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A Comparison of formulations for a three-level lot sizing and replenishment problem with a distribution structure

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A comparison of formulations for a three-level lot sizing and replenishment problem with a distribution structure

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Abstract: We address a three-level lot sizing and replenishment problem with a distribution structure (3LSPD), which is an extension of the one-warehouse multi-retailer problem (OWMR). We consider one production plant that produces one type of item over a discrete and finite planning horizon. The items produced are used to replenish warehouses and then retailers using direct shipments. Each retailer is linked to a unique warehouse and there are no transfers between warehouses nor between retailers. We also assume that transportation is uncapacitated. However, we consider the possibility of imposing production capacity constraints at the production plant level. The objective is to minimize the sum of the fixed production and replenishment costs and of the unit variable inventory holding costs at all three levels. We compare 16 different MIP formulations to solve the problem. All of these formulations are adapted from existing MIP formulations found in the one-warehouse multi-retailer literature, but most formulations are new in the context of the 3LSPD. We run experiments on both balanced and unbalanced networks. In the balanced network each warehouse serves the same number of retailers whereas in the unbalanced network 20% of the warehouses serve 80% of the retailers. Our results indicate that the multi-commodity formulation is well suited for uncapacititated instances and that the echelon stock reformulations are better for capacitated instances. They also show that the richer formulations are not necessarily the best ones and that the unbalanced instances are harder to solve.

Keywords: Production planning and control, lot sizing, replenishment, mixed integer programming formulations, deterministic demand, one-warehouse multi-retailer problem, multi-level

Résumé : Nous étudions un problème intégré de planification de production et de transport sur trois niveaux avec une structure de distribution (3LSPD), problème qui est une extension du *one-warehouse multi-retailer problem* (OWMR). On considère une usine de production qui fabrique un type de produit sur un horizon de planification fini et discret. Les biens produits sont transportés de l'usine vers des centres de stockage puis ensuite vers des détaillants via des livraisons directes. Chaque détaillant est relié à un unique centre de stockage et les transferts de produits entre les centres de stockage ou entre les détaillants ne sont pas autorisés. Cependant, nous considérons la possibilité d'imposer des restrictions sur la capacité de production au niveau de l'usine de production. L'objectif est de minimiser la somme des coûts fixes de production et de commande et des coûts variables unitaires de stockage. On compare ici 16 formulations mixtes en nombres entiers différentes pour résoudre le problème. Toutes les formulations proposées sont des adaptations des formulations mixtes en nombres entiers rencontrées dans la littérature sur le problème *One-Warehouse Multi-Retailer*, et la plupart des formulations développées ici sont proposées pour la première fois dans le contexte du 3LSPD. Nous réalisons des expériences numériques tant sur un réseau équilibré que sur un réseau non équilibré. Dans le réseau équilibré chaque centre de stockage est responsable du même nombre de détaillants alors que dans le réseau non équilibré 20% des centres de stockage sont responsables de 80% des détaillants. Nos résultats indiquent que la formulation *multi-commodity* est la plus adaptée pour la résolution des instances sans contrainte de capacité alors que les formulation *echelon-stock* sont plus adaptées pour les formulations avec contraintes de capacité. Les résultats montrent aussi que les formulations les plus riches ne sont pas nécessairement les meilleures et que les instances ayant un réseau non équilibré sont les plus difficiles à résoudre.

Mots clés : Planification de production et transport, formulations mixtes en nombres entiers, demande déterministe, taille de lot, multi-niveau

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1 Introduction

Over the last decades, lot sizing problems have drawn the attention of many researchers, mainly because of their numerous applications in production, distribution and inventory management problems. Extensions of the basic lot sizing problem (LSP) are often encountered in the context of supply chain planning. Usually, the customers of a company, which have a certain demand, are located in a different area from the production plant where the items are actually produced and where lot sizing decisions are made. This leads to a replenishment problem where the company needs to determine when to replenish its customers so as to minimize the replenishment costs. Companies facing these two operational problems often make decisions in sequence. This leads, however, to solutions that can be far from the optimal solution of an integrated lot sizing and replenishment problem.

We address here an integrated three-level lot sizing and replenishment problem with a distribution structure (3LSPD). We consider a general manufacturing company that has one production plant (level zero), several warehouses (level one) and multiple retailers (level two) facing a dynamic and known demand for one item over a discrete and finite time horizon. The supply chain considered has a distribution structure: the warehouses are all linked to the single plant and all retailers are linked to exactly one warehouse. When we consider the demand of a particular retailer, the flow of goods in the supply chain network is hence as follows: an item is produced at the production plant, then sent to the warehouse linked to the retailer for storage and finally sent to the retailer to satisfy its demand. Figure 1 illustrates this flow of goods in a distribution network which consists of one production plant, three warehouses and three retailers linked to each warehouse. The objective of the problem is to determine the optimal timing and flows of goods between the different facilities while minimizing the operational and replenishment costs in the whole network (sum of the fixed setup and replenishment costs and unit inventory holding costs).

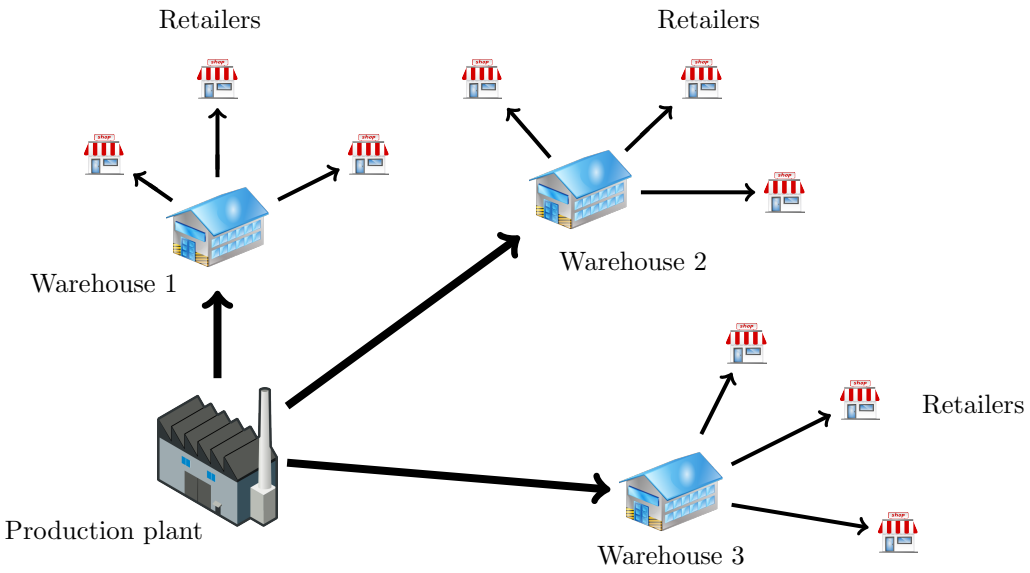

Figure 1: Graphical representation of the problem considered

More specifically, given the set T of time periods, we face an integrated problem where decisions are made at all facilities for each time period. The optimal solution of the problem will indicate, for each time period, the optimal quantities to be produced and to be ordered from their predecessor for the production plant and for the warehouses and retailers, respectively, so that the final demand at each retailer is satisfied. In this problem, the objective is to minimize the sum over all periods t of the fixed setup costs sc_t^p at the production plant, the fixed replenishment costs sc_t^w and sc_t^r of the warehouses and of the retailers, and the unit inventory holding costs hc_t^i of all facilities i. We do not include any unit production cost at the plant since the total production cost is a constant when all the demand is satisfied and when the unit production cost is constant over time. The same holds for the unit replenishment cost at the warehouses and retailers.

Transfers of goods between the warehouses and between the retailers are not allowed. Finally, we only consider uncapacitated direct shipments and do not incorporate any routing in the transportation decisions. Note that in a disaggregated context, the problem faced by any facility can be seen as the basic LSP. This basic LSP has attracted a lot of research since the seminal paper of Wagner and Whitin [39] who proposed a dynamic programming approach to solve the single item uncapacitated lot sizing problem (SI-ULSP). The reader is referred to Brahimi et al. [5] and to Pochet and Wolsey [34] for a review of the work done on the SI-ULSP and its extensions, and to Jans and Degraeve [19] for a review of industrial applications.

We consider both a capacitated and an uncapacitated version of the 3LSPD. In the capacitated version, the capacity constraints are imposed at the production plant level to limit the production quantities in each time period. There are no capacities on the flows between the facilities nor on the inventory level. Note that with the addition of the capacity constraints at the production plant level, the problem faced by the production plant can be seen as a basic capacitated lot sizing problem (CLSP). The reader is referred to Karimi et al. [21] for a review of models and algorithms used to solve the CLSP.

The motivation to work on MIP formulations for the 3LSPD is to extend the works of Solyalı and Süral [37] and Cunha and Melo [8] who compare several MIP formulations for the one-warehouse multi-retailer problem (OWMR). In the OWMR, a central warehouse replenishes several retailers that face a dynamic demand for one or several items over a discrete and finite time horizon. The objective of the problem is to jointly determine the optimal timing and quantities that are shipped between the warehouse and the retailers to minimize the sum of setup costs and inventory holding costs for the whole system. This problem has been shown to be *NP*-hard by Arkin et al. [2] and appears as a substructure in the production routing problem (PRP). Compared to the OWMR, the PRP also optimizes routing decisions to visit the different customers of the central warehouse. The reader is refered to Adulyasak et al. [1] for a detailed review of formulations and solution algorithms for the PRP.

Solyalı and Süral [37] compare four MIP formulations and Cunha and Melo [8] compare eight different MIP formulations for the OWMR. The 3LSPD can be considered as the generalization of the OWMR to three levels. Our aim in this work is to adapt these OWMR MIP formulations to the 3LSPD and to verify if the results obtained on the two-level OWMR still stand for the 3LSPD.

Our paper makes two main contributions. First, we fill a gap by adapting several MIP formulations that have been proposed in the context of the two-level OWMR (Solyalı and Süral [37], Cunha and Melo [8]) to the 3LSPD. To the best of our knowledge, this is the first attempt to provide strong formulations for the 3LSPD that could solve instances of large scale. We also give several properties about the relationships between the linear relaxations of these formulations. Second, we report the results of extensive numerical experiments using a general-purpose solver to assess the strengths and weaknesses of the different formulations. Indeed, we perform experiments for different structures of the main parameters (fixed or dynamic demand, fixed or dynamic setup costs) and for two distribution structures of the supply chain network. In one case we consider a balanced distribution network in which each warehouse is responsible for the same number of retailers. In the other case, we consider an unbalanced distribution network where 20% of the warehouses replenish 80% of the retailers. The results obtained highlight the importance of properly choosing a formulation depending on the characteristics of the problem.

The remainder of this paper is organized as follows. First, we survey the work related to our study in Section 2. We then present sixteen different MIP formulations for the problem in Section 3. These MIP formulations can be divided into three groups of formulations: the classical formulations, which use the standard MIP formulation of the basic LSP, the echelon stock based formulations, inspired from the echelon stock concept for the multi-level LSP, and the richer formulations, containing more information in the decision variables, inspired from the work on the polyhedral structure of the solutions of both the SI-ULSP and the two-level lot sizing problems. Section 4 presents computational results to determine the strengths and weaknesses of the different formulations that we propose, and to analyze the impact of the different parameters. This is followed by the conclusion in Section 5.

2 Literature review

We first review the literature on the OWMR in Section 2.1, followed by the literature on the three-level lot sizing problem in Section 2.2.

2.1 OWMR literature review

The 3LSPD studied in this paper is a generalization of the OWMR to three levels. Both problems have a distribution structure and there are similar production, inventory and replenishment decisions to be made at each time period to satisfy the demand of the retailers. The main difference is that the OWMR only considers two levels in its distribution network: the warehouse and the retailers.

Many formulations have been proposed for the OWMR. Federgruen and Tzur [14] propose the echelon stock formulation (ES), based on the echelon stock concept for multi-level lot sizing problems. Using the echelon stock concept, the traditional inventory decision variables are replaced by the echelon stock variables representing the total inventory of a component at a given facility and all of its descendents. Levi et al. [26] propose the transportation formulation inspired from the facility location literature. Melo and Wolsey [27] propose the multi-commodity formulation (MC) based on the distinction of each retailer-time period pair. Solyalı and Süral [37] compare four different MIP formulations for the OWMR: the shortest path formulation (SP), the transportation formulation (TP) and the echelon stock formulation and its strenghtened version (SES). The SES formulation is inspired from the ES formulation of Federgruen and Tzur [14] and uses transportation decision variables to strenghten the ES formulation. Solyalı and Süral [37] extend these formulations to the possibility of having a non-zero initial inventory. They also provide results concerning the LP bounds of each formulation and numerical experiments are performed with and without inital inventory. In the same vein, Cunha and Melo [8] consider eight different MIP formulations: the shortest path formulation (SP), the transportation formulation (TP), the strenghtened echelon stock formulation (SES), the Wagner-Whitin echelon stock based formulation (ESWW), the two-level lot sizing Wagner-Whitin based formulation (2LSWW) and its partial version (p2LSWW), the multi-commodity formulation (MC) and the dynamic programming formulation (DP). They compare the LP bounds of these formulations and show in particular that the DP formulation gives the best LP bound. They then perform numerous computational experiments with both dynamic and static unit transportation costs. Note that there also exists a classical MIP formulation for the OWMR which is the extension of the classical MIP formulation for the ULSP proposed by Zangwill [42].

Some work has also been done to develop families of valid inequalities for the OWMR to strengthen the MIP formulations given in Solyalı and Süral [37] and Cunha and Melo [8]. This is the case in Senoussi et al. [36]. Starting from a PRP and considering a warehouse that is really far from the retailers, they aggregate the retailers in different clusters to discard routing decisions and get a real OWMR with both fixed and unit transportation costs, and with transportation capacity. They propose six sets of valid inequalities: one to determine the maximum number of vehicles, one to break symmetries, one to have full trucks (based on the optimal properties of the solution), two which extend the (l, S) inequalities of the SI-ULSP proposed in Barany, Van Roy and Wolsey [3], and the last one to reduce the number of variables in their model. They conduct numerous experiments both with and without all the valid inequalities to see the impact of these valid inequalities. Melo [10] proposes another set of valid inequalities and also designs a separation algorithm to find the violated inequalities. This separation procedure is used in a cutting plane algorithm to perform experiments on a multi-item OWMR problem.

2.2 Three-level lot sizing problem

Because of the different nature of the decisions made at each facility and because of the three levels, one can find several supply chain structures in the literature on three-level lot sizing problems (3L-LSP). The following section only reviews the literature for which the supply chain structure is the same as in our problem: one production plant, several warehouses and several retailers. When not explicitely mentionned, the supply network structure considered in the papers reviewed in this section is a distribution structure as in our problem.

Only a few papers address a three-level lot sizing problem with a number of facilities per level which is the same as in our problem. The ones that we found all address extensions of the 3LSPD considered in this paper. Gebennini, Gamberini and Manzini [17] propose a heuristic to solve a problem where they consider safety stocks and allow backorders. The backorder in a particular period is the quantity of unmet demand for this time period. The basic model they propose is non-linear because of the safety stock cost but is linearized with an approximation of the objective function. There are also due dates for the deliveries to the customers. The authors design a procedure to solve the approximate problem.

Barbarosoglu and Ozgur [4] address the 3L-LSP where each retailer is linked to every warehouse. They thus do not have a distribution structure in their network but a general one instead. They also work in a just-in-time (JIT) environment. The JIT environment translates into a constraint that prevents retailers from keeping inventory. The model contains both fixed and unit transportation costs. The authors propose a transportation based MIP model and use Lagrangean relaxation to solve the problem. They relax the constraints linking the production and distribution components to obtain a production subproblem which can be decomposed into knapsack problems, and a distribution subproblem that can be easily solved for each item-customer pair. A customized procedure is then used to build feasible solutions from the solutions obtained in these two sub-problems.

Several extensions relate to applications for industrial cases. Kopanos, Puigjnaer and Georgiadis [23] address an industrial case in Greece in the food industry. They have a fixed cost per vehicle used for the deliveries between the facilities and there are several transportation modes available. They consider restrictions on the vehicles that can make the deliveries between facilities. They extend their MIP model to consider several production plants and use a general-purpose solver in both cases to solve their instances. Haq, Vrat and Kanda [18] also use a general-purpose solver to solve an industrial case of urea manufacturing. They propose a MIP model that contains transportation lead time and backlog but these features are discarded in the numerical experiments performed.

Heuristics have also been proposed to solve extensions of the 3LSPD applied to industrial cases. Lejeune [25] proposes to solve a problem with a fixed cost per truck used and unit transportation costs. The author also considers transportation capacities and time availability of the carriers. A combination of branch-and-bound (B&B) and variable neighborhood search (VNS) is used to solve the problem. In each node of the B&B tree, there are several neighborhoods where binary variables are split between fixed variables, variables to be fixed and free variables. The branching decisions are made depending on these sets. For each node there is also a limit on the children nodes. A computational experiment using data of a US chemical company indicates that this method outperforms CPLEX. In the same vein, Özdamar and Yazgaç [32] treat the case study of a detergent company in Turkey. They design an algorithm to approximately solve the problem. The authors consider transportation capacities and propose an aggregate and a disaggregate MIP model. The algorithm is based on an iterative hierarchical approach as well as on a rolling horizon.

Note that in the works mentioned in this section, only three different types of MIP formulation have been used: Haq, Vrat and Kanda [18], Lejeune [25], Gebennini, Gamberini and Manzini [17] and Özdamar and Yazgaç [32] use a classical formulation, Barbarosoglu and Ozgur [4] use a combined classical and transportation formulation, and Kopanos, Puigjnaer and Georgiadis [23] use a transportation formulation. The classical formulation and the combined transportation and classical formulation will be presented in Section 3.1 while the transportation formulation will be given in Section 3.4.

3 Formulations

Let $G = (F, A)$ be a graph with F the set of nodes (facilities in our problem) and A the set of arcs. Let $P = \{p\} \subset F$ be the set containing the unique production plant, $W \subset F$ be the set of warehouses and $R \subset F$ be the set of retailers. Following the problem description in Section 1, we have $F = P \cup W \cup R$. Let $\delta(i)$ be the set of all direct successors of facility i and $\delta^w(r)$ be the warehouse linked to the retailer $r \in R$. Let d_t^r be the demand for retailer r in period t. The notion of the demand faced by any retailer is extended to the

warehouses and to the production plant in the following fashion:

$$d_t^i = \begin{cases} \sum_{r\in R} d_t^r & \text{if } i = p \\ \sum_{r\in\delta(i)} d_t^r & \text{if } i \in W. \end{cases}$$

Using the notion of the demand faced by any facility, we introduce D_t^i, the total demand between period t and the end of the time horizon computed as $D_t^i = \sum_{k\geq t} d_k^i$. Similarly, we introduce, for any facility i, the demand between periods k and t as $d_{kt}^i = \sum_{k\leq l\leq t} d_l^i$. In the following sections, all the MIP formulations are presented in their capacitated version.

3.1 Classical formulations

We first present a simple MIP formulation that extends the basic MIP formulation for the ULSP as used by Pochet and Wolsey [34]. We call this formulation the classical formulation (C). This formulation is based on three sets of decisions variables: x_t^i represents the production quantities in period t if $i = p$ and the quantities ordered from the predecessor if $i \in W \cup R$, s_t^i is the inventory held at the end of period t in facility i, and y_t^i is a boolean setup variable taking value 1 iff $x_t^i > 0$. The formulation is as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc_t^i y_t^i + \sum_{i\in F} hc_t^i s_t^i\right) \tag{1}$$

$$\text{s.t. } x_t^i \leq D_t^i y_t^i \qquad \forall\, t \in T, i \in F \tag{2}$$

$$s_{t-1}^i + x_t^i = \sum_{j\in\delta(i)} x_t^j + s_t^i \qquad \forall\, t \in T, i \in P \cup W \tag{3}$$

$$s_{t-1}^r + x_t^r = d_t^r + s_t^r \qquad \forall\, t \in T, r \in R \tag{4}$$

$$x_t^p \leq \min\{C_t, D_t^p\} y_t^p \qquad \forall t \in T \tag{5}$$

$$x_t^i, s_t^i \geq 0 \qquad \forall\, t \in T, i \in F \tag{6}$$

$$y_t^i \in \{0, 1\} \qquad \forall\, t \in T, i \in F. \tag{7}$$

The objective function minimizes the sum of the fixed setup and replenishment costs and of the unit inventory holding costs. Constraints (2) are the setup forcing constraints for all facilities. Constraints (3) are the inventory balance equations for the production plant and the warehouses whereas (4) are the inventory balance equations for the retailers. Constraints (5) are the capacity constraints at the production plant.

The classical formulation C can be improved by using some ideas coming from the ULSP literature. We observe that when we only consider the inventory balance equations (4) and the setup constraints (2) specifically for the retailers, we have a single item lot sizing structure for each retailer since the inventory balance equations (4) only incorporate the independent demand for each retailer. This means that we can use the existing reformulations of the ULSP for each of the retailers. These reformulations are not directly applicable to the warehouse or plant level, since at these levels the inventory balance constraints contain dependent demand in the form of decision variables related to the ordering decisions at the direct successors. We will propose three different alternative formulations to model the lot sizing structure at the retailer level.

First, we use the network reformulation proposed by Eppen and Martin [12] to change the decision variables linked to the retailers and rewrite the constraints where these variables appear. The reformulation proposed by Eppen and Martin [12] is based on the property of extreme flows in a network as applied by Zangwill [43] to the SI-ULSP. This property, also known as the zero inventory ordering property, states that if there is a positive entering stock at any period in the SI-ULSP, then the flow coming from production is equal to zero. Conversely, if the production is positive at any period, then the entering stock for this period is equal to zero. Although this property does not hold for the capacitated case, Eppen and Martin [12] show that their proposed reformulation is valid for the capacitated case. For any retailer $r \in R$, let z_{kt}^r be the proportion of d_{kt}^r that is ordered in period k. Let also $spc_{kt}^r = \sum_{k\leq u<t} \sum_{l=u+1}^{t} h_u^r d_l^r$ be the cost linked to the variable z_{kt}^r for any retailer i. The classical-network formulation (C-N) for the 3LSPD is as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc_t^i y_t^i + \sum_{i\in P\cup W} hc_t^i s_t^i + \sum_{r\in R}\sum_{k\le t} spc_{kt}^r z_{kt}^r\right) \tag{8}$$

$$\text{s.t. } x_t^i \le D_t^i y_t^i \qquad \forall\, t\in T, i\in P\cup W \tag{9}$$

$$\sum_{k=t:d_{tk}^r>0}^{|T|} z_{tk}^r \le y_t^r \qquad \forall\, t\in T, r\in R \tag{10}$$

$$s_{t-1}^p + x_t^p = \sum_{w\in\delta(p)} x_t^w + s_t^p \qquad \forall\, t\in T \tag{11}$$

$$s_{t-1}^w + x_t^w = \sum_{r\in\delta(w)}\sum_{k\ge t} z_{tk}^r d_{tk}^r + s_t^w \qquad \forall\, t\in T, w\in W \tag{12}$$

$$\sum_{t=1}^{|T|} z_{1t}^r = 1 \qquad \forall\, r\in R \tag{13}$$

$$\sum_{l=1}^{t-1} z_{l,t-1}^r = \sum_{k=t}^{|T|} z_{tk}^r \qquad \forall\, t\ge 2, r\in R \tag{14}$$

$$x_t^p \le \min\{C_t, D_t^p\} y_t^p \qquad \forall t\in T \tag{15}$$

$$z_{kt}^r \ge 0 \qquad \forall\, t\in T, k\le t\in T, r\in R \tag{16}$$

$$x_t^i, s_t^i \ge 0 \qquad \forall\, t\in T, i\in P\cup W \tag{17}$$

$$y_t^i \in \{0,1\} \qquad \forall\, t\in T, i\in F. \tag{18}$$

Constraints (10) are the setup forcing constraints for the retailers. Constraints (12) are the inventory balance constraints for the warehouses. Constraints (13) are the initial flow constraints for each retailer and constraints (14) are the flow conservation constraints.

Second, one can use the transportation reformulation of the ULSP proposed by Krarup and Bilde [24] to give another formulation for the problem. For any retailer r, let ϕ_{kt}^r represent the quantity that is ordered in period $k\le t$ and used to satisfy d_t^r. Let also $tc_{kt}^r = \sum_{k\le u<t} h_u^r$ be the holding cost linked to the variable ϕ_{kt}^r. The classical-transportation formulation (C-TP) for the 3LSPD is as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc_t^i y_t^i + \sum_{i\in P\cup W} hc_t^i s_t^i + \sum_{r\in R}\sum_{k\le t} tc_{kt}^r \phi_{kt}^r\right) \tag{19}$$

$$\text{s.t. } x_t^i \le D_t^i y_t^i \qquad \forall\, t\in T, i\in P\cup W \tag{20}$$

$$\phi_{tk}^r \le d_k^r y_t^r \qquad \forall\, t\in T, k\le t\in T, r\in R \tag{21}$$

$$s_{t-1}^p + x_t^p = \sum_{j\in\delta(p)} x_t^j + s_t^p \qquad \forall\, t\in T \tag{22}$$

$$s_{t-1}^w + x_t^w = \sum_{r\in\delta(w)}\sum_{k\ge t} \phi_{tk}^r + s_t^w \qquad \forall\, t\in T, w\in W \tag{23}$$

$$\sum_{k=1}^{t} \phi_{kt}^r = d_t^r \qquad \forall\, t\in T, \forall\, r\in R \tag{24}$$

$$x_t^p \le \min\{C_t, D_t^p\} y_t^p \qquad \forall t\in T \tag{25}$$

$$\phi_{kt}^r \ge 0 \qquad \forall\, t\in T, k\le t\in T, r\in R \tag{26}$$

$$x_t^i, s_t^i \ge 0 \qquad \forall\, t\in T, i\in P\cup W \tag{27}$$

$$y_t^i \in \{0,1\} \qquad \forall\, t\in T, i\in F. \tag{28}$$

Constraints (21) are the setup forcing constraints for the retailers. Constraints (23) are the inventory balance constraints for the warehouses. Constraints (24) are the demand satisfaction constraints for each retailer.

Finally, one can also use the polyhedral results for the SI-ULSP to improve the classical formulation C at the retailer level. In particular, Barany et al. [3] propose the (l, S) valid inequalities that describe the polyhedron of solutions of the SI-ULSP. Besides, if the SI-ULSP has Wagner-Whitin costs (i.e., $pc_t + hc_t \geq pc_{t+1},\ \forall\ t \in T$, where pc_t is the unit production cost in period t), Pochet and Wolsey [34] propose the (l, S, WW) valid inequalities. When adapted to our problem, these (l, S, WW) inequalities are defined as follows:

$$s^r_{k-1} \geq \sum_{j=k}^{l} d^r_j \left(1 - \sum_{u=k}^{j} y^r_u\right) \quad \forall\ k \leq l \in T, r \in R. \tag{29}$$

These inequalities are always valid, even if the costs do not satisfy the Wagner-Whitin condition. However, in case the Wagner-Whitin cost condition holds, they are sufficient to describe the convex hull of the SI-ULSP. These inequalities are added to (1)–(7) to form the classical-lS formulation (C-LS).

3.2 Echelon stock formulations

Employing the idea of an echelon stock presented in Federgruen and Tzur [14], the 3LSPD can be decomposed into several independent SI-ULSPs. To do so, the inventory variables of the classical formulation C are replaced with echelon stock variables representing the total inventory at all descendents of a particular facility. We define the echelon stock I^i_t for facility i in period t as:

$$I^i_t = \begin{cases} s^i_t + \sum_{w \in W} s^w_t + \sum_{r \in R} s^r_t & \text{if } i = p \\ s^i_t + \sum_{r \in \delta(i)} s^r_t & \text{if } i \in W \\ s^i_t & \text{if } i \in R. \end{cases}$$

The echelon stock formulation (ES) is then as follows:

$$\text{Min} \sum_{t \in T} \left(\sum_{i \in F} sc^i_t y^i_t + \sum_{p \in P} hc^p_t I^p_t + \sum_{w \in W} \left(hc^w_t - hc^p_t\right) I^w_t + \sum_{r \in R} \left(hc^r_t - hc^{\delta_w(r)}_t\right) I^r_t \right) \tag{30}$$

$$\begin{aligned}
\text{s.t. } I^i_{t-1} + x^i_t &= d^i_t + I^i_t && \forall\ t \in T, i \in F && (31)\\
x^i_t &\leq D^i_t y^i_t && \forall\ t \in T, i \in F && (32)\\
I^i_t &\geq \sum_{j \in \delta(i)} I^j_t && \forall\ t \in T, i \in P \cup W && (33)\\
x^p_t &\leq \min\{C_t, D^p_t\} y^p_t && \forall t \in T && (34)\\
x^i_t, I^i_t &\geq 0 && \forall\ t \in T, i \in F && (35)\\
y^i_t &\in \{0, 1\} && \forall\ t \in T, i \in F. && (36)
\end{aligned}$$

The objective function (30) is written in terms of echelon stock variables. Constraints (31) are the inventory balance constraints using the new echelon stock variables. Constraints (33) are the echelon stock constraints ensuring that the echelon stock at a specific facility is greater than the sum of the echelon stocks at all its direct successors. These constraints come from the non-negativity constraints (6) imposed on the stock variables in the classical formulation C. Note that with the introduction of the echelon stock variables, the problem has an uncapacitated lot sizing structure (in constraints (2) and (31)) with independent demand at each level. This means that we can now apply the known reformulation techniques for the ULSP (network, transportation and (l, S, WW) inequalities) at each level.

First, in the same spirit as in the C-N formulation, we can use a network reformulation on the ES formulation. We define Z^i_{kt} to be the proportion of d^i_{kt} that is produced in period k for $i = p$, and to be the

proportion of d^i_{kt} that is ordered in period k for $i \in W \cup R$. The echelon stock network formulation (ES-N) is then as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc^i_t y^i_t + \sum_{p\in P} hc^p_t I^p_t + \sum_{w\in W}\left(hc^w_t - hc^p_t\right) I^w_t + \sum_{r\in R}\left(hc^r_t - hc^{\delta_w(r)}_t\right) I^r_t\right) \tag{37}$$

$$\text{s.t.} \sum_{k=1}^{|T|} Z^i_{1k} = 1 \qquad \forall\, i \in F \tag{38}$$

$$\sum_{l=1}^{t-1} Z^i_{l,t-1} = \sum_{l=t}^{|T|} Z^i_{tl} \qquad \forall\, t \geq 2, i \in F \tag{39}$$

$$\sum_{k=t:d^i_{tk}}^{|T|} Z^i_{tk} \leq y^i_t \qquad \forall\, t \in T, i \in F \tag{40}$$

$$I^i_t = \left(\sum_{l=1}^{t}\sum_{k=l}^{|T|} d^i_{lk} Z^i_{lk}\right) - d^i_{1t} \qquad \forall\, t \in T, i \in F \tag{41}$$

$$I^i_t \geq \sum_{j\in\delta(i)} I^j_t \qquad \forall\, t \in T, i \in P \cup W \tag{42}$$

$$\sum_{k=t}^{|T|} Z^p_{tk} d^p_{tk} \leq \min\{C_t, D^p_t\} y^p_t \qquad \forall t \in T \tag{43}$$

$$I^i_t \geq 0 \qquad \forall\, t \in T, i \in F \tag{44}$$

$$Z^i_{tk} \geq 0 \qquad \forall\, t \in T, k \geq t \in T, i \in F \tag{45}$$

$$y^i_t \in \{0,1\} \qquad \forall\, t \in T, i \in F. \tag{46}$$

Constraints (38) are the initial flow constraints for each facility and constraints (39) are the flow conservation constraints. Constraints (40) are the setup forcing constraints. Constraints (41) link the flow variables and the echelon stock variables. Constraints (43) are the capacity constraints at the production plant.

Then, in the same spirit as in the C-TP formulation, we can use a transportation reformulation on the ES formulation. We define X^i_{kt} to be the quantity that is produced in period k and used to satisfy d^i_t for $i = p$, and to be the quantity that is ordered in period k for $i \in W \cup R$ and used to satisfy d^i_t. The echelon stock transportation formulation (ES-TP) is then as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc^i_t y^i_t + \sum_{p\in P} hc^p_t I^p_t + \sum_{w\in W}\left(hc^w_t - hc^p_t\right) I^w_t + \sum_{r\in R}\left(hc^r_t - hc^{\delta_w(r)}_t\right) I^r_t\right) \tag{47}$$

$$\text{s.t. } I^i_{t-1} + \sum_{k=t}^{|T|} X^i_{tk} = d^i_t + I^i_t \qquad \forall\, t \in T, i \in F \tag{48}$$

$$\sum_{k=1}^{t} X^i_{kt} = d^i_t \qquad \forall\, t \in T, i \in F \tag{49}$$

$$X^i_{tk} \leq d^i_k y^i_t \qquad \forall k \in T, t \leq k \in T, i \in F \tag{50}$$

$$I^i_t \geq \sum_{j\in\delta(i)} I^j_t \qquad \forall\, t \in T, i \in P \cup W \tag{51}$$

$$\sum_{k=t}^{|T|} X^p_{tk} \leq \min\{C_t, D^p_t\} y^p_t \qquad \forall t \in T \tag{52}$$

$$X_{kt}^i \geq 0 \qquad \forall\, k \leq t \in T, i \in F \tag{53}$$
$$I_t^i \geq 0 \qquad \forall\, t \in T, i \in F \tag{54}$$
$$y_t^i \in \{0,1\} \qquad \forall\, t \in T, i \in F. \tag{55}$$

Constraints (48) are the inventory balance constraints. These are included in order to correctly calculate the inventory levels. Constraints (49) are the demand satisfaction constraints. Constraints (50) are the setup forcing constraints. Constraints (52) are the capacity constraints at the production plant.

Finally, we can also add the (l, S, WW) valid inequalities in the context of the ES formulation. Using the echelon stock variables, these inequalities are given as follows:

$$I_{k-1}^i + \sum_{q=k}^{t} d_{qt}^i y_q^i \geq d_{kt}^i \qquad \forall k \leq t \in T, i \in F. \tag{56}$$

These inequalities are added to (30)–(36) to form the echelon stock-lS formulation (ES-LS).

Following the model proposed in Federgruen and Tzur [14], another change can be made to the echelon stock formulation ES. Indeed, one can alternatively write the echelon stock constraints (33) using the production variables of the ES, ES-N or ES-TP formulation, respectively:

$$\sum_{k=1}^{t} x_k^i \geq \sum_{j \in \delta(i)} \sum_{k=1}^{t} x_k^j \qquad \forall t \in T, i \in P \cup W. \tag{57}$$
$$\sum_{k=1}^{t} \sum_{l \geq k} d_{kl}^i Z_{kl}^i \geq \sum_{j \in \delta(i)} \sum_{k=1}^{t} \sum_{l \geq k} d_{kl}^j Z_{kl}^j \qquad \forall t \in T, i \in P \cup W. \tag{58}$$
$$\sum_{k=1}^{t} \sum_{l \geq k} X_{kl}^i \geq \sum_{j \in \delta(i)} \sum_{k=1}^{t} \sum_{l \geq k} X_{kl}^j \qquad \forall t \in T, i \in P \cup W. \tag{59}$$

If we substitute (33) by (57), (58) and (59) in formulations ES or ES-LS, ES-N and ES-TP, respectively, we obtain the echelon stock Federgruen formulations ES-F or ES-F-LS, ES-F-N and ES-F-TP, respectively.

3.3 Network formulation

The following formulation uses the network reformulation as proposed by Eppen and Martin [12] for the SI-ULSP to rewrite the variables and constraints of the problem. Such a reformulation has also been applied by Solyalı and Süral [37] and Cunha and Melo [8] for the OWMR. For any retailer r, let ψ_{klst}^r be the proportion of d_{st}^r that is produced by the production plant in period k, transported to the warehouse of retailer r in period l and to retailer r in period s. Let also nc_{klst}^r be the cost linked to the variable ψ_{klst}^r: $nc_{klst}^r = \sum_{j=k}^{l-1} hc_j^p d_{st}^r + \sum_{j=l}^{s-1} hc_j^{\delta_w(r)} d_{st}^r + \sum_{j=s}^{t-1} hc_j^r d_{j+1,t}^r$. The network formulation (N) is given as follows:

$$\text{Min} \sum_{t \in T} \left(\sum_{i \in F} sc_t^i y_t^i + \sum_{r \in R} \sum_{k=1}^{t} \sum_{l=k}^{t} \sum_{s=l}^{t} nc_{klst}^r \psi_{klst}^r \right) \tag{60}$$

$$\sum_{t=1}^{|T|} \psi_{111t}^r = 1 \qquad \forall\, r \in R \tag{61}$$
$$\sum_{k=1}^{t-1} \sum_{l=k}^{t-1} \sum_{s=l}^{t-1} \psi_{k,l,s,t-1}^i = \sum_{k=1}^{t} \sum_{l=k}^{t} \sum_{s=t}^{|T|} \psi_{klts}^i \qquad \forall\, t \geq 2, r \in R \tag{62}$$
$$\sum_{l=k}^{t} \sum_{s=l}^{t} \sum_{j=t:d_{sj}^r>0}^{|T|} \psi_{klsj}^r \leq y_k^p \qquad \forall\, t \in T, k \leq t \in T, r \in R \tag{63}$$

$$\sum_{k=1}^{l}\sum_{s=l}^{t}\sum_{j=t:d^r_{sj}>0}^{|T|}\psi^r_{klsj} \leq y_l^{\delta_w(r)} \qquad \forall\, t \in T, l \leq t \in T, r \in R \tag{64}$$

$$\sum_{k=1}^{s}\sum_{l=k}^{s}\sum_{j=t:d^r_{sj}>0}^{|T|}\psi^r_{klsj} \leq y^r_s \qquad \forall\, t \in T, s \leq t \in T, r \in R \tag{65}$$

$$\sum_{i\in R}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{t=s}^{|T|}\psi^i_{klst}d^i_{st} \leq \min\{C_k, D^p_k\}y^p_k \qquad \forall k \in T \tag{66}$$

$$\psi^r_{klst} \geq 0 \qquad \forall\, k \leq l \leq s \leq t \in T, r \in R \tag{67}$$

$$y^i_t \in \{0,1\} \qquad \forall t \in T, i \in F. \tag{68}$$

Constraints (61) are the demand satisfaction constraints written as initial flow constraints. Constraints (62) are the flow conservation constraints. Constraints (63), (64) and (65) are the setup forcing constraints for the production plant, the warehouses and the retailers, respectively. Constraints (66) are the capacity constraints at the production plant.

3.4 Transportation formulation

In the following formulation, the interactions between the facilities are modeled based on the transportation formulation of Krarup and Bilde [24] for the SI-ULSP. For any retailer r, let θ^r_{klst} be the quantity that is produced by the production plant in period k, transported to the warehouse of retailer r in period l, transported to retailer r in period s and used to satisfy d^r_t. Let also H^r_{klst} be the cost linked to θ^r_{klst}: $H^r_{klst} = \sum_{j=k}^{l-1} hc^p_j + \sum_{j=l}^{s-1} hc_j^{\delta_w(r)} + \sum_{j=s}^{t-1} hc^r_j$. The transportation formulation (TP) is given as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc^i_t y^i_t + \sum_{r\in R}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t} H^r_{klst}\theta^r_{klst}\right) \tag{69}$$

$$\text{s.t.} \sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\theta^r_{klst} = d^r_t \qquad \forall\, t \in T, r \in R \tag{70}$$

$$\sum_{l=k}^{t}\sum_{s=l}^{t}\theta^r_{klst} \leq d^r_t y^p_k \qquad \forall\, t \in T, k \leq t \in T, r \in R \tag{71}$$

$$\sum_{k=1}^{l}\sum_{s=l}^{t}\theta^r_{klst} \leq d^r_t y_l^{\delta_w(r)} \qquad \forall\, t \in T, l \leq t \in T, r \in R \tag{72}$$

$$\sum_{k=1}^{s}\sum_{l=k}^{s}\theta^r_{klst} \leq d^r_t y^r_s \qquad \forall\, t \in T, s \leq t \in T, r \in R \tag{73}$$

$$\sum_{i\in R}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{t=s}^{|T|}\theta^i_{klst} \leq \min\{C_k, D^p_k\}y^p_k \qquad \forall k \in T \tag{74}$$

$$\theta^r_{klst} \geq 0 \qquad \forall\, k \leq l \leq s \leq t \in T, r \in R \tag{75}$$

$$y^i_t \in \{0,1\} \qquad \forall t \in T, i \in F. \tag{76}$$

Constraints (70) are the demand satisfaction constraints. Constraints (71), (72) and (73) are the setup forcing constraints for the production plant, the warehouses and the retailers, respectively. Constraints (74) are the capacity constraints at the production plant.

3.5 Multi-commodity formulation

The next formulation proposed is based on the distinction of each retailer-period pair (i.e., each d^r_t is viewed as a distinct commodity). For this formulation, for any retailer r, let w^{0r}_{kt} be the amount produced at the

production plant in period k to satisfy d_t^r, let w_{kt}^{1r} be the amount transported from the production plant to the warehouse of retailer r in period k to satisfy d_t^r and let w_{kt}^{2r} be the amount transported from the warehouse of retailer r to retailer r in period k to satisfy d_t^r. Let also σ_{kt}^{0r} be the amount stocked at the production plant at the end of period k to satisfy d_t^r, let σ_{kt}^{1r} be the amount stocked at the warehouse of retailer r at the end of period k to satisfy d_t^r and let σ_{kt}^{2r} be the amount stocked at retailer r at the end of period k to satisfy d_t^r. In the following formulation, we denote by δ_{kt} the Kronecker delta which takes the value 1 if $k = t$ and 0 otherwise. The multi-commodity formulation (MC) is as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc_t^i y_t^i + \sum_{r\in R}\sum_{k\le t} hc_k^p \sigma_{kt}^{0r} + \sum_{r\in R}\sum_{k\le t} hc_k^{\delta_w(r)} \sigma_{kt}^{1r} + \sum_{r\in R}\sum_{k\le t} hc_k^r \sigma_{kt}^{2r}\right) \tag{77}$$

$$\begin{aligned}
\sigma_{k-1,t}^{0r} + w_{kt}^{0r} &= w_{kt}^{1r} + \sigma_{kt}^{0r} && \forall\, t\in T, k\le t\in T, r\in R && (78)\\
\sigma_{k-1,t}^{1r} + w_{kt}^{1r} &= w_{kt}^{2r} + \sigma_{kt}^{1r} && \forall\, t\in T, k\le t\in T, r\in R && (79)\\
\sigma_{k-1,t}^{2r} + w_{kt}^{2r} &= \delta_{kt} d_t^r + (1-\delta_{kt})\sigma_{kt}^{2r} && \forall\, t\in T, k\le t\in T, r\in R && (80)\\
w_{kt}^{0r} &\le d_t^r y_k^p && \forall\, t\in T, k\le t\in T, r\in R && (81)\\
w_{kt}^{1r} &\le d_t^r y_k^{\delta_w(r)} && \forall\, t\in T, k\le t\in T, r\in R && (82)\\
w_{kt}^{2r} &\le d_t^r y_k^r && \forall\, t\in T, k\le t\in T, r\in R && (83)\\
\sum_{r\in R}\sum_{t=k}^{|T|} w_{kt}^{0r} &\le \min\{C_k, D_k^p\} y_k^p && \forall k\in T && (84)\\
w_{kt}^{0r}, w_{kt}^{1r}, w_{kt}^{2r}, \sigma_{kt}^{0r}, \sigma_{kt}^{1r}, \sigma_{kt}^{2r} &\ge 0 && \forall\, t\in T, k\le t\in T, r\in R && (85)\\
y_t^i &\in \{0;1\} && \forall t\in T, i\in F. && (86)
\end{aligned}$$

Constraints (78), (79) and (80) are the balance constraints for each commodity at the production plant, at the warehouses and at the retailers, respectively. Constraints (81), (82) and (83) are the setup forcing constraints for the production plant, the warehouses and the retailers, respectively. Constraints (84) are the capacity constraints at the production plant.

The last formulation combines the idea of an echelon stock presented in Federgruen and Tzur [14] and the MC formulation. It is called the multi-commodity echelon formulation (MCE). To get this formulation, the inventory variables of the MC formulation are replaced with multi-commodity echelon variables E_{kt}^{lr} representing the amount stocked at the end of period k at all predecessors of retailer r which are in level l or more, and which will be used to fulfill the specific demand d_t^r. We define the multi-commodity echelon variables E_{kt}^{lr} as:

$$E_{kt}^{lr} = \begin{cases} \sigma_{kt}^{0r} + \sigma_{kt}^{1r} + \sigma_{kt}^{2r} & \text{if } l = 0\\ \sigma_{kt}^{1r} + \sigma_{kt}^{2r} & \text{if } l = 1\\ \sigma_{kt}^{2r} & \text{if } l = 2. \end{cases}$$

The multi-commodity echelon formulation (MCE) is then as follows:

$$\text{Min} \sum_{t\in T}\left(\sum_{i\in F} sc_t^i y_t^i + \sum_{r\in R}\sum_{k\le t} hc_k^p E_{kt}^{0r} + \sum_{r\in R}\sum_{k\le t}\left(hc_k^{\delta_w(r)} - hc_k^p\right) E_{kt}^{1r} + \sum_{r\in R}\sum_{k\le t}\left(hc_k^r - hc_k^{\delta_w(r)}\right) E_{kt}^{2r}\right) \tag{87}$$

s. t. (81) – (86)

$$\begin{aligned}
E_{k-1,t}^{0r} + w_{kt}^{0r} &= \delta_{kt} d_t^r + (1-\delta_{kt}) E_{kt}^{0r} && \forall\, t\in T, k\le t\in T, r\in R && (88)\\
E_{k-1,t}^{1r} + w_{kt}^{1r} &= \delta_{kt} d_t^r + (1-\delta_{kt}) E_{kt}^{1r} && \forall\, t\in T, k\le t\in T, r\in R && (89)\\
E_{k-1,t}^{2r} + w_{kt}^{2r} &= \delta_{kt} d_t^r + (1-\delta_{kt}) E_{kt}^{2r} && \forall\, t\in T, k\le t\in T, r\in R && (90)\\
E_{kt}^{0r} &\ge E_{kt}^{1r} && \forall\, t\in T, k\le t\in T, r\in R && (91)\\
E_{kt}^{1r} &\ge E_{kt}^{2r} && \forall\, t\in T, k\le t\in T, r\in R && (92)\\
E_{kt}^{0r}, E_{kt}^{1r}, E_{kt}^{2r} &\ge 0 && \forall\, t\in T, k\le t\in T, r\in R. && (93)
\end{aligned}$$

Constraints (88), (89) and (90) are the balance constraints for each commodity at the production plant, at the warehouses and at the retailers respectively. Constraints (91) and (92) are the echelon constraints ensuring that the multi-echelon stock at a specific facility for a specific commodity is greater than or equal to the sum of the multi-echelon stocks at all its direct successors for the same commodity.

3.6 Summary

The formulations previously introduced are extensions of the MIP formulations proposed for the OWMR. For all the formulations presented, the adaptation of the original decision variables naturally leads to an increase in their number. For the N and TP formulations, this increase translates into an additionnal dimension with the new subscript k in the decision variables ψ^r_{klst} and θ^r_{klst} to reflect the third level. For all the other formulations, the increase in the number of decision variables is just the result of the increase in the number of facilities due to the added third level. Thus, the increase in the number of decision variables for the N and TP formulations is much higher than for the other formulations when going from a two-level LSP to a three-level LSP.

Table 1 gives a summary of the number of variables and constraints for each formulation previously introduced, and the paper from which the formulation has been adapted to our problem. Recall that these papers present a one-level or two-level problem whereas we consider a three-level problem. Note that, to the best of our knowledge, the ES-N, ES-F-N, ES-F-TP, ES-F-LS and MCE formulations we propose are completely new. In Table 1, one can see that the richer formulations, i.e., the ones that have more information in the decision variables, are the largest ones.

Table 1: Summary of the sizes of all formulations

Formulation	Variables	Constraints	Reference
C	$O(\|F\| \times \|T\|)$	$O(\|F\| \times \|T\|)$	Pochet and Wolsey [34]
C-N	$O(\|R\| \times \|T\|^2)$	$O(\|F\| \times \|T\|)$	Eppen and Martin [12]
C-TP	$O(\|R\| \times \|T\|^2)$	$O(\|R\| \times \|T\|^2)$	Krarup and Bilde [24]
C-LS	$O(\|R\| \times \|T\|^2)$	$O(\|R\| \times \|T\|^2)$	Pochet and Wolsey [34]
ES	$O(\|F\| \times \|T\|)$	$O(\|F\| \times \|T\|)$	Pochet and Wolsey [34]
ES-N	$O(\|F\| \times \|T\|^2)$	$O(\|F\| \times \|T\|^2)$	
ES-TP	$O(\|F\| \times \|T\|^2)$	$O(\|F\| \times \|T\|^2)$	Solyalı and Süral [37]
ES-LS	$O(\|F\| \times \|T\|)$	$O(\|F\| \times \|T\|^2)$	Melo and Wolsey [27]
ES-F	$O(\|F\| \times \|T\|)$	$O(\|F\| \times \|T\|)$	Federgruen and Tzur [14]
ES-F-N	$O(\|F\| \times \|T\|^2)$	$O(\|F\| \times \|T\|^2)$	
ES-F-TP	$O(\|F\| \times \|T\|^2)$	$O(\|F\| \times \|T\|^2)$	
ES-F-LS	$O(\|F\| \times \|T\|)$	$O(\|F\| \times \|T\|^2)$	
N	$O(\|R\| \times \|T\|^4)$	$O(\|R\| \times \|T\|^2)$	Solyalı and Süral [37]
TP	$O(\|R\| \times \|T\|^4)$	$O(\|R\| \times \|T\|^2)$	Levi et al. [26]
MC	$O(\|R\| \times \|T\|^2)$	$O(\|R\| \times \|T\|^2)$	Melo and Wolsey [27]
MCE	$O(\|R\| \times \|T\|^2)$	$O(\|R\| \times \|T\|^2)$	

3.7 Analysis of the LP relaxation of formulations

We explore the strength of the MIP formulations in terms of the objective function value of their LP relaxation, without considering the production capacity constraint (5). In the LP relaxations of the MIP formulations, we replace the binary requirements on the setup variables by the following constraints:

$$0 \leq y^i_t \leq 1 \qquad \forall\, i \in F, \forall\, t \in T. \tag{94}$$

We denote by z^X_{LP} the objective function value of the LP relaxation of formulation X. We denote by $F(X)$ the set of feasible solutions for formulation X. The following example is used to illustrate most of the strict dominance relations between the formulations. The strict dominance relation between formulations MC and N cannot be observed empirically on small instances such as the one presented hereafter. However, we have observed it for large instances, for example with $|R| = 200$ and $|T| = 30$.

Example 1. Consider an instance of the 3LSPD with $T = 4$, $|W| = 2$ and $|R| = 4$. Each warehouse is responsible for two retailers. The first warehouse is responsible for the first two retailers and the second warehouse is responsible for the other two. We have, for any $t \in T$, $hc_t^p = 30$, $hc_t^{w_1} = 50$, $hc_t^{w_2} = 60$, $hc_t^{r_1} = 10$, $hc_t^{r_2} = 20$, $hc_t^{r_3} = 100$, $hc_t^{r_4} = 10$, $sc_t^p = 100$, $sc_t^{w_1} = 500$, $sc_t^{w_2} = 600$, $sc_t^{r_1} = 100$, $sc_t^{r_2} = 200$, $sc_t^{r_3} = 300$, $sc_t^{r_4} = 50$ and $d^{r_1} = (10, 20, 15, 10)$, $d^{r_2} = (5, 30, 10, 10)$, $d^{r_3} = (45, 20, 20, 10)$, $d^{r_4} = (10, 20, 15, 20)$. For this instance, the optimal LP solutions values for six of the formulations are $z_{LP}^{C} = 3903.56$, $z_{LP}^{C-N} = 4813.46$, $z_{LP}^{ES-LS} = 6017.25$, $z_{LP}^{ES-N} = 6096.343$, $z_{LP}^{MC} = 6750.00$ and $z_{LP}^{N} = 6750.00$.

Proposition 1

$$\begin{aligned} z_{LP}^{C} = z_{LP}^{ES} = z_{LP}^{ES-F} \leq z_{LP}^{C-LS} \leq z_{LP}^{C-TP} = z_{LP}^{C-N} \leq z_{LP}^{ES-LS} = z_{LP}^{ES-F-LS} \leq z_{LP}^{ES-N} = z_{LP}^{ES-TP} \\ = z_{LP}^{ES-F-N} = z_{LP}^{ES-F-TP} \leq z_{LP}^{TP} = z_{LP}^{MC} = z_{LP}^{ME} \leq z_{LP}^{N} \end{aligned} \tag{95}$$

In case the unit inventory holding costs are increasing when we go deeper in the supply chain (i.e., if $hc_t^p \leq hc_t^{\delta_w(r)} \leq hc_t^r$ for $p \in P$ and any $r \in R$), Proposition 1 can be slightly improved.

Proposition 2 *If, for $p \in P$ and for any $r \in R$, we have $hc_t^p \leq hc_t^{\delta_w(r)} \leq hc_t^r$, then:*

$$z_{LP}^{C-LS} = z_{LP}^{C-N} \tag{96}$$

Proposition 3 $z_{LP}^{C} \leq z_{LP}^{C-N}$

Proof. This result follows from the fact that the network reformulation used describes the convex hull of the solutions satisfying (2), (6) and (7) for $i \in R$ and (4). □

Proposition 4 $z_{LP}^{C-LS} \leq z_{LP}^{C-TP}$

Proof. In our case, since the production variables for the retailers also appear in constraints (3), we may not have an exact Wagner-Whitin cost structure for the retailers. Therefore, inequalities (29) may not be sufficient to describe the convex hull of the solution space for the retailers, whereas the network reformulation at the retailer level does. Indeed, suppose that in the LP optimal solution one constraint (3) has a non-zero dual variable. If we dualize this constraint in the objective function, the Wagner-Whitin cost structure may be violated, and the (l, S, WW) valid inequalities do not describe the convex hull of the solution space for the retailers part anymore. □

Proposition 5 $z_{LP}^{C-N} = z_{LP}^{C-TP}$

Proof. This results follows from the fact that at the retailer level both the network and transportation reformulations exactly describe the convex hull of the solutions satisfying (2), (6) and (7) for $i \in R$ and (4) as stated in Pochet and Wolsey [34]. □

Proposition 6 *If, for $p \in P$ and for any $r \in R$, we have $hc_t^p \leq hc_t^{\delta_w(r)} \leq hc_t^r$, then:*

$$z_{LP}^{C-LS} = z_{LP}^{C-N} \tag{97}$$

Proof. To prove this equality, it is sufficient to prove that we still have Wagner-Whitin costs for the retailers despite the fact that the production variables x^r also appear in constraint (3) for $w = \delta_w(r)$. Therefore, as proved in Pochet and Wolsey [34], the (l, S, WW) inequalities are sufficient to describe the convex hull of solutions satisfying (2), (6) and (7) for $i \in R$ and (4). Let us dualise constraints (2) (for $i \in P \cup W$) with positive dual variables μ_t^i and constraints (3) with dual variables ν_t^i. For any retailer r and any time period t, the new production cost is $\nu_t^{\delta_w(r)}$ while the holding cost remains the same. We denote by $pc_t'^r$ this new production cost. In this modified objective function, we have Wagner-Whitin costs for one particular retailer r iff:

$$pc_t'^r + hc_t^r \geq pc_{t+1}'^r \qquad \forall t \in T$$

$$\begin{aligned} &\Leftrightarrow \nu_t^{\delta_w(r)} + hc_t^r \geq \nu_{t+1}^{\delta_w(r)} && \forall t \in T \\ \Leftrightarrow\ &\nu_t^{\delta_w(r)} - \nu_{t+1}^{\delta_w(r)} + hc_t^r \geq 0 && \forall t \in T. \end{aligned}$$

Furthermore, in the dual of problem C, at optimality, the constraint linked to the stock variables of the warehouse $\delta_w(r)$ linked to retailer r is:

$$\nu_{t+1}^{\delta_w(r)} - \nu_t^{\delta_w(r)} \leq hc_t^{\delta_w(r)} \qquad \forall t \in T. \tag{98}$$

Therefore:

$$\nu_t^{\delta_w(r)} - \nu_{t+1}^{\delta_w(r)} + hc_t^r \geq hc_t^r - hc_t^{\delta_w(r)} \qquad \forall t \in T. \tag{99}$$

As, by hypothesis, we have $hc_t^r \geq hc_t^{\delta_w(r)}$, the Wagner-Whitin cost structure still holds for any retailer. This concludes the proof. □

Proposition 7 $z_{LP}^{ES} = z_{LP}^{C}$

Proof. The proof consists in showing that any solution to the linear relaxation of ES can be converted into a solution to the linear relaxation of C with the same total cost, and that the reverse is also true. We will thus prove that $F(C) = F(ES)$. By the construction indicated in Section 3.2, we directly have $F(C) \subseteq F(ES)$. We will now prove that $F(ES) \subseteq F(C)$. Let us take a feasible solution $(x, I, y) \in F(ES)$ and construct a feasible solution $(x, s, y) \in F(C)$ with the same objective function value. We construct $(x, s, y) \in F(C)$ as follows:

$$s_t^i = \begin{cases} I_t^i & \text{if } i \in R \\ I_t^i - \sum_{r \in \delta(i)} I_t^r & \text{if } i \in W \\ I_t^i - \sum_{w \in W} I_t^w & \text{if } i = p. \end{cases} \tag{100}$$

We furthermore directly map the x and y variables. We now verify that all constraints hold.

1. Constraints (4). For any $i \in R$ and any $t \in T$, constraints (4) hold directly because they are equivalent to constraints (31).
2. Constraints (3). Let us take $i \in W$. We have, according to (31), for any $t \in T$:

$$\begin{aligned} I_{t-1}^i + x_t^i &= d_t^i + I_t^i \\ \Leftrightarrow I_{t-1}^i + x_t^i &= \sum_{r \in \delta(i)} d_t^r + I_t^i \\ \Leftrightarrow I_{t-1}^i + x_t^i &= \sum_{r \in \delta(i)} \left(I_{t-1}^r + x_t^r - I_t^r \right) + I_t^i \\ \Leftrightarrow I_{t-1}^i - \sum_{r \in \delta(i)} I_{t-1}^r + x_t^i &= \sum_{r \in \delta(i)} x_t^r + I_t^i - \sum_{r \in \delta(i)} I_t^i \\ \Leftrightarrow s_{t-1}^i + x_t^i &= \sum_{r \in \delta(i)} x_t^r + s_t^i. \end{aligned}$$

   Thus, constraints (3) hold for any warehouse as well. Using a similar approach, one can prove that constraints (3) hold for the production plant. Therefore, constraints (3) hold.
3. Constraints (2). These constraints directly hold since the production and setup variables used in formulations C and ES are the same.
4. Constraint (6). Due to constraints (33), constraints (6) directly hold.
5. Objective function value. A straightforward substitution of the I variables for the s variables in the objective function of formulation ES directly gives the objective function expression of formulation C. This concludes the proof.

□

Proposition 8 $z_{LP}^{C-LS} \leq z_{LP}^{ES-LS}$

Proof. Using a similar approach as in the proof of Proposition 7, and using the fact that the (l, S, WW) valid inequalities (29) are a subset of the (l, S, WW) valid inequalities (56), we directly have that $F(ES-LS) \subseteq F(C-LS)$. Indeed, the (l, S, WW) valid inequalities (29) are defined for all retailers r whereas the (l, S, WW) valid inequalities (56) are defined for any facility i. □

Proposition 9 $z_{LP}^{ES-LS} \leq z_{LP}^{ES-N}$

Proof. The proof consists in showing that ES-N gives a stronger reformulation than ES-LS. The result follows from the fact that ES-N uses a network reformulation (38) and (39) that gives the convex hull of the set (2), (31), (35), (36). On the contrary, the (l, S, WW) valid inequalities (56) only give an approximation of the convex hull of this set. Indeed, suppose there exist one $i \in P \cup W$ such that, in the optimal LP solution of ES-LS, we have one constraint (33) whose dual variable is strictly positive. If we dualize this constraint with its dual value in the objective function, we may destroy the Wagner-Whitin cost structure for the subproblem linked to the facility i and therefore, the (l, S, WW) valid inequalities (56) only give an approximation of the convex hull of the SI-ULSP linked to facility i. This concludes the proof. □

Proposition 10 $z_{LP}^{ES-N} = z_{LP}^{ES-TP}$

Proof. This results follows from the fact that at the retailer level both the network and transportation reformulations exactly describe the convex hull of the solutions satisfying (31), (35), (2) and (36) (see Pochet and Wolsey [34]). □

Proposition 11 $z_{LP}^{ES} = z_{LP}^{ES-F}$

Proof. To prove this result, we just need to prove that the echelon constraints (33) and (57) are equivalent, since except for the echelon constraints, formulations ES and ES-F have exactly the same objective function and constraints.

1. (33) ⇒ (57). Let $(x, I, y) \in F(ES)$ be a feasible solution for formulation ES. One has, thanks to (31), $I_t^i = \sum_{u=1}^{t} x_u^i - d_{1t}^i$. Therefore, for any $i \in F$ and any $t \in T$, one has

$$\begin{aligned} I_t^i &\geq \sum_{j \in \delta(i)} I_t^j \\ \Leftrightarrow \sum_{u=1}^{t} x_u^i - d_{1t}^i &\geq \sum_{j \in \delta(i)} \left(\sum_{u=1}^{t} x_u^j - d_{1t}^j \right) \\ \Leftrightarrow \sum_{u=1}^{t} x_u^i &\geq \sum_{j \in \delta(i)} \sum_{u=1}^{t} x_u^j \end{aligned}$$

   since $d_{1t}^i = \sum_{j \in \delta(i)} d_{1t}^j$.
2. (57) ⇒ (33). Let $(x, I, y) \in F(ES-F)$ be a feasible solution for formulation ES-F. One has, for any $i \in F$ and any $t \in T$, $\sum_{k=1}^{t} x_k^i = \sum_{k=1}^{t} \left(d_k^i + I_k^i - I_{k-1}^i \right) = I_t^i - I_0^i + \sum_{k=1}^{t} d_k^i = d_k^i + I_t^i$, since $I_0^i = 0$. Therefore,

$$\begin{aligned} \sum_{k=1}^{t} x_k^i &\geq \sum_{j \in \delta(i)} \sum_{k=1}^{t} x_k^j \\ \Leftrightarrow \sum_{k=1}^{t} d_k^i + I_t^i &\geq \sum_{j \in \delta(i)} \sum_{k=1}^{t} d_k^j + \sum_{j \in \delta(i)} I_t^j \\ \Leftrightarrow I_t^i &\geq \sum_{j \in \delta(i)} I_t^j \end{aligned}$$

   since $\sum_{j \in \delta(i)} \sum_{k=1}^{t} d_k^j = \sum_{k=1}^{t} d_k^i$.

□

Using similar arguments, one can prove Propositions 12, 13 and 14.

Proposition 12 $z_{LP}^{ES-N} = z_{LP}^{ES-F-N}$

Proposition 13 $z_{LP}^{ES-TP} = z_{LP}^{ES-F-TP}$

Proposition 14 $z_{LP}^{ES-LS} = z_{LP}^{ES-F-LS}$

Proposition 15 $z_{LP}^{ES-F-TP} \leq z_{LP}^{TP}$

Proof. Let $z_{LP}^{TP}(\theta, y)$ and $z_{LP}^{ES-F-TP}(X, I, y)$ be the LP relaxation objective function values of $(\theta, y) \in F(TP)$ and $(X, I, y) \in F(ES-F-TP)$, respectively. To prove the result, we prove that $F(TP) \subseteq F(ES-F-TP)$. The counter example presented at the beginning of the section shows that the strict equality does not hold in some cases. Let us take a feasible solution $(\theta, y) \in F(TP)$ and construct a feasible solution $(X, I, y) \in F(ES-F-TP)$ with the same objective function value. We construct $(X, I, y) \in F(ES-F-TP)$ as follows:

$$X_{qt}^p = \sum_{i \in R} \sum_{r=q}^{t} \sum_{s=r}^{t} \theta_{qrst}^i \qquad \forall q \leq t \in T \tag{101}$$

$$X_{rt}^w = \sum_{i \in \delta(w)} \sum_{q=1}^{r} \sum_{s=r}^{t} \theta_{qrst}^i \qquad \forall w \in W, r \leq t \in T \tag{102}$$

$$X_{st}^i = \sum_{q=1}^{s} \sum_{r=q}^{s} \theta_{qrst}^i \qquad \forall i \in R, s \leq t \in T \tag{103}$$

$$I_t^i = \sum_{u=1}^{t} \sum_{k=u}^{|T|} X_{uk}^i - d_{1t}^i \qquad \forall i \in F, t \in T. \tag{104}$$

We directly map the y variables since they are the same in both formulations. We show hereafter that (X, I, y) constructed using (101)–(104) belongs to $F(ES - F - TP)$.

1. Constraints (48). For any $i \in F$ and any $t \in T$, by construction one has

$$\begin{aligned} I_t^i - I_{t-1}^i &= \sum_{u=1}^{t} \sum_{k=u}^{|T|} X_{uk}^i - d_{1t}^i - \sum_{u=1}^{t-1} \sum_{k=u}^{|T|} X_{uk}^i + d_{1,t-1}^i \\ &= \sum_{k=t}^{|T|} X_{tk}^i - d_t^i. \end{aligned}$$

   Therefore, constraints (48) hold.

2. Constraints (49). For the production plant p and for any $t \in T$, one has

$$\begin{aligned} \sum_{q=1}^{t} X_{qt}^p &= \sum_{i \in R} \sum_{q=1}^{t} \sum_{r=q}^{t} \sum_{s=r}^{t} \theta_{qrst}^i \\ &= \sum_{i \in R} d_t^i \text{ by (70)} \\ &= d_t^p. \end{aligned}$$

   Using a similar approach one can prove that constraints (49) also hold for any warehouse, any retailer and any time period. Therefore, constraints (49) hold.

3. Constraints (50). If we sum up constraints (71) over all $i \in R$ for any $k \leq t \in T$, we have $\sum_{i \in R} \sum_{l=k}^{t} \sum_{s=l}^{t} \theta_{klst}^i \leq \sum_{i \in R} d_t^i y_k^p$. Besides, $\sum_{i \in R} \sum_{l=k}^{t} \sum_{s=l}^{t} \theta_{klst}^i = X_{kt}^p$ by construction and $\sum_{i \in R} d_t^i y_k^p = y_k^p \sum_{i \in R} d_t^i = d_t^p y_k^p$. Therefore, $X_{kt}^p \leq d_t^p y_k^p$ and constraints (50) hold for the production plant and any $k \leq t \in T$. Using a similar approach, one can prove that the constraints also hold for the warehouses and the retailers. Thus, constraints (50) hold.

4. Constraints (59). For the production plant (i.e., $i = p$) and for any $t \in T$, one has

$$\sum_{q=1}^{t}\sum_{l=q}^{|T|} X_{ql}^{p} \geq \sum_{w\in W}\sum_{k=1}^{t}\sum_{l=k}^{|T|} X_{kl}^{w} \tag{105}$$

$$\Leftrightarrow \sum_{q=1}^{t}\sum_{l=q}^{|T|}\sum_{i\in R}\sum_{k=q}^{l}\sum_{s=k}^{l} \theta_{qksl}^{i} \geq \sum_{i\in R}\sum_{k=1}^{t}\sum_{l=k}^{|T|}\sum_{q=1}^{k}\sum_{s=k}^{l} \theta_{qksl}^{i} \tag{106}$$

$$\Leftrightarrow \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=q}^{|T|}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} \geq \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=q}^{t}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} \tag{107}$$

$$\Leftrightarrow \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=q}^{t}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} + \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=t+1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} \geq \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=q}^{t}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} \tag{108}$$

$$\Leftrightarrow \sum_{i\in R}\sum_{q=1}^{t}\sum_{k=t+1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=k}^{l} \theta_{qksl}^{i} \geq 0. \tag{109}$$

As $\theta \geq 0$, (109) holds. Thus, thanks to the different equivalences, (105) holds and so do constraints (59) for the production plant and any $t \in T$. Using a similar approach one can prove that constraints (59) hold for the warehouses and any $t \in T$. Therefore, constraints (59) hold.

5. Objective function value. For the TP formulation, the holding cost linked to the production plant is

$$\sum_{i\in R}\sum_{q=1}^{|T|}\sum_{r=q}^{|T|}\sum_{t=r}^{|T|}\sum_{k=t}^{|T|}\sum_{l=q}^{r-1} hc_{l}^{p}\theta_{qrtk}^{i} = \sum_{i\in R}\sum_{q=1}^{|T|}\sum_{r=q}^{|T|}\sum_{t=r}^{|T|}\sum_{k=t}^{|T|}\sum_{l=q}^{k-1} hc_{l}^{p}\theta_{qrtk}^{i} - \sum_{i\in R}\sum_{q=1}^{|T|}\sum_{r=q}^{|T|}\sum_{t=r}^{|T|}\sum_{k=t}^{|T|}\sum_{l=r}^{k-1} hc_{l}^{p}\theta_{qrtk}^{i}$$

$$= \sum_{i\in R}\sum_{q=1}^{|T|}\sum_{k=q}^{|T|}\sum_{r=q}^{k}\sum_{t=r}^{k}\sum_{l=q}^{k-1} hc_{l}^{p}\theta_{qrtk}^{i} - \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=t}^{|T|}\sum_{q=1}^{t}\sum_{r=q}^{t}\sum_{l=r}^{k-1} hc_{l}^{p}\theta_{qrtk}^{i} \tag{110}$$

$$= \sum_{q=1}^{|T|}\sum_{k=q}^{|T|}\left(\sum_{l=q}^{k-1} hc_{l}^{p}\right)\sum_{i\in R}\sum_{r=q}^{k}\sum_{t=r}^{k}\theta_{qrtk}^{i} - \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=t}^{|T|}\left(\sum_{l=r}^{k-1} hc_{l}^{p}\right)\sum_{q=1}^{t}\sum_{r=q}^{t}\theta_{qrtk}^{i} \tag{111}$$

$$= \sum_{q=1}^{|T|}\sum_{k=q}^{|T|}\left(\sum_{l=q}^{k-1} hc_{l}^{p}\right)\sum_{i\in R}\sum_{r=q}^{k}\sum_{t=r}^{k}\theta_{qrtk}^{i} - \sum_{r=1}^{|T|}\sum_{k=r}^{|T|}\left(\sum_{l=r}^{k-1} hc_{l}^{p}\right)\sum_{i\in R}\sum_{q=1}^{r}\sum_{t=r}^{k}\theta_{qrtk}^{i} \tag{112}$$

$$= \sum_{q=1}^{|T|}\sum_{k=q}^{|T|}\left(\sum_{l=q}^{k-1} hc_{l}^{p}\right)X_{qk}^{p} - \sum_{r=1}^{|T|}\sum_{k=r}^{|T|}\left(\sum_{l=r}^{k-1} hc_{l}^{p}\right)\sum_{w\in W} X_{rk}^{w}. \tag{113}$$

Expression (113) is exactly the holding cost linked to the production plant in the objective function expression (47) of formulation ES-F-TP, when writen in terms of X variables. Using a similar approach, one can map the holding costs of the warehouses and the retailers in the two formulations. Besides, the setup costs for all facilities directly map since the setup variables are the same. Therefore, the objective function expression of the TP and ES-F-TP formulations are the same. This concludes the proof.

□

Proposition 16 $z_{LP}^{MC} = z_{LP}^{TP}$

Proof. The proof consists in showing that any solution to the linear relaxation of MC can be converted into a solution to the linear relaxation of TP with the same objective function value, and that the reverse is also

true. We will thus prove that $F(MC) = F(TP)$. We first prove that $F(TP) \subseteq F(MC)$. Let us take a feasible solution $(\theta, y) \in F(TP)$ and construct a feasible one $(\sigma, w, y) \in F(MC)$ with the same objective function value. We construct $(\sigma, w, y) \in F(MC)$ as follows:

$$w_{qt}^{0i} = \sum_{r=q}^{t} \sum_{s=r}^{t} \theta_{qrst}^{i} \qquad \forall i \in R, q \leq t \in T \tag{114}$$

$$w_{rt}^{1i} = \sum_{q=1}^{r} \sum_{s=r}^{t} \theta_{qrst}^{i} \qquad \forall i \in R, r \leq t \in T \tag{115}$$

$$w_{st}^{2i} = \sum_{q=1}^{s} \sum_{r=q}^{s} \theta_{qrst}^{i} \qquad \forall i \in R, s \leq t \in T \tag{116}$$

$$\sigma_{kt}^{0i} = \sum_{u=1}^{k} \left(w_{ut}^{0i} - w_{ut}^{1i} \right) \qquad \forall i \in R, k \leq t \in T \tag{117}$$

$$\sigma_{kt}^{1i} = \sum_{u=1}^{k} \left(w_{ut}^{1i} - w_{ut}^{2i} \right) \qquad \forall i \in R, k \leq t \in T \tag{118}$$

$$\sigma_{kt}^{2i} = \begin{cases} \sum_{u=1}^{k} w_{ut}^{2i} & \forall i \in R, k < t \in T \\ 0 & \text{otherwise.} \end{cases} \tag{119}$$

We directly map the y variables since they are the same in both formulations. We show hereafter that (σ, w, y) constructed using (114)–(119) belongs to $F(MC)$.

1. Constraints (78)–(80). Note that these constraints can be written just in terms of the w variables if we eliminate the stock variables. We thus get the following constraints instead of (78)–(80):

$$\sum_{j=1}^{k} w_{jt}^{0i} \geq \sum_{j=1}^{k} w_{jt}^{1i} \qquad \forall i \in R, \ \forall k \leq t \in T \tag{120}$$

$$\sum_{j=1}^{k} w_{jt}^{1i} \geq \sum_{j=1}^{k} w_{jt}^{2i} \qquad \forall i \in R, \ \forall k \leq t \in T \tag{121}$$

$$\sum_{k=1}^{t} w_{kt}^{2i} = d_t^i \qquad \forall i \in R, \ \forall t \in T. \tag{122}$$

   For any $i \in R$ and any $k \leq t \in T$, we have:

$$\sum_{j=1}^{k} w_{jt}^{0i} = \sum_{j=1}^{k} \sum_{r=j}^{t} \sum_{s=r}^{t} \theta_{jrst}^{i} \geq \sum_{j=1}^{k} \sum_{r=j}^{k} \sum_{s=r}^{t} \theta_{jrst}^{i}$$

   since $\theta \geq 0$ and since $t \leq k$. Besides, we have:

$$\begin{aligned} \sum_{j=1}^{k} \sum_{r=j}^{k} \sum_{s=r}^{t} \theta_{jrst}^{i} &= \sum_{q=1}^{k} \sum_{r=q}^{k} \sum_{s=r}^{t} \theta_{qrst}^{i} \\ &= \sum_{r=1}^{k} \sum_{q=1}^{r} \sum_{s=r}^{t} \theta_{qrst}^{i} \\ &= \sum_{r=1}^{k} w_{rt}^{1i}. \end{aligned}$$

   Therefore, $\sum_{j=1}^{k} w_{jt}^{0i} \geq \sum_{r=1}^{k} w_{rt}^{1i}$ and constraints (120) hold. Using a similar approach, one can prove that constraints (121) and (122) also hold.

2. Constraints (81)–(83). These constraints hold directly by substituing (114)–(116) in constraints (71)–(73).
3. Objective function value. In the TP formulation, the holding cost linked to the production plant is given by

$$\sum_{i\in R}\sum_{t=1}^{|T|}\sum_{q=1}^{t}\sum_{r=q}^{t}\sum_{s=r}^{t}\sum_{j=q}^{r-1} hc_j^p\theta_{qrst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{q=1}^{t}\sum_{r=q}^{t}\sum_{s=r}^{t}\sum_{j=q}^{t} hc_j^p\theta_{qrst}^i - \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{q=1}^{t}\sum_{r=q}^{t}\sum_{s=r}^{t}\sum_{j=r}^{t} hc_j^p\theta_{qrst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{j=1}^{t}\sum_{q=1}^{j}\sum_{r=q}^{t}\sum_{s=r}^{t} hc_j^p\theta_{qrst}^i - \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{j=1}^{t}\sum_{r=1}^{j}\sum_{q=1}^{r}\sum_{s=r}^{t} hc_j^p\theta_{qrst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{j=1}^{t}\sum_{q=1}^{j} hc_j^p\left(\sum_{r=q}^{t}\sum_{s=r}^{t}\theta_{qrst}^i\right) - \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{j=1}^{t}\sum_{r=1}^{j} hc_j^p\left(\sum_{q=1}^{r}\sum_{s=r}^{t}\theta_{qrst}^i\right)$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{j=1}^{t}\sum_{u=1}^{j} hc_j^p\left(w_{ut}^{0i} - w_{ut}^{1i}\right),$$

which is exactly the holding cost linked to the production plant in the objective function of the MC formulation if the inventory variables of the production plant level are replaced by the production variables using (117). Using a similar approach, one can map the holding costs linked to the warehouses and retailers and obtain the same expression as in the MC formulation. Besides, the setup costs directly match between the two formulations. Therefore, the objective function expression of the TP and MC formulations are the same. This concludes the proof showing that $F(TP) \subseteq F(MC)$.

We now prove that $F(MC) \subseteq F(TP)$. Let us consider, for each retailer i and each period t, a network with three layers representing the three levels of our distribution structure. In each layer, the nodes (l, t_1) represent each time period $t_1 \leq t$ at each level l and there are arcs going from one node to the node representing the next period. Figure 2 illustrates this network for a particular retailer i and with $t = 4$. In Figure 2, the node S represents the source node and we have displayed the variables linked to each arc in the network.

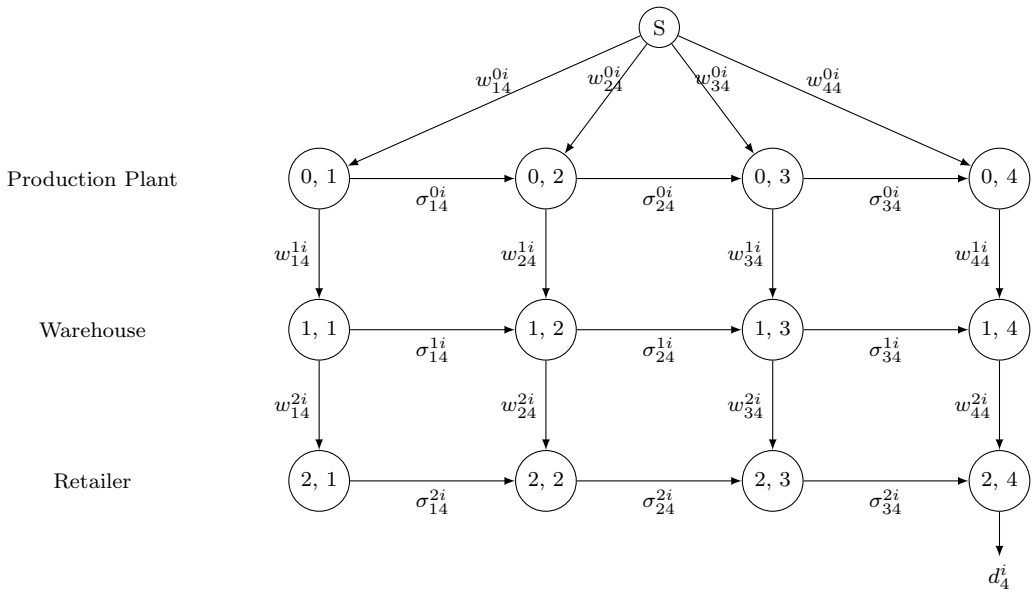

Figure 2: Graphical representation of the network used for the flow decomposition for $t = 4$

The key idea is the same as in Cunha and Melo [8]. Indeed, here also we see that variables $w^{0i}_{kt}, w^{1i}_{kt}, w^{2i}_{kt}$, $\sigma^{0i}_{kt}, \sigma^{1i}_{kt}$ and σ^{2i}_{kt} describe a feasible flow of d^i_t units of demand arriving in node $(2,t)$ in the network for retailer i. Besides, we have $\sum_{k=1}^{t} w^{2i}_{kt} = d^i_t$. Based on the flow decomposition theorem of Ford and Fulkerson [15], any feasible flow in a network can be decomposed into paths and cycles. In our general distribution network, there is no directed cycle, which means that the feasible flow can be decomposed into paths only. For any feasible flow, the decomposition into paths θ^i can be done in such a way that (114)–(116) are satisfied. Indeed, the subscripts k of the set of w^{li}_{kt} variables along a path directly translates into the subscripts q, r and s of the θ^i_{qrst} variables. This results comes fom the fact that, in the MC formulation, the flow of goods between facilities is depicted by the w variables while the flow of goods between facilities in the TP formulation is obtained through the subscripts of the θ variables. An example of such a decomposition is given in Figures 3 and 4. In Figure 3, the flow between facilities is shown in terms of w^0, w^1 and w^2 variables, and the inventory at a facility is shown in terms of σ^0, σ^1 and σ^3 variables. This flow is decomposed into paths θ in Figure 4. Note that the w variables may belong to several paths.

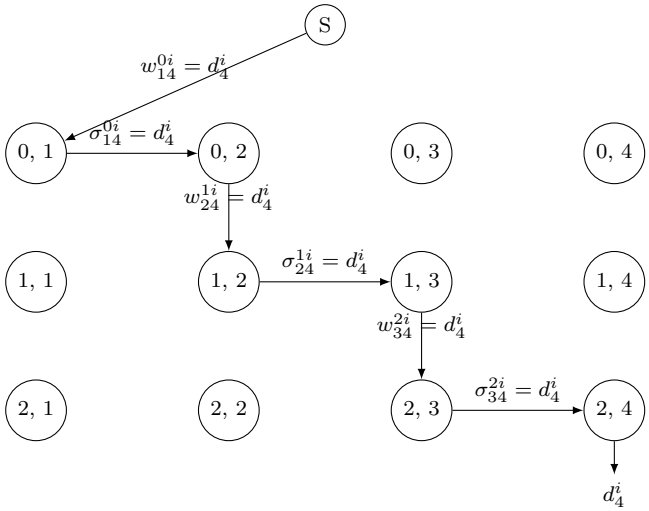

Figure 3: Graphical representation of the flow decomposition in terms of w^0, w^1 and w^2 variables, for $t = 4$

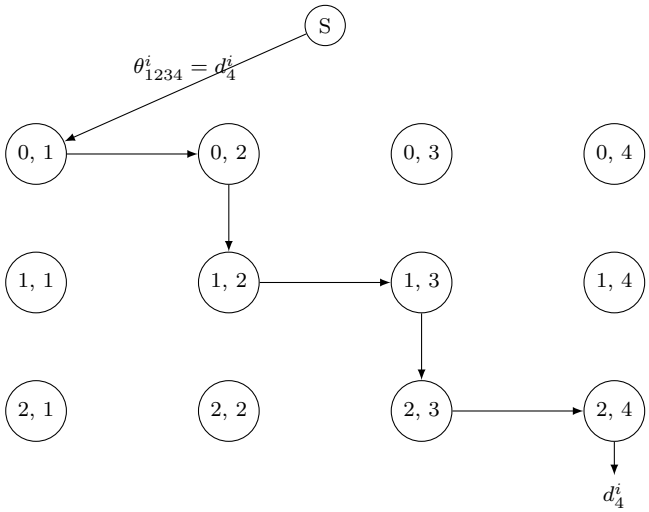

Figure 4: Graphical representation of the flow decomposition in paths θ^i for $t = 4$

We now need to prove that the constraints of the formulation TP are satisfied with the variables θ built as in the example previously.

1. Constraints (70). For any $i \in R$ and any $t \in T$, we have $\sum_{k=1}^{t} w_{kt}^{2i} = d_t^i$. Therefore, by immediate subsitution $\sum_{q=1}^{t}\sum_{r=q}^{t}\sum_{s=r}^{t}\theta_{qrst}^{i} = \sum_{s=1}^{t}\sum_{q=1}^{s}\sum_{r=q}^{s}\theta_{qrst}^{i} = \sum_{s=1}^{t} w_{st}^{2i} = d_t^i$. Therefore, constraints (70) hold.
2. Constraints (71)–(73). Substituting the w variables in (81)–(83) using (114)–(116) results directly in (71)–(73).
3. Objective function value. As stated previously, the formulations TP and MC have the same objective function value if (114)–(116) are used. This concludes the proof.

□

Proposition 17 $z_{LP}^{MC} = z_{LP}^{ME}$

Proof. The proof consists in showing that any solution to the LP relaxation of MC can be converted into a solution to the LP relaxation of ME and that the reverse is also true. We will thus prove that $F(MC) = F(ME)$. By the construction indicated in Section 3.5, we directly have $F(MC) \subseteq F(ME)$. We will now prove that $F(ME) \subseteq F(MC)$. Let us take a feasible solution $(w, E, y) \in F(ME)$ and construct a feasible solution $(w, \sigma, y) \in F(MC)$ with the same objective function value. We construct $(w, \sigma, y) \in F(MC)$ as follows: $\sigma_{kt}^{2i} = E_{kt}^{2i}$, $\sigma_{kt}^{1i} = E_{kt}^{1i} - E_{kt}^{2i}$ and $\sigma_{kt}^{0i} = E_{kt}^{0i} - E_{kt}^{1i}$. We furthermore directly map the w and y variables. We now verify that all constraints hold.

1. Balance constraints (78)–(80). For any $i \in R$ and any $k \leq t \in T$, constraints (80) hold directly because of constraint (90) and of the equality $\sigma_{kt}^{2i} = E_{kt}^{2i}$. For any $t \in T$, any $k \leq t$ and any $i \in R$, one can substract constraint (90) from (89) to obtain:

$$\begin{aligned} E_{k-1,t}^{1i} - E_{k-1,t}^{2i} + w_{kt}^{1i} - w_{kt}^{2i} &= (1-\delta_{kt})(E_{kt}^{1i} - E_{kt}^{2i}) \\ \Leftrightarrow \sigma_{k-1,t}^{1i} + w_{kt}^{1i} &= w_{kt}^{2i} + (1-\delta_{kt})\sigma_{kt}^{1i}. \end{aligned}$$

   In the previous calculations, we have used the fact that constraints (89) and (90) hold for any retailer i and any $k \leq t \in T$. If $k < t$, we directly have (79) since $\delta_{kt} = 0$. If $k = t$, it is obvious that any optimal solution will have $\sigma_{tt}^{li} = 0$ since it represents the inventory on hand at the end of period t to satisfy the demand of the current period. Thus, constraints (79) hold. Using a similar approach, one can prove that constraints (78) hold.
2. Constraints (81)–(84). These constraints directly hold since the production and setup variables used in formulations MC and ME are the same.
3. Constraint (85). Due to constraints (91) and (92), constraints (85) directly hold.
4. Objective function value. A straightforward substitution of the E variables for the σ variables in the objective function of formulation ME directly gives the objective function expression of formulation MC. This concludes the proof. □

Proposition 18 $z_{LP}^{TP} \leq z_{LP}^{N}$

Proof. Let $z_{LP}^{TP}(\theta, y)$ and $z_{LP}^{N}(\psi, y)$ be the LP relaxation objective function values of $(\theta, y) \in F(TP)$ and $(\psi, y) \in F(N)$, respectively. To prove the result, we prove that $F(N) \subseteq F(TP)$. The counter example presented at the beginning of the section shows that the strict inequality holds in some cases. Let us take a feasible solution $(\psi, y) \in F(N)$ and construct a feasible solution $(\theta, y) \in F(TP)$ with the same objective function value. We construct $(\theta, y) \in F(TP)$ as follows:

$$\theta_{klst}^{i} = \sum_{j=t}^{|T|} d_t^i \psi_{klsj}^{i} \qquad \forall k \leq l \leq s \leq t \in T. \tag{123}$$

We directly map the y variables since they are the same in both formulations. We show hereafter that (θ, y) constructed using (123) belongs to $F(TP)$.

1. Constraints (70). If, for any $i \in R$ and any demand point $k \in T$, we sum up constraints (62) over t $(2 \leq t \leq k)$ with constraint (61), one gets

$$\sum_{t=1}^{|T|} \psi^i_{111t} + \sum_{t=2}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{|T|} \psi^i_{plts} - \sum_{t=2}^{k}\sum_{p=1}^{t-1}\sum_{l=p}^{t-1}\sum_{s=l}^{t-1} \psi^i_{p,l,s,t-1} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{|T|} \psi^i_{plts} - \sum_{t=2}^{k}\sum_{p=1}^{t-1}\sum_{l=p}^{t-1}\sum_{s=l}^{t-1} \psi^i_{p,l,s,t-1} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} \psi^i_{plts} + \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{k-1} \psi^i_{plts} - \sum_{t=2}^{k}\sum_{p=1}^{t-1}\sum_{l=p}^{t-1}\sum_{s=l}^{t-1} \psi^i_{p,l,s,t-1} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} \psi^i_{plts} + \sum_{t=1}^{k-1}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{k-1} \psi^i_{plts} - \sum_{t=1}^{k-1}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=l}^{t} \psi^i_{plst} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} \psi^i_{plts} + \sum_{t=1}^{k-1}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{k-1} \psi^i_{plts} - \sum_{s=1}^{k-1}\sum_{p=1}^{s}\sum_{l=p}^{s}\sum_{t=l}^{s} \psi^i_{plts} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} \psi^i_{plts} + \sum_{t=1}^{k-1}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{k-1} \psi^i_{plts} - \sum_{t=1}^{k-1}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=t}^{k-1} \psi^i_{plts} = 1$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} \psi^i_{plts} = 1$$

$$\Rightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t}\sum_{s=k}^{|T|} d^i_k \psi^i_{plts} = d^i_k$$

$$\Leftrightarrow \sum_{t=1}^{k}\sum_{p=1}^{t}\sum_{l=p}^{t} \theta^i_{pltk} = d^i_k$$

$$\Leftrightarrow \sum_{p=1}^{k}\sum_{l=p}^{k}\sum_{t=l}^{k} \theta^i_{pltk} = d^i_k$$

Thus, constraints (70) hold. Note that the single implication that appears in the previous calculations comes from the special case where $d^i_k = 0$ for some i and some k.

2. Constraints (71). For any $i \in R$ and any $t \leq q \in T$, let us define a parameter a^i_{tq} as follows:

$$a^i_{tq} = \begin{cases} 1 & \text{if } D^i_{tq} > 0 \\ 0 & \text{otherwise.} \end{cases}$$

With this parameter, (123) can be written as $\theta^i_{klst} = \sum_{j=t}^{|T|} a^i_{sj} d^i_t \psi^i_{klsj}$ since $a^i_{sj} = 1$ for $s \leq t \leq j \in T$ if $d^i_t > 0$, otherwise θ^i_{klst} becomes zero. For any retailer i and for any $k \leq t \in T$, (63) gives

$$\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{j=t:d^i_{sj}>0}^{|T|} \psi^i_{klsj} \leq y^p_k$$

$$\Leftrightarrow \sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{j=t}^{|T|} a^i_{sj}\psi^i_{klsj} \leq y^p_k$$

$$\Leftrightarrow \sum_{l=k}^{t}\sum_{s=l}^{t} \frac{\theta^i_{klst}}{d^i_t} \leq y^p_k$$

$$\Leftrightarrow \sum_{l=k}^{t}\sum_{s=l}^{t} \theta^i_{klst} \leq d^i_t y^p_k.$$

Therefore, constraints (71) hold. In the same vain, one can prove that constraints (72) and (73) also hold.

3. Objective function value. The holding cost linked to the production plant in formulation N is given by

$$\sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{j=k}^{l-1} hc_j^p d_{st}^i \psi_{klst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{j=k}^{l-1}\sum_{u=s}^{t} hc_j^p d_u^i \psi_{klst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{u=s}^{t}\sum_{j=k}^{l-1} hc_j^p d_u^i \psi_{klst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{u=s}^{t} d_u^i \psi_{klst}^i \sum_{j=k}^{l-1} hc_j^p$$

$$= \sum_{i\in R}\sum_{k=1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{u=s}^{|T|}\sum_{t=u}^{|T|}\left(\sum_{j=k}^{l-1} hc_j^p\right) d_u^i \psi_{klst}^i$$

$$= \sum_{i\in R}\sum_{k=1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{u=s}^{|T|}\left(\sum_{j=k}^{l-1} hc_j^p\right)\theta_{klsu}^i$$

$$= \sum_{i\in R}\sum_{k=1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{u=s}^{|T|}\sum_{j=k}^{l-1} hc_j^p \theta_{klsu}^i$$

$$= \sum_{i\in R}\sum_{k=1}^{|T|}\sum_{l=k}^{|T|}\sum_{s=l}^{|T|}\sum_{t=s}^{|T|}\sum_{j=k}^{l-1} hc_j^p \theta_{klst}^i$$

$$= \sum_{i\in R}\sum_{t=1}^{|T|}\sum_{k=1}^{t}\sum_{l=k}^{t}\sum_{s=l}^{t}\sum_{j=k}^{l-1} hc_j^p \theta_{klst}^i,$$

which is exactly the holding cost linked to the production plant in the objective function of formulation TP. Using a similar approach, one can prove the equivalence between formulations N an TP for the holding costs at the warehouse and retailer level. Besides, the setup costs in the two formulations are already identical. Therefore, the objective function expression of the TP and N formulations are the same. This concludes the proof.

□

4 Numerical experiments

In order to assess the strengths and weaknesses of the different formulations, we conducted computational experiments based on the instances used in Solyalı and Süral [37]. In their experiments, Solyalı and Süral [37] set the number of retailers $|R|$ equal to 50, 100 or 150, and the length of the time horizon $|T|$ is equal to 15 or 30. The demand at the retailers is generated both in a static and dynamic way from U[5, 100]. The fixed costs at all levels are also generated both in a static and in a dynamic way. For the warehouse, the fixed costs are generated from U[1500, 4500]. For the retailers, the fixed costs are generated from U[5, 100]. All the demands and fixed costs are generated as integer values. The unit inventory holding costs are static and are set to 0.5 for the warehouse. For the retailers, the unit inventory holding costs are also static and are generated from U[0.5, 1]. The holding costs take continuous values. The authors generated 10 random instances for each combination of settings, resulting in a total of 240 instances.

As we have one more level than in Solyalı and Süral [37], we adapted these instances. In our instances, the number of retailers $|R|$ is set equal to 50, 100 or 200. The number of warehouses $|W|$ is set equal to 5, 10, 15 or 20. We used two different horizon lengths: $|T| = 15$ and 30. The demand at the retailers is generated both in a static and dynamic way from U[5, 100]. In the case of a static demand, we have $d_t^r = d^r \ \forall \ t \in T, r \in R$. The fixed costs at all levels are also generated in a static and in a dynamic way. For the production plant, the fixed costs are generated from U[30000, 45000]. For the warehouses, the fixed costs are generated from U[1500, 4500]. For the retailers, the fixed costs are generated from U[5, 100]. All the demands and fixed costs are generated as integer values. The unit inventory holding costs are static and are set to 0.25 for the production plant and 0.5 for the warehouses. For the retailers, the unit inventory holding costs are generated from U[0.5, 1]. The holding costs take continuous values. For each combination of settings, we generate five different instances leading to 480 different instances to be solved for each formulation.

In order to test our formulations, we additionnally define two structures for the distribution network represented in Figure 1. In the first structure, we consider a balanced network where each warehouse has the same number of retailers, except when the number of retailers is not a multiple of the number of warehouses. In the second structure, we consider an unbalanced network where 80% of the retailers are assigned to 20% of the warehouses. For each pair $(|W|, |R|)$, Tables 2 and 3 give the number of retailers assigned to each warehouse for the balanced and unbalanced networks, respectively. Each structure is tested on the 480 instances we generated.

Table 2: Assignment of the retailers to the warehouses for the balanced network

Number of warehouses	Number of retailers 50	100	200
5	10 $\forall w \in W$	20 $\forall w \in W$	40 $\forall w \in W$
10	5 $\forall w \in W$	10 $\forall w \in W$	20 $\forall w \in W$
15	3 if $w \in [\![1, 10]\!]$ 4 if $w \in [\![11, 15]\!]$	6 if $w \in [\![1, 5]\!]$ 7 if $w \in [\![6, 15]\!]$	14 if $w \in [\![1, 10]\!]$ 12 if $w \in [\![12, 15]\!]$
20	3 if $w \in [\![1, 10]\!]$ 2 if $w \in [\![11, 20]\!]$	5 $\forall w \in W$	10 $\forall w \in W$

Table 3: Assignment of the retailers to the warehouses for the unbalanced network

Number of warehouses	Number of retailers 50	100	200
5	40 if $w = 1$ 3 if $w \in [\![2, 3]\!]$ 2 if $w \in [\![4, 5]\!]$	80 if $w = 1$ 5 if $w =\in [\![2, 5]\!]$	160 if $w = 1$ 10 if $w =\in [\![2, 5]\!]$
10	17 if $w \in [\![1, 2]\!]$ 2 if $w \in [\![3, 10]\!]$	38 if $w \in [\![1, 2]\!]$ 3 if $w \in [\![3, 10]\!]$	80 if $w \in [\![1, 2]\!]$ 5 if $w \in [\![3, 10]\!]$
15	9 if $w \in [\![1, 2]\!]$ 8 if $w = 3$ 2 if $w \in [\![4, 15]\!]$	25 if $w \in [\![1, 2]\!]$ 26 if $w = 3$ 2 if $w \in [\![4, 15]\!]$	54 if $w \in [\![1, 2]\!]$ 56 if $w = 3$ 3 if $w \in [\![4, 15]\!]$
20	5 if $w \in [\![1, 2]\!]$ 4 if $w \in [\![3, 4]\!]$ 2 if $w \in [\![5, 20]\!]$	17 if $w \in [\![1, 4]\!]$ 2 if $w \in [\![5, 20]\!]$	38 if $w \in [\![1, 4]\!]$ 3 if $w \in [\![5, 20]\!]$

For the experiments, we used the CPLEX 12.6.1.0 C++ library and turned off CPLEX's parallel mode. We set the CPLEX MIP tolerance parameter to 10^{-6}. All the other CPLEX parameters are set to their default value. The computation time limit imposed to solve each MIP instance is 6 hours.

We compare the formulations with respect to different indicators:

- number of instances for which the MIP is solved to optimality;
- CPU time (s) taken to solve the LP relaxation;
- CPU time (s) taken to solve the MIP;
- objective function value of the LP relaxation;
- objective function value of the MIP optimal solution when available, cost of the best solution found otherwise;
- number of nodes in the branch-and-cut tree;
- integrality gap (%);
- optimality gap (%).

For a particular instance, if we denote by z^X_{LP} the objective function value of the LP relaxation with formulation X and by z^* the optimal objective function value of this instance when available (or the best objective function value obtained among all formulations for this instance otherwise), the integrality gap is computed as $(z^* - z^X_{LP}) \,/\, z^*$. The optimality gap is the gap between the best solution found and the best lower bound given by CPLEX at the end of the CPU time limit. Detailed results can be found in the appendices of this report.

In the following sections, results will be reported in two tables. The first table illustrates the aggregated results obtained for $|T| = 15$ while the second table displays the aggregated results obtained for $|T| = 30$. In each table, each row represents the results obtained for a particular formulation while each column refers to the different indicators previously defined. In the tables, MIP-opt denotes the number of MIP optimal solutions obtained (out of 240 instances in each table); LP-CPU and MIP-CPU represent the CPU time taken to solve the LP and MIP instances, respectively; LP-cost and MIP-cost represent the cost of the LP and MIP optimal solutions (or best solution found at the end of the time limit for the MIP solutions), respectively; I-gap gives the integrality gap and O-gap indicates the optimality gap. In Sections 4.1 and 4.2 we will report the results for the uncapacitated and capacitated instances, respectively. In Section 4.3, we will perform an analysis of the influence of the parameters in our experiments.

4.1 Uncapacitated instances

We first report the results for the balanced network in Section 4.1.1, followed by the unbalanced network in Section 4.1.2. For the uncapacitated instances, we performed our experiments on a 3.07 GHz Intel Xeon processor with only one thread. For these instances, CPLEX was able to find a feasible MIP solution for all uncapacitated instances with a balanced network and with an unbalanced network. The LP relaxation values are calculated separately. Note that we do not impose any time limit to solve the LP relaxations.

4.1.1 Balanced network

In the balanced network, each warehouse is responsible for approximately the same number of retailers (see Table 2).

Tables 4 and 5 illustrate the performance of the different MIP formulations for $|T| = 15$ and $|T| = 30$, respectively. In Table 4, which presents the results for the small instances, one can see that the formulations MC, MCE, N and TP obtain the best performance in general, with all MIP optimal solutions found, the lowest MIP-CPU and a value of the LP relaxation which is very close to the optimal MIP cost. Yet, the LP relaxation for these three formulations is not the same as the MIP optimal cost, as witnessed by the small but positive values for the I-gap. Besides, the MC formulation has the lowest MIP-CPU time among all formulations. However, the CPU time needed to solve the LP relaxation of these formulations is much higher than with the other formulations. The high performance of these formulations is also expected because of the rich information which is contained in the decision variables used for each formulation.

Table 4: Performance of the formulations for the balanced network - 1h time limit, $|T| = 15$

Formulation	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-opt	I-gap	O-gap
C	186156	0.03	327484	8291.35	71832.2	157	40.94	2.94
C-N	225136	0.2	327315	10023.89	202204.1	141	29.89	3.12
C-TP	225136	0.13	327247	8567.71	29431	158	29.89	2.78
C-LS	225136	0.19	327501	8337.91	14132.7	158	29.89	3.26
ES	186156	0.02	326906	600.53	29725.7	240	40.94	0
ES-N	320903	0.47	326906	117.47	4253.7	240	1.62	0
ES-TP	320903	1.69	326906	176.9	2652.1	240	1.62	0
ES-LS	320897	1.51	326906	297.58	1760.4	240	1.62	0
ES-F	186156	0.03	326906	875.35	29628	238	40.94	0
ES-F-N	320903	0.7	326906	120.92	3401.4	240	1.62	0
ES-F-TP	320903	1.3	326906	214.16	3673.9	240	1.62	0
ES-F-LS	320897	1.12	326906	208.61	3110.4	240	1.62	0
MC	326832	26.45	326906	35.51	0.7	240	0.02	0
MCE	326832	37.8	326906	40.44	0.7	240	0.02	0
N	326887	121.27	326906	74.25	0.3	240	0	0
T	326832	80.21	326906	81.67	0.8	240	0.02	0

Table 5: Performance of the formulations for the uncapacitated balanced network - $|T| = 30$

Formulation	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-opt	I-gap	O-gap
C	240367	0.07	664638	21600.07	35356.6	0	60.86	24.58
C-N	338679	0.83	705070	21600.19	19020.5	0	46.62	30.58
C-TP	338679	0.62	780467	21600.2	3018	0	46.62	29.57
C-LS	338679	2	771246	21516.86	4602.1	0	46.62	28.39
ES	240367	0.05	645908	15252.18	91231.2	84	60.86	4.03
ES-N	624974	6.77	643306	6069.55	53462.9	186	2.77	0.09
ES-TP	624974	30.3	643714	7744.16	14847.4	175	2.77	0.64
ES-LS	624935	4.09	644312	9034.64	4785.6	160	2.77	0.78
ES-F	240367	0.14	644747	14404.42	24790.8	90	60.86	2
ES-F-N	624974	11.14	643863	6270.86	32940.9	181	2.77	0.1
ES-F-TP	624974	26.5	643385	8174.27	23707.9	173	2.77	0.4
ES-F-LS	624935	5.04	643843	9930.78	17481.5	155	2.77	0.76
MC	642779	826.09	643303	1021.77	5.1	240	0.08	0
MCE	642779	996.56	643303	1276.72	5.2	240	0.08	0
N	643057	27969.13	1068367	9209.08	0.9	188	0.04	16.86
T	642779	1901.78	693483	5773.58	2.4	211	0.08	3.62

For the small instances, the classical formulations obtain the worst results, mainly because of a poor LP relaxation as shown by the integrality gap reported in Table 4. The echelon stock based formulations can be divided into two groups with formulations ES and ES-F on one side, and formulations ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS on the other side. The last six formulations are much stronger than the first two formulations, as indicated by the integrality gap reported in Table 4. Formulations ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS were able to solve all instances, which is not the case for the ES-F formulations. This better performance of formulations ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS is easily explained by the use of a reformulation of the uncapacitated lot sizing structure found in the ES formulation, and the resulting improved LP bound.

The classical based formulations have in general a much higher number of nodes in the branch-and-cut tree than the other formulations, which is a consequence of the weak LP relaxation bound. The same remarks hold for the formulations ES and ES-F. For the MC, MCE, N and TP formulations, the number of nodes is really small, less than 1 on average, showing the high performance of the LP relaxation. Concerning the O-gap, the classical based formulations have a gap of approximately 3% while the other formulations have an average gap that is less than 0.0003%. This illustrates once again the weakness of the classical based formulations. Note that for the N and TP formulations, the LP-CPU is higher than the MIP-CPU because of the efficiency of the heuristic used by CPLEX at the root node before going in the branch-and-cut tree.

Finally, one can see in Table 4 that despite the reformulation used at the retailer level or the valid inequalities added, the C-N, C-TP and C-LS formulations do not succeed in closing a lot of the integrality gap, which remains high around 30%. This contrasts with the same reformulations or valid inequalities

added in the ES formulation but at all levels instead of just at the retailer level. Indeed, the I-gap for the ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS formulations is low, around 1.6%. This indicates that the combination of the reformulation and the echelon stock structure is very efficient if we compare the performance of the ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS formulations to the one of the classical formulations.

Table 5 reports the performance of each formulation for the large instances, with $|T| = 30$. The poor performance of the classical formulations is even more apparent for these large instances. Yet, the LP relaxations are still easily solved to optimality but have a low value compared to the true MIP optimal cost. The performance of the richer formulations N, TP, MC and MCE is also more contrasted than for the small instances. The number of instances solved to optimality for the N formulation is much lower than for the three other rich formulations. This can be explained by the inability of the N formulation to solve the LP relaxation of the instances in a short time. One can see a similar behavior, but to a lesser extent, for the TP formulation. This difficulty for the formulations N and TP to even solve the LP relaxations of many large instances can be explained by the huge number of variables used in the models when $|T| = 30$, which is a major drawback of these two formulations. This practical drawback is the price one has to pay for the strong LP relaxation given by these two formulations, as stated by the theoretical results presented in Section 3.7. Finally, the MC formulation still provides the best performances for these large instances, both in terms of CPU time to solve the MIP instances and in terms of number of optimal solutions found within the time limit.

In light of the results provided in Tables 4 and 5, we can draw the following conclusions about the performance of our formulations on an uncapacitated balanced network:

- the classical formulations are the poorest, mainly because of a bad LP relaxation and providing a stronger reformulation only at the retailer level does not lead to better results at the MIP level;
- applying the echelon stock reformulation to the classical formulation does not have any impact on the LP relaxation value (as we also theoretically proved), but results nevertheless show a substantial improvement in CPU time, optimality gap and number of instances solved to optimality. The conjecture is that because the echelon stock reformulation exposes the single item lot sizing structure at the three different levels, CPLEX is able to derive better cuts;
- the echelon stock reformulation can still be improved by explicitly using one of the lot sizing reformulations at each level, i.e., using formulations ES-N, ES-TP, ES-LS, ES-F-N, ES-F-TP and ES-F-LS, with ES-N generally having the best performance among these six formulations;
- when comparing the various echelon stock reformulations with the traditional echelon stock constraints (33) to their counterpart using the constraint proposed in Federgruen and Tzur (57), we observe individual differences, but overall no general tendencies appear and the formulations provide fairly similar results;
- the N and TP formulations have difficulty to solve the LP relaxations of some instances because of the huge size of the model resulting in an overall substantially weaker performance compared to the best formulation;
- the MC formulation performs the best for the balanced network;
- the results we obtained here are in line with the ones obtained by Solyalı and Süral [37] and Cunha and Melo [8] for the OWMR.

4.1.2 Unbalanced network

We performed the same experiments as in Section 4.1.1 but considering an unbalanced distribution network. In the unbalanced network, 20% of the warehouses are responsible for 80% of the retailers (see Table 3).

Tables 6 and 7 illustrate the performance of our formulations for the small and large instances, respectively. In Table 6, one can see that, compared to Table 4 and except for the classical formulations, there is an increase in CPU time to solve the instances as MIPs. This increase ranges between 0.16% and 78.5% for the ES formulation and for the ES-F-LS formulation, respectively. As far as the classical based formulations are concerned, they have a better performance on the unbalanced network, compared to the balanced network, in

Table 6: Performance of the formulations for the uncapacitated unbalanced network - $|T| = 15$

Formulation	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-opt	I-gap	O-gap
C	177633	0.02	310925	5668.75	21108.3	197	40.78	0.66
C-N	217549	0.18	310882	5267.93	119965	197	28.84	0.28
C-TP	217549	0.12	310892	5285.29	19746.6	197	28.84	0.68
C-LS	217549	0.18	311225	7311.02	4038	169	28.84	2.61
ES	177633	0.02	310871	601.5	14711.3	239	40.78	0
ES-N	300182	0.55	310871	182.27	4045.6	240	2.99	0
ES-TP	300182	1.68	310871	262.02	3084	240	2.99	0
ES-LS	300178	1.6	310871	413.61	2917.2	240	2.99	0
ES-F	177633	0.04	310871	1165.83	17758	240	40.78	0
ES-F-N	300182	0.89	310871	186.75	3731.2	240	2.99	0
ES-F-TP	300182	1.92	310871	303.41	3814.9	240	2.99	0
ES-F-LS	300178	1.24	310871	372.34	3508.8	240	2.99	0
MC	310750	20.33	310871	39.88	1.6	240	0.03	0
MCE	310750	41.06	310871	48.25	1.6	240	0.03	0
N	310832	125.33	310871	112.39	1	240	0.01	0
T	310750	58.37	310871	93.97	2.7	240	0.03	0

Table 7: Performance of the formulations for the uncapacitated unbalanced network - $|T| = 30$

Formulation	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-opt	I-gap	O-gap
C	231785	0.06	624878	21103.84	36751.6	10	60.35	19.39
C-N	330865	0.73	627028	21600.18	25819	0	45.2	26.26
C-TP	330865	0.54	642133	21600.15	4824.3	0	45.2	23.54
C-LS	330865	1.81	647389	21600.2	3378.2	0	45.2	23.9
ES	231785	0.05	613737	14747.68	26616.9	91	60.35	4.89
ES-N	583375	8	610963	8690.4	30168.7	164	4.14	0.37
ES-TP	583375	29.78	611589	10271.05	15351.3	149	4.14	1.36
ES-LS	583349	6.53	612763	12294.87	7218.3	128	4.14	1.63
ES-F	231785	0.17	613421	14546.53	14335	90	60.35	2.99
ES-F-N	583375	20.82	611004	9512	24099.6	157	4.14	0.45
ES-F-TP	583375	45.58	611424	10509.58	18437.7	147	4.14	1.11
ES-F-LS	583349	10.48	612275	11766.99	10525.3	130	4.14	1.63
MC	610109	460.85	610908	1363.92	19.2	240	0.1	0
MCE	610109	994.48	610908	1476.23	18.7	239	0.1	0
N	610542	11473.94	828581	8018.58	3.7	204	0.04	9.05
T	610109	1700.49	705844	6356.45	14.7	201	0.1	5.55

terms of CPU time used to solve the MIP instances, number of MIP optimal solutions found and integrality and optimality gap. Note, however, that the improvements for the integrality gap is very limited compared to the other improvements. Despite these improvements, the performance of the classical formulations is still far from the performance of the other formulations, highlighting once again the weakness of the classical formulations. Apart from the two points mentioned here, all the other conclusions drawn in Section 4.1.1 for the small instances with a balanced network still hold for an unbalanced structure of the supply network.

In Table 7, one can see that there are once again small improvements for the classical formulations compared to instances solved on a balanced network. For the other formulations, the performance is worse than in the case of a balanced network. This difficulty is in particular reflected in the number of optimal MIP solutions found, which decreases by a number ranging from 0 for the MC formulation and up to 32 for the ES-LS formulation. This indicates that the unbalanced instances are harder to solve than the balanced instances. This difficulty can be explained by the fact that, in the network, the warehouses that are responsible for many retailers represent a much larger MIP to solve. Compared to the balanced instances, we have thus several big distribution channels to cope with, which makes the instances harder to solve. Note, however, that formulations C, ES and N were able to find more optimal MIP solutions for the unbalanced instances.

In light of the results provided in Tables 6 and 7, we can draw the following conclusions about the performance of our formulations on an unbalanced network:

- the unbalanced instances are generally harder to solve than the balanced instances;
- the C based formulations, the N and the ES formulations have a better performance on the unbalanced instances than on the balanced ones in terms of number of instances solved to optimality;
- the other formulations have a worse performance on the unbalanced instances compared to the balanced ones;
- the N and TP formulations have a large O-gap for many large instances;
- the MC formulation is the best suited for the unbalanced instances since it is able to solve all instances to optimality with the lowest CPU time.

4.2 Capacitated instances

For the capacitated instances, we set the production capacity as a given factor C of the average total demand. The production capacity imposed is thus $C_t = C \sum_{i \in R} \sum_{t \in T} d_t^i \,/\, |T|$. We additionally consider three different values for the capacity factor $C : C \in \{2, 1.75, 1.5\}$. We performed these experiments on a 6.67 GHz Intel Xeon X5650 Westmere processor with one thread. Because of the bad performance of the classical based formulations and of the formulations ES and ES-F in the previous section, and based on preliminary results, we decided not to run experiments using these formulations. Note that for the capacitated instances we impose a time limit of 6 hours even to solve the LP instances.

The results of this section will be reported in tables having the same columns as the tables in Section 4.1 plus two additional columns indicating the number of LP optimal solutions found within the time limit and the number of instances for which a MIP solution was found, in columns LP-opt and MIP-sol, respectively. For the columns LP-cost and I-gap, we only report the average cost and integrality gap obtained, respectively, over instances for which all formulations have both solved the LP relaxation to optimality and have found a MIP solution within the time limit. In the same vein, for the columns MIP-cost, Nodes and O-gap, we only report the average MIP cost, number of nodes and optimality gap obtained, respectively, over instances for which all formulations have found a MIP solution within the time limit. We first report the results for the balanced network in Section 4.2.1, followed by the unbalanced network in Section 4.2.2.

4.2.1 Balanced network

Tables 8–13 illustrate the performance of the different MIP formulations for the different values of the time horizon and capacity level. When comparing the results with those obtained for the uncapacitated instances on the balanced network, we can see that the results are completely different. Indeed, the richer formulations have more trouble achieving a good performance in terms of CPU time, MIP cost, number of MIP optimal solutions found and optimality gap. On the contrary, the echelon stock formulations have a better performance than the richer formulations on these indicators. This difference in performance is even more pronounced when the capacity level gets tighter. This indicates that the capacity constraint has a major impact on the performance of the formulations. Despite the properties related to the strength of their LP relaxation, the richer formulations seem to be less adequate to handle capacitated instances.

We also see that the MC formulation does not perform the best for the capacitated instances on the balanced network. The best performance, in terms of MIP-CPU time, number of optimal solutions found and optimality gap, is obtained by one of the echelon stock formulations, depending on the capacity level. Within the richer formulations, our newly introduced MCE formulation performs the best on average. Note also that the addition of the capacity constraint makes the problem harder, as stated by the increase in CPU time to solve both the MIP and LP instances. This difficulty is also apparent by observing that the number of MIP solutions found is not equal to the number of instances present in the data set used for the experiments.

Table 8: Performance of the formulations for the capacitated balanced network - $|T| = 15, C = 2.0$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	514798	1.06	240	510641	9517.05	141103	161	207	4.69	0.06
EST	514798	2.39	240	510677	10367.67	38086.4	151	240	4.69	0.1
ESLS	514786	1.71	240	510675	9030.44	37633.7	164	233	4.7	0.1
ES-F-N	514798	1.14	240	510641	9914.74	119257.7	156	220	4.69	0.05
ES-F-T	514798	1.48	240	510694	10892.41	59856.5	144	237	4.69	0.1
ES-F-LS	514786	1.5	240	510730	10732.17	50980.4	146	237	4.7	0.13
MC	519979	185.39	240	511242	16582.34	9397.9	92	240	3.76	1.02
MCE	519979	192.17	240	511042	14987.63	6900.8	113	240	3.76	0.77
N	520090	173.84	240	511024	17180.75	4452.9	89	240	3.74	0.92
T	519979	398.16	240	511809	18104.03	3372.2	76	240	3.76	1.14

Table 9: Performance of the formulations for the capacitated balanced network - $|T| = 30, C = 2.0$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	942317	18.72	240	904162	21544.09	107672.3	2	240	1.83	1
EST	942317	24.31	240	904226	21576.36	25025.4	1	240	1.83	1.16
ESLS	942276	7.91	240	904223	21538.3	26318.8	2	231	1.83	1.07
ES-F-N	942317	15.15	240	904163	21587.23	55846.7	1	240	1.83	1.05
ES-F-T	942317	26.26	240	904256	21600.23	31181.1	0	230	1.83	1.11
ES-F-LS	942276	8.89	240	904321	21591.14	21633.9	1	240	1.83	1.36
MC	950697	2626.04	240	905226	21600.5	1371.2	0	240	1	1.63
MCE	950697	2522.05	240	904873	21602.85	1543.1	0	240	1	1.55
N	950883	7689.24	191	904841	21705.65	89.8	0	141	0.98	14.78
T	950697	8999.21	193	906231	21866.83	61.9	0	191	1	22.66

Table 10: Performance of the formulations for the capacitated balanced network - $|T| = 15, C = 1.75$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	559141	1.18	240	572268	11059.05	118612.4	142	231	3.88	0.31
EST	559141	2.48	240	572377	15230.97	47566.4	80	161	3.88	0.32
ESLS	559131	1.88	240	572395	14929.48	43995.6	83	159	3.88	0.32
ES-F-N	559141	1.16	240	572279	14882.05	110598.3	81	150	3.88	0.28
ES-F-T	559141	1.58	240	572384	13894.41	59972.3	106	218	3.88	0.35
ES-F-LS	559131	1.66	240	572430	14001.68	44803.5	100	182	3.88	0.37
MC	564010	144.67	240	573036	17253.53	15058.5	83	240	3.06	0.9
MCE	564010	153.53	240	572939	17060.25	12080.5	83	240	3.06	0.8
N	564113	113.09	240	573023	17532.16	10689.8	77	240	3.04	0.72
T	564010	283.63	240	573307	18183.12	10585.5	67	240	3.06	1.06

Table 11: Performance of the formulations for the capacitated balanced network - $|T| = 30, C = 1.75$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	1039555	17.06	240	1008623	21600.1	41473.5	0	234	4.04	3.42
EST	1039555	21.94	240	1008814	21562.91	27470.6	2	236	4.04	0.98
ESLS	1039519	8.75	240	1008846	20913.82	34887.1	13	128	4.04	0.64
ES-F-N	1039555	16.97	240	1008642	21600.35	28611.6	0	240	4.04	3.5
ES-F-T	1039555	26.38	240	1008828	21600.22	39757.8	0	220	4.04	0.61
ES-F-LS	1039519	10.13	240	1008907	21582.47	22652.9	1	236	4.04	3.06
MC	1047761	2460.44	240	1009976	21602.48	1250.3	0	240	3.31	4.06
MCE	1047761	2196.98	240	1009805	21473.28	2074.7	6	239	3.31	2.75
N	1047959	6634.88	202	1009953	21673.02	54.8	0	131	3.29	17.99
T	1047761	7936.58	203	1010453	21737.07	44.7	0	210	3.31	19.81

Finally, note that in Tables 9, 11 and 13, for formulations N, TP, MC and MCE, the values obtained for O-gap is higher than the values obtained for I-gap. Since the I-gap is calculated relative to the optimal or best solution found among all formulations this indicates that these formulations have a good LP relaxation but are unable to provide a MIPsolution with a low objective function value.

