CS4331/5331: Wireless Networks and Mobile Computing

Fall 2021

Write a ONE-PAGE (10 font size and single space) summary using your own words:

• Homework number: 3

• Paper title: A Power Control MAC Protocol for Ad Hoc Networks

• Your name: Chen Zhang

Summary

The power control is a crucial matrix for mobile device communication since the device is powered by batteries often. In this field, many researchers proposed a solution based on IEEE 802.11 that claimed can reduce the power consumption of the device, specifically using maximum transmit power for RTS/CTS, and minimum transmits power for Data-Ack in order to save some power consumption during the procedure. The authors explained that even the above solution seems reasonable to reduce the power consumption, but the truth is, it results in more power consumption and degrade throughput because it will increase collisions and retransmissions. Specifically, the authors introduced the BASIC power control protocol and its deficiency in section 4. After that, the authors simulated BASIC, PCM, PCM40, and 802.11 in the later section, the results showing that PCM can save power consumption compare to the BASIC scheme without degrading throughput.

Major Contribution

The main contribution of this paper should include two parts, the first one is they explained even the BASIC scheme sounds reasonable to reduce power consumption, but it will lead to more power consumption because use more power for RTS/CTS and less power for Data/Ack may increases collisions and retransmissions. The authors have shown the results in the paper, and in figure 6, they explained with a specific example, that if we use different power for RTS/CTS and Data/Ack, the faraway nodes will not notice the Ack from the carrier sensing zone, so if those nodes send RTS with max power, the collision would happen.

The second contribution of this paper is they proposed a PCM, a power control MAC protocol that occasionally increases the transmit power during Data transmission. Although the PCM has a similar strategy compare to the BASIC scheme which uses maximum power for RTS/CTS and minimum power for Data/Ack. But it is different from details, the PCM periodically increases the transmit power during DATA transmission in order to inform nodes in the carrier sensing zone of its transmission. (Figure 7)

Weak Aspects

There are three aspects relate to the mechanism this paper introduced.

The first one is the PCM that the authors proposed was testing in an experimental environment rather than a real-world industry scenario. The testing results may be very different from real-world cases due to many unpredictable factors, such as complicated signal interference caused by the tricky layout of the nodes.

The second aspect was mentioned in the paper is, PCM requires a frequent increase and decrease in the transmit power which may make the implementation difficult.