On the Coverage Impact for RS Deployment

Document Number:

IEEE C802.16j-06/081r1

Date Submitted:

2006-07-12

Source:

Gamini Senarnath , Wen Tong, Peiying Zhu   Voice: 613 7631315

Hang Zhang, David Steer, Derek Yu, Wang G-Q   E-mail: gamini@nortel.com; wentong@nortel.com

Nortel, 3500 Carling Avenue

Ottawa, On K2H 8E9 Canada

Dean Kitchener, Mark Naden   Voice: +44 1279 403118

Nortel   Fax: +44 1279 402100

London Road   E-mail: deank@nortel.com

Harlow, Essex, CM17 9NA

Venue:

IEEE 802.16 Session #44, San Diego, USA

Base Document:

C80216j-06_043: "Harmonized Contribution on 802.16j (Mobile Multihop Relay) Usage Models"

Purpose:

The coverage improvement impact for the planed optimize RS deployment vs, Random deployment

Introduction and Background

- For the usage scenario of in-cell coverage hole, the random dropped RS node deployed by the user is compared with the planned deployment by the operator

- We show the planned deployment can achieve the significant coverage improvement by selecting good RS locations but at deployment cost
  - e.g. higher RS cite acquisition cost

- We also show that by improving relay to base link the further improvement in coverage and capacity can be obtained.

Simulation Assumptions

- Below roof top RS
- Case-1 Optimized BS $\leftarrow\rightarrow$RS link
  - e.g. directional antenna at both node
- Case-2 Conventional BS $\leftarrow\rightarrow$RS link
  - e.g. sectorized BS antenna and omni RS antenna
- Path loss and shadowing is modeled
- Scenarios Compared:
  1. Planned Deployment of RS for Case-1 (6 RS/sector)
  2. Planned Deployment of RS for Case-2 (6 RS/sector)
  3. Random Deployment of RS for Case-2
     - 6 RS/sector
     - 15 RS/sector
- Simplified Simulation Methodology
  - For give realization of path loss and correlated shadowing
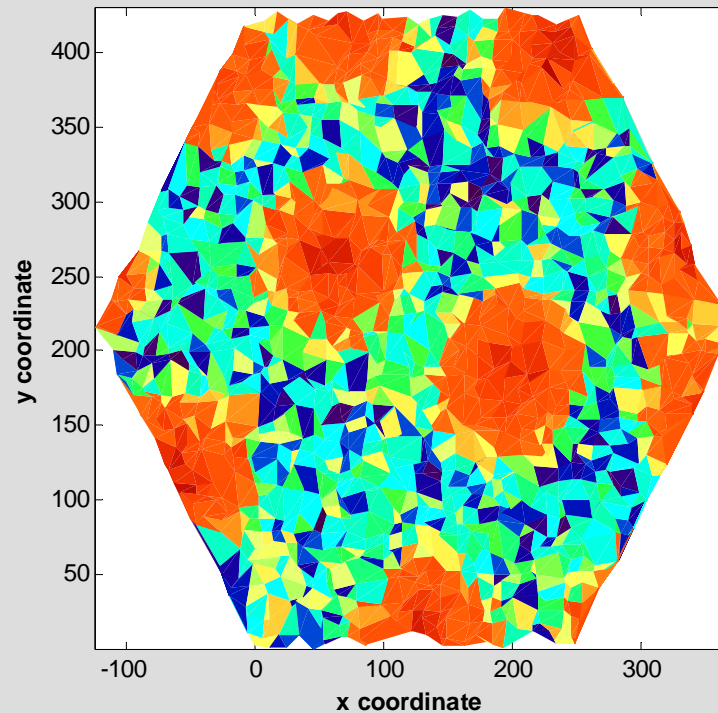 - The RS location is optimized or
  - Random dropped

