unit economics challenges.