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A FEASIBILITY ANALYSIS OF NATIONAL LEO CONSTELLATIONS AS A SOLUTION TO PROVIDE BROADBAND ACCESS IN DEVELOPING COUNTRIES.

Abstract

Since the beginning of the 2000's, several developing countries have acquired GEO satellites in governmental efforts to bridge the digital gap. The level of success of these projects has been different from country to country. However, with the ever growing demand for broadband access, traditional GEO satellites seem inadequate to fulfill this need. With the advent of series-production of small satellites, can national LEO constellations be considered as a solution to replace the aging GEO spacecrafts? And more importantly, can this solution be efficient in terms of technology and economics? Nations that have invested in GEO satellites have spent hundreds of millions of dollars for a few Gbps of capacity. How much capacity can be obtained through LEO constellations with the same level of investment? It is a fact that companies like OneWeb Satellites (a joint venture between Airbus and OneWeb) will make their platform and production line available to other customers. Other satellite manufacturers may introduce similar capabilities over the next few years, this will most likely reduce the cost per satellite. This combined with the reduced costs of launch services, will probably make national LEO constellations economically feasible for developing countries. Given that nations are sovereign in terms of radiofrequency access, a national system may be able to forego some regulatory restrictions over its territory; therefore, the spectrum may be used in a more efficient manner. It is also important to note that gateways may be placed in strategic locations for the integration with national mobile networks, this may not be possible in global systems; where gateways may be located at hundreds of kilometers of distance. A high-level study on the technical aspects of a national LEO constellation will be covered in this paper. An architecture of space and ground segments will be proposed, as well as a brief analysis on regulatory and financial aspects. Finally, this paper will provide a technical comparison between different satellite solutions (i.e. GEO HTS and VHTS, global LEO constellation and national LEO constellation) applied to Bolivia.