Abstract

We prove tight network topology dependent bounds on the round complexity of computing well studied k-party functions such as set-disjointness and element distinctness. Unlike the usual case in the CONGEST model in distributed computing, we fix the function and then vary the underlying network topology. This complements the recent such results on total communication that have received some attention. We also present some applications to distributed graph computation problems. Our main contribution is a proof technique that allows us to reduce the problem on a general graph topology to a relevant two-party communication complexity problem. However, unlike many previous works that also used the same high level strategy, we do *not* reason about a two-party communication problem that is induced by a cut in the graph. To 'stitch' back the various lower bounds from the two party communication problems, we use the notion of timed graph that has seen prior use in network coding. Our reductions use some tools from Steiner tree packing and multi-commodity flow problems that have a delay constraint.