Table 12: Performance of the formulations for the capacitated balanced network - $|T| = 15, C = 1.5$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	621721	1.7	240	583124	13304.05	184360.4	116	198	1.3	0.15
EST	621721	2.71	240	583221	14763.63	74318	99	210	1.3	0.22
ESLS	621714	3.1	240	583280	13068.93	52541.1	112	190	1.3	0.22
ES-F-N	621721	1.34	240	583119	13388.01	189937.4	112	193	1.3	0.15
ES-F-T	621721	1.8	240	583187	14895.36	98617	96	207	1.3	0.2
ES-F-LS	621714	2.09	240	583231	14321.8	65407.7	101	205	1.3	0.21
MC	626314	136.62	240	583888	17125.63	19017.5	75	238	0.58	0.23
MCE	626314	156.63	240	583528	16940.93	20167.1	78	234	0.58	0.21
N	626403	124.95	240	583690	18349.35	12262	62	212	0.57	0.24
T	626314	360.09	240	584047	18712.05	11320.1	55	227	0.58	0.32

Table 13: Performance of the formulations for the capacitated balanced network - $|T| = 30, C = 1.5$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	1174947	18.96	240	935711	21561.77	66408.5	1	194	1.59	1.43
EST	1174947	25.97	240	935867	21587.74	25253.1	1	169	1.59	1.48
ESLS	1174914	10.5	240	935960	21500.33	31446.1	2	193	1.59	1.36
ES-F-N	1174947	19.29	240	935702	21596.85	72474.6	1	236	1.59	1.43
ES-F-T	1174947	30.31	240	935812	21600.2	38381.7	0	234	1.59	1.43
ES-F-LS	1174914	11.96	240	935882	21516.6	28078.8	0	236	1.59	1.58
MC	1183634	2257.01	240	936937	21600.38	1858.3	0	240	0.89	3.5
MCE	1183634	1947.3	240	936360	21600.3	1762.5	0	240	0.89	3
N	1183835	5867.03	218	936620	21700.5	201.2	0	181	0.87	9.56
T	1183634	6773.7	222	937192	21781.93	175.3	0	213	0.89	9.52

4.2.2 Unbalanced network

Tables 14–19 illustrate the performance of the different MIP formulations on the unbalanced instances for the different values of the time horizon and capacity level. If we compare the results with those obtained for the uncapacitated instances on the unbalanced network, we can see similar differences as the ones observed in Section 4.2.1. The richer formulations also have more trouble obtaining a good performance than on the uncapacitated instances, and actually have a worse performance than the echelon stock formulations on numerous performance indicators. These differences are even clearer for the unbalanced instances, especially for the number of best solutions found, which is generally much higher for the echelon stock formulations. Within the richer formulations, the MCE formulation still has the best performance on average. Note finally that, compared to the balanced structure, the unbalanced structure of the supply network combined with the production capacity restriction results in general in better values for the number of MIP solutions found and for the number of MIP optimal solutions found.

Table 14: Performance of the formulations for the capacitated unbalanced network - $|T| = 15, C = 2.0$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	482906	1	240	504744	1263.92	28050.1	238	238	5.14	0
EST	482906	1.96	240	504744	2106.83	22230.3	236	240	5.14	0
ESLS	482904	1.28	240	504744	1531.26	13069.1	239	240	5.14	0
ES-F-N	482906	1.37	240	504744	971.1	22544.2	239	239	5.14	0
ES-F-T	482906	2.07	240	504744	1644.95	18161.5	238	240	5.14	0
ES-F-LS	482904	1.43	240	504744	1913.39	16423.3	238	240	5.14	0
MC	489860	142.82	240	504920	12934.8	6092.6	130	239	3.81	0.42
MCE	489860	129.69	240	504851	11098.95	6894.4	155	237	3.81	0.24
N	489920	118.19	240	504904	13804.04	5405.5	144	239	3.8	0.31
T	489860	302.27	240	505029	13626.37	4472.6	142	240	3.81	0.46

Table 15: Performance of the formulations for the capacitated unbalanced network - $|T| = 30, C = 2.0$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	907791	13.45	240	944359	19921.34	58469	27	239	2.35	1.13
EST	907791	16.8	240	944361	20266.64	28715.4	22	240	2.35	1.39
ESLS	907775	9.8	240	944359	20163.36	20849	24	219	2.35	1.39
ES-F-N	907791	20.31	240	944359	19939.28	54412.1	26	240	2.35	1.13
ES-F-T	907791	40.57	240	944359	20053.67	36504	27	240	2.35	1.25
ES-F-LS	907775	14.12	240	944359	20118.8	23147.8	23	238	2.35	1.35
MC	918996	2226.9	240	944688	21481.4	1455.2	3	240	1.19	2.36
MCE	918996	1806.59	240	944560	21522.96	1864.2	4	240	1.19	2.26
N	919144	6767.62	200	944659	21672.53	100.5	0	155	1.18	15.51
T	918996	8348.99	203	944892	21705.5	115.8	0	194	1.19	13.87

Table 16: Performance of the formulations for the capacitated unbalanced network - $|T| = 15, C = 1.75$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	526754	1.06	240	549514	2224.54	45994.8	238	240	4.26	0
EST	526754	2.01	240	549524	3193.44	28369.3	227	240	4.26	0.01
ESLS	526751	1.46	240	549516	2433.6	25883.5	236	239	4.26	0
ES-F-N	526754	1.38	240	549514	1786.29	39305.9	240	240	4.26	0
ES-F-T	526754	2.11	240	549521	2851.11	28501.2	231	240	4.26	0.01
ES-F-LS	526751	1.57	240	549536	3660.7	27184.3	225	240	4.26	0.02
MC	533035	125.55	240	549761	14359.29	10031.3	113	240	3.15	0.56
MCE	533035	122.02	240	549700	12873.73	11765.1	141	240	3.15	0.41
N	533092	106.24	240	549853	15213.96	7213.3	119	240	3.14	0.56
T	533035	391.23	240	550351	16143.75	5282.3	96	240	3.15	0.95

Table 17: Performance of the formulations for the capacitated unbalanced network - $|T| = 30, C = 1.75$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	997363	17.08	240	820837	21465.26	31462.3	2	240	4.44	3.59
EST	997363	18.61	240	820851	20596.13	24642	18	240	4.44	1.16
ESLS	997346	10.65	240	820839	20652.97	27727.7	16	236	4.44	1.2
ES-F-N	997363	21.66	240	820837	21569.18	25981.1	2	240	4.44	3.58
ES-F-T	997363	40.57	240	820847	20649.26	27377.4	17	240	4.44	0.9
ES-F-LS	997346	14.9	240	820870	21016.96	17628.5	11	239	4.44	2.67
MC	1008358	2052.43	240	821206	21600.27	1539	0	239	3.42	4.63
MCE	1008358	1608.27	240	821114	21228.93	2128.1	10	240	3.42	2.93
N	1003245	6127.87	212	821343	21691.07	96.8	0	178	3.92	14.76
T	1008358	7664.68	208	822087	21787.94	110.8	0	201	3.42	13.79

Table 18: Performance of the formulations for the capacitated unbalanced network - $|T| = 15, C = 1.5$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	587569	1.19	240	577246	5628.17	129453	203	222	1.6	0
EST	587569	2.03	240	577254	8291.62	82475.7	174	204	1.6	0.02
ESLS	587566	1.54	240	577264	7252.8	102829.8	185	215	1.6	0.02
ES-F-N	587569	1.47	240	577251	5830.11	107024.6	202	227	1.6	0
ES-F-T	587569	2.05	240	577255	6830.86	91531.8	195	225	1.6	0.01
ES-F-LS	587566	1.62	240	577268	7764.41	72522.2	184	216	1.6	0.02
MC	593073	130.26	240	577413	14334.42	26345.4	110	234	0.7	0.09
MCE	593073	134.1	240	577386	14168.51	34757.1	114	236	0.7	0.08
N	593130	105.81	240	577546	17307.97	14994.4	77	238	0.69	0.14
T	593073	321.95	240	577558	17069.16	15284	81	239	0.7	0.14

In light of the results provided in Tables 8–19, we can draw the following conclusions about the performance of our formulations on capacitated instances:

- the capacitated instances are harder to solve than the uncapacitated instances;
- the richer formulations have a relative worse performance than on uncapacitated instances compared to the echelon stock formulations;
- the echelon stock formulations are better than the richer formulations;
- within the richer formulations, the MCE formulation has the best performances.

Table 19: Performance of the formulations for the capacitated unbalanced network - $|T| = 30, C = 1.5$

Formulation	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
ESN	1120686	18.64	240	940086	20794.78	42369.6	14	239	1.81	1.42
EST	1120686	21.21	240	940100	20907.78	28587.9	10	236	1.81	1.54
ESLS	1120671	12.15	240	940115	20799.68	23392.2	13	159	1.81	1.45
ES-F-N	1120686	23.88	240	940094	20896.34	40821.4	13	239	1.81	1.39
ES-F-T	1120686	40.68	240	940101	20726.33	35502.7	13	236	1.81	1.28
ES-F-LS	1120671	16.63	240	940122	20910.24	24093	11	234	1.81	1.4
MC	1131290	1982.83	240	940358	21526.09	2193.1	2	240	0.91	2.58
MCE	1131290	1472.36	240	940314	21551.76	3249	1	240	0.91	2.2
N	1131441	5397.68	218	940574	21810.5	155.1	0	203	0.89	13.01
T	1117718	6687.1	217	940594	21838.89	130.3	0	182	1.87	13.54

4.3 Influence of the parameters

Table 20 reports the performance of the MC formulation for all experiments with a balanced uncapacitated network and with $|T| = 30$. The first two columns indicate the parameter that varies and the respective values taken by the parameter. Since most of the following conclusions also apply for the other formulations and for the experiments with an unbalanced network, we only report here the results for the MC formulation with a balanced network. The analyses that are specific to this formulation are discussed at the end of this section. All the other results are available in the appendices of this report.

In Table 20, one can see that when $|R|$ increases, the problems gets harder and the CPU time taken to solve both the LP and MIP instances increases. On the contrary, when $|W|$ increases, the CPU time taken to solve the MIP instances decreases. Indeed, with the same number of retailers, if the number of warehouses increases, the supply network has a smaller number of channels linked to each warehouse. This leads to a smaller problem per warehouse and makes the global problem easier to solve, thus reducing the CPU time and the number of nodes. The integrality gap is also lower but less significantly.

Table 20 indicates that for the MC formulation, generally the instances with dynamic fixed costs are much easier to solve compared to the instances with a static fixed cost. We further note that the dynamic demand case is generally slightly easier to solve than the static demand case.

Finally, the detailed results provided in the appendices of this report illustrate the fact that the impact of the setting of the parameters (static or dynamic demand, static or dynamic fixed cost), depends on the kind of formulation used. For the classical based formulations, apart for the very small instances where $|R| = 50$ and $|T| = 15$, the instances with a dynamic fixed cost are harder to solve, thus requiring a higher CPU time. For the ES-N, ES-TP and ES-LS formulations, the instances with a dynamic fixed cost are also harder to solve. On the contrary, for the N, TP and MC formulations, the instances with a static fixed cost are harder to solve in terms of CPU time required. For the ES and ES-F formulations, there is no clear impact of the setting of the parameters on the CPU time required to solve the instances. Note however that this result does not question the higher global performance of the MC formulation stated in the previous sections.

Table 20: Performances of the MC formulation for the uncapacitated balanced network - $|T| = 30$

Parameter	Value	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-opt	I-gap	O-gap
$\|R\|$	50	423630	60.36	423765	88.07	1.9	80	0.04	0
	100	609655	414.54	610096	643.15	4.5	80	0.08	0
	200	895053	2003.37	896048	2334.08	8.8	80	0.12	0
$\|W\|$	5	540034	587.33	541416	1451.26	14.8	60	0.23	0
	10	621960	912.23	622489	1095.86	3.5	60	0.07	0
	15	678045	1023.23	678196	827.76	1.5	60	0.02	0
	20	731078	781.58	731111	712.18	0.5	60	0	0
Costs	SF	658846	1040.45	659632	1508.85	8.6	120	0.12	0
	DF	626713	611.74	626974	534.68	1.6	120	0.04	0
Demand	SD	644294	840.35	644921	1077.51	6.4	120	0.1	0
	DD	641265	811.84	641685	966.03	3.7	120	0.06	0

5 Conclusions and future research

We have extended eleven MIP formulations proposed in the context of the OWMR and have applied them to the 3LSPD. We also introduced the ES-N, ES-F-N, ES-F-TP, ES-F-LS and MCE formulations that had not been tested before in the context of the OWMR. For our numerical experiments, we have considered two network structures (a balanced one and an unbalanced one) and have assessed the performance of the formulations proposed using several indicators. We have also considered the possibility of having production capacities at the plant level. The results indicate that, for the uncapacitated case, the unbalanced instances are harder to solve than the balanced instances and lead to a worse performance of all formulations, except for the classical formulations. On the contrary, for the capacitated case, the unbalanced instances give better values for our different performance indicators compared to the balanced instances. The classical formulations are much weaker than the other formulations and do not suit our problem, mainly because of a very weak LP relaxation. On the contrary, the MC formulation obtains the best performance on the uncapacitated instances and is able to solve all instances for both network structures. This result is similar to the conclusion of Cunha and Melo [8] for the OWMR. The other formulations obtain results that are not entirely satisfactory for the uncapacitated instances. In particular, for the rich formulations TP and N, the non-satisfactory performances on the large instances, in terms of number of MIP optimal solutions found and CPU time, are due to the huge size of the model. As a consequence, it is already very time-consuming to solve the LP relaxation of these formulations. When we impose capacity restrictions for production at the plant level, the performance of the formulations are reversed: the rich formulations have a worse performance and the echelon formulations have the best performance. Within the rich formulations, for the capacitated instances, our newly introduced MCE formulation generally has the best performance.

In future research, we want to introduce transportation capacities to limit the flows between all facilities. We will then use the results of our study and the possible substructures induced by transportation capacities to chose the best formulation possible to solve the problem, either heuristically or using decomposition methods.

Appendix A Uncapacitated instances

A.1 Balanced network results

Table 21: Performances of the C formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	122577	0.01	186936	165.88	28776.2	5	34.49	0
			SD/DF	111155	0.01	177723	60.79	3893.2	5	37.41	0
			DD/SF	112279	0.01	176582	259.24	23571.8	5	36.42	0
			DD/DF	112662	0.01	178781	53.69	3762.8	5	36.92	0
		10	SD/SF	160951	0.01	227013	23.42	8833.2	5	29.08	0
			SD/DF	136099	0.01	204215	10.09	1481.6	5	33.33	0
			DD/SF	146480	0.01	211618	8.48	1678.4	5	30.85	0
			DD/DF	138107	0.01	203923	3.29	790.4	5	32.11	0
		15	SD/SF	178970	0.01	239594	8.04	1819.4	5	25.26	0
			SD/DF	150792	0.01	222973	1.86	320.4	5	32.3	0
			DD/SF	170787	0.01	229781	2.52	785.8	5	25.69	0
			DD/DF	155497	0.01	224338	1.8	319.6	5	30.67	0
		20	SD/SF	202651	0.01	258538	4.51	1525	5	21.64	0
			SD/DF	175810	0.01	255121	1.37	143	5	31.04	0
			DD/SF	196948	0.01	251128	1.58	231.8	5	21.59	0
			DD/DF	173311	0.01	247537	1.41	160.2	5	29.93	0
	100	5	SD/SF	152620	0.02	273378	3501.49	96587.4	5	44.18	0
			SD/DF	135612	0.02	250053	2810.03	57387.4	5	45.72	0
			DD/SF	139691	0.02	261422	5314.09	137538	4	45.99	0
			DD/DF	137694	0.02	257451	2979.61	49931.6	5	46.5	0
		10	SD/SF	180870	0.02	305064	5254.58	391013.2	5	40.75	0
			SD/DF	166404	0.02	286684	6506.78	363624	4	41.94	0.08
			DD/SF	170871	0.02	295625	4459.9	258277	5	42.23	0
			DD/DF	162593	0.02	287589	14189.51	995230.2	4	43.46	0.13
		15	SD/SF	211157	0.03	339451	487.15	11362.4	5	37.79	0
			SD/DF	187942	0.03	311528	2426.65	200609	5	39.65	0
			DD/SF	208621	0.03	332588	746.04	23792.6	5	37.28	0
			DD/DF	191226	0.03	315099	1015	45996.6	5	39.31	0
		20	SD/SF	235452	0.03	363580	250.63	4407.6	5	35.29	0
			SD/DF	212211	0.03	349765	436.21	15196.6	5	39.33	0
			DD/SF	238077	0.03	364628	299.48	3604.8	5	34.72	0
			DD/DF	212460	0.03	352544	1099.02	65826	5	39.71	0
	200	5	SD/SF	179621	0.04	399808	21600.02	63195	0	55.03	3.37
			SD/DF	166145	0.04	379070	21600	178247	0	56.15	1.73
			DD/SF	180278	0.04	400476	21600.04	12832	0	54.79	9.84
			DD/DF	166800	0.03	373769	21600	67116.4	0	55.34	2.14
		10	SD/SF	209481	0.03	438333	21600.04	21465	0	52.05	7.55
			SD/DF	202278	0.03	423831	21600.06	24398.2	0	52.12	9.8
			DD/SF	209979	0.05	437929	21600.08	19254.8	0	52.02	10.1
			DD/DF	200937	0.04	429092	21600.04	22392.8	0	53.11	11.39
		15	SD/SF	242171	0.04	482875	21600.06	29683.4	0	49.27	10.09
			SD/DF	226042	0.05	474214	21600.02	32036.2	0	52	11.65
			DD/SF	234955	0.04	473465	21600.1	26790.8	0	50.07	11.08
			DD/DF	233271	0.05	469579	21600.08	25423.8	0	50.19	11.42
		20	SD/SF	286333	0.04	540251	21600.1	26141	0	47	9.89
			SD/DF	260664	0.04	510270	21600.08	26105	0	48.73	11.31
			DD/SF	288594	0.04	536560	21600.04	34181	0	46.22	9.52
			DD/DF	259361	0.04	507442	21600.08	40207.2	0	48.63	10.23

Table 22: Performances of the C formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	165656	0.02	378329	21600	67118.4	0	55.92	17.77
			SD/DF	147751	0.02	342924	21600	68137.4	0	56.48	11.82
			DD/SF	162331	0.02	371299	21600	68670.8	0	56.18	17.92
			DD/DF	147635	0.02	340482	21600	46558	0	56.41	12.56
		10	SD/SF	205508	0.03	434020	21600	74436.2	0	52.14	15.4
			SD/DF	179636	0.03	396941	21600	75278.2	0	54.35	16.18
			DD/SF	190323	0.03	410571	21600	67902.6	0	53.33	17.29
			DD/DF	183908	0.02	394677	21600	64848.6	0	53.09	14.96
		15	SD/SF	231822	0.03	457225	21600	94095.4	0	49.03	10.33
			SD/DF	208402	0.03	432856	21600	82914.4	0	51.79	9.68
			DD/SF	226566	0.03	457379	21600	92030	0	50	11.68
			DD/DF	210723	0.03	438722	21600	95459.6	0	51.62	12.16
		20	SD/SF	272717	0.03	504987	21600	80737.2	0	45.95	6.66
			SD/DF	234487	0.03	476597	21600	102881.4	0	50.64	5.24
			DD/SF	264024	0.03	506414	21600	87036.2	0	47.56	8.7
			DD/DF	236395	0.03	474275	21600	79606.4	0	49.97	8.22
	100	5	SD/SF	184715	0.04	532945	21600.08	20943.4	0	64.94	24.26
			SD/DF	173935	0.04	505985	21600.06	15823.8	0	65.25	27.13
			DD/SF	183529	0.04	531434	21600.08	17343	0	65.2	27.27
			DD/DF	177063	0.04	505455	21600.06	16587.6	0	64.47	28.91
		10	SD/SF	227167	0.05	619784	21600.04	24924.4	0	62.54	29.42
			SD/DF	212903	0.05	568069	21600.04	19524	0	62.31	29.43
			DD/SF	234893	0.05	621783	21600.1	19623.4	0	61.77	30.48
			DD/DF	213288	0.05	585688	21600.02	23250	0	62.81	30.1
		15	SD/SF	259165	0.05	661825	21600.08	25478.2	0	60.25	24.53
			SD/DF	247809	0.06	630045	21600.04	27200	0	60.09	26.95
			DD/SF	266277	0.05	682188	21600.04	25627.4	0	60.01	27.49
			DD/DF	249312	0.06	638856	21600.08	24672.2	0	60.46	26.36
		20	SD/SF	303053	0.07	720511	21600.04	23137.2	0	57.43	20.34
			SD/DF	280496	0.07	694598	21600.02	25608.6	0	58.95	21.89
			DD/SF	301565	0.07	722970	21600.08	17357.8	0	57.55	22.27
			DD/DF	282513	0.07	687418	21600.08	21278.2	0	58.24	22.02
	200	5	SD/SF	220768	0.12	795871	21600.14	6417.2	0	71.73	25.53
			SD/DF	207986	0.1	761164	21600.16	6259.8	0	71.96	34.48
			DD/SF	207164	0.09	777800	21600.12	6994.2	0	72.64	30.38
			DD/DF	209048	0.1	769420	21600.12	5908.8	0	71.82	32.82
		10	SD/SF	271998	0.12	949529	21600.16	6818	0	69.61	37.35
			SD/DF	253645	0.11	901636	21600.14	5281.8	0	70.23	37.36
			DD/SF	270952	0.11	940636	21600.18	6162	0	69.7	36.31
			DD/DF	256937	0.12	882363	21600.12	6897.8	0	69.67	35.61
		15	SD/SF	312792	0.12	1040379	21600.18	7520.4	0	68	36.71
			SD/DF	297095	0.12	996442	21600.1	5447	0	68.39	37.21
			DD/SF	303058	0.12	1024602	21600.16	6204.4	0	68.03	38.61
			DD/DF	295569	0.12	993376	21600.1	6123	0	68.11	37.73
		20	SD/SF	354137	0.13	1108118	21600.32	8122.6	0	65.93	34.05
			SD/DF	327697	0.13	1052238	21600.14	5605	0	66.53	36.31
			DD/SF	350065	0.14	1115710	21600.12	5453.2	0	66.02	37.21
			DD/DF	333123	0.14	1066068	21600.14	5811.4	0	66.28	36.81

Table 23: Performances of the C-N formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	139635	0.04	186936	352.89	16884.2	5	25.37	0
			SD/DF	126035	0.04	177723	178.73	10640.6	5	29.03	0
			DD/SF	128840	0.04	176582	443.45	34793.4	5	27.04	0
			DD/DF	127434	0.04	178781	116.97	7006	5	28.66	0
		10	SD/SF	177488	0.1	227013	51.69	4771	5	21.78	0
			SD/DF	149948	0.1	204215	24.79	1412.2	5	26.54	0
			DD/SF	162130	0.09	211618	7.5	781.2	5	23.44	0
			DD/DF	151257	0.09	203923	4.25	262	5	25.66	0
		15	SD/SF	194524	0.11	239594	10.57	1344.8	5	18.76	0
			SD/DF	163653	0.1	222973	2.19	94.6	5	26.54	0
			DD/SF	184996	0.1	229781	1.55	68	5	19.51	0
			DD/DF	168337	0.1	224338	1.89	97	5	24.95	0
		20	SD/SF	217779	0.12	258538	2.14	191.8	5	15.79	0
			SD/DF	189494	0.11	255121	1.45	36.8	5	25.67	0
			DD/SF	210100	0.12	251128	1.26	56.8	5	16.34	0
			DD/DF	186269	0.1	247537	1.17	41.2	5	24.7	0
	100	5	SD/SF	189993	0.08	273378	12749.93	417800.2	4	30.51	0.2
			SD/DF	168222	0.08	250053	5373.58	234400.4	5	32.68	0
			DD/SF	175572	0.08	258449	18792.27	655839.2	1	32.07	0.62
			DD/DF	170101	0.08	257451	3450.86	168311.8	5	33.9	0
		10	SD/SF	214657	0.19	305064	17548.2	919301.6	2	29.68	0.67
			SD/DF	196706	0.17	286684	17209.34	816760	2	31.37	0.85
			DD/SF	205356	0.19	295625	15872.31	957836.8	3	30.55	0.45
			DD/DF	193577	0.17	287589	20652.06	1512709.4	1	32.68	1.2
		15	SD/SF	246211	0.21	339451	2350.47	124193.8	5	27.46	0
			SD/DF	215988	0.2	311528	9115.29	687452.2	3	30.65	0.19
			DD/SF	241002	0.18	332588	1260.38	25369.2	5	27.54	0
			DD/DF	220861	0.18	315099	5173.46	456274	5	29.9	0
		20	SD/SF	269290	0.22	363580	234.87	3338.6	5	25.96	0
			SD/DF	241333	0.21	349765	1796.76	168927.8	5	31	0
			DD/SF	269460	0.2	364628	290.22	4508.4	5	26.1	0
			DD/DF	240607	0.19	352544	2472.76	215321.6	5	31.73	0
	200	5	SD/SF	259272	0.22	399619	21600.04	327188.8	0	35.03	4.98
			SD/DF	236132	0.21	378972	21600.06	557356.8	0	37.68	2.4
			DD/SF	254397	0.22	399319	21600.1	199812.4	0	36.19	5.04
			DD/DF	235526	0.2	373686	21600.1	414344.6	0	36.94	2.94
		10	SD/SF	285378	0.4	439724	21600.1	46114.8	0	34.64	8.64
			SD/DF	269414	0.38	422899	21600.1	237457.2	0	36.22	7.61
			DD/SF	282104	0.36	439214	21600.1	66136.8	0	35.51	12.17
			DD/DF	267512	0.33	428702	21600.1	25923.6	0	37.57	10.97
		15	SD/SF	316586	0.37	481106	21600.1	9482.8	0	33.66	13.02
			SD/DF	293414	0.4	472440	21600.08	14465.2	0	37.7	13.13
			DD/SF	306167	0.39	474863	21600.1	10449.2	0	34.93	13.72
			DD/DF	297869	0.4	468965	21600.1	105879.6	0	36.39	9.9
		20	SD/SF	361304	0.41	540211	21600.1	10666.4	0	33.11	11.52
			SD/DF	324964	0.38	508621	21600.1	16625.4	0	36.09	11.13
			DD/SF	357657	0.38	536897	21600.1	11626.6	0	33.33	10.34
			DD/DF	321994	0.45	506615	21600.1	205440	0	36.22	8.23

Table 24: Performances of the C-N formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	211500	0.22	378390	21600.06	16925.4	0	43.7	22.25
			SD/DF	186997	0.18	342963	21600.1	27161	0	44.93	20.67
			DD/SF	204469	0.17	372686	21600.1	20190.4	0	44.77	23.43
			DD/DF	185306	0.17	339405	21600.1	70536	0	45.29	18.25
		10	SD/SF	249743	0.49	432007	21600.1	21282.4	0	41.85	20.06
			SD/DF	216547	0.41	394798	21600.1	23903	0	44.99	19.58
			DD/SF	230654	0.39	410559	21600.08	17667.6	0	43.45	21.28
			DD/DF	219790	0.38	393865	21600.1	119192	0	43.94	18.03
		15	SD/SF	274703	0.52	460021	21600.1	34067.6	0	39.64	17.47
			SD/DF	244243	0.43	434502	21600.1	30812.2	0	43.52	17.28
			DD/SF	265767	0.42	461112	21600.1	26802.4	0	41.35	19.36
			DD/DF	246033	0.41	436356	21600.1	257619.6	0	43.51	13.78
		20	SD/SF	314593	0.54	505616	21600.1	40514.2	0	37.65	14.41
			SD/DF	269809	0.44	476348	21600.1	38921	0	43.22	15.34
			DD/SF	303020	0.45	507438	21600.1	33447.4	0	39.79	16.27
			DD/DF	270794	0.43	474881	21600.1	39127	0	42.69	16.51
	100	5	SD/SF	278020	0.38	539094	21600.1	4456.6	0	47.21	33.7
			SD/DF	256179	0.35	510912	21600.1	5475	0	48.84	32.77
			DD/SF	270192	0.37	537873	21600.1	7362.4	0	48.68	34.39
			DD/DF	257156	0.33	507662	21600.1	10371.4	0	48.4	31
		10	SD/SF	319187	0.83	639113	21600.12	1905.8	0	47.29	32.21
			SD/DF	290497	0.78	582962	21600.12	3963.6	0	48.58	30.08
			DD/SF	319879	0.71	649670	21601.74	2402.4	0	47.93	32.32
			DD/DF	291858	0.7	597893	21600.18	4193.6	0	49.11	29.96
		15	SD/SF	346747	0.9	698275	21600.16	2326.8	0	46.79	31.53
			SD/DF	323801	0.83	648257	21600.14	2587.6	0	47.85	29.16
			DD/SF	352467	0.78	711715	21600.1	1663.6	0	47.06	30.95
			DD/DF	326362	0.8	668031	21600.14	3164.2	0	48.25	29.84
		20	SD/SF	390333	1.01	754647	21600.16	1611.2	0	45.1	28.73
			SD/DF	356665	0.84	717425	21600.16	3714.4	0	47.8	27.71
			DD/SF	383780	0.91	750160	21600.14	1802.8	0	45.97	28.46
			DD/DF	356254	0.83	708996	21600.16	3065	0	47.34	27.31
	200	5	SD/SF	412734	0.94	794005	21600.2	7068.4	0	47.11	39.38
			SD/DF	377338	0.91	768065	21600.16	7290.8	0	49.12	38.91
			DD/SF	387231	0.86	782117	21600.12	4812.8	0	48.81	41.58
			DD/DF	376237	0.83	756461	21600.22	6896.6	0	49.28	38.5
		10	SD/SF	456012	1.55	1001340	21600.32	906.6	0	49.03	42.12
			SD/DF	423548	1.49	967827	21600.34	858	0	50.28	42.14
			DD/SF	447934	1.45	1011652	21600.24	830.6	0	49.9	42.65
			DD/DF	421427	1.49	941444	21600.28	672.4	0	50.25	40.68
		15	SD/SF	505060	1.62	1435506	21600.14	105.6	0	48.32	53.7
			SD/DF	463165	1.57	1105126	21600.24	688.8	0	50.73	42.08
			DD/SF	476122	1.58	1075288	21600.26	810.8	0	49.77	41.28
			DD/DF	457382	1.56	1070522	21600.3	1091.6	0	50.65	41.43
		20	SD/SF	534996	1.71	1402060	21600.22	313.4	0	48.53	48.95
			SD/DF	490125	1.62	1220476	21600.28	748.2	0	49.94	44.04
			DD/SF	522749	1.57	1321314	21600.28	580.6	0	49.25	45.34
			DD/DF	491176	1.57	1146540	21600.36	1075.2	0	50.29	40.89

Table 25: Performances of the C-TP formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	139635	0.05	186936	250.17	8162.6	5	25.37	0
			SD/DF	126035	0.04	177723	137.6	2655.8	5	29.03	0
			DD/SF	128840	0.04	176582	334.17	8821	5	27.04	0
			DD/DF	127434	0.04	178781	179.48	3599.4	5	28.66	0
		10	SD/SF	177488	0.06	227013	38.42	2440.8	5	21.78	0
			SD/DF	149948	0.04	204215	41.53	1457	5	26.54	0
			DD/SF	162130	0.05	211618	8.69	424.6	5	23.44	0
			DD/DF	151257	0.04	203923	7.28	336.2	5	25.66	0
		15	SD/SF	194524	0.06	239594	11.41	922.4	5	18.76	0
			SD/DF	163653	0.05	222973	3.42	136.2	5	26.54	0
			DD/SF	184996	0.06	229781	1.91	33	5	19.51	0
			DD/DF	168337	0.05	224338	3.85	270.6	5	24.95	0
		20	SD/SF	217779	0.07	258538	2.53	108	5	15.79	0
			SD/DF	189494	0.05	255121	2.62	62.6	5	25.67	0
			DD/SF	210100	0.06	251128	1.12	10.4	5	16.34	0
			DD/DF	186269	0.05	247537	2.08	68.4	5	24.7	0
	100	5	SD/SF	189993	0.08	273378	4900.1	73908.6	5	30.51	0
			SD/DF	168222	0.07	250053	2931.39	19778.4	5	32.68	0
			DD/SF	175572	0.09	258441	7926.2	79492	5	32.07	0
			DD/DF	170101	0.07	257451	2465.61	24101.8	5	33.9	0
		10	SD/SF	214657	0.14	305064	8436.54	202901	4	29.68	0.07
			SD/DF	196706	0.14	286684	7273.4	113313.8	4	31.37	0.15
			DD/SF	205356	0.13	295625	6419.18	107527.8	5	30.55	0
			DD/DF	193577	0.13	287589	14745.95	368758.4	3	32.68	0.25
		15	SD/SF	246211	0.13	339451	2393.64	27418.2	5	27.46	0
			SD/DF	215988	0.1	311528	3963.93	87559.4	5	30.65	0
			DD/SF	241002	0.13	332588	1202.72	5726.8	5	27.54	0
			DD/DF	220861	0.1	315099	1936.59	17116.6	5	29.9	0
		20	SD/SF	269290	0.19	363580	384.51	2010.6	5	25.96	0
			SD/DF	241333	0.16	349765	1101.68	21223.4	5	31	0
			DD/SF	269460	0.15	364628	658.14	2399.2	5	26.1	0
			DD/DF	240607	0.14	352544	2227.56	26878	5	31.73	0
	200	5	SD/SF	259272	0.26	399011	21600.04	18675.4	0	35.03	3.7
			SD/DF	236132	0.2	379004	21600	19293.4	0	37.68	2.39
			DD/SF	254397	0.24	399042	21600.06	14397.8	0	36.19	6.73
			DD/DF	235526	0.21	373599	17255.18	76479.6	2	36.94	1.3
		10	SD/SF	285378	0.26	437116	21600.06	5625.4	0	34.64	10.02
			SD/DF	269414	0.21	423196	21600.08	5622	0	36.22	8.83
			DD/SF	282104	0.22	438984	21600.1	4599.6	0	35.51	11.06
			DD/DF	267512	0.21	429556	21600.1	6034	0	37.57	10.84
		15	SD/SF	316586	0.24	481871	21600.12	6027.4	0	33.66	10.6
			SD/DF	293414	0.2	472167	21600.1	6650.4	0	37.7	10.69
			DD/SF	306167	0.25	471893	21600.1	5820.6	0	34.93	10.39
			DD/DF	297869	0.2	469547	21600.1	6018.8	0	36.39	10.01
		20	SD/SF	361304	0.26	540290	21600.1	5996	0	33.11	9.21
			SD/DF	324964	0.2	509618	21600.1	6805.8	0	36.09	9.23
			DD/SF	357657	0.24	536859	21600.1	7369.4	0	33.33	8.49
			DD/DF	321994	0.25	506833	21600.1	7648.6	0	36.22	9.34

Table 26: Performances of the C-TP formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	211500	0.18	378428	21600.06	6033.8	0	43.7	20.46
			SD/DF	186997	0.15	341084	21600.06	7509	0	44.93	18.28
			DD/SF	204469	0.15	372197	21600.1	7260	0	44.77	20.37
			DD/DF	185306	0.14	340803	21600.08	6594.4	0	45.29	18.53
		10	SD/SF	249743	0.23	435361	21600.1	6359.6	0	41.85	17.6
			SD/DF	216547	0.19	397042	21600.1	6991	0	44.99	16.93
			DD/SF	230654	0.21	412837	21600.1	5883.2	0	43.45	18.28
			DD/DF	219790	0.23	395042	21600.1	7957.8	0	43.94	16.9
		15	SD/SF	274703	0.28	462620	21600.08	6025.4	0	39.64	15.29
			SD/DF	244243	0.21	433647	21600.1	10456.4	0	43.52	13.48
			DD/SF	265767	0.21	458348	21600.1	5576.8	0	41.35	15.58
			DD/DF	246033	0.22	438131	21600.1	10055.2	0	43.51	14.75
		20	SD/SF	314593	0.24	506094	21600.06	8334.6	0	37.65	11.84
			SD/DF	269809	0.21	479089	21600.1	12960	0	43.22	12.21
			DD/SF	303020	0.23	506135	21600.1	6800.2	0	39.79	13.03
			DD/DF	270794	0.2	473804	21600.1	10884.4	0	42.69	12.73
	100	5	SD/SF	278020	0.45	557356	21600.14	917	0	47.21	30.13
			SD/DF	256179	0.38	517262	21600.1	1646.8	0	48.84	27.25
			DD/SF	270192	0.44	544492	21600.64	1604.2	0	48.68	29.08
			DD/DF	257156	0.37	522988	21600.14	1680	0	48.4	28.87
		10	SD/SF	319187	0.53	664995	21600.18	546.4	0	47.29	30.54
			SD/DF	290497	0.4	604485	21600.2	812	0	48.58	27.86
			DD/SF	319879	0.46	654535	21600.2	840	0	47.93	28.37
			DD/DF	291858	0.43	607745	21600.16	937.4	0	49.11	26.74
		15	SD/SF	346747	0.52	707426	21600.26	490.4	0	46.79	28.01
			SD/DF	323801	0.46	674938	21600.2	695.2	0	47.85	27.15
			DD/SF	352467	0.5	718424	21600.18	574.4	0	47.06	27.25
			DD/DF	326362	0.49	681737	21600.14	739.6	0	48.25	26.55
		20	SD/SF	390333	0.57	763493	21600.28	498	0	45.1	25.42
			SD/DF	356665	0.51	724449	21600.18	675	0	47.8	23.24
			DD/SF	383780	0.52	759047	21600.22	563.2	0	45.97	25.17
			DD/DF	356254	0.49	719027	21600.2	881.8	0	47.34	23.65
	200	5	SD/SF	412734	1.17	826618	21600.3	1041.2	0	47.11	34.51
			SD/DF	377338	0.98	798136	21600.36	918.2	0	49.12	34.58
			DD/SF	387231	1.2	833512	21600.34	782.2	0	48.81	37.39
			DD/DF	376237	1.02	812732	21600.36	811.4	0	49.28	36.37
		10	SD/SF	456012	1.34	1208150	21600.26	26	0	49.03	46.98
			SD/DF	423548	1.1	1084981	21600.24	220.2	0	50.28	43.56
			DD/SF	447934	1.24	1051807	21600.22	703.2	0	49.9	39.96
			DD/DF	421427	1.08	984829	21600.24	536.8	0	50.25	38.06
		15	SD/SF	505060	1.31	1830226	21600.34	0	0	48.32	59.65
			SD/DF	463165	1.08	1327946	21600.28	10	0	50.73	45.95
			DD/SF	476122	1.23	1639874	21600.28	2.8	0	49.77	57.62
			DD/DF	457382	1.13	1218168	21600.26	12.2	0	50.65	43.47
		20	SD/SF	534996	1.29	1996724	21600.46	0	0	48.53	61.56
			SD/DF	490125	1.12	1284336	21600.3	7	0	49.94	41.68
			DD/SF	522749	1.25	1798886	21600.32	0	0	49.25	57.11
			DD/DF	491176	1.17	1512442	21600.3	8	0	50.29	49.54

Table 27: Performances of the C-LS formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	139635	0.06	186936	262.14	6790	5	25.37	0
			SD/DF	126035	0.04	177723	109.05	1736	5	29.03	0
			DD/SF	128840	0.04	176582	343.08	6005	5	27.04	0
			DD/DF	127434	0.04	178781	146.76	3299.6	5	28.66	0
		10	SD/SF	177488	0.08	227013	35.86	2347.6	5	21.78	0
			SD/DF	149948	0.06	204215	26.41	1575.6	5	26.54	0
			DD/SF	162130	0.07	211618	7.85	468.2	5	23.44	0
			DD/DF	151257	0.06	203923	6.01	377.6	5	25.66	0
		15	SD/SF	194524	0.09	239594	12.45	808	5	18.76	0
			SD/DF	163653	0.06	222973	2.95	164.2	5	26.54	0
			DD/SF	184996	0.07	229781	1.8	43.6	5	19.51	0
			DD/DF	168337	0.06	224338	2.24	86.8	5	24.95	0
		20	SD/SF	217779	0.09	258538	2.33	107.4	5	15.79	0
			SD/DF	189494	0.07	255121	1.64	32.2	5	25.67	0
			DD/SF	210100	0.07	251128	1.3	51.4	5	16.34	0
			DD/DF	186269	0.06	247537	1.34	33.2	5	24.7	0
	100	5	SD/SF	189993	0.15	273378	5863.74	60623.6	5	30.51	0
			SD/DF	168222	0.1	250053	3474.32	28642	5	32.68	0
			DD/SF	175572	0.12	258441	8252.69	58527.2	5	32.07	0
			DD/DF	170101	0.11	257451	4377.46	29744.2	5	33.9	0
		10	SD/SF	214657	0.21	305064	3071.36	40851.4	5	29.68	0.04
			SD/DF	196706	0.15	286684	3015.98	32924.2	5	31.37	0
			DD/SF	205356	0.2	295625	6993.56	84221.4	4	30.55	0.07
			DD/DF	193577	0.15	287589	10503.55	176316	4	32.68	0.13
		15	SD/SF	246211	0.25	339451	1086.13	5363.2	5	27.46	0
			SD/DF	215988	0.16	311528	1755.14	19071.6	5	30.65	0
			DD/SF	241002	0.21	332588	1117.97	1994.6	5	27.54	0
			DD/DF	220861	0.16	315099	1290.09	7048.4	5	29.9	0
		20	SD/SF	269290	0.24	363580	337.18	1728.2	5	25.96	0
			SD/DF	241333	0.16	349765	572.48	3300	5	31	0
			DD/SF	269460	0.21	364628	424.39	2012.2	5	26.1	0
			DD/DF	240607	0.16	352544	1519.29	4058.2	5	31.73	0
	200	5	SD/SF	259272	0.42	399412	21600.06	5066	0	35.03	9.33
			SD/DF	236132	0.3	380566	21600.08	2848	0	37.68	9.35
			DD/SF	254397	0.37	399676	21600.06	4062	0	36.19	13.48
			DD/DF	235526	0.32	375948	21600.06	2538.8	0	36.94	12.44
		10	SD/SF	285378	0.37	438861	21600.08	5030.4	0	34.64	10.59
			SD/DF	269414	0.28	424968	21600.08	5519.8	0	36.22	9.96
			DD/SF	282104	0.32	441019	21600.1	4592.4	0	35.51	11.55
			DD/DF	267512	0.29	429869	21600.06	4877.6	0	37.57	10.97
		15	SD/SF	316586	0.42	480432	21600.1	7155	0	33.66	9.23
			SD/DF	293414	0.3	472209	21600.04	7530.4	0	37.7	9.36
			DD/SF	306167	0.34	473718	21600.04	6333.2	0	34.93	10.2
			DD/DF	297869	0.3	469888	21600.02	7389.6	0	36.39	9.23
		20	SD/SF	361304	0.45	540380	21600.08	8792	0	33.11	6.96
			SD/DF	324964	0.3	510123	21600.08	8683.8	0	36.09	7.63
			DD/SF	357657	0.32	537428	21600.06	8424.8	0	33.33	7.52
			DD/DF	321994	0.33	506290	21600.08	9171.4	0	36.22	8.24

Table 28: Performances of the C-LS formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	211500	0.42	377729	21600.06	5866.4	0	43.7	18.29
			SD/DF	186997	0.28	345830	21600.08	5941.2	0	44.93	16.26
			DD/SF	204469	0.31	373885	21600.08	7552.8	0	44.77	19.71
			DD/DF	185306	0.27	343734	21600.08	4651	0	45.29	17.72
		10	SD/SF	249743	0.47	435121	21600.1	10896	0	41.85	14.17
			SD/DF	216547	0.28	397302	21600.06	6970.6	0	44.99	13.81
			DD/SF	230654	0.39	411631	21600.1	12790.8	0	43.45	14.77
			DD/DF	219790	0.39	397555	21600.08	12878	0	43.94	14.74
		15	SD/SF	274703	0.71	457384	21600.08	15761.2	0	39.64	10.07
			SD/DF	244243	0.48	434923	21600.08	10200.2	0	43.52	9.91
			DD/SF	265767	0.59	454581	21600.08	14148.8	0	41.35	10.44
			DD/DF	246033	0.53	436556	21600.06	15857.2	0	43.51	11.05
		20	SD/SF	314593	0.54	506059	21600.04	18049.8	0	37.65	7.1
			SD/DF	269809	0.36	475382	21600.02	13534.6	0	43.22	7.77
			DD/SF	303020	0.46	503731	21600.06	17647.8	0	39.79	8.08
			DD/DF	270794	0.4	475953	21600.08	19946.4	0	42.69	9.72
	100	5	SD/SF	278020	1.49	552552	21600.14	797.6	0	47.21	28.67
			SD/DF	256179	1.45	542570	21600.18	1169.2	0	48.84	29.92
			DD/SF	270192	1.68	558801	21600.2	882.4	0	48.68	30.81
			DD/DF	257156	1.46	529171	21600.12	1110.2	0	48.4	29.6
		10	SD/SF	319187	1.51	662782	21600.14	733.2	0	47.29	28.15
			SD/DF	290497	1.46	603783	21600.12	1218.6	0	48.58	25.53
			DD/SF	319879	1.94	679134	21600.18	962.4	0	47.93	29.06
			DD/DF	291858	1.56	610595	21600.16	1181.8	0	49.11	25.47
		15	SD/SF	346747	1.52	706593	21600.22	580.6	0	46.79	23.91
			SD/DF	323801	1.26	654225	21600.14	1370.8	0	47.85	21.86
			DD/SF	352467	1.51	729219	21600.2	673.2	0	47.06	25.37
			DD/DF	326362	1.27	661287	21600.16	2317.2	0	48.25	21.38
		20	SD/SF	390333	1.7	767546	21600.22	615.4	0	45.1	20.99
			SD/DF	356665	1.05	713696	21600.18	2127.4	0	47.8	18.12
			DD/SF	383780	1.47	761508	21600.16	874.2	0	45.97	21.18
			DD/DF	356254	1.21	715908	17600.14	2299	0	47.34	19.8
	200	5	SD/SF	412734	5.46	834448	21600.28	568.4	0	47.11	36.52
			SD/DF	377338	4.32	810969	21600.36	672.4	0	49.12	39.03
			DD/SF	387231	5.04	822422	21600.32	652.2	0	48.81	39.05
			DD/DF	376237	3.67	825902	21600.4	855.6	0	49.28	40.24
		10	SD/SF	456012	4.82	955649	21600.24	767.8	0	49.03	37.13
			SD/DF	423548	3.8	1079968	21600.38	716.4	0	50.28	47.01
			DD/SF	447934	5.36	1135198	21600.3	744	0	49.9	47.3
			DD/DF	421427	3.24	1015180	21600.36	813.2	0	50.25	43.68
		15	SD/SF	505060	4.57	1935614	21600.36	15.8	0	48.32	66.05
			SD/DF	463165	3.43	1392219	21600.32	461.8	0	50.73	51.55
			DD/SF	476122	4.78	1623916	21600.32	176.4	0	49.77	59.91
			DD/DF	457382	3.26	1144002	21600.3	967.2	0	50.65	43.05
		20	SD/SF	534996	3.75	1819200	21600.34	9	0	48.53	59.81
			SD/DF	490125	3.19	1532188	21600.32	422.4	0	49.94	53.41
			DD/SF	522749	4.03	1742586	21600.32	164.4	0	49.25	58.07
			DD/DF	491176	2.93	1073620	21600.4	1287.4	0	50.29	37.32

Table 29: Performances of the ES formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	122577	0.01	186936	6.37	1086.6	5	34.49	0
			SD/DF	111155	0.01	177723	2.52	536.2	5	37.41	0
			DD/SF	112279	0.01	176582	3.4	624	5	36.42	0
			DD/DF	112662	0.01	178781	2.93	611.4	5	36.92	0
		10	SD/SF	160951	0.01	227013	7.48	1676.4	5	29.08	0
			SD/DF	136099	0.01	204215	1.23	239.8	5	33.33	0
			DD/SF	146480	0.01	211618	1.59	272.6	5	30.85	0
			DD/DF	138107	0.01	203923	0.81	88.4	5	32.11	0
		15	SD/SF	178970	0.01	239594	5.27	1068.6	5	25.26	0
			SD/DF	150792	0.01	222973	0.64	33.8	5	32.3	0
			DD/SF	170787	0.01	229781	1.61	532.4	5	25.69	0
			DD/DF	155497	0.01	224338	0.54	20.8	5	30.67	0
		20	SD/SF	202651	0.01	258538	2.86	390	5	21.64	0
			SD/DF	175810	0.01	255121	0.44	12	5	31.04	0
			DD/SF	196948	0.01	251128	0.86	140.8	5	21.59	0
			DD/DF	173311	0.01	247537	0.52	16.8	5	29.93	0
	100	5	SD/SF	152620	0.01	273378	68.23	3378.4	5	44.18	0
			SD/DF	135612	0.01	250053	37.98	2777.8	5	45.72	0
			DD/SF	139691	0.01	258441	107.7	6119.8	5	45.99	0
			DD/DF	137694	0.01	257451	47.89	2829	5	46.5	0
		10	SD/SF	180870	0.02	305064	25.27	1574.4	5	40.75	0
			SD/DF	166404	0.02	286684	48.51	2370.2	5	41.94	0
			DD/SF	170871	0.02	295625	45.58	2678.2	5	42.23	0
			DD/DF	162593	0.02	287589	59.53	3201.2	5	43.46	0
		15	SD/SF	211157	0.02	339451	11.02	1509.8	5	37.79	0
			SD/DF	187942	0.02	311528	23.38	1504.6	5	39.65	0
			DD/SF	208621	0.02	332588	11.51	1262.6	5	37.28	0
			DD/DF	191226	0.02	315099	8.77	845.4	5	39.31	0
		20	SD/SF	235452	0.02	363580	12.2	1403.4	5	35.29	0
			SD/DF	212211	0.02	349765	10.21	835	5	39.33	0
			DD/SF	238077	0.02	364628	15.5	1759	5	34.72	0
			DD/DF	212460	0.02	352544	18.41	1194.4	5	39.71	0
	200	5	SD/SF	179621	0.03	399004	1896.3	117193.8	5	55.03	0
			SD/DF	166145	0.03	378963	5008.7	797691.2	5	56.15	0
			DD/SF	180278	0.03	398679	1223.13	25277.4	5	54.79	0
			DD/DF	166800	0.03	373599	2287.84	41401.6	5	55.34	0
		10	SD/SF	209481	0.03	436692	732.89	5945	5	52.05	0
			SD/DF	202278	0.03	422430	1651.49	134588.4	5	52.12	0
			DD/SF	209979	0.03	437411	1855.94	7784.8	5	52.02	0
			DD/DF	200937	0.03	428574	1490.44	32608.2	5	53.11	0
		15	SD/SF	242171	0.03	477259	845.56	4606	5	49.27	0
			SD/DF	226042	0.03	470952	2297.15	58491	5	52	0
			DD/SF	234955	0.03	470491	1831.03	8622	5	50.07	0
			DD/DF	233271	0.03	468277	1117.58	17100.2	5	50.19	0
		20	SD/SF	286333	0.03	540006	1469.45	9616.2	5	47	0
			SD/DF	260664	0.03	508508	1568.9	34633.8	5	48.73	0
			DD/SF	288594	0.03	536449	1132.64	10876.8	5	46.22	0
			DD/DF	259361	0.03	504940	1825.72	77805.4	5	48.63	0

Table 30: Performances of the ES formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	165656	0.02	375954	3389.66	150808.2	5	55.92	0
			SD/DF	147751	0.01	339760	689.32	25399.2	5	56.48	0
			DD/SF	162331	0.01	369959	1885.41	69717.6	5	56.18	0
			DD/DF	147635	0.01	338701	1216.2	15693.8	5	56.41	0
		10	SD/SF	205508	0.02	429701	1739.5	24185.6	5	52.14	0
			SD/DF	179636	0.02	393979	2269.24	39060	5	54.35	0
			DD/SF	190323	0.02	407797	3536.87	199984.4	5	53.33	0
			DD/DF	183908	0.02	392040	2575.15	66222	5	53.09	0
		15	SD/SF	231822	0.02	455741	5208.08	160302.8	5	49.03	0
			SD/DF	208402	0.02	432574	3079.68	146996.4	5	51.79	0
			DD/SF	226566	0.02	453096	1652.82	16661.2	5	50	0
			DD/DF	210723	0.02	435578	2537.34	37427.8	5	51.62	0
		20	SD/SF	272717	0.03	504534	6881.65	81099.2	5	45.95	0
			SD/DF	234487	0.02	475293	2538.15	175930.6	5	50.64	0
			DD/SF	264024	0.02	503024	3751.41	37116.8	4	47.56	0
			DD/DF	236395	0.03	472505	6955.8	626903	4	49.97	0.01
	100	5	SD/SF	184715	0.03	527011	20509.7	70050.8	1	64.94	3.91
			SD/DF	173935	0.03	501113	16374.88	272267.4	3	65.25	0.01
			DD/SF	183529	0.03	526811	19174.14	348154.4	1	65.2	1.25
			DD/DF	177063	0.03	498617	21337.06	444938.6	1	64.47	1.08
		10	SD/SF	227167	0.04	606855	21600	21948.6	0	62.54	4.99
			SD/DF	212903	0.04	566259	21600	17844.6	0	62.31	6.36
			DD/SF	234893	0.04	616269	21600.22	18282.2	0	61.77	5.63
			DD/DF	213288	0.04	575177	21600.02	17120	0	62.81	5.65
		15	SD/SF	259165	0.04	651878	21600	20531.8	0	60.25	5
			SD/DF	247809	0.04	622876	21600.34	21118.4	0	60.09	5.99
			DD/SF	266277	0.05	666277	21600.02	22212	0	60.01	5.16
			DD/DF	249312	0.04	630866	21600.02	830474.8	0	60.46	3.17
		20	SD/SF	303053	0.05	711830	21600	21998	0	57.43	4.54
			SD/DF	280496	0.05	685623	21600.28	25507.4	0	58.95	6.44
			DD/SF	301565	0.05	711611	21600	22618.6	0	57.55	4.9
			DD/DF	282513	0.04	680557	21600	127749.2	0	58.24	4.67
	200	5	SD/SF	220768	0.1	784335	21600.1	12641.6	0	71.73	5.85
			SD/DF	207986	0.09	745562	21600.08	11016.2	0	71.96	6.77
			DD/SF	207164	0.09	761928	21600.08	13939.8	0	72.64	8.04
			DD/DF	209048	0.08	746346	21600.08	11314.8	0	71.82	7.19
		10	SD/SF	271998	0.09	902106	21600.1	10781	0	69.61	6.92
			SD/DF	253645	0.08	858750	21600.1	13456.4	0	70.23	8.89
			DD/SF	270952	0.08	902118	21600.1	12709.6	0	69.7	8.32
			DD/DF	256937	0.09	856455	21600.1	12656.6	0	69.67	9.66
		15	SD/SF	312792	0.09	986790	21600.08	12078.2	0	68	6.75
			SD/DF	297095	0.09	952114	21600.1	14198.2	0	68.39	9.96
			DD/SF	303058	0.09	954432	21600.08	11314.4	0	68.03	6.96
			DD/DF	295569	0.09	931809	21600.1	12304.8	0	68.11	9.33
		20	SD/SF	354137	0.08	1043114	21600.1	11767.4	0	65.93	6.25
			SD/DF	327697	0.1	984623	21600.1	15605.2	0	66.53	8.27
			DD/SF	350065	0.09	1034782	21600.12	12058.6	0	66.02	6.22
			DD/DF	333123	0.08	998453	21600.08	14927	0	66.28	9.08

Table 31: Performances of the ES-N formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.16	186936	3.29	146.8	5	0.33	0
			SD/DF	174999	0.14	177723	3.19	204	5	1.51	0
			DD/SF	175755	0.15	176582	2.33	45	5	0.47	0
			DD/DF	175980	0.13	178781	4.01	362	5	1.59	0
		10	SD/SF	226869	0.14	227013	4.77	877.6	5	0.06	0
			SD/DF	202106	0.11	204215	2.39	182.4	5	1.04	0
			DD/SF	210949	0.13	211618	1.81	67.8	5	0.32	0
			DD/DF	202688	0.1	203923	1.55	104.2	5	0.6	0
		15	SD/SF	239126	0.13	239594	2.92	332.6	5	0.18	0
			SD/DF	221259	0.1	222973	1.81	89.2	5	0.74	0
			DD/SF	229053	0.12	229781	1.46	19.2	5	0.32	0
			DD/DF	222699	0.11	224338	2.16	150.4	5	0.73	0
		20	SD/SF	258167	0.12	258538	1.26	10.2	5	0.15	0
			SD/DF	253284	0.12	255121	1.88	44	5	0.71	0
			DD/SF	250885	0.13	251128	1.26	9.8	5	0.1	0
			DD/DF	245967	0.11	247537	2.15	65.2	5	0.63	0
	100	5	SD/SF	271237	0.47	273378	13.18	748.4	5	0.78	0
			SD/DF	243127	0.33	250053	13.76	1138.6	5	2.78	0
			DD/SF	255064	0.39	258441	35.48	2652	5	1.31	0
			DD/DF	251040	0.29	257451	14.81	1203.4	5	2.49	0
		10	SD/SF	303748	0.33	305064	6.85	51.4	5	0.43	0
			SD/DF	278972	0.27	286684	15.24	881.8	5	2.68	0
			DD/SF	293784	0.3	295625	7.13	120.4	5	0.62	0
			DD/DF	278704	0.3	287589	22.31	1276.8	5	3.09	0
		15	SD/SF	338364	0.3	339451	6.67	23.8	5	0.32	0
			SD/DF	303039	0.3	311528	10.05	321.8	5	2.71	0
			DD/SF	331217	0.27	332588	5.79	39.4	5	0.41	0
			DD/DF	309710	0.28	315099	8.11	174.2	5	1.71	0
		20	SD/SF	362485	0.3	363580	5.85	10.4	5	0.3	0
			SD/DF	340468	0.27	349765	11.46	444	5	2.66	0
			DD/SF	362812	0.3	364628	6.93	102.6	5	0.5	0
			DD/DF	342289	0.31	352544	12.89	537.8	5	2.91	0
	200	5	SD/SF	391914	1.85	399004	337.51	6944	5	1.78	0
			SD/DF	364733	1.04	378963	279.88	6583.6	5	3.75	0
			DD/SF	389011	1.32	398679	435.62	10004.4	5	2.43	0
			DD/DF	358452	0.88	373599	715.83	20875	5	4.05	0
		10	SD/SF	433333	1.17	436692	35.84	592	5	0.77	0
			SD/DF	406585	0.82	422430	194.34	5295.4	5	3.75	0
			DD/SF	433365	1.01	437411	42.78	1401.4	5	0.93	0
			DD/DF	410804	0.82	428574	231.87	6920.8	5	4.14	0
		15	SD/SF	474171	0.91	477259	22.67	234	5	0.65	0
			SD/DF	450774	0.71	470952	2091.32	104054.6	5	4.29	0
			DD/SF	466421	0.89	470491	54.38	1660	5	0.86	0
			DD/DF	449587	0.72	468277	150.2	3448.6	5	3.99	0
		20	SD/SF	533183	0.89	540006	31.05	490.6	5	1.28	0
			SD/DF	485142	0.74	508508	344.59	8702.8	5	4.6	0
			DD/SF	530311	0.83	536449	25.8	442.2	5	1.15	0
			DD/DF	483383	0.84	504940	410.28	14091	5	4.26	0

Table 32: Performances of the ES-N formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	2.23	375954	523.45	12371.8	5	0.99	0
			SD/DF	328269	1.04	339760	108.57	2598	5	3.38	0
			DD/SF	365541	1.45	369959	144.6	2592.2	5	1.2	0
			DD/DF	328942	1.01	338701	134.6	2915.2	5	2.89	0
		10	SD/SF	427638	1.7	429701	27.14	94	5	0.49	0
			SD/DF	380825	0.96	393979	108.12	1939.4	5	3.35	0
			DD/SF	404564	1.36	407797	42.15	651	5	0.79	0
			DD/DF	378722	1.02	392040	110.25	1845.6	5	3.39	0
		15	SD/SF	452626	1.64	455741	95.15	1554	5	0.69	0
			SD/DF	417070	1.01	432574	82.46	1193.2	5	3.58	0
			DD/SF	449387	1.43	453096	28.04	206.2	5	0.82	0
			DD/DF	418669	0.99	435578	68.94	1140.4	5	3.89	0
		20	SD/SF	498662	1.55	504534	73.8	1207	5	1.17	0
			SD/DF	456692	1.07	475293	75.1	1485.2	5	3.91	0
			DD/SF	494145	1.41	503024	52.53	447.8	5	1.78	0
			DD/DF	453060	1.1	472505	132.98	1956.8	5	4.12	0
	100	5	SD/SF	521000	6.6	526452	3664.48	37744	5	1.03	0
			SD/DF	482166	3.01	501113	4808.05	65655.4	5	3.78	0
			DD/SF	517618	5.11	526280	17500.75	326691.2	2	1.65	0.05
			DD/DF	479514	2.5	498387	9564.83	153025.6	5	3.79	0
		10	SD/SF	601513	5.3	605603	268.67	1516.4	5	0.68	0
			SD/DF	538902	2.45	565163	3762.3	59281	5	4.64	0
			DD/SF	608242	3.52	614187	293.69	1370.6	5	0.97	0
			DD/DF	548982	2.35	573540	1605.08	22775	5	4.28	0
		15	SD/SF	647467	5.16	651823	162.49	339.4	5	0.67	0
			SD/DF	589048	2.54	621038	11096.45	184005.2	3	5.15	0.01
			DD/SF	658411	3.13	665812	218.33	1479.8	5	1.11	0
			DD/DF	602064	2.23	630630	1261.16	12500.2	5	4.53	0
		20	SD/SF	706242	4.89	711220	252.47	633.8	5	0.69	0
			SD/DF	649748	2.5	683630	1118	10084	5	4.95	0
			DD/SF	700745	3.37	710105	306.92	1542.2	5	1.32	0
			DD/DF	643718	2.59	676556	1448.19	15818.4	5	4.85	0
	200	5	SD/SF	765355	36.92	780309	21600.22	51774.6	0	1.92	0.56
			SD/DF	706676	14.82	741678	21600.24	164768.2	0	4.72	0.53
			DD/SF	735353	23.42	756542	21600.22	52165.6	0	2.8	0.83
			DD/DF	708023	11.43	741972	21600.26	176899	0	4.58	0.6
		10	SD/SF	886573	23.08	894648	6291.93	32816	4	0.9	0.03
			SD/DF	806654	8.76	851998	21600.24	173615	0	5.32	0.41
			DD/SF	880300	15.32	894079	4233.8	9911	5	1.54	0
			DD/DF	802832	8.8	847156	21600.28	186777.4	0	5.23	0.58
		15	SD/SF	970613	23.08	977290	1568	1239.4	5	0.69	0
			SD/DF	888058	7.93	940215	21600.24	199186.8	0	5.55	0.2
			DD/SF	933518	11.67	947725	3206.54	4512.2	5	1.5	0
			DD/DF	876006	6.65	926837	21600.28	189597	0	5.48	0.25
		20	SD/SF	1033920	23.1	1039376	766.06	818.8	5	0.53	0
			SD/DF	929080	8.03	979053	21461.84	209976.8	1	5.1	0.16
			DD/SF	1017946	16.1	1030026	1487.18	2018	5	1.17	0
			DD/DF	935441	7.44	988006	20381.12	181482.4	1	5.32	0.13

Table 33: Performances of the ES-TP formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.59	186936	4.06	118.8	5	0.33	0
			SD/DF	174999	0.26	177723	3.61	176.8	5	1.51	0
			DD/SF	175755	0.4	176582	2.91	34.8	5	0.47	0
			DD/DF	175980	0.24	178781	4.64	316	5	1.59	0
		10	SD/SF	226869	0.37	227013	6.43	1037.8	5	0.06	0
			SD/DF	202106	0.23	204215	2.36	157.8	5	1.04	0
			DD/SF	210949	0.31	211618	2.06	21.6	5	0.32	0
			DD/DF	202688	0.21	203923	1.85	86.6	5	0.6	0
		15	SD/SF	239126	0.39	239594	2.92	307.4	5	0.18	0
			SD/DF	221259	0.25	222973	1.87	95.6	5	0.74	0
			DD/SF	229053	0.36	229781	1.33	10.6	5	0.32	0
			DD/DF	222699	0.24	224338	2.47	170	5	0.73	0
		20	SD/SF	258167	0.3	258538	1.76	14.4	5	0.15	0
			SD/DF	253284	0.22	255121	1.55	36	5	0.71	0
			DD/SF	250885	0.27	251128	1.14	1.8	5	0.1	0
			DD/DF	245967	0.25	247537	1.68	71	5	0.63	0
	100	5	SD/SF	271237	1.33	273378	17.38	588.2	5	0.78	0
			SD/DF	243127	0.64	250053	21.02	1515.2	5	2.78	0
			DD/SF	255064	1.08	258441	76.34	2862	5	1.31	0
			DD/DF	251040	0.69	257451	23.5	1595.2	5	2.49	0
		10	SD/SF	303748	1.48	305064	8.5	48.4	5	0.43	0
			SD/DF	278972	0.76	286684	20.22	906.6	5	2.68	0
			DD/SF	293784	1.27	295625	12.45	256.4	5	0.62	0
			DD/DF	278704	0.85	287589	24.48	1046.6	5	3.09	0
		15	SD/SF	338364	1.44	339451	8.65	13.8	5	0.32	0
			SD/DF	303039	0.88	311528	14.5	410.2	5	2.71	0
			DD/SF	331217	1.13	332588	8.38	37	5	0.41	0
			DD/DF	309710	0.84	315099	11.16	333.2	5	1.71	0
		20	SD/SF	362485	1.36	363580	7.26	7.4	5	0.3	0
			SD/DF	340468	0.83	349765	15.36	497	5	2.66	0
			DD/SF	362812	1.12	364628	10.16	94.8	5	0.5	0
			DD/DF	342289	0.9	352544	19.2	685.6	5	2.91	0
	200	5	SD/SF	391914	7.81	399004	805.67	7571	5	1.78	0
			SD/DF	364733	2.71	378963	746.23	5845.4	5	3.75	0
			DD/SF	389011	4.28	398679	1370.79	15811	5	2.43	0
			DD/DF	358452	2.34	373599	1226.38	14673.8	5	4.05	0
		10	SD/SF	433333	6.2	436692	71.54	638.4	5	0.77	0
			SD/DF	406585	2.61	422430	432.51	4633.6	5	3.75	0
			DD/SF	433365	3.99	437411	57.8	1343.6	5	0.93	0
			DD/DF	410804	2.21	428574	409.82	5221.2	5	4.14	0
		15	SD/SF	474171	5.89	477259	43.52	266	5	0.65	0
			SD/DF	450774	2.51	470952	1152.82	33102	5	4.29	0.01
			DD/SF	466421	4.03	470491	57.85	1711.6	5	0.86	0
			DD/DF	449587	2.34	468277	398.06	2739.6	5	3.99	0
		20	SD/SF	533183	4.14	540006	43.43	396.4	5	1.28	0
			SD/DF	485142	2.1	508508	594.92	10782	5	4.6	0
			DD/SF	530311	3.87	536449	34.23	473	5	1.15	0
			DD/DF	483383	2.65	504940	704.29	8536.6	5	4.26	0

Table 34: Performances of the ES-TP formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	7.21	375954	918.94	14672	5	0.99	0
			SD/DF	328269	2.4	339760	182.41	2292.4	5	3.38	0
			DD/SF	365541	3.87	369959	277.34	3208.8	5	1.2	0
			DD/DF	328942	1.5	338701	253.47	2646	5	2.89	0
		10	SD/SF	427638	12.43	429701	64.05	70.4	5	0.49	0
			SD/DF	380825	4.02	393979	133.37	2010.6	5	3.35	0
			DD/SF	404564	6.17	407797	50.48	413.4	5	0.79	0
			DD/DF	378722	3.03	392040	137.52	1992.6	5	3.39	0
		15	SD/SF	452626	12.79	455741	175.32	1388.4	5	0.69	0
			SD/DF	417070	3.48	432574	104.54	1560.4	5	3.58	0
			DD/SF	449387	7.81	453096	56.81	276.8	5	0.82	0
			DD/DF	418669	5.59	435578	93.26	1523.6	5	3.89	0
		20	SD/SF	498662	17.68	504534	186.04	1443.6	5	1.17	0
			SD/DF	456692	5.02	475293	135.91	1160.8	5	3.91	0
			DD/SF	494145	5.29	503024	86.02	355.4	5	1.78	0
			DD/DF	453060	4.04	472505	165.64	1432.4	5	4.12	0
	100	5	SD/SF	521000	31.25	526452	8051.19	36014.8	5	1.03	0
			SD/DF	482166	9.29	501113	8055.48	34131.2	5	3.78	0
			DD/SF	517618	17.69	526280	18324.12	151161.2	1	1.65	0.09
			DD/DF	479514	6.54	498387	9416.53	90614.6	5	3.79	0
		10	SD/SF	601513	33.38	605603	571	1167.2	5	0.68	0
			SD/DF	538902	12.99	565163	8883.14	79646.2	4	4.64	0
			DD/SF	608242	16.1	614187	2085.8	2146.8	5	0.97	0
			DD/DF	548982	6.38	573540	5721.7	15437.4	5	4.28	0
		15	SD/SF	647467	36.25	651823	463.64	257.6	5	0.67	0
			SD/DF	589048	11.74	621038	12403.09	100514.8	4	5.15	0.02
			DD/SF	658411	18.08	665812	693.42	1906.2	5	1.11	0
			DD/DF	602064	8.33	630630	3503.36	12965.8	5	4.53	0
		20	SD/SF	706242	53.04	711220	471.98	408	5	0.69	0
			SD/DF	649748	16.61	683630	3299.02	8660.8	5	4.95	0
			DD/SF	700745	21.79	710105	749.51	1604.8	5	1.32	0
			DD/DF	643718	10.87	676556	4547.12	30162.6	5	4.85	0
	200	5	SD/SF	765355	138.72	781086	21600.34	2908	0	1.92	1.55
			SD/DF	706676	39.2	742081	21600.16	3516.6	0	4.72	3.15
			DD/SF	735353	88.93	758317	21600.14	2991.8	0	2.8	2.43
			DD/DF	708023	20.68	743438	21600.14	3418.8	0	4.58	3.4
		10	SD/SF	886573	130.63	894676	9896.26	1939.6	3	0.9	0.14
			SD/DF	806654	29.71	855283	21600.2	2956.4	0	5.32	4.49
			DD/SF	880300	70.2	894702	20959.14	3315.6	1	1.54	0.79
			DD/DF	802832	19.93	850332	21600.16	2915.4	0	5.23	4.29
		15	SD/SF	970613	122.48	977290	2279.55	1110.2	5	0.69	0
			SD/DF	888058	30.24	942231	21600.16	24230.8	0	5.55	2.62
			DD/SF	933518	82.07	947772	19132.24	4004.4	3	1.5	0.09
			DD/DF	876006	29.17	931069	21600.16	14357.8	0	5.48	3.18
		20	SD/SF	1033920	112.93	1039376	1370.3	704.2	5	0.53	0
			SD/DF	929080	38.3	979754	21600.2	19698	0	5.1	1.17
			DD/SF	1017946	67.42	1030042	11819.26	3367.4	4	1.17	0.08
			DD/DF	935441	21.2	989050	21600.16	17994.4	0	5.32	3.06

Table 35: Performances of the ES-LS formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.2	186936	3.39	105	5	0.33	0
			SD/DF	174993	0.09	177723	3.37	89.6	5	1.52	0
			DD/SF	175755	0.16	176582	2.5	35.2	5	0.47	0
			DD/DF	175980	0.11	178781	3.82	243	5	1.59	0
		10	SD/SF	226869	0.13	227013	2.22	210.8	5	0.06	0
			SD/DF	202106	0.08	204215	1.37	18.8	5	1.04	0
			DD/SF	210949	0.13	211618	1.7	17.4	5	0.32	0
			DD/DF	202688	0.08	203923	0.96	3	5	0.6	0
		15	SD/SF	239126	0.12	239594	1.39	19.6	5	0.18	0
			SD/DF	221259	0.08	222973	1.31	3.8	5	0.74	0
			DD/SF	229053	0.1	229781	0.82	5.6	5	0.32	0
			DD/DF	222699	0.08	224338	0.86	2.2	5	0.73	0
		20	SD/SF	258167	0.11	258538	0.81	0	5	0.15	0
			SD/DF	253284	0.08	255121	0.69	1.6	5	0.71	0
			DD/SF	250885	0.09	251128	0.53	0	5	0.1	0
			DD/DF	245967	0.08	247537	0.82	0	5	0.63	0
	100	5	SD/SF	271237	1.38	273378	19.86	698.2	5	0.78	0
			SD/DF	243096	0.39	250053	23.32	1257.2	5	2.79	0
			DD/SF	255064	0.94	258441	77.24	2422.6	5	1.31	0
			DD/DF	251027	0.47	257451	46.56	1562	5	2.5	0
		10	SD/SF	303748	1.04	305064	9.74	41.4	5	0.43	0
			SD/DF	278967	0.45	286684	19.23	490	5	2.69	0
			DD/SF	293784	0.97	295625	10.52	326.2	5	0.62	0
			DD/DF	278699	0.53	287589	24.13	967.6	5	3.09	0
		15	SD/SF	338364	0.81	339451	7.84	12.6	5	0.32	0
			SD/DF	303039	0.49	311528	16.67	303.8	5	2.71	0
			DD/SF	331217	0.67	332588	6.99	33.8	5	0.41	0
			DD/DF	309710	0.43	315099	8.92	189.6	5	1.71	0
		20	SD/SF	362485	0.63	363580	7.03	7.2	5	0.3	0
			SD/DF	340468	0.46	349765	17.5	257	5	2.66	0
			DD/SF	362812	0.68	364628	9.82	174.4	5	0.5	0
			DD/DF	342289	0.49	352544	24.71	554.8	5	2.91	0
	200	5	SD/SF	391914	11.72	399004	1037	7231.4	5	1.78	0
			SD/DF	364713	2.15	378963	1535.6	6284.6	5	3.76	0
			DD/SF	389011	5.64	398679	2627.22	14820.2	5	2.43	0
			DD/DF	358416	1.96	373599	1773.76	9234.4	5	4.06	0
		10	SD/SF	433333	7.55	436692	137.53	690.2	5	0.77	0
			SD/DF	406553	1.65	422430	1325.2	3135.6	5	3.76	0
			DD/SF	433365	4.61	437411	145.31	1796.2	5	0.93	0
			DD/DF	410784	1.65	428574	1189.12	8025.6	5	4.15	0
		15	SD/SF	474171	6.35	477259	75.89	278.4	5	0.65	0
			SD/DF	450749	1.55	470952	927.63	6441	5	4.29	0
			DD/SF	466421	3.79	470491	360.86	1833.2	5	0.86	0
			DD/DF	449555	1.44	468277	645.16	2371.6	5	4	0
		20	SD/SF	533183	4.08	540006	122.64	729	5	1.28	0
			SD/DF	485123	1.52	508508	997.47	5800.6	5	4.6	0
			DD/SF	530311	2.86	536449	83.67	1152.4	5	1.15	0
			DD/DF	483354	1.56	504940	943.31	4622.8	5	4.27	0

Table 36: Performances of the ES-LS formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	1.03	375954	1130.13	11537.4	5	0.99	0
			SD/DF	328211	0.36	339760	410.23	2135.2	5	3.39	0
			DD/SF	365541	0.58	369959	669.34	3345.4	5	1.2	0
			DD/DF	328896	0.45	338701	396.99	2411	5	2.9	0
		10	SD/SF	427638	0.92	429701	128.89	76	5	0.49	0
			SD/DF	380804	0.44	393979	177.19	1423.8	5	3.36	0
			DD/SF	404564	0.59	407797	116.69	889.2	5	0.79	0
			DD/DF	378709	0.41	392040	168.2	1567.4	5	3.4	0
		15	SD/SF	452626	0.95	455741	223.72	1173	5	0.69	0
			SD/DF	417001	0.57	432574	163.77	780.4	5	3.6	0
			DD/SF	449387	0.77	453096	96.8	145	5	0.82	0
			DD/DF	418663	0.6	435578	178.88	878.8	5	3.89	0
		20	SD/SF	498662	1.12	504534	219.52	1295.8	5	1.17	0
			SD/DF	456673	0.63	475293	212.42	496.2	5	3.92	0
			DD/SF	494145	0.78	503024	190.79	251	5	1.78	0
			DD/DF	453051	0.6	472505	285.26	908.2	5	4.12	0
	100	5	SD/SF	521000	3.13	526670	20351.52	37866	2	1.03	0.18
			SD/DF	482086	1.16	501113	9959.94	18542.6	4	3.8	0.03
			DD/SF	517618	2.23	526427	19483.9	11064	1	1.65	0.5
			DD/DF	479448	1.13	498401	12324	29132.4	4	3.8	0.07
		10	SD/SF	601513	3.11	605603	1725.51	1673.6	5	0.68	0
			SD/DF	538846	1.3	565517	15092.91	7045.2	2	4.65	1.31
			DD/SF	608242	2.14	614187	3240.47	2829.2	5	0.97	0
			DD/DF	548941	1.39	573540	5109.39	4492	5	4.29	0
		15	SD/SF	647467	3.16	651823	1105.46	453.4	5	0.67	0
			SD/DF	588983	1.44	621038	10057.69	34183.4	5	5.16	0
			DD/SF	658411	2.43	665812	2578.3	2147.8	5	1.11	0
			DD/DF	601939	1.51	630630	3459.23	3509.8	5	4.55	0
		20	SD/SF	706242	3.53	711220	1672.38	670.8	5	0.69	0
			SD/DF	649638	1.54	683630	5173.64	7157.2	5	4.97	0
			DD/SF	700745	2.54	710105	2316.48	2208.6	5	1.32	0
			DD/DF	643596	1.59	676556	5002.8	3347.4	5	4.87	0
	200	5	SD/SF	765355	23.23	783329	21600.34	1293.2	0	1.92	1.85
			SD/DF	706581	4.72	745010	21600.22	1998.6	0	4.73	3.31
			DD/SF	735353	12.98	762635	21600.3	1594.2	0	2.8	3.03
			DD/DF	707948	3.84	748067	21600.3	1819	0	4.59	3.76
		10	SD/SF	886573	11.88	894890	15086.1	2064.4	3	0.9	0.18
			SD/DF	806496	3.88	857460	21600.46	2323.6	0	5.34	3.92
			DD/SF	880300	9.03	894480	21600.4	2771.6	0	1.54	0.86
			DD/DF	802748	4.45	851007	21600.32	2056.2	0	5.24	3.51
		15	SD/SF	970613	14	977291	9213.61	1304.8	4	0.69	0.01
			SD/DF	887934	5.18	945610	21600.34	2519.2	0	5.56	3.95
			DD/SF	933518	11.02	948803	21600.3	2743.8	0	1.5	0.78
			DD/DF	875837	4.92	930937	21600.22	2775.4	0	5.5	3.58
		20	SD/SF	1033920	19.19	1039376	5136.6	1274.2	5	0.53	0
			SD/DF	928953	4.93	981902	21600.28	2373.4	0	5.12	2.67
			DD/SF	1017946	13.52	1031510	21600.26	2277.8	0	1.17	0.52
			DD/DF	935282	5.48	992162	21600.24	2884.2	0	5.33	3.65

Table 37: Performances of the ES-F formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	122577	0.01	186936	7.92	1245.4	5	34.49	0
			SD/DF	111155	0.01	177723	4.44	1113.8	5	37.41	0
			DD/SF	112279	0.01	176582	5.82	1220.4	5	36.42	0
			DD/DF	112662	0.01	178781	5.95	1131	5	36.92	0
		10	SD/SF	160951	0.01	227013	13.11	1994	5	29.08	0
			SD/DF	136099	0.01	204215	2.5	591.8	5	33.33	0
			DD/SF	146480	0.01	211618	3.8	1057.4	5	30.85	0
			DD/DF	138107	0.01	203923	2.32	521.4	5	32.11	0
		15	SD/SF	178970	0.01	239594	11.1	1315.2	5	25.26	0
			SD/DF	150792	0.01	222973	1.31	218	5	32.3	0
			DD/SF	170787	0.01	229781	2.31	607.4	5	25.69	0
			DD/DF	155497	0.01	224338	1.92	390	5	30.67	0
		20	SD/SF	202651	0.01	258538	7.05	1500.4	5	21.64	0
			SD/DF	175810	0.01	255121	1.21	90.4	5	31.04	0
			DD/SF	196948	0.01	251128	2.23	487.2	5	21.59	0
			DD/DF	173311	0.01	247537	1.2	145.8	5	29.93	0
	100	5	SD/SF	152620	0.02	273378	69.03	3335	5	44.18	0
			SD/DF	135612	0.02	250053	61.51	2525.6	5	45.72	0
			DD/SF	139691	0.02	258441	154.29	6473.4	5	45.99	0
			DD/DF	137694	0.02	257451	75.77	2476.6	5	46.5	0
		10	SD/SF	180870	0.03	305064	32.99	1543	5	40.75	0
			SD/DF	166404	0.03	286684	56.79	2503.8	5	41.94	0
			DD/SF	170871	0.03	295625	46.14	1554.6	5	42.23	0
			DD/DF	162593	0.03	287589	81.96	2426.4	5	43.46	0
		15	SD/SF	211157	0.03	339451	20.14	1470.2	5	37.79	0
			SD/DF	187942	0.03	311528	49.32	2715.4	5	39.65	0
			DD/SF	208621	0.03	332588	24.98	1681.8	5	37.28	0
			DD/DF	191226	0.03	315099	17.47	1420	5	39.31	0
		20	SD/SF	235452	0.03	363580	21.78	1566.4	5	35.29	0
			SD/DF	212211	0.03	349765	36.3	1914.4	5	39.33	0
			DD/SF	238077	0.03	364628	30.28	1891	5	34.72	0
			DD/DF	212460	0.03	352544	40.56	2533.6	5	39.71	0
	200	5	SD/SF	179621	0.06	399004	3604.5	97732	5	55.03	0
			SD/DF	166145	0.07	378963	9193.44	585678	4	56.15	0
			DD/SF	180278	0.06	398679	3460.65	35502.2	5	54.79	0
			DD/DF	166800	0.07	373599	3081.63	27130	5	55.34	0
		10	SD/SF	209481	0.05	436692	568.15	10704	5	52.05	0
			SD/DF	202278	0.06	422430	1835.8	65961.8	5	52.12	0
			DD/SF	209979	0.05	437411	778.36	5921	5	52.02	0
			DD/DF	200937	0.07	428574	2594.49	20050.8	5	53.11	0
		15	SD/SF	242171	0.06	477259	316.2	3238.8	5	49.27	0
			SD/DF	226042	0.06	470952	6246.34	404257.4	4	52	0
			DD/SF	234955	0.05	470491	705.05	7849.6	5	50.07	0
			DD/DF	233271	0.06	468277	2325.53	11125	5	50.19	0
		20	SD/SF	286333	0.05	540006	413.76	3219.4	5	47	0
			SD/DF	260664	0.06	508508	2950.57	46118	5	48.73	0
			DD/SF	288594	0.05	536449	546.65	10578.8	5	46.22	0
			DD/DF	259361	0.06	504940	2502.07	35416.2	5	48.63	0

Table 38: Performances of the ES-F formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	165656	0.03	375954	1626.79	59026	5	55.92	0
			SD/DF	147751	0.03	339760	568.85	9447.6	5	56.48	0
			DD/SF	162331	0.03	369959	600.47	16399.8	5	56.18	0
			DD/DF	147635	0.03	338701	725.41	9729.2	5	56.41	0
		10	SD/SF	205508	0.04	429701	665.85	3692.6	5	52.14	0
			SD/DF	179636	0.05	393979	774.41	7231.6	5	54.35	0
			DD/SF	190323	0.04	407797	1180.15	10048.8	5	53.33	0
			DD/DF	183908	0.04	392040	497.47	5745	5	53.09	0
		15	SD/SF	231822	0.05	455741	3137.65	188921.8	5	49.03	0
			SD/DF	208402	0.05	432574	1041.47	7432	5	51.79	0
			DD/SF	226566	0.05	453096	884.23	5183	5	50	0
			DD/DF	210723	0.05	435578	748.85	5493.2	5	51.62	0
		20	SD/SF	272717	0.06	504534	2560.64	38453.6	5	45.95	0
			SD/DF	234487	0.05	475293	1204.58	9952.4	5	50.64	0
			DD/SF	264024	0.05	503024	1726.95	11370.6	5	47.56	0
			DD/DF	236395	0.06	472505	1718.35	28114.2	5	49.97	0
	100	5	SD/SF	184715	0.08	526640	18429.97	130649	2	64.94	0.61
			SD/DF	173935	0.1	501166	17133.69	73380.4	2	65.25	0.68
			DD/SF	183529	0.08	526390	18582.48	137562.8	1	65.2	0.24
			DD/DF	177063	0.1	498535	21600.06	59647.6	0	64.47	1.33
		10	SD/SF	227167	0.1	606840	19318.5	11510	1	62.54	1.65
			SD/DF	212903	0.12	565701	21600.04	27144	0	62.31	3.29
			DD/SF	234893	0.1	615007	20176.06	11836.4	1	61.77	1.29
			DD/DF	213288	0.1	575450	18946.04	22000.2	1	62.81	3.75
		15	SD/SF	259165	0.11	652938	21600.02	11033	0	60.25	2.02
			SD/DF	247809	0.11	623337	21600	21367.4	0	60.09	4.13
			DD/SF	266277	0.11	667290	21540.4	34500.6	1	60.01	1.98
			DD/DF	249312	0.11	632790	21600.06	10194.4	0	60.46	4.47
		20	SD/SF	303053	0.11	711507	21600.02	10555.6	0	57.43	2.34
			SD/DF	280496	0.13	685501	21600.02	12480.4	0	58.95	5.09
			DD/SF	301565	0.12	710706	21600.06	11003.4	0	57.55	2.73
			DD/DF	282513	0.13	679584	19220.62	23594	1	58.24	4.02
	200	5	SD/SF	220768	0.28	782568	21600.14	11046.8	0	71.73	2.25
			SD/DF	207986	0.34	742208	21600.12	10474	0	71.96	3.65
			DD/SF	207164	0.3	757678	21600.14	13276.8	0	72.64	2.77
			DD/DF	209048	0.36	743813	21600.14	9603	0	71.82	3.66
		10	SD/SF	271998	0.25	897538	21600.08	9743.6	0	69.61	1.3
			SD/DF	253645	0.29	855380	21600.18	12678.2	0	70.23	5.16
			DD/SF	270952	0.24	894668	21600.08	13700.2	0	69.7	1.61
			DD/DF	256937	0.28	850649	21600.06	11046.6	0	69.67	4.96
		15	SD/SF	312792	0.24	978938	21600.1	7577.8	0	68	1.39
			SD/DF	297095	0.29	945774	21600.1	10173	0	68.39	5.74
			DD/SF	303058	0.26	949968	21600.1	10792.8	0	68.03	2.03
			DD/DF	295569	0.29	932128	21600.1	9313.8	0	68.11	6.04
		20	SD/SF	354137	0.25	1041630	21600.1	7875.4	0	65.93	1.49
			SD/DF	327697	0.29	985910	21600.14	8663	0	66.53	5.5
			DD/SF	350065	0.24	1031048	21600.1	9658.6	0	66.02	2.3
			DD/DF	333123	0.27	998337	21600.14	9633.6	0	66.28	6.68

Table 39: Performances of the ES-F-N formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.21	186936	4.41	145	5	0.33	0
			SD/DF	174999	0.21	177723	3.86	173.8	5	1.51	0
			DD/SF	175755	0.3	176582	2.62	41.8	5	0.47	0
			DD/DF	175980	0.29	178781	4.63	318.2	5	1.59	0
		10	SD/SF	226869	0.18	227013	5.28	530	5	0.06	0
			SD/DF	202106	0.2	204215	4.11	233.6	5	1.04	0
			DD/SF	210949	0.27	211618	2.51	49	5	0.32	0
			DD/DF	202688	0.25	203923	3.1	114.4	5	0.6	0
		15	SD/SF	239126	0.21	239594	4.22	354.4	5	0.18	0
			SD/DF	221259	0.17	222973	3	121.4	5	0.74	0
			DD/SF	229053	0.2	229781	2.03	26.4	5	0.32	0
			DD/DF	222699	0.16	224338	3.94	170.8	5	0.73	0
		20	SD/SF	258167	0.24	258538	1.74	12.4	5	0.15	0
			SD/DF	253284	0.21	255121	2.62	53.2	5	0.71	0
			DD/SF	250885	0.22	251128	1.8	10.2	5	0.1	0
			DD/DF	245967	0.21	247537	3.53	72.2	5	0.63	0
	100	5	SD/SF	271237	0.5	273378	15.99	753.4	5	0.78	0
			SD/DF	243127	0.41	250053	18.94	1208.6	5	2.78	0
			DD/SF	255064	0.46	258441	42.23	2503.8	5	1.31	0
			DD/DF	251040	0.46	257451	21.78	1308.8	5	2.49	0
		10	SD/SF	303748	0.43	305064	6.21	43	5	0.43	0
			SD/DF	278972	0.4	286684	14.36	719.2	5	2.68	0
			DD/SF	293784	0.43	295625	8.84	247.8	5	0.62	0
			DD/DF	278704	0.37	287589	23.99	1323.6	5	3.09	0
		15	SD/SF	338364	0.48	339451	5.69	22.6	5	0.32	0
			SD/DF	303039	0.42	311528	11.86	447.2	5	2.71	0
			DD/SF	331217	0.63	332588	6.4	53	5	0.41	0
			DD/DF	309710	0.53	315099	8.71	225.6	5	1.71	0
		20	SD/SF	362485	0.51	363580	5.59	8.4	5	0.3	0
			SD/DF	340468	0.49	349765	13.39	474.4	5	2.66	0
			DD/SF	362812	0.54	364628	7.63	91.8	5	0.5	0
			DD/DF	342289	0.48	352544	16.03	778.8	5	2.91	0
	200	5	SD/SF	391914	1.92	399004	377.53	7430.2	5	1.78	0
			SD/DF	364733	1.39	378963	333.2	6619	5	3.75	0
			DD/SF	389011	1.57	398679	655.87	11618.4	5	2.43	0
			DD/DF	358452	1.45	373599	634.99	16196.6	5	4.05	0
		10	SD/SF	433333	1.46	436692	41.88	650.6	5	0.77	0
			SD/DF	406585	1.18	422430	219.3	5132	5	3.75	0
			DD/SF	433365	1.43	437411	53.5	1132.2	5	0.93	0
			DD/DF	410804	1.25	428574	289.8	7210	5	4.14	0
		15	SD/SF	474171	1.65	477259	35.71	283	5	0.65	0
			SD/DF	450774	1.19	470952	1438.46	63585.6	5	4.29	0
			DD/SF	466421	1.63	470491	86.53	2109.4	5	0.86	0
			DD/DF	449587	1.35	468277	176.36	3154.2	5	3.99	0
		20	SD/SF	533183	1.22	540006	34.08	342.6	5	1.28	0
			SD/DF	485142	1.19	508508	532.33	11479	5	4.6	0
			DD/SF	530311	1.53	536449	35.23	455.6	5	1.15	0
			DD/DF	483383	1.27	504940	578.48	13231.4	5	4.26	0

Table 40: Performances of the ES-F-N formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	2.83	375954	744.7	13601.6	5	0.99	0
			SD/DF	328269	2	339760	176.56	2579.6	5	3.38	0
			DD/SF	365541	2.68	369959	199.23	2458.6	5	1.2	0
			DD/DF	328942	2.04	338701	184.97	2820.8	5	2.89	0
		10	SD/SF	427638	2.73	429701	38.45	53.2	5	0.49	0
			SD/DF	380825	1.99	393979	161.58	1715	5	3.35	0
			DD/SF	404564	2.37	407797	75.02	603.4	5	0.79	0
			DD/DF	378722	1.66	392040	156.55	2001.2	5	3.39	0
		15	SD/SF	452626	3.41	455741	207.57	1617.4	5	0.69	0
			SD/DF	417070	2.29	432574	149.92	1192.6	5	3.58	0
			DD/SF	449387	3.06	453096	70.3	340.6	5	0.82	0
			DD/DF	418669	2.23	435578	127.1	1245.2	5	3.89	0
		20	SD/SF	498662	3.06	504534	176.88	1221	5	1.17	0
			SD/DF	456692	2.36	475293	181.31	1278	5	3.91	0
			DD/SF	494145	3.29	503024	95.89	501.4	5	1.78	0
			DD/DF	453060	2.3	472505	238.61	1955.8	5	4.12	0
	100	5	SD/SF	521000	9.19	526452	4738.64	37893.2	5	1.03	0
			SD/DF	482166	6.1	501113	5078.07	55438.6	5	3.78	0
			DD/SF	517618	7.75	526280	17999.82	204647	1	1.65	0.08
			DD/DF	479514	6.22	498387	13811.32	142599.6	3	3.79	0.02
		10	SD/SF	601513	8.48	605603	357.24	1527	5	0.68	0
			SD/DF	538902	5.38	565163	5682.8	60111	5	4.64	0
			DD/SF	608242	5.9	614187	544.7	1439	5	0.97	0
			DD/DF	548982	4.6	573540	3047.88	27508.4	5	4.28	0
		15	SD/SF	647467	8.41	651823	195.14	433.6	5	0.67	0
			SD/DF	589048	4.42	647854	1646.36	12843.4	3	5.15	0
			DD/SF	658411	9.08	665812	497.09	1720	5	1.11	0
			DD/DF	602064	5.91	630630	2227.19	14372.8	5	4.53	0
		20	SD/SF	706242	10.34	711220	212.69	373	5	0.69	0
			SD/DF	649748	6.34	683630	1908.89	10798.8	5	4.95	0
			DD/SF	700745	6.12	710105	399.6	1837.6	5	1.32	0
			DD/DF	643718	5.69	676556	2690.7	18499.6	5	4.85	0
	200	5	SD/SF	765355	47.46	780275	21600.48	40577.6	0	1.92	0.56
			SD/DF	706676	24.46	741678	21600.54	86793	0	4.72	0.62
			DD/SF	735353	35.96	756516	21600.42	30662	0	2.8	0.95
			DD/DF	708023	24.49	741986	21600.48	86708.2	0	4.58	0.78
		10	SD/SF	886573	30.94	894648	5476.74	22579.2	4	0.9	0.04
			SD/DF	806654	16.05	851998	21600.48	104252.2	0	5.32	0.45
			DD/SF	880300	20.79	894079	8206.04	12615.8	5	1.54	0
			DD/DF	802832	16.44	847139	21600.44	114488	0	5.23	0.39
		15	SD/SF	970613	29.96	977290	1215.7	1268.2	5	0.69	0
			SD/DF	888058	15.66	940215	21600.5	107228.2	0	5.55	0.24
			DD/SF	933518	22.97	947725	3726.56	3124.8	5	1.5	0
			DD/DF	876006	16.58	926837	21600.48	109687.2	0	5.48	0.29
		20	SD/SF	1033920	29.83	1039376	567.85	672.6	5	0.53	0
			SD/DF	929080	16	979053	21600.48	120348.2	0	5.1	0.2
			DD/SF	1017946	21.9	1030026	1780.75	1691.6	5	1.17	0
			DD/DF	935441	15.01	988006	21600.52	111236	0	5.32	0.17

Table 41: Performances of the ES-F-TP formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.31	186936	4.8	131.8	5	0.33	0
			SD/DF	174999	0.24	177723	4.44	146.4	5	1.51	0
			DD/SF	175755	0.26	176582	3.71	32.2	5	0.47	0
			DD/DF	175980	0.2	178781	5.86	348.6	5	1.59	0
		10	SD/SF	226869	0.22	227013	5.46	621.4	5	0.06	0
			SD/DF	202106	0.21	204215	3.77	192	5	1.04	0
			DD/SF	210949	0.27	211618	2.74	38.2	5	0.32	0
			DD/DF	202688	0.22	203923	2.6	101.8	5	0.6	0
		15	SD/SF	239126	0.42	239594	3.84	332.4	5	0.18	0
			SD/DF	221259	0.3	222973	2.75	103.4	5	0.74	0
			DD/SF	229053	0.3	229781	1.95	17.4	5	0.32	0
			DD/DF	222699	0.3	224338	3.16	142.2	5	0.73	0
		20	SD/SF	258167	0.41	258538	2.31	3.2	5	0.15	0
			SD/DF	253284	0.35	255121	2.24	28	5	0.71	0
			DD/SF	250885	0.37	251128	1.79	4.2	5	0.1	0
			DD/DF	245967	0.4	247537	2.23	67.2	5	0.63	0
	100	5	SD/SF	271237	0.96	273378	22.04	701.6	5	0.78	0
			SD/DF	243127	0.67	250053	23.99	1282	5	2.78	0
			DD/SF	255064	1.03	258441	61.8	2536.4	5	1.31	0
			DD/DF	251040	0.64	257451	23.34	1146.2	5	2.49	0
		10	SD/SF	303748	0.71	305064	9.62	59.4	5	0.43	0
			SD/DF	278972	0.59	286684	20.37	846.2	5	2.68	0
			DD/SF	293784	0.74	295625	12.59	256.6	5	0.62	0
			DD/DF	278704	0.64	287589	28.3	1210.6	5	3.09	0
		15	SD/SF	338364	0.87	339451	9.52	18.2	5	0.32	0
			SD/DF	303039	0.64	311528	22.34	431.4	5	2.71	0
			DD/SF	331217	0.95	332588	11.3	72.8	5	0.41	0
			DD/DF	309710	0.72	315099	13.54	262	5	1.71	0
		20	SD/SF	362485	0.69	363580	9.61	8	5	0.3	0
			SD/DF	340468	0.79	349765	26.22	465.8	5	2.66	0
			DD/SF	362812	0.88	364628	15.24	109.8	5	0.5	0
			DD/DF	342289	0.87	352544	22.55	543	5	2.91	0
	200	5	SD/SF	391914	4.95	399004	760.83	8851.4	5	1.78	0
			SD/DF	364733	2.45	378963	507.56	7391.8	5	3.75	0
			DD/SF	389011	4.15	398679	1068.43	11311.2	5	2.43	0
			DD/DF	358452	2.66	373599	1009.36	18942.6	5	4.05	0
		10	SD/SF	433333	4.31	436692	123.49	642.6	5	0.77	0
			SD/DF	406585	2.05	422430	482.48	5932	5	3.75	0
			DD/SF	433365	2.87	437411	121.08	1303.2	5	0.93	0
			DD/DF	410804	2.04	428574	548.39	6556.2	5	4.14	0
		15	SD/SF	474171	2.98	477259	81.74	337	5	0.65	0
			SD/DF	450774	2.16	470952	2241.6	71897.4	5	4.29	0
			DD/SF	466421	2.93	470491	131.03	1712.8	5	0.86	0
			DD/DF	449587	2.26	468277	393.59	3075	5	3.99	0
		20	SD/SF	533183	2.59	540006	85.27	467.8	5	1.28	0
			SD/DF	485142	2.17	508508	1199.31	12502	5	4.6	0
			DD/SF	530311	2.91	536449	81.72	751.8	5	1.15	0
			DD/DF	483383	1.98	504940	1057.67	12410.6	5	4.26	0

Table 42: Performances of the ES-F-TP formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	3.69	375954	1490.4	17787.2	5	0.99	0
			SD/DF	328269	1.85	339760	202.85	2979.2	5	3.38	0
			DD/SF	365541	2.47	369959	258.61	3226.8	5	1.2	0
			DD/DF	328942	2.36	338701	225.58	3078.4	5	2.89	0
		10	SD/SF	427638	3.85	429701	92.95	45.2	5	0.49	0
			SD/DF	380825	2.77	393979	292.88	1991.4	5	3.35	0
			DD/SF	404564	3.22	407797	118.6	508.4	5	0.79	0
			DD/DF	378722	2.76	392040	209.68	1837.2	5	3.39	0
		15	SD/SF	452626	8.48	455741	286.05	1330.2	5	0.69	0
			SD/DF	417070	3.75	432574	221.13	943	5	3.58	0
			DD/SF	449387	5.39	453096	118.81	215.8	5	0.82	0
			DD/DF	418669	4.46	435578	292.02	1640.8	5	3.89	0
		20	SD/SF	498662	9.51	504534	276.54	1167	5	1.17	0
			SD/DF	456692	5.91	475293	580.07	1441.8	5	3.91	0
			DD/SF	494145	6.02	503024	185.43	310.8	5	1.78	0
			DD/DF	453060	5.17	472505	574.27	2369.8	5	4.12	0
	100	5	SD/SF	521000	15.78	526452	9070.09	34211.8	5	1.03	0
			SD/DF	482166	7.65	501113	5432.28	65486.4	5	3.78	0
			DD/SF	517618	10.92	526280	18175.73	172145	1	1.65	0.1
			DD/DF	479514	8.72	498387	12660.23	147081.4	4	3.79	0.01
		10	SD/SF	601513	15.4	605603	1397.62	1074.8	5	0.68	0
			SD/DF	538902	7.88	565163	12780.55	145371.4	3	4.64	0.04
			DD/SF	608242	8.77	614187	1043.34	1720.6	5	0.97	0
			DD/DF	548982	7.04	573540	4501.15	25433.2	5	4.28	0
		15	SD/SF	647467	22.21	651823	703	354.2	5	0.67	0
			SD/DF	589048	8.94	621038	15477.9	140414.2	2	5.15	0.07
			DD/SF	658411	11.64	665812	950.92	1598.6	5	1.11	0
			DD/DF	602064	9	630630	3619.45	15297	5	4.53	0
		20	SD/SF	706242	49.27	711220	633.15	357.8	5	0.69	0
			SD/DF	649748	10.14	683630	5295.18	8871	5	4.95	0
			DD/SF	700745	14.31	710105	980.44	1644.8	5	1.32	0
			DD/DF	643718	9.73	676556	7767.88	28641.8	5	4.85	0
	200	5	SD/SF	765355	149.74	780616	21600.42	2202.2	0	1.92	1.52
			SD/DF	706676	39.8	741826	21600.38	12622.6	0	4.72	1.95
			DD/SF	735353	72.85	756839	21600.54	6452	0	2.8	2.03
			DD/DF	708023	36.33	742325	21600.32	18448.2	0	4.58	1.81
		10	SD/SF	886573	95.57	894680	9771	2094.8	4	0.9	0.08
			SD/DF	806654	26.4	852471	21600.46	24448.2	0	5.32	2.36
			DD/SF	880300	37.37	894409	21107.7	4937.4	1	1.54	0.51
			DD/DF	802832	27.02	847600	21600.48	24381	0	5.23	2.17
		15	SD/SF	970613	127.67	977290	3012.18	1117.6	5	0.69	0
			SD/DF	888058	23.09	940220	21602.08	79977	0	5.55	0.37
			DD/SF	933518	59.5	947739	20113.38	8185	3	1.5	0.16
			DD/DF	876006	26.58	927327	21600.44	44773.6	0	5.48	2.07
		20	SD/SF	1033920	154.25	1039376	2996.05	1067	5	0.53	0
			SD/DF	929080	25.7	979462	21600.46	31892.2	0	5.1	1.78
			DD/SF	1017946	50.15	1030026	13443.79	2925.2	5	1.17	0
			DD/DF	935441	30.85	988495	21600.46	41879	0	5.32	1.99

Table 43: Performances of the ES-F-LS formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186328	0.27	186936	3.81	123.6	5	0.33	0
			SD/DF	174993	0.12	177723	2.85	177.4	5	1.52	0
			DD/SF	175755	0.2	176582	2.05	39.2	5	0.47	0
			DD/DF	175980	0.14	178781	3.16	297.6	5	1.59	0
		10	SD/SF	226869	0.16	227013	4.11	588.4	5	0.06	0
			SD/DF	202106	0.11	204215	2.34	118.2	5	1.04	0
			DD/SF	210949	0.16	211618	1.73	43.2	5	0.32	0
			DD/DF	202688	0.11	203923	1.18	39.4	5	0.6	0
		15	SD/SF	239126	0.17	239594	2.63	315.2	5	0.18	0
			SD/DF	221259	0.11	222973	1.55	39.2	5	0.74	0
			DD/SF	229053	0.14	229781	0.92	10.8	5	0.32	0
			DD/DF	222699	0.1	224338	1.4	49.2	5	0.73	0
		20	SD/SF	258167	0.18	258538	1.01	6	5	0.15	0
			SD/DF	253284	0.13	255121	1.26	12.6	5	0.71	0
			DD/SF	250885	0.14	251128	0.65	4.8	5	0.1	0
			DD/DF	245967	0.12	247537	1.25	14.2	5	0.63	0
	100	5	SD/SF	271237	0.88	273378	34.27	1231.8	5	0.78	0
			SD/DF	243096	0.33	250053	24.37	1456.6	5	2.79	0
			DD/SF	255064	0.54	258441	62.64	2535.8	5	1.31	0
			DD/DF	251027	0.32	257451	26.42	1663	5	2.5	0
		10	SD/SF	303748	0.59	305064	10.8	80.8	5	0.43	0
			SD/DF	278967	0.31	286684	16.07	830.8	5	2.69	0
			DD/SF	293784	0.49	295625	9.68	344	5	0.62	0
			DD/DF	278699	0.29	287589	27.25	1461.2	5	3.09	0
		15	SD/SF	338364	0.62	339451	9.01	16.6	5	0.32	0
			SD/DF	303039	0.36	311528	14.26	508.6	5	2.71	0
			DD/SF	331217	0.47	332588	6.11	76.8	5	0.41	0
			DD/DF	309710	0.35	315099	9.86	322.8	5	1.71	0
		20	SD/SF	362485	0.54	363580	6.9	9	5	0.3	0
			SD/DF	340468	0.34	349765	19.14	520.8	5	2.66	0
			DD/SF	362812	0.45	364628	8.16	117.8	5	0.5	0
			DD/DF	342289	0.36	352544	17.6	607.6	5	2.91	0
	200	5	SD/SF	391914	7.45	399004	1124.42	8855.4	5	1.78	0
			SD/DF	364713	1.35	378963	512.23	6816	5	3.76	0
			DD/SF	389011	3.37	398679	1481.54	11198	5	2.43	0
			DD/DF	358416	1.31	373599	909.17	18650.8	5	4.06	0
		10	SD/SF	433333	5.38	436692	84.68	751.4	5	0.77	0
			SD/DF	406553	1.18	422430	314.75	3995	5	3.76	0
			DD/SF	433365	2.67	437411	223.11	1666.6	5	0.93	0
			DD/DF	410784	1.24	428574	620.95	7304.4	5	4.15	0
		15	SD/SF	474171	5.04	477259	92.38	373.2	5	0.65	0
			SD/DF	450749	1.45	470952	1678.64	50657.4	5	4.29	0
			DD/SF	466421	2.65	470491	265.22	1686.8	5	0.86	0
			DD/DF	449555	1.42	468277	373.9	2700.8	5	4	0
		20	SD/SF	533183	4.05	540006	185.81	1250.6	5	1.28	0
			SD/DF	485123	1.42	508508	927.14	7375.2	5	4.6	0
			DD/SF	530311	2.74	536449	63.05	767.8	5	1.15	0
			DD/DF	483354	1.55	504940	822.04	11584.6	5	4.27	0

Table 44: Performances of the ES-F-LS formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	372220	0.89	375954	2382.08	18351.6	5	0.99	0
			SD/DF	328211	0.42	339760	280.57	3305.4	5	3.39	0
			DD/SF	365541	0.57	369959	448.24	3475.2	5	1.2	0
			DD/DF	328896	0.48	338701	305.34	3425.8	5	2.9	0
		10	SD/SF	427638	0.81	429701	113.01	80.6	5	0.49	0
			SD/DF	380804	0.52	393979	320.02	1983	5	3.36	0
			DD/SF	404564	0.66	407921	145.49	660.8	4	0.79	0
			DD/DF	378709	0.52	392040	353.05	1760	5	3.4	0
		15	SD/SF	452626	1.13	455741	339.08	1067	5	0.69	0
			SD/DF	417001	0.63	432574	212.01	1412.4	5	3.6	0
			DD/SF	449387	0.69	453096	120.89	167.4	5	0.82	0
			DD/DF	418663	0.68	435578	262.28	1611.2	5	3.89	0
		20	SD/SF	498662	1.21	504534	375.02	1464.2	5	1.17	0
			SD/DF	456673	0.83	475293	349.43	1371.6	5	3.92	0
			DD/SF	494145	1.04	503024	276.41	355.6	5	1.78	0
			DD/DF	453051	0.77	472505	349.75	1909.8	5	4.12	0
	100	5	SD/SF	521000	3.49	526452	18626.4	41619.8	4	1.03	0.01
			SD/DF	482086	1.63	501113	7578.14	59062.6	5	3.8	0
			DD/SF	517618	2.08	526282	19212.17	118659	1	1.65	0.13
			DD/DF	479448	1.66	498387	17104.26	167201.2	3	3.8	0.02
		10	SD/SF	601513	2.99	605603	3998.88	1856	5	0.68	0
			SD/DF	538846	1.5	565163	14423.42	74677.2	4	4.65	0
			DD/SF	608242	2.26	614187	3590.86	2134.6	5	0.97	0
			DD/DF	548941	1.63	573540	8495.89	38113.8	5	4.29	0
		15	SD/SF	647467	3.46	651823	978.79	403.2	5	0.67	0
			SD/DF	588983	1.74	621072	18719.5	113684.4	1	5.16	0.63
			DD/SF	658411	2.32	665812	2650.39	1884.2	5	1.11	0
			DD/DF	601939	1.67	630630	9294.34	44171.4	5	4.55	0
		20	SD/SF	706242	4.19	711220	2634.64	622.6	5	0.69	0
			SD/DF	649638	1.95	683630	9015.9	12428.8	5	4.97	0
			DD/SF	700745	2.81	710105	2274.82	2221	5	1.32	0
			DD/DF	643596	1.96	676556	11771.95	51544.6	4	4.87	0
	200	5	SD/SF	765355	37.75	782560	21600.3	1401.6	0	1.92	1.97
			SD/DF	706581	6.84	744125	21600.24	3375.4	0	4.73	3.79
			DD/SF	735353	20.29	758245	21600.24	2281.6	0	2.8	2.56
			DD/DF	707948	5.95	742900	21600.3	4998.4	0	4.59	3.39
		10	SD/SF	886573	12.17	895773	18485.17	1745.6	1	0.9	0.5
			SD/DF	806496	4.76	854670	21600.28	3838.4	0	5.34	4.52
			DD/SF	880300	6.83	894976	21600.26	2415.8	0	1.54	1.07
			DD/DF	802748	4.95	848746	21600.24	10350.4	0	5.24	3.11
		15	SD/SF	970613	17.26	977821	12733.19	887.2	3	0.69	0.24
			SD/DF	887934	5.53	942648	21600.28	7685.6	0	5.56	3.85
			DD/SF	933518	10.53	948096	21600.28	2679.8	0	1.5	0.48
			DD/DF	875837	5.96	928792	21600.2	9297	0	5.5	3.72
		20	SD/SF	1033920	25.98	1039376	7652.82	1106.4	5	0.53	0
			SD/DF	928953	6.23	983148	21600.2	2851.8	0	5.12	3.91
			DD/SF	1017946	14.97	1030098	21600.32	2141.2	0	1.17	0.09
			DD/DF	935282	6.63	990567	21600.2	9370	0	5.33	2.43

Table 45: Performances of the N formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186936	24.25	186936	15.1	0.4	5	0	0
			SD/DF	177723	7.57	177723	7	0	5	0	0
			DD/SF	176582	20.61	176582	8.7	0	5	0	0
			DD/DF	178781	5.47	178781	6.75	0	5	0	0
		10	SD/SF	227013	12.61	227013	10.53	0	5	0	0
			SD/DF	204215	4.39	204215	7.28	0	5	0	0
			DD/SF	211618	11.97	211618	8.68	0	5	0	0
			DD/DF	203923	3.44	203923	7.56	0	5	0	0
		15	SD/SF	239594	7	239594	8.41	0	5	0	0
			SD/DF	222973	3.23	222973	8.09	0	5	0	0
			DD/SF	229781	3.92	229781	7.99	0	5	0	0
			DD/DF	224338	3.15	224338	8.07	0	5	0	0
		20	SD/SF	258538	4.52	258538	7.5	0	5	0	0
			SD/DF	255121	2.76	255121	7.53	0	5	0	0
			DD/SF	251128	3.24	251128	7.09	0	5	0	0
			DD/DF	247537	3	247537	7.07	0	5	0	0
	100	5	SD/SF	273375	117.81	273378	99.51	1.6	5	0	0
			SD/DF	250053	14.65	250053	15.47	0	5	0	0
			DD/SF	258441	98.88	258441	30.99	0	5	0	0
			DD/DF	257451	30.52	257451	15.94	0	5	0	0
		10	SD/SF	305063	131.23	305064	46.97	0.4	5	0	0
			SD/DF	286684	29.57	286684	15.16	0	5	0	0
			DD/SF	295625	71.5	295625	27.8	0	5	0	0
			DD/DF	287589	24.66	287589	19.48	0	5	0	0
		15	SD/SF	339451	72.72	339451	40.18	0.8	5	0	0
			SD/DF	311528	19.34	311528	15.12	0	5	0	0
			DD/SF	332588	41.2	332588	17.07	0	5	0	0
			DD/DF	315099	9.92	315099	12.32	0	5	0	0
		20	SD/SF	363580	30.37	363580	16.42	0	5	0	0
			SD/DF	349765	11.21	349765	13.79	0	5	0	0
			DD/SF	364628	29.41	364628	16.23	0	5	0	0
			DD/DF	352544	10.02	352544	13.93	0	5	0	0
	200	5	SD/SF	398530	553.22	399004	500.13	3.8	5	0.12	0
			SD/DF	378963	113.38	378963	105.73	0	5	0	0
			DD/SF	398369	540.6	398679	389.96	2.6	5	0.08	0
			DD/DF	373575	194.56	373599	103.5	0.6	5	0.01	0
		10	SD/SF	436692	584.47	436692	264.06	0	5	0	0
			SD/DF	422430	107.67	422430	90.28	0	5	0	0
			DD/SF	437411	418.35	437411	189.32	0	5	0	0
			DD/DF	428574	214.72	428574	115.76	0	5	0	0
		15	SD/SF	477259	455.77	477259	210.03	0	5	0	0
			SD/DF	470855	131.34	470952	123.05	0.6	5	0.02	0
			DD/SF	470491	335.14	470491	145.97	0	5	0	0
			DD/DF	468277	167.93	468277	81.62	0	5	0	0
		20	SD/SF	540004	569.09	540006	364.6	1.2	5	0	0
			SD/DF	508503	154.46	508508	104.79	0.6	5	0	0
			DD/SF	536449	332.87	536449	143.71	0	5	0	0
			DD/DF	504940	83.37	504940	81.71	0	5	0	0

Table 46: Performances of the N formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	374988	6645.14	375954	12116.56	11.8	5	0.26	0
			SD/DF	339736	429.68	339760	776.31	0.6	5	0.01	0
			DD/SF	369687	3649.63	369959	5739.02	3.8	5	0.07	0
			DD/DF	338701	464.79	338701	923.3	0	5	0	0
		10	SD/SF	429410	2656.13	429701	4433.62	0.6	5	0.07	0
			SD/DF	393979	346.69	393979	599.93	0	5	0	0
			DD/SF	407797	1475.22	407797	3003.88	0	5	0	0
			DD/DF	392040	308.52	392040	644.26	0	5	0	0
		15	SD/SF	455741	2044.38	455741	2443.46	0	5	0	0
			SD/DF	432545	304.47	432574	530.58	0.6	5	0.01	0
			DD/SF	453096	1056.96	453096	1892.8	0	5	0	0
			DD/DF	435578	304.63	435578	401.3	0	5	0	0
		20	SD/SF	504534	1658.52	504534	2041.64	0	5	0	0
			SD/DF	475293	275.4	475293	389.8	0	5	0	0
			DD/SF	503024	1117.14	503024	1840.53	0	5	0	0
			DD/DF	472505	338.94	472505	453.89	0	5	0	0
	100	5	SD/SF	525836	13177.25	631083	19835.24	2.2	2	0.11	14.48
			SD/DF	501082	2542	501113	4342.45	0.6	5	0.01	0
			DD/SF	525673	9686.81	765613	16948.29	2.8	3	0.11	19.31
			DD/DF	498227	2027.92	498387	3196.7	2	5	0.03	0
		10	SD/SF	605089	7482.7	662249	19254.42	4	2	0.08	6.68
			SD/DF	564865	2212.24	565163	4496	2.2	5	0.05	0
			DD/SF	614173	9334.84	617972	13023.97	0	4	0	0.58
			DD/DF	573540	1549.23	573540	2372.19	0	5	0	0
		15	SD/SF	651652	6317.09	651823	16389.98	5.4	5	0.03	0
			SD/DF	620761	1829.6	621038	3101.02	1.2	5	0.05	0
			DD/SF	665812	3750.43	665812	8088.24	0	5	0	0
			DD/DF	630630	1518.23	630630	2144.02	0	5	0	0
		20	SD/SF	711191	5145.16	910657	14290.19	1	4	0	18.96
			SD/DF	683630	1735.87	683630	1779.28	0	5	0	0
			DD/SF	710105	3701.14	710105	7806.88	0	5	0	0
			DD/DF	676202	1939.71	676556	1954.98	0	5	0.05	0
	200	5	SD/SF	775963	352166.9	3417370	21638.92	0	0	0.56	98.12
			SD/DF	741347	7853.07	764979	13001.67	0.6	4	0.04	2.7
			DD/SF	754887	250540.34	3505662	21637.08	0	0	0.21	98.29
			DD/DF	741850	7611.25	741972	8832.75	1.6	5	0.02	0
		10	SD/SF	894648	316778	3514484	21639.26	0	0	0	97.7
			SD/DF	851666	5405.08	852173	14076.62	1.2	4	0.04	0.04
			DD/SF	893952	93942.26	3521228	21641.54	0	0	0.01	97.72
			DD/DF	846960	5162.49	847716	10627.33	0	4	0.02	0.09
		15	SD/SF	977290	50465.71	3591712	21633.04	0	0	0	97.38
			SD/DF	940021	5406.92	1005346	13341.53	0.6	4	0.02	5.16
			DD/SF	947725	67013.82	2961150	21040.9	0	1	0	77.87
			DD/DF	926835	5625.28	926835	14316.12	0	5	0	0
		20	SD/SF	1039376	43876.18	3525962	21635.92	0	0	0	96.9
			SD/DF	979053	2202.39	979053	8201.68	0	5	0	0
			DD/SF	1030026	28316.22	2992366	21519.04	0	1	0	77.5
			DD/DF	988006	3125.88	988006	9997.84	0	5	0	0

