Discretized Reformulations for a capacitated network loading problem arising in a facility location context

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We study a discretization reformulation technique in the context of a capacitated network loading problem that arises in a location facility context. We present a so-called 'traditional' model and a straightforward discretized model with a general objective function and whose linear programming relaxation dominates the linear programming relaxation of the original model. In order to explain this dominance, we show that a restricted version of the discretized model gives an extended description of the convex hull of a "small" polytope that arises in the original model and usually arises in network loading problems. Computational tests based on randomly generated data are presented showing that a lot can be gained by making use of the proposed discretized models instead of the 'traditional' models.