Coverage Performance Comparison for the Planned RS Deployment *(SINR CDF)*
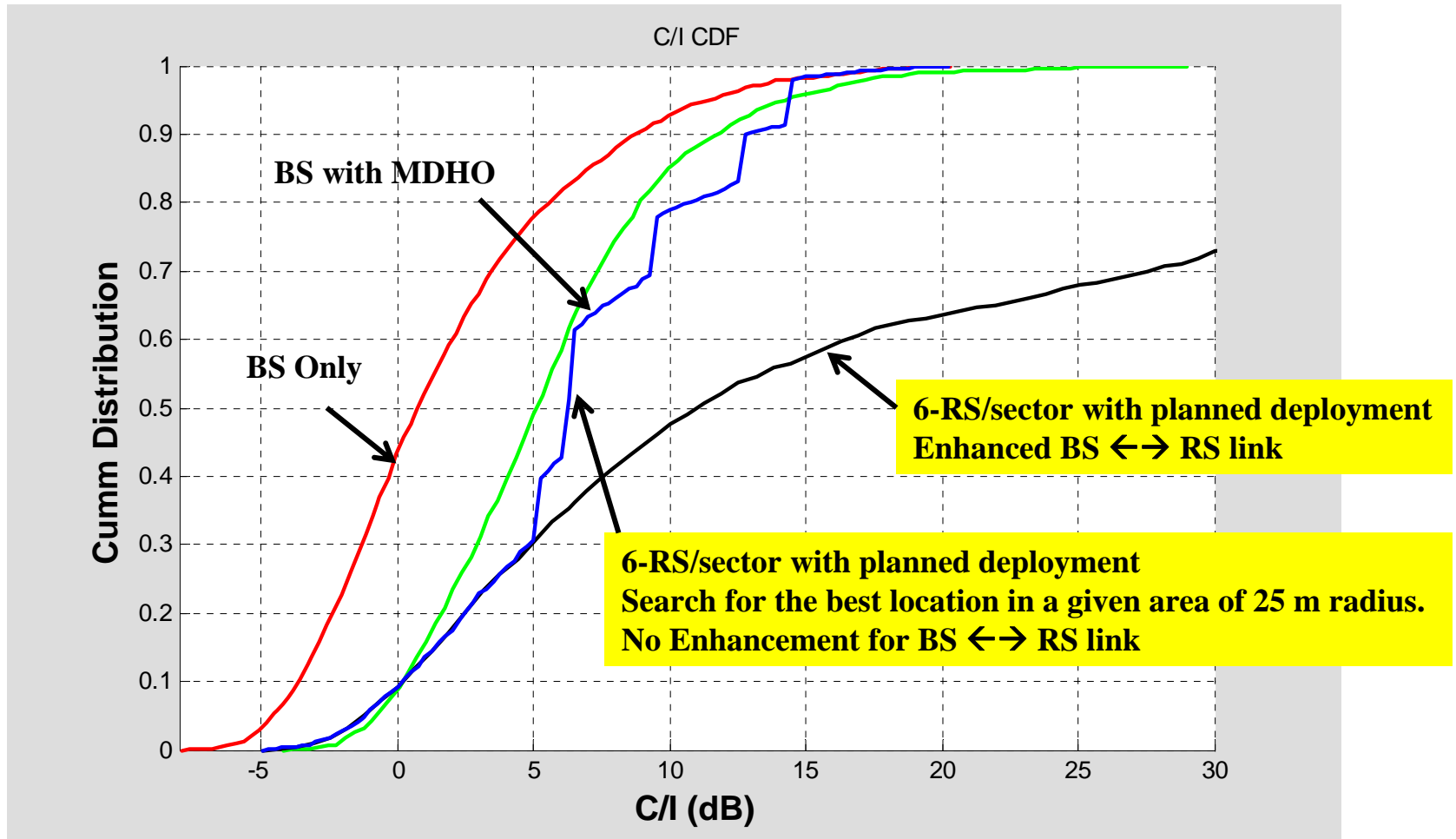
Coverage Performance Comparison for the Planned RS Deployment *(SINR distribution plot)*
