KoI graph coloring problem (after local resource allocation)

Table 1: ILP input parameters

$G = (V, E)$	interference conflict graph
V	set of nodes (equaling local cells)
E	set of conflict links with significant interference
C	set of available wireless channels
$C_{\text{pot}}(v) \subseteq 2^C$	potential channel sets for $v \in V$

Table 2: ILP variables

$x_{v,i} \in \{0, 1\}$	determines whether $v \in V$ uses channel $i \in C$
$z_{v,S} \in \{0, 1\}$	determines whether $v \in V$ uses all channels from $S \in C_{\text{pot}}(v)$

$$\text{min} \quad \sum_{v \in V} \sum_{i \in C} x_{v,i} \tag{1}$$

$$s.t. \quad x_{v,i} + x_{w,i} \leq 1, \quad \forall (v, w) \in E, i \in C \tag{2}$$

$$s.t. \quad z_{v,S} \leq x_{v,i}, \quad \forall v \in V, S \in C_{\text{pot}}(v), i \in S \tag{3}$$

$$\left(s.t. \quad z_{v,S} - 1 \geq \sum_{i \in S} x_{v,i} - |S|, \quad \forall v \in V, S \in C_{\text{pot}}(v), i \in S \right) \tag{4}$$

$$s.t. \quad \sum_{S \in C_{\text{pot}}(v)} z_{v,S} \geq 1, \quad \forall v \in V \tag{5}$$

Note: (4) is necessary in theory, to validate the intended definition of the z variables, but can practically be omitted without any effect on the obtained solution.