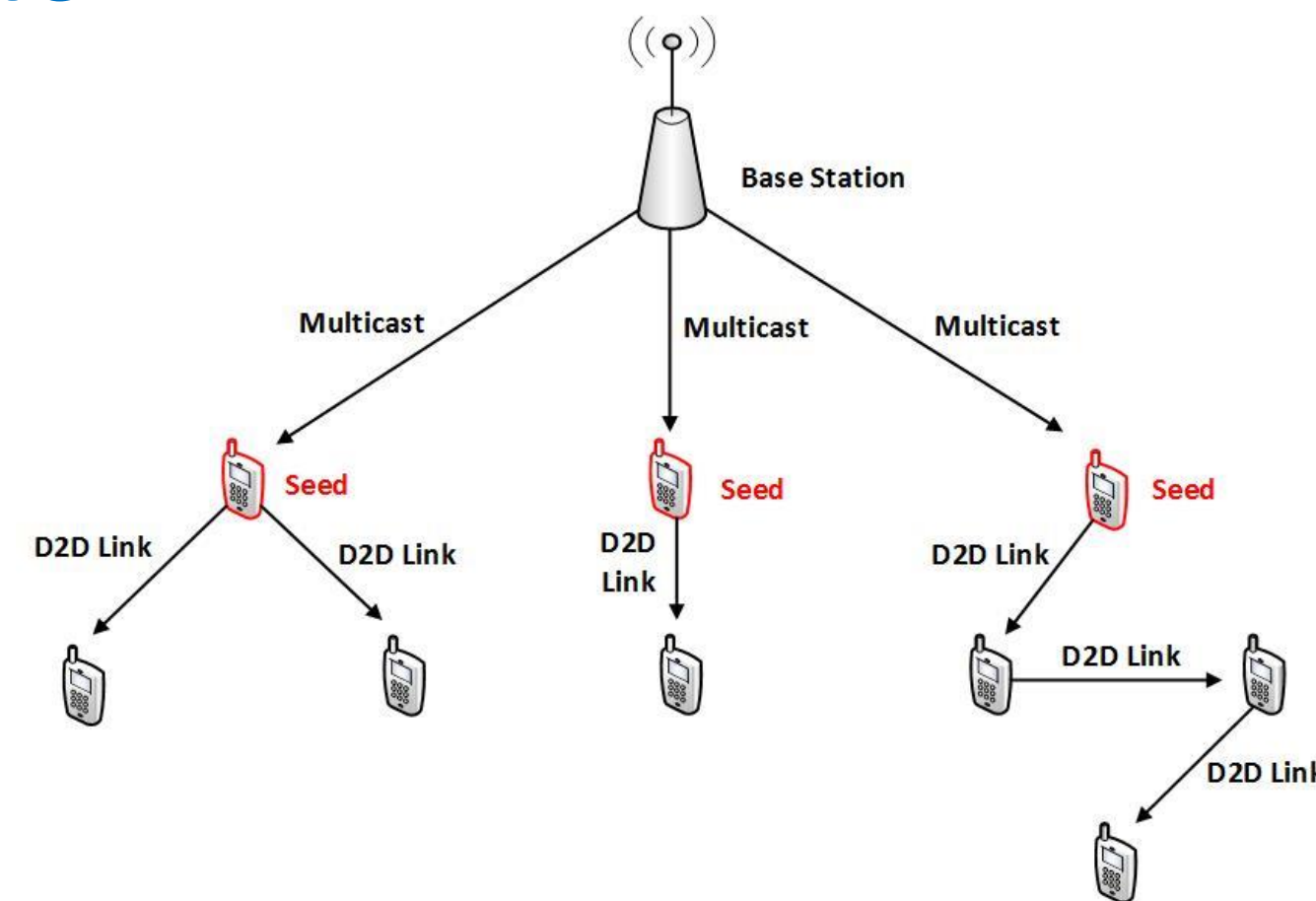


# Social-Aware Energy-Efficient Data Dissemination with D2D Communications

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## Architecture



- A D2D link is established between two users if they are friends (socially connected) and their distance is within the requirement of D2D transmission.

