# Contribution to the Radio Spectrum Policy Group regarding spectrum issues for ITS applications in Europe.

## 1. Background

ICT applications for Road Safety are urgently needed to support the high priority European transport policies to reduce road fatalities by 50% within 2010.

Standards for critical road safety radio systems are under development with both Inter Vehicle Communication (IVC) and Roadside to vehicle communication (R2V). Safety information will be exchanged between cars on the roads in ad hoc networks and with additional information provided by roadside units. Drivers will receive safety information and hazard warning to facilitate safe driving. Of high value for drivers are of course such messages which originate from an area which is out of their sight.

Dedicated spectrum is needed on a pan-European basis and should as far as possible be aligned with similar ITS initiatives world wide in particular with the existing FCC regulation in the 5.8 GHz range. As the communications are mostly for safety critical applications, spectrum is needed on a co-primary basis (Mobile Service) in a predictable sharing environment.

## 2. Potential Applications (examples)

### 2.1 Applications for improved safety

The Intelligent Co-operative Systems improve the functionality of the in-vehicle active and integrated safety systems by exchanging sensor data between the vehicles, and with the roadside equipment. This information can be displayed to the driver, or used by the in-vehicle systems directly. There are three basic classes of co-operative safety applications:

- **Co-operative Awareness Systems** extend the horizon of the in-vehicle systems by data exchange between a net of vehicles and infrastructure. The information typically includes dangerous road conditions, adverse weather conditions, obstacles, complex road situations like tunnels etc. Typical applications are such as extended blind spot applications, enhanced ACC with Stop and Go, weather and obstacle warnings etc.
- **Cooperative Assistance Systems** will rely mainly on the data from the infrastructure to the vehicle. The possible applications include management of traffic in safety critical situations (e.g. accident on a highway or in a tunnel), and local vehicle redistribution for improved safety. Typical applications include intelligent speed advisory, individualised traffic rerouting, co-operative intersections and co-operative longitudinal control with braking assistance.
- **Co-operative manoeuvring** is the most difficult set of applications. It will rely on vehicle-to-vehicle and vehicle-to-infrastructure communications. The manoeuvring strategies will be based on information exchange of the relative position and dynamics between the vehicles. Typical applications are negotiated entry to the motorway, negotiated lane change, safe overtaking and safe urban intersections.

### 2.2 Applications for improved efficiency

The applications that aim at improved traffic efficiency will rely on the information collected from two sources:

- **The infrastructure component** of the Co-operative Systems is expected to collect information on the local conditions, e.g. on weather, road conditions, traffic congestion etc, besides relaying the vehicle data
- **The vehicles** in the Co-Operative Systems continuously collect information about their vicinity, and are able to pass this in real-time to the traffic control and management systems (as well as to other vehicles). This is the Co-operative monitoring concept.

Today's traffic data acquisition is based on local sensors. Ongoing research is looking into so called Floating Car Data (e.g. X-FCD in GST). Intelligent Co-operative systems aim at joined monitoring concepts that complement the local sensor data with network-wide data from the vehicles. This higher-quality information can include location-based road and weather data, information about traffic (from travel times to whole time/position stamped travel profiles), information about accidents and incidents etc.

Furthermore, information about start and destination and desired travel time allows both network efficiency optimising and assisted individualised driving and guidance for individual passenger cars, and co-operative freight and fleet operations.

**Typical applications in urban environments include Co-operative Network Management** – optimising area traffic management using vehicle/driver destination information, **co-operative area routing** and rerouting aiming at optimised use of the network, and **co-operative local traffic control** that enhances the operation with information about approaching vehicles.

**The Co-operative Inter-urban applications** aim at offering all travellers a safe, efficient, comfortable and predictable journey. This area has not been much developed yet, but the applications could **include co-operative highway management systems** with entry/exit control**, co-operative park and ride** with information about arrival times and time-tables of public transport, **co-operative rescue operations** and **co-operative work zone management**.

