

Study of TP-Link router and Raspberry Pi on Prospect house power-line network

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This report summarises results from experiments on TP-Link router and raspberry pi in 116 Prospect house.

1 Experiment Design

A device (TP-Link router or Raspberry Pi) is plugged into live power-socket next to EMI measurement equipment power-socket and measurements are captured for different activities. Only few activities are shown in the report for drawing conclusion.

2 Results

2.1 TP Link

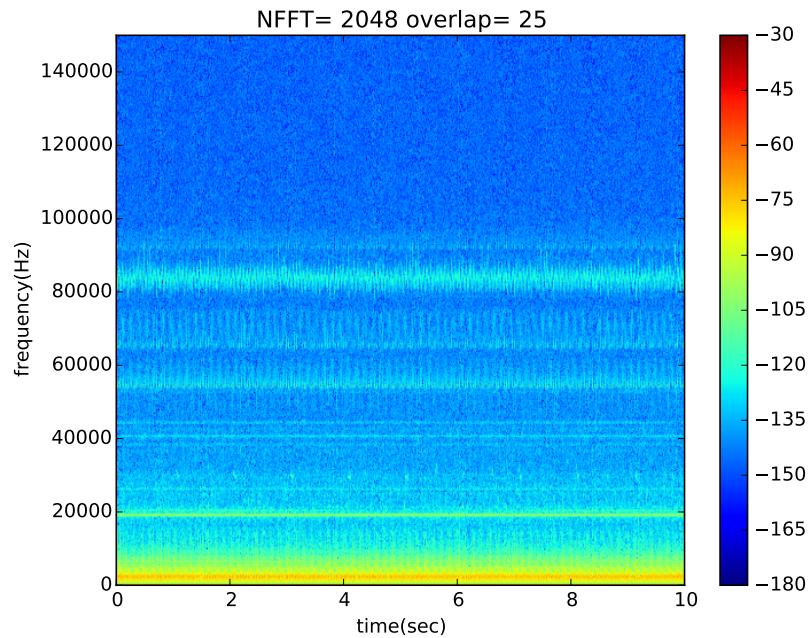


Figure 1: Spectrogram of Idle (without any network/compute activity on the router) tp link router in controlled environment

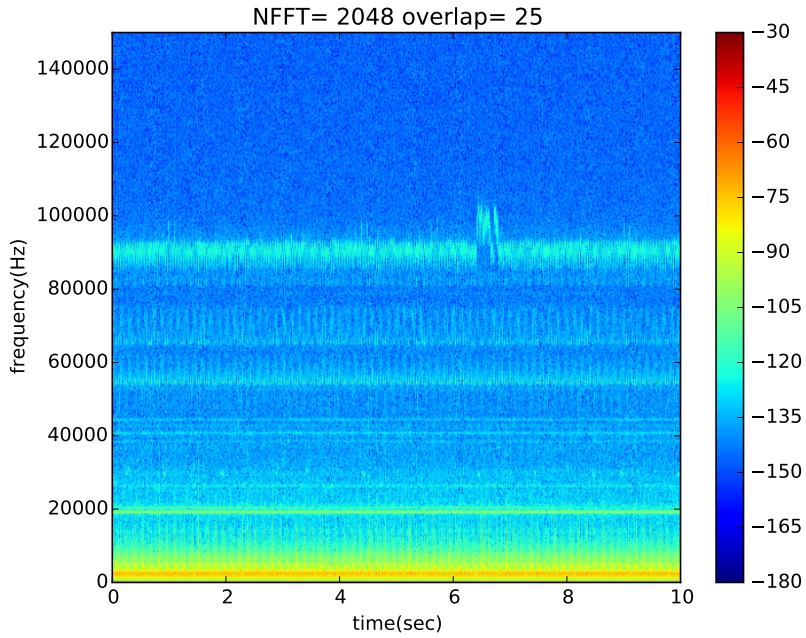


Figure 2: Spectrogram of Mirai DoS (DNS) attack using tplink router in controlled environment

