An algorithm to Calculate Phase and Amplitude of tag on RFID protocol conformance test system

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Abstract—Nowadays, RFID (Radio Frequency Identification) technology is widely used in logistics management, tolling system as well as authorization management. But either the performance of reader or tag is the largest influence factor in RFID systems compared with other components, so this paper mainly works on how to calculate tag phase and amplitude by signal with CFO that have an obvious influence on signal. This paper propose, an algorithm reducing influence CFO and carrier frequency drift have based on RFID protocol conformance test system and RFID signal analysis system. We find the change of signal with statistical idea and piecewise linear fitting to solve CFO. The difficulty is how to pinpoint location where rate of change changes and locate the start and end of signal. We use rate of change of tag phase and tag amplitude to separate tag signal to correct it, and we use cluster to get center points of signal to calculate tag phase. This algorithm has been used in our system. In this paper, we finished segmentation of signal and analysis of signal. To separate tag signal and reader signal more accurately, we filter signal firstly and then use state transition model. We calculate the value of carrier roughly with simple cluster firstly. Then we start work with state transition model. Finally, we get right location of reader signal and tag signal. And we introduce how to get the phase and amplitude of 18000-6C tag signal and 18000-6B tag signal. We analysis the influence on 18000-6c signal and 18000-6B that CFO and frequency drift have, and propose algorithms for different protocol. We get that 18000-6b IQ signals approximately periodic, but period is a little fluctuate. We use statistical idea to find the period accurately and use fitting curve to fit the change of phase. We get that tag-phase of 18000-6C signal increased linearly in a symbol. So with 18000-6c signal, we adopt piecewise linear fitting not linear regression in a whole of tag signal. After we modify the phase and then we get the correct tag amplitude and tag phase.

Keyword— RFID system, tag phase, tag amplitude, CFO, piecewise linear fitting

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