### 2.3 Commercial applications

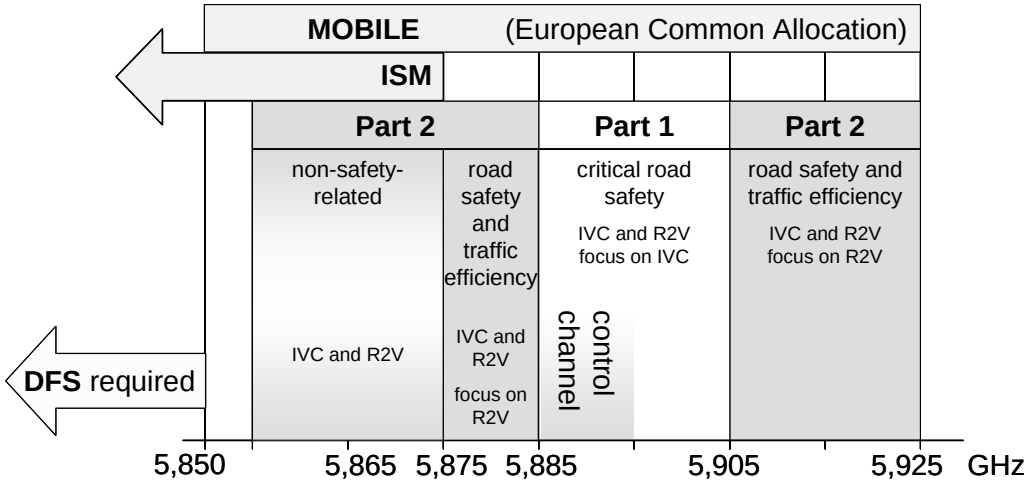
The establishment of Intelligent Co-Operative Systems, with continuous communication to the vehicles would allow a myriad of commercial applications as well. These would typically have been introduced as stand-alone, but would benefit of additional functionality of Co-operative Systems (more information, wider bandwidth, increased user base). Examples of such services are Co-operative Dynamic Route Guidance, Enhanced Traffic and Travel Information, Fleet management, Infotainment, Mobile Internet etc.

It should be noted, however, that the introduction of commercial services may introduce legal problems (e.g. if the infrastructure is publicly funded), as well as competition issues with other providers of communications services.

## 3. Spectrum designation in Europe

Industry from all over Europe is developing standards for ITS equipment and a decision on spectrum designation is urgently needed as a premise for a product decision. From product decision to market introduction it takes about 3 years. ETSI has presented spectrum requirements for ITS in the 5.9 GHz band to the CEPT in a System Reference document (TR102 492). Consideration of the

frequency designation has been started within the FM WG and compatibility studies are carried out within the SE24 Project Team.
The spectrum requirements with preferred frequency bands are presented as follows:




Sharing studies with other services in the bands are being developed and the preliminary conclusions from the SE24 project team of the CEPT are positive on compatibility with the Fixed Satellite Service (E-S). Detailed justification of the frequency requirements are being developed for the FM WG where also the economic impact of ITS systems in Europe will be considered.
The 5.9 GHz frequency band is the absolute preferred band for these applications and should be available subject to successful sharing studies. Much higher bands such as the 63 GHz band are not possible for all the different service applications envisaged for the ITS in particular because of the special propagation characteristics for these bands requiring line of sight communication.

# 4. European spectrum policy for ITS.

ITS systems are needed in support of high priority European road safety policies and the necessary spectrum in the 5.9 GHz band should therefore be made available as soon as possible.
Pan-European spectrum availability is a key issue as cars are used on a European basis.

Certainty of the spectrum designation will allow for a fast development of standards and systems and will ensure the needed high penetration of ITS systems in cars in order to provide the increased road safety in Europe

# 5. The RSPG is therefore kindly invited:

1. **to support the spectrum policies for designation of frequency spectrum in the 5.9 GHz band for ITS systems in Europe**
2. **to ensure regulatory certainty of the spectrum designation for ITS in Europe**
3. **to invite the Radio Spectrum Committee to adopt the necessary regulatory means in order to implement the above spectrum policies**