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Investigation of time diversity gain for earth to satellite link using rain rate gain (Article)

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Abstract

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The utilization of satellites for communication systems has expanded considerably in recent years. C and Ku-bands of frequencies are already congested because of high demand. Future directions of satellite communications are moving towards Ka and V-bands. Earth to satellite communications are moving towards higher frequency bands in future which are more sensitive to environment. Rain causes severe degradation in performances at higher frequency bands specially in tropical regions. Several mitigation techniques are proposed to design reliable system. Time diversity is one of the potential candidate for it. However, time diversity analysis requires measured rain attenuation data. For future high frequency link design those data are not available at most of the places. This thesis proposes a method to utilize 1-minute rain rate to analyze time diversity technique at any desired frequency. This paper proposes a method to utilize 1-minute rain rate to analyse time diversity rain rate gain. In proposed method, it is assumed that rain rate gain with delay can represent rain attenuation gain with delay for same period of time at same location. The characteristics of rain rate and rain attenuation almost same because the attenuation causes due to rain. One year measured rain rate in Malaysia is used to predict rain rate gain. The measured gain at 12.225 GHz signal is compared with that predicted by ITU-R based on rain rate measurement and is found good agreement. Hence it is recommended that the time diversity gain can be predicted using measured rain rate for any desired frequencies. © 2019 Institute of Advanced Engineering and Science. All rights reserved.

SciVal Topic Prominence ⓘ

Topic: Rain | Electromagnetic wave attenuation | ITU-R model

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Author keywords

Earth to satellite link Rain attenuation Rain rate Time delay Time diversity gain

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Prediction of rain rate distribution with time delay based on measured 1-min rain intensity data to mitigate fades on satellite link

Alam, Md.M. , Islam, Md.R. , Salam, M.A. (2018) *IET Conference Publications*

Analysis of time diversity gain for satellite communication link based on ku-band rain attenuation data measured in Malaysia

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References (21)

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1 Jong, S.L., D'Amico, M., Din, J., Lam, H.Y.

Performance of time diversity technique in heavy rain region

(2014) *ISAP 2014 - 2014 International Symposium on Antennas and Propagation, Conference Proceedings*, art. no. 7026782, pp. 575-576. Cited 4 times.

ISBN: 978-986914740-8

doi: 10.1109/ISANP.2014.7026782

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2 Saad, N.W.M., Ismail, A.F., Badron, K., Isa, F., Din, J., Tharek, A.R.

Proposed rain fade mitigation technique for Ka-band space-Earth links in tropical climate

(2013) *2013 IEEE 11th Malaysia International Conference on Communications, MICC 2013*, art. no. 6805883, pp. 511-516. Cited 3 times.

doi: 10.1109/MICC.2013.6805883

[View at Publisher](#)

3 Fukuchi, H., Chodkaveekityada, P.

Propagation impairments along satellite-to-earth path and their mitigation technologies

(2015) *Proceedings of the 2015 IEEE 4th Asia-Pacific Conference on Antennas and Propagation, APCAP 2015*, art. no. 7374437, pp. 433-434. Cited 3 times.

ISBN: 978-147998896-9

doi: 10.1109/APCAP.2015.7374437

[View at Publisher](#)

4 Chodkaveekityada, P., Fukuchi, H.

Prediction model of time diversity using Japan rain radar data

(2017) *International Journal of Satellite Communications and Networking*, 35 (4), pp. 281-293. Cited 5 times.

[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1542-0981](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1542-0981)

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