Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Capacity and diversity of MIMO systems in different propagation channels|**
Date Submitted	**2007-07-09**
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Re:	[Response to the call for comments on the 16m system evaluation methodology]
Abstract	[The document analyzes the cumulative distribution function of the capacity and the maximum eigenvalue of the channel transfer function in different environments. The results demonstrate that outdoor-to-indoor and pure indoor environments have a behavior that is markedly different from outdoor environments even when operated at the same SNR
Purpose	[Description of what *specific* action is requested of the 802.16 Working Group or subgroup.]
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Capacity and diversity of MIMO systems in different propagation channels

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This document documents the system characteristics of MIMO systems operating in different channel environments. In particular, we give the cumulative distribution function of the capacity, as well as the eigenvalue distribution, in the following environments: (i) urban macrocell, (ii) suburban macrocell, (iii) urban microcell, (iv) outdoor-to-indoor, and (v) pure indoor. The results demonstrate that channels lead to different system behavior, even if the nominal SNR is the same for all environments. Either the mean values or the shape of the cdf show significant differences. We therefore recommend that all mentioned environments are used for testing of proposed systems in IEEE 802.16m

In the following, we give first a detailed description of the simulation parameters, and then the results, for the case of omni antennas and sector antennas, respectively.

Simulation 1: Omni-directional Antennas at both BS and MS

Simulation Parameters:

Channel: Downlink (from BS to MS)

Channel model was based on the WINNER II CDL model. For each realization, time correlation was not considered (equivalently, MS does not move).

Number of BS transmit antennas: 2

Number of MS receiver antennas: 2

Antenna Gain at BS : 0dBi (omni)

Antenna Gain at MS: 0dBi (omni)

Channel power was normalized to 1

SNR at the receiver= 20dB

The path loss and shadowing were included in receiving SNR, so the capacity is independent of specific distance, path loss or shadowing model.

Other parameters are consistent with 16m Evaluation Methodology Document (C802.16m-07/080r2) and WINNER II interim report (D1.1.1 v1.0).

The capacity CDF is shown in Fig. 1. Solid lines correspond to NLOS (non line-of-sight), and dashed lines correspond to LOS (line of sight).

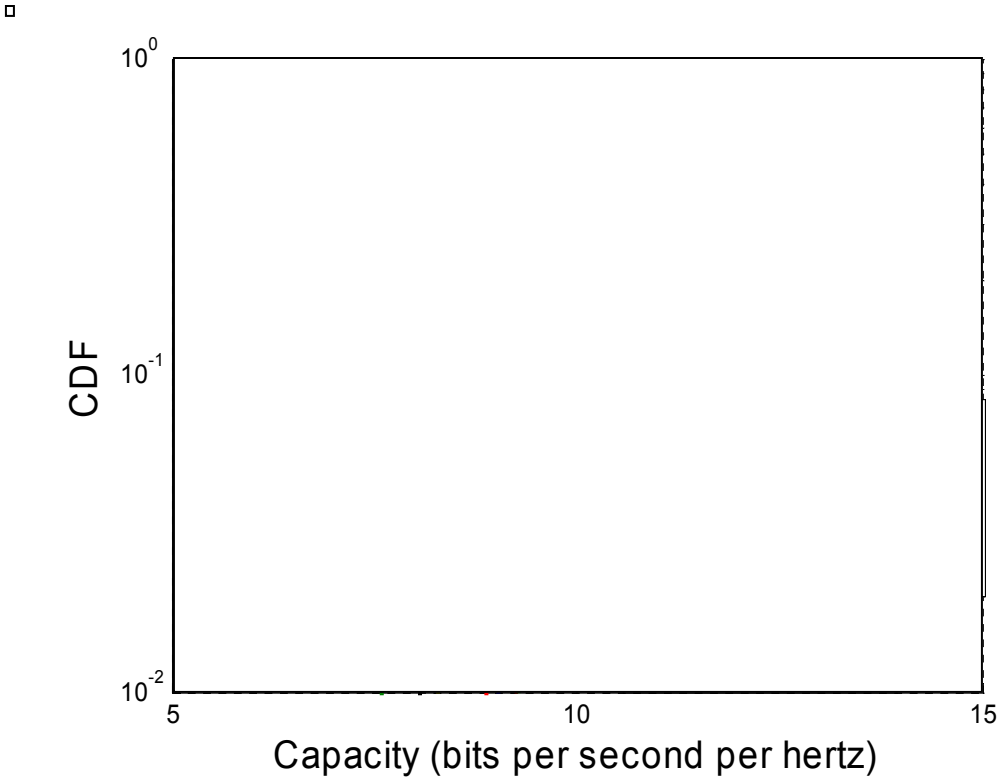

Fig. 1 Capacity CDF (omni antennas at both BS and MS)