Table 47: Performances of the TP formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186923	7.45	186936	18.81	1.8	5	0.01	0
			SD/DF	177723	2.76	177723	5.37	0	5	0	0
			DD/SF	176582	4.15	176582	7.51	0	5	0	0
			DD/DF	178781	2.86	178781	5.43	0	5	0	0
		10	SD/SF	227013	4.51	227013	17.07	0	5	0	0
			SD/DF	204215	3.12	204215	5.95	0	5	0	0
			DD/SF	211618	3.47	211618	7.2	0	5	0	0
			DD/DF	203923	2.53	203923	5.58	0	5	0	0
		15	SD/SF	239594	2.9	239594	9.14	0	5	0	0
			SD/DF	222973	2.41	222973	5.1	0	5	0	0
			DD/SF	229781	3.03	229781	5.35	0	5	0	0
			DD/DF	224338	2.65	224338	5.56	0	5	0	0
		20	SD/SF	258538	2.59	258538	8.17	0	5	0	0
			SD/DF	255121	2.33	255121	4.47	0	5	0	0
			DD/SF	251128	2.5	251128	4.62	0	5	0	0
			DD/DF	247537	2.39	247537	4.52	0	5	0	0
	100	5	SD/SF	273303	46.01	273378	78.37	3.6	5	0.03	0
			SD/DF	250046	10.2	250053	20	0.6	5	0	0
			DD/SF	258391	26.44	258441	37.28	1.8	5	0.02	0
			DD/DF	257450	12.33	257451	21.94	0	5	0	0
		10	SD/SF	305045	38.21	305064	67.14	2.4	5	0.01	0
			SD/DF	286684	12.21	286684	17.86	0	5	0	0
			DD/SF	295625	29.61	295625	33.98	0	5	0	0
			DD/DF	287589	15.81	287589	20.57	0	5	0	0
		15	SD/SF	339444	15.86	339451	45.44	1.8	5	0	0
			SD/DF	311528	10.97	311528	16.66	0	5	0	0
			DD/SF	332588	10.49	332588	17.27	0	5	0	0
			DD/DF	315099	7.35	315099	12.26	0	5	0	0
		20	SD/SF	363580	12.25	363580	43.06	1.2	5	0	0
			SD/DF	349765	7.88	349765	14.12	0	5	0	0
			DD/SF	364628	9.22	364628	17.5	0	5	0	0
			DD/DF	352544	7.83	352544	15.27	0	5	0	0
	200	5	SD/SF	397420	432.05	399004	560.61	8.8	5	0.4	0
			SD/DF	378963	145.91	378963	106.73	0	5	0	0
			DD/SF	397507	407.63	398679	522.69	7	5	0.3	0
			DD/DF	373392	122.49	373599	137.45	1.8	5	0.05	0
		10	SD/SF	436692	325.92	436692	225.36	0	5	0	0
			SD/DF	422430	120.63	422430	120.27	0	5	0	0
			DD/SF	437411	461.98	437411	207.54	0	5	0	0
			DD/DF	428570	157.63	428574	148.91	0.6	5	0	0
		15	SD/SF	477259	285.02	477259	189.73	0	5	0	0
			SD/DF	470751	123.11	470952	130.48	1	5	0.04	0
			DD/SF	470491	237	470491	154.1	0	5	0	0
			DD/DF	468277	109.24	468277	114.51	0	5	0	0
		20	SD/SF	539850	253.05	540006	292.19	3.8	5	0.03	0
			SD/DF	508450	91.48	508508	139.13	1.8	5	0.01	0
			DD/SF	536449	169.44	536449	171.89	0	5	0	0
			DD/DF	504940	83.2	504940	99.8	0	5	0	0

Table 48: Performances of the TP formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	374538	973.81	375954	4903.9	25	5	0.38	0
			SD/DF	339674	144.81	339760	201.82	1.8	5	0.03	0
			DD/SF	369412	710.44	369959	2169.85	7.4	5	0.15	0
			DD/DF	338698	140.66	338701	217.11	0.6	5	0	0
		10	SD/SF	429646	393.85	429701	943.02	2.6	5	0.01	0
			SD/DF	393979	92.11	393979	143.82	0	5	0	0
			DD/SF	407797	208.9	407797	281.64	0	5	0	0
			DD/DF	392040	83.22	392040	146.65	0	5	0	0
		15	SD/SF	455741	305.78	455741	434.44	0	5	0	0
			SD/DF	432534	74.92	432574	243.3	1	5	0.01	0
			DD/SF	453096	155.33	453096	240.82	0	5	0	0
			DD/DF	435577	83.28	435578	133.93	0	5	0	0
		20	SD/SF	504533	319.76	504534	559.2	0.6	5	0	0
			SD/DF	475293	80.94	475293	125.12	0	5	0	0
			DD/SF	503024	239.91	503024	280.27	0	5	0	0
			DD/DF	472505	100.79	472505	137.65	0	5	0	0
	100	5	SD/SF	524747	3984.34	645066	18914.22	6	2	0.32	11.89
			SD/DF	500764	798.41	501113	1877.09	3.6	5	0.07	0
			DD/SF	524639	2654.47	526280	11740.38	11.8	4	0.31	0.06
			DD/DF	498000	648.03	498387	1145.28	2.6	5	0.08	0
		10	SD/SF	604549	2224.92	699615	22320.16	5.2	1	0.17	11.51
			SD/DF	564625	646.02	565163	1174.96	3	5	0.09	0
			DD/SF	614077	1875.74	632125	9345.02	1.2	4	0.02	2.5
			DD/DF	573540	428.61	573540	533.27	0	5	0	0
		15	SD/SF	651241	1983.77	656051	16990.32	7.4	4	0.09	0.63
			SD/DF	620611	461.16	621038	2104.77	2.4	5	0.07	0
			DD/SF	665809	1636.8	665812	2135	0.6	5	0	0
			DD/DF	630630	456.28	630630	580.07	0	5	0	0
		20	SD/SF	710956	1980.14	711220	9707.42	4.2	5	0.04	0
			SD/DF	683630	441.36	683630	788.73	0	5	0	0
			DD/SF	710105	1532.8	710105	1576.05	0	5	0	0
			DD/DF	676556	402.76	676556	513.87	0	5	0	0
	200	5	SD/SF	775526	7652.43	1315980	21618.48	0	0	0.61	40.98
			SD/DF	740775	6910.6	741675	10556.3	4.2	5	0.12	0
			DD/SF	752605	6947.38	1128921	20485.24	4.6	1	0.52	27.42
			DD/DF	741032	3340.96	741972	4052.13	4.2	5	0.13	0
		10	SD/SF	893486	5524.92	1355561	19325	0	1	0.13	29.84
			SD/DF	850939	2770.85	851998	5311.46	4.4	5	0.12	0
			DD/SF	892426	4074.06	1407285	19008.38	1	2	0.19	29.26
			DD/DF	846385	2761.99	847136	3765.76	4	5	0.09	0
		15	SD/SF	977290	3990.51	977290	10758.49	0	5	0	0
			SD/DF	939577	2646.92	1005644	12212.08	1.2	4	0.07	5.19
			DD/SF	947660	5202.62	1173867	14967.61	0	3	0.01	14.64
			DD/DF	926778	2762.9	926835	3119.18	1.6	5	0.01	0
		20	SD/SF	1039376	3838.91	1039376	8324.59	0	5	0	0
			SD/DF	979015	1751.68	979053	1962.42	1.6	5	0	0
			DD/SF	1030026	2896.53	1030026	7074.16	0	5	0	0
			DD/DF	987923	1947.91	988006	1981.37	0.6	5	0.01	0

Table 49: Performances of the MC formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186923	1.51	186936	4.59	1.2	5	0.01	0
			SD/DF	177723	1.09	177723	1.48	0	5	0	0
			DD/SF	176582	1.45	176582	1.94	0	5	0	0
			DD/DF	178781	1.05	178781	1.54	0	5	0	0
		10	SD/SF	227013	1.02	227013	1.39	0	5	0	0
			SD/DF	204215	0.76	204215	1.09	0	5	0	0
			DD/SF	211618	1.01	211618	1.39	0	5	0	0
			DD/DF	203923	0.75	203923	1.09	0	5	0	0
		15	SD/SF	239594	0.73	239594	1.08	0	5	0	0
			SD/DF	222973	0.68	222973	1.06	0	5	0	0
			DD/SF	229781	0.72	229781	1.08	0	5	0	0
			DD/DF	224338	0.68	224338	1.06	0	5	0	0
		20	SD/SF	258538	0.6	258538	1.13	0	5	0	0
			SD/DF	255121	0.51	255121	1.01	0	5	0	0
			DD/SF	251128	0.53	251128	0.92	0	5	0	0
			DD/DF	247537	0.57	247537	1.05	0	5	0	0
	100	5	SD/SF	273303	16.55	273378	28.04	3	5	0.03	0
			SD/DF	250046	5.62	250053	7.97	0.6	5	0	0
			DD/SF	258391	11.99	258441	18.97	1.8	5	0.02	0
			DD/DF	257450	8.02	257451	7.61	0	5	0	0
		10	SD/SF	305045	11.67	305064	17	1.8	5	0.01	0
			SD/DF	286684	4.96	286684	5.52	0	5	0	0
			DD/SF	295625	13.08	295625	12.37	0	5	0	0
			DD/DF	287589	7.68	287589	7.4	0	5	0	0
		15	SD/SF	339444	4.62	339451	7.93	0.6	5	0	0
			SD/DF	311528	4.88	311528	4.98	0	5	0	0
			DD/SF	332588	3.54	332588	4.39	0	5	0	0
			DD/DF	315099	3.01	315099	3.78	0	5	0	0
		20	SD/SF	363580	3.12	363580	4.02	0	5	0	0
			SD/DF	349765	3.16	349765	3.85	0	5	0	0
			DD/SF	364628	2.89	364628	3.95	0	5	0	0
			DD/DF	352544	3.25	352544	4.08	0	5	0	0
	200	5	SD/SF	397420	120.49	399004	274.47	8	5	0.4	0
			SD/DF	378963	59.66	378963	64.35	0	5	0	0
			DD/SF	397507	136.46	398679	286.06	7.8	5	0.3	0
			DD/DF	373392	62.16	373599	68.03	1.8	5	0.05	0
		10	SD/SF	436692	98.71	436692	102.56	0	5	0	0
			SD/DF	422430	43.39	422430	56.49	0	5	0	0
			DD/SF	437411	85.49	437411	90.65	0	5	0	0
			DD/DF	428570	49.45	428574	62.17	0.6	5	0	0
		15	SD/SF	477259	91.61	477259	78.9	0	5	0	0
			SD/DF	470751	49.05	470952	55.84	1	5	0.04	0
			DD/SF	470491	67.14	470491	68.18	0	5	0	0
			DD/DF	468277	42.34	468277	46.89	0	5	0	0
		20	SD/SF	539850	88.96	540006	123.76	3.2	5	0.03	0
			SD/DF	508450	43.2	508508	58.21	1.8	5	0.01	0
			DD/SF	536449	69.14	536449	62.72	0	5	0	0
			DD/DF	504940	40.82	504940	40.49	0	5	0	0

Table 50: Performances of the MC formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	374538	114.21	375954	276.81	19.4	5	0.38	0
			SD/DF	339674	30.53	339760	40.25	0.6	5	0.03	0
			DD/SF	369412	92.96	369959	189.93	6.6	5	0.15	0
			DD/DF	338698	29.5	338701	41.19	0.6	5	0	0
		10	SD/SF	429646	123.88	429701	162.64	2.4	5	0.01	0
			SD/DF	393979	32.2	393979	37.8	0	5	0	0
			DD/SF	407797	85	407797	105.46	0	5	0	0
			DD/DF	392040	32.96	392040	41.69	0	5	0	0
		15	SD/SF	455741	82.25	455741	101.77	0	5	0	0
			SD/DF	432534	28.93	432574	44.47	1	5	0.01	0
			DD/SF	453096	76.67	453096	69.85	0	5	0	0
			DD/DF	435577	30.92	435578	41.23	0	5	0	0
		20	SD/SF	504533	85.06	504534	96.5	0.4	5	0	0
			SD/DF	475293	28.23	475293	35.48	0	5	0	0
			DD/SF	503024	68.57	503024	80.62	0	5	0	0
			DD/DF	472505	23.88	472505	43.49	0	5	0	0
	100	5	SD/SF	524747	511.01	526452	1329.15	18.4	5	0.32	0
			SD/DF	500764	175.68	501113	274.76	3.6	5	0.07	0
			DD/SF	524639	406.92	526280	1174.03	15.2	5	0.31	0
			DD/DF	498000	165.77	498387	264.69	2.6	5	0.08	0
		10	SD/SF	604549	796.34	605603	1441.71	10.6	5	0.17	0
			SD/DF	564625	253.97	565163	413.45	3.4	5	0.09	0
			DD/SF	614077	833.76	614187	1084.72	2.2	5	0.02	0
			DD/DF	573540	196.35	573540	266.44	0	5	0	0
		15	SD/SF	651241	602.54	651823	1044.13	8.2	5	0.09	0
			SD/DF	620611	267.89	621038	287.86	2.4	5	0.07	0
			DD/SF	665809	589.01	665812	577.76	0.6	5	0	0
			DD/DF	630630	206.49	630630	201.4	0	5	0	0
		20	SD/SF	710956	652.45	711220	854.7	4.2	5	0.04	0
			SD/DF	683630	296.33	683630	254.96	0	5	0	0
			DD/SF	710105	475.31	710105	630.74	0	5	0	0
			DD/DF	676556	202.87	676556	189.91	0	5	0	0
	200	5	SD/SF	775526	2025.1	780264	6434.04	60	5	0.61	0
			SD/DF	740775	873.46	741675	943.2	4.6	5	0.12	0
			DD/SF	752605	1821.25	756470	5341.07	41.6	5	0.52	0
			DD/DF	741032	801.61	741972	1106.03	4.2	5	0.13	0
		10	SD/SF	893486	2694.79	894648	2708.16	6.4	5	0.13	0
			SD/DF	850939	1535.12	851998	1883.28	4.4	5	0.12	0
			DD/SF	892426	2975.62	894079	3185.98	8.4	5	0.19	0
			DD/DF	846412	1386.75	847136	1818.99	4	5	0.08	0
		15	SD/SF	977290	2837.55	977290	2329.79	0	5	0	0
			SD/DF	939577	2300.67	940215	1537.26	3	5	0.07	0
			DD/SF	947660	2616.99	947725	2534.18	1.2	5	0.01	0
			DD/DF	926778	2638.81	926835	1163.47	1.6	5	0.01	0
		20	SD/SF	1039376	2129.11	1039376	2504.62	0	5	0	0
			SD/DF	979015	1691	979053	823.29	1	5	0	0
			DD/SF	1030026	2274.42	1030026	1954.09	0	5	0	0
			DD/DF	987923	1451.71	988006	1077.77	0.6	5	0.01	0

Table 51: Performances of the ME formulation for the balanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	186923	3.37	186936	7.15	1.6	5	0.01	0
			SD/DF	177723	3.1	177723	3.06	0	5	0	0
			DD/SF	176582	3.58	176582	4.19	0	5	0	0
			DD/DF	178781	3.19	178781	3.15	0	5	0	0
		10	SD/SF	227013	2.76	227013	3.56	0	5	0	0
			SD/DF	204215	2.81	204215	2.59	0	5	0	0
			DD/SF	211618	2.63	211618	3.25	0	5	0	0
			DD/DF	203923	2.71	203923	2.52	0	5	0	0
		15	SD/SF	239594	2.26	239594	2.86	0	5	0	0
			SD/DF	222973	2.36	222973	2.54	0	5	0	0
			DD/SF	229781	2.01	229781	2.61	0	5	0	0
			DD/DF	224338	2.54	224338	2.81	0	5	0	0
		20	SD/SF	258538	1.68	258538	2.09	0	5	0	0
			SD/DF	255121	2.38	255121	2.16	0	5	0	0
			DD/SF	251128	1.71	251128	2.11	0	5	0	0
			DD/DF	247537	2.7	247537	2.4	0	5	0	0
	100	5	SD/SF	273303	21.29	273378	28.97	3	5	0.03	0
			SD/DF	250046	9.01	250053	12	0.6	5	0	0
			DD/SF	258391	20.14	258441	24.72	1.8	5	0.02	0
			DD/DF	257450	12.66	257451	11.64	0	5	0	0
		10	SD/SF	305045	11.84	305064	23.88	2.2	5	0.01	0
			SD/DF	286684	10.89	286684	10.78	0	5	0	0
			DD/SF	295625	15.1	295625	16.74	0	5	0	0
			DD/DF	287589	10.33	287589	11.02	0	5	0	0
		15	SD/SF	339444	9.06	339451	17.2	1	5	0	0
			SD/DF	311528	8.1	311528	10.08	0	5	0	0
			DD/SF	332588	8.4	332588	11.91	0	5	0	0
			DD/DF	315099	6.2	315099	8.44	0	5	0	0
		20	SD/SF	363580	7.23	363580	10.94	0	5	0	0
			SD/DF	349765	7.02	349765	8.14	0	5	0	0
			DD/SF	364628	7.61	364628	11.35	0	5	0	0
			DD/DF	352544	7.66	352544	9.17	0	5	0	0
	200	5	SD/SF	397420	165.49	399004	207.54	8	5	0.4	0
			SD/DF	378963	84.17	378963	69.88	0	5	0	0
			DD/SF	397507	345.55	398679	219.57	7.4	5	0.3	0
			DD/DF	373392	78.74	373599	81.14	1.8	5	0.05	0
		10	SD/SF	436692	103.47	436692	109.04	0	5	0	0
			SD/DF	422430	69.3	422430	65.02	0	5	0	0
			DD/SF	437411	106.07	437411	105.45	0	5	0	0
			DD/DF	428570	58.33	428574	75.36	0	5	0	0
		15	SD/SF	477259	86.16	477259	104.56	0	5	0	0
			SD/DF	470751	63.89	470952	77.45	1	5	0.04	0
			DD/SF	470491	77.69	470491	91.52	0	5	0	0
			DD/DF	468277	55.94	468277	59.15	0	5	0	0
		20	SD/SF	539850	90.4	540006	142.17	3.2	5	0.03	0
			SD/DF	508450	78.21	508508	92.78	1.8	5	0.01	0
			DD/SF	536449	71.29	536449	93.73	0	5	0	0
			DD/DF	504940	65.31	504940	70.54	0	5	0	0

Table 52: Performances of the ME formulation for the balanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	374538	171.98	375954	260.26	20.2	5	0.38	0
			SD/DF	339674	44.58	339760	48.1	0.6	5	0.03	0
			DD/SF	369412	177.36	369959	168.82	7.4	5	0.15	0
			DD/DF	338698	41.88	338701	44.29	0.6	5	0	0
		10	SD/SF	429646	122.83	429701	125.63	2.6	5	0.01	0
			SD/DF	393979	62.17	393979	46.19	0	5	0	0
			DD/SF	407797	106.37	407797	91.11	0	5	0	0
			DD/DF	392040	45.19	392040	52.47	0	5	0	0
		15	SD/SF	455741	76.84	455741	87.11	0	5	0	0
			SD/DF	432534	43.3	432574	49.18	1	5	0.01	0
			DD/SF	453096	85.97	453096	80.66	0	5	0	0
			DD/DF	435577	43.9	435578	49.2	0	5	0	0
		20	SD/SF	504533	95.55	504534	108.3	0.6	5	0	0
			SD/DF	475293	45.72	475293	47.68	0	5	0	0
			DD/SF	503024	77.85	503024	99.72	0	5	0	0
			DD/DF	472505	52.77	472505	54.76	0	5	0	0
	100	5	SD/SF	524747	745.45	526452	949.24	17.2	5	0.32	0
			SD/DF	500764	359.51	501113	277.5	3.6	5	0.07	0
			DD/SF	524639	1075.87	526280	912.02	13.8	5	0.31	0
			DD/DF	498000	247.03	498387	257.21	2.6	5	0.08	0
		10	SD/SF	604549	786.91	605603	827.74	10.6	5	0.17	0
			SD/DF	564625	363.06	565163	362.85	3	5	0.09	0
			DD/SF	614077	1349.41	614187	696.95	2.2	5	0.02	0
			DD/DF	573540	269.39	573540	206.99	0	5	0	0
		15	SD/SF	651241	797.21	651823	789.96	8.6	5	0.09	0
			SD/DF	620611	356.33	621038	312.01	3.4	5	0.07	0
			DD/SF	665809	914.81	665812	502.06	0.6	5	0	0
			DD/DF	630630	241.3	630630	190.02	0	5	0	0
		20	SD/SF	710956	525.43	711220	640.22	4.2	5	0.04	0
			SD/DF	683630	247.28	683630	253.81	0	5	0	0
			DD/SF	710105	920.16	710105	492.18	0	5	0	0
			DD/DF	676556	291.96	676556	238.21	0	5	0	0
	200	5	SD/SF	775526	3662.52	780264	9499.17	64.2	5	0.61	0
			SD/DF	740775	2125.83	741675	1578.04	4.6	5	0.12	0
			DD/SF	752605	1963.67	756470	8051.5	38.2	5	0.52	0
			DD/DF	741032	1624.1	741972	1473.84	4.6	5	0.12	0
		10	SD/SF	893486	4697.77	894648	4785.49	9	5	0.13	0
			SD/DF	850939	1349.04	851998	1901.87	4.4	5	0.12	0
			DD/SF	892426	4615.63	894079	5637.3	10	5	0.19	0
			DD/DF	846412	2041.43	847136	1911.83	4.4	5	0.08	0
		15	SD/SF	977290	2733.23	977290	2853.38	0	5	0	0
			SD/DF	939577	1461.49	940215	1844.21	3	5	0.07	0
			DD/SF	947660	3363.43	947725	3529.03	1.2	5	0.01	0
			DD/DF	926778	1785.7	926835	1722.35	1.6	5	0.01	0
		20	SD/SF	1039376	1556.26	1039376	1958.01	0	5	0	0
			SD/DF	979015	1206.23	979053	1142.74	1	5	0	0
			DD/SF	1030026	1705.82	1030026	2717.26	0	5	0	0
			DD/DF	987923	1157.17	988006	1354.24	0.6	5	0.01	0

A.2 Unbalanced network results

Table 53: Performances of the C formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	116798	0.01	175296	20.79	1690.4	5	33.43	0
			SD/DF	105635	0.01	168797	14.95	1878.4	5	37.39	0
			DD/SF	107216	0.01	166826	51.17	2380.2	5	35.73	0
			DD/DF	106548	0.01	169377	18.83	1636.6	5	37	0
		10	SD/SF	154505	0.01	213232	42.09	2979.2	5	27.54	0
			SD/DF	129619	0.01	195540	23.02	2117.8	5	33.7	0
			DD/SF	140030	0.01	199116	54.46	3108	5	29.75	0
			DD/DF	132150	0.01	196472	14.54	1773.8	5	32.54	0
		15	SD/SF	175290	0.01	232679	24.59	3469	5	24.62	0
			SD/DF	147269	0.01	217500	5.36	1242.8	5	32.2	0
			DD/SF	166961	0.01	222165	14.89	1760.6	5	24.86	0
			DD/DF	151631	0.01	217120	3.74	608	5	30.14	0
		20	SD/SF	202077	0.01	258041	5.08	1592.2	5	21.71	0
			SD/DF	174790	0.01	253839	1.97	299.2	5	31.08	0
			DD/SF	195869	0.01	249786	2.72	612	5	21.59	0
			DD/DF	172142	0.01	245279	1.37	126.8	5	29.76	0
	100	5	SD/SF	147059	0.02	256259	185.34	3460	5	42.61	0
			SD/DF	129682	0.02	234855	147.54	2397.4	5	44.71	0
			DD/SF	135059	0.02	242367	1133.45	8519.6	5	44.32	0
			DD/DF	132412	0.02	243091	359.97	2597.2	5	45.49	0
		10	SD/SF	173311	0.02	289608	275	4989.8	5	40.18	0
			SD/DF	156625	0.02	270400	296.13	3384.2	5	42.06	0
			DD/SF	163126	0.02	280635	450.25	5522.2	5	41.9	0
			DD/DF	154507	0.02	271470	380.09	3894.6	5	43.08	0
		15	SD/SF	199623	0.02	321461	560.91	24598.6	5	37.89	0
			SD/DF	172826	0.02	293950	666.99	7795.4	5	41.19	0
			DD/SF	197140	0.02	317730	601.96	10044	5	37.96	0
			DD/DF	179633	0.02	298589	194.86	4226.2	5	39.82	0
		20	SD/SF	223329	0.02	348828	866.76	42219.6	5	36.03	0
			SD/DF	198106	0.02	336504	541.66	8548.4	5	41.13	0
			DD/SF	227479	0.02	356235	931.68	23786.6	5	36.15	0
			DD/DF	199278	0.02	341631	635.28	11922	5	41.64	0
	200	5	SD/SF	174870	0.04	377126	9752.53	74176.8	4	53.66	0.24
			SD/DF	162335	0.04	360584	5750.79	18343.6	5	54.97	0
			DD/SF	175773	0.04	378131	13609.74	51944	4	53.52	0.03
			DD/DF	161998	0.04	355264	5749.68	25115.2	5	54.38	0
		10	SD/SF	200676	0.04	414221	21600	31385.6	0	51.57	6.18
			SD/DF	191480	0.04	398811	14166.99	120714.6	4	51.99	0.11
			DD/SF	201621	0.04	418291	21600	17017.8	0	51.66	8.83
			DD/DF	189777	0.04	403828	13891.54	66232.2	4	53.01	0.22
		15	SD/SF	228972	0.04	449190	21600	27620	0	49.02	3.64
			SD/DF	208119	0.04	436998	17552.49	69928.6	3	52.37	0.34
			DD/SF	221620	0.04	443449	21600	29830	0	50.01	4.89
			DD/DF	214142	0.04	436027	13473.62	70819.2	5	50.89	0
		20	SD/SF	270497	0.05	506414	21600	33982.2	0	46.6	1.69
			SD/DF	241537	0.05	479637	21600	51136.4	0	49.62	1.54
			DD/SF	274050	0.05	508192	21600	30656.4	0	46.05	3.41
			DD/DF	241200	0.05	473571	18425.28	99114.4	3	49.05	0.78

Table 54: Performances of the C formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	160894	0.02	352403	21600	117336	0	54.3	2
			SD/DF	142188	0.02	316360	9095.18	135427.6	5	55.02	0
			DD/SF	157073	0.02	345753	21600	113388.8	0	54.61	2
			DD/DF	142121	0.02	318428	10237.88	143148	5	55.36	0
		10	SD/SF	200147	0.03	415692	21600	73499.6	0	51.71	11.92
			SD/DF	172121	0.03	376684	21600	50928.6	0	54.17	3.34
			DD/SF	184379	0.02	394205	21600	65380.4	0	52.94	12.75
			DD/DF	176534	0.02	374827	21600.02	77476.8	0	52.77	4.15
		15	SD/SF	228607	0.04	452726	21603.22	62521	0	49.12	11.19
			SD/DF	203136	0.03	423563	21609.18	59093.2	0	51.91	10.01
			DD/SF	223202	0.03	450443	21618.14	74879.4	0	50.33	13.36
			DD/DF	206747	0.03	427344	21617.88	74795.2	0	51.48	10.39
		20	SD/SF	271691	0.04	502184	21600	74184.6	0	45.85	7.39
			SD/DF	233473	0.03	477472	21600	71768.8	0	50.76	9.32
			DD/SF	263550	0.03	502389	21600	76647.8	0	47.43	8.62
			DD/DF	235363	0.03	472433	21600	85252.8	0	49.99	7.53
	100	5	SD/SF	179724	0.04	498382	21600.04	12985	0	63.73	23.97
			SD/DF	169629	0.04	482311	21600.06	11119.8	0	64.24	20.22
			DD/SF	179110	0.04	499335	21600.08	13188	0	63.94	25.83
			DD/DF	171362	0.04	480519	21600.04	9248.2	0	63.41	22.91
		10	SD/SF	218725	0.04	572145	21600	21993.6	0	61.54	22.46
			SD/DF	203371	0.04	535879	21600.02	20169.8	0	61.6	22.37
			DD/SF	227417	0.04	590479	21600.04	19882.4	0	61.19	22.96
			DD/DF	203495	0.04	545716	21600.04	19832.8	0	62.16	21.66
		15	SD/SF	248048	0.04	620241	21600.04	23321.2	0	59.67	21.19
			SD/DF	232754	0.04	585072	21600.06	14431	0	59.67	21.9
			DD/SF	254503	0.04	635490	21600.1	14307.6	0	59.53	22.56
			DD/DF	234643	0.05	599614	21600.1	15452.2	0	60.36	22
		20	SD/SF	292643	0.05	688871	21600.04	22521.6	0	57.18	20.34
			SD/DF	266794	0.05	661597	21600.04	21106.4	0	58.95	20.62
			DD/SF	291108	0.05	693143	21600.06	25383	0	57.39	21.29
			DD/DF	268527	0.05	654796	21600.02	28484.8	0	58.41	20.48
	200	5	SD/SF	216391	0.1	761723	21600.1	8851.6	0	70.6	24.31
			SD/DF	203707	0.1	715777	21600.12	13676.2	0	71.1	25.08
			DD/SF	203517	0.1	735105	21600.1	13305.8	0	71.74	23.97
			DD/DF	205114	0.1	725939	21600.1	12353.2	0	70.93	24.24
		10	SD/SF	263775	0.09	877426	21600.1	7651.6	0	68.85	30.43
			SD/DF	243088	0.09	830045	21600.1	5648.6	0	69.45	32.06
			DD/SF	262052	0.09	880474	21600.14	4581.4	0	68.9	32.28
			DD/DF	246037	0.09	836595	21600.1	4428.6	0	68.97	32.66
		15	SD/SF	298263	0.09	943766	21600.1	6352.6	0	67.39	28.6
			SD/DF	276195	0.09	902846	21600.12	4717.4	0	68.08	30.68
			DD/SF	289114	0.09	934005	21600.14	4607.8	0	67.48	30.97
			DD/DF	277492	0.09	881466	21600.14	5172.2	0	67.58	29.56
		20	SD/SF	341287	0.1	1030566	21600.1	7699.4	0	65.94	28.07
			SD/DF	307003	0.1	973637	21600.14	5895	0	66.77	30.51
			DD/SF	335217	0.11	1041496	21600.12	5191.2	0	65.97	30.66
			DD/DF	314336	0.1	976768	21600.12	4786.2	0	66.2	30.04

Table 55: Performances of the C-N formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	134527	0.04	175296	11.31	757.4	5	23.32	0
			SD/DF	121209	0.04	168797	5.78	406	5	28.16	0
			DD/SF	124315	0.04	166826	19.73	1492	5	25.49	0
			DD/DF	121959	0.04	169377	4.62	349	5	27.9	0
		10	SD/SF	171593	0.09	213232	41.71	2584	5	19.52	0
			SD/DF	144523	0.08	195540	9.07	862.2	5	26.07	0
			DD/SF	156304	0.08	199116	40.74	2388.4	5	21.57	0
			DD/DF	146083	0.08	196472	6.95	682	5	25.45	0
		15	SD/SF	191349	0.09	232679	24.22	1745.4	5	17.71	0
			SD/DF	160537	0.09	217500	4.59	476.2	5	26.1	0
			DD/SF	181455	0.09	222165	10.67	759.6	5	18.33	0
			DD/DF	165047	0.08	217120	4.21	410.2	5	23.96	0
		20	SD/SF	217203	0.1	258041	1.98	232	5	15.85	0
			SD/DF	188408	0.09	253839	2.23	213.4	5	25.72	0
			DD/SF	209081	0.09	249786	1.51	95.8	5	16.3	0
			DD/DF	185257	0.09	245279	0.91	41.4	5	24.41	0
	100	5	SD/SF	185177	0.08	256259	145.37	3088.6	5	27.74	0
			SD/DF	162851	0.08	234855	116.92	2397.2	5	30.59	0
			DD/SF	171677	0.08	242367	213.36	4928.4	5	29.17	0
			DD/DF	165265	0.08	243091	113.01	2178.2	5	31.97	0
		10	SD/SF	208006	0.17	289608	476.92	11231.6	5	28.2	0
			SD/DF	188031	0.16	270400	304.01	5710.2	5	30.44	0
			DD/SF	198367	0.17	280635	474.21	9129.6	5	29.32	0
			DD/DF	186239	0.16	271470	245.79	4968.2	5	31.39	0
		15	SD/SF	235943	0.18	321461	949.61	37881.6	5	26.59	0
			SD/DF	202543	0.17	293950	473.99	13941.2	5	31.09	0
			DD/SF	230432	0.17	317730	745.39	27650.4	5	27.48	0
			DD/DF	210391	0.16	298589	256.01	7033.6	5	29.52	0
		20	SD/SF	258023	0.35	348828	1678.18	76826.4	5	26.06	0
			SD/DF	228720	0.22	336504	662.46	15523.2	5	32.03	0
			DD/SF	259812	0.17	356235	1419.82	79964.8	5	27.07	0
			DD/DF	229073	0.17	341631	745.83	21387	5	32.92	0
	200	5	SD/SF	255676	0.21	377068	6475.51	49811.4	5	32.21	0
			SD/DF	232698	0.2	360584	2957.86	26557.8	5	35.45	0
			DD/SF	250802	0.22	378131	9151.78	98015.4	5	33.67	0
			DD/DF	231222	0.2	355264	4233.06	59226.2	5	34.9	0
		10	SD/SF	278090	0.33	414149	21600	486978.2	0	32.85	1.06
			SD/DF	259320	0.35	398844	14247.96	495101.6	2	34.98	0.49
			DD/SF	275048	0.33	416944	20943.02	368180.2	1	34.04	1.49
			DD/DF	257136	0.33	403828	12930.55	541171.2	5	36.32	0
		15	SD/SF	305029	0.36	449079	19064.62	293654.4	1	32.06	1.28
			SD/DF	277638	0.35	436966	17491.62	602336.8	2	36.47	0.24
			DD/SF	294288	0.34	443458	21600.06	290960.8	0	33.61	1.81
			DD/DF	280538	0.35	436027	12487.74	404180.2	3	35.66	0.18
		20	SD/SF	347074	0.38	506427	21600.02	222444.8	0	31.45	3
			SD/DF	308317	0.38	479483	21600.06	632819	0	35.69	1.74
			DD/SF	344295	0.35	507956	21600.04	327092.4	0	32.22	1.57
			DD/DF	305777	0.35	473456	15665.79	522456.6	3	35.41	0.65

Table 56: Performances of the C-N formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	207350	0.2	352974	21600.08	46414.2	0	41.09	7.45
			SD/DF	181772	0.16	316360	21600.06	306876.2	0	42.51	2.71
			DD/SF	199695	0.18	346458	21600.02	96024.2	0	42.23	6.54
			DD/DF	180038	0.16	318428	21600.04	116284.4	0	43.45	3.66
		10	SD/SF	244983	0.39	417391	21600.08	19146.6	0	40.9	20.33
			SD/DF	209790	0.33	378477	21600.06	17395.8	0	44.15	18.32
			DD/SF	225364	0.32	398585	21600.1	25103.2	0	42.49	21.99
			DD/DF	213227	0.32	375931	21600.06	159221.8	0	42.95	14.35
		15	SD/SF	271869	0.42	453005	21600.1	21020.4	0	39.53	17.83
			SD/DF	239338	0.35	423673	21600.08	71763	0	43.36	15.03
			DD/SF	262496	0.34	452399	21600.1	21890.4	0	41.59	19.04
			DD/DF	242313	0.33	427524	21600.1	21511.4	0	43.13	17.8
		20	SD/SF	313642	0.46	504441	21600.08	32094.4	0	37.48	14.61
			SD/DF	268985	0.41	476624	21600.1	31257.6	0	43.28	15.85
			DD/SF	302493	0.39	505612	21600.1	28359.6	0	39.65	16.36
			DD/DF	269849	0.37	472420	21600.1	28439.2	0	42.66	16.63
	100	5	SD/SF	273672	0.44	498700	21600.1	10098	0	44.75	27.37
			SD/DF	252151	0.39	480506	21600.1	12382.8	0	46.86	22.07
			DD/SF	266488	0.39	502889	21600.1	9276	0	46.25	26.99
			DD/DF	251754	0.39	472787	21600.1	12115.8	0	46.24	21.88
		10	SD/SF	311786	0.62	574566	21600.16	9927.2	0	45.12	30.56
			SD/DF	281720	0.6	535213	21600.18	9781.6	0	46.81	28.99
			DD/SF	313072	0.58	592570	21600.12	9319.8	0	46.57	30.95
			DD/DF	282731	0.56	544897	21600.14	14407.4	0	47.43	26.34
		15	SD/SF	336590	0.64	623314	21600.12	7356.6	0	45.25	29.15
			SD/DF	309990	0.59	582271	21600.14	8706.6	0	46.28	27.92
			DD/SF	341596	0.61	644242	21600.12	8498.2	0	45.67	29.67
			DD/DF	313021	0.58	594422	21600.18	10908.6	0	47.12	27.61
		20	SD/SF	380755	0.67	707058	21600.14	3560.8	0	44.21	27.94
			SD/DF	344274	0.61	668075	21600.18	4854.6	0	47.03	27.19
			DD/SF	373996	0.6	703148	21600.12	5853.4	0	45.24	28
			DD/DF	343583	0.6	655573	21600.22	8102.2	0	46.78	26.62
	200	5	SD/SF	409135	1.01	761720	21600.28	2193.2	0	44.38	36.29
			SD/DF	373125	0.92	719202	21600.28	4342.2	0	47.06	33.39
			DD/SF	384349	0.88	739570	21600.26	2631.2	0	46.57	37.54
			DD/DF	372541	0.87	737929	21600.32	2600.2	0	47.21	38.09
		10	SD/SF	449241	1.49	883903	21600.3	4057.6	0	46.93	37.9
			SD/DF	413335	1.52	827162	21600.32	2957.8	0	48.05	37.48
			DD/SF	440362	1.42	883402	21600.34	2546.6	0	47.73	38.98
			DD/DF	410900	1.35	819386	21600.32	4530.4	0	48.18	36.04
		15	SD/SF	492618	1.72	951365	21600.28	3385	0	46.14	36.75
			SD/DF	443730	1.41	894024	21600.4	4985.4	0	48.73	35.51
			DD/SF	463952	1.43	920325	21600.26	2886.4	0	47.81	37.75
			DD/DF	440025	1.46	881393	21600.36	4024.6	0	48.59	36.72
		20	SD/SF	523497	1.53	1063498	21600.3	2089.6	0	47.75	37.83
			SD/DF	471467	1.31	985163	21600.36	2418	0	48.96	37.35
			DD/SF	509293	1.36	1045134	21600.32	2766.2	0	48.28	37.93
			DD/DF	473587	1.28	983659	21600.3	2945.4	0	49.08	37.33

Table 57: Performances of the C-TP formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	134527	0.04	175296	21.37	804	5	23.32	0
			SD/DF	121209	0.03	168797	13.09	480	5	28.16	0
			DD/SF	124315	0.03	166826	21.13	746	5	25.49	0
			DD/DF	121959	0.03	169377	13.87	500.2	5	27.9	0
		10	SD/SF	171593	0.05	213232	50.67	1957	5	19.52	0
			SD/DF	144523	0.04	195540	24.48	1197	5	26.07	0
			DD/SF	156304	0.04	199116	70.07	2015	5	21.57	0
			DD/DF	146083	0.04	196472	15.35	679	5	25.45	0
		15	SD/SF	191349	0.05	232679	26.99	1558.2	5	17.71	0
			SD/DF	160537	0.04	217500	8.97	621.8	5	26.1	0
			DD/SF	181455	0.04	222165	12.2	632	5	18.33	0
			DD/DF	165047	0.04	217120	8.98	559.8	5	23.96	0
		20	SD/SF	217203	0.05	258041	2.48	115.4	5	15.85	0
			SD/DF	188408	0.04	253839	4.18	282.8	5	25.72	0
			DD/SF	209081	0.05	249786	1.87	84.2	5	16.3	0
			DD/DF	185257	0.04	245279	2.3	64.6	5	24.41	0
	100	5	SD/SF	185177	0.08	256259	220.45	2313.4	5	27.74	0
			SD/DF	162851	0.08	234855	111.69	1833.2	5	30.59	0
			DD/SF	171677	0.08	242367	400.21	2154	5	29.17	0
			DD/DF	165265	0.07	243091	150.95	1865.6	5	31.97	0
		10	SD/SF	208006	0.1	289608	545.96	3886.8	5	28.2	0
			SD/DF	188031	0.09	270400	432.3	2769.6	5	30.44	0
			DD/SF	198367	0.09	280635	743.88	4425.8	5	29.32	0
			DD/DF	186239	0.08	271470	451.09	3677	5	31.39	0
		15	SD/SF	235943	0.1	321461	1073.29	7302.6	5	26.59	0
			SD/DF	202543	0.08	293950	663.58	4329.6	5	31.09	0
			DD/SF	230432	0.1	317730	1167.15	9847.4	5	27.48	0
			DD/DF	210391	0.08	298589	508.53	3169	5	29.52	0
		20	SD/SF	258023	0.11	348828	1324.39	18429.6	5	26.06	0
			SD/DF	228720	0.09	336504	764.79	6511.6	5	32.03	0
			DD/SF	259812	0.1	356235	1412.48	15864.4	5	27.07	0
			DD/DF	229073	0.09	341631	918.26	7842.4	5	32.92	0
	200	5	SD/SF	255676	0.24	377068	6256.19	14536.4	5	32.21	0
			SD/DF	232698	0.19	360584	4586.91	4661.4	5	35.45	0
			DD/SF	250802	0.2	378131	6247.49	11760.2	5	33.67	0
			DD/DF	231222	0.19	355264	4372.06	6884.6	5	34.9	0
		10	SD/SF	278090	0.23	414113	21600.02	105745.8	0	32.85	1.31
			SD/DF	259320	0.21	398811	12842.85	110704	3	34.98	0.21
			DD/SF	275048	0.22	417009	21600.04	200883.2	0	34.04	0.89
			DD/DF	257136	0.22	403828	12388.56	69265.4	4	36.32	0.94
		15	SD/SF	305029	0.25	449053	18392.66	38792.4	2	32.06	1.44
			SD/DF	277638	0.21	436966	13422.17	72435.8	4	36.47	0.17
			DD/SF	294288	0.22	443305	19335.2	76817.6	1	33.61	2.69
			DD/DF	280538	0.2	436108	15062.67	43543.8	3	35.66	2.2
		20	SD/SF	347074	0.25	506535	21600.04	11594.4	0	31.45	7.47
			SD/DF	308317	0.21	479721	21600.02	10959.2	0	35.69	6.42
			DD/SF	344295	0.24	508045	21600.04	37923.4	0	32.22	3.14
			DD/DF	305777	0.21	473590	21600.06	22808.2	0	35.41	5.55

Table 58: Performances of the C-TP formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	207350	0.17	353863	21600.06	6869.8	0	41.09	13.45
			SD/DF	181772	0.14	316866	21600.06	17025.2	0	42.51	4.05
			DD/SF	199695	0.15	347409	21600.04	9434.6	0	42.23	10.67
			DD/DF	180038	0.13	318514	21600.02	29767.2	0	43.45	3.07
		10	SD/SF	244983	0.2	416704	21600.08	9942.8	0	40.9	16.37
			SD/DF	209790	0.16	378506	21600.02	7614.4	0	44.15	15.72
			DD/SF	225364	0.19	394503	21600.1	10234.2	0	42.49	17.44
			DD/DF	213227	0.16	375265	21600.06	8805.4	0	42.95	16.24
		15	SD/SF	271869	0.21	453796	21600.1	6777	0	39.53	14.76
			SD/DF	239338	0.18	424678	21600.06	10519.8	0	43.36	13.92
			DD/SF	262496	0.19	452999	21600.06	6558.6	0	41.59	15.71
			DD/DF	242313	0.17	426538	21600.02	9852.2	0	43.13	13.91
		20	SD/SF	313642	0.22	503365	21600.1	8727.4	0	37.48	11.33
			SD/DF	268985	0.18	476447	21600.1	13319	0	43.28	11.73
			DD/SF	302493	0.19	505612	21600.08	7833.6	0	39.65	12.77
			DD/DF	269849	0.17	471412	21600.1	10448.4	0	42.66	12.35
	100	5	SD/SF	273672	0.41	497867	21600.14	3537.2	0	44.75	24.72
			SD/DF	252151	0.39	480771	21600.1	4191.4	0	46.86	23.17
			DD/SF	266488	0.4	501916	21600.14	4438	0	46.25	26.01
			DD/DF	251754	0.35	475740	21600.12	4098.8	0	46.24	23.71
		10	SD/SF	311786	0.37	582425	21600.1	2764.6	0	45.12	26.12
			SD/DF	281720	0.32	537123	21600.14	3384.4	0	46.81	24.88
			DD/SF	313072	0.34	600932	21600.12	3440.2	0	46.57	27.74
			DD/DF	282731	0.34	546283	21600.12	4483.8	0	47.43	24.81
		15	SD/SF	336590	0.38	636659	21600.14	1633.2	0	45.25	25.32
			SD/DF	309990	0.32	590819	21600.1	2514.8	0	46.28	23.65
			DD/SF	341596	0.33	640055	21600.1	2525.6	0	45.67	25.01
			DD/DF	313021	0.32	602133	21600.1	3521	0	47.12	24.52
		20	SD/SF	380755	0.4	713889	21600.12	956.2	0	44.21	23.74
			SD/DF	344274	0.32	672325	21600.1	933.4	0	47.03	21.75
			DD/SF	373996	0.36	724060	21600.08	811.2	0	45.24	25.25
			DD/DF	343583	0.35	679185	21600.12	1197.2	0	46.78	23.87
	200	5	SD/SF	409135	1.28	776731	21600.28	810	0	44.38	31.71
			SD/DF	373125	0.99	737319	21600.22	1354.6	0	47.06	29.32
			DD/SF	384349	1.29	759161	21600.26	1093	0	46.57	30.84
			DD/DF	372541	1.13	753744	21600.26	992	0	47.21	30.54
		10	SD/SF	449241	1.15	896236	21600.28	803	0	46.93	32.63
			SD/DF	413335	0.95	844029	21600.26	862	0	48.05	31.87
			DD/SF	440362	1.03	894391	21600.26	855.8	0	47.73	33.34
			DD/DF	410900	1.08	842911	21600.32	935.2	0	48.18	31.7
		15	SD/SF	492618	1.28	976549	21600.3	862.2	0	46.14	32.49
			SD/DF	443730	0.92	942480	21600.28	1004	0	48.73	32.88
			DD/SF	463952	1.09	932467	21600.26	945.4	0	47.81	32.56
			DD/DF	440025	1.11	937342	21600.26	915.8	0	48.59	33.93
		20	SD/SF	523497	1.14	1277408	21600.22	82.4	0	47.75	43.03
			SD/DF	471467	0.93	1049825	21600.32	660.8	0	48.96	35.56
			DD/SF	509293	1	1088318	21600.28	461.6	0	48.28	35.94
			DD/DF	473587	0.91	1014829	21600.34	768.4	0	49.08	33.66

Table 59: Performances of the C-LS formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	134527	0.06	175296	38.74	1233.2	5	23.32	0
			SD/DF	121209	0.04	168797	31.86	1075.6	5	28.16	0
			DD/SF	124315	0.05	166826	98.66	1487.6	5	25.49	0
			DD/DF	121959	0.04	169377	28.9	896.4	5	27.9	0
		10	SD/SF	171593	0.06	213232	82.48	2198.8	5	19.52	0
			SD/DF	144523	0.05	195540	36.25	1937.4	5	26.07	0
			DD/SF	156304	0.05	199116	133.39	2369	5	21.57	0
			DD/DF	146083	0.05	196472	23.02	1147.6	5	25.45	0
		15	SD/SF	191349	0.06	232679	34.01	1380.4	5	17.71	0
			SD/DF	160537	0.05	217500	9.84	908.8	5	26.1	0
			DD/SF	181455	0.06	222165	21.51	1112.8	5	18.33	0
			DD/DF	165047	0.05	217120	9.15	773.8	5	23.96	0
		20	SD/SF	217203	0.07	258041	2.68	176	5	15.85	0
			SD/DF	188408	0.05	253839	3.02	291.2	5	25.72	0
			DD/SF	209081	0.06	249786	1.9	103.2	5	16.3	0
			DD/DF	185257	0.05	245279	1.48	44.2	5	24.41	0
	100	5	SD/SF	185177	0.14	256259	516.67	2695.4	5	27.74	0
			SD/DF	162851	0.11	234855	399.29	1895.2	5	30.59	0
			DD/SF	171677	0.11	242367	855.95	2984.2	5	29.17	0
			DD/DF	165265	0.11	243091	326.87	2170	5	31.97	0
		10	SD/SF	208006	0.16	289608	898.37	4694.6	5	28.2	0
			SD/DF	188031	0.12	270400	882.6	4441.6	5	30.44	0
			DD/SF	198367	0.14	280635	1441.99	6205.6	5	29.32	0
			DD/DF	186239	0.11	271470	1125.66	3735.2	5	31.39	0
		15	SD/SF	235943	0.16	321461	1468.3	7197.8	5	26.59	0
			SD/DF	202543	0.11	293950	1388.87	6217.6	5	31.09	0
			DD/SF	230432	0.17	317730	2295.17	7079.6	5	27.48	0
			DD/DF	210391	0.12	298589	980.71	4013.6	5	29.52	0
		20	SD/SF	258023	0.16	348828	1621.03	19315.6	5	26.06	0
			SD/DF	228720	0.12	336504	1180.69	6610.8	5	32.03	0
			DD/SF	259812	0.14	356235	2184.78	12565.2	5	27.07	0
			DD/DF	229073	0.12	341631	1607.44	8570.6	5	32.92	0
	200	5	SD/SF	255676	0.44	378035	21600.08	3856.8	0	32.21	6.27
			SD/DF	232698	0.3	360584	12766.66	4877.8	5	35.45	0
			DD/SF	250802	0.35	379669	21600.02	3003.2	0	33.67	5.86
			DD/DF	231222	0.3	355611	16030.81	9792	4	34.9	1.05
		10	SD/SF	278090	0.44	414737	21600.02	4808.4	0	32.85	11.41
			SD/DF	259320	0.36	399301	21600.04	5667	0	34.98	5.95
			DD/SF	275048	0.36	419038	21600.06	3868.2	0	34.04	12.44
			DD/DF	257136	0.3	405547	21600.06	3545.6	0	36.32	7.94
		15	SD/SF	305029	0.45	450101	21600	4788.2	0	32.06	11.27
			SD/DF	277638	0.31	437582	21600.02	3722.2	0	36.47	6.26
			DD/SF	294288	0.34	444539	21600.02	5060.4	0	33.61	12.11
			DD/DF	280538	0.28	436760	21600	5308.6	0	35.66	6.71
		20	SD/SF	347074	0.44	506997	21600	5532.8	0	31.45	9.87
			SD/DF	308317	0.32	481160	21600.06	4141.2	0	35.69	9.07
			DD/SF	344295	0.36	509219	21600.04	4711.4	0	32.22	9.84
			DD/DF	305777	0.32	475261	21600.02	3611.4	0	35.41	9.33

Table 60: Performances of the C-LS formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	207350	0.35	353222	21600.06	4480.8	0	41.09	13.08
			SD/DF	181772	0.24	318447	21600.1	3417.4	0	42.51	12.32
			DD/SF	199695	0.31	348489	21600.06	4018.4	0	42.23	16.04
			DD/DF	180038	0.3	322962	21600.08	3726.2	0	43.45	14.22
		10	SD/SF	244983	0.41	418192	21600.08	8902	0	40.9	14.43
			SD/DF	209790	0.28	382113	21600.08	4113.6	0	44.15	15.19
			DD/SF	225364	0.33	396267	21600.06	8175.8	0	42.49	15.67
			DD/DF	213227	0.29	378436	21600.1	4789.6	0	42.95	15.18
		15	SD/SF	271869	0.55	452618	21600.08	9329.4	0	39.53	11.34
			SD/DF	239338	0.41	425678	21600.04	6785.2	0	43.36	11.35
			DD/SF	262496	0.51	450797	21600.08	11803.6	0	41.59	12.39
			DD/DF	242313	0.48	429735	21600.08	8627.6	0	43.13	11.92
		20	SD/SF	313642	0.51	503216	21600.08	12417.2	0	37.48	7.5
			SD/DF	268985	0.38	476396	21600.04	8701.6	0	43.28	8.16
			DD/SF	302493	0.46	502575	21600.08	13705.2	0	39.65	8.38
			DD/DF	269849	0.42	472158	21600.1	13800	0	42.66	9.49
	100	5	SD/SF	273672	1.99	503884	21600.12	2357.6	0	44.75	26.8
			SD/DF	252151	1.51	494230	21600.16	1420.4	0	46.86	27.95
			DD/SF	266488	1.75	507771	21600.14	1437.8	0	46.25	28.11
			DD/DF	251754	1.56	493161	21600.12	1369.8	0	46.24	29.62
		10	SD/SF	311786	1.42	606261	21600.16	1233.8	0	45.12	26.81
			SD/DF	281720	1.16	557713	21600.16	1113.2	0	46.81	24.69
			DD/SF	313072	1.32	627006	21600.18	964	0	46.57	28.22
			DD/DF	282731	1.27	570599	21600.14	1744	0	47.43	26.2
		15	SD/SF	336590	1.22	643692	21600.12	1305.6	0	45.25	23.25
			SD/DF	309990	1.1	597666	21600.16	1645	0	46.28	21.54
			DD/SF	341596	1.27	657277	21600.16	836.6	0	45.67	24.16
			DD/DF	313021	1.13	621770	21600.16	1760.2	0	47.12	23.65
		20	SD/SF	380755	1.23	720033	21600.18	966.2	0	44.21	21.28
			SD/DF	344274	0.88	683518	21600.16	1779	0	47.03	20.46
			DD/SF	373996	1.38	716527	21600.18	927.4	0	45.24	21.57
			DD/DF	343583	1.08	679664	21600.14	1670	0	46.78	21.26
	200	5	SD/SF	409135	7.05	769075	21600.3	955	0	44.38	32.26
			SD/DF	373125	3.33	775863	21600.34	850.8	0	47.06	35.96
			DD/SF	384349	4.17	782306	21600.46	770.4	0	46.57	35.87
			DD/DF	372541	3.42	786264	21600.48	670.8	0	47.21	36.84
		10	SD/SF	449241	5.03	919506	21600.28	929.4	0	46.93	34.74
			SD/DF	413335	2.78	868519	21600.38	812.6	0	48.05	33.97
			DD/SF	440362	3.65	908225	21600.4	743.6	0	47.73	34.79
			DD/DF	410900	2.84	939298	21600.42	690	0	48.18	39.06
		15	SD/SF	492618	4.8	956500	21600.3	834.6	0	46.14	32.25
			SD/DF	443730	2.5	1011047	21600.32	772.4	0	48.73	36.79
			DD/SF	463952	3.42	977742	21600.36	786.2	0	47.81	35.82
			DD/DF	440025	4.48	911903	21600.36	826.8	0	48.59	32.22
		20	SD/SF	523497	3.67	1054612	21600.32	760.2	0	47.75	32.91
			SD/DF	471467	2.36	1051147	21600.34	850.2	0	48.96	34.84
			DD/SF	509293	3.39	1071166	21600.4	827.8	0	48.28	36.56
			DD/DF	473587	2.58	979436	21600.26	749.2	0	49.08	30.1

Table 61: Performances of the ES formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	116798	0.01	175296	7.62	942	5	33.43	0
			SD/DF	105635	0.01	168797	2.83	734.6	5	37.39	0
			DD/SF	107216	0.01	166826	4.68	753.4	5	35.73	0
			DD/DF	106548	0.01	169377	3.11	427.6	5	37	0
		10	SD/SF	154505	0.01	213232	5.08	1832.6	5	27.54	0
			SD/DF	129619	0.01	195540	1.99	395.2	5	33.7	0
			DD/SF	140030	0.01	199116	5.72	951.6	5	29.75	0
			DD/DF	132150	0.01	196472	1.62	295	5	32.54	0
		15	SD/SF	175290	0.01	232679	4.21	1598.2	5	24.62	0
			SD/DF	147269	0.01	217500	1.02	149.8	5	32.2	0
			DD/SF	166961	0.01	222165	2.46	621.6	5	24.86	0
			DD/DF	151631	0.01	217120	1.12	163.4	5	30.14	0
		20	SD/SF	202077	0.01	258041	3.57	465.8	5	21.71	0
			SD/DF	174790	0.01	253839	0.56	30.6	5	31.08	0
			DD/SF	195869	0.01	249786	1.26	271	5	21.59	0
			DD/DF	172142	0.01	245279	0.64	58.2	5	29.76	0
	100	5	SD/SF	147059	0.01	256259	118.76	6510	5	42.61	0
			SD/DF	129682	0.01	234855	49.01	1855.8	5	44.71	0
			DD/SF	135059	0.01	242367	252.46	3632.4	5	44.32	0
			DD/DF	132412	0.01	243091	33.84	2208	5	45.49	0
		10	SD/SF	173311	0.02	289608	56.93	2489.4	5	40.18	0
			SD/DF	156625	0.02	270400	47.11	2973.8	5	42.06	0
			DD/SF	163126	0.01	280635	62.93	3261.4	5	41.9	0
			DD/DF	154507	0.02	271470	45.46	2299.8	5	43.08	0
		15	SD/SF	199623	0.02	321461	76.66	3535.4	5	37.89	0
			SD/DF	172826	0.02	293950	46.24	2211.4	5	41.19	0
			DD/SF	197140	0.02	317730	78.8	4014.6	5	37.96	0
			DD/DF	179633	0.02	298589	26.67	1349.2	5	39.82	0
		20	SD/SF	223329	0.02	348828	53.2	2558.6	5	36.03	0
			SD/DF	198106	0.05	336504	38.61	2802.2	5	41.13	0
			DD/SF	227479	0.02	356235	71.22	2543.6	4	36.15	0
			DD/DF	199278	0.02	341631	24.45	1932.4	5	41.64	0
	200	5	SD/SF	174870	0.04	377068	666.28	15173.4	5	53.66	0
			SD/DF	162335	0.03	360584	739.21	17448.2	5	54.97	0
			DD/SF	175773	0.03	378131	2224.35	15321.2	5	53.52	0
			DD/DF	161998	0.03	355264	1174.62	4420	5	54.38	0
		10	SD/SF	200676	0.03	414113	1996.16	45681.2	5	51.57	0
			SD/DF	191480	0.03	398811	1639.73	33315	5	51.99	0
			DD/SF	201621	0.03	416944	1957.54	34218.2	5	51.66	0
			DD/DF	189777	0.03	403828	974.34	19696.8	5	53.01	0
		15	SD/SF	228972	0.04	449053	3987.93	114208.6	5	49.02	0
			SD/DF	208119	0.03	436966	919.82	33284.6	5	52.37	0
			DD/SF	221620	0.03	443242	5082.58	102283.6	5	50.01	0
			DD/DF	214142	0.03	436027	757.01	13082.6	5	50.89	0
		20	SD/SF	270497	0.04	506278	2036.69	63131.6	5	46.6	0
			SD/DF	241537	0.04	479441	1510.47	96781.4	5	49.62	0
			DD/SF	274050	0.04	507914	1013.75	26788.2	5	46.05	0
			DD/DF	241200	0.03	473456	1061.76	15441.4	5	49.05	0

Table 62: Performances of the ES formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	160894	0.02	352095	813.07	7183.4	5	54.3	0
			SD/DF	142188	0.01	316360	378.57	8804.6	5	55.02	0
			DD/SF	157073	0.02	345570	1360.62	14671.8	5	54.61	0
			DD/DF	142121	0.02	318428	592.3	11913.6	5	55.36	0
		10	SD/SF	200147	0.02	414797	1917.34	21591.4	5	51.71	0
			SD/DF	172121	0.02	375958	1454.05	33376.6	5	54.17	0
			DD/SF	184379	0.02	391861	2954.41	38401.2	5	52.94	0
			DD/DF	176534	0.02	373733	1529.66	30122.4	5	52.77	0
		15	SD/SF	228607	0.02	450270	4234.96	62518	5	49.12	0
			SD/DF	203136	0.02	422631	1722.18	61477.6	5	51.91	0
			DD/SF	223202	0.02	449340	4924.47	85154.2	5	50.33	0
			DD/DF	206747	0.02	426066	2927.26	57961	5	51.48	0
		20	SD/SF	271691	0.03	501619	2571.15	70763	5	45.85	0
			SD/DF	233473	0.02	474358	1637.88	22173.6	5	50.76	0
			DD/SF	263550	0.02	500932	3772.07	46369.2	5	47.43	0
			DD/DF	235363	0.03	470574	3045.27	45306	5	49.99	0
	100	5	SD/SF	179724	0.03	495375	21600	34901.4	0	63.73	3.44
			SD/DF	169629	0.03	474817	16471.21	101914.8	3	64.24	0.19
			DD/SF	179110	0.03	496607	19087.83	28402.2	1	63.94	2.62
			DD/DF	171362	0.03	468290	11771.87	41129.8	5	63.41	0
		10	SD/SF	218725	0.03	569016	20647.12	77335	1	61.54	5.81
			SD/DF	203371	0.03	531208	21607.7	16225.6	0	61.6	5.13
			DD/SF	227417	0.03	587474	21600.66	19644.2	0	61.19	5.47
			DD/DF	203495	0.03	539211	20864.18	24865.2	1	62.16	4.87
		15	SD/SF	248048	0.04	616881	21600.02	24963.8	0	59.67	7.39
			SD/DF	232754	0.04	577942	21600	14821.6	0	59.67	6.02
			DD/SF	254503	0.04	631291	21600.2	19267	0	59.53	7.91
			DD/DF	234643	0.04	592747	21600	19385.4	0	60.36	6.49
		20	SD/SF	292643	0.04	683481	21600	16470.2	0	57.18	6.22
			SD/DF	266794	0.05	651893	21600	16737.2	0	58.95	6.56
			DD/SF	291108	0.04	684911	21600	26961.8	0	57.39	7.25
			DD/DF	268527	0.04	647120	21601.28	14721	0	58.41	7
	200	5	SD/SF	216391	0.09	738947	21600.1	11386.2	0	70.6	5.05
			SD/DF	203707	0.08	707752	21600.06	7520.6	0	71.1	7.06
			DD/SF	203517	0.09	725171	21600.06	8276.8	0	71.74	7.11
			DD/DF	205114	0.08	711256	21600.12	6792	0	70.93	7.56
		10	SD/SF	263775	0.09	856416	21600.08	12038.2	0	68.85	9.34
			SD/DF	243088	0.08	799229	21600.1	9781.6	0	69.45	8.98
			DD/SF	262052	0.09	851395	21600.1	11981.8	0	68.9	10.2
			DD/DF	246037	0.09	801292	21600.1	9077.2	0	68.97	10.53
		15	SD/SF	298263	0.1	925572	21600.1	9419.2	0	67.39	10.56
			SD/DF	276195	0.1	873970	21600.1	9897.2	0	68.08	10.94
			DD/SF	289114	0.09	900373	21600.08	10702.4	0	67.48	11.62
			DD/DF	277492	0.09	863066	21600.1	9831.6	0	67.58	10.77
		20	SD/SF	341287	0.09	1010366	21600.1	11451.8	0	65.94	9.58
			SD/DF	307003	0.09	929958	21600.1	10887.4	0	66.77	10.9
			DD/SF	335217	0.09	995260	21600.08	13087.6	0	65.97	11.31
			DD/DF	314336	0.09	936500	21600.1	9946.8	0	66.2	11.05

Table 63: Performances of the ES-N formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.24	175296	4.27	157	5	1.41	0
			SD/DF	165436	0.16	168797	2.6	86	5	1.98	0
			DD/SF	163562	0.21	166826	3.54	81.4	5	1.96	0
			DD/DF	165957	0.15	169377	3.03	124.6	5	2.04	0
		10	SD/SF	212797	0.15	213232	3.77	108.6	5	0.2	0
			SD/DF	192771	0.12	195540	3.21	102.4	5	1.43	0
			DD/SF	196554	0.15	199116	4.89	195	5	1.31	0
			DD/DF	194826	0.12	196472	2.81	82	5	0.83	0
		15	SD/SF	232133	0.15	232679	2.85	50.6	5	0.22	0
			SD/DF	215690	0.11	217500	2.59	73.8	5	0.8	0
			DD/SF	220559	0.14	222165	3.04	70	5	0.73	0
			DD/DF	215743	0.12	217120	3.04	60	5	0.64	0
		20	SD/SF	257578	0.13	258041	1.85	25.8	5	0.18	0
			SD/DF	251980	0.12	253839	2.96	76	5	0.73	0
			DD/SF	249302	0.13	249786	1.73	9.6	5	0.19	0
			DD/DF	243881	0.12	245279	2.36	39.2	5	0.56	0
	100	5	SD/SF	251802	0.5	256259	16.16	370.6	5	1.74	0
			SD/DF	228164	0.36	234855	10.77	317.4	5	2.84	0
			DD/SF	237678	0.43	242367	21.41	759.6	5	1.94	0
			DD/DF	235788	0.35	243091	12.54	386.8	5	3.01	0
		10	SD/SF	282826	0.48	289608	34.8	1032.6	5	2.34	0
			SD/DF	261888	0.33	270400	17.97	833.6	5	3.13	0
			DD/SF	272197	0.4	280635	36	1197.6	5	3	0
			DD/DF	262943	0.35	271470	16.61	694.2	5	3.14	0
		15	SD/SF	310356	0.47	321461	59.93	2127.4	5	3.46	0
			SD/DF	282258	0.33	293950	29.7	1363	5	3.97	0
			DD/SF	304244	0.33	317730	25.87	1018.6	5	4.26	0
			DD/DF	288575	0.31	298589	21.3	975.6	5	3.34	0
		20	SD/SF	335873	0.43	348828	15.39	490.8	5	3.71	0
			SD/DF	322257	0.3	336504	36.11	1210	5	4.24	0
			DD/SF	340475	0.4	356235	33	1149	5	4.42	0
			DD/DF	327133	0.34	341631	35.75	1469.6	5	4.24	0
	200	5	SD/SF	367788	1.75	377068	104.84	1075	5	2.46	0
			SD/DF	344823	0.94	360584	70.16	1226.6	5	4.37	0
			DD/SF	365159	1.06	378131	93.08	1261.6	5	3.44	0
			DD/DF	338966	1	355264	131.06	1633.8	5	4.58	0
		10	SD/SF	397646	1.51	414113	658.07	8078.2	5	3.99	0
			SD/DF	377441	0.84	398811	267.01	4280.4	5	5.36	0
			DD/SF	398090	1.21	416944	523.6	6546.2	5	4.53	0
			DD/DF	381094	0.88	403828	207.57	2668.8	5	5.63	0
		15	SD/SF	428284	1.48	449053	835.63	16409.6	5	4.63	0
			SD/DF	413070	0.86	436966	390.8	6457	5	5.47	0
			DD/SF	418945	1.17	443242	1669.57	42363.2	5	5.49	0
			DD/DF	412325	0.84	436027	276.29	4671	5	5.43	0
		20	SD/SF	482660	1.53	506278	1025.43	28435	5	4.68	0
			SD/DF	450652	0.89	479441	785.35	20760.4	5	6	0
			DD/SF	486083	1.09	507914	959.18	26723.2	5	4.32	0
			DD/DF	449622	0.85	473456	279.67	4859.8	5	5.02	0

Table 64: Performances of the ES-N formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	2.64	352095	221.3	1643	5	1.15	0
			SD/DF	306898	1.28	316360	80.76	1503	5	2.99	0
			DD/SF	339697	2.01	345570	215.15	2596.4	5	1.71	0
			DD/DF	309211	1.23	318428	75.13	1788.2	5	2.9	0
		10	SD/SF	407193	2.07	414797	191.19	1922	5	1.81	0
			SD/DF	362143	1.12	375958	167.99	2070	5	3.69	0
			DD/SF	381968	1.77	391861	229.22	2959	5	2.53	0
			DD/DF	361474	1.1	373733	121.2	1920.8	5	3.28	0
		15	SD/SF	442956	1.9	450270	115.73	1202.6	5	1.61	0
			SD/DF	405439	1.05	422631	128.44	2132	5	4.08	0
			DD/SF	437911	1.5	449340	138.62	1807.4	5	2.55	0
			DD/DF	407520	1.05	426066	145.91	2166.8	5	4.36	0
		20	SD/SF	495297	1.66	501619	172.48	1899.4	5	1.26	0
			SD/DF	454773	1.09	474358	103.65	1296.2	5	4.13	0
			DD/SF	491723	1.4	500932	70.64	827.6	5	1.85	0
			DD/DF	451347	1.08	470574	128.61	1762.2	5	4.09	0
	100	5	SD/SF	485092	10.2	495175	7030.25	35708.6	5	2.04	0
			SD/DF	453329	3.84	474805	1572.19	10330.8	5	4.52	0
			DD/SF	484036	5.75	495677	4877.58	36464.4	5	2.35	0
			DD/DF	450280	3.66	468290	913.35	4422.2	5	3.85	0
		10	SD/SF	551740	8.18	568116	14713.96	148559	3	2.89	0.07
			SD/DF	504323	3.02	529729	2530.08	24558	5	4.79	0
			DD/SF	568628	4.53	585880	7021.19	68702.6	5	2.95	0
			DD/DF	512821	2.89	537879	1112.53	7292.6	5	4.65	0
		15	SD/SF	592127	7.17	614821	8261.73	73855	4	3.71	0.03
			SD/DF	545913	2.75	577254	2074.02	18979	5	5.43	0
			DD/SF	600265	4.28	628849	9054.88	105129.8	4	4.55	0.02
			DD/DF	557760	2.61	591973	5851.47	72391.4	5	5.78	0
		20	SD/SF	657924	6.92	682534	4513.63	38968.6	5	3.62	0
			SD/DF	612851	2.97	650370	2163.86	19921.4	5	5.77	0
			DD/SF	655392	4.91	682748	11946.12	170007	4	4.02	0.02
			DD/DF	608239	2.89	645733	2202.12	21767.2	5	5.8	0
	200	5	SD/SF	720942	31.57	735354	15804.86	9719.8	3	1.97	0.29
			SD/DF	666542	12.39	704917	16527.34	47022.6	3	5.44	0.38
			DD/SF	695155	13.95	719611	20337.08	37420.8	1	3.41	0.75
			DD/DF	668243	11.17	705810	21600.26	64778	0	5.32	0.44
		10	SD/SF	818342	29.93	846653	17121.5	9275.6	2	3.33	0.67
			SD/DF	748005	10.95	795863	21600.32	53741.4	0	6.01	0.59
			DD/SF	803840	16.82	842788	21600.26	22663.8	0	4.59	1.8
			DD/DF	740902	11.98	793104	21600.24	55486.4	0	6.57	0.86
		15	SD/SF	867388	31.62	915088	21600.36	7597	0	5.14	2.66
			SD/DF	805687	10.5	865893	21600.24	51506	0	6.94	0.89
			DD/SF	836902	16.96	889392	21600.3	17179.4	0	5.85	2.18
			DD/DF	795599	10.09	856123	21600.26	48292.2	0	7.05	0.95
		20	SD/SF	951284	32.17	1002137	21600.34	9606	0	5.05	1.81
			SD/DF	857931	11.34	923783	21600.32	50430.4	0	7.13	0.52
			DD/SF	922357	21.36	985122	21600.32	15533.6	0	6.35	2.01
			DD/DF	858617	10.88	930181	21600.32	61290.2	0	7.69	0.82

Table 65: Performances of the ES-TP formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.64	175296	5.29	126	5	1.41	0
			SD/DF	165436	0.24	168797	3.86	95.4	5	1.98	0
			DD/SF	163562	0.36	166826	5.33	116.2	5	1.96	0
			DD/DF	165957	0.21	169377	4.82	173.2	5	2.04	0
		10	SD/SF	212797	0.66	213232	3.71	99	5	0.2	0
			SD/DF	192771	0.27	195540	3.14	111.2	5	1.43	0
			DD/SF	196554	0.42	199116	4.5	229	5	1.31	0
			DD/DF	194826	0.26	196472	2.98	103.8	5	0.83	0
		15	SD/SF	232133	0.53	232679	2.76	70	5	0.22	0
			SD/DF	215690	0.3	217500	1.95	68.2	5	0.8	0
			DD/SF	220559	0.39	222165	2.45	90.4	5	0.73	0
			DD/DF	215743	0.28	217120	2.04	49.6	5	0.64	0
		20	SD/SF	257578	0.33	258041	1.96	30.2	5	0.18	0
			SD/DF	251980	0.25	253839	1.72	35.6	5	0.73	0
			DD/SF	249302	0.32	249786	1.28	6.8	5	0.19	0
			DD/DF	243881	0.28	245279	1.72	25.6	5	0.56	0
	100	5	SD/SF	251802	1.19	256259	21.74	351.6	5	1.74	0
			SD/DF	228164	0.58	234855	19.29	368.4	5	2.84	0
			DD/SF	237678	0.78	242367	30.41	694.4	5	1.94	0
			DD/DF	235788	0.53	243091	24.18	467.2	5	3.01	0
		10	SD/SF	282826	1.72	289608	27.52	871.4	5	2.34	0
			SD/DF	261888	0.7	270400	22.79	871.2	5	3.13	0
			DD/SF	272197	1.15	280635	49.46	1461.6	5	3	0
			DD/DF	262943	0.7	271470	23.7	934.2	5	3.14	0
		15	SD/SF	310356	1.81	321461	65.14	1736.8	5	3.46	0
			SD/DF	282258	0.76	293950	26.06	1159.8	5	3.97	0
			DD/SF	304244	1.06	317730	34.04	1559.6	5	4.26	0
			DD/DF	288575	0.75	298589	27.58	1538.2	5	3.34	0
		20	SD/SF	335873	1.45	348828	20.8	392.2	5	3.71	0
			SD/DF	322257	0.78	336504	31.33	1311.6	5	4.24	0
			DD/SF	340475	1.09	356235	34.46	892.8	5	4.42	0
			DD/DF	327133	0.83	341631	44.35	1470.8	5	4.24	0
	200	5	SD/SF	367788	4.84	377068	133.58	835.4	5	2.46	0
			SD/DF	344823	1.9	360584	165.47	1129.4	5	4.37	0
			DD/SF	365159	2.76	378131	256.05	1552.6	5	3.44	0
			DD/DF	338966	1.81	355264	170.97	1536.8	5	4.58	0
		10	SD/SF	397646	6.05	414113	869.75	7465.2	5	3.99	0
			SD/DF	377441	2.39	398811	577.24	3760.2	5	5.36	0
			DD/SF	398090	3.71	416944	887.93	5624.4	5	4.53	0
			DD/DF	381094	1.99	403828	439.85	2574.8	5	5.63	0
		15	SD/SF	428284	7.18	449053	938.45	12584.6	5	4.63	0
			SD/DF	413070	2.36	436966	784.32	6056.8	5	5.47	0
			DD/SF	418945	4.34	443242	1808.64	19178.4	5	5.49	0
			DD/DF	412325	2.6	436027	641.46	4208.4	5	5.43	0
		20	SD/SF	482660	6.65	506278	1696.16	30852.6	5	4.68	0
			SD/DF	450652	3.18	479441	1220.96	16433.4	5	6	0
			DD/SF	486083	4.37	507914	781.85	13257.4	5	4.32	0
			DD/DF	449622	2.68	473456	651.77	3470.4	5	5.02	0

Table 66: Performances of the ES-TP formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	8.82	352095	247.11	1698.2	5	1.15	0
			SD/DF	306898	2.17	316360	125.79	1492.8	5	2.99	0
			DD/SF	339697	4.9	345570	363.2	2545.4	5	1.71	0
			DD/DF	309211	1.6	318428	163.74	2012	5	2.9	0
		10	SD/SF	407193	10.36	414797	453.05	1977.2	5	1.81	0
			SD/DF	362143	3.91	375958	349.34	2380.2	5	3.69	0
			DD/SF	381968	5.74	391861	396.47	2639	5	2.53	0
			DD/DF	361474	2.63	373733	295.75	2313.8	5	3.28	0
		15	SD/SF	442956	13.01	450270	366.12	1446	5	1.61	0
			SD/DF	405439	4.76	422631	249.29	1745.2	5	4.08	0
			DD/SF	437911	6.13	449340	259.87	1668.6	5	2.55	0
			DD/DF	407520	3.35	426066	273.07	1607.4	5	4.36	0
		20	SD/SF	495297	13.36	501619	320.69	1945.6	5	1.26	0
			SD/DF	454773	4.64	474358	192.47	1184	5	4.13	0
			DD/SF	491723	5.79	500932	131.19	1083.8	5	1.85	0
			DD/DF	451347	4.57	470574	298.61	1853.2	5	4.09	0
	100	5	SD/SF	485092	34.17	495175	10673.06	28796.6	4	2.04	0.05
			SD/DF	453329	9.29	474805	4768.93	11338.6	5	4.52	0
			DD/SF	484036	15.19	495677	7538.88	34873.4	5	2.35	0
			DD/DF	450280	4.41	468290	2809.95	4855.8	5	3.85	0
		10	SD/SF	551740	42.13	568116	17317.94	57880.6	2	2.89	0.16
			SD/DF	504323	10.04	529729	8784.54	22205.2	5	4.79	0
			DD/SF	568628	23.52	585880	8525.86	46540.2	5	2.95	0
			DD/DF	512821	4.42	537879	3414.56	7505	5	4.65	0
		15	SD/SF	592127	39.45	614821	11423.84	50139.4	4	3.71	0.03
			SD/DF	545913	11.55	577254	6728.02	16833.6	5	5.43	0
			DD/SF	600265	23.4	628849	11700.94	68158.6	4	4.55	0.04
			DD/DF	557760	5.55	591973	12497.76	97629	4	5.78	0.05
		20	SD/SF	657924	37.27	682534	11058.97	52732.2	3	3.62	0
			SD/DF	612851	10.09	650370	6174.69	19736.4	5	5.77	0
			DD/SF	655392	18.37	682748	12481.28	117434.2	3	4.02	0.03
			DD/DF	608239	7.47	645733	7022.12	15138.2	5	5.8	0
	200	5	SD/SF	720942	94.04	735354	21600.14	4934.2	0	1.97	0.66
			SD/DF	666542	25.77	705220	21600.26	4317	0	5.44	3.09
			DD/SF	695155	40.33	721054	21600.14	4082	0	3.41	2.29
			DD/DF	668243	13.65	705952	21600.22	6154.4	0	5.32	2.88
		10	SD/SF	818342	148.92	847906	21600.18	2548	0	3.33	2.38
			SD/DF	748005	36.83	797624	21600.28	3192.2	0	6.01	4.39
			DD/SF	803840	60.28	845114	21600.24	2792.2	0	4.59	3.86
			DD/DF	740902	22.56	793479	21600.16	3442.4	0	6.57	4.67
		15	SD/SF	867388	187.48	917664	21600.18	2196.8	0	5.14	4.62
			SD/DF	805687	53.6	867662	21600.2	3611.8	0	6.94	5.48
			DD/SF	836902	80.91	894735	21600.2	2138.8	0	5.85	5.61
			DD/DF	795599	23.99	856998	21600.18	3799.2	0	7.05	4.9
		20	SD/SF	951284	129.44	1005769	21600.2	2159.8	0	5.05	4.26
			SD/DF	857931	30.67	927237	21600.32	3156.8	0	7.13	5.35
			DD/SF	922357	66.54	987393	21600.26	3032.8	0	6.35	4.95
			DD/DF	858617	22.13	932665	21600.28	3914.6	0	7.69	5.67

Table 67: Performances of the ES-LS formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.37	175296	5.32	127.6	5	1.41	0
			SD/DF	165436	0.12	168797	3.87	143.6	5	1.98	0
			DD/SF	163562	0.23	166826	7.22	117.4	5	1.96	0
			DD/DF	165957	0.11	169377	4.51	154.4	5	2.04	0
		10	SD/SF	212797	0.28	213232	2.85	78.6	5	0.2	0
			SD/DF	192771	0.11	195540	2.78	88.4	5	1.43	0
			DD/SF	196554	0.2	199116	4.94	210.4	5	1.31	0
			DD/DF	194819	0.09	196472	1.93	65.2	5	0.83	0
		15	SD/SF	232133	0.2	232679	2.13	40.8	5	0.22	0
			SD/DF	215690	0.09	217500	1.53	26.8	5	0.8	0
			DD/SF	220559	0.15	222165	1.78	55.8	5	0.73	0
			DD/DF	215743	0.09	217120	1.29	21	5	0.64	0
		20	SD/SF	257578	0.12	258041	1.24	3	5	0.18	0
			SD/DF	251980	0.1	253839	0.99	1	5	0.73	0
			DD/SF	249302	0.12	249786	0.88	0	5	0.19	0
			DD/DF	243881	0.09	245279	0.69	1.4	5	0.56	0
	100	5	SD/SF	251802	1.35	256259	27.12	494.2	5	1.74	0
			SD/DF	228158	0.42	234855	20.23	362.4	5	2.85	0
			DD/SF	237678	0.62	242367	43.08	728.2	5	1.94	0
			DD/DF	235787	0.44	243091	24.36	551.4	5	3.01	0
		10	SD/SF	282826	1.61	289608	51.34	1446.2	5	2.34	0
			SD/DF	261869	0.52	270400	32.88	1108.4	5	3.14	0
			DD/SF	272197	0.95	280635	57.26	1523.2	5	3	0
			DD/DF	262938	0.51	271470	48.49	1039.8	5	3.14	0
		15	SD/SF	310356	1.46	321461	144.94	1971.8	5	3.46	0
			SD/DF	282249	0.55	293950	57.52	1726.2	5	3.98	0
			DD/SF	304244	0.89	317730	69.14	1690	5	4.26	0
			DD/DF	288568	0.45	298589	46.2	934.6	5	3.35	0
		20	SD/SF	335873	1.2	348828	39.15	884.6	5	3.71	0
			SD/DF	322255	0.46	336504	68.53	1374.4	5	4.24	0
			DD/SF	340475	0.89	356235	64.95	1428.8	5	4.42	0
			DD/DF	327133	0.53	341631	43.75	1300	5	4.24	0
	200	5	SD/SF	367788	6.99	377068	195.26	882.2	5	2.46	0
			SD/DF	344816	1.79	360584	292.53	1861.8	5	4.37	0
			DD/SF	365159	2.2	378131	296.87	1516.4	5	3.44	0
			DD/DF	338966	1.49	355264	203.15	1755.2	5	4.58	0
		10	SD/SF	397646	7.49	414113	1410.62	6429.8	5	3.99	0
			SD/DF	377439	1.87	398811	863.89	5272.4	5	5.36	0
			DD/SF	398090	3.43	416944	1577.66	7421.2	5	4.53	0
			DD/DF	381076	1.77	403828	640	2911.2	5	5.63	0
		15	SD/SF	428284	9.01	449053	1837.96	10469.6	5	4.63	0
			SD/DF	413066	2.13	436966	1210.82	8092.6	5	5.47	0
			DD/SF	418945	4.17	443242	3170.97	16723.6	5	5.49	0
			DD/DF	412275	2.02	436027	718.45	3592.6	5	5.44	0
		20	SD/SF	482660	8.65	506278	1686.03	20319.4	5	4.68	0
			SD/DF	450646	2.19	479441	1750.99	14721	5	6	0
			DD/SF	486083	4.15	507914	1973.69	15292.2	5	4.32	0
			DD/DF	449585	2.06	473456	1141.66	3065.4	5	5.03	0

Table 68: Performances of the ES-LS formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	1.48	352095	782.42	2184.8	5	1.15	0
			SD/DF	306870	0.43	316360	293.76	1582.2	5	3	0
			DD/SF	339697	0.69	345570	706.92	2680.6	5	1.71	0
			DD/DF	309190	0.42	318428	436.65	2550.8	5	2.91	0
		10	SD/SF	407193	1.04	414797	1171.16	2540.4	5	1.81	0
			SD/DF	362129	0.39	375958	848.88	2553.8	5	3.7	0
			DD/SF	381968	0.77	391861	1060.66	3303.2	5	2.53	0
			DD/DF	361438	0.43	373733	498.4	2148.2	5	3.29	0
		15	SD/SF	442956	1.04	450270	1137.75	1860	5	1.61	0
			SD/DF	405329	0.53	422631	288.45	1800.6	5	4.1	0
			DD/SF	437911	0.82	449340	607.33	1708.2	5	2.55	0
			DD/DF	407504	0.52	426066	472.95	1834.6	5	4.36	0
		20	SD/SF	495297	1.1	501619	410.74	1430.8	5	1.26	0
			SD/DF	454758	0.63	474358	219.46	510.2	5	4.13	0
			DD/SF	491723	0.77	500932	261.86	560	5	1.85	0
			DD/DF	451320	0.56	470574	277.8	1087.2	5	4.1	0
	100	5	SD/SF	485092	5.97	495175	17261.82	22472.6	3	2.04	0.21
			SD/DF	453319	1.56	474805	9298.01	14405	5	4.52	0
			DD/SF	484036	3.23	495793	18228.76	15723.2	2	2.35	0.49
			DD/DF	450227	1.33	468290	7221.22	6609.6	5	3.86	0
		10	SD/SF	551740	5.28	568453	20741.72	36290.8	1	2.89	0.58
			SD/DF	504285	1.21	529729	10442.14	9094	4	4.8	0.11
			DD/SF	568628	2.3	585954	16173.12	28221.4	3	2.95	0.16
			DD/DF	512773	1.16	537989	8830.94	6445	4	4.66	0.21
		15	SD/SF	592127	4.04	614856	19987.28	8289.6	1	3.71	0.6
			SD/DF	545864	1.24	577260	12056	10119.8	4	5.44	0.53
			DD/SF	600265	2.22	629228	18720.51	9885.2	2	4.55	1.53
			DD/DF	557597	1.15	592882	16765.06	29366.8	2	5.8	0.66
		20	SD/SF	657924	4.35	682615	19199	13000.6	2	3.62	0.75
			SD/DF	612783	1.35	650394	10624.25	6137.2	4	5.78	0.03
			DD/SF	655392	2.45	682825	18377.26	47858.4	2	4.02	0.35
			DD/DF	608095	1.38	645733	11146.61	23383.2	4	5.82	0.03
	200	5	SD/SF	720942	69.85	736224	21600.24	2514.4	0	1.97	1.13
			SD/DF	666500	7.71	706832	21600.26	2152.4	0	5.45	3.55
			DD/SF	695155	30.24	722113	21600.3	1846.2	0	3.41	2.7
			DD/DF	668194	5.9	707554	21600.2	2343.4	0	5.33	3.26
		10	SD/SF	818342	25.95	850028	21600.4	1330	0	3.33	2.69
			SD/DF	747972	4.27	801462	21600.32	1735	0	6.01	4.98
			DD/SF	803840	13.02	850064	21600.32	1636.4	0	4.59	4.57
			DD/DF	740854	4.29	796589	21600.3	2362.4	0	6.57	4.8
		15	SD/SF	867388	32.89	921354	21600.3	1130.6	0	5.14	4.93
			SD/DF	805659	4.69	873308	21600.28	1730.6	0	6.94	5.98
			DD/SF	836902	16.79	897830	21600.24	1414	0	5.85	5.81
			DD/DF	795562	4.22	861324	21600.36	1897.4	0	7.05	5.6
		20	SD/SF	951284	20.81	1007892	21600.34	1211.2	0	5.05	4.21
			SD/DF	857817	4.45	928224	21600.24	2457	0	7.14	5.28
			DD/SF	922357	12.15	993178	21600.34	1335.6	0	6.35	5.79
			DD/DF	858560	4.26	942083	21600.44	1742.8	0	7.69	6.62

Table 69: Performances of the ES-F formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	116798	0.01	175296	10.25	1319.2	5	33.43	0
			SD/DF	105635	0.01	168797	6.45	1647.2	5	37.39	0
			DD/SF	107216	0.01	166826	6.25	880.6	5	35.73	0
			DD/DF	106548	0.01	169377	7.84	1119.8	5	37	0
		10	SD/SF	154505	0.01	213232	13.2	2057	5	27.54	0
			SD/DF	129619	0.01	195540	3.1	523	5	33.7	0
			DD/SF	140030	0.01	199116	9.26	1361.4	5	29.75	0
			DD/DF	132150	0.01	196472	2.79	482.8	5	32.54	0
		15	SD/SF	175290	0.01	232679	8.32	1292.8	5	24.62	0
			SD/DF	147269	0.01	217500	1.57	217.4	5	32.2	0
			DD/SF	166961	0.01	222165	4.12	1036.4	5	24.86	0
			DD/DF	151631	0.01	217120	2.02	324.8	5	30.14	0
		20	SD/SF	202077	0.01	258041	8.37	1296.2	5	21.71	0
			SD/DF	174790	0.01	253839	1.4	181	5	31.08	0
			DD/SF	195869	0.01	249786	2.29	491.8	5	21.59	0
			DD/DF	172142	0.01	245279	1.04	83.8	5	29.76	0
	100	5	SD/SF	147059	0.03	256259	106	5042	5	42.61	0
			SD/DF	129682	0.03	234855	83.6	2578.2	5	44.71	0
			DD/SF	135059	0.03	242367	245.64	2646.4	5	44.32	0
			DD/DF	132412	0.04	243091	99.74	1494.8	5	45.49	0
		10	SD/SF	173311	0.03	289608	98.4	3342.2	5	40.18	0
			SD/DF	156625	0.03	270400	70.87	2722.4	5	42.06	0
			DD/SF	163126	0.03	280635	93.23	2469.2	5	41.9	0
			DD/DF	154507	0.03	271470	74.53	2185.4	5	43.08	0
		15	SD/SF	199623	0.03	321461	123.12	4013.2	5	37.89	0
			SD/DF	172826	0.03	293950	72.76	2315.6	5	41.19	0
			DD/SF	197140	0.03	317730	68.34	2503.6	5	37.96	0
			DD/DF	179633	0.03	298589	46.99	1561.8	5	39.82	0
		20	SD/SF	223329	0.03	348828	54.25	2090.8	5	36.03	0
			SD/DF	198106	0.03	336504	57.27	2102.4	5	41.13	0
			DD/SF	227479	0.03	356235	88.97	3173	5	36.15	0
			DD/DF	199278	0.03	341631	74.49	1901.8	5	41.64	0
	200	5	SD/SF	174870	0.08	377068	1934.14	82437	5	53.66	0
			SD/DF	162335	0.09	360584	1087.85	6808	5	54.97	0
			DD/SF	175773	0.1	378131	2169.19	7380	5	53.52	0
			DD/DF	161998	0.11	355264	1231.35	3460.2	5	54.38	0
		10	SD/SF	200676	0.07	414113	5322.79	77950.2	5	51.57	0
			SD/DF	191480	0.07	398811	4936.11	109558	5	51.99	0
			DD/SF	201621	0.08	416944	6913.31	74470.8	5	51.66	0
			DD/DF	189777	0.09	403828	2331.38	13114.6	5	53.01	0
		15	SD/SF	228972	0.07	449053	3802.54	65976.8	5	49.02	0
			SD/DF	208119	0.07	436966	3351.81	55852.8	5	52.37	0
			DD/SF	221620	0.07	443242	6067.88	69021	5	50.01	0
			DD/DF	214142	0.08	436027	2269.15	19862.8	5	50.89	0
		20	SD/SF	270497	0.07	506278	4182.46	76229.4	5	46.6	0
			SD/DF	241537	0.07	479441	4258.07	72946.6	5	49.62	0
			DD/SF	274050	0.08	507914	2130.78	38616.4	5	46.05	0
			DD/DF	241200	0.08	473456	2424.65	22243.6	5	49.05	0

Table 70: Performances of the ES-F formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	160894	0.04	352095	1127.66	10096.6	5	54.3	0
			SD/DF	142188	0.04	316360	343.37	4520	5	55.02	0
			DD/SF	157073	0.03	345570	1413.73	9551.6	5	54.61	0
			DD/DF	142121	0.05	318428	359.84	4789.2	5	55.36	0
		10	SD/SF	200147	0.04	414797	3322.13	30842	5	51.71	0
			SD/DF	172121	0.05	375958	1768.16	22288.2	5	54.17	0
			DD/SF	184379	0.05	391861	3476.86	22055.8	5	52.94	0
			DD/DF	176534	0.05	373733	1035.75	9893.6	5	52.77	0
		15	SD/SF	228607	0.05	450270	4467.28	24405.8	5	49.12	0
			SD/DF	203136	0.05	422631	1222.42	9804.4	5	51.91	0
			DD/SF	223202	0.05	449340	2847.15	14541.2	5	50.33	0
			DD/DF	206747	0.05	426066	755.32	7936.2	5	51.48	0
		20	SD/SF	271691	0.06	501619	1926.41	17938	5	45.85	0
			SD/DF	233473	0.06	474358	1222.54	7734.2	5	50.76	0
			DD/SF	263550	0.06	500932	1905.4	10401.6	5	47.43	0
			DD/DF	235363	0.06	470574	1373.35	8454.2	5	49.99	0
	100	5	SD/SF	179724	0.11	495211	19227.31	42297.2	1	63.73	0.68
			SD/DF	169629	0.13	474805	15093.66	54683	3	64.24	0.1
			DD/SF	179110	0.13	495891	21600.04	26463	0	63.94	0.88
			DD/DF	171362	0.17	468290	12054.74	21063.2	5	63.41	0
		10	SD/SF	218725	0.1	569290	21600.06	14773.6	0	61.54	3.98
			SD/DF	203371	0.11	530368	21600.04	15618.4	0	61.6	3.11
			DD/SF	227417	0.09	588035	21600.06	12387.2	0	61.19	3.78
			DD/DF	203495	0.12	538030	18486.51	18908.4	1	62.16	1.17
		15	SD/SF	248048	0.1	618048	21600.06	15343.6	0	59.67	5.55
			SD/DF	232754	0.11	578062	21600.06	12420.6	0	59.67	3.6
			DD/SF	254503	0.1	630655	21600.08	12649.8	0	59.53	5.37
			DD/DF	234643	0.11	592633	21600.08	13403.8	0	60.36	3.43
		20	SD/SF	292643	0.1	684615	21600.08	16698.4	0	57.18	6.01
			SD/DF	266794	0.12	651376	21600.1	14050.8	0	58.95	4.39
			DD/SF	291108	0.1	685096	21600.1	11532.8	0	57.39	5.25
			DD/DF	268527	0.11	646342	21600.04	13275	0	58.41	5.22
	200	5	SD/SF	216391	0.33	737818	21600.18	12202.6	0	70.6	1.98
			SD/DF	203707	0.42	707734	21600.24	8998.2	0	71.1	4.27
			DD/SF	203517	0.4	722464	21600.18	8120.4	0	71.74	3.13
			DD/DF	205114	0.49	708276	21600.34	6994.8	0	70.93	3.82
		10	SD/SF	263775	0.29	847805	21600.18	12725.8	0	68.85	3.76
			SD/DF	243088	0.4	798749	21600.18	10464.4	0	69.45	4.86
			DD/SF	262052	0.37	845928	21600.16	10855	0	68.9	4.79
			DD/DF	246037	0.39	798364	21600.12	8693	0	68.97	6.16
		15	SD/SF	298263	0.34	920513	21600.16	11327	0	67.39	6.22
			SD/DF	276195	0.4	872872	21600.22	8476.4	0	68.08	6.72
			DD/SF	289114	0.32	904618	21600.18	10262.4	0	67.48	7.57
			DD/DF	277492	0.38	857814	21600.18	11082.4	0	67.58	6.33
		20	SD/SF	341287	0.26	1016147	21600.16	10137.6	0	65.94	7.13
			SD/DF	307003	0.31	930354	21600.2	8791.6	0	66.77	7.41
			DD/SF	335217	0.26	1005266	21600.18	9245.4	0	65.97	8.74
			DD/DF	314336	0.32	938145	21600.2	8883.6	0	66.2	8.19

Table 71: Performances of the ES-F-N formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.3	175296	5.02	146	5	1.41	0
			SD/DF	165436	0.26	168797	3.8	103	5	1.98	0
			DD/SF	163562	0.28	166826	4.09	95.4	5	1.96	0
			DD/DF	165957	0.26	169377	3.81	104.4	5	2.04	0
		10	SD/SF	212797	0.25	213232	3.82	110.4	5	0.2	0
			SD/DF	192771	0.2	195540	4.47	140	5	1.43	0
			DD/SF	196554	0.28	199116	4.98	197.2	5	1.31	0
			DD/DF	194826	0.22	196472	3.6	80.8	5	0.83	0
		15	SD/SF	232133	0.17	232679	3.24	62	5	0.22	0
			SD/DF	215690	0.14	217500	2.94	68	5	0.8	0
			DD/SF	220559	0.17	222165	4.22	94	5	0.73	0
			DD/DF	215743	0.15	217120	3.35	55.2	5	0.64	0
		20	SD/SF	257578	0.19	258041	2.91	29.6	5	0.18	0
			SD/DF	251980	0.17	253839	4.06	84	5	0.73	0
			DD/SF	249302	0.18	249786	2.69	13.8	5	0.19	0
			DD/DF	243881	0.18	245279	3.21	28.6	5	0.56	0
	100	5	SD/SF	251802	0.77	256259	18.51	426.6	5	1.74	0
			SD/DF	228164	0.65	234855	17.04	395.2	5	2.84	0
			DD/SF	237678	0.76	242367	26.6	724.4	5	1.94	0
			DD/DF	235788	0.66	243091	16.06	388	5	3.01	0
		10	SD/SF	282826	0.57	289608	27.67	1056.2	5	2.34	0
			SD/DF	261888	0.48	270400	19.06	693.8	5	3.13	0
			DD/SF	272197	0.49	280635	36.7	1090.2	5	3	0
			DD/DF	262943	0.46	271470	20.57	716.6	5	3.14	0
		15	SD/SF	310356	0.56	321461	49.67	1703.2	5	3.46	0
			SD/DF	282258	0.45	293950	24.77	984.8	5	3.97	0
			DD/SF	304244	0.47	317730	34.32	965.2	5	4.26	0
			DD/DF	288575	0.48	298589	27.34	958.2	5	3.34	0
		20	SD/SF	335873	0.51	348828	15.71	493	5	3.71	0
			SD/DF	322257	0.42	336504	29.03	1142.8	5	4.24	0
			DD/SF	340475	0.49	356235	41.27	1462.6	5	4.42	0
			DD/DF	327133	0.44	341631	42.1	1443.2	5	4.24	0
	200	5	SD/SF	367788	3.15	377068	100.21	1002	5	2.46	0
			SD/DF	344823	2.54	360584	80.88	962.4	5	4.37	0
			DD/SF	365159	2.81	378131	103.34	1170	5	3.44	0
			DD/DF	338966	2.58	355264	138.62	1793	5	4.58	0
		10	SD/SF	397646	1.97	414113	617.58	8540.2	5	3.99	0
			SD/DF	377441	1.58	398811	350.5	4697.6	5	5.36	0
			DD/SF	398090	2	416944	452.78	7354	5	4.53	0
			DD/DF	381094	1.61	403828	199.69	2733.4	5	5.63	0
		15	SD/SF	428284	1.76	449053	789.68	15033.6	5	4.63	0
			SD/DF	413070	1.43	436966	483.62	7452.4	5	5.47	0
			DD/SF	418945	1.8	443242	1673.43	39886.8	5	5.49	0
			DD/DF	412325	1.52	436027	319.37	4266.2	5	5.43	0
		20	SD/SF	482660	1.65	506278	1345.46	30542.8	5	4.68	0
			SD/DF	450652	1.28	479441	744.14	16035.6	5	6	0
			DD/SF	486083	1.45	507914	755.55	16517	5	4.32	0
			DD/DF	449622	1.31	473456	302.44	5053.4	5	5.02	0

Table 72: Performances of the ES-F-N formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	5.58	352095	311.29	1686	5	1.15	0
			SD/DF	306898	3.29	316360	125.17	1391.6	5	2.99	0
			DD/SF	339697	3.87	345570	341.02	2500.4	5	1.71	0
			DD/DF	309211	3.42	318428	205.16	1837.2	5	2.9	0
		10	SD/SF	407193	3	414797	207.36	1814.6	5	1.81	0
			SD/DF	362143	2.31	375958	246.76	2037.6	5	3.69	0
			DD/SF	381968	2.83	391861	336.07	2623.4	5	2.53	0
			DD/DF	361474	2.2	373733	218.28	2263.2	5	3.28	0
		15	SD/SF	442956	2.95	450270	160.93	1337.6	5	1.61	0
			SD/DF	405439	2.19	422631	176.94	1900.4	5	4.08	0
			DD/SF	437911	2.55	449340	195.6	1595.6	5	2.55	0
			DD/DF	407520	2.03	426066	211.01	1692.2	5	4.36	0
		20	SD/SF	495297	2.95	501619	224.24	1521	5	1.26	0
			SD/DF	454773	2.06	474358	162.59	1271.8	5	4.13	0
			DD/SF	491723	2.75	500932	124.08	812.6	5	1.85	0
			DD/DF	451347	2.25	470574	210.73	1627.8	5	4.09	0
	100	5	SD/SF	485092	23.65	495175	8433.03	32574.8	5	2.04	0
			SD/DF	453329	13.94	474805	2731.13	11023.6	5	4.52	0
			DD/SF	484036	15.95	495677	7284.9	35648.6	5	2.35	0
			DD/DF	450280	13.45	468290	1404.91	4649.4	5	3.85	0
		10	SD/SF	551740	12.64	568116	17246.78	110261.8	3	2.89	0.08
			SD/DF	504323	7.1	529729	3755.13	24461.2	5	4.79	0
			DD/SF	568628	8.8	585880	8584.18	57411.6	5	2.95	0
			DD/DF	512821	7.25	537879	1709.86	7099.4	5	4.65	0
		15	SD/SF	592127	9.65	614821	9159.87	67352	4	3.71	0.03
			SD/DF	545913	6.13	577254	3198.59	20140	5	5.43	0
			DD/SF	600265	7.75	628849	10314.88	83609	4	4.55	0.02
			DD/DF	557760	6.32	591973	9454.19	86909.8	5	5.78	0
		20	SD/SF	657924	9.87	682534	7927.6	50156.6	5	3.62	0
			SD/DF	612851	6.31	650370	3530.45	20581.2	5	5.77	0
			DD/SF	655392	8.37	682748	12697.44	126161.4	3	4.02	0.03
			DD/DF	608239	5.72	645733	3537.72	30130.8	5	5.8	0
	200	5	SD/SF	720942	138.11	735354	19436.46	8319.6	2	1.97	0.38
			SD/DF	666542	98.62	704933	21600.6	30481	0	5.44	0.76
			DD/SF	695155	104.84	719744	21600.86	14433.2	0	3.41	1.35
			DD/DF	668243	78.15	705834	21600.64	30779	0	5.32	0.79
		10	SD/SF	818342	44.71	846861	20302.6	8826.8	1	3.33	1.17
			SD/DF	748005	28.06	795863	21600.62	33731.8	0	6.01	0.71
			DD/SF	803840	39.85	843098	21600.7	12921.2	0	4.59	1.81
			DD/DF	740902	30.63	793135	21600.6	33012	0	6.57	0.95
		15	SD/SF	867388	47.77	916434	21600.72	5425.8	0	5.14	3.71
			SD/DF	805687	23.75	865833	21600.64	37846.8	0	6.94	0.59
			DD/SF	836902	33.62	889722	21600.82	9814.2	0	5.85	3.44
			DD/DF	795599	25.45	856002	21600.6	36851	0	7.05	0.73
		20	SD/SF	951284	35.41	1001989	21600.66	10462.6	0	5.05	1.64
			SD/DF	857931	17.53	923780	21600.56	38189	0	7.13	0.57
			DD/SF	922357	25.11	984976	21600.68	10970.4	0	6.35	2.11
			DD/DF	858617	18.81	930210	21600.58	38631.6	0	7.69	0.94

Table 73: Performances of the ES-F-TP formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.85	175296	6.6	125.8	5	1.41	0
			SD/DF	165436	0.34	168797	3.8	100.4	5	1.98	0
			DD/SF	163562	0.53	166826	5.54	139.4	5	1.96	0
			DD/DF	165957	0.31	169377	3.47	120.4	5	2.04	0
		10	SD/SF	212797	0.47	213232	5.01	129.8	5	0.2	0
			SD/DF	192771	0.26	195540	4.4	122	5	1.43	0
			DD/SF	196554	0.36	199116	6.13	181.8	5	1.31	0
			DD/DF	194826	0.25	196472	3.29	86.6	5	0.83	0
		15	SD/SF	232133	0.42	232679	4.43	46.2	5	0.22	0
			SD/DF	215690	0.24	217500	2.88	74.6	5	0.8	0
			DD/SF	220559	0.3	222165	4.62	139.6	5	0.73	0
			DD/DF	215743	0.27	217120	2.78	67.6	5	0.64	0
		20	SD/SF	257578	0.34	258041	3.22	19	5	0.18	0
			SD/DF	251980	0.32	253839	4.01	103.2	5	0.73	0
			DD/SF	249302	0.32	249786	2.66	6.4	5	0.19	0
			DD/DF	243881	0.29	245279	2.77	41.4	5	0.56	0
	100	5	SD/SF	251802	1.85	256259	25.42	363.4	5	1.74	0
			SD/DF	228164	1.11	234855	18.29	328.6	5	2.84	0
			DD/SF	237678	1.33	242367	27.13	605.2	5	1.94	0
			DD/DF	235788	1.15	243091	19.05	421.4	5	3.01	0
		10	SD/SF	282826	1.45	289608	41.28	668.4	5	2.34	0
			SD/DF	261888	0.95	270400	26.26	835.2	5	3.13	0
			DD/SF	272197	1.21	280635	42.32	1203.2	5	3	0
			DD/DF	262943	0.89	271470	24.56	775.6	5	3.14	0
		15	SD/SF	310356	1.41	321461	82.27	2101.6	5	3.46	0
			SD/DF	282258	0.84	293950	33.99	958.2	5	3.97	0
			DD/SF	304244	1.1	317730	66.63	1173.4	5	4.26	0
			DD/DF	288575	0.79	298589	40.6	1252	5	3.34	0
		20	SD/SF	335873	0.99	348828	37.4	433.6	5	3.71	0
			SD/DF	322257	0.82	336504	51.86	1263	5	4.24	0
			DD/SF	340475	0.99	356235	65.18	1127	5	4.42	0
			DD/DF	327133	0.9	341631	45.52	1412.8	5	4.24	0
	200	5	SD/SF	367788	7.39	377068	150.43	916.6	5	2.46	0
			SD/DF	344823	3.97	360584	122.05	1311.6	5	4.37	0
			DD/SF	365159	4.55	378131	150.61	1323.4	5	3.44	0
			DD/DF	338966	3.9	355264	121.52	1641.2	5	4.58	0
		10	SD/SF	397646	5.65	414113	1092.29	8658.2	5	3.99	0
			SD/DF	377441	2.98	398811	591.86	4493.2	5	5.36	0
			DD/SF	398090	4.05	416944	1046.43	7731.2	5	4.53	0
			DD/DF	381094	2.78	403828	556.91	2918.6	5	5.63	0
		15	SD/SF	428284	7.6	449053	1649.83	18226.8	5	4.63	0
			SD/DF	413070	2.56	436966	721.47	7295	5	5.47	0
			DD/SF	418945	4.69	443242	2365.93	41177.8	5	5.49	0
			DD/DF	412325	2.71	436027	582.3	6017.8	5	5.43	0
		20	SD/SF	482660	5.87	506278	1611.94	29232	5	4.68	0
			SD/DF	450652	3.23	479441	1341.62	18249.2	5	6	0
			DD/SF	486083	3.95	507914	1047.86	11756	5	4.32	0
			DD/DF	449622	2.75	473456	697.34	5737.4	5	5.02	0

Table 74: Performances of the ES-F-TP formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	10.26	352095	513.97	1805.8	5	1.15	0
			SD/DF	306898	5.03	316360	146.46	1440	5	2.99	0
			DD/SF	339697	5.51	345570	363.22	2334.8	5	1.71	0
			DD/DF	309211	4.84	318428	127.34	1834.8	5	2.9	0
		10	SD/SF	407193	5.3	414797	660.52	1838	5	1.81	0
			SD/DF	362143	2.96	375958	336.97	2542.4	5	3.69	0
			DD/SF	381968	4.58	391861	494.47	2913.8	5	2.53	0
			DD/DF	361474	3.1	373733	251.43	2084.6	5	3.28	0
		15	SD/SF	442956	6.43	450270	542.28	1171.2	5	1.61	0
			SD/DF	405439	3.64	422631	418.09	2098.2	5	4.08	0
			DD/SF	437911	4.16	449340	373.47	2098	5	2.55	0
			DD/DF	407520	4	426066	408.7	2072.2	5	4.36	0
		20	SD/SF	495297	7.43	501619	617.33	1934.6	5	1.26	0
			SD/DF	454773	4.52	474358	428.06	1426.2	5	4.13	0
			DD/SF	491723	5.19	500932	265.8	986.8	5	1.85	0
			DD/DF	451347	4.27	470574	686.79	1516.8	5	4.09	0
	100	5	SD/SF	485092	40.28	495175	14806.63	30008.8	4	2.04	0.05
			SD/DF	453329	19.77	474805	3140.77	14599.4	5	4.52	0
			DD/SF	484036	30.78	495677	10815.88	33245.6	4	2.35	0.1
			DD/DF	450280	22.38	468290	1769.29	6636	5	3.85	0
		10	SD/SF	551740	34.39	568115	19489.76	25543	1	2.89	0.31
			SD/DF	504323	15.73	529729	8254.24	60499.2	4	4.79	0.09
			DD/SF	568628	18.15	585880	11832.48	70819	4	2.95	0.01
			DD/DF	512821	12.48	537879	2674.21	6875	5	4.65	0
		15	SD/SF	592127	34.31	614821	13625.55	50497	4	3.71	0.04
			SD/DF	545913	11.3	577254	5653.26	23531.6	5	5.43	0
			DD/SF	600265	15.24	628849	12962.5	89016	3	4.55	0.02
			DD/DF	557760	10.07	591973	9200.57	71605.6	5	5.78	0
		20	SD/SF	657924	37.77	682534	10376.68	44190.4	5	3.62	0
			SD/DF	612851	13.39	650370	9230.01	58411.4	4	5.77	0.01
			DD/SF	655392	15.48	682748	13920.27	125548.4	3	4.02	0.03
			DD/DF	608239	12.07	645733	5404.23	22389.8	5	5.8	0
	200	5	SD/SF	720942	308.45	735605	20659.96	3938	1	1.97	0.87
			SD/DF	666542	113.85	705196	21600.52	15412	0	5.44	1.83
			DD/SF	695155	124.92	720305	21600.54	9979.4	0	3.41	1.88
			DD/DF	668243	109.99	706209	21600.44	19868.8	0	5.32	1.64
		10	SD/SF	818342	151.64	848915	21600.56	1756.2	0	3.33	2.66
			SD/DF	748005	70.13	796369	21600.5	9333.4	0	6.01	2.68
			DD/SF	803840	86.44	843788	21600.62	4287	0	4.59	3.74
			DD/DF	740902	71.35	793716	21600.74	8357.2	0	6.57	3.85
		15	SD/SF	867388	215.3	920010	21600.48	1418.4	0	5.14	4.9
			SD/DF	805687	58.8	866636	21600.52	17775	0	6.94	3.13
			DD/SF	836902	107.58	892426	21600.54	3068.2	0	5.85	5.16
			DD/DF	795599	50.49	856823	21600.66	6829.8	0	7.05	3.96
		20	SD/SF	951284	150.39	1003782	21600.56	1558.4	0	5.05	3.77
			SD/DF	857931	36.04	924520	21600.62	5968.4	0	7.13	4.46
			DD/SF	922357	63.98	987508	21600.62	4006.4	0	6.35	4.31
			DD/DF	858617	43.87	932112	21600.68	7940.4	0	7.69	3.8

Table 75: Performances of the ES-F-LS formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	172856	0.46	175296	8.21	297.6	5	1.41	0
			SD/DF	165436	0.16	168797	2.72	133.2	5	1.98	0
			DD/SF	163562	0.29	166826	5.39	156.8	5	1.96	0
			DD/DF	165957	0.16	169377	2.77	138.4	5	2.04	0
		10	SD/SF	212797	0.25	213232	3.78	125.4	5	0.2	0
			SD/DF	192771	0.13	195540	2.72	138.6	5	1.43	0
			DD/SF	196554	0.23	199116	5.16	235.6	5	1.31	0
			DD/DF	194819	0.12	196472	1.81	60.8	5	0.83	0
		15	SD/SF	232133	0.2	232679	2.66	54.6	5	0.22	0
			SD/DF	215690	0.11	217500	1.95	53.4	5	0.8	0
			DD/SF	220559	0.18	222165	2.58	76	5	0.73	0
			DD/DF	215743	0.12	217120	1.57	47	5	0.64	0
		20	SD/SF	257578	0.15	258041	1.53	25	5	0.18	0
			SD/DF	251980	0.12	253839	1.72	26	5	0.73	0
			DD/SF	249302	0.13	249786	1.11	6.6	5	0.19	0
			DD/DF	243881	0.11	245279	1.52	21	5	0.56	0
	100	5	SD/SF	251802	1.16	256259	36.32	523.8	5	1.74	0
			SD/DF	228158	0.36	234855	10.5	292.6	5	2.85	0
			DD/SF	237678	0.72	242367	53.96	1230.2	5	1.94	0
			DD/DF	235787	0.36	243091	15.11	582	5	3.01	0
		10	SD/SF	282826	1	289608	56.72	1084	5	2.34	0
			SD/DF	261869	0.41	270400	43.14	1408.4	5	3.14	0
			DD/SF	272197	0.63	280635	56.79	1447	5	3	0
			DD/DF	262938	0.38	271470	24.28	1051.6	5	3.14	0
		15	SD/SF	310356	1.02	321461	111.08	2218.8	5	3.46	0
			SD/DF	282249	0.35	293950	43.72	1695.8	5	3.98	0
			DD/SF	304244	0.6	317730	70.02	1091.4	5	4.26	0
			DD/DF	288568	0.31	298589	38.8	1479.2	5	3.35	0
		20	SD/SF	335873	0.85	348828	44.19	891.4	5	3.71	0
			SD/DF	322255	0.35	336504	39.14	1198.8	5	4.24	0
			DD/SF	340475	0.69	356235	58.6	1492.2	5	4.42	0
			DD/DF	327133	0.36	341631	49.09	1415	5	4.24	0
	200	5	SD/SF	367788	6.73	377068	255.04	1314.8	5	2.46	0
			SD/DF	344816	1.39	360584	83.83	1597.2	5	4.37	0
			DD/SF	365159	3.58	378131	222.14	1885	5	3.44	0
			DD/DF	338966	1.15	355264	119.81	1420.8	5	4.58	0
		10	SD/SF	397646	5.9	414113	1878.39	9156.8	5	3.99	0
			SD/DF	377439	1.52	398811	495.59	4207.4	5	5.36	0
			DD/SF	398090	2.97	416944	1497.77	7394.6	5	4.53	0
			DD/DF	381076	1.34	403828	430.61	2756	5	5.63	0
		15	SD/SF	428284	5.9	449053	2357.27	14899	5	4.63	0
			SD/DF	413066	1.26	436966	924.44	6478.6	5	5.47	0
			DD/SF	418945	2.81	443242	2024.22	21066.6	5	5.49	0
			DD/DF	412275	1.2	436027	578.41	3453.2	5	5.44	0
		20	SD/SF	482660	5.48	506278	2356.64	28680.6	5	4.68	0
			SD/DF	450646	1.58	479441	1378.28	18962.4	5	6	0
			DD/SF	486083	3.21	507914	1683.24	20176.6	5	4.32	0
			DD/DF	449585	1.21	473456	788.08	4272.8	5	5.03	0

Table 76: Performances of the ES-F-LS formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	348015	1.78	352095	852.72	2044.4	5	1.15	0
			SD/DF	306870	0.59	316360	126.36	1534.4	5	3	0
			DD/SF	339697	0.74	345570	767.04	3064.4	5	1.71	0
			DD/DF	309190	0.54	318428	167.54	2051.8	5	2.91	0
		10	SD/SF	407193	1.05	414797	954.4	2447.2	5	1.81	0
			SD/DF	362129	0.53	375958	419.11	2124.4	5	3.7	0
			DD/SF	381968	0.68	391861	748.12	3060.6	5	2.53	0
			DD/DF	361438	0.52	373733	379.85	2445.6	5	3.29	0
		15	SD/SF	442956	1.08	450270	745.26	1501.2	5	1.61	0
			SD/DF	405329	0.57	422631	398.51	2322.6	5	4.1	0
			DD/SF	437911	0.78	449340	416.49	1802.2	5	2.55	0
			DD/DF	407504	0.51	426066	292.46	1764.8	5	4.36	0
		20	SD/SF	495297	1	501619	634.99	1808.2	5	1.26	0
			SD/DF	454758	0.69	474358	342.33	1533.2	5	4.13	0
			DD/SF	491723	0.85	500932	345.85	768.2	5	1.85	0
			DD/DF	451320	0.72	470574	696.47	1785.4	5	4.1	0
	100	5	SD/SF	485092	9.22	495179	21548.22	11748.2	1	2.04	0.61
			SD/DF	453319	2.98	474805	3914.88	12445.4	5	4.52	0
			DD/SF	484036	4.96	495677	17941.46	22432.4	2	2.35	0.28
			DD/DF	450227	2.71	468290	2594.46	5436.4	5	3.86	0
		10	SD/SF	551740	7.31	568489	21415.06	10778.6	1	2.89	1.26
			SD/DF	504285	2.34	529729	9897.84	50687.6	5	4.8	0
			DD/SF	568628	2.92	585892	14873.13	32836.2	3	2.95	0.1
			DD/DF	512773	2.01	537879	4439.73	9740.8	5	4.66	0
		15	SD/SF	592127	5.42	615385	19980.38	16152.8	1	3.71	1.48
			SD/DF	545864	2.12	577254	7330.78	22154.6	5	5.44	0
			DD/SF	600265	2.81	628950	18420.99	14960.6	1	4.55	0.2
			DD/DF	557597	2	591973	13750.33	57684.4	3	5.8	0.07
		20	SD/SF	657924	5.7	682892	17199.7	13231.2	3	3.62	0.92
			SD/DF	612783	2.23	650370	9460.47	33662.4	5	5.78	0
			DD/SF	655392	3.27	682842	18703.76	83434.4	1	4.02	0.22
			DD/DF	608095	2.14	645733	9451.02	24641.2	4	5.82	0.01
	200	5	SD/SF	720942	133.82	736434	21600.22	1645.8	0	1.97	1.47
			SD/DF	666500	12.83	705917	21600.5	8261.4	0	5.45	2.59
			DD/SF	695155	50.48	720600	21600.3	4376.6	0	3.41	2.28
			DD/DF	668194	13.01	706475	21600.38	9821.2	0	5.33	2.18
		10	SD/SF	818342	42.43	851542	21600.46	1011.6	0	3.33	3.41
			SD/DF	747972	9.38	796978	21600.22	4274	0	6.01	3.94
			DD/SF	803840	21.73	845101	21600.26	2054.6	0	4.59	4.14
			DD/DF	740854	8.69	794899	21600.32	4729.4	0	6.57	4.49
		15	SD/SF	867388	42.02	924348	21600.4	960.2	0	5.14	5.8
			SD/DF	805659	7.64	869068	21600.22	3055.8	0	6.94	5.73
			DD/SF	836902	21.27	894127	21600.48	1297.4	0	5.85	5.99
			DD/DF	795562	9.2	858033	21600.32	2679.2	0	7.05	5.86
		20	SD/SF	951284	28.75	1009102	21600.5	936.2	0	5.05	5.09
			SD/DF	857817	6.77	929184	21600.3	2084.4	0	7.14	6.46
			DD/SF	922357	15.45	994299	21600.4	1277.4	0	6.35	6.77
			DD/DF	858560	6.69	937165	21600.36	2661.8	0	7.69	6.83

