

3GPP TSG RAN WG1 Meeting #55
Prague, Czech Republic
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R1-084323

Impact of Planning on eNB – Relay Link Model

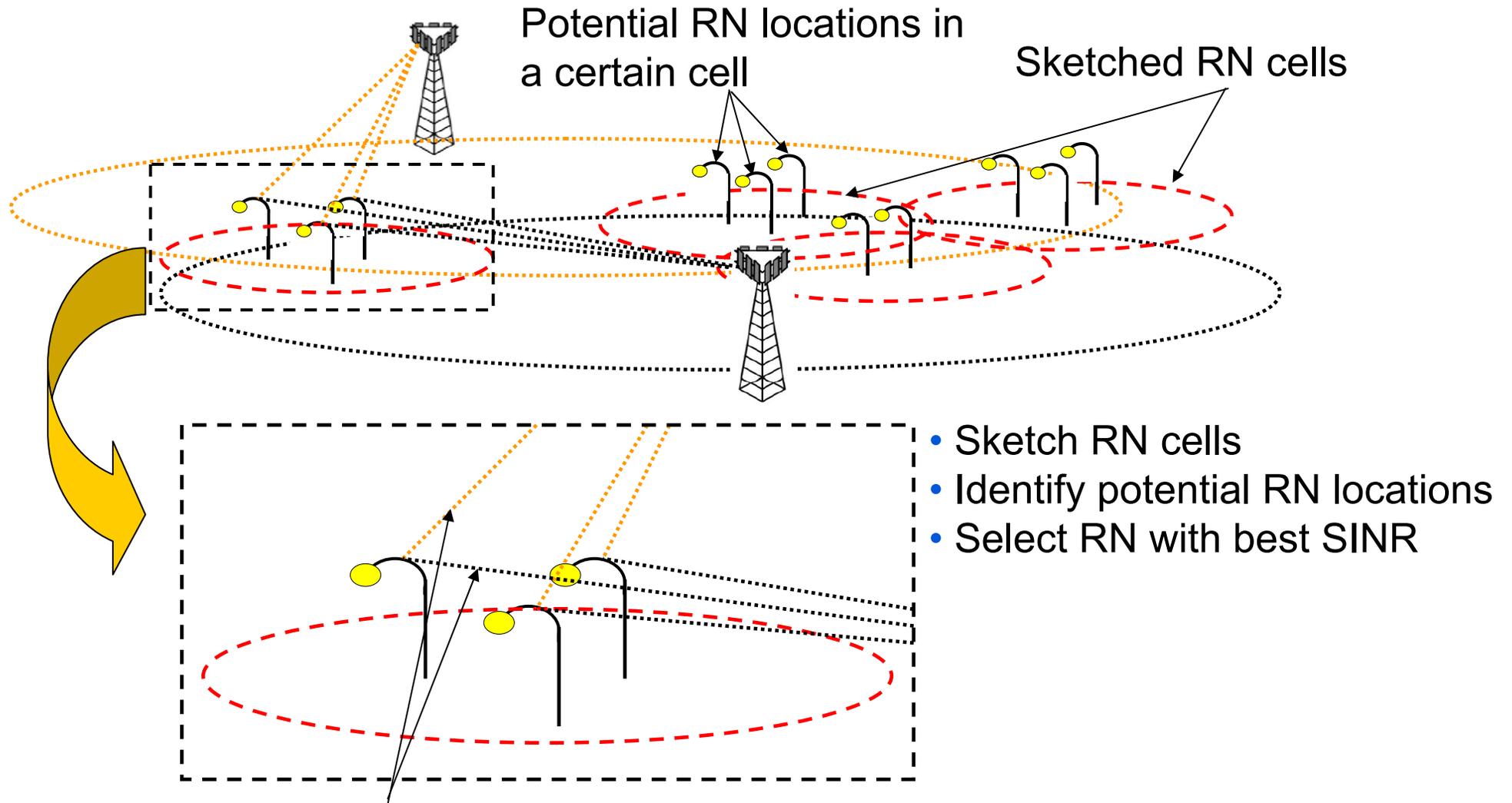
Agenda Item: 11.5 Study Item on LTE-Advanced, Relaying

Source: Nokia Siemens Networks & Nokia

Introduction

- Cell planning and site selection tools are used routinely by operators to improve system performance. That's not modelled explicitly in simulations but included in propagation formulas.
- Similarly RNs can be expected to be deployed suitably, in contrast to users that don't behave channel aware and therefore suffer from band shadowing occasionally.
- We investigated the impact of relay deployment on the eNB-RN link, assuming there are 4 candidate deployments in the vicinity.