## Motivation

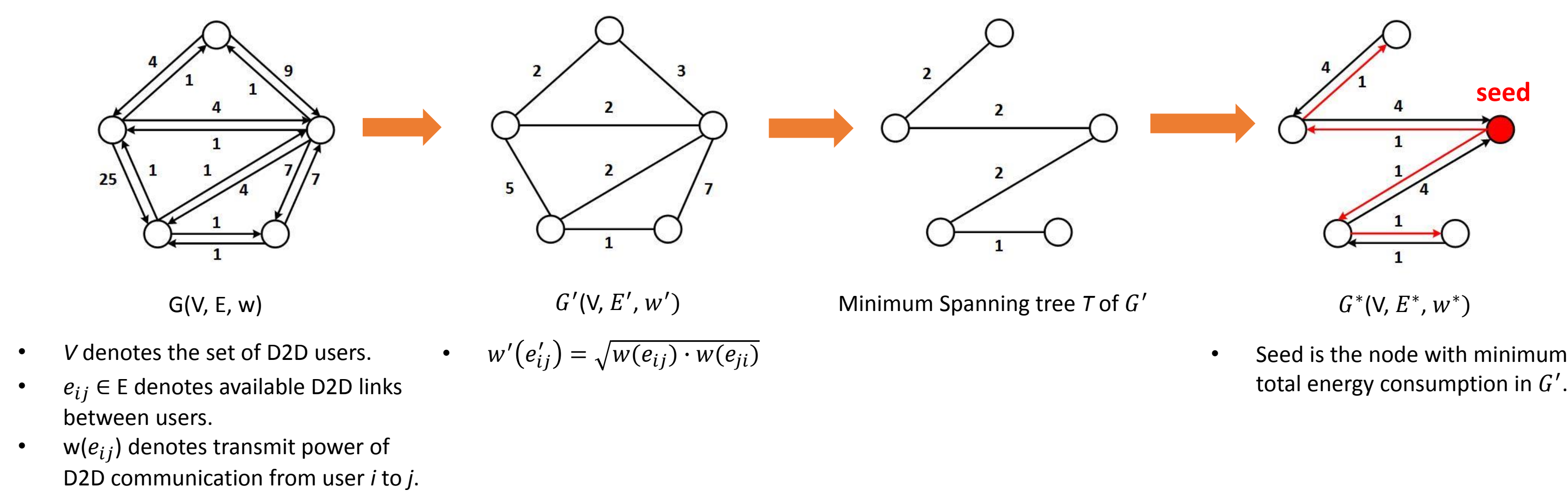
Design a social-aware data dissemination scheme that effectively selects seeds and schedules transmission to achieve the following goals:

- Reduce the total energy consumption of D2D transmission among users; and
- Reduce the finishing time of data dissemination.

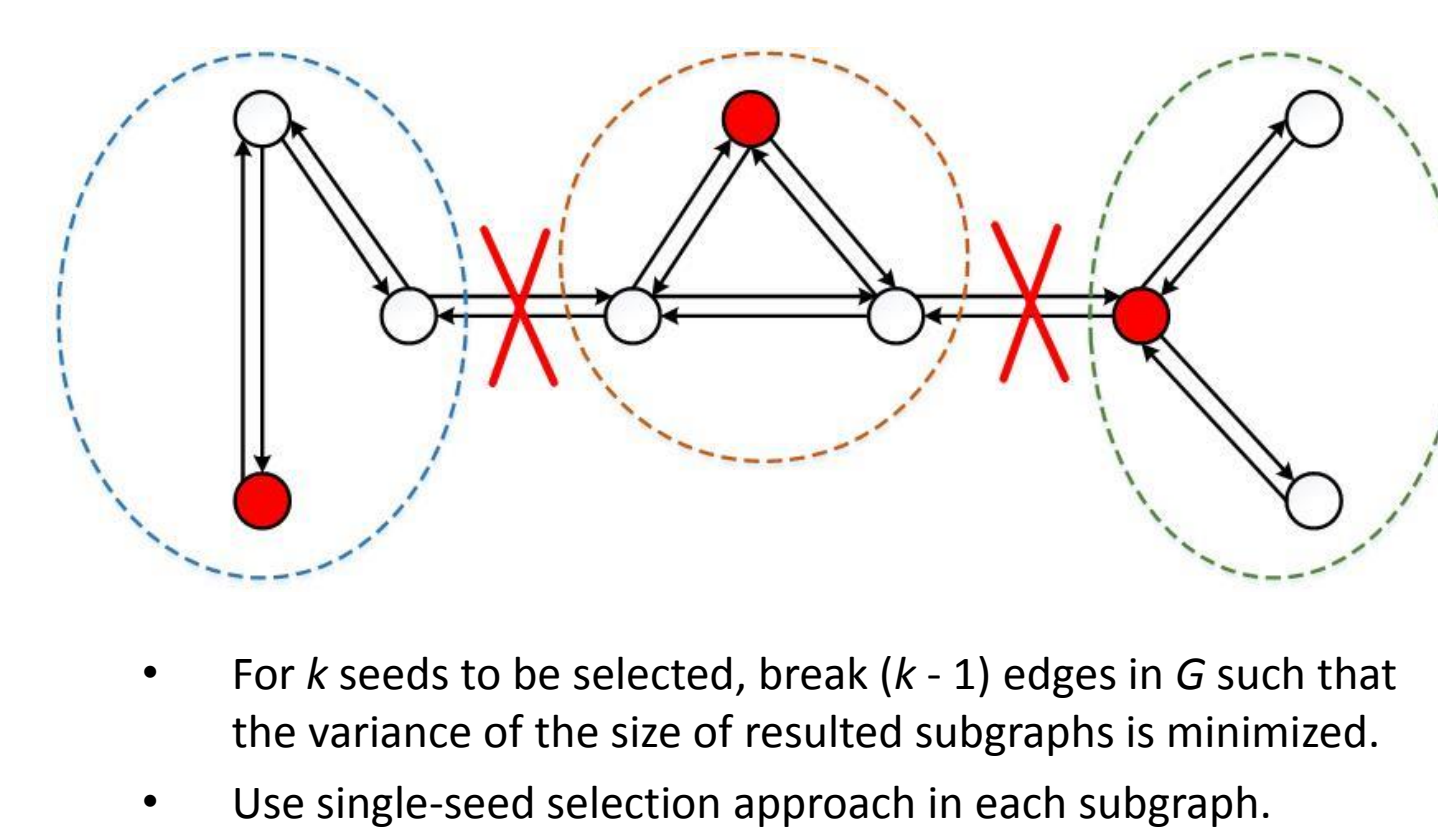
## Our Solution: Seed Tree-Based Dissemination (STBD) Approach

