Comparing the throughput performance for star topology with varying number of stations, both schemes show a decrease in throughput as the number of stations growing. But AARF degrades severely even with 5 nodes, and drops to blow 1Mbps since 25 stations. It is because ARF cannot differentiate collision from channel errors, a wireless station may decrease its frame transmission rate over-aggressively [1]. ARRF also has this drawback since it is modified version of ARF. By the other hand, CARA using RTS/CTS when first transmission fail, so we can avoid frame transmission rate decreasing over-aggressively because we can detect that this transmission fail is caused by collision, there is no need to decrease the transmission rate. So in this case, CARA has a significant better performance than AARF.

Also, since the 802.11 DCF is designed to offer equal transmission opportunities to all stations, the throughput of high-rate station is also bounded below the lowest transmissions rate in the network.

Reference:

1. J. Kim, S. Kim, S. Choi and D. Qiao, “ Collision-Aware Rate Adaptation for IEEE 802.11

WLANs ,” in Proc. IEEE INFOCOM, 2006.