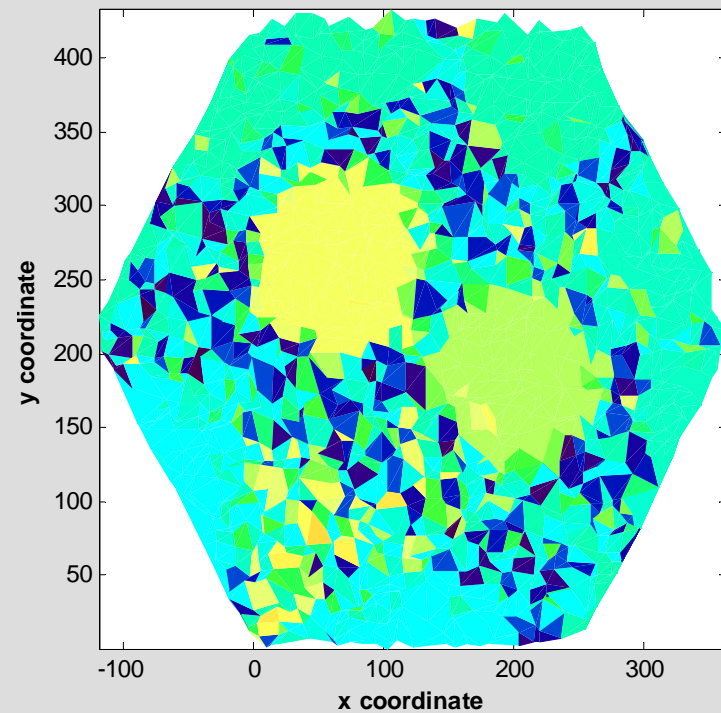
Case-1: Enhanced BS←→RS Link and RS location optimization   **Case-2: Enhanced BS←→RS Link and RS location optimization**
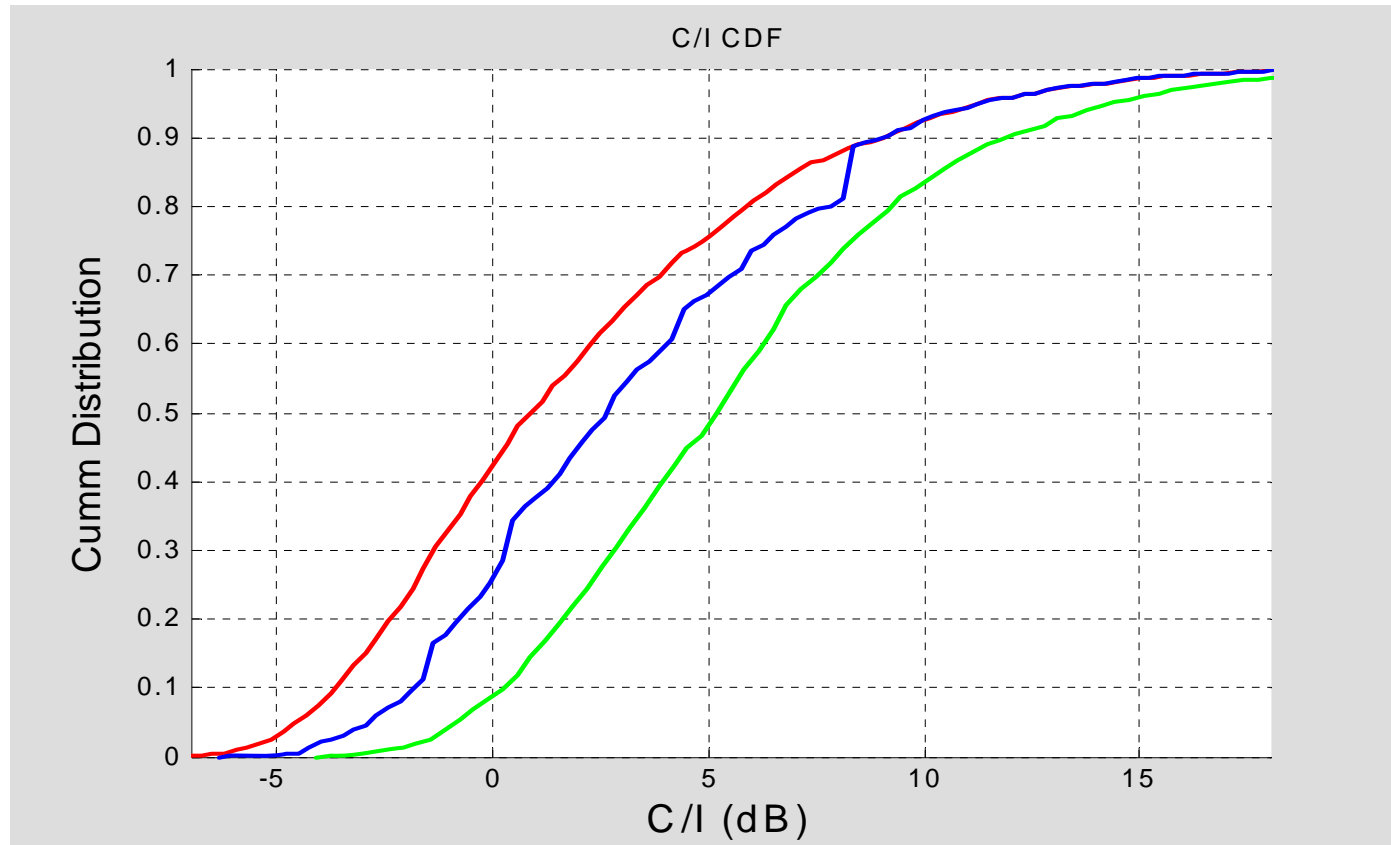