Table 77: Performances of the N formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	175290	18.12	175296	23.43	1.8	5	0	0
			SD/DF	168797	3.9	168797	6.92	0	5	0	0
			DD/SF	166826	9.53	166826	7.88	0	5	0	0
			DD/DF	169377	4.6	169377	6.66	0	5	0	0
		10	SD/SF	213232	13.22	213232	8.66	0	5	0	0
			SD/DF	195540	4.41	195540	6.86	0	5	0	0
			DD/SF	199116	10.91	199116	7.92	0	5	0	0
			DD/DF	196472	3.41	196472	6.56	0	5	0	0
		15	SD/SF	232679	10.43	232679	7.97	0	5	0	0
			SD/DF	217500	3.43	217500	6.92	0	5	0	0
			DD/SF	222165	6.63	222165	7.56	0	5	0	0
			DD/DF	217120	3.03	217120	6.82	0	5	0	0
		20	SD/SF	258041	4.72	258041	7.16	0	5	0	0
			SD/DF	253839	2.7	253839	7.22	0	5	0	0
			DD/SF	249786	3.35	249786	7.45	0	5	0	0
			DD/DF	245279	2.35	245279	6.77	0	5	0	0
	100	5	SD/SF	256155	91.49	256259	90.62	6.2	5	0.04	0
			SD/DF	234855	11.9	234855	16.23	0	5	0	0
			DD/SF	242243	23.06	242367	35.65	3	5	0.05	0
			DD/DF	243091	23.57	243091	16.79	0	5	0	0
		10	SD/SF	289603	126.98	289608	79.71	2.4	5	0	0
			SD/DF	270400	18.97	270400	16.55	0	5	0	0
			DD/SF	280635	50.35	280635	23.16	0	5	0	0
			DD/DF	271470	32.96	271470	16.85	0	5	0	0
		15	SD/SF	321447	114.67	321461	73.64	2.6	5	0	0
			SD/DF	293950	19.21	293950	18.25	0	5	0	0
			DD/SF	317730	130.3	317730	27.06	0	5	0	0
			DD/DF	298589	10.29	298589	13.56	0	5	0	0
		20	SD/SF	348824	120.16	348828	85.7	1.6	5	0	0
			SD/DF	336504	43.29	336504	17.47	0	5	0	0
			DD/SF	356234	151.58	356235	39.36	0.6	5	0	0
			DD/DF	341631	33.69	341631	16.88	0	5	0	0
	200	5	SD/SF	377009	182.12	377068	215.38	2	5	0.02	0
			SD/DF	360584	50.96	360584	49.8	0	5	0	0
			DD/SF	377863	164.97	378131	163.55	1.6	5	0.07	0
			DD/DF	355264	68.74	355264	55.3	0	5	0	0
		10	SD/SF	413816	506.19	414113	1027.7	8.6	5	0.07	0
			SD/DF	398749	162.51	398811	231.67	0.6	5	0.02	0
			DD/SF	416820	286	416944	266.43	2.2	5	0.03	0
			DD/DF	403828	128.45	403828	112.45	0	5	0	0
		15	SD/SF	448705	1017.13	449053	793.78	4.6	5	0.08	0
			SD/DF	436966	193.41	436966	124.43	0	5	0	0
			DD/SF	443158	314.76	443242	250.96	0.6	5	0.02	0
			DD/DF	435947	133.66	436027	127.79	0.6	5	0.02	0
		20	SD/SF	506100	796.8	506278	732.97	7	5	0.04	0
			SD/DF	479368	210.72	479441	200.12	0.6	5	0.02	0
			DD/SF	507914	431.48	507914	189.68	0	5	0	0
			DD/DF	473430	260.78	473456	132.57	0.6	5	0.01	0

Table 78: Performances of the N formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	352085	2742.65	352095	2405.7	5.4	5	0	0
			SD/DF	316360	373.01	316360	429.56	0	5	0	0
			DD/SF	345570	1726.25	345570	1891.58	0	5	0	0
			DD/DF	318428	295.8	318428	420.55	0	5	0	0
		10	SD/SF	414634	1705.9	414797	3673.64	1.4	5	0.04	0
			SD/DF	375958	381.67	375958	434.05	0	5	0	0
			DD/SF	391836	1220.62	391861	3030.14	0.6	5	0.01	0
			DD/DF	373724	365.82	373733	653.5	0.6	5	0	0
		15	SD/SF	450270	1562.88	450270	3996.86	0	5	0	0
			SD/DF	422605	440.55	422631	577.13	0.6	5	0.01	0
			DD/SF	449330	2250.17	449340	2830.71	0.6	5	0	0
			DD/DF	426024	592.58	426066	594.66	0.6	5	0.01	0
		20	SD/SF	501619	2155.6	501619	2056.53	0	5	0	0
			SD/DF	474358	416.34	474358	409.13	0	5	0	0
			DD/SF	500932	1074.07	500932	1740.77	0	5	0	0
			DD/DF	470574	437.91	470574	497.27	0	5	0	0
	100	5	SD/SF	494867	7017.75	495175	14618.17	27.6	5	0.06	0
			SD/DF	474805	1862.38	474805	1797.94	0	5	0	0
			DD/SF	495569	7375.33	495677	9768.54	6.4	5	0.02	0
			DD/DF	468290	1123.7	468290	1659.69	0	5	0	0
		10	SD/SF	568014	3131.5	568115	14806.22	74.8	5	0.02	0
			SD/DF	529646	1277.41	529729	2687.98	1.2	5	0.02	0
			DD/SF	585701	3435.92	585880	11548.54	0.6	5	0.03	0
			DD/DF	537879	1188.56	537879	1874.54	0	5	0	0
		15	SD/SF	614708	3057.19	616784	16900.1	29.2	3	0.02	0.33
			SD/DF	577212	1918.92	577254	2443.64	0.6	5	0.01	0
			DD/SF	628492	3541.32	628849	12816.18	1.4	5	0.06	0
			DD/DF	591815	1996.86	591973	4036.36	1	5	0.03	0
		20	SD/SF	682466	3390.65	684410	15922.5	8.2	4	0.01	0.3
			SD/DF	650370	1983.94	650370	2044.2	0	5	0	0
			DD/SF	682748	2558.45	682748	10393.67	0	5	0	0
			DD/DF	645725	1992.07	645733	2893.04	0.6	5	0	0
	200	5	SD/SF	735142	20138.61	901473	14634.13	0	3	0.03	14.51
			SD/DF	704896	4900.01	704917	5945.83	0.6	5	0	0
			DD/SF	718998	19023.6	867359	16335.47	1	3	0.08	13.4
			DD/DF	705781	5504.04	705795	4917.16	1.2	5	0	0
		10	SD/SF	846512	9256.79	1344574	14931.82	0	4	0	19.49
			SD/DF	795863	2824.94	795863	6859.36	0	5	0	0
			DD/SF	841799	19448.19	1803074	20018.02	0	1	0.08	46.44
			DD/DF	792567	3182.55	792984	11474.62	0.6	5	0.05	0
		15	SD/SF	910101	3644.35	3207190	21637.52	0	0	0.47	86.33
			SD/DF	865512	3319.28	888082	13575.42	1	4	0.03	2.3
			DD/SF	887673	26935.73	2481470	21637.06	0	0	0.13	62.27
			DD/DF	855284	3411.41	855959	10889.32	3.4	5	0.08	0
		20	SD/SF	998944	153739.08	3525962	21630.58	0	0	0.29	96.9
			SD/DF	923580	3830.06	986514	11133.59	0	4	0.02	5.01
			DD/SF	982033	204352.26	3162164	21636	0	0	0.28	87.27
			DD/DF	928737	2644.4	930237	15782.95	6	3	0.15	0.06

Table 79: Performances of the TP formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	175223	4.77	175296	17.8	6	5	0.04	0
			SD/DF	168797	2.96	168797	5.61	0	5	0	0
			DD/SF	166826	3.94	166826	6.36	0	5	0	0
			DD/DF	169377	3.07	169377	5.54	0	5	0	0
		10	SD/SF	213217	3.97	213232	14.62	3.8	5	0.01	0
			SD/DF	195540	2.53	195540	5.26	0	5	0	0
			DD/SF	199115	3.39	199116	6.33	0	5	0	0
			DD/DF	196472	2.56	196472	5.04	0	5	0	0
		15	SD/SF	232679	3.78	232679	7.67	0	5	0	0
			SD/DF	217500	2.35	217500	4.64	0	5	0	0
			DD/SF	222165	2.95	222165	5.13	0	5	0	0
			DD/DF	217120	2.29	217120	4.65	0	5	0	0
		20	SD/SF	258041	2.49	258041	7.96	0	5	0	0
			SD/DF	253839	1.88	253839	4.19	0	5	0	0
			DD/SF	249786	2.17	249786	4.16	0	5	0	0
			DD/DF	245279	1.95	245279	4.36	0	5	0	0
	100	5	SD/SF	255967	27.04	256259	58.79	8.4	5	0.11	0
			SD/DF	234854	9.03	234855	15.74	0	5	0	0
			DD/SF	242226	16.96	242367	41.45	3.2	5	0.06	0
			DD/DF	243091	12.47	243091	21.77	0	5	0	0
		10	SD/SF	289504	17.64	289608	47.31	4	5	0.04	0
			SD/DF	270400	9.51	270400	16.34	0	5	0	0
			DD/SF	280618	20.68	280635	24.77	0.6	5	0.01	0
			DD/DF	271455	12.63	271470	21.73	0.6	5	0.01	0
		15	SD/SF	321350	20.54	321461	53.14	7.4	5	0.03	0
			SD/DF	293950	12.26	293950	17.8	0	5	0	0
			DD/SF	317730	20.46	317730	24.64	0	5	0	0
			DD/DF	298589	8.06	298589	14.01	0	5	0	0
		20	SD/SF	348760	32.01	348828	66.46	3.4	5	0.02	0
			SD/DF	336504	9.07	336504	16.66	0	5	0	0
			DD/SF	356209	20.88	356235	37.16	1	5	0.01	0
			DD/DF	341631	9.59	341631	19.2	0	5	0	0
	200	5	SD/SF	376642	119.86	377068	255.39	4.8	5	0.11	0
			SD/DF	360584	57.91	360584	67.74	0	5	0	0
			DD/SF	377711	166.02	378131	204.59	3	5	0.11	0
			DD/DF	355264	61.1	355264	64.57	0	5	0	0
		10	SD/SF	413141	179.98	414113	466.08	14	5	0.24	0
			SD/DF	398632	108.92	398811	161.49	1.4	5	0.04	0
			DD/SF	416464	251.9	416944	341.36	3.6	5	0.12	0
			DD/DF	403828	118.79	403828	116.75	0	5	0	0
		15	SD/SF	448108	250.25	449053	501.03	20	5	0.21	0
			SD/DF	436965	117.84	436966	157.16	0	5	0	0
			DD/SF	442799	309.7	443242	425.16	4	5	0.1	0
			DD/DF	435864	97.66	436027	132.7	0.6	5	0.04	0
		20	SD/SF	505701	208.13	506278	361.46	33.6	5	0.12	0
			SD/DF	479198	118.2	479441	245.47	2.2	5	0.05	0
			DD/SF	507901	225.44	507914	244.92	2	5	0	0
			DD/DF	473368	104.4	473456	158.52	0.6	5	0.02	0

Table 80: Performances of the TP formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	351903	611.91	352095	2178.27	16.6	5	0.05	0
			SD/DF	316352	84.28	316360	144.38	0.6	5	0	0
			DD/SF	345446	298.3	345570	805.25	4	5	0.03	0
			DD/DF	318428	109.16	318428	137.21	0	5	0	0
		10	SD/SF	414461	310.32	414797	2498.93	18	5	0.08	0
			SD/DF	375958	82.11	375958	160.39	0	5	0	0
			DD/SF	391785	154.73	391861	443.44	1.6	5	0.02	0
			DD/DF	373710	77.18	373733	193.04	1	5	0.01	0
		15	SD/SF	450247	404	450270	1538	3.6	5	0	0
			SD/DF	422583	79.46	422631	183.15	0.6	5	0.01	0
			DD/SF	449307	228.68	449340	604.19	1.2	5	0.01	0
			DD/DF	426007	86.13	426066	216.44	0.6	5	0.01	0
		20	SD/SF	501619	271.16	501619	605.9	0	5	0	0
			SD/DF	474358	89.01	474358	135.16	0	5	0	0
			DD/SF	500931	215.4	500932	536.89	0.6	5	0	0
			DD/DF	470573	90.21	470574	187.96	0.4	5	0	0
	100	5	SD/SF	493598	2413.82	495175	10144.09	78.8	5	0.32	0
			SD/DF	474779	657.02	474805	1618.85	1.2	5	0.01	0
			DD/SF	495267	1578.71	495677	6770.65	9.8	5	0.08	0
			DD/DF	468290	490.1	468290	395.59	0	5	0	0
		10	SD/SF	567218	2240.33	568115	11924.42	174.2	5	0.16	0
			SD/DF	529552	533.8	529729	978.79	2.6	5	0.03	0
			DD/SF	585598	2093.44	585880	5278.12	5.6	5	0.05	0
			DD/DF	537879	461.92	537879	435.67	0	5	0	0
		15	SD/SF	614234	2358.63	614821	14485.73	273.8	5	0.1	0
			SD/DF	577053	467.65	577254	1432.54	1.6	5	0.03	0
			DD/SF	628327	1946.8	628849	5145.89	4.4	5	0.08	0
			DD/DF	591654	712.12	591973	1056.32	3.8	5	0.05	0
		20	SD/SF	682003	2197.06	682534	9732.05	61.2	5	0.08	0
			SD/DF	650235	777.35	650370	1122.62	1.8	5	0.02	0
			DD/SF	682590	2007.51	682748	3484.56	2.8	5	0.02	0
			DD/DF	645605	699.65	645733	773.29	2.4	5	0.02	0
	200	5	SD/SF	734801	6346.62	786179	18179.34	0.8	1	0.08	5.21
			SD/DF	704831	3423.35	704917	8352.24	2.8	5	0.01	0
			DD/SF	718028	8569.05	879803	15094.71	0	2	0.22	15.43
			DD/DF	705635	2426.41	705795	2480.61	1.2	5	0.02	0
		10	SD/SF	845855	3756.43	1344109	21620.16	0	0	0.08	34.08
			SD/DF	795649	1681.52	809339	8917.54	0.6	4	0.03	1.55
			DD/SF	840951	2914	1107850	18943.49	1	1	0.18	17.25
			DD/DF	792567	2032.63	792984	4395.7	2.2	5	0.05	0
		15	SD/SF	910101	2500.29	1683682	21618.06	0	0	0.47	45.74
			SD/DF	865123	2288.21	930478	14044.06	2.8	3	0.08	6.29
			DD/SF	885645	4340.63	1520664	21617.08	0.8	0	0.36	37.67
			DD/DF	854410	2773.9	855959	6525.63	6	5	0.18	0
		20	SD/SF	994791	4655.37	2146304	21615.94	0	0	0.71	53.61
			SD/DF	923212	3015.32	923775	6085.19	3	5	0.06	0
			DD/SF	978426	3762.73	1944148	21617.68	0	0	0.65	49.6
			DD/DF	927657	2308.92	930125	8654.3	13.2	5	0.26	0

Table 81: Performances of the MC formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	175223	1.58	175296	6.5	5	5	0.04	0
			SD/DF	168797	1.23	168797	1.63	0	5	0	0
			DD/SF	166826	1.43	166826	2.06	0	5	0	0
			DD/DF	169377	1.34	169377	1.76	0	5	0	0
		10	SD/SF	213217	1.38	213232	3.71	1.2	5	0.01	0
			SD/DF	195540	1.02	195540	1.44	0	5	0	0
			DD/SF	199115	1.32	199116	1.91	0	5	0	0
			DD/DF	196472	0.97	196472	1.53	0	5	0	0
		15	SD/SF	232679	1.05	232679	1.59	0	5	0	0
			SD/DF	217500	0.83	217500	1.28	0	5	0	0
			DD/SF	222165	1.01	222165	1.56	0	5	0	0
			DD/DF	217120	0.75	217120	1.31	0	5	0	0
		20	SD/SF	258041	0.7	258041	1.13	0	5	0	0
			SD/DF	253839	0.63	253839	1.02	0	5	0	0
			DD/SF	249786	0.67	249786	1.18	0	5	0	0
			DD/DF	245279	0.64	245279	1.1	0	5	0	0
	100	5	SD/SF	255967	6.01	256259	20.38	6.2	5	0.11	0
			SD/DF	234854	4.36	234855	5.2	0	5	0	0
			DD/SF	242226	4.74	242367	15.34	3.8	5	0.06	0
			DD/DF	243091	5.25	243091	7.17	0	5	0	0
		10	SD/SF	289504	6.37	289608	16.74	3	5	0.04	0
			SD/DF	270400	3.95	270400	5.19	0	5	0	0
			DD/SF	280618	7.6	280635	10.11	0.6	5	0.01	0
			DD/DF	271455	5.66	271470	8.55	0.6	5	0.01	0
		15	SD/SF	321350	6.41	321461	16.68	3.8	5	0.03	0
			SD/DF	293950	4.22	293950	5.24	0	5	0	0
			DD/SF	317730	7	317730	8.27	0	5	0	0
			DD/DF	298589	3.33	298589	4.3	0	5	0	0
		20	SD/SF	348760	7.71	348828	16.74	3	5	0.02	0
			SD/DF	336504	4	336504	4.77	0	5	0	0
			DD/SF	356209	6.94	356235	11.69	1	5	0.01	0
			DD/DF	341631	4.18	341631	5.57	0	5	0	0
	200	5	SD/SF	376642	68.02	377068	158.33	4.4	5	0.11	0
			SD/DF	360584	33.01	360584	44.66	0	5	0	0
			DD/SF	377711	75.7	378131	145.01	2.6	5	0.11	0
			DD/DF	355264	39.39	355264	51.21	0	5	0	0
		10	SD/SF	413141	61.46	414113	179.35	11.4	5	0.24	0
			SD/DF	398632	40.21	398811	65.2	1.4	5	0.04	0
			DD/SF	416464	67.99	416944	158.44	3.6	5	0.12	0
			DD/DF	403828	43.71	403828	58.41	0	5	0	0
		15	SD/SF	448108	74.21	449053	183.1	7.8	5	0.21	0
			SD/DF	436965	44.91	436966	65.45	0	5	0	0
			DD/SF	442799	73.38	443242	151.98	4.4	5	0.1	0
			DD/DF	435864	41.37	436027	62.54	0.6	5	0.04	0
		20	SD/SF	505701	61.81	506278	142.29	7.4	5	0.12	0
			SD/DF	479198	46.75	479441	95.11	2.2	5	0.05	0
			DD/SF	507901	61.78	507914	99.47	2.2	5	0	0
			DD/DF	473368	37.6	473456	61.24	0.6	5	0.02	0

Table 82: Performances of the MC formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	351903	73.76	352095	130.76	15.6	5	0.05	0
			SD/DF	316352	23.56	316360	28.71	0.6	5	0	0
			DD/SF	345446	51.65	345570	104.77	3.6	5	0.03	0
			DD/DF	318428	24.4	318428	29.08	0	5	0	0
		10	SD/SF	414461	79.52	414797	195.73	9.4	5	0.08	0
			SD/DF	375958	26.97	375958	32.52	0	5	0	0
			DD/SF	391785	59.92	391861	103.39	2.2	5	0.02	0
			DD/DF	373710	28.33	373733	50.17	1	5	0.01	0
		15	SD/SF	450247	111.59	450270	148.04	1.4	5	0	0
			SD/DF	422583	27.44	422631	44.28	0.6	5	0.01	0
			DD/SF	449307	81.88	449340	116.32	1.2	5	0.01	0
			DD/DF	426007	31.13	426066	52.56	0.6	5	0.01	0
		20	SD/SF	501619	67.32	501619	98.03	0	5	0	0
			SD/DF	474358	29.3	474358	42.32	0	5	0	0
			DD/SF	500931	66.92	500932	90.28	0	5	0	0
			DD/DF	470573	29.55	470574	47.79	0	5	0	0
	100	5	SD/SF	493598	389.27	495175	931.39	49.2	5	0.32	0
			SD/DF	474779	124.95	474805	174.08	1.2	5	0.01	0
			DD/SF	495267	263.65	495677	571.99	7	5	0.08	0
			DD/DF	468290	108.77	468290	132.04	0	5	0	0
		10	SD/SF	567218	334.04	568115	925.03	164.6	5	0.16	0
			SD/DF	529552	150.4	529729	178.49	2	5	0.03	0
			DD/SF	585598	304.2	585880	712.12	5.8	5	0.05	0
			DD/DF	537879	121.51	537879	164.44	0	5	0	0
		15	SD/SF	614234	402.78	614821	935.37	268.4	5	0.1	0
			SD/DF	577053	127.65	577254	204.6	1.8	5	0.03	0
			DD/SF	628327	365.66	628849	735.65	5.2	5	0.08	0
			DD/DF	591654	153.59	591973	269.81	3.8	5	0.05	0
		20	SD/SF	682003	361.77	682534	1219.16	39	5	0.08	0
			SD/DF	650235	158.19	650370	263.01	1.8	5	0.02	0
			DD/SF	682590	317.72	682748	621.28	3.8	5	0.02	0
			DD/DF	645605	148.77	645733	226.92	2.4	5	0.02	0
	200	5	SD/SF	734801	1299.75	735354	2553.9	4.4	5	0.08	0
			SD/DF	704831	443.83	704917	838.33	2.4	5	0.01	0
			DD/SF	718028	1649.6	719550	3370.63	13.8	5	0.22	0
			DD/DF	705635	500.36	705795	659.02	1.2	5	0.02	0
		10	SD/SF	845855	1686.26	846512	2900.54	8.4	5	0.08	0
			SD/DF	795649	591.23	795863	909.19	1.6	5	0.03	0
			DD/SF	840951	1245.73	842502	2974.52	15.8	5	0.18	0
			DD/DF	792567	606.76	792984	1003.46	2.2	5	0.05	0
		15	SD/SF	910101	1337.76	914464	6990.25	72.2	5	0.47	0
			SD/DF	865123	643.46	865786	1100.47	5.6	5	0.08	0
			DD/SF	885645	1439.55	888865	8186.74	22.6	5	0.36	0
			DD/DF	854410	756.69	855959	1504.03	6.6	5	0.18	0
		20	SD/SF	994791	1621.17	1001897	10370.12	99.8	5	0.71	0
			SD/DF	923212	876.97	923775	1423.64	3	5	0.06	0
			DD/SF	978426	1537.84	984799	8398.36	54.6	5	0.65	0
			DD/DF	927657	1237.73	930125	2704.88	14.2	5	0.26	0

Table 83: Performances of the ME formulation for the unbalanced network - $|T| = 15$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	175223	2.61	175296	8.6	4.2	5	0.04	0
			SD/DF	168797	2.09	168797	3.59	0	5	0	0
			DD/SF	166826	2.84	166826	4.32	0	5	0	0
			DD/DF	169377	2.24	169377	3.67	0	5	0	0
		10	SD/SF	213217	2.58	213232	5.06	1.6	5	0.01	0
			SD/DF	195540	2.42	195540	2.88	0	5	0	0
			DD/SF	199115	2.48	199116	3.73	0	5	0	0
			DD/DF	196472	2.21	196472	3.09	0	5	0	0
		15	SD/SF	232679	1.86	232679	3.21	0	5	0	0
			SD/DF	217500	2	217500	2.69	0	5	0	0
			DD/SF	222165	2.02	222165	3.15	0	5	0	0
			DD/DF	217120	2.02	217120	2.64	0	5	0	0
		20	SD/SF	258041	2.35	258041	2.44	0	5	0	0
			SD/DF	253839	2.24	253839	2.45	0	5	0	0
			DD/SF	249786	1.71	249786	2.46	0	5	0	0
			DD/DF	245279	2.1	245279	2.51	0	5	0	0
	100	5	SD/SF	255967	15.6	256259	29.44	6.2	5	0.11	0
			SD/DF	234854	8.02	234855	12.34	0	5	0	0
			DD/SF	242226	12.23	242367	24.56	3.6	5	0.06	0
			DD/DF	243091	12.17	243091	12.4	0	5	0	0
		10	SD/SF	289504	16.3	289608	26.33	3	5	0.04	0
			SD/DF	270400	8.4	270400	12.45	0	5	0	0
			DD/SF	280618	17.52	280635	18.73	0.6	5	0.01	0
			DD/DF	271455	10.16	271470	14.73	0.6	5	0.01	0
		15	SD/SF	321350	14.3	321461	29.65	3.8	5	0.03	0
			SD/DF	293950	11.76	293950	13.79	0	5	0	0
			DD/SF	317730	15.85	317730	18.65	0	5	0	0
			DD/DF	298589	5.71	298589	10.68	0	5	0	0
		20	SD/SF	348760	14.37	348828	26.47	3	5	0.02	0
			SD/DF	336504	8.46	336504	12.79	0	5	0	0
			DD/SF	356209	15.26	356235	24.7	1	5	0.01	0
			DD/DF	341631	10.08	341631	13.85	0	5	0	0
	200	5	SD/SF	376642	98.74	377068	140.6	4	5	0.11	0
			SD/DF	360584	39.96	360584	54.27	0	5	0	0
			DD/SF	377711	124.05	378131	166.2	3	5	0.11	0
			DD/DF	355264	45.76	355264	62	0	5	0	0
		10	SD/SF	413141	105.87	414113	185.22	11	5	0.24	0
			SD/DF	398632	99.97	398811	87.44	1.4	5	0.04	0
			DD/SF	416464	141.12	416944	160.66	3.6	5	0.12	0
			DD/DF	403828	46.27	403828	68.78	0	5	0	0
		15	SD/SF	448108	130.1	449053	211.02	8.2	5	0.21	0
			SD/DF	436965	87.85	436966	84.21	0	5	0	0
			DD/SF	442799	302.25	443242	200.76	3.6	5	0.1	0
			DD/DF	435864	61.87	436027	70.34	0.6	5	0.04	0
		20	SD/SF	505701	113.02	506278	151.55	7.4	5	0.12	0
			SD/DF	479198	100.25	479441	110.6	2.2	5	0.05	0
			DD/SF	507901	161.92	507914	122.96	2.2	5	0	0
			DD/DF	473368	80.01	473456	81.58	0.8	5	0.02	0

Table 84: Performances of the ME formulation for the unbalanced network - $|T| = 30$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	MIP-cost	MIP-CPU	Nodes	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	351903	112	352095	135.52	15.8	5	0.05	0
			SD/DF	316352	37.22	316360	35.87	0.6	5	0	0
			DD/SF	345446	113.29	345570	119.66	4.4	5	0.03	0
			DD/DF	318428	32.15	318428	40.52	0	5	0	0
		10	SD/SF	414461	154.93	414797	219.57	11.8	5	0.08	0
			SD/DF	375958	53.85	375958	42.71	0	5	0	0
			DD/SF	391785	112.55	391861	103.33	1.4	5	0.02	0
			DD/DF	373710	41.42	373733	52.51	1	5	0.01	0
		15	SD/SF	450247	145.6	450270	153.16	1	5	0	0
			SD/DF	422583	46.22	422631	54.66	0.6	5	0.01	0
			DD/SF	449307	112.34	449340	141.59	1.2	5	0.01	0
			DD/DF	426007	50.78	426066	66.3	0.6	5	0.01	0
		20	SD/SF	501619	64.38	501619	99.97	0	5	0	0
			SD/DF	474358	46.85	474358	56.34	0	5	0	0
			DD/SF	500931	71.46	500932	120.27	0	5	0	0
			DD/DF	470573	45.01	470574	60.02	0	5	0	0
	100	5	SD/SF	493598	621.08	495175	1036.79	47.2	5	0.32	0
			SD/DF	474779	267.21	474805	220.55	1.2	5	0.01	0
			DD/SF	495267	844.18	495677	562.81	9.8	5	0.08	0
			DD/DF	468290	202.41	468290	148.44	0	5	0	0
		10	SD/SF	567218	762.1	568115	914.01	154.2	5	0.16	0
			SD/DF	529552	290.78	529729	265.48	2.4	5	0.03	0
			DD/SF	585598	763.63	585880	925.24	5.8	5	0.05	0
			DD/DF	537879	223.3	537879	168.05	0	5	0	0
		15	SD/SF	614234	870.42	614821	1181.08	266.8	5	0.1	0
			SD/DF	577053	308.11	577254	268.57	1.6	5	0.03	0
			DD/SF	628327	1220.18	628849	804.78	3.8	5	0.08	0
			DD/DF	591654	294.42	591973	368.28	3.8	5	0.05	0
		20	SD/SF	682003	739.13	682534	918.83	31.6	5	0.08	0
			SD/DF	650235	318.75	650370	295.81	1.8	5	0.02	0
			DD/SF	682590	1092.25	682748	686	2.8	5	0.02	0
			DD/DF	645605	311.08	645733	328.1	2.8	5	0.02	0
	200	5	SD/SF	734801	1862.1	735354	1874.49	4	5	0.08	0
			SD/DF	704831	865.93	704917	907.52	2.4	5	0.01	0
			DD/SF	718028	2038.35	719550	2562.22	13.4	5	0.22	0
			DD/DF	705635	973.73	705795	586.45	1.2	5	0.02	0
		10	SD/SF	845855	3032.39	846512	2773.45	7.8	5	0.08	0
			SD/DF	795649	1409.47	795863	1013.96	1.6	5	0.03	0
			DD/SF	840951	3182.97	842502	4263.45	16.8	5	0.18	0
			DD/DF	792567	1595.58	792984	1124.26	2.2	5	0.05	0
		15	SD/SF	910101	3756.31	914464	7451.18	76.6	5	0.47	0
			SD/DF	865123	1626.62	865786	1639.32	5.6	5	0.08	0
			DD/SF	885645	2619.32	888865	6945.78	22.2	5	0.36	0
			DD/DF	854410	1906.39	855959	1554.39	7.4	5	0.18	0
		20	SD/SF	994791	4456.04	1001897	12669.78	92.4	4	0.71	0.03
			SD/DF	923212	2354.77	923775	1581.91	3	5	0.06	0
			DD/SF	978426	3998.35	984799	10799.74	54.4	5	0.65	0
			DD/DF	927657	1687.81	930125	2516.44	13	5	0.26	0

Appendix B Capacitated instances

B.1 Balanced network results

Table 85: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	0.4	5	408252	936.22	15725	5	5	4.97	0
			SD/DF	361628	0.27	5	384830	120.16	5726	5	5	6.03	0
			DD/SF	349333	0.31	5	368246	629.93	26592	5	5	5.13	0
			DD/DF	368328	0.24	5	390547	216.45	12884.4	5	5	5.69	0
		10	SD/SF	479084	0.68	5	501630	1206.39	36513.8	5	5	4.49	0
			SD/DF	414544	0.43	5	436560	122.93	4032.6	5	5	5.04	0
			DD/SF	419849	0.49	5	439303	1626.64	84923.6	5	5	4.41	0
			DD/DF	410023	0.46	5	432364	314.89	17398.4	5	5	5.17	0
		15	SD/SF	495921	0.58	5	516655	902.04	40336	5	5	4.01	0
			SD/DF	440413	0.31	5	460921	1398.81	100232.4	5	5	4.45	0
			DD/SF	453359	0.35	5	471519	500.85	22355.6	5	5	3.85	0
			DD/DF	449853	0.28	5	470099	175.12	8641.8	5	5	4.31	0
		20	SD/SF	535047	0.45	5	453050	8975	1028576.6	4	4	3.74	0
			SD/DF	487655	0.25	5	507784	152.11	11041.8	5	5	3.97	0
			DD/SF	514708	0.44	5	534941	674.1	44570.4	5	5	3.77	0
			DD/DF	488902	0.47	5	509078	495.96	39906.8	5	5	3.96	0
	100	5	SD/SF	460969	1.17	5	485827	4683.06	41937	5	5	5.11	0
			SD/DF	407148	0.59	5	432461	1316.03	44344.6	5	5	5.84	0
			DD/SF	422143	0.94	5	447600	7060.56	140580.6	5	5	5.7	0
			DD/DF	409943	0.55	5	435245	1311.77	25344.2	5	5	5.81	0
		10	SD/SF	512747	1.26	5	535934	14435.07	236109.2	4	5	4.33	0.01
			SD/DF	467904	0.55	5	493453	2218.79	64550	5	5	5.18	0
			DD/SF	470979	0.83	5	492009	6571.45	207130.6	5	5	4.27	0
			DD/DF	457395	0.56	5	481111	2784.43	65067.4	5	5	4.93	0
		15	SD/SF	565625	1.03	5	587466	16523.93	371016.6	3	5	3.71	0.02
			SD/DF	498854	0.51	5	521972	2513.16	74136.8	5	5	4.43	0
			DD/SF	547684	0.66	5	569155	10875.53	380150.2	4	5	3.76	0.01
			DD/DF	510296	0.52	5	534317	6646.06	289831.4	4	5	4.49	0.01
		20	SD/SF	597545	1.04	5	617794	14148.14	329860.6	3	5	3.26	0.02
			SD/DF	546831	0.48	5	569783	6040.55	250551.4	5	5	4.02	0
			DD/SF	608284	0.66	5	631160	20740.06	559773.6	1	5	3.61	0.09
			DD/DF	558910	0.55	5	581848	2762.72	115792.4	5	5	3.94	0
	200	5	SD/SF	527237	2.97	5	454588	10416.22	65854.4	3	4	5.83	0.01
			SD/DF	488763	1.43	5	524643	10241.88	155719.6	4	5	6.83	0.13
			DD/SF	529019	2.58	5	566656	21601.34	224198.6	0	5	6.64	0.29
			DD/DF	480192	1.5	5	518848	11368.65	224908.2	4	5	7.45	0.05
		10	SD/SF	586194	3.48	5	612861	19430.78	106741.2	1	5	4.34	0.18
			SD/DF	553291	1.37	5	234295	8640.04	169159.2	0	2	5.75	0.16
			DD/SF	583419	2.32	5	498282	15717.74	143269.4	1	4	4.64	0.24
			DD/DF	557040	1.37	5	117511	4320.02	115461.6	0	1	5.71	0.04
		15	SD/SF	647525	3.31	5	672865	21601.36	58830.8	0	5	3.73	0.84
			SD/DF	612255	1.23	5	-	-	-	0	0	4.62	-
			DD/SF	628255	1.91	5	529063	17280.54	119836.2	0	4	4.1	0.36
			DD/DF	610057	1.14	5	127054	4320.06	139462.8	0	1	4.76	0.04
		20	SD/SF	733898	2.87	5	300682	8640.06	83346.4	0	2	3.26	0.1
			SD/DF	666327	1.41	5	280242	8640.16	103818.2	0	2	4.2	0.11
			DD/SF	744819	2.1	5	295178	8640.84	78001.6	0	2	3.57	0.12
			DD/DF	662195	1.53	5	141782	4320.06	126183.8	0	1	4.48	0.07

Table 86: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	811225	8.8	5	821914	21600.02	29543.8	0	5	1.18	1.15
			SD/DF	714064	2.24	5	727208	21270.42	378981.4	1	5	1.8	0.21
			DD/SF	788831	4.64	5	798660	21600.1	55501.8	0	5	1.24	0.94
			DD/DF	702879	2.26	5	714963	19238.62	350391.8	1	5	1.69	0.14
		10	SD/SF	899923	8.99	5	907945	21600.18	51461	0	5	0.78	0.79
			SD/DF	783073	2.47	5	792954	21600.04	322868	0	5	1.24	0.26
			DD/SF	812067	4.56	5	820350	21600.24	86585.4	0	5	0.96	0.75
			DD/DF	787188	2.5	5	795916	21600.06	382351.2	0	5	1.05	0.25
		15	SD/SF	937874	11.51	5	943814	21600.2	58953.2	0	5	0.57	0.54
			SD/DF	840398	2.75	5	847971	21600.1	184680.8	0	5	0.88	0.21
			DD/SF	884927	5.24	5	891929	21600.28	88847.6	0	5	0.77	0.54
			DD/DF	854742	2.34	5	863213	21600.32	361121.8	0	5	0.96	0.17
		20	SD/SF	1052197	12.79	5	1057354	21600.28	83978	0	5	0.43	0.4
			SD/DF	899250	2.87	5	905643	21600.08	318236.2	0	5	0.69	0.14
			DD/SF	975410	5.55	5	982334	21600.7	129594.8	0	5	0.67	0.45
			DD/DF	897694	2.75	5	904760	21600.1	284288.8	0	5	0.77	0.18
	100	5	SD/SF	881217	23.36	5	905604	21600.1	6958.6	0	5	2.47	2.41
			SD/DF	816306	6.43	5	842114	21600.1	60882.6	0	5	3.02	1.12
			DD/SF	871172	13.8	5	897424	21600.1	13025.8	0	5	2.75	2.51
			DD/DF	812894	5.47	5	843404	21600.12	33415.4	0	5	3.57	1.47
		10	SD/SF	995699	27.43	5	1012396	21600.1	9119.4	0	5	1.57	1.57
			SD/DF	899727	6.74	5	920626	21600.1	62649.6	0	5	2.23	1.1
			DD/SF	1017288	13.2	5	1036744	21600.12	15219.4	0	5	1.77	1.67
			DD/DF	906375	6.01	5	928404	21600.12	61653.8	0	5	2.34	0.96
		15	SD/SF	1054450	19.85	5	1068547	21600.1	12770.8	0	5	1.17	1.27
			SD/DF	966741	6.26	5	984757	21600.1	54271.8	0	5	1.72	0.83
			DD/SF	1063308	10.68	5	1078504	21600.1	20759.8	0	5	1.39	1.26
			DD/DF	981770	4.2	5	997939	21600.12	90748.2	0	5	1.56	0.74
		20	SD/SF	1159562	22.54	5	1172663	21600.1	14219.8	0	5	1.01	1.07
			SD/DF	1046812	7.54	5	1063700	21600.12	55561	0	5	1.53	0.59
			DD/SF	1143120	10.82	5	1159022	21600.1	22859.8	0	5	1.18	1.24
			DD/DF	1054040	6.27	5	1071190	21600.12	39276.6	0	5	1.52	0.73
	200	5	SD/SF	1041384	89.2	5	1088872	21600.16	2535.8	0	5	3.62	3.89
			SD/DF	966572	32.21	5	1022824	21600.16	10940	0	5	5.39	3.96
			DD/SF	971953	63.73	5	1034305	21600.1	5005.8	0	5	5.07	5.57
			DD/DF	960637	27.39	5	1024764	21600.3	10255.2	0	5	5.97	4.33
		10	SD/SF	1210974	87.11	5	1268142	21600.16	3927.8	0	5	3.85	4.46
			SD/DF	1096270	27.61	5	1153330	21600.14	8839.6	0	5	4.57	4.17
			DD/SF	1196990	31.61	5	1260530	21600.12	4477.4	0	5	3.79	4.87
			DD/DF	1096514	21.42	5	1150498	21600.2	10524.4	0	5	4.49	3.8
		15	SD/SF	1313816	58.23	5	1367630	21600.16	3786	0	5	2.75	3.89
			SD/DF	1207378	23.05	5	1255584	21600.14	9663.4	0	5	3.53	3.21
			DD/SF	1269970	37.93	5	1320646	21600.2	4074.4	0	5	3.19	3.63
			DD/DF	1205372	18.06	5	1251280	21600.22	11587.4	0	5	3.32	3.01
		20	SD/SF	1413930	37.31	5	1452808	21600.16	3466	0	5	2.33	2.63
			SD/DF	1271276	14.6	5	1318312	21600.14	11545.6	0	5	3.31	3.01
			DD/SF	1370302	38.2	5	1416688	21600.16	7560.4	0	5	2.72	3.14
			DD/DF	1277360	18.25	5	1319886	21600.26	12576.4	0	5	2.98	2.46

Table 87: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	0.99	5	408252	468.76	5014.4	5	5	4.97	0
			SD/DF	361628	0.57	5	384830	188.52	3108.8	5	5	6.03	0
			DD/SF	349333	1.16	5	368246	820.55	11713.2	5	5	5.13	0
			DD/DF	368328	0.68	5	390547	352.83	7922.6	5	5	5.69	0
		10	SD/SF	479084	1.27	5	501630	1746.42	28855	5	5	4.49	0
			SD/DF	414544	0.56	5	436560	80.67	1468	5	5	5.04	0
			DD/SF	419849	0.71	5	439303	2153.45	52328.8	5	5	4.41	0
			DD/DF	410023	0.36	5	432364	450.11	12044.4	5	5	5.17	0
		15	SD/SF	495921	0.77	5	516655	1218.37	30431.2	5	5	4.01	0
			SD/DF	440413	0.56	5	460921	767.81	20576.2	5	5	4.45	0
			DD/SF	453359	1.1	5	471519	537.94	10700	5	5	3.85	0
			DD/DF	449853	0.84	5	470099	250.19	5959	5	5	4.31	0
		20	SD/SF	535047	1.93	5	555883	17312.08	509009.6	2	5	3.74	0.02
			SD/DF	487655	1.15	5	507784	257.11	7182.6	5	5	3.97	0
			DD/SF	514708	0.92	5	534941	1107.98	34663.2	5	5	3.77	0
			DD/DF	488902	0.59	5	509078	740.61	24536	5	5	3.96	0
	100	5	SD/SF	460969	2.54	5	485827	6415.7	24039.2	5	5	5.11	0
			SD/DF	407148	0.95	5	432461	1090.35	5362.2	5	5	5.84	0
			DD/SF	422143	2.31	5	447600	13279.1	36641.4	4	5	5.7	0.17
			DD/DF	409943	0.91	5	435245	2202.06	12580.8	5	5	5.81	0
		10	SD/SF	512747	2.63	5	535933	16876.54	53852.6	3	5	4.33	0.02
			SD/DF	467904	1.13	5	493453	3593.39	15350.6	5	5	5.18	0
			DD/SF	470979	1.81	5	492009	15414.46	60166.6	4	5	4.27	0
			DD/DF	457395	1.03	5	481111	4699.98	34270.6	5	5	4.93	0
		15	SD/SF	565625	2.35	5	587465	14820.92	87402	3	5	3.71	0.01
			SD/DF	498854	1.2	5	521972	2233.65	18060.2	5	5	4.43	0
			DD/SF	547684	1.65	5	569157	8540.96	42316.2	4	5	3.76	0.01
			DD/DF	510296	1.03	5	534317	6293.98	69443	4	5	4.49	0.01
		20	SD/SF	597545	2.46	5	617801	18187.04	127210.8	2	5	3.26	0.01
			SD/DF	546831	1.21	5	569783	5731.62	53846.6	5	5	4.02	0
			DD/SF	608284	1.58	5	631197	21600	138491.8	0	5	3.61	0.07
			DD/DF	558910	1.01	5	581848	3072.97	34628.6	5	5	3.94	0
	200	5	SD/SF	527237	7.54	5	559932	19388.48	26222.4	2	5	5.83	0.28
			SD/DF	488763	2.5	5	524643	16770.68	43791.6	2	5	6.83	0.4
			DD/SF	529019	5.15	5	567010	21600.5	19582.8	0	5	6.64	0.87
			DD/DF	480192	2.49	5	518848	15252.59	47775.8	2	5	7.45	0.25
		10	SD/SF	586194	8.73	5	612883	19369.16	26067.6	1	5	4.34	0.3
			SD/DF	553291	2.86	5	587116	21600.08	35194	0	5	5.75	0.7
			DD/SF	583419	5.79	5	612396	20426.98	23273	1	5	4.64	0.69
			DD/DF	557040	2.61	5	591207	21600.3	29698.2	0	5	5.71	0.77
		15	SD/SF	647525	7.18	5	673329	21600.16	13355.4	0	5	3.73	0.62
			SD/DF	612255	2.7	5	642045	21245.8	39056.6	1	5	4.62	0.33
			DD/SF	628255	5.63	5	655351	21600.18	25021.2	0	5	4.1	0.54
			DD/DF	610057	2.66	5	640594	21600.08	49700.8	0	5	4.76	0.32
		20	SD/SF	733898	7.07	5	759187	21600.02	22281.8	0	5	3.26	0.44
			SD/DF	666327	3.19	5	695574	18286.73	69860	1	5	4.2	0.19
			DD/SF	744819	5.56	5	772546	21600.04	43010.6	0	5	3.57	0.23
			DD/DF	662195	2.9	5	693297	21600.3	114974.8	0	5	4.48	0.15

Table 88: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	811225	9.82	5	821577	21600.42	22895.4	0	5	1.18	1.08
			SD/DF	714064	3.07	5	727179	21600.1	92287.2	0	5	1.8	0.27
			DD/SF	788831	4.46	5	799975	21600.06	32204.2	0	5	1.24	1.05
			DD/DF	702879	2.18	5	714948	20453.66	76904.2	1	5	1.69	0.2
		10	SD/SF	899923	12.91	5	908379	21600.08	18677.4	0	5	0.78	0.84
			SD/DF	783073	4.39	5	793373	21600.06	36943	0	5	1.24	0.42
			DD/SF	812067	6.6	5	821025	21600.04	25755	0	5	0.96	0.89
			DD/DF	787188	3.37	5	795779	21600.02	47335.4	0	5	1.05	0.32
		15	SD/SF	937874	15.68	5	945082	21600.04	21621.6	0	5	0.57	0.7
			SD/DF	840398	5.07	5	847973	21600.06	54006.8	0	5	0.88	0.23
			DD/SF	884927	10.47	5	892729	21600.08	34250	0	5	0.77	0.67
			DD/DF	854742	4.19	5	863209	21600.06	62161.8	0	5	0.96	0.22
		20	SD/SF	1052197	19.61	5	1058147	21600.08	24357.2	0	5	0.43	0.51
			SD/DF	899250	5.85	5	905835	21600.02	49934.2	0	5	0.69	0.2
			DD/SF	975410	11.38	5	983092	21600.06	35519.4	0	5	0.67	0.59
			DD/DF	897694	6.72	5	904971	21600.04	84000.6	0	5	0.77	0.23
	100	5	SD/SF	881217	23.57	5	909343	21600.06	4002.2	0	5	2.47	2.85
			SD/DF	816306	6.39	5	843066	21600.04	7743	0	5	3.02	1.91
			DD/SF	871172	11.56	5	897629	21600.08	5217.2	0	5	2.75	2.4
			DD/DF	812894	4.84	5	843902	21600.06	7718	0	5	3.57	1.59
		10	SD/SF	995699	25.42	5	1017810	21600.12	7679	0	5	1.57	2.07
			SD/DF	899727	8.09	5	921315	21600.1	11568.2	0	5	2.23	1.44
			DD/SF	1017288	14.24	5	1038693	21600.1	8940.6	0	5	1.77	1.79
			DD/DF	906375	4.77	5	929107	21600.1	13626.4	0	5	2.34	1.2
		15	SD/SF	1054450	31.59	5	1067913	21600.1	11202.2	0	5	1.17	1.17
			SD/DF	966741	9.56	5	985117	21600.1	14873.6	0	5	1.72	1.02
			DD/SF	1063308	16.65	5	1079958	21600.1	11830.8	0	5	1.39	1.32
			DD/DF	981770	4.89	5	998721	21600.1	11596.4	0	5	1.56	1.01
		20	SD/SF	1159562	41.81	5	1173946	21600.08	11526.6	0	5	1.01	1.14
			SD/DF	1046812	14.49	5	1064174	21600.1	15275	0	5	1.53	0.93
			DD/SF	1143120	20.26	5	1159618	21600.12	10419.4	0	5	1.18	1.24
			DD/DF	1054040	6.97	5	1071364	21600.12	9953.4	0	5	1.52	1.05
	200	5	SD/SF	1041384	104.56	5	1090732	21600.14	1856.4	0	5	3.62	4.04
			SD/DF	966572	20.96	5	1028506	21600.12	2075.8	0	5	5.39	4.66
			DD/SF	971953	47.2	5	1030919	21600.16	3137.6	0	5	5.07	4.96
			DD/DF	960637	13.53	5	1031772	21600.12	2124.4	0	5	5.97	4.63
		10	SD/SF	1210974	83.5	5	1272190	21600.16	1186.2	0	5	3.85	4.69
			SD/DF	1096270	32.63	5	1170666	21600.22	1251.4	0	5	4.57	5.39
			DD/SF	1196990	50.08	5	1271712	21600.16	1500.6	0	5	3.79	5.53
			DD/DF	1096514	19.58	5	1172470	21600.16	1367.4	0	5	4.49	5.3
		15	SD/SF	1313816	115.16	5	1373124	21606.26	957.2	0	5	2.75	4.19
			SD/DF	1207378	26.21	5	1268516	21600.14	2637.8	0	5	3.53	3.96
			DD/SF	1269970	59.52	5	1327926	21600.2	1881.2	0	5	3.19	3.99
			DD/DF	1205372	20.9	5	1262102	21600.18	2874	0	5	3.32	3.58
		20	SD/SF	1413930	118.94	5	1473186	21600.2	1889.2	0	5	2.33	3.92
			SD/DF	1271276	27.05	5	1329164	21600.18	2757.6	0	5	3.31	3.62
			DD/SF	1370302	40.66	5	1422518	21600.24	2631.6	0	5	2.72	3.41
			DD/DF	1277360	15.6	5	1325088	21600.16	2832	0	5	2.98	2.83

Table 89: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	0.85	5	408252	439.25	5657.6	5	5	4.97	0
			SD/DF	361625	0.38	5	384830	87.11	1883	5	5	6.03	0
			DD/SF	349333	0.58	5	368246	773.47	11430.2	5	5	5.13	0
			DD/DF	368328	0.24	5	390547	209.02	4804.4	5	5	5.69	0
		10	SD/SF	479084	0.48	5	501630	1378.26	29750.6	5	5	4.49	0
			SD/DF	414535	0.23	5	436560	37.48	908.4	5	5	5.04	0
			DD/SF	419849	0.35	5	439303	1046.68	28100.2	5	5	4.41	0
			DD/DF	410017	0.23	5	432364	224.18	6530.2	5	5	5.17	0
		15	SD/SF	495921	0.64	5	516655	1080.4	36023.8	5	5	4.01	0
			SD/DF	440390	0.48	5	460921	324.47	13001	5	5	4.46	0
			DD/SF	453359	0.68	5	471519	307.85	9192.2	5	5	3.85	0
			DD/DF	449841	0.48	5	470099	83.74	3147.8	5	5	4.31	0
		20	SD/SF	535047	0.88	5	338089	5775.69	286124.2	3	3	3.74	0
			SD/DF	487653	0.25	5	507784	104.03	4284.4	5	5	3.97	0
			DD/SF	514708	0.38	5	534941	799.5	25414.8	5	5	3.77	0
			DD/DF	488901	0.28	5	509078	312.22	12652.2	5	5	3.96	0
	100	5	SD/SF	460969	1.69	5	485827	6639.09	28719.6	5	5	5.11	0
			SD/DF	407138	0.63	5	432461	417.84	3038.2	5	5	5.85	0
			DD/SF	422143	1.23	5	447600	11227.17	57302.6	4	5	5.7	0.03
			DD/DF	409913	0.61	5	435245	886.26	7973.6	5	5	5.82	0
		10	SD/SF	512747	1.46	5	535933	12678.56	94786	5	5	4.33	0
			SD/DF	467864	0.69	5	493453	1132.96	9125.6	5	5	5.19	0
			DD/SF	470979	1.02	5	492009	7343.05	51184.6	5	5	4.27	0
			DD/DF	457373	0.77	5	481111	1049.22	12536.8	5	5	4.93	0
		15	SD/SF	565625	1.28	5	587465	13645.68	142922.4	3	5	3.71	0.01
			SD/DF	498835	0.92	5	521972	448.49	7760.6	5	5	4.43	0
			DD/SF	547684	0.91	5	569155	5163.65	67999.2	5	5	3.76	0
			DD/DF	510278	0.88	5	534317	2886.93	77263	5	5	4.5	0
		20	SD/SF	597545	1.28	5	483509	11382.01	126473.6	3	4	3.26	0
			SD/DF	546809	0.84	5	569783	1022.67	16431.6	5	5	4.03	0
			DD/SF	608284	0.83	5	631145	17113.67	226246.4	2	5	3.61	0.02
			DD/DF	558882	0.68	5	581848	521.33	13491.6	5	5	3.95	0
	200	5	SD/SF	527237	6.86	5	560138	20740.9	27238.8	1	5	5.83	0.58
			SD/DF	488754	2.27	5	524647	18118.76	21596.2	2	5	6.83	0.34
			DD/SF	529019	4.69	5	567180	21600	44417.6	0	5	6.64	0.83
			DD/DF	480151	2.18	5	518848	16402.43	35407.4	2	5	7.46	0.24
		10	SD/SF	586194	7.25	5	613115	21600.02	7808	0	5	4.34	0.69
			SD/DF	553238	2.01	5	587113	21600	24043.2	0	5	5.75	0.49
			DD/SF	583419	3.63	5	612528	21600	18362	0	5	4.64	0.76
			DD/DF	556996	1.76	5	591154	21050.82	29750.6	1	5	5.72	0.61
		15	SD/SF	647525	6.91	5	672903	21600.04	10906.8	0	5	3.73	0.64
			SD/DF	612206	2.09	5	641949	19294.7	54043.2	1	5	4.62	0.16
			DD/SF	628255	3.47	5	656124	21600.12	15864.2	0	5	4.1	0.94
			DD/DF	610008	2.1	5	513153	11913.04	60311	2	4	4.77	0.13
		20	SD/SF	733898	5.58	5	758729	21600.14	37389.6	0	5	3.26	0.28
			SD/DF	666271	2.3	5	558901	5836.45	51157.6	4	4	4.21	0
			DD/SF	744819	3.3	5	616226	17280.54	54831.4	0	4	3.57	0.23
			DD/DF	662145	2.36	5	551530	14841.08	125716.2	1	4	4.49	0.02

Table 90: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
			SD/SF	811225	1.55	5	822995	21600.08	12145	0	5	1.18	1.28
		5	SD/DF	714015	0.52	5	727429	21600	46704	0	5	1.81	0.31
			DD/SF	788831	0.88	5	800168	21600.04	27108.2	0	5	1.24	1.09
			DD/DF	702847	0.58	5	715016	18631.02	44627.2	2	5	1.69	0.19
			SD/SF	899923	1.87	5	908984	21600.06	15329.2	0	5	0.78	0.9
		10	SD/DF	783017	0.94	5	793218	21600.06	80693.6	0	5	1.25	0.25
			DD/SF	812067	1.25	5	820615	21600.28	24849.6	0	5	0.96	0.78
	50		DD/DF	787158	0.87	5	795717	21600.16	102452.8	0	5	1.06	0.16
			SD/SF	937874	2.92	5	943832	21600.14	24340	0	5	0.57	0.55
		15	SD/DF	840369	1.12	5	331059	8640.02	50654	0	2	0.89	0.02
			DD/SF	884927	1.81	5	893286	21600.16	27477.6	0	5	0.77	0.7
			DD/DF	854721	1.16	5	688579	17280.14	67950	0	4	0.96	0.09
			SD/SF	1052197	4.29	5	1058848	21600.44	19495.2	0	5	0.43	0.55
		20	SD/DF	899227	1.58	5	537040	12960.28	48240	0	3	0.69	0.06
			DD/SF	975410	2.26	5	805916	17280.14	38925	0	4	0.67	0.35
			DD/DF	897670	1.43	5	534649	12960.04	53585.2	0	3	0.78	0.07
			SD/SF	881217	7.48	5	907647	21600.08	5309.2	0	5	2.47	2.63
		5	SD/DF	816242	1.42	5	843107	21600.08	9188.6	0	5	3.03	1.65
			DD/SF	871172	3.4	5	899926	21600.06	5329.4	0	5	2.75	2.73
			DD/DF	812841	1.42	5	845248	21600.06	7420.8	0	5	3.58	1.49
			SD/SF	995699	6.6	5	1018132	21600.12	5746.4	0	5	1.57	2.09
		10	SD/DF	899622	2.18	5	921725	21600.06	15094.2	0	5	2.24	1.19
30			DD/SF	1017288	3.62	5	1041284	21600.42	9353.4	0	5	1.77	2.01
	100		DD/DF	906318	2.01	5	928849	21600.04	14777.6	0	5	2.34	0.89
			SD/SF	1054450	9.11	5	1070974	21600.04	8356.2	0	5	1.17	1.45
		15	SD/DF	966685	2.86	5	984649	21600.02	13639.8	0	5	1.73	0.78
			DD/SF	1063308	5.17	5	1084106	21600.04	10259.4	0	5	1.39	1.66
			DD/DF	981676	2.49	5	997856	21600.06	26844.6	0	5	1.57	0.73
			SD/SF	1159562	13.04	5	1175950	21600.08	7911.4	0	5	1.01	1.31
		20	SD/DF	1046760	3.52	5	1063622	21600.94	22349.4	0	5	1.53	0.57
			DD/SF	1143120	6.42	5	1158356	21600.12	18632.2	0	5	1.18	1.03
			DD/DF	1053950	3.74	5	1071076	21600.08	23343.6	0	5	1.53	0.52
			SD/SF	1041384	32.05	5	1089374	21600.12	1345	0	5	3.62	3.86
		5	SD/DF	966546	3.73	5	1036004	21600.18	1803	0	5	5.4	4.82
			DD/SF	971953	11.59	5	1052335	21600.18	1783.8	0	5	5.07	6.69
			DD/DF	960594	3.3	5	1030178	21600.2	2720	0	5	5.97	4.2
			SD/SF	1210974	28.4	5	1275448	21600.24	1667	0	5	3.85	4.83
		10	SD/DF	1096128	5.07	5	1171184	21600.18	3240.2	0	5	4.58	4.76
			DD/SF	1196990	13.96	5	1270594	21600.14	2486.8	0	5	3.79	5.36
	200		DD/DF	1096390	6.25	5	1159372	21600.12	3689.6	0	5	4.5	3.36
			SD/SF	1313816	40.36	5	1369902	21600.2	2095.6	0	5	2.75	3.95
		15	SD/DF	1207206	8.19	5	1264382	21600.2	4221.4	0	5	3.55	3.03
			DD/SF	1269970	20.92	5	1327120	21600.16	3006	0	5	3.19	3.89
			DD/DF	1205224	8.13	5	1253500	21600.22	4820.8	0	5	3.33	2.33
			SD/SF	1413930	50.59	5	1459560	21600.28	2401.8	0	5	2.33	3.01
		20	SD/DF	1271110	10.69	5	1324702	21600.3	5984.4	0	5	3.32	2.69
			DD/SF	1370302	26.28	5	1419216	21600.14	3848.4	0	5	2.72	3.1
			DD/DF	1277184	10.74	5	1322064	21600.2	7681.4	0	5	2.99	1.96

Table 91: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	0.54	5	408252	351.1	8673.4	5	5	4.97	0
			SD/DF	361628	0.41	5	384830	103.39	5805.4	5	5	6.03	0
			DD/SF	349333	0.52	5	368246	547.12	22448	5	5	5.13	0
			DD/DF	368328	0.38	5	390547	181.61	8535.2	5	5	5.69	0
		10	SD/SF	479084	0.58	5	501630	841.05	31566.8	5	5	4.49	0
			SD/DF	414544	0.81	5	436560	117.96	3991.6	5	5	5.04	0
			DD/SF	419849	0.95	5	439303	1951.55	118195.8	5	5	4.41	0
			DD/DF	410023	0.74	5	432364	318.23	19412.6	5	5	5.17	0
		15	SD/SF	495921	1.61	5	516655	981.58	48610.8	5	5	4.01	0
			SD/DF	440413	0.53	5	460921	894.59	50157	5	5	4.45	0
			DD/SF	453359	1.01	5	471519	506.99	20970.4	5	5	3.85	0
			DD/DF	449853	0.61	5	470099	200.07	9973.2	5	5	4.31	0
		20	SD/SF	535047	0.45	5	555879	15646.08	983192.6	3	5	3.74	0.02
			SD/DF	487655	0.47	5	507784	208.99	10211.6	5	5	3.97	0
			DD/SF	514708	0.73	5	534941	819.93	45979.6	5	5	3.77	0
			DD/DF	488902	0.63	5	509078	654.63	36977.2	5	5	3.96	0
	100	5	SD/SF	460969	1.04	5	485827	3510.56	35907	5	5	5.11	0
			SD/DF	407148	0.63	5	432461	880.02	9835.2	5	5	5.84	0
			DD/SF	422143	0.97	5	447600	5931.01	106345.8	5	5	5.7	0
			DD/DF	409943	0.63	5	435245	1740.95	25538.4	5	5	5.81	0
		10	SD/SF	512747	1.01	5	535933	14071.76	198283.8	5	5	4.33	0
			SD/DF	467904	0.56	5	493453	3443.74	64153.8	5	5	5.18	0
			DD/SF	470979	0.85	5	492009	11508.98	150487	5	5	4.27	0
			DD/DF	457395	0.62	5	481111	3761.4	83384.6	5	5	4.93	0
		15	SD/SF	565625	0.84	5	587465	17633.09	397096.4	3	5	3.71	0.01
			SD/DF	498854	0.62	5	521972	3609.3	79932	5	5	4.43	0
			DD/SF	547684	0.87	5	569155	11894.19	234522	3	5	3.76	0.03
			DD/DF	510296	0.62	5	534321	9819.49	185282.2	3	5	4.49	0.05
		20	SD/SF	597545	1.06	5	617786	16386.88	300673.6	2	5	3.26	0.01
			SD/DF	546831	0.6	5	569783	9435.5	178265.8	3	5	4.02	0.04
			DD/SF	608284	0.86	5	631262	20850.88	303243	1	5	3.61	0.11
			DD/DF	558910	0.63	5	581848	6246.81	145963.4	5	5	3.94	0
	200	5	SD/SF	527237	2.69	5	559894	12064.51	92920.8	4	5	5.83	0.09
			SD/DF	488763	1.89	5	524643	9900.08	175193.2	4	5	6.83	0.09
			DD/SF	529019	2.34	5	566657	21600.34	193552.2	0	5	6.64	0.27
			DD/DF	480192	1.89	5	518848	10911.16	185217.8	4	5	7.45	0.07
		10	SD/SF	586194	2.52	5	612861	18776.25	167465.6	1	5	4.34	0.11
			SD/DF	553291	1.47	5	467774	17280.22	291578	0	4	5.75	0.41
			DD/SF	583419	2.15	5	477104	17280.42	151807.6	0	4	4.64	0.28
			DD/DF	557040	1.6	5	590799	21600.96	251470	0	5	5.71	0.53
		15	SD/SF	647525	2.48	5	672868	21601.02	57705.6	0	5	3.73	0.43
			SD/DF	612255	1.46	5	384641	12960.36	124578	0	3	4.62	0.29
			DD/SF	628255	2.16	5	268329	8640.18	64265.2	0	2	4.1	0.19
			DD/DF	610057	1.49	5	386585	12960.1	292584.8	0	3	4.76	0.22
		20	SD/SF	733898	2.39	5	442232	12961.84	114209.6	0	3	3.26	0.17
			SD/DF	666327	1.38	5	278673	8640.34	168809.6	0	2	4.2	0.08
			DD/SF	744819	1.99	5	160306	4320.1	53274.4	0	1	3.57	0.05
			DD/DF	662195	1.45	5	412543	12960.28	274560	0	3	4.48	0.14

Table 92: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	811225	9.12	5	821543	21600.18	30764.2	0	5	1.18	1.08
			SD/DF	714064	3.39	5	727246	21600.14	194962.6	0	5	1.8	0.29
			DD/SF	788831	5.06	5	799888	21600.18	32095.8	0	5	1.24	1.12
			DD/DF	702879	3.58	5	715049	20973.46	136948.2	1	5	1.69	0.28
		10	SD/SF	899923	9.64	5	909087	21600.24	31267.2	0	5	0.78	0.92
			SD/DF	783073	3.33	5	793165	21600.22	129042.4	0	5	1.24	0.36
			DD/SF	812067	6.38	5	822015	21600.28	43863.6	0	5	0.96	1.01
			DD/DF	787188	3.35	5	795902	21600.1	167436.4	0	5	1.05	0.32
		15	SD/SF	937874	12.59	5	945005	21600.16	46370.8	0	5	0.57	0.68
			SD/DF	840398	3.65	5	848096	21600.16	130810.4	0	5	0.88	0.26
			DD/SF	884927	7.57	5	893829	21600.18	52209.6	0	5	0.77	0.78
			DD/DF	854742	3.88	5	863189	21600.16	176962.6	0	5	0.96	0.21
		20	SD/SF	1052197	11.87	5	1057426	21600.18	70926.2	0	5	0.43	0.41
			SD/DF	899250	4.94	5	905879	21600.2	113502.4	0	5	0.69	0.21
			DD/SF	975410	6.81	5	983332	21600.14	58895.2	0	5	0.67	0.59
			DD/DF	897694	4.18	5	904837	21600.18	115646.4	0	5	0.77	0.23
	100	5	SD/SF	881217	19.47	5	905696	21600.18	7939.2	0	5	2.47	2.44
			SD/DF	816306	8.43	5	842260	21600.18	39275.6	0	5	3.02	1.21
			DD/SF	871172	11.13	5	898330	21600.22	11634	0	5	2.75	2.56
			DD/DF	812894	7.69	5	843351	21600.26	28969.2	0	5	3.57	1.4
		10	SD/SF	995699	17.4	5	1015033	21600.22	7073.2	0	5	1.57	1.86
			SD/DF	899727	6.43	5	922392	21600.26	26264.8	0	5	2.23	1.37
			DD/SF	1017288	15.94	5	1037178	21600.26	14359.4	0	5	1.77	1.7
			DD/DF	906375	7.96	5	928942	21600.22	70151.2	0	5	2.34	0.97
		15	SD/SF	1054450	19.08	5	1067553	21600.22	12625	0	5	1.17	1.18
			SD/DF	966741	6.66	5	984271	21600.26	59783.8	0	5	1.72	0.71
			DD/SF	1063308	11.22	5	1080888	21600.38	13601	0	5	1.39	1.46
			DD/DF	981770	6.7	5	998165	21600.44	41311.6	0	5	1.56	0.87
		20	SD/SF	1159562	17.89	5	1174699	21600.46	11732.6	0	5	1.01	1.25
			SD/DF	1046812	6.4	5	1064324	21600.46	34209.8	0	5	1.53	0.63
			DD/SF	1143120	13.32	5	1160380	21600.48	18474.6	0	5	1.18	1.34
			DD/DF	1054040	8.1	5	1071636	21600.3	29831.8	0	5	1.52	0.8
	200	5	SD/SF	1041384	48.67	5	1081887	21600.36	2669.6	0	5	3.62	3.29
			SD/DF	966572	21.22	5	1022590	21600.36	9507.8	0	5	5.39	3.52
			DD/SF	971953	34.64	5	1023345	21600.34	4760	0	5	5.07	4.42
			DD/DF	960637	23	5	1022324	21600.44	11159.2	0	5	5.97	3.46
		10	SD/SF	1210974	41.55	5	1263924	21600.34	4594.4	0	5	3.85	4.09
			SD/DF	1096270	16.1	5	1150344	21600.34	12256.2	0	5	4.57	3.27
			DD/SF	1196990	27.5	5	1244314	21600.3	6944	0	5	3.79	3.52
			DD/DF	1096514	16.73	5	1150610	21600.32	15816.4	0	5	4.49	2.94
		15	SD/SF	1313816	48.09	5	1352326	21600.36	5271.2	0	5	2.75	2.77
			SD/DF	1207378	15.29	5	1253900	21600.38	14721	0	5	3.53	2.61
			DD/SF	1269970	29.93	5	1319312	21600.3	7640.4	0	5	3.19	3.55
			DD/DF	1205372	16.52	5	1248578	21600.3	14207.6	0	5	3.32	2.4
		20	SD/SF	1413930	48.95	5	1463214	21600.52	3732.4	0	5	2.33	3.32
			SD/DF	1271276	14.38	5	1316252	21600.58	9363	0	5	3.31	2.69
			DD/SF	1370302	27.03	5	1417856	21600.46	4437.8	0	5	2.72	3.25
			DD/DF	1277360	14.35	5	1319754	21600.5	12149	0	5	2.98	2.23

Table 93: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	0.74	5	408252	529.11	6654	5	5	4.97	0
			SD/DF	361628	0.3	5	384830	165.2	4682.6	5	5	6.03	0
			DD/SF	349333	0.56	5	368246	1109.31	27443.6	5	5	5.13	0
			DD/DF	368328	0.3	5	390547	413.76	11972	5	5	5.69	0
		10	SD/SF	479084	0.52	5	501630	2027.38	38516.8	5	5	4.49	0
			SD/DF	414544	0.31	5	436560	116.84	2510.8	5	5	5.04	0
			DD/SF	419849	0.52	5	439303	4944.85	104322.4	5	5	4.41	0
			DD/DF	410023	0.31	5	432364	566.83	19404	5	5	5.17	0
		15	SD/SF	495921	0.87	5	516655	3049.81	87407	5	5	4.01	0
			SD/DF	440413	0.49	5	460921	1024.98	32888.8	5	5	4.45	0
			DD/SF	453359	0.62	5	471519	759.51	13074.4	5	5	3.85	0
			DD/DF	449853	0.39	5	470099	337.75	9801.4	5	5	4.31	0
		20	SD/SF	535047	0.97	5	555867	16051.3	430690.6	3	5	3.74	0.01
			SD/DF	487655	0.61	5	507784	369.36	9582.4	5	5	3.97	0
			DD/SF	514708	0.71	5	534941	1819.6	49770.8	5	5	3.77	0
			DD/DF	488902	0.68	5	509078	822.56	25426.8	5	5	3.96	0
	100	5	SD/SF	460969	1.64	5	485827	7869.84	31420.2	5	5	5.11	0
			SD/DF	407148	0.89	5	432461	658.04	6125.2	5	5	5.84	0
			DD/SF	422143	1.6	5	447600	15147.57	70335	3	5	5.7	0.09
			DD/DF	409943	0.96	5	435245	1182.38	18499.2	5	5	5.81	0
		10	SD/SF	512747	1.01	5	535933	16031.51	107366.8	3	5	4.33	0.02
			SD/DF	467904	0.76	5	493453	2435.54	41140.4	5	5	5.18	0
			DD/SF	470979	0.96	5	492009	18426.55	81801.2	1	5	4.27	0.05
			DD/DF	457395	0.74	5	481111	4849.02	42002.6	5	5	4.93	0
		15	SD/SF	565625	1.24	5	587502	19039.85	127644.4	1	5	3.71	0.06
			SD/DF	498854	0.89	5	521972	4826.46	40715.2	5	5	4.43	0
			DD/SF	547684	1.21	5	569162	12466.18	93373	3	5	3.76	0.03
			DD/DF	510296	0.9	5	534317	6948.52	137433.4	4	5	4.49	0.01
		20	SD/SF	597545	1.16	5	617795	18107.65	150058.2	3	5	3.26	0.02
			SD/DF	546831	1.02	5	569870	9226.63	92715.8	4	5	4.02	0.04
			DD/SF	608284	1.27	5	631180	19550.62	115514.4	1	5	3.61	0.09
			DD/DF	558910	1.05	5	581853	9890.83	89340	3	5	3.94	0.02
	200	5	SD/SF	527237	5.44	5	559948	20432.76	55526.8	1	5	5.83	0.34
			SD/DF	488763	2.77	5	524647	11519.38	100152	4	5	6.83	0.19
			DD/SF	529019	4.57	5	566973	21600.08	68466.6	0	5	6.64	0.65
			DD/DF	480192	2.99	5	518848	10420.68	172674.4	4	5	7.45	0.03
		10	SD/SF	586194	3.48	5	613113	20494.96	17456.8	1	5	4.34	0.48
			SD/DF	553291	1.91	5	587335	21600.04	47351.4	0	5	5.75	0.8
			DD/SF	583419	2.68	5	612666	21600.08	31769.2	0	5	4.64	0.84
			DD/DF	557040	2.11	5	590925	21600.04	62107.2	0	5	5.71	0.71
		15	SD/SF	647525	3.31	5	673722	21600.26	10924	0	5	3.73	0.82
			SD/DF	612255	1.81	5	642062	21600.16	90747.4	0	5	4.62	0.47
			DD/SF	628255	2.69	5	655750	21600.78	20636.8	0	5	4.1	0.93
			DD/DF	610057	1.89	5	513221	17280.5	78489.6	0	4	4.76	0.38
		20	SD/SF	733898	2.95	5	758815	21600.2	22835.6	0	5	3.26	0.35
			SD/DF	666327	1.85	5	695549	21600.22	87980.2	0	5	4.2	0.25
			DD/SF	744819	2.53	5	772906	21600.12	20835.6	0	5	3.57	0.49
			DD/DF	662195	2.04	5	415934	12960.28	76041.2	0	3	4.48	0.48

Table 94: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	811225	8.1	5	821384	21600.1	12343.4	0	5	1.18	1.12
			SD/DF	714064	2.38	5	727333	21600.12	105114.2	0	5	1.8	0.36
			DD/SF	788831	3.03	5	799720	21600.12	24937	0	5	1.24	1.08
			DD/DF	702879	2.87	5	714952	21600.2	100571.2	0	5	1.69	0.23
		10	SD/SF	899923	12.79	5	907424	21600.32	28917.2	0	5	0.78	0.71
			SD/DF	783073	3.18	5	315172	8640.04	50345.4	0	2	1.24	0.13
			DD/SF	812067	3.96	5	318826	8640.08	22142.8	0	2	0.96	0.37
			DD/DF	787188	3.26	5	639167	17280.24	40172	0	4	1.05	0.25
		15	SD/SF	937874	17.74	5	945175	21600.24	20547.8	0	5	0.57	0.71
			SD/DF	840398	4.03	5	680974	17280.18	36287.6	0	4	0.88	0.23
			DD/SF	884927	6.03	5	892660	21600.48	26498.4	0	5	0.77	0.68
			DD/DF	854742	4.38	5	516724	12960.14	32760	0	3	0.96	0.14
		20	SD/SF	1052197	25.9	5	1058212	21600.32	20672.6	0	5	0.43	0.51
			SD/DF	899250	6.56	5	905771	21600.18	60637.2	0	5	0.69	0.2
			DD/SF	975410	8.21	5	982430	21600.12	45121.4	0	5	0.67	0.53
			DD/DF	897694	6.3	5	904998	21600.1	103118.2	0	5	0.77	0.23
	100	5	SD/SF	881217	28.86	5	904492	21600.16	6822.4	0	5	2.47	2.32
			SD/DF	816306	7.6	5	842160	21600.12	39636.8	0	5	3.02	1.2
			DD/SF	871172	11.71	5	896553	21600.12	12400.6	0	5	2.75	2.3
			DD/DF	812894	7.74	5	844608	21600.18	26608.6	0	5	3.57	1.4
		10	SD/SF	995699	36.96	5	1013240	21600.16	7897.4	0	5	1.57	1.63
			SD/DF	899727	6	5	921935	21600.1	17155	0	5	2.23	1.44
			DD/SF	1017288	8.46	5	1037574	21600.18	10494.8	0	5	1.77	1.7
			DD/DF	906375	6.34	5	929578	21600.22	23079.6	0	5	2.34	1.27
		15	SD/SF	1054450	59.46	5	1068958	21600.2	10814.8	0	5	1.17	1.29
			SD/DF	966741	7.06	5	985375	21600.18	13717.8	0	5	1.72	1.06
			DD/SF	1063308	11.85	5	1083074	21600.22	10392.2	0	5	1.39	1.64
			DD/DF	981770	6.82	5	998820	21600.24	10400	0	5	1.56	1.1
		20	SD/SF	1159562	79.88	5	1173905	21600.22	10062.2	0	5	1.01	1.16
			SD/DF	1046812	9.22	5	1063888	21600.18	17813.8	0	5	1.53	0.72
			DD/SF	1143120	16.16	5	1159884	21600.18	11864.4	0	5	1.18	1.28
			DD/DF	1054040	9.42	5	1071314	21600.22	17299.6	0	5	1.52	0.88
	200	5	SD/SF	1041384	129.37	5	1083814	21600.32	1543.6	0	5	3.62	3.35
			SD/DF	966572	28.6	5	1025594	21600.3	4892	0	5	5.39	4.14
			DD/SF	971953	56.76	5	1032389	21600.32	3312.8	0	5	5.07	5.04
			DD/DF	960637	29.09	5	1026204	21600.28	2884.4	0	5	5.97	4.05
		10	SD/SF	1210974	125.81	5	1273296	21600.36	1964.8	0	5	3.85	4.7
			SD/DF	1096270	15.98	5	1158966	21600.32	3964.6	0	5	4.57	4.58
			DD/SF	1196990	31.98	5	1255606	21600.38	3098	0	5	3.79	4.39
			DD/DF	1096514	18.44	5	1153884	21600.36	4501.2	0	5	4.49	3.82
		15	SD/SF	1313816	117.26	5	1366056	21600.3	2652.4	0	5	2.75	3.67
			SD/DF	1207378	15.12	5	1261436	21600.3	5265.4	0	5	3.53	3.52
			DD/SF	1269970	43.54	5	1324284	21600.3	4377	0	5	3.19	3.82
			DD/DF	1205372	17.43	5	1253688	21600.28	4989.6	0	5	3.32	2.98
		20	SD/SF	1413930	114.33	5	1462358	21600.36	2266.2	0	5	2.33	3.22
			SD/DF	1271276	19.3	5	1325610	21600.36	3533.4	0	5	3.31	3.39
			DD/SF	1370302	44.92	5	1419056	21600.38	3695.6	0	5	2.72	3.22
			DD/DF	1277360	20.53	5	1328104	21600.34	3372.2	0	5	2.98	3.07

Table 95: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	387914	1.08	5	408252	433.94	4091	5	5	4.97	0
			SD/DF	361625	0.33	5	384830	127.41	3739.6	5	5	6.03	0
			DD/SF	349333	0.4	5	368246	794.22	10676.6	5	5	5.13	0
			DD/DF	368328	0.25	5	390547	304.23	5958.4	5	5	5.69	0
		10	SD/SF	479084	0.65	5	501630	2214.73	30949.4	5	5	4.49	0
			SD/DF	414535	0.36	5	436560	82.35	1615.8	5	5	5.04	0
			DD/SF	419849	0.75	5	439303	2707.12	52717	5	5	4.41	0
			DD/DF	410017	0.51	5	432364	450.4	11914.8	5	5	5.17	0
		15	SD/SF	495921	1.19	5	516655	2170.2	45585.6	5	5	4.01	0
			SD/DF	440390	0.55	5	460921	769.79	18874.4	5	5	4.46	0
			DD/SF	453359	0.58	5	471519	881.06	16859	5	5	3.85	0
			DD/DF	449841	0.29	5	470099	179.43	4880.6	5	5	4.31	0
		20	SD/SF	535047	0.56	5	555873	18830.6	534358.6	2	5	3.74	0.02
			SD/DF	487653	0.26	5	507784	202.9	6358	5	5	3.97	0
			DD/SF	514708	0.47	5	534941	1243.96	34396.4	5	5	3.77	0
			DD/DF	488901	0.38	5	509078	571.8	16869.4	5	5	3.96	0
	100	5	SD/SF	460969	1.45	5	485827	8781.97	28931.6	5	5	5.11	0
			SD/DF	407138	0.56	5	432461	683.44	7995.2	5	5	5.85	0
			DD/SF	422143	1.05	5	447615	14564.42	43837.2	3	5	5.7	0.13
			DD/DF	409913	0.51	5	435245	1772.75	11892.4	5	5	5.82	0
		10	SD/SF	512747	1.25	5	535933	16659.72	95379.6	3	5	4.33	0.02
			SD/DF	467864	0.54	5	493453	2928.65	25221.6	5	5	5.19	0
			DD/SF	470979	0.86	5	492009	12426.01	96146	4	5	4.27	0.01
			DD/DF	457373	0.5	5	481111	3071.74	48648.4	5	5	4.93	0
		15	SD/SF	565625	1.35	5	587465	16619.63	173527.8	3	5	3.71	0.01
			SD/DF	498835	0.59	5	521972	1256.84	24379.6	5	5	4.43	0
			DD/SF	547684	0.78	5	569155	11780.73	95152	4	5	3.76	0.02
			DD/DF	510278	0.52	5	534317	7419.75	126272.4	4	5	4.5	0.01
		20	SD/SF	597545	1.76	5	617806	19297.52	144801.2	2	5	3.26	0.02
			SD/DF	546809	0.52	5	569783	7766.95	97836.6	4	5	4.03	0.01
			DD/SF	608284	1.01	5	252547	6698.86	65906	1	2	3.61	0.01
			DD/DF	558882	0.52	5	581848	4601.23	73439.8	5	5	3.95	0
	200	5	SD/SF	527237	5.82	5	560310	21600	11610.8	0	5	5.83	0.64
			SD/DF	488754	1.54	5	524643	14288.94	64232.6	3	5	6.83	0.24
			DD/SF	529019	3.88	5	567080	21600.02	21123	0	5	6.64	0.87
			DD/DF	480151	1.45	5	518887	17199.6	74334	3	5	7.46	0.18
		10	SD/SF	586194	7.48	5	613703	21600.02	7795.8	0	5	4.34	0.82
			SD/DF	553238	1.87	5	587152	21600.04	36182.8	0	5	5.75	0.81
			DD/SF	583419	3.32	5	612925	21600.02	15553.2	0	5	4.64	1.11
			DD/DF	556996	1.78	5	591209	21600.02	46341.8	0	5	5.72	0.74
		15	SD/SF	647525	5.92	5	673735	21600.02	10711	0	5	3.73	0.81
			SD/DF	612206	1.65	5	642086	21600	25276	0	5	4.62	0.54
			DD/SF	628255	3.42	5	655797	21600.04	9036.8	0	5	4.1	0.93
			DD/DF	610008	1.48	5	640683	21600	79088.8	0	5	4.77	0.44
		20	SD/SF	733898	4.02	5	759140	21600.04	11465.8	0	5	3.26	0.47
			SD/DF	666271	1.57	5	695614	21600.02	58589.8	0	5	4.21	0.26
			DD/SF	744819	2.92	5	772939	21600.52	25758.2	0	5	3.57	0.49
			DD/DF	662145	1.51	5	693390	21600.62	151348.2	0	5	4.49	0.21

Table 96: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	811225	1.86	5	822963	21600.08	11271.4	0	5	1.18	1.29
			SD/DF	714015	0.61	5	727391	21600.02	81457.6	0	5	1.81	0.34
			DD/SF	788831	0.96	5	799888	21600.02	22112.2	0	5	1.24	1.05
			DD/DF	702847	0.68	5	714948	21167.44	95756.4	1	5	1.69	0.24
		10	SD/SF	899923	1.92	5	908824	21600.06	18130.6	0	5	0.78	0.88
			SD/DF	783017	0.86	5	793261	21600	68201	0	5	1.25	0.37
			DD/SF	812067	1.09	5	821113	21600.02	29430.4	0	5	0.96	0.85
			DD/DF	787158	0.78	5	795878	21600.02	47454.8	0	5	1.06	0.35
		15	SD/SF	937874	3.41	5	945314	21600.08	16239.2	0	5	0.57	0.71
			SD/DF	840369	1.2	5	848304	21600.08	55687.2	0	5	0.89	0.26
			DD/SF	884927	1.83	5	893225	21600.12	20391.8	0	5	0.77	0.71
			DD/DF	854721	1.12	5	863676	21600.04	55172.4	0	5	0.96	0.29
		20	SD/SF	1052197	5.22	5	1059593	21600.02	17836.8	0	5	0.43	0.63
			SD/DF	899227	1.67	5	905872	21600	41833.2	0	5	0.69	0.2
			DD/SF	975410	2.56	5	983936	21600.04	25356.8	0	5	0.67	0.66
			DD/DF	897670	1.49	5	905070	21600	63596.4	0	5	0.78	0.24
	100	5	SD/SF	881217	10.23	5	912078	21600.16	2203.8	0	5	2.47	3.16
			SD/DF	816242	1.96	5	842875	21600.06	8662.6	0	5	3.03	1.93
			DD/SF	871172	3.76	5	900680	21600.08	5381.8	0	5	2.75	2.8
			DD/DF	812841	1.77	5	845579	21600.12	6864.8	0	5	3.58	2.09
		10	SD/SF	995699	7.97	5	1019445	21600.08	3733.2	0	5	1.57	2.29
			SD/DF	899622	2.08	5	922952	21600.06	9543.6	0	5	2.24	1.76
			DD/SF	1017288	3.81	5	1040579	21600.1	6980.8	0	5	1.77	1.98
			DD/DF	906318	2.07	5	930113	21600.08	10593.2	0	5	2.34	1.46
		15	SD/SF	1054450	10.53	5	1074713	21600.24	3843	0	5	1.17	1.82
			SD/DF	966685	3.04	5	986975	21600.2	7163.2	0	5	1.73	1.42
			DD/SF	1063308	5.92	5	1086138	21600.16	5101.2	0	5	1.39	1.91
			DD/DF	981676	2.48	5	999549	21600.16	10496.6	0	5	1.57	1.2
		20	SD/SF	1159562	15.6	5	1178708	21600.18	4242.4	0	5	1.01	1.56
			SD/DF	1046760	3.7	5	1069454	21600.16	8934.2	0	5	1.53	1.46
			DD/SF	1143120	7.6	5	1163220	21600.06	5581.6	0	5	1.18	1.51
			DD/DF	1053950	3.74	5	1072070	21600.1	7582.4	0	5	1.53	1.08
	200	5	SD/SF	1041384	38.95	5	1095966	21600.26	1080.2	0	5	3.62	4.71
			SD/DF	966546	6.57	5	1026328	21600.62	3577.6	0	5	5.4	4.24
			DD/SF	971953	15.92	5	1031333	21600.28	2371.8	0	5	5.07	4.7
			DD/DF	960594	6.19	5	1024708	21600.74	4346.8	0	5	5.97	3.87
		10	SD/SF	1210974	36.72	5	1276192	21600.18	1343.4	0	5	3.85	5.04
			SD/DF	1096128	4.69	5	1164118	21600.16	3674.4	0	5	4.58	4.9
			DD/SF	1196990	14.3	5	1268382	21600.58	2221.2	0	5	3.79	5.28
			DD/DF	1096390	4.8	5	1156872	21600.26	4778.2	0	5	4.5	3.97
		15	SD/SF	1313816	49.5	5	1378494	21600.2	1586.2	0	5	2.75	4.6
			SD/DF	1207206	6.29	5	1271414	21600.14	4401	0	5	3.55	4.16
			DD/SF	1269970	22.68	5	1326240	21600.26	2527	0	5	3.19	3.93
			DD/DF	1205224	5.9	5	1267662	21600.2	4921.4	0	5	3.33	3.82
		20	SD/SF	1413930	57.36	5	1453386	21600.28	1339.8	0	5	2.33	2.65
			SD/DF	1271110	9.05	5	1332900	21600.16	4232.4	0	5	3.32	3.8
			DD/SF	1370302	26.22	5	1417512	21600.22	2779.8	0	5	2.72	3.11
			DD/DF	1277184	8.11	5	1335832	21600.22	4608.2	0	5	2.99	3.53

Table 97: Performance of the N formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	388827	24.5	5	408252	4891.69	2676	5	5	4.74	0
			SD/DF	364519	18.89	5	384830	7201.42	3563.4	5	5	5.28	0
			DD/SF	350996	24.23	5	368246	12598.1	4326.6	3	5	4.68	0.04
			DD/DF	371424	20.8	5	390547	10426.61	3572	5	5	4.9	0
		10	SD/SF	479970	21.59	5	501791	18104.99	9759.4	3	5	4.32	0.83
			SD/DF	416700	18.73	5	436560	11843.27	3098.2	4	5	4.55	0.04
			DD/SF	420835	20.57	5	439393	20406.48	6025.6	1	5	4.19	2.09
			DD/DF	412539	22.38	5	432364	11849.05	5781.4	4	5	4.59	0.01
		15	SD/SF	496524	20.77	5	516713	19702.02	16205	2	5	3.89	0.74
			SD/DF	442887	17.58	5	460946	15512.97	9245.6	3	5	3.92	0.07
			DD/SF	454237	16.86	5	471631	16696.32	8193.8	3	5	3.66	0.5
			DD/DF	451822	15.48	5	470099	8819.72	4239.6	5	5	3.89	0
		20	SD/SF	535748	18.63	5	556007	21600.46	35092.6	0	5	3.61	0.47
			SD/DF	489310	16.11	5	507882	10236.4	5791.2	4	5	3.64	0.04
			DD/SF	515514	18.79	5	535004	19775.1	13600.6	3	5	3.62	0.04
			DD/DF	490616	17.09	5	509078	16319.99	12304.2	2	5	3.63	0.04
	100	5	SD/SF	463829	84.71	5	486580	21600.7	1067.4	0	5	4.52	3.97
			SD/DF	413161	46.92	5	432514	10355.35	1160.4	3	5	4.46	0.05
			DD/SF	426693	68.29	5	447600	13836.7	2506	4	5	4.67	0.02
			DD/DF	416131	59.84	5	435245	10623.72	1811.8	4	5	4.39	0.03
		10	SD/SF	514910	94.86	5	536161	20275.74	2042.2	1	5	3.92	2.03
			SD/DF	473247	59.62	5	493605	15505.36	1733.6	3	5	4.09	0.5
			DD/SF	473877	89.92	5	492145	17970.94	1986.2	2	5	3.68	1.28
			DD/DF	463266	54.88	5	481386	17579.31	2010.6	1	5	3.71	0.17
		15	SD/SF	567019	84.11	5	588192	21600.7	2673.6	0	5	3.48	1.93
			SD/DF	504038	64.49	5	522054	14116.06	1813.8	3	5	3.44	0.07
			DD/SF	550511	87.42	5	569449	21600.6	1030	0	5	3.26	2.64
			DD/DF	515648	72.69	5	535329	15256.59	1565.8	2	5	3.49	0.6
		20	SD/SF	598774	83.24	5	618916	21600.64	1503.8	0	5	3.06	2.82
			SD/DF	551755	65.03	5	570133	19063.29	1588.6	1	5	3.16	0.97
			DD/SF	610458	77.83	5	631930	21600.62	1510.8	0	5	3.27	3.11
			DD/DF	563729	78.74	5	582919	21600.6	1560.8	0	5	3.12	1.02
	200	5	SD/SF	535421	313.72	5	561113	21600.94	878.6	0	5	4.36	2.84
			SD/DF	502733	230.12	5	524909	16721.77	1083.6	3	5	4.17	0.35
			DD/SF	540243	286.4	5	567190	21600.76	792.8	0	5	4.66	2.34
			DD/DF	494532	325.43	5	519191	18368.7	1165.4	2	5	4.69	0.57
		10	SD/SF	592792	811.06	5	614602	21601.1	861.8	0	5	3.27	1.9
			SD/DF	568732	456.51	5	587501	17960.52	1355.8	1	5	3.11	0.61
			DD/SF	591685	572.44	5	612743	21601.06	825	0	5	3.28	1.21
			DD/DF	571028	489.43	5	591584	19728.5	927.8	1	5	3.34	0.97
		15	SD/SF	652611	736.66	5	675401	21601.08	667	0	5	2.97	3.14
			SD/DF	625210	399.87	5	642933	18404.38	1035.6	1	5	2.6	0.68
			DD/SF	635733	449.16	5	655825	20041.42	1021.8	1	5	2.96	1.08
			DD/DF	622551	387.84	5	640747	19115.08	1089	1	5	2.82	0.09
		20	SD/SF	737711	449.21	5	759972	21618.38	1031	0	5	2.76	1.2
			SD/DF	677281	258.84	5	695676	18034.68	1381.8	1	5	2.63	0.06
			DD/SF	750814	422.87	5	773481	21601.18	533	0	5	2.79	2.52
			DD/DF	675736	269.38	5	693585	14904.69	684.2	2	5	2.53	0.41

Table 98: Performance of the N formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	812904	2157.69	5	1037801	21604.26	133	0	5	0.97	18.49
			SD/DF	719381	861.93	5	750963	21604.32	208.4	0	5	1.07	3.76
			DD/SF	791731	1182.59	5	831507	21604	169	0	5	0.88	4.81
			DD/DF	707813	717.75	5	748852	21606.42	142	0	5	1	5.23
		10	SD/SF	901152	1371.77	5	1166851	21608.46	61.8	0	5	0.65	19.81
			SD/DF	787856	817.67	5	657078	17285.56	120.8	0	4	0.63	2.93
			DD/SF	814388	1189.07	5	1016320	21606.72	119.4	0	5	0.67	16.36
			DD/DF	791466	943.75	5	832941	21604.1	139	0	5	0.52	4.9
		15	SD/SF	938703	1885.83	5	1051080	21605	131.2	0	5	0.48	9.38
			SD/DF	843759	903.29	5	557350	12962.34	107.4	0	3	0.49	4.54
			DD/SF	886998	1530.9	5	1153876	21604.14	147.2	0	5	0.53	21.82
			DD/DF	858491	1041.47	5	722479	17283.06	135	0	4	0.53	4.15
		20	SD/SF	1052795	1888.51	5	1255388	21603.98	182	0	5	0.37	14.85
			SD/DF	902687	819.01	5	969867	21604.76	194	0	5	0.31	6.78
			DD/SF	977598	1534.88	5	871615	17285.76	117	0	4	0.44	9.37
			DD/DF	901159	1299.74	5	595047	12964.62	76	0	3	0.39	4.97
	100	5	SD/SF	848355	11899.05	3	921444	14475.4	0	0	3	1.95	26.84
			SD/DF	828973	5889.38	4	522110	12965.02	84.4	0	3	1.46	3.1
			DD/SF	879278	7629.94	4	628608	9404.86	4.2	0	2	1.7	17.21
			DD/DF	825758	1990.41	5	711654	17288.92	25	0	4	2.04	5.34
		10	SD/SF	974893	16346.91	2	1319798	17289.84	1.6	0	4	1.11	32.67
			SD/DF	911003	6320.91	4	614362	12964.96	40.4	0	3	1.01	6.11
			DD/SF	1023667	4539.34	5	219612	4321.52	6.8	0	1	1.15	2.57
			DD/DF	917721	2150.22	5	596011	12965.88	15.8	0	3	1.11	5.11
		15	SD/SF	1073924	9476.64	4	1097832	13380.94	0	0	3	0.9	24.75
			SD/DF	976091	2344.42	5	833857	17291.7	32	0	4	0.77	5.69
			DD/SF	1068664	3999.92	5	683054	8643.32	7.2	0	2	0.89	14.48
			DD/DF	989937	2329.56	5	646030	12971.7	19.4	0	3	0.74	4.82
		20	SD/SF	1150894	8364.55	4	1476226	18418.1	0	0	4	0.84	29.23
			SD/DF	1056688	2931.5	5	1155108	21612.56	36.8	0	5	0.6	8.29
			DD/SF	1148392	4874.82	5	617876	8645.56	9.4	0	2	0.72	8.41
			DD/DF	1063736	2847.86	5	675248	12967.6	50.8	0	3	0.61	3.42
	200	5	SD/SF	-	21696.7	0	-	-	-	-	-	-	-
			SD/DF	995294	11933.45	4	519016	8656.44	0	0	2	2.23	9.41
			DD/SF	991659	16521.15	3	-	-	-	-	-	2.55	-
			DD/DF	989701	9817.36	4	286376	4327.76	0	0	1	3	5.98
		10	SD/SF	-	21636.26	0	-	-	-	-	-	-	-
			SD/DF	1128343	12060.55	4	847482	12970.8	2.6	0	3	2.16	12.23
			DD/SF	1203055	19008.38	2	-	-	-	-	-	2.38	-
			DD/DF	1123194	6666.19	5	547808	8654.66	0	0	2	2.17	7.61
		15	SD/SF	-	21697.56	0	-	-	-	-	-	-	-
			SD/DF	1230650	16338.72	3	600968	9609.1	0	0	2	1.47	7.7
			DD/SF	1287820	18656.22	3	-	-	-	-	-	2.2	-
			DD/DF	1231464	8176.99	5	1258424	17300.96	3.4	0	4	1.22	17.31
		20	SD/SF	-	21630.08	0	-	-	-	-	-	-	-
			SD/DF	1289220	14032.95	4	864552	12971.62	1.8	0	3	1.25	5.54
			DD/SF	-	21640.46	0	-	-	-	-	-	-	-
			DD/DF	1303680	13489.14	4	617490	8654.26	0	0	2	1.04	6.49

Table 99: Performance of the T formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	388728	35.54	5	408340	16135.33	4054.6	4	5	4.77	0.83
			SD/DF	364500	28.46	5	384830	7495.83	2184.4	5	5	5.28	0
			DD/SF	350912	50.8	5	368249	12658.95	4337	4	5	4.7	0.02
			DD/DF	371408	47.56	5	390547	10162.18	4282.8	4	5	4.91	0.04
		10	SD/SF	479909	67.84	5	501768	19520.54	13570	1	5	4.33	0.85
			SD/DF	416684	42.81	5	436560	6582.46	2133.6	5	5	4.55	0
			DD/SF	420819	28.9	5	439414	21050.98	8087	1	5	4.19	0.14
			DD/DF	412530	26.89	5	432510	12538.87	5409.8	4	5	4.59	0.1
		15	SD/SF	496509	33.15	5	516721	21600.2	5173.8	0	5	3.89	1.21
			SD/DF	442876	16.2	5	460921	13407.52	6042.6	4	5	3.92	0.04
			DD/SF	454229	23.11	5	471637	16884.33	5645.4	2	5	3.66	0.68
			DD/DF	451819	12.83	5	470099	8897.42	6149.6	5	5	3.89	0
		20	SD/SF	535734	18.21	5	556053	21600.2	9534	0	5	3.61	2
			SD/DF	489300	17.51	5	507784	8125.21	4886.2	4	5	3.64	0.01
			DD/SF	515511	17.36	5	534953	18018.08	15358	2	5	3.62	0.05
			DD/DF	490609	13.99	5	509135	14544.46	13944.2	3	5	3.63	0.06
	100	5	SD/SF	463613	241.43	5	486289	21600.38	1093.6	0	5	4.57	1.13
			SD/DF	413115	114.98	5	432461	10095.57	1961.2	5	5	4.47	0
			DD/SF	426528	167.23	5	447952	21139.64	1257.2	1	5	4.71	0.36
			DD/DF	416100	112.56	5	435307	11935.14	1418.4	4	5	4.39	0.41
		10	SD/SF	514721	139.11	5	537377	21600.42	933.8	0	5	3.96	2.56
			SD/DF	473217	188.2	5	493876	17958.82	1335.4	2	5	4.1	0.95
			DD/SF	473771	138.82	5	492147	21600.36	1072.4	0	5	3.7	1.44
			DD/DF	463235	134.63	5	481171	18478.7	3070.6	2	5	3.71	0.09
		15	SD/SF	566905	168.61	5	589624	21600.38	1031.2	0	5	3.49	3.53
			SD/DF	504012	121.88	5	522238	18281.39	1173	1	5	3.44	0.47
			DD/SF	550438	179.17	5	569551	21600.36	1114.6	0	5	3.28	2.49
			DD/DF	515622	86.59	5	535122	18332.15	1070.6	1	5	3.5	0.57
		20	SD/SF	598708	196.07	5	618914	21600.34	770.2	0	5	3.07	2.91
			SD/DF	551736	141.24	5	570215	19472.82	1854.6	2	5	3.16	0.54
			DD/SF	610434	113.83	5	631884	21600.36	1499.6	0	5	3.27	2.34
			DD/DF	563706	156.08	5	582173	21600.4	1424.4	0	5	3.12	0.21
	200	5	SD/SF	534874	1067.05	5	565833	21600.48	301.6	0	5	4.46	4.93
			SD/DF	502664	858.89	5	525272	15775.08	784.8	3	5	4.18	1
			DD/SF	539983	942	5	568850	21600.56	421.8	0	5	4.7	3.51
			DD/DF	494475	738.13	5	519089	19926.88	707.2	1	5	4.7	0.46
		10	SD/SF	592296	1074.61	5	616453	21600.68	450	0	5	3.35	2.43
			SD/DF	568587	1032.29	5	587880	19049.02	854	2	5	3.14	0.92
			DD/SF	591323	1325.35	5	615751	21600.8	188.4	0	5	3.34	3.53
			DD/DF	570953	956.42	5	592289	20396.58	912.4	1	5	3.35	1.55
		15	SD/SF	652161	1289.92	5	691014	21600.74	188.2	0	5	3.04	4.73
			SD/DF	625104	759.44	5	642811	21600.76	742.6	0	5	2.61	0.99
			DD/SF	635402	1257.04	5	661282	21600.74	266.2	0	5	3.01	3.63
			DD/DF	622497	840.57	5	641986	21600.72	553.4	0	5	2.83	1.32
		20	SD/SF	737276	1196.51	5	777116	21600.78	266.4	0	5	2.81	4.9
			SD/DF	677228	979.82	5	696850	21600.58	333	0	5	2.63	1.51
			DD/SF	750585	1334.51	5	775440	21600.64	459.2	0	5	2.82	2.43
			DD/DF	675667	577.72	5	693656	18518.46	1122.2	3	5	2.54	0.5

Table 100: Performance of the T formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	812471	1928.97	5	987806	21601.76	67	0	5	1.03	15.47
			SD/DF	719315	770.73	5	731255	21602.02	279	0	5	1.08	1.25
			DD/SF	791515	2070.4	5	935865	21601.86	101.4	0	5	0.9	12.46
			DD/DF	707783	605.9	5	727485	21601.96	169.6	0	5	1	2.59
		10	SD/SF	900887	2417.31	5	1292630	21602.72	21.6	0	5	0.67	29.92
			SD/DF	787826	974.1	5	796181	21603.02	168.4	0	5	0.64	0.88
			DD/SF	814275	1647.35	5	1028452	21602.88	35.2	0	5	0.69	18.92
			DD/DF	791437	993.36	5	799443	21603.26	183.6	0	5	0.52	0.87
		15	SD/SF	938598	2718.81	5	1383892	21602.44	13.4	0	5	0.49	30.61
			SD/DF	843735	887.9	5	856086	21602.12	115.6	0	5	0.49	1.34
			DD/SF	886926	1787.17	5	808100	17282.34	33.4	0	4	0.54	8.88
			DD/DF	858475	1031.87	5	869563	21601.76	163.6	0	5	0.53	1.18
		20	SD/SF	1052732	2443.26	5	1245586	21601.74	41.4	0	5	0.38	14.66
			SD/DF	902672	1092.81	5	910219	21601.84	183.4	0	5	0.31	0.76
			DD/SF	977556	2685.92	5	1089845	21601.98	153.2	0	5	0.45	7.61
			DD/DF	901148	1394.76	5	912613	21602.92	258	0	5	0.39	1.22
	100	5	SD/SF	886200	7433.57	5	1626790	21604.1	0	0	5	1.91	43.75
			SD/DF	828516	3217.67	5	1413026	22989.52	39.8	0	5	1.57	36.44
			DD/SF	879636	6735.14	5	1131120	21849.82	7.2	0	5	1.8	21.33
			DD/DF	825645	2927.83	5	1413702	21606.64	7.8	0	5	2.06	36.86
		10	SD/SF	998741	9280.37	5	1671299	22063.9	4.8	0	5	1.26	35.79
			SD/DF	910782	3434.67	5	1563970	22186.4	15.4	0	5	1.03	35.28
			DD/SF	1023187	9523.63	5	1479286	23117.82	0.6	0	5	1.2	32.66
			DD/DF	917625	3746.28	5	1620438	21950.14	10	0	5	1.12	33.94
		15	SD/SF	1056591	9054.28	5	1638720	21603.96	6.4	0	5	0.97	35.07
			SD/DF	976037	3428.15	5	1546160	21603.8	27	0	5	0.78	27.22
			DD/SF	1068288	9069.84	5	1594100	22554.4	14.2	0	5	0.93	28.65
			DD/DF	989904	4557.47	5	1628680	21622.94	4.6	0	5	0.75	32.77
		20	SD/SF	1161327	13200.26	5	2083314	22922.74	1	0	5	0.86	41.81
			SD/DF	1056650	4617.54	5	1774192	22805.08	7	0	5	0.6	33.34
			DD/SF	1148142	11537.99	5	1682008	23589.64	1.4	0	5	0.75	30.62
			DD/DF	1063694	3586.41	5	1731450	21990.14	3.4	0	5	0.62	32.06
	200	5	SD/SF	-	21614.38	0	454180	8642.86	12.4	0	2	-	2.52
			SD/DF	997404	15912.2	4	296904	4322.14	0	0	1	2.32	6.38
			DD/SF	1073995	20860.82	2	811208	12966.5	0	0	3	1.44	15.67
			DD/DF	992111	14596.58	5	328490	4321.18	0	0	1	2.89	8.38
		10	SD/SF	-	21610.34	0	1102690	17285.28	0.8	0	4	-	21.99
			SD/DF	1111527	14397.26	3	852114	8643.36	0	0	2	1.95	17.41
			DD/SF	-	21616.54	0	1099842	17287.04	0	0	4	-	14.36
			DD/DF	1123006	15016.26	5	269916	4322.82	0	0	1	2.18	3.55
		15	SD/SF	-	21612.84	0	-	-	-	-	-	-	-
			SD/DF	1227648	14831.52	4	-	-	-	0	0	1.34	-
			DD/SF	-	21612.98	0	1277508	18505.8	0	0	4	-	18.03
			DD/DF	1229058	18531.5	4	334490	4321.56	0	0	1	1.24	5.29
		20	SD/SF	-	21610.5	0	639414	8642.84	0	0	2	-	9.16
			SD/DF	1280245	17999.56	2	1728386	17286.66	0	0	4	1.36	25.78
			DD/SF	-	21614.86	0	1131492	14002.24	0	0	3	-	17.15
			DD/DF	1300668	17722.03	4	-	-	-	0	0	1.01	-

Table 101: Performance of the MC formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	388728	14.77	5	408252	14392.15	15889.4	3	5	4.77	0.06
			SD/DF	364500	9.22	5	384830	9979.17	5494.8	5	5	5.28	0
			DD/SF	350912	13.34	5	368249	7070.87	8086.8	4	5	4.7	0.05
			DD/DF	371408	10.09	5	390547	9511.22	5330.4	5	5	4.91	0
		10	SD/SF	479909	13.88	5	501755	15922.79	31377.6	3	5	4.33	0.05
			SD/DF	416684	8.5	5	436560	4561.43	3390.8	5	5	4.55	0
			DD/SF	420819	10.22	5	439303	14711.77	31521.8	5	5	4.19	0
			DD/DF	412530	7.21	5	432364	8600.55	16906.8	5	5	4.59	0
		15	SD/SF	496509	7.84	5	516655	11974.15	50682.8	5	5	3.89	0
			SD/DF	442876	6.8	5	460921	6745.19	14751.4	5	5	3.92	0
			DD/SF	454229	6.2	5	471519	4809.79	6942	5	5	3.66	0
			DD/DF	451819	7.21	5	470099	5128.14	6919.8	5	5	3.89	0
		20	SD/SF	535734	5.84	5	555911	21600	112668.2	0	5	3.61	0.05
			SD/DF	489300	6.46	5	507784	3163.58	5310.6	5	5	3.64	0
			DD/SF	515511	6.43	5	534941	6601.01	21711.2	5	5	3.62	0
			DD/DF	490609	6.07	5	509078	4843.21	28678.6	5	5	3.63	0
	100	5	SD/SF	463613	145.4	5	487571	21600.1	1516.6	0	5	4.57	4.34
			SD/DF	413115	79.88	5	432524	13947.28	1377.4	3	5	4.47	0.08
			DD/SF	426528	164.47	5	447935	21600.1	1473.4	0	5	4.71	2.93
			DD/DF	416100	102.41	5	435315	17451.17	1783.8	2	5	4.39	0.57
		10	SD/SF	514721	69.19	5	536466	21600.08	1611.6	0	5	3.96	2.82
			SD/DF	473217	68.45	5	493835	20069.92	2745.8	1	5	4.1	0.46
			DD/SF	473771	59.73	5	492694	21600.08	1709	0	5	3.7	2.78
			DD/DF	463235	37.63	5	481333	18437.98	2262.2	1	5	3.71	0.73
		15	SD/SF	566905	58.32	5	587681	21600.08	2554	0	5	3.49	1.71
			SD/DF	504012	59.35	5	522091	19965.3	1879.4	1	5	3.44	0.11
			DD/SF	550438	71.09	5	569349	18449.79	1786	1	5	3.28	1.02
			DD/DF	515622	54.57	5	534700	16059.99	2269.6	2	5	3.5	0.18
		20	SD/SF	598708	55.99	5	617911	20941.46	6360.6	1	5	3.07	1.06
			SD/DF	551736	39.19	5	569986	21103.28	3030.4	1	5	3.16	0.12
			DD/SF	610434	56.76	5	631536	21600.06	4143.8	0	5	3.27	1.73
			DD/DF	563706	38.63	5	582048	20244.32	3469.4	2	5	3.12	0.51
	200	5	SD/SF	534874	1062.25	5	563067	21600.22	567.8	0	5	4.46	3.94
			SD/DF	502664	548.42	5	525468	18997.3	781.2	1	5	4.18	1.41
			DD/SF	539983	502.58	5	571266	21600.2	616.2	0	5	4.7	4.28
			DD/DF	494475	314.56	5	520026	19839.14	1086.6	1	5	4.7	0.51
		10	SD/SF	592296	674.87	5	615361	21600.22	608.2	0	5	3.35	3.11
			SD/DF	568587	359.16	5	588394	21600.18	742.2	0	5	3.14	1.29
			DD/SF	591323	481.25	5	614082	21600.18	545.6	0	5	3.34	2.9
			DD/DF	570953	324.23	5	592405	18753.68	1169.6	1	5	3.35	1.12
		15	SD/SF	652161	707.07	5	675771	21600.16	467.6	0	5	3.04	3.15
			SD/DF	625104	301.33	5	642812	19630.78	1161.6	1	5	2.61	0.45
			DD/SF	635402	614.71	5	657447	21600.22	632.4	0	5	3.01	2.84
			DD/DF	622497	227.18	5	641317	18744.87	1533	1	5	2.83	0.58
		20	SD/SF	737276	430.83	5	761273	21600.24	685.2	0	5	2.81	2.87
			SD/DF	677228	263.52	5	695752	20682.7	1024.4	1	5	2.63	0.09
			DD/SF	750585	452.31	5	774352	21600.16	877.2	0	5	2.82	2.69
			DD/DF	675667	333.18	5	693412	19016.11	1299.8	1	5	2.54	0.05

Table 102: Performance of the MC formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	812471	356.8	5	825378	21600.1	1968	0	5	1.03	1.51
			SD/DF	719315	187.01	5	728136	21600.1	2027	0	5	1.08	0.62
			DD/SF	791515	285.52	5	805034	21600.12	1551.2	0	5	0.9	1.64
			DD/DF	707783	148.84	5	715906	21600.12	2002	0	5	1	0.63
		10	SD/SF	900887	338.62	5	912804	21600.1	1979.2	0	5	0.67	1.29
			SD/DF	787826	170.68	5	793601	21600.12	2308.4	0	5	0.64	0.39
			DD/SF	814275	233.48	5	825791	21600.16	1861.8	0	5	0.69	1.36
			DD/DF	791437	174.25	5	796394	21600.08	2935.6	0	5	0.52	0.38
		15	SD/SF	938598	181.93	5	947667	21600.14	2426.4	0	5	0.49	0.94
			SD/DF	843735	154.76	5	848839	21600.14	2184.4	0	5	0.49	0.39
			DD/SF	886926	263.14	5	895457	21600.12	1524.6	0	5	0.54	0.94
			DD/DF	858475	177.95	5	863763	21600.1	2631.2	0	5	0.53	0.32
		20	SD/SF	1052732	214.34	5	1060622	21600.12	2119.4	0	5	0.38	0.74
			SD/DF	902672	147.48	5	906276	21600.1	3612	0	5	0.31	0.28
			DD/SF	977556	170.9	5	984697	21600.1	2110	0	5	0.45	0.71
			DD/DF	901148	174.11	5	905383	21600.1	4260	0	5	0.39	0.29
	100	5	SD/SF	886200	2411.48	5	918059	21600.18	473	0	5	1.91	3.45
			SD/DF	828516	1046.98	5	845537	21600.16	870.8	0	5	1.57	1.54
			DD/SF	879636	2714.44	5	912298	21600.18	404.4	0	5	1.8	3.49
			DD/DF	825645	1051.58	5	849677	21600.2	656.4	0	5	2.06	2.2
		10	SD/SF	998741	2454.69	5	1028307	21600.3	446.4	0	5	1.26	2.88
			SD/DF	910782	1211.02	5	926884	21600.24	730.4	0	5	1.03	1.45
			DD/SF	1023187	2104.99	5	1046215	21600.2	327	0	5	1.2	2.16
			DD/DF	917625	1039.88	5	932154	21600.2	724.8	0	5	1.12	1.09
		15	SD/SF	1056591	1938.47	5	1085452	21600.96	438.6	0	5	0.97	2.6
			SD/DF	976037	1022.11	5	999262	21600.24	480.4	0	5	0.78	0.66
			DD/SF	1068288	1956.03	5	1140976	21600.28	203.8	0	5	0.93	2.71
			DD/DF	989904	1266.07	5	1011198	21600.18	739.4	0	5	0.75	1.03
		20	SD/SF	1161327	2009.39	5	1250170	21600.26	555	0	5	0.86	2.58
			SD/DF	1056650	1095.88	5	1082188	21600.22	769.8	0	5	0.6	0.82
			DD/SF	1148142	1461.8	5	1208372	21600.18	597.4	0	5	0.75	2.41
			DD/DF	1063694	1141.15	5	1106102	21600.22	872.6	0	5	0.62	1.05
	200	5	SD/SF	1055862	7298.73	5	1751510	21601.36	6.4	0	5	2.27	39.29
			SD/DF	998245	3401.99	5	1072660	21601.24	68.8	0	5	2.29	6.89
			DD/SF	995415	5674.88	5	1407914	21600.3	9.8	0	5	2.77	26.8
			DD/DF	992111	2994.35	5	1065224	21600.34	82.8	0	5	2.89	6.64
		10	SD/SF	1220700	9169.14	5	2166618	21600.5	3.6	0	5	3.07	43.62
			SD/DF	1124324	4260.74	5	1172064	21600.3	91.4	0	5	2.13	4.05
			DD/SF	1212828	7237.34	5	1980448	21600.4	13	0	5	2.51	38.24
			DD/DF	1123006	3521.52	5	1211346	21600.3	26.6	0	5	2.18	7.18
		15	SD/SF	1321668	10000.18	5	2396742	21600.38	2.2	0	5	2.17	44.85
			SD/DF	1234336	4994.28	5	1323540	21610.14	53.6	0	5	1.38	6.48
			DD/SF	1283910	9168.57	5	1647950	21600.44	6.2	0	5	2.13	19.35
			DD/DF	1231254	4414.99	5	1330564	21600.28	51.2	0	5	1.24	7.32
		20	SD/SF	1418802	7566.69	5	2164242	21600.38	0.8	0	5	1.99	32.33
			SD/DF	1295344	4321.5	5	1366058	21600.28	42.8	0	5	1.48	5.02
			DD/SF	1381854	8647.74	5	2340840	21600.74	0	0	5	1.9	40.97
			DD/DF	1301706	4071.43	5	1342384	21600.48	35.8	0	5	1.13	2.96

Table 103: Performance of the ME formulation for the capacitated balanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	388728	23.23	5	408285	16527.53	5984.4	2	5	4.77	1.5
			SD/DF	364500	14.51	5	384830	3899.56	3608.6	5	5	5.28	0
			DD/SF	350912	17.19	5	368249	10535.08	6762.6	4	5	4.7	0.04
			DD/DF	371408	11.22	5	390547	7567.75	7161	5	5	4.91	0
		10	SD/SF	479909	24.57	5	501751	12661.66	11708.6	3	5	4.33	0.81
			SD/DF	416684	16.3	5	436560	4551.4	2522.4	5	5	4.55	0
			DD/SF	420819	25.02	5	439330	17978.95	15400.2	1	5	4.19	0.81
			DD/DF	412530	10.19	5	432364	4454.28	6604.8	5	5	4.59	0
		15	SD/SF	496509	14.64	5	516657	12962.79	28417.8	4	5	3.89	0.01
			SD/DF	442876	12.43	5	460921	4584.38	12339.6	5	5	3.92	0
			DD/SF	454229	14.5	5	471519	9488.93	11322.4	5	5	3.66	0
			DD/DF	451819	10.95	5	470099	1799.11	3649.6	5	5	3.89	0
		20	SD/SF	535734	11.46	5	555889	21600	85726.2	0	5	3.61	0.05
			SD/DF	489300	8.47	5	507784	4129.81	6756	5	5	3.64	0
			DD/SF	515511	12.12	5	534941	11400.17	21438.4	5	5	3.62	0
			DD/DF	490609	10.62	5	509091	7350.27	17310.6	4	5	3.63	0.01
	100	5	SD/SF	463613	197.18	5	486738	19173.47	1604.4	1	5	4.57	2.61
			SD/DF	413115	85.06	5	432554	12272	1742.6	3	5	4.47	0.09
			DD/SF	426528	144.9	5	448074	20675.16	1665.2	1	5	4.71	2.84
			DD/DF	416100	57.98	5	435247	7977.95	1398.2	4	5	4.39	0.04
		10	SD/SF	514721	105.2	5	536491	21600.06	2774.8	0	5	3.96	1.46
			SD/DF	473217	58.47	5	493454	13429.85	3096.8	4	5	4.1	0.02
			DD/SF	473771	148.7	5	492609	20294.88	3692.2	1	5	3.7	1.85
			DD/DF	463235	99.66	5	481230	14860.41	5118	3	5	3.71	0.11
		15	SD/SF	566905	107.17	5	587890	18531.55	4005	1	5	3.49	0.83
			SD/DF	504012	79.92	5	521980	12864.93	2904.8	4	5	3.44	0.02
			DD/SF	550438	135.36	5	569209	14592.44	3235.2	3	5	3.28	0.04
			DD/DF	515622	53.74	5	534376	13397.07	4783.8	3	5	3.5	0.07
		20	SD/SF	598708	91.66	5	618143	21600.06	11735.2	0	5	3.07	1.13
			SD/DF	551736	71.17	5	569810	11831.22	3649	3	5	3.16	0.46
			DD/SF	610434	125.62	5	631498	21600	4065.6	0	5	3.27	1.91
			DD/DF	563706	66.1	5	581895	14126.88	4878	3	5	3.12	0.04
	200	5	SD/SF	534874	502.24	5	562115	21600.08	866.4	0	5	4.46	2.8
			SD/DF	502664	296.25	5	524680	14897.35	1183	3	5	4.18	0.3
			DD/SF	539983	841.38	5	569400	21600.16	894.4	0	5	4.7	3.18
			DD/DF	494475	301.35	5	518864	17814.22	1717.8	2	5	4.7	0.07
		10	SD/SF	592296	456.76	5	615164	21600.16	464.8	0	5	3.35	2.89
			SD/DF	568587	329.66	5	587212	19405.68	1165.2	1	5	3.14	0.35
			DD/SF	591323	613.86	5	613531	21600.16	779.8	0	5	3.34	2.4
			DD/DF	570953	381.22	5	590850	19770.2	1281	1	5	3.35	0.52
		15	SD/SF	652161	611.96	5	675499	21600.16	769.8	0	5	3.04	3.11
			SD/DF	625104	241.17	5	642496	16933.05	2015.6	2	5	2.61	0.4
			DD/SF	635402	497.14	5	657011	21600.18	767.2	0	5	3.01	2.47
			DD/DF	622497	314.28	5	640917	19678.06	1750	1	5	2.83	0.22
		20	SD/SF	737276	716.48	5	760106	21600.2	1040	0	5	2.81	2.22
			SD/DF	677228	377.11	5	695803	14128.32	1370.8	3	5	2.63	0.08
			DD/SF	750585	522.74	5	773251	18697.21	817.8	1	5	2.82	1.59
			DD/DF	675667	355.42	5	693425	16561.5	1170	2	5	2.54	0.04

