

# Can Platoons Form on Their Own?

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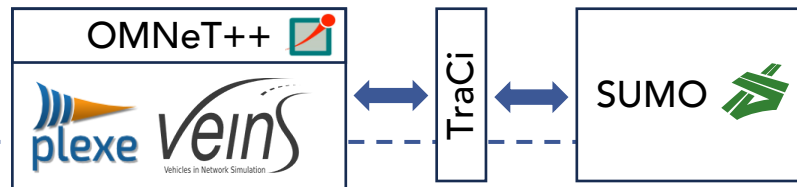
Distrib. protocols to build platoons

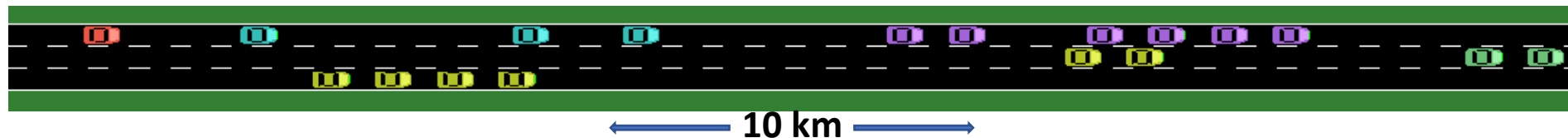
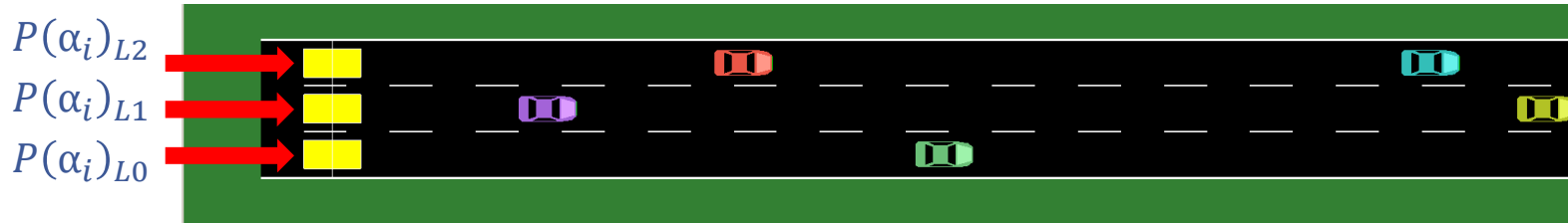


