The behaviour of the SFF and GFF solution methods have already been analyzed in [5], therefore we will only summarize these results, and instead concentrate on TS and its performance. We have pointed out earlier that for quite some problem instances SFF or GFF (but usually not both) can find optimal or near optimal solutions, yet there are many problem instances, for which both SFF and GFF yield rather poor results. Fortunately, there are some systematics in parameter settings, which influence this behaviour. As can be seen, GFF finds optimal or near optimal solutions if $r/n \ll 1$. GFF solution quality decreases as r/n increases, and at the same time SFF solution quality improves. At the intersection of these two developments both solutions are of rather poor quality. Especially in this case we expect and wish TS to achieve improvements in the results computed.
And indeed, as long as $r/n \ll 1$, TS has a hard time generating results, which are as good as those of GFF, for surely GFF is the method of choice as long as $r/n \ll 1$. But as r/n increases, TS clearly begins to dominate SFF and GFF, and this becomes most obvious in the vicinity of the intersection point mentioned above, where SFF and GFF yield results of similiar quality.
So, all would be fine, were it not that though TS delivers clearly better results than SFF and GFF if $1/2 \leq r/n$ (and r/n within the range of our tests), nevertheless the ratio TS/S is not in all cases as good as hoped for, with values up to $TS/S = 1.47$. This brings up the question of where to look for the shortcomings — either our TS has not been designed as powerful as there is a need for it to be, or our clique packing number is not as sharp a lower bound to the optimum as necessary, if it is to be a quality measurement for the solutions generated.
It's probably a bit of both. Surely, our TS is still in the state of development, and some problems concerning it's design are known, yet not solved. For an example, our TS aims at constructing single frequency networks (SFNs), employing oversupply of services to reach that goal, with a number of criteria to help decide if in a given situation expanding, or cutting back a SFN is advantageous. These criteria are in the moment still somewhat a construction area. So up to now, in unclear situations our TS rather tends to build up a SFN, even if the opposite would, eventually in longer terms, bring greater gain. When the evaluation of a given situation needs more sophisticated perspectives, our TS is still blind, and then biased, prefering to build SFNs.
On the other hand, we have begun to investigate the clique packing number on how sharp a lower bound to the optimum it really is. It might be that an increasing r/n not only corrupts the capabilities of GFF to achieve good results, as shown with the tests above, but maybe also corrupts the sharpness of the clique packing number as a lower bound to the optimum. Research in direction of this assumption is currently in progress.

References

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