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UNLOCKING POTENTIAL: SPECTRUM ACCESS FOR SMALL-SCALE OPERATORS

Abstract

As the space industry accelerates, small-scale operators are emerging as key players in satellite communications, Earth observation, and global connectivity. However, unequal access to the radiofrequency spectrum – a crucial yet finite resource for these activities – remains one of the greatest barriers to their growth. Spectrum has historically been dominated by established, larger entities, leaving small-scale operators with limited access and significant regulatory hurdles. The current system shaped by the International Telecommunication Union (ITU) and national regulators might not fully meet the needs of emerging operators, hindering potential technological breakthroughs and the emergence of disruptive innovations to improve everyday life. Beyond being a regulatory challenge, this raises fundamental questions of equity. This paper will address four key challenges that small-scale operators face: (i) uncertain spectrum licensing regimes, (ii) regulatory restrictions, (iii) technical barriers (e.g., interference, frequency coordination), and (iv) high costs, which impose financial and compliance burdens. These barriers are particularly severe in underserved areas, where small-scale operators could provide essential connectivity. To better understand these challenges and explore potential solutions, this paper will analyse spectrum access through the why, what, and how perspectives. Why should spectrum access for small-scale operators be reconsidered? Adapting spectrum licensing mechanisms to support emerging technologies may improve global innovation, benefit industries and unlock new opportunities. What are the potential use cases and economic benefits? The technologies used by small-scale operators such as the Internet of Things (IoT) and Machine-to-Machine (M2M) communication may deliver innovative benefits across multiple sectors as their networks may facilitate essential services in agriculture, energy, public safety, logistics, transportation, etc. Their networks enable critical data collection helping businesses and consumers make informed

decisions at a lower cost while promoting economic growth, enhanced collaboration, and technological advancement. How can the regulatory framework be redefined? In response to the aforementioned spectrum challenges, spectrum allocation models may be restructured to enable transformative solutions to facilitate the market entry of small-scale operators by fostering competition, enhancing innovation, and improving service quality. In conclusion, equitable spectrum access is crucial for long-term innovation and digital inclusion. Addressing regulatory, technical, and financial barriers may enable small-scale operators to unlock new opportunities and ensure a more competitive, connected, and innovative space industry.

Key words: Spectrum access, small-scale operators, spectrum sharing, license-exempt spectrum, spectrum licensing mechanisms.