

## On the number of components of coherent partitions

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Motivated by the clustering problem, we study coherent network partitions, defined as partitions which yield only disconnected subgraphs in the graph complement. The optimal partition is a partition with the minimum edge cut.

For this research, we modify the definition of optimal coherent partitions to exclude singleton partitions and we study what effect this change in definition would have. We found that in trees, one can find an optimal coherent partition that avoids singleton components without changing the coherence number or the number of components of the optimal coherent partition. However, for some graphs we found that not allowing singleton partitions drastically increases the coherence number although the number of components seems to stay the same or change by 1. In addition, we were expecting to find that the optimal coherent partition would always have the same number of components. We proved that this is the case for graphs with 6 or less than 6 vertices. However, we found a counterexample on a 7-vertex graph where there are two optimal coherent partitions, meaning they both have the minimal edge cut, and they each have a different number of components.