# Modelling Interference for Indoor Wireless Systems Using the FDTD Method

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June 4, 2009

# Outline

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- Interfering power levels are heavily influenced by the specific nature of the environment.
- Propagation in indoor environments is not well understood.
  - Complicated by variability in building layout and construction materials

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- Steel-reinforced concrete construction.
- RF propagation complicated by a central services shaft.
- What is the best way to deploy BSs in this, and other buildings to minimize co-channel interference?

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- f = 2.45 GHz (802.11b/g/n WLAN).
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- Various BS configurations considered.

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- Electric fields are spatially averaged over $3\lambda \times 3\lambda$ sectors to remove fading.
- The CIR is thus:

$$\mathrm{CIR}_{i,j}^{(x)} = \frac{\max\left\{P_{i,j}^{(x)} \in x\right\}}{\sum_{x} P_{i,j}{}^{(x)} - \max\left\{P_{i,j}^{(x)} \in x\right\}} \tag{1}$$

$i$ and $j$ identify the sector and $x$ represents the set of transmitter locations.

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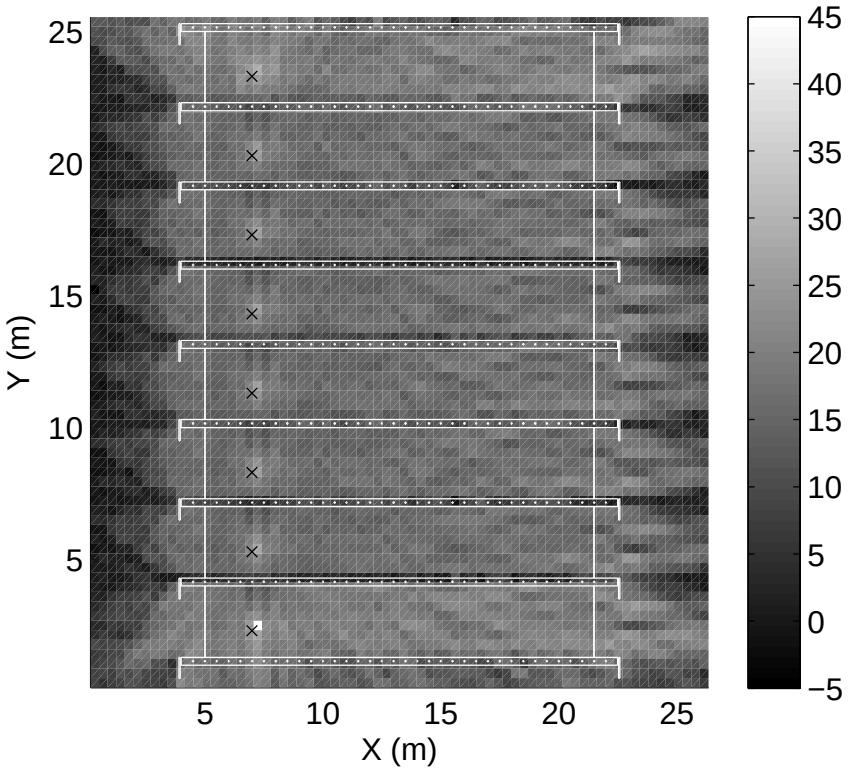
- The DS-CDMA outage probability in the presence of n Rayleigh interfering signals is:

