Vehicle – Infrastructure Cooperative Innovations
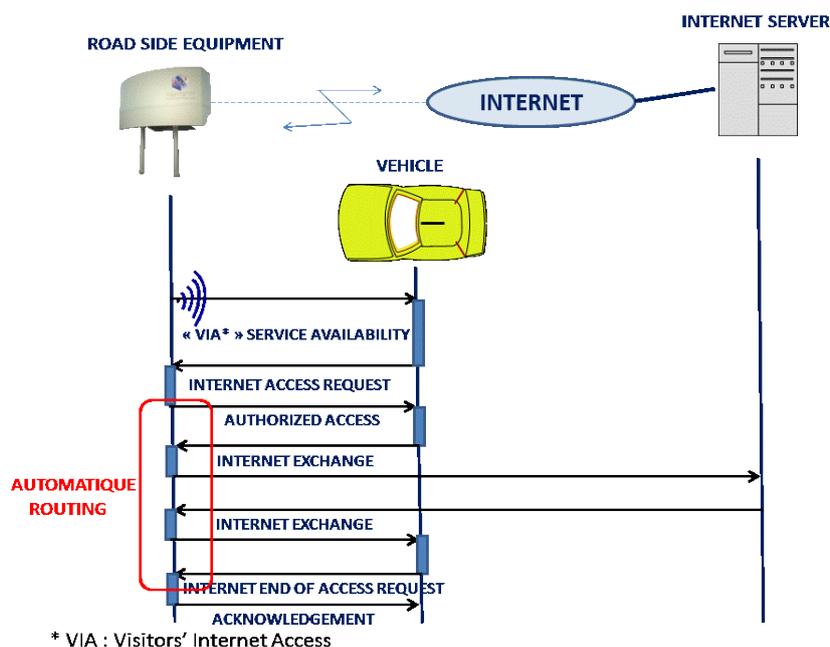
Factory of the Possible - Service

This synthesis sheet describes a possible service which is achievable by means of cooperative ITS. However, before making this service in operation, it is requested to ensure some technical and non-technical studies with the objective to verify the technical feasibility, the customer' acceptability and value as well as non-technical impacts.

INTERNET ACCESS VIA THE ROAD INFRASTRUCTURE

CUSTOMERS' OFFER :
An Internet visitor member of a recognized community from the road infrastructure (Road Side Equipment (RSE)) encountered in its mobility may access Internet more or less freely according to negotiated usage conditions between the community and the service provider, via the local RSE used as a router. The Internet access may be restricted to temporal communication capabilities of the RSE (as long as the RSE is sharing the same ad-hoc network with the vehicle supporting the service).

TECHNICAL PRINCIPLE :

INTERNET SERVER

ROAD SIDE EQUIPMENT

INTERNET

VEHICLE

« VIA* » SERVICE AVAILABILITY

INTERNET ACCESS REQUEST

AUTHORIZED ACCESS

INTERNET EXCHANGE

AUTOMATIQUE ROUTING

INTERNET EXCHANGE

INTERNET END OF ACCESS REQUEST

ACKNOWLEDGEMENT

* VIA : Visitors' Internet Access

The Road Side Equipment which are offering a VIA (Visitors' Internet Access) service advertise the availability of this service to mobiles evolving in their radio communication coverage (general or geographical broadcasting). The access to this service may be reserved to one or several communities of users (e.g. the SCOOP@F community, an specific OEM community…etc.).

Upon reception of this information, the interested and authorized mobiles may issue an Internet access request for the data exchange with one or several connected server(s). As soon as the Internet access has been granted by the Road Side Equipment to the mobile, a route to Internet is established by the RSE (used as a router) for the requesting mobile. Then the accepted mobile can access the Internet network as long as being in the radio coverage of the RSE. Such connectivity may of course be maintained accross adjacent RSE providing that an appropriate roaming protocol be developed for this purpose. This Internet access can be interupted at any time on request of the mobile.

APPLICATIONS :
This is a generic Internet access service. In futur, it can be competing with cellular networks in areas covered with a high density level of RSE such as in cities and on highways.
At the French deployment pilot SCOOP@F level, this service will be used for the following applications as most of the customers' vehicles will not be equipped with cellular networks, but only with G5 :
- Downloading of security short term certificats (pseudonyms) required for the respect of users privacy.
- Uploading of technical logs necessary to analyze the performance of the vehicle embedded system and more generally the technical performance of the whole C-ITS. This can be part in the future of VRM (Vehicle Relationship Management).
- Uploading of customer usage logs necessary to assess the customer acceptability (service value) of proposed services in particular when receiving an HMI solicitation. This can be used also to analyze the driver' distraction level upon HMI solicitations. This can be part in the future of CRM (Customer Relationship Management).

ISSUES TO BE CONSIDERED :

- **Technical Issues**

From a technical viewpoint and considering that we don't benefit from roaming protocols between adjacent RSE, the communication temporal window existing between the mobile and the RSE will be limited according to several parameters :

- Mobile velocity,
- Radio communication coverage of the Road Side Equipment,
- Processing time at the level of Internet servers.

For example, if we consider that the mobile and the RSE will stay in radio communication over 1 kilometer (RSE coverage of about 500 meters radius), and that the mobile is runing at an average speed of 70 Km / hour, the temporal communication window will be approximatively 50 seconds. However, if we consider an average throughput of 3 Megabits / second (max 6 or 12 Megabits / second), this will enable the exchange of about 150 Megabits of data, that is to say about 20 Megabytes. This type of exchanged volume seems very reasonnable for the targeted SCOOP@F applications.

- **Standardisation**

The exchanged information flows are represented on the above figure. Among these flows, a certain number of application messages require some standardization :

- The message advertizing the availability of the VIA service. This can be achieved in a generic way advertizing the availability of any service at the RSE level, however, some application specific data elements shall be standardized for the sake of interoperability between the RSE and the mobile. One generic requirement is also the specification of one or several communities for which the service is provided at particular conditions.
- The message containing the Internet access request taking into account some security requirement in particular for the authentication of the requesting user and its satisfaction of some specific conditions e.g. belonging to at least one targeted community.
- The message from the RSE accepting or not the Internet access request.
- The message requesting the end of Internet access from the mobile and its acknowledgement by the RSE.

- **Sécurité**

Definition of the security policy to be applied at the operational level of this service.

- Authorisation to deliver the service and required procedures to obtain this authorization,
- Authentication and Internet access rights of exchanging parties,
- Respect of the user' life privacy,
- …etc.

- **Economics**

This service can be offered free of charge to one or several communities according to existing agreements of these communities with the service provider. It can also be charged through some service subscription or using a pay per use model, being not accessible to others users. The Internet access is relatively at high throughput (6 to 12 megabits / second according to used service channel) so enabling multimedia exchanges (audio, music, photos…etc.).

It can be also charged to all subscribers, the benefits being shared between several stakeholders e.g. the service supplier and the vehicle manufacturer which is making the service accessible to drivers / passengers in their vehicles).

Being given the multiplicity of possible business models, some particular economical sudies need to be achieved relatively to the targeted service and its context of use.