### Part 1: Seed selection

#### (a) Single-Seed Scenario

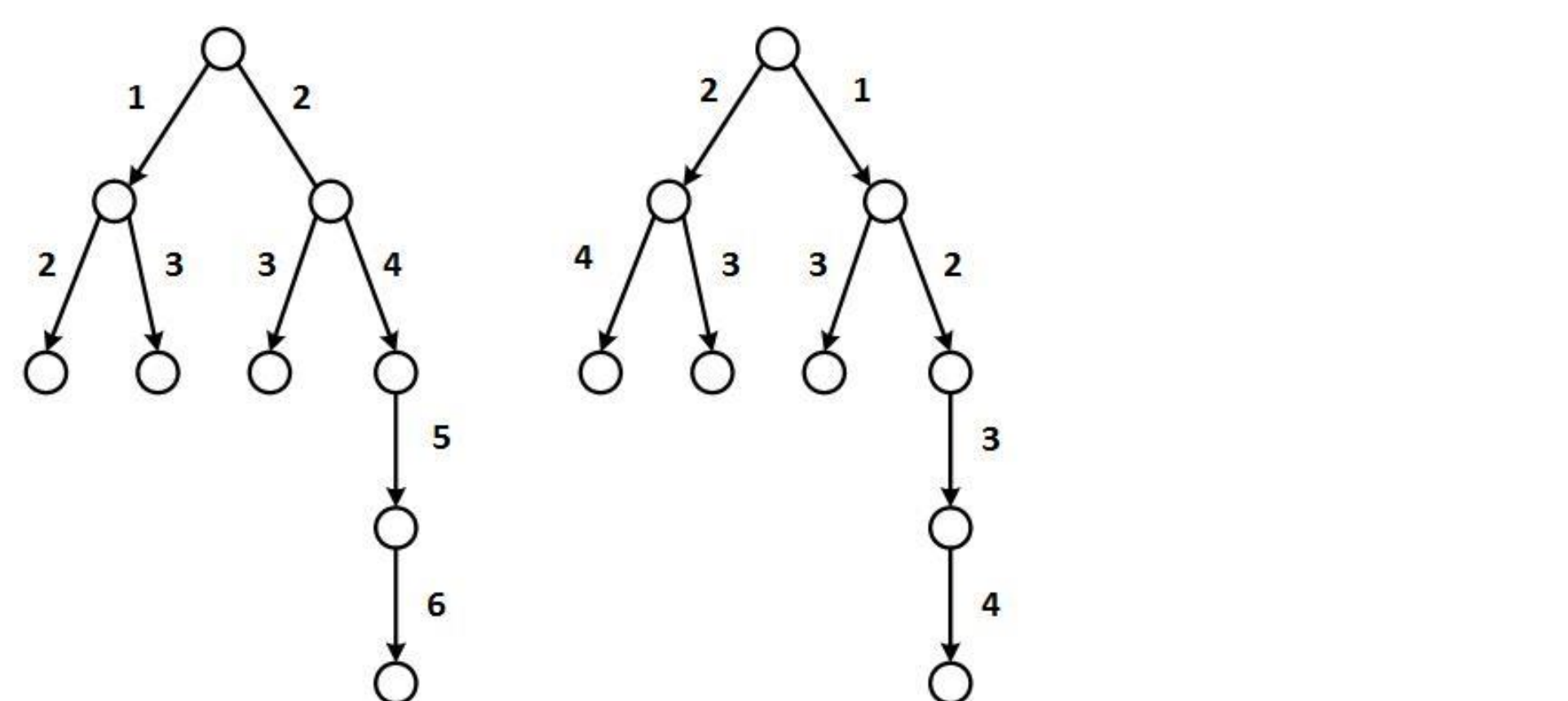


#### (b) Multiple-Seed Scenario



### Part 2: