URBAN ART-ART Path Loss Model

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Purpose:
   To address the missing path loss model in 802-16j-06-013r1 by including a path loss model for Urban ART-ART case

Introduction

> The Type D LOS pathloss model specified in IEEE 802.16j-06/013r1 for ART to ART propagation is not suitable for use in an urban environment

  • Average rooftop heights in the urban environment are greater than the maximum receive antenna height of 10m allowed by the Type D LOS pathloss model – which is taken into account by a rapid degradation of the signal after a break point.

> COST 231 Walfisch-Ikagami pathloss model specified in IEEE 802.16j-06/013r1 for ART to BRT NLOS propagation in an urban environment can be modified to be used for ART to ART case by removing the roof top to street diffraction component (Lrts) in the model.

Incompatibility of Type D and Type E Pathloss Models for the ART-ART Urban Environment

Type D cannot be used as the maximum height of RS antenna allowed is10m, which is below rooftop height in an urban environment

ART to ART

BS

RS

MS

ART to BRT (NLOS) model (cost 231 Walfisch-Ikagami **model) for urban includes several hops of over-the-building propagation component and a rooftop_to_street diffraction (last hop) component.**

Urban LOS ART to ART Pathloss Model

> The basic transmission loss is composed of two terms: free space loss (L_0) and multiple screen diffraction loss (L_{msd})

• The rooftop-to-street diffraction and scatter loss (L_{rts}) component of the NLOS COST 231 Walfisch-Ikagami model is neglected

$$L = \begin{cases} L_0 + L_{msd} & \text{for } L_{msd} > 0 \\ L_0 & \text{for } L_{msd} \le 0 \end{cases}$$
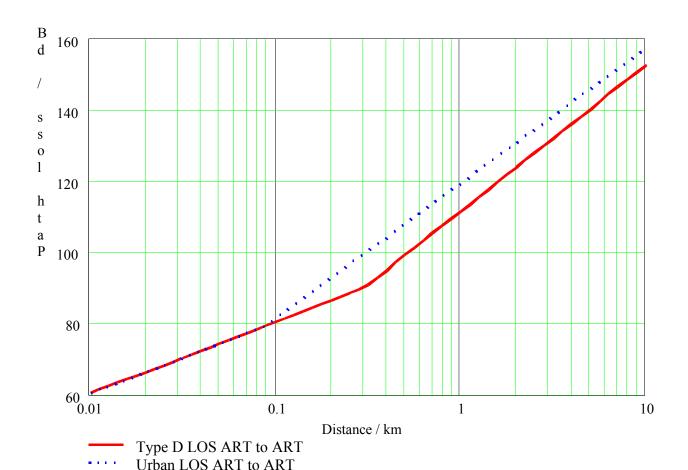
Free Space Loss

> The free space loss is given by:

$$L_0(dB) = 32.4 + 20\log(d/km) + 20\log(f/MHz)$$

Multiscreen Diffraction Loss

$$L_{msd} = L_{bsh} + L_{rfs} + k_a + k_d \log\frac{d}{|km|} + k_f \log\frac{f}{|MHz|} - 9\log\frac{b}{|m|}$$

Proposal is to make Lrfs = 0 (Roof top to street diffraction loss)

Comparison of Type D and Proposed Urban LOS ART to ART Pathloss Models

b : 60m
h_{Roof} : 25m
h_{Base} : 30m
h_{RS} : 30m