Implementations of such protocols

1. A Protocol for Platoon Discovery & Formation

2. Performance Benchmark





10 km

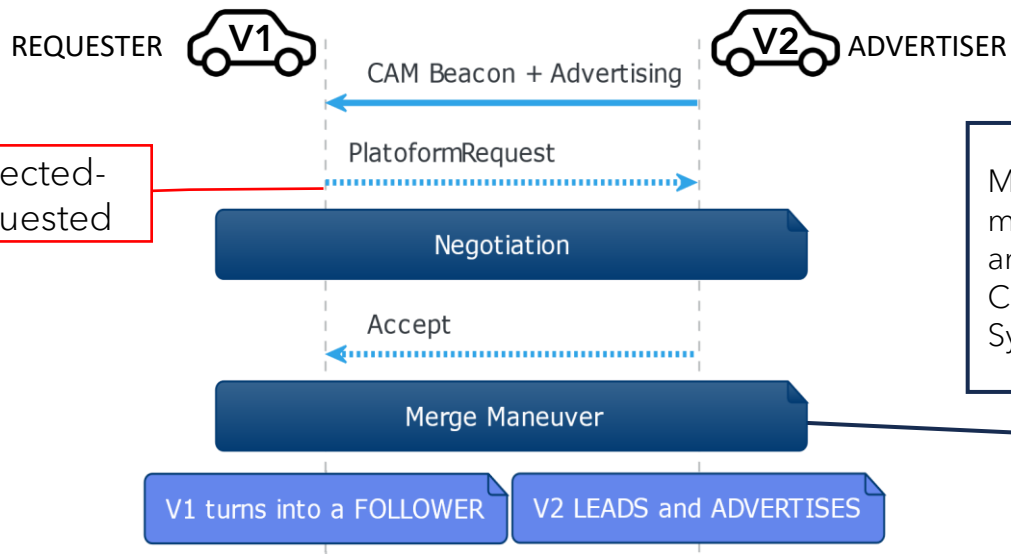