$$P_{out}^{n} = 1 - \prod_{i=1}^{n} \frac{\Lambda_i}{\Lambda_i + r_p} \tag{2}$$

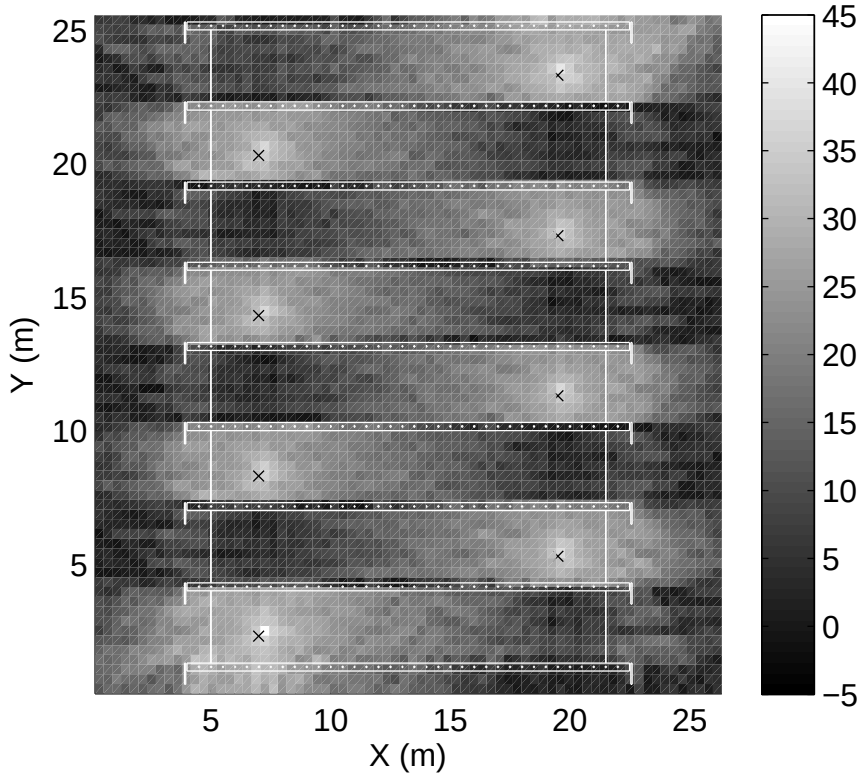
where $\Lambda_i$ is the mean desired-signal/interfering-signal ratio $\Lambda_i = \frac{A}{B_i}$.

# BS Deployment: CIR

Vertically aligned:




Vertically staggered:



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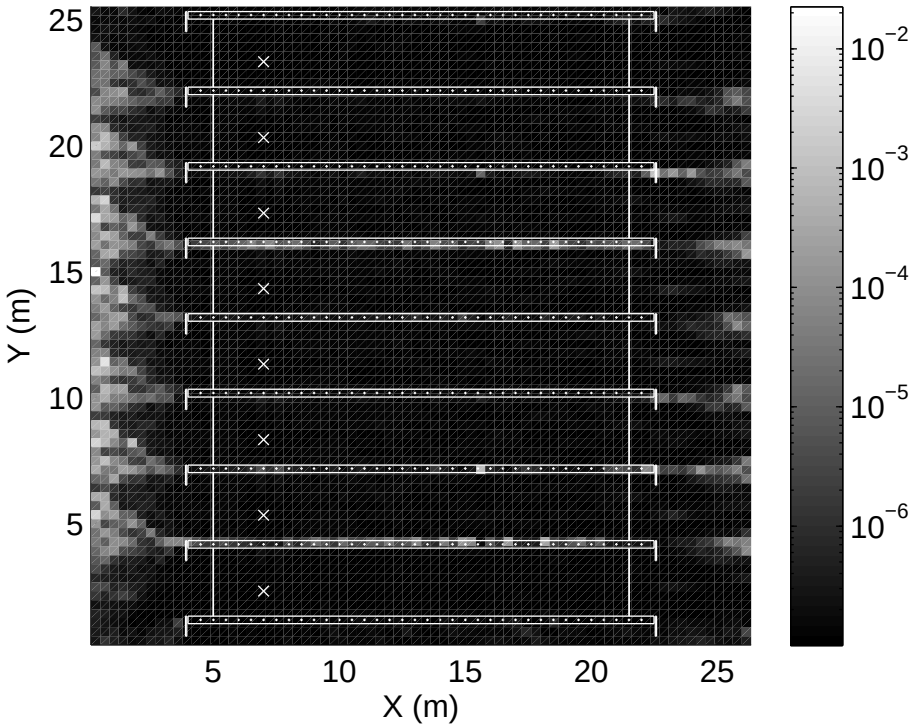


