

Weekly Report (2009-10-04)

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According to the problems discussed during Tuesday's meeting, I continued to read the book [1] and searched related topics in recent literatures. And I have the following results.

- 1) **Problem 1:** *if the received power of each signal apparently differs from each other ($P_1 > P_2 > \dots > P_n$ and $P_i - P_{i+1} \geq c$, here c is some predefined value), is it possible to decode each signal using interference cancelation?*
The answer is positive on the theoretical part. However, the problem is that the cumulative capacity of whole channel will be limited. Saying $\sum_{i=1}^n R_i \leq W \log(1 + \frac{\sum_{i=1}^n P_i}{N_0})$, here R_i is the capacity for signal i and W is the bandwidth of the channel.
- 2) **Problem 2:** *if the received power of each signal is generally the same, is it possible to decode them with interference cancelation or some network coding?* The answer is that we can decode each signal with successive interference cancelation. But the cumulative capacity will be severely decreased. It is also possible to decode each signal in a parallel fashion, just like the case in CDMA. However, some mature coding technology should be applied.
- 3) **Problem 3:** *What is the common applications of interference cancelation or physical network coding?* The interference cancelation is mainly utilized in some multiple-input-signal-output scenario. For example, wireless adapter in WLAN or base-station in cellular networks. I will go on to search the applications for physical network coding.

References

- [1] D. Tse and P. Viswanath, *Fundamentals of Wireless Communication*, Cambridge University Press, 2005.