Transmission Scheduling

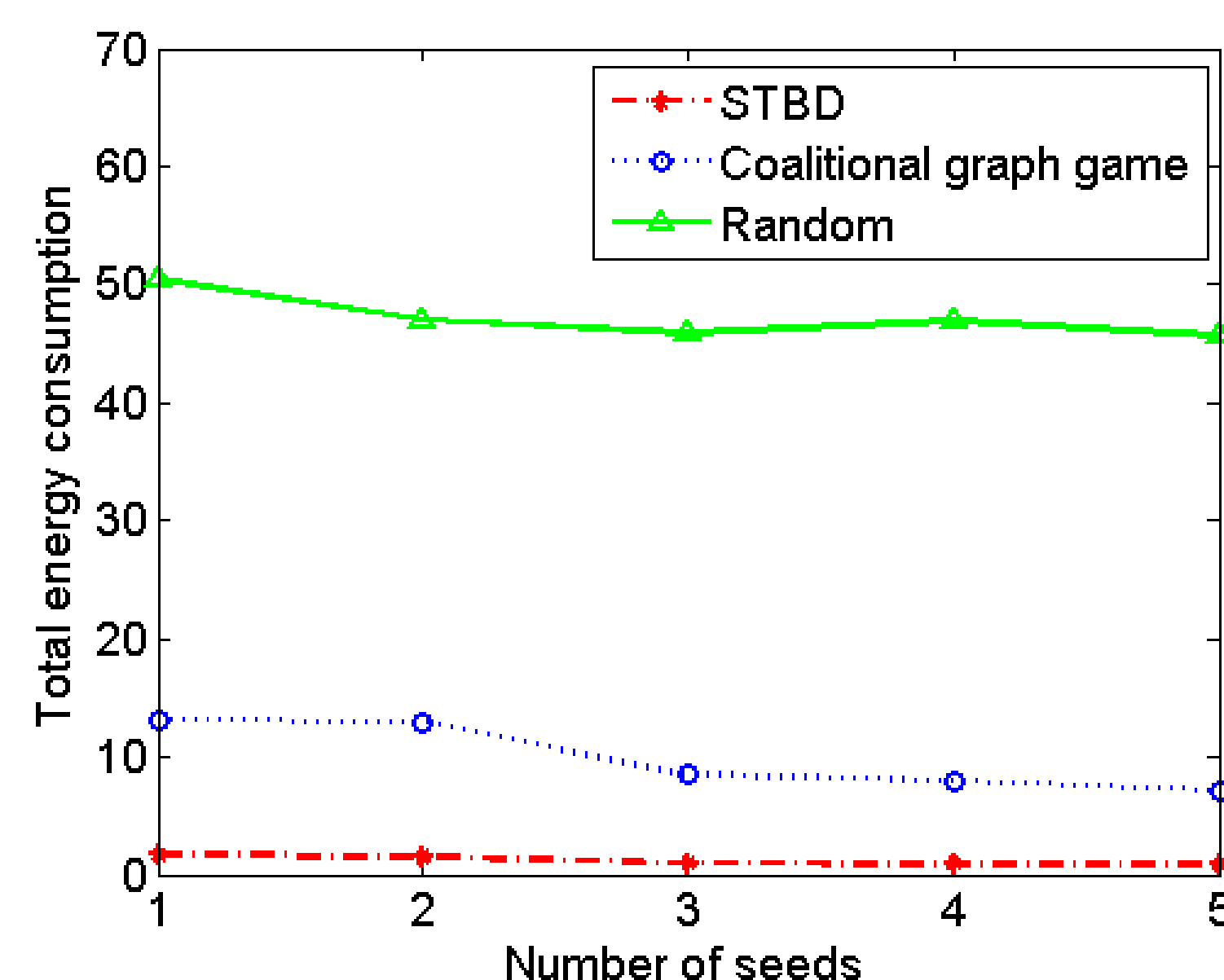
- Transmission order can influence the finishing time of data dissemination.
- For example:



