

# A Graph Transformation Case Study for the Topology Analysis of Dynamic Communication Systems

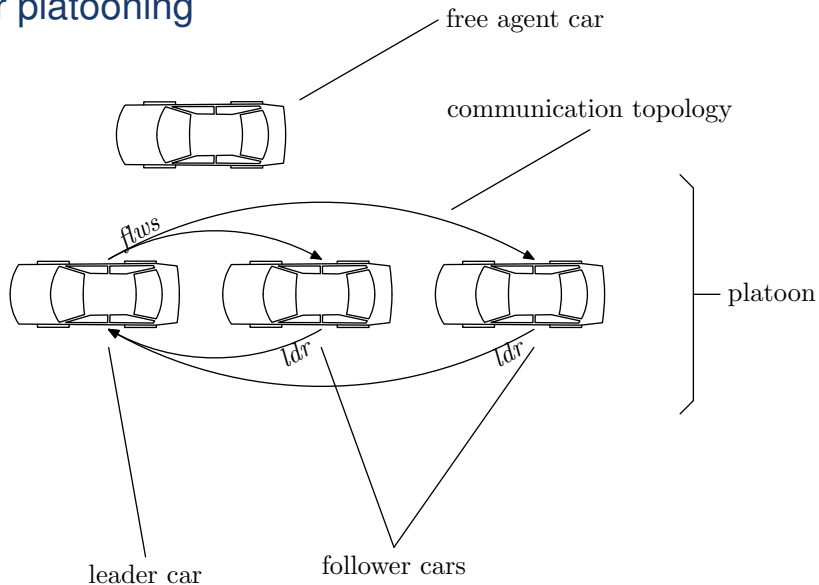
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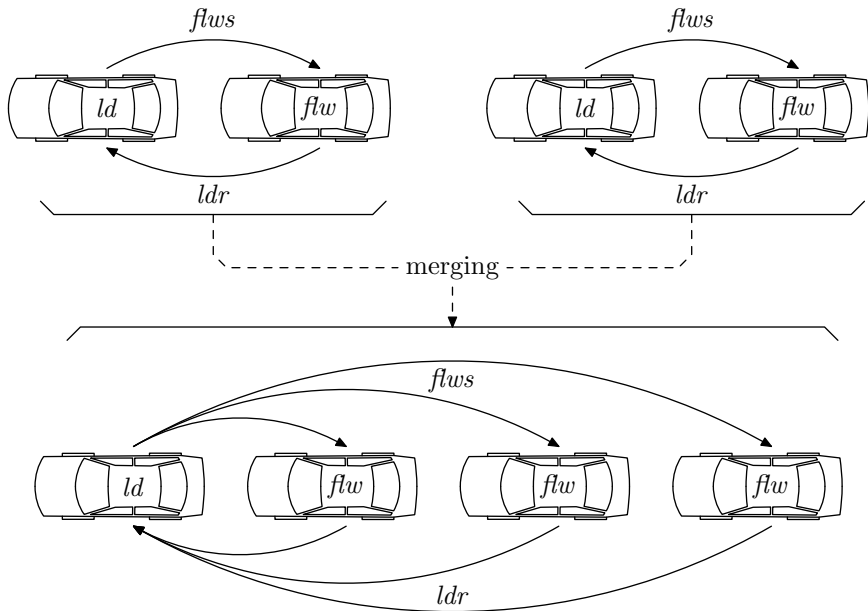
<sup>2</sup>Department of Electrical Engineering and Computer Sciences  
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TTC Workshop, July 2010

