Optimization problem definition

- $k \in \{0, 1, \ldots, K\}, K \in \mathbb{N}^0$
- $m \in \{1, \ldots, M\}, M \in \mathbb{N}^+$
- $L \in \mathbb{N}^+$
- $P \in \mathbb{R}$
- $\sigma^2_{(k,m)} \quad \forall k, m \quad \in \mathbb{R}$
- $G_{(k,m);l} \quad \forall (k,m), l \quad \in \mathbb{R}$
- optimization variable $z_{(k,m);l}$ — two cases:
  - $l = k$: $z_{(k,m);k} \in \{0, 1, \ldots, L\}, \forall k, m$
  - $l \neq k$: $0 \leq z_{(k,m);l} \leq 1, \forall l \neq k$
- Υ — the set of all possible (k, m) tuples (KM elements in total)

Mixed-integer nonlinear optimization problem:

$$\left(z^{\text{opt}}_{(k,m);l}\right)_{\forall (k,m);l} = \underset{\left\{z_{(k,m);l}\right\}_{\forall (k,m);l}}{\text{argmax}} \left\{ \sum_{k=1}^{K} \sum_{m=1}^{M} \log_2 \left(1 + \frac{z_{(k,m);k} PG_{(k,m);k}}{\sigma^2_{(k,m)} + \sum\limits_{l \neq k} (1 - z_{(k,m);l}) PG_{(k,m);l}} \right) \right\} \tag{1}$$

subject to

$$\sum_{(k,m) \in \Upsilon} z_{(k,m);l} = L, \quad \forall l, \tag{2}$$

$$z_{(k,m);k} \in \{0, 1, \ldots, L\}, \quad \forall k, m, \tag{3}$$

and

$$0 \leq z_{(k,m);l} \leq 1, \quad \forall k, l, m, \quad l \neq k \tag{4}$$