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Sophia Antipolis

Trends behind non-uniform Patterns in Vehicular Networks

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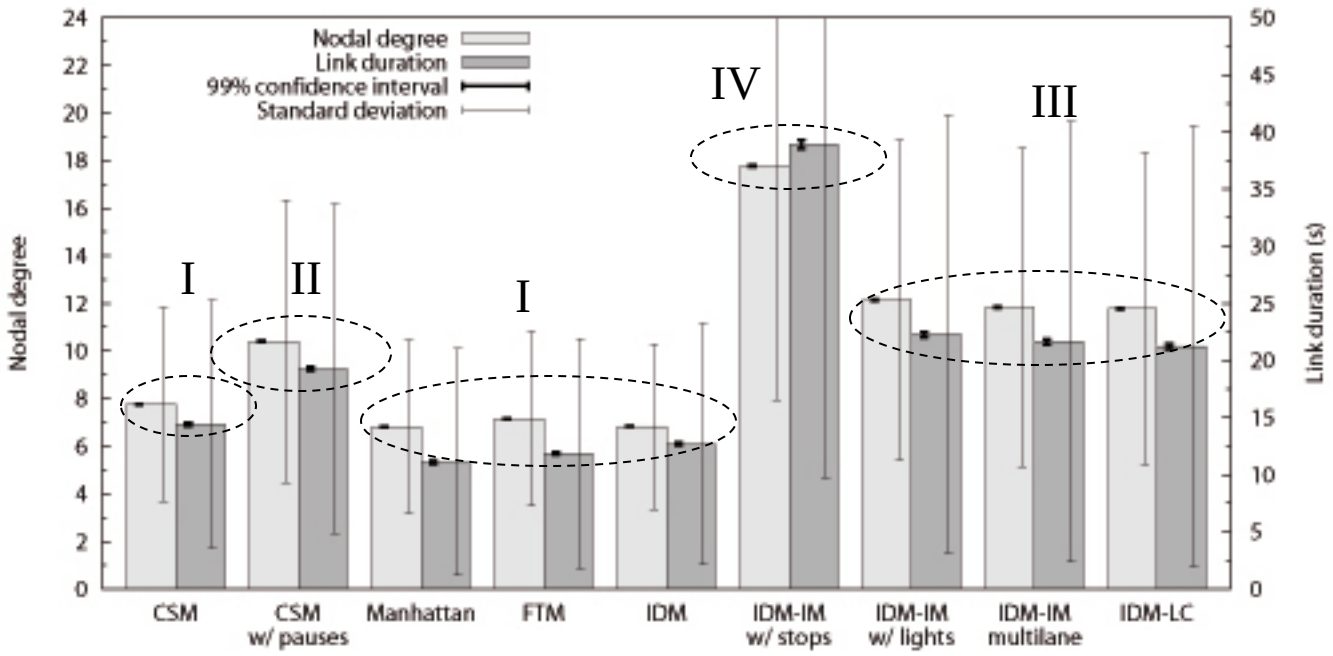
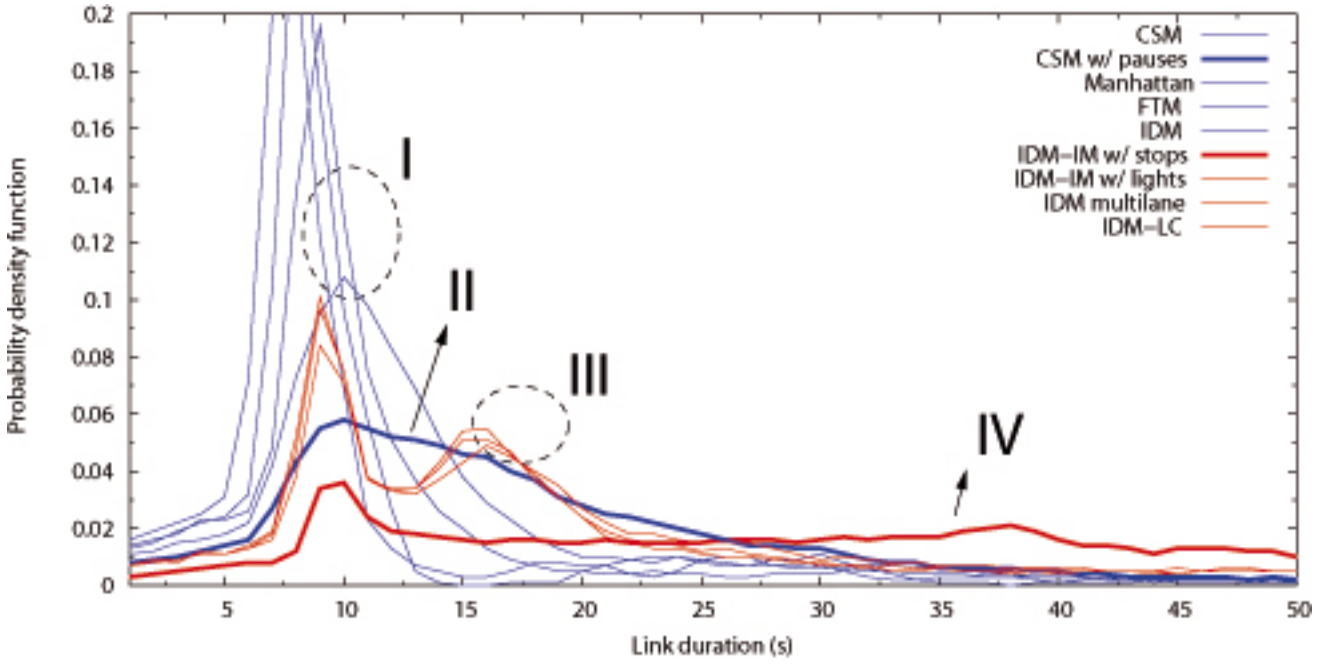
Link-level Analysis

