problem instance characterized by a search space T and a cost function f to be optimized, one must define a function $N : T \to 2^T$, where for all $t \in T$ the subset $N(t) \subseteq T$ is interpreted as the neighborhood of t in T.
With a neighborhood defined, we can now run any TS iteration by first choosing a suitable initial value $t_0 \in T$ and then at each iteration step $i \in \mathbb{N}$ a permissible value $t_i \in N(t_{i-1})$ of greatest possible gain as the next iteration value, continuing in this fashion until some condition terminates the process. To avoid trapping a TS iteration in a local optimum, a so called tabu list is introduced consisting of either the most recent transitions, or of fundamental data specifying the most recent transitions or specifying families of similiar transitions for each of the most recent transitions. Any entry in the tabu list and, in consequence, any transition described by an entry in the tabu list is said to be tabued, meaning that such a transition is not selectable in the TS iteration as long as the tabu set on it has not expired. Expiration is then naturally expressed by removing the according entry from the tabu list. For each entry in the tabu list, the time of expiration is expressed by a value called the tabu tenure. In classic TS framework the tabu tenure is a constant $c \in \mathbb{N}$, equally valid for any entry in the tabu list, expressing in number of iteration steps the duration of the entry's tabu validity, and measuring this from the moment (iteration step) the entry was added to the tabu list.
Our adaption of TS to the EPP brought up the necessity for more dynamics in the generation of tabu tenure values, for reasons we will show in detail later. Thus, we calculate the tabu tenure using an adequate periodic function $g : \mathbb{N} \to \mathbb{N}$, with $g(i)$, $i \in \mathbb{N}$, being the tabu tenure value to be used when the iteration has reached the i-th iteration step.
As a further component of TS, the aspiration criteria is somewhat the dual to the concept of working with tabus, allowing,– under certain circumstances defined by the aspiration criteria –, a transition of some kind of global improvement to be made even though it might initially have been prohibited by a tabu. In the most common interpretation of this idea, the aspiration criteria ignores a tabu on any transition that yields improvement of the best solution obtained so far in a TS iteration.
The criteria for TS termination are usually kept simple. A TS iteration terminates if for a given number of iteration steps there is no further improvement in the cost function. This termination condition is sufficient for most cases, and we use it as is in the current development state of our TS.

3 Tabu Search – Adaption to the EPP

3.1 Notation and Mathematical Preliminaries

Since we now develop a solution method for the EPP optimization problem introduced in the previous article, we will make use of the same notations, mathematical preliminaries and problem description techniques as depicted there.

3.2 Definition of Neighborhood

As already pointed out in the description of the basic TS framework, we must first give a definition of neighborhood, that is, given a problem instance of EPP,— characterized by an area graph $G = (V, E)$, a set of services S, a bandwidth μ_s for each $s \in S$, a maximum