Table 104: Performance of the ME formulation for the capacitated balanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	812471	447.48	5	826447	21600.04	1628	0	5	1.03	1.65
			SD/DF	719315	145.35	5	728871	21600.08	2462.6	0	5	1.08	0.73
			DD/SF	791515	418.53	5	803233	21600.06	1767.6	0	5	0.9	1.42
			DD/DF	707783	152.77	5	715666	21600.08	2737.4	0	5	1	0.56
		10	SD/SF	900887	541.87	5	912819	21600.16	1946.6	0	5	0.67	1.29
			SD/DF	787826	188.25	5	794217	21600.08	3460.2	0	5	0.64	0.53
			DD/SF	814275	509.07	5	825087	21600.14	1494.2	0	5	0.69	1.28
			DD/DF	791437	207.39	5	796347	21600.08	3969.6	0	5	0.52	0.36
		15	SD/SF	938598	538.81	5	948113	21600.18	2074.2	0	5	0.49	0.99
			SD/DF	843735	205.09	5	848664	21600.04	2836.8	0	5	0.49	0.36
			DD/SF	886926	459.96	5	894493	21600.1	1911.4	0	5	0.54	0.82
			DD/DF	858475	164.87	5	863583	21600.04	3091.2	0	5	0.53	0.27
		20	SD/SF	1052732	441.54	5	1060256	21600.06	2013.6	0	5	0.38	0.71
			SD/DF	902672	207.4	5	906242	21600.14	2943	0	5	0.31	0.27
			DD/SF	977556	392.34	5	984786	21600.1	1770.6	0	5	0.45	0.73
			DD/DF	901148	206.59	5	905775	21600.04	3448.2	0	5	0.39	0.35
	100	5	SD/SF	886200	2251.14	5	917504	21600.12	410.4	0	5	1.91	3.35
			SD/DF	828516	752.24	5	846838	21600.14	1082.8	0	5	1.57	1.49
			DD/SF	879636	2209.78	5	916323	21600.08	556.8	0	5	1.8	3.92
			DD/DF	825645	860.1	5	846477	21600.1	734.8	0	5	2.06	1.71
		10	SD/SF	998741	2522.74	5	1028481	21600.14	478.4	0	5	1.26	2.79
			SD/DF	910782	987.25	5	922805	21600.1	1307	0	5	1.03	1
			DD/SF	1023187	2876	5	1045481	21600.12	557.4	0	5	1.2	2.08
			DD/DF	917625	988.59	5	935849	21600.12	960.6	0	5	1.12	1.5
		15	SD/SF	1056591	3027.54	5	1081589	21600.16	396.6	0	5	0.97	2.29
			SD/DF	976037	1198.84	5	985613	21600.16	907	0	5	0.78	0.58
			DD/SF	1068288	2671.71	5	1098632	21600.2	553	0	5	0.93	2.7
			DD/DF	989904	1038.11	5	1000367	21600.08	1251.2	0	5	0.75	0.87
		20	SD/SF	1161327	3030.87	5	1189398	21600.16	386	0	5	0.86	2.38
			SD/DF	1056650	1110.96	5	1069062	21600.14	925.2	0	5	0.6	1.02
			DD/SF	1148142	3095.59	5	1179214	21600.18	548.4	0	5	0.75	2.61
			DD/DF	1063694	1202.75	5	1073978	21600.12	1188.8	0	5	0.62	0.81
	200	5	SD/SF	1055862	6625.45	5	1866924	21600.48	4	0	5	2.27	43.4
			SD/DF	998245	3168.9	5	1083020	21600.34	137	0	5	2.29	7.51
			DD/SF	995415	5595.53	5	1655646	21600.66	3.4	0	5	2.77	39.68
			DD/DF	992111	2841.67	5	1178624	21600.38	45.8	0	5	2.89	14.6
		10	SD/SF	1220700	6830.67	5	2165798	21600.5	2.8	0	5	3.07	43.59
			SD/DF	1124324	3032.94	5	1170706	21600.46	61.2	0	5	2.13	3.9
			DD/SF	1212828	6599.7	5	2122410	21600.58	2	0	5	2.51	42.84
			DD/DF	1123006	3467.36	5	1261504	21600.58	22.6	0	5	2.18	10.05
		15	SD/SF	1321668	10398.93	5	1930050	21677.36	2	0	5	2.17	28.84
			SD/DF	1234336	4580.14	5	1266732	21600.44	107.4	0	5	1.38	2.48
			DD/SF	1283910	6740.57	5	2066026	21600.68	1.4	0	5	2.13	36.66
			DD/DF	1231254	4184.24	5	1368522	21600.94	32.8	0	5	1.24	9.53
		20	SD/SF	1418802	8227.76	5	2135108	21647.4	2.4	0	5	1.99	32.7
			SD/DF	1295344	3667.62	5	1324692	21600.34	160.8	0	5	1.48	2.13
			DD/SF	1381854	7235.18	5	1855458	21601.28	7.6	0	5	1.9	23.38
			DD/DF	1301706	2810.29	5	1347604	21600.86	79.8	0	5	1.13	3.3

Table 105: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	0.49	5	446877	1206.6	19766.8	5	5	4.03	0
			SD/DF	403801	0.28	5	424997	221.28	8661	5	5	4.99	0
			DD/SF	385405	0.34	5	402269	1122.11	38265.4	5	5	4.19	0
			DD/DF	410285	0.26	5	430282	211.78	7472	5	5	4.65	0
		10	SD/SF	528271	0.53	5	548211	1780.96	53397.6	5	5	3.64	0
			SD/DF	460505	0.27	5	480341	255.82	9381	5	5	4.13	0
			DD/SF	460459	0.33	5	477791	1442.38	53173.6	5	5	3.62	0
			DD/DF	455047	0.28	5	474095	369.42	33129.8	5	5	4.02	0
		15	SD/SF	544803	0.51	5	562957	2625.14	170203.2	5	5	3.23	0
			SD/DF	488013	0.34	5	506082	568.56	29936.4	5	5	3.57	0
			DD/SF	497325	0.43	5	513473	3203.33	167798.2	5	5	3.14	0
			DD/DF	496303	0.3	5	514270	570.66	33722.2	5	5	3.49	0
		20	SD/SF	587024	0.51	5	604928	9831.35	863226.6	5	5	2.95	0
			SD/DF	537969	0.27	5	556404	583.5	36821.8	5	5	3.32	0
			DD/SF	563950	0.37	5	581671	1198.53	76343	5	5	3.04	0
			DD/DF	540296	0.48	5	558512	914.71	53999.4	5	5	3.26	0
	100	5	SD/SF	505200	1.31	5	526823	4563.63	28553.6	5	5	4.1	0
			SD/DF	447964	0.67	5	471566	898.68	13204	5	5	5.01	0
			DD/SF	462641	1.36	5	484554	8056.37	101753.8	5	5	4.53	0
			DD/DF	449879	0.61	5	473300	1150.16	24844	5	5	4.95	0
		10	SD/SF	557728	1.67	5	577761	15281.76	222506.4	3	5	3.47	0.03
			SD/DF	512576	0.64	5	535146	2103.52	43347.2	5	5	4.21	0
			DD/SF	509694	0.88	5	528026	17314.12	360963.2	2	5	3.47	0.06
			DD/DF	499303	0.63	5	520675	2724.2	80959.6	5	5	4.11	0
		15	SD/SF	611769	1.32	5	631796	21600.02	335411	0	5	3.17	0.1
			SD/DF	543244	0.61	5	563077	9074.41	223571	4	5	3.52	0.04
			DD/SF	591686	0.9	5	610724	16827.63	274880.8	2	5	3.11	0.08
			DD/DF	555804	0.58	5	576953	7122.02	200188.4	5	5	3.67	0
		20	SD/SF	644781	1.42	5	662844	21600	412497.8	0	5	2.71	0.06
			SD/DF	593846	0.58	5	613440	9785.71	280018	5	5	3.19	0
			DD/SF	657296	0.96	5	677021	19631.36	471852.8	2	5	2.91	0.04
			DD/DF	607747	0.6	5	628442	5849.3	181147.6	5	5	3.3	0
	200	5	SD/SF	569618	3.15	5	598880	19795.18	61428.8	1	5	4.87	0.71
			SD/DF	528633	1.71	5	561733	21081.24	206470.4	2	5	5.88	0.26
			DD/SF	572697	2.49	5	606143	21600.06	82605.6	0	5	5.52	0.65
			DD/DF	520104	1.63	5	554627	19461.62	240822.8	1	5	6.23	0.39
		10	SD/SF	628815	3.72	5	652748	21600.08	59363	0	5	3.63	1.23
			SD/DF	594883	1.46	5	624535	21600.2	191707.8	0	5	4.74	0.65
			DD/SF	624945	2.67	5	651057	21600.14	59807.2	0	5	3.97	1.14
			DD/DF	598889	1.47	5	629529	21600.86	197739.6	0	5	4.86	0.62
		15	SD/SF	690509	3.56	5	712745	21600.1	49048.2	0	5	3.11	0.92
			SD/DF	655199	1.45	5	269218	8640	68811.8	0	2	4.07	0.27
			DD/SF	669310	2.48	5	556980	17280.32	85761	0	4	3.48	0.63
			DD/DF	652286	1.33	5	536875	17280.28	219940	0	4	4.05	0.52
		20	SD/SF	779687	3.21	5	800761	21602.24	136551.6	0	5	2.61	0.3
			SD/DF	712413	1.54	5	439061	12960.36	170088.8	0	3	3.61	0.22
			DD/SF	793928	2.37	5	651754	17281.38	77040.8	0	4	2.86	0.61
			DD/DF	707414	1.66	5	588818	17281.46	199757.4	0	4	3.87	0.41

Table 106: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	7.61	5	939008	21600.02	23067.8	0	5	4.18	4.27
			SD/DF	796336	2.64	5	836411	21600.04	100682.4	0	5	4.67	2.89
			DD/SF	872759	6.44	5	914046	21600.02	41683.4	0	5	4.29	4.33
			DD/DF	782472	2.41	5	820010	21600.08	150783.4	0	5	4.56	2.55
		10	SD/SF	988970	14.09	5	1028341	21600.04	27124.4	0	5	3.66	3.75
			SD/DF	865903	3.02	5	902968	21600.12	69416.2	0	5	4.04	3.12
			DD/SF	889921	6.2	5	925818	21600.06	45834.6	0	5	3.71	3.7
			DD/DF	872091	2.98	5	909665	21600.04	140563.6	0	5	4.1	1.83
		15	SD/SF	1027278	12.67	5	1065278	21600.04	29752.2	0	5	3.37	3.51
			SD/DF	928027	3.33	5	965971	21600.06	64203.2	0	5	3.84	3.03
			DD/SF	966112	7.52	5	1001386	21600.04	40422.2	0	5	3.36	3.38
			DD/DF	943337	2.33	5	980019	21600	122223.8	0	5	3.69	2.33
		20	SD/SF	1152620	10.87	5	1193464	21600.02	31464.8	0	5	3.23	3.38
			SD/DF	989738	2.38	5	1024939	21600.02	47746	0	5	3.4	2.58
			DD/SF	1063545	4.89	5	1099852	21600.06	43137.8	0	5	3.19	3.13
			DD/DF	988115	2.63	5	1023374	21600.1	103497.8	0	5	3.37	1.57
	100	5	SD/SF	965837	23.73	5	1016741	21600.1	5442.8	0	5	4.51	4.86
			SD/DF	898972	8.27	5	949779	21600.1	35327.6	0	5	5.12	4.15
			DD/SF	954937	15.25	5	1004616	21600.1	8985.4	0	5	4.76	4.67
			DD/DF	894795	7.3	5	944511	21600.12	24744.8	0	5	5.09	4
		10	SD/SF	1080958	18.83	5	1128263	21600.1	8351.6	0	5	3.67	4.13
			SD/DF	981578	6.93	5	1025092	21600.1	27555.6	0	5	4.13	3.41
			DD/SF	1104850	15.92	5	1152896	21600.1	15125	0	5	3.86	4.03
			DD/DF	989702	6.36	5	1033966	21600.12	25861.4	0	5	4.17	3.4
		15	SD/SF	1137666	31.73	5	434128	8640.04	4089.8	0	2	3.28	1.45
			SD/DF	1051078	7.51	5	431364	8640.04	8954.2	0	2	3.78	1.34
			DD/SF	1146308	15.3	5	1190102	21600.1	15637.4	0	5	3.4	3.55
			DD/DF	1065138	5.79	5	1106380	21600.1	20686.6	0	5	3.58	2.98
		20	SD/SF	1249248	43.88	5	1290022	21600.1	13061.2	0	5	2.97	3.12
			SD/DF	1132818	7.47	5	1173526	21600.12	19849.8	0	5	3.35	2.74
			DD/SF	1231130	16.28	5	1276204	21600.1	14348.8	0	5	3.17	3.41
			DD/DF	1143164	8.7	5	1184774	21600.12	16709	0	5	3.39	2.96
	200	5	SD/SF	1126150	52.1	5	1202964	21600.18	3181	0	5	5.85	6.07
			SD/DF	1045790	18.89	5	1116498	21600.14	10226.8	0	5	6.14	5.12
			DD/SF	1048969	29.7	5	1126284	21600.12	4991.4	0	5	6.58	6.29
			DD/DF	1039768	19.43	5	1111136	21600.14	10367.4	0	5	6.34	5.11
		10	SD/SF	1297962	60.04	5	1364850	21600.18	3827.6	0	5	4.43	4.79
			SD/DF	1177154	21.74	5	1246946	21600.18	8800	0	5	5.13	5.01
			DD/SF	1282670	31.12	5	1348036	21600.16	3930.6	0	5	4.69	4.68
			DD/DF	1177630	20.88	5	1242538	21600.16	8977.6	0	5	5.1	4.52
		15	SD/SF	1398120	50.96	5	1464284	21600.12	3821.8	0	5	3.89	4.46
			SD/DF	1290536	24.27	5	1355846	21600.14	9937.6	0	5	4.49	4.34
			DD/SF	1353372	36.07	5	1422930	21600.14	4901.2	0	5	4.18	4.77
			DD/DF	1289076	16.13	5	1351150	21600.16	9967.8	0	5	4.48	4.16
		20	SD/SF	1499246	39.57	5	1559126	21600.18	4177	0	5	3.09	3.8
			SD/DF	1354364	17.28	5	1412374	21600.18	9413.6	0	5	3.97	3.73
			DD/SF	1450198	28.01	5	1507716	21600.24	6192	0	5	3.67	3.74
			DD/DF	1361080	21.61	5	1420456	21600.18	10740	0	5	4.02	3.73

Table 107: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	1.74	5	446877	735.6	8600.6	5	5	4.03	0
			SD/DF	403801	0.74	5	424997	383.14	6224.6	5	5	4.99	0
			DD/SF	385405	0.74	5	402269	2001.67	22965	5	5	4.19	0
			DD/DF	410285	0.39	5	430282	256.26	4651.2	5	5	4.65	0
		10	SD/SF	528271	0.76	5	548211	3271.68	56322	5	5	3.64	0
			SD/DF	460505	0.57	5	480341	437.84	7567	5	5	4.13	0
			DD/SF	460459	1.21	5	477791	3193.97	61546.8	5	5	3.62	0
			DD/DF	455047	0.47	5	474095	292.25	7283.2	5	5	4.02	0
		15	SD/SF	544803	0.86	5	562957	5364.21	141736	5	5	3.23	0
			SD/DF	488013	0.57	5	506082	1250.56	22959	5	5	3.57	0
			DD/SF	497325	0.94	5	513473	5580.55	124503.4	5	5	3.14	0
			DD/DF	496303	0.96	5	514270	524.74	12228.2	5	5	3.49	0
		20	SD/SF	587024	2.17	5	604929	15928.02	475066.8	3	5	2.95	0.01
			SD/DF	537969	1.14	5	556404	1170.36	27262.6	5	5	3.32	0
			DD/SF	563950	0.94	5	581671	2311.06	62972.8	5	5	3.04	0
			DD/DF	540296	0.6	5	558512	1888.88	41684.4	5	5	3.26	0
	100	5	SD/SF	505200	3.06	5	113044	957.58	2796.4	1	1	4.1	0
			SD/DF	447964	1.18	5	-	-	-	0	0	5.01	-
			DD/SF	462641	1.89	5	-	-	-	0	0	4.53	-
			DD/DF	449879	1.18	5	-	-	-	0	0	4.95	-
		10	SD/SF	557728	2.85	5	-	-	-	0	0	3.47	-
			SD/DF	512576	1.17	5	-	-	-	0	0	4.21	-
			DD/SF	509694	2.03	5	-	-	-	0	0	3.47	-
			DD/DF	499303	1.19	5	-	-	-	0	0	4.11	-
		15	SD/SF	611769	2.59	5	-	-	-	0	0	3.17	-
			SD/DF	543244	1.26	5	-	-	-	0	0	3.52	-
			DD/SF	591686	2.04	5	-	-	-	0	0	3.11	-
			DD/DF	555804	1.22	5	-	-	-	0	0	3.67	-
		20	SD/SF	644781	2.7	5	-	-	-	0	0	2.71	-
			SD/DF	593846	1.35	5	-	-	-	0	0	3.19	-
			DD/SF	657296	2.1	5	-	-	-	0	0	2.91	-
			DD/DF	607747	1.32	5	-	-	-	0	0	3.3	-
	200	5	SD/SF	569618	7.46	5	599411	20257.72	20505.4	1	5	4.87	0.9
			SD/DF	528633	2.76	5	561690	21600.22	48116.6	0	5	5.88	0.56
			DD/SF	572697	4.7	5	606399	21600	26033.2	0	5	5.52	0.83
			DD/DF	520104	2.67	5	554693	21600	82658.4	0	5	6.23	0.47
		10	SD/SF	628815	8.32	5	652836	21600.04	13942	0	5	3.63	0.61
			SD/DF	594883	2.97	5	624676	21600.06	14537.6	0	5	4.74	0.73
			DD/SF	624945	5.35	5	651514	21600.04	10089.4	0	5	3.97	0.96
			DD/DF	598889	2.91	5	629631	21600.04	14630.8	0	5	4.86	1.06
		15	SD/SF	690509	7.64	5	713959	21600.06	11002.6	0	5	3.11	0.8
			SD/DF	655199	3.07	5	683677	21600.02	26864	0	5	4.07	0.55
			DD/SF	669310	5.6	5	694291	21600.08	13650.2	0	5	3.48	1.39
			DD/DF	652286	3.02	5	679935	21600.02	37387.2	0	5	4.05	0.45
		20	SD/SF	779687	7.38	5	800795	21600	35239.8	0	5	2.61	0.3
			SD/DF	712413	3.58	5	739148	21600	59434.4	0	5	3.61	0.22
			DD/SF	793928	4.97	5	817480	21600.06	39384.4	0	5	2.86	0.58
			DD/DF	707414	2.92	5	736261	21600.04	18757.8	0	5	3.87	0.88

Table 108: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	11.24	5	937072	21600	22303.4	0	5	4.18	0.38
			SD/DF	796336	2.5	5	835397	21600.04	44526.8	0	5	4.67	0.38
			DD/SF	872759	4.99	5	912126	21600.02	33032.6	0	5	4.29	0.43
			DD/DF	782472	2.52	5	819889	21600	55140.4	0	5	4.56	0.3
		10	SD/SF	988970	15.11	5	1027255	21600.06	33927.6	0	5	3.66	0.33
			SD/DF	865903	5.2	5	902497	21600	56137.4	0	5	4.04	0.27
			DD/SF	889921	7.99	5	924734	21600.06	45922.6	0	5	3.71	0.41
			DD/DF	872091	3.33	5	729660	17280	54834	0	4	4.1	0.25
		15	SD/SF	1027278	19.2	5	1063850	21600.04	39125.6	0	5	3.37	0.27
			SD/DF	928027	5.97	5	587922	12960.04	53137	0	3	3.84	0.14
			DD/SF	966112	9.33	5	1000001	21600.02	55045.8	0	5	3.36	0.28
			DD/DF	943337	5.17	5	979565	21184.02	94952.8	1	5	3.69	0.21
		20	SD/SF	1152620	22.31	5	1191862	21600.04	45972.2	0	5	3.23	0.91
			SD/DF	989738	6.67	5	1024637	20231.14	73204.2	1	5	3.4	0.09
			DD/SF	1063545	12.12	5	1098933	21600.04	57667.4	0	5	3.19	0.3
			DD/DF	988115	6.34	5	1022859	21600.06	87835.2	0	5	3.37	0.17
	100	5	SD/SF	965837	28.17	5	1011779	21600.06	4938.2	0	5	4.51	1.69
			SD/DF	898972	6.15	5	948208	21600.1	9066.2	0	5	5.12	1.08
			DD/SF	954937	12.1	5	1004200	21600.08	5977.2	0	5	4.76	2.49
			DD/DF	894795	4.77	5	943105	21600.1	8642	0	5	5.09	1.65
		10	SD/SF	1080958	36.07	5	1124692	21600.1	8748	0	5	3.67	3.62
			SD/DF	981578	9.14	5	1023944	21600.06	15368.6	0	5	4.13	0.63
			DD/SF	1104850	15.95	5	1150340	21600.1	12473.2	0	5	3.86	1.81
			DD/DF	989702	4.31	5	827488	17280.04	14191.6	0	4	4.17	0.92
		15	SD/SF	1137666	37.97	5	1177742	21600.1	10838.6	0	5	3.28	1.61
			SD/DF	1051078	10.11	5	1092630	21600.1	17759.6	0	5	3.78	0.45
			DD/SF	1146308	18.08	5	1188884	21600.08	10556.6	0	5	3.4	1.1
			DD/DF	1065138	6.23	5	1105132	21600.06	18203.2	0	5	3.58	0.96
		20	SD/SF	1249248	53.03	5	1289634	21600.1	12466.2	0	5	2.97	1.02
			SD/DF	1132818	13.82	5	1172918	21600.1	18748.8	0	5	3.35	0.48
			DD/SF	1231130	19.87	5	1272294	21600.1	12468.8	0	5	3.17	1.5
			DD/DF	1143164	7.82	5	1183550	21600.1	22540.8	0	5	3.39	0.52
	200	5	SD/SF	1126150	70.48	5	1199750	21600.14	3567.8	0	5	5.85	4.43
			SD/DF	1045790	16.2	5	1118856	21600.12	2953.8	0	5	6.14	4.18
			DD/SF	1048969	23.11	5	1126734	21600.16	3147.6	0	5	6.58	5.86
			DD/DF	1039768	10.77	5	1114846	21600.14	3055.4	0	5	6.34	4.24
		10	SD/SF	1297962	80.21	5	1364364	21600.14	2961.6	0	5	4.43	3.25
			SD/DF	1177154	19.03	5	1244672	21600.22	4436.8	0	5	5.13	3.61
			DD/SF	1282670	38.84	5	1350908	21600.12	4947.4	0	5	4.69	2.34
			DD/DF	1177630	15.82	5	1243854	21600.18	3894	0	5	5.1	3.95
		15	SD/SF	1398120	98.43	5	1462562	21600.16	3118	0	5	3.89	2.95
			SD/DF	1290536	22.98	5	1353114	21600.18	4348	0	5	4.49	2.81
			DD/SF	1353372	42.59	5	1423950	21600.14	4338.2	0	5	4.18	3.31
			DD/DF	1289076	14.56	5	1350162	21600.18	6355	0	5	4.48	2.05
		20	SD/SF	1499246	97.21	5	1548762	21600.16	4587.2	0	5	3.09	1.78
			SD/DF	1354364	23.97	5	1411684	21600.16	6043.4	0	5	3.97	2.43
			DD/SF	1450198	42.12	5	1508816	21600.12	5816.8	0	5	3.67	2.45
			DD/DF	1361080	13.45	5	1421488	21600.16	6247.4	0	5	4.02	2.3

Table 109: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	1.15	5	446877	467.79	5819.8	5	5	4.03	0
			SD/DF	403797	0.33	5	424997	220.9	4104.2	5	5	4.99	0
			DD/SF	385405	0.42	5	402269	2001.12	28024.2	5	5	4.19	0
			DD/DF	410281	0.21	5	430282	140.39	2948.2	5	5	4.65	0
		10	SD/SF	528271	0.54	5	548211	2255.93	45864.2	5	5	3.64	0
			SD/DF	460503	0.23	5	480341	113.04	2929.6	5	5	4.13	0
			DD/SF	460459	0.34	5	477791	1287.76	23982.2	5	5	3.62	0
			DD/DF	455042	0.24	5	474095	108.65	3430.6	5	5	4.02	0
		15	SD/SF	544803	0.65	5	562957	4889.23	168841.4	5	5	3.23	0
			SD/DF	488006	0.29	5	506082	222.63	8079.2	5	5	3.57	0
			DD/SF	497325	0.47	5	513473	2671.91	89987.2	5	5	3.14	0
			DD/DF	496301	0.27	5	514270	203.28	7140.2	5	5	3.49	0
		20	SD/SF	587024	0.57	5	493379	8789.57	434611	4	4	2.95	0
			SD/DF	537968	0.37	5	556404	341.41	14527	5	5	3.32	0
			DD/SF	563950	0.46	5	581671	1480.42	51379.2	5	5	3.04	0
			DD/DF	540293	0.29	5	558512	510.43	19573.2	5	5	3.26	0
	100	5	SD/SF	505200	3.06	5	-	-	-	0	0	4.1	-
			SD/DF	447959	1.37	5	-	-	-	0	0	5.01	-
			DD/SF	462641	2.69	5	-	-	-	0	0	4.53	-
			DD/DF	449824	0.86	5	-	-	-	0	0	4.96	-
		10	SD/SF	557728	1.84	5	-	-	-	0	0	3.47	-
			SD/DF	512537	0.72	5	-	-	-	0	0	4.22	-
			DD/SF	509694	1.05	5	-	-	-	0	0	3.47	-
			DD/DF	499277	0.66	5	-	-	-	0	0	4.11	-
		15	SD/SF	611769	2.41	5	-	-	-	0	0	3.17	-
			SD/DF	543228	1	5	-	-	-	0	0	3.53	-
			DD/SF	591686	0.92	5	-	-	-	0	0	3.11	-
			DD/DF	555793	0.78	5	-	-	-	0	0	3.67	-
		20	SD/SF	644781	1.46	5	-	-	-	0	0	2.71	-
			SD/DF	593827	0.81	5	-	-	-	0	0	3.19	-
			DD/SF	657296	1	5	-	-	-	0	0	2.91	-
			DD/DF	607732	0.9	5	-	-	-	0	0	3.3	-
	200	5	SD/SF	569618	9.54	5	599076	21600.06	9713	0	5	4.87	1.06
			SD/DF	528623	2.5	5	561825	21600.02	25131.2	0	5	5.89	0.48
			DD/SF	572697	4.53	5	606874	21600.1	7131	0	5	5.52	1.48
			DD/DF	520085	1.81	5	554916	21600.04	14634.2	0	5	6.23	0.77
		10	SD/SF	628815	7.65	5	653615	21600.04	9782.8	0	5	3.63	1.01
			SD/DF	594838	2.14	5	624749	21058.68	25727	1	5	4.75	0.61
			DD/SF	624945	4.27	5	651178	21600.06	10483.6	0	5	3.97	0.91
			DD/DF	598859	1.89	5	629659	19951.98	26888.4	1	5	4.87	0.54
		15	SD/SF	690509	6.63	5	713844	21600.08	13405	0	5	3.11	0.8
			SD/DF	655158	2.15	5	683258	21600.04	44858.4	0	5	4.08	0.3
			DD/SF	669310	3.95	5	694516	21600.1	12662.4	0	5	3.48	1.26
			DD/DF	652245	2.32	5	680056	21600.02	66581	0	5	4.06	0.31
		20	SD/SF	779687	4.98	5	800950	21600.02	19122.6	0	5	2.61	0.34
			SD/DF	712385	2.24	5	739171	19179.34	67193.2	2	5	3.62	0.14
			DD/SF	793928	2.93	5	817712	21600.08	30993.6	0	5	2.86	0.28
			DD/DF	707372	2.22	5	735969	21600	101412.8	0	5	3.87	0.2

Table 110: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	1.77	5	940376	21600	16987.8	0	5	4.18	1.44
			SD/DF	796304	0.52	5	666833	16265.78	78988	1	4	4.67	0.11
			DD/SF	872759	0.75	5	916502	21600.06	30101.6	0	5	4.29	1.42
			DD/DF	782454	0.47	5	819834	17724.82	107036.4	3	5	4.56	0.02
		10	SD/SF	988970	1.82	5	1026819	21600.08	29527	0	5	3.66	0.3
			SD/DF	865887	0.79	5	178920	945.65	5996.4	1	1	4.04	0
			DD/SF	889921	1.18	5	538020	12960.08	33622.6	0	3	3.71	0.19
			DD/DF	872061	0.75	5	543970	9982.85	53006.4	1	3	4.1	0.06
		15	SD/SF	1027278	3.01	5	1063294	21600.08	35611	0	5	3.37	0.22
			SD/DF	927997	1.09	5	197273	4320	32843.6	0	1	3.84	0
			DD/SF	966112	1.7	5	795144	17280.18	43962	0	4	3.36	0.2
			DD/DF	943319	1.07	5	781645	6176.36	49007.2	3	4	3.69	0.01
		20	SD/SF	1152620	4.37	5	938718	17280.08	35773.2	0	4	3.23	0.13
			SD/DF	989717	1.54	5	614510	4878.78	38852.4	3	3	3.4	0
			DD/SF	1063545	2.35	5	482320	8640.02	25791.4	0	2	3.19	0.06
			DD/DF	988091	1.41	5	198409	1807.13	12826.6	1	1	3.37	0
	100	5	SD/SF	965837	7.9	5	614212	12960.04	2876.2	0	3	4.51	1.59
			SD/DF	898910	1.51	5	949100	21600.06	9878.2	0	5	5.12	1.24
			DD/SF	954937	3.27	5	1011598	21600.08	7321.2	0	5	4.76	2.74
			DD/DF	894746	1.6	5	947165	21600.04	10909.6	0	5	5.1	2.05
		10	SD/SF	1080958	7.82	5	1124796	21600.12	6522.4	0	5	3.67	0.91
			SD/DF	981489	2.21	5	818332	17280.02	21995.2	0	4	4.14	0.41
			DD/SF	1104850	3.84	5	1151374	21600.16	14664	0	5	3.86	0.9
			DD/DF	989647	2.17	5	1033286	21600.08	31277.6	0	5	4.18	0.48
		15	SD/SF	1137666	9.25	5	1178076	21600.08	10055.6	0	5	3.28	0.66
			SD/DF	1051028	3.22	5	1092578	21600.04	34592.8	0	5	3.78	0.28
			DD/SF	1146308	5.98	5	1187506	21600.1	16646.4	0	5	3.4	0.62
			DD/DF	1065056	3.29	5	883070	17280.02	39666	0	4	3.58	0.14
		20	SD/SF	1249248	13.16	5	1288892	21600.06	8469.2	0	5	2.97	0.75
			SD/DF	1132782	3.87	5	714066	12960.08	28722.6	0	3	3.36	0.09
			DD/SF	1231130	7.47	5	1271854	21600.14	15844.2	0	5	3.17	0.47
			DD/DF	1143060	4.02	5	948372	17280.08	26874.6	0	4	3.4	0.15
	200	5	SD/SF	1126150	42.22	5	-	-	-	0	0	5.85	-
			SD/DF	1045784	4.08	5	-	-	-	0	0	6.14	-
			DD/SF	1048969	10.73	5	-	-	-	0	0	6.58	-
			DD/DF	1039716	3.59	5	-	-	-	0	0	6.34	-
		10	SD/SF	1297962	33.34	5	-	-	-	0	0	4.43	-
			SD/DF	1177016	5.59	5	-	-	-	0	0	5.14	-
			DD/SF	1282670	15.29	5	-	-	-	0	0	4.69	-
			DD/DF	1177534	6.79	5	-	-	-	0	0	5.1	-
		15	SD/SF	1398120	48.18	5	-	-	-	0	0	3.89	-
			SD/DF	1290384	9.17	5	-	-	-	0	0	4.5	-
			DD/SF	1353372	21.64	5	-	-	-	0	0	4.18	-
			DD/DF	1288950	9.35	5	-	-	-	0	0	4.49	-
		20	SD/SF	1499246	52.5	5	-	-	-	0	0	3.09	-
			SD/DF	1354198	11.94	5	-	-	-	0	0	3.98	-
			DD/SF	1450198	28.19	5	-	-	-	0	0	3.67	-
			DD/DF	1360916	12.06	5	-	-	-	0	0	4.03	-

Table 111: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	0.6	5	446877	541.52	16054.2	5	5	4.03	0
			SD/DF	403801	0.41	5	424997	220.8	11272	5	5	4.99	0
			DD/SF	385405	0.58	5	402269	673.36	25830.6	5	5	4.19	0
			DD/DF	410285	0.39	5	430282	163.86	7228.6	5	5	4.65	0
		10	SD/SF	528271	0.67	5	548211	1386.19	58221.8	5	5	3.64	0
			SD/DF	460505	0.46	5	480341	155.53	8572.8	5	5	4.13	0
			DD/SF	460459	0.6	5	477791	1056.81	53947.8	5	5	3.62	0
			DD/DF	455047	0.58	5	474095	190.68	11756.6	5	5	4.02	0
		15	SD/SF	544803	0.99	5	562957	2079.5	165662.2	5	5	3.23	0
			SD/DF	488013	0.56	5	506082	576.11	34194.2	5	5	3.57	0
			DD/SF	497325	1.17	5	513473	2693.17	161207	5	5	3.14	0
			DD/DF	496303	0.69	5	514270	372.8	27291.6	5	5	3.49	0
		20	SD/SF	587024	0.49	5	604928	9861.54	866786	5	5	2.95	0
			SD/DF	537969	0.34	5	556404	549.8	36271.4	5	5	3.32	0
			DD/SF	563950	0.42	5	581671	1900.25	116251.2	5	5	3.04	0
			DD/DF	540296	0.39	5	558512	1115.57	76844.2	5	5	3.26	0
	100	5	SD/SF	505200	1.02	5	-	-	-	0	0	4.1	-
			SD/DF	447964	0.66	5	-	-	-	0	0	5.01	-
			DD/SF	462641	0.97	5	-	-	-	0	0	4.53	-
			DD/DF	449879	0.68	5	-	-	-	0	0	4.95	-
		10	SD/SF	557728	0.96	5	-	-	-	0	0	3.47	-
			SD/DF	512576	0.67	5	-	-	-	0	0	4.21	-
			DD/SF	509694	0.92	5	-	-	-	0	0	3.47	-
			DD/DF	499303	0.66	5	-	-	-	0	0	4.11	-
		15	SD/SF	611769	1.13	5	-	-	-	0	0	3.17	-
			SD/DF	543244	0.67	5	-	-	-	0	0	3.52	-
			DD/SF	591686	0.9	5	-	-	-	0	0	3.11	-
			DD/DF	555804	0.71	5	-	-	-	0	0	3.67	-
		20	SD/SF	644781	1.03	5	-	-	-	0	0	2.71	-
			SD/DF	593846	0.92	5	-	-	-	0	0	3.19	-
			DD/SF	657296	0.96	5	-	-	-	0	0	2.91	-
			DD/DF	607747	0.7	5	-	-	-	0	0	3.3	-
	200	5	SD/SF	569618	2.79	5	598812	21600.1	48786	0	5	4.87	0.54
			SD/DF	528633	1.79	5	561692	21600.1	165828.8	0	5	5.88	0.39
			DD/SF	572697	2.42	5	606289	21600.1	63899.4	0	5	5.52	0.71
			DD/DF	520104	1.93	5	554627	21198.76	189815	1	5	6.23	0.32
		10	SD/SF	628815	2.82	5	524673	17280.08	58412.8	0	4	3.63	0.67
			SD/DF	594883	1.56	5	499861	17280.08	128038.4	0	4	4.74	0.55
			DD/SF	624945	2.29	5	650929	21600.12	52133.4	0	5	3.97	1.09
			DD/DF	598889	1.65	5	503157	17280.2	153506.8	0	4	4.86	0.44
		15	SD/SF	690509	2.69	5	712851	21600.1	58830.4	0	5	3.11	0.77
			SD/DF	655199	1.49	5	414285	12960.08	144103.8	0	3	4.07	0.28
			DD/SF	669310	2.4	5	693709	21600.1	72393	0	5	3.48	0.63
			DD/DF	652286	1.53	5	412174	12960.06	156728.2	0	3	4.05	0.35
		20	SD/SF	779687	2.71	5	313299	8640.54	64245.4	0	2	2.61	0.12
			SD/DF	712413	1.47	5	739228	21600.32	246768.4	0	5	3.61	0.37
			DD/SF	793928	2	5	817891	21600.1	73741	0	5	2.86	0.67
			DD/DF	707414	1.5	5	735970	21600.1	155519.2	0	5	3.87	0.51

Table 112: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	10.75	5	939540	21600.1	21842.4	0	5	4.18	4.33
			SD/DF	796336	3.81	5	836681	21600.14	80827.2	0	5	4.67	3.49
			DD/SF	872759	6.92	5	913266	21600.12	36339.4	0	5	4.29	4.25
			DD/DF	782472	3.83	5	820895	21600.2	71837.6	0	5	4.56	3.15
		10	SD/SF	988970	14.91	5	1029467	21600.1	25836.4	0	5	3.66	3.86
			SD/DF	865903	4.39	5	903433	21600.1	79886	0	5	4.04	2.67
			DD/SF	889921	7.49	5	925784	21600.1	38724.6	0	5	3.71	3.69
			DD/DF	872091	4.01	5	910289	21600.1	61948.6	0	5	4.1	3.09
		15	SD/SF	1027278	16.25	5	1065496	21600.12	32647.2	0	5	3.37	3.53
			SD/DF	928027	5.22	5	966121	21600.16	51961	0	5	3.84	2.94
			DD/SF	966112	9.46	5	1002046	21600.12	46349	0	5	3.36	3.42
			DD/DF	943337	5.04	5	980123	21600.12	58970	0	5	3.69	2.69
		20	SD/SF	1152620	15.03	5	1193112	21600.28	43385	0	5	3.23	3.35
			SD/DF	989738	4.7	5	1025700	21605.4	46587.4	0	5	3.4	2.46
			DD/SF	1063545	7.55	5	1099867	21600.28	44477.8	0	5	3.19	3.13
			DD/DF	988115	4.84	5	1024524	21600.14	66281.4	0	5	3.37	2.05
	100	5	SD/SF	965837	16.58	5	1013021	21600.2	8211	0	5	4.51	4.46
			SD/DF	898972	7.97	5	949921	21600.18	29212.2	0	5	5.12	4.04
			DD/SF	954937	11.09	5	1004665	21600.18	12746.2	0	5	4.76	4.66
			DD/DF	894795	8.28	5	944915	21600.14	26953.2	0	5	5.09	3.85
		10	SD/SF	1080958	20.41	5	1126327	21600.2	8382.6	0	5	3.67	3.97
			SD/DF	981578	6.37	5	1024956	21600.22	22932.4	0	5	4.13	3.27
			DD/SF	1104850	19.82	5	1153636	21600.2	13995	0	5	3.86	4.09
			DD/DF	989702	12.3	5	1034222	21600.2	29261.8	0	5	4.17	2.79
		15	SD/SF	1137666	22.59	5	1180166	21600.22	10077.2	0	5	3.28	3.54
			SD/DF	1051078	6.77	5	1094060	21600.26	22124.4	0	5	3.78	3.21
			DD/SF	1146308	11.73	5	1190384	21600.2	13200.6	0	5	3.4	3.55
			DD/DF	1065138	6.83	5	1106366	21600.26	17465.8	0	5	3.58	2.86
		20	SD/SF	1249248	22.42	5	1289492	21600.22	10877.6	0	5	2.97	3.08
			SD/DF	1132818	6.66	5	1173566	21600.22	19409.6	0	5	3.35	2.62
			DD/SF	1231130	21.17	5	1274498	21600.2	14066.2	0	5	3.17	3.27
			DD/DF	1143164	12.13	5	1184712	21600.24	22385	0	5	3.39	2.44
	200	5	SD/SF	1126150	47.68	5	1197500	21600.34	3551.6	0	5	5.85	5.6
			SD/DF	1045790	21.75	5	1114780	21600.44	9502.2	0	5	6.14	4.92
			DD/SF	1048969	32.37	5	1128020	21600.34	4100.6	0	5	6.58	6.42
			DD/DF	1039768	23.8	5	1113374	21600.34	10680.8	0	5	6.34	5.1
		10	SD/SF	1297962	43.73	5	1359738	21600.4	4128.2	0	5	4.43	4.41
			SD/DF	1177154	16.12	5	1242974	21600.4	9299.4	0	5	5.13	4.45
			DD/SF	1282670	30.56	5	1349446	21600.36	4385.4	0	5	4.69	4.77
			DD/DF	1177630	17.74	5	1241692	21600.34	8876.2	0	5	5.1	4.26
		15	SD/SF	1398120	47.96	5	1461416	21600.36	4105.2	0	5	3.89	4.28
			SD/DF	1290536	15.95	5	1354340	21600.34	10739.6	0	5	4.49	4.07
			DD/SF	1353372	36.57	5	1419328	21600.32	4733	0	5	4.18	4.53
			DD/DF	1289076	16.3	5	1352408	21600.38	11254.4	0	5	4.48	4.07
		20	SD/SF	1499246	58.39	5	1555028	21600.4	4865.8	0	5	3.09	3.56
			SD/DF	1354364	16.7	5	1412422	21600.38	9651.6	0	5	3.97	3.46
			DD/SF	1450198	34.25	5	1518600	21600.34	6037.2	0	5	3.67	4.42
			DD/DF	1361080	17.58	5	1420700	21600.4	11151.8	0	5	4.02	3.54

Table 113: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	0.78	5	446877	757.15	11003.2	5	5	4.03	0
			SD/DF	403801	0.38	5	424997	310.83	8079.6	5	5	4.99	0
			DD/SF	385405	0.53	5	402269	1708.99	34629.2	5	5	4.19	0
			DD/DF	410285	0.38	5	430282	195.41	7095.4	5	5	4.65	0
		10	SD/SF	528271	0.58	5	548211	3211.38	68172.4	5	5	3.64	0
			SD/DF	460505	0.34	5	480341	601.19	12451	5	5	4.13	0
			DD/SF	460459	0.51	5	477791	3597.07	66224.4	5	5	3.62	0
			DD/DF	455047	0.39	5	474095	311.94	9382.4	5	5	4.02	0
		15	SD/SF	544803	0.7	5	562957	7050.8	215558.6	4	5	3.23	0
			SD/DF	488013	0.49	5	506082	1078.87	30514.8	5	5	3.57	0
			DD/SF	497325	0.7	5	513473	6832.14	195347	5	5	3.14	0
			DD/DF	496303	0.36	5	514270	474.55	14475.6	5	5	3.49	0
		20	SD/SF	587024	0.97	5	604936	18907.72	532083.2	3	5	2.95	0.01
			SD/DF	537969	0.61	5	556404	957.75	32778.8	5	5	3.32	0
			DD/SF	563950	0.68	5	581671	2751.04	80045	5	5	3.04	0
			DD/DF	540296	0.7	5	558512	1741.02	43254.6	5	5	3.26	0
	100	5	SD/SF	505200	2.12	5	-	-	-	0	0	4.1	-
			SD/DF	447964	1.01	5	-	-	-	0	0	5.01	-
			DD/SF	462641	1.41	5	-	-	-	0	0	4.53	-
			DD/DF	449879	0.96	5	-	-	-	0	0	4.95	-
		10	SD/SF	557728	1.44	5	453575	14312.83	71968.6	1	4	3.47	0.05
			SD/DF	512576	0.9	5	535146	3346.56	37933.4	5	5	4.21	0
			DD/SF	509694	1.08	5	528041	21600	105983.6	0	5	3.47	0.19
			DD/DF	499303	0.99	5	520675	5933.3	74498.8	5	5	4.11	0
		15	SD/SF	611769	1.43	5	631911	21600	80845.4	0	5	3.17	0.16
			SD/DF	543244	0.97	5	563077	14290.14	110727.6	4	5	3.52	0.03
			DD/SF	591686	1.27	5	610758	19285.94	85478.6	1	5	3.11	0.11
			DD/DF	555804	0.96	5	576969	9471.17	75417.8	4	5	3.67	0.04
		20	SD/SF	644781	1.29	5	662889	21600.02	106386.4	0	5	2.71	0.09
			SD/DF	593846	0.99	5	613442	15792.53	95638.6	3	5	3.19	0.03
			DD/SF	657296	1.22	5	677049	21600.02	113618.4	0	5	2.91	0.08
			DD/DF	607747	1.06	5	628442	11869.25	123604	5	5	3.3	0
	200	5	SD/SF	569618	5.27	5	599219	21600.12	9751.8	0	5	4.87	1.11
			SD/DF	528633	2.95	5	561692	21600.1	74230.4	0	5	5.88	0.57
			DD/SF	572697	3.97	5	606342	21600.28	35557	0	5	5.52	0.9
			DD/DF	520104	2.92	5	554670	21020.16	67346.8	1	5	6.23	0.48
		10	SD/SF	628815	4.61	5	653021	21600.1	9512	0	5	3.63	0.77
			SD/DF	594883	2.06	5	624796	21600.14	44454	0	5	4.74	0.9
			DD/SF	624945	3.08	5	651048	21600.08	27515	0	5	3.97	0.99
			DD/DF	598889	2.14	5	503205	17280.08	44080.4	0	4	4.86	0.66
		15	SD/SF	690509	3.53	5	713839	21600.1	15393	0	5	3.11	1.18
			SD/DF	655199	1.9	5	683163	21600.08	100208.4	0	5	4.07	0.5
			DD/SF	669310	3.11	5	694538	21600.08	12398	0	5	3.48	1.32
			DD/DF	652286	2.13	5	680160	21600.1	29909	0	5	4.05	0.61
		20	SD/SF	779687	3.23	5	800803	21600.1	18740.4	0	5	2.61	0.34
			SD/DF	712413	2.08	5	739654	21600.1	32673.4	0	5	3.61	0.53
			DD/SF	793928	2.71	5	817861	21600.14	19855.6	0	5	2.86	0.41
			DD/DF	707414	2.16	5	736722	21600.12	26488.4	0	5	3.87	0.7

Table 114: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	12.11	5	937341	21600.1	32485.6	0	5	4.18	0.45
			SD/DF	796336	2.38	5	835558	21600.24	128486.2	0	5	4.67	0.36
			DD/SF	872759	3.53	5	713913	17280.1	41153.8	0	4	4.29	0.37
			DD/DF	782472	3.1	5	492176	12960.22	73435.6	0	3	4.56	0.15
		10	SD/SF	988970	13.48	5	1027219	21600.16	41977.2	0	5	3.66	0.34
			SD/DF	865903	3.17	5	540692	12960.3	46461	0	3	4.04	0.1
			DD/SF	889921	4.31	5	740911	17280.26	39726.8	0	4	3.71	0.34
			DD/DF	872091	3.35	5	364244	8640.08	26346.6	0	2	4.1	0.14
		15	SD/SF	1027278	25.58	5	1064004	21600.1	41528	0	5	3.37	0.29
			SD/DF	928027	4.22	5	965171	21600.14	88752.4	0	5	3.84	0.28
			DD/SF	966112	5.95	5	418572	8640.04	22326.2	0	2	3.36	0.1
			DD/DF	943337	4.78	5	592611	12960.1	68551	0	3	3.69	0.03
		20	SD/SF	1152620	22.08	5	1191754	21600.14	39565.2	0	5	3.23	0.78
			SD/DF	989738	6.69	5	819937	17280.16	56404.8	0	4	3.4	0.07
			DD/SF	1063545	9.35	5	459000	8640.12	16077.4	0	2	3.19	0.62
			DD/DF	988115	6.24	5	612407	12960.2	50403.4	0	3	3.37	0.12
	100	5	SD/SF	965837	38.49	5	1012352	21600.14	6521.2	0	5	4.51	1.18
			SD/DF	898972	7.45	5	947643	21600.16	24598.4	0	5	5.12	1.05
			DD/SF	954937	12.81	5	1002870	21600.16	10147.4	0	5	4.76	1.28
			DD/DF	894795	8	5	943077	21600.14	45566.4	0	5	5.09	1.06
		10	SD/SF	1080958	40.43	5	1122091	21600.16	10307.8	0	5	3.67	0.66
			SD/DF	981578	6.4	5	1024174	21600.16	35052.6	0	5	4.13	0.69
			DD/SF	1104850	10.95	5	1150568	21600.18	11423.8	0	5	3.86	1.94
			DD/DF	989702	6.36	5	1033038	21600.14	22264	0	5	4.17	0.71
		15	SD/SF	1137666	44.12	5	1176578	21600.2	11872.2	0	5	3.28	0.54
			SD/DF	1051078	7.82	5	1092858	21600.18	14353	0	5	3.78	0.55
			DD/SF	1146308	11.6	5	1186946	21600.16	12068	0	5	3.4	1.15
			DD/DF	1065138	7.59	5	1105130	21600.16	23576.6	0	5	3.58	0.54
		20	SD/SF	1249248	67.05	5	1287628	21600.22	11451	0	5	2.97	0.38
			SD/DF	1132818	9.94	5	1172484	21600.2	22952.2	0	5	3.35	0.44
			DD/SF	1231130	17.26	5	1271740	21600.24	14428.4	0	5	3.17	0.98
			DD/DF	1143164	9.67	5	1183570	21600.2	20874.2	0	5	3.39	0.45
	200	5	SD/SF	1126150	137.97	5	1198408	21600.3	2742.6	0	5	5.85	4.56
			SD/DF	1045790	28.22	5	1118210	21600.32	4233.8	0	5	6.14	4.47
			DD/SF	1048969	49.63	5	1124158	21600.34	3382.2	0	5	6.58	5.68
			DD/DF	1039768	30.52	5	1113004	21600.24	4836	0	5	6.34	4.71
		10	SD/SF	1297962	122.01	5	1362332	21600.34	2914	0	5	4.43	3.15
			SD/DF	1177154	16.56	5	1242448	21600.38	13397.8	0	5	5.13	3.49
			DD/SF	1282670	39.56	5	1349222	21600.34	4708.4	0	5	4.69	3.23
			DD/DF	1177630	18.97	5	1242562	21600.32	6400.4	0	5	5.1	3.17
		15	SD/SF	1398120	108.07	5	1457548	21600.32	3793.8	0	5	3.89	2.66
			SD/DF	1290536	16.44	5	1354312	21600.36	7797.6	0	5	4.49	2.58
			DD/SF	1353372	34.8	5	1414096	21600.4	4836	0	5	4.18	2.67
			DD/DF	1289076	16.27	5	1352012	21600.36	5625.8	0	5	4.48	3.54
		20	SD/SF	1499246	114.64	5	1553776	21600.36	4251.2	0	5	3.09	2.08
			SD/DF	1354364	18.89	5	1412410	21600.32	5339.4	0	5	3.97	2.4
			DD/SF	1450198	56.11	5	1507472	21600.36	6028.6	0	5	3.67	3.2
			DD/DF	1361080	21.31	5	1420348	21600.3	6741.2	0	5	4.02	2.22

Table 115: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	428826	0.74	5	446877	545.17	6017.8	5	5	4.03	0
			SD/DF	403797	0.3	5	424997	335.47	6891	5	5	4.99	0
			DD/SF	385405	0.52	5	402269	1526.6	20582.2	5	5	4.19	0
			DD/DF	410281	0.29	5	430282	186.72	4172.4	5	5	4.65	0
		10	SD/SF	528271	0.79	5	548211	2487.09	41797.8	5	5	3.64	0
			SD/DF	460503	0.3	5	480341	342.47	6938.8	5	5	4.13	0
			DD/SF	460459	0.82	5	477791	2647.54	50207.8	5	5	3.62	0
			DD/DF	455042	0.28	5	474095	262.89	5412.4	5	5	4.02	0
		15	SD/SF	544803	0.69	5	562957	6732.15	163867.6	5	5	3.23	0
			SD/DF	488006	0.34	5	506082	736.3	14513.4	5	5	3.57	0
			DD/SF	497325	0.51	5	513473	5821.2	117820	5	5	3.14	0
			DD/DF	496301	0.3	5	514270	310.47	10091.2	5	5	3.49	0
		20	SD/SF	587024	0.85	5	604928	17377.6	492962	5	5	2.95	0
			SD/DF	537968	0.47	5	556404	663.97	21070.6	5	5	3.32	0
			DD/SF	563950	1.1	5	581671	1915.59	53473	5	5	3.04	0
			DD/DF	540293	0.81	5	558512	688.3	16737.6	5	5	3.26	0
	100	5	SD/SF	505200	2.27	5	526823	8780.89	15924.8	5	5	4.1	0
			SD/DF	447959	0.67	5	471566	920.27	6853.8	5	5	5.01	0
			DD/SF	462641	1.18	5	484554	13370.81	35680.2	4	5	4.53	0.05
			DD/DF	449824	0.61	5	473300	1738.4	17954.4	5	5	4.96	0
		10	SD/SF	557728	1.97	5	474249	17280	62271.8	0	4	3.47	0.09
			SD/DF	512537	0.59	5	-	-	-	0	0	4.22	-
			DD/SF	509694	0.94	5	-	-	-	0	0	3.47	-
			DD/DF	499277	0.61	5	-	-	-	0	0	4.11	-
		15	SD/SF	611769	1.46	5	-	-	-	0	0	3.17	-
			SD/DF	543228	0.64	5	-	-	-	0	0	3.53	-
			DD/SF	591686	1.02	5	-	-	-	0	0	3.11	-
			DD/DF	555793	0.69	5	-	-	-	0	0	3.67	-
		20	SD/SF	644781	1.47	5	-	-	-	0	0	2.71	-
			SD/DF	593827	0.57	5	-	-	-	0	0	3.19	-
			DD/SF	657296	1	5	-	-	-	0	0	2.91	-
			DD/DF	607732	0.56	5	-	-	-	0	0	3.3	-
	200	5	SD/SF	569618	6.87	5	599115	21600.08	5582	0	5	4.87	1.07
			SD/DF	528623	1.73	5	561783	21600.02	40987.2	0	5	5.89	0.6
			DD/SF	572697	3.66	5	606965	21600.06	10957.6	0	5	5.52	1.29
			DD/DF	520085	1.74	5	554670	21490.34	42355	1	5	6.23	0.56
		10	SD/SF	628815	7.02	5	653500	21600.06	9919.2	0	5	3.63	0.88
			SD/DF	594838	1.58	5	624674	21600.02	41133	0	5	4.75	0.78
			DD/SF	624945	3.65	5	651600	21600.04	9551.6	0	5	3.97	1.2
			DD/DF	598859	1.54	5	630258	21600.02	44266.8	0	5	4.87	0.9
		15	SD/SF	690509	6.03	5	713576	21600.08	11714.6	0	5	3.11	0.74
			SD/DF	655158	1.58	5	683155	21600.04	59015.8	0	5	4.08	0.44
			DD/SF	669310	3.86	5	694541	21600.02	10945	0	5	3.48	1.37
			DD/DF	652245	1.62	5	547499	17280.06	46855.8	0	4	4.06	0.39
		20	SD/SF	779687	6.73	5	651812	17280	28159.4	0	4	2.61	0.21
			SD/DF	712385	2.09	5	739308	21600.02	48976.6	0	5	3.62	0.37
			DD/SF	793928	3.13	5	817724	21600.04	31536.8	0	5	2.86	0.37
			DD/DF	707372	1.59	5	736162	21600.02	35447.4	0	5	3.87	0.78

Table 116: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	897786	2.15	5	939366	21600.06	9966.6	0	5	4.18	4.26
			SD/DF	796304	0.67	5	835601	21600.02	80284.8	0	5	4.67	0.43
			DD/SF	872759	1.01	5	913624	21600.02	27922	0	5	4.29	4.21
			DD/DF	782454	0.8	5	819952	21600.04	78299.2	0	5	4.56	0.93
		10	SD/SF	988970	2.36	5	1028169	21600.02	15836.2	0	5	3.66	3.08
			SD/DF	865887	0.84	5	902732	21600.06	69952.6	0	5	4.04	1.08
			DD/SF	889921	1.22	5	925294	21600.04	25955.2	0	5	3.71	3.58
			DD/DF	872061	0.86	5	729943	17280.04	68505.2	0	4	4.1	0.25
		15	SD/SF	1027278	4.31	5	1065192	21600.04	15459.6	0	5	3.37	3.47
			SD/DF	927997	1.56	5	772537	17280.06	35718	0	4	3.84	1.83
			DD/SF	966112	2.55	5	1001356	21600.02	24776	0	5	3.36	3.32
			DD/DF	943319	1.26	5	783666	17280.04	59761.2	0	4	3.69	0.53
		20	SD/SF	1152620	6.29	5	1192648	21600.06	16551.8	0	5	3.23	2.87
			SD/DF	989717	2.1	5	1024612	20752.92	78403.2	1	5	3.4	0.08
			DD/SF	1063545	3.04	5	1099949	21600.02	27435.4	0	5	3.19	2.57
			DD/DF	988091	1.98	5	822977	17280.04	46055	0	4	3.37	0.78
	100	5	SD/SF	965837	10.03	5	1020425	21600.1	5040.8	0	5	4.51	5.15
			SD/DF	898910	2.05	5	950662	21600.1	10352	0	5	5.12	3.79
			DD/SF	954937	3.79	5	1005394	21600.06	5474.6	0	5	4.76	4.02
			DD/DF	894746	1.97	5	944231	21600.04	13709.6	0	5	5.1	2.82
		10	SD/SF	1080958	8.28	5	1130545	21600.1	5408.4	0	5	3.67	4.31
			SD/DF	981489	2.12	5	1026836	21600.02	8831.8	0	5	4.14	3.69
			DD/SF	1104850	4.07	5	1154624	21600.08	5484.2	0	5	3.86	4.12
			DD/DF	989647	2.02	5	1035306	21600	10615.6	0	5	4.18	2.97
		15	SD/SF	1137666	11.94	5	1185018	21600.08	5867.2	0	5	3.28	3.92
			SD/DF	1051028	3.37	5	1095630	21600.08	9241.4	0	5	3.78	3.47
			DD/SF	1146308	6.84	5	1194904	21600.12	5740	0	5	3.4	3.72
			DD/DF	1065056	2.78	5	1106852	21600.1	13205.8	0	5	3.58	2.65
		20	SD/SF	1249248	18.31	5	1298282	21600.14	4614.2	0	5	2.97	3.74
			SD/DF	1132782	4.24	5	1175060	21600.04	13574.4	0	5	3.36	2.59
			DD/SF	1231130	9.29	5	1276860	21600.14	7653.4	0	5	3.17	3.4
			DD/DF	1143060	3.95	5	1185678	21600.06	13333.2	0	5	3.4	2.09
	200	5	SD/SF	1126150	52.64	5	1206532	21600.24	1658.4	0	5	5.85	6.04
			SD/DF	1045784	7.7	5	1119058	21600.26	4782.2	0	5	6.14	4.51
			DD/SF	1048969	18.48	5	1126544	21600.44	1991.8	0	5	6.58	5.78
			DD/DF	1039716	7.69	5	1117548	21600.22	4633.8	0	5	6.34	4.47
		10	SD/SF	1297962	45.68	5	1373968	21600.3	1375.8	0	5	4.43	3.98
			SD/DF	1177016	6.19	5	1248316	21600.24	4075.4	0	5	5.14	4.92
			DD/SF	1282670	17.68	5	1361662	21600.28	2342	0	5	4.69	3.18
			DD/DF	1177534	6.13	5	1244452	21600.24	4784.2	0	5	5.1	3.54
		15	SD/SF	1398120	46.6	5	1470484	21600.3	1548.6	0	5	3.89	3.99
			SD/DF	1290384	7.59	5	1361518	21600.24	4254	0	5	4.5	3.19
			DD/SF	1353372	23.43	5	1434376	21600.28	2163.2	0	5	4.18	5.37
			DD/DF	1288950	6.75	5	1358822	21600.2	5906.2	0	5	4.49	3.65
		20	SD/SF	1499246	63.05	5	1562550	21600.22	2233.4	0	5	3.09	2.31
			SD/DF	1354198	10.28	5	1424126	21600.14	5452.6	0	5	3.98	3.21
			DD/SF	1450198	29.01	5	1516112	21600.22	3363.8	0	5	3.67	2.59
			DD/DF	1360916	9.47	5	1422218	21600.2	5727.2	0	5	4.03	2.04

Table 117: Performance of the N formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	429742	21.01	5	447172	12941.04	7128.4	3	5	3.82	1.22
			SD/DF	406886	15.45	5	424998	16004.31	9325.4	3	5	4.26	0.42
			DD/SF	386944	18.63	5	402288	12524.09	9825.6	3	5	3.81	0.07
			DD/DF	413444	17.66	5	430282	6100.84	4474	5	5	3.92	0
		10	SD/SF	528894	17.91	5	548377	20115.98	18244.6	1	5	3.52	1.25
			SD/DF	462204	18.14	5	480341	6888.96	7512.6	5	5	3.78	0
			DD/SF	461460	18.48	5	477796	18921.74	22013	2	5	3.41	0.13
			DD/DF	457379	16.4	5	474095	4623.25	3641.4	5	5	3.52	0
		15	SD/SF	545227	14.8	5	563146	18089.28	32788	3	5	3.15	0.63
			SD/DF	490325	12.29	5	506082	8861.6	13191	5	5	3.12	0
			DD/SF	498175	14.35	5	513484	17316.24	22903.6	3	5	2.98	0.04
			DD/DF	497791	11.88	5	514270	6269.37	11151.2	5	5	3.2	0
		20	SD/SF	587584	16.1	5	604951	21600.22	71928	0	5	2.86	0.06
			SD/DF	539643	13.02	5	556410	9437.25	18450.4	4	5	3.02	0.02
			DD/SF	564695	13.8	5	581671	16532.96	36288.6	2	5	2.91	0.04
			DD/DF	541981	11.89	5	558555	8774.31	15358.6	4	5	2.96	0.02
	100	5	SD/SF	507974	73.87	5	526943	18617.06	2339.2	2	5	3.57	1.24
			SD/DF	453735	54.7	5	471566	9962.1	2436.6	5	5	3.78	0
			DD/SF	467111	66.72	5	484597	12847.52	1732.2	3	5	3.6	0.91
			DD/DF	455854	47.18	5	473300	9261.5	2765.4	5	5	3.69	0
		10	SD/SF	559892	92.1	5	578653	21600.7	2108.4	0	5	3.09	1.83
			SD/DF	517666	65.68	5	535146	16106.08	1492	2	5	3.26	0.06
			DD/SF	512308	76.94	5	528927	21600.66	3757.8	0	5	2.97	1.92
			DD/DF	504926	49.78	5	520739	17211.3	2205.6	2	5	3.03	0.14
		15	SD/SF	613507	87.44	5	632976	21600.98	1945.2	0	5	2.89	2.91
			SD/DF	547676	59.97	5	563158	21600.92	2565.4	0	5	2.74	0.15
			DD/SF	593853	75.6	5	611650	21600.64	1510	0	5	2.75	1.94
			DD/DF	560847	66.81	5	577372	21600.8	1676	0	5	2.79	0.22
		20	SD/SF	645714	76.06	5	663730	21600.86	2865.2	0	5	2.57	2.05
			SD/DF	597806	62.79	5	613609	20967.12	3834.4	1	5	2.54	0.1
			DD/SF	659279	74.97	5	677453	21600.76	2874.8	0	5	2.61	1.74
			DD/DF	612187	73.34	5	628802	20434.9	3084.6	1	5	2.59	0.18
	200	5	SD/SF	577616	293.68	5	601401	21601.44	531.2	0	5	3.53	2.73
			SD/DF	542700	192.23	5	562765	18847.16	731.4	1	5	3.38	0.8
			DD/SF	583949	217.65	5	608989	21601.72	722.4	0	5	3.66	2.01
			DD/DF	534578	188.5	5	554845	17058.37	1712.8	2	5	3.62	0.13
		10	SD/SF	635141	306.78	5	654158	21601.6	675.2	0	5	2.66	1.73
			SD/DF	608597	194	5	624992	21601.64	1772.2	0	5	2.54	0.25
			DD/SF	632721	285.52	5	652116	21601.68	623.6	0	5	2.76	2.18
			DD/DF	611974	227.39	5	630201	21601.54	1224.2	0	5	2.78	0.47
		15	SD/SF	695224	287.8	5	715843	21601.84	901.8	0	5	2.45	1.45
			SD/DF	667101	205.56	5	683669	21601.6	1328.8	0	5	2.33	0.45
			DD/SF	676353	272.99	5	694726	21601.92	839.6	0	5	2.46	1.12
			DD/DF	663834	203.39	5	680414	21601.46	1810.4	0	5	2.36	0.24
		20	SD/SF	783470	376.92	5	804392	21601.5	839	0	5	2.14	1.7
			SD/DF	722751	239.54	5	741988	21601.64	968.4	0	5	2.22	1.02
			DD/SF	799305	337.48	5	820237	21601.5	608	0	5	2.2	2.41
			DD/DF	719390	243.02	5	736800	21601.5	634.6	0	5	2.24	0.93

Table 118: Performance of the N formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	921315	5306.27	4	857294	12964.5	27.6	0	3	4.02	21.29
			SD/DF	801638	636.13	5	858416	21607.96	123.4	0	5	4.04	6.55
			DD/SF	875455	890.77	5	725442	17286.42	131.2	0	4	3.99	5.31
			DD/DF	787352	579.78	5	684665	17284.04	51	0	4	3.97	6.14
		10	SD/SF	990051	1100.83	5	1148360	21607.36	60.4	0	5	3.56	13.62
			SD/DF	869812	753.13	5	738093	17286.4	95	0	4	3.61	4.46
			DD/SF	891934	980.49	5	1120818	21607.12	94.4	0	5	3.49	19.45
			DD/DF	876333	633.72	5	933464	21605.9	180.8	0	5	3.64	6.01
		15	SD/SF	1028086	1390.52	5	1254966	21607.96	64.8	0	5	3.29	17.69
			SD/DF	931340	808.42	5	1012024	21607.56	106.8	0	5	3.5	7.89
			DD/SF	967849	949.35	5	1156918	21606.8	104.2	0	5	3.19	14.69
			DD/DF	946452	702.81	5	812100	17285.06	109.8	0	4	3.37	5.5
		20	SD/SF	1153160	1528.61	5	1177844	17286.16	80.2	0	4	3.19	17.57
			SD/DF	992753	803.85	5	835186	17285.68	72.8	0	4	3.11	3.86
			DD/SF	1065313	927.66	5	1307736	21605.86	104.8	0	5	3.03	17.57
			DD/DF	991891	727.88	5	633256	12964.12	68.6	0	3	3	4.06
	100	5	SD/SF	971583	4547.97	5	896868	13901.34	0	0	3	3.93	22.8
			SD/DF	910847	2444.74	5	200004	4321.78	7.8	0	1	3.86	1.84
			DD/SF	984867	7161.66	4	874380	12964.6	11.4	0	3	3.9	21.85
			DD/DF	907322	1872.6	5	385663	8643.66	22	0	2	3.76	2.23
		10	SD/SF	1084536	5410.04	5	1660988	22927.28	0	0	5	3.34	34.83
			SD/DF	991418	2034.5	5	1125648	21610.54	37.6	0	5	3.17	11.75
			DD/SF	1110716	3329.59	5	1261502	17662.82	0	0	4	3.35	21.91
			DD/DF	999683	2496.61	5	465964	8645.62	10	0	2	3.21	5.07
		15	SD/SF	1104158	8876.47	4	1768868	22245.46	0.6	0	5	3.03	35.53
			SD/DF	1059748	2250.1	5	930832	17286.16	23.8	0	4	2.99	6.85
			DD/SF	1151230	3999.06	5	1389134	17287.38	6.2	0	4	2.98	26.26
			DD/DF	1075328	6117.64	4	908886	17285.98	36.2	0	4	2.89	4.57
		20	SD/SF	1251206	4516.37	5	1079488	12965.38	0	0	3	2.81	20
			SD/DF	1141426	2903.04	5	726544	12967.42	23.8	0	3	2.62	3.24
			DD/SF	1235646	4503.97	5	587216	8645.68	8.8	0	2	2.81	5.2
			DD/DF	1151696	2468.55	5	974802	17287.34	46.4	0	4	2.67	4.51
	200	5	SD/SF	1253790	19337.7	1	-	-	-	0	0	4.58	-
			SD/DF	1071877	13415.83	3	-	-	-	0	0	3.45	-
			DD/SF	1084373	14212.56	4	-	-	-	0	0	4.46	-
			DD/DF	1070673	12197.56	3	-	-	-	0	0	3.59	-
		10	SD/SF	1294430	19300.58	2	-	-	-	0	0	3.45	-
			SD/DF	1205348	10269.5	4	-	-	-	0	0	2.93	-
			DD/SF	1301743	14736.85	4	-	-	-	0	0	3.53	-
			DD/DF	1208338	9366.93	4	-	-	-	0	0	3.12	-
		15	SD/SF	-	21678	0	-	-	-	0	0	-	-
			SD/DF	1310393	14539.73	3	-	-	-	0	0	2.7	-
			DD/SF	1314420	17336.02	2	-	-	-	0	0	3.15	-
			DD/DF	1314750	10285.45	4	-	-	-	0	0	2.69	-
		20	SD/SF	1559470	20049.28	1	-	-	-	0	0	2.67	-
			SD/DF	1368030	10237.15	4	970986	12980.44	1.2	0	3	2.49	9.12
			DD/SF	1442905	19231.58	2	-	-	-	0	0	2.83	-
			DD/DF	1383234	8626.57	5	1291120	17297.2	8.4	0	4	2.45	11.62

Table 119: Performance of the T formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	429671	35.22	5	446877	13065.35	8393	4	5	3.84	0.02
			SD/DF	406862	24.05	5	424997	8884.98	8527.8	4	5	4.27	0.12
			DD/SF	386878	31.54	5	402269	12759.07	10290.8	4	5	3.82	0.03
			DD/DF	413417	23.01	5	430282	5994.76	6065.4	5	5	3.92	0
		10	SD/SF	528842	25.39	5	548252	20359.74	24843.6	1	5	3.53	0.12
			SD/DF	462190	15.42	5	480341	7262.98	8310	5	5	3.78	0
			DD/SF	461440	24.66	5	477819	19791.08	23539.4	1	5	3.42	0.1
			DD/DF	457369	15.92	5	474095	8073.33	10439.8	5	5	3.53	0
		15	SD/SF	545194	21.28	5	563194	21600.1	19032	0	5	3.16	1.19
			SD/DF	490313	16.94	5	506082	10497	13245	4	5	3.12	0.01
			DD/SF	498162	15.81	5	513500	18480.96	28292.2	1	5	2.98	0.55
			DD/DF	497785	15.38	5	514270	6521.05	10967.2	5	5	3.21	0
		20	SD/SF	587575	26.38	5	604963	21600.12	38759.6	0	5	2.86	0.07
			SD/DF	539631	11.16	5	556404	11269.7	27207	4	5	3.02	0
			DD/SF	564686	15.34	5	581709	17454.68	33283	2	5	2.92	1.01
			DD/DF	541974	10.67	5	558512	10414.38	25872.6	5	5	2.96	0
	100	5	SD/SF	507767	162.89	5	526992	21600.48	1897.4	0	5	3.61	0.26
			SD/DF	453693	143.4	5	471568	14790.4	2681.2	4	5	3.79	0.01
			DD/SF	466951	124.09	5	485754	21113.58	2079.2	1	5	3.63	1.59
			DD/DF	455808	167.66	5	473370	13537.67	1857	3	5	3.7	0.13
		10	SD/SF	559724	148.59	5	578706	21600.44	948.8	0	5	3.12	1.98
			SD/DF	517624	128.93	5	535710	16883.93	1166.2	2	5	3.27	0.55
			DD/SF	512212	123.64	5	528323	21600.4	3411.4	0	5	2.99	0.72
			DD/DF	504894	146.16	5	520962	21600.56	2220.8	0	5	3.03	0.35
		15	SD/SF	613370	231.15	5	633421	21600.58	1154.4	0	5	2.91	1.85
			SD/DF	547650	124.02	5	563612	21600.46	1401.8	0	5	2.74	0.58
			DD/SF	593811	139.14	5	611183	21600.48	1636.4	0	5	2.76	2.07
			DD/DF	560824	117.9	5	578125	19375.86	1246.4	1	5	2.8	1.43
		20	SD/SF	645614	158.72	5	664099	21600.48	1413.2	0	5	2.59	2.63
			SD/DF	597795	85.04	5	613623	20981.04	2564	1	5	2.55	0.13
			DD/SF	659244	118.95	5	677495	21600.44	3229.6	0	5	2.62	1.81
			DD/DF	612177	94.26	5	628765	19909.42	2984.6	1	5	2.59	0.46
	200	5	SD/SF	577039	790.5	5	602876	21600.54	456.6	0	5	3.63	3.86
			SD/DF	542621	569.83	5	562468	21600.58	1420	0	5	3.39	1.39
			DD/SF	583704	951.84	5	610735	21600.88	350.6	0	5	3.7	3.58
			DD/DF	534518	501.36	5	556195	15816.96	653.6	2	5	3.63	1.2
		10	SD/SF	634703	600.83	5	656612	21600.64	364.2	0	5	2.73	3.06
			SD/DF	608482	574.76	5	625585	21600.7	867.8	0	5	2.56	1.09
			DD/SF	632416	801.67	5	653799	21600.66	356.2	0	5	2.81	3.04
			DD/DF	611906	569.55	5	630148	19891.94	2747	1	5	2.8	0.91
		15	SD/SF	694829	919.02	5	715302	21600.66	586.2	0	5	2.5	2.73
			SD/DF	667000	620.5	5	685149	21205.44	1315.6	1	5	2.35	0.84
			DD/SF	676046	1107.16	5	694189	21641.46	568.6	0	5	2.51	1.67
			DD/DF	663769	514.59	5	680538	21600.58	708	0	5	2.37	0.73
		20	SD/SF	783113	768.93	5	805124	21600.8	336.8	0	5	2.18	2.58
			SD/DF	722695	565.55	5	744029	21600.76	542.4	0	5	2.22	1.69
			DD/SF	799154	741.75	5	819276	21600.88	267.8	0	5	2.22	2.26
			DD/DF	719333	473.52	5	737011	21600.74	789.8	0	5	2.25	1.12

Table 120: Performance of the T formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	899033	2243.39	5	1315678	21602.34	21.8	0	5	4.04	31.01
			SD/DF	801576	803.86	5	852594	21601.74	156.2	0	5	4.04	5.92
			DD/SF	875260	1685.36	5	983903	21602.66	68.2	0	5	4.01	10.99
			DD/DF	787324	767.76	5	827719	21602.62	179.4	0	5	3.97	4.79
		10	SD/SF	989808	2090.66	5	1378486	21602.96	19.6	0	5	3.58	27.09
			SD/DF	869779	978.62	5	904734	21602.56	139.8	0	5	3.61	3.78
			DD/SF	891842	1514.15	5	1193524	21602.7	21.8	0	5	3.5	24.4
			DD/DF	876302	793.75	5	916287	21603.66	95.6	0	5	3.64	4.24
		15	SD/SF	1027926	2413.44	5	1384998	21603.56	19	0	5	3.31	25.49
			SD/DF	931312	923.04	5	984031	21603.22	109.4	0	5	3.5	5.3
			DD/SF	967786	1602.41	5	1255762	21602.14	40	0	5	3.2	21.15
			DD/DF	946436	906.64	5	983980	21603.4	120.6	0	5	3.37	3.7
		20	SD/SF	1153064	2725.39	5	1617814	21603.46	13	0	5	3.2	28.69
			SD/DF	992734	883.38	5	1040514	21602.84	109.2	0	5	3.11	4.55
			DD/SF	1065266	1693.18	5	1226936	21602.52	55	0	5	3.03	12.81
			DD/DF	991875	899.84	5	1042221	21602.22	115.6	0	5	3	4.73
	100	5	SD/SF	970711	8202.01	5	1255894	18394.36	0	0	4	4.02	30.87
			SD/DF	910750	3298.91	5	1107782	21793	22	0	5	3.87	17.43
			DD/SF	963186	6821.93	5	1374818	21602.84	22.8	0	5	3.93	25.72
			DD/DF	907203	2697.99	5	990116	21602.66	67	0	5	3.77	8.28
		10	SD/SF	1122885	12589.2	4	1756618	22004.12	0	0	5	3.41	38.19
			SD/DF	991340	3288.59	5	1089826	21602.56	51.4	0	5	3.18	8.4
			DD/SF	1110330	8507.58	5	1661152	23302.84	2.6	0	5	3.38	32.87
			DD/DF	999612	2103.47	5	1055070	21603	70.8	0	5	3.22	5.22
		15	SD/SF	1139826	7854.45	5	1847588	22515.48	1	0	5	3.1	38.31
			SD/DF	1059692	2649.61	5	1146540	21606.74	20	0	5	2.99	7.41
			DD/SF	1150912	9355.45	5	1661296	22035.5	5.2	0	5	3.01	29.53
			DD/DF	1072760	3263.21	5	1136790	21604.08	88.4	0	5	2.88	5.53
		20	SD/SF	1250718	8472.97	5	1964180	21937.16	0	0	5	2.85	36.33
			SD/DF	1141374	3094.95	5	1192132	21603.2	43.8	0	5	2.62	4.18
			DD/SF	1235412	7518.86	5	1848024	22003.84	4.4	0	5	2.83	33.15
			DD/DF	1151654	3630.41	5	1200460	21603.34	43.4	0	5	2.67	4.05
	200	5	SD/SF	1038940	20648.92	1	1050382	12965	0	0	3	4.53	24.03
			SD/DF	1076070	14102.62	5	1335914	21615.8	0	0	5	3.43	18.86
			DD/SF	1011520	18264.28	3	318330	4321.74	0	0	1	4.41	7.27
			DD/DF	1069692	13567.11	5	1400366	21614.84	0	0	5	3.64	24
		10	SD/SF	-	21613.06	0	1298274	12965.7	0	0	3	-	23.46
			SD/DF	1203278	9798.68	5	1499124	21616.66	0	0	5	3.02	19.69
			DD/SF	1311505	21413.54	2	410574	4321.62	0	0	1	3.68	7.46
			DD/DF	1202640	10695.17	5	1435858	21610.42	3.2	0	5	3.08	15.87
		15	SD/SF	-	21611.84	0	1450512	12965.22	0	0	3	-	25.24
			SD/DF	1311500	12302.05	4	1649196	22488.26	0	0	5	2.72	23.09
			DD/SF	-	21612.66	0	411878	4321.58	0	0	1	-	7.67
			DD/DF	1312700	11033.94	5	962920	12966.54	0.8	0	3	2.73	10.76
		20	SD/SF	-	21610.88	0	-	-	-	0	0	-	-
			SD/DF	1375020	12038.27	4	1617496	21612.12	0	0	5	2.48	15.87
			DD/SF	-	21613.14	0	436364	4321.64	0	0	1	-	6.12
			DD/DF	1383086	12755.14	5	1660270	21612.78	1.6	0	5	2.46	16.64

Table 121: Performance of the MC formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	429671	11.76	5	446877	11645.18	11827.8	4	5	3.84	0.05
			SD/DF	406862	11.13	5	425071	11968.75	5486.8	4	5	4.27	0.29
			DD/SF	386878	12.23	5	402342	9494.72	10048.2	4	5	3.82	0.05
			DD/DF	413417	11.3	5	430282	7172.64	5889.4	5	5	3.92	0
		10	SD/SF	528842	11.37	5	548269	18010.29	28655	2	5	3.53	0.66
			SD/DF	462190	8.62	5	480341	8865.04	7167.8	5	5	3.78	0
			DD/SF	461440	8.88	5	477791	18652.93	49883.2	3	5	3.42	0.04
			DD/DF	457369	7.58	5	474095	5367.01	4983.2	5	5	3.53	0
		15	SD/SF	545194	7.68	5	563055	18931.8	57215.8	2	5	3.16	0.05
			SD/DF	490313	8.6	5	506082	4732.09	16224.8	5	5	3.12	0
			DD/SF	498162	7.83	5	513587	16088.85	36905.2	3	5	2.98	0.07
			DD/DF	497785	8.45	5	514270	3900.95	9606.6	5	5	3.21	0
		20	SD/SF	587575	7.07	5	604951	21600	109507.8	0	5	2.86	0.05
			SD/DF	539631	6.3	5	556404	4662.51	21973.6	5	5	3.02	0
			DD/SF	564686	6.67	5	581671	9306.85	35854.6	4	5	2.92	0.01
			DD/DF	541974	6.24	5	558512	4699.21	21098.8	5	5	2.96	0
	100	5	SD/SF	507767	173.21	5	527092	19401.02	5071.4	2	5	3.61	1.32
			SD/DF	453693	93.88	5	471571	16210.89	3513	3	5	3.79	0.03
			DD/SF	466951	129.8	5	484681	18453.81	1756	1	5	3.63	2.15
			DD/DF	455808	67.19	5	473406	14873.93	4028.4	2	5	3.7	0.51
		10	SD/SF	559724	103.39	5	578218	21600.1	2465.2	0	5	3.12	2.86
			SD/DF	517624	89.94	5	535225	16019.46	2160.4	3	5	3.27	0.09
			DD/SF	512212	102.43	5	528519	21600.08	3719	0	5	2.99	1.79
			DD/DF	504894	42.33	5	520816	20272.6	4225.2	2	5	3.03	0.2
		15	SD/SF	613370	73.5	5	632235	21600.08	7630.2	0	5	2.91	1.19
			SD/DF	547650	45.24	5	563593	21162.84	3440	1	5	2.74	0.6
			DD/SF	593811	47.81	5	610840	21600.12	4620.6	0	5	2.76	1.54
			DD/DF	560824	56.82	5	577074	20666.82	3662.2	1	5	2.8	0.1
		20	SD/SF	645614	51.3	5	663492	21600.1	5845.2	0	5	2.59	2.32
			SD/DF	597795	42.81	5	613443	18413.64	6758.4	2	5	2.55	0.05
			DD/SF	659244	79.14	5	677198	21600.1	5655.8	0	5	2.62	1.3
			DD/DF	612177	39.13	5	628442	13263.29	10869.8	4	5	2.59	0.01
	200	5	SD/SF	577039	567.12	5	601285	21600.26	733.8	0	5	3.63	3.54
			SD/DF	542621	274.68	5	561975	21600.26	1250.8	0	5	3.39	0.44
			DD/SF	583704	479.27	5	609043	21600.18	887.8	0	5	3.7	3.42
			DD/DF	534518	275	5	554972	20728	1011.4	1	5	3.63	0.79
		10	SD/SF	634703	426.2	5	655333	21600.26	536.4	0	5	2.73	2.74
			SD/DF	608482	321.22	5	625449	21600.2	766.4	0	5	2.56	1.27
			DD/SF	632416	482.37	5	654802	21600.22	504.6	0	5	2.81	2.99
			DD/DF	611906	277.23	5	629532	21600.16	1636	0	5	2.8	0.46
		15	SD/SF	694829	394.69	5	716986	21600.26	614	0	5	2.5	3.01
			SD/DF	667000	279.34	5	685591	21600.18	685.2	0	5	2.35	1.42
			DD/SF	676046	440.24	5	695524	21600.36	533.4	0	5	2.51	2.51
			DD/DF	663769	219.26	5	680626	21600.22	819.4	0	5	2.37	0.57
		20	SD/SF	783113	346.08	5	805060	21600.34	1055.2	0	5	2.18	2.55
			SD/DF	722695	201.29	5	740399	21600.24	945	0	5	2.22	0.66
			DD/SF	799154	369.9	5	818051	21600.3	437	0	5	2.22	1.92
			DD/DF	719333	210.61	5	737242	21600.24	1125	0	5	2.25	1.24

Table 122: Performance of the MC formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	899033	333.33	5	943276	21600.16	2710.2	0	5	4.04	4.64
			SD/DF	801576	209.84	5	836880	21600.1	1959	0	5	4.04	3.87
			DD/SF	875260	258.4	5	915563	21600.14	2570.2	0	5	4.01	4.33
			DD/DF	787324	234.2	5	822191	21600.18	1752	0	5	3.97	3.86
		10	SD/SF	989808	197.96	5	1032781	21600.16	2381.2	0	5	3.58	4.15
			SD/DF	869779	163.15	5	903777	21600.12	1908.4	0	5	3.61	3.5
			DD/SF	891842	272.09	5	928881	21600.14	2261	0	5	3.5	3.95
			DD/DF	876302	166.78	5	910783	21600.14	1800.2	0	5	3.64	3.48
		15	SD/SF	1027926	202.9	5	1069611	21600.2	2435	0	5	3.31	3.87
			SD/DF	931312	144.37	5	966323	21600.16	2384.2	0	5	3.5	3.47
			DD/SF	967786	190.87	5	1004309	21600.12	2391.8	0	5	3.2	3.61
			DD/DF	946436	137.67	5	980691	21600.12	1961.4	0	5	3.37	3.2
		20	SD/SF	1153064	175.82	5	1196424	21600.16	2493	0	5	3.2	3.61
			SD/DF	992734	139.41	5	1025353	21600.1	1926.8	0	5	3.11	2.88
			DD/SF	1065266	197.62	5	1102577	21600.12	2363.4	0	5	3.03	3.37
			DD/DF	991875	156.61	5	1025017	21600.12	2763.4	0	5	3	3.08
	100	5	SD/SF	970711	2028.9	5	1050102	21600.24	234.6	0	5	4.02	7.27
			SD/DF	910750	917.93	5	952805	21600.3	648.2	0	5	3.87	4.12
			DD/SF	963186	1699.94	5	1021289	21600.32	290.8	0	5	3.93	5.62
			DD/DF	907203	911.76	5	952573	21600.28	469.2	0	5	3.77	4.51
		10	SD/SF	1083924	1934.2	5	1139118	21600.4	398.4	0	5	3.4	4.83
			SD/DF	991340	889.57	5	1034326	21600.26	275.6	0	5	3.18	4.01
			DD/SF	1110330	1769.15	5	1162090	21600.24	312.8	0	5	3.38	4.45
			DD/DF	999612	797.73	5	1040860	21600.24	361	0	5	3.22	3.79
		15	SD/SF	1139826	1814.16	5	1203926	21600.34	404.2	0	5	3.1	5.25
			SD/DF	1059692	654.51	5	1098644	21600.26	303	0	5	2.99	3.37
			DD/SF	1150912	1711.26	5	1206988	21600.28	397	0	5	3.01	4.61
			DD/DF	1072760	1015.11	5	1112118	21600.24	379.4	0	5	2.88	3.3
		20	SD/SF	1250718	1265.3	5	1327298	21600.28	530.8	0	5	2.85	5.77
			SD/DF	1141374	1118.07	5	1175838	21600.24	463.2	0	5	2.62	2.73
			DD/SF	1235412	1011.88	5	1295414	21600.3	558.6	0	5	2.83	4.64
			DD/DF	1151654	850.27	5	1189164	21600.2	400.8	0	5	2.67	2.96
	200	5	SD/SF	1140260	8293.99	5	1861748	21600.7	0.4	0	5	4.66	38.74
			SD/DF	1076070	3925.34	5	1249416	21600.76	13.4	0	5	3.43	13.1
			DD/SF	1072208	6239.5	5	1502168	21601.14	0	0	5	4.5	26.2
			DD/DF	1069692	3460.89	5	1207118	21600.68	21.2	0	5	3.64	11.19
		10	SD/SF	1307384	8386.67	5	2046412	21600.54	5.6	0	5	3.73	35.41
			SD/DF	1203278	4429.54	5	1273934	21600.62	147.4	0	5	3.02	5.51
			DD/SF	1297972	8111.44	5	1781060	21600.54	12.2	0	5	3.55	25.31
			DD/DF	1202640	4193.26	5	1282398	21600.46	35.2	0	5	3.08	5.9
		15	SD/SF	1405718	8519.17	5	2241908	21702.36	4.4	0	5	3.37	36.48
			SD/DF	1314954	5188.89	5	1424522	21600.7	14.6	0	5	2.69	7.34
			DD/SF	1366504	6851.13	5	2163772	21600.86	0	0	5	3.25	36.83
			DD/DF	1312700	3375.61	5	1370102	21600.6	65	0	5	2.73	4.15
		20	SD/SF	1504002	8494.05	5	2364082	21600.5	7.8	0	5	2.79	36.37
			SD/DF	1375204	3495.7	5	1451708	21600.52	54.6	0	5	2.49	5.15
			DD/SF	1460852	7995.06	5	1565112	21600.58	8.2	0	5	2.96	6.52
			DD/DF	1383086	3570.16	5	1429010	21600.94	64	0	5	2.46	3.17

Table 123: Performance of the ME formulation for the capacitated balanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	429671	17.99	5	447367	18369.79	7157.4	1	5	3.84	2.77
			SD/DF	406862	9.63	5	424997	5451.26	4248.2	5	5	4.27	0
			DD/SF	386878	15.77	5	402360	14503.8	17811.2	2	5	3.82	0.72
			DD/DF	413417	12.02	5	430282	4946.52	5488.6	5	5	3.92	0
		10	SD/SF	528842	19.03	5	548228	20111.94	25667.6	1	5	3.53	0.06
			SD/DF	462190	10.63	5	480341	4457.07	4685.4	5	5	3.78	0
			DD/SF	461440	16.85	5	477791	19558.28	25648.2	2	5	3.42	0.05
			DD/DF	457369	9.21	5	474095	4053.36	3947.8	5	5	3.53	0
		15	SD/SF	545194	13.48	5	563159	21600.02	40243.4	0	5	3.16	0.59
			SD/DF	490313	10.81	5	506082	5403.55	11266.6	5	5	3.12	0
			DD/SF	498162	16.89	5	513511	18455.16	34367.2	1	5	2.98	0.05
			DD/DF	497785	10.15	5	514270	4506.06	12651	5	5	3.21	0
		20	SD/SF	587575	12.51	5	604972	21600.04	61185.6	0	5	2.86	0.06
			SD/DF	539631	8.68	5	556404	9782.8	29146.4	4	5	3.02	0.02
			DD/SF	564686	11.81	5	581671	16327.82	32217.4	2	5	2.92	0.03
			DD/DF	541974	9.6	5	558555	7446.19	21444.6	4	5	2.96	0.01
	100	5	SD/SF	507767	107.69	5	527302	17765.97	3177.8	1	5	3.61	1.84
			SD/DF	453693	52.56	5	471566	10103.55	3547.8	5	5	3.79	0
			DD/SF	466951	100.3	5	484876	17963.99	2107.4	1	5	3.63	1.17
			DD/DF	455808	43.48	5	473312	13639.44	6020.6	3	5	3.7	0.07
		10	SD/SF	559724	94.05	5	578195	21600.02	4599	0	5	3.12	1.21
			SD/DF	517624	39.53	5	535151	11544.5	2074	4	5	3.27	0.03
			DD/SF	512212	77.35	5	528232	21600.06	3531	0	5	2.99	2.27
			DD/DF	504894	49.42	5	520678	17216.26	5166.2	3	5	3.03	0.05
		15	SD/SF	613370	71.17	5	632441	21600.08	5773.2	0	5	2.91	0.72
			SD/DF	547650	41.04	5	563412	18247.58	8494	3	5	2.74	0.41
			DD/SF	593811	70.75	5	610982	21600.06	4960.6	0	5	2.76	1.48
			DD/DF	560824	41.15	5	576969	15606.81	6068.2	4	5	2.8	0.02
		20	SD/SF	645614	61.86	5	663277	21600.1	6953	0	5	2.59	1.46
			SD/DF	597795	39.04	5	613459	17274.5	10362.6	3	5	2.55	0.03
			DD/SF	659244	82.03	5	677240	20538.82	4770.4	1	5	2.62	1.04
			DD/DF	612177	53.45	5	628442	13508.63	12038.2	5	5	2.59	0
	200	5	SD/SF	577039	552.07	5	600834	21600.16	696.6	0	5	3.63	1.72
			SD/DF	542621	227.7	5	561750	21600.2	1844	0	5	3.39	0.13
			DD/SF	583704	483.3	5	609315	21600.32	404.6	0	5	3.7	3.59
			DD/DF	534518	210.19	5	554763	20231.94	1377.8	1	5	3.63	0.52
		10	SD/SF	634703	566.57	5	654649	21600.22	624.4	0	5	2.73	1.39
			SD/DF	608482	246.12	5	625666	21600.26	584.6	0	5	2.56	1.17
			DD/SF	632416	527.63	5	653047	21600.2	876.6	0	5	2.81	1.81
			DD/DF	611906	241.37	5	630796	21600.16	943.8	0	5	2.8	1.23
		15	SD/SF	694829	553.49	5	715730	21600.24	482.8	0	5	2.5	2.81
			SD/DF	667000	264.25	5	684403	18757.99	1003	1	5	2.35	0.87
			DD/SF	676046	494.66	5	696697	21600.32	493.6	0	5	2.51	2.69
			DD/DF	663769	240.65	5	680231	21115.02	1773.2	1	5	2.37	0.16
		20	SD/SF	783113	519.51	5	803764	21600.22	1370.6	0	5	2.18	1.23
			SD/DF	722695	222.38	5	739462	21600.14	1857.2	0	5	2.22	0.12
			DD/SF	799154	527.22	5	818856	21600.3	1011.8	0	5	2.22	1.6
			DD/DF	719333	262.6	5	736932	21600.2	862.2	0	5	2.25	1.1

Table 124: Performance of the ME formulation for the capacitated balanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	899033	506.79	5	939986	21600.1	1867	0	5	4.04	2.8
			SD/DF	801576	186.78	5	835514	21600.1	4330.6	0	5	4.04	0.23
			DD/SF	875260	400.76	5	914172	21600.1	2493.8	0	5	4.01	2.73
			DD/DF	787324	141.52	5	819947	20139.24	5182.2	1	5	3.97	0.19
		10	SD/SF	989808	456.23	5	1028746	21600.1	2550.8	0	5	3.58	3.14
			SD/DF	869779	182.36	5	902553	21244.56	4615.2	1	5	3.61	0.24
			DD/SF	891842	475.9	5	925573	21600.1	3203	0	5	3.5	2.28
			DD/DF	876302	169.91	5	909725	20700.38	4900.4	1	5	3.64	0.94
		15	SD/SF	1027926	508.99	5	1065070	21600.1	3865.2	0	5	3.31	0.36
			SD/DF	931312	270.35	5	965490	21600.1	4563.2	0	5	3.5	0.33
			DD/SF	967786	486.45	5	1001315	21600.08	3457.2	0	5	3.2	2.09
			DD/DF	946436	146.06	5	979485	19612	8682.4	2	5	3.37	0.08
		20	SD/SF	1153064	557.67	5	1193732	21600.1	3441	0	5	3.2	2.17
			SD/DF	992734	223.92	5	1024629	21600.1	5087.6	0	5	3.11	0.1
			DD/SF	1065266	441.98	5	1099457	21600.22	4123.4	0	5	3.03	1.97
			DD/DF	991875	223.17	5	1023339	19893.14	6944.2	1	5	3	0.22
	100	5	SD/SF	970711	1931.99	5	1025642	21600.2	274.8	0	5	4.02	5.22
			SD/DF	910750	611.14	5	951633	21600.22	1285.4	0	5	3.87	1.46
			DD/SF	963186	1486.69	5	1021508	21600.28	336.2	0	5	3.93	5.59
			DD/DF	907203	606.9	5	945925	21600.34	777	0	5	3.77	2.02
		10	SD/SF	1083924	2012.79	5	1193266	21600.26	298	0	5	3.4	8.69
			SD/DF	991340	698.65	5	1027056	21600.1	744.2	0	5	3.18	2.11
			DD/SF	1110330	2011.08	5	1158584	21600.26	339.4	0	5	3.38	4.15
			DD/DF	999612	602.8	5	1035386	21600.16	940.2	0	5	3.22	1.63
		15	SD/SF	1139826	2044.17	5	1195514	21600.24	325.4	0	5	3.1	4.66
			SD/DF	1059692	710.3	5	1094022	21600.18	801	0	5	2.99	1.45
			DD/SF	1150912	2099.24	5	1196706	21600.24	392.4	0	5	3.01	3.77
			DD/DF	1072760	692.35	5	1105428	21600.2	992.8	0	5	2.88	0.74
		20	SD/SF	1250718	2135.32	5	1296762	21600.22	238.8	0	5	2.85	3.53
			SD/DF	1141374	752.2	5	1173904	21600.22	900.4	0	5	2.62	0.83
			DD/SF	1235412	1998.93	5	1288444	21600.2	508	0	5	2.83	4.08
			DD/DF	1151654	608.11	5	1187186	21600.2	1265	0	5	2.67	1.02
	200	5	SD/SF	1140260	5586.16	5	1717446	21600.5	8.8	0	5	4.66	32.9
			SD/DF	1076070	2664.76	5	1147704	21600.42	80	0	5	3.43	6.09
			DD/SF	1072208	4848.53	5	1575976	21600.9	4	0	5	4.5	30.71
			DD/DF	1069692	2395.36	5	1205670	21600.56	46.8	0	5	3.64	10.98
		10	SD/SF	1307384	7463.8	5	1753626	17595.18	4	0	4	3.73	31.29
			SD/DF	1203278	2645.78	5	1356400	21600.7	19.6	0	5	3.02	10.83
			DD/SF	1297972	5707.76	5	1976574	21600.76	1	0	5	3.55	33.77
			DD/DF	1202640	2647.01	5	1269328	21600.42	176.4	0	5	3.08	5.12
		15	SD/SF	1405718	7302.62	5	2353282	21600.7	6.6	0	5	3.37	40.25
			SD/DF	1314954	3043.61	5	1376434	21600.44	168.8	0	5	2.69	3.97
			DD/SF	1366504	10549.85	5	1887092	21600.5	12.8	0	5	3.25	25.59
			DD/DF	1312700	3368.46	5	1363008	21600.44	171.8	0	5	2.73	3.64
		20	SD/SF	1504002	8247.91	5	2364952	21600.5	4.6	0	5	2.79	36.4
			SD/DF	1375204	2635.01	5	1424324	21600.5	101.4	0	5	2.49	3.39
			DD/SF	1460852	6545.06	5	2001304	21600.48	6.8	0	5	2.96	24.53
			DD/DF	1383086	3421.71	5	1440754	21600.5	169.2	0	5	2.46	3.93

Table 125: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	0.58	5	488726	1102.41	44418.2	5	5	0.92	0
			SD/DF	461236	0.3	5	468009	112.7	6661	5	5	1.44	0
			DD/SF	434384	0.4	5	438894	967.25	54068.2	5	5	1.03	0
			DD/DF	468162	0.31	5	475440	235.2	15408.6	5	5	1.53	0
		10	SD/SF	596423	0.71	5	599104	4662.99	237618.4	5	5	0.45	0
			SD/DF	525089	0.34	5	528896	229.23	13713.2	5	5	0.72	0
			DD/SF	517956	0.43	5	521460	5930.19	351801	5	5	0.68	0
			DD/DF	518041	0.34	5	523640	443.43	28662.6	5	5	1.07	0
		15	SD/SF	614130	0.73	5	256736	6952.58	369932	1	2	0.35	0.01
			SD/DF	557111	0.47	5	561593	1424.59	84402.2	5	5	0.8	0
			DD/SF	559614	0.56	5	562427	14405.28	785991.2	4	5	0.5	0
			DD/DF	565640	0.39	5	569360	1422.64	77786.2	5	5	0.65	0
		20	SD/SF	663324	0.7	5	262422	8640.26	450595.4	0	2	0.26	0.04
			SD/DF	613347	0.34	5	617106	3384.84	257065.6	5	5	0.61	0
			DD/SF	636980	0.46	5	390136	8778.46	529806.8	2	3	0.38	0
			DD/DF	617858	0.37	5	621399	4104.17	270002	5	5	0.57	0
	100	5	SD/SF	564152	1.37	5	570760	3968.36	77888.6	5	5	1.16	0
			SD/DF	505542	0.74	5	516361	1093.86	44140	5	5	2.09	0
			DD/SF	516717	1.11	5	525219	13348.86	404390.2	4	5	1.63	0.03
			DD/DF	505991	0.68	5	516279	658.85	24811.8	5	5	1.99	0
		10	SD/SF	619494	1.73	5	265676	6464.72	183054.2	1	2	0.79	0.02
			SD/DF	575197	0.75	5	584565	2415.33	99677.6	5	5	1.6	0
			DD/SF	562933	1.25	5	441053	17280.06	426091.4	0	4	1.01	0.18
			DD/DF	559207	0.73	5	567949	4964.02	212381	5	5	1.54	0
		15	SD/SF	677924	1.77	5	127213	4320.02	76132	0	1	0.55	0.03
			SD/DF	607267	0.73	5	488214	5910.39	206286.6	3	4	1.03	0.03
			DD/SF	654805	1.23	5	126130	4320.06	88760.2	0	1	0.71	0.01
			DD/DF	620788	0.66	5	501186	6307.51	238138.8	4	4	0.94	0
		20	SD/SF	713566	1.74	5	-	-	-	0	0	0.44	-
			SD/DF	662284	0.72	5	398651	10592.68	337166.8	2	3	0.85	0.02
			DD/SF	727620	1.2	5	289278	8640.22	224437.6	0	2	0.54	0.06
			DD/DF	679232	0.72	5	545167	7176.65	266346.4	3	4	0.89	0
	200	5	SD/SF	625995	3.45	5	640369	21600.02	134435.6	0	5	2.26	0.62
			SD/DF	583618	1.67	5	604685	17233.8	360058.6	3	5	3.48	0.09
			DD/SF	631288	2.55	5	647972	21600	176933.6	0	5	2.58	0.54
			DD/DF	575102	1.79	5	598277	18496.84	368278.8	3	5	3.87	0.16
		10	SD/SF	685310	3.55	5	696789	21600.04	132377.4	0	5	1.63	0.75
			SD/DF	651452	1.74	5	668235	21600.04	373388.4	0	5	2.46	0.71
			DD/SF	680314	3.2	5	693164	21600.02	163684.2	0	5	1.85	0.81
			DD/DF	656742	1.83	5	539544	14925.27	243451.6	1	4	2.28	0.45
		15	SD/SF	748749	6.94	5	758092	21600.06	122103.8	0	5	1.17	0.66
			SD/DF	716057	3.15	5	586335	17280.02	235965.2	0	4	2.04	0.59
			DD/SF	725231	5.94	5	736870	21600	172150.8	0	5	1.54	0.82
			DD/DF	712908	2.8	5	433760	12960.06	205328	0	3	2	0.4
		20	SD/SF	845330	7.7	5	314087	8640.18	84460	0	2	0.86	0.21
			SD/DF	780682	3.24	5	632114	17280.06	250074	0	4	1.76	0.48
			DD/SF	863397	4.23	5	871796	21600.06	213820.6	0	5	0.93	0.51
			DD/DF	774111	3.53	5	630488	17280.06	279789.4	0	4	1.87	0.42

Table 126: Performance of the ES-N formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	11.16	5	1026064	21600.04	20986.4	0	5	0.95	1.04
			SD/DF	909695	2.87	5	921766	21600.02	216197.8	0	5	1.27	0.39
			DD/SF	985847	7.21	5	998036	21600.08	56330.8	0	5	1.09	0.98
			DD/DF	895512	3.13	5	907985	21600.06	225778.4	0	5	1.37	0.3
		10	SD/SF	1110688	13.99	5	1120366	21600.06	37004.8	0	5	0.62	0.82
			SD/DF	982236	3.62	5	991780	21600.06	133185	0	5	0.92	0.43
			DD/SF	996734	7.58	5	1005820	21600.06	67900.8	0	5	0.75	0.76
			DD/DF	991355	3.38	5	1001535	21600.08	136134.4	0	5	0.92	0.5
		15	SD/SF	1150758	15.79	5	1158078	21600.08	54098.4	0	5	0.56	0.59
			SD/DF	1052556	3.74	5	1061276	21600.04	197380.8	0	5	0.77	0.37
			DD/SF	1078616	8.06	5	1087304	21600.04	78760.2	0	5	0.61	0.69
			DD/DF	1068236	4.19	5	1075552	19758.54	158922.8	1	5	0.65	0.3
		20	SD/SF	1292460	16.92	5	1298412	21600.06	66367.2	0	5	0.39	0.43
			SD/DF	1119716	4.37	5	1126358	21600.1	186793.8	0	5	0.55	0.3
			DD/SF	1186240	8.61	5	1192834	21600.1	75032.6	0	5	0.51	0.45
			DD/DF	1118678	4.52	5	1126088	21600.08	168193.4	0	5	0.64	0.27
	100	5	SD/SF	1078541	20.07	5	-	-	-	0	0	1.8	-
			SD/DF	1013290	8.17	5	416006	8640.04	15383.6	0	2	2.02	0.49
			DD/SF	1066542	15.73	5	411183	8640.04	4561	0	2	2.01	0.8
			DD/DF	1007253	8.34	5	824536	17280.1	34574.6	0	4	2.12	1.05
		10	SD/SF	1196186	29.5	5	443602	8640.04	4042	0	2	1.25	0.66
			SD/DF	1096314	9.22	5	671488	12960.06	30326.2	0	3	1.59	0.61
			DD/SF	1223652	25.22	5	231064	4320.02	5007.4	0	1	1.41	0.28
			DD/DF	1104278	8.23	5	677052	12960.06	31849.8	0	3	1.55	0.57
		15	SD/SF	1252672	29.41	5	497686	8640.06	4721	0	2	1.14	0.6
			SD/DF	1171152	9.72	5	950558	17280.08	47586	0	4	1.26	0.54
			DD/SF	1261324	19.02	5	1279196	21600.96	26862.4	0	5	1.23	1.28
			DD/DF	1182138	8.78	5	1198054	21601.34	72720.2	0	5	1.25	0.71
		20	SD/SF	1374016	32.97	5	295556	4320.02	3092.4	0	1	0.82	0.15
			SD/DF	1256820	10.33	5	-	-	-	0	0	1.09	-
			DD/SF	1353596	22.41	5	-	-	-	0	0	0.98	-
			DD/DF	1269872	11.22	5	-	-	-	0	0	1.15	-
	200	5	SD/SF	1239002	43.6	5	1284366	21600.1	3012.2	0	5	3.13	3.47
			SD/DF	1153994	19.54	5	1203560	21600.18	11958.2	0	5	4.03	3.2
			DD/SF	1152158	29.53	5	1207304	21600.12	4869	0	5	4.08	4.29
			DD/DF	1148000	19.82	5	1198816	21600.16	12938.4	0	5	4.14	2.99
		10	SD/SF	1413846	63.74	5	1463946	21600.14	3416.8	0	5	2.9	3.38
			SD/DF	1288416	25.1	5	1333070	21600.16	10760.8	0	5	3.26	2.73
			DD/SF	1396814	35.81	5	1441488	21600.18	5523	0	5	3.02	3
			DD/DF	1289908	27.96	5	1332406	21600.12	13163	0	5	3.12	2.64
		15	SD/SF	1511778	42.58	5	1555404	21600.14	3673	0	5	2.44	2.78
			SD/DF	1406770	30.74	5	1448952	21600.18	16238	0	5	2.74	2.43
			DD/SF	1466014	34.88	5	1519826	21600.12	5876.8	0	5	2.83	3.44
			DD/DF	1405824	16.12	5	1444074	21600.12	14736.4	0	5	2.54	2.18
		20	SD/SF	1617296	52.64	5	1651068	21600.14	5005	0	5	1.85	2.01
			SD/DF	1470764	31.25	5	1506712	21600.16	15800	0	5	2.21	1.99
			DD/SF	1561248	25.7	5	1607660	21600.14	6831.4	0	5	2.43	2.81
			DD/DF	1480024	23.58	5	1520396	21600.24	16508.4	0	5	2.24	2.28

Table 127: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	1.2	5	488726	2573.61	39006.8	5	5	0.92	0
			SD/DF	461236	0.42	5	468009	226.99	4714.6	5	5	1.44	0
			DD/SF	434384	0.76	5	438894	2219.63	38325.4	5	5	1.03	0
			DD/DF	468162	0.44	5	475440	562.84	10122.8	5	5	1.53	0
		10	SD/SF	596423	1.1	5	599104	12484.25	254603.4	4	5	0.45	0.02
			SD/DF	525089	0.47	5	528896	481.47	9735.8	5	5	0.72	0
			DD/SF	517956	0.84	5	521460	9732.78	208695	5	5	0.68	0
			DD/DF	518041	0.46	5	523640	996.8	23186.6	5	5	1.07	0
		15	SD/SF	614130	1.2	5	126618	4320.02	159315.2	0	1	0.35	0
			SD/DF	557111	0.68	5	561593	2062.28	56423.4	5	5	0.8	0
			DD/SF	559614	1.13	5	439490	11780.28	251238.4	3	4	0.5	0.01
			DD/DF	565640	0.59	5	569360	2656.11	61115.6	5	5	0.65	0
		20	SD/SF	663324	1.56	5	142566	4320.02	89281.2	0	1	0.26	0.01
			SD/DF	613347	0.82	5	617106	5462.42	183416.8	5	5	0.61	0
			DD/SF	636980	1.08	5	269542	7402.66	189673.8	1	2	0.38	0.01
			DD/DF	617858	0.8	5	621399	7654.3	230747.2	5	5	0.57	0
	100	5	SD/SF	564152	3.05	5	570760	8810.48	49400	5	5	1.16	0
			SD/DF	505542	1.12	5	516361	3222.96	41692.8	5	5	2.09	0
			DD/SF	516717	1.9	5	525219	19876.48	105286.6	1	5	1.63	0.19
			DD/DF	505991	1	5	516279	1745.74	14090.8	5	5	1.99	0
		10	SD/SF	619494	3.2	5	624594	21600.34	117568.4	0	5	0.79	0.32
			SD/DF	575197	1.46	5	584565	4006.73	40059.6	5	5	1.6	0
			DD/SF	562933	2.42	5	569113	21600.3	97049.2	0	5	1.01	0.44
			DD/DF	559207	1.28	5	567949	11577.65	90718.6	4	5	1.54	0.02
		15	SD/SF	677924	3.25	5	270743	8640.02	49581.4	0	2	0.55	0.1
			SD/DF	607267	1.54	5	613590	11733.25	96352.8	3	5	1.03	0.07
			DD/SF	654805	2.47	5	408487	12960.76	79936.6	0	3	0.71	0.11
			DD/DF	620788	1.41	5	501186	10078	75800.8	2	4	0.94	0.04
		20	SD/SF	713566	3.73	5	-	-	-	0	0	0.44	-
			SD/DF	662284	1.84	5	528388	14435.05	130851	1	4	0.85	0.06
			DD/SF	727620	2.54	5	155721	4320	28632.4	0	1	0.54	0.05
			DD/DF	679232	1.64	5	404101	4859.95	61716.4	3	3	0.89	0
	200	5	SD/SF	625995	8.21	5	640394	21600	42010	0	5	2.26	0.68
			SD/DF	583618	2.72	5	604755	20665.18	48380.2	1	5	3.48	0.45
			DD/SF	631288	4.59	5	648046	21600	38304.2	0	5	2.58	0.65
			DD/DF	575102	2.49	5	598292	21600	59439.8	0	5	3.87	0.52
		10	SD/SF	685310	7.99	5	697570	21600	16873.2	0	5	1.63	1.11
			SD/DF	651452	3.26	5	668110	21600	29517.2	0	5	2.46	0.76
			DD/SF	680314	5.69	5	694001	21600	23277.2	0	5	1.85	1
			DD/DF	656742	2.98	5	672149	21584.44	46925.8	1	5	2.28	0.59
		15	SD/SF	748749	9.02	5	758678	21600	24917.4	0	5	1.17	0.84
			SD/DF	716057	3.33	5	731613	21600.04	38331.4	0	5	2.04	0.68
			DD/SF	725231	6.46	5	737118	21600.08	31770.6	0	5	1.54	0.83
			DD/DF	712908	3.04	5	727854	21600.02	63605.8	0	5	2	0.67
		20	SD/SF	845330	8.96	5	853110	21600	48811.6	0	5	0.86	0.57
			SD/DF	780682	4.19	5	794808	21600.04	50892.8	0	5	1.76	0.45
			DD/SF	863397	6.21	5	871988	21600.04	49336.2	0	5	0.93	0.48
			DD/DF	774111	3.56	5	788931	21600.04	71494	0	5	1.87	0.41

Table 128: Performance of the ES-T formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	11.84	5	1025056	21600.02	22208.6	0	5	0.95	0.79
			SD/DF	909695	3.3	5	922286	21600.02	41387.4	0	5	1.27	0.52
			DD/SF	985847	6.4	5	997505	21600.02	36012.8	0	5	1.09	0.81
			DD/DF	895512	2.37	5	908061	21600	50254.8	0	5	1.37	0.38
		10	SD/SF	1110688	18.06	5	1119904	21600.04	28126.8	0	5	0.62	0.75
			SD/DF	982236	5.33	5	991839	21600.02	54005	0	5	0.92	0.42
			DD/SF	996734	9.69	5	1005764	21600.02	52533.8	0	5	0.75	0.73
			DD/DF	991355	3.28	5	1000742	21600	48229.4	0	5	0.92	0.43
		15	SD/SF	1150758	18.87	5	1158142	21600.04	36648.6	0	5	0.56	0.58
			SD/DF	1052556	7.28	5	1060990	21600.02	56265.8	0	5	0.77	0.35
			DD/SF	1078616	11.37	5	1086536	21600.06	47212.2	0	5	0.61	0.61
			DD/DF	1068236	5.87	5	1075290	21008.92	77240	1	5	0.65	0.26
		20	SD/SF	1292460	27.05	5	1299304	21600	27790.8	0	5	0.39	0.49
			SD/DF	1119716	8.54	5	1126286	21600.02	52354.4	0	5	0.55	0.3
			DD/SF	1186240	15.03	5	1193052	21600.04	56984	0	5	0.51	0.46
			DD/DF	1118678	8.1	5	894530	17280.02	55564.6	0	4	0.64	0.24
	100	5	SD/SF	1078541	29.07	5	-	-	-	0	0	1.8	-
			SD/DF	1013290	7.01	5	-	-	-	0	0	2.02	-
			DD/SF	1066542	13.58	5	-	-	-	0	0	2.01	-
			DD/DF	1007253	4.73	5	823348	17280.08	7910	0	4	2.12	0.99
		10	SD/SF	1196186	41.9	5	678476	12960.06	4609.6	0	3	1.25	0.84
			SD/DF	1096314	9.8	5	446264	8640.04	4478.2	0	2	1.59	0.54
			DD/SF	1223652	18.01	5	231204	4320.02	2962	0	1	1.41	0.27
			DD/DF	1104278	5.39	5	-	-	-	0	0	1.55	-
		15	SD/SF	1252672	49.77	5	-	-	-	0	0	1.14	-
			SD/DF	1171152	11.09	5	-	-	-	0	0	1.26	-
			DD/SF	1261324	24.63	5	-	-	-	0	0	1.23	-
			DD/DF	1182138	7.15	5	-	-	-	0	0	1.25	-
		20	SD/SF	1374016	80.74	5	-	-	-	0	0	0.82	-
			SD/DF	1256820	14.86	5	-	-	-	0	0	1.09	-
			DD/SF	1353596	26.58	5	-	-	-	0	0	0.98	-
			DD/DF	1269872	8.98	5	-	-	-	0	0	1.15	-
	200	5	SD/SF	1239002	77.09	5	1281234	21600.1	3288	0	5	3.13	3.05
			SD/DF	1153994	16.54	5	1205346	21600.1	3234	0	5	4.03	3.1
			DD/SF	1152158	25.91	5	1205812	21600.1	3203.2	0	5	4.08	3.83
			DD/DF	1148000	11.62	5	1203238	21600.1	3679	0	5	4.14	3.27
		10	SD/SF	1413846	87.32	5	1464796	21600.1	3068.2	0	5	2.9	3.33
			SD/DF	1288416	21.15	5	1340126	21600.14	4521.6	0	5	3.26	3.07
			DD/SF	1396814	41.42	5	1450066	21600.12	4313	0	5	3.02	3.42
			DD/DF	1289908	13.5	5	1334824	21600.12	4585.2	0	5	3.12	2.63
		15	SD/SF	1511778	114.19	5	1554718	21600.1	2817.6	0	5	2.44	2.64
			SD/DF	1406770	23.66	5	1453512	21600.12	6113.2	0	5	2.74	2.52
			DD/SF	1466014	49.15	5	1513220	21600.12	4336.4	0	5	2.83	2.86
			DD/DF	1405824	15.96	5	1451448	21600.12	4817.2	0	5	2.54	2.5
		20	SD/SF	1617296	129.87	5	1655934	21600.14	3438.8	0	5	1.85	2.24
			SD/DF	1470764	29.96	5	1510140	21600.1	5982	0	5	2.21	1.99
			DD/SF	1561248	57.33	5	1603384	21600.14	4597.2	0	5	2.43	2.4
			DD/DF	1480024	16.01	5	1522710	21600.18	6471.8	0	5	2.24	2.22

