|  |  |  |
| --- | --- | --- |
| **Algorithm 2 Inner loop algorithm** | | |
| **Input** | **:** | **your mother boom** |
| **Output** | **:** |  |
| **Step 1** | **:** |  |
| **Step 2** | **:** |  |
| **Step 3** | **:** | **Calculate using (5), and obtain using function A** |
| **Step 4** | **:** |  |
| **Step 5** | **:** | **Initialize as as** |
| **Step 6** | **:** | **Initialize t=0,** |
| **Step 7** | **:** | **obtain by calculating (13) using** |
| **Step 8** | **:** |  |
| **Step 9** | **:** | **Obtain using to calculate (14)** |
| **Step 10** | **:** | **Obtain using to calculate (13)** |
| **Step 11** | **:** |  |
| **Step 12** | **:** |  |
| **Step 13** | **:** |  |
| **Step 14** | **:** |  |
| **Step 15** | **:** | **Update all the Lagrange multipliers using（15）** |
| **Step 16** | **:** |  |
| **Step 17** | **:** |  |
| **Step 18** | **:** |  |
| **Step 19** | **:** |  |
| **Step 20** | **:** |  |
| **Step 21** | **:** |  |
| **Step 22** | **:** |  |

|  |  |  |
| --- | --- | --- |
| **Algorithm 1 Pre-Matching Algorithm** | | |
| **Input** | **:** |  |
| **output** | **:** |  |
| **Initialize** | **:** |  |
| **Step 1** | **:** | **for do** |
| **Step 2** | **:** |  |
| **Step 3** | **:** | **for do** |
| **Step 4** | **:** | **obtain using (6), obtain using (8)** |
| **Step 5** | **:** | **if then** |
| **Step 6** | **:** | **Remove current k from** |
| **Step 7** | **:** | **end if** |
| **Step 8** | **:** | **end for** |
| **Step 9** | **:** | **if = then** |
| **Step 10** | **:** | **add to** |
| **Step 11** | **:** | **elseif then** |
| **Step 12** | **:** | **add to** |
| **Step 13** | **:** | **end if** |
| **Step 14** | **:** | **add to** |
| **Step 15** | **:** | **end for** |

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| **Algorithm 4 Preference list** | | |
| **Input** | **:** | **,,** |
| **Output** | **:** |  |
| **Step 1** | **:** |  |
| **Step 2** | **:** |  |
| **Step 3** | **:** | **and place k into in descending order of** |
| **Step 4** | **:** |  |
| **Step 5** | **:** |  |
| **Step 6** | **:** |  |
| **Step 7** | **:** |  |
| **Step 8** | **:** |  |
| **Step 9** | **:** | **obtain caused by i using (16), and place i into in ascending order of** |
| **Step 10** | **:** |  |
| **Step 11** | **:** |  |

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| --- | --- |
| Simulation parameter | Value |
| Radius of Cellular Network | 250m |
| Number of D2D links N |  |
| Number of CUE links M |  |
| D2D communication distance |  |
| Path loss exponent | 3 |
| EH power segment [] | [10 100 230.06 57368] uw |
| EH linear function coefficient [] | [0 0.3899 0.6967 0.1427] |
| EH linear function intercept [] | [0 -1.6613 -19.1737 108.2778] |
| Maximum harvested power | 250uw |
| Max transmission power | 23dBm |
| Circuit power consumption | 20dBm |
| CUE transmission power | 23dBm |
| Initial Lagrange multipliers | 0.1 |
| Noise power | -100dBm |
| Throughput requirement of D2D link i | 2bits/Hz |
| Throughput requirement of CUE k | 1bit/Hz |

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| --- | --- | --- |
| **Algorithm 5: One-to-one Stable Matching Algorithm** | | |
| **Input** | **:** | **,** |
| **Output** | **:** |  |
| **Step 1** | **:** |  |
| **Step 2** | **:** |  |
| **Step 3** | **:** | **Let propose its most preferred CUE which should be the first CUE in** |
| **Step 4** | **:** |  |
| **Step 6** | **:** | **k is the most preferred CUE for i** |
| **Step 7** | **:** | **receives only one proposal from D2D link then** |
| **Step 8** | **:** | **will be matched with ,** |
| **Step 9** | **:** | **The matched will be removed form** |
| **Step 10** | **:** | **receives not only one proposal from different D2D links** |
| **Step 11** | **:** | **one of the D2D links has only one preferred CUE in its preference list** |
| **Step 12** | **:** | **will be matched with , it will be removed from** |
| **Step 13** | **:** | **all the D2D links have more than one preferred CUE in their preference lists** |
| **Step 14** | **:** | **The CUE will be matched with its most preferred D2D link from its preference list , and the matched D2D link will be removed form** |
| **Step 15** | **:** |  |
| **Step 15** | **:** |  |
| **Step 16** | **:** |  |
| **Step 17** | **:** |  |
| **Step 18** | **:** |  |
| **Step 19** | **:** |  |
| **Step 20** | **:** | **i deletes its most preferred CUE from** |
| **Step 21** | **:** |  |
| **Step 22** | **:** |  |
| **Step 23** | **:** | **Gather all the unmatched CUEs in** |

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| **Algorithm 3 Out loop Algorithm** | | |
| **Input** | **:** |  |
| **Output** | **:** |  |
| **Step 1** | **:** |  |
| **Step 2** | **:** |  |
| **Step 3** | **:** | **Obtain using (5), and obtain using function** |
| **Step 4** | **:** |  |
| **Step 5** | **:** |  |
| **Step 6** | **:** | **Assign** |
| **Step 7** | **:** |  |
| **Step 8** | **:** |  |
| **Step 9** | **:** |  |