# Multihop Network Simulation with Street Layout

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

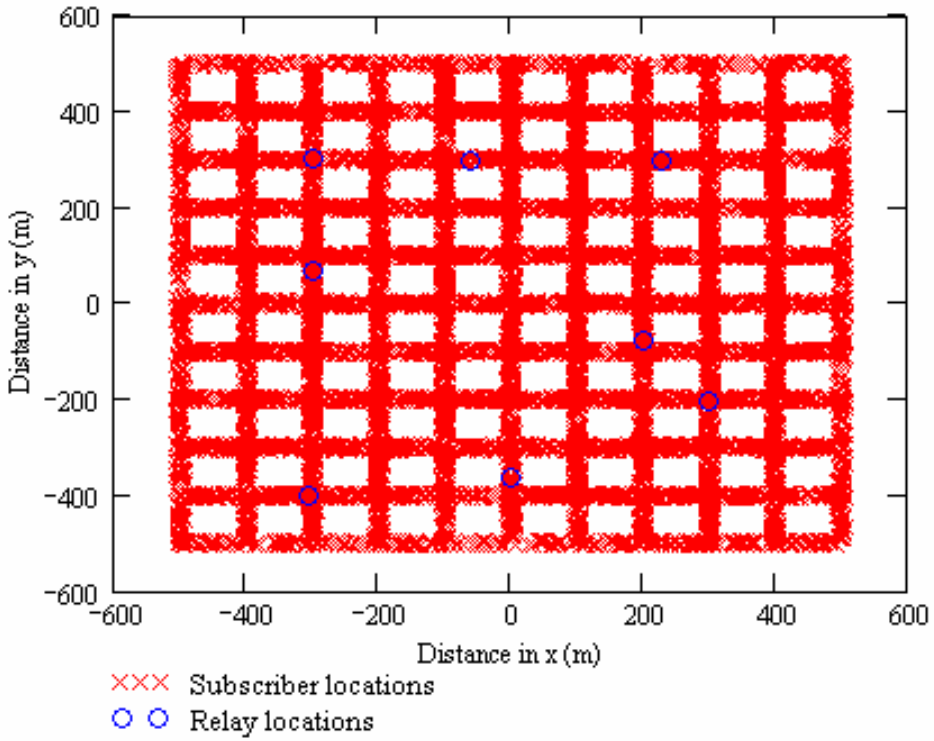
# Introduction

- 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



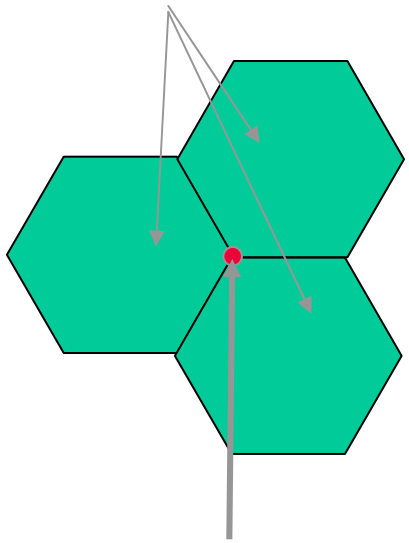

**The NLOS Berg model (see C802.16j-06/010) needs to know the number of street sections between two points.**

**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.**

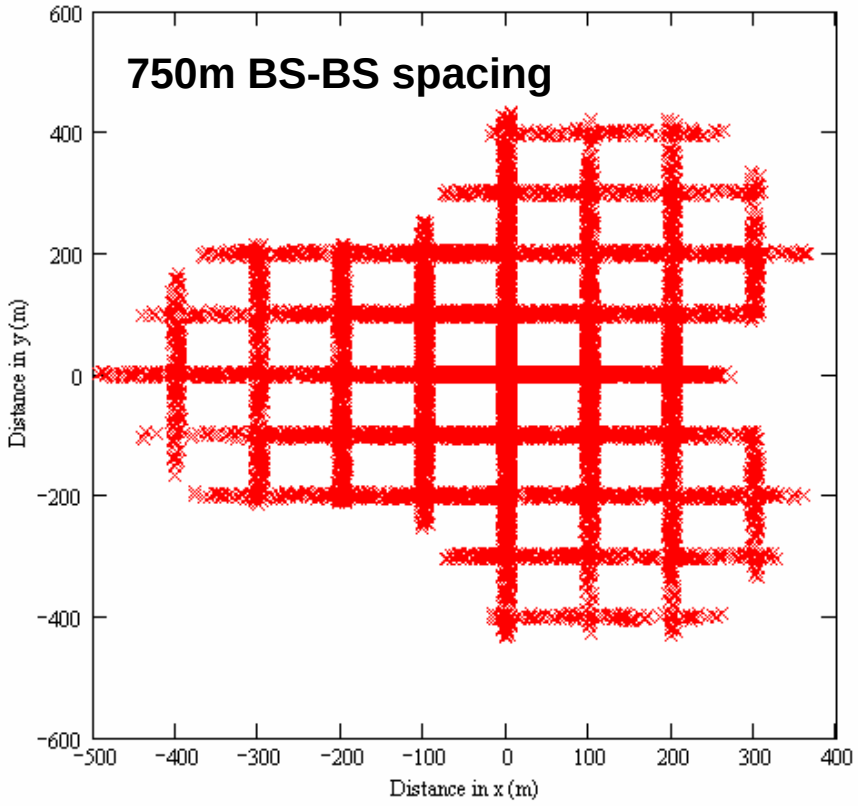
# Tricellular Network

**Sectors**



**Base location**

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



# 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.