Table 129: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	0.67	5	488726	1656.95	32050	5	5	0.92	0
			SD/DF	461229	0.26	5	468009	118.15	2680.2	5	5	1.45	0
			DD/SF	434384	0.43	5	438894	1650.85	30855.4	5	5	1.03	0
			DD/DF	468162	0.26	5	475440	287.07	6045	5	5	1.53	0
		10	SD/SF	596423	0.78	5	599104	11075.94	277998.8	5	5	0.45	0
			SD/DF	525087	0.3	5	528896	173.34	4980.6	5	5	0.72	0
			DD/SF	517956	0.47	5	521460	6010.46	185134.8	5	5	0.68	0
			DD/DF	518038	0.29	5	523640	421.28	10176.8	5	5	1.07	0
		15	SD/SF	614130	0.84	5	0	0	0	0	0	0.35	0
			SD/DF	557108	0.37	5	561593	571.58	20940.2	5	5	0.8	0
			DD/SF	559614	0.59	5	439472	7424.15	205047.2	3	4	0.5	0
			DD/DF	565640	0.3	5	569360	507.79	19755.6	5	5	0.65	0
		20	SD/SF	663324	0.84	5	265898	7221.32	239186	1	2	0.26	0
			SD/DF	613346	0.31	5	617106	1384.27	67724.4	5	5	0.61	0
			DD/SF	636980	0.61	5	258196	3946.35	135669	2	2	0.38	0
			DD/DF	617857	0.35	5	621399	1326.91	72581	5	5	0.57	0
	100	5	SD/SF	564152	2.34	5	570760	7474.75	42859	5	5	1.16	0
			SD/DF	505538	0.73	5	516361	2012.7	18477.2	5	5	2.09	0
			DD/SF	516717	1.38	5	525251	17735.26	83063	2	5	1.63	0.21
			DD/DF	505948	0.78	5	516279	1799.76	13521	5	5	2	0
		10	SD/SF	619494	2.17	5	364499	12960.22	86981.4	0	3	0.79	0.18
			SD/DF	575188	0.87	5	584565	1891.1	22846	5	5	1.6	0
			DD/SF	562933	1.2	5	568859	21600.1	139190.6	0	5	1.01	0.34
			DD/DF	559187	0.86	5	567949	3106.16	41679.4	5	5	1.54	0
		15	SD/SF	677924	1.99	5	143450	4320.04	34135.2	0	1	0.55	0.05
			SD/DF	607265	1.06	5	488199	3406	61900.4	4	4	1.03	0
			DD/SF	654805	1.15	5	540250	14449.87	137040.8	1	4	0.71	0.13
			DD/DF	620784	0.95	5	626670	7146.58	116834.6	4	5	0.94	0.02
		20	SD/SF	713566	2.07	5	-	-	-	0	0	0.44	-
			SD/DF	662278	1.28	5	528355	3869.55	80781.2	4	4	0.85	0
			DD/SF	727620	1.25	5	-	-	-	0	0	0.54	-
			DD/DF	679221	1.07	5	545167	2160.57	53662	4	4	0.89	0
	200	5	SD/SF	625995	13.54	5	640558	21600	37490.8	0	5	2.26	0.83
			SD/DF	583615	4.42	5	604684	20871.72	50846	1	5	3.48	0.17
			DD/SF	631288	10.29	5	647973	21600	29542.4	0	5	2.58	0.67
			DD/DF	575081	2.02	5	598290	21600.16	56755.8	0	5	3.87	0.24
		10	SD/SF	685310	18.31	5	697866	21600	17505.8	0	5	1.63	1.39
			SD/DF	651421	4.23	5	668054	21600	43626.2	0	5	2.47	0.52
			DD/SF	680314	6.68	5	694714	21600.02	22131.8	0	5	1.85	1.37
			DD/DF	656711	4.46	5	672233	18086	49923.6	1	5	2.29	0.45
		15	SD/SF	748749	12.39	5	759027	21600.1	28941	0	5	1.17	0.95
			SD/DF	716039	4.6	5	432383	12960.06	38138.2	0	3	2.04	0.29
			DD/SF	725231	7.95	5	737884	21600	33358.8	0	5	1.54	1.12
			DD/DF	712887	4.16	5	288370	8641.26	51852.2	0	2	2	0.14
		20	SD/SF	845330	11.28	5	519409	12960.08	29834.6	0	3	0.86	0.38
			SD/DF	780667	4.57	5	319399	8640.04	35419	0	2	1.76	0.11
			DD/SF	863397	7.34	5	173890	4320.06	7186.6	0	1	0.93	0.17
			DD/DF	774067	3.89	5	157501	4320.04	41918.4	0	1	1.88	0.06

Table 130: Performance of the ES-LS formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	2.16	5	1025050	21600	26626.4	0	5	0.95	0.84
			SD/DF	909668	0.59	5	921440	21600.16	65077	0	5	1.27	0.24
			DD/SF	985847	1.14	5	998091	21600.02	43995	0	5	1.09	0.89
			DD/DF	895471	0.66	5	907958	20047.14	55719.8	1	5	1.37	0.22
		10	SD/SF	1110688	3.26	5	1118262	21600.02	26822.4	0	5	0.62	0.59
			SD/DF	982207	1.03	5	399629	8640.1	25567	0	2	0.92	0.08
			DD/SF	996734	1.72	5	598370	12960.16	26977.6	0	3	0.75	0.32
			DD/DF	991317	1.14	5	607416	12960.04	50652.4	0	3	0.92	0.18
		15	SD/SF	1150758	4.29	5	927694	17280.1	26852.6	0	4	0.56	0.47
			SD/DF	1052526	1.69	5	633548	12960.08	60592.2	0	3	0.78	0.15
			DD/SF	1078616	2.55	5	1086616	21600.14	50145.6	0	5	0.61	0.57
			DD/DF	1068220	1.45	5	214498	1083.36	7481	1	1	0.65	0
		20	SD/SF	1292460	6.13	5	1299078	21600.12	41096.8	0	5	0.39	0.47
			SD/DF	1119702	2.26	5	446212	8640.22	51968.8	0	2	0.55	0.11
			DD/SF	1186240	3.65	5	754164	12960.06	47616.6	0	3	0.51	0.26
			DD/DF	1118648	2.03	5	226280	4320.04	19769.6	0	1	0.65	0.04
	100	5	SD/SF	1078541	9.71	5	-	-	-	0	0	1.8	-
			SD/DF	1013248	1.68	5	1035186	21600.18	11666.4	0	5	2.02	1.1
			DD/SF	1066542	4	5	1093910	21600.14	9369.8	0	5	2.01	2.19
			DD/DF	1007228	1.6	5	1030940	21600.04	11388.8	0	5	2.12	1.2
		10	SD/SF	1196186	9.35	5	1213786	21600.1	8375.8	0	5	1.25	1.37
			SD/DF	1096248	2.58	5	1114470	21600.06	15083.2	0	5	1.59	0.82
			DD/SF	1223652	4.82	5	730466	12960.04	7448.6	0	3	1.41	0.95
			DD/DF	1104226	2.32	5	230786	4320	3789	0	1	1.56	0.18
		15	SD/SF	1252672	11.92	5	1271188	21600.08	9060.2	0	5	1.14	1.37
			SD/DF	1171096	3.9	5	1186556	21600.08	21232	0	5	1.27	0.5
			DD/SF	1261324	7.38	5	258348	4320	2661	0	1	1.23	0.21
			DD/DF	1182070	3.47	5	-	-	-	0	0	1.25	-
		20	SD/SF	1374016	17.53	5	1386048	21600.26	12903	0	5	0.82	0.81
			SD/DF	1256774	4.78	5	514380	8640.06	10825.4	0	2	1.1	0.22
			DD/SF	1353596	10.05	5	1367256	21600.1	23576.2	0	5	0.98	0.8
			DD/DF	1269804	4.85	5	1025060	17280.08	27826.4	0	4	1.15	0.38
	200	5	SD/SF	1239002	48.26	5	1293584	21600.18	1440.8	0	5	3.13	3.93
			SD/DF	1153988	4.53	5	1213938	21600.12	2341.2	0	5	4.03	3.5
			DD/SF	1152158	10.9	5	1214834	21600.14	2350.8	0	5	4.08	4.52
			DD/DF	1147960	3.78	5	1204472	21600.12	3115.6	0	5	4.14	3.13
		10	SD/SF	1413846	41.24	5	1467172	21600.18	2319.6	0	5	2.9	3.54
			SD/DF	1288326	6.98	5	1340314	21600.2	4594.6	0	5	3.27	2.56
			DD/SF	1396814	17.77	5	1453350	21600.1	3455.6	0	5	3.02	3.61
			DD/DF	1289822	7.01	5	1341108	21600.12	5657.6	0	5	3.12	2.57
		15	SD/SF	1511778	49.62	5	1556282	21600.18	2383.6	0	5	2.44	2.78
			SD/DF	1406646	11.61	5	1452240	21600.14	6231.6	0	5	2.75	2.03
			DD/SF	1466014	30.8	5	1526284	21600.2	4144.6	0	5	2.83	3.62
			DD/DF	1405708	10.93	5	1450382	21600.2	5666.4	0	5	2.55	2.03
		20	SD/SF	1617296	61.54	5	1653428	21600.46	2531	0	5	1.85	2.1
			SD/DF	1470638	13.76	5	1508986	21600.18	8737.6	0	5	2.22	1.57
			DD/SF	1561248	35.93	5	1603904	21600.2	4437.8	0	5	2.43	2.37
			DD/DF	1479886	13.66	5	1525242	21600.36	7301.2	0	5	2.25	1.96

Table 131: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	1.25	5	488726	951.81	49271	5	5	0.92	0
			SD/DF	461236	0.51	5	468009	92.42	5333	5	5	1.44	0
			DD/SF	434384	0.63	5	438894	825.06	50147.8	5	5	1.03	0
			DD/DF	468162	0.48	5	475440	210.09	13031	5	5	1.53	0
		10	SD/SF	596423	0.84	5	599104	5504.13	291895.2	5	5	0.45	0
			SD/DF	525089	0.56	5	528896	243.55	13878.4	5	5	0.72	0
			DD/SF	517956	0.72	5	521460	3495.51	220130.8	5	5	0.68	0
			DD/DF	518041	0.53	5	523640	459.72	32332.6	5	5	1.07	0
		15	SD/SF	614130	1.29	5	616290	18747.68	1172859	2	5	0.35	0.04
			SD/DF	557111	0.68	5	561593	1449.4	94472.4	5	5	0.8	0
			DD/SF	559614	1.5	5	439472	7676.86	461418	4	4	0.5	0
			DD/DF	565640	0.89	5	569360	1861.06	107228	5	5	0.65	0
		20	SD/SF	663324	0.62	5	142566	2685.2	159122.4	1	1	0.26	0
			SD/DF	613347	0.39	5	617106	4197.82	294138.8	5	5	0.61	0
			DD/SF	636980	0.54	5	380414	7956.9	446002	2	3	0.38	0.03
			DD/DF	617858	0.44	5	621399	5320.79	358297.8	5	5	0.57	0
	100	5	SD/SF	564152	1.21	5	570760	3066.33	59005.2	5	5	1.16	0
			SD/DF	505542	0.72	5	516361	1127.35	40474	5	5	2.09	0
			DD/SF	516717	1	5	525219	14843.68	372716.6	2	5	1.63	0.05
			DD/DF	505991	0.73	5	516279	704.09	24776.8	5	5	1.99	0
		10	SD/SF	619494	1.15	5	383815	11461.4	269547	1	3	0.79	0.06
			SD/DF	575197	0.72	5	584565	2689.37	104200.4	5	5	1.6	0
			DD/SF	562933	1.01	5	568690	21600.38	433801	0	5	1.01	0.24
			DD/DF	559207	0.74	5	567949	5319.13	199606.8	5	5	1.54	0
		15	SD/SF	677924	1.27	5	542631	17282.28	371913.8	0	4	0.55	0.17
			SD/DF	607267	0.75	5	488199	6425.05	207205	3	4	1.03	0.02
			DD/SF	654805	1.03	5	268877	8640	207622	0	2	0.71	0.05
			DD/DF	620788	0.78	5	626664	10995.74	363355	4	5	0.94	0.04
		20	SD/SF	713566	1.3	5	-	-	-	0	0	0.44	-
			SD/DF	662284	0.78	5	136921	4305.08	146219.4	1	1	0.85	0
			DD/SF	727620	1.13	5	-	-	-	0	0	0.54	-
			DD/DF	679232	0.78	5	404101	5381.48	209810.4	3	3	0.89	0
	200	5	SD/SF	625995	2.77	5	640375	21600.08	146694.6	0	5	2.26	0.59
			SD/DF	583618	1.91	5	604682	16969.37	343563.8	2	5	3.48	0.02
			DD/SF	631288	2.46	5	648050	21600.04	164706.8	0	5	2.58	0.58
			DD/DF	575102	2.01	5	598286	19584.44	374799.4	1	5	3.87	0.16
		10	SD/SF	685310	3.13	5	696826	21600.04	142382.4	0	5	1.63	0.75
			SD/DF	651452	1.78	5	400669	12960.04	236157	0	3	2.46	0.3
			DD/SF	680314	2.41	5	693292	21600.02	156163.4	0	5	1.85	0.8
			DD/DF	656742	1.74	5	536938	15830.64	273535	1	4	2.28	0.4
		15	SD/SF	748749	3.47	5	599260	17280.08	129663.2	0	4	1.17	0.48
			SD/DF	716057	1.83	5	437182	12960.04	190040.8	0	3	2.04	0.39
			DD/SF	725231	2.87	5	736872	21600.1	197226.2	0	5	1.54	0.82
			DD/DF	712908	1.73	5	298871	8640.04	136445	0	2	2	0.32
		20	SD/SF	845330	3.45	5	696816	17280.12	192604.4	0	4	0.86	0.47
			SD/DF	780682	1.76	5	159798	4320.02	55640.4	0	1	1.76	0.11
			DD/SF	863397	2.44	5	690124	17280.1	167754.8	0	4	0.93	0.39
			DD/DF	774111	1.75	5	478651	12960.02	197751.6	0	3	1.87	0.34

Table 132: Performance of the ES-F-N formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	11.16	5	1025787	21600.1	43837.8	0	5	0.95	0.99
			SD/DF	909695	4.09	5	921906	21600.14	217465.6	0	5	1.27	0.37
			DD/SF	985847	9.36	5	997528	21600.4	59426.2	0	5	1.09	0.93
			DD/DF	895512	4.81	5	908240	21600.1	189774.4	0	5	1.37	0.37
		10	SD/SF	1110688	13.97	5	1118626	21600.1	49921.2	0	5	0.62	0.65
			SD/DF	982236	4.44	5	991858	21600.1	172251.2	0	5	0.92	0.43
			DD/SF	996734	8.83	5	1005534	21600.1	81570.4	0	5	0.75	0.72
			DD/DF	991355	4.96	5	1000976	21600.12	213394.2	0	5	0.92	0.4
		15	SD/SF	1150758	21.2	5	1157738	21600.1	71983	0	5	0.56	0.56
			SD/DF	1052556	5.46	5	849518	17280.16	151481.6	0	4	0.77	0.26
			DD/SF	1078616	11.17	5	1086850	21600.14	80181.2	0	5	0.61	0.64
			DD/DF	1068236	4.93	5	1075444	21436.48	216541.8	1	5	0.65	0.27
		20	SD/SF	1292460	19.05	5	1298198	21600.12	72772.8	0	5	0.39	0.41
			SD/DF	1119716	6.73	5	907212	17280.12	143457	0	4	0.55	0.2
			DD/SF	1186240	9.93	5	1193418	21600.14	128881.2	0	5	0.51	0.49
			DD/DF	1118678	6.04	5	671010	12960.06	99760.6	0	3	0.64	0.2
	100	5	SD/SF	1078541	17.09	5	1101818	21600.2	9775.8	0	5	1.8	2
			SD/DF	1013290	8.98	5	1034780	21600.14	62008.8	0	5	2.02	1.11
			DD/SF	1066542	12.43	5	1090772	21600.22	15202.4	0	5	2.01	2
			DD/DF	1007253	8.73	5	1029428	21600.18	56546.4	0	5	2.12	1.12
		10	SD/SF	1196186	23.26	5	1212178	21600.24	10080.8	0	5	1.25	1.29
			SD/DF	1096314	7.01	5	1115186	21600.24	68734.8	0	5	1.59	1.01
			DD/SF	1223652	18.32	5	1241110	21600.2	18511.8	0	5	1.41	1.29
			DD/DF	1104278	9.86	5	1122322	21600.2	72967.4	0	5	1.55	0.91
		15	SD/SF	1252672	25.2	5	1269906	21600.22	14535.2	0	5	1.14	1.3
			SD/DF	1171152	7.63	5	1187634	21600.22	50079	0	5	1.26	0.83
			DD/SF	1261324	15.32	5	1281034	21600.2	21877.4	0	5	1.23	1.45
			DD/DF	1182138	7.54	5	1197626	21600.26	77890.6	0	5	1.25	0.67
		20	SD/SF	1374016	29.95	5	1387110	21600.2	20647.8	0	5	0.82	0.91
			SD/DF	1256820	7.23	5	1271140	21600.26	71574	0	5	1.09	0.6
			DD/SF	1353596	21.41	5	1368730	21600.26	29800.2	0	5	0.98	1.01
			DD/DF	1269872	11.2	5	1285714	21600.24	70059.2	0	5	1.15	0.7
	200	5	SD/SF	1239002	48.8	5	1280032	21600.4	3858.2	0	5	3.13	3.14
			SD/DF	1153994	22.29	5	1204160	21600.58	8849.2	0	5	4.03	3.26
			DD/SF	1152158	34.39	5	1208318	21600.44	4361.2	0	5	4.08	4.4
			DD/DF	1148000	23.67	5	1198552	21600.34	9243.4	0	5	4.14	3.06
		10	SD/SF	1413846	50.93	5	1462382	21600.48	3582	0	5	2.9	3.28
			SD/DF	1288416	18.63	5	1335736	21600.58	9418	0	5	3.26	2.97
			DD/SF	1396814	31.21	5	1447784	21600.4	5625.4	0	5	3.02	3.42
			DD/DF	1289908	17.72	5	1332470	21600.34	15248.2	0	5	3.12	2.54
		15	SD/SF	1511778	80.23	5	1558652	21600.48	3623.4	0	5	2.44	2.97
			SD/DF	1406770	17.13	5	1450244	21600.38	15481.2	0	5	2.74	2.47
			DD/SF	1466014	39.29	5	1513888	21600.32	5402.4	0	5	2.83	3.07
			DD/DF	1405824	18.84	5	1448516	21600.38	15400.4	0	5	2.54	2.49
		20	SD/SF	1617296	72.29	5	1656648	21600.36	4488.4	0	5	1.85	2.36
			SD/DF	1470764	16.59	5	1508938	21600.34	15463.2	0	5	2.21	2.1
			DD/SF	1561248	39.38	5	1607190	21600.32	6153	0	5	2.43	2.79
			DD/DF	1480024	17.36	5	1517942	21600.46	17266	0	5	2.24	2.1

Table 133: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	0.75	5	488726	2424.21	52918.6	5	5	0.92	0
			SD/DF	461236	0.55	5	468009	184.97	4954.4	5	5	1.44	0
			DD/SF	434384	0.85	5	438894	1982.32	55570.8	5	5	1.03	0
			DD/DF	468162	0.53	5	475440	416.21	14414	5	5	1.53	0
		10	SD/SF	596423	1.51	5	599104	12364.22	265717.2	4	5	0.45	0.01
			SD/DF	525089	0.88	5	528896	744.75	17064.8	5	5	0.72	0
			DD/SF	517956	0.94	5	402105	8411.74	171787.8	3	4	0.68	0.03
			DD/DF	518041	0.4	5	523640	1148.65	28316	5	5	1.07	0
		15	SD/SF	614130	1.29	5	489838	17280.56	345977.8	0	4	0.35	0.12
			SD/DF	557111	1.03	5	561593	2833.52	67241.8	5	5	0.8	0
			DD/SF	559614	1.38	5	562562	20914.52	345514.4	1	5	0.5	0.1
			DD/DF	565640	0.59	5	569360	2272.81	59529	5	5	0.65	0
		20	SD/SF	663324	1.14	5	281650	8640.1	173570.2	0	2	0.26	0.04
			SD/DF	613347	1.12	5	617106	5226.79	161253.4	5	5	0.61	0
			DD/SF	636980	1.17	5	258196	5595.42	150945.6	2	2	0.38	0
			DD/DF	617858	1.24	5	621399	6036.89	174664.4	5	5	0.57	0
	100	5	SD/SF	564152	1.81	5	570760	7553.14	70135	5	5	1.16	0
			SD/DF	505542	0.99	5	516361	2009.32	35713.6	5	5	2.09	0
			DD/SF	516717	1.37	5	525219	20317.56	152462.6	1	5	1.63	0.2
			DD/DF	505991	1.06	5	516279	1350.88	23742	5	5	1.99	0
		10	SD/SF	619494	1.69	5	624569	21600.26	157918	0	5	0.79	0.31
			SD/DF	575197	1.01	5	584565	6720.63	95337	5	5	1.6	0
			DD/SF	562933	1.4	5	347659	12960.64	74755.6	0	3	1.01	0.23
			DD/DF	559207	0.87	5	567949	12099.83	183058.8	3	5	1.54	0.05
		15	SD/SF	677924	2.01	5	410201	12960.34	80308.8	0	3	0.55	0.13
			SD/DF	607267	1.08	5	613591	13145.55	137952.4	3	5	1.03	0.09
			DD/SF	654805	1.47	5	245412	8640.3	52950.4	0	2	0.71	0.12
			DD/DF	620788	1.06	5	374259	6532.18	48863.2	2	3	0.94	0.05
		20	SD/SF	713566	1.74	5	-	-	-	0	0	0.44	-
			SD/DF	662284	1.26	5	129867	4320	30113	0	1	0.85	0.06
			DD/SF	727620	1.38	5	275641	8640.44	60039.4	0	2	0.54	0.08
			DD/DF	679232	1.12	5	404101	5225.65	62323.4	3	3	0.89	0
	200	5	SD/SF	625995	5	5	640379	21600.04	46225.2	0	5	2.26	0.7
			SD/DF	583618	2.59	5	604686	18996.56	124712.4	1	5	3.48	0.26
			DD/SF	631288	3.82	5	647961	21600.02	68907	0	5	2.58	0.61
			DD/DF	575102	2.8	5	598277	19105.34	219978.6	3	5	3.87	0.21
		10	SD/SF	685310	4.08	5	697483	21600.08	32112	0	5	1.63	0.99
			SD/DF	651452	2.14	5	668086	21600.04	89595.2	0	5	2.46	0.77
			DD/SF	680314	3.2	5	693809	21600.1	43220.6	0	5	1.85	0.99
			DD/DF	656742	2.4	5	672292	21600.04	128241.4	0	5	2.28	0.68
		15	SD/SF	748749	4.74	5	758320	21600.06	40020.4	0	5	1.17	0.71
			SD/DF	716057	2.1	5	731211	21600.08	100703.8	0	5	2.04	0.66
			DD/SF	725231	3.31	5	736938	21600.08	32383.8	0	5	1.54	0.88
			DD/DF	712908	2.26	5	582517	17280.02	86258	0	4	2	0.5
		20	SD/SF	845330	3.52	5	852718	21600.08	63597.8	0	5	0.86	0.55
			SD/DF	780682	2.47	5	634957	17280.04	44548.8	0	4	1.76	0.42
			DD/SF	863397	2.9	5	871884	21600.06	46388.2	0	5	0.93	0.48
			DD/DF	774111	2.41	5	789027	21600.04	87761.4	0	5	1.87	0.46

Table 134: Performance of the ES-F-T formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	10.88	5	1025433	21600.1	31621.2	0	5	0.95	0.92
			SD/DF	909695	2.54	5	921385	21600.1	108491.6	0	5	1.27	0.39
			DD/SF	985847	3.45	5	813037	17280.08	44022.6	0	4	1.09	0.74
			DD/DF	895512	2.98	5	908035	21600.12	91722.2	0	5	1.37	0.37
		10	SD/SF	1110688	18.94	5	1118898	21600.1	41957.2	0	5	0.62	0.66
			SD/DF	982236	3.51	5	991692	21600.1	79755.2	0	5	0.92	0.4
			DD/SF	996734	4.53	5	804849	17280.08	45437.8	0	4	0.75	0.5
			DD/DF	991355	3.78	5	1000835	21600.1	60802.4	0	5	0.92	0.4
		15	SD/SF	1150758	27.93	5	1157798	21600.1	39865.6	0	5	0.56	0.56
			SD/DF	1052556	4.95	5	1060980	21600.1	82932.4	0	5	0.77	0.34
			DD/SF	1078616	6.71	5	863396	17280.12	39455.6	0	4	0.61	0.38
			DD/DF	1068236	4.7	5	1075250	21600.1	97235.8	0	5	0.65	0.25
		20	SD/SF	1292460	26.34	5	1044028	17280.08	41271.4	0	4	0.39	0.33
			SD/DF	1119716	7.51	5	1126074	21600.12	85777.4	0	5	0.55	0.27
			DD/SF	1186240	10.53	5	941194	17280.1	44420	0	4	0.51	0.39
			DD/DF	1118678	6.87	5	904888	17280.08	44781.4	0	4	0.64	0.22
	100	5	SD/SF	1078541	25.59	5	1098520	21600.16	8987	0	5	1.8	1.64
			SD/DF	1013290	7.67	5	1034744	21600.12	40443.8	0	5	2.02	1.07
			DD/SF	1066542	11.67	5	1088627	21600.14	11978.6	0	5	2.01	1.72
			DD/DF	1007253	8.61	5	1029916	21600.16	34568.4	0	5	2.12	1.15
		10	SD/SF	1196186	41.31	5	1211694	21600.18	11555.2	0	5	1.25	1.2
			SD/DF	1096314	6.97	5	1115284	21600.18	24414.4	0	5	1.59	1.12
			DD/SF	1223652	15.38	5	1244346	21600.14	13949.8	0	5	1.41	1.48
			DD/DF	1104278	6.86	5	1122840	21600.18	28453.8	0	5	1.55	0.99
		15	SD/SF	1252672	59.84	5	1267104	21600.18	11496.2	0	5	1.14	1.07
			SD/DF	1171152	8.36	5	1186914	21600.2	18097	0	5	1.26	0.76
			DD/SF	1261324	13.74	5	1278306	21600.14	14027.4	0	5	1.23	1.16
			DD/DF	1182138	7.83	5	1198096	21600.18	25211.8	0	5	1.25	0.72
		20	SD/SF	1374016	109.92	5	1387774	21600.2	14355.4	0	5	0.82	0.94
			SD/DF	1256820	9.95	5	1271190	21600.2	26139.4	0	5	1.09	0.66
			DD/SF	1353596	23.58	5	1370226	21600.18	18457.8	0	5	0.98	1.09
			DD/DF	1269872	10.17	5	1284716	21600.18	24065.6	0	5	1.15	0.63
	200	5	SD/SF	1239002	133.44	5	1284082	21600.28	3144.4	0	5	3.13	3.35
			SD/DF	1153994	29.34	5	1206094	21600.36	6822.8	0	5	4.03	3.13
			DD/SF	1152158	48.21	5	1206518	21600.3	3504	0	5	4.08	3.94
			DD/DF	1148000	29.56	5	1200314	21600.28	6811.6	0	5	4.14	2.77
		10	SD/SF	1413846	106.7	5	1465840	21600.38	1717	0	5	2.9	3.49
			SD/DF	1288416	19.25	5	1337630	21600.4	5918.2	0	5	3.26	2.98
			DD/SF	1396814	40.91	5	1448870	21600.3	3671.2	0	5	3.02	3.4
			DD/DF	1289908	20.77	5	1336420	21600.32	7971.4	0	5	3.12	2.75
		15	SD/SF	1511778	144.63	5	1559138	21600.38	2917	0	5	2.44	2.98
			SD/DF	1406770	16.72	5	1454150	21600.3	8026.8	0	5	2.74	2.82
			DD/SF	1466014	56.29	5	1521102	21600.32	3416.8	0	5	2.83	3.44
			DD/DF	1405824	19.86	5	1448606	21600.34	6587	0	5	2.54	2.38
		20	SD/SF	1617296	174.91	5	1653286	21600.32	4099.6	0	5	1.85	2.1
			SD/DF	1470764	21.72	5	1508588	21600.3	8385.6	0	5	2.21	2.04
			DD/SF	1561248	54.44	5	1605910	21600.32	5446.8	0	5	2.43	2.59
			DD/DF	1480024	24.43	5	1523356	21600.34	6695.6	0	5	2.24	2.27

Table 135: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	484295	0.78	5	488726	2104.75	31033.6	5	5	0.92	0
			SD/DF	461229	0.33	5	468009	156.49	3943.4	5	5	1.45	0
			DD/SF	434384	0.52	5	438894	1490.57	29104.6	5	5	1.03	0
			DD/DF	468162	0.34	5	475440	328.61	9125.8	5	5	1.53	0
		10	SD/SF	596423	0.94	5	599104	10925.31	224821	5	5	0.45	0
			SD/DF	525087	0.37	5	528896	460.53	9923	5	5	0.72	0
			DD/SF	517956	0.6	5	521460	9689.17	213014.8	5	5	0.68	0
			DD/DF	518038	0.33	5	523640	1376.67	32145.6	5	5	1.07	0
		15	SD/SF	614130	0.96	5	-	-	-	0	0	0.35	-
			SD/DF	557108	0.46	5	561593	1376.35	33368.8	5	5	0.8	0
			DD/SF	559614	0.71	5	562427	13532.44	243883.2	4	5	0.5	0.03
			DD/DF	565640	0.39	5	569360	1340.87	27178.6	5	5	0.65	0
		20	SD/SF	663324	0.95	5	123339	4320	95371	0	1	0.26	0.01
			SD/DF	613346	0.44	5	617106	3318.15	87523.8	5	5	0.61	0
			DD/SF	636980	0.72	5	258196	5622.33	120578.6	1	2	0.38	0
			DD/DF	617857	0.42	5	621399	2925.09	90696.8	5	5	0.57	0
	100	5	SD/SF	564152	2.07	5	570760	8861.23	38607.2	5	5	1.16	0
			SD/DF	505538	0.73	5	516361	1820.39	30749.4	5	5	2.09	0
			DD/SF	516717	1.14	5	525219	19173.54	99260.6	2	5	1.63	0.17
			DD/DF	505948	0.65	5	516279	1367.7	14774.4	5	5	2	0
		10	SD/SF	619494	2.15	5	512477	17280.28	80672.8	0	4	0.79	0.27
			SD/DF	575188	0.73	5	584565	3794.25	57097.8	5	5	1.6	0
			DD/SF	562933	1.23	5	344178	12960.14	66777.4	0	3	1.01	0.18
			DD/DF	559187	0.84	5	567985	11716.29	113885	3	5	1.54	0.05
		15	SD/SF	677924	2.3	5	554758	17280.24	127892	0	4	0.55	0.25
			SD/DF	607265	0.79	5	493663	8013.32	73973.2	3	4	1.03	0.04
			DD/SF	654805	1.19	5	268901	8640.06	58858.8	0	2	0.71	0.06
			DD/DF	620784	0.72	5	626664	14733.19	124150.4	2	5	0.94	0.1
		20	SD/SF	713566	1.99	5	123496	4320.02	39199.6	0	1	0.44	0.04
			SD/DF	662278	0.82	5	260944	6758.94	59305	1	2	0.85	0.01
			DD/SF	727620	1.45	5	155731	4320	40337.6	0	1	0.54	0.06
			DD/DF	679221	0.71	5	404101	3770.68	53158	3	3	0.89	0
	200	5	SD/SF	625995	7.01	5	640548	21600	18059.6	0	5	2.26	0.93
			SD/DF	583615	2.07	5	604712	18825.24	84468.6	1	5	3.48	0.37
			DD/SF	631288	3.79	5	648184	21600	40328.6	0	5	2.58	0.7
			DD/DF	575081	1.98	5	598277	19883.18	139810	1	5	3.87	0.24
		10	SD/SF	685310	9.11	5	697884	21600.04	12834.6	0	5	1.63	1.26
			SD/DF	651421	2.19	5	668146	21600	47533	0	5	2.47	0.76
			DD/SF	680314	4.77	5	693444	21600	33842.4	0	5	1.85	0.91
			DD/DF	656711	2.13	5	672745	21600	71835	0	5	2.29	0.76
		15	SD/SF	748749	11.35	5	758553	21600	29657.4	0	5	1.17	0.8
			SD/DF	716039	2.33	5	731204	21600.02	62463.8	0	5	2.04	0.62
			DD/SF	725231	5.33	5	737634	21600.04	36114.8	0	5	1.54	1
			DD/DF	712887	2.03	5	582451	17280.04	56299.4	0	4	2	0.49
		20	SD/SF	845330	7.69	5	853335	21600	49375	0	5	0.86	0.64
			SD/DF	780667	2.66	5	794918	21600	63239.4	0	5	1.76	0.56
			DD/SF	863397	4.93	5	872983	21600	40180.6	0	5	0.93	0.65
			DD/DF	774067	2.28	5	630786	17280	73235	0	4	1.88	0.36

Table 136: Performance of the ES-F-LS formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1014311	2.45	5	1025719	21600.02	15531	0	5	0.95	0.92
			SD/DF	909668	0.73	5	921910	21600	61471	0	5	1.27	0.43
			DD/SF	985847	1.18	5	997788	21600.02	49172.2	0	5	1.09	0.86
			DD/DF	895471	0.83	5	908038	21600	75579	0	5	1.37	0.31
		10	SD/SF	1110688	3.09	5	1120586	21600.08	26361.4	0	5	0.62	0.8
			SD/DF	982207	1.15	5	992455	21600	49618.8	0	5	0.92	0.5
			DD/SF	996734	1.5	5	1006079	21600	39321.6	0	5	0.75	0.73
			DD/DF	991317	1.08	5	1001408	21600.08	63117.6	0	5	0.92	0.47
		15	SD/SF	1150758	5.19	5	1159210	21600	34803.8	0	5	0.56	0.68
			SD/DF	1052526	1.63	5	633738	12960.04	32021.8	0	3	0.78	0.21
			DD/SF	1078616	2.79	5	1087226	21600.04	43972.4	0	5	0.61	0.64
			DD/DF	1068220	1.52	5	868122	17280.04	67760	0	4	0.65	0.24
		20	SD/SF	1292460	7.32	5	1298992	21600.08	40811	0	5	0.39	0.46
			SD/DF	1119702	2.42	5	897504	17280.02	50118.4	0	4	0.55	0.3
			DD/SF	1186240	3.93	5	1193368	21600.1	32965.6	0	5	0.51	0.47
			DD/DF	1118648	2.06	5	1126770	21600.04	56536	0	5	0.65	0.31
	100	5	SD/SF	1078541	13.15	5	1100993	21600.1	6120.6	0	5	1.8	1.84
			SD/DF	1013248	2.25	5	1035524	21600.02	15961.4	0	5	2.02	1.26
			DD/SF	1066542	4.31	5	1090576	21600.06	7153.2	0	5	2.01	1.89
			DD/DF	1007228	2.33	5	1030128	21600.04	18682	0	5	2.12	1.23
		10	SD/SF	1196186	9.86	5	1216598	21600.1	7620.4	0	5	1.25	1.61
			SD/DF	1096248	2.85	5	1116498	21600.04	18415.4	0	5	1.59	1.19
			DD/SF	1223652	5.4	5	1243714	21600.1	10766.4	0	5	1.41	1.42
			DD/DF	1104226	2.58	5	1122710	21600.02	16934.6	0	5	1.56	1.06
		15	SD/SF	1252672	16.25	5	1270342	21600.1	9206.8	0	5	1.14	1.32
			SD/DF	1171096	4.94	5	1188360	21600.08	14478.2	0	5	1.27	0.9
			DD/SF	1261324	9.61	5	1280728	21600.1	8949	0	5	1.23	1.37
			DD/DF	1182070	3.84	5	1198494	21600.08	17096.8	0	5	1.25	0.85
		20	SD/SF	1374016	23.54	5	1390202	21600.08	9175.2	0	5	0.82	1.14
			SD/DF	1256774	5.87	5	1273184	21600.06	20008	0	5	1.1	0.82
			DD/SF	1353596	12.95	5	1371268	21600.1	11409.8	0	5	0.98	1.13
			DD/DF	1269804	4.71	5	1286726	21600.06	17916	0	5	1.15	0.83
	200	5	SD/SF	1239002	46.16	5	1291502	21600.2	1709	0	5	3.13	3.79
			SD/DF	1153988	8.09	5	1209226	21600.18	6002.4	0	5	4.03	3.42
			DD/SF	1152158	19.04	5	1212030	21600.24	2281	0	5	4.08	4.33
			DD/DF	1147960	7.81	5	1199498	21600.16	5835.8	0	5	4.14	2.66
		10	SD/SF	1413846	47.66	5	1466044	21600.22	1596	0	5	2.9	3.48
			SD/DF	1288326	6.27	5	1339148	21600.18	4696	0	5	3.27	3.09
			DD/SF	1396814	19.54	5	1452328	21600.18	2959.8	0	5	3.02	3.62
			DD/DF	1289822	6.77	5	1346716	21600.22	6655.2	0	5	3.12	3.49
		15	SD/SF	1511778	58.53	5	1556270	21600.36	1412	0	5	2.44	2.8
			SD/DF	1406646	9.02	5	1466922	21600.16	4856.2	0	5	2.75	3.48
			DD/SF	1466014	31.84	5	1521848	21600.24	2586.8	0	5	2.83	3.49
			DD/DF	1405708	8.41	5	1459756	21600.2	4647.4	0	5	2.55	3.1
		20	SD/SF	1617296	69.41	5	1662008	21600.3	1736	0	5	1.85	2.64
			SD/DF	1470638	14.38	5	1521264	17591.42	2912.6	0	5	2.22	2.16
			DD/SF	1561248	46.03	5	1609952	21600.24	2099.6	0	5	2.43	2.87
			DD/DF	1479886	11.88	5	1530752	21600.38	3892.8	0	5	2.25	2.74

Table 137: Performance of the N formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	485288	21.14	5	488733	17568.52	15606.6	3	5	0.71	0.06
			SD/DF	464307	19.65	5	468009	1838.31	2327.2	5	5	0.79	0
			DD/SF	435810	25.01	5	438894	14844.71	12387.4	4	5	0.7	0.02
			DD/DF	471140	18.46	5	475440	4865.33	6874.8	5	5	0.91	0
		10	SD/SF	597222	23.03	5	599328	21600.2	30204.2	0	5	0.31	0.22
			SD/DF	526755	16.39	5	528896	3561.94	5756.6	5	5	0.41	0
			DD/SF	518791	14.56	5	521630	20443.28	24796.8	1	5	0.52	0.18
			DD/DF	520310	15.2	5	523640	5798.13	9567	5	5	0.63	0
		15	SD/SF	614606	13.77	5	616562	21600.2	42751.4	0	5	0.27	0.22
			SD/DF	558864	13.74	5	561593	11789.92	23311.4	5	5	0.49	0
			DD/SF	560198	15.8	5	562631	21600.22	36697.8	0	5	0.4	0.22
			DD/DF	566995	13.91	5	569360	10261.16	21628.4	4	5	0.42	0.02
		20	SD/SF	663730	17.58	5	665373	21600.7	51659.6	0	5	0.2	0.19
			SD/DF	614964	13.15	5	617141	18848.22	42123.2	2	5	0.35	0.07
			DD/SF	637366	14.26	5	639807	21601.64	40468.2	0	5	0.32	0.25
			DD/DF	619126	11.32	5	621405	19415.3	39677.8	1	5	0.37	0.09
	100	5	SD/SF	566782	85.91	5	571181	20824.58	4784.4	1	5	0.7	0.37
			SD/DF	511327	99.33	5	516361	11504.04	12826.6	4	5	0.97	0
			DD/SF	520978	72.61	5	525725	21600.4	4485	0	5	0.81	0.53
			DD/DF	512347	82.98	5	516279	6513.66	4525.6	5	5	0.76	0
		10	SD/SF	621591	137.78	5	624929	21600.48	6695.4	0	5	0.45	0.38
			SD/DF	580307	67.16	5	584565	15088.09	8886.6	4	5	0.73	0
			DD/SF	565563	107.38	5	569306	21600.4	6059.4	0	5	0.55	0.45
			DD/DF	564743	65.1	5	567961	16589.6	9106.8	3	5	0.56	0.04
		15	SD/SF	679630	112.04	5	682741	21600.56	8385.8	0	5	0.3	0.36
			SD/DF	611345	75.68	5	613657	18543.78	10946.4	1	5	0.37	0.07
			DD/SF	656874	105.29	5	660427	21600.44	6944.2	0	5	0.39	0.43
			DD/DF	624616	88.41	5	626727	17874.26	9299	2	5	0.33	0.11
		20	SD/SF	714795	88.9	5	717255	21600.48	11802.6	0	5	0.27	0.28
			SD/DF	665676	76.34	5	668163	21600.44	11116	0	5	0.34	0.19
			DD/SF	729360	78.41	5	731750	21600.52	8474.2	0	5	0.3	0.25
			DD/DF	683035	75.56	5	685519	18180.25	9835.6	2	5	0.34	0.1
	200	5	SD/SF	633705	268.62	5	528821	17280.62	1217.4	0	4	1.05	0.81
			SD/DF	597476	240.96	5	604701	21600.78	5188.6	0	5	1.19	0.11
			DD/SF	642250	250.94	5	649005	21600.82	1779	0	5	0.88	0.75
			DD/DF	588836	223.68	5	598284	21601.1	4193.6	0	5	1.57	0.03
		10	SD/SF	691361	279.19	5	701293	21600.98	1791.4	0	5	0.76	1.26
			SD/DF	663713	200.85	5	668227	21600.78	3224.2	0	5	0.63	0.26
			DD/SF	687736	310.87	5	696255	21601.04	1859.8	0	5	0.78	1.03
			DD/DF	668588	204.7	5	672473	21600.84	2719.8	0	5	0.52	0.3
		15	SD/SF	753182	324.86	5	761981	21600.88	1942	0	5	0.59	0.98
			SD/DF	726908	257.08	5	586516	17280.68	2358.2	0	4	0.55	0.19
			DD/SF	731633	267.15	5	459733	12960.5	1333.8	0	3	0.67	0.55
			DD/DF	723589	222.55	5	145351	4320.22	922	0	1	0.54	0.05
		20	SD/SF	849166	363.7	5	-	-	-	0	0	0.41	-
			SD/DF	791208	299.43	5	-	-	-	0	0	0.43	-
			DD/SF	868290	359.57	5	-	-	-	0	0	0.37	-
			DD/DF	785262	237.66	5	-	-	-	0	0	0.46	-

Table 138: Performance of the N formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1016055	1262.9	5	1047639	21604.22	287.2	0	5	0.78	3.04
			SD/DF	914866	685.83	5	741853	17325.02	482	0	4	0.71	0.96
			DD/SF	955033	5000.52	4	1014653	21603.82	258.4	0	5	0.85	2.6
			DD/DF	900647	666.76	5	910041	21603.98	576	0	5	0.8	0.73
		10	SD/SF	1111702	1324.56	5	1141312	21603.56	228	0	5	0.53	2.58
			SD/DF	985958	721.3	5	1009739	21603.76	447.6	0	5	0.55	2.24
			DD/SF	998497	1014	5	1084226	21603.22	258.6	0	5	0.57	6.72
			DD/DF	994971	782.74	5	1003870	21603.54	528.2	0	5	0.56	0.77
		15	SD/SF	1151604	1258.24	5	1207382	21603.72	263	0	5	0.49	4.44
			SD/DF	1055700	772.06	5	856142	17282.78	306.8	0	4	0.48	1.4
			DD/SF	1080108	799.15	5	1156748	21603.62	302.4	0	5	0.47	6.1
			DD/DF	1071188	795.41	5	1088400	21621	424.6	0	5	0.38	1.5
		20	SD/SF	1293102	1692.09	5	1250266	17283.08	178.2	0	4	0.34	12.06
			SD/DF	1122172	827.66	5	915638	17283.12	317.4	0	4	0.33	1.89
			DD/SF	1187596	769.13	5	1002370	17282.58	237.6	0	4	0.4	6.29
			DD/DF	1121730	767.44	5	918050	17282.64	304.2	0	4	0.37	1.1
	100	5	SD/SF	1084266	4308.68	5	1593980	22225.88	0	0	5	1.27	31.93
			SD/DF	1025352	2399.51	5	1063822	21607.8	96	0	5	0.85	3.54
			DD/SF	1075103	3664.42	5	1544024	21607.02	25.8	0	5	1.21	30.32
			DD/DF	1023795	6169.15	4	1087482	21608.4	83	0	5	0.88	6.09
		10	SD/SF	1167890	7404.34	4	1339358	17855.84	0	0	4	0.99	24.13
			SD/DF	1105948	2219.71	5	707474	12964.22	33	0	3	0.72	3.36
			DD/SF	1229044	3130.34	5	642088	8951.84	1	0	2	0.97	8.52
			DD/DF	1113284	2204.93	5	916604	17286.32	90.6	0	4	0.75	1.71
		15	SD/SF	1255244	4475.85	5	1744214	22008.68	0.4	0	5	0.93	27.96
			SD/DF	1179272	2526.27	5	995072	17287.66	82.8	0	4	0.58	3.68
			DD/SF	1265642	4079.55	5	1640648	21606.92	39.4	0	5	0.89	21.6
			DD/DF	1189426	2334.09	5	1224310	21607.7	115.4	0	5	0.64	2.66
		20	SD/SF	1375818	5114.49	5	1430514	17285.76	1.2	0	4	0.68	19.4
			SD/DF	1264388	2557.57	5	1350062	21607.7	129.2	0	5	0.5	6.06
			DD/SF	1357452	3726.06	5	1449496	17774.42	17	0	4	0.7	20.37
			DD/DF	1277050	2679.9	5	1064316	17285.86	82.4	0	4	0.59	3.37
	200	5	SD/SF	-	21635.66	0	-	-	-	0	0	-	-
			SD/DF	1181120	10239.09	4	1473480	21639.98	0	0	5	1.67	19.58
			DD/SF	1175652	10912.36	5	-	-	-	0	0	2.11	-
			DD/DF	1176670	8141.56	5	903964	12981.26	0	0	3	1.74	13.32
		10	SD/SF	1395960	17579.34	2	850836	8648.42	0	0	2	2.29	12.72
			SD/DF	1313706	9019.57	5	1256846	17310.82	0	0	4	1.36	12.74
			DD/SF	1415950	15492.12	4	-	-	-	0	0	1.96	-
			DD/DF	1313400	8735.81	5	1524060	21636.2	0.2	0	5	1.35	13.54
		15	SD/SF	1476517	17465.1	3	490976	4323.24	0	0	1	1.94	6.36
			SD/DF	1429822	6137.91	5	1360430	18299.14	0.4	0	4	1.14	12.82
			DD/SF	1427770	16619.58	3	393146	4324.34	0	0	1	1.92	5.37
			DD/DF	1426950	9029.48	5	1651422	22545.68	8	0	5	1.07	13.25
		20	SD/SF	1616620	20955.72	1	-	-	-	0	0	1.72	-
			SD/DF	1489888	7964.4	5	1756554	21656.6	0.4	0	5	0.94	15.14
			DD/SF	1582785	16286.26	4	-	-	-	0	0	1.73	-
			DD/DF	1499662	7268.79	5	1033324	13012.82	0	0	3	0.95	7.54

Table 139: Performance of the T formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	485222	40.06	5	489231	21600.12	9432.4	0	5	0.73	0.37
			SD/DF	464275	35.64	5	468009	2379.92	2040.6	5	5	0.8	0
			DD/SF	435747	44.79	5	438946	19694.4	10548	1	5	0.72	0.16
			DD/DF	471117	25.7	5	475440	5598.05	7639.8	5	5	0.91	0
		10	SD/SF	597145	29.59	5	599302	21600.1	17203.4	0	5	0.33	0.24
			SD/DF	526745	17.85	5	528896	3422.21	5134.2	5	5	0.41	0
			DD/SF	518777	22.54	5	521740	21600.14	19346.2	0	5	0.52	0.27
			DD/DF	520292	19.44	5	523640	4641.21	8278.4	5	5	0.64	0
		15	SD/SF	614575	33.66	5	616794	21600.14	25683.2	0	5	0.28	0.28
			SD/DF	558857	26.65	5	561593	13292.39	23654.6	4	5	0.49	0.01
			DD/SF	560190	40.11	5	562860	21600.3	35944	0	5	0.4	0.29
			DD/DF	566992	33.12	5	569360	10071.63	21284.2	4	5	0.42	0.03
		20	SD/SF	663712	30.47	5	665183	21600.24	38948.4	0	5	0.21	0.17
			SD/DF	614957	16.09	5	617121	16257.3	44956.6	4	5	0.35	0.03
			DD/SF	637362	21.17	5	639802	21600.34	47862.2	0	5	0.32	0.25
			DD/DF	619121	15.66	5	621399	19044.17	54428.6	1	5	0.37	0.06
	100	5	SD/SF	566567	195.06	5	339813	12960.16	1676.8	0	3	0.74	0.35
			SD/DF	511293	239.99	5	516443	16094.69	5346.6	3	5	0.98	0.1
			DD/SF	520853	175.28	5	525413	21600.28	3818.4	0	5	0.83	0.4
			DD/DF	512310	199.36	5	516279	10623.19	5009.6	5	5	0.77	0
		10	SD/SF	621477	369.35	5	626206	21600.22	4290.2	0	5	0.47	0.66
			SD/DF	580279	239.71	5	584568	13440.02	7985.2	4	5	0.73	0.01
			DD/SF	565464	205.22	5	569639	21600.2	4464.8	0	5	0.57	0.58
			DD/DF	564723	300.44	5	567974	17381.94	8443.6	3	5	0.57	0.06
		15	SD/SF	679493	226.24	5	683178	21600.26	6269.8	0	5	0.32	0.46
			SD/DF	611322	195.76	5	613659	17725.64	11614.4	2	5	0.37	0.08
			DD/SF	656814	195.08	5	660176	21600.28	6684.4	0	5	0.4	0.4
			DD/DF	624593	215.09	5	626682	17942.33	9092.8	2	5	0.33	0.11
		20	SD/SF	714668	215.37	5	717472	21600.28	8594.2	0	5	0.29	0.33
			SD/DF	665665	134.05	5	668055	21600.24	12336.8	0	5	0.35	0.18
			DD/SF	729320	193.92	5	731870	21600.26	8802.4	0	5	0.31	0.27
			DD/DF	683020	178.83	5	685445	19881.84	11487.8	1	5	0.34	0.1
	200	5	SD/SF	633094	957.94	5	-	-	-	0	0	1.14	-
			SD/DF	597410	828.74	5	604716	21600.44	2360	0	5	1.2	0.09
			DD/SF	642072	900.46	5	650920	21600.42	966.6	0	5	0.91	0.93
			DD/DF	588796	726.25	5	598402	21600.44	1692	0	5	1.58	0.24
		10	SD/SF	690923	809.59	5	703074	21600.48	1535.8	0	5	0.82	1.57
			SD/DF	663640	718.71	5	668163	21600.46	1848.4	0	5	0.64	0.28
			DD/SF	687479	862.82	5	698429	21600.5	1153.4	0	5	0.81	1.33
			DD/DF	668528	873.85	5	672989	21077.94	2692.2	1	5	0.53	0.42
		15	SD/SF	752935	977.46	5	763804	21600.36	984.2	0	5	0.62	1.24
			SD/DF	726853	484.23	5	731864	21600.42	2111	0	5	0.56	0.36
			DD/SF	731419	902.96	5	599019	17280.38	1263.8	0	4	0.7	0.87
			DD/DF	723524	576.19	5	288962	8640.18	1648	0	2	0.55	0.06
		20	SD/SF	848922	1039.15	5	517692	12960.28	784.6	0	3	0.44	0.55
			SD/DF	791138	1034.69	5	795889	21600.52	1886.2	0	5	0.44	0.4
			DD/SF	868170	1120.05	5	874595	21600.42	1461	0	5	0.39	0.66
			DD/DF	785216	540.17	5	789017	21600.48	2962.2	0	5	0.46	0.2

Table 140: Performance of the T formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1015633	2201.23	5	1222156	21601.34	102.6	0	5	0.82	15.12
			SD/DF	914806	751.97	5	924440	21601.5	538	0	5	0.71	0.83
			DD/SF	988313	1682.02	5	1006394	21601.46	233.6	0	5	0.84	1.76
			DD/DF	900613	683.31	5	915362	21601.62	541.6	0	5	0.8	1.34
		10	SD/SF	1111494	1986.68	5	1238834	21622.66	89.8	0	5	0.55	9.23
			SD/DF	985935	1036.55	5	995852	21602.12	419.8	0	5	0.55	0.88
			DD/SF	998419	1450.86	5	1016108	21601.54	324.4	0	5	0.58	1.72
			DD/DF	994946	845	5	1004534	21601.58	460.8	0	5	0.56	0.85
		15	SD/SF	1151442	2488.66	5	1214898	21601.4	150.8	0	5	0.5	4.93
			SD/DF	1055678	956.67	5	1065110	21601.36	380	0	5	0.48	0.78
			DD/SF	1080050	1571.07	5	1112124	21601.42	277.2	0	5	0.48	2.86
			DD/DF	1071170	804.21	5	1078044	21601.36	496.2	0	5	0.38	0.57
		20	SD/SF	1292948	2750.16	5	1330644	21601.28	192.6	0	5	0.35	2.73
			SD/DF	1122154	930.99	5	1128852	21601.28	458.4	0	5	0.33	0.55
			DD/SF	1187560	1249.83	5	1200158	21601.94	403.6	0	5	0.4	1.05
			DD/DF	1121712	756.61	5	1130178	21601.46	446.4	0	5	0.37	0.66
	100	5	SD/SF	1083361	6773.86	5	1299878	17434.96	0	0	4	1.35	26.98
			SD/DF	1025262	2499.01	5	1145640	21603.02	96.4	0	5	0.86	9.58
			DD/SF	1074648	6054.76	5	1509182	21602.78	18.6	0	5	1.25	28.13
			DD/DF	1019634	2381.38	5	1084206	21644.9	110.6	0	5	0.92	5.8
		10	SD/SF	1199130	9181.98	5	1784010	22968.02	2.6	0	5	1	32.82
			SD/DF	1105886	2757.82	5	1147702	21602.8	66.8	0	5	0.73	3.49
			DD/SF	1228764	7519.19	5	1734462	23330.7	0	0	5	1	29.17
			DD/DF	1113228	1976.11	5	1131758	21603.08	116.8	0	5	0.76	1.53
		15	SD/SF	1254812	6466.38	5	1809910	21697.14	0.6	0	5	0.97	30.6
			SD/DF	1179218	3089.33	5	1198958	21603.94	68.8	0	5	0.58	1.62
			DD/SF	1265362	4861.45	5	1716938	21603.12	4.8	0	5	0.91	26.15
			DD/DF	1189392	2236.76	5	1204036	21603.3	115.2	0	5	0.64	1.1
		20	SD/SF	1375466	10147.65	5	1908894	22821.72	2	0	5	0.71	27.93
			SD/DF	1264354	2944.61	5	1293280	21602.98	76.8	0	5	0.5	2.21
			DD/SF	1357272	5223.35	5	1810970	21991.92	13.4	0	5	0.71	24.83
			DD/DF	1277014	2615.03	5	1294196	21602.72	119.4	0	5	0.59	1.29
	200	5	SD/SF	1227218	15491.1	4	407886	4321.38	0	0	1	2.24	6.46
			SD/DF	1183360	10994.78	5	1488104	21610.02	1	0	5	1.59	20.42
			DD/SF	1175194	12780.86	5	1692584	21608.9	0	0	5	2.15	30.59
			DD/DF	1176558	11023.11	5	1502520	21613.26	1.8	0	5	1.75	21.52
		10	SD/SF	1423072	16536.84	5	2107740	24423.76	0	0	5	2.26	32.43
			SD/DF	1313490	8821.87	5	1572870	21946.86	3.8	0	5	1.38	16.32
			DD/SF	1411497	19365.3	3	399168	4321.64	0	0	1	1.94	6
			DD/DF	1313254	10039.83	5	1194080	17289.94	0.6	0	4	1.36	9.99
		15	SD/SF	1493100	20067.6	2	960790	8643.88	0	0	2	1.86	13.59
			SD/DF	1429626	11160.28	5	1387066	17291.44	0	0	4	1.16	14.21
			DD/SF	-	21610.62	0	-	-	-	0	0	-	-
			DD/DF	1426830	10602.23	5	1300944	17288.56	2.2	0	4	1.08	9.45
		20	SD/SF	1615890	20156.5	1	932512	8642.78	0	0	2	1.76	13.2
			SD/DF	1489746	9106.6	5	1353864	17673.24	3.2	0	4	0.95	9.29
			DD/SF	1613535	20021.54	2	864606	8644.04	0	0	2	1.89	11.89
			DD/DF	1499528	8484.12	5	1634236	21610.68	7.4	0	5	0.96	7.96

Table 141: Performance of the MC formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	485222	10.78	5	488760	17484.09	23379.4	2	5	0.73	0.08
			SD/DF	464275	9.48	5	468009	1325.1	2439	5	5	0.8	0
			DD/SF	435747	9.77	5	438894	11542.44	17162.8	4	5	0.72	0.03
			DD/DF	471117	10.88	5	475440	2881.9	7853.4	5	5	0.91	0
		10	SD/SF	597145	11.3	5	602729	21600.85	40445.8	0	4	0.33	0.12
			SD/DF	526745	7.96	5	528896	1796.92	5105.4	5	5	0.41	0
			DD/SF	518777	10.79	5	422714	14998.48	34738.4	1	4	0.52	0.1
			DD/DF	520292	9.59	5	523640	3357.39	10365.8	5	5	0.64	0
		15	SD/SF	614575	8.45	5	616561	21600.12	80421.2	0	5	0.28	0.19
			SD/DF	558857	8.54	5	561593	6121.24	24114.6	5	5	0.49	0
			DD/SF	560190	7.25	5	562688	19900.34	68820.8	1	5	0.4	0.15
			DD/DF	566992	6.7	5	569360	4116.62	27845.6	5	5	0.42	0
		20	SD/SF	663712	6.65	5	665153	21600.26	114640.2	0	5	0.21	0.15
			SD/DF	614957	6.94	5	617106	10873.23	79485.2	5	5	0.35	0
			DD/SF	637362	7.75	5	639708	21600.08	105341.6	0	5	0.32	0.2
			DD/DF	619121	7.08	5	621399	11361.78	75594	4	5	0.37	0.02
	100	5	SD/SF	566567	73	5	571717	21600.4	6009.6	0	5	0.74	0.61
			SD/DF	511293	51.25	5	516364	12162.43	12336.2	4	5	0.98	0.04
			DD/SF	520853	85.84	5	525618	21601.08	6077.2	0	5	0.83	0.53
			DD/DF	512310	46.43	5	516279	3150.15	4151.4	5	5	0.77	0
		10	SD/SF	621477	86.78	5	625357	21601.2	8962.4	0	5	0.47	0.49
			SD/DF	580279	38.36	5	584565	10631.14	11034	5	5	0.73	0
			DD/SF	565464	55.84	5	569188	21600.56	8989.2	0	5	0.57	0.46
			DD/DF	564723	42.66	5	567961	15275.66	10430.8	3	5	0.57	0.04
		15	SD/SF	679493	54.45	5	682208	21600.42	13894.8	0	5	0.32	0.29
			SD/DF	611322	40.07	5	613714	18355.97	15148.2	2	5	0.37	0.1
			DD/SF	656814	47.27	5	660000	21600.1	14386.4	0	5	0.4	0.34
			DD/DF	624593	32	5	626796	15303.42	10811.6	2	5	0.33	0.14
		20	SD/SF	714668	60.5	5	717410	21600.08	22427.8	0	5	0.29	0.3
			SD/DF	665665	41.6	5	668090	19793.9	22770.2	1	5	0.35	0.14
			DD/SF	729320	42.88	5	731728	21600.2	17946.8	0	5	0.31	0.23
			DD/DF	683020	34.77	5	685537	16050.09	17987.6	3	5	0.34	0.09
	200	5	SD/SF	633094	484.37	5	642244	21600.1	2219.6	0	5	1.14	1.12
			SD/DF	597410	298.65	5	611766	20085.04	12246	1	5	1.2	0.01
			DD/SF	642072	407.71	5	649725	21600.12	2106.2	0	5	0.91	0.88
			DD/DF	588796	327.33	5	598348	21231.48	4872.2	1	5	1.58	0.11
		10	SD/SF	690923	498.5	5	701129	21600.16	2660.2	0	5	0.82	1.32
			SD/DF	663640	319.26	5	668318	21600.12	3143	0	5	0.64	0.28
			DD/SF	687479	333.21	5	696232	21600.12	2697.8	0	5	0.81	1.02
			DD/DF	668528	263.21	5	672269	19904.12	4903.8	1	5	0.53	0.28
		15	SD/SF	752935	402.49	5	760668	21600.12	2888	0	5	0.62	0.81
			SD/DF	726853	305.96	5	731497	21600.1	3507.4	0	5	0.56	0.34
			DD/SF	731419	406.28	5	739611	21600.12	2844.2	0	5	0.7	0.92
			DD/DF	723524	226.39	5	727944	21600.1	5238	0	5	0.55	0.27
		20	SD/SF	848922	300.66	5	854643	21600.16	3562.8	0	5	0.44	0.58
			SD/DF	791138	231.57	5	795018	21600.62	5176	0	5	0.44	0.26
			DD/SF	868170	510.28	5	873495	21600.14	4529.4	0	5	0.39	0.52
			DD/DF	785216	268.49	5	789002	21600.1	5713.8	0	5	0.46	0.17

Table 142: Performance of the MC formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1015633	369.87	5	1031936	21600.16	1626.4	0	5	0.82	1.55
			SD/DF	914806	167.15	5	923690	21600.2	2055.6	0	5	0.71	0.73
			DD/SF	988313	243.28	5	1003140	21600.12	2548.2	0	5	0.84	1.42
			DD/DF	900613	159.16	5	909203	21600.18	2399.6	0	5	0.8	0.61
		10	SD/SF	1111494	251.8	5	1126726	21600.16	1558.2	0	5	0.55	1.35
			SD/DF	985935	134.83	5	993709	21600.14	2685.2	0	5	0.55	0.63
			DD/SF	998419	289.4	5	1009340	21600.1	2279.8	0	5	0.58	1.06
			DD/DF	994946	149.67	5	1001806	21600.12	3239.4	0	5	0.56	0.54
		15	SD/SF	1151442	227.89	5	1162752	21600.14	3863.8	0	5	0.5	0.97
			SD/DF	1055678	136.22	5	1061334	21600.58	4528.2	0	5	0.48	0.36
			DD/SF	1080050	182.42	5	1087792	21600.8	4255	0	5	0.48	0.69
			DD/DF	1071170	154.6	5	1076126	21600.12	5766.8	0	5	0.38	0.34
		20	SD/SF	1292948	204.85	5	1301160	21600.16	4679.8	0	5	0.35	0.62
			SD/DF	1122154	132.16	5	1126382	21600.1	7666.8	0	5	0.33	0.27
			DD/SF	1187560	175.77	5	1194594	21600.2	4183.6	0	5	0.4	0.57
			DD/DF	1121712	140.86	5	1126474	21600.14	6785.8	0	5	0.37	0.29
	100	5	SD/SF	1083361	1866.83	5	1117451	21600.28	513.4	0	5	1.35	3.07
			SD/DF	1025262	791.44	5	1039518	21600.3	745.2	0	5	0.86	1.14
			DD/SF	1074648	1475.02	5	1114353	21600.36	353.4	0	5	1.25	3.49
			DD/DF	1019634	753.52	5	1044240	21600.36	306.6	0	5	0.92	2.23
		10	SD/SF	1199130	1891.86	5	1244998	21600.5	281.6	0	5	1	3.61
			SD/DF	1105886	841.28	5	1124174	21600.42	526.4	0	5	0.73	1.53
			DD/SF	1228764	1596.55	5	1280496	21600.4	259.8	0	5	1	4
			DD/DF	1113228	776.18	5	1127404	21600.38	368	0	5	0.76	1.11
		15	SD/SF	1254812	1218.19	5	1337554	21600.26	147.8	0	5	0.97	5.96
			SD/DF	1179218	1056.08	5	1189058	21600.18	748.4	0	5	0.58	0.71
			DD/SF	1265362	1358.68	5	1287906	21600.26	699	0	5	0.91	1.75
			DD/DF	1189392	607.98	5	1200536	21600.2	1135	0	5	0.64	0.63
		20	SD/SF	1375466	1680.57	5	1405332	21600.26	601.6	0	5	0.71	2.21
			SD/DF	1264354	910.89	5	1273784	21600.16	1086.8	0	5	0.5	0.65
			DD/SF	1357272	1216.9	5	1376696	21600.32	521	0	5	0.71	1.4
			DD/DF	1277014	707.72	5	1288378	21600.22	822.6	0	5	0.59	0.75
	200	5	SD/SF	1252756	7011.93	5	1800714	21600.62	11.4	0	5	2.04	30.15
			SD/DF	1183360	3816.85	5	1264084	21600.54	71.8	0	5	1.59	6.33
			DD/SF	1175194	5049.41	5	1643082	21600.68	6.4	0	5	2.15	28.09
			DD/DF	1176558	3484.19	5	1316524	21600.72	97	0	5	1.75	10.27
		10	SD/SF	1423072	7567.42	5	2107276	21600.9	6.4	0	5	2.26	32.41
			SD/DF	1313490	4213.7	5	1390232	21600.72	85.2	0	5	1.38	5.41
			DD/SF	1411596	6947.97	5	1893250	21600.72	8	0	5	1.99	24.62
			DD/DF	1313254	3527.91	5	1365278	21600.66	31.2	0	5	1.36	3.76
		15	SD/SF	1519090	8569.3	5	2206832	21600.7	14.6	0	5	1.96	30.44
			SD/DF	1429626	4407.19	5	1475848	21600.54	110.8	0	5	1.16	3.09
			DD/SF	1478602	7292.8	5	1708488	21600.56	17	0	5	2	12.05
			DD/DF	1426830	3394.97	5	1499264	21600.44	136	0	5	1.08	4.71
		20	SD/SF	1622036	8424.18	5	2463744	21600.58	6.4	0	5	1.57	34.09
			SD/DF	1489746	3811.89	5	1534962	21600.4	115.2	0	5	0.95	2.92
			DD/SF	1571248	6244.52	5	2092940	21600.44	19.8	0	5	1.81	23.6
			DD/DF	1499528	2702.53	5	1530772	21600.64	186	0	5	0.96	1.98

Table 143: Performance of the ME formulation for the capacitated balanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	485222	12.28	5	488726	18138.54	26265.2	3	5	0.73	0.03
			SD/DF	464275	9.22	5	468009	757.84	2042	5	5	0.8	0
			DD/SF	435747	17.94	5	438974	13093.31	18696.4	3	5	0.72	0.09
			DD/DF	471117	11.27	5	475440	2531.63	7537.6	5	5	0.91	0
		10	SD/SF	597145	10.26	5	599363	21600	45190.8	0	5	0.33	0.2
			SD/DF	526745	7.11	5	528896	1699.85	5153.4	5	5	0.41	0
			DD/SF	518777	14.63	5	521675	19288.14	40292.8	1	5	0.52	0.17
			DD/DF	520292	9.01	5	523640	3332.41	13041	5	5	0.64	0
		15	SD/SF	614575	9.67	5	616582	21600	76324.2	0	5	0.28	0.2
			SD/DF	558857	10.02	5	561593	6006.56	22728.2	5	5	0.49	0
			DD/SF	560190	17.92	5	562561	21350.94	78560	1	5	0.4	0.16
			DD/DF	566992	12.53	5	569360	5620.49	25927	5	5	0.42	0
		20	SD/SF	663712	11.04	5	526119	17280.04	76095.4	0	4	0.21	0.13
			SD/DF	614957	8.95	5	617121	11103.14	70453.8	4	5	0.35	0.02
			DD/SF	637362	14.58	5	517303	17280.08	72043.6	0	4	0.32	0.14
			DD/DF	619121	9.9	5	621399	13470.48	90256.6	4	5	0.37	0.01
	100	5	SD/SF	566567	97.38	5	571548	21600.04	5483	0	5	0.74	0.59
			SD/DF	511293	48.71	5	516361	7486.99	18836.8	5	5	0.98	0
			DD/SF	520853	88.14	5	525860	21600.08	7028	0	5	0.83	0.51
			DD/DF	512310	73.57	5	516279	6793.67	6840.4	5	5	0.77	0
		10	SD/SF	621477	118.43	5	625155	21600.26	9153.8	0	5	0.47	0.45
			SD/DF	580279	48.83	5	584565	7651.04	11589.6	5	5	0.73	0
			DD/SF	565464	105.04	5	569119	21600.06	9309.2	0	5	0.57	0.41
			DD/DF	564723	50.97	5	567949	9315.06	12001.2	5	5	0.57	0
		15	SD/SF	679493	77.14	5	682788	21600.02	13874.2	0	5	0.32	0.36
			SD/DF	611322	70.72	5	613583	17351.02	20478.6	2	5	0.37	0.03
			DD/SF	656814	97.66	5	660279	21600.06	12978.4	0	5	0.4	0.39
			DD/DF	624593	57.52	5	626721	15874	13488.8	2	5	0.33	0.1
		20	SD/SF	714668	72.29	5	717073	21600.34	23079.8	0	5	0.29	0.26
			SD/DF	665665	63.26	5	668092	20022.86	25128.6	1	5	0.35	0.13
			DD/SF	729320	86.85	5	732189	21600.04	18542.2	0	5	0.31	0.28
			DD/DF	683020	65.51	5	685491	14710.18	18524.6	3	5	0.34	0.08
	200	5	SD/SF	633094	541.59	5	362778	12960.06	1610	0	3	1.14	0.67
			SD/DF	597410	258.45	5	356703	12960.06	2396.8	0	3	1.2	0.01
			DD/SF	642072	500.88	5	648587	21600.48	2059	0	5	0.91	0.57
			DD/DF	588796	260.02	5	598344	18921.09	25910.6	1	5	1.58	0.13
		10	SD/SF	690923	490.39	5	699753	21600.12	2732.6	0	5	0.82	1.04
			SD/DF	663640	303.39	5	668190	21472.92	5290	1	5	0.64	0.23
			DD/SF	687479	483.72	5	695825	21600.1	2698.6	0	5	0.81	0.96
			DD/DF	668528	301.44	5	672291	18450.49	5207.2	1	5	0.53	0.2
		15	SD/SF	752935	507.68	5	760476	21600.1	3420	0	5	0.62	0.82
			SD/DF	726853	283.02	5	731695	21600.08	4349.4	0	5	0.56	0.32
			DD/SF	731419	496.33	5	738354	21600.12	2725.2	0	5	0.7	0.73
			DD/DF	723524	281.14	5	727794	20319.54	6513.2	1	5	0.55	0.19
		20	SD/SF	848922	444.8	5	854419	21600.1	4274	0	5	0.44	0.55
			SD/DF	791138	245.47	5	794905	21600.1	4876.8	0	5	0.44	0.23
			DD/SF	868170	459.52	5	872603	21600.1	3598.4	0	5	0.39	0.43
			DD/DF	785216	252.28	5	789001	21600.1	5829	0	5	0.46	0.17

Table 144: Performance of the ME formulation for the capacitated balanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	1015633	539.35	5	1030056	21600.16	1469.4	0	5	0.82	1.4
			SD/DF	914806	183.4	5	922355	21600.12	2824.8	0	5	0.71	0.54
			DD/SF	988313	451.44	5	1003348	21600.16	1977.6	0	5	0.84	1.45
			DD/DF	900613	237.65	5	908527	21600.12	3126	0	5	0.8	0.52
		10	SD/SF	1111494	447.37	5	1124260	21600.14	2602.4	0	5	0.55	1.13
			SD/DF	985935	186.67	5	992864	21600.12	3863	0	5	0.55	0.54
			DD/SF	998419	475.87	5	1008656	21600.18	2253.8	0	5	0.58	0.98
			DD/DF	994946	279.83	5	1001509	21600.1	4221.6	0	5	0.56	0.48
		15	SD/SF	1151442	494.92	5	1163192	21600.12	3200.8	0	5	0.5	1.01
			SD/DF	1055678	288.35	5	1061654	21600.12	2902.6	0	5	0.48	0.44
			DD/SF	1080050	431.58	5	1089824	21600.1	2482.8	0	5	0.48	0.88
			DD/DF	1071170	288.96	5	1076060	21600.08	7008.2	0	5	0.38	0.34
		20	SD/SF	1292948	507	5	1303568	21600.12	3255.6	0	5	0.35	0.81
			SD/DF	1122154	246.28	5	1126606	21600.16	5929	0	5	0.33	0.31
			DD/SF	1187560	415.04	5	1196368	21600.14	2558	0	5	0.4	0.73
			DD/DF	1121712	221.83	5	1127438	21600.18	5307.2	0	5	0.37	0.39
	100	5	SD/SF	1083361	1750.7	5	1113729	21600.2	555.6	0	5	1.35	2.72
			SD/DF	1025262	505.79	5	1042820	21600.3	767.2	0	5	0.86	1.41
			DD/SF	1074648	1163.81	5	1117011	21600.48	254.2	0	5	1.25	3.76
			DD/DF	1019634	531.85	5	1036012	21600.36	803.4	0	5	0.92	1.39
		10	SD/SF	1199130	1683.24	5	1269158	21600.42	217.2	0	5	1	5.23
			SD/DF	1105886	642.1	5	1120570	21600.28	921	0	5	0.73	1.14
			DD/SF	1228764	1578.79	5	1251864	21600.24	488.2	0	5	1	1.82
			DD/DF	1113228	450.37	5	1125476	21600.16	1255	0	5	0.76	0.91
		15	SD/SF	1254812	1695.03	5	1286614	21600.28	335	0	5	0.97	2.44
			SD/DF	1179218	686.02	5	1189538	21600.18	1036.6	0	5	0.58	0.73
			DD/SF	1265362	1551.39	5	1290174	21600.22	524.4	0	5	0.91	1.91
			DD/DF	1189392	624.48	5	1201552	21600.32	898.4	0	5	0.64	0.79
		20	SD/SF	1375466	1817.75	5	1403138	21600.24	585.6	0	5	0.71	2
			SD/DF	1264354	822.42	5	1274500	21600.2	1245.4	0	5	0.5	0.7
			DD/SF	1357272	1722.84	5	1387366	21600.18	632.4	0	5	0.71	2.23
			DD/DF	1277014	778.14	5	1286830	21600.22	1026.4	0	5	0.59	0.63
	200	5	SD/SF	1252756	5405.96	5	1688710	21600.6	7.4	0	5	2.04	25.36
			SD/DF	1183360	2677.8	5	1280882	21600.44	102.6	0	5	1.59	7.49
			DD/SF	1175194	4462.93	5	1497230	21600.52	19.8	0	5	2.15	20.95
			DD/DF	1176558	2145.18	5	1217120	21600.48	289	0	5	1.75	3.16
		10	SD/SF	1423072	7639.4	5	1978038	21600.58	14	0	5	2.26	27.52
			SD/DF	1313490	2732.77	5	1419782	21600.56	117.2	0	5	1.38	7.32
			DD/SF	1411596	6141.86	5	1864516	21600.7	12	0	5	1.99	23.66
			DD/DF	1313254	2414.18	5	1353184	21600.46	226	0	5	1.36	2.85
		15	SD/SF	1519090	7386.84	5	2298420	21600.68	9	0	5	1.96	33.86
			SD/DF	1429626	2666.64	5	1468260	21600.48	239.4	0	5	1.16	2.58
			DD/SF	1478602	4752.29	5	2007402	21600.58	10	0	5	2	25.89
			DD/DF	1426830	1996.65	5	1462968	21600.4	193.8	0	5	1.08	2.42
		20	SD/SF	1622036	8408.44	5	2405038	21600.38	15.4	0	5	1.57	32.26
			SD/DF	1489746	2619.35	5	1517944	21600.48	151.4	0	5	0.95	1.83
			DD/SF	1571248	5891.14	5	1968712	21600.46	27.6	0	5	1.81	18.94
			DD/DF	1499528	2428.84	5	1528484	21600.36	351.8	0	5	0.96	1.81

B.2 Unbalanced network results

Table 145: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	0.46	5	388994	195.24	5806	5	5	5.63	0
			SD/DF	343618	0.29	5	367688	72.44	3743.6	5	5	6.54	0
			DD/SF	330210	0.33	5	350285	194.37	8178.4	5	5	5.73	0
			DD/DF	348379	0.29	5	370307	47.79	2311.8	5	5	5.92	0
		10	SD/SF	459032	0.45	5	482151	395.4	10000	5	5	4.79	0
			SD/DF	398713	0.27	5	421694	78	3494.6	5	5	5.45	0
			DD/SF	398538	0.36	5	418573	215.74	8323.6	5	5	4.77	0
			DD/DF	394086	0.33	5	416434	99.59	4426.2	5	5	5.36	0
		15	SD/SF	484818	0.7	5	505444	315.47	11568.2	5	5	4.08	0
			SD/DF	429321	0.52	5	449512	106.3	6576.4	5	5	4.5	0
			DD/SF	439742	0.61	5	458173	163.71	5875	5	5	4.02	0
			DD/DF	439909	0.5	5	460458	83.12	3977.6	5	5	4.47	0
		20	SD/SF	533233	0.59	5	553909	5717.35	704164.2	5	5	3.72	0
			SD/DF	485287	0.27	5	505001	184.58	13900.2	5	5	3.91	0
			DD/SF	510858	0.28	5	531194	345.81	31048	5	5	3.82	0
			DD/DF	485672	0.25	5	505747	116.66	8269.4	5	5	3.97	0
	100	5	SD/SF	433680	0.92	5	458130	434.66	8451.4	5	5	5.34	0
			SD/DF	387141	0.51	5	413703	188.79	5075.2	5	5	6.42	0
			DD/SF	398562	0.66	5	423193	330.8	6045	5	5	5.83	0
			DD/DF	388995	0.47	5	414956	197.13	5283.8	5	5	6.26	0
		10	SD/SF	479894	1.04	5	504463	779.92	9503	5	5	4.88	0
			SD/DF	439743	0.58	5	467036	274.95	5870	5	5	5.85	0
			DD/SF	436860	0.84	5	459919	737.33	10913.6	5	5	5.02	0
			DD/DF	429932	0.6	5	455556	149.82	3321.4	5	5	5.62	0
		15	SD/SF	520671	1.17	5	544902	1569.53	24121	5	5	4.45	0
			SD/DF	460075	0.54	5	483962	253.28	5937.4	5	5	4.94	0
			DD/SF	504631	0.81	5	528600	1177.62	18551.8	5	5	4.53	0
			DD/DF	471277	0.58	5	495465	444.96	20828.8	5	5	4.88	0
		20	SD/SF	555676	1.11	5	577521	1481.86	29935.6	5	5	3.77	0
			SD/DF	514416	0.56	5	537406	319.09	7197.6	5	5	4.27	0
			DD/SF	572117	0.94	5	596032	1472.17	64347	5	5	4.01	0
			DD/DF	532151	0.64	5	555780	359.06	8559	5	5	4.25	0
	200	5	SD/SF	497969	2.19	5	525276	813.11	9604.8	5	5	5.19	0
			SD/DF	464748	1.17	5	499228	394.81	4863.8	5	5	6.88	0
			DD/SF	500934	1.63	5	534363	571.41	6935.2	5	5	6.26	0
			DD/DF	456448	1.24	5	495407	234.58	3713	5	5	7.86	0
		10	SD/SF	534124	2.66	5	560819	1183.56	28516.8	5	5	4.76	0
			SD/DF	509377	1.36	5	544161	838.24	9635.4	5	5	6.39	0
			DD/SF	531588	1.88	5	561525	885.4	10040.2	5	5	5.33	0
			DD/DF	516179	1.37	5	551713	1144.22	12409.4	5	5	6.44	0
		15	SD/SF	579211	2.74	5	607302	3484.86	23658.4	5	5	4.62	0
			SD/DF	551786	1.37	5	585841	3708.85	98154.6	5	5	5.81	0
			DD/SF	557956	2.17	5	588855	2282.43	25995.8	5	5	5.25	0
			DD/DF	551676	1.56	5	586394	1279.43	14825.2	5	5	5.92	0
		20	SD/SF	658274	2.76	5	686769	5668.26	56216.6	5	5	4.15	0
			SD/DF	611898	1.72	5	647141	6159.29	119722.8	5	5	5.44	0
			DD/SF	675268	2.26	5	418929	2621.41	36317.6	3	3	4.52	0
			DD/DF	607754	1.61	5	639683	2255.86	35262	5	5	4.99	0

Table 146: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
			SD/SF	777129	7.83	5	787101	21600.3	36522.4	0	5	1.14	0.69
		5	SD/DF	680915	2.33	5	697480	7145.32	42982.4	4	5	2.37	0
			DD/SF	751532	4.29	5	763255	21600.1	36317.2	0	5	1.45	0.73
			DD/DF	671378	1.98	5	688280	4259.15	22241.4	5	5	2.45	0
			SD/SF	867830	10.58	5	876751	21600.08	44752	0	5	0.86	0.81
		10	SD/DF	750940	2.8	5	762244	8145.26	79200	5	5	1.48	0
			DD/SF	776236	5.58	5	785876	21600.22	63744.2	0	5	1.1	0.84
	50		DD/DF	757479	2.39	5	768084	6056	90020.8	5	5	1.38	0
			SD/SF	919947	12.46	5	926669	21600.04	48505.6	0	5	0.63	0.62
		15	SD/DF	822362	2.66	5	831215	21600.1	292918	0	5	1.02	0.18
			DD/SF	866045	5.47	5	874051	21600.14	105328.2	0	5	0.8	0.64
			DD/DF	834995	2.84	5	844610	12146.11	219548	3	5	1.14	0.04
			SD/SF	1046012	9.22	5	1051419	21600.06	120845.6	0	5	0.45	0.42
		20	SD/DF	895527	3.04	5	902376	21600.04	314813.6	0	5	0.75	0.15
			DD/SF	971289	4.86	5	977883	21600.06	163905.8	0	5	0.57	0.42
			DD/DF	893715	2.73	5	720236	17280.04	266865.4	0	4	0.78	0.12
			SD/SF	834070	15.13	5	855799	21600.12	10090.6	0	5	2.5	1.36
		5	SD/DF	775415	5.61	5	807227	12370.06	43918.4	4	5	3.93	0.49
			DD/SF	827179	8.07	5	853647	21600.1	17546.4	0	5	2.97	1.71
			DD/DF	773649	5.75	5	808671	21600.1	74275.2	0	5	4.32	0.78
			SD/SF	924174	17.97	5	941905	21600.1	13192	0	5	1.75	1.49
		10	SD/DF	846677	7.18	5	869217	21600.1	78992.4	0	5	2.55	0.91
30			DD/SF	958951	11.51	5	980235	21600.12	20110	0	5	1.91	1.64
	100		DD/DF	853216	7.42	5	878018	20497.06	67258.4	1	5	2.81	0.48
			SD/SF	972347	26.64	5	986719	21600.12	12832.8	0	5	1.39	1.29
		15	SD/DF	901633	6.91	5	922752	21600.1	49302.4	0	5	2.27	0.65
			DD/SF	977841	12.07	5	997701	21600.1	20136.4	0	5	1.85	1.64
			DD/DF	916162	5.52	5	935662	21600.1	61160	0	5	2.06	0.68
			SD/SF	1087582	31.44	5	1100501	21600.1	19246.6	0	5	1.12	1.02
		20	SD/DF	990811	8.55	5	1009581	21600.12	86518.2	0	5	1.82	0.54
			DD/SF	1075042	12.72	5	1092082	21600.1	21572.8	0	5	1.4	1.27
			DD/DF	998112	7.8	5	1013919	21600.1	89907.2	0	5	1.52	0.45
			SD/SF	988099	31.05	5	1045999	21600.18	3332.4	0	5	5.25	4.56
		5	SD/DF	917149	12.06	5	982038	21600.18	10065.2	0	5	6.51	3.96
			DD/SF	925150	17.64	5	986603	21600.18	6427.2	0	5	6.12	4.77
			DD/DF	911828	10.73	5	978501	21600.14	13527.4	0	5	6.8	3.32
			SD/SF	1118794	31.31	5	1165078	21600.14	3193.8	0	5	3.65	3.46
		10	SD/DF	1013498	17.43	5	1076298	21600.12	10200.8	0	5	5.65	3.87
			DD/SF	1093252	19.32	5	1148568	21600.12	5896.8	0	5	4.34	3.88
	200		DD/DF	1013930	12.68	5	1072786	21600.26	10184	0	5	5.32	3.4
			SD/SF	1169052	42.51	5	1207652	21600.18	4235.8	0	5	2.96	2.98
		15	SD/DF	1091164	18.62	5	1150882	21600.18	9934.4	0	5	5.11	3.8
			DD/SF	1133692	30.61	5	1183112	21600.16	5293	0	5	3.59	3.52
			DD/DF	1092056	19.54	5	1149708	21600.14	8589.2	0	5	4.79	3.37
			SD/SF	1294440	36.56	5	1329088	21600.18	5286.6	0	5	2.33	2.56
		20	SD/DF	1169306	27.18	5	1218652	21600.16	6225.6	0	5	3.82	3.2
			DD/SF	1235674	30.93	5	1278106	21600.14	5908.8	0	5	3.17	3.04
			DD/DF	1173616	16.15	5	1223188	21600.18	8856.4	0	5	3.71	3.1

Table 147: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	1.4	5	388994	102.07	2137.4	5	5	5.63	0
			SD/DF	343618	0.34	5	367688	26.53	842	5	5	6.54	0
			DD/SF	330210	0.45	5	350285	83.91	1937	5	5	5.73	0
			DD/DF	348379	0.29	5	370307	26.39	1476.4	5	5	5.92	0
		10	SD/SF	459032	1.02	5	482151	218.07	5474	5	5	4.79	0
			SD/DF	398713	0.39	5	421694	67.08	1981.2	5	5	5.45	0
			DD/SF	398538	0.78	5	418573	263.03	5107.8	5	5	4.77	0
			DD/DF	394086	0.68	5	416434	46.76	1640.8	5	5	5.36	0
		15	SD/SF	484818	1.88	5	505444	237.37	6806	5	5	4.08	0
			SD/DF	429321	0.92	5	449512	112.03	3939	5	5	4.5	0
			DD/SF	439742	1.47	5	458173	176.24	4558.8	5	5	4.02	0
			DD/DF	439909	0.68	5	460458	76.5	2135	5	5	4.47	0
		20	SD/SF	533233	1.08	5	553909	7750.76	345771.8	4	5	3.72	0
			SD/DF	485287	0.42	5	505001	195.45	6595.2	5	5	3.91	0
			DD/SF	510858	0.56	5	531194	790.99	28150.8	5	5	3.82	0
			DD/DF	485672	0.48	5	505747	208.95	6795.4	5	5	3.97	0
	100	5	SD/SF	433680	1.83	5	458130	264.53	5151.2	5	5	5.34	0
			SD/DF	387141	0.68	5	413703	78.64	1798.4	5	5	6.42	0
			DD/SF	398562	1.14	5	423193	280.59	2478	5	5	5.83	0
			DD/DF	388995	0.71	5	414956	211.08	3213.8	5	5	6.26	0
		10	SD/SF	479894	2.05	5	504463	709.16	5104.2	5	5	4.88	0
			SD/DF	439743	0.97	5	467036	282.28	3690.8	5	5	5.85	0
			DD/SF	436860	1.56	5	459919	1172.42	8255	5	5	5.02	0
			DD/DF	429932	0.91	5	455556	210.83	2204.4	5	5	5.62	0
		15	SD/SF	520671	2.39	5	544902	1410.95	13118.6	5	5	4.45	0
			SD/DF	460075	1.1	5	483962	588.52	5016.2	5	5	4.94	0
			DD/SF	504631	1.66	5	528600	1182.5	11492.8	5	5	4.53	0
			DD/DF	471277	0.94	5	495465	248.36	3169.8	5	5	4.88	0
		20	SD/SF	555676	2.32	5	577521	1673.13	22118	5	5	3.77	0
			SD/DF	514416	1.12	5	537406	328.12	3864.4	5	5	4.27	0
			DD/SF	572117	1.69	5	596032	1217.94	8923	5	5	4.01	0
			DD/DF	532151	1.12	5	555780	345.49	4538	5	5	4.25	0
	200	5	SD/SF	497969	5.03	5	525276	876.59	6728	5	5	5.19	0
			SD/DF	464748	1.89	5	499228	668.69	3991.4	5	5	6.88	0
			DD/SF	500934	3.13	5	534363	860.34	5957.2	5	5	6.26	0
			DD/DF	456448	1.95	5	495407	4719.7	251267.2	4	5	7.86	0
		10	SD/SF	534124	5.64	5	560819	1699.9	16894.6	5	5	4.76	0
			SD/DF	509377	2.31	5	544161	3638.81	14679.8	5	5	6.39	0
			DD/SF	531588	3.92	5	561525	1770.75	8303	5	5	5.33	0
			DD/DF	516179	2.26	5	551713	2948.9	11539.8	5	5	6.44	0
		15	SD/SF	579211	6.6	5	607302	4862.67	18566.4	5	5	4.62	0
			SD/DF	551786	2.74	5	585841	8694.42	38829	5	5	5.81	0
			DD/SF	557956	4.54	5	588855	5050.09	30848.8	5	5	5.25	0
			DD/DF	551676	2.44	5	586394	4548.89	17799.8	5	5	5.92	0
		20	SD/SF	658274	6.43	5	686769	11276.84	46287	5	5	4.15	0
			SD/DF	611898	2.96	5	647166	11046.83	52752.6	4	5	5.44	0.04
			DD/SF	675268	4.33	5	707305	11875.45	63497.2	4	5	4.52	0.05
			DD/DF	607754	2.77	5	639683	6002.33	24247.8	5	5	4.99	0

Table 148: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	777129	8.29	5	786417	21600	44258.2	0	5	1.14	0.39
			SD/DF	680915	2.43	5	697478	3500.97	28832.4	5	5	2.37	0
			DD/SF	751532	3.98	5	762753	21600.04	44737.2	0	5	1.45	0.46
			DD/DF	671378	1.78	5	688280	3167.23	12764	5	5	2.45	0
		10	SD/SF	867830	12.53	5	875906	21600.02	35111.4	0	5	0.86	0.69
			SD/DF	750940	3.55	5	762275	13202.55	53590.4	4	5	1.48	0.05
			DD/SF	776236	5.58	5	785552	21600.02	50599.2	0	5	1.1	0.81
			DD/DF	757479	2.98	5	768127	15603.09	75804.8	3	5	1.38	0.06
		15	SD/SF	919947	15.86	5	926681	21600.12	48516.6	0	5	0.63	0.61
			SD/DF	822362	4.76	5	831061	21600.02	137441.2	0	5	1.02	0.18
			DD/SF	866045	8.85	5	873437	21600.02	72580.8	0	5	0.8	0.58
			DD/DF	834995	3.09	5	844615	14243.79	98244.2	3	5	1.14	0.05
		20	SD/SF	1046012	19.36	5	1051502	21600.04	59230.6	0	5	0.45	0.43
			SD/DF	895527	6.45	5	902384	21600.02	122702.2	0	5	0.75	0.17
			DD/SF	971289	9.37	5	977613	21600.02	91218.6	0	5	0.57	0.4
			DD/DF	893715	6.29	5	900841	21600.02	131595.8	0	5	0.78	0.16
	100	5	SD/SF	834070	15.94	5	856199	21600.02	8894	0	5	2.5	1.29
			SD/DF	775415	5.41	5	808040	15877.81	17648.8	2	5	3.93	1.17
			DD/SF	827179	7.17	5	852846	21600.1	11122.6	0	5	2.97	1.52
			DD/DF	773649	3.79	5	808847	21600.04	17623.8	0	5	4.32	1.22
		10	SD/SF	924174	23.62	5	941890	21600.04	8644.2	0	5	1.75	1.5
			SD/DF	846677	7.19	5	869295	21600.02	21133.6	0	5	2.55	1.26
			DD/SF	958951	11.7	5	979689	21600.08	11242.6	0	5	1.91	1.66
			DD/DF	853216	4.36	5	878893	21600.04	12928.6	0	5	2.81	1.11
		15	SD/SF	972347	31.41	5	987106	21600.08	10726.6	0	5	1.39	1.33
			SD/DF	901633	8.79	5	923657	21600.08	9757.2	0	5	2.27	1.32
			DD/SF	977841	14.3	5	997369	21600.06	8607.6	0	5	1.85	1.64
			DD/DF	916162	4.58	5	937035	21600.1	8713.4	0	5	2.06	1.44
		20	SD/SF	1087582	40.5	5	1101541	21600.1	12460	0	5	1.12	1.14
			SD/DF	990811	10.65	5	1010089	21600.08	19926	0	5	1.82	0.89
			DD/SF	1075042	15.59	5	1090817	21600.1	11998.8	0	5	1.4	1.22
			DD/DF	998112	5.39	5	1014527	21600.08	18524	0	5	1.52	0.76
	200	5	SD/SF	988099	48.46	5	1047282	21600.08	2680.8	0	5	5.25	4.62
			SD/DF	917149	13.72	5	986450	21600.12	3766.8	0	5	6.51	5.02
			DD/SF	925150	18.51	5	985413	21600.1	4501.2	0	5	6.12	4.13
			DD/DF	911828	8.74	5	979221	21600.1	4382.8	0	5	6.8	3.93
		10	SD/SF	1118794	55.3	5	1166490	21600.1	3843.2	0	5	3.65	3.57
			SD/DF	1013498	14.72	5	1078288	21600.14	3274.8	0	5	5.65	4.78
			DD/SF	1093252	25.02	5	1151340	21600.14	3795.6	0	5	4.34	4.01
			DD/DF	1013930	14.97	5	1074108	21600.1	3900.4	0	5	5.32	3.94
		15	SD/SF	1169052	72.02	5	1208660	21600.14	4257	0	5	2.96	3.03
			SD/DF	1091164	20.1	5	1155864	21600.1	4064.4	0	5	5.11	4.52
			DD/SF	1133692	29.64	5	1176872	21600.14	3992.6	0	5	3.59	2.73
			DD/DF	1092056	13.67	5	1157120	21600.16	2887.4	0	5	4.79	4.4
		20	SD/SF	1294440	78.38	5	1334156	21600.12	3701	0	5	2.33	2.85
			SD/DF	1169306	21.02	5	1225186	21600.18	4081.6	0	5	3.82	3.73
			DD/SF	1235674	34.39	5	1282906	21600.12	3443.4	0	5	3.17	3.34
			DD/DF	1173616	12.06	5	1225032	21600.12	4165.2	0	5	3.71	3.38

Table 149: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	0.44	5	388994	101.98	1578.2	5	5	5.63	0
			SD/DF	343618	0.22	5	367688	13.54	402.2	5	5	6.54	0
			DD/SF	330210	0.3	5	350285	74.32	1314.8	5	5	5.73	0
			DD/DF	348379	0.16	5	370307	10.13	318.2	5	5	5.92	0
		10	SD/SF	459032	0.48	5	482151	143.75	3770.2	5	5	4.79	0
			SD/DF	398713	0.24	5	421694	26.97	1376.6	5	5	5.45	0
			DD/SF	398538	0.64	5	418573	201.22	4277.4	5	5	4.77	0
			DD/DF	394085	0.37	5	416434	31.21	1228.8	5	5	5.36	0
		15	SD/SF	484818	1.01	5	505444	157.65	6562.6	5	5	4.08	0
			SD/DF	429315	0.48	5	449512	62.58	2464.6	5	5	4.5	0
			DD/SF	439742	0.51	5	458173	158.63	5084.8	5	5	4.02	0
			DD/DF	439898	0.23	5	460458	23.09	1525	5	5	4.47	0
		20	SD/SF	533233	0.45	5	553909	3298.12	238672	5	5	3.72	0
			SD/DF	485284	0.2	5	505001	127.71	7277.4	5	5	3.91	0
			DD/SF	510858	0.33	5	531194	374.15	19526.2	5	5	3.82	0
			DD/DF	485664	0.27	5	505747	96.75	4315.2	5	5	3.97	0
	100	5	SD/SF	433680	1.16	5	458130	210.46	3892.8	5	5	5.34	0
			SD/DF	387139	0.43	5	413703	56.23	1517.2	5	5	6.42	0
			DD/SF	398562	0.96	5	423193	227.07	2344	5	5	5.83	0
			DD/DF	388992	0.44	5	414956	113.1	3550	5	5	6.26	0
		10	SD/SF	479894	1.46	5	504463	627.15	4651.4	5	5	4.88	0
			SD/DF	439743	0.62	5	467036	268.65	3157.2	5	5	5.85	0
			DD/SF	436860	1.24	5	459919	1113.54	7631.4	5	5	5.02	0
			DD/DF	429916	0.59	5	455556	99.74	1460.6	5	5	5.62	0
		15	SD/SF	520671	1.43	5	544902	1170.31	11994.4	5	5	4.45	0
			SD/DF	460072	0.83	5	483962	243.35	2395	5	5	4.94	0
			DD/SF	504631	1.15	5	528600	1013.11	8803.8	5	5	4.53	0
			DD/DF	471272	0.61	5	495465	236.99	3693	5	5	4.88	0
		20	SD/SF	555676	1.35	5	577521	1017.11	13828.4	5	5	3.77	0
			SD/DF	514391	0.79	5	537406	241.7	3127.4	5	5	4.27	0
			DD/SF	572117	1.14	5	596032	695.43	6399.8	5	5	4.01	0
			DD/DF	532143	0.74	5	555780	232.53	3077.4	5	5	4.25	0
	200	5	SD/SF	497969	2.97	5	525276	1139.72	11610.6	5	5	5.19	0
			SD/DF	464747	1.43	5	499228	582.37	3415.8	5	5	6.88	0
			DD/SF	500934	1.9	5	534363	763.96	5172.2	5	5	6.26	0
			DD/DF	456442	1.24	5	495407	413.53	2638.2	5	5	7.86	0
		10	SD/SF	534124	4.03	5	560819	1176.19	10793.6	5	5	4.76	0
			SD/DF	509376	1.65	5	544161	2406.09	10132.4	5	5	6.39	0
			DD/SF	531588	2.25	5	561525	1456.47	7683.2	5	5	5.33	0
			DD/DF	516175	1.5	5	551713	2395.21	9019	5	5	6.44	0
		15	SD/SF	579211	4.39	5	607302	4511.81	20827.4	5	5	4.62	0
			SD/DF	551785	1.88	5	585841	4069.91	26502.2	5	5	5.81	0
			DD/SF	557956	2.62	5	588855	5161.44	23600	5	5	5.25	0
			DD/DF	551676	1.81	5	586394	3074.79	11969.4	5	5	5.92	0
		20	SD/SF	658274	4.6	5	686769	9086.96	48282.2	5	5	4.15	0
			SD/DF	611894	2.01	5	647141	9755.93	44314.6	5	5	5.45	0
			DD/SF	675268	3.9	5	707317	11667.79	58375.6	4	5	4.52	0.03
			DD/DF	607738	1.94	5	639683	3370.23	16249.2	5	5	4.99	0

Table 150: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	777129	2.66	5	786687	21600	27067.6	0	5	1.14	0.48
			SD/DF	680912	0.59	5	697478	5538.62	17536.8	5	5	2.37	0
			DD/SF	751532	1.1	5	763259	21600.02	34962.2	0	5	1.45	0.65
			DD/DF	671374	0.57	5	688280	7014.7	16064.6	5	5	2.45	0
		10	SD/SF	867830	2.41	5	876461	21600	26949	0	5	0.86	0.78
			SD/DF	750903	0.82	5	762244	12604.21	30504.8	4	5	1.48	0.03
			DD/SF	776236	1.4	5	786007	21600	34224.6	0	5	1.1	0.84
			DD/DF	757459	0.91	5	768084	8429.82	43481.8	5	5	1.38	0
		15	SD/SF	919947	2.6	5	926281	21600.06	44263.6	0	5	0.63	0.54
			SD/DF	822341	1.1	5	168764	4320.02	31581.2	0	1	1.03	0.01
			DD/SF	866045	1.52	5	0	0	0	0	0	0.8	0
			DD/DF	834967	1.09	5	844598	8063.76	87723.2	4	5	1.14	0.01
		20	SD/SF	1046012	4.14	5	646622	12960.04	34884	0	3	0.45	0.2
			SD/DF	895505	1.63	5	182319	4320.02	16690.2	0	1	0.75	0.03
			DD/SF	971289	2.18	5	380909	8640.04	29027.6	0	2	0.57	0.14
			DD/DF	893680	1.55	5	358937	8640.08	71902.4	0	2	0.78	0.01
	100	5	SD/SF	834070	12.99	5	855834	21600.06	5773.2	0	5	2.5	1.5
			SD/DF	775399	1.61	5	808803	18985.4	11198.6	1	5	3.93	1.62
			DD/SF	827179	5.32	5	856405	21600.14	3263.8	0	5	2.97	2.26
			DD/DF	773639	1.63	5	809165	21600.16	5933.2	0	5	4.33	1.4
		10	SD/SF	924174	8.4	5	944372	21600.14	3388.4	0	5	1.75	1.86
			SD/DF	846640	1.73	5	870465	21600.16	3976.4	0	5	2.56	1.51
			DD/SF	958951	4.23	5	979805	21600.1	5661.8	0	5	1.91	1.6
			DD/DF	853184	1.79	5	878392	21600.1	11218.2	0	5	2.81	0.82
		15	SD/SF	972347	10.33	5	989811	21600.1	5879	0	5	1.39	1.59
			SD/DF	901601	2.35	5	923848	21600.08	9851.4	0	5	2.27	1.04
			DD/SF	977841	4.69	5	1003585	21600.16	5752	0	5	1.85	2.21
			DD/DF	916114	2.1	5	937653	21600.16	5212	0	5	2.06	1.24
		20	SD/SF	1087582	11.71	5	1103575	21600.2	4985.6	0	5	1.12	1.34
			SD/DF	990786	3.26	5	1010761	21600.16	6091.6	0	5	1.83	0.91
			DD/SF	1075042	6.36	5	1096396	21600.16	5355.6	0	5	1.4	1.72
			DD/DF	998049	2.97	5	1014285	21600.1	12894.2	0	5	1.53	0.55
	200	5	SD/SF	988099	81.48	5	1046849	21600.14	2539.2	0	5	5.25	4.35
			SD/DF	917123	7.63	5	987160	21600.1	2996	0	5	6.51	4.48
			DD/SF	925150	29.98	5	986487	21600.16	2771.8	0	5	6.12	4.24
			DD/DF	911798	6.21	5	981605	21600.14	3493.4	0	5	6.8	3.56
		10	SD/SF	1118794	46.44	5	1171272	21600.12	2896.4	0	5	3.65	3.85
			SD/DF	1013484	4.58	5	1079878	21600.12	4313.4	0	5	5.65	4.33
			DD/SF	1093252	16.44	5	1152168	21600.16	3644	0	5	4.34	4.18
			DD/DF	1013903	4.72	5	1080964	21600.14	5339.6	0	5	5.32	4.12
		15	SD/SF	1169052	40.23	5	1210126	21600.2	2807.4	0	5	2.96	2.97
			SD/DF	1091128	4.85	5	1161992	21600.2	3467.2	0	5	5.11	4.63
			DD/SF	1133692	16.21	5	1184828	21600.24	2603.6	0	5	3.59	3.4
			DD/DF	1092040	5.42	5	1154730	21600.18	2775.4	0	5	4.79	3.75
		20	SD/SF	1294440	56.23	5	1346914	21600.22	1893	0	5	2.33	3.69
			SD/DF	1169280	9.3	5	1234836	21600.22	2410	0	5	3.82	3.98
			DD/SF	1235674	25.74	5	1287532	21600.14	3441.8	0	5	3.17	3.56
			DD/DF	1173552	7.03	5	1225002	21600.16	3794.8	0	5	3.71	2.88

Table 151: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	1.17	5	388994	176.46	5321.6	5	5	5.63	0
			SD/DF	343618	0.52	5	367688	88.58	4597.8	5	5	6.54	0
			DD/SF	330210	0.55	5	350285	120.55	4408.4	5	5	5.73	0
			DD/DF	348379	0.52	5	370307	49.1	2858	5	5	5.92	0
		10	SD/SF	459032	0.67	5	482151	178.62	6404.4	5	5	4.79	0
			SD/DF	398713	0.42	5	421694	49.12	2322.4	5	5	5.45	0
			DD/SF	398538	0.58	5	418573	149.96	6162.2	5	5	4.77	0
			DD/DF	394086	0.59	5	416434	51.77	2372.6	5	5	5.36	0
		15	SD/SF	484818	1.48	5	505444	306.31	9272.4	5	5	4.08	0
			SD/DF	429321	0.9	5	449512	122.7	6708.6	5	5	4.5	0
			DD/SF	439742	1.46	5	458173	127.11	6484.4	5	5	4.02	0
			DD/DF	439909	0.73	5	460458	80.56	3406	5	5	4.47	0
		20	SD/SF	533233	0.49	5	553909	4879.59	519716.8	5	5	3.72	0
			SD/DF	485287	0.33	5	505001	260.95	19849.6	5	5	3.91	0
			DD/SF	510858	0.38	5	531194	546.96	33445	5	5	3.82	0
			DD/DF	485672	0.34	5	505747	180.92	10468.4	5	5	3.97	0
	100	5	SD/SF	433680	1.25	5	458130	418.86	7033.8	5	5	5.34	0
			SD/DF	387141	0.95	5	413703	176.96	5500	5	5	6.42	0
			DD/SF	398562	1.21	5	423193	253.49	4220.8	5	5	5.83	0
			DD/DF	388995	0.89	5	414956	170.7	4004.2	5	5	6.26	0
		10	SD/SF	479894	0.99	5	504463	792.67	10342	5	5	4.88	0
			SD/DF	439743	0.7	5	467036	182.19	4242.8	5	5	5.85	0
			DD/SF	436860	0.91	5	459919	657.85	10533.6	5	5	5.02	0
			DD/DF	429932	0.77	5	455556	126.78	2831.6	5	5	5.62	0
		15	SD/SF	520671	1.15	5	544902	826.68	14942.8	5	5	4.45	0
			SD/DF	460075	0.72	5	483962	232.59	4701.4	5	5	4.94	0
			DD/SF	504631	0.91	5	528600	745.69	12760.8	5	5	4.53	0
			DD/DF	471277	0.8	5	495465	192.61	5448.8	5	5	4.88	0
		20	SD/SF	555676	0.91	5	577521	728.61	23614.2	5	5	3.77	0
			SD/DF	514416	0.71	5	537406	282.59	7270	5	5	4.27	0
			DD/SF	572117	0.95	5	596032	656.52	10768.4	5	5	4.01	0
			DD/DF	532151	0.68	5	555780	259.51	8182	5	5	4.25	0
	200	5	SD/SF	497969	3.65	5	410696	597.31	6694.2	4	4	5.19	0
			SD/DF	464748	2.79	5	499228	359.96	4086	5	5	6.88	0
			DD/SF	500934	3.23	5	534363	647.87	7028	5	5	6.26	0
			DD/DF	456448	2.89	5	495407	320.74	4008	5	5	7.86	0
		10	SD/SF	534124	2.99	5	560819	1218.02	14850	5	5	4.76	0
			SD/DF	509377	1.99	5	544161	644.34	9563.8	5	5	6.39	0
			DD/SF	531588	2.49	5	561525	784.72	8249.2	5	5	5.33	0
			DD/DF	516179	2.13	5	551713	760.38	8589.6	5	5	6.44	0
		15	SD/SF	579211	3.13	5	607302	2459.78	18921.8	5	5	4.62	0
			SD/DF	551786	2.03	5	585841	1566.34	24141.2	5	5	5.81	0
			DD/SF	557956	2.44	5	588855	1788.24	18881.6	5	5	5.25	0
			DD/DF	551676	2.02	5	586394	957.11	12914.2	5	5	5.92	0
		20	SD/SF	658274	2.64	5	686769	4839.87	52422.6	5	5	4.15	0
			SD/DF	611898	1.75	5	647141	4013.97	67747	5	5	5.44	0
			DD/SF	675268	2.23	5	707300	5306.67	67827	5	5	4.52	0
			DD/DF	607754	1.96	5	639683	1953.92	29970	5	5	4.99	0

Table 152: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	777129	11.13	5	787269	21600.1	34261.2	0	5	1.14	0.7
			SD/DF	680915	4.46	5	697478	4329.48	40471.8	5	5	2.37	0
			DD/SF	751532	6.84	5	763651	21600.1	78340.2	0	5	1.45	0.67
			DD/DF	671378	4.8	5	688280	2843.33	24005.2	5	5	2.45	0
		10	SD/SF	867830	10.68	5	876415	21600.14	66505.2	0	5	0.86	0.71
			SD/DF	750940	3.76	5	762244	7123.18	79750.6	5	5	1.48	0
			DD/SF	776236	6.24	5	786151	21600.14	81536.8	0	5	1.1	0.84
			DD/DF	757479	3.78	5	768084	7549.64	105696.6	5	5	1.38	0
		15	SD/SF	919947	12.04	5	926389	21600.14	75320.2	0	5	0.63	0.54
			SD/DF	822362	4.47	5	831125	21600.1	285100.4	0	5	1.02	0.18
			DD/SF	866045	5.91	5	873535	21600.12	98278.2	0	5	0.8	0.58
			DD/DF	834995	3.97	5	844615	13676.38	194659	3	5	1.14	0.04
		20	SD/SF	1046012	15.07	5	1051169	21600.18	115045.2	0	5	0.45	0.39
			SD/DF	895527	4.81	5	902349	21600.12	273425.8	0	5	0.75	0.16
			DD/SF	971289	6.84	5	977081	21600.14	159532.2	0	5	0.57	0.32
			DD/DF	893715	4.51	5	900874	21600.12	243925	0	5	0.78	0.17
	100	5	SD/SF	834070	24.74	5	855874	21600.2	9329	0	5	2.5	1.41
			SD/DF	775415	13.13	5	807381	14350.21	36167.4	3	5	3.93	0.53
			DD/SF	827179	19.58	5	853581	21600.22	12817.6	0	5	2.97	1.83
			DD/DF	773649	13.43	5	808933	21600.24	38464.4	0	5	4.32	0.96
		10	SD/SF	924174	19.66	5	941778	21600.18	10400.8	0	5	1.75	1.55
			SD/DF	846677	8.97	5	869095	21600.22	51517.8	0	5	2.55	0.83
			DD/SF	958951	18.66	5	978478	21600.2	11380	0	5	1.91	1.52
			DD/DF	853216	13.13	5	878631	21600.22	59721.6	0	5	2.81	0.69
		15	SD/SF	972347	17.67	5	988014	21600.22	10703	0	5	1.39	1.41
			SD/DF	901633	8.15	5	922978	21600.24	39121.6	0	5	2.27	0.65
			DD/SF	977841	17.6	5	997292	21600.24	19638.6	0	5	1.85	1.55
			DD/DF	916162	10.28	5	936071	21600.22	50319	0	5	2.06	0.71
		20	SD/SF	1087582	19.72	5	1100608	21600.24	14015	0	5	1.12	1.05
			SD/DF	990811	6.95	5	1010724	21600.2	54493	0	5	1.82	0.75
			DD/SF	1075042	17.93	5	1091978	21600.22	26763	0	5	1.4	1.28
			DD/DF	998112	8.97	5	1014070	21600.22	78042.2	0	5	1.52	0.47
	200	5	SD/SF	988099	77.12	5	1043175	21600.54	4172.8	0	5	5.25	4.1
			SD/DF	917149	46.91	5	981411	21600.5	11680.4	0	5	6.51	3.69
			DD/SF	925150	55.07	5	986940	21600.66	7030.4	0	5	6.12	4.62
			DD/DF	911828	45.51	5	980227	21600.92	7581.4	0	5	6.8	3.84
		10	SD/SF	1118794	52.28	5	1165466	21600.8	3006.6	0	5	3.65	3.64
			SD/DF	1013498	29.78	5	1075352	21600.54	7354.6	0	5	5.65	3.63
			DD/SF	1093252	39.71	5	1153854	21600.64	4515.4	0	5	4.34	4.17
			DD/DF	1013930	29.81	5	1073012	21600.52	10102.2	0	5	5.32	3.31
		15	SD/SF	1169052	51.55	5	1205998	21600.54	3414.6	0	5	2.96	2.8
			SD/DF	1091164	24.98	5	1151996	21600.48	8586.2	0	5	5.11	3.69
			DD/SF	1133692	37.89	5	1179468	21600.46	5675	0	5	3.59	2.99
			DD/DF	1092056	26.59	5	1149262	21600.38	7952.4	0	5	4.79	3.17
		20	SD/SF	1294440	41.78	5	1326154	21600.36	4551.6	0	5	2.33	2.31
			SD/DF	1169306	19.69	5	1217764	21600.44	9316.2	0	5	3.82	2.77
			DD/SF	1235674	29.43	5	1279406	21600.42	6251.6	0	5	3.17	3.03
			DD/DF	1173616	18.77	5	1219372	21600.34	13383.4	0	5	3.71	2.34

Table 153: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	0.91	5	388994	123.4	2239.2	5	5	5.63	0
			SD/DF	343618	0.43	5	367688	21.08	815.6	5	5	6.54	0
			DD/SF	330210	0.88	5	350285	70.21	2061	5	5	5.73	0
			DD/DF	348379	0.76	5	370307	22.12	1080.8	5	5	5.92	0
		10	SD/SF	459032	1.51	5	482151	235.5	4928.2	5	5	4.79	0
			SD/DF	398713	0.75	5	421694	45.21	2127.8	5	5	5.45	0
			DD/SF	398538	1.13	5	418573	264.69	5744.4	5	5	4.77	0
			DD/DF	394086	0.51	5	416434	45.5	1680.4	5	5	5.36	0
		15	SD/SF	484818	1.09	5	505444	237.96	7775	5	5	4.08	0
			SD/DF	429321	0.43	5	449512	165.2	4379.8	5	5	4.5	0
			DD/SF	439742	0.61	5	458173	200.41	4792.8	5	5	4.02	0
			DD/DF	439909	0.41	5	460458	81.23	2707.4	5	5	4.47	0
		20	SD/SF	533233	0.95	5	553909	9026.52	419798.8	4	5	3.72	0
			SD/DF	485287	1.06	5	505001	266.01	9106.8	5	5	3.91	0
			DD/SF	510858	1.29	5	531194	925.41	31567.4	5	5	3.82	0
			DD/DF	485672	0.97	5	505747	241.84	8009.6	5	5	3.97	0
	100	5	SD/SF	433680	1.9	5	458130	238.8	5860.2	5	5	5.34	0
			SD/DF	387141	1.35	5	413703	67.62	2773.2	5	5	6.42	0
			DD/SF	398562	1.69	5	423193	227.21	2813.2	5	5	5.83	0
			DD/DF	388995	1.36	5	414956	139.69	2081.8	5	5	6.26	0
		10	SD/SF	479894	1.95	5	504463	800.77	4777	5	5	4.88	0
			SD/DF	439743	1.17	5	467036	241.6	3000.2	5	5	5.85	0
			DD/SF	436860	1.51	5	459919	1205.66	9236.6	5	5	5.02	0
			DD/DF	429932	1.21	5	455556	171.09	1750.8	5	5	5.62	0
		15	SD/SF	520671	1.76	5	544902	1575.13	15670	5	5	4.45	0
			SD/DF	460075	1	5	483962	207.71	2753.8	5	5	4.94	0
			DD/SF	504631	1.52	5	528600	1277.68	11185	5	5	4.53	0
			DD/DF	471277	1.13	5	495465	233.99	3470.4	5	5	4.88	0
		20	SD/SF	555676	1.3	5	577521	1766.06	20510.2	5	5	3.77	0
			SD/DF	514416	1.02	5	537406	332.43	5731	5	5	4.27	0
			DD/SF	572117	1.5	5	596032	1244.04	9031.2	5	5	4.01	0
			DD/DF	532151	1.12	5	555780	378.62	5859.4	5	5	4.25	0
	200	5	SD/SF	497969	5.25	5	525276	705.69	6139	5	5	5.19	0
			SD/DF	464748	3.44	5	499228	592.3	4652.8	5	5	6.88	0
			DD/SF	500934	4.1	5	534363	678.99	5937.2	5	5	6.26	0
			DD/DF	456448	3.59	5	495407	371.15	3066.8	5	5	7.86	0
		10	SD/SF	534124	5.51	5	560819	1376.34	12536.4	5	5	4.76	0
			SD/DF	509377	2.91	5	544161	1003.94	8192.2	5	5	6.39	0
			DD/SF	531588	4.14	5	561525	974.12	6171.2	5	5	5.33	0
			DD/DF	516179	3.29	5	551713	1553.97	9270.4	5	5	6.44	0
		15	SD/SF	579211	5.82	5	607302	4051.21	14251.8	5	5	4.62	0
			SD/DF	551786	3.59	5	585841	3192.14	22016.4	5	5	5.81	0
			DD/SF	557956	4.49	5	588855	3642.58	19925.6	5	5	5.25	0
			DD/DF	551676	3.05	5	586394	2500.61	12528.2	5	5	5.92	0
		20	SD/SF	658274	4.16	5	686769	9228.71	49022.6	5	5	4.15	0
			SD/DF	611898	3.01	5	647141	6861.07	72463.2	5	5	5.44	0
			DD/SF	675268	3.93	5	707300	12453.57	70327.4	5	5	4.52	0
			DD/DF	607754	3.07	5	639683	7690.78	27994.8	4	5	4.99	0.03

