CONDITIONAL TRANSMISSIONS: PERFORMANCE STUDY OF A NEW COMMUNICATION STRATEGY IN VANET

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OUTLINE

- INTRODUCTION
- NEW APPROACH FOR VANET
- CONDITIONAL-TRANSMISSION TECHNIQUE
  - Principle
  - Useful Conditions
  - Performance Discussion
- PERFORMANCE STUDY
- CONCLUSION
INTRODUCTION

- The topological routing algorithms
  - more control messages are required
- The geographical routing protocols
  - bandwidth wastage
- The hierarchical routing protocols
  - The overhead needed to build such clusters increases and the clusters are less stable
INTRODUCTION

- The movement-based routing protocols
  - it is not sufficient nor practicable in all the situations
- The broadcasting-based routing protocols
  - requires more control messages and then consumes more bandwidth when the dynamic increases
NEW APPROACH FOR VANET

- Avoiding the Addresses
- Path Maintenance
  - consists in the maintenance of a communication that began when the receiver was in the neighborhood of the sender
- Conditional Transmission
NEW APPROACH FOR VANET

- conditional addressing instead of network addressing
- path maintenance instead of traditional unicast
- conditional transmissions instead of broadcast
CONDITIONAL-TRANSMISSION TECHNIQUE: Principle

- it is passed by to the application layer if CUP (the upward condition) is true.
- it is forwarded to the neighbors when CFW (the forward condition) is true.
- the conditional transmission has no impact on the security of the routing layer.
They can also concern trajectory-related information to determine whether a mobile is on the same trajectory than the sender or not.

- compare \((h_1*w_1 + h_2*w_2 + \ldots)\) to a predefined empirical threshold.
Performance Discussion

- **Control Overhead**
  - The header is about 200 B
  - A conditional transmission does not require control messages

- **Processing Time**
  - In [8], the impact of the interpacket gap (IPG) in intervehicle wireless communications is studied

- **Collisions**
  - A condition such as “rand() < 1/n”
Simulation Methodology

- **Single Convoy**
  - IPG (in seconds)
  - IVD (in meters)
  - Leader vehicle

- **Convoy with Stopped Vehicles**
  - Vehicles in convoy
  - 300 m
  - Stopped vehicles

- **Two Convoys in the Same Road**
  - 50 km/h

- **Two Perpendicular Convoys**
  - 50 km/h
Simulator Configuration

- The transport protocol is UDP
- consider 20 vehicles per convoy
Single Convoy

Percentage of received data by the last vehicle in the convoy (DIV=27m)

Percentage of received data (%)

Sending rate (Kbit/s)

End-to-end delay for the first packet in the convoy (DIV=27m)

End-to-end delay (s)

Sending rate (Kbit/s)

Percentage of received data by the last vehicle in the convoy (DIV=72m)

Percentage of received data (%)

Sending rate (Kbit/s)

End-to-end delay for the first packet in the convoy (DIV=72m)

End-to-end delay (s)

Sending rate (Kbit/s)
The Other Road-Traffic Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>OLSR</th>
<th>Fast OLSR</th>
<th>AODV</th>
<th>HOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single convoy</td>
<td>21%</td>
<td>8%</td>
<td>23%</td>
<td>36%</td>
</tr>
<tr>
<td>With stopped veh.</td>
<td>14%</td>
<td>2%</td>
<td>15.7%</td>
<td>36%</td>
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</tbody>
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<td>23%</td>
<td>36%</td>
</tr>
<tr>
<td>With crossing convoy</td>
<td>7%</td>
<td>2%</td>
<td>15.7%</td>
<td>36%</td>
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<td>21%</td>
<td>8%</td>
<td>23%</td>
<td>36%</td>
</tr>
<tr>
<td>With perp. convoy</td>
<td>12%</td>
<td>2%</td>
<td>15.7%</td>
<td>36%</td>
</tr>
</tbody>
</table>
CONCLUSION

- Conditional transmissions Instead of transporting addresses or positions, a message is sent with some conditions used for retransmission or reception.
- Conditional transmissions can efficiently support the high dynamic of the networks.
- The simulation results show that the conditional transmissions offer better performances than the other algorithms and is not affected by the road-traffic scenario.