

Scalable Cloud-Based LEO Satellite Constellation Simulator

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Abstract : Distributed applications deployed on LEO satellites and ground stations require substantial communication between different members in a constellation to overcome the earth coverage barriers imposed by GEOs. Applications running on LEO constellations suffer the earth line-of-sight blockage effect. They need adequate lab testing before launching to space. We propose a scalable cloud-based net-work simulation framework to simulate problems created by the earth line-of-sight blockage. The framework utilized cloud IaaS virtual machines to simulate LEO satellites and ground stations distributed software. A factorial ANOVA statistical analysis is conducted to measure simulator overhead on overall communication performance. The results showed a very low simulator communication overhead. Consequently, the simulation framework is proposed as a candidate for testing LEO constellations with distributed software in the lab before space launch.

Keywords : LEO, cloud computing, constellation, satellite, network simulation, netfilter

Conference Title : ICSSC 2015 : International Conference on Satellite and Space Communications

Conference Location : London, United Kingdom

Conference Dates : June 28-29, 2015