

A Survey Non-Terrestrial Networks in 6G/ 7G Smart Network for 2035+ and Beyond

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Abstract: The Smart Networks and Services (SNS) initiative is currently halfway of its implementation period under the Horizon Europe programmed. Three calls have been launched since the inception of the SNS initiative in 2021, two of them having already delivered significant R&I project work covering the multiple technologies underpinning the 6G vision. This work naturally includes projects covering the Non-Terrestrial Networks (NTN) domain as part of the NTN component of Beyond 6G and future 7G mobile communication systems. Non-Terrestrial Networks (NTN) are considered pivotal for the development of 6G, aiming to provide ubiquitous and continuous mobile broadband coverage. With ongoing standardization efforts by 3GPP, 5G NTN promises seamless connection moving between terrestrial and satellite networks, using existing or next-generation smartphone devices. This paper focuses on the integration of NTN, particularly Low Earth Orbit (LEO) constellations, for 5G NR services. Six-generation (6G) telecommunication systems are expected to meet world market demands of accessing and delivering services anywhere and anytime. Non-Terrestrial Networks (NTN) are able to satisfy requests of anywhere and anytime connection by offering wide-area coverage and ensuring service availability, continuity, and scalability. In this paper, we review 3GPP NTN features and their potential in satisfying user expectations in 6G & beyond networks. State of the art, current 3GPP research activities, and open issues are investigated to highlight the importance of NTN in wireless communication networks. Finally, future research directions are identified to assess the role of NTN in 6G/7G and beyond.

Keywords: Non-Terrestrial Networks, Smart Networks, SatCom networks, Services Satellite communication, 6G systems, 7G