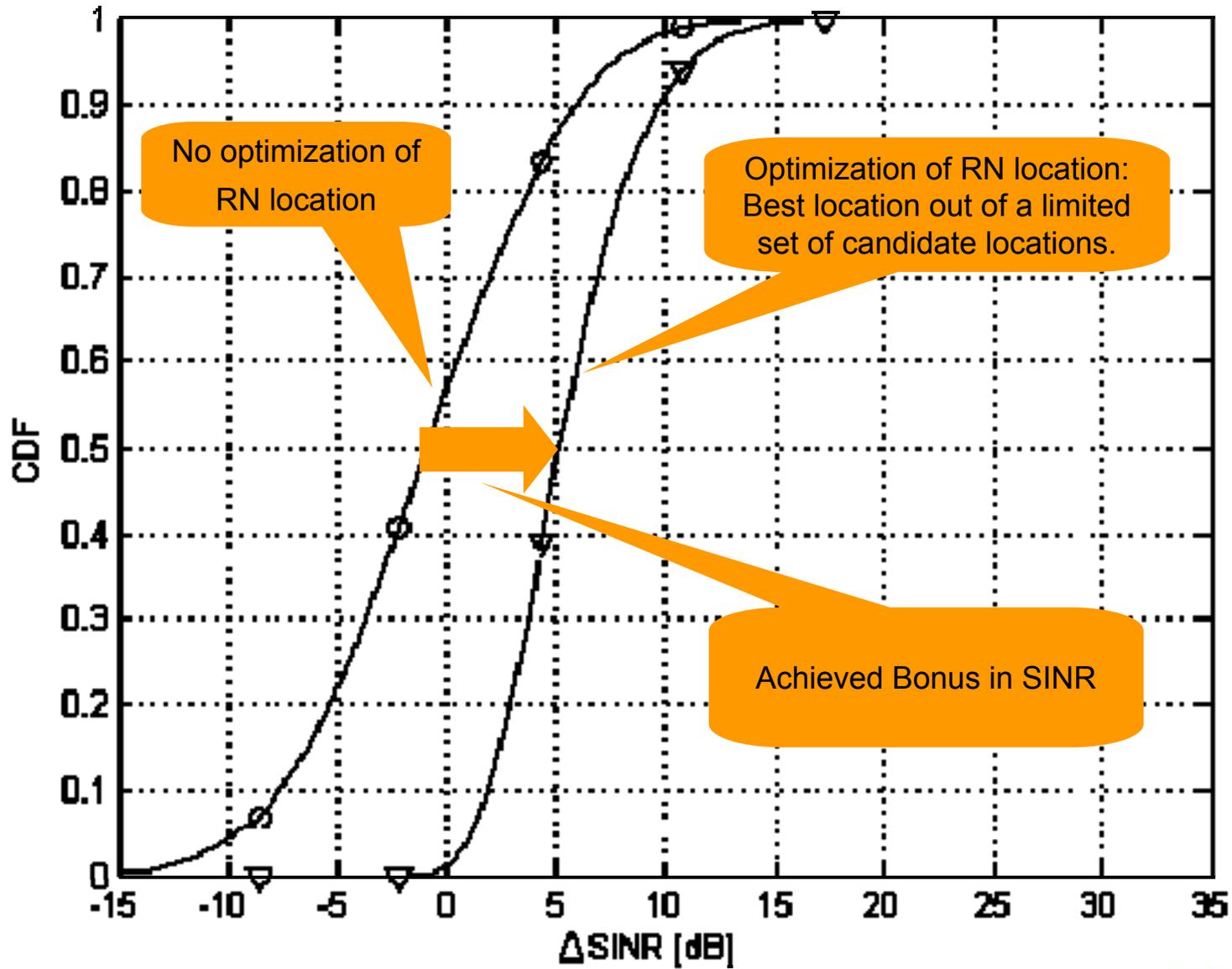
Illustration



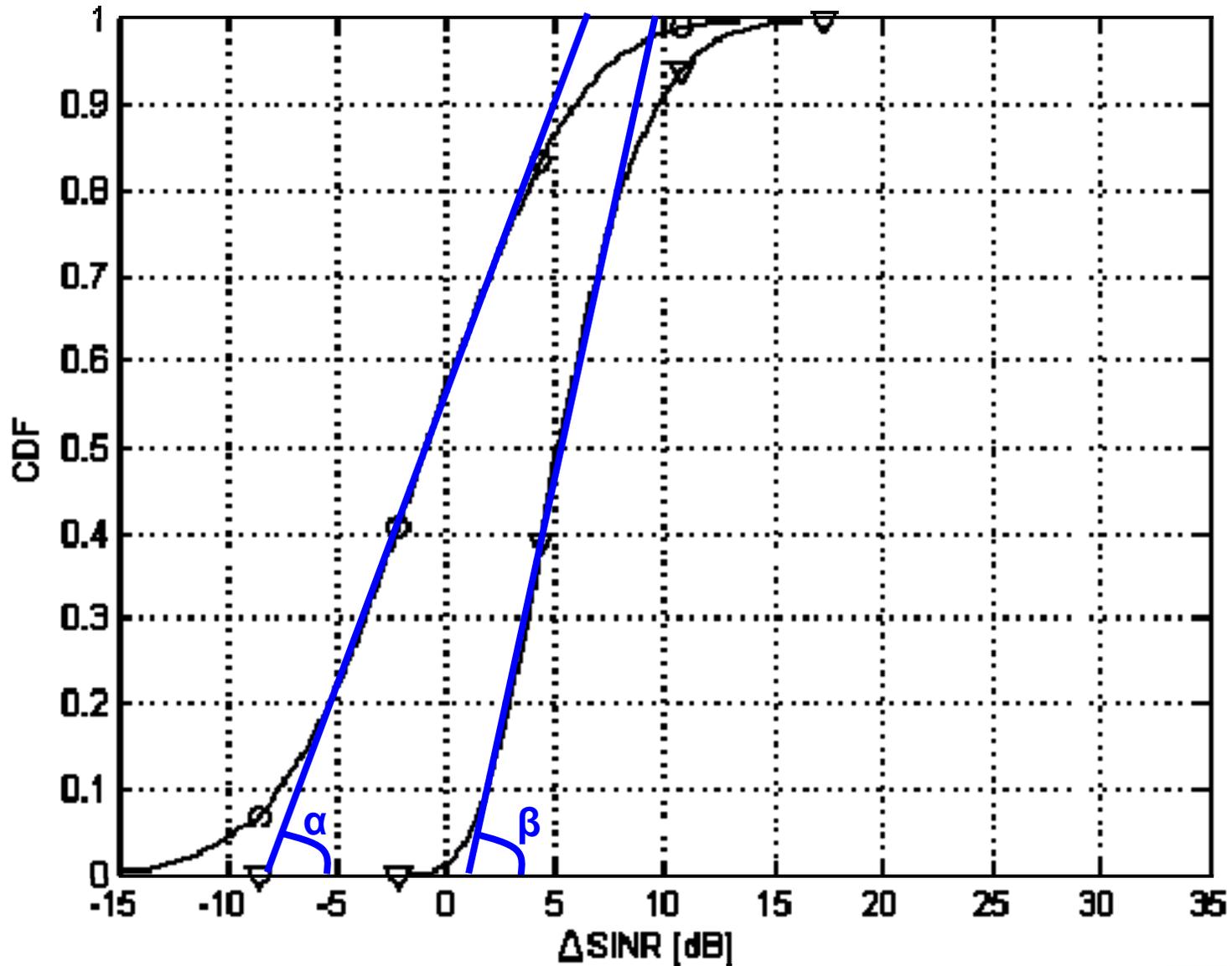
Channel models for eNB-RN link

- eNB-RN link
 - $124.5 + 37.6\log_{10}(R)$ with R in Km
 - shadow standard deviation 6 dB
 - Similar formula as already used in 3GPP plus 3.6dB bonus due to higher RN height compared to UE, as suggested by propagation formulas that model UE height.
 - Proposed in [1]
 - Coordinated or uncoordinated deployment possible

Effect of shadow distribution on SINR eNB – RN link (1/2)



Effect of shadow distribution on SINR eNB – RN link (2/2)



β/α is the ratio by which the shadow standard deviation is reduced due to the selection process

Conclusions

- Relay nodes will not be deployed at random (like users) but will be deployed reasonably by operators.
- This allows to select favorable RN placements by selection from a set of close by potential RN deployments
- With the currently discussed evaluation parameters we observe a gain of some 6 dB in SINR of the link to the serving eNB. Further more the effective variations of the shadowing after site selection will be reduced to some 2.6 dB.
- This effect can be taken into account explicitly by taking the deployment into account in simulations, or implicitly by taking the gain and the lower standard deviation into account.
- This effect will not apply for purely random RN deployments, which are not considered to be done by operators anyhow.

References

- [1] R1-084026, Text proposal for evaluation methodology, WG1 #54bis, September 29 – October 3, 2008, Alcatel-Lucent, CATT, CEWiT, Fujitsu, Ericsson, Huawei, ITRI, LGE, Mitsubishi Electric, Motorola, NEC, Nokia, Nokia Siemens Network, Nortel, NTT DOCOMO, Orange, Panasonic, Qualcomm Europe, Samsung, Sharp, Texas Instruments, T-Mobile, ZTE