- Assess protocol ability to support the creation of platoons



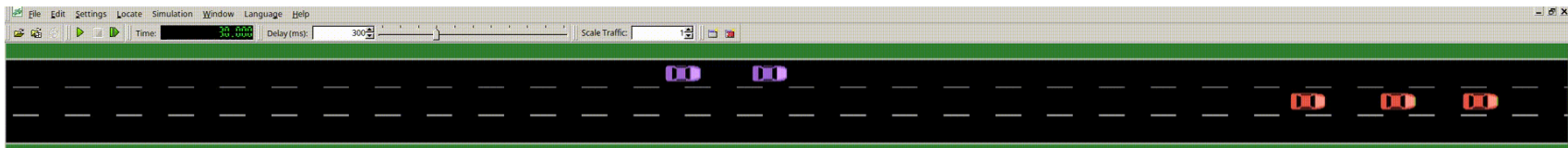
- Assess and tune protocol performance

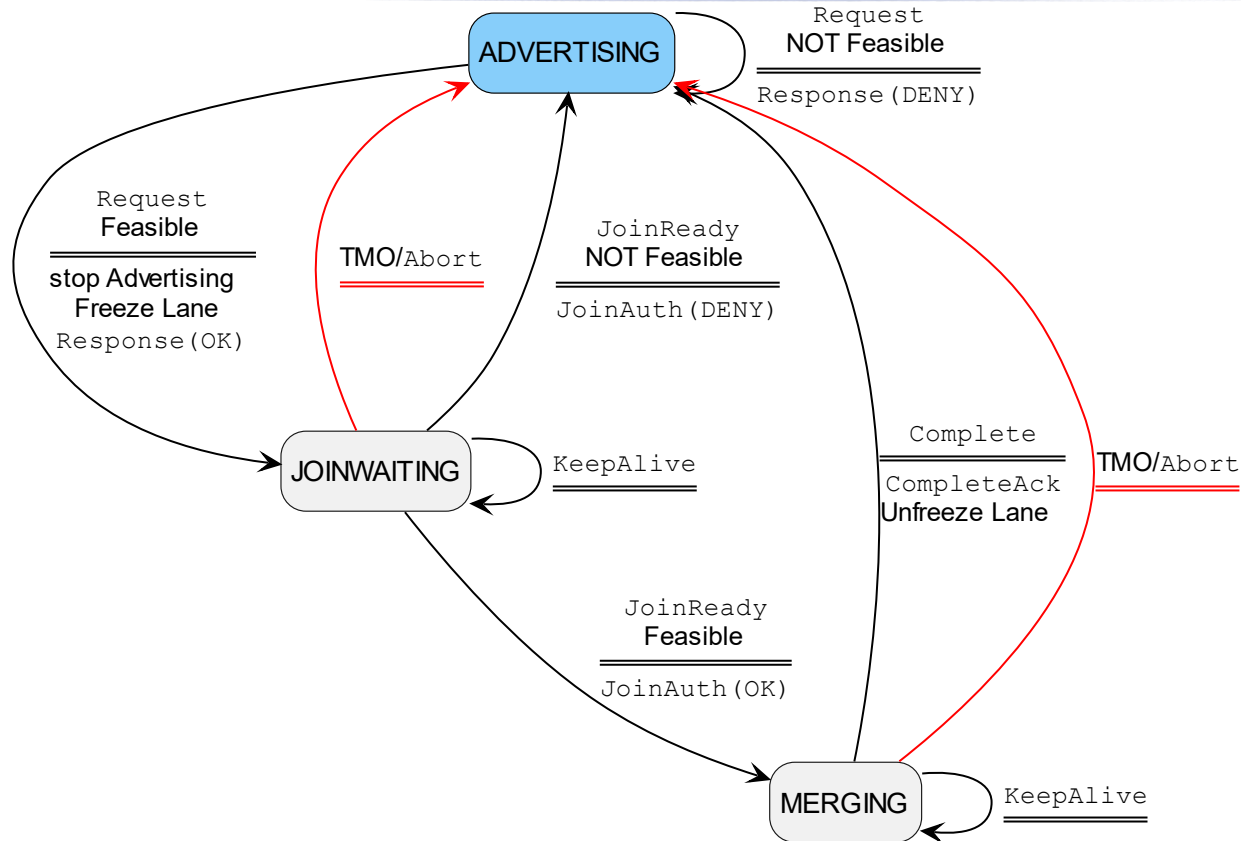