- **Impact as function of different classes of flow-interaction:**
  - none (I), random (II), traffic lights/lane changes (III), stop signs (IV)



Link-level Analysis

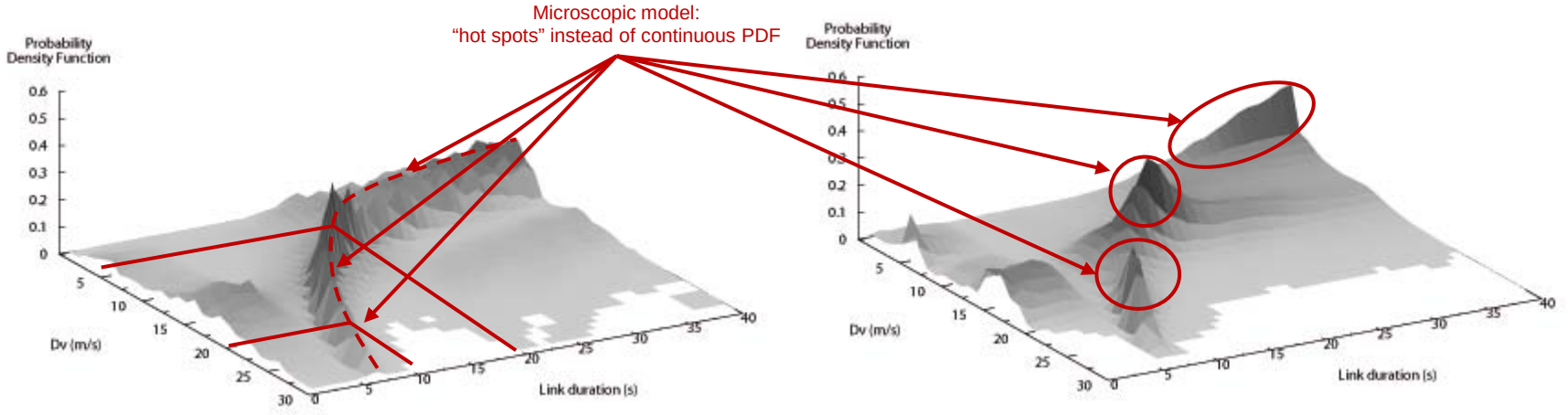
- **The previous „average“ analysis hides further different aspects of the various flow-interactions classes**
  - The pdf of the metric (here link duration) shows more…



  - Why do we have more than 1 peak for models II, III and IV ?
  - What is the source of the various peaks?

