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| RELAY STATIONS |
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RELAY STATIONS

Dr. Fatma Al Newagi

**Abstract:**

An ad-hoc network with a sender, a destination and a third station acting as a relay

is analyzed. The channels are modeled containing thermal noise, Rayleigh fading and path loss. Different combining methods and diversity protocols are compared. The amplify and forward protocol shows a better performance than the decode and forward protocol, unless an error correcting code is simulated. To combine the incoming signals the channel quality should be estimated as well as possible. Information about the average quality shows nice benefits, a rough approximation about the variation of the channel quality increases the performance.

used second level diversity is observed. The relative distances between and the stations have a large effect on the performance. Index Terms are wireless networks, cooperative diversity, relay, diversity protocols, combining methods, fading and path loss.

**CONCLUSION:**

The results have shown the possible benefits of a wireless transmission using cooperative diversity to increase the performance. The diversity is realized by building a multi-hop network using a third station as a relay. The data is sent directly from the base to the mobile or via the relay station. Such a system has been simulated to see the performance of different diversity protocols. The choice of combining method as MRC, EGC, ERC, FRC, SNRC and ESNRC has benefits compared to the single link transmission. Fixed Ratio Combining (FRC) needs knowledge of the average channel quality, and shows a much better performance than the ERC. If knowledge of the current state of the channel quality

is available more sophisticated combining methods can be used. The Enhanced Signal-to-Noise Ratio Combining (ESNRC) has shown a very good performance considering that a rough approximation of the channel quality is sufficient.

The location of the relay is crucial to the performance. The best performance was

achieved when the relay is at equal distance from the sender and the destination. In general the relay should not be too far from the line between the two stations.

We also show that when the mobile station moves between the relay station and

the base station by which station we can serve this mobile station to get the better performance, we state many cases such as when the mobile is closer to the base station and when it is closer to the relay station.

The space diversity can be achieved using multi antenna relay so that the signals

from multipath between the source and relay can be received by multi antenna relay and combined at the relay so we can improve the system performance.

**Future work:**

There are many ways to take this project further, As we work mainly with specific types of relay as fixed Decode and forward and Amplify and forward relay, we can work with adaptive Decode and forward relay, Compress and

This system serves only single input single output networks using OFDM Technique So we can extend its functionality to be used for multi input multi output networks With many users that can be served using the relay node.

This system model can be modified such that we can extend it for multi hop system by using more than only relay station so that we can enhance the system performance and can increase the coverage area.

During a wireless communication the involved stations might be moving around.

Sometimes there is a well-placed mobile station available that can be used as a relay. But most of the time the mobile station is not located optimally or is too far away to be useful as a relay at all. It would be very interesting to see the overall performance of this more complicated system.