1. Fig 1 and fig 2 are spectrograms when experiments are conducted on separate power-line in controlled environment
2. There is a marked difference in the change in frequency around 80KHz to 90 KHz when a network intensive activity is started
3. The noise floor is low at the higher frequency range, compared to spectrogram 3 when measurements are conducted in house power-line network

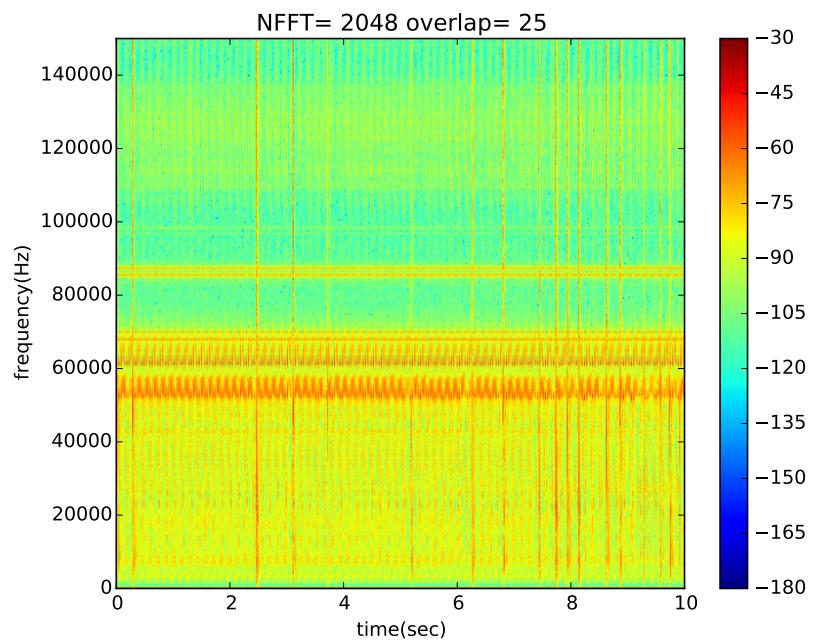


Figure 3: Spectrogram of Idle (without any network/compute activity started on the router) tpLink router in Prospect house

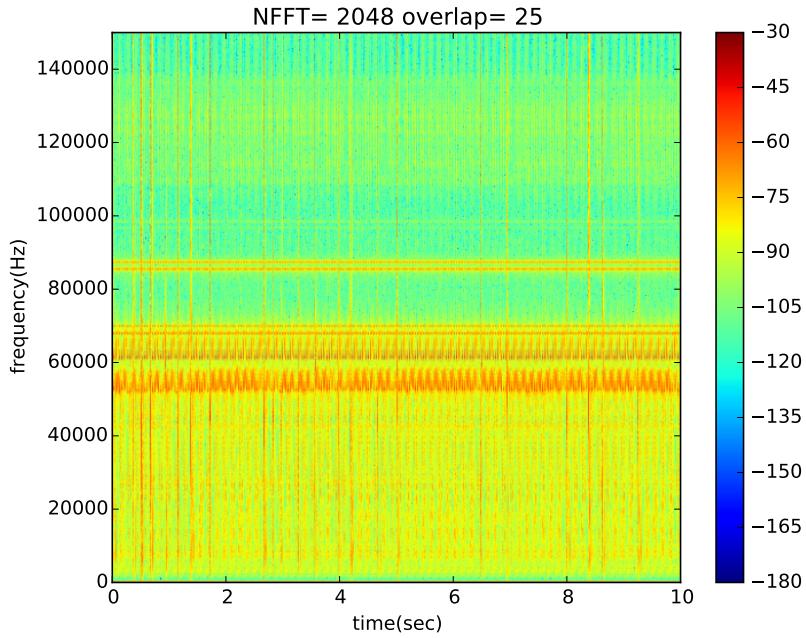


Figure 4: Spectrogram of Mirai DoS (DNS) attack using TP-Link router in Prospect house

