Competition: Using Enhanced OF\partial\text{COIN} to Monitor Multiple Concurrent Events under Adverse Conditions

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What is it about?
Performance evaluation and comparison of IoT communication protocols in **harsh** RF environments

- **Performance metrics**
  - Reliability
  - Latency
  - Energy consumption

- **Multiple concurrent events**
  - One-to-one
  - One-to-many
  - Many-to-one
Challenges

- Multiple (concurrent) events
- Adverse conditions (harsh RF environments)
- Large-scale deployment
Enhanced OF$\partial$COIN
Derived from previous year’s OF$\partial$COIN$^1$

- Concurrent transmissions
  - Constructive interference
  - Capture effect
- Opportunistic multichannel hopping$^2$

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Implementation

- Contiki OS
- TelosB sky mote
- Flocklab\(^3\) + Jamlab\(^4\)
- D-Cube\(^5\)


Frame Structure

- Identical part ← Constructive interference
- Different part ← Capture effect
- Decision making of re-transmissions

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</thead>
<tbody>
<tr>
<td>Preamble Sequence</td>
<td>Start of Frame Delimiter</td>
<td>Frame Length</td>
<td>Public Information</td>
<td>Identical Part Checksum</td>
<td>Private Information</td>
<td>Topology Information</td>
<td>Different Part Checksum</td>
<td>Footer/ CRC</td>
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<td>Different Part</td>
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Example of a one-to-one scenario
Network Coordination

One-to-one scenario

- **Destination nodes**
- **Source nodes**
- **Active Relay Nodes**
- **Silent Relay Nodes**
- **Data Flow**
Network Coordination

One-to-one scenario x2
Results

Performance in different scenarios

- Reliability: 88.89%
- Latency: 332.49 ms
- Energy consumption: 10579 J
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非常感谢!

Any Questions?