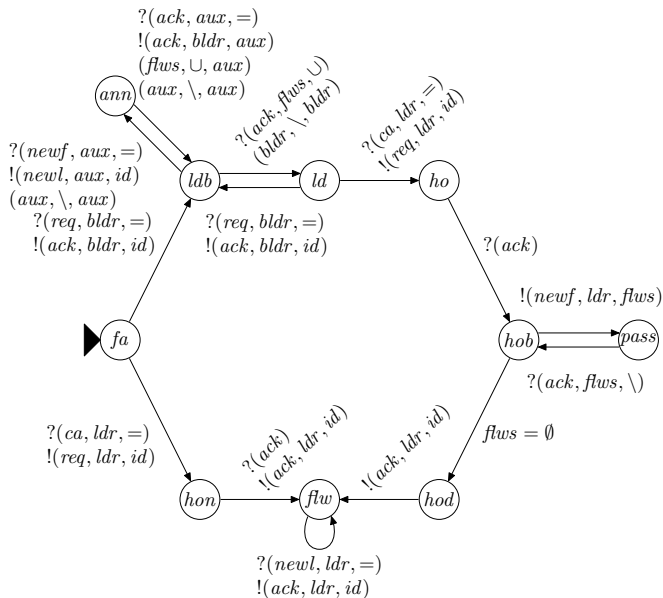
# car platooning



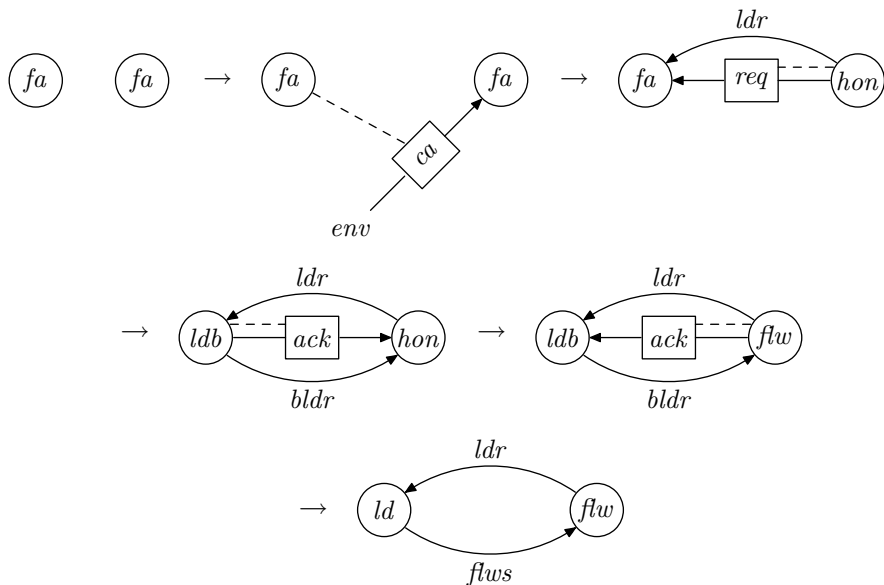
# platoon merging



# The merge protocol



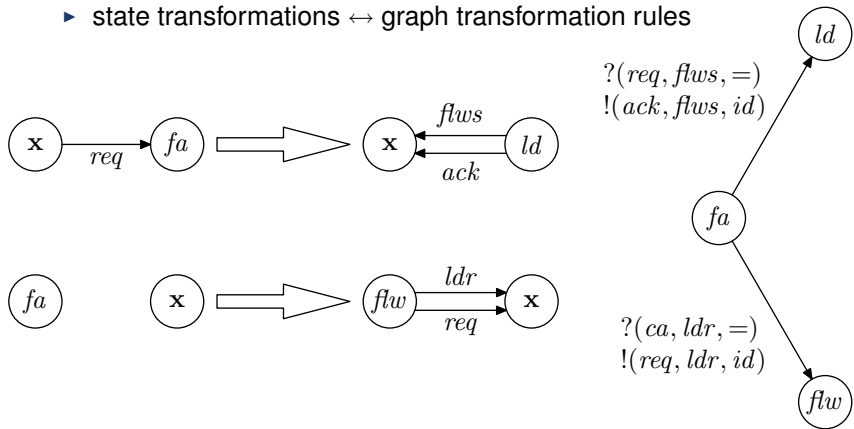
# example run



# DCS and graph transformation

## ■ dynamic communication systems $\leftrightarrow$ graph transformation systems

- ▶ processes  $\leftrightarrow$  nodes
- ▶ communication links and messages  $\leftrightarrow$  edges
- ▶ state transformations  $\leftrightarrow$  graph transformation rules



# Goals and evaluation criteria

## ■ Goals

- ▶ Compute and output reachable topologies
- ▶ Evaluate properties like “is there a node with label  $a$  and a node with label  $b$  such that an edge with label  $c$  points from the one to the other”
- ▶ Filtering and displaying result
- ▶ Extensions: Transition metagraph, queue analysis, abstraction

## ■ Evaluation criteria

- ▶ Completeness of analyzed system
- ▶ Completeness of analysis (number of processes)
- ▶ Performance of analysis
- ▶ Flexibility of output (filtering)
- ▶ Power of property evaluation

# Thanks



# Acknowledgement

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