

Time-reversal Combining Using Multiple Base Station Transmitters in a CDMA Multi-user Communication

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Time-reversal method provides an efficient way to send signal to a location while suppressing the signal in other locations. In time-reversal, transmitted signal is recorded on a receiver array and then time reversed. Then the time reversed signal is sent back by the same receiver array through the same medium. It is observed that the signal sent back by the array tends to focus on original source point. Following the aforementioned time-reversal procedure a narrow beam can be created in both time and spatial domains. Especially, in a rich scattering environment, a better performance, narrower beam in the space domain, can be expected.

Thus, time-reversal method can be applied to communication, where more received signal power guarantees higher performance. In time-reversal CDMA communication, the CIR(channel impulse response) between a transmitter and a mobile user is time reversed, and acts as a transmitted signal for each user. Then the signal for each user passes through the PN code generator and the modulator like an ordinary CDMA transmitter. So, the assumption was made that the knowledge of the CIRs between a transmitter and each mobile user is known to the transmitter in advance.

The time-reversal combining method was already covered by previous works in communication field, while the method is referred to as pre-rake combining. But the correlation between the channels from two different transmitters to a mobile user was ignored. We will take into account the correlation between the transmitters by using established correlation model based on actual measurements. In the presence of the correlation, the shape of the base station transmitter array affects the performance of the communication system, and we will present the simulation results involved.