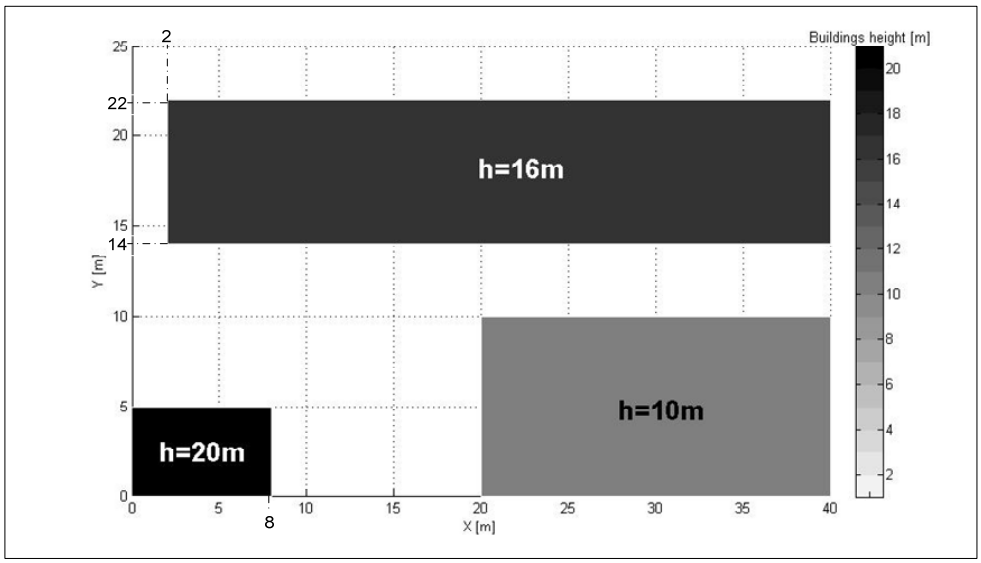
Final exam project - 2007

Problem 1)

Consider the 2.4GHz radio link described here below. An EIRP of 3,14dBW is emitted from the Tx. The link is operating in the environment depicted in the figure. Diffraction from horizontal edges can be neglected.

	Tx	*Receiver*
Position	(x=25, y=11, z=2)	(x=9, y=2, z=2)
Antenna	Vertical λ/2 Dipole G_{MAX}=2,14dBi	Vertical λ/2 Dipole G_{MAX}=2,14dBi

The electromagnetic characteristics of building walls are: εr=5, σ=0.01 [S/m]



Environment topology (top view)

Question 1.1) It is requested to compute the total coherent received power and the RMS delay spread assuming max one interaction per ray (N_{ev}=1, edge diffraction or reflection only). Diffuse scattering can be neglected.

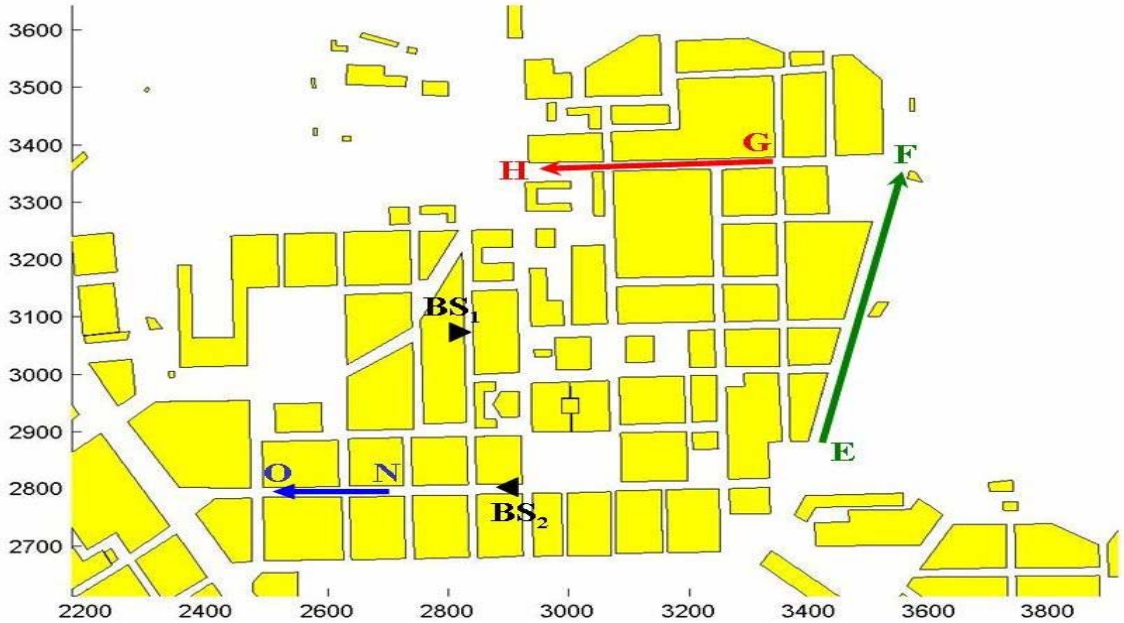
Question 1.2) It is requested to give an estimate of fast fading fluctuation depth (approximate number of dB's).

Problem 2)

The Attached files "EF_delaySpread_meas.txt" and "EF_delaySpread_sim.txt" contain the measured and RT-simulated RMS delay spread corresponding to route EF, in the central Helsinki environment depicted in the figures here-below. The active transmitter is on BS_1. Carrier frequency is 2.154 GHz. Alignment between measurement and simulation can be inaccurate, with an uncertainty range of +/- 20 m. The spatial step must be derived from the figure, and is the same for both the measurement and the simulation file.
RT simulation has been performed with 3 events (N_{ev}=3), max 2 diffractions.

Question 2.1) It is requested to estimate the prediction performance in terms of mean error and standard deviation of the error.

Question 2.2) It is requested to comment over the measurement behaviour and the deviations between measurement and simulation.



Environment representation (part of)

City map reference