# How *Platoform* works

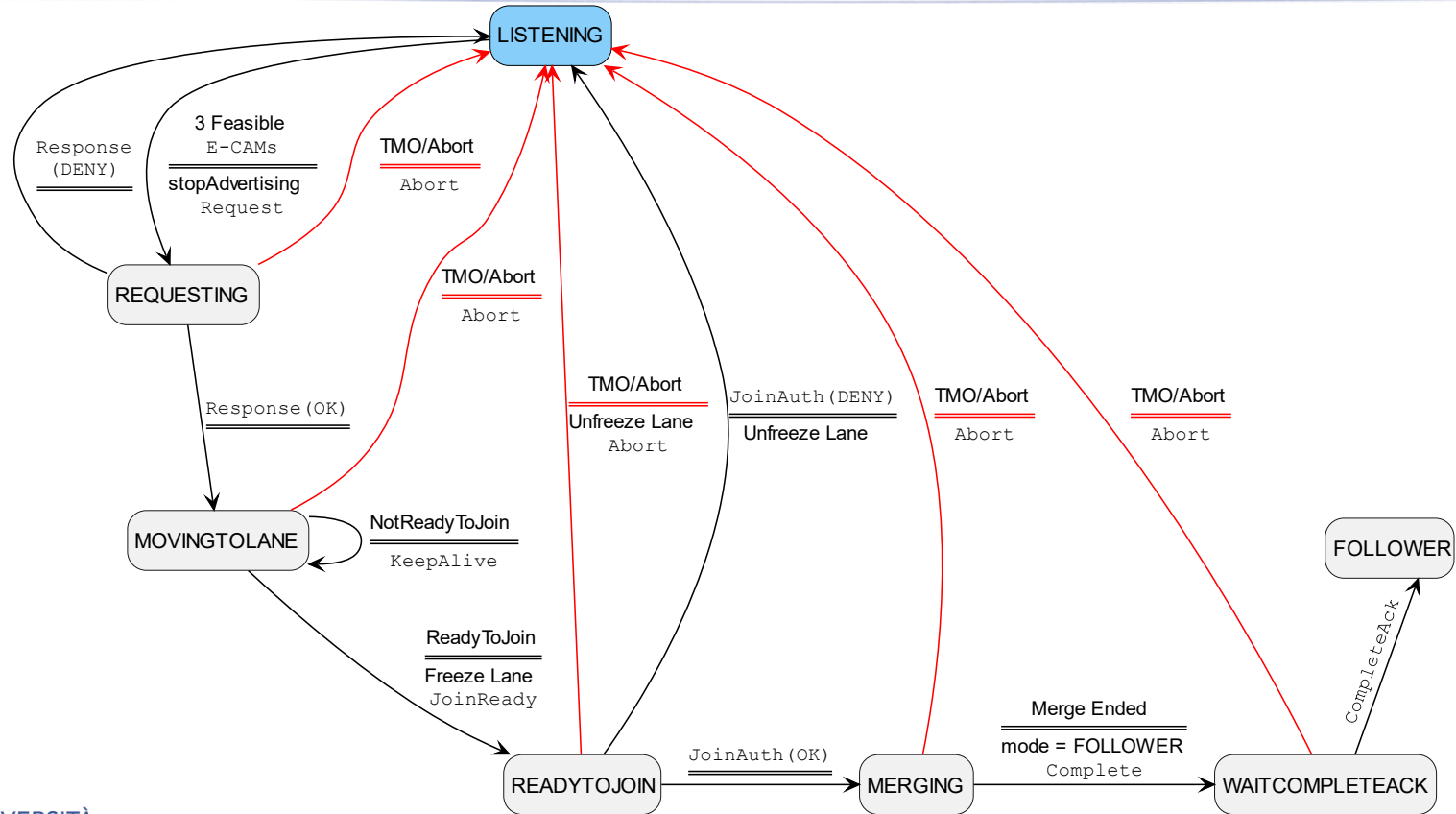


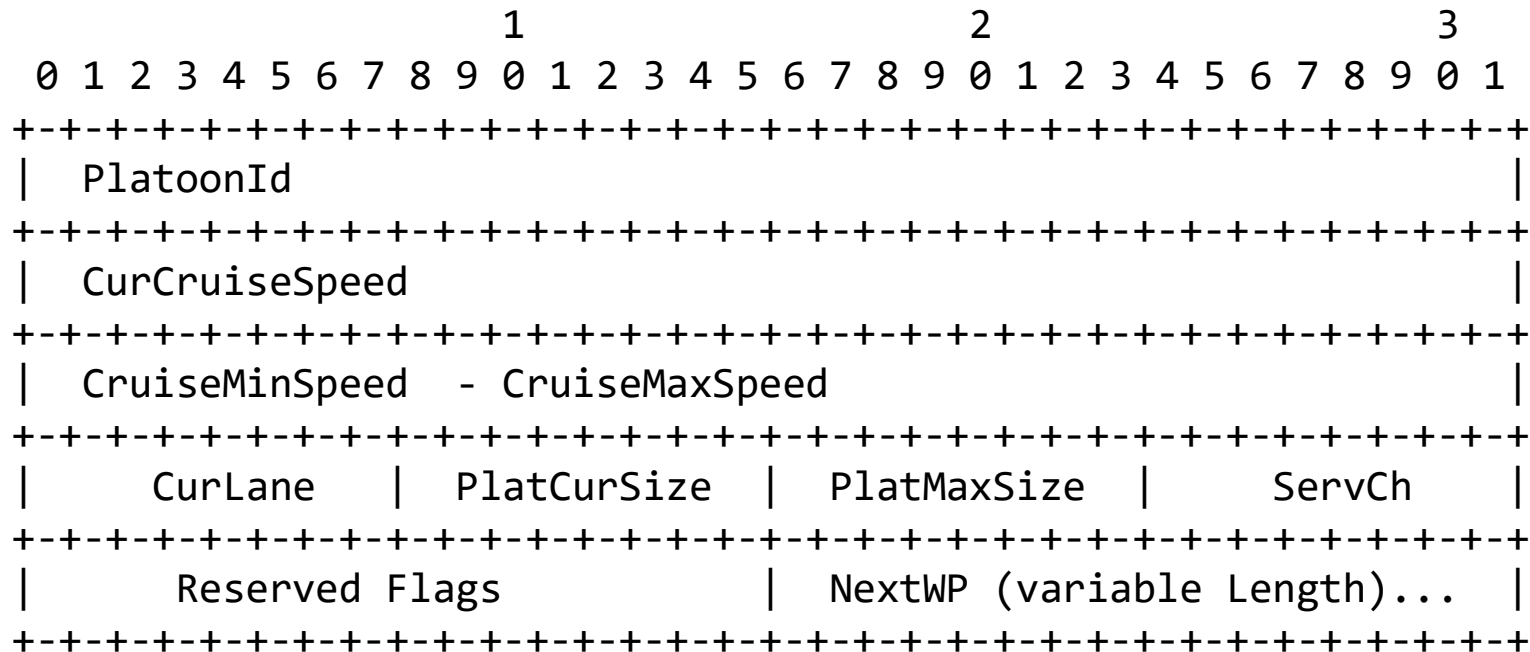
First-Detected-  
First-Requested

M. Segata et al., "Supporting platooning maneuvers through IVC: An initial protocol analysis for the JOIN maneuver" 11th IEEE Conf. on Wireless On-demand Network Systems and Services (WONS), Apr. 2014.