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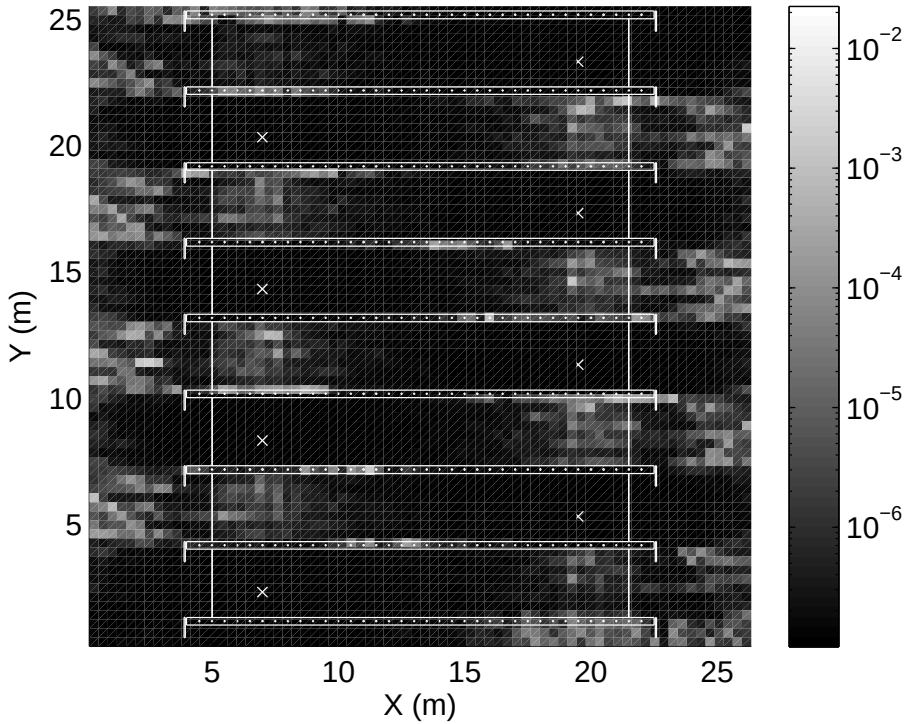

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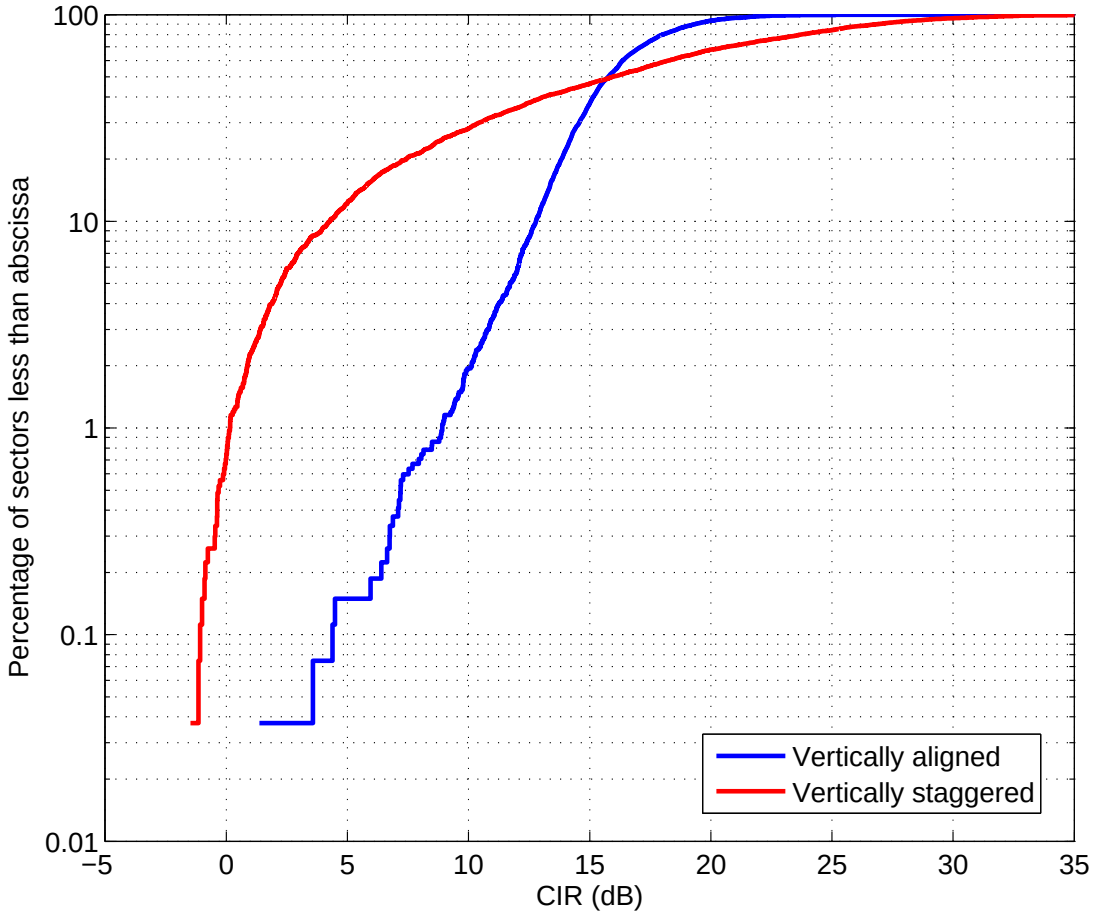

