We then obviously have $f(\mathcal{B}) = f(m(\mathcal{B}))$ for all $m \in M(\mathcal{B})$. In effect, if $\mathcal{B}$ would be an intermediate result of a TS iteration, the cost function f could give no hint as to how to proceed in the TS iteration, for all possible transitions would appear equally valuable.

Though this example is rather extreme, it nevertheless reflects the general situation. Given a problem instance of EPP, for almost all ensemble assignments $\mathcal{B} \in \mathbb{B}$ we have $f(\mathcal{B}) \leq f(m(\mathcal{B}))$ for all elementary moves $m \in M(\mathcal{B})$ and thus no achievable improvement in the cost function. Furthermore, for almost all ensemble assignments $\mathcal{B} \in \mathbb{B}$ we even have $f(\mathcal{B}) = f(m(\mathcal{B}))$ for most elementary moves $m \in M(\mathcal{B})$ and thus no alteration in the cost function at all.

This problemspecific phenomena makes the cost function as is absolutely unsuitable for any kind of guidance in a TS iteration. A way to overcome this dilemma is to develop an alternative system for evaluating the elementary moves $m \in M(\mathcal{B})$. Such a system will surely arise from characteristic features of the problem given, yet avoiding those aspects that lead to the situation of undecidable guidance of the TS iteration as described above.
One of these characteristic features of EPP is that for any $v, w \in V$, $v \neq w$, and any $B \in \mathcal{B}_v$, $C \in \mathcal{B}_w$ not only may we use the same frequencies $f(v, B) = f(w, C)$ in the case of $(v, w) \notin E$, which in the same or similar form is found for most problems of frequency assignment, but may we also use the same frequencies $f(v, B) = f(w, C)$ in the case of $(v, w) \in E$ if we have $B = C$. Let us call this latter case the SFN-property (SFN = Single Frequency Network). Now, knowing from GFF, which takes exhaustive advantage of the SFN-property by oversupplying vertices $v \in V$ with services $s \in S$ not explicitly required, that use of this property may lead to significant reduction in frequency demand, this gives us a first hinge on how to proceed.

3.4 Definition of "$\equiv$" and "$\lhd$"

Before going into the details, let us have an overlook to where the journey goes. Given an ensemble assignment $\mathcal{B} \in \mathbb{B}$, we will introduce an equivalence relation "$\equiv$" and an order relation "$\lhd$" for the elementary moves on $\mathcal{B}$. Given $m_1, m_2 \in M(\mathcal{B})$, and assuming $\mathcal{B}$ to be the intermediate result of a TS iteration, the equivalence $m_1 \equiv m_2$ will state that in our problem context both moves appear equally valuable in achieving an improvement in result quality during the further course of the TS iteration. Then given the set

$$\mathcal{T} := \{\, T \subseteq M(\mathcal{B}) \mid T \text{ is an equivalence class for "}\equiv\text{"} \,\},$$

for any $m_1, m_2 \in M(\mathcal{B})$, with $m_1 \in T_1$, $m_2 \in T_2$, $T_1, T_2 \in \mathcal{T}$, $T_1 \neq T_2$, the order $m_1 \lhd m_2$ expresses that in our problem context the move m_2 is of greater value than the move m_1 in guiding the TS iteration to future improvement in result quality. With "$\equiv$" and "$\lhd$" given, we can then guide any TS iteration using "$\equiv$" and "$\lhd$" in the way of an alternative cost function.

Underlying the relations "$\equiv$" and "$\lhd$" is a set of values measuring the tendency of a move to take advantage of the SFN-property. The original cost function f will surely too be part of this set of values, but now playing a secondary role so to prevent its renewed domination. In consequence, the cost function's role in a TS iteration will be less to work out future result improvements, but rather to help hinder loss of result quality already achieved.
For lack of space, we can only develop the major values underlying "$\equiv$" and "$\lhd$". We first need to define that given a vertex $v \in V$ and an ensemble $B \in \mathcal{B}_v$, we call an ensemble $\hat{B}$ an