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# Wi-Fi Adaptor Identification Based on Receiver-Agnostic RF Fingerprint

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The security of wireless communication attracts more researchers' attention recently as the pervasion of wireless devices in the era of Internet of Things (loT). Many current advanced cryptographic algorithms used for the wireless communications become unaffordable in many applications. Authentication of radio signal transmitters using their physical layer characteristics, such as radio frequency / radiometric fingerprint and spatial signatures, is a promising technology to overcome this challenge . The RF fingerprint identification (RFFI) using a machine learning classifier is an effective approach as revealed in literatures [1]. This approach, however, encounters some portability [2] or receiver-agnostic [3] problems in practical applications. That is the performance of transmitter identification based on the RF fingerprint significantly degrades if the RF fingerprint features used for the classifier model training are collected by another receiver.

In this work, we take RF fingerprint measurements of IEEE 802.11g wireless local area network (LAN) including 15 Wi-Fi adaptors as transmitters and five low-cost universal software radio peripherals (USRPs) as receivers. The experiments are carried out under two kinds of channels, namely Added White Gaussian Noise (AWGN) channel and Rician channel. The collected raw data in each receiver are used to extract various features including carrier frequency offset, error vector magnitude, power spectrum density, and so on. The extracted features at a different receiver are used to train individual classifier models. The degradation of RFFI rate is obvious if the classifiers are trained by the data collected from different receivers.

To overcome this problem, a receiver calibration (RC) scheme based on the comparison of histograms of individual extracted features and a weighted classifier combining decision (WCCD) scheme that assign different weighting to each classifier based on its portability are jointly used. Experimental results show that the proposed method can significantly improve the overall identification rate of the tested Wi-Fi adaptors using different receivers under AWGN channel and Rician channel, respectively. Figure 1 illustrates the average RFFI performance improvement.

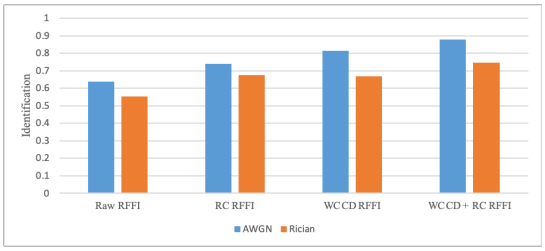


**Figure 1.** RFFI comparison. Apparently, jointly using the RC and WCCD scheme can significantly increase the average RFFI rates under both AWGN channel and Rician channel.

## References

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