Link Duration Distribution

- **Random Waypoint vs. Microscopic Driver Model w. Intersection Management**

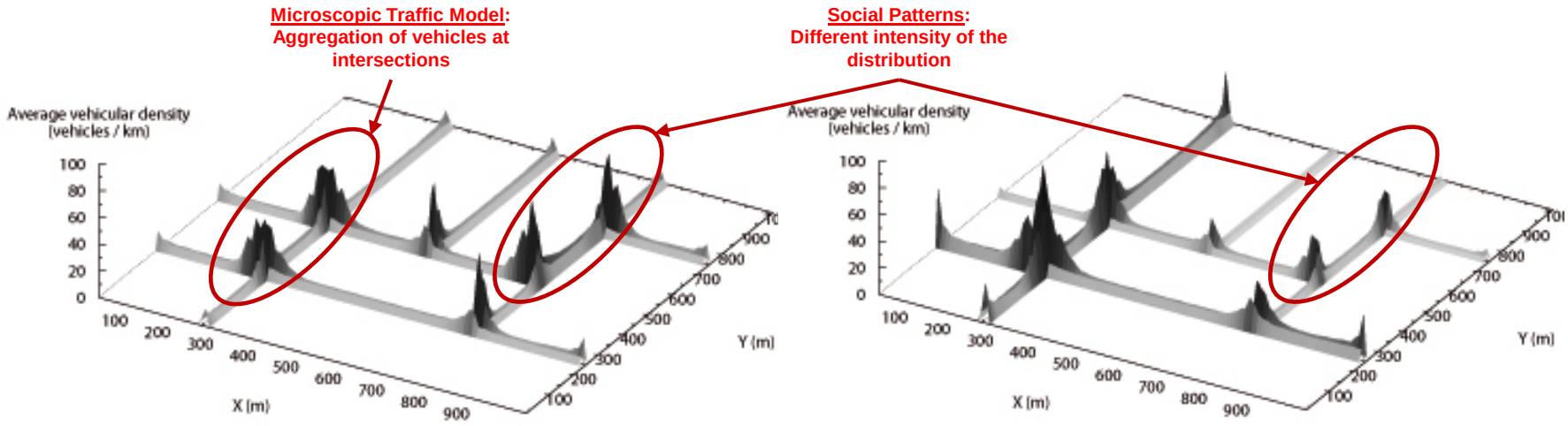


- **<u>Conclusions</u>:**
  - Link duration not only proportional to the speed difference
  - Link duration shows a context-based distribution
    - Need to identify them and use them

- **<u>Exemplary Benefit</u>:**
  - Geo-Intelligence - Spatial maps providing locations of contextual zone of good link duration
    - Opportunistic communication at these location possible
    - Hot spots for data aggregation and dissemination
    - Overlay routing between these locations