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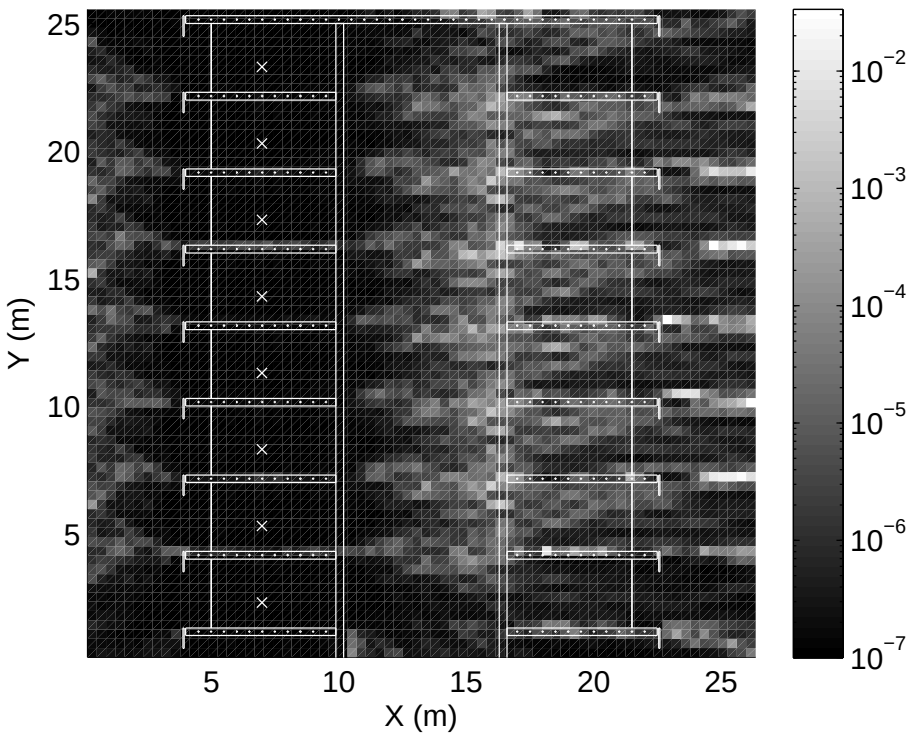


