

## IEEE 802.11p Vehicle to Infrastructure Communications in Urban Environment

Cooperative vehicular services in urban environments will require an efficient deployment of roadside units (RSUs). This paper provides the results of an extensive field-testing campaign that analyzes the impact of urban characteristics, RSU deployment conditions, and communication settings. The reported results show that the factors, such as street layout, urban environment, traffic density, presence of heavy vehicles, trees, and terrain elevation influence on V2I communications, and should be considered to adequately deploy and configure urban RSUs. This paper considers LOS (line of sight) and NLOS (non-LOS) conditions in their field test. Based on the tests conducted in the city of Bologna as part of the iTETRIS project, a set of RSU deployment guidelines are presented to assist stakeholders in deploying RSUs and maximizing the efficiency of cooperative vehicular applications.

### Strengths:

The other papers referenced by the authors mostly focus on highway scenarios, but this paper mainly focused in-depth on the Vehicle to Infrastructure urban scenarios. Also, it extensively analyzed V2I communications performance in urban environments and how to efficiently deploy roadside units. The Bologna urban scenario test campaign included 22 different RSU locations selected to study the impact of various operating and propagation conditions on V2I environments. The campaign analyzed more than 70 RSU deployment configurations and, more than 700 test drives were conducted in total, with around 950km of testing distance traveled during more than 35 hours of wireless measurement tests being recorded. This paper did a good job to explain the parameters such as PDR (Packet Delivery Ratio), RCR (Reliable Connectivity Range), and UCR (Unreliable Connectivity Range). Also talks about how the various NLOS conditions affect those parameters. This paper also analyzed the effect of different antenna's heights on the signal quality under NLOS conditions.

### Weakness:

In my opinion, this paper should also have focused on the weather conditions. The quality of the signal would also depend on the impact of the weather conditions, such as rain, wind, snow. Also, this article tested only a few transmission powers ( $p = 10\text{dBm}$  and  $20\text{ dBm}$ ). If they tested more transmission powers, then the average signal quality could have been checked efficiently. Also, I suggest that the author should have included the vehicles to everything (V2X) communication, such as vehicle to vehicle (V2V) and vehicle to pedestrian (V2P) communication in urban environments. Finally, this paper needs to have included the details on the security policies for the data that was collected and analyzed. Privacy and security are the key concerns when we collect a lot of users' data.