Table 154: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	777129	12.72	5	786428	21600.1	42748.6	0	5	1.14	0.46
			SD/DF	680915	5.45	5	697478	3015.17	31019.2	5	5	2.37	0
			DD/SF	751532	6.39	5	763056	21180.76	72155.2	1	5	1.45	0.49
			DD/DF	671378	5.24	5	688280	2038.67	15562.2	5	5	2.45	0
		10	SD/SF	867830	14.83	5	876455	21600.1	43515.6	0	5	0.86	0.75
			SD/DF	750940	4.12	5	762244	9330.11	56641	5	5	1.48	0
			DD/SF	776236	5.18	5	785312	21600.1	59145.4	0	5	1.1	0.79
			DD/DF	757479	4.08	5	768084	9524.82	75361.4	5	5	1.38	0
		15	SD/SF	919947	22.04	5	926497	21600.1	42647.4	0	5	0.63	0.58
			SD/DF	822362	4.53	5	831079	21600.12	141101.2	0	5	1.02	0.19
			DD/SF	866045	5.91	5	873908	21600.1	71395.6	0	5	0.8	0.62
			DD/DF	834995	4.61	5	844672	15462.59	123203.6	3	5	1.14	0.06
		20	SD/SF	1046012	20.16	5	1051490	21600.1	53019.2	0	5	0.45	0.44
			SD/DF	895527	6.56	5	902423	21600.1	117844.6	0	5	0.75	0.19
			DD/SF	971289	8.95	5	977998	21600.1	66970	0	5	0.57	0.45
			DD/DF	893715	6.8	5	900892	21600.1	108783.8	0	5	0.78	0.18
	100	5	SD/SF	834070	48.88	5	855916	21600.14	7991.2	0	5	2.5	1.45
			SD/DF	775415	17.87	5	807388	18076.55	19920.6	1	5	3.93	0.98
			DD/SF	827179	24.65	5	852335	21600.14	16695	0	5	2.97	1.32
			DD/DF	773649	18.15	5	808938	20469	34589.2	1	5	4.32	0.94
		10	SD/SF	924174	51.14	5	941099	21600.14	10590.4	0	5	1.75	1.42
			SD/DF	846677	10.55	5	869380	21600.14	28634.8	0	5	2.55	1.04
			DD/SF	958951	16.44	5	980087	21600.18	20195.8	0	5	1.91	1.5
			DD/DF	853216	11.43	5	878011	21067.98	55177.6	1	5	2.81	0.56
		15	SD/SF	972347	63.77	5	986749	21600.12	11788	0	5	1.39	1.24
			SD/DF	901633	9.65	5	923628	21600.16	30361.8	0	5	2.27	0.95
			DD/SF	977841	13.69	5	997897	21600.14	21128	0	5	1.85	1.62
			DD/DF	916162	10.3	5	936188	21600.12	36858	0	5	2.06	0.85
		20	SD/SF	1087582	79.3	5	1101129	21600.18	15658.8	0	5	1.12	1.1
			SD/DF	990811	10.14	5	1009710	21600.2	36252.6	0	5	1.82	0.69
			DD/SF	1075042	17.66	5	1090698	21600.18	22145.4	0	5	1.4	1.14
			DD/DF	998112	12.26	5	1014079	21600.18	35380.2	0	5	1.52	0.61
	200	5	SD/SF	988099	167.77	5	1046234	21600.32	3632.2	0	5	5.25	4.59
			SD/DF	917149	65.4	5	988417	21600.38	2870.6	0	5	6.51	5
			DD/SF	925150	88.71	5	986698	21600.5	6089.4	0	5	6.12	4.19
			DD/DF	911828	62.43	5	980400	21600.68	4028	0	5	6.8	3.91
		10	SD/SF	1118794	207.09	5	1167550	21600.44	2464.4	0	5	3.65	3.68
			SD/DF	1013498	43.29	5	1084328	21600.78	3154.6	0	5	5.65	4.95
			DD/SF	1093252	67.29	5	1149860	21600.74	4841.4	0	5	4.34	3.59
			DD/DF	1013930	40.33	5	1074672	21600.5	2960.8	0	5	5.32	3.98
		15	SD/SF	1169052	245.57	5	1210036	21600.5	3323.6	0	5	2.96	3.12
			SD/DF	1091164	34.75	5	1157804	21600.46	3121.8	0	5	5.11	4.68
			DD/SF	1133692	59.8	5	1177796	21600.36	3732	0	5	3.59	2.86
			DD/DF	1092056	32.59	5	1152578	21600.44	3624.4	0	5	4.79	3.65
		20	SD/SF	1294440	165.9	5	1331100	21600.32	3926.8	0	5	2.33	2.64
			SD/DF	1169306	27.88	5	1220870	21600.3	5542	0	5	3.82	3.32
			DD/SF	1235674	54.97	5	1277144	21600.34	6038.8	0	5	3.17	2.79
			DD/DF	1173616	30.02	5	1221272	21600.36	6215.6	0	5	3.71	3.03

Table 155: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	367082	0.58	5	388994	163.25	2501.2	5	5	5.63	0
			SD/DF	343618	0.31	5	367688	24.08	1238	5	5	6.54	0
			DD/SF	330210	0.66	5	350285	107.29	2266.4	5	5	5.73	0
			DD/DF	348379	0.4	5	370307	28.51	1642.8	5	5	5.92	0
		10	SD/SF	459032	0.97	5	482151	187.77	4629	5	5	4.79	0
			SD/DF	398713	0.51	5	421694	45.29	1978.6	5	5	5.45	0
			DD/SF	398538	0.46	5	418573	198.63	4167.6	5	5	4.77	0
			DD/DF	394085	0.24	5	416434	56.71	1911.6	5	5	5.36	0
		15	SD/SF	484818	0.59	5	505444	284.08	7918.4	5	5	4.08	0
			SD/DF	429315	0.32	5	449512	118.32	3806.4	5	5	4.5	0
			DD/SF	439742	0.43	5	458173	172.53	4355.8	5	5	4.02	0
			DD/DF	439898	0.26	5	460458	65.04	2051.4	5	5	4.47	0
		20	SD/SF	533233	1.08	5	553909	6615.59	320781.8	5	5	3.72	0
			SD/DF	485284	0.52	5	505001	208.56	9460.6	5	5	3.91	0
			DD/SF	510858	0.79	5	531194	690	29505.6	5	5	3.82	0
			DD/DF	485664	0.59	5	505747	129.84	4550.4	5	5	3.97	0
	100	5	SD/SF	433680	1.51	5	458130	306.97	3486.2	5	5	5.34	0
			SD/DF	387139	0.52	5	413703	57.17	2373	5	5	6.42	0
			DD/SF	398562	0.93	5	423193	309.52	2838.8	5	5	5.83	0
			DD/DF	388992	0.46	5	414956	98.52	2085	5	5	6.26	0
		10	SD/SF	479894	1.49	5	504463	1025.93	5867.8	5	5	4.88	0
			SD/DF	439743	0.49	5	467036	228.77	2586.6	5	5	5.85	0
			DD/SF	436860	0.82	5	459919	1298.58	7775.2	5	5	5.02	0
			DD/DF	429916	0.55	5	455556	97.88	2169	5	5	5.62	0
		15	SD/SF	520671	1.39	5	544902	2404.6	15945	5	5	4.45	0
			SD/DF	460072	0.71	5	483962	235.53	2969.2	5	5	4.94	0
			DD/SF	504631	0.91	5	528600	1179.06	9553	5	5	4.53	0
			DD/DF	471272	0.49	5	495465	258	3566.8	5	5	4.88	0
		20	SD/SF	555676	1.32	5	577521	1551.79	18632.2	5	5	3.77	0
			SD/DF	514391	0.57	5	537406	400.54	4503.2	5	5	4.27	0
			DD/SF	572117	0.98	5	596032	1070.53	8876.4	5	5	4.01	0
			DD/DF	532143	0.62	5	555780	355.96	4737.2	5	5	4.25	0
	200	5	SD/SF	497969	6.56	5	525276	1060.71	7935	5	5	5.19	0
			SD/DF	464747	1.25	5	499228	691.65	3988.6	5	5	6.88	0
			DD/SF	500934	3.6	5	534363	1022.85	6447.4	5	5	6.26	0
			DD/DF	456442	1.26	5	495407	330.21	3353.6	5	5	7.86	0
		10	SD/SF	534124	5.37	5	560819	2508.63	22783.4	5	5	4.76	0
			SD/DF	509376	1.32	5	544161	1453.96	10553	5	5	6.39	0
			DD/SF	531588	3.08	5	561525	1642.21	7418.4	5	5	5.33	0
			DD/DF	516175	1.32	5	551713	1738.66	8938.6	5	5	6.44	0
		15	SD/SF	579211	4.92	5	607302	6655.3	20310.4	5	5	4.62	0
			SD/DF	551785	1.68	5	585841	5042.86	29367.4	5	5	5.81	0
			DD/SF	557956	3.68	5	588855	7379.91	30126.8	5	5	5.25	0
			DD/DF	551676	1.35	5	586394	2036.58	12438.6	5	5	5.92	0
		20	SD/SF	658274	4.33	5	686769	10195.43	56950.2	5	5	4.15	0
			SD/DF	611894	1.85	5	647141	9164.68	63089.6	5	5	5.45	0
			DD/SF	675268	3.01	5	707306	17096.02	62729.6	3	5	4.52	0.06
			DD/DF	607738	1.47	5	639683	3848.01	25987.2	5	5	4.99	0

Table 156: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	777129	3.7	5	786803	21600	22285.4	0	5	1.14	0.54
			SD/DF	680912	0.78	5	697478	3995.19	19546.6	5	5	2.37	0
			DD/SF	751532	1.19	5	763590	21600	33554	0	5	1.45	0.64
			DD/DF	671374	0.66	5	688280	3826.26	14780.4	5	5	2.45	0
		10	SD/SF	867830	2.61	5	876149	21600.06	23144	0	5	0.86	0.74
			SD/DF	750903	0.8	5	762244	10591.78	46205.8	4	5	1.48	0.04
			DD/SF	776236	1.2	5	786419	21600.02	40248	0	5	1.1	0.89
			DD/DF	757459	0.71	5	768136	10579.64	58065.4	4	5	1.38	0.03
		15	SD/SF	919947	3.32	5	928189	17380.47	29057.4	0	5	0.63	0.55
			SD/DF	822341	1.2	5	660186	17280.04	124141.6	0	4	1.03	0.13
			DD/SF	866045	1.66	5	874197	21600.04	54320.8	0	5	0.8	0.64
			DD/DF	834967	1.08	5	844678	16695.44	78306	2	5	1.14	0.07
		20	SD/SF	1046012	4.99	5	1052319	21600.08	37455.6	0	5	0.45	0.53
			SD/DF	895505	1.72	5	902502	21600	92777.2	0	5	0.75	0.18
			DD/SF	971289	2.45	5	978420	21600.06	51542.8	0	5	0.57	0.51
			DD/DF	893680	1.5	5	725315	17280	83294.8	0	4	0.78	0.13
	100	5	SD/SF	834070	21.82	5	858557	21600.06	3745.8	0	5	2.5	1.99
			SD/DF	775399	3.03	5	807388	17028.55	24684	3	5	3.93	0.71
			DD/SF	827179	8.89	5	853416	21600.06	10379.6	0	5	2.97	1.5
			DD/DF	773639	3.05	5	808810	21600.04	26459	0	5	4.33	0.6
		10	SD/SF	924174	10.46	5	946415	21600.1	4654.2	0	5	1.75	1.97
			SD/DF	846640	2.92	5	869196	21600.06	13618	0	5	2.56	1.11
			DD/SF	958951	5.33	5	981548	21600.1	8449.6	0	5	1.91	1.72
			DD/DF	853184	2.53	5	878769	21600.08	15862.6	0	5	2.81	1.02
		15	SD/SF	972347	10.59	5	990447	21600.04	6729.4	0	5	1.39	1.65
			SD/DF	901601	2.93	5	923546	21600.02	13477.6	0	5	2.27	1.05
			DD/SF	977841	5.28	5	1000585	21600.08	9701.2	0	5	1.85	1.88
			DD/DF	916114	2.48	5	936025	21600.04	14689.4	0	5	2.06	1.04
		20	SD/SF	1087582	16.01	5	1102510	21600.1	9446.8	0	5	1.12	1.24
			SD/DF	990786	3.43	5	1010581	21600.06	14938.2	0	5	1.83	0.94
			DD/SF	1075042	7.86	5	1094142	21600.08	11343.8	0	5	1.4	1.47
			DD/DF	998049	3.27	5	1014076	21600.06	18977	0	5	1.53	0.66
	200	5	SD/SF	988099	145.5	5	1050577	21600.2	1793.8	0	5	5.25	5.12
			SD/DF	917123	14.71	5	988105	21600.22	2918	0	5	6.51	4.91
			DD/SF	925150	53.7	5	989061	21600.2	2998.4	0	5	6.12	4.56
			DD/DF	911798	13.08	5	982396	21600.26	3945	0	5	6.8	3.88
		10	SD/SF	1118794	78.05	5	1187870	21600.38	1136	0	5	3.65	5.47
			SD/DF	1013484	8.65	5	1081030	21600.14	3089	0	5	5.65	4.71
			DD/SF	1093252	27.62	5	1156002	21600.22	2265.8	0	5	4.34	4.36
			DD/DF	1013903	9.12	5	1076000	21600.18	4820.4	0	5	5.32	3.69
		15	SD/SF	1169052	46.7	5	1227312	21600.22	1531.2	0	5	2.96	4.38
			SD/DF	1091128	7.57	5	1159340	21600.42	2592.8	0	5	5.11	4.85
			DD/SF	1133692	22.99	5	1193822	21600.28	2098.8	0	5	3.59	4.19
			DD/DF	1092040	8.86	5	1154818	21600.2	3354.6	0	5	4.79	3.76
		20	SD/SF	1294440	59.44	5	1341322	21600.22	1603.2	0	5	2.33	3.29
			SD/DF	1169280	7.92	5	1221274	21600.2	4431.4	0	5	3.82	3.35
			DD/SF	1235674	26.6	5	1287312	21600.3	2403	0	5	3.17	3.47
			DD/DF	1173552	7.96	5	1224050	21600.18	4258.6	0	5	3.71	3.19

Table 157: Performance of the N formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	368857	21.46	5	388994	6821.99	3486.4	4	5	5.17	0.45
			SD/DF	349394	15.75	5	367688	2834.63	2235.6	5	5	4.98	0
			DD/SF	332815	18.9	5	350285	3348.2	2200.4	5	5	4.99	0
			DD/DF	353413	19.31	5	370307	3421.02	2503.6	5	5	4.56	0
		10	SD/SF	460243	25.38	5	482151	8868.7	6946.6	5	5	4.54	0
			SD/DF	401424	19.22	5	421694	5179.94	3482.2	5	5	4.81	0
			DD/SF	400132	18.4	5	418585	12974.76	10636.8	4	5	4.39	0.73
			DD/DF	396810	18.37	5	416434	6478.67	5124	5	5	4.71	0
		15	SD/SF	485415	24.05	5	505444	10507.17	22282.4	5	5	3.96	0
			SD/DF	431430	18.4	5	449512	5232.35	7195.8	5	5	4.03	0
			DD/SF	440811	19.26	5	458282	8969.35	7029.8	4	5	3.78	0.06
			DD/DF	442148	19.44	5	460458	6261.22	3506.8	5	5	3.98	0
		20	SD/SF	533922	22.27	5	553956	20126.48	51397.8	1	5	3.6	0.03
			SD/DF	487567	15.58	5	505001	6591.59	8444.2	5	5	3.45	0
			DD/SF	511831	18.62	5	531194	10634.84	15839.2	4	5	3.64	0.01
			DD/DF	487592	14.75	5	505747	5406.32	7675	5	5	3.59	0
	100	5	SD/SF	438668	71.26	5	458909	18889.55	8360	1	5	4.24	1.11
			SD/DF	393951	51.61	5	413703	9761.5	4339.2	5	5	4.78	0
			DD/SF	405557	56.03	5	423200	12969.2	2693	3	5	4.16	0.02
			DD/DF	397096	70.01	5	414956	13536.92	3821.8	3	5	4.31	0
		10	SD/SF	483379	84.59	5	504692	20221.14	2875.2	1	5	4.18	1.51
			SD/DF	447174	61.71	5	467059	12335.35	3918.4	4	5	4.26	0.31
			DD/SF	441561	76.1	5	460074	20780.16	2976	1	5	3.99	1.53
			DD/DF	438110	54.67	5	455556	12623.13	2524.6	4	5	3.82	0
		15	SD/SF	523881	109.46	5	545072	16657.45	4068	2	5	3.85	0.84
			SD/DF	467035	69.84	5	483962	10567.8	3457.2	5	5	3.5	0
			DD/SF	508415	128.05	5	528627	13526.28	6628.4	4	5	3.81	0.04
			DD/DF	477948	90.51	5	495465	6747.21	3288.8	5	5	3.53	0
		20	SD/SF	557874	136.18	5	577814	17775.52	10248	3	5	3.39	1.05
			SD/DF	519531	96.53	5	537406	11140.86	2647.8	5	5	3.32	0
			DD/SF	575160	81.05	5	596284	18185.26	3580.8	3	5	3.49	0.66
			DD/DF	537576	67.63	5	555780	11671.65	2906.2	4	5	3.28	0.01
	200	5	SD/SF	509228	290.54	5	525649	20989.84	1498	1	5	3.04	0.69
			SD/DF	480974	153.9	5	499230	15409.68	1527.8	2	5	3.63	0
			DD/SF	516447	198.81	5	534381	19264.22	3516	2	5	3.35	0.02
			DD/DF	473788	177.52	5	495423	16721.13	6205	2	5	4.36	0.01
		10	SD/SF	545033	297.77	5	560822	21449.34	3836.2	1	5	2.81	0.01
			SD/DF	526078	233.12	5	544163	19387.66	1816.6	1	5	3.32	0
			DD/SF	545080	247.33	5	561649	21600.74	1217.2	0	5	2.92	0.43
			DD/DF	530684	200.09	5	551798	19544.72	1709.8	2	5	3.81	0.37
		15	SD/SF	587934	327.54	5	608093	21600.7	972.8	0	5	3.17	1.48
			SD/DF	566050	212.25	5	585844	19479.68	2381	1	5	3.37	0.01
			DD/SF	570517	253.34	5	478371	17280.62	853.8	0	4	3.11	1.32
			DD/DF	567348	225.07	5	586407	12246.53	1588.6	3	5	3.26	0.01
		20	SD/SF	665384	389.89	5	687216	21600.7	1459	0	5	3.11	1.33
			SD/DF	626409	232.89	5	647368	19296.52	2709.8	2	5	3.21	0.1
			DD/SF	684410	363.18	5	707675	19755.04	1807.2	2	5	3.23	0.88
			DD/DF	624087	255.62	5	640801	21600.74	1707.2	0	5	2.44	0.66

Table 158: Performance of the N formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
			SD/SF	780244	1327.5	5	911470	21603.34	160.8	0	5	0.75	10.91
		5	SD/DF	686554	4879.68	4	563667	17283.16	249.8	0	4	1.44	1.77
			DD/SF	756059	726.52	5	623292	17282.92	151.4	0	4	0.85	4.2
			DD/DF	674216	4821.48	4	562781	17282.68	291	0	4	1.37	2.1
			SD/SF	870121	1596.18	5	1040021	21603.28	154	0	5	0.59	12.41
		10	SD/DF	756609	734.56	5	784000	21603.32	205	0	5	0.73	3.39
			DD/SF	779741	1189	5	801929	21603.88	166.6	0	5	0.66	2.75
	50		DD/DF	763435	915.79	5	817094	21603.34	205.4	0	5	0.61	6.1
			SD/SF	921155	1223.94	5	938678	17282.56	138.4	0	4	0.5	15.81
		15	SD/DF	826188	1090.9	5	910128	21603.62	203.4	0	5	0.56	8.87
			DD/SF	868355	1197.64	5	1170914	21603.5	163	0	5	0.54	22.68
			DD/DF	839462	1169.78	5	699076	17282.86	172.4	0	4	0.61	3.03
			SD/SF	1046738	1685.88	5	1069740	17283.06	131.8	0	4	0.38	16.38
		20	SD/DF	899232	985.08	5	759423	17283.04	120.2	0	4	0.34	3.57
			DD/SF	973396	1069.51	5	1039110	21603.4	222.6	0	5	0.35	6.15
			DD/DF	897588	762.46	5	556280	12961.96	186.6	0	3	0.35	1.7
			SD/SF	841712	3256.75	5	259124	4322.18	0	0	1	1.6	8.51
		5	SD/DF	789279	1679.48	5	833610	21607.56	103.2	0	5	2.22	5.17
			DD/SF	864775	6483.75	4	458350	8643.24	5.2	0	2	1.29	13.35
			DD/DF	788794	1164.56	5	687148	17285.76	64.6	0	4	2.45	6.49
			SD/SF	906705	12624.79	3	928190	12992.84	0.4	0	3	0.92	24.86
30		10	SD/DF	858347	2169.45	5	732772	17285.2	41	0	4	1.21	5.14
			DD/SF	953606	6640.58	4	891654	12964.96	5.8	0	3	0.95	19.28
	100		DD/DF	866541	5780.92	4	556234	12964.08	27.4	0	3	1.26	4.09
			SD/SF	1047050	14829.62	2	1611754	22373.88	0	0	5	0.83	39.34
		15	SD/DF	914180	2148.64	5	815874	17289.18	42.2	0	4	0.9	7.7
			DD/SF	986155	4607.22	5	684006	8643.56	5.6	0	2	1.01	16.09
			DD/DF	927238	2284.81	5	393830	8642.78	15.6	0	2	0.87	2.32
			SD/SF	1091385	7132.78	5	1843744	22726.98	0	0	5	0.77	40.7
		20	SD/DF	1002860	2375.06	5	1120918	21607.56	49.8	0	5	0.63	10.36
			DD/SF	1082128	3790.97	5	729458	8643.1	10.6	0	2	0.75	15.64
			DD/DF	1008863	2958.19	5	654788	12965.4	30.6	0	3	0.46	4.54
			SD/SF	1079850	19478.68	1	-	-	-	0	0	3.14	-
		5	SD/DF	951120	9387.46	5	736112	12978.58	0.4	0	3	3.05	13.15
			DD/SF	944629	14776.74	3	-	-	-	0	0	3.24	-
			DD/DF	949193	9190.74	4	539498	8651.82	1.8	0	2	3.24	11.63
			SD/SF	-	21633.86	0	-	-	-	0	0	-	-
		10	SD/DF	1044826	6303.55	5	521328	8653	0.8	0	2	2.73	7.75
			DD/SF	1122005	13480.44	4	-	-	-	0	0	2.25	-
	200		DD/DF	1036345	9159.78	4	545918	8650.06	0.4	0	2	2.41	9.17
			SD/SF	1162450	18326.72	2	-	-	-	0	0	1.98	-
		15	SD/DF	1120148	6089.09	5	1434092	22888.52	0.8	0	5	2.59	21.7
			DD/SF	1181663	16689.42	3	741282	8650.62	0	0	2	1.2	14.89
			DD/DF	1124445	11256.25	4	1475974	21628.62	1.6	0	5	1.73	23.69
			SD/SF	-	21653.66	0	-	-	-	0	0	-	-
		20	SD/DF	1203920	10411.03	4	1212250	17305.94	0.6	0	4	1.38	16.21
			DD/SF	1289205	19969.64	2	421058	4324.24	0	0	1	1.78	7.92
			DD/DF	1195218	11735.01	4	1517522	21621.64	1.2	0	5	1.54	20.61

Table 159: Performance of the T formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	368764	63.89	5	388994	7149.72	3746	5	5	5.19	0
			SD/DF	349360	50.83	5	367688	5108.86	2642.4	5	5	4.98	0
			DD/SF	332766	60.06	5	350285	5861.15	2854.4	5	5	5	0
			DD/DF	353394	64.36	5	370307	2781.3	1773.8	5	5	4.57	0
		10	SD/SF	460172	65.49	5	482167	7593.23	5302.8	4	5	4.56	0.02
			SD/DF	401403	69.3	5	421694	3812.44	3629	5	5	4.81	0
			DD/SF	400088	56.98	5	418573	4903.88	8900.6	5	5	4.4	0
			DD/DF	396797	44.59	5	416434	2376.7	2708.4	5	5	4.71	0
		15	SD/SF	485368	84.35	5	505444	9572.43	12738.4	5	5	3.97	0
			SD/DF	431423	30.45	5	449512	4043.79	5014.4	5	5	4.03	0
			DD/SF	440789	41.24	5	458336	9304.94	6226.4	4	5	3.79	0.63
			DD/DF	442136	25.7	5	460458	2506.49	2395.6	5	5	3.98	0
		20	SD/SF	533898	30.54	5	554021	19112.3	33374.6	1	5	3.6	0.75
			SD/DF	487563	25.36	5	505001	7092.73	10819.6	5	5	3.45	0
			DD/SF	511822	47.96	5	531194	12193.85	22051.8	4	5	3.64	0
			DD/DF	487587	18.07	5	505747	2985.48	5389.2	5	5	3.59	0
	100	5	SD/SF	438627	190.93	5	458586	20404.18	1699.8	1	5	4.25	2.06
			SD/DF	393939	112.84	5	413703	10699.55	4519.8	4	5	4.78	0
			DD/SF	405540	174.88	5	423198	17689.54	2073.6	3	5	4.16	0.61
			DD/DF	397086	220.37	5	414956	7491.68	8865	5	5	4.31	0
		10	SD/SF	483235	211.7	5	504766	17024.82	1996.4	2	5	4.21	1.33
			SD/DF	447121	150.91	5	467043	10671.71	2919.4	4	5	4.27	0.03
			DD/SF	441495	205.52	5	460061	19048.5	3465.8	4	5	4	0.49
			DD/DF	438084	167.63	5	455556	7534.31	2290	5	5	3.83	0
		15	SD/SF	523763	125.04	5	545129	21600.24	5758	0	5	3.88	0.71
			SD/DF	466974	161.96	5	483962	9957.34	3237.8	5	5	3.51	0
			DD/SF	508327	162.95	5	528868	20763.86	4483.2	1	5	3.82	0.64
			DD/DF	477922	117.16	5	495465	11244.37	5290	5	5	3.54	0
		20	SD/SF	557728	146.67	5	578173	21181.3	4787.4	1	5	3.41	0.83
			SD/DF	519501	167.54	5	537406	10354.82	2656.2	5	5	3.33	0
			DD/SF	575074	138.37	5	596041	15991.34	5716.8	4	5	3.51	0
			DD/DF	537556	162.41	5	555823	14232.84	2460.4	4	5	3.28	0.03
	200	5	SD/SF	509107	832.01	5	526558	21600.44	1122.2	0	5	3.07	1.4
			SD/DF	480953	420.39	5	499230	14377.22	1319.6	2	5	3.64	0
			DD/SF	516349	752.35	5	535663	21600.46	630.8	0	5	3.37	1.39
			DD/DF	473741	315.53	5	495415	16071.21	965.6	3	5	4.37	0
		10	SD/SF	545002	752.94	5	561963	21600.44	2601.8	0	5	2.81	0.76
			SD/DF	526034	444.98	5	544162	17120.84	2215.6	3	5	3.33	0
			DD/SF	545051	891.76	5	561806	21600.48	3366	0	5	2.93	0.72
			DD/DF	530660	486.16	5	551846	21600.46	2045.8	0	5	3.81	0.49
		15	SD/SF	587743	690.05	5	609249	21600.42	462.2	0	5	3.2	2.84
			SD/DF	565982	551.22	5	585859	14775.34	5732.4	3	5	3.39	0.43
			DD/SF	570444	1018.73	5	591291	21600.5	817	0	5	3.12	1.98
			DD/DF	567301	751.32	5	586406	17460.57	2392	2	5	3.27	0.02
		20	SD/SF	664995	969.81	5	688535	21600.42	622.2	0	5	3.16	2.88
			SD/DF	626340	619.71	5	647453	19862.74	1157	1	5	3.22	0.41
			DD/SF	684241	715.21	5	707734	18811.78	1583.6	1	5	3.25	1.1
			DD/DF	624053	900.82	5	639942	20492.64	1663.2	1	5	2.44	0.18

Table 160: Performance of the T formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	779925	1921.53	5	1071677	21601.24	42.2	0	5	0.79	23.73
			SD/DF	688282	860.95	5	700431	21601.5	486.2	0	5	1.32	1.08
			DD/SF	755918	1331.4	5	774289	21601.62	240	0	5	0.86	2.26
			DD/DF	677947	528.75	5	690377	21601.36	386.2	0	5	1.5	1.32
		10	SD/SF	869800	2748.84	5	915149	21601.48	75.4	0	5	0.63	4.92
			SD/DF	756553	757.3	5	766732	21601.52	351.8	0	5	0.74	1.07
			DD/SF	779568	1687.64	5	798701	21601.4	235.2	0	5	0.68	2.39
			DD/DF	763381	1054.6	5	776355	21601.54	306.4	0	5	0.61	1.42
		15	SD/SF	920956	2209.99	5	955387	21601.46	86.4	0	5	0.52	3.58
			SD/DF	826170	950.12	5	834127	21601.46	328	0	5	0.57	0.77
			DD/SF	868256	1618.29	5	970846	21601.46	168.6	0	5	0.55	7.93
			DD/DF	839436	892.99	5	848078	21601.52	359.2	0	5	0.61	0.86
		20	SD/SF	1046648	2197.37	5	1115130	21601.46	90.2	0	5	0.39	5.97
			SD/DF	899217	1380	5	906024	21601.38	295.6	0	5	0.34	0.66
			DD/SF	973338	2169.15	5	991113	21601.3	265.6	0	5	0.35	1.77
			DD/DF	897572	788.62	5	904725	21601.4	352	0	5	0.35	0.7
	100	5	SD/SF	841561	10280.43	5	1505252	21602.94	0	0	5	1.61	44.02
			SD/DF	789255	3159.45	5	847163	21602.82	97.4	0	5	2.22	6.64
			DD/SF	840331	7143	5	1479616	21603.24	7.4	0	5	1.41	43.15
			DD/DF	788750	2817.43	5	886124	21602.76	77	0	5	2.45	10.83
		10	SD/SF	930901	9420.68	5	1313652	17282.2	0	0	4	1.03	33.17
			SD/DF	858306	2662.9	5	925941	21602.74	39.6	0	5	1.22	7.14
			DD/SF	967885	5737.93	5	1295568	17380.46	7.2	0	4	1	32.86
			DD/DF	866820	3036.94	5	963847	21602.72	54.2	0	5	1.26	9.02
		15	SD/SF	976879	9421.69	5	1627550	22563.12	0	0	5	0.92	39.91
			SD/DF	914089	4247.05	5	978105	21602.58	35.2	0	5	0.91	6.48
			DD/SF	985721	6216.51	5	1575974	21869.58	6	0	5	1.05	36.14
			DD/DF	927158	2796.76	5	963226	21602.86	61.8	0	5	0.88	3.7
		20	SD/SF	1090761	12744.9	5	1882126	21603.66	0	0	5	0.83	41.98
			SD/DF	1002803	4585.08	5	1036667	21602.72	72.2	0	5	0.63	3.21
			DD/SF	1081734	8437.65	5	1838910	22710.18	0	0	5	0.78	41.19
			DD/DF	1008825	3163.99	5	1034710	21602.7	45.4	0	5	0.46	2.46
	200	5	SD/SF	-	21608.36	0	-	-	-	0	0	-	-
			SD/DF	951032	12161.4	5	1270788	21610.98	0	0	5	3.05	25.06
			DD/SF	950915	20719.78	2	603366	8643.24	0	0	2	3.32	16.47
			DD/DF	943036	15066.74	4	1203680	21610	2.4	0	5	3.29	19.67
		10	SD/SF	-	21613.52	0	375440	4321.44	0	0	1	-	8.09
			SD/DF	1044734	10437.06	5	1099308	18505.28	0	0	4	2.74	19.25
			DD/SF	1103347	19156.08	3	-	-	-	0	0	1.84	-
			DD/DF	1043914	17747.38	5	1344490	21610.1	1.8	0	5	2.52	22.02
		15	SD/SF	-	21618.44	0	-	-	-	0	0	-	-
			SD/DF	1115108	16101.19	4	1160646	18566.96	1	0	4	2.63	17.94
			DD/SF	1145240	19036.8	3	-	-	-	0	0	1.37	-
			DD/DF	1123706	13466.82	5	481054	8643.86	0	0	2	2.03	2.77
		20	SD/SF	-	21672.8	0	-	-	-	0	0	-	-
			SD/DF	1203133	14976.11	3	1506882	21608.02	0.6	0	5	1.59	19.61
			DD/SF	1306660	21046.88	1	-	-	-	0	0	1.92	-
			DD/DF	1201290	15352.41	3	922548	12963.62	1.2	0	3	1.44	12.92

Table 161: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	368764	19.73	5	388994	5719.04	5800.8	5	5	5.19	0
			SD/DF	349360	11.78	5	367688	2584.62	3239.6	5	5	4.98	0
			DD/SF	332766	12.81	5	350285	3710.21	4969	5	5	5	0
			DD/DF	353394	12.99	5	370307	1420.06	2075	5	5	4.57	0
		10	SD/SF	460172	13.37	5	482151	5905.69	7703.2	5	5	4.56	0
			SD/DF	401403	8.91	5	421694	945.27	1994.8	5	5	4.81	0
			DD/SF	400088	9.41	5	418573	4461.98	7482.2	5	5	4.4	0
			DD/DF	396797	7.89	5	416434	3624.78	5356.6	5	5	4.71	0
		15	SD/SF	485368	8.47	5	505444	2468.94	8484.8	5	5	3.97	0
			SD/DF	431423	6.32	5	449512	2524.91	5027.4	5	5	4.03	0
			DD/SF	440789	7.54	5	458173	3602.94	5621.4	5	5	3.79	0
			DD/DF	442136	7.45	5	460458	1315.78	1874.6	5	5	3.98	0
		20	SD/SF	533898	5.88	5	553913	15430.27	123257.8	2	5	3.6	0.01
			SD/DF	487563	6.31	5	505001	1706.32	6386	5	5	3.45	0
			DD/SF	511822	8.03	5	531194	3909.14	14419.2	5	5	3.64	0
			DD/DF	487587	9.37	5	505747	1155.46	5321.8	5	5	3.59	0
	100	5	SD/SF	438627	141.89	5	458185	21600.1	3760.6	0	5	4.25	0.08
			SD/DF	393939	52.95	5	413703	7181.38	4207.2	5	5	4.78	0
			DD/SF	405540	76.13	5	423468	21600.08	3632.8	0	5	4.16	0.52
			DD/DF	397086	57.94	5	414956	6498.51	3817.4	5	5	4.31	0
		10	SD/SF	483235	166.05	5	504659	17933.89	3401.8	2	5	4.21	0.56
			SD/DF	447121	67.93	5	467036	13892.68	5998.6	5	5	4.27	0
			DD/SF	441495	111.59	5	460062	21040.1	3570.8	1	5	4	1.69
			DD/DF	438084	52.09	5	455556	4440.89	1805.2	5	5	3.83	0
		15	SD/SF	523763	84.15	5	545103	18965.27	4251.2	1	5	3.88	1.97
			SD/DF	466974	53.04	5	483963	11400.8	3902.6	4	5	3.51	0
			DD/SF	508327	68.69	5	529116	21600.08	3365.4	0	5	3.82	3.01
			DD/DF	477922	49.96	5	495468	9234.8	4896.6	4	5	3.54	0.3
		20	SD/SF	557728	61.77	5	577753	18570.01	9918.2	1	5	3.41	1.19
			SD/DF	519501	63.6	5	537406	6846.54	5089.4	5	5	3.33	0
			DD/SF	575074	63.42	5	596195	21600.02	5245.2	0	5	3.51	0.91
			DD/DF	537556	46.9	5	555780	16178.86	4680	4	5	3.28	0.01
	200	5	SD/SF	509107	438.91	5	525992	21600.16	1335.2	0	5	3.07	0.35
			SD/DF	480953	263.2	5	499229	14534.05	2905.8	3	5	3.64	0
			DD/SF	516349	438.86	5	534395	21600.1	1858	0	5	3.37	0.04
			DD/DF	473741	216.41	5	495408	13149.85	2990	3	5	4.37	0
		10	SD/SF	545002	346.98	5	560982	21600.14	1211.6	0	5	2.81	0.36
			SD/DF	526034	294.05	5	544172	15542.87	1811	2	5	3.33	0.24
			DD/SF	545051	389.75	5	561821	20643.86	1326.4	1	5	2.93	0.4
			DD/DF	530660	279.81	5	443051	16008.78	2353.8	2	4	3.81	0.03
		15	SD/SF	587743	391.08	5	608928	21600.14	836.8	0	5	3.2	2.23
			SD/DF	565982	281.53	5	585852	21600.18	2008.8	0	5	3.39	0.01
			DD/SF	570444	393.63	5	589901	21600.12	1133.2	0	5	3.12	2.08
			DD/DF	567301	272.04	5	586445	21600.16	2416.2	0	5	3.27	0.03
		20	SD/SF	664995	431.5	5	687978	21600.14	947.8	0	5	3.16	2.43
			SD/DF	626340	270.54	5	648051	21600.12	1863	0	5	3.22	0.56
			DD/SF	684241	508.92	5	708173	21600.16	867.2	0	5	3.25	2.32
			DD/DF	624053	263.73	5	639817	21600.14	2477.4	0	5	2.44	0.41

Table 162: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	779925	306.49	5	791008	21600.12	2199.4	0	5	0.79	1.27
			SD/DF	688282	197.28	5	698446	20064.3	5495.6	1	5	1.32	0.58
			DD/SF	755918	323.04	5	767014	21600.12	2915	0	5	0.86	1.26
			DD/DF	677947	157.68	5	688694	21600.12	2232	0	5	1.5	0.63
		10	SD/SF	869800	333.77	5	879898	21600.1	3055.2	0	5	0.63	1.1
			SD/DF	756553	159.82	5	763171	21600.1	2802	0	5	0.74	0.43
			DD/SF	779568	266.19	5	788414	21600.12	2459.4	0	5	0.68	1.06
			DD/DF	763381	163.76	5	768653	19021.87	3039.4	1	5	0.61	0.28
		15	SD/SF	920956	212.94	5	929255	21600.16	3467	0	5	0.52	0.86
			SD/DF	826170	142.03	5	831953	21600.12	3198	0	5	0.57	0.38
			DD/SF	868256	237.3	5	876191	21600.12	2628.6	0	5	0.55	0.85
			DD/DF	839436	149.68	5	845395	19983.9	3556	1	5	0.61	0.27
		20	SD/SF	1046648	220.64	5	1055537	21600.16	2519	0	5	0.39	0.83
			SD/DF	899217	133.47	5	902945	21600.14	3824.4	0	5	0.34	0.28
			DD/SF	973338	176.74	5	978820	21600.12	3239.2	0	5	0.35	0.54
			DD/DF	897572	133.87	5	901657	21600.1	4283.8	0	5	0.35	0.3
	100	5	SD/SF	841561	1624.21	5	862250	21600.22	314.4	0	5	1.61	2.25
			SD/DF	789255	809.58	5	813266	21600.22	663	0	5	2.22	1.99
			DD/SF	840331	1483.14	5	861699	21600.18	334	0	5	1.41	2.35
			DD/DF	788750	710.4	5	824875	21600.24	564	0	5	2.45	3.69
		10	SD/SF	930901	1689.38	5	960961	21600.28	590.8	0	5	1.03	3.08
			SD/DF	858306	755.67	5	874613	21600.22	802.4	0	5	1.22	1.42
			DD/SF	967885	1663.1	5	990508	21600.18	442.8	0	5	1	2.23
			DD/DF	866820	845.84	5	881585	21600.2	1114.8	0	5	1.26	1.24
		15	SD/SF	976879	1726.82	5	1003238	21600.26	510.2	0	5	0.92	2.57
			SD/DF	914089	816.36	5	926322	21600.18	623.6	0	5	0.91	0.95
			DD/SF	985721	1364.06	5	1007850	21600.22	502.8	0	5	1.05	2.17
			DD/DF	927158	803.63	5	939176	21600.22	1087.8	0	5	0.88	0.9
		20	SD/SF	1090761	1954.42	5	1112521	21600.22	507.6	0	5	0.83	1.96
			SD/DF	1002803	837.14	5	1016244	21600.18	916	0	5	0.63	1.16
			DD/SF	1081734	2214.48	5	1107511	21600.22	506.4	0	5	0.78	2.31
			DD/DF	1008825	1033.84	5	1015885	21600.18	834.8	0	5	0.46	0.48
	200	5	SD/SF	1005008	6522.92	5	1224090	21600.54	7	0	5	3.62	15.21
			SD/DF	951032	3068.36	5	1003466	21600.52	84	0	5	3.05	5.08
			DD/SF	952830	5596.47	5	1051811	21600.58	73.2	0	5	3.29	9.23
			DD/DF	945554	2967.74	5	1020718	21600.54	128.8	0	5	3.35	7.03
		10	SD/SF	1134798	7239.6	5	1216168	21600.44	9	0	5	2.27	6.68
			SD/DF	1044734	3077.22	5	1103912	21600.46	103.4	0	5	2.74	5.27
			DD/SF	1119370	7164.67	5	1262550	21600.5	13.2	0	5	2.05	11.21
			DD/DF	1043914	2851.94	5	1133020	21600.48	88.4	0	5	2.52	7.51
		15	SD/SF	1184606	6734.33	5	1643648	21624.66	4.2	0	5	1.66	25.1
			SD/DF	1120032	3312.94	5	1337346	21600.46	51.8	0	5	2.6	15.34
			DD/SF	1158354	6357.23	5	1873304	21600.52	0	0	5	1.49	38.1
			DD/DF	1123706	3934.3	5	1302156	21600.34	23.4	0	5	2.03	12.72
		20	SD/SF	1304780	8747.88	5	1993526	21600.44	14.8	0	5	1.54	33.52
			SD/DF	1198088	4062.3	5	1278312	21600.44	137.4	0	5	1.45	6.17
			DD/SF	1254762	7495.84	5	1627606	21600.52	10.8	0	5	1.67	19.32
			DD/DF	1201310	4110.86	5	1266684	21600.52	111.6	0	5	1.44	5.05

Table 163: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 15, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	368764	12.37	5	388994	6687.16	10428.4	5	5	5.19	0
			SD/DF	349360	8.37	5	367688	1040.93	1974	5	5	4.98	0
			DD/SF	332766	10.54	5	350285	7101.83	8010.6	4	5	5	0.71
			DD/DF	353394	7.67	5	370307	1653.66	2817.2	5	5	4.57	0
		10	SD/SF	460172	15.99	5	482153	8968.47	8957.2	4	5	4.56	0.78
			SD/DF	401403	8.94	5	421694	2713.74	4263.8	5	5	4.81	0
			DD/SF	400088	16.46	5	418573	6800.85	15193.8	5	5	4.4	0
			DD/DF	396797	8.97	5	416434	2141.96	5662.6	5	5	4.71	0
		15	SD/SF	485368	10.6	5	505444	4189.89	9336.4	5	5	3.97	0
			SD/DF	431423	10.33	5	449512	1472.02	6204.8	5	5	4.03	0
			DD/SF	440789	13.05	5	458173	3911.16	5264	5	5	3.79	0
			DD/DF	442136	8.6	5	460458	993.36	2207.8	5	5	3.98	0
		20	SD/SF	533898	12.63	5	450793	10841.18	67376.8	2	4	3.6	0.01
			SD/DF	487563	7.84	5	505001	2857.87	12028.2	5	5	3.45	0
			DD/SF	511822	14.28	5	531194	5281.39	17063.2	5	5	3.64	0
			DD/DF	487587	9.54	5	505747	1606.92	6110.4	5	5	3.59	0
	100	5	SD/SF	438627	75.13	5	458218	17051.73	4288	2	5	4.25	0.05
			SD/DF	393939	38.84	5	413703	5562.38	4559.6	5	5	4.78	0
			DD/SF	405540	74.49	5	423193	8622.14	3129.2	4	5	4.16	0
			DD/DF	397086	39.68	5	414956	2865.82	3694.2	5	5	4.31	0
		10	SD/SF	483235	91.73	5	504797	11949.93	4283.8	4	5	4.21	0.61
			SD/DF	447121	69.7	5	467036	6948.66	4644.4	5	5	4.27	0
			DD/SF	441495	127.04	5	460298	21600.02	4519.2	0	5	4	0.81
			DD/DF	438084	79.83	5	455556	2318.67	1522.6	5	5	3.83	0
		15	SD/SF	523763	120.56	5	545069	18426.31	5844	1	5	3.88	1.47
			SD/DF	466974	60.78	5	483962	5178.48	3316.2	5	5	3.51	0
			DD/SF	508327	80.54	5	528675	16013.85	6215	3	5	3.82	0.62
			DD/DF	477922	57.34	5	495465	5651.31	4165	5	5	3.54	0
		20	SD/SF	557728	76.55	5	577862	18253.5	14429.8	1	5	3.41	1.27
			SD/DF	519501	34.99	5	537406	3834.44	2767.4	5	5	3.33	0
			DD/SF	575074	132.22	5	596052	12365.89	7030.2	3	5	3.51	0.02
			DD/DF	537556	113.49	5	555780	5013.97	2705.4	5	5	3.28	0
	200	5	SD/SF	509107	447.61	5	525476	21600.14	1871.4	0	5	3.07	0.1
			SD/DF	480953	134.11	5	499228	11922.02	5261.6	4	5	3.64	0
			DD/SF	516349	324.43	5	534516	21002.36	1789.8	1	5	3.37	0.07
			DD/DF	473741	161.06	5	495408	12248.5	3816.4	3	5	4.37	0
		10	SD/SF	545002	445.4	5	560847	21600.1	3481	0	5	2.81	0.34
			SD/DF	526034	200.34	5	544161	12177.05	10497.2	4	5	3.33	0
			DD/SF	545051	390	5	561530	21600.1	2198.6	0	5	2.93	0.01
			DD/DF	530660	210.36	5	551715	15502.35	5096.2	3	5	3.81	0.01
		15	SD/SF	587743	342.96	5	608249	21600.12	1414	0	5	3.2	0.66
			SD/DF	565982	208.79	5	585846	20403.6	15954.6	1	5	3.39	0
			DD/SF	570444	450.62	5	589723	21600.08	1594	0	5	3.12	1.09
			DD/DF	567301	225.56	5	586396	17747	3652.6	2	5	3.27	0
		20	SD/SF	664995	399.49	5	687282	21600.1	1250.2	0	5	3.16	1.64
			SD/DF	626340	242.38	5	647221	19089.06	3476.4	2	5	3.22	0.06
			DD/SF	684241	352.13	5	431997	12960.06	658.2	0	3	3.25	1.34
			DD/DF	624053	240.82	5	639798	17217.26	2661	2	5	2.44	0.05

Table 164: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 30, C = 2.0$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	779925	372.78	5	791406	21600.1	2232.2	0	5	0.79	1.33
			SD/DF	688282	147.25	5	698307	20157.06	23000.4	2	5	1.32	0.41
			DD/SF	755918	296.03	5	764749	21600.1	2780.6	0	5	0.86	0.95
			DD/DF	677947	132.22	5	688389	21600.08	3764	0	5	1.5	0.3
		10	SD/SF	869800	417.5	5	878603	21600.14	3218	0	5	0.63	0.95
			SD/DF	756553	207.59	5	762524	21600.08	4796.6	0	5	0.74	0.16
			DD/SF	779568	369.37	5	787487	21600.12	2650.4	0	5	0.68	0.95
			DD/DF	763381	165.61	5	768440	19921.9	4590.2	1	5	0.61	0.18
		15	SD/SF	920956	439.64	5	929408	21600.12	2482.6	0	5	0.52	0.88
			SD/DF	826170	219.24	5	831509	21600.1	4448.4	0	5	0.57	0.31
			DD/SF	868256	475.66	5	876147	21600.08	2740.8	0	5	0.55	0.86
			DD/DF	839436	197.17	5	844828	20915.24	4639.2	1	5	0.61	0.14
		20	SD/SF	1046648	411.94	5	1054339	21600.12	2994.4	0	5	0.39	0.72
			SD/DF	899217	201.25	5	902825	21600.1	4496.6	0	5	0.34	0.27
			DD/SF	973338	416.04	5	978474	21600.12	3330.2	0	5	0.35	0.5
			DD/DF	897572	178.93	5	901835	21600.12	5153	0	5	0.35	0.32
	100	5	SD/SF	841561	1553.03	5	862428	21600.2	405.4	0	5	1.61	2.24
			SD/DF	789255	501.42	5	810211	21600.12	1257.8	0	5	2.22	1.77
			DD/SF	840331	1221.29	5	858908	21600.18	497.8	0	5	1.41	1.97
			DD/DF	788750	525.76	5	813487	21600.24	1115.6	0	5	2.45	2.16
		10	SD/SF	930901	1767.21	5	953133	21607.66	576.4	0	5	1.03	2.22
			SD/DF	858306	745.48	5	873190	21600.2	1061.8	0	5	1.22	1.16
			DD/SF	967885	1633.68	5	995404	21600.22	651	0	5	1	2.7
			DD/DF	866820	556.34	5	882938	21600.14	1441.2	0	5	1.26	1.37
		15	SD/SF	976879	1984.25	5	1006273	21600.24	548.4	0	5	0.92	2.84
			SD/DF	914089	899.19	5	925410	21600.18	878.4	0	5	0.91	0.89
			DD/SF	985721	1521.68	5	1007960	21600.2	640.6	0	5	1.05	2.16
			DD/DF	927158	693.21	5	938434	21600.16	1361.4	0	5	0.88	0.82
		20	SD/SF	1090761	1865.51	5	1117236	21619.82	450.4	0	5	0.83	2.3
			SD/DF	1002803	832.46	5	1016533	21600.22	1308.4	0	5	0.63	1.18
			DD/SF	1081734	1848.38	5	1102821	21600.22	601.2	0	5	0.78	1.9
			DD/DF	1008825	826.46	5	1015164	21600.22	1194.4	0	5	0.46	0.42
	200	5	SD/SF	1005008	5855.32	5	1158054	21600.52	6.4	0	5	3.62	12.44
			SD/DF	951032	2894.29	5	1026336	21600.5	140	0	5	3.05	6.9
			DD/SF	952830	4494	5	1080890	21600.44	6	0	5	3.29	11.22
			DD/DF	945554	1890.53	5	1067844	21600.42	154.8	0	5	3.35	10.03
		10	SD/SF	1134798	5399.88	5	1933932	21600.7	3.4	0	5	2.27	41.26
			SD/DF	1044734	2098.26	5	1137028	21600.42	82.4	0	5	2.74	7.9
			DD/SF	1119370	5255.7	5	1386078	21600.5	34.8	0	5	2.05	17.78
			DD/DF	1043914	2128.39	5	1133018	21600.36	200.6	0	5	2.52	7.49
		15	SD/SF	1184606	5585.9	5	1596358	21600.48	6	0	5	1.66	23.35
			SD/DF	1120032	2422.53	5	1189540	21600.4	279.6	0	5	2.6	5.64
			DD/SF	1158354	5149.42	5	1639040	21600.44	16.4	0	5	1.49	26.69
			DD/DF	1123706	2651.08	5	1224364	21669.02	112.2	0	5	2.03	7.75
		20	SD/SF	1304780	5435.93	5	1892318	21600.44	9	0	5	1.54	28.46
			SD/DF	1198088	3518.58	5	1239554	21600.64	179.6	0	5	1.45	3.29
			DD/SF	1254762	5275.81	5	1797158	21600.58	7.6	0	5	1.67	27.85
			DD/DF	1201310	3037.23	5	1282270	21600.48	190.6	0	5	1.44	5.87

Table 165: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.5	5	427493	230.13	6540.4	5	5	4.52	0
			SD/DF	384854	0.3	5	406353	78.33	3200.4	5	5	5.29	0
			DD/SF	366430	0.35	5	384296	160.71	5118.4	5	5	4.65	0
			DD/DF	389422	0.3	5	410521	81.04	3192.4	5	5	5.15	0
		10	SD/SF	507069	0.47	5	527642	573.24	17070	5	5	3.9	0
			SD/DF	443088	0.29	5	463185	123.9	4707.2	5	5	4.34	0
			DD/SF	438602	0.37	5	456243	236.07	7120.6	5	5	3.86	0
			DD/DF	437843	0.29	5	457166	88.41	2767.8	4	5	4.23	0
		15	SD/SF	532733	0.53	5	551125	1245.79	101763.4	5	5	3.33	0
			SD/DF	475732	0.33	5	493994	220.45	19811.2	5	5	3.7	0
			DD/SF	482400	0.46	5	499115	675.1	46345.8	5	5	3.34	0
			DD/DF	485358	0.31	5	503767	104.68	5178.2	5	5	3.66	0
		20	SD/SF	585122	0.47	5	602932	10212.68	761671	4	5	2.95	0
			SD/DF	534719	0.29	5	552816	653.25	61451	5	5	3.27	0
			DD/SF	560748	0.38	5	578611	896.56	62994.4	5	5	3.08	0
			DD/DF	536721	0.28	5	554793	404.71	29918.4	5	5	3.26	0
	100	5	SD/SF	478021	0.88	5	499402	627.48	4278	5	5	4.28	0
			SD/DF	428104	0.55	5	451075	330.16	3055.2	5	5	5.09	0
			DD/SF	438869	0.66	5	461172	734.62	5190	5	5	4.84	0
			DD/DF	428190	0.52	5	452054	455.68	3934	5	5	5.28	0
		10	SD/SF	525220	1.22	5	547972	4163.5	25795.8	5	5	4.15	0
			SD/DF	484289	0.51	5	508535	638.48	9047.8	5	5	4.77	0
			DD/SF	475636	0.9	5	496662	2225.63	21099.6	5	5	4.23	0
			DD/DF	471369	0.81	5	494286	317.44	5279.2	5	5	4.63	0
		15	SD/SF	567221	1.25	5	589350	3812.53	30760.2	5	5	3.75	0
			SD/DF	502836	0.66	5	524869	1136.26	9501	5	5	4.19	0
			DD/SF	548498	0.89	5	570406	3796.68	33908.2	5	5	3.84	0
			DD/DF	515342	0.61	5	539927	709.17	10290	5	5	4.55	0
		20	SD/SF	601725	1.29	5	621030	2899.99	91832.2	5	5	3.1	0
			SD/DF	559749	0.65	5	581505	577.49	8804.8	5	5	3.74	0
			DD/SF	620476	1.03	5	641927	3251.33	38045.2	5	5	3.34	0
			DD/DF	578949	0.65	5	600800	1678.29	36320.2	5	5	3.64	0
	200	5	SD/SF	539869	2.38	5	565400	853.73	7568.4	5	5	4.52	0
			SD/DF	504006	1.25	5	534975	416.19	5595.6	5	5	5.79	0
			DD/SF	544401	1.66	5	574239	734.21	9737.8	5	5	5.19	0
			DD/DF	495762	1.23	5	527054	366.51	5052.2	5	5	5.94	0
		10	SD/SF	576700	2.45	5	599807	1854.51	15546.2	5	5	3.85	0
			SD/DF	549555	1.38	5	577232	982.54	20853	5	5	4.8	0
			DD/SF	573387	1.85	5	600691	2460.4	34196	5	5	4.55	0
			DD/DF	557321	1.5	5	590014	2568.11	48515.8	5	5	5.54	0
		15	SD/SF	622450	2.98	5	646847	5375.24	43225.6	5	5	3.76	0
			SD/DF	594023	1.55	5	626575	2712.21	39689.6	5	5	5.2	0
			DD/SF	599176	2.27	5	625642	4128.54	26233.6	5	5	4.23	0
			DD/DF	593944	1.66	5	624703	1929.02	26596.6	5	5	4.93	0
		20	SD/SF	704721	3.09	5	730595	12756.4	92081.6	5	5	3.54	0
			SD/DF	657981	1.95	5	690192	10389.08	204453.6	5	5	4.66	0
			DD/SF	725305	2.76	5	754370	12334.84	119716.2	5	5	3.85	0
			DD/DF	652075	2.06	5	682201	3576.81	48174.4	5	5	4.41	0

Table 166: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
			SD/SF	863930	7.33	5	906697	21600.06	21039.4	0	5	4.58	4.35
		5	SD/DF	762960	2.94	5	804995	17868.04	87566.4	1	5	5.21	2.66
			DD/SF	835532	4.86	5	879112	21600.02	28745.2	0	5	4.76	4.48
			DD/DF	750426	2.25	5	791963	18859.31	71188.6	1	5	5.24	2.58
			SD/SF	956019	9.04	5	996149	21600.06	20452.4	0	5	3.85	3.87
		10	SD/DF	833218	3.14	5	871271	21600.06	70474.8	0	5	4.29	3.18
			DD/SF	853278	7.04	5	890592	21600.06	41154.4	0	5	3.99	3.93
	50		DD/DF	841297	5.09	5	880626	21600.1	89566	0	5	4.36	3
			SD/SF	1008234	23	5	1047034	21600	29041.6	0	5	3.47	3.62
		15	SD/DF	908634	6.24	5	945272	21600.06	85500	0	5	3.83	2.34
			DD/SF	945934	13.78	5	981695	21600.08	44831.2	0	5	3.47	3.47
			DD/DF	922327	2.8	5	959333	21600.08	59641	0	5	3.83	2.83
			SD/SF	1146174	12.82	5	1186670	21600.06	26788	0	5	3.26	3.37
		20	SD/DF	985722	3.38	5	1021839	21600.1	44221	0	5	3.47	2.63
			DD/SF	1059803	7.28	5	1096043	21600.08	42505.2	0	5	3.21	3.14
			DD/DF	983192	3.85	5	1019498	21600.08	75496	0	5	3.44	2.06
			SD/SF	918594	15.33	5	963908	21600.1	7521.6	0	5	4.5	4.34
		5	SD/DF	857216	5.65	5	905708	21600.1	34135.2	0	5	5.24	3.32
			DD/SF	910641	8.68	5	961178	21600.1	12801	0	5	5.06	4.46
			DD/DF	855043	12.12	5	903403	21600.12	30038.6	0	5	5.32	3.47
			SD/SF	1009773	37.21	5	1058337	21600.1	7690.4	0	5	4.36	4.37
30		10	SD/DF	928609	10.18	5	975743	21600.1	21997.6	0	5	4.75	3.59
			DD/SF	1046704	15.88	5	1098682	21600.12	11337.2	0	5	4.52	4.38
	100		DD/DF	936139	8.87	5	984903	21600.1	22019.6	0	5	4.86	3.67
			SD/SF	1055924	52.26	5	1101008	21600.1	7544.4	0	5	3.82	3.95
		15	SD/DF	984833	19.37	5	1032544	21600.1	19373.6	0	5	4.51	3.58
			DD/SF	1060600	33.25	5	1107796	21600.1	9624.4	0	5	3.98	4.01
			DD/DF	998653	7.3	5	1045394	21600.1	22728.8	0	5	4.33	3.48
			SD/SF	1175619	30.85	5	1218856	21600.1	9022.8	0	5	3.33	3.45
		20	SD/DF	1075396	9.49	5	1117220	21600.12	20899.2	0	5	3.7	2.28
			DD/SF	1161978	15.55	5	1208536	21600.1	10894.4	0	5	3.55	3.71
			DD/DF	1085304	8.78	5	1130244	21600.12	20014	0	5	3.85	3.2
			SD/SF	1072701	32.11	5	1129436	21600.18	3647.2	0	5	4.78	4.48
		5	SD/DF	996488	14.18	5	1057618	21600.18	10151.8	0	5	5.71	3.72
			DD/SF	1002018	20.96	5	1065618	21600.14	6189.2	0	5	5.72	4.75
			DD/DF	990273	13.5	5	1056176	21600.14	11817.6	0	5	6.12	4.02
			SD/SF	1205872	33.6	5	1267926	21600.12	3528	0	5	4.4	4.73
		10	SD/DF	1093204	19.17	5	1159184	21600.14	9515.4	0	5	5.5	4.4
			DD/SF	1178702	20.86	5	1243362	21600.16	4500	0	5	5.09	4.49
	200		DD/DF	1094158	15.08	5	1164062	21600.14	9477	0	5	5.81	4.58
			SD/SF	1253814	44.21	5	1315092	21600.14	4574.4	0	5	4.2	4.51
		15	SD/DF	1172946	24.16	5	1241252	21600.14	9012.2	0	5	5.28	4.56
			DD/SF	1217578	29.86	5	1288028	21600.14	4939.2	0	5	5.22	5.1
			DD/DF	1175250	22.39	5	1244212	21600.2	8477.2	0	5	5.43	4.53
			SD/SF	1380444	47.95	5	1445858	21600.18	5174.6	0	5	3.94	4.46
		20	SD/DF	1251558	29.1	5	1315910	21600.22	9303.6	0	5	4.75	4.08
			DD/SF	1316492	26.76	5	1381104	21600.14	5064.6	0	5	4.47	4.47
			DD/DF	1255452	20.52	5	1320898	21600.16	9046	0	5	4.72	4.19

Table 167: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.97	5	427493	110.53	2338.4	5	5	4.52	0
			SD/DF	384854	0.32	5	406353	61.24	1779.4	5	5	5.29	0
			DD/SF	366430	0.51	5	384296	97.61	1806.2	5	5	4.65	0
			DD/DF	389422	0.29	5	410521	47.97	1744.8	5	5	5.15	0
		10	SD/SF	507069	1.19	5	527642	414.73	10667.8	5	5	3.9	0
			SD/DF	443088	0.44	5	463185	85.33	1649.6	5	5	4.34	0
			DD/SF	438602	0.72	5	456243	277.16	5248	5	5	3.86	0
			DD/DF	437843	0.37	5	457166	57.54	1953	5	5	4.23	0
		15	SD/SF	532733	0.99	5	551125	2156.38	104497.6	5	5	3.33	0
			SD/DF	475732	0.51	5	493994	227.5	6640.8	5	5	3.7	0
			DD/SF	482400	0.81	5	499115	1432.64	47475.8	5	5	3.34	0
			DD/DF	485358	0.46	5	503767	117.46	2831.2	5	5	3.66	0
		20	SD/SF	585122	1.19	5	602932	14238.46	390961.6	2	5	2.95	0.01
			SD/DF	534719	0.64	5	552816	821.26	29778.2	5	5	3.27	0
			DD/SF	560748	0.86	5	578611	1748.08	52786.2	5	5	3.08	0
			DD/DF	536721	0.61	5	554793	694.91	19836	5	5	3.26	0
	100	5	SD/SF	478021	3.27	5	499402	301.44	2572	5	5	4.28	0
			SD/DF	428104	1.82	5	451075	155.46	1669.2	5	5	5.09	0
			DD/SF	438869	2.03	5	461172	525.82	3318.8	5	5	4.84	0
			DD/DF	428190	1.34	5	452054	121.59	1666.4	5	5	5.28	0
		10	SD/SF	525220	2.37	5	547972	3386.75	14779	5	5	4.15	0
			SD/DF	484289	0.98	5	508535	678.05	4003.8	5	5	4.77	0
			DD/SF	475636	1.05	5	496662	3168.33	14660.8	5	5	4.23	0
			DD/DF	471369	0.83	5	494286	393.33	3072.4	5	5	4.63	0
		15	SD/SF	567221	2.51	5	589350	3476.51	20420.8	5	5	3.75	0
			SD/DF	502836	1.16	5	524869	472.19	4955.8	5	5	4.19	0
			DD/SF	548498	1.99	5	570406	3805.76	23472.4	5	5	3.84	0
			DD/DF	515342	1.01	5	539927	833.61	7306	5	5	4.55	0
		20	SD/SF	601725	2.43	5	621030	5115.85	64371	5	5	3.1	0
			SD/DF	559749	1.48	5	581505	861.45	4316.2	5	5	3.74	0
			DD/SF	620476	2.08	5	641927	3433.59	21440.6	5	5	3.34	0
			DD/DF	578949	1.21	5	600800	742.97	7063.4	5	5	3.64	0
	200	5	SD/SF	539869	4.59	5	565400	850.88	18222.2	5	5	4.52	0
			SD/DF	504006	2.09	5	534975	614.77	4194.8	5	5	5.79	0
			DD/SF	544401	2.88	5	574239	916.95	7792.8	5	5	5.19	0
			DD/DF	495762	1.92	5	527054	659.19	3774.4	5	5	5.94	0
		10	SD/SF	576700	5.77	5	599807	1820.51	25892.8	5	5	3.85	0
			SD/DF	549555	2.36	5	577232	1753.45	12526.2	5	5	4.8	0
			DD/SF	573387	3.39	5	600691	3137.48	47883	5	5	4.55	0
			DD/DF	557321	2.45	5	590014	6810.45	42071.2	4	5	5.54	0
		15	SD/SF	622450	6.68	5	646847	5743.83	39658.8	5	5	3.76	0
			SD/DF	594023	2.62	5	626575	9039.49	23268.2	4	5	5.2	0.12
			DD/SF	599176	4.01	5	625642	3624.8	10995	4	5	4.23	0
			DD/DF	593944	2.54	5	624703	8014.07	36232.8	5	5	4.93	0
		20	SD/SF	704721	6.52	5	730701	15357.41	47718.8	4	5	3.54	0.04
			SD/DF	657981	2.82	5	690199	17961.64	83421.8	2	5	4.66	0.07
			DD/SF	725305	4.75	5	754693	18910.18	48192.4	2	5	3.85	0.28
			DD/DF	652075	2.49	5	682201	8008.73	45062.4	5	5	4.41	0

Table 168: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	863930	8.89	5	905422	20747.64	59169.4	1	5	4.58	0.26
			SD/DF	762960	2.51	5	804895	6427.38	17057.2	5	5	5.21	0
			DD/SF	835532	4.28	5	877436	21600.02	59476.6	0	5	4.76	0.31
			DD/DF	750426	1.87	5	791869	3328.66	10906.8	5	5	5.24	0
		10	SD/SF	956019	14.32	5	994826	21600.04	31886.6	0	5	3.85	0.35
			SD/DF	833218	3.84	5	870709	20360.96	59185.4	1	5	4.29	0.25
			DD/SF	853278	7.15	5	888898	21600.02	30838.6	0	5	3.99	0.45
			DD/DF	841297	2.8	5	879960	19424.24	56871.6	1	5	4.36	0.29
		15	SD/SF	1008234	22.37	5	1044868	21600.08	21363	0	5	3.47	0.54
			SD/DF	908634	8.36	5	944827	21600	49534.8	0	5	3.83	0.19
			DD/SF	945934	9.27	5	980501	21600	35780.2	0	5	3.47	0.35
			DD/DF	922327	3.95	5	959045	14979.03	54358.6	3	5	3.83	0.02
		20	SD/SF	1146174	21.45	5	1185784	21600	24025.6	0	5	3.26	1.17
			SD/DF	985722	7.48	5	1021226	21600.02	68670.4	0	5	3.47	0.18
			DD/SF	1059803	12.4	5	1095281	21600	48797.6	0	5	3.21	0.26
			DD/DF	983192	5.68	5	1018292	21600.04	78227.4	0	5	3.44	0.17
	100	5	SD/SF	918594	17.51	5	962323	21600.04	11703.6	0	5	4.5	0.76
			SD/DF	857216	5.23	5	904748	19859.36	53538.4	1	5	5.24	0.2
			DD/SF	910641	8.16	5	960004	21600.06	18959.2	0	5	5.06	1.13
			DD/DF	855043	4.28	5	903059	19483.62	20568	1	5	5.32	0.65
		10	SD/SF	1009773	28.01	5	1056558	21600.08	8404	0	5	4.36	1.36
			SD/DF	928609	7.37	5	975191	21600.1	13190.8	0	5	4.75	0.93
			DD/SF	1046704	13.08	5	1096772	21600.08	9542.8	0	5	4.52	1.78
			DD/DF	936139	4.48	5	984581	21600.08	11305.4	0	5	4.86	1.15
		15	SD/SF	1055924	38.2	5	1098661	21600.08	6821.2	0	5	3.82	0.89
			SD/DF	984833	8.91	5	1032060	21600.08	13665	0	5	4.51	1.39
			DD/SF	1060600	15.29	5	1104880	21600.1	9681.6	0	5	3.98	0.97
			DD/DF	998653	4.62	5	1044440	21600.08	16125.6	0	5	4.33	0.94
		20	SD/SF	1175619	50.36	5	1216926	21600.08	8976.2	0	5	3.33	2.18
			SD/DF	1075396	10.17	5	1117366	21600.06	13350.2	0	5	3.7	1
			DD/SF	1161978	17.1	5	1205404	21600.1	10567.8	0	5	3.55	0.84
			DD/DF	1085304	6.55	5	1129118	21600.1	10721.2	0	5	3.85	0.72
	200	5	SD/SF	1072701	50.68	5	1128492	21600.12	4014	0	5	4.78	2.16
			SD/DF	996488	13.13	5	1057996	21600.14	4931.4	0	5	5.71	2.21
			DD/SF	1002018	18.69	5	1065625	21600.12	3935.6	0	5	5.72	3.26
			DD/DF	990273	7.98	5	1057150	21600.1	4433.8	0	5	6.12	3.26
		10	SD/SF	1205872	60.8	5	1263318	21600.12	3655.8	0	5	4.4	2.81
			SD/DF	1093204	15.4	5	1161542	21600.14	3129.4	0	5	5.5	3.78
			DD/SF	1178702	25.29	5	1248014	21600.18	3590.8	0	5	5.09	4.77
			DD/DF	1094158	12.17	5	1163828	21600.14	3146.8	0	5	5.81	3.74
		15	SD/SF	1253814	87.73	5	1310178	21600.1	4580.2	0	5	4.2	2.23
			SD/DF	1172946	19.43	5	1241718	21600.14	2945.2	0	5	5.28	3.84
			DD/SF	1217578	29.89	5	1285642	21600.18	4712.6	0	5	5.22	3.47
			DD/DF	1175250	12.79	5	1248004	21600.16	3771	0	5	5.43	3.82
		20	SD/SF	1380444	91.5	5	1439086	21600.1	4516.2	0	5	3.94	3.93
			SD/DF	1251558	21.98	5	1318998	21600.12	4443.8	0	5	4.75	3.89
			DD/SF	1316492	34.28	5	1380910	21600.12	4923.6	0	5	4.47	3.1
			DD/DF	1255452	15.53	5	1319402	21600.14	4104.2	0	5	4.72	3.34

Table 169: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.48	5	427493	83.15	1571.8	5	5	4.52	0
			SD/DF	384854	0.23	5	406353	18.44	734.2	5	5	5.29	0
			DD/SF	366430	0.32	5	384296	96.94	1622.2	5	5	4.65	0
			DD/DF	389420	0.18	5	410521	13.17	478.8	5	5	5.15	0
		10	SD/SF	507069	0.57	5	527642	235.44	8908.2	5	5	3.9	0
			SD/DF	443086	0.23	5	463185	36.37	1560.4	5	5	4.34	0
			DD/SF	438602	1.15	5	456243	229.24	4793.8	5	5	3.86	0
			DD/DF	437841	0.21	5	457166	31.43	1232.8	5	5	4.23	0
		15	SD/SF	532733	0.57	5	551125	1022.01	59329.8	5	5	3.33	0
			SD/DF	475726	0.27	5	493994	141.44	5736.6	5	5	3.7	0
			DD/SF	482400	0.48	5	499115	863.39	36554.6	5	5	3.34	0
			DD/DF	485341	0.24	5	503767	58.22	2233.2	5	5	3.66	0
		20	SD/SF	585122	0.63	5	602932	7718.45	393616.6	4	5	2.95	0
			SD/DF	534715	0.25	5	552816	354.85	19216.2	5	5	3.27	0
			DD/SF	560748	0.39	5	578611	992.89	38876.2	5	5	3.08	0
			DD/DF	536713	0.3	5	554793	238.15	9499.6	5	5	3.26	0
	100	5	SD/SF	478021	1.26	5	499402	147.35	1652.6	5	5	4.28	0
			SD/DF	428101	0.47	5	451075	67.46	1595	5	5	5.09	0
			DD/SF	438869	0.86	5	461172	502.62	2853.4	5	5	4.84	0
			DD/DF	428189	0.51	5	452054	126.37	1428.8	5	5	5.28	0
		10	SD/SF	525220	1.89	5	547972	2660.83	14169	5	5	4.15	0
			SD/DF	484288	0.74	5	508535	380.2	3529	5	5	4.77	0
			DD/SF	475636	1.28	5	496662	1987.68	13271	5	5	4.23	0
			DD/DF	471360	0.64	5	494286	234.48	3197.2	5	5	4.64	0
		15	SD/SF	567221	2.05	5	589350	2817.55	23776.2	5	5	3.75	0
			SD/DF	502826	1.13	5	524869	765.09	4000.6	5	5	4.19	0
			DD/SF	548498	1.24	5	570406	3304.28	23141.8	5	5	3.84	0
			DD/DF	515335	0.85	5	539927	688.46	4812.6	5	5	4.55	0
		20	SD/SF	601725	1.96	5	621030	3477.17	60378.2	5	5	3.1	0
			SD/DF	559741	1.02	5	581505	452.66	3366.8	5	5	3.74	0
			DD/SF	620476	1.24	5	641927	4306.92	27748.8	5	5	3.34	0
			DD/DF	578927	0.89	5	600800	387.66	4500	5	5	3.64	0
	200	5	SD/SF	539869	4.13	5	565400	883.6	23985	5	5	4.52	0
			SD/DF	504004	1.47	5	534975	472.92	4772	5	5	5.79	0
			DD/SF	544401	1.89	5	574239	1107.2	6721.6	5	5	5.19	0
			DD/DF	495757	1.22	5	527054	1144.98	5392.6	5	5	5.94	0
		10	SD/SF	576700	4.43	5	599807	1846.42	31909.6	5	5	3.85	0
			SD/DF	549555	1.44	5	577232	2117.11	11641.6	5	5	4.8	0
			DD/SF	573387	2.16	5	600691	3436.9	29880	5	5	4.55	0
			DD/DF	557316	1.56	5	590014	7311.82	58207	5	5	5.54	0
		15	SD/SF	622450	5.48	5	512075	4141.75	18500.2	4	4	3.76	0
			SD/DF	594021	1.74	5	626575	5394.12	19971.2	5	5	5.2	0
			DD/SF	599176	3.19	5	625642	4293.31	11118.2	5	5	4.23	0
			DD/DF	593932	1.81	5	624703	2447.34	11835	5	5	4.93	0
		20	SD/SF	704721	6.61	5	730595	12028.5	50474	5	5	3.54	0
			SD/DF	657972	2.45	5	690237	11252.85	71433.6	4	5	4.66	0.04
			DD/SF	725305	3.79	5	754394	14862.98	74053.2	4	5	3.85	0.02
			DD/DF	652058	2.08	5	682201	5310.72	27952.6	5	5	4.42	0

Table 170: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	863930	3.2	5	907252	21600	11568.8	0	5	4.58	1.78
			SD/DF	762958	0.65	5	805140	17860.79	42074.4	1	5	5.21	0.91
			DD/SF	835532	1.06	5	879579	21600	15900.2	0	5	4.76	1.74
			DD/DF	750420	0.55	5	791869	9976.76	26519.8	4	5	5.24	0.11
		10	SD/SF	956019	2.67	5	996765	21600	15199.6	0	5	3.85	1.04
			SD/DF	833187	0.94	5	870637	19763.84	71110	2	5	4.3	0.17
			DD/SF	853278	1.45	5	890342	21600	25319.2	0	5	3.99	1.08
			DD/DF	841288	0.89	5	879967	18110.14	68231.4	1	5	4.36	0.26
		15	SD/SF	1008234	3.52	5	1045571	21600.02	42335.6	0	5	3.47	0.38
			SD/DF	908623	1.23	5	570230	10210.08	76201.2	1	3	3.83	0.03
			DD/SF	945934	1.88	5	980254	21600.04	61768	0	5	3.47	0.29
			DD/DF	922303	1.11	5	959045	4321.06	28645.6	5	5	3.83	0
		20	SD/SF	1146174	4.98	5	1184876	21600.04	26806.2	0	5	3.26	0.17
			SD/DF	985710	1.84	5	817403	17280.02	86619.2	0	4	3.47	0.09
			DD/SF	1059803	2.91	5	1095270	21600.02	42989	0	5	3.21	0.21
			DD/DF	983165	1.82	5	1018243	18543.21	113120.6	1	5	3.44	0.1
	100	5	SD/SF	918594	12.95	5	966197	21600.1	5828.2	0	5	4.5	2.15
			SD/DF	857197	2.16	5	724744	15593.18	19578.8	1	4	5.25	0.43
			DD/SF	910641	10.14	5	962375	21600.04	7683.2	0	5	5.06	2.31
			DD/DF	855033	3.44	5	903306	21600.04	16116.2	0	5	5.32	1.21
		10	SD/SF	1009773	13.92	5	1061605	21600.1	7019	0	5	4.36	2.57
			SD/DF	928575	1.92	5	975741	21600.02	12430.6	0	5	4.76	0.85
			DD/SF	1046704	4.35	5	1102848	21600.04	7647	0	5	4.52	2.41
			DD/DF	936097	1.82	5	985136	21600.06	10122.6	0	5	4.86	1.38
		15	SD/SF	1055924	9.71	5	1102405	21600.08	7910.2	0	5	3.82	2.11
			SD/DF	984792	2.65	5	1031852	21600.04	17710	0	5	4.51	0.8
			DD/SF	1060600	4.98	5	1111184	21600.06	9145.2	0	5	3.98	1.84
			DD/DF	998589	2.55	5	1044228	21600.02	14182	0	5	4.34	0.59
		20	SD/SF	1175619	24.8	5	1222098	21600.08	8276.2	0	5	3.33	1.18
			SD/DF	1075372	4.17	5	1116846	21600.02	23574.2	0	5	3.7	0.26
			DD/SF	1161978	13.59	5	1207388	21600.08	9916	0	5	3.55	1.08
			DD/DF	1085214	5.66	5	1129282	21600.06	26137	0	5	3.86	0.39
	200	5	SD/SF	1072701	77.49	5	1131336	21600.12	2434.6	0	5	4.78	2.64
			SD/DF	996470	7.3	5	1060542	21600.12	4849.6	0	5	5.71	1.81
			DD/SF	1002018	27.23	5	1069115	21600.18	3303.4	0	5	5.72	2.99
			DD/DF	990241	5.94	5	1055742	21600.12	4525.2	0	5	6.12	1.68
		10	SD/SF	1205872	50.92	5	1272996	21600.22	2000.2	0	5	4.4	3.39
			SD/DF	1093192	5	5	1162788	21600.16	3332.2	0	5	5.5	3.23
			DD/SF	1178702	15.95	5	1254972	21600.14	3219.6	0	5	5.09	3.53
			DD/DF	1094120	5.21	5	1165060	21600.14	3439	0	5	5.81	3.6
		15	SD/SF	1253814	43.06	5	1318326	21600.2	2875.4	0	5	4.2	3.13
			SD/DF	1172904	5.58	5	1238574	21600.16	3234.6	0	5	5.29	2.84
			DD/SF	1217578	15.65	5	1291396	21600.18	4209.6	0	5	5.22	3.76
			DD/DF	1175230	5.78	5	1243988	21600.12	3711.2	0	5	5.43	2.99
		20	SD/SF	1380444	54.48	5	1449406	21600.16	3852.2	0	5	3.94	3.43
			SD/DF	1251516	8.96	5	1321268	21600.16	4256.2	0	5	4.75	3.13
			DD/SF	1316492	24.94	5	1389198	21600.14	4493.2	0	5	4.47	3.54
			DD/DF	1255382	8.1	5	1324538	21600.18	4436.6	0	5	4.72	3.02

Table 171: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.76	5	427493	222.82	6247.6	5	5	4.52	0
			SD/DF	384854	0.47	5	406353	77.22	3054	5	5	5.29	0
			DD/SF	366430	1.09	5	384296	192.55	6277.4	5	5	4.65	0
			DD/DF	389422	0.54	5	410521	99.97	4047.4	5	5	5.15	0
		10	SD/SF	507069	0.74	5	527642	369.75	16759	5	5	3.9	0
			SD/DF	443088	0.46	5	463185	101.98	4295	5	5	4.34	0
			DD/SF	438602	0.52	5	456243	212.14	7608.2	5	5	3.86	0
			DD/DF	437843	0.46	5	457166	75.94	2701.4	5	5	4.23	0
		15	SD/SF	532733	1	5	551125	1170.45	88627.4	5	5	3.33	0
			SD/DF	475732	0.58	5	493994	164.08	12615.8	5	5	3.7	0
			DD/SF	482400	1.01	5	499115	827.72	54058.6	5	5	3.34	0
			DD/DF	485358	0.69	5	503767	98.79	4908.2	5	5	3.66	0
		20	SD/SF	585122	0.48	5	602931	7193.27	627319.8	5	5	2.95	0
			SD/DF	534719	0.33	5	552816	930.11	64488.6	5	5	3.27	0
			DD/SF	560748	0.44	5	578611	1556.05	90213.6	5	5	3.08	0
			DD/DF	536721	0.5	5	554793	512.6	28762.4	5	5	3.26	0
	100	5	SD/SF	478021	1.3	5	499402	385.22	3732.6	5	5	4.28	0
			SD/DF	428104	0.86	5	451075	184.36	2957	5	5	5.09	0
			DD/SF	438869	1.36	5	461172	439.66	4738.8	5	5	4.84	0
			DD/DF	428190	0.93	5	452054	169.51	3976	5	5	5.28	0
		10	SD/SF	525220	1.01	5	547972	1515.4	19834.2	5	5	4.15	0
			SD/DF	484289	0.72	5	508535	666.44	7839.6	5	5	4.77	0
			DD/SF	475636	0.87	5	496662	1275.54	15876	5	5	4.23	0
			DD/DF	471369	0.79	5	494286	348.4	5267	5	5	4.63	0
		15	SD/SF	567221	1.16	5	589350	1909.61	23068.8	5	5	3.75	0
			SD/DF	502836	0.72	5	524869	491.79	7191.4	5	5	4.19	0
			DD/SF	548498	0.95	5	570406	2148.81	25977.2	5	5	3.84	0
			DD/DF	515342	0.78	5	539927	432.2	9258.2	5	5	4.55	0
		20	SD/SF	601725	1.06	5	621030	2108.22	89258	5	5	3.1	0
			SD/DF	559749	0.7	5	581505	322.28	7524.4	5	5	3.74	0
			DD/SF	620476	0.91	5	641927	1367.86	30518.8	5	5	3.34	0
			DD/DF	578949	0.77	5	600800	723.29	10839.6	5	5	3.64	0
	200	5	SD/SF	539869	3.51	5	565400	729.95	10962.4	5	5	4.52	0
			SD/DF	504006	2.82	5	534975	444	5201.4	5	5	5.79	0
			DD/SF	544401	3.32	5	574239	1201.22	11456.6	5	5	5.19	0
			DD/DF	495762	2.98	5	527054	510.52	6100.2	5	5	5.94	0
		10	SD/SF	576700	3.2	5	599807	1384.85	9766	5	5	3.85	0
			SD/DF	549555	2.15	5	577232	927.29	13247	5	5	4.8	0
			DD/SF	573387	2.58	5	600691	2686.05	33092.8	5	5	4.55	0
			DD/DF	557321	2.19	5	590014	1812.99	32424.8	5	5	5.54	0
		15	SD/SF	622450	3.09	5	646847	5939.53	125020	5	5	3.76	0
			SD/DF	594023	2.03	5	626575	2608.38	30661.4	5	5	5.2	0
			DD/SF	599176	2.58	5	625642	3981.3	21321.2	5	5	4.23	0
			DD/DF	593944	2.09	5	624703	2450.75	24183.6	5	5	4.93	0
		20	SD/SF	704721	2.72	5	730595	8785.29	71621.8	5	5	3.54	0
			SD/DF	657981	1.88	5	690192	10487.86	154550.4	5	5	4.66	0
			DD/SF	725305	2.32	5	754370	9613.19	104708.6	5	5	3.85	0
			DD/DF	652075	1.82	5	682201	3884.75	46292	5	5	4.41	0

Table 172: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	863930	12.29	5	907171	21600.12	17107.2	0	5	4.58	4.47
			SD/DF	762960	5.19	5	805389	20599.06	74815.2	1	5	5.21	2.94
			DD/SF	835532	7.15	5	879388	21600.1	31913.4	0	5	4.76	4.49
			DD/DF	750426	4.59	5	792514	21600.1	68328.4	0	5	5.24	3.33
		10	SD/SF	956019	13.64	5	996083	21600.12	18612.8	0	5	3.85	3.88
			SD/DF	833218	4.67	5	871104	21108.66	64709.2	1	5	4.29	1.87
			DD/SF	853278	7.5	5	889887	21600.1	24084.4	0	5	3.99	3.89
			DD/DF	841297	4.6	5	880639	21600.18	53732.2	0	5	4.36	2.64
		15	SD/SF	1008234	15.2	5	1046429	21600.24	15980	0	5	3.47	3.57
			SD/DF	908634	5.68	5	946463	21600.22	53788.2	0	5	3.83	2.5
			DD/SF	945934	9.76	5	981390	21600.16	33845.2	0	5	3.47	3.43
			DD/DF	922327	5.04	5	959445	21600.14	44084.2	0	5	3.83	2.81
		20	SD/SF	1146174	15.94	5	1187472	21600.18	28258.4	0	5	3.26	3.43
			SD/DF	985722	4.64	5	1022038	21600.16	35339.8	0	5	3.47	2.54
			DD/SF	1059803	8.3	5	1096524	21600.12	41666.4	0	5	3.21	3.18
			DD/DF	983192	5.77	5	1019312	21600.14	27422.2	0	5	3.44	2.55
	100	5	SD/SF	918594	26.37	5	963894	21600.24	9159.6	0	5	4.5	4.29
			SD/DF	857216	14.1	5	906028	21600.28	33622.2	0	5	5.24	3.28
			DD/SF	910641	19.4	5	961491	21600.22	10810.2	0	5	5.06	4.47
			DD/DF	855043	13.81	5	903868	21600.22	31170	0	5	5.32	3.45
		10	SD/SF	1009773	21.94	5	1058121	21600.24	9308	0	5	4.36	4.28
			SD/DF	928609	9.22	5	976012	21600.22	23968.6	0	5	4.75	3.53
			DD/SF	1046704	18.13	5	1099192	21600.22	9964.6	0	5	4.52	4.42
			DD/DF	936139	13.01	5	985846	21600.22	26419.6	0	5	4.86	3.65
		15	SD/SF	1055924	18.97	5	1100827	21600.22	8395.2	0	5	3.82	3.91
			SD/DF	984833	8.98	5	1032946	21600.28	20705.6	0	5	4.51	3.55
			DD/SF	1060600	21.25	5	1107164	21600.2	9595.6	0	5	3.98	3.95
			DD/DF	998653	10.28	5	1046428	21600.22	23713.4	0	5	4.33	3.48
		20	SD/SF	1175619	20.62	5	1219152	21600.22	9894.6	0	5	3.33	3.49
			SD/DF	1075396	7.33	5	1118940	21600.24	19233.4	0	5	3.7	2.77
			DD/SF	1161978	17.77	5	1208060	21600.24	13439.6	0	5	3.55	3.64
			DD/DF	1085304	10.83	5	1130220	21600.22	18209.8	0	5	3.85	3.12
	200	5	SD/SF	1072701	81.66	5	1128124	21600.48	5076.6	0	5	4.78	4.26
			SD/DF	996488	45.49	5	1057698	21600.46	8522.8	0	5	5.71	3.67
			DD/SF	1002018	59.27	5	1064153	21600.46	5727.2	0	5	5.72	4.64
			DD/DF	990273	47.42	5	1055598	21600.48	9766.6	0	5	6.12	3.92
		10	SD/SF	1205872	56.96	5	1264312	21600.44	5329.8	0	5	4.4	4.24
			SD/DF	1093204	29.53	5	1159682	21600.36	9292	0	5	5.5	4.29
			DD/SF	1178702	39.62	5	1245964	21600.52	5718.6	0	5	5.09	4.66
			DD/DF	1094158	30.02	5	1166104	21600.36	9272	0	5	5.81	4.49
		15	SD/SF	1253814	57.43	5	1315076	21600.4	4615.8	0	5	4.2	4.46
			SD/DF	1172946	25.84	5	1240784	21600.4	6812	0	5	5.28	4.56
			DD/SF	1217578	36.12	5	1286576	21600.42	4594	0	5	5.22	4.95
			DD/DF	1175250	27.25	5	1245368	21600.46	7035	0	5	5.43	4.61
		20	SD/SF	1380444	51.8	5	1442680	21600.72	3278.6	0	5	3.94	4.22
			SD/DF	1251558	21.52	5	1315232	21600.44	8532.2	0	5	4.75	3.93
			DD/SF	1316492	26.91	5	1382364	21600.38	4807.2	0	5	4.47	4.53
			DD/DF	1255452	20.69	5	1320970	21600.42	7693.8	0	5	4.72	4.11

Table 173: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.95	5	427493	133.04	3071.4	5	5	4.52	0
			SD/DF	384854	0.42	5	406353	46.51	1944	5	5	5.29	0
			DD/SF	366430	0.76	5	384296	96.11	2234.4	5	5	4.65	0
			DD/DF	389422	0.46	5	410521	38.69	1858.8	5	5	5.15	0
		10	SD/SF	507069	1.19	5	527642	442.36	14595	5	5	3.9	0
			SD/DF	443088	0.45	5	463185	89.75	2394.6	5	5	4.34	0
			DD/SF	438602	0.92	5	456243	272.11	5605.2	5	5	3.86	0
			DD/DF	437843	0.54	5	457166	47.97	1857.2	5	5	4.23	0
		15	SD/SF	532733	0.93	5	551125	1637.75	81485.4	5	5	3.33	0
			SD/DF	475732	0.5	5	493994	254.79	7050	5	5	3.7	0
			DD/SF	482400	0.61	5	499115	1267.88	41247.4	5	5	3.34	0
			DD/DF	485358	0.46	5	503767	139.73	3562.2	5	5	3.66	0
		20	SD/SF	585122	0.76	5	602944	13610.47	431420.4	3	5	2.95	0.01
			SD/DF	534719	0.61	5	552816	1117.53	47717.2	5	5	3.27	0
			DD/SF	560748	0.66	5	578611	1629.98	57452.4	5	5	3.08	0
			DD/DF	536721	0.61	5	554793	756.74	23775.8	5	5	3.26	0
	100	5	SD/SF	478021	2.16	5	499402	212.24	2212	5	5	4.28	0
			SD/DF	428104	1.59	5	451075	103.91	1932.2	5	5	5.09	0
			DD/SF	438869	1.68	5	461172	362.01	3622.2	5	5	4.84	0
			DD/DF	428190	1.33	5	452054	110.89	1909.2	5	5	5.28	0
		10	SD/SF	525220	2.53	5	547972	2024.03	14863	5	5	4.15	0
			SD/DF	484289	1.35	5	508535	344.94	3684.4	5	5	4.77	0
			DD/SF	475636	1.88	5	496662	1504.42	15904.4	5	5	4.23	0
			DD/DF	471369	1.55	5	494286	308.41	3982.2	5	5	4.63	0
		15	SD/SF	567221	2.37	5	589350	2927.99	20002.2	5	5	3.75	0
			SD/DF	502836	1.18	5	524869	497	7193.6	5	5	4.19	0
			DD/SF	548498	1.79	5	570406	3565.65	25322.8	5	5	3.84	0
			DD/DF	515342	1.24	5	539927	586.53	6190.2	5	5	4.55	0
		20	SD/SF	601725	2.11	5	621030	3938.36	71101.2	5	5	3.1	0
			SD/DF	559749	1.26	5	581505	492.3	5366.8	5	5	3.74	0
			DD/SF	620476	1.91	5	641927	4552.98	26786.8	5	5	3.34	0
			DD/DF	578949	1.38	5	600800	876.74	7359.2	5	5	3.64	0
	200	5	SD/SF	539869	5.81	5	565400	627.27	4728.6	5	5	4.52	0
			SD/DF	504006	3.65	5	534975	466.41	4836.8	5	5	5.79	0
			DD/SF	544401	3.82	5	574239	742.6	6564.6	5	5	5.19	0
			DD/DF	495762	3.65	5	527054	450.77	4224.4	5	5	5.94	0
		10	SD/SF	576700	5.12	5	599807	2483.29	19656	5	5	3.85	0
			SD/DF	549555	2.95	5	577232	1155.22	9307.8	5	5	4.8	0
			DD/SF	573387	3.95	5	600691	2706.33	14785.4	5	5	4.55	0
			DD/DF	557321	3.19	5	590014	5189.88	36597	5	5	5.54	0
		15	SD/SF	622450	5.65	5	646847	5087.27	23072.2	5	5	3.76	0
			SD/DF	594023	3.31	5	626575	6531.85	32267.8	5	5	5.2	0
			DD/SF	599176	4.2	5	625642	3395.84	14786.4	5	5	4.23	0
			DD/DF	593944	3.18	5	624703	3646.83	20990.4	5	5	4.93	0
		20	SD/SF	704721	4.64	5	730679	18753.86	45477.2	3	5	3.54	0.15
			SD/DF	657981	2.91	5	690224	19104.8	65079.8	2	5	4.66	0.2
			DD/SF	725305	3.74	5	754558	17678.05	92430	3	5	3.85	0.05
			DD/DF	652075	3.25	5	682201	4842.99	36100	5	5	4.41	0

Table 174: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	863930	14.99	5	905450	21600.1	46224.2	0	5	4.58	0.3
			SD/DF	762960	5.41	5	804895	4764.45	21188.4	5	5	5.21	0
			DD/SF	835532	7.06	5	877581	21600.1	81724.6	0	5	4.76	0.29
			DD/DF	750426	5.4	5	791869	5122.55	16908.6	5	5	5.24	0
		10	SD/SF	956019	15.4	5	995583	21600.1	22687.6	0	5	3.85	0.45
			SD/DF	833218	4.2	5	870929	21600.14	46815.8	0	5	4.29	0.29
			DD/SF	853278	5.68	5	889166	21600.18	28982.2	0	5	3.99	0.48
			DD/DF	841297	4.26	5	879880	18937.99	58612.4	1	5	4.36	0.25
		15	SD/SF	1008234	27.65	5	1045755	21600.14	21843.2	0	5	3.47	0.36
			SD/DF	908634	4.81	5	944930	21600.18	36138.2	0	5	3.83	0.25
			DD/SF	945934	6.55	5	980468	21600.22	22912.6	0	5	3.47	0.36
			DD/DF	922327	4.95	5	959045	17077.53	55209	3	5	3.83	0.05
		20	SD/SF	1146174	44.56	5	1185642	21600.1	31161.4	0	5	3.26	0.24
			SD/DF	985722	9.25	5	1021202	21600.1	64278.4	0	5	3.47	0.15
			DD/SF	1059803	10.44	5	1095197	21600.1	37332	0	5	3.21	0.26
			DD/DF	983192	9.44	5	1018480	21600.1	65398.6	0	5	3.44	0.23
	100	5	SD/SF	918594	46.7	5	962502	21600.14	15185	0	5	4.5	0.83
			SD/DF	857216	16.77	5	904753	19417.5	96307.6	1	5	5.24	0.17
			DD/SF	910641	22.92	5	959539	21600.12	32274.4	0	5	5.06	0.9
			DD/DF	855043	16.68	5	903093	18635.1	52298	2	5	5.32	0.36
		10	SD/SF	1009773	46.43	5	1056369	21600.18	8555.6	0	5	4.36	1.14
			SD/DF	928609	11.85	5	975130	21600.16	30299.8	0	5	4.75	0.72
			DD/SF	1046704	16.76	5	1097384	21600.14	14670.6	0	5	4.52	1.23
			DD/DF	936139	10.98	5	984102	21600.14	26472.2	0	5	4.86	0.84
		15	SD/SF	1055924	62.06	5	1097939	21600.18	8478.6	0	5	3.82	0.82
			SD/DF	984833	10.23	5	1031598	21600.18	22353	0	5	4.51	0.75
			DD/SF	1060600	16.24	5	1105742	21600.14	16614.8	0	5	3.98	1.04
			DD/DF	998653	10.3	5	1044208	21600.18	25253.4	0	5	4.33	0.84
		20	SD/SF	1175619	89.83	5	1216586	21600.18	10458.6	0	5	3.33	1.06
			SD/DF	1075396	10.32	5	1117104	21600.18	15908.6	0	5	3.7	0.53
			DD/SF	1161978	18.33	5	1205066	21600.2	12567	0	5	3.55	1.24
			DD/DF	1085304	10.72	5	1129126	21600.2	30040.8	0	5	3.85	0.56
	200	5	SD/SF	1072701	156.6	5	1127324	21600.36	3757.8	0	5	4.78	2.15
			SD/DF	996488	64.26	5	1057210	21600.34	13386	0	5	5.71	1.94
			DD/SF	1002018	84.76	5	1065679	21600.38	5267.8	0	5	5.72	3.88
			DD/DF	990273	61.55	5	1056166	21600.38	9095.6	0	5	6.12	2.51
		10	SD/SF	1205872	208.93	5	1263384	21600.28	3420.4	0	5	4.4	3.15
			SD/DF	1093204	40.84	5	1158954	21600.46	6939.6	0	5	5.5	2.4
			DD/SF	1178702	63.27	5	1247672	21600.4	5288.8	0	5	5.09	3.48
			DD/DF	1094158	43.19	5	1163234	21600.3	4172.8	0	5	5.81	3.97
		15	SD/SF	1253814	230.89	5	1311106	21600.34	4149.8	0	5	4.2	3.59
			SD/DF	1172946	33.77	5	1241128	21600.32	5200.2	0	5	5.28	2.91
			DD/SF	1217578	66.89	5	1284728	21600.3	5324.8	0	5	5.22	3.21
			DD/DF	1175250	35.84	5	1245652	21600.32	4491.2	0	5	5.43	3.49
		20	SD/SF	1380444	147.2	5	1440428	21600.32	4159	0	5	3.94	1.86
			SD/DF	1251558	28.25	5	1314492	21600.38	8944.4	0	5	4.75	1.92
			DD/SF	1316492	53.71	5	1380394	21600.36	6638.4	0	5	4.47	2.99
			DD/DF	1255452	30.01	5	1317740	21600.36	7346.6	0	5	4.72	1.86

Table 175: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	408200	0.68	5	427493	182.15	2356	5	5	4.52	0
			SD/DF	384854	0.41	5	406353	57.28	2067	5	5	5.29	0
			DD/SF	366430	0.36	5	384296	103.71	2088.2	5	5	4.65	0
			DD/DF	389420	0.22	5	410521	26.18	1516.6	5	5	5.15	0
		10	SD/SF	507069	0.68	5	527642	502.26	16590.4	5	5	3.9	0
			SD/DF	443086	0.29	5	463185	81.53	2304	5	5	4.34	0
			DD/SF	438602	0.5	5	456243	211.54	4193.4	5	5	3.86	0
			DD/DF	437841	0.29	5	457166	52.01	1771.2	5	5	4.23	0
		15	SD/SF	532733	0.75	5	551125	1439.25	89150.6	5	5	3.33	0
			SD/DF	475726	0.32	5	493994	167.14	6944.6	5	5	3.7	0
			DD/SF	482400	0.5	5	499115	945.44	41411.2	5	5	3.34	0
			DD/DF	485341	0.31	5	503767	93.48	3359.4	5	5	3.66	0
		20	SD/SF	585122	0.72	5	602932	10593.67	358183	4	5	2.95	0
			SD/DF	534715	0.27	5	552816	753.68	38889	5	5	3.27	0
			DD/SF	560748	0.5	5	578611	1405.5	46625.8	5	5	3.08	0
			DD/DF	536713	0.33	5	554793	385.58	12297	5	5	3.26	0
	100	5	SD/SF	478021	1.84	5	499402	303.49	2213.2	5	5	4.28	0
			SD/DF	428101	0.51	5	451075	103.86	2203.2	5	5	5.09	0
			DD/SF	438869	0.99	5	461172	562.26	3039	5	5	4.84	0
			DD/DF	428189	0.5	5	452054	204.31	2144	5	5	5.28	0
		10	SD/SF	525220	1.87	5	547972	5469.23	15274	5	5	4.15	0
			SD/DF	484288	0.62	5	508535	985.4	3905.6	5	5	4.77	0
			DD/SF	475636	1	5	496662	4868.08	11351.6	5	5	4.23	0
			DD/DF	471360	0.65	5	494286	652.73	3059.4	5	5	4.64	0
		15	SD/SF	567221	2.06	5	589354	11072.26	28238.6	4	5	3.75	0.03
			SD/DF	502826	1.44	5	524869	1005.8	5355.2	5	5	4.19	0
			DD/SF	548498	1.42	5	570406	10728.66	34287.4	5	5	3.84	0
			DD/DF	515335	0.82	5	539927	1142.69	7723.6	5	5	4.55	0
		20	SD/SF	601725	1.73	5	621030	4536.72	97535.8	5	5	3.1	0
			SD/DF	559741	0.72	5	581505	498.48	4328.2	5	5	3.74	0
			DD/SF	620476	1.21	5	641927	4099.24	39249.6	5	5	3.34	0
			DD/DF	578927	0.78	5	600986	851.57	9279.4	4	5	3.64	0
	200	5	SD/SF	539869	6.9	5	565400	1146.79	5502	5	5	4.52	0
			SD/DF	504004	1.22	5	534975	311.89	4090.6	5	5	5.79	0
			DD/SF	544401	3.39	5	574239	1174.72	6722.2	5	5	5.19	0
			DD/DF	495757	1.16	5	527054	346.75	4752	5	5	5.94	0
		10	SD/SF	576700	6.14	5	599807	2251.3	17561.4	5	5	3.85	0
			SD/DF	549555	1.35	5	577232	3552.05	13946.8	5	5	4.8	0
			DD/SF	573387	3.04	5	600691	3749.05	47807.2	5	5	4.55	0
			DD/DF	557316	1.45	5	590014	3283.38	21461	5	5	5.54	0
		15	SD/SF	622450	6.2	5	646847	9171.04	53876.2	5	5	3.76	0
			SD/DF	594021	1.68	5	626575	7718.01	28180.8	5	5	5.2	0
			DD/SF	599176	3.08	5	625642	6979.88	14714.2	5	5	4.23	0
			DD/DF	593932	1.4	5	624703	5908.88	18883	5	5	4.93	0
		20	SD/SF	704721	6.32	5	730826	18412.62	40532	1	5	3.54	0.18
			SD/DF	657972	1.83	5	690285	19168.46	71377.4	2	5	4.66	0.24
			DD/SF	725305	3.53	5	754909	21600	34833.8	0	5	3.85	0.52
			DD/DF	652058	1.54	5	682201	6853.53	39905.6	5	5	4.42	0

Table 176: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	863930	3.32	5	907248	21600.02	13828.8	0	5	4.58	3.48
			SD/DF	762958	0.74	5	804895	14253.91	38042.4	4	5	5.21	0.04
			DD/SF	835532	1.24	5	879642	21600.02	18487	0	5	4.76	4.34
			DD/DF	750420	0.75	5	791870	7612.1	24083.4	4	5	5.24	0
		10	SD/SF	956019	2.83	5	997210	21600.02	10363.8	0	5	3.85	3.26
			SD/DF	833187	0.83	5	871207	21600.02	44707	0	5	4.3	1.27
			DD/SF	853278	1.35	5	890181	21600.02	15134.8	0	5	3.99	3.18
			DD/DF	841288	0.88	5	880079	19014.22	38680	1	5	4.36	0.78
		15	SD/SF	1008234	4.23	5	1047003	21600.02	9834.6	0	5	3.47	2.86
			SD/DF	908623	1.48	5	945355	21600	58597.6	0	5	3.83	0.82
			DD/SF	945934	2.26	5	981743	21600.1	19052.2	0	5	3.47	3.43
			DD/DF	922303	1.12	5	959259	18564	41878.8	1	5	3.83	0.72
		20	SD/SF	1146174	6.06	5	1187140	21600.04	16718.2	0	5	3.26	2.74
			SD/DF	985710	2	5	815441	17280.06	56775.4	0	4	3.47	1.16
			DD/SF	1059803	3.26	5	1096896	21600.04	17874.6	0	5	3.21	2.77
			DD/DF	983165	1.82	5	1018735	21600	61491.4	0	5	3.44	0.65
	100	5	SD/SF	918594	24.77	5	965225	21600.02	5561.4	0	5	4.5	2.93
			SD/DF	857197	3.29	5	904839	20565.22	15989	1	5	5.25	1.55
			DD/SF	910641	9.23	5	961003	21600.08	9864.8	0	5	5.06	2.88
			DD/DF	855033	3.3	5	903768	21600.06	12677.8	0	5	5.32	3
		10	SD/SF	1009773	14.06	5	1060972	21600.06	3485.6	0	5	4.36	4.53
			SD/DF	928575	3.07	5	977281	21600.06	10682.4	0	5	4.76	3.44
			DD/SF	1046704	5.83	5	1100248	21600.06	5763.4	0	5	4.52	4.44
			DD/DF	936097	2.67	5	984907	21600.04	11890.4	0	5	4.86	2.72
		15	SD/SF	1055924	11.97	5	1104174	21600.06	5519.6	0	5	3.82	4.19
			SD/DF	984792	2.94	5	1033906	21600.04	9844.2	0	5	4.51	3.78
			DD/SF	1060600	5.91	5	1109614	21600.08	4892.6	0	5	3.98	4.08
			DD/DF	998589	2.64	5	1044370	21600.02	10899.8	0	5	4.34	2.37
		20	SD/SF	1175619	15.47	5	1222346	21600.08	6623.8	0	5	3.33	3.74
			SD/DF	1075372	3.79	5	1118742	21600.04	12507.6	0	5	3.7	2.52
			DD/SF	1161978	9.06	5	1210302	21600.06	4903.8	0	5	3.55	3.78
			DD/DF	1085214	3.38	5	1130842	21600.06	10168.8	0	5	3.86	3.07
	200	5	SD/SF	1072701	138.94	5	1133384	21600.18	1939.8	0	5	4.78	4.41
			SD/DF	996470	14.38	5	1059154	21600.12	4751.8	0	5	5.71	2.45
			DD/SF	1002018	50.98	5	1067756	21600.2	3119.6	0	5	5.72	3.61
			DD/DF	990241	13.25	5	1057100	21600.18	5468	0	5	6.12	2.29
		10	SD/SF	1205872	84.7	5	1268612	21600.28	2066.4	0	5	4.4	3.53
			SD/DF	1093192	9.33	5	1159262	21600.16	4600.6	0	5	5.5	3.13
			DD/SF	1178702	25.25	5	1249594	21600.2	3150	0	5	5.09	4.21
			DD/DF	1094120	9.97	5	1165290	21600.18	5347.6	0	5	5.81	3.7
		15	SD/SF	1253814	54.45	5	1320110	21600.28	2349.4	0	5	4.2	4.23
			SD/DF	1172904	8.89	5	1242862	21600.24	3967	0	5	5.29	3.84
			DD/SF	1217578	23	5	1295158	21600.26	2625.8	0	5	5.22	4.85
			DD/DF	1175230	9.33	5	1248680	21600.22	4221	0	5	5.43	3.92
		20	SD/SF	1380444	68.31	5	1443818	21600.24	2511.8	0	5	3.94	2.04
			SD/DF	1251516	10.1	5	1318750	21600.32	5421	0	5	4.75	2.99
			DD/SF	1316492	29.45	5	1386222	21600.18	2767.6	0	5	4.47	4.23
			DD/DF	1255382	9.16	5	1321168	21600.18	4931.8	0	5	4.72	2.79

Table 177: Performance of the N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	410078	16.68	5	427513	10245.13	3783.8	3	5	4.07	0.64
			SD/DF	389366	16.37	5	406353	4208.29	4033.4	5	5	4.18	0
			DD/SF	368983	16.31	5	384409	6745.32	3060	4	5	3.98	0.72
			DD/DF	393501	14.86	5	410521	4147.48	2366.6	5	5	4.15	0
		10	SD/SF	508302	17.96	5	527642	17159	14092.4	2	5	3.66	0.01
			SD/DF	445504	15.36	5	463185	7993.45	8754.2	5	5	3.82	0
			DD/SF	440290	16.92	5	456243	13293.16	6484.2	3	5	3.48	1.01
			DD/DF	440375	13.32	5	457166	5402.39	3337.8	5	5	3.67	0
		15	SD/SF	533219	15.98	5	551195	20406.92	28023.2	1	5	3.25	0.05
			SD/DF	477670	13.43	5	493994	8358.2	16061	5	5	3.3	0
			DD/SF	483445	16.11	5	499223	15483.93	24058.4	3	5	3.14	0.34
			DD/DF	487475	14.52	5	503767	3274.96	3111	5	5	3.23	0
		20	SD/SF	585611	13.3	5	603000	21145.46	65234.6	1	5	2.87	0.05
			SD/DF	536672	13.51	5	552816	10086.99	15655.4	4	5	2.92	0.01
			DD/SF	561523	13.12	5	578611	13489.13	29672	5	5	2.95	0
			DD/DF	538394	12.53	5	554793	8824.76	13832.4	5	5	2.95	0
	100	5	SD/SF	482077	60.99	5	499404	10139.06	2453.4	4	5	3.46	0.31
			SD/DF	434099	43.38	5	451108	10261.61	1942.4	3	5	3.76	0.08
			DD/SF	444963	49.29	5	461172	4914.8	2813.4	5	5	3.5	0
			DD/DF	435691	39.43	5	452056	9631.63	2761	4	5	3.62	0.01
		10	SD/SF	528849	75.13	5	548443	21600.56	4082.2	0	5	3.49	0.64
			SD/DF	491806	58.63	5	508793	14853.02	3821.8	3	5	3.29	0.79
			DD/SF	480452	57.85	5	496805	20525.52	4187	2	5	3.26	1.02
			DD/DF	478516	48.2	5	494294	7652.63	2755.2	4	5	3.19	0.04
		15	SD/SF	570694	80.67	5	589676	17317.76	3393.2	2	5	3.16	1.07
			SD/DF	509722	47.54	5	524869	11169.96	4251	5	5	2.88	0
			DD/SF	552182	63.96	5	570613	19349.24	3874	2	5	3.19	1.72
			DD/DF	522514	53.09	5	539928	17088	4010.6	3	5	3.22	0
		20	SD/SF	603600	86.08	5	621450	19779.22	6924.8	2	5	2.79	1.52
			SD/DF	564665	55.65	5	581613	15675.52	2761	2	5	2.89	0.03
			DD/SF	623382	70.02	5	642212	17039.3	3130.2	2	5	2.88	0.9
			DD/DF	584332	67.02	5	600843	15250.28	3983.8	3	5	2.74	0.03
	200	5	SD/SF	548229	229.52	5	565403	20688.88	9036.2	1	5	3.03	0.45
			SD/DF	517777	167.72	5	534976	19102.59	4324.4	2	5	3.22	0
			DD/SF	557435	194.39	5	574879	19108.07	4690.2	1	5	2.91	1.36
			DD/DF	509703	176.56	5	527056	14948.24	1244.6	3	5	3.29	0
		10	SD/SF	585403	279.56	5	601829	21601.34	843	0	5	2.39	2.1
			SD/DF	562828	203.95	5	577273	19250.07	2173.2	1	5	2.5	0.21
			DD/SF	585019	254.14	5	601882	21600.96	3811.2	0	5	2.6	1.53
			DD/DF	571303	167.24	5	591168	21114.48	3754.2	1	5	3.17	0.76
		15	SD/SF	630455	368.95	5	650333	21601.1	1307.4	0	5	2.52	2.25
			SD/DF	607910	195.54	5	627146	19642.74	2697	1	5	2.98	1.24
			DD/SF	610162	311.52	5	626870	21386.92	2295.4	1	5	2.47	1.51
			DD/DF	608040	196.35	5	624757	21600.92	1768	0	5	2.67	0.03
		20	SD/SF	712403	400.92	5	733089	21601.3	995.2	0	5	2.48	2.5
			SD/DF	672524	218.66	5	691258	21601.06	2014	0	5	2.56	0.84
			DD/SF	734601	324.01	5	754738	21600.94	2072.4	0	5	2.62	1.28
			DD/DF	666656	213.31	5	682283	21307.74	3533.2	1	5	2.28	0.24

Table 178: Performance of the N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	867042	1020.92	5	960873	21604.48	116.8	0	5	4.24	9.56
			SD/DF	769671	907.99	5	814351	21622.4	387.6	0	5	4.38	4.7
			DD/SF	840098	743.69	5	887395	21605.42	165.8	0	5	4.23	5.15
			DD/DF	757214	750.91	5	800595	21604.86	273.2	0	5	4.38	5.19
		10	SD/SF	958202	1179.39	5	1071496	21603.9	106.2	0	5	3.63	10.56
			SD/DF	838646	633.93	5	889928	21603.66	198.2	0	5	3.67	5.64
			DD/SF	857627	4891.3	4	919917	21603.56	176	0	5	3.64	6.9
			DD/DF	847176	685.57	5	914337	21603.52	159.2	0	5	3.69	7.05
		15	SD/SF	1004522	5282.39	4	1195602	21604.12	154.2	0	5	3.32	14.62
			SD/DF	912499	726.03	5	956951	21604.52	157.6	0	5	3.42	4.54
			DD/SF	947969	1091.43	5	1158904	21603.44	182.4	0	5	3.26	17.32
			DD/DF	925659	615.71	5	792879	17283.06	124	0	4	3.48	4.57
		20	SD/SF	1146806	1408.85	5	1352564	21604.04	121.8	0	5	3.21	14.07
			SD/DF	988973	820.86	5	841670	17282.92	147	0	4	3.15	5.16
			DD/SF	1061536	1004.37	5	1257118	21603.52	167.8	0	5	3.05	14.03
			DD/DF	987370	786.35	5	1040408	21603.76	181.8	0	5	3.03	5.01
	100	5	SD/SF	924938	4360.5	5	541930	8644.08	4	0	2	3.84	13.64
			SD/DF	868273	5812.97	4	791026	17285.96	32.4	0	4	3.82	9.38
			DD/SF	922759	2979.04	5	230464	4321.36	7.8	0	1	3.78	2.05
			DD/DF	868982	1248.58	5	952058	21606.62	85.6	0	5	3.77	8.67
		10	SD/SF	988556	10937.83	3	0	0	0	0	0	3.59	0
			SD/DF	940635	1848.33	5	651508	12964.24	49.6	0	3	3.52	6.77
			DD/SF	1043917	11699.66	3	1323070	17292.72	6.8	0	4	3.6	28.51
			DD/DF	955810	6651.44	4	819352	17286.74	50	0	4	3.57	5.82
		15	SD/SF	1061223	4425.08	5	1652858	22990.58	0	0	5	3.33	35.73
			SD/DF	997250	2302.32	5	1068910	21607.54	43	0	5	3.3	6.6
			DD/SF	1068743	3320.73	5	1326736	17803.52	9.6	0	4	3.24	28.46
			DD/DF	1009173	1812.4	5	1084912	21606.58	45.8	0	5	3.33	6.92
		20	SD/SF	1179319	7241.29	5	1859136	23717.64	0	0	5	3.02	36.17
			SD/DF	1079408	6498.77	4	1185502	21607.22	54.8	0	5	2.8	7.81
			DD/SF	1168340	5813.82	5	971168	12964.86	10	0	3	3.02	15.69
			DD/DF	1095352	2358.65	5	1000512	17286.62	41.2	0	4	2.96	9.29
	200	5	SD/SF	1077398	17192.77	2	306986	4323.64	0	0	1	3.44	7.19
			SD/DF	1022705	8153.88	4	513080	8649.42	0	0	2	2.96	8.21
			DD/SF	1026990	9786.96	5	632938	8647.5	0	0	2	3.35	14.09
			DD/DF	818767	4860.1	5	751936	12977.58	1.4	0	3	22.65	10.87
		10	SD/SF	1239425	16838.61	2	360216	4323.4	0	0	1	3.16	6.89
			SD/DF	1114330	8845.82	4	1143616	17293.62	0.6	0	4	3	16.79
			DD/SF	1207210	13008.4	4	1467236	17294.9	0	0	4	3.16	27.32
			DD/DF	1122472	6441.14	5	1179810	17293.44	1.6	0	4	3.37	18.27
		15	SD/SF	1284187	16687.4	3	763466	8647.9	0	0	2	3.08	13.9
			SD/DF	1193543	9500.59	4	1479040	21620.28	1	0	5	2.95	17.91
			DD/SF	1224605	12790.82	4	815900	8647.94	0	0	2	3.36	14.31
			DD/DF	1205156	8716.09	5	905554	12975.18	1.6	0	3	3.03	12.07
		20	SD/SF	1343470	19848.12	2	0	0	0	0	0	2.92	0
			SD/DF	1282780	15853.01	3	947878	12974.92	0	0	3	2.86	11.92
			DD/SF	1340968	16730.9	4	390032	4324.12	0	0	1	3.1	7.02
			DD/DF	1281850	7021.94	5	1256986	17310.02	0	0	4	2.72	14.82

Table 179: Performance of the T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	409972	22.82	5	427493	7230.67	6314	4	5	4.09	0.04
			SD/DF	389322	16.69	5	406353	2684.66	2202.2	5	5	4.19	0
			DD/SF	368940	23.18	5	384311	10893.67	2912.8	4	5	4	0.64
			DD/DF	393477	17.53	5	410521	3397.89	2294.2	5	5	4.16	0
		10	SD/SF	508223	28.13	5	527789	16798.87	12062.4	2	5	3.68	1.4
			SD/DF	445488	15.53	5	463185	3267.42	2372.2	5	5	3.82	0
			DD/SF	440235	23.88	5	456360	19847.72	11194.2	2	5	3.5	1.95
			DD/DF	440361	20.03	5	457166	4374.75	2243.6	5	5	3.68	0
		15	SD/SF	533160	24.34	5	551217	21600.1	17087.6	0	5	3.26	1.19
			SD/DF	477664	16.44	5	493994	6997.97	8928.2	5	5	3.3	0
			DD/SF	483419	17.28	5	499118	19255.08	25995.6	2	5	3.14	0.05
			DD/DF	487466	14.46	5	503767	4207.69	4583.8	5	5	3.24	0
		20	SD/SF	585595	25.23	5	603080	21600.1	23147.2	0	5	2.87	0.55
			SD/DF	536664	14.25	5	552820	10384.62	16731.6	4	5	2.92	0.02
			DD/SF	561515	14.93	5	578787	17946.44	21003.4	1	5	2.95	1.08
			DD/DF	538388	13.75	5	554793	7874.8	14859.8	5	5	2.96	0
	100	5	SD/SF	482059	217.93	5	500108	21600.24	1030.6	0	5	3.47	2.63
			SD/DF	434087	129.7	5	451133	11316.69	4017.4	4	5	3.76	0.12
			DD/SF	444947	107.1	5	461293	15721.49	2570	2	5	3.51	1
			DD/DF	435674	151.36	5	452058	9501.6	4979	4	5	3.62	0.51
		10	SD/SF	528702	163.8	5	548882	21600.48	2027.6	0	5	3.51	0.98
			SD/DF	491745	97.24	5	508833	15220.65	3187.8	2	5	3.31	0.19
			DD/SF	480389	150.95	5	496925	21600.26	1736.2	0	5	3.27	2.08
			DD/DF	478489	139.39	5	494286	14023.34	5222.2	4	5	3.19	0
		15	SD/SF	570562	203.53	5	590242	21600.3	3427	0	5	3.18	1.85
			SD/DF	509664	231.89	5	524869	9111.41	3965.4	5	5	2.89	0
			DD/SF	552093	200.11	5	571717	21233.96	2428.2	1	5	3.21	2.44
			DD/DF	522477	157.07	5	539928	10968.96	4059.4	4	5	3.22	0.01
		20	SD/SF	603458	237.01	5	621289	21600.32	7233.4	0	5	2.82	0.6
			SD/DF	564646	165.09	5	581581	14331.46	2217.2	3	5	2.89	0.04
			DD/SF	623291	197.19	5	642235	19303.14	2552.6	1	5	2.9	1.03
			DD/DF	584312	175.34	5	600981	14011.21	3225.6	4	5	2.75	0.29
	200	5	SD/SF	548128	1147.54	5	567375	19508.02	761.6	2	5	3.05	1.93
			SD/DF	517766	652.27	5	535032	19371.94	1445.8	1	5	3.22	0.36
			DD/SF	557384	873.32	5	574748	21600.76	2891.2	0	5	2.92	1.03
			DD/DF	509691	539.33	5	527854	19278.62	1342.8	2	5	3.3	0.62
		10	SD/SF	585375	1648.54	5	605253	21600.72	340.6	0	5	2.4	2.91
			SD/DF	562794	759.5	5	577476	21600.9	455.8	0	5	2.5	0.76
			DD/SF	584996	1087.36	5	604761	21600.78	663	0	5	2.6	2.29
			DD/DF	571286	866.1	5	591109	20123.24	3090	1	5	3.17	1.26
		15	SD/SF	630303	1472.95	5	650595	21600.54	595	0	5	2.54	2.62
			SD/DF	607848	752.34	5	627767	19922.18	7533.2	1	5	2.99	0.67
			DD/SF	610094	1010	5	630978	21600.94	741.2	0	5	2.48	2.69
			DD/DF	608003	781.6	5	627198	19580.44	663.2	1	5	2.67	1.31
		20	SD/SF	712011	1122.42	5	733090	21600.46	765	0	5	2.54	2.54
			SD/DF	672459	961	5	692079	21600.8	2171.6	0	5	2.57	1.24
			DD/SF	734429	1202.63	5	757297	21600.86	533.4	0	5	2.64	2.29
			DD/DF	666615	869.13	5	683709	21600.78	767.4	0	5	2.29	1.07