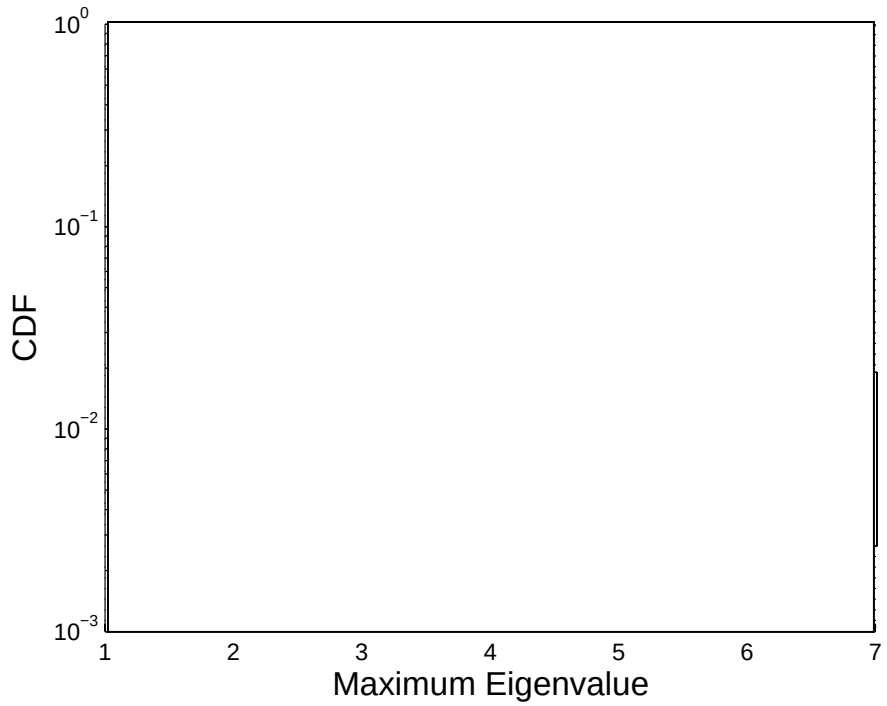

Fig. 2 Cumulative distribution of the maximum eigenvalue.

Simulation 2: 3-sector-cell Antennas at BS

Simulation conditions are same except that transmit Antennas of BS are of 3 sector cells (consistent with 16m Evaluation document).

Transmit Antenna Gain (boresight) : 17 dBi

3-dB bandwidth: 70 degrees

The azimuth of MS (with respect to the Boresight of BS) is uniformly distributed in [-60 °, 60°].

Receiver antennas at MS are still omni.

Figure 2 shows the capacity CDF.

