Multihop Network Simulation with Street Layout

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To further clarify the modeling procedure for network simulation with street layout

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Introduction

• Some path loss and shadowing models have been proposed for multihop networks (see C802.16j-06/009, C802.16j-06/010, and C802.16j-06/011)

• The below rooftop NLOS path loss model (C802.16j-06_010) requires a street layout to be defined. These slides show how a Manhattan street layout can be applied for a Multihop network simulation, after which the path loss models can be easily applied.
Manhattan Street Grid

- Assume all subscribers are located outdoors in streets, where the street layout is a Manhattan type street grid
- Determine the block size in x- and y-directions
  - For example, 100m in both x and y
- Assume a street width (e.g., 12m)
- Randomly generate subscriber locations on the street grid, taking into account the street width
- Randomly generate some relay locations on the street grid
Example: 1km x 1km area

The NLOS Berg model (see C802.16j-06/010) needs to know the number of street sections between two points.

A simple algorithm can be used to determine this for the given street layout – there will never be more than three.

Berg path loss can then be compared with the over-the-rooftop path loss and the minimum taken.
Tricellular Network

Outdoor subscriber locations on a Manhattan street grid in a tricellular network

750m BS-BS spacing
Summary of modelling procedure

• BS-RS and BS-MS path loss and shadowing can be applied using the models given in C802.16j-06/010

• Outdoor subscriber locations can be determined using a street layout
  – Manhattan street layout is given as an example in this slide set
  – Other, irregular, street grids can also be considered
  – The approach gives the option for including indoor subscribers, where these could be distributed not just in x and y, but according to a height (z) distribution as well. An appropriate path loss/shadowing model is needed for this

• From the street layout, path loss for below rooftop relays and subscribers can be calculated using the proposed below rooftop path loss model.