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Understanding MIMO: Part II

By Dr. Jack Winters, Motia 04.28.2005 ☐ 0

With MIMO, systems use multiple transmit and multiple receive antennas. Looking at various MIMO techniques (specifically the receive techniques) that use different approaches to antenna and signal optimization, note that each type of MIMO has advantages and disadvantages.

Selection diversity is the simplest diversity approach. Using multiple antennas with overlapping coverage, this approach selects the antenna with the highest received signal power, mitigating fading (Fig. 6). In this case, the outage probability with M antennas is equal to the outage probability of the single antenna raised to the M th power. This substantially reduces outage probability, i.e., diversity gain.

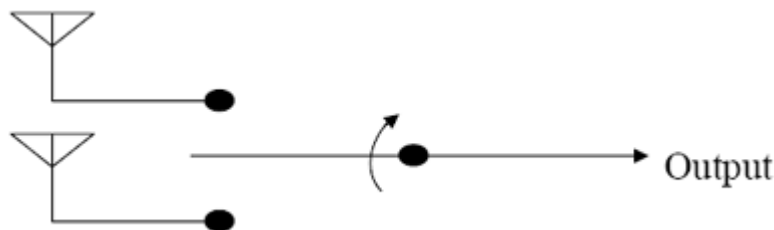
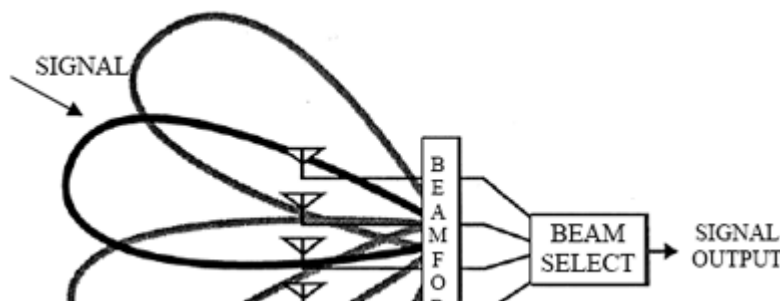


Fig. 6: Selection diversity.


Selection diversity is the simplest technique to implement and requires only one RF chain, such as an LNA, filter, or down converter, independent of the number of antennas. However, it doesn't use all the signal energy available at the antennas, so the diversity gain is less than M and the array gain is limited. Interference suppression is also limited.

Switched multi-beam

A switched multi-beam antenna is an array with multiple fixed beams pointing in different directions (Fig. 7). The receiver picks the beam with the highest signal-to-noise ratio (SNR).



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