1. There is no change in EMI of the channel in Fig ?? and Fig ???. Mostly because of the masking of the frequency range by other devices(unknown and already present) on the channel
2. The overall noise on the channel is remarkably high, given the range of the scale is the same for all the spectrograms
3. Simple denoising technique of removing variance $\sigma\sqrt{\log n}$ (n is the number of samples) of the data was used, which as not yielded positive result in Fig 5

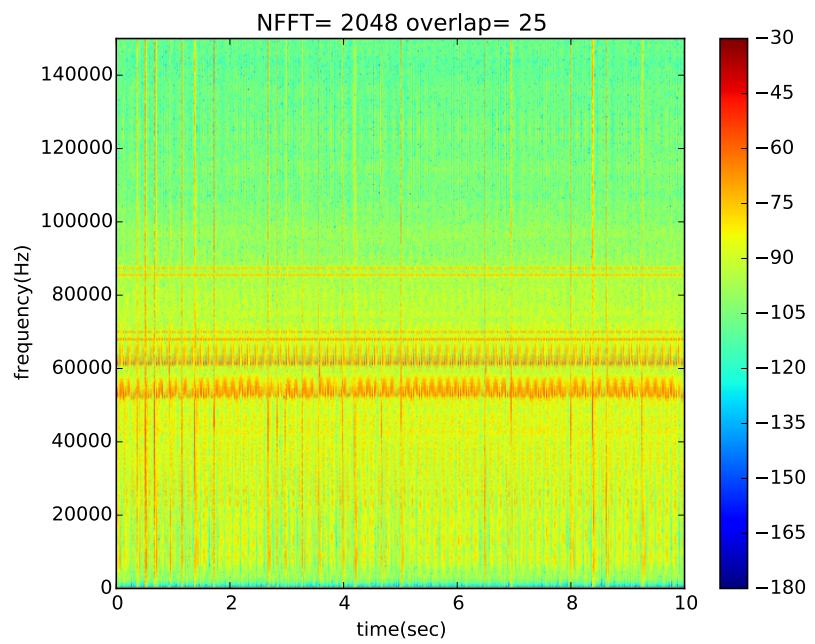


Figure 5: Spectrogram of denoising Mirai DoS (DNS) activity using TP-Link router in Prospect house

2.2 Raspberry Pi

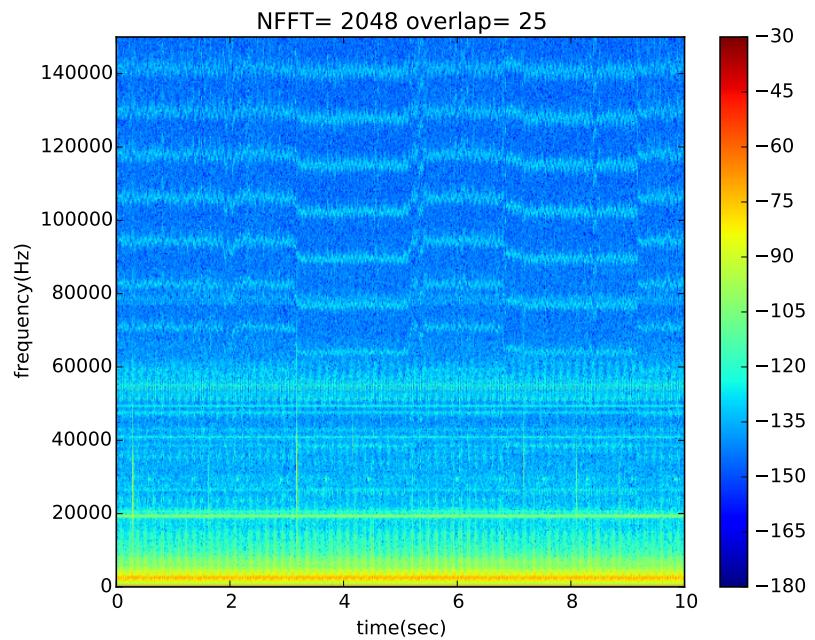


Figure 6: Spectrogram of raspberry Pi running Litecoin miner in controlled environment

