

GLOBDEV 2013

Mitigation of Rain-Induced Ka-Band Attenuation and Enhancement of Communications Resiliency in Sub-Saharan Africa

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Abstract

Despite tremendous growth in the area of mobile telephony, Africa continues to lag behind other developing regions in Internet access. The business opportunity to capitalize upon this Internet Protocol (IP) traffic need has not gone unnoticed. Major communications service providers have been investing heavily in Ka-band communications (the Ka-band is part of the K band of the electromagnetic spectrum) — which can carry more data than lower frequencies and offers additional frequency ranges at already occupied satellite positions — such that next generation Ka-band satellites can be responsive to the burgeoning IP traffic market. However, these Kaband systems have disadvantages compared to lower frequency solutions; Ka-band systems are much more susceptible to weather due to signal absorption by moisture in the air and by wetness on antenna surfaces. These inherent limitations of the Ka-band hold a special significance for communications in Africa since almost a third of the continent is tropical in climate, and weather patterns across the continent are expected to further increase in variability, including increases in the frequency of extreme events, such as storms. The Paper further explores how the use of TV White Spaces, in addition to the availability of real-time weather information via the notion of “humans of sensors,” could be particularly useful for observing, anticipating, and mitigating disruptions to communications services.

Recommended Citation

Sala, Simone; Zennaro, Marco; Sokol, Lisa; Miao, Anna; Spousta, Robert; and Chan, Steve, "Mitigation of Rain-Induced Ka-Band Attenuation and Enhancement of Communications Resiliency in Sub-Saharan Africa" (2013). *GlobDev 2013*. 10. <https://aisel.aisnet.org/globdev2013/10>