

## Gender Assignment For Directional Frequency-Division Duplex Nodes In Wireless Networks

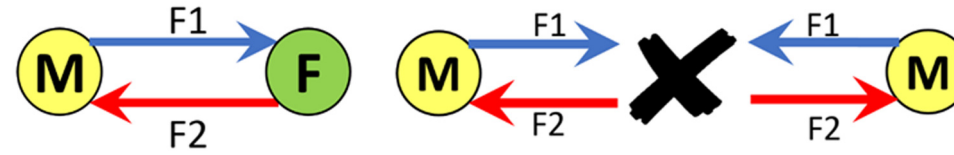


The frequency-division duplex (FDD) nodes use two separate frequency bands (separated by a guard band) for transmission and reception, thus enabling the full-duplex (FD) communication. The use of directional FDD nodes in multi-hop wireless networks offers the advantages of larger transmission

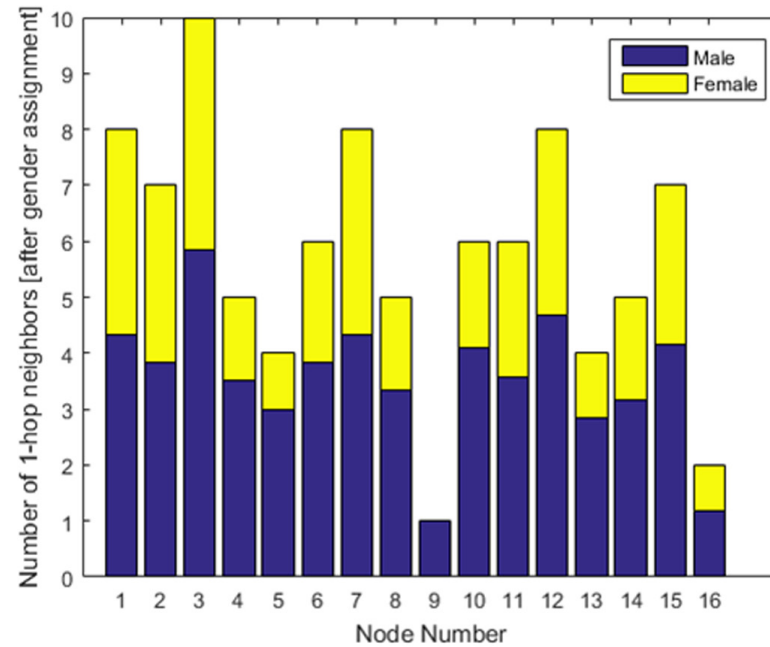
range, better link reliability, and spatial reuse, resulting in much higher throughput and superior interference mitigation. However, the multi-hop FDD communication partitions the nodes in two classes (or genders) wherein the nodes of the same class (or gender) in a neighborhood cannot communicate with each other. This can seriously impact the availability of neighboring nodes for communication, and lead to disconnected nodes or network partitioning. We have designed a novel algorithm to assign the appropriate genders to these nodes in a multi-hop network such that each node is able to communicate with its multiple 1-hop neighbors, located in different directions. Our algorithm achieves approximately half of the neighbors of each node of opposite gender and they are distributed in different directions, thus enabling robust, multipath, and high throughput communication in the network.

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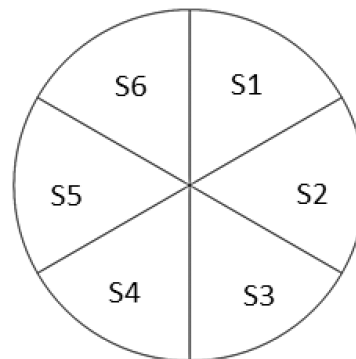
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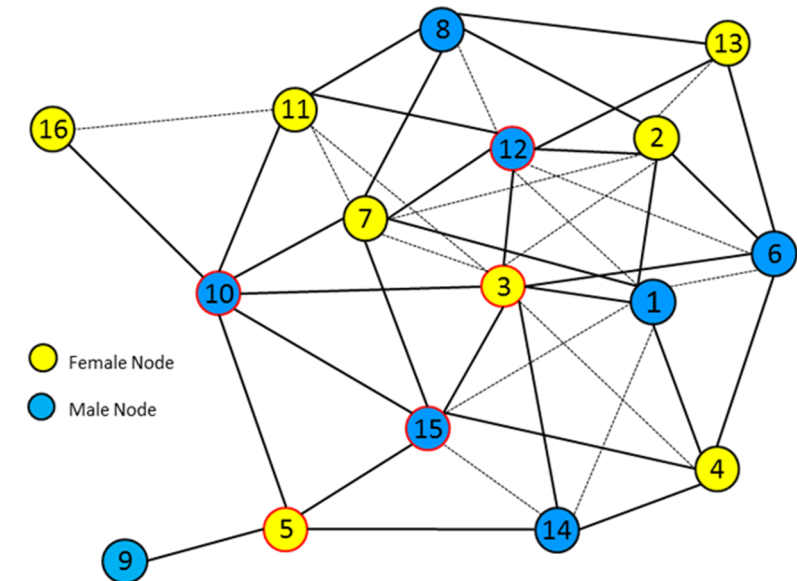
**Fig 1. FDD communication:** (a) A node can communicate only with another node of opposite gender; (b) Two nodes of the same gender cannot communicate with each other. Here, M denotes the 'male' and F denotes the 'female' node; and F1, F2 represent channel frequency.



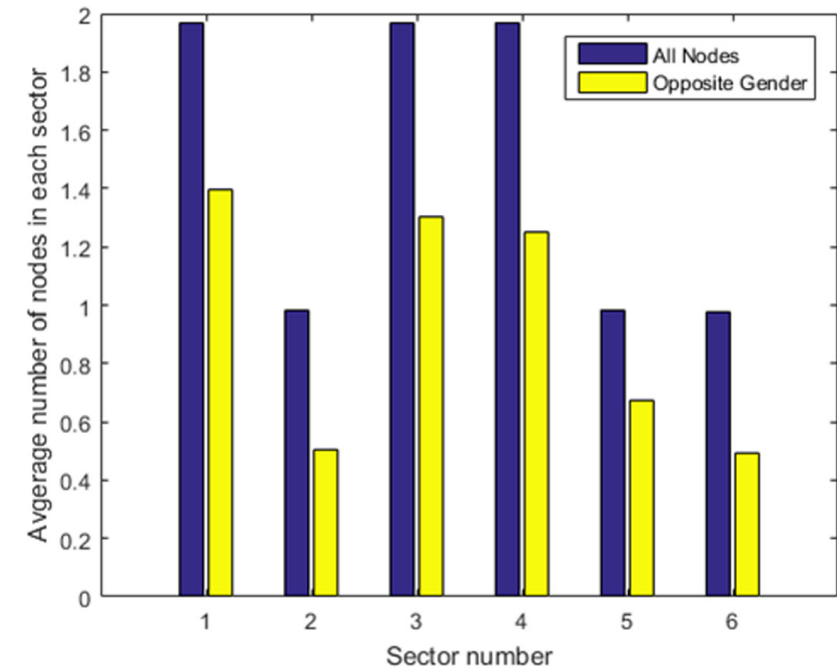
**Fig 3. Gender distribution in the 1-hop neighborhood of each node.** Note that approximately half neighbor nodes belong to each gender.



**Fig 4. Directions are divided in six sectors of 60 degree each.**



**Fig 2. Gender assignment for a 16 node network.**



**Fig 5. Average distribution of genders in 1-hop neighborhood of all the seed nodes in each sector.**