MODULATION DESIGN IN AMPLIFY-AND-FORWARD TWO-WAY RELAY HARQ NETWORK

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ABSTRACT

***Index Terms*—** Modulation diversity, amplify-and-forward, two-way relay, HARQ, QAP

1. INTRODUCTION

As an advanced technique to improve the robustness of high-rate wireless transmissions against poor channel conditions, Hybrid Automatic Repeat reQuest (HARQ) has found its application in various communication systems [1]. HARQ works on both PHY layer and MAC sublayer to mitigate packet loss due to channel fading and link-adaptation accuracy. Recently, substantial research interest has been drawn to HARQ in Two-Way Relay Channel (TWRC) [2-4]. In [2], the average throughput of naive Type-I HARQ policy for both Amplify and Forward (AF) and Decode and Forward (RF) TWRC schemes have been analyzed. The energy-delay tradeoff, and the diversity-multiplexing tradeoff of type-II HARQ policy, also known as full Incremental Redundancy (IR), for AF TWRC scheme have been studied in [3] and [4], respectively. Related works about TWRC with ARQ for different relay schemes and retransmission policies can also be found in [5, 6, 7] and the references therein.

Apart from the naive Type-I HARQ and HARQ-IR, Type-I HARQ with maximal ratio combining (MRC), also known as HARQ-Chase Combining (HARQ-CC) [8], is another practical HARQ scheme supported by such standands as HSPA [9], LTE [10] and so forth. As practical transmissions often admit linear modulations of finite-alphabet constellation (e.g. Q-ary QAM), the performance of HARQ-CC can be improved with Modulation Diversity (MoDiv) [11], in which a same group of $\log_2 Q$ bits are mapped to different symbols in a same constellation in different round of (re)transmissions.

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2. SYSTEM MODEL

3. SUCCESSIVE CONSTELLATION MAPPING DESIGN FOR MODULATION DIVERSITY

3.1. A BER upperbound

3.2. The Successive Quadratic Assignment Problem

4. NUMERICAL RESULTS

5. CONCLUSION

6. REFERENCES

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