

1 Contribution

- Channel measurements of 3D-MU-MIMO SJTU
- Measurements show the experimental characteristics of the sensitivity of the spatial Correlation
- Kronecker production.
- Analyze the capacity of MU-MIMO systems

3 Model for Multi-User MIMO System

$$y_u = H_u^{DL} x + z_u, u = 1, 2, \dots$$

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} H_1^{DL} \\ H_2^{DL} \\ H_3^{DL} \end{bmatrix} x + \begin{bmatrix} Z_1 \\ Z_2 \\ Z_3 \end{bmatrix}$$

$$R_H = \text{vec}(H)\text{vec}(H)^H$$

$$R_H = \begin{pmatrix} h_{11}h_{11}^* & h_{11}h_{21}^* & \dots & h_{11}h_{316}^* \\ h_{21}h_{11}^* & h_{21}h_{21}^* & \dots & h_{21}h_{316}^* \\ \vdots & \vdots & \ddots & \vdots \\ h_{316}h_{11}^* & h_{316}h_{21}^* & \dots & h_{316}h_{316}^* \end{pmatrix}$$

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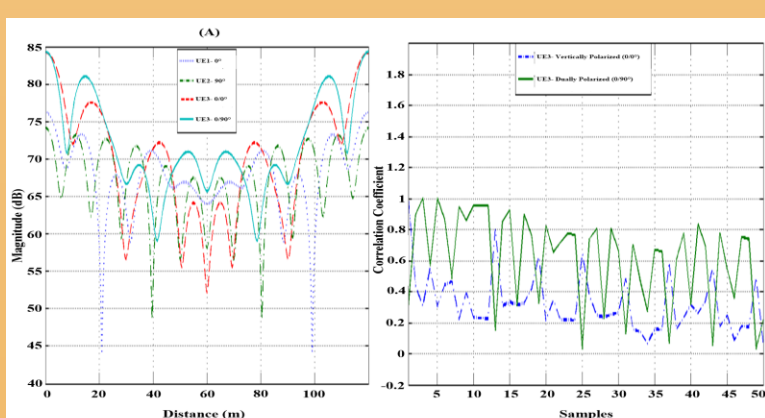
2 Multi-user MIMO transmission model system

- A (UE1, UE2, UE3) line-of-sight (LOS)
- B (UE1, UE2, UE3)
- C (UE1, UE2, UE3) in a circular at the speed of 30 km/hr.
- The base station height is about 35

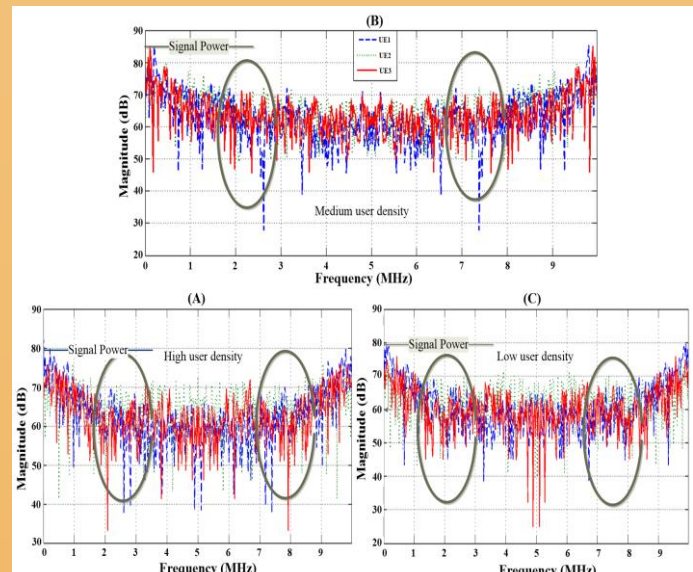
4 System Implementation

- Sixteen antennas a of cross-polarized (X-Pol) antenna elements with +/-45 degrees polarization slant angle in the transmitter side
- Three users platform universal software at the receiver side with single and multiple antennas vertically, horizontally and ducally polarized.

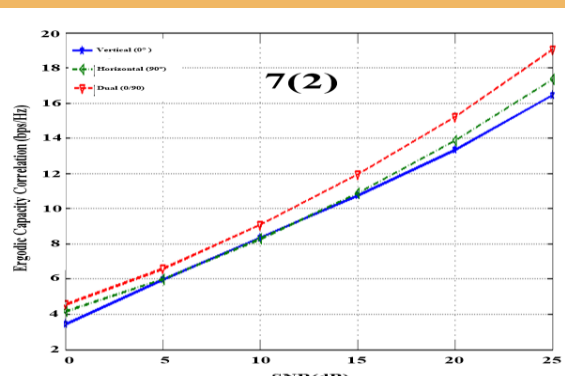
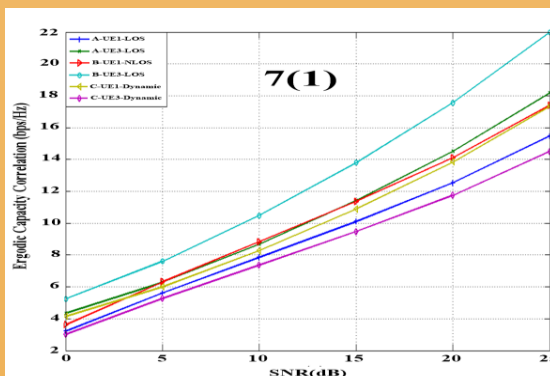
5 System Measurements



The receiver complex spatial correlation coefficient over group A for the different polarized antennas .The result consistently shows low and high spatial correlation depending upon antenna spacing.



Representative plots showing the magnitude of the channel response between transmute antenna 4 and users with single and multiple antennas at conditions A, B and C with different correlation results depending upon user spacing.



- It is seen in Figure 7(1) that the user at high SNR in condition A with single receiver performs a lower capacity than user B when UE is at a medium SNR with less user density. From the picture, it can be seen that with multiple antennas at condition A, with high user density and SNR, the performance of MU-MIMO is much lower than when the user is in low spatial correlation with well separated users even if UE is farther from base station.
- It is seen in Figure 7(2) that for MU-MIMO receiver antennas, the results show that ergodic capacity proportionally increases with the number of antennas. The use of additional antenna improves the performance of communication system when it is polarized at 0/90 degrees.