

Resilience Analysis of Multichord Peer to Peer IoT Satellite Networks

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Abstract— The world is witnessing a dramatic shift in usage of social networks from being a passive network to an active one. This will incorporate all types of information and devices that require scalability and resilience in network operations. With Internet of Things (IoT), the challenge is doubled with the limited capabilities of such devices in addition to being self-organizing and self-configuring topologies. Some research started proposing the use of satellite networks as a carrying medium of the information in IoT networks. In this paper, we focus on analyzing the resilience of such networks in the presence of frequent disconnections that may lead to a significant delay in discovering, connecting and organizing IoT devices. This facilitates mechanisms to collect, aggregate, filter, process, store and retrieve data. In particular, we present the mathematical model of the proposed novel peer to peer multichord-based protocol for IoT over LEO satellite networks. Preliminary results show that multichord IoT satellite networks can provide the required high-speed connectivity with low latency and high robustness to failure.

Keyword— Satellite Internet of Things, Multichord Peer to Peer networks, Starlink LEO Constellation



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Ángeles Vázquez-Castro received the Telecommunications Engineering MSc and PhD degrees from Vigo University, Spain, in 1994 and 1998, respectively. She also received MSc degree in Analytical Philosophy from University of Barcelona, Spain in 2015. Until 2002 she worked with the University Carlos III University (Madrid) and University of Southern California (Los Angeles) as assistant and visiting Professor, respectively. During 2002-2004 she held a Research Fellow position at the European Space Agency to work at the Space Research and Technology Centre in Noordwijk, The Netherlands. From 2008 to 2012, she was a part-time visiting professor with the University of Oslo (at UNIK) in Norway. Since 2004 she is an Associate Professor at the Universitat Autònoma de Barcelona, Spain. Her research results have been used for the development of satellite Digital Video Broadcasting (DVB) satellite communication standards such as DVB-SH (channel models), DVB-RCS (coding) and DVB-S2 (optimization of adaptive coding and modulation). She has authored and co-authored more than than 140 peer-reviewed scientific papers, 13 book chapters, 1 co-edited book on Network Coding and Subspace Designs, Springer, 2018, and 2 patents. Her current research is focused on information and communication theory with application to secure, reliable and robust space communication and networking. She is a Senior Member of the IEEE.



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