Directional Transmissions and Receptions for Burst Forwarding using Disjoint Paths
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HIGHLIGHT
✓ Directional antennas attractive for many applications that communicate large amount of sensed data. No solution exists for bulk transmissions with ESD antennas!
✓ Disjoint path forwarding improves the sink throughput. Can keep sender and receiver radio always communicating. Helps reach maximum throughput supported.
✓ Our solution: DPT, a protocol that uses ESD antennas for bulk transmissions. It doubles the sink throughput using disjoint paths while using only one channel for communication.

DPT - MAXIMUM THROUGHPUT

DPT PROTOCOL
- DPT is a centralized protocol for transmissions of large amount of data using directional communications in WSNs. It constructs node disjoint and interference free paths for packet forwarding using ESD antennas.
- DPT consists of three distinct phases:
  i) Topology discovery: Neighbour discovery done in the network to collect link statistics (ETX and RSSI) for different sender and receiver antenna configuration.
  ii) Path construction: The collected topological information used to generates paths and antenna configuration for the packet forwarding.
  iii) Bulk transmissions: The source transmits packets on disjoint paths. The forwarding of the packets is done in a deterministic manner. This results in source implicitly clocking the pipeline on the disjoint paths.

DPT - MEAN THROUGHPUT

EXPERIMENTAL SETUP

ESD ANTENNA (SPIDA)
- Figure 1: Horizontal black line indicates maximum achievable throughput which is 225 Kbps. Maximum throughput achieved with our solution is 212 Kbps.
- Figure 2: S1 indicates node with ID 1. S1 is the source node, S6 is the sink node. The disjoint paths are S1,S2,S5,S6 and S1,S3,S4,S6. Transmissions with similar arrows occur together.
- Figure 3: Sics Parasitic Interference Directional Antenna (SPIDA) is an Electronically Switched Di-rectional (ESD) antenna. It allows software based control of the direction of the maximum antenna gain. The approximate antenna gain is 4 dBi.

DPT - PACKET RECEPTION RATIO