Best coverage and throughput gain   the coverage and throughput gain are reduced

EQT capacity improvement = 250%
95% coverage improvement = 4.2 dB
Median C/I improvement = 10 dB

EQT capacity improvement = 160%
95% coverage improvement = 4.2 dB
Median C/I improvement = 7 dB

Coverage Performance Comparison for the Random RS Deployment *(6-RS/Sector)*

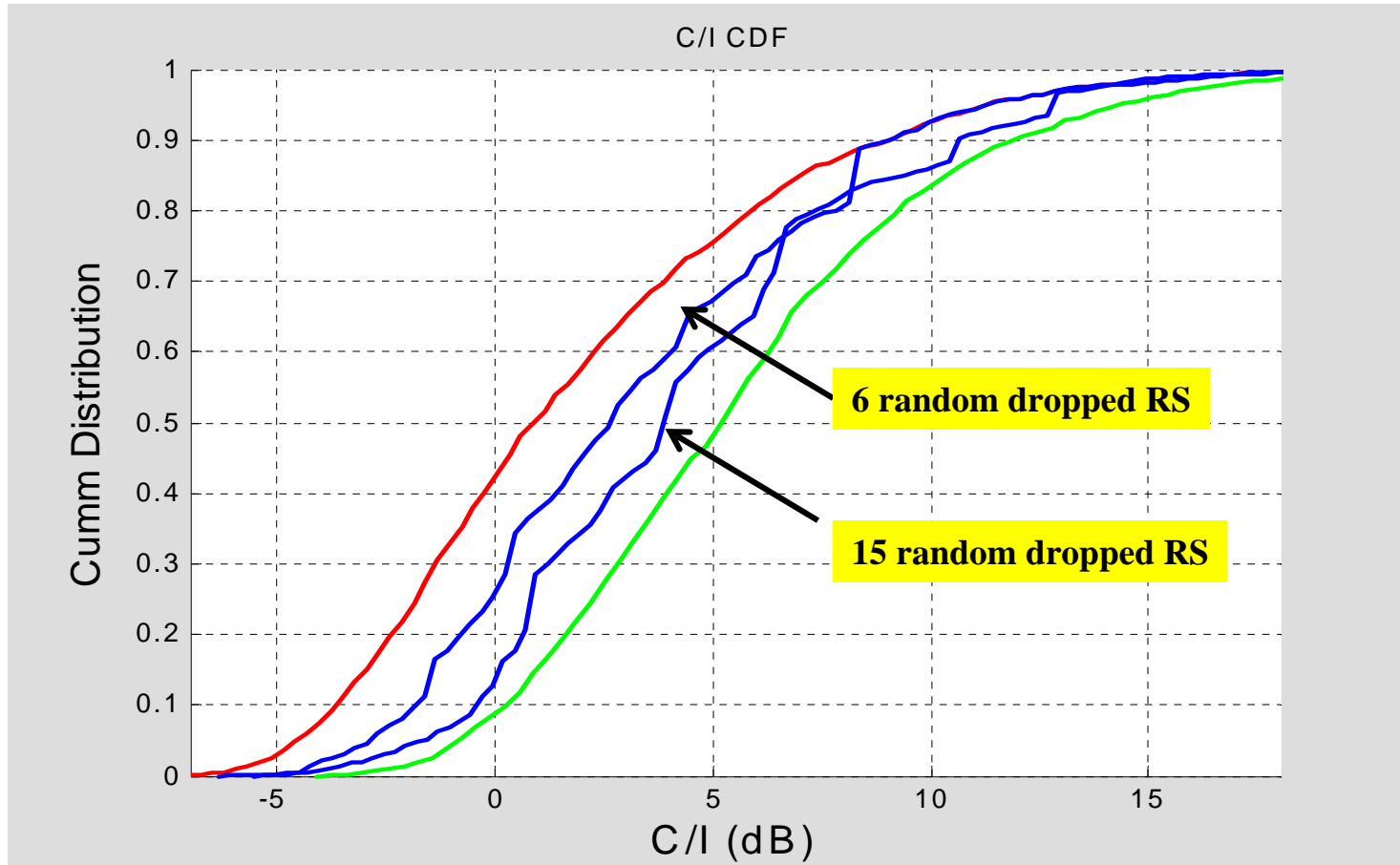
EQT capacity improvement = 31%
95% coverage improvement = 1.6 dB
Median C/I improvement = 1.8 dB