Table 180: Performance of the T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	866734	1626.23	5	1134967	21601.48	33.6	0	5	4.27	21.73
			SD/DF	769592	773.18	5	809657	21601.68	301	0	5	4.39	4.64
			DD/SF	839960	1175.73	5	890732	21601.76	244.8	0	5	4.24	5.56
			DD/DF	757165	697.69	5	801131	21601.52	274.4	0	5	4.39	5.04
		10	SD/SF	957878	1956.55	5	1155214	21601.66	62.4	0	5	3.66	15.18
			SD/DF	838600	843.72	5	875239	21601.64	334.8	0	5	3.68	2.85
			DD/SF	845121	5385.98	4	903487	21601.62	308	0	5	3.63	5.21
			DD/DF	847123	838.97	5	887357	21603.46	263.6	0	5	3.7	4.33
		15	SD/SF	1009189	2140.5	5	1281516	21601.34	35	0	5	3.38	20.59
			SD/DF	912477	994.14	5	948454	21601.52	310.8	0	5	3.42	3.7
			DD/SF	947851	1735.09	5	1013191	21601.84	209.6	0	5	3.27	6.46
			DD/DF	925646	849.3	5	959983	21601.6	344	0	5	3.48	2.73
		20	SD/SF	1146690	2687.04	5	1354738	21601.36	34.2	0	5	3.22	15.3
			SD/DF	988948	729.09	5	1024122	21601.52	186	0	5	3.15	3.26
			DD/SF	1061478	1796.83	5	1117077	21601.38	165.4	0	5	3.06	4.87
			DD/DF	987352	1009.49	5	1031846	21601.56	251	0	5	3.03	4.18
	100	5	SD/SF	924816	7341.86	5	1512898	22271.04	0	0	5	3.85	38.71
			SD/DF	871574	6142.21	4	997392	21670.66	96	0	5	3.78	11.41
			DD/SF	894884	8595.56	4	1388328	21602.72	15.8	0	5	3.77	32.66
			DD/DF	868945	2456.84	5	934822	21602.92	88.8	0	5	3.78	6.97
		10	SD/SF	1016354	9888.4	5	1623008	22851.26	0	0	5	3.73	37.35
			SD/DF	940557	3472.3	5	1040431	21602.88	89.2	0	5	3.53	8.62
			DD/SF	1055602	6261.19	5	1650814	21983.96	18	0	5	3.71	35.93
			DD/DF	949205	2837.57	5	1044196	21602.92	38.6	0	5	3.53	8.6
		15	SD/SF	1060669	8705	5	1667872	22604.88	0	0	5	3.38	36.36
			SD/DF	997160	3797.62	5	1116912	22203.04	22.6	0	5	3.31	10.26
			DD/SF	1068356	6482.77	5	1663054	22730.28	0	0	5	3.27	35.69
			DD/DF	1009096	2679.89	5	1087916	21602.58	51.6	0	5	3.33	7.19
		20	SD/SF	1178699	7157.62	5	1876632	21786.88	0	0	5	3.07	37.14
			SD/DF	1085948	3170.5	5	1131536	21603	52	0	5	2.75	3.98
			DD/SF	1168004	6521.82	5	1558634	22119.68	18	0	5	3.05	23.76
			DD/DF	1095302	2973.72	5	1154962	21602.68	48.4	0	5	2.97	5.14
	200	5	SD/SF	-	21611.26	0	-	-	-	0	0	-	-
			SD/DF	1025306	10236.75	5	1040556	18808.38	0	0	4	2.98	16.8
			DD/SF	1046196	19732.36	2	-	-	-	0	0	3.6	-
			DD/DF	1019837	10323.48	5	1236048	21606.68	3.4	0	5	3.32	16.43
		10	SD/SF	-	21616.78	0	365942	4321.2	0	0	1	-	7.1
			SD/DF	1121830	9371.9	5	1161156	17286.06	0	0	4	3.03	18.11
			DD/SF	1191047	18539.24	3	370832	4321.24	0	0	1	3.15	6.91
			DD/DF	1122412	8724.07	5	1338872	21606.76	0.6	0	5	3.38	15.37
		15	SD/SF	1224840	21220.88	1	-	-	-	0	0	2.94	-
			SD/DF	1200404	13722.86	5	1487472	23180.74	0	0	5	3.07	18.47
			DD/SF	1247618	16978.9	4	404312	4321.3	0	0	1	3.43	7.08
			DD/DF	1205036	11289.15	5	1503352	21606.88	1	0	5	3.03	19.76
		20	SD/SF	-	21613.68	0	456752	4321.26	0	0	1	-	7.36
			SD/DF	1278220	14384.8	5	1566196	21607.1	0	0	5	2.72	18.08
			DD/SF	1351910	20368.74	1	-	-	-	0	0	3.26	-
			DD/DF	1281718	14445.45	5	1293822	17284.98	0	0	4	2.73	15.94

Table 181: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	409972	10.87	5	427493	4551.02	4291.4	5	5	4.09	0
			SD/DF	389322	9.32	5	406353	3534.84	4096	5	5	4.19	0
			DD/SF	368940	10.47	5	384296	9760.6	6557.2	4	5	4	0.54
			DD/DF	393477	8.81	5	410521	4159.46	4117.6	5	5	4.16	0
		10	SD/SF	508223	9.9	5	527642	10013.88	46970.2	4	5	3.68	0
			SD/DF	445488	7.64	5	463185	4856.31	6937.8	5	5	3.82	0
			DD/SF	440235	8.24	5	456243	6624.2	16534	5	5	3.5	0
			DD/DF	440361	8.5	5	457166	2407.98	3141.2	5	5	3.68	0
		15	SD/SF	533160	7.73	5	551125	14083.15	72360.4	4	5	3.26	0.01
			SD/DF	477664	6.96	5	493994	1568.4	4921.2	5	5	3.3	0
			DD/SF	483419	7.61	5	499299	11892.65	27282.4	4	5	3.14	0.26
			DD/DF	487466	8.59	5	503767	2070.6	3785.8	5	5	3.24	0
		20	SD/SF	585595	7.57	5	602944	17656.12	114603.4	2	5	2.87	0.03
			SD/DF	536664	6.35	5	552816	3289.95	18880.8	5	5	2.92	0
			DD/SF	561515	8.21	5	578611	6325.93	37206.2	5	5	2.95	0
			DD/DF	538388	5.67	5	554793	2331.96	11781.4	5	5	2.96	0
	100	5	SD/SF	482059	60.75	5	499819	14384.95	3282.6	2	5	3.47	1.14
			SD/DF	434087	44.63	5	451099	17121.42	3081	2	5	3.76	0.07
			DD/SF	444947	56.16	5	461179	17552.12	2301.2	1	5	3.51	0.02
			DD/DF	435674	53.29	5	452054	7952.67	4764.2	5	5	3.62	0
		10	SD/SF	528702	53.74	5	548359	21600.1	2726.8	0	5	3.51	1.93
			SD/DF	491745	42.35	5	508965	21600.14	2495.2	0	5	3.31	0.79
			DD/SF	480389	70.22	5	497236	21600.12	2993.4	0	5	3.27	2.4
			DD/DF	478489	46.88	5	494286	7750.25	5834.2	5	5	3.19	0
		15	SD/SF	570562	52.78	5	589857	21600.12	3268.2	0	5	3.18	2.24
			SD/DF	509664	47.49	5	524901	12962.11	4361.4	3	5	2.89	0.07
			DD/SF	552093	48.89	5	570624	17301.32	5494.8	2	5	3.21	1.54
			DD/DF	522477	34.2	5	540043	16235.52	3539.2	2	5	3.22	0.43
		20	SD/SF	603458	35.76	5	621301	21600.1	5056.8	0	5	2.82	1.54
			SD/DF	564646	34.84	5	581505	7531.96	3270.2	5	5	2.89	0
			DD/SF	623291	37.32	5	642090	14514.55	7296.8	3	5	2.9	0.56
			DD/DF	584312	31.93	5	600800	8577.45	5299.4	5	5	2.75	0
	200	5	SD/SF	548128	477.94	5	565438	21600.1	1029.6	0	5	3.05	1.06
			SD/DF	517766	245.65	5	534990	21600.12	2511	0	5	3.22	0.01
			DD/SF	557384	408.9	5	574253	21600.14	1470.4	0	5	2.92	0.5
			DD/DF	509691	224.92	5	527055	13517.64	2114.2	4	5	3.3	0
		10	SD/SF	585375	432.94	5	600716	21600.1	1427.2	0	5	2.4	1.33
			SD/DF	562794	262.09	5	577263	18314.42	1790.2	1	5	2.5	0.04
			DD/SF	584996	259.29	5	601828	21600.14	1446.2	0	5	2.6	1.27
			DD/DF	571286	247.58	5	590029	21600.12	2112.6	0	5	3.17	0.04
		15	SD/SF	630303	341.87	5	649039	21600.12	1845	0	5	2.54	2.3
			SD/DF	607848	284.6	5	626646	21600.12	2108.2	0	5	2.99	0.05
			DD/SF	610094	375.38	5	626593	21600.14	1510	0	5	2.48	1.64
			DD/DF	608003	252.92	5	624920	21600.12	2286.6	0	5	2.67	0.22
		20	SD/SF	712011	406.97	5	731743	21600.12	1527.6	0	5	2.54	2.09
			SD/DF	672459	302.03	5	690838	21600.14	2432.4	0	5	2.57	0.81
			DD/SF	734429	375.86	5	755533	21600.1	1898	0	5	2.64	2.13
			DD/DF	666615	244.06	5	682498	21600.12	3949.6	0	5	2.29	0.11

Table 182: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	866734	349.01	5	713142	17280.08	3308	0	4	4.27	3.69
			SD/DF	769592	179.88	5	806622	21600.1	2518.2	0	5	4.39	4.19
			DD/SF	839960	215.95	5	881357	21600.14	3268.8	0	5	4.24	4.55
			DD/DF	757165	156.89	5	793191	21600.1	1845.4	0	5	4.39	3.92
		10	SD/SF	957878	222.86	5	996030	21600.1	2833.8	0	5	3.66	3.06
			SD/DF	838600	161.93	5	872975	21600.1	3233.4	0	5	3.68	3.69
			DD/SF	856268	200.11	5	893382	21600.1	2935.4	0	5	3.65	4.1
			DD/DF	847123	185.02	5	880918	21600.1	3057.6	0	5	3.7	3.6
		15	SD/SF	1009189	210.91	5	1047364	21600.12	3062	0	5	3.38	2.97
			SD/DF	912477	149.71	5	947582	21600.14	2022.4	0	5	3.42	3.44
			DD/SF	947851	212.19	5	982556	21600.14	2654.8	0	5	3.27	3.49
			DD/DF	925646	177.87	5	959921	21600.1	2247	0	5	3.48	3.24
		20	SD/SF	1146690	198.29	5	1186868	21600.16	4357.8	0	5	3.22	2.14
			SD/DF	988948	156.29	5	1022320	21600.1	2722.6	0	5	3.15	2.97
			DD/SF	1061478	307.55	5	1097486	21600.12	3217	0	5	3.06	3.25
			DD/DF	987352	174.88	5	1020430	21600.12	3305.4	0	5	3.03	3.05
	100	5	SD/SF	924816	1760.86	5	975945	21600.3	429.8	0	5	3.85	5.17
			SD/DF	869982	731.59	5	912037	21600.28	812	0	5	3.83	4.25
			DD/SF	922677	1340.29	5	971677	21600.28	291	0	5	3.79	4.96
			DD/DF	868945	651.3	5	916593	21600.24	486.8	0	5	3.78	4.85
		10	SD/SF	1016354	1686.06	5	1072241	21600.3	422.8	0	5	3.73	5.12
			SD/DF	940557	855.57	5	986970	21600.22	497	0	5	3.53	4.49
			DD/SF	1055602	1562.98	5	1112984	21600.26	354.2	0	5	3.71	5.13
			DD/DF	949205	713.53	5	991716	21600.2	509	0	5	3.53	4.06
		15	SD/SF	1060669	1339.39	5	1119412	21600.26	547.6	0	5	3.38	5.22
			SD/DF	997160	789.47	5	1037294	21600.26	394.4	0	5	3.31	3.64
			DD/SF	1068356	1638.56	5	1126098	21600.28	458.2	0	5	3.27	5.08
			DD/DF	1009096	767.39	5	1052052	21600.22	443.6	0	5	3.33	3.87
		20	SD/SF	1178699	1412.84	5	1240480	21600.32	491.2	0	5	3.07	5
			SD/DF	1085948	712.31	5	1122142	21600.26	255.6	0	5	2.75	2.98
			DD/SF	1168004	1515.73	5	1217664	21600.24	630.6	0	5	3.05	4.04
			DD/DF	1095302	774.7	5	1138884	21600.24	483.2	0	5	2.97	3.6
	200	5	SD/SF	1086557	8362.41	5	1212140	21600.46	9.4	0	5	3.53	9.62
			SD/DF	1025306	3214.41	5	1086110	21600.56	78.4	0	5	2.98	5.5
			DD/SF	1026764	5982.95	5	1118020	21600.52	14.8	0	5	3.37	8.11
			DD/DF	1019837	2808.94	5	1073798	21600.46	106.6	0	5	3.32	4.91
		10	SD/SF	1219796	7029.21	5	1643816	21600.48	5.2	0	5	3.3	24.36
			SD/DF	1121830	2706.31	5	1216722	21600.42	54.8	0	5	3.03	7.67
			DD/SF	1202722	7142.48	5	1354462	21600.52	15	0	5	3.16	10.98
			DD/DF	1122412	2454.47	5	1241526	21600.32	47.4	0	5	3.38	9.5
		15	SD/SF	1267770	6065.85	5	1576110	21600.5	21	0	5	3.13	18.05
			SD/DF	1200404	3003.48	5	1267038	21600.28	152	0	5	3.07	5.19
			DD/SF	1240702	4985.17	5	1387542	21600.4	27.4	0	5	3.41	10.54
			DD/DF	1205036	3296.35	5	1269334	21600.46	133.6	0	5	3.03	5.05
		20	SD/SF	1390948	6830.06	5	2048916	21600.46	27	0	5	3.2	31.2
			SD/DF	1278220	3881.26	5	1357708	21600.42	125	0	5	2.72	5.84
			DD/SF	1335258	5869.81	5	1460738	21600.42	28.8	0	5	3.11	8.41
			DD/DF	1281718	3371.55	5	1395492	21600.44	92	0	5	2.73	7.98

Table 183: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 15, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	409972	13.17	5	427493	6845.98	9339.4	5	5	4.09	0
			SD/DF	389322	8.95	5	406353	2830.96	10900.2	5	5	4.19	0
			DD/SF	368940	14.44	5	384296	3138.14	3722.6	5	5	4	0
			DD/DF	393477	9.84	5	410521	885.69	1832.8	5	5	4.16	0
		10	SD/SF	508223	13.32	5	527642	10587.65	24044	5	5	3.68	0
			SD/DF	445488	8.04	5	463185	2254.9	2924	5	5	3.82	0
			DD/SF	440235	13.52	5	456243	7022.47	12653.2	4	5	3.5	0
			DD/DF	440361	10.98	5	457166	1585.02	2801.2	5	5	3.68	0
		15	SD/SF	533160	11.67	5	551158	15214.83	62754.4	4	5	3.26	0.41
			SD/DF	477664	10.38	5	493994	1914.63	17782.2	5	5	3.3	0
			DD/SF	483419	14.4	5	499117	11527.03	31631.2	4	5	3.14	0
			DD/DF	487466	8.81	5	503767	936.04	2930.2	5	5	3.24	0
		20	SD/SF	585595	15.08	5	602936	19903.84	115348.2	2	5	2.87	0.02
			SD/DF	536664	8.97	5	552816	4694.22	23194.6	5	5	2.92	0
			DD/SF	561515	15.31	5	578611	11214.03	69247.6	4	5	2.95	0
			DD/DF	538388	9.01	5	554793	2704.95	13984.8	5	5	2.96	0
	100	5	SD/SF	482059	68.12	5	499662	19390	4448.2	2	5	3.47	0.9
			SD/DF	434087	35.53	5	451075	3544.72	4418.2	5	5	3.76	0
			DD/SF	444947	61.53	5	461251	14563.65	4063	3	5	3.51	0.06
			DD/DF	435674	36.77	5	452055	6769.24	3066.6	4	5	3.62	0.14
		10	SD/SF	528702	61.72	5	548588	21600.06	3480	0	5	3.51	2.51
			SD/DF	491745	56.49	5	508546	13203.4	5340.6	4	5	3.31	0.29
			DD/SF	480389	59.29	5	496822	14905.21	4111.4	2	5	3.27	1.19
			DD/DF	478489	38.87	5	494286	8937.16	4717.8	5	5	3.19	0
		15	SD/SF	570562	70.52	5	589678	19520.94	4736.4	2	5	3.18	1.79
			SD/DF	509664	39.36	5	524869	7666.49	5048.8	4	5	2.89	0.02
			DD/SF	552093	61.44	5	570854	21600.08	3113.4	0	5	3.21	2.18
			DD/DF	522477	39.76	5	539927	10284.46	4860.2	5	5	3.22	0
		20	SD/SF	603458	86.83	5	621161	20981.02	10070.4	1	5	2.82	0.5
			SD/DF	564646	37.04	5	581505	11119.16	2700.8	3	5	2.89	0.01
			DD/SF	623291	68.58	5	641930	15882.47	9716	2	5	2.9	0.06
			DD/DF	584312	42.29	5	600800	5168.34	5056.2	5	5	2.75	0
	200	5	SD/SF	548128	383.05	5	565405	21600.1	15025.8	0	5	3.05	0.19
			SD/DF	517766	170.05	5	534975	9733.33	11541.4	4	5	3.22	0
			DD/SF	557384	358.93	5	574290	16321.67	8685.6	2	5	2.92	0.14
			DD/DF	509691	146.97	5	527054	9591.62	4915.6	5	5	3.3	0
		10	SD/SF	585375	427.95	5	600485	21600.1	1891.8	0	5	2.4	0.56
			SD/DF	562794	212.94	5	577234	14081.09	8089.2	4	5	2.5	0
			DD/SF	584996	322.46	5	601527	21600.1	1540	0	5	2.6	1.23
			DD/DF	571286	204.25	5	590029	19408.36	5050.6	2	5	3.17	0.27
		15	SD/SF	630303	445.39	5	648032	21600.1	1539	0	5	2.54	1.39
			SD/DF	607848	247.38	5	626615	17782.51	3004.2	2	5	2.99	0.04
			DD/SF	610094	381.78	5	626981	21600.08	1871.6	0	5	2.48	1.19
			DD/DF	608003	221	5	624716	21600.08	2616.4	0	5	2.67	0.21
		20	SD/SF	712011	388.09	5	731765	21600.06	1806.2	0	5	2.54	1.7
			SD/DF	672459	223.64	5	690965	21600.1	6798	0	5	2.57	0.56
			DD/SF	734429	456.35	5	755145	21600.1	1444.4	0	5	2.64	2.11
			DD/DF	666615	216.7	5	682269	18223	2818	2	5	2.29	0.32

Table 184: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 30, C = 1.75$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	866734	352.24	5	908522	21600.14	1968.4	0	5	4.27	2.95
			SD/DF	769592	134.03	5	805293	19832.56	2670.4	1	5	4.39	0.36
			DD/SF	839960	295.24	5	879521	21600.14	1950.4	0	5	4.24	1.42
			DD/DF	757165	174.42	5	791871	17005.82	3367.6	3	5	4.39	0.14
		10	SD/SF	957878	416.42	5	996509	21600.12	3310.6	0	5	3.66	2.45
			SD/DF	838600	258.06	5	871027	21058.64	5332	1	5	3.68	0.27
			DD/SF	856268	394.47	5	889643	21600.1	3585.6	0	5	3.65	2.22
			DD/DF	847123	256.68	5	879787	20692.42	5276.8	1	5	3.7	0.17
		15	SD/SF	1009189	509.4	5	1045842	21600.1	3641.2	0	5	3.38	2.26
			SD/DF	912477	245.77	5	945200	21600.1	4837.8	0	5	3.42	0.23
			DD/SF	947851	425.61	5	981398	21600.1	3355.2	0	5	3.27	2.13
			DD/DF	925646	216.22	5	959047	11587.02	5766.6	4	5	3.48	0.01
		20	SD/SF	1146690	462.52	5	1187152	21600.12	3183.8	0	5	3.22	3.39
			SD/DF	988948	223.95	5	1021366	21600.1	6665.2	0	5	3.15	0.22
			DD/SF	1061478	420.9	5	1096465	21600.1	4540	0	5	3.06	1.47
			DD/DF	987352	225.63	5	1018605	21600.1	8072.4	0	5	3.03	0.73
	100	5	SD/SF	924816	1342.17	5	972876	21600.34	227.8	0	5	3.85	4.2
			SD/DF	869982	508.47	5	907783	21600.28	851.6	0	5	3.83	1.35
			DD/SF	922677	1111.4	5	972478	21600.4	261.6	0	5	3.79	5.03
			DD/DF	868945	480.66	5	904871	21600.3	1373.6	0	5	3.78	1.52
		10	SD/SF	1016354	1478.87	5	1079433	21600.26	389.8	0	5	3.73	5.75
			SD/DF	940557	597.83	5	985434	21600.38	449	0	5	3.53	4.16
			DD/SF	1055602	1370.6	5	1112448	21600.24	326.6	0	5	3.71	5.08
			DD/DF	949205	568.27	5	991708	21600.22	662.8	0	5	3.53	2.33
		15	SD/SF	1060669	1374	5	1109388	21600.26	317	0	5	3.38	4.37
			SD/DF	997160	671.83	5	1034036	21600.18	1041.6	0	5	3.31	1.6
			DD/SF	1068356	1359.59	5	1123150	21600.18	498	0	5	3.27	4.82
			DD/DF	1009096	686.14	5	1050044	21600.28	838	0	5	3.33	1.9
		20	SD/SF	1178699	1664.17	5	1259486	21600.32	378.6	0	5	3.07	6.41
			SD/DF	1085948	754.41	5	1118136	21600.24	1460.4	0	5	2.75	0.67
			DD/SF	1168004	1514.08	5	1220388	21600.26	266.4	0	5	3.05	4.26
			DD/DF	1095302	539.11	5	1131084	21600.18	722	0	5	2.97	2.43
	200	5	SD/SF	1086557	5792.46	5	1422654	21600.5	7.4	0	5	3.53	22.1
			SD/DF	1025306	2033.78	5	1075546	21600.34	134.2	0	5	2.98	4.52
			DD/SF	1026764	3741.64	5	1103794	21600.42	26.4	0	5	3.37	6.92
			DD/DF	1019837	1590.83	5	1070960	21600.3	223.6	0	5	3.32	4.41
		10	SD/SF	1219796	4981.25	5	1783916	21600.34	13.6	0	5	3.3	31.27
			SD/DF	1121830	2256.61	5	1178088	21600.36	383	0	5	3.03	4.57
			DD/SF	1202722	3903.73	5	1376486	21600.46	27.4	0	5	3.16	12.14
			DD/DF	1122412	1826.42	5	1200564	21600.46	269.4	0	5	3.38	6.32
		15	SD/SF	1267770	4976.83	5	1942722	21600.4	14.6	0	5	3.13	34.65
			SD/DF	1200404	2299.25	5	1259476	21600.4	211.2	0	5	3.07	4.62
			DD/SF	1240702	5103.78	5	1550580	21600.5	19.8	0	5	3.41	18.44
			DD/DF	1205036	2631.85	5	1274560	21600.5	299	0	5	3.03	4.89
		20	SD/SF	1390948	5617.37	5	2125198	21600.42	21.8	0	5	3.2	34.32
			SD/DF	1278220	2906.26	5	1330536	21600.42	174.6	0	5	2.72	3.86
			DD/SF	1335258	3925.18	5	1715278	21600.48	24.4	0	5	3.11	21.06
			DD/DF	1281718	2576.69	5	1351954	21600.42	213	0	5	2.73	5.1

Table 185: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.5	5	468710	80.06	2840	5	5	1.24	0
			SD/DF	441392	0.34	5	448962	129.48	31486.8	5	5	1.69	0
			DD/SF	415013	0.38	5	420864	87.81	4110	5	5	1.4	0
			DD/DF	446236	0.33	5	453273	48.79	8325.6	5	5	1.56	0
		10	SD/SF	572590	0.65	5	576410	624.02	44183.2	5	5	0.66	0
			SD/DF	504470	0.31	5	509714	62.79	4088.2	5	5	1.03	0
			DD/SF	493839	0.5	5	498442	806.38	80270.2	5	5	0.93	0
			DD/DF	498129	0.33	5	504415	88.98	6165.4	5	5	1.24	0
		15	SD/SF	600437	0.71	5	602610	4301.86	286539.6	5	5	0.36	0
			SD/DF	542445	0.4	5	547500	707.44	62536.8	5	5	0.92	0
			DD/SF	544530	0.59	5	548259	4592.9	408988.4	5	5	0.68	0
			DD/DF	550684	0.4	5	556051	296.46	24933	5	5	0.96	0
		20	SD/SF	660792	0.73	5	0	0	0	0	0	0.27	0
			SD/DF	608397	0.36	5	612207	2023.81	145293.4	5	5	0.62	0
			DD/SF	632983	0.45	5	247883	4108.44	282345.4	2	2	0.4	0
			DD/DF	613350	0.36	5	616759	2505.98	173856.6	5	5	0.55	0
	100	5	SD/SF	537363	1.01	5	428823	261.59	10770.6	4	4	1.57	0
			SD/DF	484689	0.57	5	495018	116.14	8655.8	5	5	2.09	0
			DD/SF	493140	0.7	5	502159	1286.71	184614	5	5	1.8	0
			DD/DF	483171	0.57	5	494412	1395.9	218461.4	5	5	2.28	0
		10	SD/SF	585804	1.19	5	592241	987.41	31776.2	5	5	1.08	0
			SD/DF	545572	0.7	5	554703	1768.52	195275.4	5	5	1.65	0
			DD/SF	527962	1.01	5	535534	1054.63	23535.6	5	5	1.42	0
			DD/DF	529353	0.71	5	538435	583.94	47310.4	5	5	1.68	0
		15	SD/SF	629851	1.24	5	635754	2411.8	81755	5	5	0.93	0
			SD/DF	562844	0.73	5	570997	445.98	19125.2	5	5	1.43	0
			DD/SF	607255	1.07	5	614026	1859.09	49024.6	5	5	1.11	0
			DD/DF	577223	0.7	5	585709	541.68	22877.4	5	5	1.45	0
		20	SD/SF	665713	1.45	5	670029	12683.29	729739.4	4	5	0.65	0.01
			SD/DF	623749	0.72	5	629784	761.32	35649.6	5	5	0.95	0
			DD/SF	687748	1.3	5	692933	7378.6	367831.8	5	5	0.75	0
			DD/DF	644544	0.79	5	651934	730.44	32902.8	5	5	1.13	0
	200	5	SD/SF	596386	2.69	5	611237	3190.56	188362.6	5	5	2.46	0
			SD/DF	558449	1.36	5	577715	9907.2	758454.4	4	5	3.33	0
			DD/SF	603204	1.76	5	619590	13252.94	1076355.8	2	5	2.64	0
			DD/DF	549705	1.37	5	571024	3571.38	234659.6	5	5	3.71	0
		10	SD/SF	634008	3.04	5	647660	6282.93	383740.8	4	5	2.12	0
			SD/DF	604959	1.61	5	498495	7181.55	395981.8	3	4	3.24	0
			DD/SF	629573	2.13	5	511949	6375.48	267951.2	3	4	2.56	0
			DD/DF	614693	1.63	5	632929	11925.96	824092	3	5	2.88	0
		15	SD/SF	681005	3.75	5	552507	4643.48	48036.6	4	4	1.78	0
			SD/DF	653014	1.68	5	538462	3325.98	126720.4	4	4	3.13	0
			DD/SF	655386	2.43	5	523066	10213.55	242980.2	3	4	2.37	0
			DD/DF	652315	1.73	5	402801	5751.75	247479	2	3	2.58	0
		20	SD/SF	767470	3.49	5	778665	19260.11	406173.4	1	5	1.44	0.03
			SD/DF	722351	2.05	5	588826	6860.24	161899.2	4	4	2.21	0
			DD/SF	792897	2.72	5	805173	15557.14	265867	3	5	1.52	0.03
			DD/DF	713663	1.98	5	583588	10359.7	575955.8	3	4	2.2	0

Table 186: Performance of the ES-N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	7.79	5	991162	21600.06	43147.2	0	5	1.08	0.62
			SD/DF	875670	3.11	5	890153	4788	86451.2	5	5	1.63	0
			DD/SF	947825	5.94	5	961861	21600.04	72643.8	0	5	1.35	0.71
			DD/DF	860656	2.84	5	877983	4972.09	60502.2	5	5	1.98	0
		10	SD/SF	1075834	16.86	5	1084848	21600.06	44402.6	0	5	0.7	0.64
			SD/DF	947202	3.5	5	959144	21600.08	132926.4	0	5	1.2	0.33
			DD/SF	958320	8.31	5	968583	21600.1	61193	0	5	1.01	0.74
			DD/DF	958949	3.93	5	969688	18018.77	195288.6	3	5	1.08	0.12
		15	SD/SF	1130584	16.16	5	1138434	21600.06	69624.4	0	5	0.53	0.62
			SD/DF	1031462	3.67	5	1041108	21600.06	227431.6	0	5	0.9	0.3
			DD/SF	1057423	9.41	5	1066172	21600.06	99059.8	0	5	0.68	0.67
			DD/DF	1045226	3.48	5	1053446	21600.14	272386	0	5	0.77	0.2
		20	SD/SF	1285510	16.81	5	1291564	21600.08	78369.4	0	5	0.43	0.43
			SD/DF	1115988	4.35	5	896604	17280.08	160808.4	0	4	0.57	0.27
			DD/SF	1182592	9.51	5	1189246	21600.08	123999.8	0	5	0.51	0.44
			DD/DF	1113104	4.58	5	1121056	21600.06	231564.8	0	5	0.68	0.26
	100	5	SD/SF	1031515	13.02	5	1050048	21600.1	13543.6	0	5	1.68	1.17
			SD/DF	970338	8.76	5	993813	19953.82	75263.6	1	5	2.36	0.26
			DD/SF	1022399	9.43	5	1044806	21600.1	13773.2	0	5	2.13	1.42
			DD/DF	966721	8.76	5	992708	21600.12	38042	0	5	2.59	0.69
		10	SD/SF	1124130	27.34	5	1140882	21600.1	10274.8	0	5	1.35	1.27
			SD/DF	1041774	9.97	5	1062088	21600.1	26415.4	0	5	1.86	0.9
			DD/SF	1163864	16.87	5	1187588	21600.1	15132	0	5	1.6	1.74
			DD/DF	1049546	10.16	5	1069874	21602.6	25873	0	5	1.85	0.91
		15	SD/SF	1167470	49.49	5	1183230	21605.66	12018.4	0	5	1.18	1.24
			SD/DF	1100882	11.91	5	1122946	21603.16	29885.2	0	5	1.87	0.99
			DD/SF	1171910	24.66	5	1192012	21600.14	21393.2	0	5	1.6	1.49
			DD/DF	1112286	9.53	5	1132020	21600.12	32380.8	0	5	1.69	1
		20	SD/SF	1295268	49.23	5	1309706	21600.14	12279.4	0	5	0.96	1.03
			SD/DF	1194754	14.07	5	1211872	21600.16	41321.2	0	5	1.36	0.66
			DD/SF	1279866	30.76	5	1297114	21600.14	20296.2	0	5	1.16	1.2
			DD/DF	1207450	16.01	5	1226072	21600.2	19889.2	0	5	1.37	0.98
	200	5	SD/SF	1185558	29.5	5	1224966	21600.16	3964	0	5	3	2.76
			SD/DF	1104240	13.04	5	1150624	21600.2	11283.6	0	5	3.99	2.23
			DD/SF	1105216	20.22	5	1148242	21600.18	6117	0	5	3.56	2.94
			DD/DF	1097814	15.59	5	1147802	21600.14	11314.2	0	5	4.29	2.3
		10	SD/SF	1322306	42.16	5	1358922	21600.14	3363.2	0	5	2.44	2.57
			SD/DF	1202528	26.55	5	1254400	21600.2	8071	0	5	4	2.85
			DD/SF	1293504	20.22	5	1338806	21600.14	4244	0	5	3.25	2.98
			DD/DF	1204956	26.2	5	1254274	21600.26	7678.4	0	5	3.73	2.9
		15	SD/SF	1367194	43.87	5	1410508	21600.22	2562.4	0	5	2.63	2.98
			SD/DF	1286728	29.81	5	1333898	21600.3	4928.8	0	5	3.26	2.93
			DD/SF	1330782	29.69	5	1385150	21600.26	3193.6	0	5	3.01	3.71
			DD/DF	1289538	24.92	5	1339904	21600.24	4968.4	0	5	3.49	3.2
		20	SD/SF	1495566	60.38	5	1533430	21600.18	3975.4	0	5	2.08	2.4
			SD/DF	1365472	35.32	5	1404694	21600.16	8269	0	5	2.63	2.29
			DD/SF	1424496	21.12	5	1464458	21600.16	6642.2	0	5	2.57	2.54
			DD/DF	1370138	25.89	5	1407784	21600.14	8374.6	0	5	2.61	2.13

Table 187: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.93	5	468710	127.25	2943.8	5	5	1.24	0
			SD/DF	441392	0.33	5	448962	106.32	17731.8	5	5	1.69	0
			DD/SF	415013	0.48	5	420864	120.29	2924.2	5	5	1.4	0
			DD/DF	446236	0.29	5	453273	52.87	7528	5	5	1.56	0
		10	SD/SF	572590	1.17	5	576410	1336.41	43293	5	5	0.66	0
			SD/DF	504470	0.42	5	509714	124.88	3827.4	5	5	1.03	0
			DD/SF	493839	0.74	5	498442	1373.84	59454.8	5	5	0.93	0
			DD/DF	498129	0.4	5	504415	165.3	4724.4	5	5	1.24	0
		15	SD/SF	600437	1.21	5	478734	4911.49	133293	4	4	0.36	0
			SD/DF	542445	0.63	5	547500	1441.69	56364.4	5	5	0.92	0
			DD/SF	544530	1.04	5	438235	9270.47	267212.6	3	4	0.68	0.02
			DD/DF	550684	0.55	5	556051	507.15	16491.4	5	5	0.96	0
		20	SD/SF	660792	1.7	5	0	0	0	0	0	0.27	0
			SD/DF	608397	0.8	5	484445	899.29	32087.6	4	4	0.62	0
			DD/SF	632983	1.09	5	126442	2510.98	80410.4	1	1	0.4	0
			DD/DF	613350	0.78	5	616759	3831.48	125644.2	5	5	0.55	0
	100	5	SD/SF	537363	1.97	5	545834	4749.64	849399.4	4	5	1.57	0
			SD/DF	484689	0.78	5	495018	134.11	4056.4	5	5	2.09	0
			DD/SF	493140	1.11	5	502159	1126.02	97060.2	5	5	1.8	0
			DD/DF	483171	0.73	5	494412	826.11	87268.8	5	5	2.28	0
		10	SD/SF	585804	2.31	5	592241	2865.28	28570.2	5	5	1.08	0
			SD/DF	545572	1.09	5	554703	2429.1	188294.8	5	5	1.65	0
			DD/SF	527962	1.6	5	535534	2571.34	20477.2	5	5	1.42	0
			DD/DF	529353	1.04	5	538435	690.98	34995	5	5	1.68	0
		15	SD/SF	629851	2.5	5	635754	5775.94	77374.6	5	5	0.93	0
			SD/DF	562844	1.38	5	570997	883.9	12280.6	5	5	1.43	0
			DD/SF	607255	1.9	5	614026	3712.45	40836.4	5	5	1.11	0
			DD/DF	577223	0.99	5	585709	1397.65	14968.4	5	5	1.45	0
		20	SD/SF	665713	2.91	5	531712	15146.16	295039.4	2	4	0.65	0
			SD/DF	623749	1.34	5	629784	1800.84	24237	5	5	0.95	0
			DD/SF	687748	2.34	5	692933	17661.1	331408.8	4	5	0.75	0
			DD/DF	644544	1.32	5	651934	1327.31	17636.6	5	5	1.13	0
	200	5	SD/SF	596386	5.79	5	611237	2746.91	79212.2	5	5	2.46	0
			SD/DF	558449	2.02	5	577715	10394.55	562080.6	3	5	3.33	0
			DD/SF	603204	2.88	5	619590	13366.88	834143.6	2	5	2.64	0
			DD/DF	549705	1.83	5	571024	3330.14	126015.8	5	5	3.71	0
		10	SD/SF	634008	6.38	5	647660	10531.2	299727	4	5	2.12	0
			SD/DF	604959	2.4	5	625247	13910.77	392237.6	3	5	3.24	0
			DD/SF	629573	3.46	5	511957	12999.27	208365.4	2	4	2.56	0.08
			DD/DF	614693	2.3	5	632929	14764.01	508769.6	3	5	2.88	0
		15	SD/SF	681005	6.52	5	-	-	-	0	0	1.78	-
			SD/DF	653014	2.63	5	-	-	-	0	0	3.13	-
			DD/SF	655386	4.07	5	-	-	-	0	0	2.37	-
			DD/DF	652315	2.48	5	-	-	-	0	0	2.58	-
		20	SD/SF	767470	6.25	5	778759	21552.44	78972.4	1	5	1.44	0.16
			SD/DF	722351	3.12	5	738756	19588.7	54818	1	5	2.21	0.3
			DD/SF	792897	4.5	5	805313	20235.38	77933.6	1	5	1.52	0.17
			DD/DF	713663	3.05	5	434312	9179.81	242319.8	2	3	2.2	0

Table 188: Performance of the ES-T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	9.34	5	990770	21600	53262.4	0	5	1.08	0.4
			SD/DF	875670	2.46	5	890153	4877.53	83077.8	5	5	1.63	0
			DD/SF	947825	4.79	5	961151	21600	61444.2	0	5	1.35	0.5
			DD/DF	860656	2.64	5	877983	5092.14	35202.2	5	5	1.98	0
		10	SD/SF	1075834	15.38	5	1084474	21600	42364.6	0	5	0.7	0.6
			SD/DF	947202	4.1	5	959124	21600	60894.8	0	5	1.2	0.39
			DD/SF	958320	9.74	5	968525	21600.04	55858.2	0	5	1.01	0.76
			DD/DF	958949	3.68	5	969578	21600.04	79533.8	0	5	1.08	0.23
		15	SD/SF	1130584	30.51	5	1137076	21600	48492.8	0	5	0.53	0.5
			SD/DF	1031462	6.99	5	1040972	21600	93731.6	0	5	0.9	0.29
			DD/SF	1057423	10.62	5	1065048	21600.06	71593	0	5	0.68	0.56
			DD/DF	1045226	4.02	5	1053374	21600	98196.2	0	5	0.77	0.23
		20	SD/SF	1285510	27.44	5	1291724	21600	52401.6	0	5	0.43	0.44
			SD/DF	1115988	9.28	5	1122638	21600.02	95057.4	0	5	0.57	0.3
			DD/SF	1182592	13.62	5	666690	12960.04	46395	0	3	0.51	0.28
			DD/DF	1113104	6.99	5	892262	17280.04	77075.6	0	4	0.68	0.21
	100	5	SD/SF	1031515	18.96	5	1049256	21600.12	11081.2	0	5	1.68	1.14
			SD/DF	970338	5.82	5	993995	21600.04	35405.2	0	5	2.36	0.41
			DD/SF	1022399	7.84	5	1045028	21600.08	12817	0	5	2.13	1.32
			DD/DF	966721	3.62	5	793409	17280.06	21724.4	0	4	2.59	0.51
		10	SD/SF	1124130	26.24	5	1141860	21600.1	10727.8	0	5	1.35	1.35
			SD/DF	1041774	8.01	5	1061770	21600.06	14504.8	0	5	1.86	0.99
			DD/SF	1163864	16.73	5	1184960	21600.08	10674.8	0	5	1.6	1.52
			DD/DF	1049546	5.13	5	1070460	21600.1	15481.6	0	5	1.85	1.13
		15	SD/SF	1167470	38.79	5	1182892	21600.08	9525.6	0	5	1.18	1.2
			SD/DF	1100882	9.94	5	1123152	21600.18	9755.8	0	5	1.87	1.34
			DD/SF	1171910	17.2	5	1192874	21600.1	12171.4	0	5	1.6	1.56
			DD/DF	1112286	6.21	5	1131892	21600.04	13866.6	0	5	1.69	1.07
		20	SD/SF	1295268	61.74	5	1308710	21600.06	13112.2	0	5	0.96	0.95
			SD/DF	1194754	12.09	5	1211682	21600.06	12761.8	0	5	1.36	0.72
			DD/SF	1279866	23.53	5	1295010	21600.08	18774.2	0	5	1.16	1.02
			DD/DF	1207450	7.67	5	1225110	21600.08	19342.2	0	5	1.37	0.88
	200	5	SD/SF	1185558	59.41	5	1223012	21600.1	3912	0	5	3	2.46
			SD/DF	1104240	13.81	5	1151582	21600.12	3407.6	0	5	3.99	2.68
			DD/SF	1105216	18.47	5	1148994	21600.1	3528.4	0	5	3.56	2.77
			DD/DF	1097814	7.7	5	1148570	21600.12	3189.6	0	5	4.29	2.98
		10	SD/SF	1322306	77.38	5	1365942	21600.16	2756.2	0	5	2.44	3.09
			SD/DF	1202528	17.71	5	1265588	21600.24	1725.6	0	5	4	4.21
			DD/SF	1293504	26.14	5	1343428	21600.2	3128.2	0	5	3.25	3.38
			DD/DF	1204956	12.81	5	1255446	21600.18	2738.4	0	5	3.73	3.05
		15	SD/SF	1367194	99.31	5	1410308	21600.22	2854	0	5	2.63	2.93
			SD/DF	1286728	20.71	5	1337648	21600.2	2394.4	0	5	3.26	3.08
			DD/SF	1330782	35.25	5	1378540	21600.16	4173.4	0	5	3.01	3.19
			DD/DF	1289538	14.55	5	1338550	21600.1	3277.6	0	5	3.49	2.9
		20	SD/SF	1495566	95.82	5	1529104	21600.1	4579.8	0	5	2.08	2.1
			SD/DF	1365472	25.95	5	1407162	21600.1	3919.8	0	5	2.63	2.43
			DD/SF	1424496	44.52	5	1470468	21600.12	4203.2	0	5	2.57	2.92
			DD/DF	1370138	17.5	5	1410282	21600.1	4337.2	0	5	2.61	2.24

Table 189: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.56	5	468710	142.81	2650	5	5	1.24	0
			SD/DF	441392	0.23	5	448962	74.15	13609.8	5	5	1.69	0
			DD/SF	415013	0.32	5	420864	140.35	3369.2	5	5	1.4	0
			DD/DF	446236	0.17	5	453273	60.39	9855.2	5	5	1.56	0
		10	SD/SF	572590	0.62	5	576410	753.72	36279.2	5	5	0.66	0
			SD/DF	504468	0.25	5	509714	93.33	2695.2	5	5	1.03	0
			DD/SF	493839	0.47	5	498442	1164.63	55842.8	5	5	0.93	0
			DD/DF	498129	0.23	5	504415	153.88	4187.8	5	5	1.24	0
		15	SD/SF	600437	0.76	5	356101	1421.68	65358.6	3	3	0.36	0
			SD/DF	542437	0.31	5	547500	639.37	24449	5	5	0.93	0
			DD/SF	544530	0.54	5	332019	3282.02	162500.8	3	3	0.68	0
			DD/DF	550681	0.28	5	556051	244.46	12931.8	5	5	0.97	0
		20	SD/SF	660792	0.81	5	0	0	0	0	0	0.27	0
			SD/DF	608397	0.32	5	612207	1286.77	78320.2	5	5	0.62	0
			DD/SF	632983	0.55	5	126442	2019.46	85115.4	1	1	0.4	0
			DD/DF	613348	0.34	5	616759	1057.37	45707.6	5	5	0.55	0
	100	5	SD/SF	537363	1.16	5	545834	4773.75	814755	4	5	1.57	0
			SD/DF	484682	0.57	5	495018	95.31	4205.6	5	5	2.09	0
			DD/SF	493140	0.78	5	502159	803.54	67939	5	5	1.8	0
			DD/DF	483168	0.53	5	494412	722.57	97069	5	5	2.28	0
		10	SD/SF	585804	1.74	5	592241	1736.54	28493.8	5	5	1.08	0
			SD/DF	545565	0.76	5	554703	1711.3	153713.8	5	5	1.65	0
			DD/SF	527962	1.31	5	535534	2418.07	20937.6	5	5	1.42	0
			DD/DF	529328	0.71	5	538435	591.83	25910.2	5	5	1.69	0
		15	SD/SF	629851	1.93	5	635754	4393.73	57931.4	5	5	0.93	0
			SD/DF	562835	0.93	5	570997	852.09	12131	5	5	1.43	0
			DD/SF	607255	1.29	5	614026	3050.19	45917.8	5	5	1.11	0
			DD/DF	577221	0.77	5	585709	1077.23	15097	5	5	1.45	0
		20	SD/SF	665713	2.04	5	114960	1067.04	18827.4	1	1	0.65	0
			SD/DF	623744	1.02	5	629784	804.54	16798.6	5	5	0.95	0
			DD/SF	687748	1.42	5	416863	7736.27	172523.8	3	3	0.75	0
			DD/DF	644530	1.09	5	651934	806.52	16808.2	5	5	1.13	0
	200	5	SD/SF	596386	4.43	5	611237	4416.32	241410.2	5	5	2.46	0
			SD/DF	558448	1.52	5	577715	10066.39	964998.8	4	5	3.33	0
			DD/SF	603204	2.06	5	619590	13378.62	1199374.6	2	5	2.64	0
			DD/DF	549698	1.15	5	571024	1790.64	144670.2	5	5	3.71	0
		10	SD/SF	634008	4.62	5	647758	15049.1	190307.8	3	5	2.12	0.17
			SD/DF	604958	1.51	5	500261	9822.22	626482.4	3	4	3.24	0
			DD/SF	629573	2.13	5	646037	10611.06	324465.8	4	5	2.56	0
			DD/DF	614686	1.57	5	507483	8438.47	366467	3	4	2.88	0
		15	SD/SF	681005	5.66	5	693425	19388.3	37060.4	1	5	1.78	0.25
			SD/DF	653009	1.97	5	406505	5362.67	37218.2	3	3	3.13	0
			DD/SF	655386	2.93	5	671372	19023.93	85910.6	1	5	2.37	0.25
			DD/DF	652282	2.25	5	536843	9878.57	475972.2	3	4	2.58	0
		20	SD/SF	767470	7.53	5	779073	21600.1	66687	0	5	1.44	0.32
			SD/DF	722344	2.61	5	738844	14630.37	70375.4	3	5	2.21	0.11
			DD/SF	792897	4.88	5	805236	20360.5	59225.6	1	5	1.52	0.27
			DD/DF	713646	2.33	5	583588	11142.04	348090.2	4	4	2.2	0

Table 190: Performance of the ES-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	2.76	5	991151	21600.02	35154.2	0	5	1.08	0.53
			SD/DF	875661	0.63	5	890153	4655.18	45633.4	5	5	1.63	0
			DD/SF	947825	1.25	5	961219	21600.06	55429.6	0	5	1.35	0.59
			DD/DF	860652	0.65	5	877983	6131.78	31578.6	5	5	1.98	0
		10	SD/SF	1075834	3.5	5	1083918	21600	34568.6	0	5	0.7	0.54
			SD/DF	947189	1.08	5	959127	21600	70552.6	0	5	1.21	0.24
			DD/SF	958320	1.92	5	777731	17280	43839.8	0	4	1.01	0.63
			DD/DF	958933	0.97	5	574307	6934.62	38741	3	3	1.08	0
		15	SD/SF	1130584	4.54	5	933096	17280.08	34060	0	4	0.53	0.39
			SD/DF	1031454	1.5	5	-	-	-	0	0	0.91	-
			DD/SF	1057423	2.47	5	201202	4320.02	14866.8	0	1	0.68	0.1
			DD/DF	1045208	1.38	5	-	-	-	0	0	0.77	-
		20	SD/SF	1285510	5.87	5	1022660	17280.06	37935	0	4	0.43	0.35
			SD/DF	1115978	2.38	5	-	-	-	0	0	0.58	-
			DD/SF	1182592	3.3	5	-	-	-	0	0	0.51	-
			DD/DF	1113076	2.04	5	-	-	-	0	0	0.69	-
	100	5	SD/SF	1031515	23.05	5	1050683	21600.12	4569.6	0	5	1.68	1.26
			SD/DF	970327	2.41	5	993939	21600.44	15402	0	5	2.36	0.45
			DD/SF	1022399	6.4	5	1045704	21605.16	8741	0	5	2.13	1.36
			DD/DF	966711	2.9	5	793632	17282.54	8978.8	0	4	2.59	0.65
		10	SD/SF	1124130	12.8	5	1142508	21600.24	9711.4	0	5	1.35	1.42
			SD/DF	1041754	3.09	5	1062036	21610.48	10543.8	0	5	1.86	0.85
			DD/SF	1163864	5.8	5	712316	12960.38	5551.4	0	3	1.6	0.78
			DD/DF	1049504	2.28	5	-	-	-	0	0	1.86	-
		15	SD/SF	1167470	22.51	5	210490	4320.14	1153.2	0	1	1.18	0.25
			SD/DF	1100826	3.66	5	-	-	-	0	0	1.87	-
			DD/SF	1171910	7.32	5	-	-	-	0	0	1.6	-
			DD/DF	1112234	3.34	5	-	-	-	0	0	1.69	-
		20	SD/SF	1295268	23.43	5	-	-	-	0	0	0.96	-
			SD/DF	1194718	4.79	5	-	-	-	0	0	1.36	-
			DD/SF	1279866	15.34	5	-	-	-	0	0	1.16	-
			DD/DF	1207392	6.62	5	-	-	-	0	0	1.38	-
	200	5	SD/SF	1185558	79.67	5	1226526	21600.14	2788	0	5	3	2.61
			SD/DF	1104222	8.11	5	1152442	21600.2	3769.8	0	5	3.99	2.28
			DD/SF	1105216	26.23	5	1152948	21600.18	2156.8	0	5	3.56	3.16
			DD/DF	1097780	6.83	5	1149578	21600.26	2544.8	0	5	4.29	2.31
		10	SD/SF	1322306	65.7	5	1375588	21600.3	1117.8	0	5	2.44	3.66
			SD/DF	1202516	6.94	5	1258810	21600.24	2554.4	0	5	4.01	3.26
			DD/SF	1293504	17.78	5	1353984	21600.28	1866.2	0	5	3.25	3.99
			DD/DF	1204916	6.04	5	1261040	21600.26	2457.2	0	5	3.74	3.3
		15	SD/SF	1367194	42.15	5	1425412	21600.28	1869.8	0	5	2.63	3.86
			SD/DF	1286680	6.77	5	1332638	21600.16	3364.4	0	5	3.27	2.4
			DD/SF	1330782	17.66	5	1385086	21600.16	3272.2	0	5	3.01	3.48
			DD/DF	1289516	6.73	5	1341062	21600.18	3818.4	0	5	3.49	2.91
		20	SD/SF	1495566	61.68	5	1533890	21600.16	3464	0	5	2.08	2.38
			SD/DF	1365432	10.85	5	1410828	21600.16	4642.4	0	5	2.63	2.36
			DD/SF	1424496	29.14	5	1466892	21600.16	3565.2	0	5	2.57	2.62
			DD/DF	1370094	9.06	5	1410092	21600.16	3604.2	0	5	2.61	1.91

Table 191: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.78	5	468710	100.48	3615.6	5	5	1.24	0
			SD/DF	441392	0.48	5	448962	233.92	37625.6	5	5	1.69	0
			DD/SF	415013	0.67	5	420864	76.32	3704.4	5	5	1.4	0
			DD/DF	446236	0.6	5	453273	71.08	9706.4	5	5	1.56	0
		10	SD/SF	572590	0.96	5	576410	664.64	48110.4	5	5	0.66	0
			SD/DF	504470	0.49	5	509714	63.6	3788	5	5	1.03	0
			DD/SF	493839	0.66	5	498442	685.9	57093.4	5	5	0.93	0
			DD/DF	498129	0.48	5	504415	90.97	5936.8	5	5	1.24	0
		15	SD/SF	600437	1.26	5	602610	4657.41	326622.8	5	5	0.36	0
			SD/DF	542445	0.69	5	547500	875.08	69263.6	5	5	0.92	0
			DD/SF	544530	1.26	5	548259	5590.05	433525	5	5	0.68	0
			DD/DF	550684	0.84	5	556051	349.18	25213.2	5	5	0.96	0
		20	SD/SF	660792	0.64	5	260119	8640.08	422492	0	2	0.27	0.04
			SD/DF	608397	0.39	5	612207	2263.42	169324.4	5	5	0.62	0
			DD/SF	632983	0.48	5	498649	12540.75	799701.2	3	4	0.4	0.01
			DD/DF	613350	0.42	5	616759	2309.05	145311.4	5	5	0.55	0
	100	5	SD/SF	537363	1.25	5	428823	315.82	10740.6	4	4	1.57	0
			SD/DF	484689	0.89	5	495018	142.38	9221	5	5	2.09	0
			DD/SF	493140	1.16	5	502159	815.33	66471.8	5	5	1.8	0
			DD/DF	483171	0.96	5	494412	4626.61	399512.2	4	5	2.28	0
		10	SD/SF	585804	1.05	5	592241	989.08	27242.8	5	5	1.08	0
			SD/DF	545572	0.86	5	554703	2416.22	183796.2	5	5	1.65	0
			DD/SF	527962	0.96	5	535534	1048.29	25829.2	5	5	1.42	0
			DD/DF	529353	0.86	5	538435	744.78	53023.8	5	5	1.68	0
		15	SD/SF	629851	1.26	5	635754	2270.37	78257.6	5	5	0.93	0
			SD/DF	562844	0.81	5	570997	434.21	16994.8	5	5	1.43	0
			DD/SF	607255	1.07	5	614026	1655.94	46015.8	5	5	1.11	0
			DD/DF	577223	0.81	5	585709	634.09	26775.6	5	5	1.45	0
		20	SD/SF	665713	1.29	5	399602	7245.98	347572.8	3	3	0.65	0
			SD/DF	623749	0.78	5	629784	821.54	31492	5	5	0.95	0
			DD/SF	687748	1.14	5	692933	7765.43	325777.8	5	5	0.75	0
			DD/DF	644544	0.83	5	651934	942.3	39378.8	5	5	1.13	0
	200	5	SD/SF	596386	3.91	5	611237	5457.35	197454.6	4	5	2.46	0
			SD/DF	558449	2.78	5	577715	13704.67	688424	2	5	3.33	0
			DD/SF	603204	3.28	5	496425	8404.9	398625.6	3	4	2.64	0
			DD/DF	549705	2.88	5	571024	4333.16	157448.8	5	5	3.71	0
		10	SD/SF	634008	3.19	5	647660	6136.9	264037.2	4	5	2.12	0
			SD/DF	604959	2.2	5	625247	11686.93	507433.8	3	5	3.24	0
			DD/SF	629573	2.64	5	521016	3393.35	76250.6	4	4	2.56	0
			DD/DF	614693	2.23	5	632929	11168.95	551237.2	3	5	2.88	0
		15	SD/SF	681005	3.4	5	552507	4450.66	39619	4	4	1.78	0
			SD/DF	653014	2.28	5	538462	3552.15	100081.2	4	4	3.13	0
			DD/SF	655386	2.75	5	523066	8362.31	122221.4	4	4	2.37	0
			DD/DF	652315	2.2	5	669578	12267.56	521104.6	3	5	2.58	0
		20	SD/SF	767470	3.14	5	778679	19133.84	328633.2	1	5	1.44	0.04
			SD/DF	722351	1.92	5	738704	12249.19	265607.8	4	5	2.21	0
			DD/SF	792897	2.5	5	805317	15749.31	231182.6	3	5	1.52	0.08
			DD/DF	713663	2.02	5	583588	11553.6	391455	2	4	2.2	0

Table 192: Performance of the ES-F-N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	13.09	5	991501	21600.1	47108.4	0	5	1.08	0.7
			SD/DF	875670	5.52	5	890153	5354.74	61641	5	5	1.63	0
			DD/SF	947825	7.82	5	961635	21600.1	57483.8	0	5	1.35	0.72
			DD/DF	860656	5.13	5	877983	6197.5	61360.8	5	5	1.98	0
		10	SD/SF	1075834	17.77	5	1085042	21600.1	53488.2	0	5	0.7	0.65
			SD/DF	947202	5.19	5	959248	21600.12	133452.2	0	5	1.2	0.32
			DD/SF	958320	9.85	5	969095	21600.1	65058.8	0	5	1.01	0.82
			DD/DF	958949	5.13	5	969635	19493.08	179152.6	2	5	1.08	0.12
		15	SD/SF	1130584	16.59	5	1137384	21600.1	70561	0	5	0.53	0.52
			SD/DF	1031462	5.16	5	1041224	21600.12	189591.6	0	5	0.9	0.32
			DD/SF	1057423	11.64	5	1065708	21600.12	97792.8	0	5	0.68	0.61
			DD/DF	1045226	6.24	5	1053502	21600.1	221073.4	0	5	0.77	0.22
		20	SD/SF	1285510	20.29	5	1292014	21600.18	86183.8	0	5	0.43	0.47
			SD/DF	1115988	6.47	5	1122758	21600.12	201768.6	0	5	0.57	0.32
			DD/SF	1182592	9.87	5	1189640	21600.14	127263.6	0	5	0.51	0.48
			DD/DF	1113104	6.55	5	1121338	21600.12	208582	0	5	0.68	0.31
	100	5	SD/SF	1031515	30.54	5	1050377	21600.24	9712.2	0	5	1.68	1.32
			SD/DF	970338	15.12	5	993789	21566.06	72738.4	1	5	2.36	0.3
			DD/SF	1022399	18.14	5	1045359	21600.22	16217.2	0	5	2.13	1.43
			DD/DF	966721	13.9	5	992664	21600.24	64956.4	0	5	2.59	0.47
		10	SD/SF	1124130	24.53	5	1141312	21600.2	11728.6	0	5	1.35	1.32
			SD/DF	1041774	9.5	5	1061880	21600.2	30954	0	5	1.86	0.8
			DD/SF	1163864	26.15	5	1186016	21600.22	15371.6	0	5	1.6	1.58
			DD/DF	1049546	14.44	5	1070256	21600.22	33100.2	0	5	1.85	0.9
		15	SD/SF	1167470	24.3	5	1183326	21600.22	13111.8	0	5	1.18	1.22
			SD/DF	1100882	9.44	5	1122758	21600.24	21820.2	0	5	1.87	1.03
			DD/SF	1171910	27.98	5	1193256	21600.2	20293.4	0	5	1.6	1.58
			DD/DF	1112286	12.38	5	1131960	21600.24	22741	0	5	1.69	1.02
		20	SD/SF	1295268	27.38	5	1310784	21600.24	17602.2	0	5	0.96	1.1
			SD/DF	1194754	8.08	5	1211582	21600.3	34151.2	0	5	1.36	0.62
			DD/SF	1279866	20.76	5	1297082	21600.22	22003	0	5	1.16	1.19
			DD/DF	1207450	12.08	5	1225406	21600.26	36649	0	5	1.37	0.81
	200	5	SD/SF	1185558	85.62	5	1224266	21600.5	4575.4	0	5	3	2.61
			SD/DF	1104240	46.84	5	1151006	21600.48	8762.8	0	5	3.99	2.3
			DD/SF	1105216	61.18	5	1149824	21600.5	6019	0	5	3.56	3.12
			DD/DF	1097814	48.1	5	1148590	21600.44	10220.6	0	5	4.29	2.38
		10	SD/SF	1322306	64.88	5	1357746	21600.44	4080	0	5	2.44	2.41
			SD/DF	1202528	30.34	5	1255638	21600.46	7052.4	0	5	4	2.88
			DD/SF	1293504	40.23	5	1340832	21600.4	5458.4	0	5	3.25	3.09
			DD/DF	1204956	31.64	5	1253428	21600.36	9181	0	5	3.73	2.63
		15	SD/SF	1367194	62.85	5	1406936	21600.38	4637.8	0	5	2.63	2.69
			SD/DF	1286728	28.39	5	1331362	21600.44	9320.4	0	5	3.26	2.56
			DD/SF	1330782	38.47	5	1087096	17280.38	4313	0	4	3.01	2.53
			DD/DF	1289538	27.86	5	1337204	21600.48	8947.4	0	5	3.49	2.73
		20	SD/SF	1495566	58.28	5	1533278	21600.42	4397.8	0	5	2.08	2.4
			SD/DF	1365472	21.28	5	1404116	21601.32	8004.2	0	5	2.63	2.24
			DD/SF	1424496	31.64	5	1465074	21600.36	6080	0	5	2.57	2.59
			DD/DF	1370138	21.7	5	1407758	21600.36	9087.2	0	5	2.61	2.06

Table 193: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.98	5	468710	149.54	3175.6	5	5	1.24	0
			SD/DF	441392	0.4	5	448962	192.63	32653.4	5	5	1.69	0
			DD/SF	415013	0.75	5	420864	117.39	3024.8	5	5	1.4	0
			DD/DF	446236	0.44	5	453273	48.01	6969.2	5	5	1.56	0
		10	SD/SF	572590	0.99	5	576410	1100.32	41047.6	5	5	0.66	0
			SD/DF	504470	0.47	5	509714	117.15	3551	5	5	1.03	0
			DD/SF	493839	0.88	5	498442	1200.26	61870.4	5	5	0.93	0
			DD/DF	498129	0.56	5	504415	134.82	4786.4	5	5	1.24	0
		15	SD/SF	600437	1.09	5	602610	8669.54	298455.8	5	5	0.36	0
			SD/DF	542445	0.57	5	547500	1247.36	40190.4	5	5	0.92	0
			DD/SF	544530	0.67	5	548259	10984.88	394939	5	5	0.68	0
			DD/DF	550684	0.45	5	556051	508.43	18283	5	5	0.96	0
		20	SD/SF	660792	1.1	5	-	-	-	0	0	0.27	-
			SD/DF	608397	0.65	5	612207	3471.73	128249.8	5	5	0.62	0
			DD/SF	632983	0.77	5	126442	3654.68	115280.2	1	1	0.4	0
			DD/DF	613350	0.71	5	616759	3545.05	110802.2	5	5	0.55	0
	100	5	SD/SF	537363	1.95	5	545834	4690.65	789194.2	4	5	1.57	0
			SD/DF	484689	1.27	5	495018	95.06	4085.2	5	5	2.09	0
			DD/SF	493140	1.46	5	502159	1172.3	130541.6	5	5	1.8	0
			DD/DF	483171	1.27	5	494412	639.72	65862.4	5	5	2.28	0
		10	SD/SF	585804	1.89	5	592241	2025.77	27468.4	5	5	1.08	0
			SD/DF	545572	1.22	5	554703	1809.11	160461.4	5	5	1.65	0
			DD/SF	527962	1.55	5	535534	1412.88	17519	5	5	1.42	0
			DD/DF	529353	1.27	5	538435	329.37	16382.2	5	5	1.68	0
		15	SD/SF	629851	1.92	5	635754	3761.23	58133	5	5	0.93	0
			SD/DF	562844	1.18	5	570997	522.62	15026.2	5	5	1.43	0
			DD/SF	607255	1.56	5	614026	4013.99	55711.6	5	5	1.11	0
			DD/DF	577223	1.42	5	585709	842.17	17849	5	5	1.45	0
		20	SD/SF	665713	2.03	5	670068	17743.29	379174.4	2	5	0.65	0.02
			SD/DF	623749	1.18	5	629784	1197.67	21334.2	5	5	0.95	0
			DD/SF	687748	1.83	5	692933	12523.41	286094.6	5	5	0.75	0
			DD/DF	644544	1.25	5	651934	1054.1	20099.8	5	5	1.13	0
	200	5	SD/SF	596386	5.79	5	611237	2910.54	120880	5	5	2.46	0
			SD/DF	558449	3.45	5	577715	10613.46	668853.6	3	5	3.33	0
			DD/SF	603204	4.05	5	496425	8897.15	607350.6	2	4	2.64	0
			DD/DF	549705	3.52	5	571024	2634.51	157152.8	5	5	3.71	0
		10	SD/SF	634008	5.13	5	647660	8167.47	279381	4	5	2.12	0
			SD/DF	604959	2.86	5	625247	10956.42	562787	3	5	3.24	0
			DD/SF	629573	3.74	5	646037	7270.98	257342.8	4	5	2.56	0
			DD/DF	614693	3.25	5	632929	14541.35	669921.4	3	5	2.88	0
		15	SD/SF	681005	6.04	5	552507	8610.09	41156	4	4	1.78	0
			SD/DF	653014	2.86	5	538462	4488.28	105671.4	4	4	3.13	0
			DD/SF	655386	4.25	5	671340	17972.11	93932.2	2	5	2.37	0.14
			DD/DF	652315	3.12	5	536003	11767.75	274600.4	3	4	2.58	0
		20	SD/SF	767470	4.41	5	778737	21600.14	113337.4	0	5	1.44	0.11
			SD/DF	722351	2.96	5	738769	15252.14	96914.4	2	5	2.21	0.05
			DD/SF	792897	3.83	5	805351	19368.5	103952	1	5	1.52	0.15
			DD/DF	713663	3.31	5	438073	9055.07	221428.6	3	3	2.2	0

Table 194: Performance of the ES-F-T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	13.1	5	990768	21600.1	44097.8	0	5	1.08	0.53
			SD/DF	875670	5.62	5	890153	3390.89	47292.2	5	5	1.63	0
			DD/SF	947825	6.86	5	961133	21600.1	76124	0	5	1.35	0.51
			DD/DF	860656	5.66	5	877983	3337.87	33345.4	5	5	1.98	0
		10	SD/SF	1075834	18.86	5	1084216	21600.1	51708.2	0	5	0.7	0.59
			SD/DF	947202	5.16	5	959087	21600.1	83808.8	0	5	1.2	0.33
			DD/SF	958320	5.9	5	776328	17280.08	57912	0	4	1.01	0.64
			DD/DF	958949	4.99	5	969654	19340.72	112130.4	1	5	1.08	0.17
		15	SD/SF	1130584	26.32	5	1137060	21600.1	49074.2	0	5	0.53	0.5
			SD/DF	1031462	5.92	5	1041236	21600.1	107722.4	0	5	0.9	0.32
			DD/SF	1057423	8.51	5	1065164	21600.1	63151.2	0	5	0.68	0.57
			DD/DF	1045226	5.24	5	849644	17280.08	83721.6	0	4	0.77	0.19
		20	SD/SF	1285510	36.14	5	1292012	21600.1	52790.4	0	5	0.43	0.47
			SD/DF	1115988	9.29	5	1122676	21600.14	81185	0	5	0.57	0.3
			DD/SF	1182592	8.69	5	1189418	21600.14	70094.4	0	5	0.51	0.45
			DD/DF	1113104	9.16	5	1120964	21600.12	80812.6	0	5	0.68	0.26
	100	5	SD/SF	1031515	49.76	5	1050163	21600.18	7777.6	0	5	1.68	1.31
			SD/DF	970338	17.2	5	796278	14064.76	65429.2	2	4	2.36	0.19
			DD/SF	1022399	22.85	5	1045142	21600.14	24499.2	0	5	2.13	1.2
			DD/DF	966721	17.35	5	793270	17280.12	56238.4	0	4	2.59	0.18
		10	SD/SF	1124130	57.79	5	1140812	21600.14	9232.2	0	5	1.35	1.27
			SD/DF	1041774	13.75	5	1062252	21600.12	27362.6	0	5	1.86	0.83
			DD/SF	1163864	18.49	5	1183656	21600.14	17978.4	0	5	1.6	1.32
			DD/DF	1049546	11.59	5	1069870	21600.12	30386.6	0	5	1.85	0.88
		15	SD/SF	1167470	69.33	5	1182330	21600.18	9061.6	0	5	1.18	1.14
			SD/DF	1100882	10.45	5	1122112	21600.16	21615	0	5	1.87	1.01
			DD/SF	1171910	17.99	5	1191808	21600.2	11340	0	5	1.6	1.45
			DD/DF	1112286	10.83	5	1132298	21600.16	17207.6	0	5	1.69	1.03
		20	SD/SF	1295268	79.57	5	1308700	21600.18	12748.4	0	5	0.96	0.95
			SD/DF	1194754	10.82	5	1211568	21600.16	21774.2	0	5	1.36	0.59
			DD/SF	1279866	20.43	5	1295950	21600.18	19589	0	5	1.16	1.09
			DD/DF	1207450	11.09	5	1224764	21600.16	31797.2	0	5	1.37	0.73
	200	5	SD/SF	1185558	143.03	5	1222908	21600.28	4151.2	0	5	3	2.48
			SD/DF	1104240	66.72	5	1151636	21600.36	9326.2	0	5	3.99	2.1
			DD/SF	1105216	78.29	5	1148536	21600.32	6888	0	5	3.56	2.62
			DD/DF	1097814	60.43	5	1147412	21600.32	10575.6	0	5	4.29	1.76
		10	SD/SF	1322306	176.05	5	1361538	21600.26	3257.8	0	5	2.44	2.71
			SD/DF	1202528	43.96	5	1255842	21600.32	6125.4	0	5	4	2.93
			DD/SF	1293504	63.78	5	1337884	21600.26	6183.8	0	5	3.25	2.7
			DD/DF	1204956	45.19	5	1253322	21600.24	5360.2	0	5	3.73	2.51
		15	SD/SF	1367194	188.86	5	1407118	21600.3	3713	0	5	2.63	2.72
			SD/DF	1286728	37.45	5	1331922	21601.16	6712	0	5	3.26	2.43
			DD/SF	1330782	69.22	5	1372922	21600.26	5668.8	0	5	3.01	2.65
			DD/DF	1289538	35.16	5	1337680	21600.74	5070	0	5	3.49	2.69
		20	SD/SF	1495566	203.59	5	1531862	21600.28	4592.8	0	5	2.08	2.32
			SD/DF	1365472	30.99	5	1404568	21600.34	6058.8	0	5	2.63	2.15
			DD/SF	1424496	63.86	5	1464080	21600.28	6056	0	5	2.57	2.44
			DD/DF	1370138	31.23	5	1409616	21600.32	4368.2	0	5	2.61	2.1

Table 195: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	462969	0.68	5	468710	130.65	2408.4	5	5	1.24	0
			SD/DF	441392	0.28	5	448962	125.02	17251.8	5	5	1.69	0
			DD/SF	415013	0.4	5	420864	158.28	3301.2	5	5	1.4	0
			DD/DF	446236	0.22	5	453273	79.15	11063.4	5	5	1.56	0
		10	SD/SF	572590	0.76	5	576410	1152.11	32285.2	5	5	0.66	0
			SD/DF	504468	0.31	5	509714	112.02	2853.6	5	5	1.03	0
			DD/SF	493839	0.52	5	498442	1300.09	54103	5	5	0.93	0
			DD/DF	498129	0.29	5	504415	125.36	3953.4	5	5	1.24	0
		15	SD/SF	600437	0.84	5	602614	9349.87	233528.8	4	5	0.36	0
			SD/DF	542437	0.39	5	547500	890.24	25230	5	5	0.93	0
			DD/SF	544530	0.67	5	548259	9259.35	303572.4	5	5	0.68	0
			DD/DF	550681	0.38	5	556051	507.73	14320.6	5	5	0.97	0
		20	SD/SF	660792	0.92	5	-	-	-	0	0	0.27	-
			SD/DF	608397	0.38	5	612207	2060.63	79127.8	5	5	0.62	0
			DD/SF	632983	0.57	5	498649	15659.18	387659.4	2	4	0.4	0.02
			DD/DF	613348	0.41	5	616759	1620.77	46209.8	5	5	0.55	0
	100	5	SD/SF	537363	1.72	5	545834	4849.7	738949.6	4	5	1.57	0
			SD/DF	484682	0.52	5	495018	106.45	4227.2	5	5	2.09	0
			DD/SF	493140	0.96	5	502159	1308.35	113224.6	5	5	1.8	0
			DD/DF	483168	0.5	5	494412	3094.17	414889.4	5	5	2.28	0
		10	SD/SF	585804	1.71	5	592241	2346.45	22740	5	5	1.08	0
			SD/DF	545565	0.59	5	554703	3219.8	288883.2	5	5	1.65	0
			DD/SF	527962	1.12	5	535534	2526.45	19981.4	5	5	1.42	0
			DD/DF	529328	0.7	5	538435	493.47	24587	5	5	1.69	0
		15	SD/SF	629851	1.92	5	635754	5664.23	62197.8	5	5	0.93	0
			SD/DF	562835	0.79	5	570997	685.18	12649.8	5	5	1.43	0
			DD/SF	607255	1.15	5	614026	4365.74	48159.6	5	5	1.11	0
			DD/DF	577221	0.66	5	468467	846.02	11257.6	4	4	1.45	0
		20	SD/SF	665713	1.87	5	670025	15064.81	396940.8	4	5	0.65	0
			SD/DF	623744	0.84	5	629784	1211.38	21343.6	5	5	0.95	0
			DD/SF	687748	1.45	5	692960	14520.58	261870	4	5	0.75	0.02
			DD/DF	644530	0.84	5	651934	1041.45	14695	5	5	1.13	0
	200	5	SD/SF	596386	6.35	5	611237	3217.77	95071.8	5	5	2.46	0
			SD/DF	558448	1.25	5	577715	5417.24	409934.2	5	5	3.33	0
			DD/SF	603204	3.25	5	619590	11866.54	865460.6	3	5	2.64	0
			DD/DF	549698	1.23	5	571024	2862.17	156544.4	5	5	3.71	0
		10	SD/SF	634008	6.31	5	521189	7797	37781.8	4	4	2.12	0
			SD/DF	604958	1.42	5	124986	1176.17	48549	1	1	3.24	0
			DD/SF	629573	3.35	5	118463	1855.4	9285.6	1	1	2.56	0
			DD/DF	614686	1.37	5	-	-	-	0	0	2.88	-
		15	SD/SF	681005	6.93	5	549416	17284.96	27069.4	0	4	1.78	0.15
			SD/DF	653009	1.77	5	674088	11938.04	295160	4	5	3.13	0
			DD/SF	655386	3.47	5	671388	20450.5	92925	1	5	2.37	0.23
			DD/DF	652282	1.7	5	536377	11818.26	432251	2	4	2.58	0
		20	SD/SF	767470	6.8	5	778988	21600	48470.4	0	5	1.44	0.3
			SD/DF	722344	2.04	5	738719	15272.44	60758.8	2	5	2.21	0.22
			DD/SF	792897	3.38	5	805559	21131.32	75370	1	5	1.52	0.23
			DD/DF	713646	1.66	5	584170	11448.97	235499	3	4	2.2	0

Table 196: Performance of the ES-F-LS formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	979856	4.01	5	990996	21600.02	36455.8	0	5	1.08	0.42
			SD/DF	875661	0.8	5	890153	5720.2	61588.6	5	5	1.63	0
			DD/SF	947825	1.32	5	961301	21600.02	60208.8	0	5	1.35	0.44
			DD/DF	860652	0.76	5	877983	4457.05	25782.6	5	5	1.98	0
		10	SD/SF	1075834	4.09	5	1084874	21600	33957.2	0	5	0.7	0.63
			SD/DF	947189	1.01	5	959673	21600.08	60206.8	0	5	1.21	0.45
			DD/SF	958320	1.75	5	969331	21600	59043.8	0	5	1.01	0.75
			DD/DF	958933	1.07	5	970056	21502.96	89223.8	1	5	1.08	0.23
		15	SD/SF	1130584	5.51	5	1137816	21600.08	35754.8	0	5	0.53	0.56
			SD/DF	1031454	1.67	5	826604	17280.02	52383.8	0	4	0.91	0.28
			DD/SF	1057423	2.58	5	1066522	21600.04	50760.2	0	5	0.68	0.67
			DD/DF	1045208	1.36	5	637914	12960	67661.4	0	3	0.77	0.14
		20	SD/SF	1285510	7.08	5	1292628	21600.02	36986.8	0	5	0.43	0.51
			SD/DF	1115978	2.34	5	672964	12960.04	43093.2	0	3	0.58	0.21
			DD/SF	1182592	3.57	5	1190624	21600.08	54102.2	0	5	0.51	0.55
			DD/DF	1113076	2.25	5	902504	17280.04	65969.4	0	4	0.69	0.26
	100	5	SD/SF	1031515	24.38	5	1050639	21600.1	4836.4	0	5	1.68	1.21
			SD/DF	970327	3.4	5	993921	21600.68	89822.8	0	5	2.36	0.37
			DD/SF	1022399	9.85	5	1045180	21600.04	8834.4	0	5	2.13	1.2
			DD/DF	966711	3.51	5	992513	21600.08	39770.4	0	5	2.59	0.39
		10	SD/SF	1124130	16.03	5	1142613	21600.08	6700.6	0	5	1.35	1.36
			SD/DF	1041754	3.43	5	1061906	21600.08	14209.8	0	5	1.86	0.93
			DD/SF	1163864	6.15	5	1185212	21600.06	9126	0	5	1.6	1.43
			DD/DF	1049504	2.72	5	1069958	21600.04	14496.4	0	5	1.86	1
		15	SD/SF	1167470	14.94	5	1185618	21600.06	8916.4	0	5	1.18	1.42
			SD/DF	1100826	3.58	5	1123038	21600.02	11664.4	0	5	1.87	1.27
			DD/SF	1171910	7.26	5	1192188	21600.06	9025	0	5	1.6	1.45
			DD/DF	1112234	3.1	5	1132014	21600.08	11662.4	0	5	1.69	1.08
		20	SD/SF	1295268	22.46	5	1314338	21600.08	9548	0	5	0.96	1.37
			SD/DF	1194718	4.27	5	1212274	21600.08	21939	0	5	1.36	0.7
			DD/SF	1279866	12.09	5	1299222	21600.1	8341.8	0	5	1.16	1.33
			DD/DF	1207392	4.26	5	1225280	21600.08	12464.6	0	5	1.38	0.92
	200	5	SD/SF	1185558	136.1	5	1229632	21600.22	1858.6	0	5	3	2.97
			SD/DF	1104222	14.66	5	1152220	21600.86	5550.2	0	5	3.99	2.22
			DD/SF	1105216	44.66	5	1146282	21601.08	4103	0	5	3.56	2.13
			DD/DF	1097780	13.96	5	1148428	21602.38	7011.8	0	5	4.29	1.7
		10	SD/SF	1322306	94	5	1364930	21600.96	1893.8	0	5	2.44	2.92
			SD/DF	1202516	12.05	5	1259492	21600.98	4857.8	0	5	4.01	3.29
			DD/SF	1293504	30.47	5	1345322	21600.22	3233	0	5	3.25	3.24
			DD/DF	1204916	11.08	5	1252770	21600.2	5151.4	0	5	3.74	2.52
		15	SD/SF	1367194	64.77	5	1416004	21600.7	2149.6	0	5	2.63	3.19
			SD/DF	1286680	10.99	5	1334384	21600.26	4709.4	0	5	3.27	2.72
			DD/SF	1330782	28.47	5	1382002	21600.22	2698.6	0	5	3.01	3.28
			DD/DF	1289516	10.91	5	1342512	21600.18	4596.4	0	5	3.49	3.11
		20	SD/SF	1495566	86.9	5	1540222	21600.22	1693.2	0	5	2.08	2.75
			SD/DF	1365432	13.2	5	1407644	21600.26	3828.2	0	5	2.63	2.41
			DD/SF	1424496	33.65	5	1476694	21600.22	2286	0	5	2.57	3.2
			DD/DF	1370094	9.69	5	1414422	21600.16	5058.6	0	5	2.61	2.51

Table 197: Performance of the N formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	464654	16.27	5	468710	4559.03	3685.8	5	5	0.88	0
			SD/DF	444723	13.58	5	448962	5609.86	39888.4	4	5	0.94	0
			DD/SF	417326	17.27	5	420864	4955.78	5286.6	5	5	0.85	0
			DD/DF	449368	17.04	5	453273	5466.87	27836.6	4	5	0.86	0
		10	SD/SF	573761	21.23	5	576417	17104.03	24649.8	2	5	0.46	0.04
			SD/DF	506749	15.82	5	509714	1801.04	3363.8	5	5	0.58	0
			DD/SF	495414	17.85	5	498442	18462.22	28029.8	4	5	0.61	0.05
			DD/DF	500623	14.11	5	504415	3312.21	5352.8	5	5	0.75	0
		15	SD/SF	600974	18	5	602811	21600.24	35734.4	0	5	0.27	0.12
			SD/DF	544219	12.58	5	547525	11421.3	19974.4	4	5	0.6	0.04
			DD/SF	545450	13.61	5	548293	21600.28	26972.8	0	5	0.51	0.23
			DD/DF	553342	13.25	5	556051	7913.44	14393.4	4	5	0.49	0
		20	SD/SF	661168	12.71	5	662792	21600.22	46995.8	0	5	0.22	0.18
			SD/DF	610085	10.38	5	612207	15094.17	32381.2	3	5	0.35	0.02
			DD/SF	633492	11.17	5	635758	21600.2	35307.8	0	5	0.32	0.22
			DD/DF	614631	12.95	5	616828	15631.77	32695	3	5	0.34	0.06
	100	5	SD/SF	540539	84.94	5	545854	21600.48	7683.8	0	5	0.98	0.11
			SD/DF	490575	70.57	5	495018	10161.15	30419.4	5	5	0.9	0
			DD/SF	498255	65.35	5	502159	18398.15	32061.2	2	5	0.77	0
			DD/DF	489708	69.75	5	295860	8963.04	25148.8	2	3	0.95	0
		10	SD/SF	589169	87.72	5	592692	21600.46	5562	0	5	0.51	0.27
			SD/DF	551383	86.21	5	554704	19665.34	23954.8	1	5	0.6	0
			DD/SF	532426	87.32	5	535682	20948.1	9984	1	5	0.58	0.08
			DD/DF	535000	67.79	5	538435	12052.05	17569.4	4	5	0.64	0
		15	SD/SF	632980	105.74	5	635882	21585.54	10049.4	1	5	0.43	0.07
			SD/DF	568382	70.23	5	571000	16639.43	20098.4	2	5	0.46	0.01
			DD/SF	610855	102.62	5	614180	21031.54	8895.6	1	5	0.52	0.1
			DD/DF	582593	88.7	5	585709	14206.41	12871.4	3	5	0.53	0
		20	SD/SF	667574	108.83	5	670756	21600.5	9210.4	0	5	0.37	0.24
			SD/DF	627696	78.55	5	629784	15218.33	12880.2	3	5	0.33	0.01
			DD/SF	690542	101.51	5	693333	21600.44	8773.2	0	5	0.35	0.21
			DD/DF	649759	77.28	5	651935	13535.83	7848.8	3	5	0.33	0.02
	200	5	SD/SF	602566	195.16	5	612332	21600.78	1606.4	0	5	1.44	0.89
			SD/DF	570832	128.83	5	577720	21600.94	12105	0	5	1.19	0.02
			DD/SF	613818	186.66	5	620682	21600.7	2331.2	0	5	0.93	0.47
			DD/DF	561914	128.72	5	571026	21600.78	8563.2	0	5	1.58	0.16
		10	SD/SF	640667	247.21	5	648922	21600.76	1572	0	5	1.09	0.73
			SD/DF	617046	146.87	5	625404	21600.82	8369.6	0	5	1.31	0.16
			DD/SF	639652	203.23	5	647319	21601	2466.2	0	5	0.99	0.67
			DD/DF	628145	178.77	5	632958	21590.88	5191.8	1	5	0.75	0.15
		15	SD/SF	688113	286.1	5	695195	21600.7	1763.6	0	5	0.75	0.64
			SD/DF	666637	205.32	5	674600	21600.78	4457	0	5	1.1	0.28
			DD/SF	665428	253.06	5	672909	21600.7	2024.4	0	5	0.87	0.85
			DD/DF	664834	211.47	5	669661	21600.78	5186.2	0	5	0.71	0.14
		20	SD/SF	774449	351.2	5	781417	21600.8	2073.8	0	5	0.54	0.67
			SD/DF	735294	253.64	5	738919	21600.9	3077.8	0	5	0.46	0.12
			DD/SF	801376	297.77	5	808210	21600.82	1735.4	0	5	0.47	0.68
			DD/DF	726073	213.95	5	729871	21600.78	3284.8	0	5	0.5	0.1

Table 198: Performance of the N formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
			SD/SF	982893	831.73	5	1011243	21608.04	150	0	5	0.77	2.61
		5	SD/DF	882022	851.08	5	894521	21604.58	538.8	0	5	0.91	1.12
			DD/SF	952192	966.03	5	974610	21604.02	262	0	5	0.89	2.16
			DD/DF	867314	1159.35	5	712622	17283.58	490.8	0	4	1.22	1.2
			SD/SF	1077962	1113.15	5	1189492	21603.56	206.4	0	5	0.51	8.06
		10	SD/DF	952190	1049.61	5	964501	21604.66	375.2	0	5	0.69	1.12
			DD/SF	961305	730.75	5	788699	17283.34	236.8	0	4	0.7	1.72
	50		DD/DF	964350	835.92	5	978639	21604.56	492.6	0	5	0.53	1.33
			SD/SF	1131700	1545.24	5	1310002	21604.28	212.4	0	5	0.43	12.14
		15	SD/DF	1035862	771.71	5	1062516	21604.48	301.8	0	5	0.48	2.44
			DD/SF	1059198	1088.82	5	1104832	21614.14	240.4	0	5	0.52	4.12
			DD/DF	1048676	851.19	5	849682	17283.1	325.8	0	4	0.44	0.91
			SD/SF	1286202	1367.01	5	1419658	21604.34	274	0	5	0.37	8.57
		20	SD/DF	1118450	846.56	5	1135128	21604.2	438	0	5	0.36	1.44
			DD/SF	1183938	909.1	5	1268160	21603.88	297.4	0	5	0.4	6.32
			DD/DF	1116454	813.84	5	1132750	21604.28	377.6	0	5	0.38	1.37
			SD/SF	987374	10322.34	3	1473642	22538.06	0	0	5	1.21	29.57
		5	SD/DF	983412	1700.03	5	1102182	21607.34	139.2	0	5	1.04	9.55
			DD/SF	1033479	3469.2	5	1240319	21608.54	76.8	0	5	1.06	14.47
			DD/DF	980856	2231.14	5	1087698	21607.04	101.6	0	5	1.17	9.29
			SD/SF	1130599	4393.25	5	1270526	17287.9	0	0	4	0.78	24.54
30		10	SD/DF	1049348	5760.88	4	1129212	21607.6	48.4	0	5	0.81	6.41
			DD/SF	1172784	2675.01	5	1007278	12965.28	8.8	0	3	0.85	18.63
	100		DD/DF	1062248	5517.16	4	917274	17320.32	50.6	0	4	0.73	5.07
			SD/SF	1188443	7058.25	4	1638510	22863.02	0	0	5	0.74	28.3
		15	SD/DF	1112110	1848.87	5	707784	12964.1	33.2	0	3	0.87	2.76
			DD/SF	1179474	2972.48	5	1579302	22861.22	24.4	0	5	0.96	24.14
			DD/DF	1122252	2167.91	5	926370	17286.54	57.4	0	4	0.8	2.41
			SD/SF	1273128	7372.17	4	1802988	21671.42	0	0	5	0.71	27.95
		20	SD/DF	1204804	2330.2	5	1296806	21608.54	91	0	5	0.53	6.95
			DD/SF	1285746	3180.89	5	1668520	21608.3	14.2	0	5	0.7	22.23
			DD/DF	1216788	2758.84	5	1075284	17286.74	60.4	0	4	0.61	7.42
			SD/SF	1228550	11925.03	4	986936	13500.02	0	0	3	1.99	17.13
		5	SD/DF	1130864	6199.55	5	1442478	21636.94	4.2	0	5	1.68	21.44
			DD/SF	1145635	10063.29	4	300884	4326.3	0	0	1	1.52	5.73
			DD/DF	1125854	4668.31	5	1081720	17294.76	13.8	0	4	1.85	12.61
			SD/SF	-	21640.26	0	405266	4324.52	0	0	1	-	5.92
		10	SD/DF	1225550	9476.31	4	1215212	17297.72	1.4	0	4	1.63	14.54
			DD/SF	1315116	11659.2	5	1459224	17295.94	0	0	4	1.64	22.48
	200		DD/DF	1233080	5079.52	5	1572866	21615.1	8.2	0	5	1.49	21.4
			SD/SF	1342125	16410.66	2	1169430	13959.24	0	0	3	1.51	17.12
		15	SD/DF	1311195	10123.52	4	939286	13405.44	0	0	3	1.19	10.18
			DD/SF	1352406	11659.36	5	761882	10450.22	0	0	2	1.43	11.39
			DD/DF	1317316	7146.02	5	1315484	17309.74	0	0	4	1.41	15.74
			SD/SF	1504620	20937.1	1	1292214	12973.98	0	0	3	1.42	19.1
		20	SD/DF	1389312	9023.02	5	1336838	17829.76	6	0	4	0.93	13.14
			DD/SF	1442722	13879	5	1606046	19120.08	1	0	4	1.32	22.69
			DD/DF	1395306	7708.55	5	1329652	17313.28	0	0	4	0.82	12.95

Table 199: Performance of the T formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	464525	33.76	5	468710	9333.41	6904.2	5	5	0.91	0
			SD/DF	444683	26.64	5	448962	5241.75	51152.4	5	5	0.95	0
			DD/SF	417279	35.66	5	420864	5075.66	4348.4	5	5	0.86	0
			DD/DF	449346	32.31	5	453273	4022.81	34714.8	5	5	0.87	0
		10	SD/SF	573678	44.01	5	576478	18597.24	20267.4	3	5	0.47	0.08
			SD/DF	506736	34.55	5	509714	2864.08	5420	5	5	0.58	0
			DD/SF	495366	27.71	5	498460	20083.7	22798.8	1	5	0.62	0.12
			DD/DF	500609	20.1	5	504415	2929.05	4995.8	5	5	0.75	0
		15	SD/SF	600938	25.1	5	603483	21600.12	31280	0	5	0.28	0.26
			SD/DF	544207	13.4	5	547500	13513.71	28903	4	5	0.6	0.03
			DD/SF	545432	19.21	5	548290	21600.12	30620.6	0	5	0.52	0.21
			DD/DF	553328	18.22	5	556051	4479.19	10153.2	5	5	0.49	0
		20	SD/SF	661158	24.72	5	662785	21600.12	42731.2	0	5	0.22	0.19
			SD/DF	610080	14.2	5	612207	12449.5	37604.6	4	5	0.35	0.02
			DD/SF	633486	22.45	5	635654	21600.12	47010.2	0	5	0.33	0.2
			DD/DF	614626	16.5	5	616759	13455.25	41089	3	5	0.35	0.03
	100	5	SD/SF	540525	157.94	5	545971	21175.28	4839	1	5	0.98	0.27
			SD/DF	490556	124.52	5	495018	7381.89	25066.8	5	5	0.9	0
			DD/SF	498243	255.51	5	502160	20890.42	33366.4	2	5	0.77	0
			DD/DF	489690	97.02	5	396920	12250.81	55323.4	2	4	0.95	0
		10	SD/SF	589000	262.23	5	593435	21600.2	4248.2	0	5	0.54	0.37
			SD/DF	551353	266.97	5	554703	18852.5	36052	3	5	0.61	0
			DD/SF	532346	160.55	5	535849	21600.22	5146	0	5	0.6	0.19
			DD/DF	534983	194.34	5	538435	7544.62	15512.4	4	5	0.64	0
		15	SD/SF	632834	218.03	5	636145	21600.26	7041.2	0	5	0.46	0.17
			SD/DF	568353	147.09	5	570998	14185.12	30831.2	4	5	0.46	0.01
			DD/SF	610748	208.44	5	614240	21600.22	5748.4	0	5	0.54	0.22
			DD/DF	582577	175.39	5	585727	13719.14	10864.4	3	5	0.53	0.02
		20	SD/SF	667400	342.82	5	670987	21600.28	7224.2	0	5	0.39	0.37
			SD/DF	627684	256.6	5	629800	14899.22	11753.6	3	5	0.33	0.03
			DD/SF	690463	193.51	5	693487	21600.28	7450.6	0	5	0.36	0.28
			DD/DF	649732	152.48	5	652001	12090.57	7312.2	3	5	0.34	0.05
	200	5	SD/SF	602515	925.71	5	612806	21600.42	909	0	5	1.45	0.81
			SD/DF	570812	753.55	5	577719	21600.6	7477.4	0	5	1.19	0
			DD/SF	613785	791.1	5	619889	21600.44	2995.8	0	5	0.93	0.13
			DD/DF	561907	475.03	5	571030	19955.88	12446.8	1	5	1.58	0.01
		10	SD/SF	640639	799.81	5	649632	21600.42	940.6	0	5	1.09	0.75
			SD/DF	616997	659.84	5	625289	21600.48	3825.2	0	5	1.31	0.02
			DD/SF	639623	594.22	5	647270	21600.44	1638.6	0	5	1	0.54
			DD/DF	628125	818.94	5	633171	21600.42	4818.4	0	5	0.76	0.08
		15	SD/SF	687957	826.24	5	696432	21600.46	1174	0	5	0.77	0.86
			SD/DF	666576	664.99	5	674092	21600.48	9362.6	0	5	1.11	0
			DD/SF	665359	939.68	5	673381	21600.52	2057	0	5	0.88	0.88
			DD/DF	664811	651.37	5	669592	21600.46	5346.4	0	5	0.71	0.03
		20	SD/SF	774001	749.39	5	780750	21600.44	1469.4	0	5	0.6	0.53
			SD/DF	735232	767.36	5	738787	21600.46	2914.2	0	5	0.47	0.07
			DD/SF	801181	754.57	5	806692	21600.46	1811.8	0	5	0.49	0.5
			DD/DF	726019	659.65	5	729977	21600.44	2783	0	5	0.5	0.16

Table 200: Performance of the T formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	982576	1550.57	5	1056976	21601.36	112.2	0	5	0.8	6.44
			SD/DF	881932	763.36	5	894542	21601.44	481.8	0	5	0.92	1.02
			DD/SF	952030	939.28	5	972279	21601.38	370.6	0	5	0.9	1.83
			DD/DF	867246	806.2	5	881718	21601.52	439.2	0	5	1.23	1.1
		10	SD/SF	1077670	2825.01	5	1271686	21601.42	84.8	0	5	0.53	13.8
			SD/DF	957079	5321.32	4	963310	21601.46	420.4	0	5	0.66	0.99
			DD/SF	961156	1422.35	5	981580	21601.64	445.6	0	5	0.72	2.02
			DD/DF	964309	973.88	5	977265	21601.46	305.6	0	5	0.53	1.15
		15	SD/SF	1131518	4441.5	5	1378624	21601.38	38.6	0	5	0.45	16.76
			SD/DF	1035836	1172.58	5	1044298	21601.96	387.4	0	5	0.48	0.73
			DD/SF	1059104	4047.82	5	1073580	21601.38	287.6	0	5	0.53	1.34
			DD/DF	1048650	1739.52	5	1054914	21603.16	467	0	5	0.45	0.46
		20	SD/SF	1286050	3271.61	5	1306062	21601.42	139	0	5	0.38	1.5
			SD/DF	1118434	1928.34	5	1124988	21601.54	398.4	0	5	0.36	0.55
			DD/SF	1183880	1975.04	5	1206688	21601.44	384.4	0	5	0.4	1.9
			DD/DF	1116440	1063.47	5	1124168	21601.52	394.4	0	5	0.39	0.6
	100	5	SD/SF	1037351	6350.06	5	1490922	23692.92	0	0	5	1.12	30.38
			SD/DF	983367	2086.09	5	1084464	21602.88	144.4	0	5	1.05	8.12
			DD/SF	1033426	3990.18	5	1416924	22641.14	10.4	0	5	1.07	26.06
			DD/DF	980828	1537.39	5	1026079	21602.92	137.6	0	5	1.17	4.12
		10	SD/SF	1130180	6821.66	5	652210	8641.16	0	0	2	0.81	12.81
			SD/DF	1053526	1996.15	5	-	-	-	0	0	0.75	-
			DD/SF	1172448	5069.93	5	-	-	-	0	0	0.87	-
			DD/DF	1061762	2856.99	5	221596	4320.62	40.8	0	1	0.71	0.35
		15	SD/SF	1172138	5385.25	5	0	0	0	0	0	0.78	0
			SD/DF	1112028	3290.24	5	-	-	-	0	0	0.88	-
			DD/SF	1179108	5407.61	5	-	-	-	0	0	0.99	-
			DD/DF	1122182	2110.09	5	-	-	-	0	0	0.81	-
		20	SD/SF	1298232	8955.93	5	1457678	18387.2	0	0	4	0.73	24.16
			SD/DF	1204736	2723.72	5	1244684	21603.1	69.4	0	5	0.53	3.21
			DD/SF	1285436	5347.7	5	1779138	22175.84	7.4	0	5	0.72	27.75
			DD/DF	1216748	3043.71	5	1239264	21602.7	102	0	5	0.61	1.79
	200	5	SD/SF	1231135	19196.18	2	1005784	12964.96	0	0	3	1.94	17.81
			SD/DF	1130838	7868.51	5	1443226	21607.3	1.4	0	5	1.68	21.48
			DD/SF	1154343	16481	4	1584606	21607	0	0	5	1.56	28.75
			DD/DF	1125840	6959.92	5	1382352	21605.9	14.2	0	5	1.85	18
		10	SD/SF	1325875	19419.62	2	1136490	14006.8	0	0	3	1.36	18.31
			SD/DF	1233485	10177.48	4	1534696	27064.26	3.8	0	5	1.94	19.31
			DD/SF	1330510	19416.32	1	1847150	21609.18	0	0	5	1.49	28.81
			DD/DF	1233030	8830.74	5	1573586	21613.32	1	0	5	1.49	21.4
		15	SD/SF	1387375	17189.16	4	386136	4321.86	0	0	1	1.69	6
			SD/DF	1311075	10475.09	4	1643996	21612.84	1.8	0	5	1.19	19.92
			DD/SF	1352170	15425.14	5	717254	8644.96	0	0	2	1.44	11.28
			DD/DF	1317218	9452.44	5	1582996	21611.42	1.8	0	5	1.42	16.36
		20	SD/SF	1450680	19803.68	2	0	0	0	0	0	1.52	0
			SD/DF	917803	13787.22	3	1620296	21612.94	0	0	5	33.8	13.92
			DD/SF	752005	15949.16	2	421846	4321.58	0	0	1	50.72	6.13
			DD/DF	1395182	9334.58	5	1571916	21606.54	1.2	0	5	0.83	10.66

Table 201: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	464525	14.26	5	468710	2106.39	4095.6	5	5	0.91	0
			SD/DF	444683	10.15	5	448962	1265.81	48405	5	5	0.95	0
			DD/SF	417279	11.91	5	420864	1690.43	4709.8	5	5	0.86	0
			DD/DF	449346	12.11	5	453273	803.09	25118.2	5	5	0.87	0
		10	SD/SF	573678	11.98	5	576412	12169.35	35396.8	4	5	0.47	0.01
			SD/DF	506736	9.62	5	509714	968.25	3952	5	5	0.58	0
			DD/SF	495366	8.11	5	498458	12333.04	36096.8	4	5	0.62	0.04
			DD/DF	500609	10.98	5	504415	906.65	3472	5	5	0.75	0
		15	SD/SF	600938	8.53	5	602775	20482.72	80473.8	2	5	0.28	0.09
			SD/DF	544207	8.24	5	547500	6815.29	23905	4	5	0.6	0.02
			DD/SF	545432	9.67	5	548300	21600.1	67902.8	0	5	0.52	0.18
			DD/DF	553328	8.77	5	556051	1703.89	8181.2	5	5	0.49	0
		20	SD/SF	661158	9.06	5	662611	21600.3	108439.2	0	5	0.22	0.15
			SD/DF	610080	7.92	5	612207	7163.44	44755.2	4	5	0.35	0.01
			DD/SF	633486	7.42	5	635635	21600.02	98479.6	0	5	0.33	0.16
			DD/DF	614626	7.53	5	616759	7041.03	58081.2	5	5	0.35	0
	100	5	SD/SF	540525	81.25	5	545886	17902.04	37363.6	2	5	0.98	0.1
			SD/DF	490556	73.6	5	495018	2133.07	16730	5	5	0.9	0
			DD/SF	498243	72.54	5	412337	10018.41	77576.8	3	4	0.77	0
			DD/DF	489690	59.81	5	494412	12836.04	254024.4	3	5	0.95	0
		10	SD/SF	589000	56.28	5	592721	19881.98	18731.4	2	5	0.54	0.24
			SD/DF	551353	54.69	5	334877	4231.46	32765.8	3	3	0.61	0
			DD/SF	532346	65.65	5	535549	17311.26	13253.2	3	5	0.6	0.11
			DD/DF	534983	58.76	5	538435	5870.54	111713.8	5	5	0.64	0
		15	SD/SF	632834	61.83	5	635911	21600.18	12836	0	5	0.46	0.08
			SD/DF	568353	44.24	5	570997	5400.28	28996.8	5	5	0.46	0
			DD/SF	610748	43.42	5	614185	21341.2	13045.4	1	5	0.54	0.14
			DD/DF	582577	36.52	5	585709	6828.78	17546.8	5	5	0.53	0
		20	SD/SF	667400	45.43	5	670907	21600.56	16677.6	0	5	0.39	0.27
			SD/DF	627684	44.25	5	629784	6592.32	16092	5	5	0.33	0
			DD/SF	690463	42.31	5	693369	21600.16	17489.8	0	5	0.36	0.2
			DD/DF	649732	40.93	5	652001	7889.31	11224.8	4	5	0.34	0.04
	200	5	SD/SF	602515	427.47	5	611808	21600.14	2587	0	5	1.45	0.48
			SD/DF	570812	266.16	5	577715	21100.84	75561.6	1	5	1.19	0
			DD/SF	613785	424.12	5	619809	21600.1	11114	0	5	0.93	0.12
			DD/DF	561907	234.87	5	571024	16594.93	66071	2	5	1.58	0
		10	SD/SF	640639	378.95	5	648680	21600.14	2464.4	0	5	1.09	0.43
			SD/DF	616997	363.16	5	625272	21600.54	17893.6	0	5	1.31	0.08
			DD/SF	639623	370.96	5	646869	21600.16	3346.8	0	5	1	0.6
			DD/DF	628125	264.53	5	506965	14795.53	12654	1	4	0.76	0.1
		15	SD/SF	687957	371.31	5	694539	21600.14	3202.4	0	5	0.77	0.59
			SD/DF	666576	327.54	5	674091	18605.24	20062.8	1	5	1.11	0
			DD/SF	665359	320.35	5	671907	21600.16	3429	0	5	0.88	0.4
			DD/DF	664811	291.51	5	536855	17280.1	21997.6	0	4	0.71	0.1
		20	SD/SF	774001	361.99	5	780373	21600.16	3911.4	0	5	0.6	0.5
			SD/DF	735232	287.15	5	738811	18786.52	10819.8	1	5	0.47	0.04
			DD/SF	801181	305.46	5	806322	21600.12	3793	0	5	0.49	0.38
			DD/DF	726019	219.24	5	586937	17280.08	12181	0	4	0.5	0.03

Table 202: Performance of the MC formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	982576	263.91	5	995653	21600.18	4125.2	0	5	0.8	1.19
			SD/DF	881932	171.22	5	890578	20528.76	8324	1	5	0.92	0.23
			DD/SF	952030	260.77	5	964342	21600.14	4025.4	0	5	0.9	1.02
			DD/DF	867246	166.22	5	878933	19110.87	3378.4	1	5	1.23	0.4
		10	SD/SF	1077670	262.88	5	1086122	21600.14	4422.6	0	5	0.53	0.74
			SD/DF	952124	164.36	5	959658	21600.1	3694.8	0	5	0.69	0.49
			DD/SF	961156	248.66	5	971105	21600.12	3812	0	5	0.72	0.94
			DD/DF	964309	169.56	5	970535	21600.12	4019.2	0	5	0.53	0.39
		15	SD/SF	1131518	234.68	5	1141268	21600.12	4887.6	0	5	0.45	0.84
			SD/DF	1035836	154.58	5	1041804	21600.1	5370.2	0	5	0.48	0.4
			DD/SF	1059104	214.85	5	1067874	21600.12	3824.6	0	5	0.53	0.78
			DD/DF	1048650	175.34	5	1053732	21600.1	5831.2	0	5	0.45	0.28
		20	SD/SF	1286050	206.86	5	1295454	21600.12	6000.2	0	5	0.38	0.72
			SD/DF	1118434	174.56	5	1123208	21600.12	6959.4	0	5	0.36	0.33
			DD/SF	1183880	251.53	5	1191828	21600.1	5027	0	5	0.4	0.65
			DD/DF	1116440	206.13	5	1121728	21600.1	6448	0	5	0.39	0.33
	100	5	SD/SF	1037351	1675.15	5	1062018	21600.22	434.2	0	5	1.12	2.25
			SD/DF	983367	712.12	5	995298	21600.22	1243.6	0	5	1.05	0.63
			DD/SF	1033426	1015.85	5	1057296	21600.24	735.6	0	5	1.07	2.16
			DD/DF	980828	720.48	5	997241	21600.24	1199.6	0	5	1.17	1.27
		10	SD/SF	1130180	1401.09	5	1154145	21600.18	569.4	0	5	0.81	2.01
			SD/DF	1053526	655.8	5	1064318	21600.18	1093.2	0	5	0.75	0.72
			DD/SF	1172448	1289.35	5	1197692	21600.24	561	0	5	0.87	2.06
			DD/DF	1061762	699.34	5	1073378	21600.2	1366.6	0	5	0.71	0.92
		15	SD/SF	1172138	1371.64	5	1195190	21600.22	970.4	0	5	0.78	1.92
			SD/DF	1112028	752.26	5	1125340	21600.22	1050	0	5	0.88	0.99
			DD/SF	1179108	1261.13	5	1203200	21600.22	953	0	5	0.99	1.99
			DD/DF	1122182	618.78	5	1134636	21600.22	1342.2	0	5	0.81	0.99
		20	SD/SF	1298232	970.1	5	1323578	21600.2	759.2	0	5	0.73	1.91
			SD/DF	1204736	674.6	5	1213592	21600.22	1013.2	0	5	0.53	0.58
			DD/SF	1285436	1221.11	5	1314726	21600.18	692.8	0	5	0.72	2.18
			DD/DF	1216748	585.61	5	1228548	21600.2	1023.4	0	5	0.61	0.83
	200	5	SD/SF	1197564	6822.33	5	1476302	21600.9	52.2	0	5	2.01	17.12
			SD/DF	1130838	2986.51	5	1183202	21600.46	274	0	5	1.68	4.21
			DD/SF	1127552	5146.21	5	1212326	21600.38	91.6	0	5	1.59	6.84
			DD/DF	1125840	2779.22	5	1190470	21600.66	170.6	0	5	1.85	5.28
		10	SD/SF	1335290	7848.04	5	1548688	21600.46	21.8	0	5	1.48	13.24
			SD/DF	1230100	2840.69	5	1286916	21600.48	347	0	5	1.8	4.26
			DD/SF	1315050	4989.48	5	1385160	21600.66	49.4	0	5	1.64	5
			DD/DF	1233030	2937.36	5	1271556	21600.48	331.8	0	5	1.49	2.9
		15	SD/SF	1380284	6329.11	5	1729386	21600.44	35	0	5	1.69	19.03
			SD/DF	1313770	3450.47	5	1364366	21600.4	255	0	5	1.23	3.58
			DD/SF	1352170	4999.08	5	1507638	21600.38	38	0	5	1.44	10.16
			DD/DF	1317218	3471.66	5	1367500	21600.44	239.8	0	5	1.42	3.65
		20	SD/SF	1505886	8110.38	5	2003390	21600.38	62.4	0	5	1.41	22.44
			SD/DF	1389164	4091.12	5	1427866	21600.48	128	0	5	0.94	2.69
			DD/SF	1442198	5979.27	5	1590532	21600.38	46.4	0	5	1.36	9.07
			DD/DF	1395182	3444.35	5	1434548	21600.44	141.4	0	5	0.83	2.68

Table 203: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 15, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
15	50	5	SD/SF	464525	11.71	5	468710	2183.09	4083.8	5	5	0.91	0
			SD/DF	444683	9.33	5	448962	2225.43	75805.6	5	5	0.95	0
			DD/SF	417279	12.95	5	420864	1533.25	4050.6	5	5	0.86	0
			DD/DF	449346	8.95	5	453273	1270.99	34569.4	5	5	0.87	0
		10	SD/SF	573678	10.18	5	576412	12426.06	45303.8	4	5	0.47	0.01
			SD/DF	506736	9.36	5	509714	681.99	3299.6	5	5	0.58	0
			DD/SF	495366	13.37	5	498445	16721.1	46546.8	4	5	0.62	0.03
			DD/DF	500609	8.56	5	504415	1044.81	4702.4	5	5	0.75	0
		15	SD/SF	600938	11.02	5	602750	20100.78	76885.6	1	5	0.28	0.08
			SD/DF	544207	6.74	5	547500	7278.45	33371	4	5	0.6	0.01
			DD/SF	545432	14.29	5	548376	21600.02	59132	0	5	0.52	0.19
			DD/DF	553328	8.94	5	556051	2335.03	12345	5	5	0.49	0
		20	SD/SF	661158	10.1	5	662792	21600	97404	0	5	0.22	0.17
			SD/DF	610080	7.51	5	612207	7987.16	49879.2	4	5	0.35	0.01
			DD/SF	633486	10.55	5	635570	21600	90670.4	0	5	0.33	0.15
			DD/DF	614626	8.78	5	616813	8358.07	43365	4	5	0.35	0.03
	100	5	SD/SF	540525	92.07	5	428825	12202.46	18139.4	3	4	0.98	0.02
			SD/DF	490556	52.4	5	495018	2868.53	23803.2	5	5	0.9	0
			DD/SF	498243	73.59	5	502159	13992.93	164076	3	5	0.77	0
			DD/DF	489690	47.03	5	494412	12381.1	286982.6	3	5	0.95	0
		10	SD/SF	589000	93.72	5	592601	20837.84	15067.6	1	5	0.54	0.12
			SD/DF	551353	77.74	5	554703	12026.38	162873	3	5	0.61	0
			DD/SF	532346	74.8	5	535534	16421.58	15976.8	4	5	0.6	0.01
			DD/DF	534983	34.78	5	429481	2393	14411.4	4	4	0.64	0
		15	SD/SF	632834	121.05	5	635786	19853.04	19133.8	3	5	0.46	0.04
			SD/DF	568353	42.51	5	570997	4764.52	43632.2	5	5	0.46	0
			DD/SF	610748	93.6	5	614133	21600.06	14998.6	0	5	0.54	0.08
			DD/DF	582577	50.2	5	585709	6517.4	27683.4	5	5	0.53	0
		20	SD/SF	667400	71.79	5	670711	21600.06	17526	0	5	0.39	0.24
			SD/DF	627684	41.6	5	629784	5573.88	22710	5	5	0.33	0
			DD/SF	690463	98.4	5	693394	21600.08	17081	0	5	0.36	0.21
			DD/DF	649732	58.96	5	651934	7265.05	12773.6	4	5	0.34	0.02
	200	5	SD/SF	602515	360.45	5	611455	21600.42	3274.2	0	5	1.45	0.52
			SD/DF	570812	165.42	5	577715	18565.05	143742.2	1	5	1.19	0
			DD/SF	613785	328.46	5	619599	21600.08	19885.4	0	5	0.93	0.07
			DD/DF	561907	157.92	5	571024	15158.13	115891.6	3	5	1.58	0
		10	SD/SF	640639	422.54	5	648472	21600.12	3076.4	0	5	1.09	0.58
			SD/DF	616997	218.63	5	625251	18564.32	36558.6	1	5	1.31	0.02
			DD/SF	639623	391.82	5	646071	21600.08	3215.6	0	5	1	0.27
			DD/DF	628125	236.3	5	509353	13902.08	67752.4	1	4	0.76	0
		15	SD/SF	687957	537.56	5	694072	21600.12	3017.4	0	5	0.77	0.42
			SD/DF	666576	243.89	5	542180	14231.51	11845	1	4	1.11	0.03
			DD/SF	665359	397.94	5	672182	21600.08	3318.2	0	5	0.88	0.47
			DD/DF	664811	274.59	5	669578	17919.2	119015.6	2	5	0.71	0
		20	SD/SF	774001	457.21	5	779919	21600.08	3393.6	0	5	0.6	0.44
			SD/DF	735232	275.15	5	738715	19222.73	30228.8	1	5	0.47	0.03
			DD/SF	801181	418.62	5	806527	21600.12	4048	0	5	0.49	0.45
			DD/DF	726019	263.69	5	729679	21600.1	84462.4	0	5	0.5	0

Table 204: Performance of the ME formulation for the capacitated unbalanced network - $|T| = 30, C = 1.5$

$\|T\|$	$\|R\|$	$\|W\|$	Setting	LP-cost	LP-CPU	LP-sol	MIP-cost	MIP-CPU	Nodes	MIP-opt	MIP-sol	I-gap	O-gap
30	50	5	SD/SF	982576	320.62	5	994348	21600.1	4184	0	5	0.8	1.06
			SD/DF	881932	270.42	5	890171	21600.1	25464.8	0	5	0.92	0.06
			DD/SF	952030	332.51	5	963656	21600.08	4368.8	0	5	0.9	0.92
			DD/DF	867246	154.11	5	878123	19272.2	5742	1	5	1.23	0.19
		10	SD/SF	1077670	433.83	5	1086834	21600.1	4330	0	5	0.53	0.81
			SD/DF	952124	283.72	5	959953	21600.1	4706.2	0	5	0.69	0.51
			DD/SF	961156	358.37	5	969547	21600.1	3874.4	0	5	0.72	0.79
			DD/DF	964309	234.16	5	970153	21600.1	5734.2	0	5	0.53	0.31
		15	SD/SF	1131518	459.06	5	1139900	21600.1	5090.8	0	5	0.45	0.73
			SD/DF	1035836	196.24	5	1041810	21600.1	6552.6	0	5	0.48	0.37
			DD/SF	1059104	434.47	5	1067240	21600.12	5064.8	0	5	0.53	0.72
			DD/DF	1048650	226.88	5	1054124	21600.1	7060.8	0	5	0.45	0.3
		20	SD/SF	1286050	488.95	5	1293894	21600.1	4094.2	0	5	0.38	0.6
			SD/DF	1118434	351.05	5	1122892	21600.22	7692	0	5	0.36	0.31
			DD/SF	1183880	399.52	5	1191634	21600.1	5050.2	0	5	0.4	0.64
			DD/DF	1116440	254.74	5	1121150	21600.08	9508.6	0	5	0.39	0.26
	100	5	SD/SF	1037351	1421.97	5	1066255	21600.18	811.2	0	5	1.12	2.66
			SD/DF	983367	492.02	5	994404	21600.2	1661.4	0	5	1.05	0.47
			DD/SF	1033426	857.91	5	1050598	21600.2	1278	0	5	1.07	1.5
			DD/DF	980828	450.28	5	993913	21600.2	1425.2	0	5	1.17	0.84
		10	SD/SF	1130180	1454.48	5	1147645	21600.18	689.8	0	5	0.81	1.47
			SD/DF	1053526	576.06	5	1063262	21600.16	1451.2	0	5	0.75	0.54
			DD/SF	1172448	1231.03	5	1190444	21600.2	937.8	0	5	0.87	1.46
			DD/DF	1061762	561.85	5	1071400	21600.2	2094.4	0	5	0.71	0.74
		15	SD/SF	1172138	1295.78	5	1191092	21600.18	729.6	0	5	0.78	1.55
			SD/DF	1112028	637.57	5	1124408	21600.18	1409.2	0	5	0.88	0.82
			DD/SF	1179108	1222.2	5	1205710	21600.18	971.8	0	5	0.99	2.17
			DD/DF	1122182	467.89	5	1133586	21600.16	1591.8	0	5	0.81	0.8
		20	SD/SF	1298232	1619.54	5	1322066	21600.14	691	0	5	0.73	1.79
			SD/DF	1204736	444.35	5	1213220	21600.18	1648.6	0	5	0.53	0.53
			DD/SF	1285436	1412.02	5	1313676	21600.16	1047.8	0	5	0.72	2.14
			DD/DF	1216748	705.23	5	1227316	21600.14	1711.2	0	5	0.61	0.74
	200	5	SD/SF	1197564	6023.35	5	1350420	21600.44	145.6	0	5	2.01	10.16
			SD/DF	1130838	1700.62	5	1168528	21600.4	487.6	0	5	1.68	2.95
			DD/SF	1127552	3126.26	5	1215852	21600.42	238.8	0	5	1.59	6.99
			DD/DF	1125840	1491.33	5	1162960	21600.68	479.6	0	5	1.85	2.78
		10	SD/SF	1335290	5204.49	5	1852308	21600.98	17.2	0	5	1.48	27.65
			SD/DF	1230100	2241.59	5	1281006	21600.54	348.4	0	5	1.8	3.73
			DD/SF	1315050	3568.36	5	1411300	21600.36	66.6	0	5	1.64	6.65
			DD/DF	1233030	1934.6	5	1270216	21600.38	393.4	0	5	1.49	2.76
		15	SD/SF	1380284	4741.29	5	1564874	21600.42	49	0	5	1.69	11.03
			SD/DF	1313770	1824.13	5	1357880	21600.4	426	0	5	1.23	3.08
			DD/SF	1352170	3749.15	5	1511024	21600.48	81.2	0	5	1.44	10.1
			DD/DF	1317218	1916.63	5	1367368	21600.48	333.6	0	5	1.42	3.62
		20	SD/SF	1505886	5165.48	5	1879136	21600.36	36.4	0	5	1.41	18.4
			SD/DF	1389164	2177.45	5	1421740	21600.5	215	0	5	0.94	2.24
			DD/SF	1442198	3792.67	5	1872524	21600.44	23.8	0	5	1.36	21.92
			DD/DF	1395182	1966.9	5	1419490	21600.42	326.2	0	5	0.83	1.62

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