→ Begin with directed graph (edges are links).

→ Remove directions (may get multigraph). Work with matchings in resulting undirected G.

Notation: E = set of edges of G.
$\mathcal{M}$ = set of all matchings of G.
$\mathcal{M}_{ok}$ = set of all matchings of G satisfying SINR constraints.
$\mathcal{M}_{\overline{ok}} = \mathcal{M} \setminus \mathcal{M}_{ok}$.

Primal LP: variable y_M for each $M \in \mathcal{M}$.

$$\text{minimize} \quad \sum_{M \in \mathcal{M}_{ok}} y_M + \mu \sum_{M \in \mathcal{M}_{\overline{ok}}} y_M \qquad \mu \geq 1$$

$$\text{s.t.} \quad y_M \geq 0 \qquad \forall M \in \mathcal{M}$$

$$\sum_{\substack{M \in \mathcal{M} \\ e \in M}} y_M = 1 \qquad \forall e \in E$$

(Note: $\lim_{\mu \to \infty}$ objective function $= 1/\text{capacity}$.)

Dual LP: variable x_e for each $e \in E$.

$$\text{maximize} \quad \sum_{e \in E} x_e$$

$$\text{s.t.} \quad \sum_{e \in M} x_e \leq 1 \qquad \forall M \in \mathcal{M}_{ok} \quad (C)$$

$$\sum_{e \in M} x_e \leq \mu \qquad \forall M \in \mathcal{M}_{\overline{ok}} \quad (D)$$

Algorithm:

Initialize set of constraints C;

$\mu := 1$;

repeat

  $D := \emptyset$;

  ok := false;

  repeat

   solve the dual LP given $C \cup D$ and let $x_1^* x_2^* \dots x_{|E|}^*$ be the optimal solution;

   find a maximum-weight matching M^* on G using weights $x_1^* x_2^* \dots x_{|E|}^*$;

   if $w(M^*, x^*) \leq 1$

    ok := true;

   if $w(M^*, x^*) > \mu$ and $M^* \in \mathcal{M}_{\overline{ok}}$

    add $\sum_{e \in M^*} x_e \leq \mu$ to D;

   if $w(M^*, x^*) > 1$ and $M^* \in \mathcal{M}_{ok}$

    add $\sum_{e \in M^*} x_e \leq 1$ to C;

   if $1 < w(M^*, x^*) \leq \mu$ and $M^* \in \mathcal{M}_{\overline{ok}}$

    search (exhaustively) for $M \in \mathcal{M}_{ok}$ such that $1 < w(M, x^*) \leq w(M^*, x^*)$;

    if none found

     ok := true;

    else add $\sum_{e \in M} x_e \leq 1$ to C;

  until ok;

  if $D \neq \emptyset$

   $\mu := \mu + \Delta\mu$; $(\Delta\mu > 0)$

until $D = \emptyset$;

notation: $w(M, x) = \sum_{e \in M} x_e$.