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Estimating losses at 40-GHz downlink using non-meteorological techniques in heavy rain areas

Suhaimi, Nur Hanis Sabrina^{a, b} ; [Ismail, Ahmad Fadzil^a](#); [Ahmad, Yasser Asrul^a](#); [Badron, Khairayu^a](#) [Save all to author list](#)^a Department of Electrical and Computer, Faculty of Engineering, International Islamic University Malaysia (IIUM), Selangor, Malaysia^b Division of Maritime Technology, Science and Technology Research Institute for Defence (STRIDE), Perak, Lumut, Malaysia[View PDF](#) [Full text options](#) [Export](#) [Abstract](#)[Author keywords](#)[SciVal Topics](#)[Funding details](#)**Abstract**

The advancement of satellite communication has arisen tremendously where higher capacity communications systems are needed. Most satellite engineers are shifting to Ka, Q, and V-band upcoming since the low frequencies such as below 10 GHz are already congested. Actual measurement data at millimetre-wave frequencies in tropical regions are minimal. The prediction of rain attenuation at frequencies above 10 GHz is required to determine a reliable fade margin. In this paper, a statistical frequency scaling technique has been developed as an alternative way of estimating rain attenuation. The technique was derived based on the correlation between the attenuation ratio of a higher and lower frequency against the attenuation at a lower frequency. The attenuations from the proposed model were compared to the proposed frequency scaling by International Telecommunication Union-R

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Sabrina Suhaimi, N.H. , Ismail, A.F. , Badron, K. (2023) *International Journal of Electrical and Computer Engineering*

Scaling of rain attenuation models: A survey

Samad, M.A. , Choi, D.-Y. (2021) *Applied Sciences (Switzerland)*

Rain attenuation scaling in south korea: Experimental results and artificial neural network

Samad, M.A. , Diba, F.D. , Choi, D.-Y. (2021) *Electronics (Switzerland)*[View all related documents based on references](#)

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(ITU-R) as well as the conventional ITU-R rain prediction model. To deliver a reliable model, validation methods have been done using a set of data with different years and locations in tropical regions. A dependent prediction technique with the lowest root mean square error (RMSE) value and error was produced. This technique is beneficial in applying suitable mitigation techniques to moderate rain fade in tropical regions. © This is an open access article under the CC BY-SA license.

Author keywords

Rain attenuation; Satellite-earth link; Statistical frequency scaling; Tropical regions; V-band

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