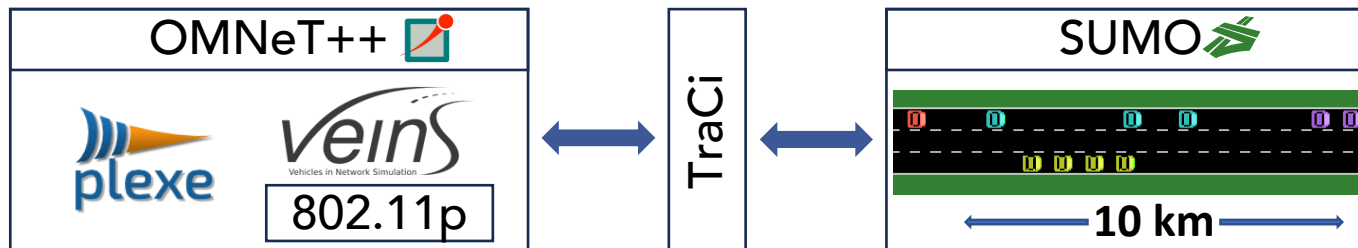




Road & Traffic

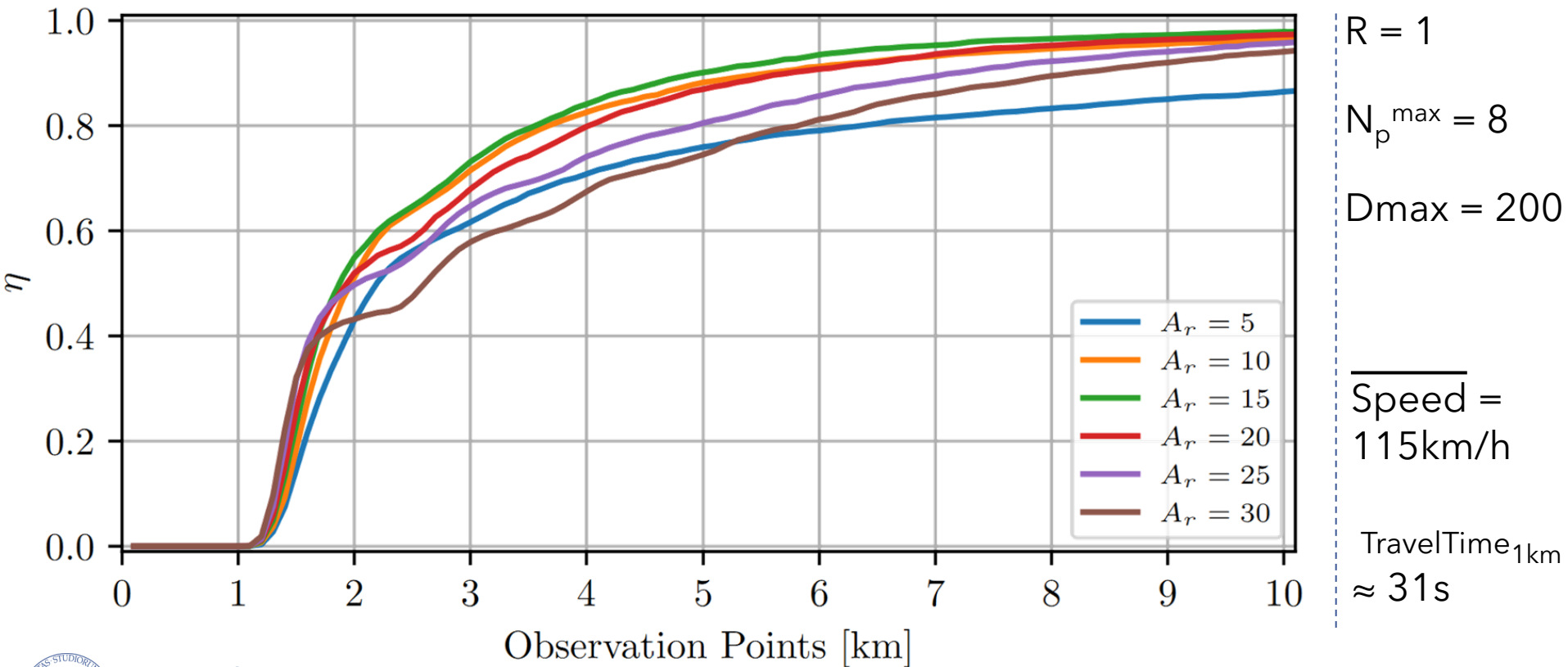
Parameter	Value
No. of lanes	$N_L = 3$
Road length	10 km of effective observation
Observed vehicles	$> 1000$
$A_r$	$\{5, 10, 15, 20, 25, 30\}$ veh./min./lane
$V_i$ Desired speed	$s_i = U[100, 105, 110, 115, 120, 125, 130]$ km/h
$V_i$ platooning speed range	$s_i \pm \delta_s, \delta_s = 10$ km/h
Platooning Penetration Rate $R$	$\{0.25, 0.50, 0.75, 1.0\}$

Comm.	L2-technology	dual radio 802.11p
	Tx power	500 mW
	Broadcast MCS	3 Mbit/s
	Unicast MCS	12 Mbit/s
	Rx sensitivity	-94 dBm
Protocol	$D_{min}$	20 m
	$D_{max}$	$\{50, 100, 150, 200\}$ m
	$N_P^{max} = PlatMaxSz$	$\{6, 8, 10, 25\}$
	Wait after Success / Abort	5 s / 20 s
	Req. Feasible Adv.	3