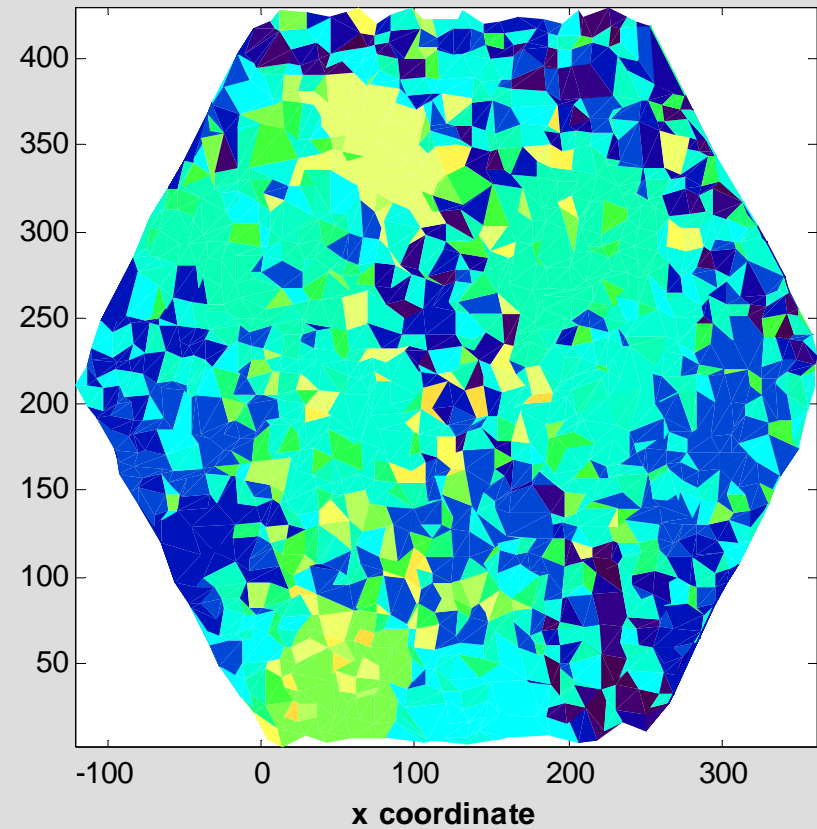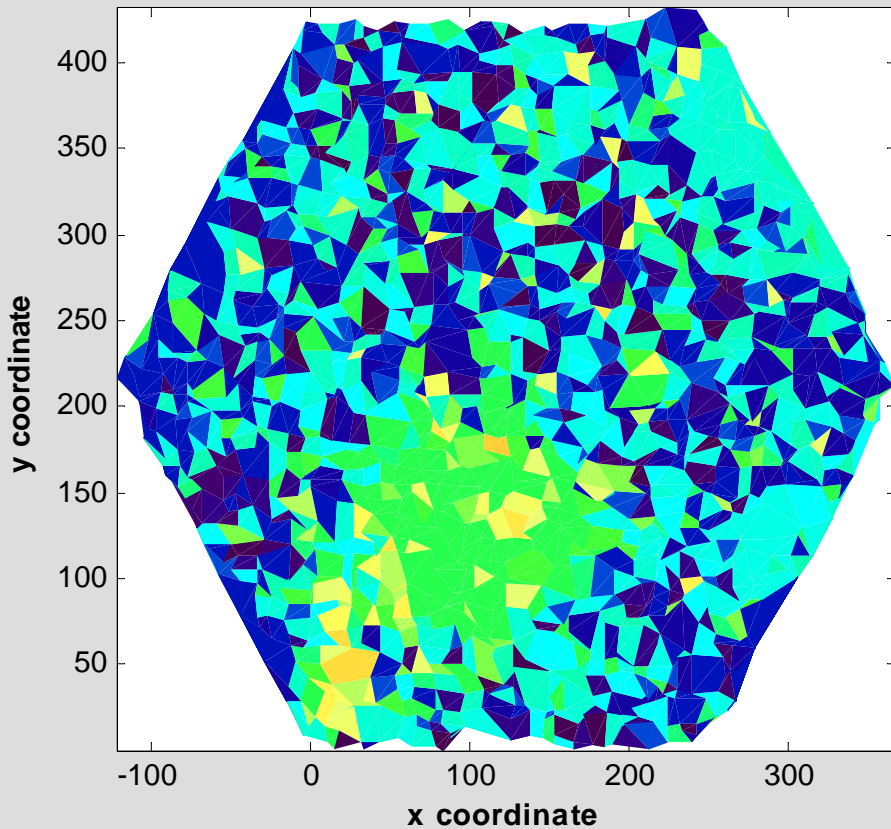# Coverage Performance Comparison for the Random RS Deployment *(15-RS/Sector)*

EQT capacity improvement = 70%
95% coverage improvement = 3dB
Median C/I improvement = 3.4 dB

7

Coverage Performance Comparison for the Random RS Deployment *(SINR distribution plot)*

6 random dropped RS   **15 random dropped RS**

Summary

- A preliminary simulation study on the deployment strategies for the RS and their impact on the coverage improvement is compared