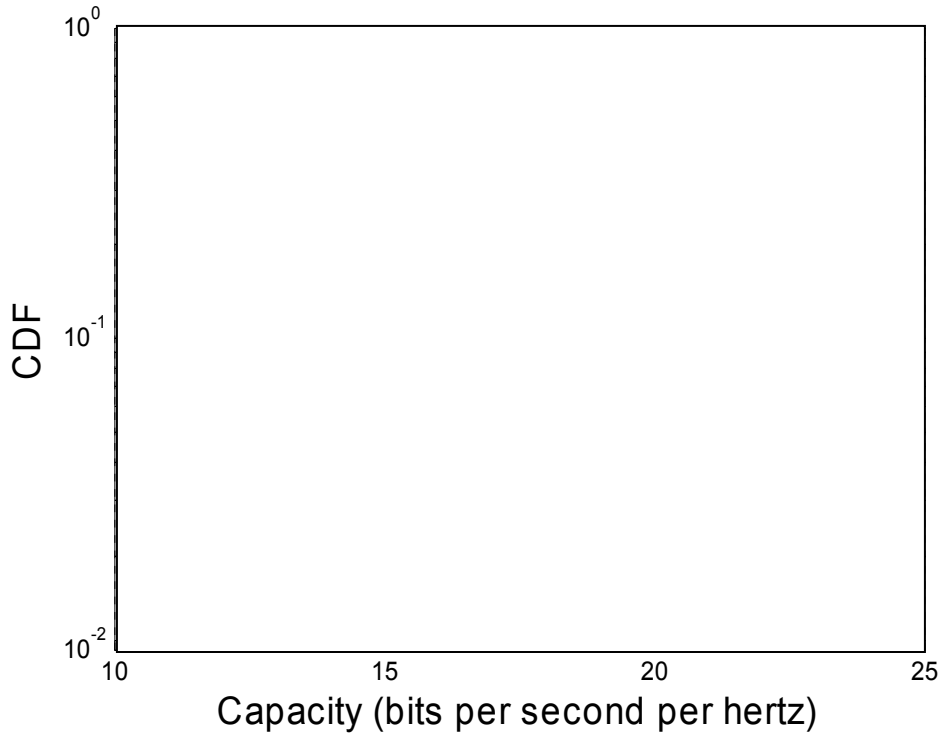

Fig 3. Capacity CDF (3-sector-cell antennas at BS)

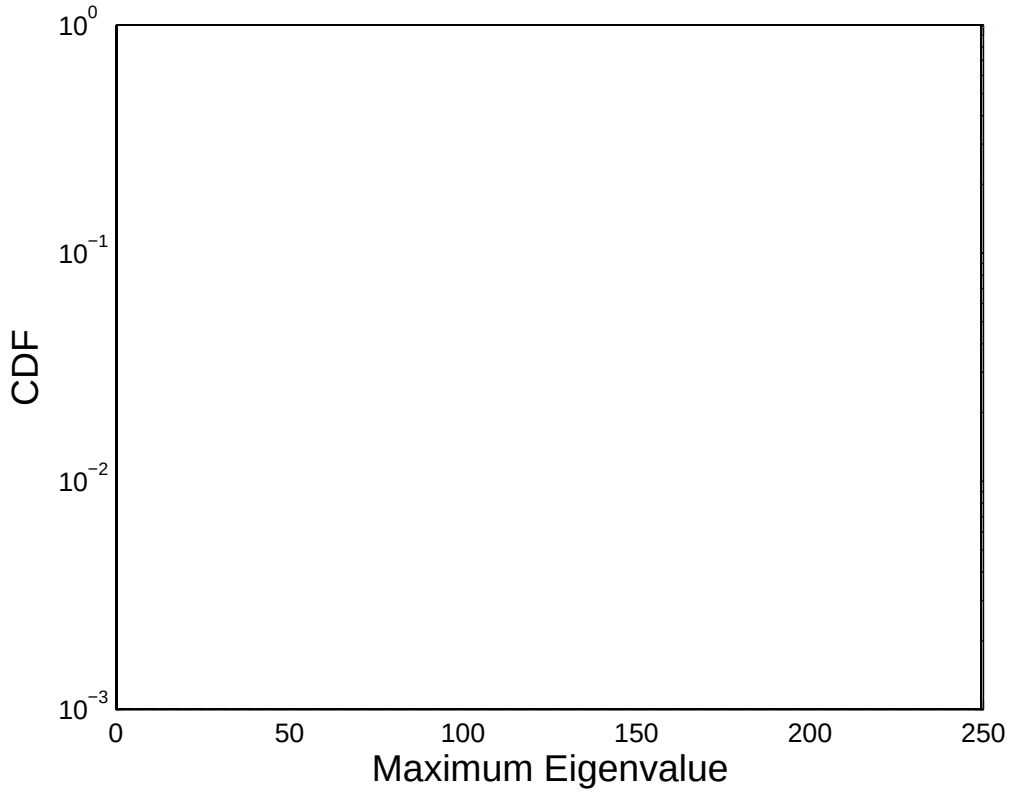

Fig. 4 Cdf of the maximum eigenvalue (3-sector-cell antennas at BS)