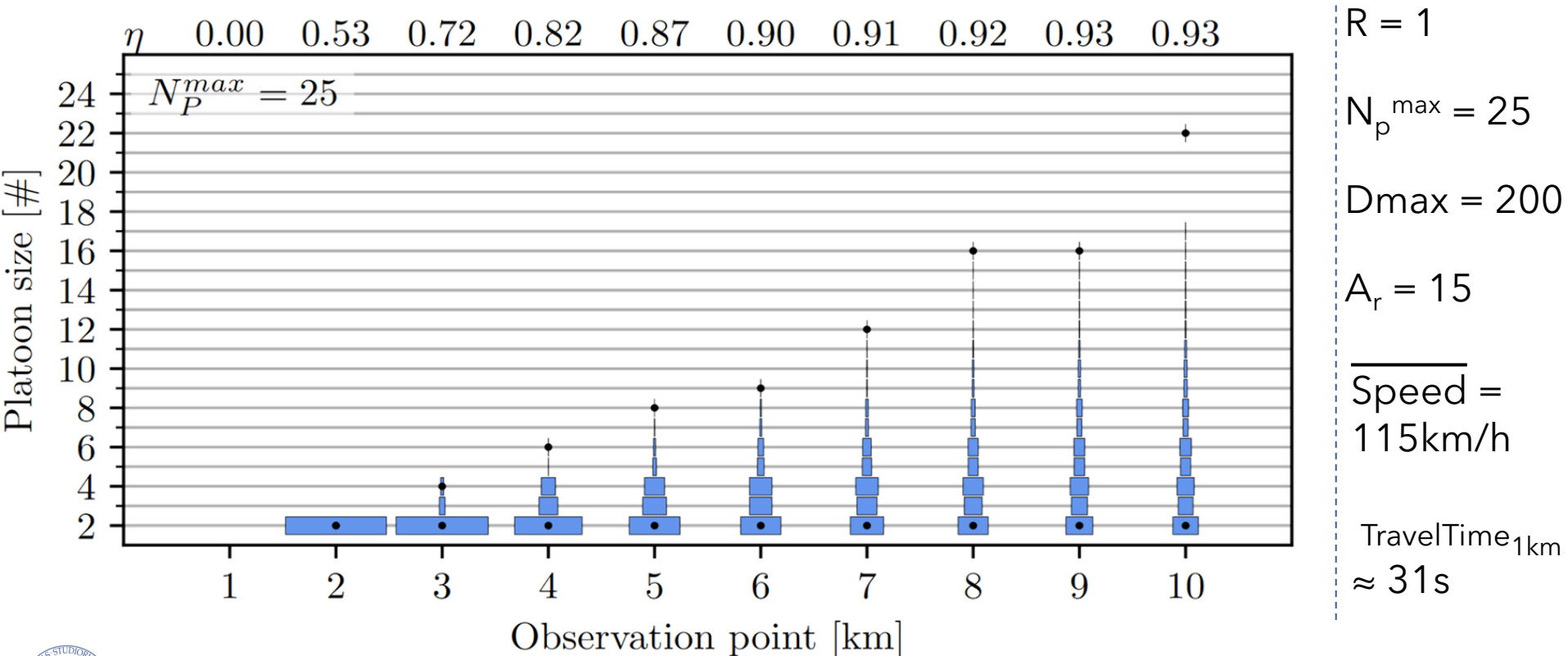




# Ratio of Plato-Vehicles ( $\eta$ ) over Space

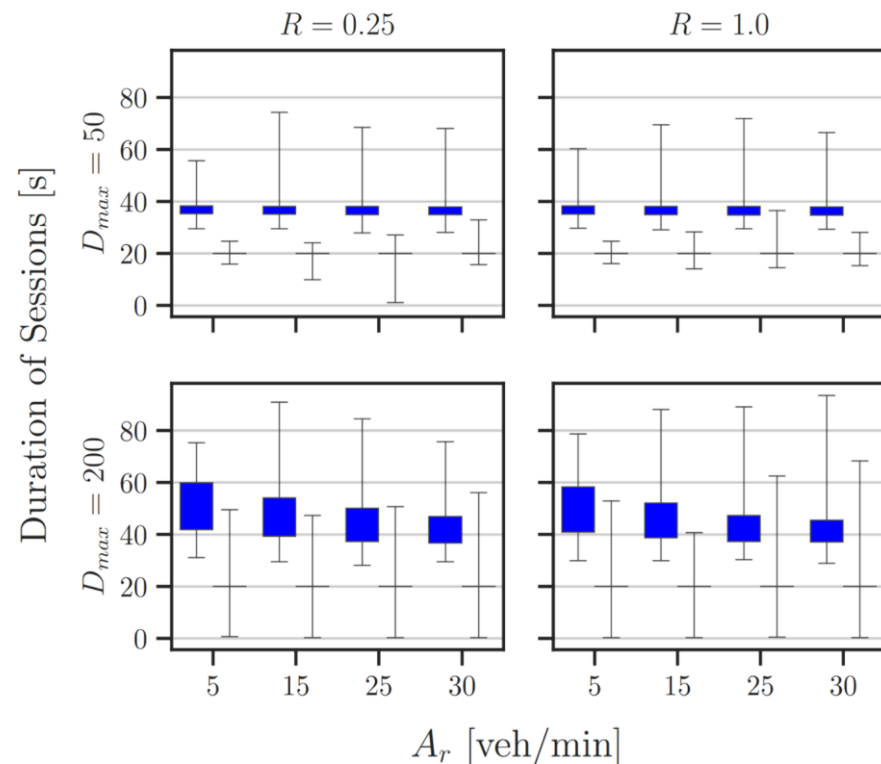
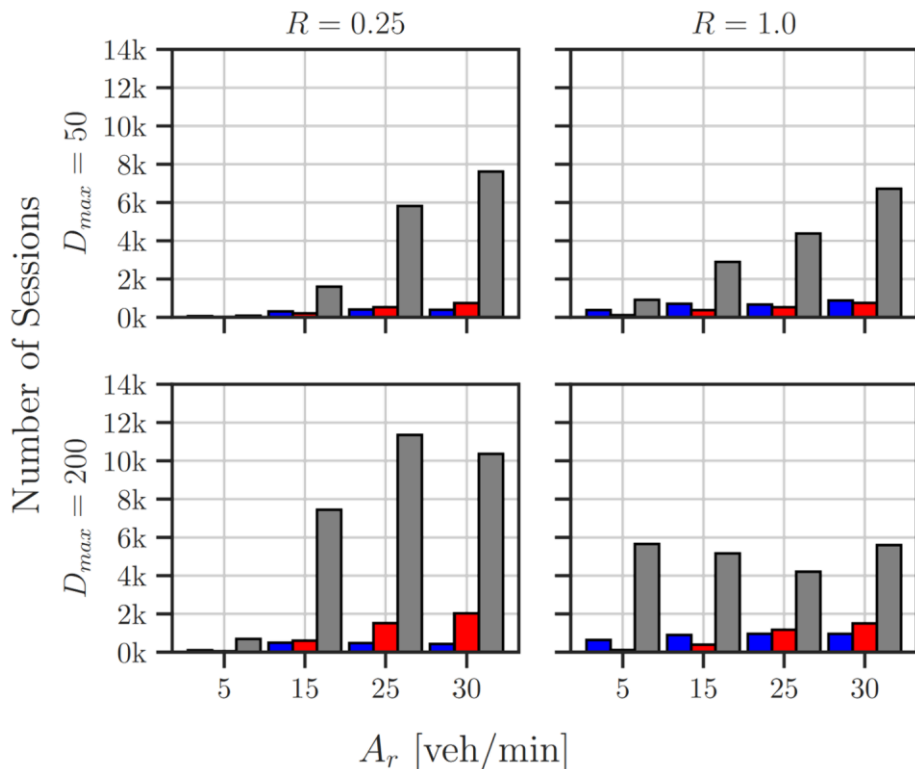


# Platoon Size over Space



# Sessions Analysis

$$N_p^{\max} = 8$$



■ OK      
 ■ ABORT      
 ■ DENY



- Platoon self-organization is possible
  - Explored on top of 802.11p, can be adapted to other IVC techs
- First-Detected-First-Requested policy is just the start!
  - Optimal selection strategies (AI-assisted) can be explored
- Performance of the Communication layer not explored yet



<https://github.com/michele-segata/plexe>



ANY QUESTION?



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## Acknowledgments

The logo for MOST, with 'MO' in blue and 'ST' in orange, set against a background of white and grey geometric shapes.

CENTRO NAZIONALE PER LA MOBILITÀ SOSTENIBILE

The logo for SELF4COP, with 'SELF4C' in white on a blue background and 'OP' in white on a blue background, with two circular icons representing wheels or gears between 'C' and 'OP'.

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DI RIPRESA E RESILIENZA