Effective Node Assignment in 2-Hop Fixed Relay Networks

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Purpose:

To propose an effective node-relay assignment in IEEE 802.16 relay networks.

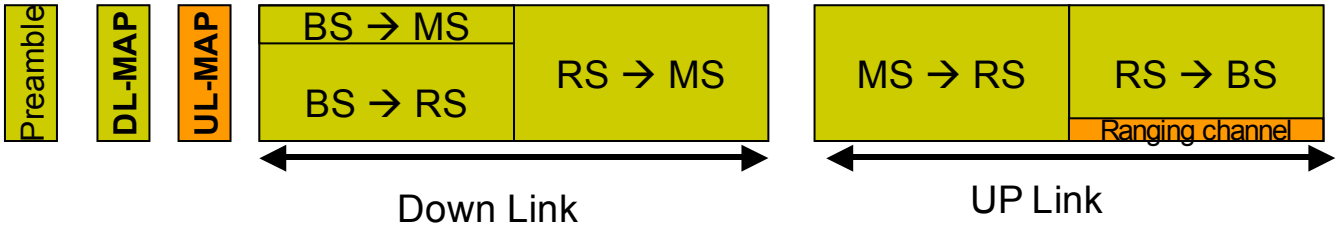
Key Contributions

- RRM:
  - A flexible and extendable algorithm for interference management.
  - Minimizing extra signaling overhead.

- Network entry/ Mobility management:
  - Determine the relay which should relay the signal.

Sub-channel Reuse Practical Issues

- Define Three zones for each relay:
  - Receiving Zone, Interference Zone and Non-interference Zone.
- Facts
  - All relays receive UL-MAP.
  - Each relay can scan all sub-channels (even not assigned to that relay).



- We propose a table called "Interference Table":
  - Passive network discovery procedure.
  - Low overhead
    - Does not required initiation message from BS
  - Can be used in
    - Smart Relays
    - Power allocation and adaptive modulation.
  - Mobile RSs and MSs are also supported.

CID	Sub Ch.	Received power	Type
1250	5	a	In
1430	4	b	Out
…	…	…	…

Node Assignment

- Objective: Network throughput: $t_M = \sum_{n=1}^{N} \sum_{k=0}^{K} \sum_{m=1}^{M} p_{mk}^{(n)} R_{mk}^{(n)}$
- Problem: Optimizing trade off between
  - Spatial multiplexing
  - and user throughput

❖ Using the proposed "Interference Table"

CID	Sub Ch.	Received power	Type
1250	5	a	In
1430	4	b	Out
…	…	…	…

❖ Efficient node assignment algorithm:

$$\max \quad t_M = \sum_{n=1}^{N} \sum_{k=0}^{K} \sum_{m=1}^{M} p_{mk}^{(n)} R_{mk}^{(n)}$$

$$s.t. \quad \forall S_m, \sum_{k=0}^{K} \sum_{n=1}^{N} p_{mk}^{(n)} \quad 1, \quad m = \{1,2,...,M\}$$

$$\forall R_k, \forall n \quad \{1,...,N\}, \sum_{l=1}^{M} I_{lk} \sum_{k'=0}^{K} p_{lk}^{(n)} \quad 1, \quad k = \{1,2,...,K\}$$

$$0 \quad p_{mk}^{(n)} \quad 1 \quad \forall m = \{1,2,...,M\}, k = \{1,2,...,K\}, n \quad \{1,...,N\}$$