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## A BUSINESS CASE ANALYSIS FOR SATELLITE BACKHAUL IN 5G/6G MOBILE NETWORKS

**Abstract**

The global mobile telecommunication market has been growing rapidly over the last few years, with new emerging markets and applications, such as IoT, unmanned vehicles and machine-to-machine communications, driving the demand for more connections and at the same time tightening the requirements for the modern telecom systems. With the next-generation ground-based networks still on their way to global coverage and proving their efficiency in some of the use-case scenarios they were meant to bring in, a trend has been observed where many companies worldwide would consider introducing space-based systems for providing global mobile broadband connection of a comparable quality to hundreds of millions of users. A number of such networks has been proposed, and some of them have already deployed dozens of test satellites in orbit. However, most of them have so far proposed a more or less separate, autonomous network requiring a dedicated set of ground hardware to connect, be it a direct end-user connection or a link connecting satellites to a base station that would then provide wireless signal to users. This work, on the other hand, explores an opportunity to integrate a possible telecom satellite constellation with the existing mobile communication ecosystem, that is steadily moving towards global 5G, and later 6G coverage. It has been established in this work, that although satellites are far from being able to provide an end-user connection comparable with 5G in quality, it might be feasible to use the space segment to provide a backhaul connection to the base stations in certain regions of the world. This paper discusses the ways telecom megaconstellations can be integrated in the next-generation mobile networks. A method is proposed for estimating a price of a full-scale deployment of a new-generation mobile network, and ways to cut this price depending on the region and local markets by using satellite backhaul are discussed. The paper provides an estimate of the share of the global telecom market that the satellite telecom systems might occupy in the 7-10 years, the share of the global traffic that such systems would process, and the possible general layout of these systems in terms of orbital composition and satellite design. Finally, a business case is studied where a constellation of the scale of 100-5000 satellites would be used by a hypothetical satellite operator company to provide backhaul services for local 5G/6G mobile operators worldwide.