

Coexistence between 5,8 GHz CEN DSRC and ITS-G5 - On the way to an implementation

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Agenda

- Who we are / What we do
- The challenge
- The proposed solutions
- The way ahead

ASECAP facts

- The European professional Association of Tolloed Road Infrastructures Concessionaires
- 173 tolled motorway operators / 21 countries
- Operate 46.475 km of roads
- Tolling is the most efficient tool to finance the construction, operation and maintenance of motorways

CEN DSRC

- 5.8 GHz DSRC is used for ETC by practically all tolled motorway since early 90's

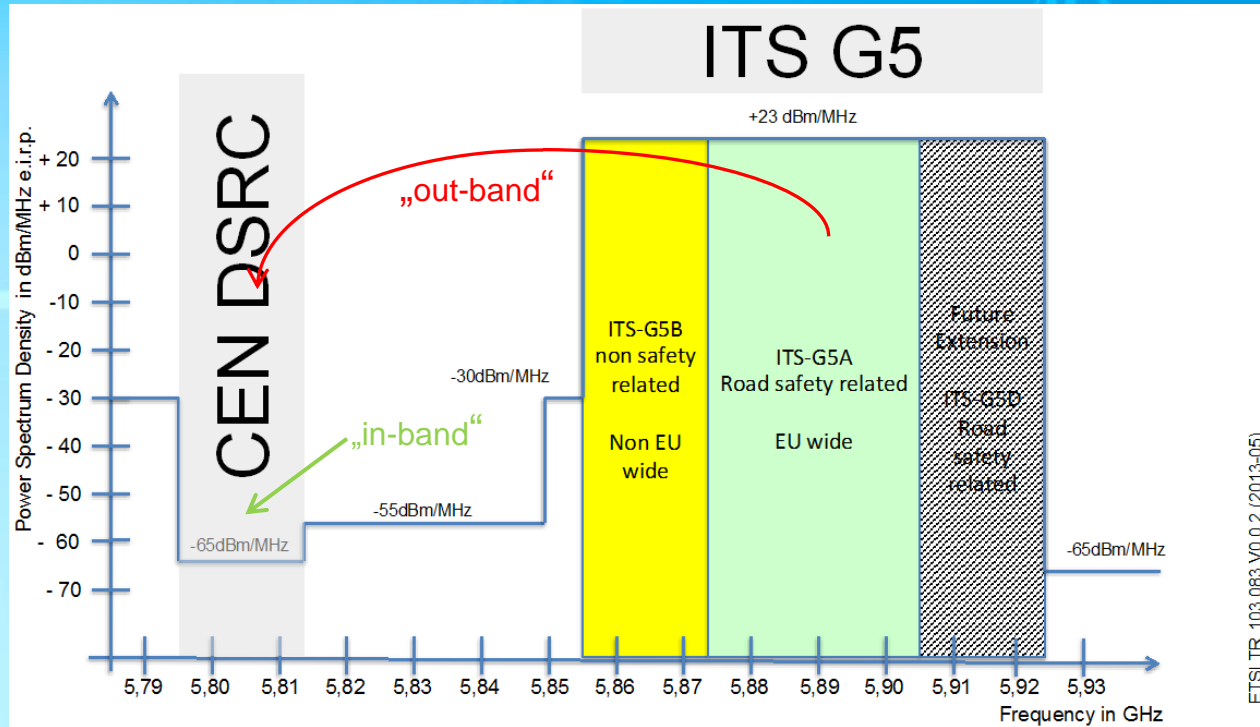
ASECAP network

- 19.473 ETC Lanes
- 25.000.000 of ETC subscribers
- 25 billions Euros of revenues

CEN DSRC

- Not only for tolling itself, but for enforcement of tolling, parking applications etc.
- In 2004, EC has issued the Directive on EETS (European Electronic Toll Service)
- 5.8 GHz DSRC as one of the 3 communication technologies to be used

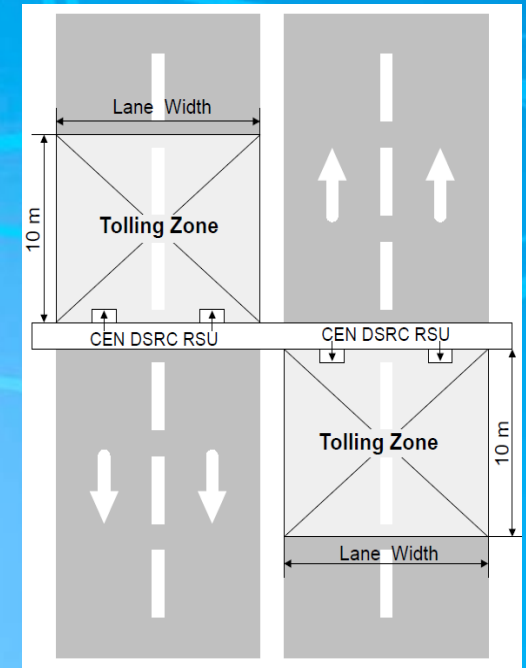
The challenge



- The effect is that tolling transactions are influenced

The challenge

- ETSI has carried out tests at Ispra, Italy in June 2011
- Interference from ITS-G5 to DSRC
- The relevance area is the DSRC tolling zone
- Specific measures have to be taken to allow a co-existence



**Approximation of Tolling
Zone geometry**

Standardization activities

- Normative standard EN 302 571 V1.2.0 (2013-05) references to ETSI TS 102 792 V1.1.1 (2012-10)
- Harmonized standards will be adopted into national regulation
- TS 102 792 will be legally binding

Mitigation techniques

- 1. + 2. fixed limitations on ITS-G5
- 3. knowledge about the position of tolling zones
- 4. RSU disseminates information on tolling zone
- 5. + 6. DSRC detection on board the vehicle
- 7. Software based approaches
- 8. Other mitigation technologies

Mitigation techniques

- 1.) Always use an limited output power level less or equal 10 dBm on ITS-G5
- 2.) Always use a lower repetition rate on G5
 - no effort in roadside infrastructure
 - permanent limitation of ITS-G5 performance

Mitigation techniques

- 3.) Map based information about the tolling zones to power down ITS-G5
 - effort for „tolling-zone map“
 - enforcement stations have to be published
- 4.) RSUs disseminate information about tolling zone via a CAM (or DENM)
 - effort in roadside infrastructure hardware

Mitigation techniques

- 5.) DSRC detector within the ITS-G5 OBU to power down V-ITS-S
- 6.) ITS-G5 equipped vehicles transmit CAM (DENM) when detecting CEN-DSRC
 - DSRC detector needed in vehicle

Mitigation techniques

- 7.) Software based approach → Use a combination of low duty cycle and reduced power level based on the number of ITS-S in the vicinity.
- no effort in roadside infrastructure
 - reduced C-ITS performance when many ITS-S in the vicinity.
- 8.) The EN 302 571 defines:
- „Mitigation techniques providing an equivalent or better level of protection shall be allowed.”

Conclusion

- Strong need for DSRC / G5 co-existence
- Some of the proposed mitigation technologies are not implemented / tested yet
- Analyse the transfer of standards into national law
- Don't leave it totally to the market
- ASECAP invites automotive industry to investigate in this issue jointly

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