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I have been reading a number of influential papers to learn how to analyze network capacity these days. All these papers can be classified into three categories according to their analytical technique.

1) *Graph theory*: Papers in this category [4], [6], [7] conduct the analysis based on the graphic constraints on wireless communications, e.g. the disks centered at any two concurrent receivers with radius $\Delta r/2$ should not overlap (r is the transmission range while Δ characterizes the intensity of interference). In [6], the network capacity is formulated into a max-flow min-cut problem. The capacity of the sparsity-cut is regarded as the bottleneck of network capacity.
2) *Information theory*: The network capacity is analyzed with information theory like entropy, e.g. the sum of input and output information of any node set is no larger than the input information of that set. For the first time, [3] utilizes entropy calculus to verify the *Li-Li* conjecture [5] for a specific network.
3) *Combinatorial optimization*: Different from previous two techniques, which are used to find an asymptotic capacity bound for random networks with random data flow pattern, paper in this category [2] aims on networks with given topology and data flow pattern, and provides the method to derive bound for given topology instead of deterministic bound. In fact, the network capacity is formulated into a multiple-source max-flow problem appended with application-related constraints, e.g. multicast or network coding.

The main result on network capacity with network coding is that the achievable network capacity is in the same order with that without network coding while we still have a constant coding-gain for the network capacity.

I am still digesting these techniques and trying to find the coding benefit on network capacity with our network coding scheme.

I also read a few papers [8], [9], which are mentioned by Dr. Li, on demodulation technique for physical network coding. These papers mainly focus on decreasing the Bit-Error-Rate or on increasing the data rate based on information theory with advanced demodulation schemes. Multiuser detection techniques are widely utilized to **estimation** the original data packet or to generate XOR signal of received combined signal. So there can be **error** in the packets. However, our work is on the basis of the assumption that no multiuser detection technique is used while the original data of n individual packets cannot be **perfectly decoded** with less than n independent linear combinations of signals. So I think it may not be our focus to add novel demodulation scheme into our contribution.

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