Vehicular Density Distribution

- **Random Trips vs. Activity-based Trips (social patterns)**

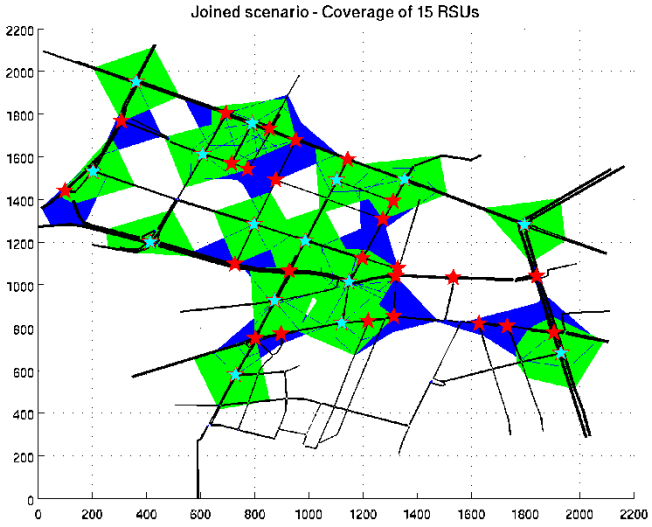


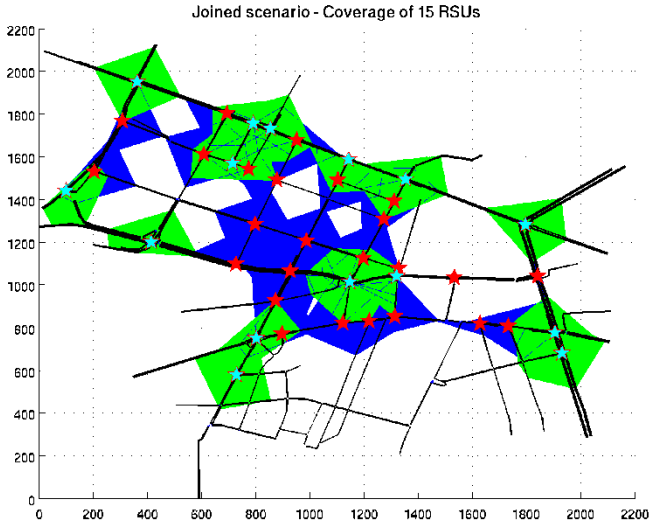
- **Conclusion:**
  - Microscopic models provides non-uniform distribution and intensity of network-level metrics
  - Social Patterns have strong impacts on distribution and intensity of network-level metrics

- **Exemplary Benefit:**
  - Infrastructure distribution in urban area (next)

Pattern-based Infrastructure Deployment

- **Pure Coverage-based vs. Encounter-based**



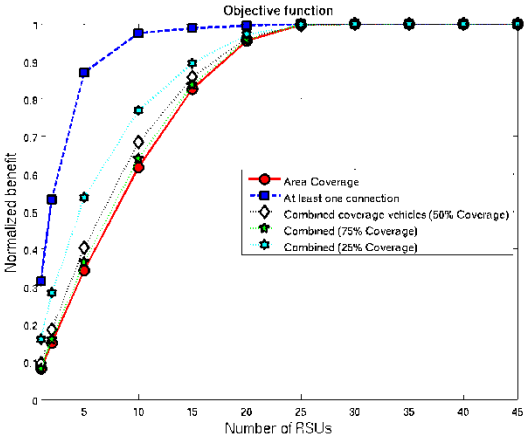


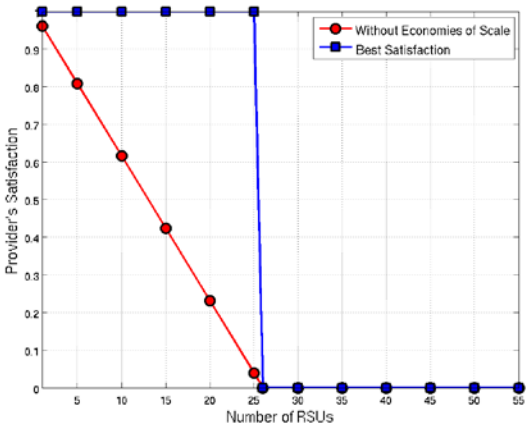
Sources: P. Cataldi, J. Haerri, EURECOM for iTETRIS

Pattern-based Infrastructure Deployment

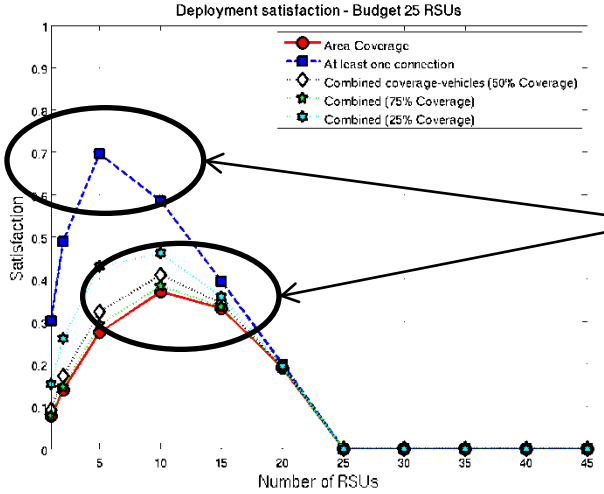
- **Objective Function: Satisfaction**

User vs. Infrastructure





- **Overall Objective function**



Different Optima

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Summary

- **Mobility and Connectivity Patterns are particular in wireless vehicular networks**
  - Connectivity metrics non-uniformly distributed
    - ☞ **Averaging Problem !!**

- **Benefits of Using such Patterns**
  - Communication
    - ☞ Link properties have spatio-temporal properties to be exploited by communication patterns for routing protocols
      - Ozan Tonguz already illustrated this on Monday
  - Infrastructure Deployment
    - ☞ Using Patterns allows a better joint user-infrastructure satisfaction...
      - **Less AP might be required for same satisfaction !!**