Optimization study of the roadside units location for connected vehicles in Brittany

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1. The project – Context of the study

SCOOP project in Brittany (fig.1)
In the framework of SCOOP @ France project, Brittany is one of the local pilots deployment of cooperative systems in France. The objective is to give relevant users' information services to improve road safety and road management (road traffic data collection, roadwork information, etc.). Up to 200 Road Side Units (RSU) on 600 km of road network will be installed in two phases. Studies of integration of new equipments on existing road infrastructure should be conducted to provide highest expected quality of cooperative services.

SCOOP Project architecture with RSU connection (fig.2)
RSUs are connected to the SCOOP Platform and are able to collect and spread traffic data and warning information from connected vehicles.

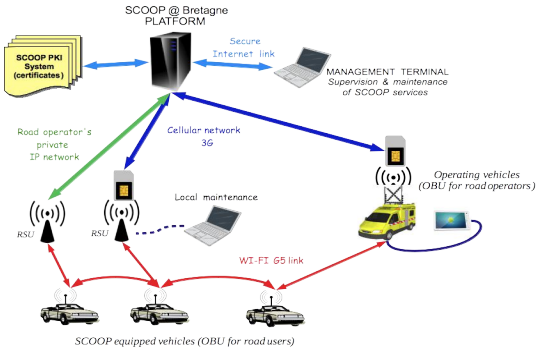

Fig.2 : SCOOP Project architecture in Brittany

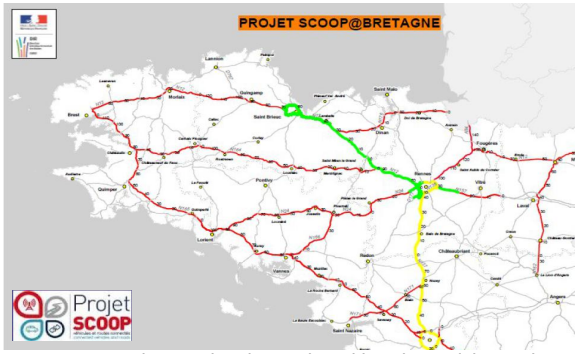

Fig.1 : SCOOP road network to be equipped in Brittany (phase1 in green)

2. Methodology of the study

Two theoretical principles
Firstly, SCOOP services are delivered by each RSU and one RSU must located at the beginning and one at the end the network defined coverage. Secondly, distance between RSUs depends on the update time interval which is to be defined with the road manager according to the needs for road users traffic information.

Operating environments study (fig.3)
Operating environments are used to determine relevant information services to be deployed and also the update time required. A refresh time of 5 minutes seems to be sufficient for road users for interurban roads. Critical spots are also identified.

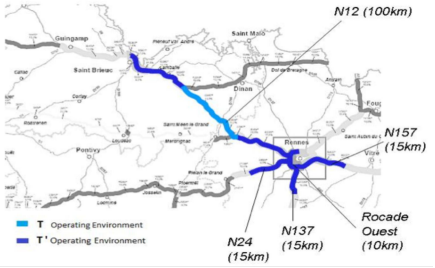

Fig.3 : Cartography of operating environments

3. Theoretical location of fixed RSU

Theoretical RSU location (fig.4)
Radio propagation of Wi-Fi signal (5,8 GHz) must be estimated around RSUs. At 120 km/h, a vehicle could establish a connection for data exchange with a RSU in 30 seconds (depends on the antenna coverage).

RSU definitive location (fig.5)
Visits to the field have to confirm or adjust the definitive location of the RSU implantation. Specific mobile RSU will be developed to validate the best performance by testing different positions near the estimated location.

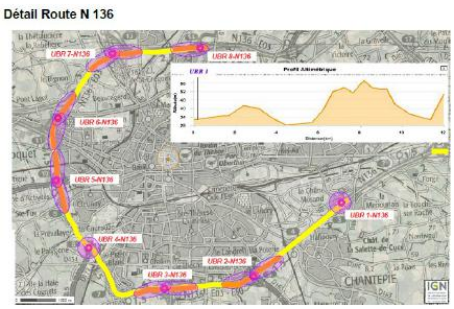

Fig.4 : Theoretical RSU location final map

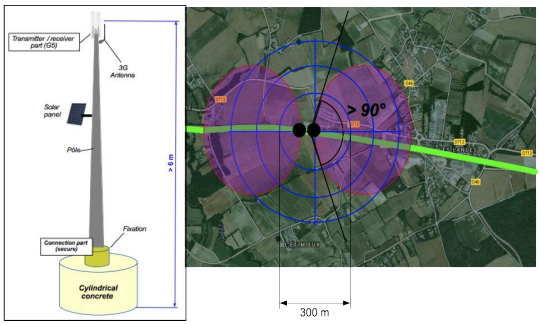

Fig.5 : RSU coverage simulation before definitive implantation