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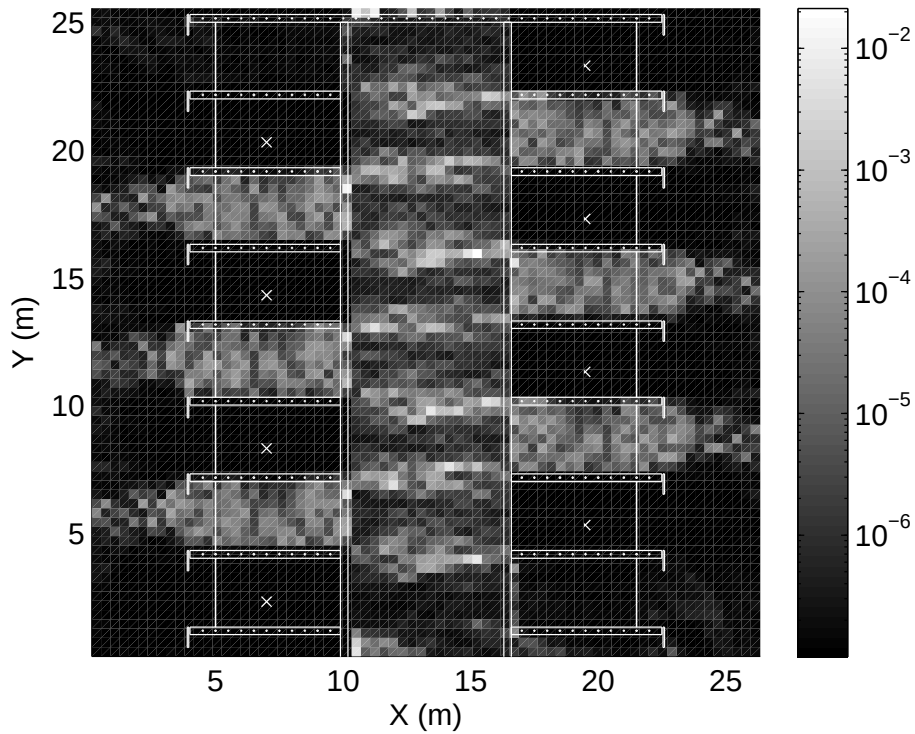

