Re: FCC Docket 14-177 and RM-11664

Millimeter-Wave Channel Modeling for Indoor Communications

October 14, 2015

NYU WIRELESS

Dear FCC Colleagues:

On behalf of NYU WIRELESS, an interdisciplinary academic research center supported by the National Science Foundation and by an Industrial Affiliates program that involves the sponsorships and board service of 16 major telecommunications companies, we are pleased to report the results of recent millimeter wave propagation measurements in an indoor office building environment.

The following paper has been peer-reviewed and has just been published in IEEE Access, and documents one of the most extensive indoor millimeter wave wireless channel modeling campaigns to date:

http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=7289335

This work may be used for channel modeling and wireless system simulation and design for pending millimeter wave indoor communications. Of note, this work considers many different polarization combinations, and also provides closed form optimization expressions for many existing and novel large-scale path loss models that can be used in 5G standards and for predicting coverage or interference in any proposed rulemaking.

This indoor work shows that unlike in outdoor millimeter wave radio channels (see the September 2015 paper on wideband millimeter-wave propagation measurements and channel modeling in IEEE Trans. Comm.), millimeter wave propagation in indoor channels show a strong dependence on path loss over distance as the frequency increases. The paper also shows that simpler, distant-dependent path loss models do virtually the same job at predicting signal strength as more cumbersome and less intuitive models currently used in industry. That is, the cited work proposes a simpler close-in free space reference distance model, using a 1 m reference, which has a stronger physical basis and uses fewer model parameters than existing 3GPP and ITU standard propagation models.

This work, combined with key results provided in our September 26, 2015 comments, may help the Commission and industry as it develops rules, standards and products for the millimeter wave bands. We note again, as we did in our January 2015 comments, that providing copious quantities of unlicensed spectrum that is close in frequency to large blocks of licensed millimeter wave bands, combined with large unlicensed spectrum allocations above 100 GHz, would serve US interests for the long term.

With kind regards,

Theodore (Ted) S. Rappaport

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