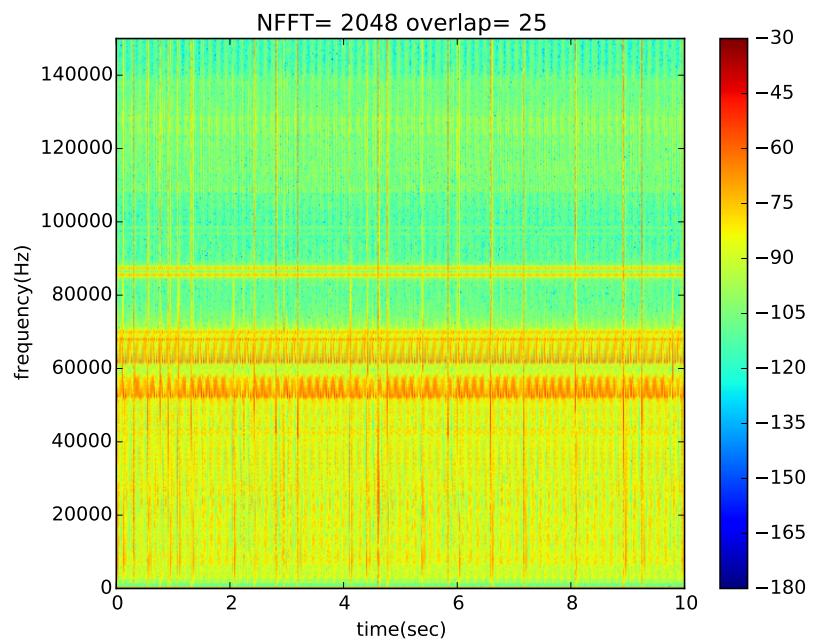


Figure 7: Spectrogram of mining activity on raspberry Pi. There is no noticeable difference as the expected frequencies around 80 KHz are masked.

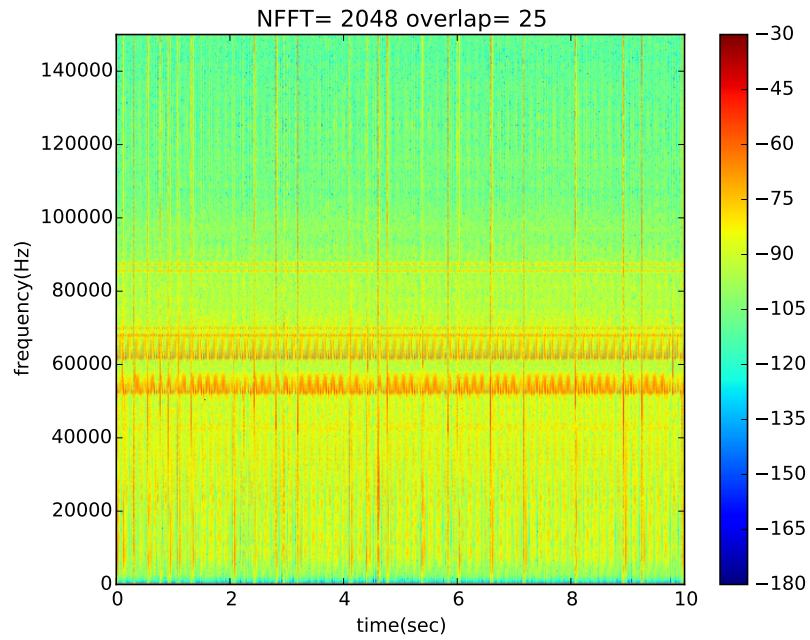


Figure 8: Spectrogram of denoising Litecoin miner activity on raspberry Pi

1. There is no change in EMI of the channel in Fig ?? as expected in Fig ???. This is due to masking of the frequency range by other devices on the channel
2. The overall noise on the channel is remarkably high, given the range of the scale is the same for all the spectrograms
3. Simple denoising technique of removing variance $\sigma\sqrt{\log n}$ (n is the number of samples) of the data was used, which as not yielded positive result in Fig 8