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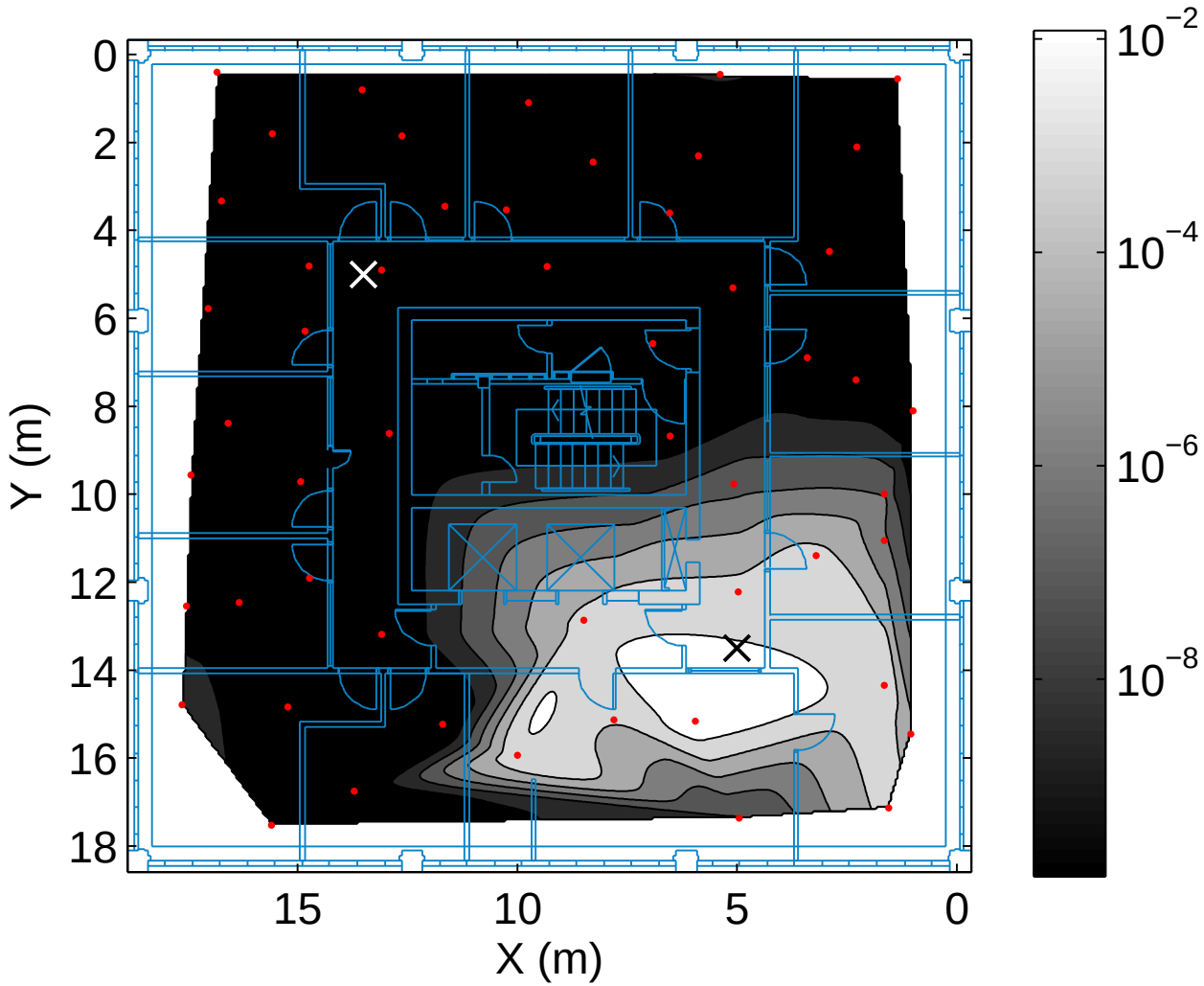

