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AN ASSESSMENT OF IOT VIA SATELLITE: TECHNOLOGIES, SERVICES AND POSSIBILITIES

Abstract

The number of proposed satellite constellations for communication purposes has been steadily increasing in the past years. Currently, more than 18 constellations have been proposed and are in different stages of development, from early design to having already launched in-orbit-demonstration (IOD) satellites. The common feature among these different proposals is that all of them aim to provide connectivity to IoT sensor systems in areas outside coverage from terrestrial mobile networks.

Despite the generalized use of IoT for several purposes, IoT via satellite systems typically target a few special use-cases, leaving other relevant applications and services behind. In this work, we study and discuss how such systems can be integrated and augment a broader range of terrestrial IoT and mobile systems. This includes an analysis of the technical properties of the constellations, their service philosophies, and how they are aligned with existing communication networks. Relevant cellular and non-cellular terrestrial technologies are considered, including LoRa, SigFox and 5G alternatives such as NB-IoT.

The impact of mega constellations will also be taken into account, identifying existing technology and service gaps. These gaps in satellite-IoT systems and in mega constellations may result in an inadequate augmentation of terrestrial networks and fail to fulfill user requirements. Relevant end-user services are investigated, spanning from asset tracking, simple environmental and industrial sensors to more advanced sensor networks in remote areas. The different user requirements are compared and matched against available and upcoming IoT solutions.

From this, different strategies for integration of IoT via satellite with terrestrial systems are proposed and evaluated.