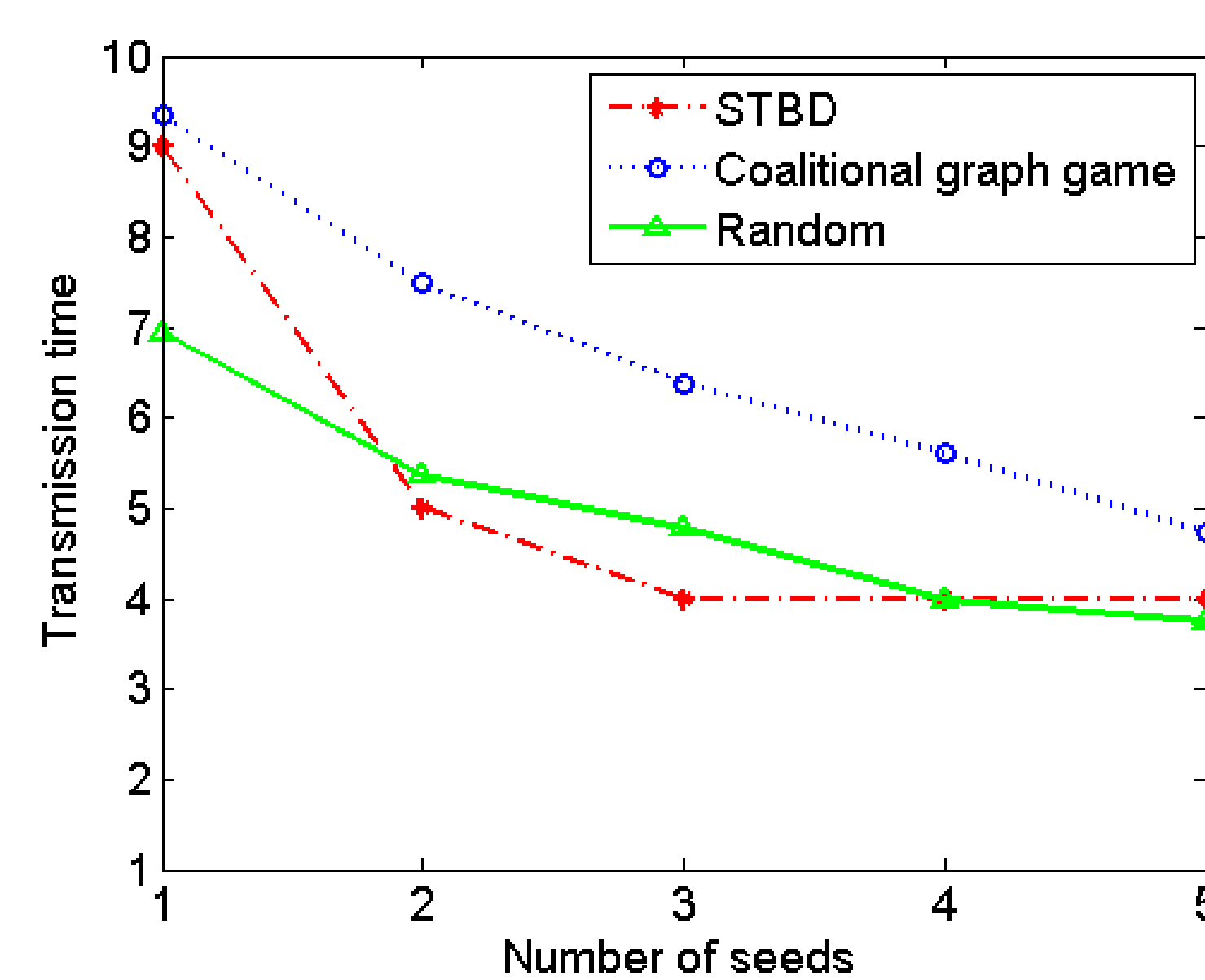
\* The value on the edge is the time slot in which the transmission occurs.

- When a node determines the order of data transmission to its children, the following factors need to be considered:
  - (1) Number of descendants of child  $i$ ;
  - (2) Depth of the subtree rooted at child  $i$ .
- $influenceValue_i = \beta \cdot descendant(i)_{normal} + (1 - \beta) \cdot depth(i)_{normal}$
- The higher the *influenceValue* of a child is, the earlier it should receive data from its parent.

## Simulation Results



Reduce total energy consumption



Reduce finishing time of data dissemination