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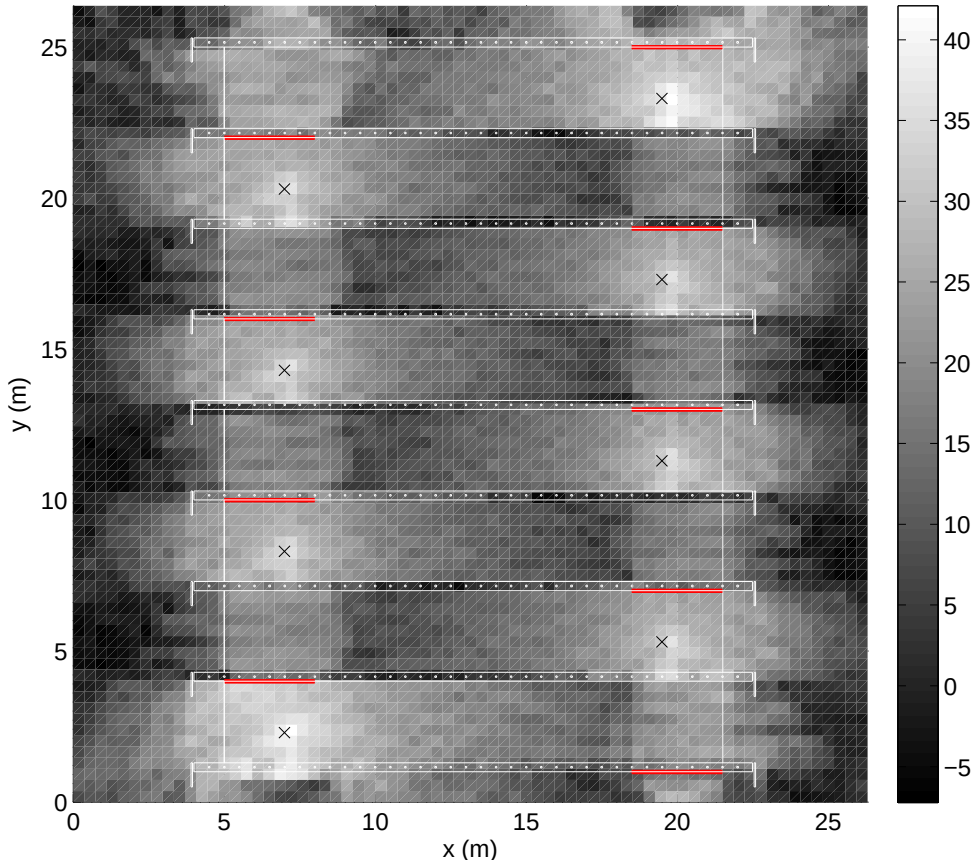
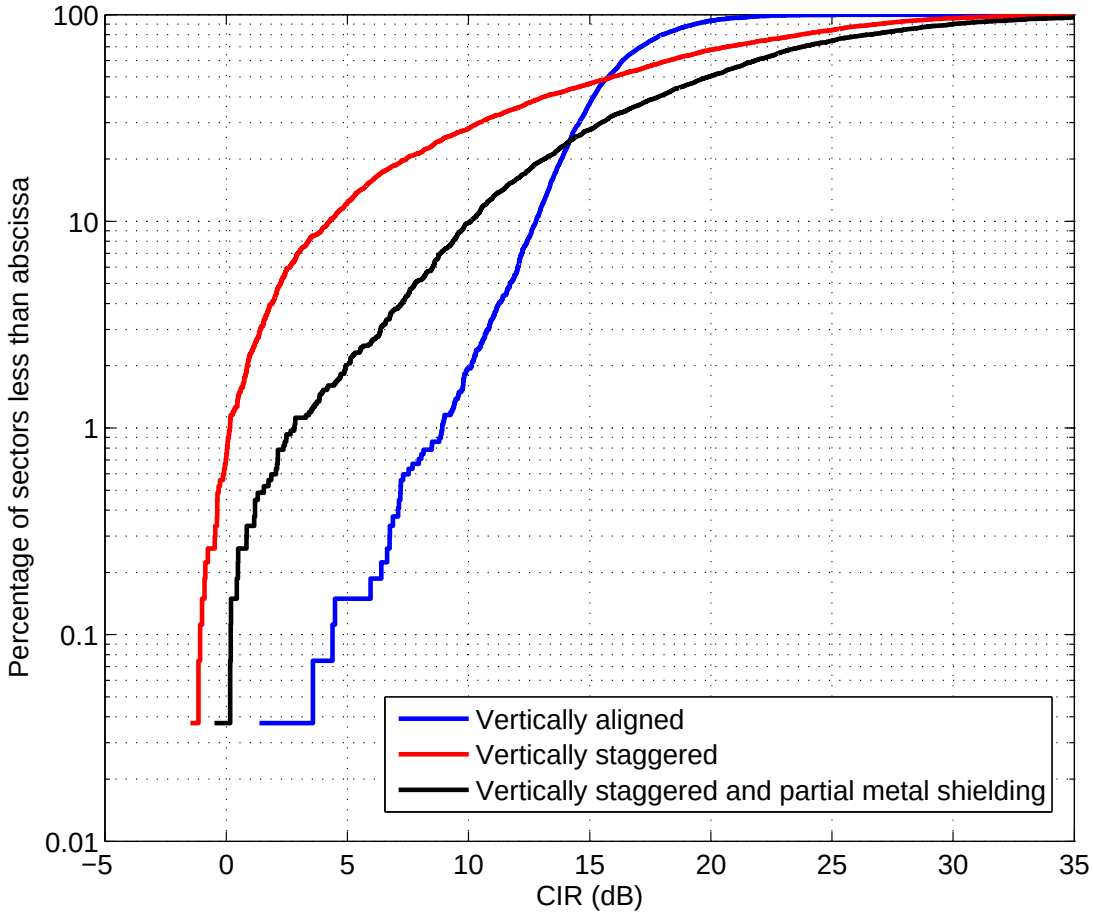


# Interference mitigation

- Shielding can improve the CIR.



Thank you.

Questions?